APENDICES
TO THE REPORT OF THE ECONOMIC IMPACT ASSESSMENT
TRIBUNAL ON THE CLEAN ELECTRICITY REGULATIONS
MAY 1, 2024

APPENDIX 1
TO THE REPORT OF THE ECONOMIC IMPACT ASSESSMENT
TRIBUNAL ON THE CLEAN ELECTRICITY REGULATIONS
MAY 1, 2024

LIST OF ENTITIES WHO RECEIVED AN INVITATION
TO MAKE A SUBMISSION TO THE TRIBUNAL

Invitation Letters Sent

1. Alliance Grain Traders
2. Algonquin Power Co./Liberty Power
3. Allied Energy
4. Baytex Energy
5. BUNGE
6. Cameco Corporation
7. Canadian Natural Resources
8. Canadian Oilseed Processor's Association
9. Canadian Power Holdings
10. Canola Council of Canada
11. Canadian Association of Petroleum Producers
12. Cardinal Energy
13. Cargill
14. Cenovus Energy
15. Co-op Refinery
16. Crescent Point Energy
17. Electricity Canada
18. Elemental Energy
19. Enbridge Pipelines Inc.
20. EVRAZ
21. First Nations Natural Resource Centre of Exellence
22. First Nations Power Authority
23. Federation of Sovereign Indigenous Nations
24. Kingston Midstream
25. K+S Potash
26. Loblaws
27. Longhorn Oil and Gas
28. Louis Dreyfus Company
29. Meadow Lake Mechanical Pulp Inc.
30. Metis Nation - Saskatchewan
31. Norsask Forest Products
32. Nutrien
33. Orano Canada
34. PKM Cochin
35. Plains Midstream
36. Potentia Renewables Inc.
37. Prairie Mines and Royalty ULC
38. Praxair-Linde
39. Renewable Energy Systems
40. Saskatchewan Association of Rural Municipalities
41. SaskEnergy
42. SaskPower

43. Saturn Oil and Gas
44. Saturn Power
45. SGO Mining Inc.
46. Saskatchewan Industrial Energy Consumers Association
47. Saskatchewan Mining Association
48. Steel Reef Infrastructure
49. Strathcona Resources
50. Saskatchewan Urban Municipalities Association
51. TC Energy
52. Teine Energy Ltd.
53. Terra Grain Fuels
54. The Explorers and Producers Association of Canada
55. The Mosaic Company
56. Tolko
57. Tundra Oil and Gas
58. Vermilion Energy
59. Weyerheuser
60. Whitecap Resources Inc.
61. Yara Belle Plaine Inc.

Federal Invitation Letters Sent – December 28, 2023

1. The Right Honourable Justin Trudeau, P.C., M.P.
2. The Honourable Jonathan Wilkinson, P.C., M.P.
3. The Honourable Lawrence MacAulay, P.C., M.P.
4. The Honourable Steven Guilbeault, P.C., M.P.

APPENDIX 2
TO THE REPORT OF THE ECONOMIC IMPACT ASSESSMENT TRIBUNAL ON THE CLEAN ELECTRICITY REGULATIONS
MAY 1, 2024

COPY OF SUBMISSIONS

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1391 Timberlake Manor Parkway
Chesterfield, MO 63017
314.292.2000 | bunge.com

February 23, 2024

Mr. Ken Dueck
Executive Director
Economic Impact Assessment Tribunal Secretariat
1100 - 1874 Scarth Street
Regina, SK S4P 4B3

Re: Request for Input on Proposed Clean Electricity Regulations

Dear Mr. Dueck,

On behalf of Bunge, I would like to thank the Saskatchewan Economic Impact Assessment Tribunal for the letter of January 31st requesting our input into the Government of Canada's proposed Clean Electricity Regulations (CER).

At this stage, Bunge has not completed a comprehensive analysis of the proposed regulations' potential impacts for our company. Given that the specifics of these regulations have yet to be finalized, understanding their full implications on our operations remains challenging. However, it is critical to note that electricity costs represent a key input cost for our business. Consequently, any changes in legislation affecting electricity pricing or supply in Canada could have ramifications for our operational efficiency and competitiveness.

We are actively monitoring the developments surrounding the proposed clean electricity regulations and we remain steadfast in our commitment to sustainability and economic competitiveness. At Bunge, we strive to integrate sustainable practices within our operations, ensuring we contribute positively to decarbonization objectives without compromising our ability to compete effectively in the global market.

Bunge holds membership in both the Canola Council of Canada (CCC) and the Canadian Oilseed Processors Association (COPA). These organizations have been engaging directly with Environment and Climate Change Canada on the design of the CER, and we have asked CCC and COPA to share their analysis with the Tribunal on behalf of Bunge and our sector.

Thank you again for the opportunity to provide feedback. We appreciate the Economic Impact Assessment Tribunal's consideration of our sector's views.

Sincerely,

Jared W. Hill
Vice President
Government and Industry Affairs, North America
Bunge

Cameco

February 13, 2024

CAMECO CORPORATION
Corporate Office
2121 – 11th Street West
Saskatoon, Saskatchewan
Canada S7M 1J3

Tel 306.956.6200
Fax 306.956.6201
www.cameco.com

Mr. Ken Dueck
Executive Director
Economic Impact Assessment Tribunal of Saskatchewan
1100 – 1874 Scarth Street
Regina, SK S4P 4B3

VIA EMAIL: ken.dueck3@gov.sk.ca

Dear Mr. Dueck:

This correspondence is in reply to the letter Cameco received from Mr. Michael Milani, Chair of the Economic Impact Assessment Tribunal of Saskatchewan, requesting input from stakeholders to help inform the Tribunal's assessment of the potential impact of the proposed *Clean Electricity Regulations* (CER) on provincial businesses and economic sectors. Please consider this to be Cameco's submission in this regard.

Cameco does not report the precise cost for or consumption of electricity at our facilities and operations in Saskatchewan as an individual line item. Instead, utility costs are included in the "Contracted Services" category in our public reporting (along with items such as camp costs, air charters, mining and maintenance contractors, and security and ground freight, among others). In 2023, Contracted Services comprised 28% of Cameco's total uranium operating costs. As such, this category, and the utility costs that are a portion of it, are certainly considerable factors in our company's financial management.

Mr. Milani's letter notes that the Government of Saskatchewan has estimated the CER would result in a 107% increase in utility rates by 2035 and poses the question of how this scenario, if it were to occur, might impact our operations in the province. The simple answer is that it would increase our operating costs and the cost of production from our uranium mines and mills in northern Saskatchewan, thereby lessening our competitiveness relative to our counterparts producing in other jurisdictions that would not encounter these sorts of cost factors or price escalations.

In addition, it is important to note that, for a remote, northern producer like Cameco, electrical alternatives under the CER are simply not feasible. Wind and solar, for example, are not viable options for wide-scale deployment in northern Saskatchewan due to extreme weather conditions, low infrastructure availability and intermittency of generation, given that most facility and home heating throughout the region is also electrical.

However, we cannot quantify or estimate a more precise impact because it is difficult to predict our future energy usage or sources of electricity at these operations. In 2022, Cameco completed our Low Carbon Transition Plan, which includes a target to reduce our combined company-wide Scope 1 and Scope 2 greenhouse gas emissions by 30% from 2015 levels by 2030. To support this goal, over 160 decarbonization project ideas were solicited from across the company, including several focused on energy efficiency measures and reduced electricity consumption. We continue to evaluate these proposals and are already moving to implement a number we believe to be the most feasible, achievable and impactful – in some cases with the support of federal and provincial funding programs.

Cameco is also extremely supportive of the provincial government's and SaskPower's efforts to pursue the potential addition of carbon-free nuclear energy to Saskatchewan's electricity grid through the deployment of small modular reactor (SMR) technology – ideally with the support of the federal government.

The prospective deployment of SMRs in Saskatchewan is not anticipated until the early 2030s. However, should it come to pass, the substantial increase in zero-emission power production this would facilitate, and assuming the corresponding reduction in fossil fuel-based electricity generation is achieved, would help to dampen the effect the CER might otherwise have on the province's economy and business climate. In fact, we would strongly encourage the Province to expand its plans for nuclear energy deployment as arguably the most realistic and achievable solution to fully decarbonize Saskatchewan's power grid, thereby completely shielding provincial residents and industries from the potential impact of the CER while ensuring a continued supply of stable, reliable electricity a growing economy will need. Again, the Government of Canada's partnership and commitment may be required to make this a reality.

In collaboration with the Saskatchewan Mining Association and Mining Association of Canada, Cameco has also encouraged the federal government to work with the provinces to ensure adequate time and financial support are available to implement the transition to a net-zero electricity grid. One of the biggest challenges in that regard is the federal impact assessment process that many of these activities might trigger and the delays this process introduces that will push them beyond 2035 for implementation. For further detail, I am including the comments and recommendations Cameco submitted to Environment and Climate Change Canada in November 2023 as part of the department's consultation on the proposed CER.

Please feel free to contact me by e-mail at liam_mooney@cameco.com or phone at 306-956-6685 should you have any further questions regarding the information we have provided. Thank you for your consideration.

Sincerely,

R. Liam Mooney
Vice-President, Safety, Health, Environment, Quality & Regulatory Relations

Enclosure

Cameco

November 1, 2023

CAMECO CORPORATION
Corporate Office
2121 – 11th Street West
Saskatoon, Saskatchewan
Canada S7M 1J3

Tel 306.956.6200
Fax 306.956.6201
www.cameco.com

John Moffet
Assistant Deputy Minister
Environmental Protection Branch
Environment and Climate Change Canada
351, boul. Saint-Joseph
Gatineau, QC K1A 0H3

Mark Cauchi
Director General
Energy and Transportation
Environment and Climate Change Canada
351, boul. Saint-Joseph
Gatineau, QC K1A 0H3

via email: john.moffet@ec.gc.ca
mark.cauchi@ec.gc.ca

Re: Cameco Corporation Comments on the Proposed Clean Electricity Regulations

Dear Mr. Moffet and Mr. Cauchi,

Cameco Corporation (Cameco) has prepared the below comments and recommendations on the proposed *Clean Electricity Regulations* (CER) published in *Canada Gazette*, Part I, Volume 157, Number 33 on August 19, 2023.

Cameco is one of the largest global providers of uranium fuel needed to energize a clean air world. We have controlling ownership of the world's largest high-grade uranium reserves and mining operations in northern Saskatchewan, western United States, Kazakhstan, and Australia. We are also a leading supplier of uranium refining, conversion, and fuel manufacturing services, with facilities located in Ontario. Utilities around the world rely on Cameco's nuclear fuel products to generate carbon-free and affordable baseload nuclear power that is critical to support a net-zero economy by 2050.

Since Cameco was formed in 1988, we have worked in close collaboration with northern Saskatchewan communities, the majority of which are Indigenous. We believe that Indigenous Peoples and local communities should benefit from resource development on or near their communities or traditional lands, through employment, training, business opportunities, community investment, and environmental stewardship. We regularly work with more than 17 Indigenous communities around our Saskatchewan mining operations and are supported by our community liaisons in seven communities. In that regard, CER and any electricity cost increases would have a higher impact on northern and Indigenous communities and Cameco's northern Saskatchewan operations compared to other regions within Canada.

Cameco is committed to using local suppliers wherever we operate. This commitment is codified in our Procurement of Goods and Services Policy and exemplified by our spending in northern Saskatchewan, where we have procured more than $357 million in services from local companies over the past three years. In 2022, 80% of all service spend at Cameoc's northern Saskatchewan mine sites was with northern local businesses. In addition, we have an outstanding record of employment success with Indigenous individuals comprising 50% of the workforce at our operations in northern Saskatchewan at the end of 2022.

Cameco supports the climate action of Environment and Climate Change Canada (ECCC) in alignment with the Paris Agreement, including the reduction of greenhouse gases (GHGs) from electricity generation. We appreciate that nuclear is being supported as one of the non-emitting technologies that will ensure Canada's electrical system is clean, reliable, and secure on our journey to a net-zero economy. We believe that nuclear energy has a significant role to play to enable a critical emissions reductions and electricity grid-cleaning in Canada and around the world. However, to successfully provide nuclear fuel to our global customer base we must continue to operate in a cost-competitive manner. With this consideration in mind, Cameco offers the following feedback on the CER as currently written.

1. Grid Reliability and Stability

With the ever-increasing electrical demand along with a push towards a cleaner and decarbonized grid in Saskatchewan, the province will require significant upgrades to electrical transmission and distribution infrastructure. Currently, Saskatchewan's grid relies primarily on emitting sources, such as coal and natural gas, due to a lack of renewable and non-emitting opportunities. While Small Modular Reactor (SMR) projects are advancing, the 2035 timeline (as outlined in the CER) may not be adequate for full implementation.

- *Cameco recommends the provincial and federal governments align to accelerate the regulatory approval timeframe for SMR projects and address the gap between technology advancement and critical climate mitigation efforts.*

Adding electrical supply due to increasing demand, while decarbonizing the grid in a short period of time puts stability at risk. With Cameco's mining operations in northern Saskatchewan operating 24/7, and our commitment to providing uranium in the world market to meet the increasing demand, power outages can put production at risk. Natural gas is an "on-demand" source of power with capabilities to ramp up or down instantaneously and can be stored indefinitely. CER limits the operation of natural gas plants to 450 hours per year, which is not economically feasible or practical, and greater flexibility is necessary.

Further, solar and wind power are not workable alternatives for wide-scale deployment in northern Saskatchewan due to extreme weather conditions and low infrastructure availability.

Saskatchewan's power system needs time to refine its approach to Carbon Capture and Storage (CCS) and to explore greenfield nuclear energy projects through required regulatory review and public engagement processes.

- *Cameco believes that CER must be technology agnostic. Natural gas power generation should not be excluded from use, especially in the regions like Saskatchewan, where other renewable and non-emitting options are currently limited by resource suitability and technology readiness.*

With Canada moving towards cleaning the electrical grid and industrial electrification, supply chain and resource issues also need to be addressed. Globally, there is a shortage of parts that will be used in technology deployed for clean power generation, with many items on back-order for a prolonged period. Additionally, as climate change is a global issue with many countries moving towards implementing clean technologies, supply chain delays are likely to become worse.

- *Cameco recommends the federal government take likely supply chain delays and resource shortage issues into consideration as CER implementation and target timelines are adjusted to reflect these realities.*

2. Electricity Affordability

To comply with CER, the majority of electricity cost increases will be passed on to consumers and customers. Energy costs represent approximately one-third of total expenditures for companies in the mining sector.

Additionally, as mentioned earlier, Saskatchewan has a large Indigenous population, especially in the north where the cost of electricity per month is already high due to a lack of natural gas infrastructure, and electricity is used for home heating. Any additional costs would have a higher impact on our northern and Indigenous Communities and Cameco's northern Saskatchewan operations compared to other regions within Canada.

According to the Regulatory Impact Analysis Statement (RIAS), the total incremental costs in response to the CER will amount to $36.6 billion between 2024 and 2035, escalating to $76 billion by 2050. Saskatchewan costs are estimated to be $11.2 billion over the next 27 years in the RIAS. However, the Government of Saskatchewan's independent estimates stand at $46 billion for compliance with CER between 2023-2035.[1] This is a significant difference, considering Saskatchewan's population of 1.2 million people and one of the largest grids per capita in North America with lowest density of customers (2.6 customers per line). Without significant federal funding support and reasonable implementation timelines, compliance with the CER in Saskatchewan will result in an untenable increase in electricity expenses for residents and industry.

- *Cameco recommends the federal government make adjustments to the CER to allow flexibility for jurisdictions to meet the clean grid requirements sustainably and in a balanced manner that mitigates the risk of spiking electricity costs.*

[1] https://www.saskatchewan.ca/-/media/news-release-backgrounders/2023/may/sk-power-presentation.pdf

3. Inclusion of Nuclear Energy in Green Bond Framework

With Canada's commitment to reducing GHG emissions, we firmly believe that the federal government's Green Bond Framework must be expanded to include nuclear energy as an eligible green expenditure. With traditional nuclear and SMRs playing a pivotal role in decarbonizing electrical grids in Canada, equitable financial support mechanisms are required for successful deployment of these critical non-emitting technologies.

In recent years, nuclear has gained support globally with the European Union Commission for Financial Services, Financial Stability and Capital Markets Union taking steps to include nuclear energy as a transitional activity eligible for sustainable finance products[2]. Given that, in 2019, nuclear energy was the second largest source of clean electricity in this country,[3] Canada must follow in the footsteps of these organizations.

- *Cameco recommends the federal government amend the Green Bond Framework to provide equitable financial support for nuclear technology, as it will contribute to investment in innovative and sustainable solutions that foster a clean electricity grid.*

In closing, Cameco appreciates the opportunity to provide feedback on the CER and recognition of nuclear energy as a critical non-emitting technology to address the climate change concerns in Canada. We support action that reduces GHGs as well as Canada's plan for a net-zero economy. However, we urge the federal government to adjust the CER in alignment to address the concerns outlined above.

We welcome future dialogue with the federal government for any clarification or discussion on these comments and recommendations.

Sincerely,

R. Liam Mooney
Vice President
Safety, Health, Environment, Quality & Regulatory Relations
Cameco Corporation

[2] https://www.world-nuclear-news.org/Articles/A-guide-to-the-EUs-green-taxonomy-and-nuclears-pla

[3] https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-canada.html

Canadian Power Holdings Inc.
801-322 11th Ave. SW
Calgary, Alberta, T2R 0C5

Mar. 1, 2024

Attn. Mr. Ken Dueck, Executive Director
Economic Impact Assessment Tribunal
Secretariat Office,
1100 – 1874 Scarth St.
Regina, Saskatchewan, S4P 4B3

Dear Mr. Dueck,

Re: Request for input to the Economic Impact Assessment Tribunal (the "Tribunal")

Thank you for the opportunity to provide input to the Tribunal regarding potential impacts to the Saskatchewan economy associated with the proposed Clean Energy Regulations (August 2023) (the "**CER**"). The provision of reliable, cost-effective, environmentally sensitive electricity is a cornerstone of any modern economy. Canadian Power Holdings Inc. ("**Canadian Power**" or "**CPHI**") is pleased to share its perspective as a long-time electricity provider in Saskatchewan.

Canadian Power owns the Meridian Cogeneration Power Station ("**Meridian**") at Lloydminster, Saskatchewan. It provides 220 MW of electrical supply to the province's electricity grid under a power purchase agreement ("**PPA**") with Crown-owned utility Saskatchewan Power Corporation ("**SaskPower**"). As a long-standing power generator in Saskatchewan, CPHI has a unique perspective on the relevant implications of the CER on electricity and investment decisions in the power sector. This submission *will consider*:

- an introduction to Meridian operation within the SaskPower electricity system,
- a review of basic elements of the Saskatchewan Output Based Price System ("**OBPS**") and the CER on Meridian and its offtake customers, SaskPower and Cenovus Energy Inc. ("**Cenovus**"),
- operations at Meridian under the CER and Sask OBPS, and
- investment considerations.

The submission *does not consider* wider carbon emission impacts or climate change, as this is outside Canadian Power's expertise. Canadian Power has taken steps to drive the energy transition in Canada, having acquired its first renewable power generation assets in 2021 at the Shinish and Pennask wind farms in the Okanagan region of BC, and together with its partner TransAlta, transitioned its carbon-intense asset (the Sheerness Generating Station in Alberta) from coal to natural gas fuel, resulting in a near 50% reduction in carbon intensity. Canadian Power recognizes that politicians and their voting populations will need to consider difficult and conflicting issues in the energy transition discussion. Canadian Power hopes its input will help inform this larger discussion around policy implications or options and assist the Saskatchewan Economic Impact Assessment Tribunal in making such policy decisions.

Executive Summary

The reliability of the electrical grid is built on predictable, dependable firm generating assets like Meridian. Canadian Power believes its Meridian facility can provide inexpensive, reliable, and environmentally responsible energy to its customers well beyond the 2035 implementation date for the CER emission intensity target which would enable more effective decarbonization solutions to be developed over the longer term.

It is likely that Canadian Power's highly efficient, reliable, and cost-effective Meridian cogeneration plant will be unable to continue to operate past 2035 under the proposed CER regulation. At a minimum, this would result in significant impacts for Canadian Power's thermal and electrical customers, Cenovus and SaskPower, by increasing operating costs at Cenovus' heavy oil upgrader operations and resulting in higher electricity costs for Saskatchewan residents and businesses.

Detailed Discussion

I. Meridian Cogeneration Plant

Meridian was the first significant scale investor-owned asset serving the SaskPower grid. It began commercial operation as a cogeneration facility in 1999, providing 220 MW of electrical capacity to the grid, and thermal energy (steam) to the Lloydminster Upgrader owned originally by Husky and now owned by Cenovus.

Cogeneration is one of the most efficient methods of supplying "firm" electricity generally in use today. Cogeneration, and the related combined cycle gas generation, is reasonably expected to produce electricity at a "heat rate" in the range of 6 – 8 GJ (gigajoules) of natural gas per MWh of generation (more on this concept in the economic discussion section which follows). "Firm" means the power can predictably and reliably be provided to the electrical grid. This means that it can be expected that the plant will ***run at all times***, except periods where maintenance activities are required, or where its generation is not needed to meet the grid load.

Meridian has been a very reliable asset for SaskPower. The facility's availability over the past three years has ranged from 95% to almost 99%, depending on the routine maintenance work schedule for the plant. Exempting these planned maintenance periods, the plant has been available from 99.3% to 99.9% of the hours where electricity planners at SaskPower – and the residents and businesses of Saskatchewan – were counting on it to supply electricity. In 2021, the best of these 3 years, the plant was 98.7% available overall and 99.9% available outside of planned outage periods. High reliability and predictable operation, such as that provided by Meridian and other similar assets in SaskPower's system, allows grid operators and planners to provide stable electrical supply to residents and businesses in Saskatchewan. Firm power generation backs-up other generating facilities when they experience an unexpected issue, as well as renewable generating assets that stop generating due to loss of input sources such as sun or wind, uniquely ensuring that electrical demand in the province is met at all times.

Meridian is nearing 25 years of operation. Plants employing this technology can generally be expected to operate efficiently and reliably for 50 years or longer with strategic maintenance or capital replacements throughout their life. Meridian is capable of providing efficient, reliable, affordable electricity to the Saskatchewan economy for another 25 years.

II. Saskatchewan Output Based Pricing System (OBPS) and Clean Energy Regulation (CER)

The table below shows the anticipated requirements imposed under current Saskatchewan OBPS regulations (including the newly passed *Management and Reduction of Greenhouse Gases (Standards and Compliance) Regulations, 2023*) and implications of the CER. Meridian became operational in 1999 and its operation is likely to be governed by these standards. The table shows the applicable carbon tax under the Sask OBPS, expected baseline emission level for applicability of carbon tax under the Sask OBPS, and whether the Meridian plant can be deemed to operate as currently configured under the CER. The rules apply to both Cogeneration and Combined Cycle Gas Turbine (CCGT) assets. The table below also shows how the rules apply to Meridian (1999) or to a newer hypothetical plant with a commercial operation date of 2022 or 2024, for illustrative purposes.

	Plant COD	2023	2024	2025	2026	2027	2028	2029	2030	2031-2034	2035-2044
Carbon Tax under Sask OBPS ($ per tonne of CO_2e)	All	65	80	95	110	125	140	155	170	170	170
Baseline Emission Intensity Standard under Sask OBPS (T/MWh)	1999	.370	.370	.370	.370	.370	.370	.370	.370	.370	0
	2022	.370	.370	.370	.370	.370	.370	.370	.370	.370	0
	2024	.288	.247	.206	.164	.123	.820	.410	0	0	0
Operable under CER (Y/N)	1999	Y	Y	Y	Y	Y	Y	Y	Y	Y	N [1,2,3]
	2022	Y	Y	Y	Y	Y	Y	Y	Y	Y	To 2042
	2024	Y	Y	Y	Y	Y	Y	Y	Y	Y	To 2044

Note 1: Under the CER, generally all gas cogeneration and CCGT facilities are deemed to be required to shut down after 20 years of operation or in 2035, whichever is later, if they cannot meet the new emission intensity standard of 30 tonnes of CO_2 emissions/GWh by such date. As a result, Meridian would be required to cease operations in 2035, unless abatement technology limiting emissions to less than 30 T of CO_2 is in place in 2035. This level of abatement technology performance is not currently proven for typical CCGT or Cogen assets.

Note 2: There is an exception under the CER from meeting the 30 t/GWh performance standard for peaker simple cycle gas turbines allowing them to operate up to 450 hours per year and emit no more than 150 T per year. Presumably these will be subject to the "0" baseline emissions threshold and $170/T carbon tax under the Sask OBPS.

Note 3: Failure to comply with new emissions thresholds under the CER may result in exposure to criminal code prosecution.

As the proposed CER is made under Canadian Environmental Protection Act, 1999 ("**CEPA**"), Enforcement Officers would, when verifying compliance with the new emission standard, apply the Compliance and Enforcement Policy for CEPA. This Policy sets out the range of possible responses to alleged violations, including warnings, directions, environmental protection compliance orders, tickets, ministerial orders, injunctions, *criminal prosecution* and environmental protection alternative measures. Potential exposure to criminal prosecution is a substantive issue, unduly subjecting proactive operators seeking to preserve reliable electricity supply for customers using cutting edge technology, while aggressively moving forward with decarbonization, to risk of punitive treatment under the law.

III. Meridian under CER

Meridian has long been one of the most efficient, reliable baseload generators in Saskatchewan. It has been very well maintained by its operators, making a lifespan of 50 years very reasonable. Meridian and its off-taker partners Cenovus and SaskPower would most certainly entertain the prospect of utilizing it for its projected 50-year life. What may influence Meridian's future in 2035?

(i) Abatement and replacement technologies

There are potential paths to managing carbon emissions Meridian. These include:

- Carbon capture and utilization / sequestration
- Hydrogen fueled generation

Canadian Power sees solid potential for carbon capture to be applied in Saskatchewan, given the very geological features which already provide Saskatchewan with a wealth of energy resources. These features are also leading candidates for the storage of carbon dioxide.

This discussion would be incomplete without acknowledging the contributions made by SaskPower via the Boundary Dam Carbon Capture and Sequestration Project. This is truly a world-leading technology implementation piloted by SaskPower in Saskatchewan. Much of the subsequent work worldwide in carbon capture implementation builds on the initial experience of SaskPower at this facility.

One of the enablers of the technology at Boundary Dam, and similar "conventional boiler" combustion facilities, is the concentration of carbon dioxide in the combustion gases. CO2 is highly concentrated in combustion products in a conventional boiler. As such, extraction rates for this technology can exceed 85 or 90%. The CO2 in combined cycle gas generation facilities is much more diluted in their combustion gas streams, at 50% the concentration of conventional boilers. This means that carbon capture vessels and process equipment for cogeneration facilities like Meridian need to be many times larger in size (and therefore more expensive to build and operate). **Most importantly, none of the carbon capture technologies available today are capable of operating at the intensity standards mandated in the CER on cogeneration or CCGT assets**.

Use of Hydrogen, instead of gas, in gas turbines is a promising approach. This is CO2 emission free, however, the challenge is producing and transporting the Hydrogen economically in large quantities. The best forecasts today suggest that Hydrogen will cost many times more than natural gas for the indefinite future.

(ii) Cost of abatement

N*o present abatement technology meets the CER intensity requirements for cogen or CCGT.* If the requisite technological development were to emerge over the next decade, the capital cost of a carbon capture facility would easily exceed the costs of the generation facility itself. Operating costs for the abatement technology facility would also be expected to rival that of the generating asset itself. As a result, it is likely that the additional costs per MWh of electricity generated, including abatement technology, if it comes to exist, would rival the cost of the base power generation. This cost would also flow through to the power cost.

(iii) Penalties Under the CER

With the prospect of potential criminal sanctions for exceedances, it would be difficult to deploy this technology. With any cutting-edge development, it is likely that "teething pains" will occur. While there is some modest allowance for this in the CER, the potential of criminal sanctions if the technology does not meet the standard seems severe.

(iv) Considerations for Meridian's Thermal Off-taker

Cogeneration is one of the most efficient ways to meet thermal energy needs of certain industrial production sites and a means of providing extremely economical electricity for grid customers. For cogeneration plants such as Meridian, in particular, any uncertainty surrounding carbon capture effectiveness would preclude investment. The thermal customer requires absolute certainty of supply. Unlike a stand-alone power station, a cogen plant could not just "shut off" to work out technology problems without grievously impacting its cogeneration thermal partner. Inability to operate new technology with certainty when threatened by the sanctions contemplated in the CER could result in the premature retirement of an important power supplier to the electricity grid.

IV. Basic economics of electricity from natural gas at facilities like Meridian

Meridian normally supplies in the range of 200 – 225 MW of electricity to SaskPower throughout the year, as well as thermal energy in the range of 150 – 250 tonnes per hour of steam to Cenovus. For SaskPower, this reliable, firm baseload generation is economical, reliable, and efficient. For Cenovus, Meridian is the primary (and most economical) means of providing steam to its upgrading process.

For context, indicative costs for the 24/7 power which Meridia may be able to provide are as follows:

1) Fuel cost

- Cogeneration or combined cycle power is likely to have a "heat rate" of 6 - 8 gigajoules per megawatt-hour (GJ/MWh). For this illustration, assume "7".
- With a market price of natural gas of $3/GJ, the cost of fuel to make a MWh of electricity is:

- $7 GJ/MWh * $3/GJ = $21/MWh

2) Operating and Maintenance costs

- These can vary more widely depending on the technology deployed. Generally, a newer, more efficient asset requires less fuel to operate but requires higher technology materials with a higher purchase price and maintenance cost. For this discussion, $10/MWh is assumed.

3) Capital recovery

- A contemporary combined cycle or cogen plant in the 300 MW range may cost in the range of $2 million/MW. At $2 million x 300, this is a total capital cost of $600 million.
- Amortizing the $600M over 25 years in a straight-line, results in capital costs of $9–10/MWh, depending on operating assumptions. Profit would be required on the capital investment but is not considered here.
- Further, the $40 (being the sum of the Fuel Cost, Operating and Maintenance Costs and Capital Recovery) with 2% annual escalation through 2035, could increase this by 20%, to ~ $50.

2024 pre-carbon tax cost of electricity for a “firm” cogen / combined cycle facility…. = 21 + 10 + 9 = $40/MWh, rising to **$50 by 2035**

This simplified analysis does not consider profit, tax, nor financing considerations.

4) Carbon costs

- With the baseline emission threshold of 0.37 T of carbon emission per MWh there would be no appreciable carbon cost for assets of Meridian’s age until 2035.
- The present CER does not anticipate allowing assets of Meridian’s age to continue to operate and pay carbon taxes, although assets with a similar efficiency may be allowed to continue.
- For these assets, assuming an emission threshold of “0” T by 2035 and carbon emissions at $170/T under the Sask OBPS, this carbon charge to a gas-fired facility would become:
    - $170/T * 0.37 T/MWh emissions = $63/MWh
- This increases the cost of electricity, after application of the carbon tax, to
    - $50 + $69/MWh (carbon tax) = $109

2035 projected post-carbon tax cost of electricity with all emissions taxed = **$109/MWh,**

An efficient cogen or CCGT facility may reasonably be expected to provide electricity at a cost of ~ $40/MWh in 2024, rising to $50 in 2035. With the application of a carbon tax, even if such a facility is permitted to operate, it would be subjected to significant additional costs.

> The cost of a MWh of electricity from cogeneration with carbon charges applied post-2035 could reasonably be assumed to be in the range of $109 vs. $50 without, ***if operation is even permitted***.
>
> The cost of adding carbon capture to this facility would be expected to result in total costs which rival these costs.

V. Investment Context

Power generation infrastructure investment is always challenging. Assets are generally large and costly, with useful lives ranging to several decades. The environmental attributes and footprint of electricity infrastructure assets also demand thoughtful engagement by regulators. For these reasons, investors require a high level of stability in the market and regulatory certainty. This stability is provided differently in each province, given that electricity systems fall under the jurisdiction of the provinces, but it has generally always been present in Canada.

Saskatchewan provides this stability for power generators via long term contracts with the crown utility, SaskPower. In recent years, SaskPower has invited participation through procurement processes to supply thermal and renewable power and has accommodated behind-the-fence generation at sites where unique opportunities exist for Saskatchewan business investors. On the regulatory side, CPHI has found regulators in Saskatchewan to be highly responsive and engaged. Regulatory discussions are carried out in a timely fashion. Input provided to the discussion by impacted businesses is always respectfully considered.

While such support of investment is firmly in place in Saskatchewan, there will very likely be no meaningful investment to either abate carbon emissions via carbon capture technology, nor to provide affordable firm generation, given the CER as presently constituted. As society contemplates an energy transition, a solution that does not offer affordable, reliable firm generation supply will falter. The inability to make the necessary investments in both new and existing assets will impair the reliability of the system. It is difficult to imagine what magnitude of investment in unproven and/or emerging technology will supplant the need for existing technology firm generation well into the future (and past 2035), but Canadian Power believes that highly efficient cogeneration which supports Saskatchewan industries and provides affordable, reliable electricity, is necessary. Leveraging well-maintained, efficient existing firm power assets will avoid the need for massive capital injections for new assets which may also face premature retirement and help keep power costs down for the people of Saskatchewan as more comprehensive decarbonization solutions are implemented. Cogen, coupled with strategic peaking thermal assets, will provide much needed balance and stability to the expanding renewable generation asset base in Saskatchewan.

VI. Closing Discussion

Under the proposed CER regulation, one of Saskatchewan's most efficient, reliable, and low-cost electricity suppliers faces the risk of premature closure in 2035. This will compel both its thermal and electrical customers, Cenovus and SaskPower, to consider very costly alternatives which would result in higher electricity costs for the people of Saskatchewan and may materially impact operating costs of Cenovus' Lloydminster Upgrader.

There are technologies that will enable a lower carbon grid in the future. These may require a larger make-over of the electrical system in Saskatchewan – as it will in other jurisdictions in Canada, and around the globe, where achieving net zero by 2050 is the more commonly accepted objective. In short, more time is needed to develop and implement some of the alternatives discussed. In the meantime, our modern electrical grids are built on predictable, dependable firm generating assets like Meridian. Canadian Power believes its Meridian facility can provide inexpensive, reliable, and environmentally responsible energy to its customers well beyond the 2035 implementation date for the CER's emission intensity standard and enable more effective decarbonization solutions to be developed over the longer term.

Yours Sincerely

Derek Goodmanson
CEO, Canadian Power Holdings Inc.

CAPP CANADA'S OIL & NATURAL GAS PRODUCERS

February 23, 2024

Ken Dueck, Executive Director
Economic Impact Assessment Tribunal Secretariat
Saskatchewan Ministry of Justice and Attorney General
Secretariat Office
1100 – 1874 Scarth Street, Regina, SK S4P 4B3
Via email ken.dueck3@gov.sk.ca

Dear Mr. Dueck:

Re: Tribunal's Assessment of the Proposed Clean Electricity Regulations

The Canadian Association of Petroleum Producers (CAPP) is a constructive and solutions-oriented partner in addressing the triple challenge of reducing emissions while assuring domestic and western alliance energy security and affordability for Canadians. CAPP appreciates the Tribunal's invitation to provide feedback on the potential impact of the Clean Electricity Regulations (CER) on the oil and natural gas sector in Saskatchewan.

CAPP members are concerned that the proposed CER, will be challenging to industry competitiveness and decarbonization opportunities in Saskatchewan.

Electricity costs comprise a large portion of oil and natural gas producers' operating costs. In 2022, well and flowline total operating expenditures in Saskatchewan were $2,511 million[1] and in the same year, SaskPower realized $440 million in revenues from its Oilfield customer class[2]. This indicates that electricity costs represent approximately 1/5th of oil and natural gas producer operating expenses. Given electricity comprises a significant portion of operating expenditures, electricity prices have significant impact on competitiveness. Rising electricity costs and the expected increase in the volatility of electricity prices amplifies industry's concerns.

Widely accepted principles in the public utility ratemaking process include *bill stability* where ratemaking provides stability and predictability of the rates with a minimum of changes adverse to utility customers. The proposed CER will hinder SaskPower's ability to adhere to this principle. Moreover, the regulations will impose higher costs which will be borne by all SaskPower customers and disproportionally more so by the Oilfield customer class since SaskPower's Revenue-to-Revenue Requirement Ratio (RR/R) is greater than one for this customer class.

[1] CAPP Statistical Handbook Petroleum Industry Statistics | The Statistical Handbook | CAPP 2022
[2] SaskPower Annual Report 2022-23 Current Reports (saskpower.com)

Electrification is an important option for the oil and gas sector to decarbonize. The ability to do this depends on the ability to access grid electricity. Saskatchewan faces significant challenges to build clean, grid-based electricity lines to oil and natural gas fields. The proposed CER will make it even more difficult for utilities to justify building electrical generation and distribution infrastructure to enable access and supply for our industry, particularly given the remote locations of industry's operations which are often far removed from populated areas in the province. Natural gas supports affordable and reliable electricity generation. Standards need to ensure natural gas can continue to be a key contributor to the electricity system – it is the only lower emission baseload source that can be built on the timeline of the CER.

Our facilities operate 24/7 and need fully reliable / guaranteed power. New baseload sources like nuclear or hydro will take years to complete; however, natural gas provides a stable baseload at a competitive cost while reducing emissions for the Saskatchewan grid. Actions that have the potential to impact the reliability and affordability of electricity will have a direct adverse effect on our operations.

Furthermore, the proposed CER will limit the breadth of options for SaskPower to include Indigenous communities in Saskatchewan's power sector as it did with the Flying Dust First Nation and the First Nation Power Authority. The Kopahawakenum Flare to Power Facility is an example of partnering with Indigenous People in Saskatchewan's power sector and achieving sustainable economic development, community benefits, and reducing greenhouse gas emissions.

Finally, the proposed regulations will create commensurately higher costs to comply with the federal regulations and will create a competitive disadvantage for industries operating in the province. The oil and natural gas industry competes on a global market and the risk of significant increases to the cost of doing business in Saskatchewan may compromise the province's competitiveness.

We invite you to review CAPP's submission to the Minister of Environment and Climate Change Canada, submitted on October 30, 2023, attached herein. Should you have any questions, please contact sian.pascoe@capp.ca

Sincerely,

Original signed by

Richard Wong
Vice President, Regulatory and Operations

DM#424725

CAPP CANADA'S OIL & NATURAL GAS PRODUCERS

October 30, 2023

The Honourable Steven Guilbeault
Minister of Environment and Climate Change Canada
200, boul. Sacré-Coeur
Gatineau, Quebec
K1A 0H3
(via email: steven.guilbeault5@ec.gc.ca)

Dear Minister Guilbeault:

Re: Canada Gazette, Part I, August 10, 2023, Clean Electricity Regulations

The Canadian Association of Petroleum Producers (CAPP) is committed to environmental leadership and working to be a constructive and solution-oriented partner in addressing the triple challenge of emission reduction, energy security and affordability. It is in this spirit that we provide our comments regarding the federal Government's proposed Clean Electricity Regulation (CER), as announced on August 10, 2023.

Upon review of the CER, CAPP members are concerned that the proposed regulations as drafted will be challenging to industry competitiveness as well as decarbonization opportunities.

With respect to competitiveness, the overall average price of electricity is expected to rise, but more concerning is the expected increase in the volatility of electricity prices, which is a key input to the oil and gas industry's operations.

Of greater concern is the potential reduction in electrification options in the oil and natural gas fields. A key element of industry's ability to decarbonize—depends on the ability to access grid electricity. We note that electrical utilities in British Columbia, Alberta and Saskatchewan are already concerned about the cost to build clean, grid-based electricity lines to oil and natural gas fields. The CER, as proposed, will make it even more difficult for utilities to justify building electrical generation and distribution infrastructure to enable access and supply for our industry. As we have conveyed to federal government officials in the past, many of CAPP member operations exist in remote areas, across several provinces, including the offshore. As a result, they rely heavily on natural gas, propane and diesel to do work and support production operations.

Our sector relies on reliable energy sources to support production operations to ensure they can operate in a consistent and stable manner 24 hours a day, 7 days a week, delivering the energy that both Canada and the world needs.

As new projects are designed, industry evaluates all forms of power for facilities, notwithstanding the limitations and constraints on electricity systems to fulfill the needs of these projects.

Electrification is one pathway to lower emissions intensity of the products we produce if electricity is available and is a cost competitive alternative to other energy sources. If electricity is not a dependable and cost competitive option, operations will not be able to consider it. New projects aside, our sector remains a significant consumer of electricity and any actions that have the potential to impact the reliability and affordability of electricity will have a direct adverse effect on the sectors' current operations.

Over and above the potential capacity increase from the oil and gas sector, energy demand is increasing in all provinces. Even in Budget 2023, it was noted that supply capacity would have to more than double by 2050 to ensure adequate supply.[1]

Electricity has the potential to reduce emissions from many parts of the economy, however this will not be achieved if the safety, reliability and affordability of the electricity system is compromised, even without considerations for necessary growth and expansion. Regional considerations must be afforded, and CAPP believes that a one-size fits all approach will not be suitable to address the widely varying ability to access clean electricity systems across the country.

CAPP's comments will further highlight some of the potential impacted areas to upstream oil and natural gas sector but overall, our industry is looking for the following outcomes:

- Regulations must ensure the safety, reliability, and affordability of electricity.
- Regulations must maintain the important role of natural gas to be a reliable part of the electricity mix.
- Regulations should recognize the contribution and provide flexibility for co-generation operations within the oil and natural gas sector.

Currently, the federal Output Based Pricing System (OBPS) has a standard to reduce the intensity of the electricity used in the country and that tool should be the first step in the process on what should be done and enable operations to use the system to its fullest capacity. Tools such as the OBPS have just been implemented and it is unclear why current policies under the Greenhouse Gas Pollution Pricing Act (GGPPA) are deemed insufficient. Additional policy layers are likely to create unnecessary complexity thus diminishing the effectiveness of the

[1] Government of Canada (Budget 2023) A Made-in-Canada Plan: Strong Middle Class, Affordable Economy, Healthy Future

existing policy tools. Investors that are vital to funding our industry's decarbonization efforts need greater clarity, not greater complexity.

CAPP suggests that the federal government of Canada work with provincial jurisdictions on what timing is feasible for reducing emissions from electricity systems to 2035 and beyond to ensure they can deliver the electricity Canadians need and on an achievable timeframe. In some cases, 2035 is too ambitious for achieving a Net Zero grid. Regional considerations and recognition that provinces are starting at different points needs to be factored into the regulatory framework.

CAPP urges the government to reconsider its approach with respect to co-generation energy production. Co-generation units utilize what would otherwise be wasted heat in the generation of electricity to meaningfully contribute to the thermal needs at oil and natural gas operations. Inclusion of this technology in the CER is not consistent with the other generation options. In Alberta, Co-generation plants are physically tied to the production operation systems and as such cannot be cycled up and down. Inclusion of co-generation within the CER will result in unintended consequences and these operations should be excluded.

We urge the Government of Canada to carefully consider the complexities surrounding all emission reduction policies. There is a fundamental risk that if not considered and addressed, the impacts of a proposed clean electricity regulation could affect progress on decarbonization in our sector and impact our ability to deliver energy to those that need it within Canada and beyond. Should you have any questions related to the details contained herein, please contact the undersigned or patrick.mcdonald@capp.ca.

Regards,

Lisa Baiton, MBA, ICD.D
President & CEO

Cc: Jean-François Tremblay, Deputy Minister, Environment and Climate Change Canada
John Moffet, Assistant Deputy Minister, Environment and Climate Change Canada
Karishma Boroowa, Director, Electricity and Combustion Division

Attachment 1

As ECCC reviews the CER in context of Canada's oil and natural gas sector, CAPP believes the following critical elements need to be considered:

1 – Safety, Reliability and Affordability:

- **Our sector is a major consumer of electricity that is required to run operations.**
- **Reliable and affordable electricity continues to be needed for existing operations and will be necessary if electrification is to be leveraged as one of the key decarbonization pathways of the industry.**

2 – Natural Gas:

- **Our sector is a supplier of natural gas to the electricity system.**
- **Natural gas has been responsible for a significant reduction in emissions from electricity and provides reliable baseload electricity.**

3- Co-Generation:

- **Our sector is an electricity generator through co-generation units.**
- **Co-generation units have been efficiently and effectively improving the performance of the Alberta grid and enabling effective resource recovery.**

Safety, Reliability and Affordability

Oil and gas plant operations rely heavily on a stable source of energy and power outages most often lead to plant outages and operational upsets. Significant portions of oil and natural gas operations can be electrified if favorable conditions exist. Specifically, if electricity is available and a cost competitive alternative to other energy sources. New technologies are constantly being incorporated and will continue to be able to leverage the electricity grid when there is access and affordable and reliable supply to support low emitting resource production.

CAPP notes that the electricity supply across Canada needs to have sufficient baseload to assist in the decarbonization of many sectors including oil and natural gas. Sacrificing the reliability of the system and increasing cost will slow down industrial operations' ability to reduce emissions through electrification. Technology to support a lower emission baseload power is evolving and will take time to implement depending on what resources provinces have developed and the changes that need to be made to lower emissions of the system. Many provinces are in the process of phasing out coal and this additional timeline constraint will have implications on past investment decisions.

CAPP believes there is potential in using electrification as a key decarbonization pillar for the conventional oil and natural gas sector. Electrification can significantly reduce stationary combustion emissions form processes which are fueled by fuels like natural gas, propane, and diesel. However, electrification of these sources can only be realized if there is access to affordable and reliable electricity. In absence of that, operators must look to other means of energizing their operations. An analysis by S&P Global highlighted that a potential 17% increase in supply for electricity across Canada by 2040 would be necessary to fulfill electrification needs of the conventional oil and natural operations sector.[2]

This increase in potential demand is significant when considering the needs for transportation and other sectors across the economy. As noted in Budget 2023 the demand for electricity is expected to increase broadly across Canada and electricity systems need time to adapt. According to Alberta's Electricity System Operator, even with aggressive renewable growth that has dominated the Alberta supply mix in the past few years there is still expected to be a gap in the ability to meet generation requirements on the forecasted timeline.[3]

In consideration for potential mitigation outcomes to avoid unintended consequences, the key consideration is that sufficient time is provided to provinces to manage regional circumstances to decarbonize unique to their jurisdictions.

Natural Gas

Natural gas supports affordable and reliable electricity generation within Canada. Currently, the performance standard included in CER (30 tonnes CO2 emissions/GWh) is over a 90% reduction in the current Federal Standard of 370 tonnes CO2e per GWh for gaseous fuels.

It is unclear if the proposed standard is achievable for new gas fired plants coupled with carbon capture and sequestration. Existing plants would not be able to achieve the standard and would require significant retrofitting or would have to be used in limited capacity. Given natural gas generation in AB and SK are 72%[4] and 38.6%[5] respectively, the implications of minimizing natural gas' role in the future of electricity generation in these provinces will be immense. Natural gas has been an effective means globally for reduction.

On average, coal-to-gas switching reduces emissions by 50% when producing electricity and 33% when providing heat.[6] We recognize that maximizing the climate benefits of switching to natural gas requires best practices to reduce methane leaks, and Canada has a proven track record in this regard.

As written, the draft regulations risk electricity generation with natural gas not being a viable means to produce energy after 2035.

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[2] Reference S&P Global Electrification 2023

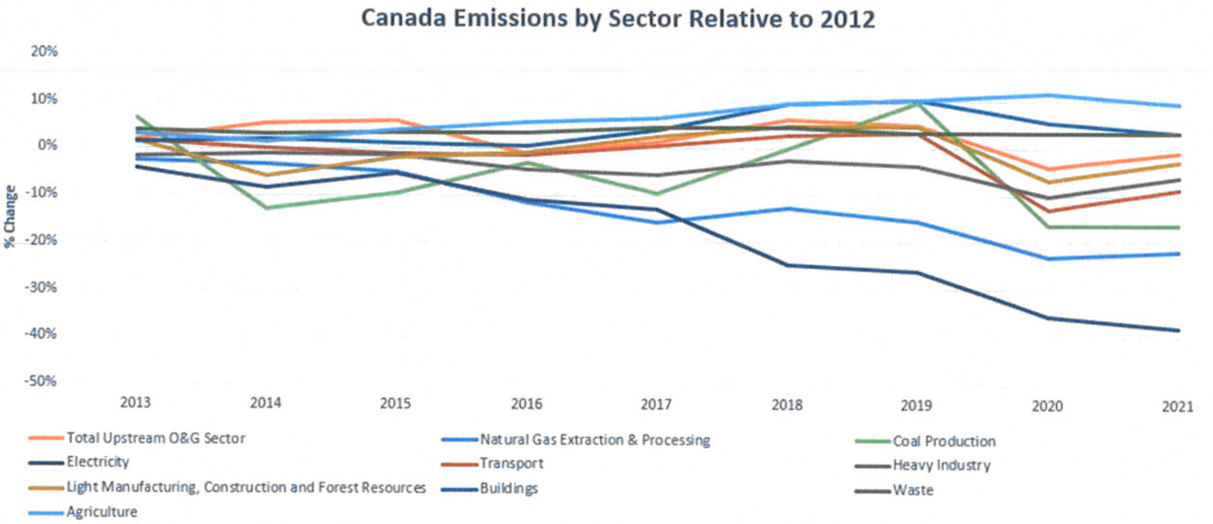
[3] Alberta Electric Systems Operator (September 28, 2023) *Technical Briefing on Proposed Clean Electricity Regulations* https://www.aeso.ca/assets/AESO-CER-Technical-Briefing_FINAL.pdf Approved AESO Slides

[4] Alberta Electric Systems Operator (September 28, 2023) *Technical Briefing on Proposed Clean Electricity Regulations* https://www.aeso.ca/assets/AESO-CER-Technical-Briefing_FINAL.pdf Approved AESO Slides

[5] SK Power (n.d.) *System Map* https://www.saskpower.com/Our-Power-Future/Our-Electricity/Electrical-System/System-Map System Map (saskpower.com)

[6] World Energy Outlook (2019) *The Role of Gas in Today's Energy Transitions* https://www.iea.org/reports/the-role-of-gas-in-todays-energy-transitions IEA. The Role of Gas in Today's Energy Transitions

Natural gas implementation has been one of the largest sources of emission reductions in the electricity system in the last ten years and this needs to continue. See Figure 1.



Any proposed regulations need to enable the continued use of natural gas for effective baseload power delivery and include flexibility for regions that depend and currently use natural gas as the primary source of electricity generation baseload.

Potential mitigation outcomes to avoid unintended consequences, requires that the regulation recognizes the contribution natural gas has and will continue to deliver to the electricity system in Canada and beyond. Any standards must ensure natural gas can be a key contributor to the electricity system.

Co-Generation

Oil sands operations and gas processing plants have brought on a significant amount of electricity generation in past years. This has helped to lower the intensity of Alberta's electricity grid over the past decade. More co-generation units are expected to come online between now and 2035. Co-generation is unique as it allows for increased efficiency for multiple uses to leverage the thermal heat produced from the operation.

Co-generation has been a key technology to reduce the emission intensity of electricity grids and support thermal needs at facilities. As the co-generation unit is in many cases fully integrated into the system it will affect how these projects operate if they are to adjust the electricity they generate.

If the units are not used, there will have to be other systems built to meet the thermal heat demands if the co-generation units are not able to meet the performance standard requirements and are shut in.

Approximately 28% of the Alberta generation maximum capacity is delivered through co-generation[7]. Many of the Heat Recovery Steam Generator units associated with co-generation in oil and natural gas operations are closely tied with operations that need the thermal heat to generate steam to recover the resource through SAGD or CSS or to run process units. As these systems are fully integrated with the production operation system overall, there is an added level of complexity that must be considered.

Currently any export of electricity from co-generation results in inclusion in the CER. This position is significantly more stringent than the 25 MW of generation capacity threshold than is proposed for other sources within the CER. This unreasonable limit must be addressed as the inclusion of co-generation systems that are physically integrated with industrial operations will result in unintended consequences to the operation and the ability to support the electricity grid with low emission intensity.

Given the complex nature of co-generation and the direct integration into the production systems, these units should be excluded from the scope of the CER.

If the units are not excluded, flexibility needs to be added back into the regulatory framework system or else significant generation capacity may be lost, past investments in co-generation will be negatively impacted, and additional infrastructure will have to be built to meet thermal needs of the production operations.

[7] Alberta Electric Systems Operator (April 14, 2023) *Current Supply/Demand Asset List*
https://www.aeso.ca/market/market-and-system-reporting/data-requests/current-supply-demand-asset-list/
Current Supply/Demand Asset List » AESO

BY EMAIL (ECD-DEC@ec.gc.ca)

November 2, 2023

Environment and Climate Change Canada
351 Saint-Joseph Boulevard
Gatineau, Quebec
K1A0H3

Re: Draft *Clean Electricity Regulations*

To whom it may concern:

Cenovus Energy appreciates the opportunity to provide input to Environment and Climate Change Canada's (ECCC) consultation on the draft Clean Electricity Regulations (CER). Cenovus is one of Canada's largest oil and natural gas companies. We are an integrated energy company with upstream operations including oil sands projects in northern Alberta, thermal and conventional crude oil and natural gas projects across Western Canada, crude oil production offshore Newfoundland and Labrador, and natural gas and liquids production offshore China and Indonesia. Our downstream business includes upgrading and refining operations in Canada and the United States and commercial fuel operations across Canada. We are focused on managing our assets in a safe, innovative, and cost-efficient manner, integrating sustainability considerations into our business plans. Our commitment to environmental, social and governance performance is key to how we work and approach sustainability at Cenovus.

Cenovus has made public commitments to reduce absolute scope 1 and 2 GHG emissions by 35 percent from 2019 levels by year-end 2035 and has announced our long-term ambition of reaching net zero by 2050. To address our scope 2 emissions, we are an active participant in the renewable power purchase agreement (PPA) market and intend to continue to add to our portfolio of renewable PPAs. In addition to our broader GHG goals, we have a new milestone that will see us reduce absolute methane emissions in our upstream operations by 80% by year-end 2028, using a 2019 baseline. Since our oil sands operations have only trace amounts of methane emissions, this work is primarily focused on our conventional oil and natural gas production. Turning to our oil sands emissions reduction initiatives, Cenovus is a founding member of the Pathways Alliance, which consists of Canada's six largest oil sands producers who represent about 95 percent of Canada's oil sands production. The members are Cenovus Energy, Canadian Natural Resources, ConocoPhillips Canada, Imperial, MEG Energy, and Suncor Energy. We are committed to holding each other accountable to take the actions needed to get to net zero emissions from operations by 2050 and to working closely with governments to ensure necessary policy supports are in place.

Cenovus recognizes the need to address emissions associated with electricity generation to move the Canadian economy toward net-zero emissions by 2050. However, we have significant concerns related to the draft regulations' ability to manage critical issues affecting Canadian power markets. As currently drafted, we believe that the Clean Electricity Regulations do not adhere to Government's stated core principles; maximizing GHG reductions from the grid; maintaining electricity affordability for Canadians and businesses; and maintaining grid reliability to support a strong economy. Instead, the outcome will be lower emissions, but at the significant expense of both affordability and reliability for a sizable portion of the economy and Canadian residents. The impacts will be particularly acute for Alberta and Saskatchewan electricity users.

Cenovus has meaningful power market exposure, and many of our decarbonization projects will serve to increase our reliance on electricity imported from provincial grids. However, by driving up costs and the prospect of power shortages, the CER risks significantly eroding the viability of our decarbonization projects. More broadly speaking, we are concerned that the CER will be a major impediment to investments in the power grid due to a lack of operational flexibility, an excessively stringent performance standard with minimal compliance flexibility, if any at all, and the potential for protracted legal challenges. We also have concerns about risks to the broader economy and the likelihood that vulnerable Canadians will be hard-hit by soaring power bills at a time when household budgets are already stretched to their limits.

Cenovus is aligned with and endorses the comments provided in the respective submissions of the Business Council of Alberta and the Pathways Alliance, and echo their concerns regarding affordability, reliability, and impacts to decarbonization initiatives. We would also like to offer additional comments and recommendations for further consideration.

Primary Concerns

Higher power costs and the potential for reduced reliability add further challenges to the economics of decarbonization

It is widely expected that the overhaul of Alberta and Saskatchewan's power grids required by the draft Clean Electricity Regulations will be costly; the short timelines imposed by the regulations also threaten to undermine grid reliability. While there are conflicting estimates of the true cost of reaching a near-zero grid by 2035, meeting the requirements laid out in the draft regulations will cost ratepayers billions. Meanwhile, an increasing reliance on intermittent power sources like wind and solar leaves markets vulnerable to shortages without adequate backup generation when weather conditions change. The draft regulations only allow peaking plants to operate unabated roughly five percent of the hours in a given year; we are concerned this will not be sufficient to ensure that intermittent power sources are supported with backup supply. It is also highly unlikely new peaking capacity will be added to the grid to support additional intermittent renewables due to the economic impact of the restrictions imposed by the CER.

The prospect of rising power costs will put additional pressure on the already-challenging economics of large-scale decarbonization projects, many of which are heavily dependent on electricity or electrification. Projects that are heavily power-dependent, such as carbon capture and storage (CCS), would also face the potential for reduced effectiveness in the event that outages prevented them from operating. Prior to the release of the draft regulations, electricity was expected to account for approximately half of the carbon capture operating costs for projects we intend to build at our oil sands facilities. EDC Associates, a prominent Alberta power market consulting firm, projects the regulations will push electricity prices up materially from our base case assumptions, resulting in a 40 percent increase in CCS operating costs. Meanwhile, the decarbonization of conventional oil and gas extraction is almost wholly dependent on electrification. It is important that major pieces of government policy, like the Clean Electricity Regulations, do not disincentivize the energy sector's decarbonization initiatives by driving up costs.

This commentary extends more broadly to other sectors and households. Without measures to stabilize power prices, the draft Clean Electricity Regulations risk disincentivizing the widespread adoption of electricity-based technologies, such as electric vehicles and heat pumps.

Broader economic implications

A reliable, cost-effective power grid is the lynchpin of all modern economies. It is imperative that any proposed regulations affecting the functioning of electricity markets be thoroughly vetted. To illustrate, recall the energy price crisis experienced by Ontario in the late 2000s and 2010s. The price spikes experienced by the province, which have been directly attributed to provincial government policy, had a devastating effect on the economy. It has been estimated that high electricity prices were responsible for approximately 75,000 job losses in the Ontario manufacturing sector. The productive capacity of its manufacturing industries was badly hit during the 2008 recession, but unlike other regions, Ontario did not enjoy a robust recovery.[1]

The current design of each provincial power grid is largely a function of geography. As drafted, the CER will have dramatic implications for the competitive landscape within Canada. While many regions will be unaffected, provinces that do not enjoy existing large-scale nuclear or hydroelectric capacity will face escalated costs, in some cases multiples of current expenses. Indeed, Government has stated that a $170/tonne carbon price on 100 percent of electrical generation emissions is insufficient to prompt significant decarbonization of provincial power grids. In making this claim, Government is indirectly stating it intends to transfer even greater costs onto citizens in provinces that have no choice but to pay.

Cenovus is highly supportive of the Federal Government's focus on society's most vulnerable populations. However, we are concerned that the draft regulations threaten to exacerbate energy poverty at a time when a cost-of-living crisis is already hitting the poorest Canadians particularly hard. Energy poverty is currently estimated to afflict between six and 19 percent of Canadian households[2]; those struggling to heat and cool their homes and power their appliances face multiple challenges such as sacrificing essentials like food and medication to keep the lights on, increased incidence of respiratory illness in young children, poor mental health outcomes, and significant discomfort from living in under- or overheated homes.[3] New Brunswick and Saskatchewan already face above-average energy poverty rates[4] and will now bear a disproportionate share of the costs associated with the Clean Electricity Regulations. In a resource-rich country, it should be Government's top priority to ensure households are not afflicted by energy poverty, yet the draft regulations are liable to exacerbate the issue.

We have provided a series of recommendations below that we feel will ameliorate some of the issues that have arisen as a result of the draft regulations.

Recommendations

1. Refer the question of constitutionality of the regulations to the Supreme Court of Canada prior to implementation

We are aware the Government's view is the proposed regulations are within Federal jurisdiction. However, the recent Supreme Court of Canada ruling regarding the Impact Assessment Act has called this stance into question.[5,6] In its decision, both the Court's majority and the dissent agreed that greenhouse gas emissions from intra-provincial projects do not automatically result in a project having effects within federal jurisdiction. The decision explicitly reiterated that the matter of national concern recognized in the *References re GGPPA* did not extend to enabling the federal government to comprehensively regulate GHG emissions. In the same ruling on carbon pricing, the Court cautioned that the Government of Canada does not have the right to regulate specific industries.

Policy uncertainty has been a major impediment to the deployment of decarbonization projects in Canada for several years. The questions regarding the constitutionality of the Clean Electricity Regulations will inevitably result in further

[1] https://www.theglobeandmail.com/news/national/high-electrical-costs-have-driven-thousands-of-manufacturing-jobs-from-ontario-report/article36610740/
[2] https://www.sciencedirect.com/science/article/abs/pii/S2214629621003303
[3] https://energypoverty.ca/
[4] https://energypoverty.ca/backgrounder.pdf
[5] https://www.osler.com/en/resources/regulation
[6] https://www.blakes.com/insights/bulletins/2023/scc-rules-federal-impact-assessment-act-s-designat

court challenges. Rather than prolonging uncertainty and effectively freezing investment decisions, Government should proactively ensure the proposed regulations are legal. This would allow generators more time to design and build facilities required to adhere to the regulations. The 2035 timeline is very ambitious; Government must ensure the policy landscape is settled as soon as possible to avoid a disorderly transition featuring suboptimal grid design, high prices, and significant reliability issues.

2. Extend the timeline for compliance with the Clean Electricity Regulations

Cenovus accepts that mass electrification of the economy is crucial to reaching Canada's GHG reduction commitments, and that power supplying the economy must be as low emitting as possible given tested technology. However, Government has not provided an adequate explanation for why decarbonization of the grid must occur 15 years earlier than the rest of the economy. A molecule of CO_2 emitted from an electricity generator fundamentally bares no difference to a molecule emitted from a combustion engine, residential or commercial furnace, manufacturing facility, or volcanic eruption. The effect on our climate is the same. Given that, as far as the atmosphere is concerned, CO_2 is a homogenous product, the decision to specifically regulate certain sectors is a fundamental deviation from the underlying principles forming the basis for carbon pricing.

The scale of the investments required to fully green Canada's grid is unprecedented; it cannot realistically be accomplished in 12 years. Rushing the timeline will serve to force suboptimal results and put enormous pressure on the cost to build technologies required to bring existing natural gas power generation facilities into compliance. At a time when there is a rush to build CCS capacity both domestically and internationally, there is already significant risk of labour and materials shortages that will cause delays and material cost inflation. This will amplify the risk of cost escalation to investments targeting the decarbonization of power generation, as well as our own CCS projects.

The fiscal supports for technologies such as carbon capture should be similarly afforded an extension. Halving the value of the yet-to-be finalized investment tax credit (ITC) for CCS after 2030 will sharply reduce supports at a time when the largest amounts of capital will need to be deployed. Since the announcement of a CCS ITC in Budget 2021, additional requirements have been rolled out that have layered substantial risk and ambiguity onto companies accessing funding. The draft legislation does not provide sufficient certainty on project eligibility, the scope of qualifying expenditures, or the provisions allowing for the disqualification or repayment of the ITC. Taking full advantage of the CCS investment tax credit by 2030 is not possible, and its overall effectiveness has been eroded by the addition of ambiguous requirements in the associated legislation.

3. Allow further compliance flexibility if installed carbon capture technology is unable to achieve the performance standard

The performance standard being contemplated by the draft regulations is extremely stringent, requiring generators to install CCS capacity capable of capturing 90-95 percent of emissions. While achieving 30 t/GWh may be feasible under ideal testing conditions, practical real-world circumstances make it improbable that operators will consistently achieve this optimal level. To date, there have been no instances where large-scale combined cycle gas turbine plants, equipped with CCS, have consistently captured 95 percent of emissions. Hypothetical technological advancements should not form the basis of government regulations.

The implication for generators is that even if best efforts are made, and the realized capture rate of installed CCS falls even slightly short, a generation facility and its newly installed CCS infrastructure immediately become stranded assets that are prohibited from operating. Without guaranteed compliance with federal regulations, companies will not invest in the required CCS technology, but seek to place capital in higher return ventures. This is particularly true in Alberta, where electrical generation is dominated by the private sector. Capital will flow to less risky jurisdictions, leaving generators unable to make investments required to comply with the CER. While the draft regulations allow for some flexibility in the initial years of operation, it is not sufficient to justify the deployment of hundreds of millions of dollars in investment capital. This lack of flexibility increases the risk of severe power shortages when the regulations come into effect.

We propose an adjustment to the capture rate requirement, setting it at levels achievable in real-world applications, which can be modified as CCS technology evolves. We recommend a performance standard reflective of top quartile Canadian performance. We also recommend affording generators who made good faith efforts to meet the performance standard in the regulated timeline the flexibility to pay a carbon tax in the event they are unable to meet the extremely stringent 30 t/GWh threshold in time. This will help support grid reliability by helping to partially de-risk their investments.

4. Provide clarity on the criteria for emergency circumstances and place the authority to declare emergencies with the Systems Operator

The draft regulations define emergency circumstances that warrant lifting the performance standard as circumstances that arise due to an "extraordinary, unforeseen, and irresistible" event. This language is nebulous and vague. To illustrate, in this submission Cenovus has cautioned Government that an overly onerous timeline and performance standard could result in power shortages and energy poverty. Should any of those come to fruition upon the regulations' implementation, they could scarcely be called "unforeseen," but would constitute an emergency by reasonable interpretation.

Additionally, the authority to declare emergencies must reside with the Systems Operator. To place it with the Minister of Environment and Climate Change Canada risks politicizing decision making. Systems Operators have the technical expertise and knowledge needed to evaluate the needs of grids under their direct management and are best suited to judge when climate targets must be put aside to ensure the safety and well-being of customers.

5. Exempt all cogeneration that is subject to industrial carbon pricing

Industrial facilities use cogeneration to fulfill both heat and power requirements for operations. Unlike traditional natural gas or nuclear facilities, the energy produced by cogeneration facilities is not lost as waste heat. Instead, it can be recovered for other applications such as generating process steam. Without cogeneration capacity at our operations, Cenovus would require additional natural gas boilers for steam generation.

Although the bulk of our cogeneration capacity will be unaffected, provided the final regulations maintain the exemption for non-exporting units, the proposed regulations undermine the flexibility granted by economy-wide programs for emitters to find the most innovative and cost-effective solutions to reduce emissions. We are concerned that the CER will force industrial facilities to prioritize less effective and/or economic projects at their cogeneration units rather than focusing on projects that would be more suitable for addressing sitewide emissions.

Given industrial facilities are already subject to carbon pricing under the Federal *Output Based Performance System*, or its provincial equivalents, layering on a stand-alone, highly stringent performance standard for cogeneration is needlessly restrictive and risks undermining the optimal economics of companies' emissions reduction plans. Barring an exemption for all cogeneration, we urge ECCC to delay the imposition of the 30 t/GWh performance standard on cogeneration facilities until 2050 if the cogen is part of a project that is covered by another emissions regulation.

6. Allow more flexibility for peaking plants to back up intermittent renewable power generation

For provinces without large-scale hydroelectric capacity, the most viable forms of renewable power generation come with intermittency challenges. Alberta has among the best solar and wind resources in Canada, but the wind does not always blow, and the sun does not always shine, and utility-scale power storage has yet to become a viable backstop for these generation assets despite ongoing efforts.

Peaking facilities that can quickly ramp up with weather changes are a critical compliment to wind and solar generation capacity. Allowing them to operate unabated only five percent of the year is not economic and will result in their retirement while providing no incentive for new peaking facilities to be built. This presents a significant reliability risk. We recommend further analysis of what is required to ensure critical capacity is available to support further deployment of intermittent renewables while maintaining reliability.

7. Provide generators with additional financial support to address the high upfront cost of decarbonization and new generation capacity that is proportionate to the required levels of grid decarbonization for each province

As noted previously, provincial grid development has largely been a function of geography. The regions most affected by the draft regulations are those not endowed with considerable hydroelectric capacity, nor the large water resource required to facilitate the safe and sustainable operation of large-scale nuclear power. While provinces like Alberta do enjoy abundant wind and solar resources, grids need reliable baseload power and the ability to back up intermittent renewables with peaking capacity.

Since the brunt of the costs of the regulations will fall to provinces without major hydroelectric or nuclear capacity, Government should offer fiscal support proportionate to the investments needed to support the objective of reaching a near-zero grid by 2035. This would help de-risk investments, ensure sufficient generation capacity to maintain grid reliability, and mitigate the possibility of widespread energy poverty. Regulatory approvals for required infrastructure should be similarly prioritized.

8. Revise the Regulatory Impact Assessment Statement to reflect reasonable assumptions

Electricity is one of the most fundamental inputs to any developed economy. For a country like Canada, where temperatures can range from extreme lows to extreme highs, a properly functioning power grid is critical to the safety of its population. The Regulatory Impact Assessment Statement (RIAS) associated with the draft regulations does not provide a fulsome account of the true cost of attaining Government's ambitious electricity targets by 2035. It simultaneously ascribes significant benefits to the policy, which are largely based on the speculative Social Cost of Carbon.

i. The RIAS must account for direct and indirect costs

A major omission from ECCC's accounting of the draft regulations' effects was the cost of intra-provincial transmission. This enormous cost was deemed "not incremental" in the RIAS because it is, "a key compliance strategy for coal-dependent provinces to meet the requirements of the *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity* Regulations as amended in 2018." However, Alberta, the province that will bear the largest share of the costs of the CER, is not coal-dependent. The omission of required transmission build within Alberta was not given any justification, yet modelling shows significant changes to the grid that would undoubtedly require additional transmission infrastructure.

The RIAS should also lay out anticipated "knock-on" effects of the regulations. As we saw in Ontario in the 2010's, power prices can be deeply detrimental to an economy. Given the RIAS calculates the indirect benefits of the CER on a *global* basis, an analysis of second-order costs to the domestic economy should not be omitted. Such analysis should include the risk of labour and materials shortages resulting from the requirement to expand CCS capacity in a compressed 12-year time horizon.

ii. The RIAS drastically understates projected demand growth

The assumption that power demand will grow by only 40 percent from 2024 to 2050 directly contradicts industry forecasts; systems operators; and even the Canadian Energy Regulator, who released its Canada Net Zero modelling in June 2023 and produced power demand forecasts to 2050. According to their analysis, in the Canada Net Zero scenario there would be an 81 percent increase in power demand between 2024 and 2050. Even under its Current Measures scenario, the Canadian Energy Regulator projected a 47 percent increase in power demand. Similarly, the Canadian Climate Institute has stated that in a net zero future, Canadian electricity demand will grow to be 1.6 to 2.1 times larger by 2050 compared to today.[7]

The Treasury Board of Canada Secretariat guidance on cost-benefit analysis states that regulators must consider whether the scenarios that are most likely to occur.[8] Given the widespread belief that power demand will climb substantially through 2050, the assumption by ECCC of a modest cumulative increase of just 40 percent warrants scrutiny. Although the RIAS does offer a brief overview of sensitivity analysis where demand rises by up to 2.5 times current levels, the results are not combined with results presented in the main cost-benefit analysis because they employ separate models, and the discussion of results was limited.

In scenarios where power demand growth exceeds 40 percent, it stands to reason that provinces not currently relying heavily on emitting power generation will also need to dramatically expand baseload capacity. The question of how those provinces can adapt to regulations in light of extremely long lead times to build further hydroelectric or nuclear capacity should be considered, particularly since ECCC has indicated it believes provinces like British Columbia and Manitoba will simultaneously be exporting significant quantities of power to neighboring provinces. Indeed, the three most populated provinces in Canada (Ontario, Quebec, and British Columbia) have already publicly announced they will need to source additional supply to meet projected demand levels and circumvent rolling blackouts to sustain economic growth.

iii. Costs to consumers have been underestimated

Particularly in the context of the cost-of-living crisis facing Canadians, it is imperative Government make a concerted effort to ensure the cost of the regulations is well-understood. The E3MC modelling work conducted to estimate the effect of the regulations on provincial electricity rates for residential, commercial, and industrial customers implied that power costs would scarcely be affected. However, as noted in the RIAS, the model is unable to take provincial rate setting and market structures into account, raising questions on the validity of the conclusions. Transmission and distribution cost effects were not modelled, even though they comprise a substantial component of an end user's electricity bill.

iv. Benefits associated with the draft regulations are speculative

Cost-benefit analysis is meant to provide an apples-to-apples comparison of the costs and benefits within a consistent scope. The RIAS ECCC has released, however, does not adhere to this principle. While the cost of the CER will be borne almost entirely by ratepayers in provinces not geographically endowed with large hydropower capacity, the purported benefits of the regulations are calculated globally. The costs are only modelled out to the year 2050, yet the Social Cost of Carbon (SCC) is based on modelling out to the year 2300.

SCC estimates are highly sensitive to chosen discount rates, the climate sensitivities to estimate the impact of increases in atmospheric GHG concentration, the timespan chosen to estimate cumulative damages, the assumptions chosen regarding the potential for adaptation to mitigate the cost of climate change, and the socioeconomic assumptions. They have been roundly criticized for being easily manipulated. The climate scenarios employed to calculate the SCC envisage enormous emissions of carbon dioxide from the burning of fossil fuels to 2300, and the damage curves associated with these scenarios are highly back-ended, with the majority of damages occurring after

[7] https://climateinstitute.ca/reports/big-switch/
[8] https://www.canada.ca/en/government/system/laws/developing-improving-federal-regulations/requirements-developing-managing-reviewing-regulations/guidelines-tools/cost-benefit-analysis-guide-regulatory-proposals.html

2100.[9]

The US EPA's SCC estimates were then run with below-market discount rates, inflating the perceived present value of future climate damages and emissions reductions[10]. ECCC has chosen to utilize an even lower discount rate of 2%, which is far below the cost of capital for utility providers. The use of below-market discount rates is particularly significant when cumulative damages are calculated over a 300-year period, which is well beyond the limits of informed speculation about future economic vulnerabilities and adaptive technologies.

Despite the speculative nature of the SCC, it comprises the majority of the benefits calculated in the CER RIAS. Of the total monetized benefits, over 85% are based on applying the SCC to expected emissions reductions. Meanwhile, the very real costs associated with the regulations are not fully captured due to the limited scope of the cost analysis. Given the wide-reaching effects the CER is expected to have, the RIAS should be revised to provide Canadians with a full accounting of the anticipated implications of the regulations.

Concluding Remarks

Cenovus appreciates the opportunity to provide feedback on the CER and agrees with the government's goal of decarbonizing the electricity sector. However, as drafted, the CER's requirements cannot be achieved within the proposed timeline without significantly impacting affordability and grid reliability – two fundamental principles Government committed to upholding. The success of any electricity policy regime will require Government to work closely with industry to design a framework that enables Canada to meet its substantial climate commitments while maintaining Canadians' standard of living. We look forward to the opportunity to collaborate with ECCC on the CER to achieve our decarbonization goals.

Sincerely,

Rhona DelFrari
Chief Sustainability Officer & Executive Vice-President Stakeholder Engagement
Cenovus Energy Inc.

CC: Steven Guilbeault, Minister - Environment and Climate Change Canada
Jonathan Wilkinson, Minister – Energy and Natural Resources Canada
Chrystia Freeland, Minister – Finance Canada

[9] https://www.epri.com/research/products/3002004657
[10] https://www.heritage.org/environment/report/discounting-climate-costs

CONFIDENTIAL

BY EMAIL (ken.dueck3@gov.sk.ca)

February 23, 2024

Economic Impact Assessment Tribunal
Secretariat Office
1100-1874 Scarth Street
Regina, Saskatchewan
S4P 4B3

Re: Impact of proposed *Clean Electricity Regulations*

Cenovus Energy appreciates the opportunity to comment on the expected impact of the proposed Clean Electricity Regulations (CER) on our Saskatchewan operations. Cenovus is one of Canada's largest oil and natural gas companies. We are an integrated energy company with upstream operations across Western Canada, crude oil production offshore Newfoundland and Labrador, and natural gas and liquids production offshore China and Indonesia. Our downstream business includes upgrading and refining operations in Canada and the United States, as well as ethanol production in Saskatchewan and Manitoba. We are focused on managing our assets in a safe, innovative, and cost-efficient manner, integrating sustainability considerations into our business plans. Our commitment to environmental, social, and governance performance is key to how we work and approach sustainability at Cenovus.

Cenovus recognizes the need to address emissions associated with electricity generation to move the Canadian economy toward net-zero emissions by 2050. However, we have significant concerns related to the draft regulations' ability to manage critical issues affecting Canadian power markets. As currently drafted, we believe that the Clean Electricity Regulations do not adhere to Government's stated core principles; maximizing GHG reductions from the grid; maintaining electricity affordability for Canadians and businesses; and maintaining grid reliability to support a strong economy. Instead, the outcome will be lower emissions, but at the significant expense of both affordability and reliability for a sizable portion of the economy and Canadian residents. The impacts will be particularly acute for Alberta and Saskatchewan electricity users.

Cenovus has meaningful power market exposure in Western Canada, and many of our proposed decarbonization projects will serve to increase our reliance on electricity imported from provincial grids. Rising power prices will result in a corresponding increase in our operating costs. In Saskatchewan specifically, we are concerned that the tight timelines required to adhere to the CER will risk power shortages and grid instability.

In response to the publication of the draft regulations, we provided Environment and Climate Change Canada (ECCC) with a series of recommendations that we feel will ameliorate some of the issues that have arisen because of the draft regulations. We have attached a copy of our comments and recommendations as an appendix to this submission for your reference.

Overview of Potential Impacts to Cenovus's Saskatchewan Operations

As a major industrial power user, Cenovus expects its Saskatchewan assets to be adversely affected by the CER as currently drafted. While ECCC recently released a discussion document contemplating significant revisions to the draft CER, we are unable to evaluate the likely impact until further specifics are made public. Even so, we do not currently have any reason to revise our expectations of markedly higher electricity costs, grid instability, and potential power shortages when the regulations come into force. One of our most pointed concerns relates to the significant operational safety risks to our employees and contractors that is introduced by power interruptions caused by grid instability.

Cenovus's major operations in Saskatchewan include:

- Our Lloydminster Thermal operations, which include 12 producing assets using steam-assisted gravity drainage technology. Together they produced over 100 Mbbl/day in 2023.
- Cold heavy oil production of roughly 10 Mbbl/day, with 500 bbl/day recovered via CO2 enhanced oil recovery.
- The Lloydminster Upgrader, which processes up to 81.5 Mbbl/day of heavy oil from our Saskatchewan-based thermal projects. The synthetic crude produced at this upgrader is used in the production of gasoline and diesel fuels in refineries in Canada and the U.S.
- Our Lloydminster Ethanol Plant, which relies on locally sourced grain to manufacture low-carbon ethanol.

Our total power costs in Saskatchewan are significant; we spent $195 million on electricity in 2023. Should the Government of Saskatchewan's estimate of a 107% increase in utility rates by 2035 come to fruition, we would expect to see a corresponding spike in our operational costs, resulting in an annual spend of roughly $400 million. Our analysis shows that, depending on the commodity price assumptions used, production in Saskatchewan will be negatively impacted as the economic lifespan of some of our thermal projects is reduced by high operational costs (under a 107% power cost escalation scenario).

Additionally, we are concerned about the potential impact of the CER (as drafted) on the Canadian Power owned (but Cenovus operated) Meridian Cogeneration Plant located at the Lloydminster Upgrader. Under the CER, all gas cogeneration and combined-cycle gas turbine (CCGT) facilities are required to shut down after 20 years of operation or in 2035, whichever is later, if they cannot meet the new emission intensity standard of 30 tonnes of CO_2 emissions/GWh by such date. As a result, Meridian would be required to cease operations in 2035, unless abatement technology limiting emissions to less than 30 T of CO_2 is in place in 2035. This level of abatement technology performance is not currently proven for typical CCGT or Cogen assets.

The Lloydminster Upgrader currently sources all its thermal energy (steam) needs from Meridian and premature shut-down of the cogeneration plant would cause major operational disruption and cost increases to the Upgrader above and beyond what we are already facing in terms of Saskatchewan OBPS compliance and additional layered federal costs. Additionally, as the upgrader cannot operate without steam, less efficient steam would have to be procured, resulting in increased emissions intensity, counter to the intent of CER or any other carbon mitigation policy.

The resulting cost escalation of electricity will occur in tandem with rising carbon pricing liabilities, as well as increasingly stringent methane regulations. The Federal Government is also proposing to add further costs to our industry via a cap-and-trade system exclusively targeting oil and gas producers. Taken together, these punitive policies will substantially erode the economics of our primary operations, as well as our decarbonization initiatives.

We appreciate the Government of Saskatchewan's work to address the significant concerns the CER has raised and will continue to support the province's efforts to protect their economy.

Should you require further information or details related to this submission, please don't hesitate to reach out to myself or my team; specifically, Travis Davies (Travis.Davies@Cenovus.com) who is responsible for the Saskatchewan government affairs portfolio for Cenovus.

Sincerely,

Devin Iversen
Vice President, Government Affairs

Clean Electricity Regulations:
Federal Policy Referred to Economic Impact Assessment Tribunal

David M. Brock, VP, Energy Security, CIC

CIC's Role in the Machinery of Government

- Provides strategic advice to the CIC Board
- Communicates strategic direction to the Crowns
- Ensures government priorities are achieved
- Assesses & ensures financial and business performance
- Provides direct services to the Crowns
- Leads priority projects and initiatives

SaskPower Powering our future® SGI SaskEnergy SaskTel SaskWater LGS Lotteries and Gaming Saskatchewan

CIC Mandate for Energy Security

CIC Mandate

Oversight
Supporting the CIC Board in its oversight of the Crown sector

Policy
Driving forward provincial policy goals

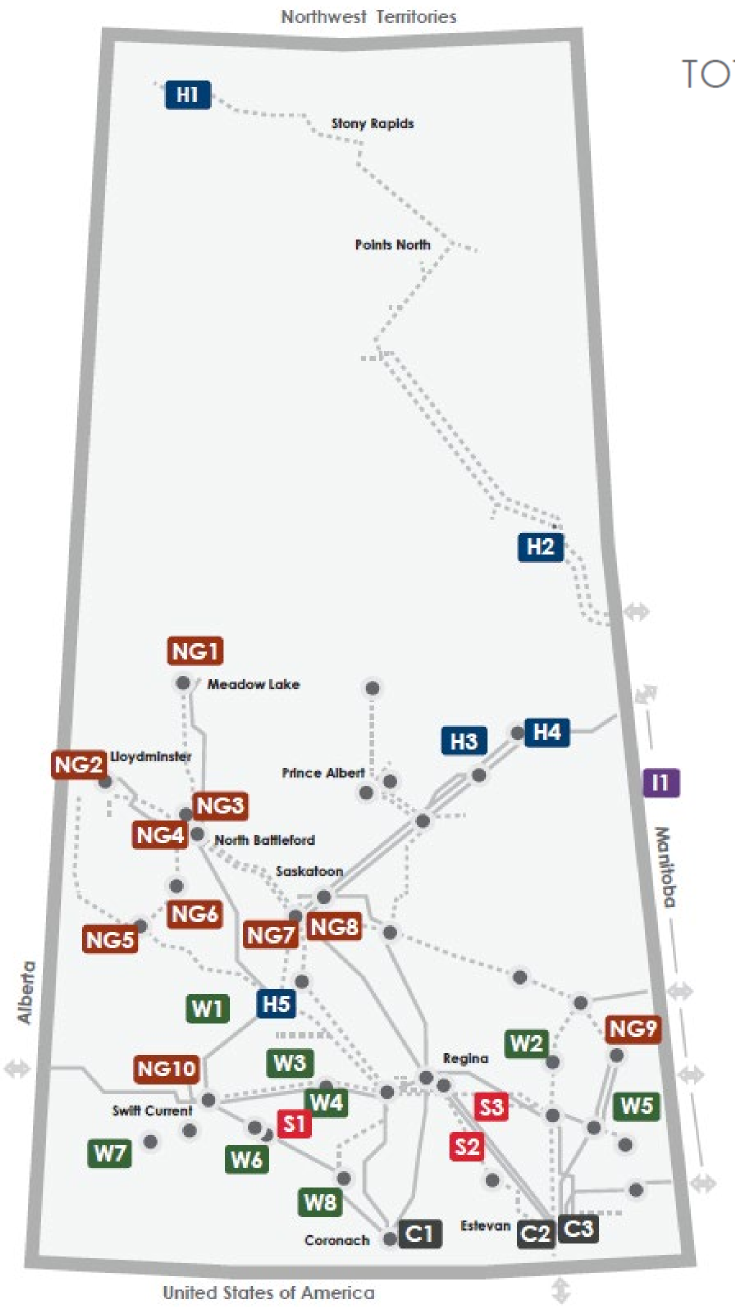
Direction
Providing Crowns with guidance to align with government priorities

Crown Energy Security Division

Nuclear Energy

Policy Coordination and Economic Modelling

Electricity and Natural Gas Transition Planning



TOTAL AVAILABLE GENERATING CAPACITY AS AT **SEPTEMBER 30, 2023: 5,349 MEGAWATTS (MW)**

HYDRO TOTAL CAPACITY - 865 MW

- H1 Athabasca Hydroelectric System - 23 MW
- H2 Island Falls Hydroelectric Station - 111 MW
- H3 Nipawin Hydroelectric Station - 253 MW
- H4 E.B. Campbell Hydroelectric Station - 292 MW
- H5 Coteau Creek Hydroelectric Station - 186 MW

IMPORT POWER PURCHASE AGREEMENTS - 290 MW

- I1 Manitoba Hydro - 290 MW

NATURAL GAS TOTAL CAPACITY - 2,065 MW

- NG1 Meadow Lake Power Station - 41 MW
- NG2 Meridian Cogeneration Station* - 228 MW
- NG3 North Battleford Generating Station* - 289 MW
- NG4 Yellowhead Power Station - 135 MW
- NG5 Ermine Power Station - 90 MW
- NG6 Landis Power Station - 78 MW
- NG7 Cory Cogeneration Station - 234 MW
- NG8 Queen Elizabeth Power Station - 528 MW
- NG9 Spy Hill Generating Station* - 89 MW
- NG10 Chinook Power Station - 353 MW

TRANSMISSION

230 kilovolt (kV)
138 kV/115 kV/110 kV
Switching station
Interconnection

*Large Independent Power Producer

WIND TOTAL CAPACITY - 617 MW

- W1 Riverhurst Wind Energy Facility* - 10 MW
- W2 Western Lily Wind Energy Facility* - 20 MW
- W3 Morse Wind Energy Facility* - 23 MW
- W4 Blue Hill Wind Energy Facility* - 175 MW
- W5 Red Lily Wind Energy Facility* - 26 MW
- W6 Centennial Wind Power Facility - 150 MW
- W7 Cypress Wind Power Facility - 11 MW
- W8 Golden South Wind Energy Facility* - 200 MW

Customer-generated wind capacity - 2 MW
(NOT SHOWN ON MAP)

SOLAR TOTAL CAPACITY - 89 MW

- S1 Highfield Solar Energy Facility* - 10 MW
- S2 Pesâkâstêw Solar Energy Facility* - 10 MW
- S3 Awasis Solar Energy Facility* - 10 MW

Customer-generated solar capacity - 59 MW
(NOT SHOWN ON MAP)

COAL TOTAL CAPACITY - 1,389 MW

- C1 Poplar River Power Station - 582 MW
- C2 Boundary Dam Power Station - 531 MW
- C3 Shand Power Station - 276 MW

SMALL INDEPENDENT POWER PRODUCERS TOTAL CAPACITY - 34 MW (NOT SHOWN ON MAP)

(Includes flare gas, waste heat recovery, landfill gas and biomass)

SaskPower Customer Classes

Residential:

- Individually-metered residential premises.

Commercial:

- Non-farm and non-residential locations, including small and medium sized businesses.

Power:

- Large commercial or industrial customers.

Farm:

- Farms with normal household and agricultural use.

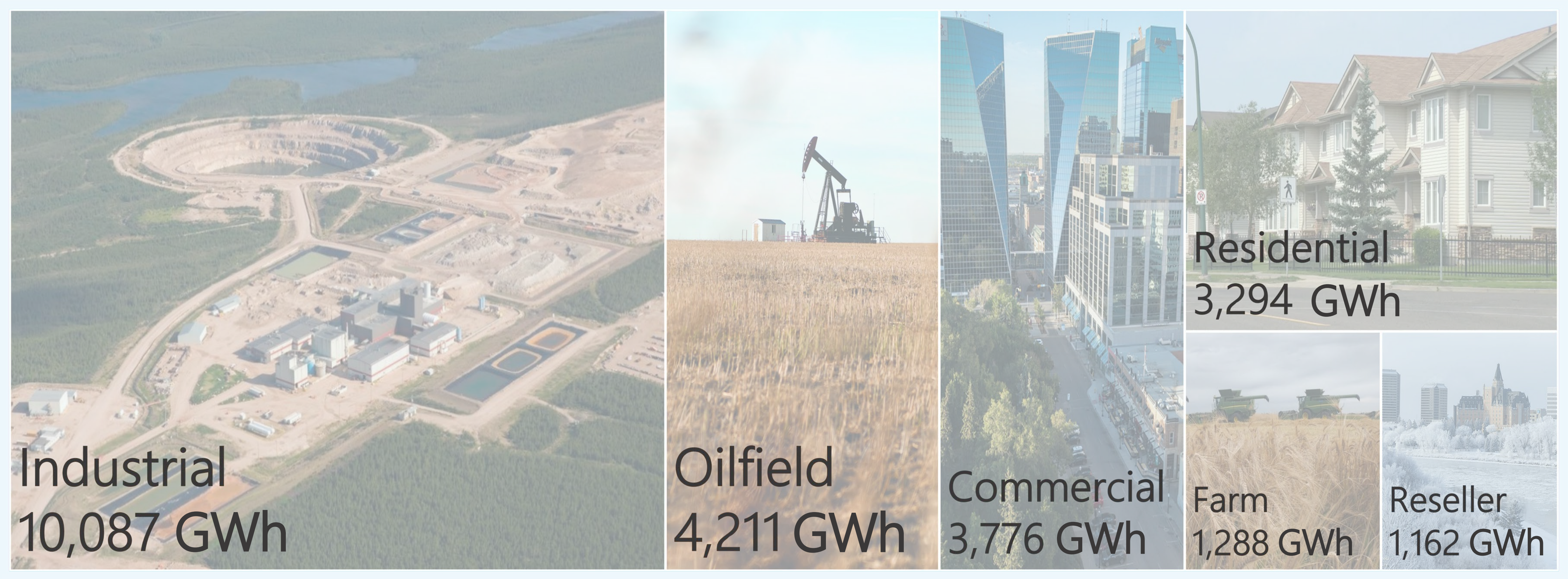
Oilfield:

- Oil and gas production sites along with oil pumping and processing services.

Reseller:

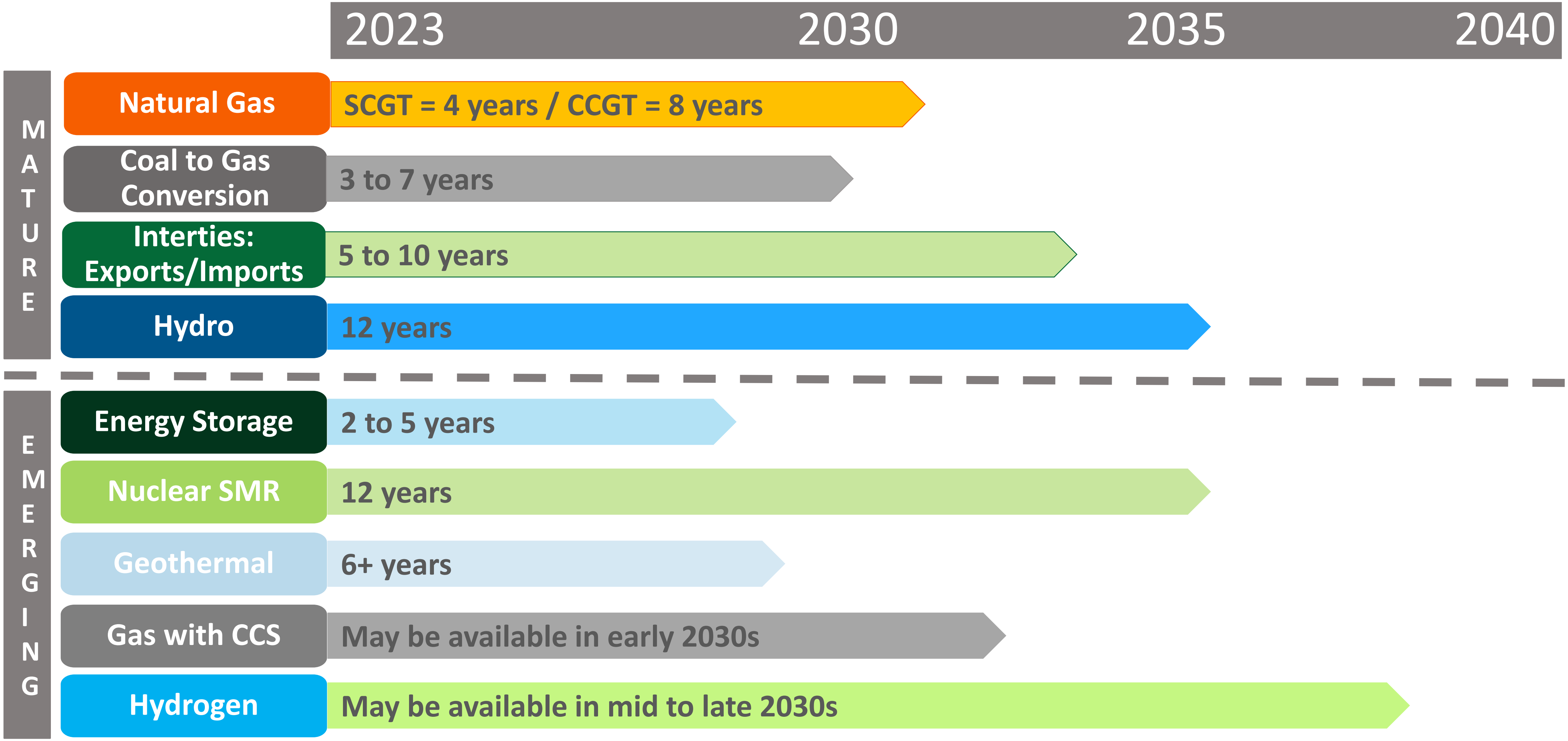
- Municipal utilities in Saskatoon and Swift Current.

Saskatchewan Electricity Demand



170 of SaskPower's 550,000+ customers account for 58% of electricity sales.

Timeline for Dispatchable Supply Options



North American Electricity Markets

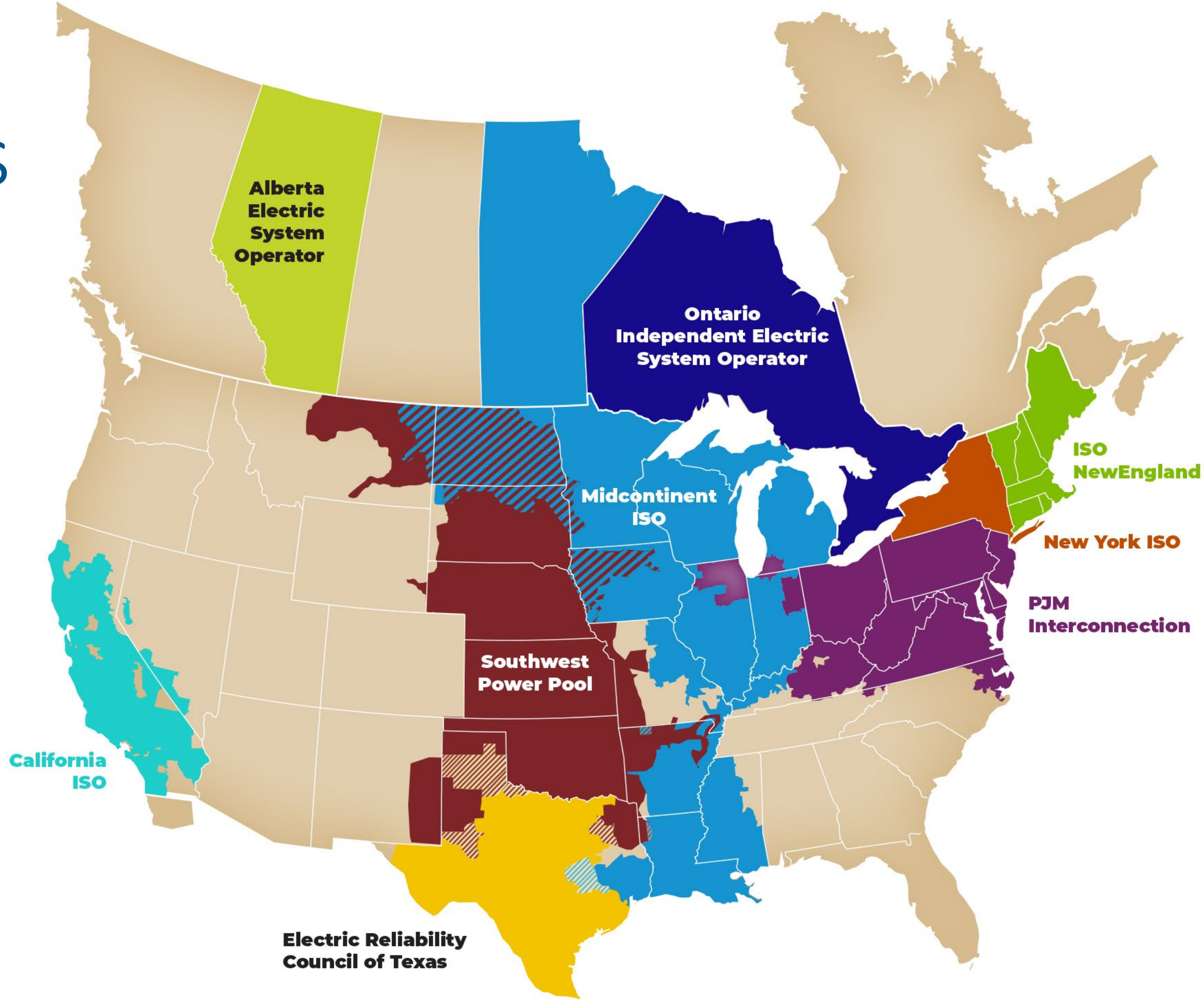
SaskPower
5,400 MW

Alberta Electric System Operator (AESO)
17,200 MW

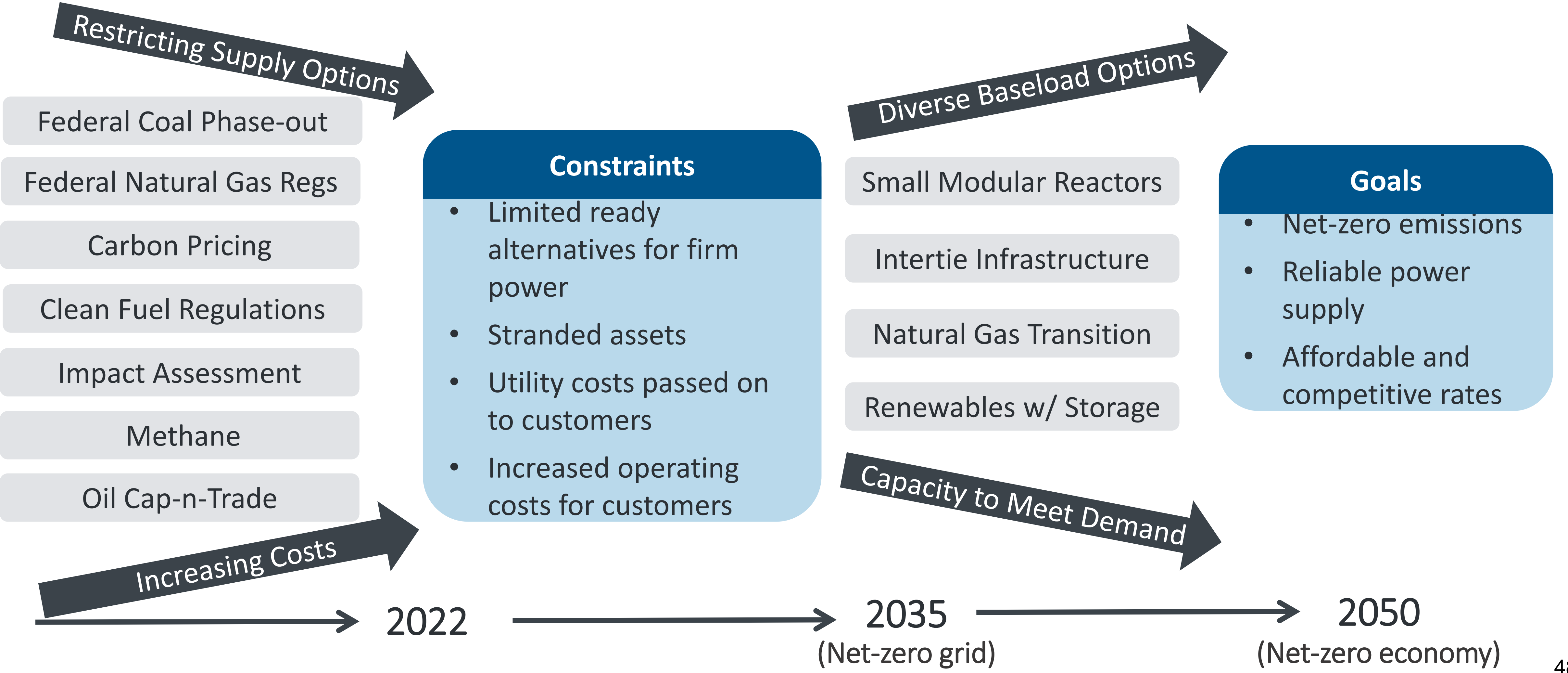
Manitoba Hydro Energy Board (MHEB)
5,680 MW

Southwest Power Pool (SPP)
105,000 MW

Midcontinent Independent System Operator (MISO)
190,000 MW



Federal Policy Interactions – CER Plus



The Regulations and Their Context

Scope

- The CER will come into force Jan. 1, 2025, and starting in 2035 a stringent near-zero emissions performance standard is enforced on generating units.
  - For regulated units, the performance standard applies in any year when a unit has net exports to an electricity system that is subject to NERC standards.
  - Units **must meet a performance standard of 30 tonnes of CO_2 per gigawatt hour (t/GWh)**, noting that an efficient natural gas power plant emits about 380 t/GWh.
  - Co-generation plants that are connected to the grid are exempt as long as they are not 'net exporters'

All of SaskPower's coal and natural gas facilities, currently **64%** of the total generating capacity in the province, will fall within the scope of the regulations.

The Regulations and Their Context

'Exceptions'

- The CER allows units to exceed the performance standard in very limited situations:
  - **'Emergency circumstances'** that must be approved by the federal Minister of Environment and Climate Change Canada (ECCC);
  - **'Peaking' provisions** for units to run unabated for the lesser of 450 hours (approximately 5% capacity) or 150 kt CO_2 annually, which is less than half of SaskPower's current peaking use;
  - **End-of-life provisions** that allow any units commissioned between 2015 and 2025 to be exempt from the CER for the first 20 years of operation,
    - For Saskatchewan, this is only the Queen Elizabeth (2015), Chinook (2019) and the expected Great Plains (2024) power plants, totaling approximately 1100-1200 MW. This would not account for projects, like Aspen, that are in-flight but won't be operational before 2025.

The Regulations and Their Context

Carbon capture, carbon pricing, and enforcement

- The CER has an alternate performance standard of 40 t/GWh for units with carbon capture (CCS) technology during the first 7 years of operation or until 2039, whichever is sooner.
    - An approximate 92% capture rate is required to meet the 30 t/GWh performance standard. This is slightly reduced to 89.5% under the 40 t/GHh performance standard. This standard has never been proven in testing or at grid scale.
- The CER would not replace the carbon pricing system for the electricity sector until 2035.
- Emissions above the defined performance standard are **illegal** (enforced by the Canadian Environmental Protection Act).

The Regulations and Their Context

Impact on SaskPower Facilities

- As proposed, the CER covers approximately 2900MW of existing and planned generation:
  - 2200MW gas generation (SaskPower)
  - 600MW gas generation (IPPs)
  - 110MW carbon capture (Boundary Dam Unit #3)
- Older gas units would need to retire, run as limited 'peaker units', or have CCS installed to performance.
- Newer gas generation commissioned before Jan. 1, 2025, can run unabated (carbon tax still applies)
  - Chinook – can run until 2039
  - Great Plains – can run until 2044
  - Aspen – to be commissioned after Jan. 1, 2025, and will require CCS or have severely restricted operation as a 'peaker'.

The RIAS Modelling

The **RIAS (Regulatory Impact Analysis Statement)** provides the public with a plain-language description of how a regulation works, supported by an analysis of its expected impacts to society as a whole.

One of the analytical lenses in the RIAS is the Cost-Benefit Analysis (CBA), which **seeks to quantify, and when possible, monetize the incremental direct and indirect costs and benefits of a regulation over time**.

ECCC uses multiple models to outline the full implications of the CER.

Models Used to Inform the RIAS

Energy, Emissions and Economy Model for Canada (E3MC)

- Used by the Government of Canada for international reporting, forecasting emissions trends, etc.
- Provides integrated results from two sub-models:
    - Energy 2020: simulates energy markets to provide outputs such as energy use, energy prices, greenhouse gas emissions, and air pollutant emissions.
    - The Informetrica Macroeconomic Model (TIM): examines consumption, investment, production, and trade decisions.

NextGrid

- Capacity expansion model that determines electricity system infrastructure and usage that minimizes national costs, subject to many constraints including system reliability and resource availability.
- ECCC engagement on the NextGrid model with major electrical utilities like SaskPower is ongoing.

The RIAS Modelling Results

Region	27-year total (2024 – 2050)	Measure of relative cost by size of economy*
NL	-964	-1 190
PE	412	2 419
NS	3 177	3 089
NB	8 377	9 910
QC	-1 194	-118
ON	19 353	968
MB	353	210
SK	11 204	5 292
AB	34 694	3 906
BC	-16 848	-2 404
YK	3	31
NT	-6	-51
NU	0	0
Total	**58,561**	**N/A**

Source: RIAS Table 27

* The values in this column are relative only, in that they are only meaningful when compared against each other to denote relative positioning. They have no real interpretation in isolation of each other.

- The RIAS examines interlinking economic effects for Canada as a whole.
- The RIAS results are derived from modelled scenarios reflecting what is likely to occur in response to the draft CER based on constraints and assumptions in the model.
- As per the RIAS, highest cost impacts are modelled in Alberta ($34B), Ontario, ($20B), Saskatchewan ($11B), New Brunswick ($8B), and Nova Scotia ($3B).

ECCC estimates that the CER would result in significant net positive benefits

Total monetized benefits

+102.5 Billion

Mainly from reduced GHG emissions and savings from reduced fuel use

Total costs

-$73.6 Billion

Mainly from the incremental expenditure required to ensure that the buildout of electricity system capacity conforms with the CER (not the projected cost of increasing electricity generation in response to increased demand)

Total net benefits

≈$28.9 Billion

A net-positive CBA

CIC

Clean Electricity Regulations: Comparing and Contrasting SK Projections

David Brock, Vice President, CIC

04 April 2024

Table of Contents

Part 1:
SAPP and SK-CER and SaskPower

Saskatchewan's Power Future

Looking to 2035 and Beyond

SaskPower Saskatchewan

Affordable and Reliable Power

The Goal: Saskatchewan needs to ensure an affordable, reliable power supply while continuing to reduce GHG emissions within realistic timelines.

The Challenge: Saskatchewan has low customer density and significant reliance on fossil fuel generating sources, making our challenge more significant than many other jurisdictions.

Saskatchewan

navius research

Government of Saskatchewan Economic Impact Assessment Tribunal: Clean Electricity Regulations

Final Study Report

SUBMITTED TO

Crown Investments Corporation of Saskatchewan (CIC)

March 19, 2024

Updated: April 1, 2024

SUBMITTED BY

Navius Research Inc.

Box 48300 Bentall

Vancouver BC V7X 1A1.

SaskPower Written Submission
Government of Saskatchewan
Economic Impact Assessment Tribunal

February 15, 2024

SaskPower
Powering our future®

60

Assumptions:

SAPP vs SK-CER vs SaskPower

SAPP	SK-CER	SaskPower
Net-zero by 2050	Net-zero by 2035	Net-zero by 2050
Carbon pricing backstop fixed at $65/tCO2e within OBPS.	Carbon pricing backstop rises at $15/tCO2e per year to $170/tCO2e by 2030.	Carbon pricing backstop rises at $15/tCO2e per year to $170/tCO2e by 2030.
Electricity sector excluded from OBPS carbon pricing.	Electricity sector included in OBPS carbon pricing.	Electricity sector included in OBPS carbon pricing.
Federal support of 75% of capex for first SMR and 50% capex for renewables up to $6B inclusive of existing policy supports.	Federal support for electricity generation technologies does not exceed the announced investment tax credits.	Federal support for electricity generation technologies does not exceed the announced investment tax credits.
	All other existing provincial and federal policies remain in place.	

Economic Comparisons:

SAPP vs SK-CER vs SaskPower

	2025 Baseline	SAPP	SK-CER	SaskPower
GDP (billion C$2015) [1]	$82.8	$102.1	$101.2	Not modelled.
Employment (thousand FTEs)	645.6	713.7	709.5	Not modelled.
Annual Household consumption (million C$2022) [2]	39,517	46,423	45,997	Not modelled.
Estimated Capital Cost (billions)	N/A	[$28 minus $6]	$37.4 - $42.1	$28
Electricity Rates (¢/kWh)				
Residential	22.6	22.6	25.7	28.3 [3]
Commercial	16.3	16.5	19.4	
Industrial	12.7	12.9	15.8	

[1] Cumulative GDP difference between SAPP and SK-CER is $7.1B by 2035.

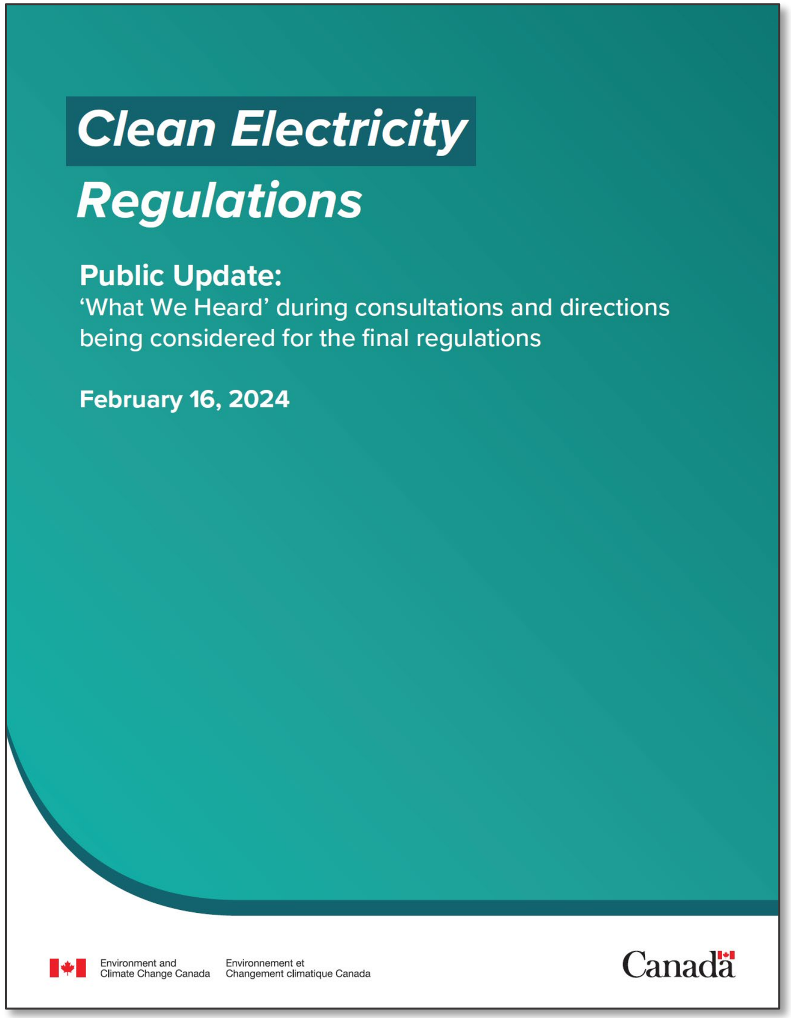
[2] Household consumption is a per household total across all income quintiles.

[3] Rate is approximated by CIC using a 90% increase from SPC's submission and today's price per kWh, only for the illustrative purposes of this presentation. This is not a prediction of actual future power rates.

Conclusions about Interpretations

- The impact of the SK-CER *relative* to SAPP is more significant, in every category, beyond 2035.
- SK-CER *relative* to the SAPP: leads to lower job growth, lower exports, and lower economic output.
- Effects on rates are influenced more by utility investment into generating technologies, whereas effects on GDP are influenced more by lower economy-wide carbon pricing under SAPP. Both could be moderated by levels of federal investment into generating technologies.
- All scenarios lead to reduced emissions.
    - SAPP reduction is approximately 75% of the CER, remaining 25% (4 $MtCO_2e$) achieved by 2050.

Part 2:
Update Paper Compared to Canada Gazette 1



PROPOSED REGULATORY TEXT

Notice is given, under subsection 332(1)[a] of the *Canadian Environmental Protection Act, 1999*[b], that the Governor in Council proposes to make the annexed *Clean Electricity Regulations* under subsections 93(1), section 286.1[c] and subsection 330(3.2)[d] of that Act.

Any person may, within 75 days after the date of publication of this notice, file with the Minister of the Environment comments with respect to the proposed Regulations or a notice of objection requesting that a board of review be established under section 333 of that Act and stating the reasons for the objection. Persons filing comments are strongly encouraged to use the online commenting feature that is available on the *Canada Gazette* website. Persons filing comments by any other means, and persons filing a notice of objection, should cite the *Canada Gazette*, Part I, and the date of publication of this notice, and send the comments or notice of objection to Karishma Boroowa, Director, Electricity and Combustion Division, Environment and Climate Change Canada, 351 Saint-Joseph Boulevard, Gatineau, Quebec, K1A 0H3 (email: ECD-DEC@ec.gc.ca).

Any person who provides information to the Minister may submit with the information a request for confidentiality under section 313 of that Act.

Ottawa, August 9, 2023

Wendy Nixon
Assistant Clerk of the Privy Council

Clean Electricity Regulations

Purpose

Purpose
1 These Regulations establish a regime for limiting carbon dioxide (CO_2) emissions that result from the generation of electricity from the combustion of fossil fuels.

[a] S.C. 2004, c. 15, s. 31
[b] S.C. 1999, c. 33
[c] S.C. 2009, c. 14, s. 80
[d] S.C. 2008, c. 31, s. 5

PROJET DE RÉGLEMENTATION

Avis est donné, conformément au paragraphe 332(1)[a] de la *Loi canadienne sur la protection de l'environnement (1999)*[b], que la gouverneure en conseil, en vertu du paragraphe 93(1), de l'article 286.1[c] et du paragraphe 330(3.2)[d] de la même loi, se propose de prendre le *Règlement sur l'électricité propre*, ci-après.

Les intéressés peuvent présenter au ministre de l'Environnement, dans les soixante-quinze jours suivant la date de publication du présent avis, leurs observations au sujet du projet de règlement ou un avis d'opposition motivé demandant la constitution de la commission de révision prévue à l'article 333 de la même loi. Ceux qui présentent des observations sont fortement encouragés à le faire au moyen de l'outil en ligne disponible à cet effet sur le site Web de la *Gazette du Canada*. Ceux qui présentent leurs observations par tout autre moyen, ainsi que ceux qui présentent un avis d'opposition, sont priés d'y citer la Partie I de la *Gazette du Canada*, ainsi que la date de publication du présent avis, et d'envoyer le tout à Karishma Boroowa, directrice, Division de l'électricité et de la combustion, Direction de l'énergie et des transports, Direction générale de la protection de l'environnement, ministère de l'Environnement, 351, boul. Saint-Joseph, Gatineau (Québec) K1A 0H3 (courriel : ECD-DEC@ec.gc.ca).

Quiconque fournit des renseignements au ministre peut en même temps présenter une demande de traitement confidentiel aux termes de l'article 313 de cette loi.

Ottawa, le 9 août 2023

La greffière adjointe du Conseil privé
Wendy Nixon

Règlement sur l'électricité propre

Objet

Objet
1 Le présent règlement établit un régime visant la réduction des émissions de dioxyde de carbone (CO_2) provenant de la production d'électricité à partir de la combustion de combustibles fossiles.

[a] L.C. 2004, ch. 15, art. 31
[b] L.C. 1999, ch. 33
[c] L.C. 2009, ch. 14, art. 80
[d] L.C. 2008, ch. 31, art. 5

CER Comparison: CG1 and Update Paper

	Canada Gazette Part 1 Publication	Update Paper
Performance Standard	30 t/GWh or 95% capture rate	Undetermined, will be used to calculate the annual emissions limit.
Emissions Limit	N/A	Unit-specific limit based on capacity (MW) and a new performance standard.
Pooling	Not allowed	Parties with multiple units in the same province could pool emissions limits.
Offsets	Not allowed	Considering a maximum percentage above each unit's annual emissions limit.
End of Prescribed Life (existing units)	20 years	To be determined
New Units	Units commissioned by Dec. 31, 2024 are treated like existing units.	Considering extending this to cover units with significant investment and work underway, but with a shorter prescribed life.
Cogeneration Units	Cogen units > 25 MW subject to same performance standard as any unit exporting to the grid.	Considering amendments for both new and existing units, no details provided.
Emergencies	Requires retroactive approval from federal Minister	System operator declares emergency, Ministerial notification may be required.
Minimum Size Threshold	25 MW	Single units: > 25 MW or New units at one facility: > 25 MW combined.

CER Update Paper:
Implications for Saskatchewan

	Update Paper - Impacts
Performance Standard **Emissions Limit** **Pooling**	Shift from the Performance Standard to the "Tailored Approach" with pooled emissions limits should offer slightly more flexibility to SaskPower – without firm details it is impossible to assess.
Offsets	Compliance is less criminal and more financial, but still has potential costs to SaskPower and rate payers – without firm details it is impossible to assess.
End of Prescribed Life (existing units)	Exact change is unknown. Unless extended to 30+ years, units could still face early retirement.
New Units	Aspen could be treated as an "existing unit" but may still be subject to early retirement. Could effect annual and long-term supply planning.
Cogeneration Units	Two major cogen facilities currently contribute to the SK power grid, with the potential for more future sites, so these provisions will impact current and future facilities.
Emergencies	Update provides more latitude for SaskPower to continue making operational decisions in emergency circumstances.
Minimum Size Threshold	No current plans in SK for gas units <25 MW, but some industrial sites are considering future units and will be impacted by these provisions.

Conclusions about Changes

- The Government of Canada plans to proceed directly to publication in Canada Gazette 2, making law.
  - Because of the potential magnitude of the changes, some provincial governments and utilities are advocating for a return to publication in Canada Gazette 1, with a new Regulatory Impact Assessment Statement.
- The Government of Canada is not planning to publish the estimated effects on regional or provincial economies.
- The Government of Canada has still not published its academic study on electricity affordability, as was promised in the RIAS in CG1.
- All combined - a less stringent performance standard, a fleet approach to pooling total emissions against an annual limit, a longer period for end-of-prescribed-life and/or later effective date for newer commissioned units – could potentially lessen the economic impact of the CER relative to the original draft regulations.
  - These proposed potential changes do not alter the provincial government's fundamental position that the CER is unaffordable, unattainable, and unconstitutional.

CIC

MEMORANDUM

From:	David Brock Vice President Energy Security	**Date:**	April 12, 2024
		Phone:	306-787-2627
To:	Michael Milani Chair Economic Impact Assessment Tribunal		

Re: **Economic Impact Assessment Tribunal: CIC Presentation**

Thank you for the opportunity to speak with the Economic Impact Assessment Tribunal. Further to the presentation delivered on April 4th, Crown Investments Corporation wishes to provide additional context on two points.

Electricity Prices vs Electricity Rates

There is an important distinction to be made between the wholesale cost of electricity and the rates paid by consumers in the Province of Saskatchewan. Electricity price is the cost to SaskPower for the generation, transmission, and distribution of electricity. The price includes variable costs, for items such as fuel and maintenance, and fixed costs such as infrastructure and operations.

Electricity rates for the six customer classes within the province are set by the Lieutenant Governor in Council, based on recommendations from the Saskatchewan Rate Review Panel (SRRP). The SRRP comprises seven members appointed by the Government of Saskatchewan with the mandate to review rate applications made by a Crown rate-regulated utility and provide the government with an objective evaluation of each rate application and recommendation on how to proceed.

The process for rate determination in the province includes SaskPower submitting a rate application to Crown Investments Corporation (CIC), the review of the application and all supporting documentation by the SRRP, and recommendation from the SRRP to the Minister of CIC. The Minister then brings the recommendation to the Lieutenant Governor in Council, who ultimately makes the final decision on rates.

When making their recommendation, there are many factors that play into the SRRP's review of the rate application. The terms of reference for the SRRP, as found on their website, lists several considerations that are considered by the SRRP when determining rate review recommendations:

- The interests of SaskPower, its customers, and the public.
- Consistency with SaskPower's mandate, objectives, and methodologies.
- Relevant industry practices and principles.
- Effect of proposed rate changes on the competitiveness of SaskPower relative to other Canadian utilities.

As a publicly owned entity, SaskPower has the mandate to serve the people of Saskatchewan and provide that service with the interests of the people as a priority. Therefore, increases to the cost of electricity do not always translate into increases to the rates paid by the people of Saskatchewan.

Navius Modelled Price Impacts

Additionally, I wanted to provide further context on Table 2 (page 8) from the Navius Final Study Report, as updated on April 1, 2024. The table uses a forecasted 2025 electricity price and Navius' projections for electricity price increases across various types of consumers based on their modelled results. The residential increase is presented as $241 per consumer and was the subject of discussion during the April 4th presentations.

The values in the *Net increase* column of Table 2 are projected incremental cost increases between the SK-CER and the SAPP scenarios as modelled by Navius. The prices contained within Table 2, and later in Figure 3 (page 8), are noted to be wholesale electricity prices. The previously discussed distinction between electricity prices and electricity rates is as an important consideration. The results presented in the report indicate that wholesale electricity prices are projected to be, on average, $241 more in the SK-CER scenario relative to the SAPP scenario. The SAPP scenario would likely represent an increase to today's cost of electricity; however, Navius has not included a comparison to today's electricity price.

David Brock

cc: Ken Dueck, Executive Director Economic Impact Assessment Tribunal

CANADIAN OILSEED PROCESSORS ASSOCIATION

canola council OF CANADA

February 23, 2024

Attention:
Ken Dueck
Executive Director
Economic Impact Assessment Tribunal Secretariat

Submitted via email: ken.dueck3@gov.sk.ca

Re: Saskatchewan Economic Impact Assessment Tribunal - Review of the Clean Electricity Regulation

Dear Ken,

On behalf of the Canola Council of Canada (CCC) and Canadian Oilseed Processors Association (COPA) we welcome the opportunity to provide feedback on the Tribunal's review of the Clean Electricity Regulation (CER).

The CCC and the COPA work collaboratively to address issues and opportunities impacting the value chain and oilseed processing industry respectively. A competitive business environment coupled with open and stable trade are the foundation for the $14.7 billion the canola value chain contributes to the Saskatchewan economy annually and the 93,000 jobs it supports in the province. The oilseed processing industry alone is responsible for $2.5 billion[1] in economic activity, creating nearly 2,600 direct and indirect jobs in Saskatchewan.

Our industry is growing[2] and is committed to helping contribute to Saskatchewan's economic success and climate change objectives. Since early 2021, more than $3 billion of additional processing capacity has been announced in Saskatchewan, with a potential economic impact of $2.8 billion and the creation of 3,000 new jobs by 2025. Many of these new announcements are linked to the growing demand for low carbon feedstocks in renewable fuel production, being driven by programs such as the Clean Fuel Regulation. Owing to canola's natural ability to sequester carbon from the air and store this carbon in the soil via sustainable production practices such as reduced tillage, renewable fuels derived from canola can reduce GHG lifecycle emissions by up to 90 % when compared to fossil diesel[3].

To capitalize on these growing opportunities and avoid any unintended outcomes that impact our industry's competitiveness, regulations like the CER must be balanced and realistic to implement.

[1] https://copacanada.com/economic-impact/
[2] https://www.canolacouncil.org/about-canola/processing-industry/
[3] O'Connor, D. 2011. Lifecycle Analysis Canola Biodiesel, (S&T)2 Consultants Inc. 22

The canola industry supports efforts to further decarbonize the electricity grid in Saskatchewan and other parts of Canada, but these efforts must be evaluated against the costs and time it will take to transition to lower emitting sources.

Oilseed processing requires a significant amount of electricity to support the production of canola oil and meal, which are shipped to markets around the world. The energy intensive and trade reliant nature of the business makes the industry vulnerable to changes in the operating environment that increase costs, which impact the competitiveness of processors and farmers.

The oilseed processing industry in Saskatchewan is a significant user of electricity and consumption is expected to more than double by 2025 with the current processing expansion that is underway. Even modest increases in electricity rates have a significant impact on industry costs and can impact competitiveness. Access to reliable, cost effective and lower carbon electricity will be critical to our industry. All three priorities must be carefully balanced. Moving hastily to decarbonize the grid, could lead to increased costs or even worse, a lack of available power in the years ahead.

It's important to reemphasize that our industry recognizes the importance of emissions reduction measures with the broader objective of addressing climate change and meeting net zero goals. However, these measures must be developed considering the competitive impact they have vis a vis Canada's largest trading partners / competitors. Over the past five years, approximately 77 % of all processed canola products (oil and meal) produced in Canada was exported to the US and China. While climate commitments are being made by these jurisdictions, the fact remains that oilseed processors located there are not subject to any national regulation that mandate a net-zero electricity supply.

We haven't had the opportunity to fully review the new design options for the CER proposed by Environment and Climate Change Canada on February 16, 2024, but our organizations have consistently provided the following feedback during its development.

1. **Regional Flexibility:** It is essential that the CER be sensitive to regional realities and challenges with achieving a net-zero electricity supply by 2035. Given the significance of the announced processing investments and canola production, the CER must be attuned to current electricity generation practices and the feasibility of the transformations required to have a net-zero supply by 2035. This is particularly true for jurisdictions where predictable and consistent zero emission electricity generation is not a viable option.

2. **Competitiveness:** The CER must not impair our global competitiveness and ability to feed and fuel the world. With 90% of Canada's canola currently going to export markets annually and a nascent domestic biofuels market, the CER must be designed and implemented in a way that does not impact Canada's competitiveness, particularly for trade exposed industries such as canola. This includes additional costs borne by processors as a result of a shift to a net-zero electricity supply.

3. **Regulatory duplication and burden:** Emissions from electricity generation in Canada are already regulated under carbon pricing programs such as the Output Based Pricing System (OBPS). Implementing a CER must not create dual compliance obligations on the same emissions. Duplication of regulations is inefficient, burdensome and costly for obligated parties and stakeholders along the supply chain.

4. **Support for Cogen:** Cogen is being deployed at several oilseed processing facilities across Canada, with the possibility greater adoption in the future. The efficiency gains and corresponding environmental benefits of cogen must be recognized by government.

5. **Government Investments:** Federal investments in the electricity grid will need to match the transformational ambitions of the government to achieve a net-zero electricity supply by 2035. Governments will need to consider their role in accelerating the capital expenditures necessary for this goal.

Thank you again for the opportunity to provide feedback. Please do not hesitate to reach out if you have any follow questions.

Sincerely,

Chris Davison
President and CEO
CCC

Chris Vervaet
Executive Director
COPA

Ministre de l'Environnement et du Changement climatique

Minister of Environment and Climate Change

Ottawa, Canada K1A 0H3

FEB 15 2024

Mr. Ken Dueck
Executive Director
Economic Impact Assessment Tribunal Secretariat
ken.dueck3@gov.sk.ca

Dear Mr. Dueck:

I am responding to the letter of December 28, 2023, sent by the Chair of the Economic Impact Assessment Tribunal, Mr. Michael W. Milani, with respect to the proposed Clean Electricity Regulations.

The proposed regulations were designed to establish performance standards to reduce greenhouse gas emissions from fossil fuel generated electricity starting in 2035. The Government of Canada has determined that without federal regulations to ensure the electricity-generating sector is prepared to supply cleaner electricity from low- and non-emitting electricity generating sources by 2035, the sector would not be on a path that would enable the economy to reach net-zero greenhouse gas emissions by 2050.

There is an urgent need to address climate change and Canada is committed to doing its part. As climate change makes weather patterns more extreme and volatile, weather-related disasters are becoming more frequent and costlier. Without rapid reduction in greenhouse gas emissions, the adverse impacts of climate change are projected to escalate beyond adaptive capacity, affecting disproportionally Canada's most vulnerable people. In addition to causing catastrophic environmental and human health impacts, climate change will also entail significant social, cultural and economic losses in Canada. In an effort to help limit the worst of these impacts and based on the overwhelming conclusion of climate science, in 2021, Canada joined more than 120 countries in committing to be a net-zero greenhouse gas emissions economy by 2050.

In order for Canada to achieve economy-wide net-zero greenhouse gas emissions by 2050, the electrification of energy-intensive activities, such as transportation, heating and cooling of buildings and various industrial processes, will be needed. For that electrification to have the desired impact, electricity generation will need to come from low- and non-emitting electricity generation sources, and this will need to happen much earlier than 2050.

…/2

Clean, reliable, and affordable electricity will be critical to establishing a net-zero economy by 2050. It will also be an important factor in preserving the competitive position of Saskatchewan in a global market where investors are demanding clean power and where Canada's largest trading partner, the United States, is advancing aggressively through national clean power regulations and the U.S. *Inflation Reduction Act*.

That is why the Government of Canada is taking strides to accelerate progress toward a net-zero electricity grid. The proposed Clean Electricity Regulations, along with a suite of complementary programs (e.g. grants programs, investment tax credits and concessional loan programs to support the transition) will work together to support this goal. The Government of Canada is providing more than $40 billion in investments over the next decade to enable the country to transition to a net-zero grid.

Even without the proposed regulations, Saskatchewan would need to make substantial investments in the coming decade to perform routine unit replacements and to meet growing electricity demand. Saskatchewan can take advantage of federal investment opportunities to direct these necessary grid investments toward clean generation sources.

In the United States, the deployment of wind, solar and batteries are significantly outpacing natural gas deployment (*www.eia.gov/outlooks/steo/pdf/steo_full.pdf*). Coal power is in an absolute decline in both the United States and Canada. Canada is also witnessing growing deployment of renewable energy. The draft Clean Energy Regulations focus on greenhouse gas emissions, are technology-neutral and recognize a continued role for natural gas. All other existing fuels or technologies remain an option for generating electricity under the draft Clean Energy Regulations as long as the resulting emissions comply with the limits of these regulations.

As requested in the December 28, 2023, letter, Environment and Climate Change Canada confirms that the publicly available Regulatory Impact Analysis Statement (*www.gazette.gc.ca/rp-pr/p1/2023/2023-08-19/html/reg1-eng.html*) that accompanied the draft Clean Energy Regulations included preliminary analysis of incremental costs and incremental impacts on forecasted rates attributable to the draft regulations for Canada from 2025 to 2050, which includes disaggregated impacts for Saskatchewan and by five-year periods. As noted, the estimated cost impacts are relatively modest in the context of estimated increased grid expansion required by provinces that will happen with or without the proposed Clean Electricity Regulations. Incremental impacts attributed to

…/3

these regulations must also be understood within the context of broader energy savings by households as they turn to clean electricity instead of relying on volatile fuel prices to power up their cars and heat their homes in the future. Numerous economic studies, including those conducted by the Canadian Climate Institute (*https://climateinstitute.ca/reports/electricity*), the Roosevelt Institute (*https://rooseveltinstitute.org/wp-content/uploads/2022/05/RI_Energy PriceStability_IssueBrief_202205.pdf*), the International Energy Agency (*www.iea.org/reports/world-energy-outlook-2023/secure-and-people-centred-energy-transitions*), and Clean Energy Canada (*https://cleanenergycanada.org/report/a-clean-bill*) have drawn that conclusion. For example, the International Energy Agency estimates that household energy bills in advanced economies could fall by nearly 20 percent by 2030 as fossil fuel use drops and energy efficiency gains accrue. Likewise, there are cost savings that may be derived from avoided health costs and climate change impacts that will benefit the governments of Saskatchewan and Canada.

Beyond the comprehensive analysis provided in the Regulatory Impact Analysis Statement on incremental costs and rate impacts attributable to the draft regulations on a national and provincial basis, the Government of Canada has not done additional analysis on the forecasted effect on Saskatchewan electricity rates, estimated cost to the province for complying with these regulations, or forecasted cumulative effects attributable to the regulations for Saskatchewan overall, or the forecasted cumulative effect on the provincial economy by economic sector.

Since the publication of the draft regulations, Government of Canada officials have met on numerous occasions with key interested parties from Saskatchewan including SaskPower. This engagement has been constructive, and federal officials appreciate and are carefully considering the province's suggestions on potential additional flexibilities that could address regional needs. Moreover, given that the proposed Clean Energy Regulations are only in draft form, the Government of Canada continues to accept input and recommendations on potential regulatory design changes and other improvements prior to finalizing these regulations and cost-benefit analysis later this year.

Based on feedback received from a wide range and large number of key interested parties, including from provinces and territories, Indigenous organizations, industry, academia and civil society, the Government of Canada plans to publish an update paper containing a summary of feedback received to date and improvements under consideration prior to finalization of these regulations. The final regulations will be published in the *Canada Gazette* later

…/4

this year and will be accompanied by a revised Regulatory Impact Analysis Statement, which will include finalized estimates of incremental impacts to costs and rates.

Environment and Climate Change Canada is committed to taking Saskatchewan's perspective into consideration as the Government of Canada finalizes the proposed Clean Energy Regulations, and the Department looks forward to continued in-depth engagement with the province.

Please accept my best regards.

Sincerely,

The Honourable Steven Guilbeault, P.C., M.P. (il/lui/he/him)

c.c.: The Right Honourable Justin Trudeau, P.C., M.P.
The Honourable Lawrence MacAulay, P.C., M.P.
The Honourable Jonathan Wilkinson, P.C., M.P.
The Honourable Arif Virani, P.C., M.P.

Economic Impact Assessment Tribunal

Ministry of Finance

December 2023

saskatchewan.ca

Saskatchewan Canada

Provincial Economy Overview

Forest

340,000 km²

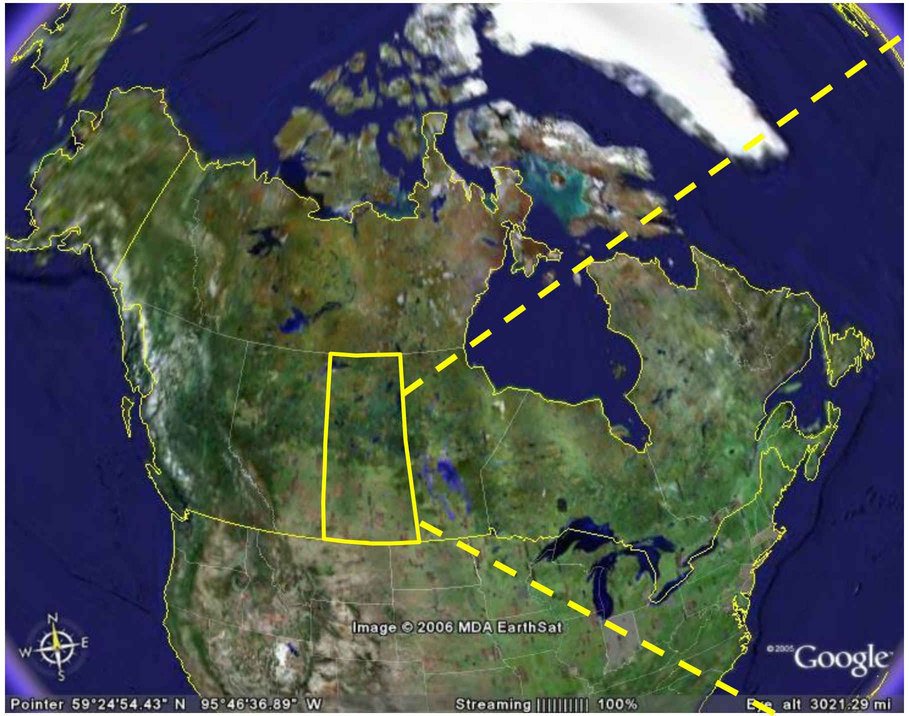
(84 million acres)

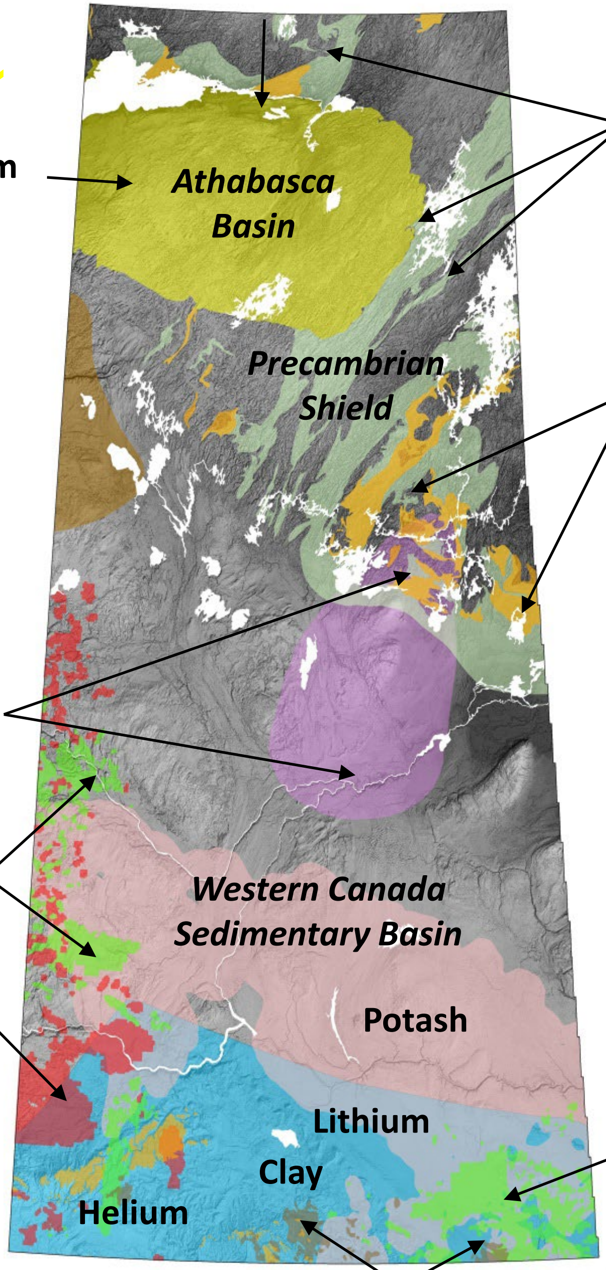
Farmland

240,000 km²

(60 million acres)

Subsurface Resources





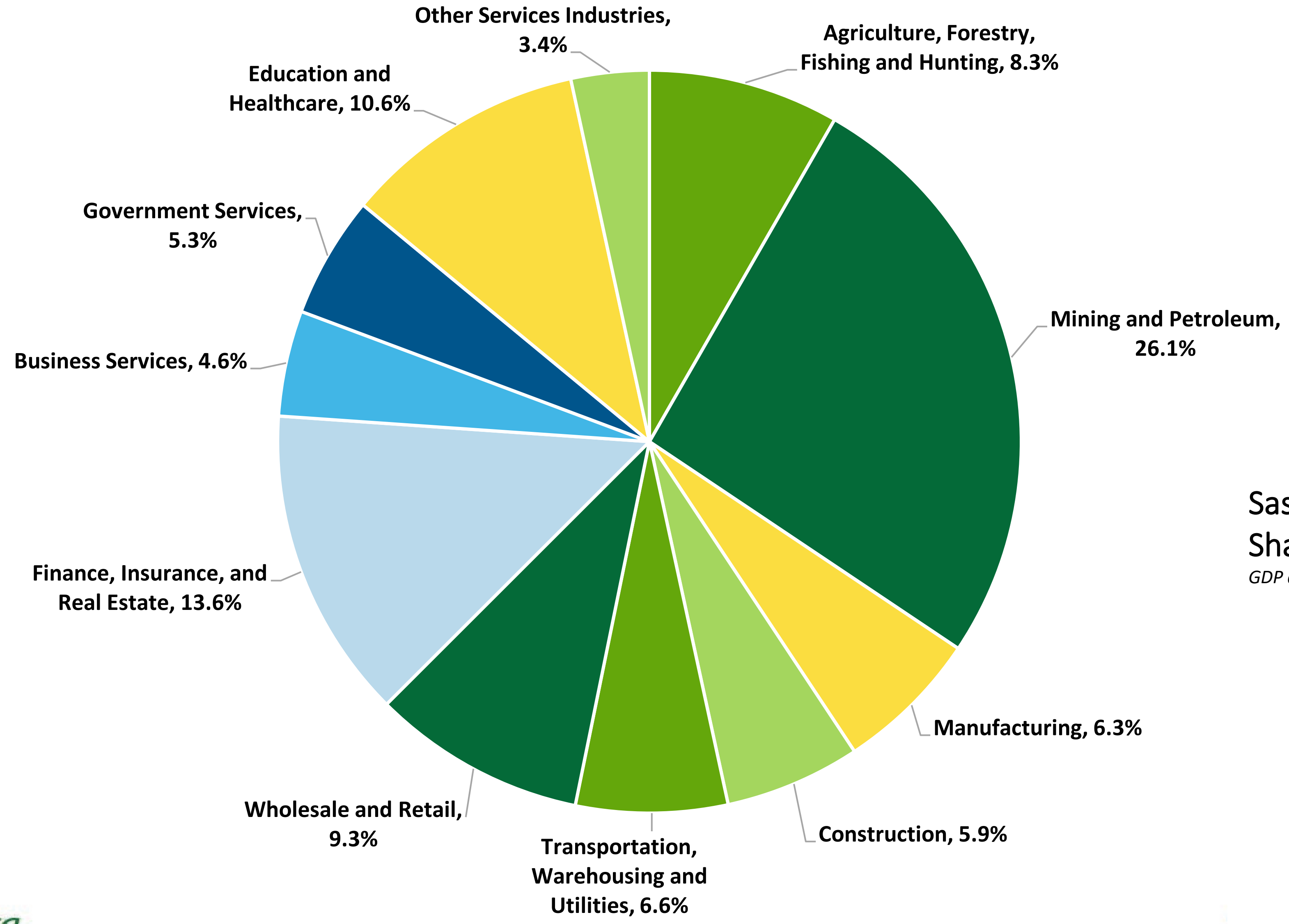
Saskatchewan Canada

Saskatchewan's Food, Fuels, and Fertilizers

Agriculture	Mining	Energy

• 40% of Canada's total farm area.
• Agri-food exports of $18.5 billion in 2022.
• In 2022, Saskatchewan supplied:
  • 56% of the world's canary seed exports
  • 45% of the world's lentil exports
  • 37% of the world's dry pea exports
  • 33% of the world's durum wheat exports
	• Saskatchewan is the world's largest potash producer; accounted for 37% of global potash production in 2022.
	• Saskatchewan has occurrences of 23 of the 31 critical minerals including:
	- cobalt, - copper,
	- graphite, - helium,
	- lithium, - nickel,
	- platinum group metals, and
	- rare earth elements
		• The world's second-largest uranium producer.
		• Home to the world's largest high-grade uranium deposits.
		• Canada's second-largest oil producer, 457,000 barrels per day.
		• Saskatchewan produces a mix of conventional light, medium, and heavy oil and has the fifth-largest oil refinery in Canada.

Saskatchewan’s Export-Oriented Economy



Saskatchewan’s Real GDP and Share by Industry, 2022

GDP at Basic Prices by Industry, Chained (2017) dollars

Top International Export Products

POTASH

$16.3B

OIL

$13.2B

WHEAT

$4.7B

CANOLA OIL

$3.5B

CANOLA SEED

$2.7B

LENTILS

$2.0B

PEAS

$1.1B

CANOLA MEAL

$913M

AGRICULTURAL MACHINERY

$697M

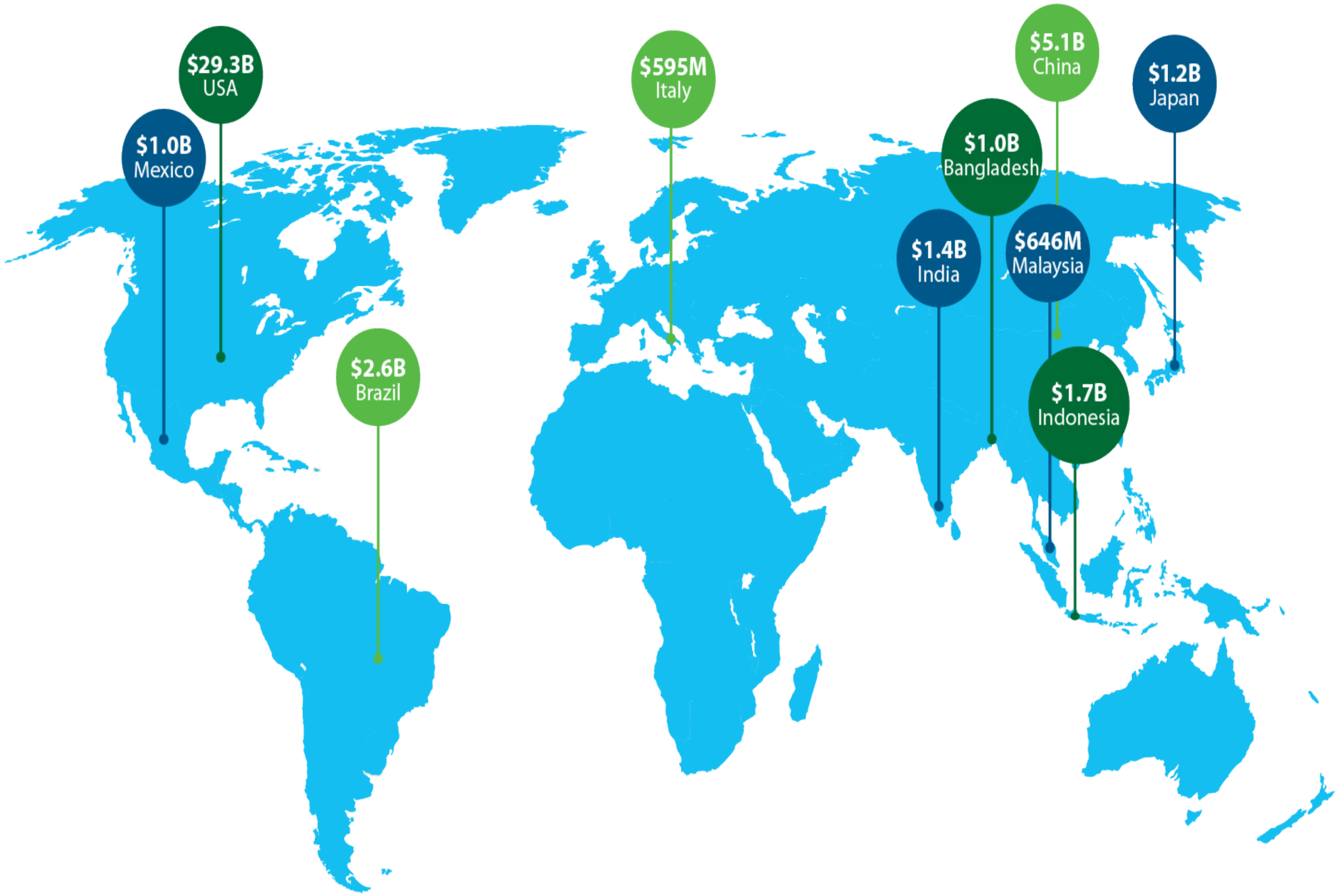
BARLEY

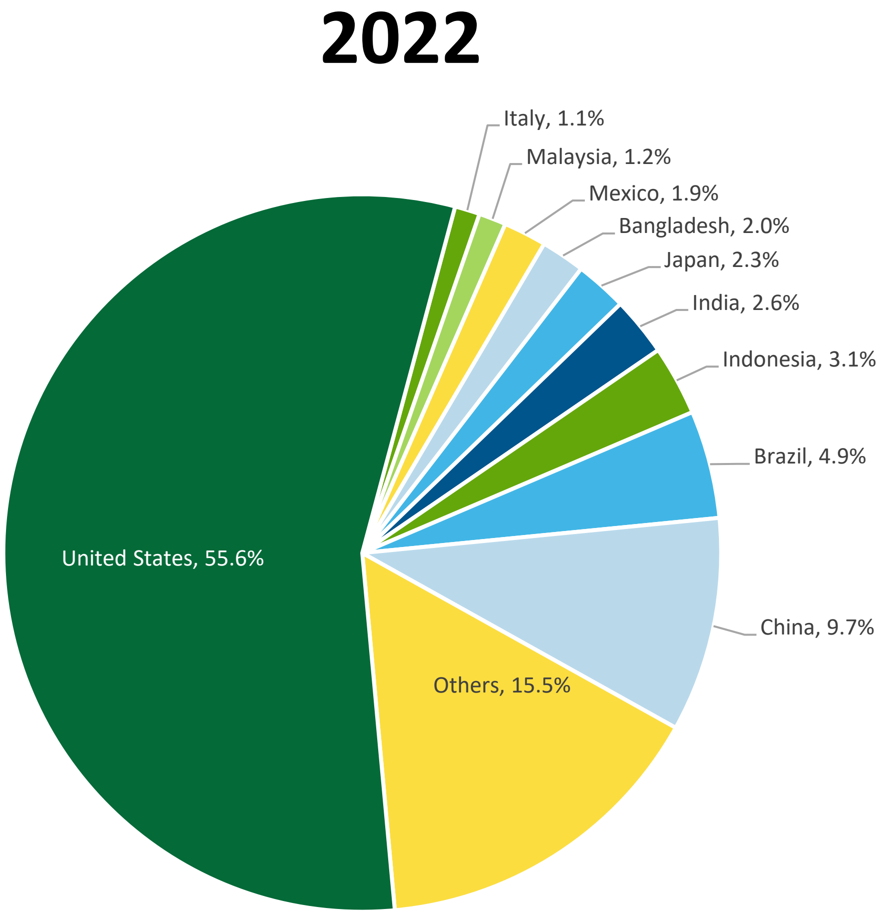
$551M

Source: Canada Trade Data Online, accessed August 2023
Data may not total 100% due to rounding
Dollar figures are in $CAN.

TOTAL EXPORTS FOR 2022 = $52.6B

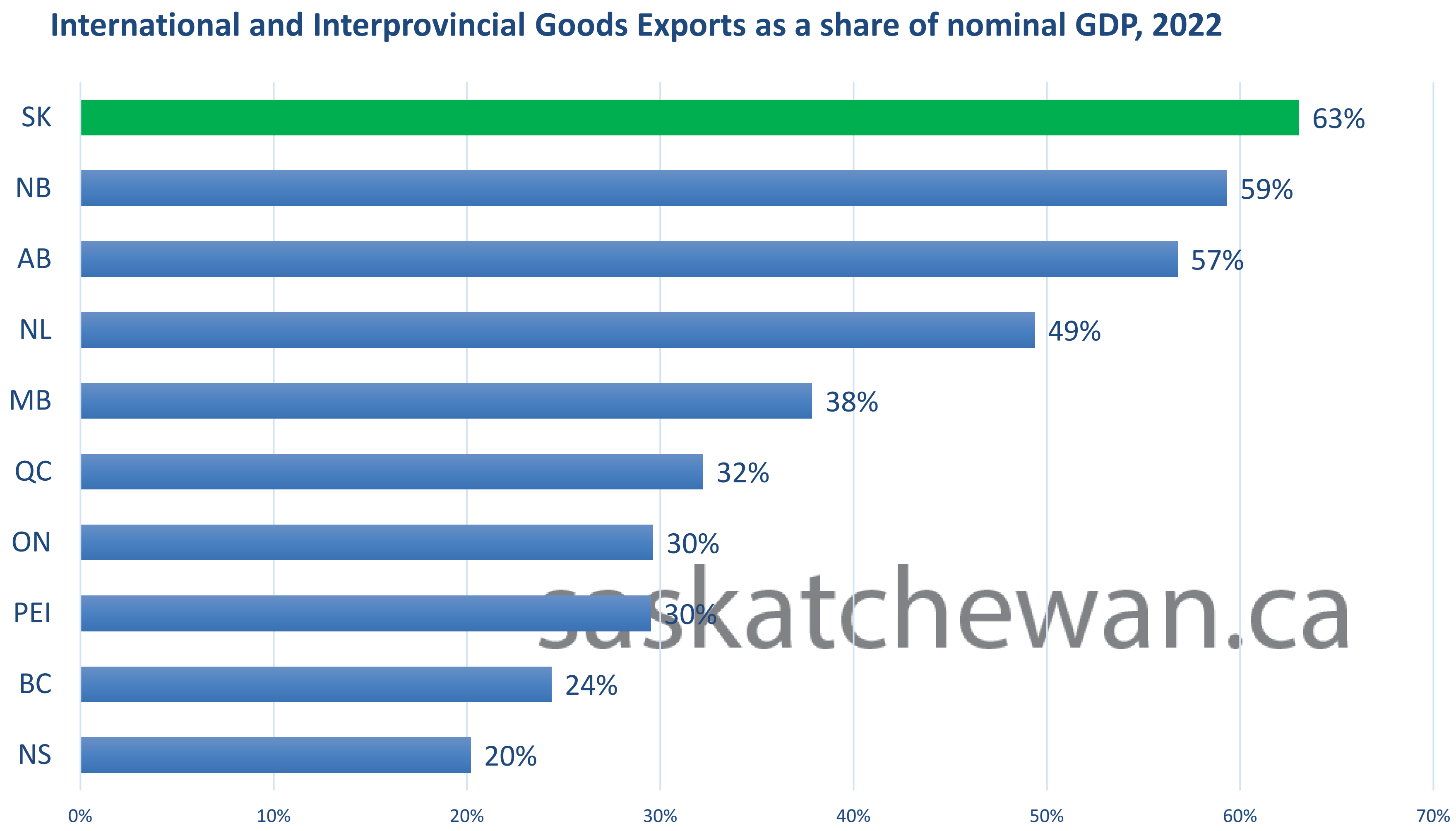
Saskatchewan's Top Export Markets





Source: Canada Trade Data Online, accessed August 2023
Data may not total 100% due to rounding
Dollar figures are in $CAN.

Most trade-dependent province in Canada

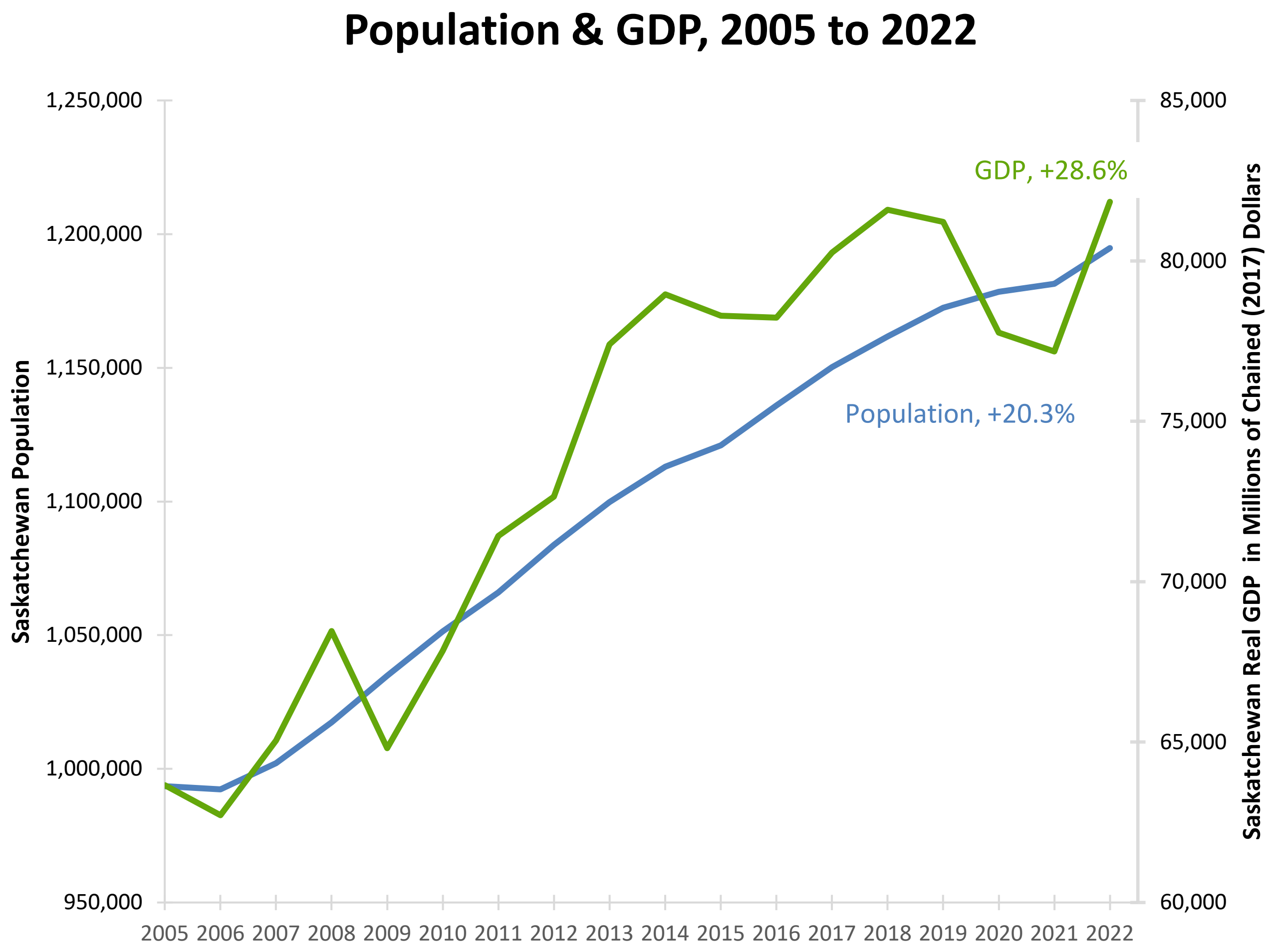


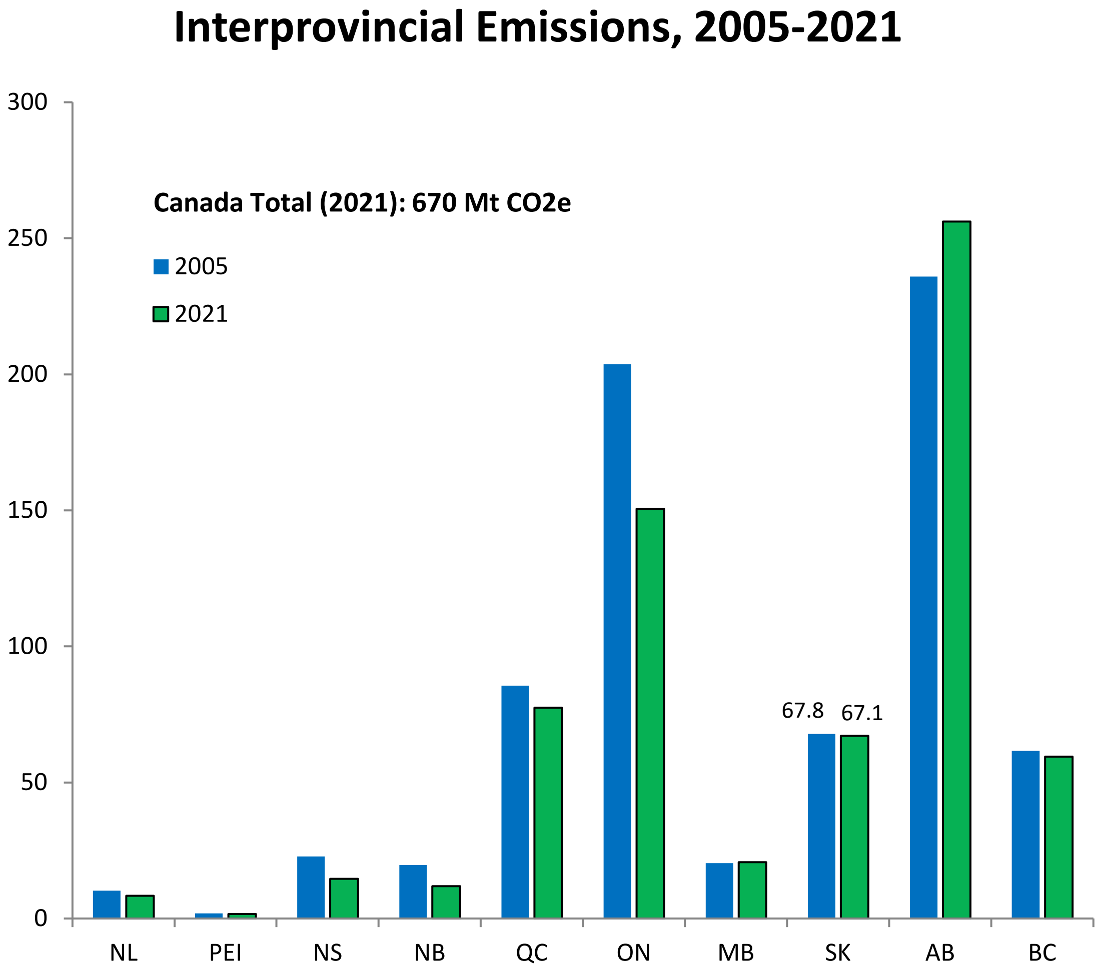
Note: *GDP and Exports at current prices (nominal)*
Source: *Statistics Canada, table 36-10-0222-01*

Capital Investment

- Private sector capital investment is forecast to reach $13.2 billion in 2023.
- Mining and oil and gas investment is expected to be $7.8 billion in 2023, and total gov't/Crown Corps investment is expected to be $3.8B in 2023-24 FY.
- Major private sector capital projects with an aggregate estimated value of $42.6 billion expected to be completed over the next 5 to 10 years.

Saskatchewan's Emissions in Context





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Saskatchewan's Emissions in Context

- Saskatchewan accounts for about 10% of Canada's total emissions.
- Canada's emissions represent between 1.5% to 2% of global emissions.
- Saskatchewan has one of the highest per capita emissions rates in the world, and also one of the highest per capita export rates.
- Production-based emissions attribution vs. consumption-based creates markedly different jurisdictional profiles.

Geography	Total emissions (MtCO2e)	Emissions per capita (tCO2e)	Annual exports per capita (2019 CAD thousands)
Province/State			
Alberta	278.8	63.9	27.0
Ontario	165.5	11.4	17.4
Quebec	83.6	9.8	10.8
Oklahoma	90.8	22.9	2.1
West Virginia	85.4	47.6	4.4
Washington	84.2	11.1	10.4
Saskatchewan	**78.0**	**66.5**	25.3
Iowa	77.3	24.5	5.5
South Carolina	69.4	13.5	10.7
Arkansas	65.1	21.5	2.7
British Columbia	65.0	12.8	8.7
Manitoba	22.3	16.3	11.8
Nova Scotia	16.1	16.6	6.3
New Brunswick	13.1	16.9	16.9
Newfoundland and Labrador	11.1	21.3	28.3
Prince Edward Island	1.7	10.6	10.8
Country			
Canada	738		
Japan	1110		
India	2630		
European Union	2910		
United States	5159		
China	10740		
Global	37080		

Modelling Overview

Types of Models That May Be Relevant

Model Types	Examples of insights/outputs
Environmental models	Insights into the expected changes in GHG emissions, air quality, land-use and biodiversity, and other environmental factors.
Corporate financial impact and compliance cost models	Project, company, or sub-sector specific financial analysis and interjurisdictional competitiveness evaluation of regulatory regimes and compliance costs.
System-wide and facility-based models for the electricity sector	Details on the cost of electricity generation, grid management considerations (including, transmission and distribution), technologies and investments required, and electricity rate impacts.
Economy-wide models (e.g., EEE-CGE models, DSGE models, macro-forecast)	Macroeconomic impacts at the provincial and sector levels (e.g., GDP, employment, trade, investment, household consumption etc.). Some of these types of models can also demonstrate emissions projections and technology adoption rates.

Modelling Considerations

- **Model Suitability**
  - Selection of the appropriate model type(s) for the issue at hand (e.g., electricity capacity models do not provide broad economic impacts, and economic models do not provide gov't fiscal impacts etc.).
  - In what capacities has the model been previously demonstrated (exs: peer-reviewed, FID at a board, public decision-making/panels etc.).
- **Assumptions**
  - A model's output depends to a very high degree on modelling assumptions (e.g., technology costs, electric vehicle adoption rates, forecasted commodity prices, a "social cost of carbon" benefit etc.)
  - Understanding a model's assumptions is critical for evaluating the model's output and reliability.
- **Calibration and Data Quality**
  - A model's output also depends on the quality of model calibration (e.g., baseline and forecast data).
  - Good model calibration requires the input of detailed data into the model from reliable sources.

Modelling Considerations (continued)

- **Disaggregation ("Top-Down vs. Bottom-Up")**
  - The disaggregation level determines the model output indicators (e.g., a facility-level model provides micro-level analysis, which can then be aggregated to a sector-level vs. an economy-wide model covers all sectors using macro-data sets with no differences for facility types or operating conditions).
- **Scope and Limitations**
  - Understanding the scope of the model and where its predictions or insights may not be applicable.
    - Models are simplified theoretical constructs/simulations; so many of the practicality/challenges involved in real-world implementation may be out of scope/not addressed.
    - Models may not capture all individual behavioral responses or unrelated changes in economic performance (ex: global commodity supply-demand fluctuations or carbon leakage), and/or important regulatory/taxation changes in other jurisdictions (ex: U.S. Inflation Reduction Act).
- **Sensitivity analysis**
  - Sensitivity analysis is key to understanding how changes in various inputs impact the model's output. This helps assess the reliability of the results and helps identify the key drivers of the outcomes/future risk factors (ex: commodity price ranges, technology cost and performance ranges).

Summary Considerations

- **Data Quality and Calibration ("Garbage in, Garbage out")**
  - The quality of results is highly dependent on good baseline data/model setup.

- **Models Are Tools for Gaining Insights; Not Crystal Balls**
  - Models are best used for identifying the range of potential outcomes across different scenarios. Evaluations using different types of models can be helpful to construct a fuller view of the range of outcomes.

- **Model Assumptions Need to be Examined Closely**
  - Results can vary widely with changes in key assumptions, running a sensitivity analysis can be helpful to understanding the results.

Economic Assessment Tribunal
Navius Research Report Review

Ministry of Finance

April 22, 2024

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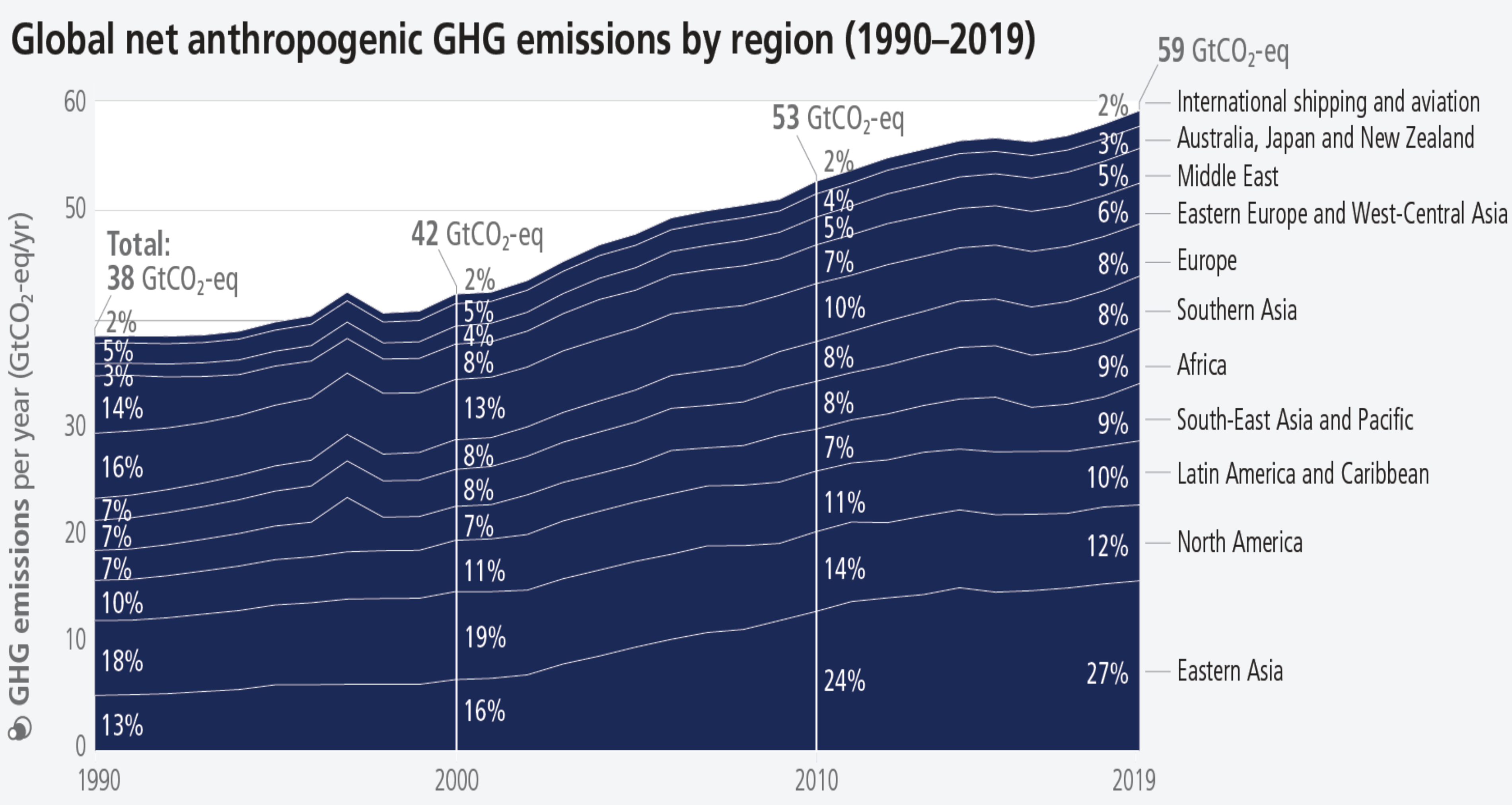
Saskatchewan

GHG Emissions Context



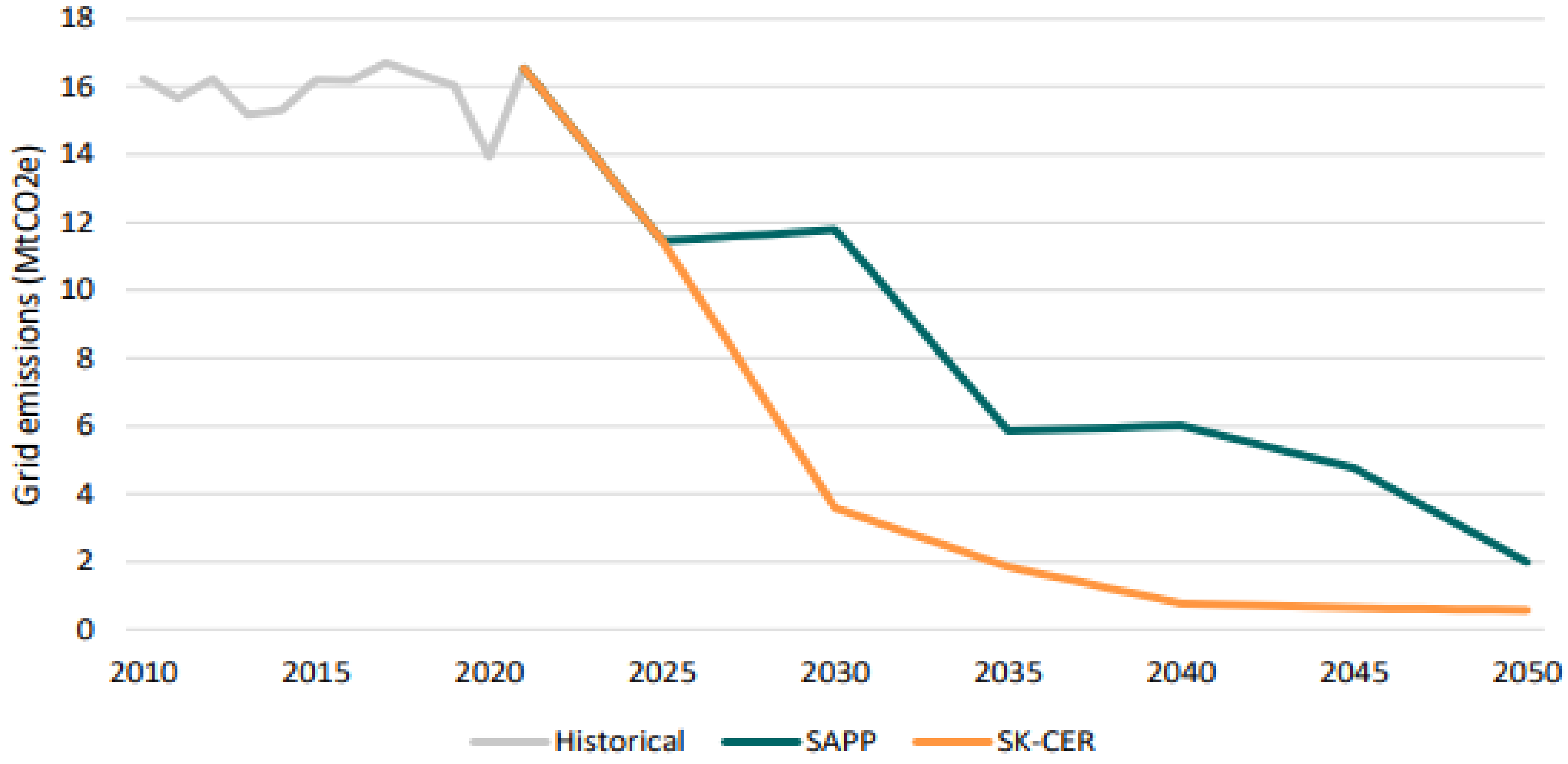
United Nations Intergovernmental Panel on Climate Change, AR6 Synthesis Report Climate Change 2023

- Canada's most recent National Inventory Report states SK's total emissions in 2019 were ~75 Mt CO_2-eq, or ~0.13 per cent of total global emissions that year.
- SK has among the highest emissions per capita globally, due to several large EITE industries[1] and reliance on fossil fuels for power, heating, transport and machinery.

[1]EITE: Emission-Intensive and Trade-Exposed

SAPP vs. SK-CER Electricity Sector Emissions Summary

Figure 23: Electricity grid emissions under the SAPP and SK-CER, extended to 2050



Annual Reduction from 2015 Emission Level:

- SK-CER: 14 Mt (by 2035)
  15 Mt (by 2050)
- SAPP: 10 Mt (by 2035)
  14 Mt (by 2050)

Annual Emissions Difference (SAPP minus SK-CER):

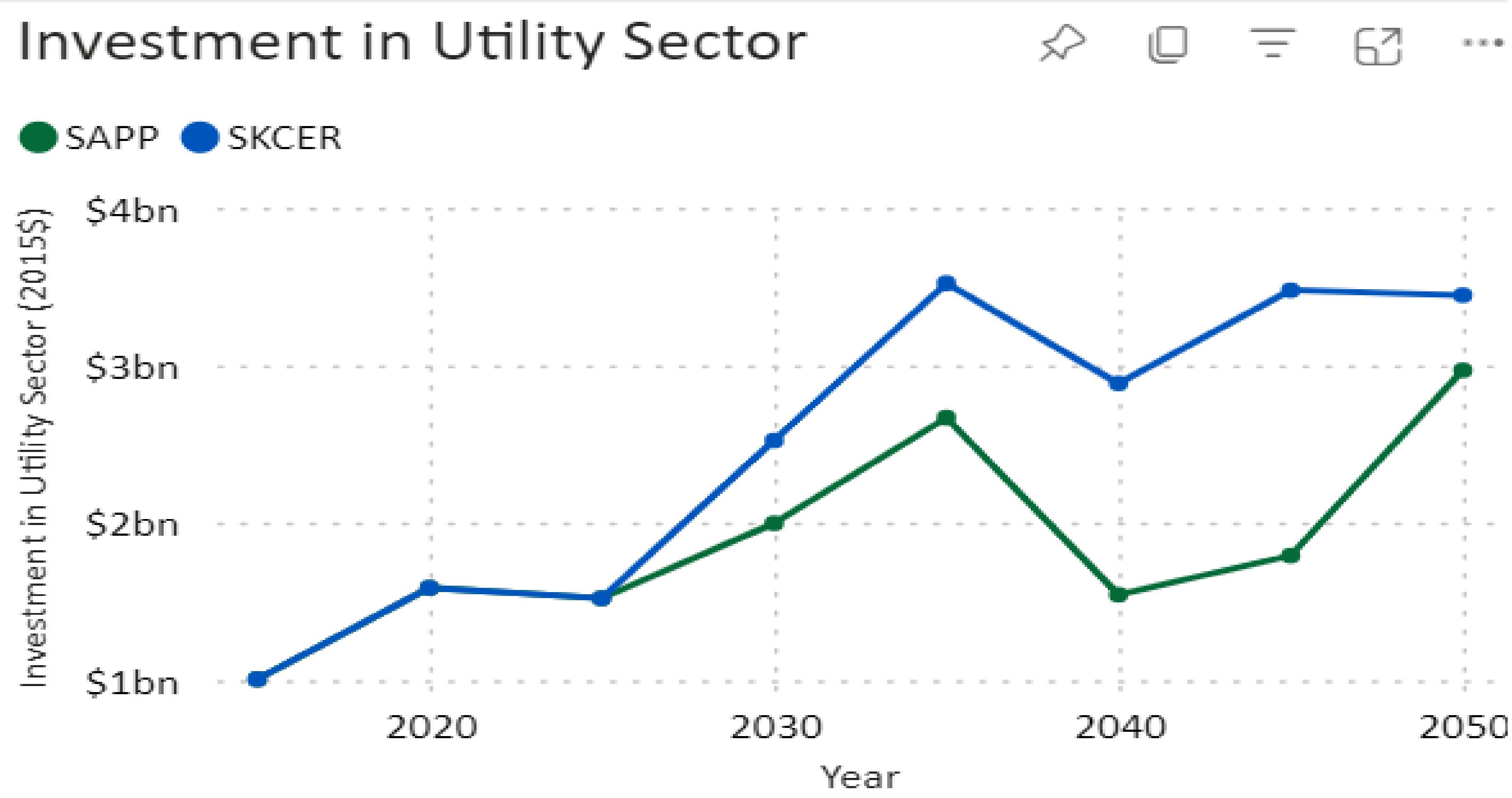
- 4 Mt (2035)
- 1 Mt (2050)

Cumulative Difference (SAPP minus SK-CER):

- 53 Mt (2026-2035)
- 59 Mt (2036-2050)

Note: All values reflect Ministry of Finance calculations based on the full data set for the report prepared by Navius Research. Values may vary slightly from the report due to differences in the treatment of cogeneration emissions.

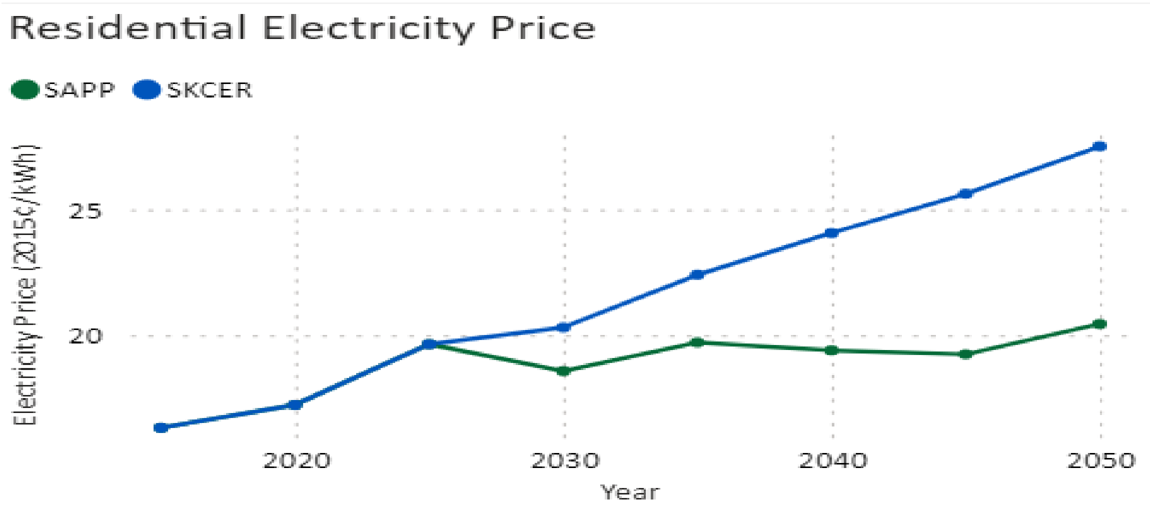
SAPP vs. SK-CER Utility Sector Investment Summary

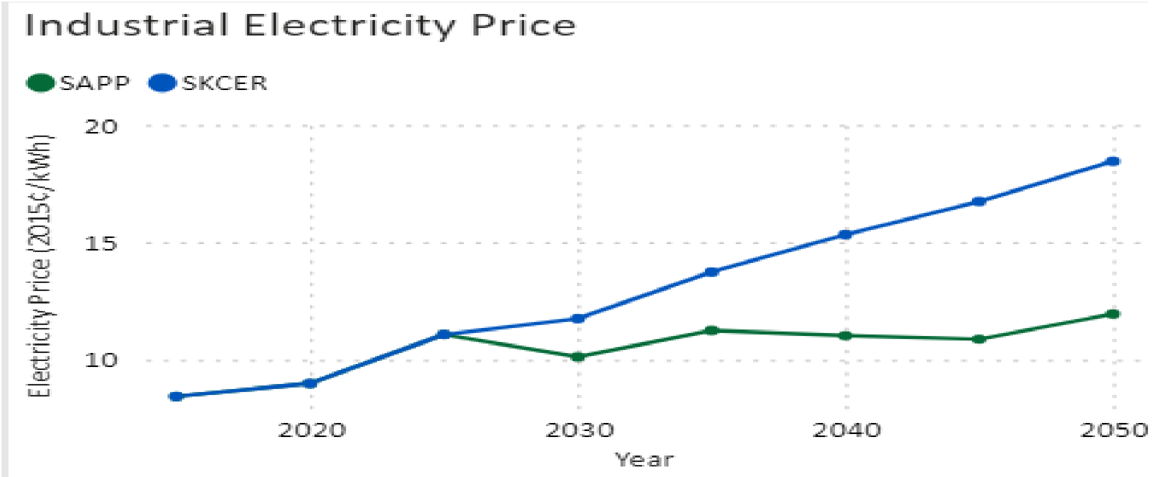


- SK-CER Cumulative Investment:
  - $23.5B (2025-2035)
  - $39.3B (2036-2050)
  - $62.8B (Total)
- SAPP Cumulative Investment:
  - $18.6B (2025-2035)
  - $24.7B (2036-2050)
  - $43.3B (Total)
- Difference (SK-CER minus SAPP):
  - $4.9B (2025-2035)
  - $14.6B (2036-2050)
  - $19.5B (Total)

Note: All values reflect Ministry of Finance calculations based on the full data set for the report prepared by Navius Research.

SAPP vs SK-CER Electricity Prices Summary





Note: All values reflect Ministry of Finance calculations based on the full data set for the report prepared by Navius Research.

- Electricity prices are significantly higher under SK-CER than SAPP.

SK-CER electricity prices in 2035, compared to SAPP ($2022):

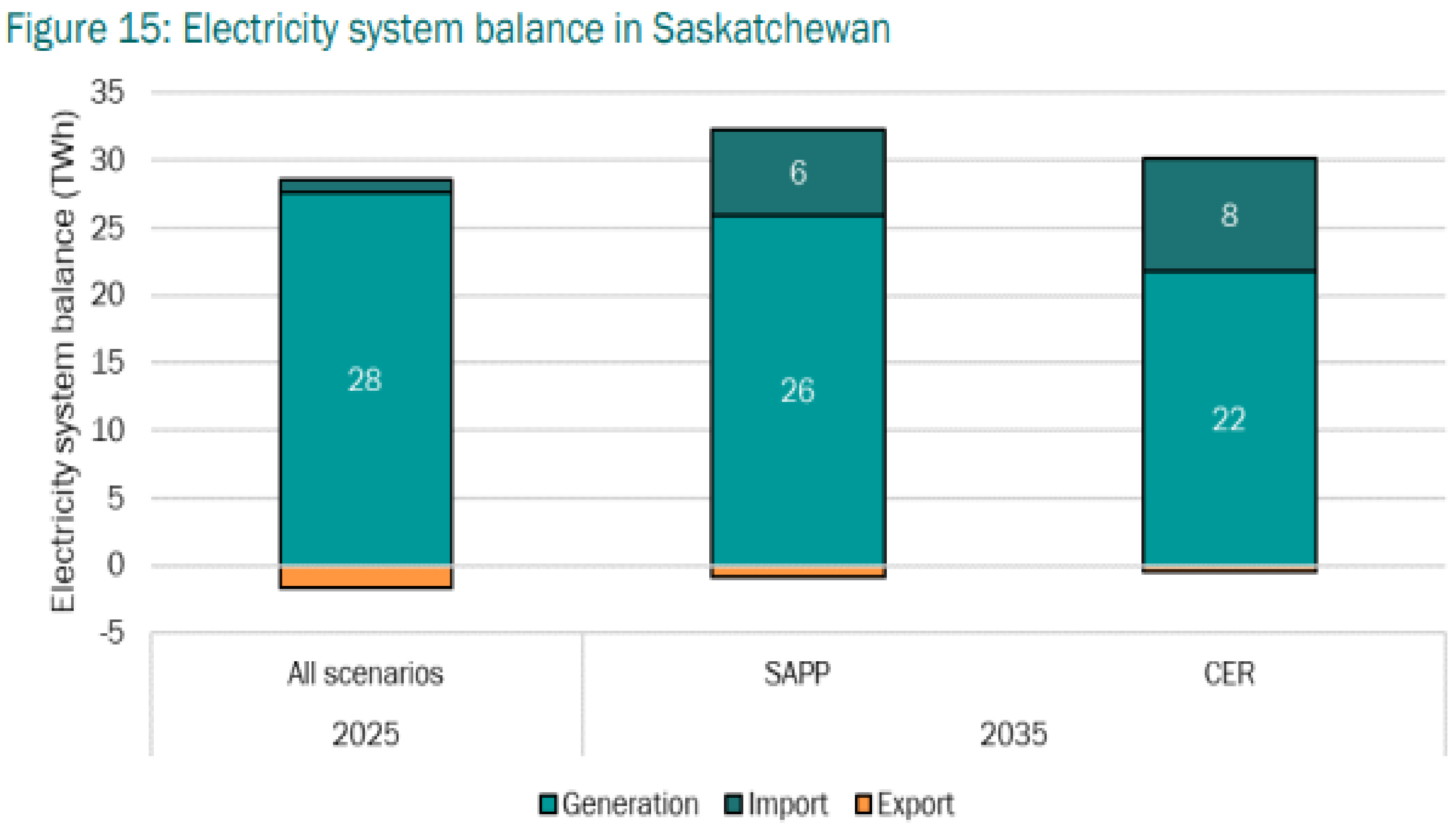
- Residential: 14% or 3.1 ¢/kWh higher
- Commercial: 18% or 3.0 ¢/kWh higher
- Industrial: 22% or 2.9 ¢/kWh higher

SK-CER electricity price in 2050, compared to SAPP ($2022):

- Residential: 35% or 8.1 ¢/kWh higher
- Commercial: 45% or 7.8 ¢/kWh higher
- Industrial: 54% or 7.5 ¢/kWh higher

Note: SaskPower estimates larger price increases.

SAPP vs. SK-CER Electricity System Balance Summary



- *"In 2035, domestic electricity generation is lower under the SK-CER relative to the SAPP. Reduced generation is due to both lower domestic consumption and an increased reliance on imports".*
- *"Relatively cheaper electricity from the U.S. offsets some domestic generation in SK… Inflation Reduction Act policies in the U.S. help to lower the marginal cost of generation".*

SAPP vs. SK-CER GDP Summary

GDP (Billion C$2015)	Cumulative (SK-CER Minus SAPP) (2025-2035)	(2025-2050)
Total	-7.1	-26.8
Agriculture & Forestry	-1.5	-5.9
Construction	+0.1	+1.3
Manufacturing	-0.1	-1.7
Mining	-2.3	-9.2
Oil & gas	-1.2	-5.9
Services	-4.8	-25.5
Transportation	+0.4	-0.3
Utilities	+2.2	+20.4

- Lower growth is wide-spread, impacting almost every sector.

Cumulative GDP Loss (SK-CER minus SAPP):

- -$7.1B (2025-2035)
- -$26.8B (2025-2050)

Note: All values reflect Ministry of Finance calculations based on the full data set for the report prepared by Navius Research.

SAPP vs. SK-CER Jobs and Households Summary

Employment (FTE)	SK-CER Minus SAPP (Year 2035)	SK-CER Minus SAPP (Year 2050)
Total	**-4,164**	**-9,352**
Agriculture & Forestry	-245	-125
Construction	+871	+641
Manufacturing	-973	-1,228
Mining	-483	-851
Oil & gas	+13	-253
Services	-2,877	-5,634
Transportation	-350	-317
Utilities	-120	-303

Indicator	Cumulative (SK-CER Minus SAPP) (2025-2035)	Cumulative (SK-CER Minus SAPP) (2025-2050)
Household-Total Consumption (billion C$2015)	-3.5	-19.9
Household-Consumption Per Household (C$2015)	-6,843	-34,022

Note: All values reflect Ministry of Finance calculations based on the full data set for the report prepared by Navius Research.

- Slower job growth is wide-spread across the economy.

Full-Time Equivalent Employment Loss (SK-CER minus SAPP):

- ~4,200 lower in 2035
- ~9,400 lower in 2050

Household Cumulative Consumption Reduced (SK-CER minus SAPP):

- -$3.5B (2025-35)
- -$19.9B lower (2025-2050)

Economic Impacts Summary

1. **SK-CER requires more investment in the utility sector than SAPP**
   - $4.9B increase in cumulative utility sector investment under SK-CER from 2025 to 2035; and $19.5B from 2025 to 2050

2. **Electricity costs increases more under the SK-CER than SAPP**
   - $241 annual increase for residential ratepayers by 2035; and $630 increase by 2050
   - $888 annual increase for commercial ratepayers by 2035; and $2,340 increase by 2050
   - $1,429 annual increase for smaller industrial ratepayers by 2035; and $3,750 increase by 2050
   - $1M to $10M annual increase for larger industrial ratepayers[1] by 2035; and $3M to $28M increase by 2050

3. **SK's economy grows slower under the SK-CER than SAPP**
   - $7.1B cumulative reduction in GDP growth under SK-CER from 2025 to 2035; and $26.8B from 2025 to 2050
   - ~4,200 fewer jobs in 2035 under SK-CER compared to SAPP; and ~9,400 fewer by 2050
   - Lower growth and output is wide-spread across all industries, except utilities and construction

4. **Households reduce consumption more under the SK-CER than SAPP**
   - $3.5B cumulative reduction in household consumption from 2025-2035 under SK-CER, compared to SAPP; and $19.9B cumulative reduction from 2025 to 2050

5. **Carbon/investment leakage risks appear more acute under the SK-CER than SAPP**

[1]Assumes a very large power customer uses 3,060,000 to 30,600,000 kWh per month as reported "2023 Comparison of Electricity Prices In Major North American Cities" published by Hydro-Quebec. Saskatchewan has some industrial users that consume significantly more than the high end of this range. Values for 2025 stated in 2022 dollars and values for 2050 stated in 2015 dollars

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Supplementary Slides

Large Industrial Electricity Customer Impacts Summary

Industrial Electricity Customer Class

- Over 120 customer accounts in Saskatchewan
- Annual electricity consumption levels vary significantly across this customer class
  - The average annual consumption in this customer class is 80 million kWh (2022-23)
  - Most industrial customers in Saskatchewan use between 36 million kWh and 367 million kWh per year However, the largest industrial customers use two to three times more electricity annually compared to the top of this upper range annually
    - Note: SaskPower considers specific customer electricity consumption data to be commercially-sensitive

Cost Impacts under SK-CER compared to SAPP ($2022)

- **For Most Industrial Customers**: an annual cost increase of $1M to $10M for industrial ratepayers[1] by 2035; and $3M to $28M annually by 2050
- **For the Largest Industrial Customers**: an annual cost increase of $15M to over $29M for the largest industrial customers by 2035; and $38M to over $75M annually by 2050

[1]Assumes a very large power customer uses 3,060,000 to 30,600,000 kWh per month as reported "2023 Comparison of Electricity Prices In Major North American Cities" published by Hydro-Quebec. Saskatchewan has some industrial users that consume significantly more than the high end of this range. Values for 2025 stated in 2022 dollars and values for 2050 stated in 2015 dollars

Per Household Cost of Living Impacts Summary

Navius Research Report Figures: Household Consumption Expenditures

- In 2035, under the SK-CER compared to SAPP, an average Saskatchewan household will have $1,350 less to spend on all non-electricity life essentials, like groceries, transportation, and housing
  - This figure reflects the combined relative less overall household consumption (-$1,074 per household) and higher household electricity expenditures (+$276 per household) (in 2022$)

- Note: Household consumption expenditures include:
  - **Durable goods** (mortgage, automobiles, furniture, household appliances, and electronics)
  - **Semi-durable goods** (clothing, footwear, jewelry, toys, tools, and household textiles and utensils)
  - **Non-durable goods** (food, beverages, motor fuels, electricity, gas, and other consumable goods)
  - **Services** (rent, restaurant meals, and various personal services)

Per Household Cost of Living Impacts Summary

SaskPower Figures: Household Consumption Expenditures

- SaskPower expects a faster/higher increase in electricity prices, with a nominal increase of 110% from 2025 to 2035 under SK-CER. The comparable increase from the Navius Research Report, in nominal terms, is 39% from 2025 to 2035
- If nominal prices increase by 110% from 2025-2035, it is estimated that in 2035 the average Saskatchewan household will have $2,040 less (in 2022$) for all non-electricity life essentials, like groceries, transportation, or housing, under SK-CER compared to SAPP
  - This includes the combined impact of relatively less household consumption (-$1,623 per household) and relatively higher household electricity expenditures (+$417 per household) (in 2022$).

Electricity Price Comparison, Navius and SaskPower

Price: cents/kWh Change (2025-2035): %	Navius		SaskPower	
	Price	**Change**	**Price**	**Change**
Price in 2035 (nominal)	33.3	39%	41.1	110%
Price in 2035 (2022$)	25.7	14%	31.8	72%

Notional Provincial Revenue Impact Context

Total Provincial Own-Source Revenue[1]

- Historical data (1990-2023) suggests that for every $1 decrease in provincial GDP, the Government of Saskatchewan's total own-source revenue typically decreases by about 15 cents.

- Navius Research's principal scenario analysis of SK-CER compared to SAPP estimated (all figures in $2015):
  - SK's GDP in 2035 is $900M lower under the SK-CER compared to SAPP.
    - As such, using the historical correlation between provincial GDP and provincial own-source revenue listed above, this would be estimated to result in approximately $135M less in provincial own-source revenue.
  - SK's cumulative GDP between 2026 and 2035 is estimated to be $7.1B lower under the SK-CER compared to SAPP.
    - As such, using the historical correlation between provincial GDP and provincial own-source revenue listed above, this would be estimated to result in approximately $1.1B less in provincial own-source revenue.

[1]Total provincial own-source revenue refers to the Government of Saskatchewan's combined revenue sources, excluding transfers from the federal government.

Linde Canada Inc.
5015 Spectrum Way, Suite 500,
Mississauga, Ontario,
L4W 0E4

March 12, 2024

Mr. Ken Dueck
Executive Director
Economic Impact Assessment Tribunal
Secretariat Office

Dear Mr. Dueck:

On behalf of Linde Canada Inc., I am writing in response to a letter received on January 31st, 2024, from the office of the Economic Impact Assessment Tribunal. As we understand the objectives of the letter, your office has invited Linde Canada Inc. to share information on the impacts to our operations under the federal government's proposed *Clean Electricity Regulations*. We support the efforts of the Government of Saskatchewan in understanding the effects of high utility rates. We share the concern that rising utility rates in the future would impact investment decisions. However, we are not in a position today to forecast the impact of our current operations under the scenario of an increase in rates as presented in the letter.

Thank you for all your efforts in working to understand the manufacturing sector and how policy can impact business decisions. We would be open to more communication if you have any additional questions.

Sincerely,

Eric Mackenzie
Vice President of Merchant and Onsite
Linde Canada Inc.
Tel: (416) 729-5936
Email : Eric.Mackenzie@linde.com

1001 Main Street
PO Box 562
Kindersley, SK S0L 1S0
P (306) 460-5410

March 1st, 2024

Ken Dueck
Executive Director
Economic Impact Assessment Tribunal Secretariat
1001 – 1874 Scarth Street
Regina, SK, S4P 4B3

Re: The Impacts of the Proposed Clean Electricity Regulations on Longhorn Oil & Gas Ltd.'s Operations

We are very thankful to have the opportunity to submit and respond to the tribunal on this very important topic and are also very appreciative that the tribunal has been set up and is now operating. The future of the entire province is at risk, not just the oil and gas industry. As you are well aware, the oil and gas sector represents a cornerstone of the Saskatchewan economy, contributing significantly to employment, provincial GDP, and government revenues through royalties and taxes.

The anticipated utility rate increase of 107% by 2035 poses a significant challenge for the industry as a whole but, even more so for older fields that move significant amounts of water. These fields generally have a flatter production profile with long life reserves; however, they are extremely economically sensitive to higher power prices. This memo outlines the potential impacts the utility rate hike would have on Longhorn Oil & Gas Ltd. (Longhorn) and its surrounding communities, including Coleville, Dodsland, Kerrobert, Kindersley, and Luseland, and surrounding rural municipalities.

The sector is a major employer and a critical source of economic activity, driving both direct and indirect job creation throughout the province.

Longhorn currently produces oil and gas at three properties (referred to as Buffalo Coulee, Northern Blizzard, and Smiley.) All industry players will undoubtedly agree that utility costs are one of the most significant operational expenses.

Longhorn's income statement in 2023, shows utility expenses totaling $3.75M. This accounted for 26.25% of total operational costs. The estimated utility increase would cause utility expenses to rise to $7.78M annually, accounting for 42.43% of operational costs (see Appendix A). This would drastically decrease Longhorn's profitability.

As the Northern Blizzard (NB) property utilizes the most power of any Longhorn property (11.9 million KwH annually), I would like to highlight the impact the proposed rate increase

1001 Main Street
PO Box 562
Kindersley, SK S0L 1S0
P (306) 460-5410

would have on this property alone (see Appendix B). In 2023, utility expenses associated with the NB property were $2.85M. All other things held equal, a 107% utility increase results in operational expenses more than doubling (by $3.0M). This unreasonable increase eliminates the profitability of the entire NB property and would cause any sensible business owner to question the financial viability of the asset. Moving from a $785K profit to a $1.95M loss would push this property to abandonment status.

Still isolating the NB property, I would like to highlight how abandoning this property would impact various stakeholders including the government, third party vendors, employees, and surrounding communities.

As are all of our production assets, NB is a vital source of **royalties and taxes**, essential for funding public services and infrastructure. In 2023, NB's share of **federal/provincial tax, SK corporate capital tax, royalties and various Ministry of Energy and Resources levies** was approximately **$500,000.00.**

This reduction in revenue would have negative impacts to the local and provincial economy. Reducing the ability to fund public services, infrastructure projects, and social welfare programs. Those types of revenue streams are very hard to replace. Increased taxation or spending cuts on public services and infrastructure not viable options as Saskatchewan already has a competitive disadvantage being next door to Alberta (no PST and huge oil & gas reserves).

This sets us on a path to having long-term negative effects on economic growth and quality of life here in the province. For example, cuts in education funding can affect workforce quality, and reductions in infrastructure spending can hinder economic efficiency and overall competitiveness.

Our federal government addresses tax revenue shortfalls by borrowing. This is not a long-term solution. In March 2023, the Federal government debt reached $1,423.3B (USD), and while borrowing can help maintain spending levels in the short-term, interest rates are at a 20-year high. Debt service charges are now among the costliest line items in the federal budget.

In 2023, Longhorn paid approximately $7.1M to third party vendors which included contract operators, service providers and rural municipalities. The elimination of these expenses as previously mentioned, would have a ripple effect on the local economy, affecting many other businesses and services.

For example, there are **five** contract operators responsible for ensuring the NB property is running efficiently **($915,000.00)**. All would lose their contracts with Longhorn if the NB

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property were abandoned. Other notable expenses that would be eliminated include surface lease payments to landowners **($460,000.00),** property taxes paid to rural municipalities **($560,000.00),** repairs and maintenance **($1,750,000.00)** and well servicing contracts **($950,000.00)**.

Eliminating these expenses would cause indirect job losses, affecting local businesses such as retail stores, restaurants, and service providers, leading to further economic downturns within Longhorn's surrounding communities.

Not only would indirect jobs be lost if the NB property were abandoned, direct jobs too. Without this property, Longhorn would resort to layoffs as the staffing mix would be over capacity. In addition to lower morale among remaining employees, the layoffs have negative implications for consumer spending. The loss of income for the individuals would lead to reduced consumer spending. Local businesses rely on consumer demand, potentially leading to further job losses. Unemployment often leads to increased government spending on social welfare programs such as employment insurance benefits, welfare assistance, and healthcare. This adds pressure to government budgets/spending, and may require increased borrowing, which I have already addressed above as unfeasible.

Historically, **Longhorn** has been a generous contributor to its surrounding communities. In 2017, Longhorn committed **$1,000,000.00** over five years to one of the largest construction projects in Kindersley's history - the Kindersley Aquatic Centre.

Companies facing financial strain due to increased costs will cut back on their community involvement and charitable contributions as they prioritize core business operations and financial health.

There will be a shift in focus strictly to survival and efficiency, moving resources away from charitable causes to core business operations. This can have a significant impact on the local community, especially for organizations that rely heavily on corporate sponsorship to operate such as local food banks, crisis centres, and youth programs. Drastically increased utility expenses would lead to a significant reduction in community involvement and support, affecting not just the immediate beneficiaries of such efforts but also the broader socio-economic fabric of the community.

The projected increase in utility rates presents a formidable challenge for Saskatchewan's oil and gas sector. The local economy is interconnected, and money spent by employees, companies, and government circulates through various channels. When a company cuts expenses significantly, it not only affects those directly involved but also indirectly impacts businesses and individuals throughout the local economy due to reduced spending. This multiplier effect amplifies the economic impact of the initial expense reductions.

1001 Main Street
PO Box 562
Kindersley, SK S0L 1S0
P (306) 460-5410

While eliminating expenses associated with the NB property would be necessary under the proposed *Clean Electricity Regulations* for Longhorn to remain competitive and financially viable, the broader implications on the local and provincial economy are profound and cannot be overstated!

Current and future employment, local business, government revenues and overall economic health and prosperity of my community and honestly the whole province are at stake.

In summation, I would like to state that Longhorn (being a private, small Saskatchewan operated producer) runs as efficiently as ANY in the province, perhaps Western Canada. If we are unable to operate, I suggest no one can.

We (as have all of us in our industry) have strived and met the "ever changing" emissions regulations reduction targets and in many cases have surpassed them. We know the importance of providing clean and sustainable energy products. Saskatchewan, Alberta, Canada for that matter is leading the world on this front.

We need the world to buy more of our ethically and environmentally produced oil & gas products. Not less. These electrical generation regulations will make it impossible to compete with the likes of the Saudis, Iranians, and Russians.

In my opinion, these regulations will be a death blow to the oil & gas industry here and rural Saskatchewan die along with it. Furthermore, global emissions will rise when the Canadian industry is dead and the continuing demand for oil and gas is backfilled by the aforementioned jurisdictions.

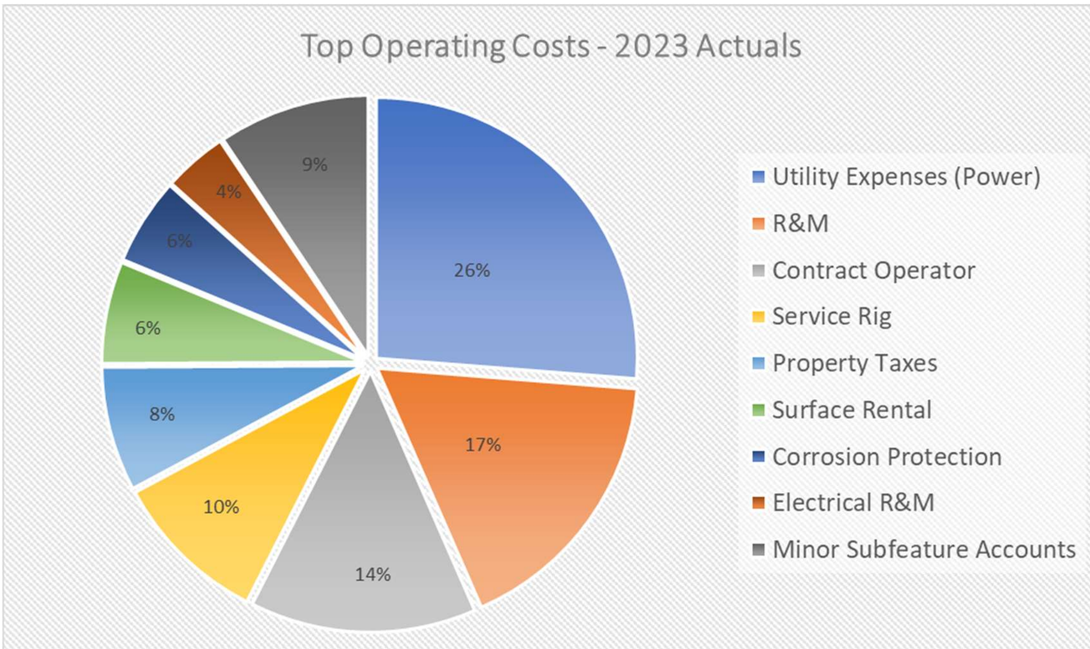
So, what have we actually accomplished? Thank you for your consideration in this extremely important matter.

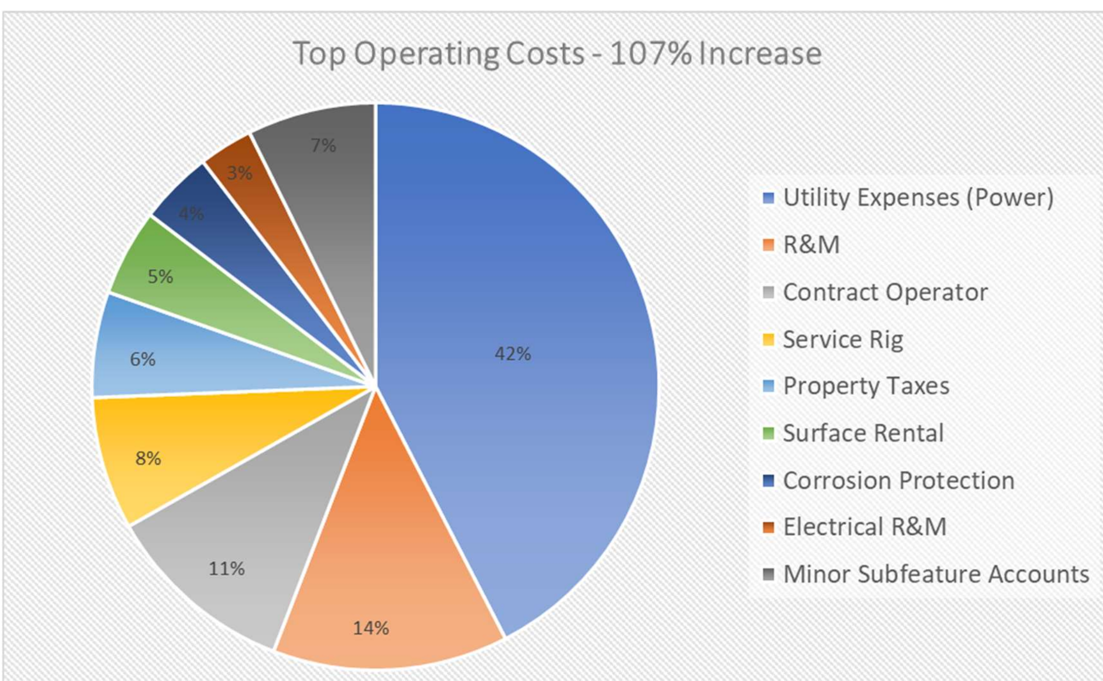
Sincerely,

Gary Becker
President/CEO
Longhorn Oil & Gas Ltd.

1001 Main Street
PO Box 562
Kindersley, SK S0L 1S0
P (306) 460-5410

Appendix A: Top Operating Costs





LONGHORN OIL & GAS

1001 Main Street
PO Box 562
Kindersley, SK S0L 1S0
P (306) 460-5410

Appendix B: Northern Blizzard Property Profitability

	Northern Bilzzard 2023 Actuals	Northern Bilzzard 107% Increase	Difference
Total Sales	10,565,293	10,565,293	-
Total Royalities	549,779	549,779	-
Total Cost of Goods Sold	8,407,379	11,447,785	3,040,406
Gross Margin	1,608,135	- 1,432,271	- 3,040,406
	15.22%	*-13.56%*	
Payroll Expenses	487,322	487,322	-
Total General & Admin. Expenses	26,308	26,308	-
Net Income (Loss) Before Income Tax	1,094,504	- 1,945,902	- 3,040,406
	10.36%	*-18.42%*	
Income Tax	310,701	-	
Net Income	783,803	- 1,945,902	- 3,040,406
	7.42%	*-18.42%*	

Louis Dreyfus Company

Louis Dreyfus Company Canada ULC
525 - 11th Avenue SW, Suite 500
Calgary, Alberta T2R 0C9

Canada

March 1, 2024

Ken Dueck, Executive Director
Economic Impact Assessment Tribunal Secretariat
Submitted via email: ken.dueck3@gov.sk.ca

Re: Saskatchewan Economic Impact Assessment Tribunal
Review of the draft federal *Clean Electricity Regulation* (CER)

Dear Mr. Dueck:

Louis Dreyfus Company Canada ULC (LDC) is pleased to provide its perspective on the future of electricity in Saskatchewan as part of the Economic Impact Assessment Tribunal's review process.

LDC is a leading merchant and processor of agricultural goods. Founded in 1851, we operate in over 100 countries. Since 2009, LDC has been operating multiple facilities in Saskatchewan, employing hundreds of people – and we are excited about expanding here. The expansion of our Yorkton canola processing complex, announced in 2023, and the construction of a pea protein isolate plant, announced earlier this year, will create jobs as well as food and energy products, positioning Saskatchewan as a strategic feedstock provider to value-added food and renewable energy producers.

LDC's Saskatchewan sites are industrial facilities and large electricity customers. Operating competitively and – more importantly – operating safely, depends on reliable electricity service. Electricity is a major cost input for our business. As such, LDC has been following the development of the CER with interest.

LDC is committed to the development of sustainable energy practices and is supportive of efforts to decarbonize the electricity grid in Canada. At the same time, LDC shares the concerns raised by the Tribunal of potential energy cost increases. As LDC sells its products into global markets, such cost increases cannot be passed down the value chain and will be borne by Saskatchewan businesses. Equally, it has been suggested that measures the CER could require ahead of 2035 may make the electricity grid less reliable during periods of stress, such as recent cold spells. That is also a concern as we have designed our facilities to operate as efficiently as possible. We chose Saskatchewan because of its robust capability to provide production inputs, including energy.

March 1, 2024
Page 2

LDC appreciates that significant consultation has taken place, and that key changes have and will be made to the initial version of the CER. Going forward, it will be important to accommodate the unique circumstances of provinces like Saskatchewan, so that its electricity grid continues to reliably deliver competitively priced electricity, and in turn helps businesses like LDC leverage the unique strengths of the province in the global marketplace.

Yours truly,

Brian Conn

Country Manager
Louis Dreyfus Company Canada ULC

Métis Nation
Saskatchewan

March 6, 2024

Executive Director Ken Dueck
Economic Impact Assessment Tribunal Secretariat
1100 – 1874 Scarth Street
Regina, SK
S4P 4B3
ken.dueck3@gov.sk.ca

Dear Executive Director Dueck,

Re: MN-S Submission on Canada's proposed Clean Electricity Regulations

The Métis Nation-Saskatchewan ("MN-S"), as the government representing Métis citizens in Saskatchewan, welcomes the opportunity to provide this Tribunal with its concerns on the proposed Clean Electricity Regulations ("CER").

There is an urgent need to address climate change and the role of the utilities sector in both contributing to and mitigating greenhouse gas emissions. While the MN-S is supportive of the overarching objectives of the CER, it has reservations about how it will ultimately affect affordability—particularly for our most vulnerable citizens.

Many communities in Northern Saskatchewan are primarily composed of Métis citizens. These regions have little-to-no access to natural gas and are often the most impacted by rate increases and the most threatened by climate change. For these ratepayers, one of the only feasible alternatives to natural gas is resistive electrical heating, which requires longer heating times and higher energy costs, putting low-income households at an even greater disadvantage.

Homeowners and tenants using electrical heating in communities like Cumberland House and Ile-a-la-Crosse often receive monthly bills in excess of $600. For other homes using diesel, costs can be as high as $1,300 for just a few months of heat (depending on the quality of the home's insulation, which is frequently substandard). It would be hard for anyone limited to cost-prohibitive electricity such as this to see the promise of an affordable, reliable, net-zero grid as anything but a pie-in-the-sky notion.

Each year, the MN-S provides substantial funding to support low-income Métis citizens who are unable to afford these rates. Many of these individuals earn less than $12,000 per year, and without support from the Nation, would be at risk of eviction or homelessness. We recognize this rate sensitivity is not justification for delaying efforts to reduce carbon emissions, but we must acknowledge its reflection of broader historic and economic patterns. For example, the dependence on more expensive electrical heating is a major contributor to the enduring economic disparity between northern and southern Saskatchewan. Any substantial rate increase caused by the CER would affect livelihoods and welfare, exacerbating existing economic disparities; the increase the Government of Saskatchewan is anticipating would cripple these communities.

While affordability is one of the pillars of the CER, it does not explicitly state how costs will be managed in areas like northern Saskatchewan; locations which not only lack infrastructure but also have a lower customer density. Likewise, the CER is vague on accountability measures for missing reduction targets and is silent on how Canada intends to work with other levels of government (including Indigenous governments) to achieve its goals. While the CER includes lofty platitudes toward Indigenous peoples, noticeably absent is a detailed plan for how Canada intends to help Indigenous communities and stakeholders participate in growing the green economy.

The transition to any net-zero, clean-energy framework will require significant capital expenditure for the infrastructure necessary to generate, transmit, and reliably distribute green energy. This is the primary reason for the projected increase in rates, but it has the potential to provide significant opportunities for growing the green economy and creating new investments and job opportunities (particularly with Saskatchewan's status as a jurisdiction with one of the most carbon-intensive electricity grids in Canada).

The MN-S and its citizens are an integral part of Saskatchewan's socio-economic fabric, and they can play a vital role in the transition to a green economy. The shift will require a broad range of skills and disciplines, from the initial construction of green-energy facilities like wind and solar to ongoing operation and maintenance. Unfortunately, Métis citizens often face barriers when trying to access these opportunities or take part in the benefits of new investment. The consequence of the historic failure to recognize Indigenous jurisdiction is that the Métis are frequently blocked from economic integration, left out of the decision-making process, or excluded from broader participation altogether. A commitment to provide a more Métis-inclusive approach to training, development, and procurement opportunities would ensure the Métis workforce is well-equipped to participate in this new economy—not just as laborers but as skilled professionals, equity-owners, and leaders in the field. Given the values and strategic priorities of the MN-S, every one of its construction projects is engineered to be net-zero ready. The Nation will be looking for partnership opportunities in green-energy production.

Any implementation of the CER must consider the disproportionate impacts to our northern and remote communities, and it must also consider the historic exclusion of Métis citizens from decisions that have had a direct impact on their lives. Properly costed funding must be committed to support skills training opportunities and programs that promote and facilitate meaningful Métis participation in the economy.

It is also critical to develop a comprehensive plan for mitigating the risk of vulnerable and marginalized communities bearing a disproportionate share of the transition costs and higher rates. One possible method for alleviating this is to offer these communities price certainty when they are equity holders in green energy projects. This certainty should not be limited to the duration of Power Purchase Agreements (PPAs) but should extend over the life of the assets involved. Such a measure would not only provide financial stability for these communities but also encourage their active participation in projects by mitigating long-term financial risks.

While the Métis Nation remains supportive of the drive to reduce emissions and move Saskatchewan to a green economy, it is clear that the CER, as currently drafted, leaves more questions than answers. To fully support these regulations, all levels of government must work together to provide predictable funding for skills training, to bolster the economic participation of Indigenous peoples, and to avoid transitioning to a green economy at the expense of our most vulnerable citizens. As stated in Thomas Isaac's MSR report on reconciliation with the Métis: "*Reconciliation is more than platitudes and recognition. Reconciliation flows from the constitutionally protected rights of Métis protected by Section 35 and is inextricably tied to the honour of the Crown, and must be grounded in practical actions.*"

We look forward to continuing to work with both the Economic Impact Assessment Tribunal and the Government of Saskatchewan to ensure a prosperous province for all.

Yours sincerely,

Matthew Vermette
Chief Operating Officer
Métis Nation-Saskatchewan

The Mosaic Company
1700 – 2010 12TH Avenue
Regina, SK S4P 0M3
www.mosaicco.com

February 21, 2024

Economic Impact Assessment Tribunal
Secretariat Office
1100-1874 Scarth Street
Regina, Canada, SK S4P 4B3

Sent via e-mail

RE: ECONOMIC IMPACT ASSESSMENT TRIBUNAL – FEDERAL CLEAN ELECTRICITY REGULATIONS

Dear Executive Director Ken Dueck:

Thank you for this opportunity to provide a submission to the **Economic Impact Assessment Tribunal** regarding the Government of Canada's proposed **Clean Electricity Regulations (CER)**.

The Mosaic Company produces millions of tonnes of potash annually that is used in fertilizer to help grow healthy crops around the world. Mosaic operates three facilities and a business office in Saskatchewan. Our flagship Esterhazy Complex is now considered the world's largest potash operation, capable of producing 7.8M tonnes of potash annually. Mosaic's Belle Plaine facility is the world's largest potash solution mine, delivering over 2M tonnes of high-quality product for agriculture and industrial uses. Our Colonsay facility near Saskatoon offers swing-production capacity.

Mining and processing potash is an energy-intensive endeavor, despite using best available technologies and equipment. Most of the emissions are generated during processing when the product needs to be heated and dried. Natural gas is used to power burners and boilers that remove water and dry the granular potash particles that can be shipped and later placed on farmer's fields.

In 2021, The Mosaic Company set a **2040 company-wide net zero goal**. This is one of the most ambitious and aggressive targets in the industry. To reach our goal, greening the provincial grid is essential. Some of our decarbonization plans also require transitioning from carbon-based fuels to cleaner electricity sources. We expect greater power demands in the future – along with many others in the industry.

Equally important is the ability to do this affordably while ensuring power reliability and availability. Mosaic's facilities run 24/7/365. For example, this past summer, when SaskPower was facing a stretch of high temperature days combined with key assets being offline, Mosaic was forced to stagger power usage at facilities or to avoid operating during peak power times. Reliable base-load power is essential to meet operational demands. Fast-tracking the transition to new, untested sources of power in the province during more frequent extreme temperatures and higher demand raises concerns.

Losing power – whether for five minutes or five hours – is very impactful to our operations. Restarting facilities takes considerable time and can pose safety hazards with mine personnel and underground ventilation. Power losses cause rippling production implications. It takes around eight hours to get back to steady operation following an outage. For example, during a one-hour power outage at our Esterhazy Complex, we could lose up to 930 product tonnes per hour. When adding in the restart time – the total loss could be over 4,600 tonnes (valued at around $1.3M).

The Mosaic Company, along with all potash producers in the province, are part of a global market where the price for potash is set by supply and demand. Saskatchewan producers compete with aggressive and ever-expanding competition in Russia, Belarus, and China. Producers are measured primarily by their costs. Global farmers are typically less concerned about where product comes from, focusing more on availability and price.

Competitors in Eastern Europe play by a very different set of rules – receiving government subsidies for power/energy, low taxes, cheap labour and very few environmental regulations. They are also location advantaged, transporting product shorter distances to reach key growing regions like China, Brazil and India compared to land-locked Saskatchewan. Currency exchange benefits add another layer of advantage to these producers. Despite the ongoing conflict in Ukraine, Russian producers have returned to near-normal production rates pre-invasion and Belarus could reach 2021 levels this year.

Studies confirm that potash produced in Saskatchewan is made with **50 percent fewer emissions** than product coming from Russia and Belarus. While some of this difference is regulated, much of it comes from responsible choices and investment made by the industry to be more efficient and reduce overall impacts. The Clean Energy Regulations follow previous carbon-related legislation that has already increased costs to industry through required upgrades and the carbon tax. These are one-sided costs that are only penalizing Saskatchewan producers and offer a cost advantage to the competition.

To reduce emissions and the carbon tax burden – and reach the company's own 2040 net zero ambitions, Mosaic is considering options like **Carbon Capture and Storage** and other decarbonization capital investments. Annually, the company invests about half-a-billion dollars in capital simply to keep operations running safely and efficiently. To decarbonize these facilities, massive capital investment is required on top of regular capital expenditures. These expenses will again impact cost per tonne and overall capital dollar availability. Instead of making investments to increase production capabilities, dollars will be dedicated to decarbonization. Industry partners like Fertilizer Canada have detailed the projected costs and technology paths to decarbonizing fertilizer products like potash and cite costs ranging from millions to billions per facility. Possible solutions and their price tags can be found in their Technology Roadmap Study commissioned in 2023.

The Government of Saskatchewan estimates in its **Affordable Power Plan** that the proposed Clean Electricity Regulations (CER) would result in an increase in utility rates for Saskatchewan residents and business of **107% by 2035**.

If this scenario were to occur, Mosaic projects the following estimated potential cost impacts from utility rate increases alone:

- Today Mosaic requires around **600 million kWh** of power across the province, and we expect that consumption rate to rise over time. Modelling shows we could be paying an additional $68M annually for power by 2035.

- Another example would be the power required to hoist ore at our Esterhazy K3 mine. Today it costs just under $400,000 a month to operate – we expect that to more than double under future utility costs.

- In the potash industry, we are measured by our cost per tonne of product made. Today, power makes up **8%** of our cost to produce one tonne of potash, applying the 107% increase would raise the cost to **16%** of our total cost per tonne. This would double today's rate and negatively impact profitability while deterring new investment in Canada.

We expect the Clean Electricity Regulations will pose additional challenges to:

- Ensuring reliable sources of power – whether that be through the provincial grid – or other renewable options being evaluated by the company given the short timeline and capital required to make the transition.

- The availability of goods, services, talent and supplies to transform the grid to reach areas of the province where Mosaic operates and accommodate other parallel regulations, like those mandating higher EV ratios and supply chain capabilities to deliver the specialized technology and infrastructure needed.

- Technology readiness for implementation and use of renewable power options on this aggressive timeline.

- Overall affordability for residents who make up Mosaic's workforce. Saskatchewan stands out for its high industry power/energy needs, extreme high and low temperatures, sprawling distance to reach all communities and low population density. Today, the industry needs to recruit talent outside the province and expects that challenge to increase. Affordability remains critical to attracting workers and their families to live and work in Saskatchewan, particularly in rural areas like Esterhazy, where well over half of our 1,900 employees are located.

The Mosaic Company remains committed to being a responsible and sustainable potash producer. Our bold ESG goals – ranging from per tonne emission intensity reductions, to water usage decreases to Indigenous Engagement and diversity and inclusion goals – demonstrate that we are a progressive company and are evolving to meet the demands and expectations of our many stakeholders.

Yet, we still have a noble mission: **to help the world grow the food it needs**. Without delivering the product tonnes to the farmers who need to grow food to feed us all, we simply won't exist. The ability for potash production to continue in Saskatchewan for future generations depends on the industry's ability to compete. Commodity markets are volatile and unpredictable, controlling costs is one of the only counter measures.

With every new cost burden coming from one-sided environmental regulations, the global competition wins, and high-emission-made product will replace more sustainable Canadian-made potash. There is no premium for greener products, potash is potash to a global farmer today. Global food security is at risk if we make it more difficult for Canadian producers to get potash to market and remain competitive. The question we should be asking ourselves is: who do we want to be in control of our global food security? Those with the competitive edge will win, it's simply how the market works and a reality we must carefully consider.

Thank you for the opportunity to provide comments to the province's Economic Impact Assessment Tribunal. If you have questions or require additional information, please let us know.

Sincerely,

Karen Swager
Executive Vice President, Operations - The Mosaic Company

NorSask Forest Products LP
Kelly Lehoux, General Manager
PO Box 9020
Meadow Lake, Canada S9X 1V7
Email Kelly.lehoux@norsask.ca

Economic Impact Assessment Tribunal
Secretariat Office
1100-1874 Scarth Street
Regina, Canada S4P 4B3

To whom it may concern,

NorSask Forest Products LP is a softwood lumber producer located near Meadow Lake, Saskatchewan that is a key employer in the region that supports hundreds of jobs both directly and indirectly. In addition to being a key employer in the region, NorSask is proud to say that approximately 70% of our employees are of Indigenous ancestry making NorSask a model for Indigenous employment in our industry.

Operating an economically viable sawmill in today's economic climate is challenging with inflationary pressures driving up operating costs with regards to supplies, parts, wages etc. In addition softwood lumber tariffs imposed by the U.S. on Canadian softwood lumber producers negatively impact the bottom line,

It is NorSask's view that an increase to utility rates of 107% by 2035 as estimated in the Government of Saskatchewan's Affordable Power Plan would be yet another hurdle to overcome and would be another significant challenge to our ability to operate when combined with the aforementioned challenges that we already face.

In closing, forestry is vital to the Saskatchewan economy and NorSask appreciates the opportunity to participate in any discussion regarding initiatives that will negatively impact our ability to operate.

Sincerely,

Kelly Lehoux, RSE
NorSask Forest Products
General Manager

Economic Impact Assessment Tribunal | February 14, 2024
Secretariat Office
1100 – 1874 Scarth Street
Regina, Saskatchewan
S4P 4B3

RE: Nutrien's Submission to the Saskatchewan Impact Assessment Tribunal on The Proposed Federal Clean Electricity Regulations (CER)

On behalf of Nutrien and our more than 25,000 employees around the world, I would like to thank you for the opportunity to provide this submission to the Tribunal for your consideration.

About Nutrien

Nutrien is the world's largest provider of crop inputs and services, helping to safely and sustainably feed a growing world. We operate a world-class network of production, distribution and retail facilities that positions us to efficiently serve the needs of growers around the planet. We focus on creating long-term value for all stakeholders by advancing our key environmental, social and governance priorities.

Nutrien is the largest potash producer in the world and the only Canadian company producing this critical mineral at its six mines across the province of Saskatchewan. Nutrien's Potash, the potassium compound essential to crop development, is used by farmers in over 40 countries. Additionally, Nutrien is the largest private employer in the province of Saskatchewan employing over 4,000 people in our operations and head office in Saskatoon. In 2022, the most recent aggregate numbers available show Nutrien spent over $1.16 billion with local suppliers, 30% of which was with indigenous organizations. Nutrien is proud to contribute to federal, provincial, and municipal spending priorities providing over $3.25 billion in taxes and royalties in 2022 alone for schools, hospitals, highways, and many other government commitments. We partner with 230 local organizations and our employees have provided over 6,000 volunteer hours to the community.

Our Potash Business

Nutrien's potash business operates in a highly competitive global environment, with the capacity to produce more than 15 million tonnes annually from six world-class potash mines in Saskatchewan. More than 95% of Canada's potash production is exported, while Canada accounts for 52% of the world's potash reserves. Secure reliable electrical power at a competitive price is essential in our potash operations. Electrical power represents Nutrien's third largest cost of potash production by category. An increase in electrical costs of an estimated 107% by 2035 will have a dramatic impact both to capital availability and the viability of our potash business. As price takers on the international market, Canadian potash producers are unable to pass on additional costs to consumers. Therefore, any disproportional costs, especially of the magnitude contemplated by the CER, incurred by potash producers not replicated in other producing jurisdictions will significantly undermine the industry's ability to compete on a global scale. To be clear, Canadian potash producer's largest competitors in

Belarus, Russia and China have shown no indication of carbon pricing for potash producers in their jurisdictions and they continue to focus on providing greenhouse gas intense and cheaply produced base-load energy for industrial operations. Unachievable targets or regulatory regimes that do not recognize our industry's emissions reduction potential or ability to compete internationally will result in emissions displacement to jurisdictions with more emissions-intensive production systems and no or lesser greenhouse gas (GHG) reduction policies. In fact, this will have the effect of displacing cleaner production with higher emission-tonnes, globally counteracting any reduction intended by the Canadian climate policy regime.

Over the past two decades, Nutrien has invested over $11 billion in our potash facilities to modernize production capability and enhance efficiency. As part of this modernization, over 76% of our underground horsepower is electric with now over 100 electric vehicles deployed at our sites. Decades of best-practice development coupled with unprecedented investment are displayed in a recent report by Cheminfo that identified "Canada's 2014 full lifecycle GHG emissions intensity for potash was only 29% of the global average and lower than other regions." This means that there are very few, if any, scientifically achievable emission reduction technologies available to improve on our already world-class environmental performance. In short, Nutrien's environmental performance is already best-in-class both in Canada and around the globe.

The Canadian Fertilizer Industry

Overall, the Canadian fertilizer manufacturing and production facilities are some of the most technologically advanced, energy efficient and safest facilities in the world. The Canadian fertilizer industry accounts for 12% of the global fertilizer supply, contributing approximately $24 billion annually to Canada's economic activity and supporting the employment of over 76,000 individuals throughout the supply chain. Our industry has world-class, sustainable operations resulting from early action to reduce its environmental footprint and maximize operational efficiency. We are committed to high standards for environmental sustainability, and we support science-based policy that achieves environmental objectives while also protecting our competitiveness in a global market.

Our fertilizer production and manufacturing sector is dependent on a continued reliable and affordable source of base-load electricity generation. All Canadian potash is extracted in Saskatchewan, and Saskatchewan currently has a relatively high electricity grid carbon intensity that has a significant impact on indirect emissions from electricity consumption. While we appreciate the emphasis Environment and Climate Chance Canada (ECCC) has put on reliability and affordability in the CER development, we continue to have concerns that the burden to transition to a net-zero electricity grid will be disproportionately felt in the province and mostly by the industrial electricity consuming sector. While other grid intensities are currently lower and compliance burden with the CER is less at the moment, the infrastructure changes put in place to proactively create these greener grids already place burden on manufacturing in those jurisdictions and have done so for many years. Recent events in Alberta have shown that an over-reliance upon intermittent power generation rather than relatively low emitting base-load generation can have catastrophic consequences if the realities of Canada's weather patterns are not considered when deploying electricity policy.

In collaboration with the Canadian fertilizer production industry, Nutrien has been urging the federal government to work with the provinces to ensure adequate time and provide financial support to support the transition to a net-zero electricity grid. The fertilizer production sector has, and hopes to continue to have, a significant footprint in Saskatchewan, and we are particularly concerned about the regional impacts of the proposed CER on both Saskatchewan and Alberta.

Conclusion

More than half of the world's population depends on food grown with the use of fertilizers, a number which will only continue to grow. Canada is well positioned to support the nutrient demands of a growing global population but will require a competitive business environment to successfully transition to a low-carbon future. Canadian fertilizer producers and manufacturers like Nutrien are competing in a global market with disproportionate environmental regulations and no premium market for sustainably produced products. The implementation of step-change decarbonization technologies with 50 per cent reduction of GHG emissions or greater will require at minimum five to ten years to implement and could result in a 107% increase to power rates in the province of Saskatchewan. With power being the third highest input cost for Nutrien, such an increase would be catastrophic to the company's ability to compete globally.

At Nutrien, we operate with a long-term view and are committed to working with all our stakeholders as we address our environmental, social, and economic priorities. We believe that in working with our customers through programs like 4R environmental stewardship and deploying low emission technology at our production sites, we can achieve tangible emissions reductions while maintaining our top quartile environmental performance. However, we also believe that reduction targets and regulations must be scientifically established and achievable to ensure Canada's place as a competitive potash producing jurisdiction is maintained.

Once again, on behalf of Nutrien, thank you for the opportunity to submit our thoughts to the panel.

Sincerely,

Chris Reynolds,
EVP & President, Potash
Nutrien

To Executive Director Ken Dueck
EIA Tribunal Secreteriat

Dear Mr Dueck

Thank you for the opportunity to express our opinion on the federal government's CER regulations and their impact upon the electricity sector in Saskatchewan.

Our company, RES or Renewable Energy Systems, is the largest independent renewable energy player in the world. We are a global company, founded in Great Britain over 40 years ago, and active in Canada for now 20 years. We are currently building over 1GW of renewable energy projects in Western Canada, including a 200MW wind project in Saskatchewan.

In regards to the CER, we are generally supportive of this initiative. Our planet and species cannot further tolerate increased growth in carbon emissions. We are responsible individually and collectively to reduce carbon pollution, and the CER targets frankly one of the lowest hanging fruit, which are electricity emissions.

Saskatchewan faces real challenges swapping out coal and gas. Historically its grid has been centralized around large thermal facilities. It however sits on an Eldorado of wind and solar resources unlike any province in the federation. With strategic planning, energy storage, back up peaking plants, and greater interprovincial interties, the province could realistically be nearly 100 percent clean powered.

Our major points regarding CER are as follows

- The Carbon emergency necessitates a drastic reduction in emissions globally
- SaskPower is already making great progress in replacing coal with wind and peaking gas
- All other non-emitting electricity options are either spectacularly expensive (eg nuclear) or challenging to Saskatchewan with commercially priced hydro power either unavailable or with increasing unreliability (river depths, droughts)
- Removing all carbon from power generation is the most resilient and long-term cost-effective method to keep power prices reliable and low over the long term, with domestic free fuel, non-exhaustable renewable energy.
- Increasing RE along with shallow and deep storage technology, along with back-up peaking gas is the best solution. The CER permits a certain percentage of back up gas generation, which may be today's cost effective solution balancing high penetrations of renewables.
- Other balancing technology is growing in stature. For instance, RES is currently constructing over 1GW of 4 hour battery storage systems, with this technology regularly improving on cost and scale.
- The CER is beneficial to RES' business and we support it. We recommend that Saskatchewan engage with the federal government to make the legislation applicable and acceptable to the provincial rate base, either by introducing amendments to keep the price impact to the rate-base manageable to customers, easing the introduction of new non-emitting energy sources into the grid in the coming decade.

Again, thank you for the opportunity to express this opinion to your consultation

Sincerely

Peter Clibbon
SVP RES Canada

SMA
Saskatchewan
Mining Association

Suite 610
2220 12th Ave
Regina, SK S4P 0M8
P 306-757-9505
F 306-569-1085
E info@saskmining.ca
@SaskMiningAssoc

November 1, 2023

Mark Cauchi,
Director General
Energy and Transportation
Environment and Climate Change Canada
351, boul. Saint-Joseph
Gatineau, Quebec K1A 0H3

via e-mail: mark.cauchi@ec.gc.ca
ECD-DEC@ec.gc.ca

Re: SMA Comments and Recommendations on the Proposed Clean Electricity Regulations

The Saskatchewan Mining Association (SMA) is the voice of the mining industry in Saskatchewan and has the role of liaison and consultant with government and the public to ensure the safe, profitable and sustainable development of the mineral resources of the province. The SMA represents over 45 mining and exploration companies. Environmental protection and stewardship are important to SMA members as demonstrated by their commitment to environmental planning, monitoring, compliance and reclamation. Our members are also among the largest industrial employers of Indigenous people in Canada.

In 2022, the Saskatchewan mining sector ranked number one in Canada by value of mineral production at $19.5 billion. Saskatchewan's potash sector was number one in the world with 37% of global potash sales and Saskatchewan's uranium sector was number two globally with 15% of uranium sales.

Our industry annually contributes approximately $2 billion in federal and provincial royalties and taxes. Saskatchewan's minerals sector accounts for approximately 12% of provincial GDP. Saskatchewan also has deposits or occurrences of 23 of 31 minerals on Canada's Critical Minerals list. These minerals are integral to Canada achieving its transition to a net-zero economy by 2050.

The SMA and our members recognizes and supports the reduction of greenhouse gas emissions in Canada and believes that nuclear as well as Carbon Capture and Storage (CCS) and Carbon Capture Utilization and Storage (CCUS) technology will play key roles in ensuring the requirements of *Clean Electricity Regulations* are met; however, this transition should be done in a reasonable and economically feasible way. We also recognize 84% of Canada already has non-emitting electricity and jurisdictions like Saskatchewan that are more reliant on emitting sources due to geographical limitations will need a longer timeline and increased financial support from the federal and provincial government to transition Saskatchewan's grid to be non-emitting.

The SMA and our members have reviewed the Technical Backgrounder published by Environment and Climate Change Canada (ECCC), on August 10, 2023 and the official version of the proposed *Clean Electricity Regulations* (CER) published in *Canada Gazette* Part I, Volume 157, Number 33 on August 19, 2023. The SMA appreciated the technical webinar provided by ECCC officials on September 13, 2023. We also appreciate the recognition by ECCC that stakeholders in Saskatchewan will be some of the most heavily affected by the CER.

General

1. Secure, Reliable, Affordable Baseload Power

As we strive for a net-zero economy by 2050, electricity demand will increase significantly in a very short period of time, and our economy will require massive electrical infrastructure in terms of both generation, as well as transmission and distribution.

As noted in the Regulatory Impact Analysis Statement (RIAS), the demand for electricity is projected to be 1.4x (low demand scenario) to 2.5x (high demand scenario) higher by 2050 than current levels. Considering the efforts by all levels of government, industry and private citizens to move towards net-zero it is reasonable to predict that actual electricity demand will be closer to the 2.5x value. With the federal government's stated intention of having 100% of new light duty vehicles be electric vehicles by 2035, there will be increased pressure on electrical grids and the economic analysis must take this into account.

This means there will be even higher costs to those jurisdictions, like Saskatchewan, that will need to both replace existing emitting electricity generating capacity, as well as add new non-emitting baseload capacity to meet the anticipated higher demand for electricity as we progress to 2035 and ultimately to 2050. The Government of Saskatchewan has identified that approximately 3,500 megawatt (MW) of existing baseload electricity comes from emitting sources and they project that an additional 7,000 MW will be required to support Saskatchewan's economy by 2035[1]

Replacing existing capacity and building new capacity requires considerable planning, permitting (some may require environmental assessments) constructing and commissioning on the part of operators, most of which will be undertaken by SaskPower in Saskatchewan.

It is important to recognize that affordability of electricity in Canada is already a challenge for consumers and is often one of the top input costs with respect to mining production. While there is a wide range of costs across regions in Canada, further increases in electricity prices will reduce investment attractiveness for direct investment in mining projects given energy costs tend to be the third largest cost for mining operations in Canada.

Given the extent technologies, such as Carbon Capture Use and Storage (CCUS), Direct Air Capture (DAC) and others can be partnered with existing infrastructure to limit and reduce emissions to meet net-zero requirements, fossil fuel-based generation must continue to have a place in the electricity sector in the near- to medium-term. This flexibility is needed to act as a secure and reliable source of baseload power while emerging opportunities such as Small Modular Reactors (SMRs) are realized, and to act as a backstop for renewables due to their intermittency, while improved battery technologies are developed and brought to market. Mining operations run 24/7/365 and power outages cause safety and productivity risks. It is essential to ensure electricity remains affordable and reliable for all through the use of Canada's low-cost power sources that are supported by billions of dollars worth of existing infrastructure.

Although the CER does mention enhanced oil recovery (EOR) in the context of CCUS technology – the federal CCUS investment tax credit system doesn't allow for EOR. For CCUS to be viable in many cases, investment tax credits are required for both. It is important to also remember that using CCUS technology to capture differing makeups of emission gases is untested and will require robust research, development, flexibility in capture efficiency and financial support to fully operationalize it.

[1] https://www.saskatchewan.ca/-/media/news-release-backgrounders/2023/may/sk-power-presentation.pdf

The SMA believes 2035 is an unrealistic timeline which does not properly account for the years required to fulfill existing federal and provincial environmental assessment and permitting requirements, in addition to the time required to support further technological development and grid integrations necessary to support reliable baseload power that is free of fossil fuel-based generation. Natural gas has the advantage of being an “on-demand” source of power that can be ramped up and down virtually instantaneously, and can be stored indefinitely as an abundant source of back-up power. The natural gas limitation in the CER of operating for only 450 hours a year is not economically feasible, and greater flexibility is required. Solar and wind power are not feasible in Northern Saskatchewan due to weather and technology limitations. Saskatchewan’s weather is punishing with extreme highs and lows, consideration should be given for these unique characteristics that differ from coast to coast.

The SMA believes natural gas can, and should, act as a source of power until SMRs, and other non-emitting sources of electricity, are ready for wide-spread deployment, and not simply as an emergency backup (with conditions) as currently proposed in the CER. According to SaskPower, “commercial operation of the first 300 MW SMR could be as early as 2034, with potential expansion to 600 MW by 2037 or earlier”[2], which means that approximately 3000 MW of emitting electricity will still need to be replaced. According to a recent IPSOS poll, “three-quarters (74%) of Canadians support the use of natural gas to generate electricity, with a majority of Canadians in all provinces voicing support for using this fossil fuel for generation.”[3]

Natural gas will also be needed to act as backup for some of the renewables, where SMR capacity is insufficient. In many cases, our members have made many capital decisions based on the widely held belief that natural gas would be available well into the future. We are looking at millions of dollars of stranded assets and ever-growing costs to electrify complex operating footprints. We encourage the rapid development and approval of SMRs, and alongside it, an accelerated environmental assessment and regulatory process to meet the aggressive timelines proposed by ECCC.

With respect to the small megawatt threshold the SMA believes this threshold is an important aspect to discuss by jurisdiction to determine an appropriate threshold allowing small natural gas stations to operate and lengthen their useful life for these important assets.

With the majority of the compliance costs of electricity generators being passed on to consumers/customers, including SMA members, with the implementation of CER, the cost of electricity will rise significantly. The RIAS (Table 27) estimates total incremental costs in response of CER to be $36.6 billion between 2024-2035 and increasing to $76 billion by 2050. Saskatchewan cost estimates are $11.2 billion over the next 27 years. Considering Saskatchewan’s population of only 1.2 million residents, there would be a tremendous and disproportionate increase in electricity costs to the general population and industry.

According to the Government of Saskatchewan, the capital cost of complying with the CER is $46 billion.[4] Considering that Saskatchewan has the longest path to grid decarbonization of any Canadian jurisdiction, with one of the largest grids per capita in North America and with the lowest density of customers (2.6 customers per line km) it can be seen that Saskatchewan will have the largest cost impact compared with other Canadian jurisdictions.[5]

Saskatchewan has a large Indigenous population and those that live in Saskatchewan’s north already pay very high electricity rates. The proposed changes in the CER will impact northern Indigenous communities significantly more than the average Canadian.

[2] https://www.saskpower.com/-/media/SaskPower/Our-Power-Future/Construction-Projects/SMR/Guide-SMR-Regional-Evaluation-Process-Draft-2.ashx
[3] https://www.ipsos.com/sites/default/files/ct/news/documents/2023-10/Nuclear_Factum_Ipsos_20 October 2023.pdf
[4] https://www.saskatchewan.ca/-/media/news-release-backgrounders/2023/may/sk-power-presentation.pdf
[5] https://www.saskatchewan.ca/government/government-structure/premier-scott-moe

As Canada rapidly moves towards a clean electrical grid and industrial electrification, supply chain and resource issues need to be addressed. Globally, there is already a shortage of critical parts that will be used in technology that is deployed for power generation, with many items on back-order for prolonged periods. Additionally, as this issue is global with many countries moving towards implementing clean technologies, the issue of supply chain may worsen.

SMA Recommendations:

- **The CER should be designed and implemented within a practical timeframe to ensure Canadians have access to secure, reliable and affordable baseload power in all regions, which must include the use of natural gas in recognition of the current technology limitations and in some cases extreme climatic conditions.**

- **The CER should be designed to provide flexibility for jurisdictions to meet the expectations of the CER while balancing the burden of major impending infrastructure costs.**

- **The CER needs to be designed with reasonable timeframes (extending past 2035) to account for local and global supply chain realities and should be commensurate with technological viability and commercial availability.**

- **The federal government should revise the CCUS Investment Tax Credit System to align with the CER and allow CCUS projects with an EOR component to be eligible for the tax credit.**

- **The small MW threshold should be set at 50 MW to be consistent with the federal and provincial (SK) OBPS thresholds. It should be noted that industrial emitters in the province with cogeneration facilities will have their emissions double counted through the OBPS (scope 2 grouped in with scope 1) and the CER.**

- **ECCC should discuss any proposed small MW threshold with provincial/territorial governments and electricity providers (like SaskPower) to ensure the threshold aligns with the supply planning needs of that jurisdiction and which will support expansion of intermittent renewable generation.**

2. Regulatory and Policy Certainty

Provinces, territories, utilities and industries all struggle to incorporate ECCC's continued regulatory changes into their planning efforts. These multi-faceted regulatory changes make it extremely difficult to plan, fund and execute new projects to meet the everchanging regulatory framework set out by ECCC.

One Saskatchewan-specific example is the approximately $800 million investment by SaskPower in their Great Plains natural gas power station. This 377 MW natural gas plant is scheduled to be operational by the end of 2024 yet under CER will only be allowed 20 years of operation under the CER's arbitrary End of Prescribed Life (EoPL) instead of at its true end of life. A typical lifespan for a natural gas power station is 30 years.

The $605 million investment in the Chinook natural gas power station will also fall under the 20-year EoPL criteria but the 46 MW Ermine and Yellowhead natural gas power stations as well as the proposed 370 MW Aspen natural gas power station near Lanigan will not be commissioned until after the January 1, 2025 deadline. These are significant capital and operational commitments made on behalf of the people and industries of Saskatchewan and their operational lifespans must not be cut short due to arbitrary deadlines. The timeline from 2025 should be 25 years, as this would align with the net zero 2050 timeframe, anything more stringent would force earlier investment and stranding of assets.

The decision by SaskPower to further augment their fleet of natural gas-powered stations was because in 2012 the federal government established the *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations* that would see conventional coal-fired power plants shut down by 2030. At the time, the only viable conventional technology option to provide this baseload power was natural gas.

In 2018 the federal government brought in the *Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity* (RLCDENGGE) which further restricts the opportunity to provide baseload power to Canadian industry and residents. With the CER following close on the heels of the RLCDENGGE the federal government continues to instill uncertainty and significantly increased cost potential for ratepayers and taxpayers. Provinces/territories, utilities, ratepayers and taxpayers need more regulatory and policy certainty going forward.

Regulatory certainty must be assured by the federal government if provinces, territories, utilities and industries are to be allowed the necessary time to evaluate potential low carbon/clean technologies, consult with stakeholders, including Indigenous Peoples, conduct necessary regulatory processes (environmental impact statements, permits, etc.) and to construct/commission the facilities.

There is also a need to research or design if new technologies will work or integrate into existing infrastructure. If it can't be integrated, additional time will be needed to determine how/when new infrastructure can be installed and operated. Economic feasibility must also be a major consideration with respect to new technology development and deployment. All federal GHG regulations appear to have a major threat for tightening after the initial draft. Such arbitrary tightening has a drastic effect on investment uncertainty.

Continually changing regulations will hinder both suppliers and industry, who will be making major investments in these emerging technologies, due to both real and perceived concerns that the federal government will potentially render these technologies obsolete.

Regulatory certainty is also needed to ensure the economics hold in the long term and don't result in stranded assets. As alluded to above, some of the technologies being considered in the RIAS (e.g., SMRs) simply won't be available at commercially or economically viable scales in time to meet the 2035 timeframe. New baseload hydro developments will also not likely be ready given changing public and stakeholder perceptions as well as environmental and climate concerns - this leaves very few viable "ready today" baseload options on the table for deployment by 2035.

Also, with respect to regulatory certainty, the potential costs of the regulatory changes cannot be borne by only a few small regions, but must be shared equally by all of Canada. Canada must invest accordingly to ensure all jurisdictions have access to affordable and reliable baseload power.

Infrastructure spend should be specifically focused on those regions which are most impacted by the regulations, with measures such as interties, transmission expansion and buildout between jurisdictions, direct investment in generation for the electricity grids with the most potential for de-carbonization, and tax credits and streamlining of regulations for industry to contribute solutions to the electricity grid. Any proposed regulations must consider minimizing rate increases and avoid stranding of assets, when a doubling of existing generation capacity will be required by 2050.

The Interpretation section of the CER lacks a definition of "Clean Electricity". A stable, long-term definition of clean electricity is needed to encourage investment and to develop clean electricity sources.

As the focus of the CER is on reducing emissions in jurisdictions with higher carbon intensity grids, the federal government should ensure it invests in those regions that are currently most dependent on fossil fuels for generation. Funding design and allocation should be commensurate with the proportional gap required to "clean" the electricity grid in a given jurisdiction.

The SMA appreciates that nuclear is being considered a low-emitting technology that will ensure system reliability by 2035 and beyond to meet net zero target and with this consideration there needs to be a clear and certain regulatory path to implementation as well as financial support from the federal government.

SMA Recommendations:

- **Ensure the design and implementation of the CER and attendant performance standards provide clear guidance expectations and definitions, which are technologically and economically achievable and which provide long-term regulatory certainty.**

- **The design and implementation of the CER and performance standards must be carried out in consultation with provinces, territories, utilities and industries.**

- **Federal investment dollars should be proportionately allocated to regions with the highest need for grid decarbonization, and to promote synergies between jurisdictions. Eligibility for such funding should likewise be proportional to the need to decarbonize the grid, in both the short term through conventional technologies (e.g., CCUS/DAC) and the longer term through emerging technologies such as SMRs.**

- **The EoPL requirements should be amended such that projects that have begun by January 1, 2025 are eligible and that the EoPL is based on a 30-year timeframe (rather than the proposed 20-year EoPL) to more accurately reflect the useable life of these long-lived assets. This would help to prevent stranding of costly and effective assets.**

- **Include a definition of "Clean Electricity" based on discussions with provinces and territories.**

3. <u>Technology Selection</u>

The SMA believes the CER should be technology agnostic, in that it should not exclude fossil fuel generation so long as the electricity grid itself is meeting net-zero requirements through CCUS, DAC, natural offsets, and other mechanisms. While the CER states that it is technology agnostic, it then proceeds to pick and choose what technologies are disallowed (e.g., NG conversion of coal plant vs a new NG plan that offsets existing coal).

The SMA also believes utilities should be judged on a fleet-wide basis, rather than on an individual unit/facility basis. This approach would allow utility operators to continue to use some existing operations that don't individually meet a clean electricity definition. This would have the added benefit of allowing these operations to operate through a normal life cycle and not strand an important asset through implementation of an arbitrary EoPL. This flexibility will be especially important in regions, like Saskatchewan, with non-competitive electricity grids where the cost of decarbonization across the system will be shared across all customer groups.

Saskatchewan's grid is primarily from emitting sources such as coal and natural gas. While SMR is on the list and is advancing, the 2035 timeline is inadequate for implementation. The provincial and federal governments need to be on the same page to accelerate SMR projects.

ECCC should consider existing infrastructure, as well as the technological readiness of alternate generation sources, when implementing policies/regulations. While a transition is to be expected, ECCC should consider the high cost of reducing the useable life of existing or newly approved assets, and practical limits of existing technology and infrastructure when designing the regulations intended to signal and encourage change.

With respect to CCS technology there should be a recognition by ECCC that this technology is still being developed and will continue to do so into the future given an appropriate regulatory framework and financial support. As noted in the International CCS Knowledge Centre's review of the CER, "there may be unintended consequences from requiring too stringent and punitive emissions intensity limits through the CER. If the limits are unachievable or there is a question of whether they could be met, this would disincentivize investments in CCS projects in the electricity generation sector."[6]

Considering that CCS technology applied to natural gas power stations would approximately double the capital cost of the station, there needs to be regulatory certainty around the emissions limits to ensure that this costly emission reduction technology could meet the limits on a reasonably achievable and consistent basis.

SMA Recommendations:

- **The CER must be designed and implemented with the end goal of reducing GHG emissions rather than setting out specific required technologies and arbitrary EoPL.**

- **The CER must be designed and implemented to allow for a fleet approach to meeting net-zero targets.**

- **The federal government should ensure adequate policy, regulatory and funding support are provided for the development of SMRs, CCUS/DAC and hydrogen technology, with a focus on high carbon grid jurisdictions.**

- **Flexibility must be provided with respect to emissions intensity limits to ensure the successful uptake and implementation of CCUS/CCS/DAC technology.**

4. Economic Modeling

Regulations of this size and scale must be designed and implemented with cost as a consideration. In this scenario, which demands a vast re-build of billions of dollars of existing infrastructure, costs incurred which could effectively cripple Canada's economy must be taken into consideration when proposing timelines for implementation. Further, capital-replacement and normal investment cycles are already significantly delayed by the environmental assessment and regulatory approval process, so further regulation only exacerbates the ability of utilities and the private sector to adapt.

Another factor that could cause unintended consequences of the CER is the federal government's intention to accelerate the electrification of the transportation and industrial sectors as well as in the heating and cooling of buildings. The concern is that technical or economically viable technologies for electricity generation do not necessarily exist throughout all of Canada's regions. Solar and wind power are not feasible in Northern Saskatchewan due to weather and technology limitations.

[6] https://www.google.com/url?client=internal-element-cse&cx=012571760536256647865:ssx5bn9ffdk&q=https://ccsknowledge.com/pub/CCUS%2520%26%2520Clean%2520Electricity%2520Regulations%2520Review.pdf&sa=U&ved=2ahUKEwiSq6-ZsI-CAxVzGFkFHTB_CbkQFnoECAEQAg&usg=AOvVaw1nEBmDr80wYoDhCRMEylxt

Saskatchewan's weather is punishing with extreme highs and lows, consideration should be given for these unique characteristics that differ from coast to coast. These costs would be passed on to utility ratepayers. Furthermore, a high demand on materials and labour for infrastructure will have an implementation delay effect that should be adequately considered as part of this economic modelling.

SMA Recommendations:

- **A comprehensive economic analysis should be conducted by ECCC in consultation with provinces, territories, utilities and industries to understand the scale of possible stranded assets at the 2035 deadline and total cost of shifting away from the use of these assets before the end of their usable life.**

- **The economic analysis should clearly describe the costs of meeting the CER by the 2035 deadline rather than the 2050 timeframe outlined in the RIAS, as well as province specific breakdowns of these impacts. This would better reflect the true costs to today's tax payers and rate payers that are required to fund the necessary capital projects to meet the 2035 regulatory requirements set out in the CER rather than artificially stretching out the costs over a longer timeframe.**

- **The SMA recommends the economic analysis include a consideration of any assets coming online to increase generation for the pending electrification of industry and transportation and the removal of conventional coal from the grid in a very short term, without realistic baseload-capable net-zero ready technologies.**

5. Industrial Considerations

For hard to abate sectors like industry with large heat requirements, co-generation/self-generation should be permitted to most effectively utilize the natural gas already being consumed, which could provide baseload and/or back-up power to the grid, while emissions would be attributable to the industry process for their respective products. Technologies which generate electricity as a by-product of an industrial process should not be unfairly targeted by regulations if the primary purpose of the fuel consumption is for heat required by the process. Further, by potentially targeting co-generation/self-generation as a technology that could fall under CER, it would potentially inhibit implementation of renewables, if industry weren't able to put excess generation back onto the grid because it would then be deemed to be an electricity generator. As proposed, any units with net exports to a North American Electric Reliability Corporation (NERC) regulated electricity system would be subject to the CER Performance Standard (CERPS).

The SMA and our members believe it is important to differentiate between electricity being offered for sale onto a regulated electricity system as a primary business versus electricity being offered for sale which is in excess of the electricity required by an industrial operation "behind the fence line".

Electricity generation carried out at industrial operations, like mining, is primarily used to support the operation and it would only be the surplus electricity generated that would be offered for sale. Emissions from the generation of electricity behind the fence line are already captured under the provincial industrial output-based pricing system.

Not exporting electricity to SaskPower (a NERC-regulated electricity system) in order to maintain their status of not being subject to the CER, would restrict industrial emitters from decreasing their own production to support the broader grid in times of peak demand. Without that flexibility in the regulations, through the net exporter provision in the regulations, would be a huge disincentive for industrial generators to support the province at a time of need. This must be avoided.

Some of our members also rely on electricity and/or steam from co-generation units that are within a shared fence-line, third-party operated, are significantly above the 25 MW threshold, and connected to the NERC grid. Our understanding is that the regulatory performance threshold would apply to these units. This is creating uncertainty around continued access to reliable power and/or steam from these units, which has been established through long-standing (20+ years) agreements. If these existing units were to shut down due to the CER performance standard, the fertilizer facilities that rely on this steam would need to install new boilers to replace the heat imported from the co-generation units, which could result in a net increase in emissions. The associated cost impacts would include capital expenditures in addition to increased operational costs going forward.

SMA Recommendations:

- **The CER must be designed to ensure it encourages industrial operations to operate co-generation/self-generation systems and should not overlap, interfere with, or duplicate regulatory requirements of OBPSs.**

- **The CER must be designed to allow a small percentage (e.g., up to 15%) of generated electricity through industrial co-generation/self-generation to be sold to a NERC-regulated electricity system without being subject to the CER.**

6. <u>Critical Minerals</u>

NRCan has identified a suite of minerals it deems to be critical in ensuring Canada's economic security, which are required for Canada to transition to a low-carbon economy and to provide a sustainable source of critical minerals for our partners.

Saskatchewan is a source of 23 of these critical minerals, including the two most economically important for Saskatchewan: potash and uranium. These critical minerals help to feed and provide a clean source of power for the world respectively and are among the most sustainably produced in the world.

Geopolitical realities make it even more apparent that Canadian resource development, which is carried out in a responsible manner as opposed to many of our international competitors, should be encouraged by all levels of Canadian government. As proposed, the CER poses a significant risk to the competitiveness of Canada's and Saskatchewan's critical minerals and may incentivize development in other parts of the world to our country's detriment.

SMA Recommendations:

- **The CER must be designed to ensure it encourages the responsible development of Canada's critical minerals. New policy must take into consideration impacts of existing carbon tax in the global market while acting to enable the existing goals of NRCan's Critical Minerals Strategy.**

- **The CER must be designed to minimize impacts on the competitiveness of Canada's critical minerals including potash and uranium.**

7. <u>Green Bond Framework</u>

The SMA expressed our disappointment and concern with the federal government's March 3, 2022 announcement of a $5 billion Green Bond Framework that specifically excluded nuclear energy from the list of Eligible Green Expenditures. The SMA provided comments to the federal department of Finance regarding this exclusion; however, we also wanted to raise the concern directly with ECCC as it relates to the viability of SMRs in helping Canada to achieve its net-zero goal.

The SMA has been a strong supporter of NRCan's SMR Roadmap and attendant SMR Action Plan, and to highlight this support, the SMA has provided a chapter in the SMR Action Plan.[7] It is important for the federal government to continue to support NRCan's efforts to engage Canadians and to further the development and implementation of SMRs in Canada. By supporting Canada's SMR implementation it will also aid in expediting the development and implementation of hydrogen production and utilization as highlighted in NRCan's Hydrogen Strategy for Canada. These are two highly synergistic low/zero-emission technologies, when considering their life cycle emissions.

With respect to Eligible Green Expenditures, one item to note is that in February 2022, the European Union Commission (EU Commission) for Financial Services, Financial Stability and Capital Markets Union, has concluded that **nuclear technology is sustainable and have taken steps to include nuclear energy as a transitional activity eligible for sustainable finance products.**[8]

SMA Recommendation:

- **With SMRs and traditional nuclear set to play a pivotal role in decarbonizing the grid, nuclear energy projects must be included in Canada's Green Bond Framework as eligible for sustainable finance funding, this policy alignment step will ensure Canada's approach to a net-zero grid is science-based and technology agnostic**

Closing

The SMA and our members recognize and support the reduction of Canada's GHGs; however, the federal government needs to ensure the CER is developed and implemented in a manner which supports Canada's Critical Minerals Strategy and provides long-term regulatory and investment certainty as well as providing for a secure, reliable and affordable source of baseload power.

Yours Sincerely,

Brad Sigurdson
Vice President – Environment, Safety and Regulatory Affairs

cc Jean-François Tremblay – Deputy Minister (ECCC)
Michael Vandergrift – Deputy Minister (NRCan)
Veronica Gelowitz – Deputy Minister (ENV)
Blair Wagar – Deputy Minister (MER)
Kent Campbell – President and CEO (CIC)

[7] https://smractionplan.ca/content/saskatchewan-mining-association-sma
[8] https://www.world-nuclear-news.org/Articles/A-guide-to-the-EUs-green-taxonomy-and-nuclears-pla

Rupen Pandya – President and CEO (SaskPower)
Mark Guillet – President and CEO (SaskEnergy)
Karishma Boroowa – Director – Electricity Group (ECD-ECCC)
Maria Klimas – Acting Director – Regulatory Analysis and Valuation Division (EAD-ECCC)
Karl Abraham – Chief Engineer - Electricity & Combustion (ECD-ECCC)
Troy King – Executive Vice-President and Chief Strategy, Technology and Financial Officer (SaskPower)
Tim Eckel – Vice-President, Energy Transition and Asset Management (SaskPower)
Kory Hayko – Executive Vice-President, Chief Operating Officer (SaskPower)
David Brock – Vice President, Energy Security (CIC)
Pam Schwann – President (SMA)

SMA
Saskatchewan
Mining Association

Suite 610
2220 12th Ave
Regina, SK S4P 0M8
P 306-757-9505
F 306-569-1085
E info@saskmining.ca
@SaskMiningAssoc

February 22, 2024

Mr. Ken Dueck
Executive Director
Economic Impact Assessment Tribunal of Saskatchewan
1100 - 1874 Scarth Street
Regina, SK S4P 4B3
via e-mail: ken.dueck3@gov.sk.ca

The SMA is pleased to provide the following information in response to the letter received from Mr. Michael Milani, Chair of the Economic Impact Assessment Tribunal of Saskatchewan, requesting input from the mining sector to help inform the Tribunal's assessment of the potential impact of the proposed *Clean Electricity Regulations* (CER) on our sector.

The Saskatchewan Mining Association (SMA) is the voice of the mining industry in Saskatchewan and has the role of liaison and consultant with government and the public to ensure the safe, profitable and sustainable development of the mineral resources of the province. The SMA represents over 45 mining and exploration companies. Environmental protection and stewardship are important to SMA members as demonstrated by their commitment to environmental planning, monitoring, compliance and reclamation. Our members are also among the largest industrial employers of Indigenous people in Canada.

In 2022, Saskatchewan's mining sector claimed the top spot in Canada in terms of mineral production value, reaching $19.5 billion. The province's potash industry held the global lead with 37% of worldwide sales, while its uranium sector ranked second globally with 15% of uranium sales.

Annually, our industry contributes roughly $2 billion in federal and provincial royalties and taxes, constituting about 12% of Saskatchewan's GDP. Notably, Saskatchewan boasts deposits or occurrences of 23 out of 31 minerals listed as critical by Canada, essential for the nation's transition to a net-zero economy by 2050.

The SMA and its members endorse efforts to reduce greenhouse gas emissions in Canada. We believe that nuclear power, along with Carbon Capture and Storage (CCS) and Carbon Capture Utilization and Storage (CCUS) technologies, will be pivotal in meeting the Clean Electricity Regulations' requirements. However, this transition must be conducted reasonably and economically. Recognizing that 84% of Canada already relies on non-emitting electricity sources, we acknowledge that regions like Saskatchewan, constrained by geographical factors, will require a longer timeline and increased financial support from both federal and provincial governments to transition our grid to non-emitting sources.

The SMA noted in Mr. Milani's letter that "the Government of Saskatchewan has estimated in its Affordable Power Plan that the Regulations would result in an increase in utility rates of 107% by 2035." and is seeking the SMA's input into how this scenario, should it occur, would impact the mining sector in Saskatchewan. Provided below are comments and context around this query.

Because of the diverse nature of mining operations in the province, both on a commodity and location basis, as well as the long timeframes being considered, it is exceedingly difficult to predict the impact to SMA members with any certainty. As SaskPower is the primary provider of electricity for our operations, we will consider the 107% increase during future planning exercises.

Cost and regulatory certainty are the main concerns that our members have with the CER. Our members continually need to re-evaluate project plans as both the federal and provincial governments propose new or amended acts, regulations, standards and guidelines and this leads to increased costs and lack of project certainty.

This regulatory uncertainty is highlighted with respect to the cost of electricity. Provinces, territories, utilities, and industries face significant challenges in integrating Environment and Climate Change Canada's (ECCC) ongoing regulatory adjustments into their planning processes. These complex regulatory shifts make it exceedingly difficult to plan, secure funding, and execute new projects within the ever-evolving regulatory framework set by ECCC.

This everchanging regulatory landscape for electricity was the federal government's 2012 establishment of the *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations*, which mandated the closure of conventional coal-fired power plants by 2030. The subsequent introduction of the *Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity* in 2018 further restricted baseload power options. Coupled with the CER, these regulations introduce uncertainty and increased cost potential for ratepayers and taxpayers. This means that there will be three major policy shifts in how electricity is regulated in a little over a decade. The long-lived (many decades) nature of most of our power generating stations in the province would benefit from a more certain regulatory regime.

Continuously changing regulations impede both suppliers and industries making significant investments in emerging technologies, due to concerns that the federal government may render these technologies obsolete. Regulatory certainty is also crucial to ensuring long-term economic viability and preventing asset stranding.

The SMA acknowledges and supports the deployment of nuclear as a non-emitting technology vital for ensuring system reliability and meeting net-zero targets beyond 2030. A clear and certain regulatory path to implementation, including eliminating the requirement for federal impact assessment review for nuclear projects, along with financial support from the federal and provincial governments is essential in this regard.

The SMA strongly supports SaskPower's efforts to explore the potential addition of carbon-free nuclear energy to Saskatchewan's electricity grid through the deployment of small modular reactor (SMR) technology. While this work is focused on the deployment of one or two 300 MW SMRs, the reality is that many more of these baseload units will be required if we are to prevent the application of the CER in the province. This will take significant effort by SaskPower as well as the Government of Saskatchewan to secure the investment and regulatory climate needed to dramatically overhaul power generation in this province.

Recognizing that many baseload-capable SMRs will be required, and that SaskPower has estimated that the first 300 MW SMR will be put into service in 2034, the SMA has recommended to ECCC that the timeframe for compliance with the CER be 2050 rather than the proposed 2035. This would allow a more reasonable timeframe for baseload nuclear deployment as well as minimizing the economic impact that stranding our existing baseload coal and natural gas operations would bring.

For additional detail and context I enclose our response to ECCC's *Canada Gazette* Part I consultation.

Closing

The SMA and our members recognize and support the reduction of Canada's GHGs; however, the SMA would strongly encourage the Government of Saskatchewan to work with the Government of Canada to secure the much-needed financial support and regulatory framework for the rapid deployment of SMRs, as well as increased financial support for CCUS/CCS projects, that are needed to ensure a timely and cost-effective transition to a low carbon grid.

Yours Sincerely,

Brad Sigurdson
Vice President – Environment, Safety and Regulatory Affairs

Enclosure

cc Rupen Pandya - President and Chief Executive Officer (SaskPower)
Troy King – Executive Vice-President and Chief Strategy, Technology and Financial Officer (SaskPower)
Tim Eckel – Vice-President, Energy Transition and Asset Management (SaskPower)
Kory Hayko – Executive Vice-President, Chief Operating Officer (SaskPower)
David Brock – Vice President, Energy Security (CIC)
Pam Schwann – President (SMA)

1000 – 1777 Victoria Avenue
REGINA SK S4P 4K5

February 15, 2024

Mr. Ken Dueck
Economic Impact Assessment Tribunal
Secretariat Office
1100 – 1874 Scarth Street
REGINA SK S4P 4B3

via e-mail: ken.dueck3@gov.sk.ca

Dear Mr. Dueck:

Thank you for providing SaskEnergy the opportunity to submit our assessment of the impact of the Clean Electricity Regulations on our business, including the impact of a potential 107 per cent increase in electricity rates by 2035.

SaskEnergy is a provincial Crown corporation with the exclusive legislated franchise to transport and distribute natural gas within Saskatchewan. SaskEnergy operates the natural gas distribution utility and separately the transmission utility under subsidiary corporation TransGas Limited (TransGas). Our system includes approximately 72,000 kilometres of distribution lines and 15,000 kilometres of transmission lines spanning across the province. We serve 93 per cent of Saskatchewan communities and more than 400,000 customers with employees working in more than fifty locations across the province.

In setting service rates, SaskEnergy and its subsidiaries follow a cost-of-service methodology. With a large service area and geographic footprint, SaskEnergy relies on affordable and reliable electricity to our sites, buildings and equipment to maintain competitive rates while providing safe and reliable natural gas service to our customers.

Electricity costs are a significant component of our operating expenses. Forecasting a 107 per cent increase in electricity rates would result in an operating cost increase of nearly $3.4 million per year for the transmission utility TransGas. Cost increases of this magnitude by 2035 would require transportation rate increases of approximately 1.2 per cent to fully recover the additional costs. TransGas' customers include SaskEnergy's distribution utility, as well as large volume industrial customers, including SaskPower. Given the wide variation among customer sizes, providing the average annual dollar impact per customer of the 1.2 per cent rate increase is not practical in this context.

We would also expect additional costs to be passed on to TransGas from other service providers responding to the electricity cost increase. These costs are not considered in the above estimate, though would increase rate pressure for transmission customers.

. . . 2

For SaskEnergy's distribution utility, the estimate is an increase of $1.2 million from higher electricity costs as well as an estimated increase of over $0.8 million as a result of the higher costs passed on from the transmission utility. The incremental rate pressure is estimated at approximately 0.6 per cent by 2035. The majority of the distribution utility's customers are residential users across the province. For these customers, a 0.6 per cent delivery rate increase would equate to an additional $5 per year in costs.

While the increased electricity costs impact operating expenses for SaskEnergy's transmission and distribution utilities, there is a potential for a significant impact to the organization's revenue because of the Clean Electricity Regulations.

At present, SaskPower indicates that 40 per cent of its generating capacity is derived from natural gas. This natural gas usage provides SaskEnergy with nearly 20 per cent of its transmission and storage revenue annually. With the Clean Electricity Regulations placing significant restrictions on using natural gas for electricity generation, it is reasonable to anticipate a significant impact to SaskEnergy's transmission and storage revenue.

The total impact is not presently known as the pathways chosen by the electricity generators in the province is still being assessed, however imagining a scenario where natural gas could no longer be utilized for any electricity generation would result in lost revenue and a significant impairment in the value of TransGas' system assets. The inability to recover the cost of those stranded assets would result in a significant financial impairment to SaskEnergy's transmission system assets currently valued at $1.5 billion.

The significant loss in revenue combined with the increase in operating expenses presents a challenge for energy affordability in Saskatchewan post 2035. SaskEnergy remains committed to finding operating efficiencies in order to maintain competitive rates for customers, however, the Clean Electricity Regulations coupled with the prospective increase in electricity costs would no doubt impact SaskEnergy's cost of service for customers.

Yours truly,

Mark H. J. Guillet, K.C.
President and Chief Executive Officer
SaskEnergy Incorporated

cc: Honourable Dustin Duncan, Minister of Crown Investments Corporation
Kent Campbell, President, Crown Investments Corporation

Rupen Pandya
President and Chief Executive Officer

12C - 2025 Victoria Avenue
Regina, Saskatchewan
Canada S4P 0S1
Phone: 306-566-6644
rpandya@saskpower.com

February 16, 2024

Ken Dueck
Executive Director, Economic Impact Assessment Tribunal Secretariat
ken.dueck3@gov.sk.ca

Dear Mr. Dueck,

On behalf of SaskPower, I am writing to provide our submission regarding the anticipated costs and rate impacts of the Government of Canada's proposed Clean Energy Regulations (CER). For the purposes of this submission, because SaskPower is not positioned to respond to the request for the impact to the Saskatchewan economy, our response is focused on the following two areas noted in the December 28, 2023 request for submission, as they are directly related to SaskPower's business as the provincial electric utility:

1. The estimated cost to Saskatchewan of complying with the Regulations, against the baseline of Saskatchewan's electricity supply plan over the same time period, in alignment with the provincial Affordability Plan;
2. The forecasted effect on electrical utility rates, against a baseline of Saskatchewan's electricity supply plan over the same period, in alignment with the provincial Affordability Plan.

SaskPower remains fully committed to decarbonizing Saskatchewan's electricity system by 2050, and we have charted an aggressive course and already invested billions of dollars into our clean energy transition. However, the requirements of the CER are unachievable by 2035 from technological, financial, and logistical perspectives. SaskPower requires more time and flexibility than the CER allows, and significant federal funding will be required to enable the transition without jeopardizing reliability and affordability for our customers.

The proposed CER fails to consider Saskatchewan's unique circumstances and challenges. This context is crucial, and so our response includes a brief history of Saskatchewan's electricity system, an overview of the federal regulations impacting electricity generation and outlines SaskPower's journey toward decarbonization.

Thank you for the opportunity to respond to how these regulations will impact SaskPower, and specifically the significant impact they will have on our ability to provide reliable and affordable power to customers. Please review the attached submission, and do not hesitate to reach out if you have any questions. We look forward to the Tribunal's report.

Yours sincerely,

Rupen Pandya
President & Chief Executive Officer, SaskPower

SaskPower Written Submission
Government of Saskatchewan
Economic Impact Assessment Tribunal

February 15, 2024

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INTRODUCTION

As the globe's energy sector transitions from fossil fuel-based systems of electricity production, SaskPower is envisioning a future where it successfully contributes to the development of a thriving low-carbon economy in Saskatchewan.

Because Saskatchewan is a jurisdiction that does not have the benefit of access to large amounts of low-cost zero-emissions legacy hydroelectricity, the journey to a net-zero greenhouse gas (GHG) future will challenge us in unprecedented ways. The change we experience during this energy transition will be greater than we have seen in generations. It will require us to work even closer with our customers, stakeholders, and Indigenous rights holders. We have a critical role in Saskatchewan — one that drives the progress of industry and agriculture, creates jobs, and directly and indirectly supports local businesses.

Saskatchewan's electricity system of tomorrow will look very different from the one we operate today. At the heart of the energy transition are two fundamental shifts: one involving the sources of our electricity, and another involving how that electricity is moved through our transmission and distribution grid.

When it comes to electricity supply, we have very clear targets: to reduce GHG emissions by 50% from 2005 levels by 2030 while also preparing for a net-zero GHG emissions future by 2050 or sooner. This will not only involve SaskPower integrating more renewable generation, it will also require a combination of emerging technologies and stronger transmission interconnections with neighbouring electricity markets to ensure reliability and resiliency.

Natural gas-fired generation will play a foundational role in ensuring system reliability and supporting an estimated build-out of at least 3,000 megawatts (MW) of zero-emitting intermittent wind and solar generation in Saskatchewan by 2035. Meanwhile, in the decades ahead SaskPower will continue to make significant investments in new generation, grid modernization, regional transmission interconnections, and the sustainment of our province’s electricity system.

We will also continue to pursue the development of innovative solutions that will contribute to a clean energy future for our customers and communities, such as nuclear small modular reactors, utility-scale energy storage systems, and carbon capture and storage on natural gas-fired generation.

The modernization of our transmission and distribution grid will be essential in safely integrating all of these new sources of electricity. New technologies and operating systems will provide the necessary increased control, automation and visibility. Meanwhile, much needed system upgrades will provide enhanced reliability and resiliency as we further our climate change adaptation and mitigation planning

Our customers will also play a major role in the provision of electricity in our province through Distributed Energy Resources such as solar, wind, storage and other low- and zero-carbon sources. They will also require SaskPower to assist them in lowering their carbon footprint as the electrification of transportation, industry, agriculture and buildings takes hold.

SaskPower is committed to pursuing a decarbonization pathway that will ensure sustainability, affordability, and reliability. We continue to engage with the Federal Government, key stakeholders and our customers on how to achieve a decarbonized Canadian electricity system and economy, however a one-size-fits-all approach such as the one illustrated in the proposed *Clean Energy Regulations* (CER) is not the solution.

The draft CER does not take Saskatchewan's unique challenges into account. As such, its requirements are unachievable by 2035 from technological, financial, and logistical perspectives. If we are to achieve net-zero GHGs without jeopardizing affordability and reliability for our customers, we will require sufficient time, significant federal funding, and streamlined regulatory pathways.

POWERING SASKATCHEWAN

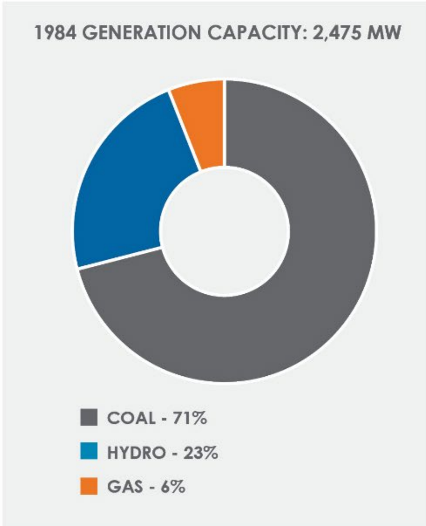
NEARLY A CENTURY OF BUILDING SASKATCHEWAN'S ELECTRICITY SYSTEM

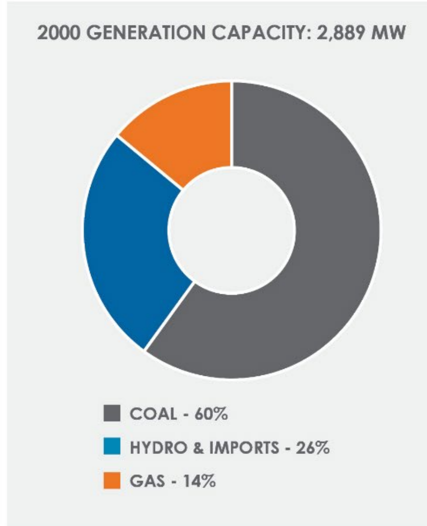
The earliest decisions in power generation in Canada were made based on what resources were available locally. In Saskatchewan, those resources were coal and water. Plentiful lignite coal deposits in the southeast area of the province created quality employment in the region and provided reliable baseload electricity province wide. Water resources in northern Saskatchewan were harnessed to support mining developments and local communities to generate emissions-free power through hydroelectricity.

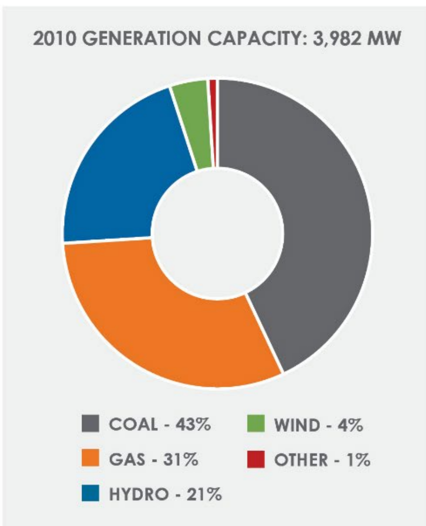
Over the years, we diversified our fuel sources to achieve a supply mix that now also includes natural gas, wind, solar, waste heat, imported power, flare gas, biomass, and coal with carbon capture and storage. This diverse supply mix has been crucial to maintaining affordability for residential, business and industrial customers – and has been key to growing the provincial economy.

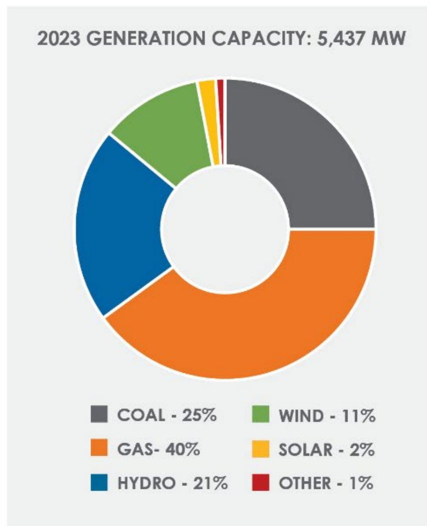
While our generation supply mix has become more diversified, fossil fuel-fired generation continues to serve a critical role of supplying baseload generation and backing up intermittent renewable generation to ensure reliability, accounting for more than 70 per cent of the electricity generated in fiscal year 2022-23.

The graphic below shows how our electricity generation mix has evolved over the last 40 years, from primarily coal in the 1980s, to increasing natural gas in the 2000s, to a more diverse mix today.









In 2024, SaskPower has over 550,000 customers and 3,100 employees. Our generating capacity – or the theoretical maximum electricity output of a given facility or system under perfect conditions – is 5,453 megawatts (MW). To put that in context, Saskatchewan's current peak demand for power was on December 30, 2021, when the province needed a record-breaking 3,910 MW of power.

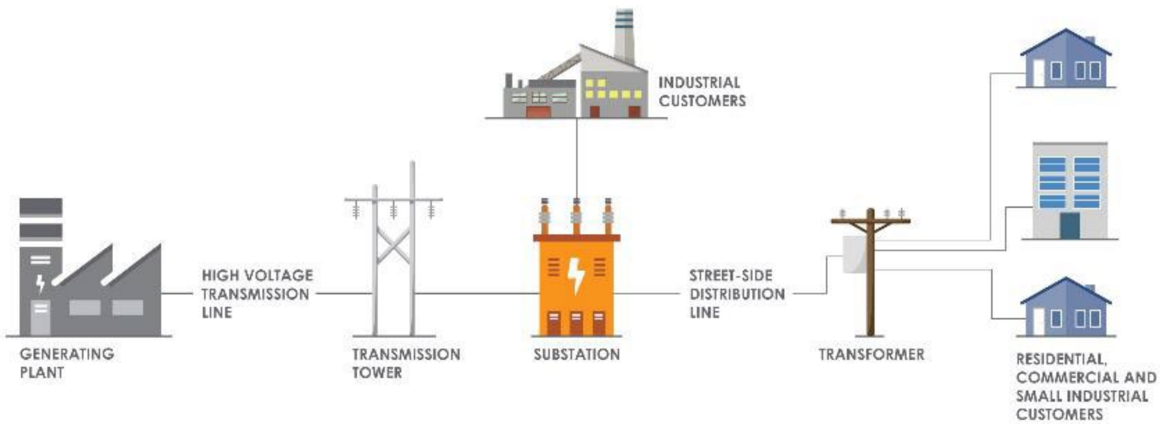
Our company manages almost $13 billion in assets which include 31 generating facilities – three coal-fired power stations, 10 natural gas stations, seven hydroelectric stations, eight wind power facilities, and three solar facilities. Of these 31 facilities, 12 of them are operated by Independent Power Producers (IPPs) who sell electricity to SaskPower through Power Purchase Agreements (PPAs). Refer to SaskPower's System Map in Appendix 1.

We're committed to achieving a net-zero GHG emissions power system and are on track to do so by 2050 or sooner. To help reach net-zero, we will retire all conventional coal-fired generation by 2030 and will add at least 3,000 MW of wind and solar generation by 2035. We also maintain a GHG emissions reduction target of 50 per cent below 2005 levels by 2030, exceeding the federal target of 40 per cent below 2005 levels by 2030.

In 2022 and 2023, we reduced GHG emissions below 2005 levels for the first time ever under normal operating conditions. This was despite a growth of 34 per cent in power generated between 2005 and 2023 to serve our customers.

THE ELECTRICITY SYSTEM

SaskPower's electricity system is comprised of generation, transmission and distribution assets that all work together to provide reliable, sustainable and cost-effective power for the customers and communities we serve.



Generation: Electricity generating units (or power stations) produce electricity by converting various energy sources (such as coal, natural gas, water, wind or sunlight) into electrical energy. The different types of generation are:

> **Baseload power plants:** They operate continuously, providing a steady and consistent supply of electricity to meet the minimum level of electricity demand over a 24-hour period. These power plants are typically fueled by coal, natural gas, nuclear or hydro and operate 24/7 with minimal variation.
>
> **Peaking plants:** These are designed to follow changes in electrical demand caused by the variability of renewable generation or to meet electricity demand during peak hours when consumption is at its highest. Natural gas-fired turbines and hydroelectric plants with reservoirs are common peaking generators that can start-up and shutdown quickly to complement baseload generation by handling sudden surges in electricity demand.
>
> **Variable generation sources:** These include wind and solar, and produce electricity based on natural conditions (wind, sunlight) and are inherently unpredictable with output fluctuating based on

weather conditions and time of day. Variable generation sources are essential for transitioning to a sustainable energy mix, however the fluctuating output requires flexibility in the electricity system to ensure reliability.

In summary, baseload plants provide a stable foundation, peaking plants handle demand spikes, and variable renewables contribute to a cleaner energy mix.

Transmission: High-voltage transmission lines connect power stations to switching stations that interconnect different regions, both within Saskatchewan and to jurisdictions outside of Saskatchewan. These lines efficiently transmit electricity over long distances. Some of SaskPower's largest customers are served directly from the transmission system due to the amount of electricity they require to support their operations.

Distribution: Transmission lines connect to distribution substations that reduce the voltage to levels suitable for customers with lower electricity demand. From the substation, lower voltage distribution lines deliver electricity to homes, businesses and industries.

THE CRITICALITY OF RELIABILITY AND RESILIENCE

A reliable and resilient electricity system is a critical part of everyday life, supporting everything from basic necessities to essential services to technological advancements. A reliable and resilient electricity system contributes to:

Security of Supply: A robust electricity grid ensures the security of our province. It supports essential services like hospitals and emergency response. Interruptions in power supply can have severe consequences for public safety and security.

Economic Impact: The reliability of the electricity system underpins virtually every sector of the economy. Businesses, industries, and commerce rely on uninterrupted power to function efficiently. Power outages can lead to financial losses, disrupt supply chains, and impact productivity.

Health and Safety: Access to reliable electricity is crucial for maintaining health and safety. Hospitals and care homes depend on continuous power supply. Additionally, extreme weather events are occurring more frequently, highlighting the need for resilient systems that can withstand disruptions.

Quality of Life: Electricity powers our daily lives, from lighting and heating to communication and entertainment. A reliable grid ensures that people can access essential services consistently, regardless of their location.

Climate Resilience: As climate change brings more extreme weather events, a resilient grid becomes essential. It must withstand storms, floods, and other challenges to minimize service disruptions and facilitate rapid recovery.

HOW WE PLAN THE SYSTEM

To meet net-zero GHG emissions by 2050 or sooner, SaskPower's energy transition requires not only a shift to lower emitting electricity generation sources, but also a build out of new transmission assets and investments to modernize and sustain existing transmission and distribution assets within the province that currently make up one of the largest grid systems in Canada. SaskPower is different than many other utilities across North America in that in addition to owning electricity generation facilities, the company also owns and manages its transmission and distribution system, which allows for an integrated approach to planning the future electricity system.

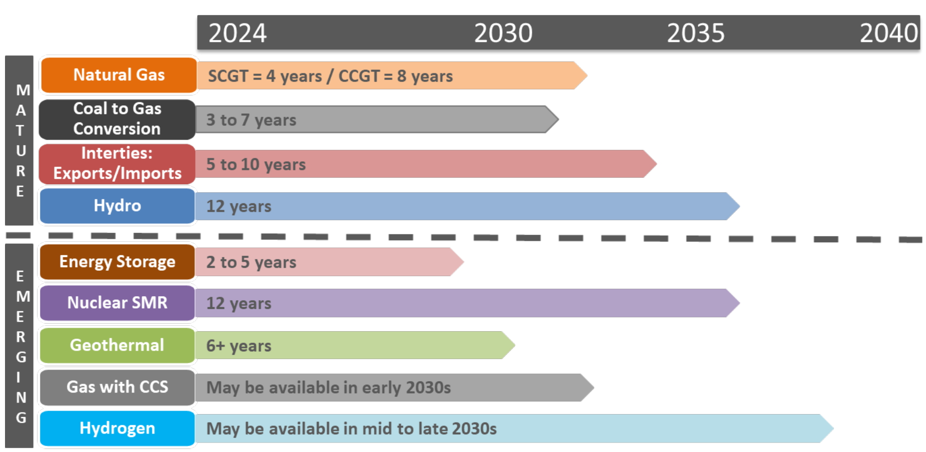
Generation Supply Planning

Our generation supply planning process involves making two plans that work together – the Annual Supply Plan and the Long-Term Supply Plan. To develop these plans, we conduct ongoing scenario analysis that considers various inputs, assumptions and comparison of generation technology options that informs recommendations for future generation projects. In general, the generation projects in the supply plan in the next five to eight years have been approved and are in development, while the longer-term plan is fluid and subject to change as costs, technology options and other factors change.

The **Annual Supply Plan** sets out the supply requirements to 2035. Its purpose is to serve as a guideline for decision makers by outlining the current recommended path forward. That path must balance cost, reliability, regulatory requirements, environmental targets and risk.

The **Long-Term Supply Plan** informs the annual plan and is updated every two to three years and shows what the long-term supply plan could look like out to 2050, based on current assumptions and generation supply options.

A key consideration in supply planning is the time it takes to develop new electricity supply projects. The graphic below shows the approximate time it takes to build a project from initial planning to operation. Based on SaskPower's recent experience, supply chain pressures are extending the development timelines beyond what is indicated below as jurisdictions in Canada and around the world compete for the same resources to transition their electricity systems to lower-emitting sources.



* SCGT = Simple Cycle Gas Turbine; CCGT = Combined Cycle Gas Turbine

This year we also asked for the public's feedback to improve our learning and to address the risks they identified. Refer to the Public Engagement section for more information.

<u>Transmission System Planning</u>

The transmission system of the future must be nimble and quickly able to respond to changing operating conditions and load. SaskPower must strike a balance between building a transmission system that not only meets our present needs but also accounts for growing demand for power delivered through a more dynamic and two-way grid of the future.

Transmission grid expansion — both inside the province and to bolster connections with other jurisdictions — is foundational to the transition to a net-zero GHG future, allowing SaskPower's energy transition to be completed in a fiscally efficient manner that does not compromise grid reliability or flexibility.

The Long-Range Transmission Plan details the work required to meet the requirements of Saskatchewan's transmission system in the next five years and provides the foundation for the electricity system to support a net-zero GHG future.

<u>Distribution System Planning</u>

Traditionally, distribution infrastructure has been designed so it can easily accommodate foreseeable customer demand for power. This design approach has been changing as new customer appliances have driven a gradual but steady increase in electricity consumption. Looking ahead, electrification of transportation and heating represents a leap which could double or triple a customer's load and easily exceed the capacity of most of SaskPower's existing legacy services.

SaskPower is implementing new standards to accommodate electrification, considering that customer adoption of electrification will not be uniform. Early uptake is expected in higher income areas and focused on electric vehicles, followed by conversion to electric home/water heating appliances. Affordability challenges will delay adoption in lower income households, meaning it will be critical for SaskPower to have visibility into individual customer load so service upgrades can be prioritized.

SaskPower's long-term distribution system transformation program will enhance visibility, control, and automation of the grid. It will provide an enhanced customer experience, incorporate increased levels of distributed energy resources (DERs), enable the growth of renewable generation, increase reliability and resiliency, reduce emissions, and improve safety.

SASKPOWER'S DECARBONIZATION JOURNEY

PRAIRIE RESILIENCE AND GROWTH PLAN ALIGNMENT

SaskPower's sustainability journey is, in part, informed by policy direction provided by our shareholders — Crown Investments Corporation of Saskatchewan and the Government of Saskatchewan. Our company's operations align with relevant measures included in the Saskatchewan Growth Plan as well as the provincial government's Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy (Prairie Resilience) and its companion Climate Resilience in Saskatchewan Report that tracks progress.

Notably, the Growth Plan makes a commitment for the continued renewal and development of new electricity infrastructure needed to meet growing demand from new industrial, commercial and residential customers. While SaskPower works to ensure new generation, transmission and distribution are in place to meet future load growth, the utility is to achieve this goal while also reducing carbon emissions by as much as 50 per cent by 2030 from 2005 levels.

In order to do this, as noted in Prairie Resilience, SaskPower is doubling its percentage of electricity capacity from renewables. In fact, SaskPower is currently planning to add more than 3,000 MW of renewable energy to the grid by 2035. As SaskPower works towards this goal, direction was provided by the provincial government to add the largest-ever tranche of intermittent renewable power in SaskPower's history: 700 megawatts (MW) by 2027.

CHANGING REGULATIONS

In 2012, the federal government introduced regulations requiring coal-fired power facilities to meet a stringent performance standard of 420 tonnes of carbon dioxide (CO_2) per gigawatt-hour of electricity (t/GWh) to limit their GHG emissions. The limit was to be imposed in 2015 on new coal units. It would also apply to units built before 1975 (starting in 2020), to units built before 1986 (starting in 2030), and to all units once they reach 50 years of age.

In response, SaskPower established CO_2 emissions intensity (CO_2e/GWh) as a performance measure for all generating units including power purchased from Independent Power Producers (IPPs) in 2013. Also, the world-leading carbon capture and storage (CCS) facility at Boundary Dam Unit 3 came online in 2014 – a $1.5 billion investment in low emissions electricity.

In 2018, the federal government went further and announced a complete phase out of conventional coal generation by 2030 – regardless of the year a unit was built. This change impacted two of the three coal-fired facilities in Saskatchewan, the Shand Power Station in Estevan, and the Poplar River Power Station in Coronach. The conventional coal-fired units at Boundary Dam Power Station all reach the end of their service-life before 2030. At the time, SaskPower's generating capacity was 4,493 megawatts (MW) and the three coal-fired power stations accounted for 34 per cent of that capacity.

In response to these federal measures, the Government of Saskatchewan negotiated an Equivalency Agreement to stand down the federal coal-fired electricity generation regulations based on its own *The Management and Reduction of Greenhouse Gas Act* and electricity producer regulations of 2017. The Canada-Saskatchewan Equivalency Agreement (EA) for the control of greenhouse gas emissions from electricity producers in Saskatchewan was signed in May 2019. The EA provides flexibility on how conventional coal-fired units are operated and when they retire, provided that total system emissions are managed within defined limits while the EA is in force. The EA expires on December 31, 2024, but a new EA could extend through 2029.

A condition of the EA is a mandated buildout of non-emitting generating capacity through 2030, requiring 40 to 50 per cent of the total system generating capacity to be from non-emitting generation sources. SaskPower is on track and expects to exceed this condition.

The table below illustrates how changing federal coal regulations have impacted SaskPower's coal-fired units.

Unit[a]	End of Service Life	2012 Federally Regulated Retirement Dates[c]	2018 Federally Regulated Retirement Dates[c]	SaskPower Planned Retirement Dates[d]
BDPS Unit 3	2020/2044[b]	Dec 31, 2019	Dec 31, 2044	Dec 31, 2034[e]
BDPS Unit 4	2020	Dec 31, 2019	Dec 31, 2019	2021 Q4[f]
BDPS Unit 5	2023	Dec 31, 2019	Dec 31, 2019	2024 Q4[f]
BDPS Unit 6	2027	Dec 31, 2027	Dec 31, 2027	2027 Q4[f]
PRPS Unit 2	2031	Dec 31, 2029	Dec 31, 2029	2029 Q4
PRPS Unit 1	2033	Dec 31, 2029	Dec 31, 2029	2029 Q4
Shand Unit 1	2042	Dec 31, 2042	Dec 31, 2029	TBD[g]

a BDPS = Boundary Dam Power Station, PRPS = Poplar River Power Station, Shand = Shand Power Station

b BDPS Unit 3 was originally commissioned in 1970 and would have reached the end of its 50-year service life in 2020. In 2014, Unit 3 was retrofit with carbon capture and storage (CCS) and upgraded to extend its service life by 30 years to 2044.

c Operation beyond their regulated retirement dates would require conventional coal-fired units to be retrofit with carbon capture and storage (CCS) that can achieve an emissions performance standard of 420 t/GWh on an average annual basis. For reference, conventional coal-fired units have an emissions intensity of approximately 1,100 t/GWh.

d The EA provides flexibility with when the conventional coal-fired units are retired, provided emissions are managed within defined limits and all conventional coal-fired units are retired before 2030.

e BD3 with CCS was designed to operate until the end of 2044. Operation beyond the expiration of the EA will require BD3 to operate below the emissions performance standard of 420 t/GWh or shut down. In addition, the proposed federal Clean Electricity Regulations (CER) are expected to impose a 'near-zero' emissions intensity performance standard that cannot be met with commercially available CCS on coal technology. For this reason, it is anticipated that BD3 will not be allowed to operate beyond 2034.

f Following the planned retirement of BDPS Units 4, 5 and 6 on the dates indicated, these units will be available for emergency use if needed to ensure customer demand for electricity can be met.

g SaskPower is considering converting the Shand Power Station from coal-fired to natural gas-fired which could extend it's life to the end of 2037. A final decision is expected in 2024.

In 2018, the federal government introduced regulations imposing restrictions on natural gas-fired generation, including:

- New units 150 MW or larger must meet 420 t/GWh based on an annual average; and
- New units with a capacity between 25 MW and 150 MW must meet 550 t/GWh.

Also in 2018, the federal government introduced the carbon tax that would take effect starting in 2019, with additional details released in 2020, impacting both coal-fired and natural gas-fired generation. The carbon tax started at $20 per tonne in 2019, increasing to $170 per tonne in 2030. Although the carbon tax rate beyond 2030 has not been confirmed, it is anticipated to increase beyond $170 per tonne.

The carbon tax is applied to coal-fired and natural gas-fired generating units on emissions that exceed a defined emissions intensity (t/GWh) threshold, as outlined in the following table.

Year	Carbon Tax ($ per tonne)	Emissions Intensity Threshold for Carbon Tax Application (t/GWh)		
		Coal-Fired Units	Natural Gas Units Commissioned before 2021 & New Units <50MW	Natural Gas Units Commissioned after 2020 & New Units >50MW
2019	$20	678	370	-
2020	$30	650	370	-
2021	$40	622	370	370
2022	$50	594	370	329
2023	$65	566	370	288
2024	$80	538	370	247
2025	$95	510	370	206
2026	$110	482	370	164
2027	$125	454	370	123
2028	$140	426	370	82
2029	$155	398	370	41
2030	$170	370	370	0

In 2020, the Government of Canada set a target of achieving net-zero GHG emissions by 2050, and SaskPower committed to reaching that goal. The 2050 goal allowed time for advancement of emerging low- and non-emitting baseload technologies, such as nuclear small modular reactors and natural gas with CCS, that Saskatchewan needs to transition its power system to enable a net-zero future.

However, there were further changes to federal regulations in 2022 with the introduction of a standard that would require the electricity sector to reach net-zero GHG emissions by 2035. In support of this goal, the federal government published the draft *Clean Electricity Regulation*s (CER) in August 2023. Refer to the Clean Electricity Regulations section for more information on the CER.

OTHER FACTORS DRIVING DECARBONIZATION

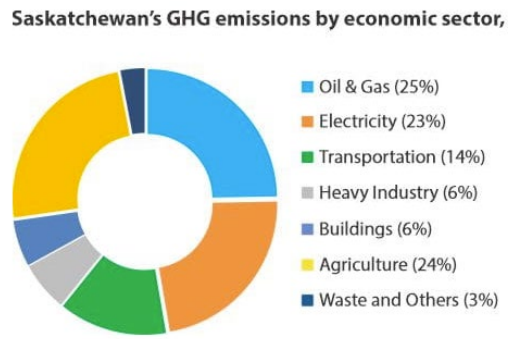
Regulatory changes are not the only circumstance driving SaskPower's efforts to achieve net-zero GHG emissions. Other key drivers include:

Customer expectations: Increasingly, customers want to see more renewable power incorporated into SaskPower's supply mix, along with the ability to control their personal energy use and be engaged in decisions about Saskatchewan's energy future. This shift in sentiment applies not only to our larger industrial customers, but is also growing among residential and farm customers, especially as the size and price of solar generating options improves. Customers are no longer passive consumers of power but have become energy producers wanting meaningful opportunities to participate in the electricity system.

Industrial decarbonization and ESG requirements: SaskPower's larger customers are aggressively responding to calls from investors, lenders, and insurance underwriters to align with environmental, social and governance (ESG) targets in daily operations and reduce the carbon footprint of their operations. These larger customers expect SaskPower's power generation mix to support their own decarbonization efforts and are pushing the company to accelerate its transition to net-zero GHG emissions. The risk facing SaskPower is that if we do not move quickly enough, these customers may opt to relocate their operations outside of Saskatchewan.

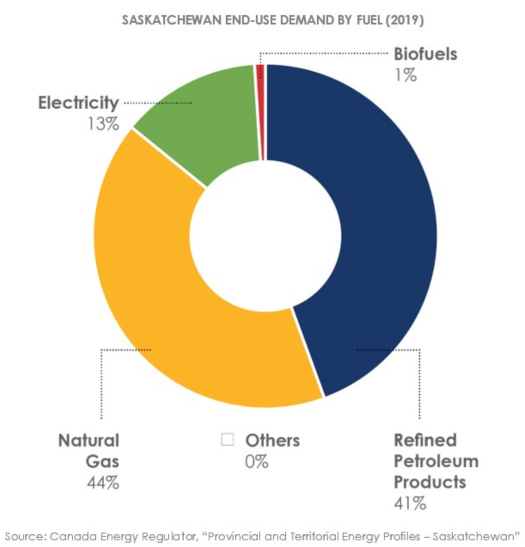
Regional impacts: As climate change results in ever larger extreme weather events, there is an increasing recognition that more regional cooperation and interconnection between utilities will be essential. As an example, SaskPower may need to rely on a neighbouring jurisdiction — or a jurisdiction connected to our direct neighbour — to help restore electrical service to customers after a major weather event.

GHG Emissions in Saskatchewan: While the electricity sector in Saskatchewan accounts for a relatively small proportion of the province's GHG emissions (23%), transforming the way we produce and deliver electricity is viewed by policy makers as a critical first step in delivering on broad societal decarbonization goals, which adds to the pressure for SaskPower to act.



https://www.saskatchewan.ca/residents/environment-public-health-and-safety/saskatchewan-state-of-the-environment-2023/greenhouse-gas-emissions

Electrification: New and expanded uses for electricity will emerge as society responds to the need to decarbonize our economy — to fuel vehicles, to provide process heat for industrial facilities, and to heat homes and businesses — that will lead to unprecedented demand for power. In Canada and the United States, some sources estimate that total electricity demand could more than double by 2050. This will drive the need for significant investment not only in clean power generation, but also in Saskatchewan's grid so it can support growing electrification and customer self-generation.



An emerging hydrogen industry: Growth in Saskatchewan's production of hydrogen may significantly increase demand for clean power. Until the cost to produce non-emitting hydrogen falls, the power sector will focus on other lower cost supply options; however, with fewer non-emitting energy options large industrial and heavy transportation sectors may drive this growth.

Energy decentralization: Historically, economies of scale resulted in SaskPower and other monopoly utilities deciding to deliver reliable service via large, centralized sources of power generation that were combined with vast transmission and distribution grids. As the cost of renewable generation decreases, customers are increasingly producing their own electricity. To support growth in these distributed energy resources (DERs), customers expect SaskPower to have a responsive and nimble supply, transmission, and distribution system that can accommodate rooftop solar, electric vehicles, storage, microturbines, microgrids, and demand response.

SASKPOWER IS RISING TO THE DECARBONIZATION CHALLENGE

Our company has one of the longest decarbonization paths of any Canadian jurisdiction. Like other provinces, historically we have relied on the resources that have been readily available and affordable for power generation. This means that in the absence of viable large-scale in-province hydroelectricity potential, fossil fuels have played a critical role in our electricity system.

With only three customer accounts per line kilometre of transmission and distribution lines, SaskPower has one of the lowest customer densities in the country, meaning the costs of building and maintaining a grid for a decarbonizing and increasingly electrified economy must be borne by a relatively small ratepayer base.

However, we have already charted an aggressive course for transitioning our electricity system to low- and zero-carbon resources while enhancing our transmission and distribution systems to enable electrification. We are currently on track to meet our commitment to reduce GHG emissions by 50 per cent below 2005 levels by 2030 – a commitment made in advance and greater than federal government targets.

SaskPower has already committed billions in its transition to a net-zero GHG future. This is evidenced by:

- Our investment in nearly 450 MW of wind, solar and biomass generation in the last five years, with a minimum requirement now introduced for Indigenous equity for all new wind and solar projects;
- The planned build-out of over 3,000 MW of wind and solar energy capacity by 2035;
- Investment in life extensions at key legacy hydroelectric facilities;
- Expanding import agreements with Manitoba Hydro to 290 MW;

- Investment in nuclear Small Modular Reactor (SMR) development, with the potential for a first unit to be commissioned by the mid-2030s;
- A commitment to a regional transmission interconnection expansion to support a major build-out of intermittent renewables and to act as a bridge to the potential construction of nuclear SMRs in Saskatchewan;
- The planned integration of multiple utility-scale Battery Energy Storage Systems, one of which would be among the largest in Canada;
- Support for geothermal project development in Saskatchewan;
- Development of the Boundary Dam Integrated Carbon Capture and Storage (CCS) Project – the world's first commercial scale CCS facility at a coal-fired power station that has captured almost 5.8 million tonnes of carbon dioxide (CO_2) to-date;
- Development of the SaskPower Carbon Capture Test Facility at Shand Power Station, capable of long-term technology evaluation using up to 120 tonnes/day of CO_2;
- Co-founding the International CCS Knowledge Centre, sharing SaskPower's experience with the world to advance CCS technologies;
- Our existing and planned investment in 1,500 MW of efficient natural-gas fired generation to support our unprecedented build-out of intermittent renewable energy and assist us with bridging away from conventional coal until zero-emissions baseload options can be commercialized for use in Saskatchewan;
- Execution of a distribution transformation program; and
- Construction of the Descharme Lake Microgrid in Northern Saskatchewan, which will increase reliability while providing cleaner electricity through solar generation and a battery energy storage system.

THE CHANGING ROLE OF CUSTOMERS

SaskPower continues to focus on innovative programs and self-serve tools that make it easier for customers to work with us, while offering more options to reduce electricity costs and environmental impacts.

With industrial customers looking to invest in climate solutions, three new programs are underway to support their transition to a cleaner energy future. The Renewable Subscription Service will allow participating customers to pay a premium on their bill and effectively count up to 100% of their power consumption as having come from renewable generation sources. Meanwhile, the Renewable

Partnership Offering will allow larger customers to partner with us in the development of a new 100-MW solar facility and count up to 25% of their annual consumption as solar power. Finally, the Renewable Access Service will allow industrial customers to secure their own renewable generation from an independent power producer and pay SaskPower to transmit the electricity from their generating facility to serve the load on their site.

SaskPower continues to help residential and small business customers manage their electricity bills through the delivery of a diverse portfolio of energy efficiency, conservation and self-generation programs and services. Research and development of new programs and services to ensure value is provided to customers. SaskPower currently has five active programs and one additional program in collaboration with SaskEnergy, including the Online Energy Assessment for Homes and Business, the Energy Assistance Program, the Northern First Nations Home Retrofit Program, the Energy Efficiency Discounts Program, and the Net Metering Program.

Additionally, industrial customers can participate in The Demand Response Program that allows us to pay our larger industrial customers to reduce or shift their power use.

PUBLIC ENGAGEMENT

For the first time, SaskPower has created a multi-year, five-stage process to engage with customers and stakeholders, including Indigenous rights holders and industry. The purpose of the engagement plan is to better understand the values and priorities of all customers and how they envision a net-zero GHG emissions future unfolding. As part of this plan, The Future Supply Plan – 2030 and Beyond project started in the fall of 2022 and will conclude with the release of the 2024 Integrated Supply Plan in the summer of 2024. The project's focus is on supporting participation in Saskatchewan's power future from a broad range of people without requiring a technical background in electricity.

The engagement goal of the project was to provide opportunities for the public to participate as much or as little as they wanted. In Stage 3 alone, more than 25,000 Saskatchewan residents participated. This is considered exceptional participation by industry standards and an increase of 10,000 over Stage 2.

With Stage 3 engagement activities concluded SaskPower is now in early 2024 moving into the reporting stage. The Stage 3 "What We Heard" report will be published in spring (March/April) 2024. The release of the draft 2024 Long-Term Integrated Supply Plan falls under Stage 4 of the process. Stage 5 of the process is the release of the final version of this plan in June 2024.

Thousands of customers across Saskatchewan have taken part through a combination of online learning events, surveys, workshops, a dedicated website, and other tools.

Key themes emerging from the stages of our engagement process are summarized below.

What is most important to customers and stakeholders about future power?

- Reliability.
- Affordability.

- Reducing GHG emissions.
- Minimizing land and water use impacts.
- Economic development in Saskatchewan.

What is needed by customers and during this energy transition?

- Information to understand the full costs of supply.
- Equity and opportunity for Indigenous people, youth, and lower income earners.
- Confidence that residents' input to the process will make a difference.
- A long-term view that avoids burdening future generations.

What are key opportunities to keep in mind?

- Facilitate efficiency and reduction in consumption.
- Leverage wind and solar power generation.
- Create economic growth and jobs.
- Leverage Saskatchewan's land, wind, and solar resources, as well as experience in mining, oil, and natural gas.
- Strengthen power distribution in rural and remote areas.

THE PROPOSED CLEAN ELECTRICITY REGULATIONS

REGULATION DEVELOPMENT HISTORY AND OVERVIEW

In March 2022, the federal government through Environment and Climate Change Canada (ECCC), began to define emission standards for the electricity sector with the goal of enabling decarbonization of the Canadian economy by 2050. Draft regulations were published August 19, 2023, in Canada Gazette, Part 1. The official comment period on the draft CER ended on November 2, 2023, during which SaskPower submitted a detailed response. ECCC continues engagement with stakeholders with a goal of finalizing the regulations by June 2024.

The regulations demonstrate Canada's desire to spur adoption of developing technologies and to constrain reliance on natural gas-fired generation. Draft terms would set a legally binding performance standard at 30 tonnes CO_2 per gigawatt-hour for generating units (with carbon pricing applied to any allowable emissions). The CER applies to individual generating units that: 1) use any fossil fuels to generate electricity; 2) have a capacity of 25 megawatts (MW) or greater; and 3) connect to a North American Electric Reliability Corporation (NERC)-regulated grid, like SaskPower's.

SASKPOWER'S CONCERNS WITH THE CER

Overall, our company is moving as quickly as possible to a net-zero GHG future and our analysis has shown that compliance with the CER by 2035 is not possible from technological, financial and logistical perspectives. The CER will only impose more cost and risk – which will be borne by our customers and the provincial economy – without helping us achieve a net-zero GHG future more quickly.

SaskPower's major concerns with the CER are summarized below.

The CER does not recognize Saskatchewan's unique context

- The model used to design the CER is nationally optimized and does not accurately represent Saskatchewan or SaskPower's electricity system, resulting in significant risk to reliability and affordability. In addition to the model and its detailed inputs not being shared by ECCC for discussion prior to Gazette I of the CER, a Saskatchewan-focused segment has not been developed to truly test the impacts of the CER on our province.

- Currently, there are no commercially available non-emitting baseload generation technologies available for Saskatchewan that can replace baseload conventional coal-fired generation by the end of 2029 and baseload natural gas-fired generation by the end of 2034.

- The CER will be inflationary and increase pressure on an already stressed supply chain in the run-up to 2035. Saskatchewan will be competing with many other jurisdictions in North America for the same labour and material resources to build the low- and non-emitting generation sources and supporting infrastructure needed to enable the global transition to a low-carbon economy.

- The timeline required to build the generation, transmission and distribution infrastructure needed for Saskatchewan to comply with the CER is not achievable by 2035.

The CER will threaten reliability for Saskatchewan customers

- Restrictions imposed by the CER on existing and future natural gas-fired generation will put SaskPower in the position of having to choose between providing reliable electricity for our customers and compliance with the CER.

- The CER does not consider Saskatchewan's extreme weather conditions, such as during extreme hot or cold temperatures when wind generation can be near zero for extended periods, from several hours to a number of consecutive days.

- The allowances provided in the CER to run natural gas-fired generation are inadequate. Increased flexibility for natural gas-fired generation will be critical to ensuring reliability in Saskatchewan well beyond 2034, until non-emitting baseload generation options and long duration utility-scale energy storage are commercially available and deployed at the scale required to replace natural gas-fired generation.

The CER will make electricity unaffordable in Saskatchewan

- The overall net economic benefits estimated by ECCC for the CER downplay the disproportionate and major negative affordability impact the CER will have on Saskatchewan.

- Within federal CER analysis, the upward trajectory of wind and solar generation costs has not been recognized, nor have first-of-a-kind technologies – such as nuclear SMRs and CCS on natural gas-fired generation – been appropriately costed.

- In addition to the replacement of the majority of SaskPower's generating fleet in such a short time to meet federal requirements, SaskPower must also continue to make historic investments in new transmission and distribution lines, grid modernization and the sustainment of our province's existing electricity system.

- Saskatchewan's rate disparity with hydro-rich jurisdictions will only widen under the CER. Higher rates will deter conversion to electricity from other competitive energy alternatives.

- The profitability and competitiveness of industry – including the critical minerals mining and agricultural sectors – will be significantly impacted. The result will be a substantial decline in investment in major Saskatchewan industries, resulting in lower employment and income.

- With carbon emissions being a national issue and recognizing regional differences related to the extent of required decarbonization efforts (hydro vs. non-hydro jurisdictions), the costs to comply with federal emission reduction regulations should be shared by the national tax base rather than exclusively by the provincial rate base.

<u>The CER doesn't allow sufficient time for emerging technologies to develop and be commercially available in Saskatchewan</u>

- The CER will require SaskPower to prematurely lock in large investments for commercially unproven technologies rather than benefitting from technological advances and cost reductions that will occur over time. A target of a net-zero GHG electricity system by 2050 provides the time necessary for these emerging technologies to be commercially proven, mitigating cost and risk.

- The CER Performance Standard of 30 tonnes CO_2/gigawatt hour (GWh) by 2035 is excessively stringent. Until CCS on natural gas generation is commercially proven, the strict performance standard proposed, coupled with the associated legal implications, make this a highly risky investment for SaskPower..

- The CER does not recognize the parasitic load of CCS – approximately 25%. This means that if SaskPower converted four natural gas-fired units to CCS, a fifth natural gas-fired unit would need to be built just to power the four CCS facilities.

- The CER does not recognize the limitations that a CCS facility can place on generating facility availability, nor the limitations of placing CCS on peaking natural gas-fired facilities.

- Nuclear SMR technology is currently in development and has not been successfully deployed in the western world. SaskPower has launched a project to build one of the world's first GE Hitachi BWRX-300 SMRs with an expected commissioning date of 2034.

- With nuclear SMRs being an emerging technology that will not be commercially available in Saskatchewan until the mid-2030s, natural gas-fired generation is the only baseload option available at the scale required to bridge between the end of conventional coal-fired generation in 2029 and SMRs in the mid-2030s.

SASKPOWER'S CURRENT SUPPLY PLAN

OVERVIEW OF CURRENT ANNUAL SUPPLY PLAN

SaskPower's annual Supply Plan covers the current period out to 2035. Until the federal *Clean Electricity Regulations* are finalized and become law, SaskPower will continue to plan for a net-zero GHG electricity system by 2050. Without significant changes to the CER, achieving compliance by 2035 will not be possible.

The main themes in the approved Supply Plan are:
1. Transition from conventional coal;
2. Leverage natural gas in the short-term;
3. Expand and integrate renewable resources into the system;
4. Stage distributed energy resource additions to match the pace of grid modernization;
5. Increase transmission interconnections to facilitate a build-out of intermittent renewables, increase system resiliency and act as a bridge to low-emitting provincial options; and
6. Advance low- or non-emitting baseload supply options for 2035 – including SMRs, natural gas with CCS, hydroelectric power, and energy storage.

The supply plan is updated at least annually as inputs such as load forecast, regulations, technology options and costs change.

FORECASTING FUTURE ELECTRICITY DEMAND

The load forecast is developed annually to determine the long-term energy requirements and system peak demand for SaskPower's customers in the province of Saskatchewan. The service area consists of the entire province except for two resale customers that supply energy to their customers in the City of Saskatoon and the City of Swift Current.

The load forecast is prepared using inputs from independent data sources, historical energy sales, and individual customer forecasts. The forecast is a compilation of energy sales forecasts for Power, Oilfield, Commercial, Residential, Farm, and Reseller customers and includes projections for internal corporate use, system losses, peak demand, unaccounted energy use, and non-grid energy use. SaskPower's load forecast forms the basis for capacity additions, maintenance schedules, power plant operations, fuel budgets, operation budgets and the corporate revenue forecast which supports both rate design and accounting.

An independent economist jointly hired by the Government of Saskatchewan and SaskPower provides important Saskatchewan-based inputs to the load forecast such as population, household growth, potash and oil production forecasts.

While there are many variables that can affect load forecasts, the most significant for SaskPower are the forecasts provided by large-scale industrial and commercial customers. SaskPower contacts these customers semi-annually to obtain short and long-term expansion plans.

SaskPower's load forecast methodology is typically reviewed by outside industry experts every five years as recommended by the Saskatchewan Rate Review Panel. The purpose of the review is to determine if the methodology is appropriate for SaskPower and is consistent with accepted electric power utility practices.

Longer-term, a desire to shift more energy consumption from fossil fuels to electricity creates challenges in projecting future load requirements. Factors such as Electric Vehicle (EV) adoption rates, conversion to electric home heating, adoption of heat pumps and improvements to battery storage technologies are only a few of the variables that can significantly impact future load growth projections. Add to this the potential for regulatory changes and new / emerging technologies changing the way we both produce and consume electricity and not only does load forecasting become a challenge but so to does confirming the generation options required to serve that load.

CRITICAL ROLE OF NATURAL GAS-FIRED GENERATION

As SaskPower executes on its plan to add more than 3,000 MW of intermittent renewable generation by 2035, without non-emitting dispatchable generation sources being commercially available at the scale required before 2035, natural gas-fired generation will be critical to ensuring reliability for customers beyond 2034. The significant variability in wind and solar generation sources will require natural gas-fired generation as a back-up to ensure a reliable supply of electricity when the wind isn't blowing and the sun isn't shining. Until SMRs or other non-emitting baseload and dispatchable supply options become technically and economically viable in Saskatchewan, SaskPower's supply mix will include natural gas-fired generation to provide reliable electricity.

CRITICAL ROLE OF TRANSMISSION INTERCONNECTIONS

Transmission interconnections to energy markets outside of Saskatchewan serve multiple independent purposes and provide flexibility that is critical to meeting the diverse needs of SaskPower's system, including:

Reliability and Resiliency of SaskPower's Electrical System
Dedicated transmission capacity reserved for importing electricity on a short-term, as-needed basis during emergency conditions is a critical part of a reliable and resilient electrical system. The import/export needs of the electricity system can swing hundreds of megawatts in a 24-hour period, and this variability will grow as more intermittent renewable generation is integrated into

Saskatchewan's electricity system. Interconnections with neighbouring jurisdictions increases the diversity of the electricity supply options available to serve SaskPower's customers and enhances reliability and resiliency by reducing the impact of emergency events or allowing service to be restored more quickly following an unplanned outage of a generating unit or facility.

As extreme weather events become more common, it is increasingly important to have strong interconnections with multiple external markets as it may be necessary to rely on our neighbour, or our neighbour's neighbour, to reduce the impact of these events. During the January 2024 cold snap in western Canada, SaskPower supported Alberta during an emergency energy alert by exporting surplus energy to help avoid rotating brownouts.

Flexibility to Import and Export Electricity

Operating an electrical system like SaskPower's requires infrastructure that provides flexibility to manage situations where conditions can vary significantly over short periods of time. Having sufficient interconnection capacity provides the flexibility required to quickly respond to changing conditions and reduce the risk of outages.

Supporting the development of Small Modular Reactors (SMRs) in Saskatchewan

Expanded interconnections allow SMRs and other emerging technologies (hydrogen-based generation, utility scale storage, etc.) to be implemented as soon as they are technically and economically viable. This could be accomplished through a short-term import contract to bridge the gap from the regulated end of conventional coal generation in 2029 until an SMR or other technology is built and operating in Saskatchewan around 2035. Upon expiry of the import contract, the transmission infrastructure could be used for other purposes, such as exporting surplus electricity. This is in contrast to the alternative: an over-build of emitting generation sources to fill part of the gap created by the retirement of conventional coal, which could then end up as stranded assets.

Enabling renewable generation to be expanded in Saskatchewan

As more intermittent renewable generation is added to SaskPower's system, the impact of the variability in generation from wind and solar becomes more difficult to manage. SaskPower currently has approximately 600 MW of intermittent renewable generation. Experience has shown that this generation is often not available on the hottest or coldest days of the year when demand is the highest – at times resulting in system emergency energy alerts.

Expanding interconnections will support SaskPower's planned build-out of wind and solar generation in Saskatchewan by providing access to neighbouring markets to quickly import electricity on a short-term basis to meet demand when the wind isn't blowing or the sun isn't shining. Conversely, expanded interconnections will allow surplus renewable energy to be exported rather than curtailing it when Saskatchewan has surplus electricity.

Assisting in long-term rate competitiveness

Building natural gas generation instead of interconnections would result in higher rates for SaskPower's customers due to natural gas being a higher-cost supply option. Additionally, Saskatchewan would not be able to benefit from access to the Southwest Power Pool, which has recently been the lowest cost energy market in the United States.

Reducing regulatory, operational and load forecast risk
Expanded interconnections will help lower GHG emissions and **reduce regulatory risk** by supporting expanded intermittent renewable generation in Saskatchewan, reducing the need for natural gas generation and supporting the earliest implementation of non-emitting baseload options, like SMRs.

Expanded interconnections will **reduce operational risk** by:

- Increasing the diversity of SaskPower's supply mix, enhancing reliability and resiliency.
- Reducing exposure to natural gas price fluctuations.

Expanded interconnections will **reduce load forecast risk** by providing the flexibility to accommodate uncertainty in future demand for electricity. Interconnections can mitigate this uncertainty by allowing power to be imported if demand is higher than expected or allow surplus electricity to be exported at times when there is more generation than needed.

EMERGING ELECTRICITY GENERATION TECHNOLOGY OPTIONS

Carbon Capture and Storage (CCS) on Natural Gas-Fired Generation: CCS on natural gas is not yet commercially available and while there is significant development happening in Canada and around the world, it is not yet commercially proven and represents a high-risk pathway to compliance in the time available. Based on SaskPower's experience with the Boundary Dam Unit 3 CCS facility, the CER performance standard should be based on commercially proven performance, which will require more time than the 2035 compliance date allows.

Nuclear: Saskatchewan will not have its first SMR in operation until the mid-2030s, at the earliest. If a decision is made to proceed with SMR development in Saskatchewan, it is likely that at least two SMRs would be built. However, two SMRs (2 x 315 MW) would not be sufficient to offset even half of the 1,280 MW of conventional coal-fired generation retired due to federal coal regulations by 2030. Further, as SMRs are an emerging technology and not commercially available in Saskatchewan until at least the mid-2030s, natural gas-fired generation is the only baseload option available at the scale required to bridge between the end of conventional coal-fired generation and potential deployment of SMRs. Although large-scale nuclear is not currently a viable option for Saskatchewan's grid, it could be an option in the future.

Long-Duration Energy Storage: This is a category of energy storage solutions that can supply their rated capacity for an extended duration, such as days or even weeks. In comparison, shorter duration energy storage systems, like lithium-ion batteries, are only able to provide energy for up to four hours. Examples of long-duration energy storage systems include pumped hydro that involves pumping water to a raised reservoir and releasing it to generate power, or other technologies like compressed air and flow batteries.

Hydrogen: Hydrogen blending is not a proven technology at the utility scale. Meanwhile, hydrogen is locally constrained by infrastructure and globally constrained by supply. Additionally, hydrogen volumes required for a power station are too large for practical application. As hydrogen is primarily produced from fossil fuels (>95 per cent globally), co-firing or blending hydrogen is likely to result in no better emissions outcomes than direct combustion of natural gas.

RESPONSE TO QUESTIONS FROM THE ECONOMIC IMPACT ASSESSMENT TRIBUNAL

QUESTIONS FROM THE TRIBUNAL

The information that follows in this section is SaskPower's response to the following matters identified by the Tribunal:

1. The estimated cost to Saskatchewan of complying with the Regulations, against the baseline of Saskatchewan's electricity supply plan over the same time period (2025 to 2035), in alignment with the provincial Affordability Plan.
2. The forecasted effect on electrical utility rates, against a baseline of Saskatchewan's electricity supply plan over the same period (2025 to 2035), in alignment with the provincial Affordability Plan.

SASKPOWER'S RESPONSE

The Saskatchewan Affordability Plan released in May 2023 was based on a number of assumptions on what the requirements of the CER would be when they were released. With the release of the draft CER on August 19, 2023, there were many differences between the previous assumptions and the provisions defined in the draft regulations. As a result of this and in accordance with our normal supply planning process, we have updated our scenario analysis considering the new requirements defined in the draft CER to determine what would be required to comply with the draft regulations, as compared to a net-zero by 2050 scenario.

The "CER compliant" data contained within this section is the result of SaskPower's latest scenario planning that attempts to estimate cost impacts of the proposed regulations. However, SaskPower analysis concludes that **compliance with the draft CER is not attainable** due to the immense logistical and technological challenges that are present in the period up to the 2035 deadline.

RESPONSE TO MATTER #1: ESTIMATED CAPITAL COST

- SaskPower has completed several scenarios to estimate the capital cost of meeting the CER. To provide a comparison, a scenario anticipating reaching net-zero in 2050 has also been completed.
- Three scenarios are included in this section:

Table 1: Scenarios

Scenario	CER Compliant?	Generation Comments
CER Compliant (Diverse Mix)	Yes, Net-Zero 2035	Mix of Carbon Capture on Natural Gas and Imports
CER Compliant (Low Imports)	Yes, Net-Zero 2035	Primarily Carbon Capture on Natural Gas
Net-Zero by 2050	No, Net-Zero 2050	No Carbon Capture on Natural Gas

- As noted above, the Net-Zero by 2050 scenario is not the same as the Government of Saskatchewan Affordability Plan. The Net-Zero by 2050 scenario is the SaskPower scenario that achieves net-zero by 2050 instead of the 2035 target in the CER.

The CER Compliant scenarios both meet the CER regulations but have different generation mixes.

Table 2: Generation Addition in MW between 2025 - 2035

Generation Type	Net-Zero by 2050	CER Compliant (Diverse Mix)	CER Compliant (Low Imports)
Hydro	60 MW	60 MW	60 MW
Biomass	58 MW	58 MW	58 MW
Wind	1,900 MW	1,900 MW	1,900 MW
Solar	900 MW	900 MW	900 MW
Interconnections/Imports	500 MW	1,000 MW	500 MW
Battery	375 MW	375 MW	375 MW
SMR	315 MW	315 MW	315 MW
Natural Gas with CCS	-	754 MW	1,131 MW
Unabated Natural Gas	743 MW	743 MW	878 MW
Total Additions	**4,851 MW**	**6,105 MW**	**6,117 MW**

- The primary impact is the advancement of capital expenditures on carbon capture on natural gas and interconnections.

- The capital expenditures are separated into two categories: i) **Generation** includes the cost of new generation and the cost of new interconnections to facilitate imports or exports; and ii) **Other** includes capital expenditures related to sustaining capital, new transmission and distribution and customer interconnections.

Table 3: Capital Expenditures between 2025 - 2035

	Net-Zero by 2050	CER Compliant (Diverse Mix)	CER Compliant (Low Imports)
Generation	$16.9 B	$24.6 B	$28.4 B
Other	$11.1 B	$12.9 B	$13.7 B
Total	$28.0 B	$37.4 B	$42.1 B
Incremental	**-**	**$9.4 B**	**$14.1 B**

- The incremental capital cost of achieving net-zero by 2035 as compared to achieving net-zero by 2050 is estimated in a range between $9 billion and $14 billion between 2025 and 2035.

- While SaskPower has estimated the capital cost of being CER compliant by 2035, as discussed earlier in this document, it has determined that **the plan is not feasible** from either a technological or logistical basis.

- Recent attempts at securing firm capacity via imports from neighbouring jurisdictions have not produced viable options.

RESPONSE TO MATTER #2: INFLATION IMPACT AND ESTIMATED RATE IMPACT

- Inflation impacts the forecasted cost of goods including electricity.

Table 4: Inflation impact between 2025 - 2035

Inflation Impact	2.0% per year	2.5% per year	3.0% per year
Cumulative Impact (2025 – 2035)	22%	28%	34%

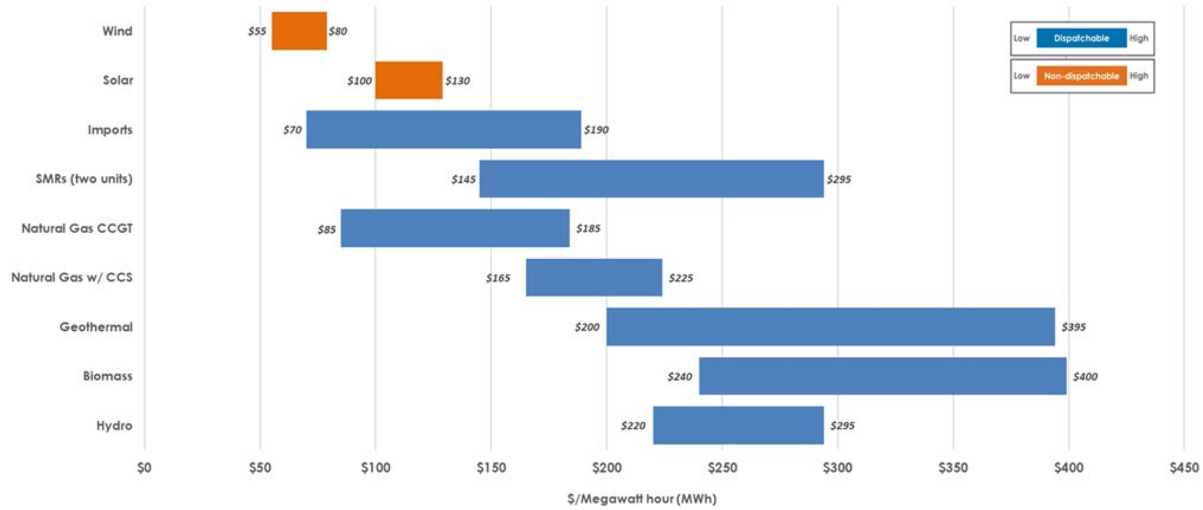
- If inflation averages 2%, the expected cumulative impact on electricity rates is 22%. The impact increases to 34% if inflation averages 3%.

- In addition, the cost of new dispatchable generation will be higher than the cost of existing generation. Dispatchable generation is needed to ensure that customer demand may be met even when electricity generated by wind or solar is not available.

- The current all-in cost of generation (capital cost, operating costs, fuel and taxes) for SaskPower is approximately $86/MWh (fiscal year 2022-23).

- The cost of new non-emitting dispatchable generation will be materially higher than the average cost observed in Fiscal Year 2022-23.

Chart 1: Levelized Cost of Energy ("LCOE") by Generation Source (2024$) without Subsidies



- The LCOE values do not include the benefit of the federal Investment Tax Credit ("ITC") or government subsidies.

- The assumed capacity factor for natural gas facilities is 85%. The capacity factor achieved may be lower due to regulations and this would result in a higher LCOE range.

- The low end of the range for natural gas generation LCOE assumes carbon tax is returned to SaskPower. The high end assumes that carbon tax is not returned.

- As existing generation is replaced with new generation, the average cost will increase materially.

- Additionally, the transmission and distribution system needs to be enhanced to support the energy transition, which will result in higher costs for the delivery of the electricity to SaskPower customers.

- The anticipated rate impacts, including the impacts of inflation, are:

Table 5: Estimated Rate Impact between 2025 – 2035 (before government subsidies)

Rate Impact	Net-Zero by 2050	CER Compliant (Diverse Mix)	CER Compliant (Low Imports)
Cumulative Impact by 2035	90%	110%	110%
Carbon Tax Paid in 2035	$675 M	$310 M	$335 M

- SaskPower does not anticipate that CER Compliant (Diverse Mix) or the CER Compliant (Low Imports) scenarios are feasible from either a technological or logistical basis.

- Electricity rates are expected to increase more rapidly than the rate of inflation.

- The electricity rate impact will be lower if SaskPower receives government subsidies.

IMPACT OF FEDERAL FUNDING

- Federal funding allows SaskPower to avoid incurring new debt to pay for the energy transition.
- In the simplest terms, $1 billion of funding means avoiding an annual mortgage payment of $61 million (4.5%, 30 years). Debt servicing costs need to be recovered in electricity rates.
- A 1% rate increase results in an approximately $30 million of revenue for SaskPower, which is an additional cost to SaskPower rate payers.
- Therefore, every $1 billion of funding reduces the electricity rate impact by 2%.
- The rate impact benefit is reduced if the accelerated schedule imposed by the regulations results in additional costs.

APPENDICES

SASKPOWER

SYSTEM MAP

TOTAL AVAILABLE GENERATING CAPACITY AS AT **DECEMBER 31, 2023: 5,353 MEGAWATTS (MW)**

HYDRO TOTAL CAPACITY - 865 MW

- H1 Athabasca Hydroelectric System - 23 MW
- H2 Island Falls Hydroelectric Station - 111 MW
- H3 Nipawin Hydroelectric Station - 253 MW
- H4 E.B. Campbell Hydroelectric Station - 292 MW
- H5 Coteau Creek Hydroelectric Station - 186 MW

IMPORT POWER PURCHASE AGREEMENTS - 290 MW

- I1 Manitoba Hydro - 290 MW

NATURAL GAS TOTAL CAPACITY - 2,065 MW

- NG1 Meadow Lake Power Station - 41 MW
- NG2 Meridian Cogeneration Station* - 228 MW
- NG3 North Battleford Generating Station* - 289 MW
- NG4 Yellowhead Power Station - 135 MW
- NG5 Ermine Power Station - 90 MW
- NG6 Landis Power Station - 78 MW
- NG7 Cory Cogeneration Station - 234 MW
- NG8 Queen Elizabeth Power Station - 528 MW
- NG9 Spy Hill Generating Station* - 89 MW
- NG10 Chinook Power Station - 353 MW

WIND TOTAL CAPACITY - 617 MW

- W1 Riverhurst Wind Energy Facility* - 10 MW
- W2 Western Lily Wind Energy Facility* - 20 MW
- W3 Morse Wind Energy Facility* - 23 MW
- W4 Blue Hill Wind Energy Facility* - 175 MW
- W5 Red Lily Wind Energy Facility* - 26 MW
- W6 Centennial Wind Power Facility - 150 MW
- W7 Cypress Wind Power Facility - 11 MW
- W8 Golden South Wind Energy Facility* - 200 MW

Customer-generated wind capacity - 2 MW
(NOT SHOWN ON MAP)

SOLAR TOTAL CAPACITY - 93 MW

- S1 Highfield Solar Energy Facility* - 10 MW
- S2 Pesâkâstêw Solar Energy Facility* - 10 MW
- S3 Awasis Solar Energy Facility* - 10 MW

Customer-generated solar capacity - 63 MW
(NOT SHOWN ON MAP)

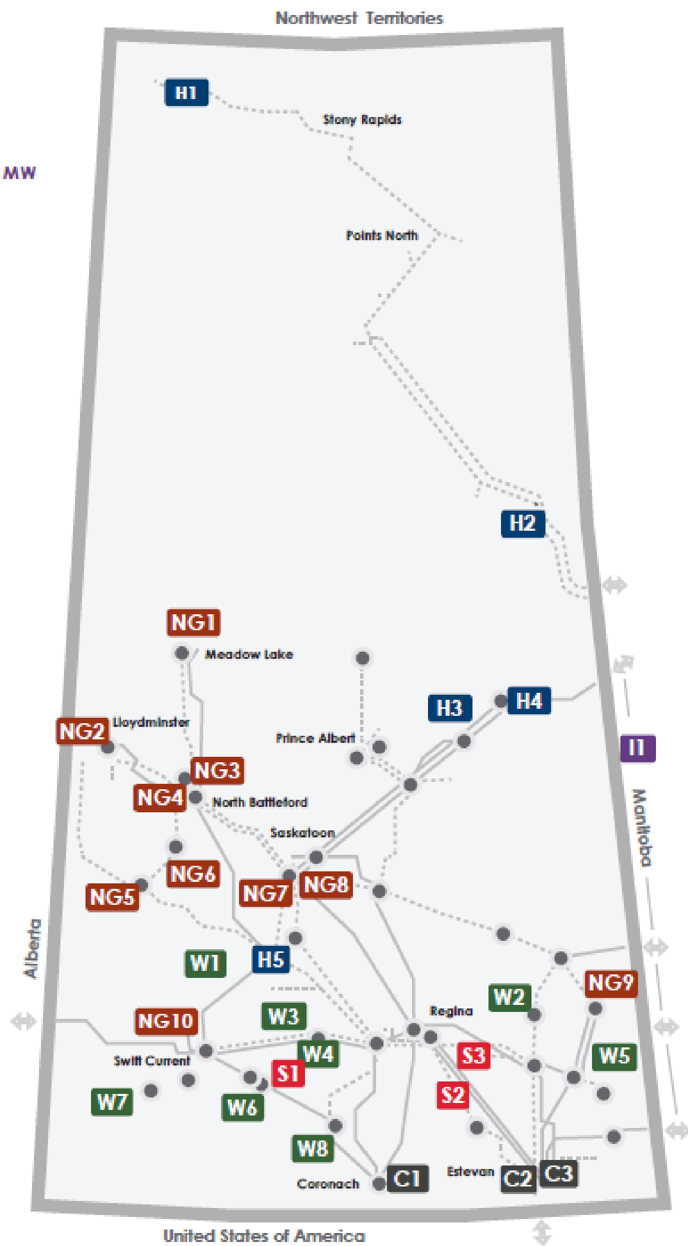
COAL TOTAL CAPACITY - 1,389 MW

- C1 Poplar River Power Station - 582 MW
- C2 Boundary Dam Power Station - 531 MW
- C3 Shand Power Station - 276 MW

SMALL INDEPENDENT POWER PRODUCERS TOTAL CAPACITY - 34 MW (NOT SHOWN ON MAP)
(Includes flare gas, waste heat recovery, landfill gas and biomass)

TRANSMISSION

230 kilovolt (kV)
138 kV/115 kV/110 kV
Switching station
Interconnection



*Large Independent Power Producer

SaskPower
Powering our future®

GLOSSARY

Baseload power
The minimum amount of electricity needed to be supplied to the grid at all times to meet steady and often essential levels of demand. Electricity utilities seek to have access to constantly operating and highly reliable generation sources to meet their baseload needs. Coal and hydro generation are excellent sources of baseload power generation.

Biomass
Energy resources derived from organic matter. These include wood, agricultural waste and other living-cell material that can be burned to produce heat energy.

Capacity
The greatest load that can be supplied by a generating unit, power station or an entire provincial grid system.

Carbon capture and storage (CCS) Technology that reduces greenhouse gas emissions by capturing carbon dioxide, typically at fossil-fueled power plants, and storing it in geological reservoirs deep underground.

Carbon dioxide (CO_2)
One of the primary greenhouse gases causing climate change. Carbon dioxide is produced in fossil fuel-based electricity generation.

CO_2 equivalent (CO_2e)
Unit of measure for greenhouse gases that includes CO2 emissions as well as the CO2 equivalents (CO2e) for methane (CH4) and nitrous oxide (N2O) emissions.

Climate change
Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity.

Decarbonization
Reducing the use of fossil fuels to decrease carbon dioxide emissions.

Demand
The rate at which electric energy is delivered at a given instant or averaged over a period of time. It is measured in kilowatts, megawatts, etc.

Distribution
Process of moving electric energy at lower voltages from major substations to customers.

Gigawatt (GW)
A unit of bulk power; one billion watts or one million kilowatts.

Gigawatt hour (GWh)
A unit of bulk energy; one million kilowatt hours.

Independent power producer (IPP)
An unregulated entity that owns power plants and generates electricity in the competitive wholesale market.

Load
The amount of electric power or energy consumed by a particular customer or group of customers.

Megawatt (MW)
A unit of bulk power; 1,000 kilowatts. The unit generally used to describe the output of a commercial generator.

Megawatt hour (MWh)
A unit of bulk energy; 1,000 kilowatt hours.

Net metering
The offsetting of electricity consumption by a customer against the same customer's production of electricity, typically from a small-scale renewable energy source such as wind or solar.

Nuclear small modular reactors (SMRs)
Nuclear fission reactors that are smaller than conventional nuclear reactors. In areas lacking sufficient lines of transmission and grid capacity, SMRs can be installed into an existing grid or remotely off-grid, providing low-carbon power for industry and consumers.

Peak load demand or peak energy demand
The maximum amount of electric power or energy consumed by a particular customer or group of customers at a precise time.

Power purchase agreement (PPA)
A contract between electricity producers in which one party sells energy and/or generating capacity to another, who generally serves end-use retail customers. For example, instead of building a new power plant, an electric company can choose to enter into a PPA.

Renewable generation
Electricity generated from sources that can be used continuously without being depleted and are generally free of greenhouse gas emissions.

Switching station
A facility containing transformers, regulators, switches and protective equipment for changing transmission voltages between transmission lines.

Transmission
Process of moving electric power in bulk at higher voltages from the source of supply to distribution centres.

Peter Haugen
General Manager – SSR Seabee
2100 Airport Drive, Suite 201
Saskatoon, Saskatchewan
S7L 6M6

Feb. 23, 2024

Economic Impact Assessment Tribunal,

Please consider this response from SGO Mining Inc. in response to the Tribunal's request for information on the impact of Regulations on Utility Rates in Saskatchewan. This note specifically considers what the impact of an increase in utility rates of 107% by 2035.

Electrical energy is an important driver in the production of gold our SSR - Seabee site. Saskatchewan's stable Utility provider, SaskPower, is an important partner in the success of the Seabee site.

We have performed an analysis on the impact of the stated increase in electricity rates on the current cost structure of our operation. The rate increase would have the effect of a 4.2% increase in our overall cost structure. Controlling for all other operating costs, the rate increase, and associated impacts to our cost structure, would have the net impact of reducing economically recoverable gold, with the outcome that the operation could shut down earlier than planned in our current cost structure.

SSR Seabee continues to be a responsible contributor to the economic value of the Province of Saskatchewan, with a GDP contribution of $221 MM and $16 MM in provincial, federal, and local taxes. SSR Seabee takes pride in supporting the local economy and in 2023 procured $57 MM in goods and services from Saskatchewan businesses. As we continue to grow and develop resources, SSR Seabee continuously engages local businesses to strengthen relationship with suppliers and vendors.

Our site employs approximately 427 full time employees, works with many contract partners, and supports Saskatchewan business through local sourcing of material. In 2023 SSR Seabee paid out $55 MM in wages and continues to develop skilled labor and trades through experience and training programs. Of those 427 employees, 14% are northern employees, and 27% are self identified indigenous workers. SSR Seabee works closely with the communities of Lac LaRonge Indian Band (LLRIB) and Peter Ballyntyne Cree Nation (PBCN) to increase local employment and procurement opportunities and sources $23 MM through the services of indigenous vendors.

Thank you for the opportunity for SSR Seabee to share the impact of these future changes.

Regards,

Peter Haugen
General Manager - SSR Seabee

Steel Reef Infrastructure Corp.
1600, 333 – 7th Avenue S.W.
Calgary, AB T2P 2Z1
P: 403.263.8333 | F: 403.237.9464

Sent via email: ken.dueck3@gov.sk.ca
Economic Impact Assessment Tribunal
Executive Director Ken Dueck
Secretariat Office
1100-1874 Scarth Street
Regina, Canada S4P 4B3
Attention: Ken Dueck, Executive Director

Mr. Dueck,

Thank you for the opportunity to provide a written submission on the impact of the Government of Canada's *Clean Electricity Regulations* on Steel Reef's Saskatchewan projects, operations, and activities.

Steel Reef Background:
Steel Reef Infrastructure Corp. (Steel Reef) is the predominate midstream infrastructure and service provider in Saskatchewan. Steel Reef provides an essential service by developing and operating the infrastructure to capture associated natural gas (flare gas) from oil production in Saskatchewan and North Dakota. Without Steel Reef, this associated natural gas would have otherwise been flared or vented. Steel Reef gathers and processes over 145 million standard cubic feet per day of associated natural gas preventing ~6,200,000 tonnes of carbon dioxide emissions annually that would have otherwise occurred from flaring or venting.

Steel Reef is supportive of the path to net zero in Canada and throughout the world. It aligns with our core activity of flare gas capture (which in our opinion, is still the most effective way of reducing Canada's emission profile) and also aligns with our goal of installing electricity generation that continues to support emissions reduction. Our organization is already helping to shape a major energy transition for the Province of Saskatchewan by assisting in backfilling coal-fired electricity generation with electricity generated from captured emissions. This reflects Steel Reef's positive impact and contribution to the sustainability of the energy sector and our communities. As such, we are keenly interested in the draft Clean Electricity Regulations (CER) and have been watching their development closely. We have been compelled to provide these comments in light of the Clean Electricity Regulations Public Update released on February 16, 2024 (the Update).

25MW per site threshold impact on flare gas capture:
Steel Reef has been actively working on expanding our infrastructure to incentivize capturing additional volume of associated natural gas in Saskatchewan. To this end we are developing approximately 180 megawatts of flare gas-fired electrical generation capacity through projects consisting of 8 and 15 megawatt (MW) units distributed across multiple facilities. These projects would reliably self-supply critical flare gas processing facilities with the required electricity to operate, and export excess electricity to the grid, thereby enhancing the efficiency and profitability of the captured flare gas. It is planned that between 30 to 50 MW would be installed per site, but with each unit at these facilities meeting the previously proposed CER minimum regulatory capacity threshold of 25 MW per unit. The public update provided by the ECCC on the CER included a "change under consideration" to move the per unit threshold to a per facility threshold. This potential change puts these projects at risk. Steel Reef's proposed development of 180 MW of capacity would provide an opportunity to capture up to an incremental 40 million standard cubic feet per day of natural gas that is potentially still being flared or vented (equivalent to ~1,700,000 tonnes of carbon dioxide of emissions annually).

It is understood that the regulatory rationale for the draft CER's exemption applying to units 25MW or smaller was intended to provide relief for remote communities and to limit the administrative burden to manage these small units that produce only low overall emissions. The Update raises the concern that including the 25 MW minimum threshold could incent multiple inefficient units of less than 25 MW to be built to avoid the CER requirements (daisy chaining multiple small turbines) and indicates that a facility-based approach that instead adopts a collective capacity approach is now being considered. We believe that the same intent would be satisfied by retaining the previously proposed CER minimum regulatory capacity threshold of 25 MW per unit, while also adopting a total per site threshold of slightly larger limit (such as 35-50 MW). It is unlikely that setting the site limit to 35-50MW would limit the applicability of the CER as this capacity would still be too small a size to be used for large scale base load power. However, a total facility capacity of 35-50 MW does make sense for efficient flare gas utilization distributed across multiple facilities as it allows for efficient installations with flexibility and redundancy. One of our most fuel-efficient flare gas power generation configurations is the installation of two Solar Titan-130 turbines. The total name plate capacity for this design at one site is 33.1 MW and it can capture up to 11 million standard cubic feet per day of raw flare gas. Maintaining the 25 MW minimum threshold and applying it on a collective facility basis would have the perverse consequence of prohibiting this configuration under the CER, notwithstanding its clear environmental attributes in reducing GHG emissions.

25MW per site threshold on Co-Generation:
The current commentary also will limit a cogeneration site where any amount of power (over a calendar year) is being exported to the grid but where there is more than 25 MW of installed power is on site. Therefore, a cogeneration unit is subject to the CER, even if its net exports have consistently been the same or lower than another < 25 MW generating unit that purely provides its electricity the grid, which is not subject to the CER. We would recommend to apply the per site exemption based on the total power exported not based on total power installed. This would allow for efficient use of potentially wasted power where waste heat needs can exceed onsite power requirements.

Summary:
With these proposed changes to the draft CER identified in the Update, multiple flare gas to power projects are at risk and create no viable option for captured associated natural gas that would otherwise have been flared or vented. Similarly, the proposed changes will limit the efficiencies that can be realized through cogeneration initiatives. We are requesting the ECCC consider the ramifications of the changes under consideration to the per unit exemption threshold and take into account the option for electricity generation from associated natural gas that would have otherwise been flared or vented.

Should you have any further questions, please do not hesitate to contact me.

Sincerely,

Scott Southward
President & CEO

February 29, 2024

Ken Dueck
Executive Director
Economic Impact Assessment Tribunal Secretariat
ken.dueck3@gov.sk.ca

Dear Ken Dueck:

Thank-you for allowing the Saskatchewan Urban Municipalities Association ("SUMA") to submit feedback on the proposed federal *Clean Electricity Regulations* (the "Regulations"). SUMA represents cities, towns, villages, resort villages, and northern municipalities in the Province of Saskatchewan.

We are deeply concerned about the potential 107% increase these Regulations would have on utility rates by 2035 for our members. Municipalities of all sizes pay large amounts of money for utilities provisions, especially for large recreational centres. Municipal operating budgets must be balanced, and any increase to utility rates will make it difficult for municipalities to remain financially stable. A 107% increase in utility rates would be devastating for urban municipalities in the Province, and SUMA strongly advocates against any legislation or policy which would increase these utility prices and rates.

Additionally, a significant increase in utility rates of 107%, would have widespread consequences not only on municipalities but businesses, and residents of Saskatchewan hometowns. Higher utility rates can place a substantial financial burden on residents, particularly those with fixed or low incomes. This might lead to increased financial stress and challenges in meeting basic needs and potentially risk disconnection, posing health and safety concerns, especially in extreme weather conditions.

Businesses, especially those that rely on energy-intensive operations, will experience a significant increase in operational costs. This would impact profitability leading to downsizing or closure of businesses in our hometowns, particularly given the ongoing challenges municipalities are still facing in stabilizing from the impact of COVID-19.

That said, there could be the risk of reduced economic activity and potential defaulting of property taxes leading to reduced revenue for urban municipalities. Saskatchewan urban municipalities may experience increased demand for social services if more residents struggle with affordability, potentially straining local resources. The housing crisis in our hometowns is a well-acknowledged example in this context.

Unit 305 – 4741 Parliament Avenue
Regina, SK S4W 0T9
Tel: 306-525-3727 Fax: 306-525-4373
E-mail: suma@suma.org

SUMA supports an energy mix that ensures reliability as well as affordability for customers, which includes municipalities.

We call on the federal government to re-evaluate these regulations, especially the negative impacts on the overall well-being of the Saskatchewan people. Furthermore, if any such policy or legislation is implemented, urban municipalities would require financial support to deal with the change. Essentially, if these Regulations come into force, utility rates will be increased to an unaffordable level.

In addition, we request that the federal government ensures adequate communication and proper engagement with various stakeholders, including municipal governments, before implementing any changes. This is very crucial for informing our membership and residents of Saskatchewan about the intended regulatory advancements and ensuring their involvement in the decision-making process.

SUMA appreciates your willingness to hear feedback on this matter. We look forward to future developments and remain hopeful that the federal government will reconsider its position on this issue.

Sincerely,

Jean-Marc Nadeau
SUMA CEO

Weyerhaeuser

Saskatchewan Timberlands • Box 40, Highway 9 south, Airport Road • Hudson Bay, SK. Canada S0E 0Y0

February 29th, 2024

Mr. Ken Dueck
Executive Director
Economic Impact Assessment Tribunal Secretariat

Government of Canada's Clean Electricity Regulations

Dear Mr. Dueck:

This letter is in response to your letter, dated January 31, 2024, requesting input on the implications of the Federal *Clean Electricity Regulations* upon our forest product processing operations in Hudson Bay, Saskatchewan.

In way of background, Weyerhaeuser operates an oriented strand board (OSB) mill in Hudson Bay, Saskatchewan. This mill represents the latest iteration of a long history of forest products harvest and processing in the community. Our facility produces between 575 and 600 million square feet of OSB annually. To do that we employ 163 staff and associates within the mill, 14 staff looking after harvesting and forest management along with approximately 175 contractors carrying out the harvest and hauling operations.

Our business is highly competitive, we compete in North American and global commodity markets to produce and sell our product. The projection that rates for electricity usage could increase by 107% due the imposition of new Federal regulations is troubling news. We estimate that this change in regulation would add upwards of $500,000 to our annual operating costs.

We are a business rooted in sustainability in terms of our facility, the forest we manage under license with the Province, and the community we are privileged to be a part of. Any cost increases that place us at an economic disadvantage to our competitors also place our sustainability at risk. We appreciate your attention to this matter and the work to maintain our long-term competitiveness and sustainability.

Regards,

Michael LeBlanc RPF
General Manager, Weyerhaeuser Timberlands

cc:
Paul Beckerton
Mill Manager, Weyerhaeuser Hudson Bay OSB

March 4, 2024

Economic Impact Assessment Tribunal
Ken Dueck
Secretariat
Email: ken.dueck3@gov.sk.ca

Dear Ken,

Subject: Economic Impact Assessment of the Proposed Clean Energy Regulations

Introduction

Whitecap Resources Inc. (Whitecap) has been active in the Saskatchewan energy sector for more than a decade. We currently produce more than 60,000 BOE/d in the province from our assets spread across the southern portion of the province, specifically in the Kindersley, Swift Current, Weyburn, and Estevan regions. Our current plans contemplate spending $300-400 million each year on capital projects – drilling wells, building infrastructure, and furthering our enhanced recovery projects such as the Weyburn Unit CO2 flood. On top of our capital investments, we also spend approximately $400 million annually on operating expenses, directly employing 300 people, and indirectly, hundreds more.

Saskatchewan has been a favorable place to do business for Whitecap. We've had excellent support from stakeholders, including Government, regulatory bodies, and citizens over the years, which has built a relationship that has greatly benefited all parties. The collaborative efforts and supportive environment in Saskatchewan have facilitated our operations and investments in the province. This positive relationship has enabled us to navigate various challenges and capitalize on opportunities, contributing to the economic prosperity of the region. We sincerely appreciate the ability to provide feedback on the proposed Clean Electricity Regulations' impact to our business.

The proposed regulations stand to significantly impact Whitecap's business in Saskatchewan. While precise quantification of the impact is challenging, it is evident that these regulations would detrimentally affect our existing operations and future capital deployment decisions.

Impact of Proposed Regulations

Of particular concern is the forecasted 107% increase in utility costs by 2035. Presently, our annual expenditure on electricity in Saskatchewan amounts to approximately $80 million, representing nearly a quarter of our operational costs. An additional $85 million annual expense would not only directly impact our bottom line but also exert broader, far-reaching consequences.

Well Economics

A considerable portion of our assets in Saskatchewan, notably in the Swift Current, Estevan, and Weyburn areas, exhibit high water-cuts. Over time, while the total fluid produced remains relatively stable, escalating water cuts lead to diminished oil rates. Doubling electricity costs would significantly alter the economic thresholds of our wells, potentially necessitating the shutdown of wells previously considered viable.

Today, Whitecap has almost 3400 wells that produce less than 6 BOE/d in Saskatchewan. Any drastic change to our economics such as a major increase in power cost, puts these wells in serious jeopardy. This would mean a significant increase in the number of inactive wells and corresponding mandatory retirement spending – an undesirable situation for both Whitecap and the province. Almost every other producer in the province would be in a similar situation, further amplifying this issue.

Production, BOE/d	# of Wells
0-2	1641
2-4	1101
4-6	632

Figure 1: Count of wells with production less than 6 BOE/d

Capital Investment Impact

In our industry, we operate within cash flow constraints. Therefore, an increase of $85 million in power costs would directly translate to $85 million less available for investment in our assets. Annual investments of this magnitude play a vital role in driving growth and innovation, benefiting both our business and the province of Saskatchewan. For instance, with an additional $85 million, we could undertake significant initiatives such as drilling approximately 60 new wells each year, resulting in the addition of 2000-3000 barrels of oil equivalent per day (BOE/d) in new production. Furthermore, this investment would create employment opportunities through the engagement of dozens of full-time workovers, thereby contributing to the local economy.

Moreover, it is essential to recognize the competitive landscape within our organization. Each project undergoes rigorous evaluation and is measured against others within Whitecap. Therefore, any increase in operating costs significantly impacts the competitiveness of our Saskatchewan assets, including the Weyburn CO2 EOR project. Large-scale expansions in Weyburn are inherently challenging, given the myriad risks involved, particularly due to the long-term nature of the asset. If an additional $30 million is added to the annual operating costs, these projects would be at substantial risk, potentially jeopardizing their viability.

The prospect of power costs more than doubling raises significant concerns about the long-term viability of our investments in the province. This challenge is further underscored by a comparative analysis of projected power costs in Saskatchewan versus Alberta.

Province	Current	2035 FCST
SK	$80	$165
AB	$80	$100

Figure 2: Electricity Prices by Province ($/MWh)

Summary

In conclusion, Whitecap Resources Inc. expresses significant concerns regarding the proposed Clean Electricity Regulations and their potential impact on our operations in Saskatchewan. As a longstanding participant in the province's energy sector, with a substantial presence and considerable investments, we are deeply invested in the economic well-being of both our company and the province as a whole.

The proposed regulations, particularly the forecasted 107% increase in utility costs by 2035, pose significant challenges to our business. This increase would not only directly impact our bottom line but also have broader implications for our operational viability, potentially leading to the shutdown of previously viable wells and a surge in inactive assets.

Furthermore, the reduction in available funds for capital investment, due to heightened operating costs, would hinder critical initiatives such as drilling new wells and expanding production capacity. This, in turn, would limit employment opportunities and impede the growth and innovation necessary for our industry's continued success.

The competitive landscape within our organization would also be significantly affected, with Saskatchewan assets, particularly long-term projects like the Weyburn CO2 EOR project, facing increased risks and challenges. Comparative analyses with neighboring provinces highlight the potential economic disadvantages that such regulations could impose on Saskatchewan's energy sector.

In light of these concerns, we urge careful consideration of the proposed regulations and their potential economic ramifications. It is essential to strike a balance between environmental objectives and economic realities, ensuring that regulatory changes foster continued growth and prosperity for both Whitecap and the province of Saskatchewan.

We appreciate the opportunity to provide feedback on these regulations and remain committed to working collaboratively with all stakeholders to find solutions that support sustainable economic development while maintaining environmental stewardship.

Sincerely,

Jordan May
Vice President, Production
Whitecap Resources Inc.
jmay@wcap.ca

Knowledge grows

Our date
22 February 2024

To
Economic Impact Assessment Tribunal
Secretariate Office
1100-1874 Scarth Street
Regina, Canada, S4P 4B3

Copy to

Assessment of the proposed *Clean Electricity Regulations*

Dear Ken Dueck,

Thank you for inviting Yara Belle Plaine Inc. to submit a written submission about the impact of the proposed federal *Clean Electricity Regulations (CER)* to the newly appointed Economic Impact Assessment Tribunal. While Yara Belle Plaine did not share a dedicated response to the *Canada Gazette Part I* publication of the proposed CER, we did actively participate in the submission that was sent by Fertilizer Canada. To this extent, our concerns and recommendations related to the CER are in alignment and have been communicated through the Fertilizer Canada Submission. In addition, Fertilizer Canada will submit a response to the Economic Impact Assessment Tribunal on the CER, and we continue to support the recommendations contained therein.

While recognizing the need for decarbonization, Yara Belle Plaine is concerned about the disproportionate impact that the proposed CER may have on SaskPower that will subsequently decrease our competitiveness in the global nitrogen market. We encourage both the Federal and Provincial Government to quantify the cumulative impacts of carbon related policies on the Fertilizer Sector and take measures that would protect and strengthen our competitiveness. Once again, we thank the Economic Impact Assessment Tribunal for taking the opportunity to engage with Yara Belle Plaine on this important topic.

Sincerely,
for Yara Belle Plaine Inc.

Aaron Bourque
President & Plant Manager
Aaron.bourque@yara.com

Un-Solicited Responses Received:

1. Chad Eggerman, Procido LLP
2. Fertilizer Canada
3. Saskatchewan Chamber of Commerce

The Birks Building
#200, 165 – 3rd Avenue South
Saskatoon, SK, Canada, S7K 1L8

December 1, 2023

Delivered Via Email:

Lawyer: Chad Eggerman
Direct Line: 306.380.7664
Fax No.: 306.664.1616
Email: chad.eggerman@procido.com

ministerER@gov.sk.ca

mmilani@mcdougallgauley.com

Honourable Jim Reiter
Minister of Energy and Resources
Government of Saskatchewan
Room 302, 2405 Legislative Drive
Regina, SK S4S 0B3

Attention: Honourable Jim Reiter

Dear Minister Reiter:

Re: Economic Benefits of Energy

I am a Partner at law firm Procido LLP in Saskatoon practicing energy law. I have acted for coal miners, oil and gas companies and most notably renewable energy project developers. Our firm understands and appreciates that an appropriate mix of energy from different sources will be required to power Saskatchewan into the future. We note that the Government of Saskatchewan is at a critical point in time now when important decisions may be made which could have an effect on independent power producers ("IPPs") and all those people and businesses in Saskatchewan who derive economic benefits from private investment in renewable energy facilities. We note that recently the economic benefits of renewable energy to Saskatchewan seem to have been overlooked. We write to you in order to provide some clarity on the benefits of renewable energy to Saskatchewan. Although different renewable energy generation types have different economic benefits to Saskatchewan, we highlight some of those just for wind power generation facilities below:

1. **Farmers receive option fees.** Landowners (usually farmers in rural Saskatchewan) receive payment from IPPs for entering into an Option to Lease and Lease Agreement – an agreement that gives the IPP the future right to lease the land. Farmers receive payment even though the land is not currently leased. IPPs typically hold various options over many different lands as they are uncertain where a future project might be developed. This provides regular cash payments for farmers even though the lands may never be used for a wind power generation facility. Until (and if) the option to lease is triggered, the land continues to be under full production.

2. **Farmers receive rent.** Once the option to lease is triggered, the IPP and farmer enter into the Lease and farmers receive rent for their land. These rent payments over the life of the wind power generation facility (depending on the acreage held by the farmer and number of turbines on their property) can be in the many millions of dollars. The farmer receives compensation for any crop or land loss or damage. There are typically carve-outs in the Lease Agreement which allow the farmer to farm, rent, or transfer the land. Farmers may also negotiate carve-outs to

accommodate concurrent oil and gas development, geothermal and/or small modular or subsurface potash mining on the same lands.

3. **Land agents are employed.** Land agents in Saskatchewan receive payment from IPPs for assisting them in acquiring land for the wind power generation facility.

4. **Farmers provide weed control.** Local farmers may be hired by the IPP to control weeds and vegetation around the turbines and roads.

5. **Local businesses provide fencing.** Local businesses or the rural municipality may be hired by the IPPs to provide and install fencing.

6. **Professional services.** Local accounting firms are often engaged to provide tax advice to farmers receiving payments from the IPPs. Local law firms provide advice to farmers on agreements with IPPs. IPPs retain accountants and lawyers to assist with tax and project development.

7. **Rural municipalities receive taxes.** Once the wind power generation facility is operational, the IPP pays taxes to the rural municipality (which can be significant, especially for a small rural municipality).

8. **Community planning professionals.** If a rural municipality does not have renewable energy-specific bylaws in place, the RM may pay a local community planning professional to assist.

9. **Environmental consultants.** Local environmental consultants are often retained by IPPs to assist with environmental assessments as part of the permitting process.

10. **Rural building owners and contractors.** IPPs may purchase buildings in rural Saskatchewan and pay local rural contractors to refurbish the buildings, or build new buildings for education, demonstration, operation and maintenance and other purposes.

11. **Local contractors build transmission infrastructure.** Local Saskatchewan contractors are typically contracted for any new transmission, distribution and interconnection work required for the wind power generation facility - which costs to build this public infrastructure are currently passed on and paid entirely by the IPP (even though the IPP has no ownership, and all others can use this electricity infrastructure).

12. **Bonding agents.** Bonds may be required to decommission the wind power generation facility which are secured through a local bonding agent in Saskatchewan.

13. **EPC Subcontractors.** The IPP typically enters into a form of engineering, procurement and construction (EPC) contract to build the wind power generation facility. We don’t yet have EPC contractors with this capability in Saskatchewan, but

often the EPC contractor hires local construction companies as subcontractors. The IPP pays the EPC contractor and then the EPC contractor pays the local Saskatchewan construction subcontractors.

14. **Consulting engineers.** Both IPPs and EPC contractors often contract with local Saskatchewan consulting engineering firms on the design of the wind power generation facility.

15. **Road builders.** Many roads are required for a wind farm and a large contract is usually entered into between the IPP's EPC contractor and a roadbuilder. Due to the size of this contract only large roadbuilders in Saskatchewan typically have capacity to do this work. But those large local Saskatchewan roadbuilders may hire local and Indigenous workers close to the project site to build these roads.

16. **Local businesses upgrade and maintain roads.** Local businesses, or sometimes the RM itself, are paid by the IPP to upgrade existing roads to allow for the transport of tower, turbines and blades to the site. IPPs may enter into contracts and pay local rural people and companies or Indigenous groups to keep roads connecting the wind farm maintained and clear of snow throughout the year.

17. **Rural or indigenous communities.** Jobs (with salaries paid by the IPP) to operate and maintain the facility could be located in the local rural or Indigenous community.

18. **Indigenous groups earn dividends.** SaskPower currently requires at least 10% Indigenous equity ownership IPP projects supplying power to SaskPower. Unlike with SaskPower-owned facilities (which don't make a profit), Indigenous equity owners can share with the IPP in the profits distributed by way of dividends.

19. **Local investors.** Local investors have the opportunity to help Indigenous groups finance equity in the wind farm.

20. **Indigenous groups earn a return on capital.** Unlike with SaskPower-owned facilities, Indigenous equity ownership in an IPP-owned facility increases in value as the total value of the project increases. If an IPP sells the wind power generation facility, Indigenous equity owners can benefit very significantly if there is a sale of the project.

21. **Industry investment in Saskatchewan.** Any large or publicly traded company looking to invest in economic opportunities in Saskatchewan is subject to Environmental, Social, and Governance (ESG) business imperatives requiring the procurement of clean energy and the ability to meet GHG emissions targets within overall global operations. Decarbonizing electricity generation will increase Saskatchewan's competitive position as an attractive place for industry to invest.

We understand that very recently the Economic Assessment Tribunal has been convened pursuant to *The Saskatchewan First Act* (Saskatchewan) in order to examine the economic costs of the federal government's proposed Clean Electricity Regulations. We are hopeful that the Economic Assessment Tribunal will not only consider the costs of decarbonizing electricity generation in Saskatchewan, but also the economic benefits.

This is an important issue to our firm and so we remain open and willing to provide any further information on the economic benefits of renewable energy which you may find useful to assist with the important decisions ahead.

Yours truly,

PROCIDO LLP

Per:

Chad Eggerman
CPE/cf

cc. Michael W. Milani, Chair of *The Saskatchewan First Act* (Saskatchewan) Economic Assessment Tribunal

FERTILIZER CANADA
FERTILISANTS CANADA

907 – 350 Sparks, Ottawa ON K1R 7S8
T (613) 230-2600 | F (613) 230-5142

info@fertilizercanada.ca
fertilizercanada.ca | fertilisantscanada.ca

Ken Dueck
Executive Director
Economic Impact Assessment Tribunal
Secretariat Office
1100-1874 Scarth Street
Regina, Canada S4P 4B3

Submitted via email: ken.dueck3@gov.sk.ca

February 23, 2024
Dear Mr. Dueck:

We understand that the Saskatchewan Economic Impact Assessment Tribunal has sent letters to fertilizer production and manufacturing members in Saskatchewan requesting information on the economic impact of Environment and Climate Change Canada's (ECCC) proposed Clean Electricity Regulations (CER) by February 23, 2024. While Fertilizer Canada did not receive a direct request for input, our members believe it would be beneficial if we organized and provided you a submission on their behalf.

The fertilizer industry is a significant contributor to Saskatchewan's economy. Across the province, we account for approximately $5.5 billion of economic activity and support over 19,000 jobs throughout the supply chain including services from indigenous businesses. Over 20 million tonnes of potash are produced in Saskatchewan each year across ten mines (eight conventional and two solution) where 95 per cent of Canadian potash is exported internationally, serving more than 70 countries. Saskatchewan is also home to one nitrogen manufacturing facility.

Canadian potash production is already the most environmentally sustainable and ethically produced potash in the world, producing approximately 50 per cent fewer emissions than potash produced in Russia, Belarus and China. Canadian ammonia manufacturing is produced with an overall net emissions intensity that is 30 to 63 per cent lower than other countries examined.

As you are aware, ECCC has recently published a public report, *"What We Heard" During Consultations and Directions Being Considered for the Final Regulations*, with additional regulatory design options. Fertilizer Canada is in the process of reviewing the report and plans to provide feedback to ECCC by the March 15 deadline. Please note that this letter does not reflect our positions on the additional options released for consultation.

This submission provides an overview of Fertilizer Canada's positions and recommendations for the proposed regulations with Saskatchewan-specific context. We believe that the

FERTILIZER CANADA
FERTILISANTS CANADA
907 – 350 Sparks, Ottawa ON K1R 7S8
T (613) 230-2600 | F (613) 230-5142
info@fertilizercanada.ca
fertilizercanada.ca | fertilisantscanada.ca

proposed CER requires amendments to ensure that flexibilities, exemptions, and timelines are feasible and realistic for our industry to comply with. Fertilizer Canada's full response to the proposed CER pre-published in *Canada Gazette Part I* can be found here.

Our members are committed to high standards for environmental sustainability and have made significant investments to date to reduce emissions. We support science-based policies that achieve environmental objectives while also protecting our competitiveness in a global market. As part of our commitment, we have recently completed a Technology Roadmap study with financial support from Natural Resources Canada. The roadmap presents an analysis of the available decarbonization "step-change" technologies most applicable to Canada's fertilizer production sector, including nitrogen and potash. This report assesses available technology solutions, pathways to implementation, timelines and financial commitments, and the necessary government support required for sector decarbonization. Successful adoption of technologies with > 50 per cent reduction of GHG emissions will require at least five to ten years to implement and could cost upwards of $1 billion per facility, based on similar publicly announced projects.

The ability for the fertilizer production sector to decarbonize also relies heavily on investments in infrastructure outside our fence-line including access to a clean (low intensity), affordable, and reliable electricity grid. Therefore, we proposed the following recommendations to ECCC specific to the proposed CER:

1. ECCC should amend the proposed CER to ensure that the flexibilities, exemptions and timelines are feasible and realistic.
2. ECCC should work with industry to conduct a specific, targeted, and transparent assessment on the true costs anticipated to be required to facilitate this transition, as well as a broader cumulative effects analysis including regional impacts to the hardest-hit provinces, such as Saskatchewan.
3. We urge the federal government to work with the provinces to ensure adequate time and provide financial support (e.g. Small Modular Reactors, cogeneration, Carbon Capture Utilization and Storage) to assist the transition to a net-zero electricity grid.

We are concerned by SaskPower's projected 107% increase in electricity costs should CER be implemented in its current form. Fertilizer production is energy-intensive, and as a global, trade-exposed commodity Canada's fertilizer sector must balance reducing emissions and remaining competitive with countries who don't face the same environmental policies and regulatory barriers, such as Russia and China. Increases in input costs, such as electricity, cannot be passed down to customers due to trade exposure implications – stifling company's ability to reinvest and compete internationally including the United States.

FERTILIZER CANADA
FERTILISANTS CANADA

907 – 350 Sparks, Ottawa ON K1R 7S8
T (613) 230-2600 | F (613) 230-5142

info@fertilizercanada.ca
fertilizercanada.ca | fertilisantscanada.ca

While we recognize the importance of decarbonization efforts, it is crucial that the proposed CER be affordable, reliable and realistic in its implementation timeline. Moving forward, we welcome any opportunity with the Saskatchewan government and the tribunal to thoughtfully assess the impact of carbon related policies impacting the fertilizer sector.

Thank you for considering our input on this important matter. We look forward to your response and working together to address these issues.

Sincerely,

Dustin Pike
Director, Government Relations
Fertilizer Canada

Clean Electricity Regulations Backgrounder

Saskatchewan, like all provinces, is committed to addressing climate change and reducing greenhouse gas emissions. However, the federal government's proposed Clean Electricity Regulations, which mandate a 2035 net-zero emissions target for Canada's electricity sector, pose significant challenges for our province. Saskatchewan's electricity grid composition relies heavily on natural gas and coal, making the transition to cleaner sources complex.

1. The Saskatchewan Mix

Saskatchewan's electricity grid is currently composed of 40% natural gas, 25% coal, 16% hydro, 11% wind, and 3% solar. Achieving the federal 2035 net-zero target would require a 65% reduction in electricity production from carbon-emitting sources, primarily natural gas and coal. However, Saskatchewan's energy resources are not yet depleted, and **it is essential to utilize the full capacity and life cycle of our existing assets to generate electricity sustainably**.

2. Capital Investment and Economic Growth:

The transition to cleaner energy sources requires a substantial capital investment of $46 billion from 2023 to 2035. However, the federal government is providing only $54 billion for the entire country to achieve these targets. To meet the 2035 federal goal, Saskatchewan's economy and GDP must grow by $27 billion within the same timeframe. **Striking this balance between economic growth and environmental objectives is crucial for the province**.

3. Clean Electricity Regulations:

The proposed Clean Electricity Regulations represent a significant departure from the usual provincial control over electricity policy in Canada. While the federal goals of phasing out coal-fired generation by 2030 and achieving net-zero emissions by 2035 are commendable, **imposing an emissions cap on large electricity generating facilities in 2035 at 30 tonnes per gigawatt hour poses a challenge**, particularly for Saskatchewan, with its current grid composition.

4. Federal Tax Credits:

The federal government's consideration of tying substantial tax credits and grants for electricity projects to a commitment to achieve an emissions-free electricity grid by 2035 overlooks Saskatchewan's unique challenges**. This policy change could hinder the province's ability to access much-needed funding for transitioning to cleaner energy sources**.

5. Affordability:

The projected rise in electricity infrastructure costs by 2050, reaching around $400 billion, and the federal deficit creates additional financial challenges. T**hese costs will impact the entire supply chain, and it is crucial to assess the affordability of rapid transitions carefully**.

6. Constitution and Jurisdiction:

The constitutional debate over federal regulations in provincial electricity production is a critical issue. While provinces argue that electrical energy falls under their jurisdiction, the federal government claims that reducing greenhouse gas emissions is a matter of national concern. **Balancing these concerns is essential to ensure a fair and effective transition**.

7. Conclusion:

The Saskatchewan Chamber of Commerce acknowledges the importance of reducing greenhouse gas emissions and transitioning to cleaner energy sources. However, the federal 2035 net-zero electricity grid targets present significant challenges for our province. Achieving a balance between environmental objectives and economic growth is crucial. Saskatchewan is committed to making progress but requires understanding, flexibility, and support from the federal government to navigate these complex transitions successfully.

APPENDIX 3
TO THE REPORT OF THE ECONOMIC IMPACT ASSESSMENT
TRIBUNAL ON THE CLEAN ELECTRICITY REGULATIONS
MAY 1, 2024

NAVIUS STUDY AND NAVIUS SLIDE DECK

A Study to Review the Economic Impact of the Clean Electricity Regulations on Saskatchewan

Final Study Report

SUBMITTED TO

Crown Investments Corporation of Saskatchewan (CIC)

March 19, 2024

Updated: April 29, 2024

SUBMITTED BY

Navius Research Inc.

Box 48300 Bentall

Vancouver BC V7X 1A1.

Contents

Executive Summary

In 2023, The Saskatchewan First Act established the Economic Impact Assessment Tribunal (EIAT) to conduct economic impact assessments of Government of Canada initiatives that may cause harm to Saskatchewan projects, operations, activities, industries, businesses, or residents. This study report was requested by the EIAT through Crown Investments Corporation (CIC) as the referring agency. CIC contracted Navius Research to examine the economic impacts of CER on Saskatchewan up to 2035. This report presents Navius' quantitative analysis using its gTech-IESD model and model customizations that consider the unique elements of Saskatchewan's economy.

Approach

Two policy scenarios were modeled in this analysis – Saskatchewan's Affordable Power Plan (SAPP) and the Government of Saskatchewan (GoS) CER compliance pathways (SK-CER). The table below summarizes key assumptions in these scenarios.

Table 1: Key policy assumptions

Policy area	SAPP scenario	SK-CER scenario
Electricity capacity mix	GoS SAPP supply plan	GoS CER compliance pathway
Clean Electricity Regulations	Not implemented	The CER is implemented as per the Draft Regulations[1] published in August 2023.[2]
Carbon price level	Maintaining the federal carbon pricing backstop at $65/tCO_2e$ in nominal terms with an output-based pricing system (OBPS) in place	The federal carbon pricing backstop rises at $15/tCO_2e$ per year to $170/tCO_2e$ by 2030, in nominal terms, with the OBPS in place

[1] Government of Canada (2023) Canada Gazette, Part I, Volume 157, Number 33: Clean Electricity Regulations. Available from: https://www.gazette.gc.ca/rp-pr/p1/2023/2023-08-19/html/reg1-eng.html

[2] In February 2024, the federal government released an update on the CER. The proposed changes are not reflected in this modeling.

Carbon price coverage	Exclusion of the electricity sector from carbon pricing in 2026 onwards	The electricity sector is included in the OBPS
Federal Investment Tax Credits	Federal support of 75% of capex for a 300MW Small modular nuclear reactor (SMnR) and 50% of capex for renewables deployment[3], up to $6 billion	Federal support for electricity generation technologies does not extend beyond the announced Investment Tax Credits[4]

Across these two policy scenarios, three cost sensitivities were modeled as part of this analysis:

- GoS baseline cost assumptions for generation technologies and electricity storage
- GoS high-cost assumptions for generation technologies and electricity storage
- National Renewable Energy Laboratory (NREL) costs, as used in the gTech-IESD reference case

Results presented in this report refer to the GoS baseline costs sensitivity, unless specified otherwise. Results presented as a range refer to the range of outcomes under the three cost sensitivities.

Impact analysis

Emissions and capacity mix

Figure 1 presents installed capacity under each policy scenario and model year, following the prescribed supply plans provided by GoS.

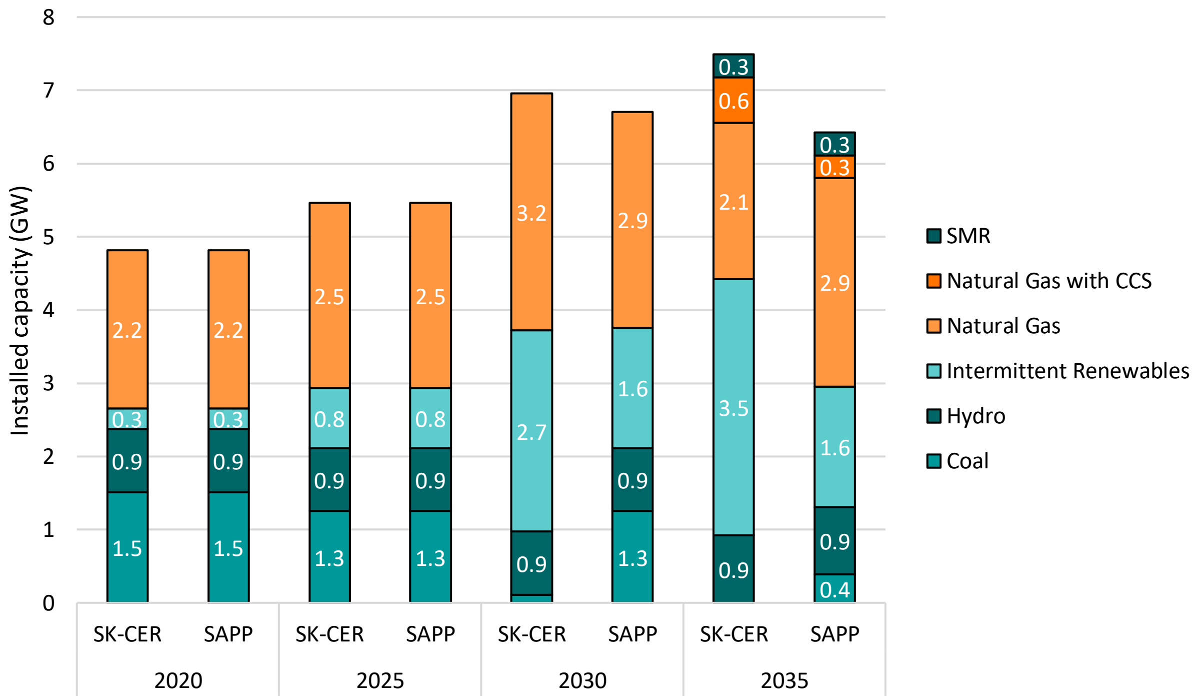
Expansion of intermittent renewables capacity accelerates under the SK-CER pathway relative to the SAPP. The SAPP supply plan delays the phase out of coal-fired power and extends gas-fired power plants to the end of their useful life, as they continue to be economic under a lower carbon price. The provision of higher capacity factors and additional firm capacity from dispatchable generators, i.e. coal and gas plants, leads to

3 Inclusive of existing policy supports, such as the Clean Electricity Investment Tax Credit

4 Government of Canada (2023) Clean Investment Tax Credits in Budget 2023. Available from: https://www.canada.ca/en/environment-climate-change/news/2023/04/minister-guilbeault-highlights-the-big-five-new-clean-investment-tax-credits-in-budget-2023-to-support-sustainable-made-in-canada-clean-economy.html

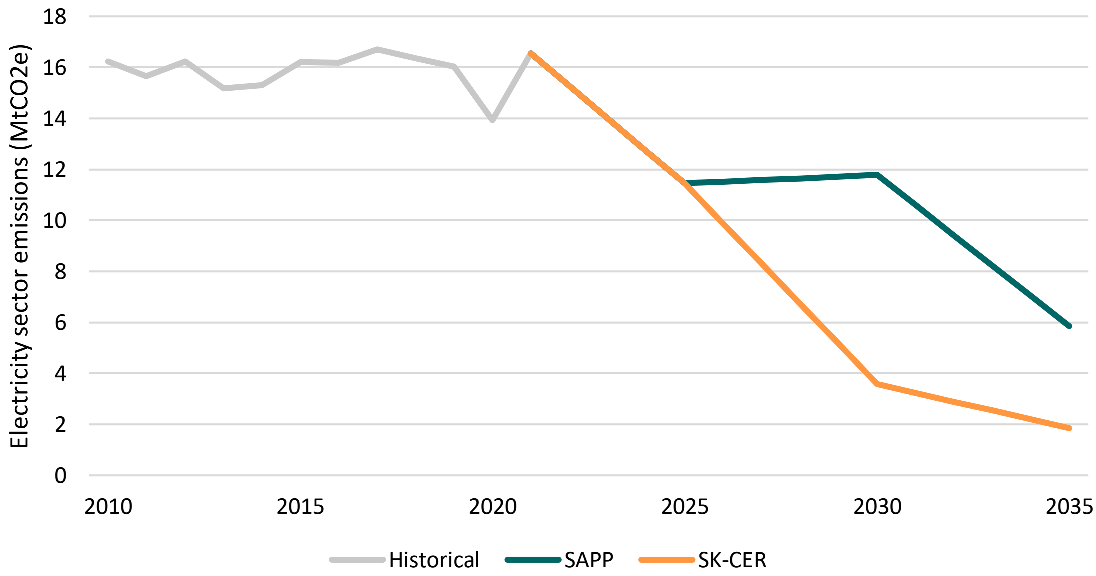
a lower total required installed capacity in 2030 and 2035 under the SAPP relative to the SK-CER.

Figure 1: Installed capacity under each policy scenario and model year



Annual emissions from electricity generation in Saskatchewan decline under both the SAPP and SK-CER scenarios (Figure 2). The SAPP scenario has higher GHG emissions in 2030 due to the use of unabated coal generation, made more economic by a lower carbon price. In 2035, coal is replaced with natural gas and emissions decline, but not to the level achieved by implementing the CER compliance plan.

Figure 2: Total electricity sector emissions in Saskatchewan, including cogeneration



Electricity market

Electricity prices increase out to 2035 under both scenarios but they grow at a faster rate under the SK-CER relative to the SAPP. Table 2 summarizes electricity prices in 2035 under the two scenarios.

Consumers in Saskatchewan pay 2.7 to 3.1 cents per kWh (C$2022) more for electricity in 2035 under the SK-CER scenario, depending on the type of consumer. The average four-person household[5] in Saskatchewan will pay $241 per year more for electricity under the SK-CER scenario in 2035, a 14% increase from the SAPP. Respectively, commercial and industrial consumers will pay $888 and $1,429 more for electricity per year, an 18% and 22% increase from the SAPP, assuming annual usage of 30 MWh and 50 MWh.

[5] SaskPower (2024). Home Power Use. Available from: https://www.saskpower.com/Power-Savings-and-Programs/Home/Tools-to-Analyze-Your-Power-Use/Home-Power-Use

Table 2: Electricity price impacts of SK-CER relative to SAPP in 2035 (C$2022)

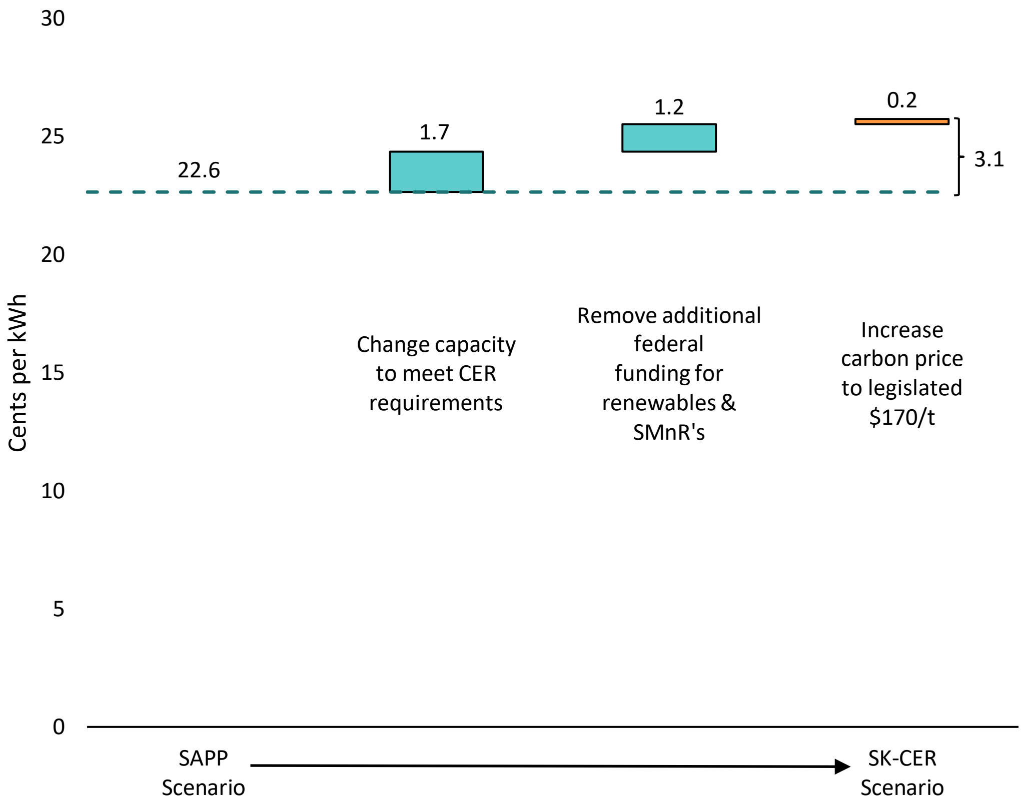
	2025 Electricity Prices (c/kWh	2035 Electricity Prices (c/kWh)		Net increase (CER vs SAPP)	
Consumer type	All scenarios	SAPP	SK-CER	Rate change (c/kWh)	Annual cost per consumer[6] ($)
Generator	7.4	7.6	10.3	2.7	
Residential	22.6	22.6	25.7	3.1	$241
Commercial	16.3	16.5	19.4	3.0	$888
Industrial	12.7	12.9	15.8	2.9	$1,429

To fully understand the impact of the CER, it is important to consider each policy difference between the SAPP and SK-CER scenarios. The SAPP includes multiple policy changes from the current climate policy suite in Canada, including freezing the economy-wide carbon price at $65 per tonne, exempting the utilities sector from carbon pricing, and providing additional federal funding for renewables and SMnRs.

Figure 3 provides a waterfall chart detailing the impact on wholesale electricity prices of each change. Moving left to right on Figure 3, policy changes are made to the SAPP to reflect legislated policies that are included in the SK-CER scenario. The changes to electricity capacity under the CER account for 55% of the increase in price between the SAPP and SK-CER, while the remaining 45% can be attributed to differences in other policies. This assessment helps isolate the price impact that is attributable to compliance with the draft CER, and the impact that is attributable to exempting utilities from carbon pricing and providing higher federal investment tax credits under the SAPP.

[6] Assumes annual consumption of 7.8 MWh for residential, 30 MWh for commercial and 50 MWh for industrial consumers.

Figure 3: Impact of policy on household electricity prices in 2035



Macroeconomy

Saskatchewan's annual GDP (C$2015) is $0.9 billion to $1.0 billion (0.9%) lower in 2035 under the SK-CER relative to the SAPP. The GDP impact referenced in Table 3 compares the SAPP scenario against the SK-CER. Consumption, exports, and government expenditure are all lower under the SK-CER, with investment increasing in response to additional deployment of generation capacity. The cumulative GDP impact of the SK-CER between 2026 and 2035 is $7.1 billion to $8.0 billion, which is a function of compliance with the CER and changes to carbon pricing and federal investment tax credits.

Table 3: GDP impacts of SK-CER relative to SAPP in 2035 (C$2015)

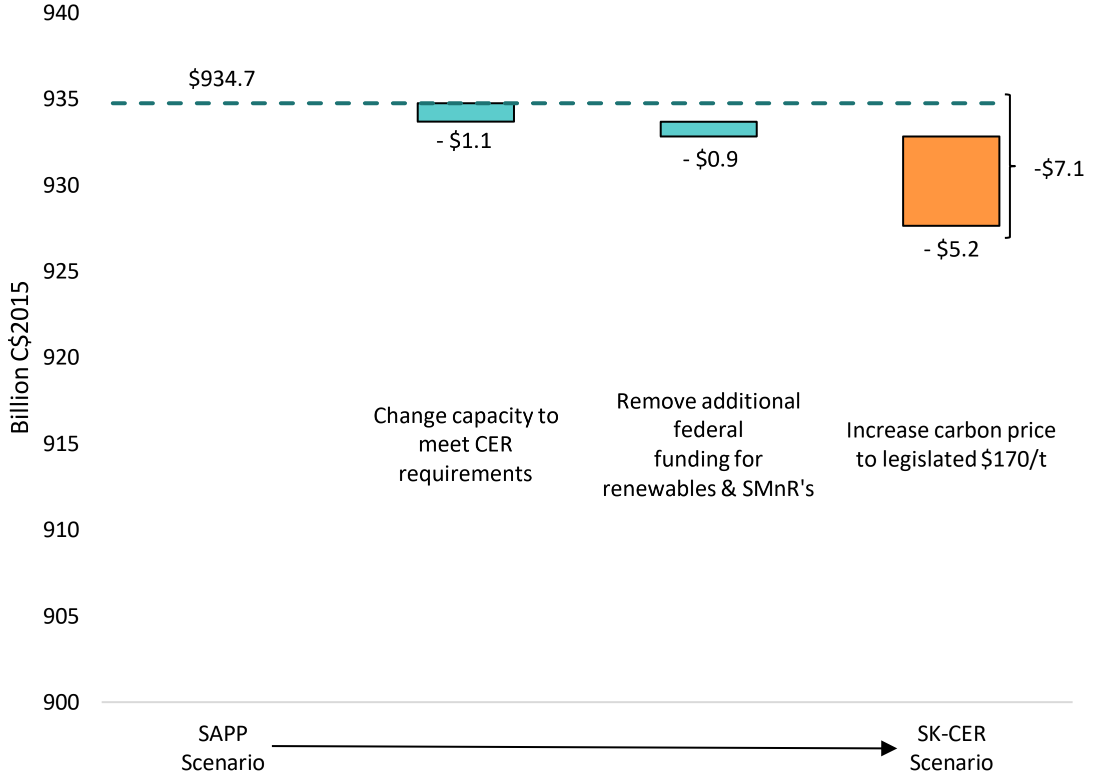
Sector	2025 GDP	2035 GDP		SK-CER impact		
	All ($bn)	SAPP ($bn)	SK-CER ($bn)	Annual ($bn)	2026-2035 cumulative ($bn)	2026-2035 CAGR[7] (%)
Consumption	43.1	56.0	55.5	-0.5	-3.5	-0.09%
Investment	17.8	19.7	20.2	0.5	2.3	0.26%
Government	16.9	21.1	21.0	-0.1	-0.5	-0.05%
Exports	54.8	64.3	63.2	-1.1	-8.1	-0.18%
Imports	-49.8	-59.1	-58.7	0.3	2.8	-0.06%
Total	**82.8**	**102.1**	**101.2**	**-0.9**	**-7.1**	**-0.09%**

When assessing GDP by sector, services (-$0.7 billion), mining (-$0.3 billion), oil and gas (-$0.2 billion), and agriculture and forestry (-$0.2 billion) all contribute less to Saskatchewan's GDP under the SK-CER. This scenario spurs additional activity from the utilities (+$0.5 billion) and construction (+$0.1 billion) sectors in response to additional investment in Saskatchewan's electricity grid.

It is important to consider each policy difference between the SAPP and SK-CER scenarios when assessing GDP impacts. Figure 4 breaks down the relative impact of each policy change on GDP between 2026 and 2035. Of the $7.1 billion difference in cumulative GDP between the SAPP and SK-CER, $1.1 billion is due to compliance with the CER, and $6.0 billion is due to changes to carbon pricing and federal investment tax credits. This assessment highlights the relative impact of CER compliance and other policy differences between the two scenarios.

[7] Compounded Annual Growth Rate

Figure 4: Impact of policy on cumulative GDP in Saskatchewan, 2026-2035



Total real household consumption is approximately 1% lower under the SK-CER scenario across all households. Household consumption reflects total expenditures on goods and services by households and can be used as a proxy for the welfare impact of policy changes.

Table 4 outlines the change in household consumption across income quintiles. Lower income households reduce consumption the least under the SK-CER (0.1-0.5%), while higher income households reduce their consumption the most (1.0-1.2%), indicating that policy costs skew to wealthier households.

Table 4: Annual household consumption per capita (C$2022)[8]

	2025	2035			SK-CER Impact
Household Income Quintile	All scenarios	SAPP	SK-CER capacity & legislated Fed funding	SK-CER	SK-CER minus SAPP
Min - 50,086	16,588	19,910	19,830	19,883	-0.13%
50,087 - 73,507	25,943	31,796	31,651	31,622	-0.55%
73,508 - 102,063	36,892	44,879	44,645	44,505	-0.83%
102,064 - 141,258	47,027	55,551	55,202	54,969	-1.05%
141,259 - Max	71,136	79,981	79,425	79,005	-1.22%
Total	**39,517**	**46,423**	**46,151**	**45,997**	**-0.92%**

Technology mix

Low-carbon technology adoption, including electrification of transportation and CCS deployment outside of the electricity sector, is higher in the SK-CER scenario. This result occurs despite higher electricity prices. Technology choice decisions, such as the decision to purchase a zero-emission vehicle (ZEV) or install an electric heat pump, are influenced more by the carbon price differential on non-electricity fuels between the SAPP and SK-CER than the electricity price differential caused by the CER.

Key differences in low-carbon technology adoption between the two scenarios include:

- **A higher percentage of light-duty ZEV sales in the SK-CER scenario relative to the SAPP scenario.** The higher carbon price in the SK-CER scenario makes it more expensive to operate internal combustion engines (ICEs), increasing the market share of ZEVs. Increased electricity prices under the SK-CER disincentivizes low-carbon vehicle adoption but this effect is more than offset by the impact of a higher carbon price on ICE adoption.
- **The use of heat pumps for home heating is higher under the SK-CER scenario than the SAPP**. Increased electricity prices lead to a higher cost for heat pumps under the SK-CER, but this effect is more than offset by the impact of a higher carbon price on carbon-intensive home heating technologies, such as gas-fired boilers.
- **There is more uptake of CCS for industrial heat and hydrogen production in the SK-CER scenario relative to the SAPP scenario**. This difference is driven primarily by

[8] Annual household consumption by quintile calculated from expenditure GDP in constant chained C$2015. Values deflated using Fisher Price index. Population for per capita calculation referenced from Canada Energy Regulator 2021. Canada Energy Regulator. (2021). Canada's Energy Future 2021. Available from: https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2021/

the higher carbon price in the SK-CER scenario. The usage of CCS in the electricity sector is sensitive to technology cost assumptions, but CCS capacity in the sector is fixed by scenario.

Impacts beyond 2035

This impact analysis predominantly focuses on impacts of the SK-CER compliance pathway between 2026 and 2035. However, it is important to consider impacts beyond 2035, as full compliance under the Draft CER is not necessarily required until 2045, depending on the year a generator is commissioned.

Post-2035 policy impacts of note include:

- **Electricity sector emissions continue to decline under both the SAPP and SK-CER scenarios post-2035**. Under the SK-CER, electricity emissions fall to 0.6 $MtCO_2e$ in 2045 and 2050. Residual emissions in the SK-CER come from non-captured CO_2 from natural gas with CCS facilities, and cogeneration. Under the SAPP, electricity emissions decline to 4.8 $MtCO_2e$ in 2045 and 2.0 $MtCO_2e$ in 2050. The higher emissions level under the SAPP is driven by extending the life of the natural gas turbine fleet, which are partially phased out between 2040 and 2050. The gas turbine fleet is mostly replaced by intermittent renewable capacity in 2050.
- **The difference in electricity prices between the SAPP and SK-CER increases out to 2050**. By 2050, residential electricity prices are 4.8 to 8.8 cents per kWh higher under the SK-CER compared to the SAPP, with 88% of the increase due to compliance with the SK-CER. This difference is 1.6 to 2 times higher than the gap in 2035, due to full CER compliance coming into effect in 2045.
- **GDP under the SK-CER continues to grow at a slower rate than under the SAPP after 2035**. By 2050, annual GDP is $2.5 billion (2015$), or 1.8%, lower under the SK-CER. The cumulative GDP impact between 2036 and 2050 is $19.7 billion, or 1.1% of cumulative GDP over that period. The impact of compliance with the CER makes up 49% of the GDP impact between 2036 and 2050; the remaining 51% is due to differences in carbon pricing and federal funding for renewables and SMnRs.

Key insights

This impact assessment has produced six key insights.

Insight 1: The SK-CER drives deeper emissions reductions in Saskatchewan than the SAPP. The change in emissions from the electricity sector makes up most of the province's emissions reductions in both scenarios. The SAPP scenario has higher GHG emissions in 2030 due to the use of unabated coal generation, made more economic by a lower carbon price. In 2035, coal is replaced with natural gas causing emissions to decline under the SAPP, but not to the level achieved by implementing the CER compliance plan.

Insight 2: Higher electricity prices and carbon pricing under the SK-CER lead to lower energy demand and increased reliance on imported electricity. Household electricity rates (C$2022) are 1.9 to 3.8 cents per kWh higher in 2035 under the SK-CER than the SAPP. Province-wide electricity consumption is 0.9 to 1.7 TWh lower under the SK-CER in 2035. Further, higher costs of domestic generation result in additional imports from the United States, making use of additional interconnection between Saskatchewan and the United States.

Insight 3: Saskatchewan's GDP is higher under the SAPP than under Saskatchewan's CER compliance pathway. Saskatchewan's GDP (C$2015) is $0.9 billion to $1.0 billion (0.9%) lower in 2035 under the SK-CER relative to the SAPP, with a cumulative GDP loss of $7.1 billion to $8.0 billion between 2026 and 2035. There are three to four thousand fewer full time equivalents jobs in Saskatchewan under the SK-CER in 2035. Some of this change is attributable to the electricity sector's response to the CER, but most of the GDP impact is a result of a lower economy-wide carbon price under the SAPP.

Insight 4: Household consumption of goods and services is lower under the SK-CER. Aggregate consumption is 1% lower under the SK-CER relative to the SAPP scenario. High-income households reduce consumption the most under SK-CER and see greater welfare impacts relative to low-income households. This distributive impact is due to higher energy expenditure in high-income households and more transfers from carbon pricing rebates to low-income households.

Insight 5: Low carbon technology adoption, including electrification of transportation and CCS deployment outside of the electricity sector, is higher under the SK-CER. This result occurs despite higher electricity prices under the SK-CER. Technology choice decisions, such as the decision to purchase a zero-emission vehicle or adopt CCS, are influenced more by the carbon price differential between the two scenarios than the electricity price differential.

Insight 6: The economic impact of the SK-CER scenario is due to both compliance with the CER and changes to other federal policy. The electricity rate impact in Saskatchewan is predominantly driven by the change in electricity generation capacity to comply with the CER. However, most of the SK-CER scenario's GDP impact is due to a higher economy-wide carbon price and less federal funding for renewables and SMnRs, relative to the SAPP.

1. Introduction

In 2023, The Saskatchewan First Act established the Economic Impact Assessment Tribunal (EIAT) to conduct economic impact assessments of Government of Canada initiatives that may cause harm to Saskatchewan projects, operations, activities, industries, businesses, or residents. This study report was requested by the EIAT through Crown Investments Corporation (CIC) as the referring agency. CIC contracted Navius Research to examine the economic impacts of CER on Saskatchewan up to 2035. This report presents Navius' quantitative analysis using its gTech-IESD model and model customizations that consider the unique elements of Saskatchewan's economy.

The study report is structured as follows:

- Section 2: Analytical approach
- Section 3: Impact analysis
- Section 4: Key insights
- Appendix A: provides a comparison to other Navius analysis, conducted with fewer constraints on the electricity capacity mix
- Appendix B: details the legislated policies modeled
- Appendix C: outlines technoeconomic assumptions including technology costs and performance
- Appendix D: provides detailed supplementary results

2. Analytical approach

This section introduces energy-economy modeling and gTech-IESD.

Introduction to energy-economy modeling

Canada's energy-economy is complex. Energy consumption, which is the main driver of anthropogenic greenhouse gas emissions, results from the decisions made by millions of Canadians. Households must choose what type of vehicles they will buy and how to heat their homes; industry must decide whether to install technologies that might cost more but consume less energy; municipalities must determine whether to expand transit service; and investors need to decide whether to invest their money in Canada or somewhere else.

Estimating the greenhouse gas and economic impacts of Canadian and Saskatchewan climate policy requires a modeling framework that captures much of the complexity of the energy-economic system as well as the range of policies implemented and proposed across the country. Navius Research's gTech-IESD model has unique capability that make it well-suited to considering the economic impacts of the Clean Electricity Regulations.

2.1. Integration of gTech and IESD

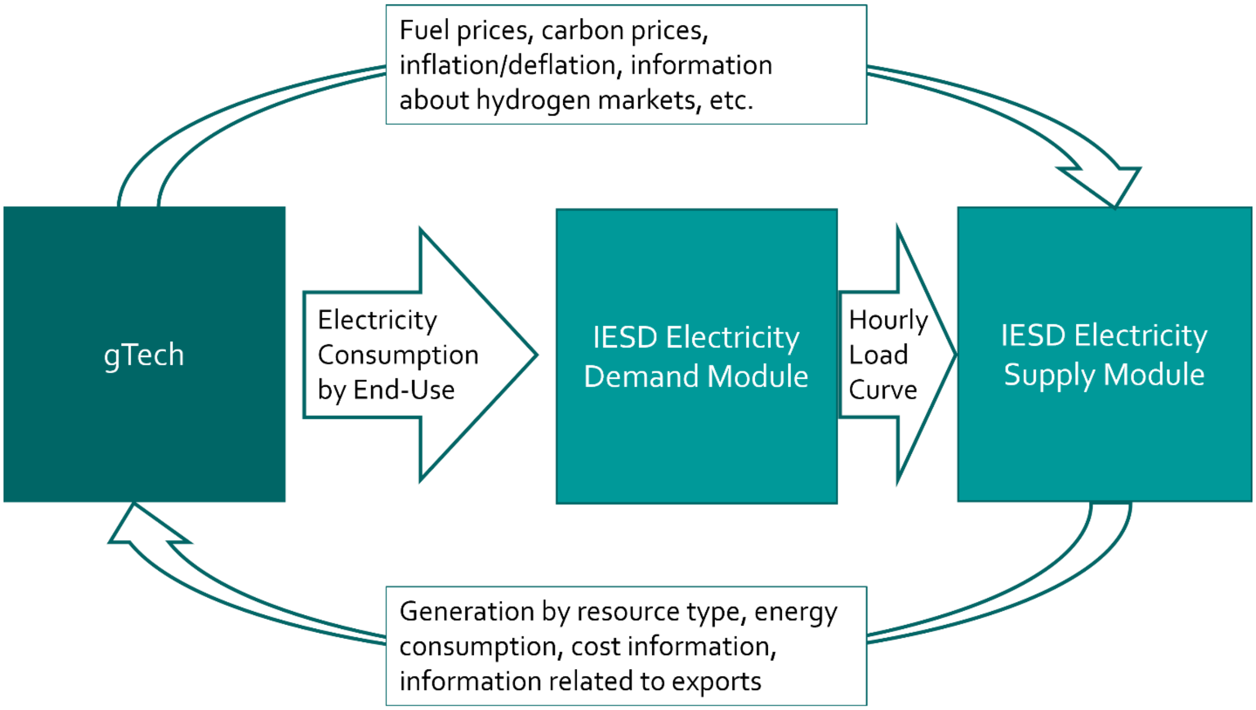
This project will make use of Navius' gTech-IESD modelling suite. This model's key features include an exhaustive accounting of Canada's macroeconomy, technology choice decision-making across all economic sectors, hourly dispatch of electricity in each province, and electricity system capacity expansion. This section provides information on the integration of gTech (Navius' Computable General Equilibrium [CGE] model) and IESD (Navius' Integrated Electricity Supply and Demand model). More information on the individual models is available on our website.[9]

The full integration of gTech and IESD allows for information to be passed back and forth between the models. In the integrated model, gTech completes a simulation for a given year, then passes key information to IESD. IESD then completes its simulation for the same year and passes key information back to gTech. This process is referred to as an iteration. The linked models continue to iterate until convergence is achieved and then advance to the next simulation year. In this section, we describe the

[9] Navius Research (2023) Canada Energy Dashboard. Available from: https://www.canadaenergydashboard.com/data/navius_research_gtech_iesd_model_documentation.pdf

integration methodology in more detail. Section 2.1.1 describes the information passed from gTech to IESD, Section 2.1.2 describes the information passed from IESD to gTech, and Section 2.1.3 explains the convergence procedure. Finally, Section 2.1.4 covers how declining capital costs are linked across the two models so that they are consistent in an integrated run. Figure 5 provides a visual representation of the integrated system.

Figure 5: The integrated gTech-IESD energy-economy-electricity modeling system



2.1.1. Information gTech passes to IESD

- **Electricity consumption by end-use.** gTech generates an estimate for electricity consumption by end-use. This electricity consumption is used to generate hourly electricity profiles which are ultimately used in IESD.

- **Fuel prices and carbon prices.** gTech estimates the price for fuels that are used by the electricity sector. For example, the price for natural gas paid in the electricity sector is endogenously calculated by gTech, and this price is then passed into IESD. Carbon prices provided to IESD include prices that are set explicitly and prices that are simulated in gTech as the result of other GHG policies (e.g., a cap and trade system).

- **Capital cost inflation or deflation.** Information on overall capital cost inflation or deflation is taken into account by the electricity supply simulation in IESD. Capital cost inflation could, for example, be the result of increased labour costs in gTech leading to increased construction costs, while deflation could be the result of corporate income tax cuts.

- Costs and prices related to captured CO_2. The cost of CO_2 pipeline transport, the cost of CO_2 storage, and the price of CO_2 for use in Enhanced Oil Recovery (EOR) are provided by region and influence how much carbon capture and storage occurs in IESD.

- Renewable natural gas (RNG) availability. The maximum amount of RNG available for use in electricity generation acts as a resource constraint in IESD. Please note that the price for RNG is also passed into IESD from gTech.

- **Hydrogen consumption.** IESD can endogenously simulate electrolysis-based hydrogen production. To do this, it requires a load curve for hydrogen. The shape of the hydrogen consumption load curve influences the amount of hydrogen storage that must be built in IESD to accompany hydrogen production from electrolysis. The amount of storage required, in turn, influences the cost of hydrogen production. We currently assume that the shape of the hydrogen consumption load curve is the same as the shape of the electricity consumption load curve. Estimating a load curve specific to hydrogen is an area for future work.

- **Hydrogen produced using electrolysis.** This information establishes a lower bound on hydrogen production in IESD. The model must supply this quantity of hydrogen, regardless of the cost. Total demand for hydrogen (regardless of the production method) is also estimated by gTech and establishes an upper bound on hydrogen production in IESD. The model supplies up to this quantity of hydrogen from electrolysis, as long as the cost is less than the price of hydrogen.

2.1.2. Information IESD passes to gTech

Once the simulation in IESD is complete, information is compiled and passed back to gTech. Information from IESD is used to build an aggregated electricity sector within gTech that comprises all the dynamics included in IESD. These include:

- **Electricity generation by resource type.**

- **Energy consumed by electricity generation.**

- **Total capital cost and fixed operating cost of generating electricity.** This information includes the cost for storage technology and hydrogen production.

- **Any dispatchable hydrogen produced by IESD.**
- **Origin and destination of exported electricity.**

Other information is used to adjust end-use electricity prices in gTech.

- **Cost of any transmission system upgrades required.** Transmission system costs are calculated based on peak load and an average cost per unit of capacity.
- **Cost of any distribution system upgrades required.** Distribution system costs are calculated by sector (industry, residential, and commercial) based on peak load and an average cost per unit of capacity. If growth in peak load outpaces growth in annual electricity consumption, the distribution system cost per unit of electricity consumed could increase significantly. This has been raised as a potential concern for scenarios involving the rapid electrification of residential buildings (with heat pumps and other electric heating appliances) and personal transportation (with electric vehicles). However, under electrification scenarios, it is expected that total electricity consumption will increase as well, mitigating the impact on per unit distribution system costs.

2.1.3. Convergence

In each simulation year, after passing information to and receiving information from IESD, the gTech model then runs again, and the entire process is repeated until convergence is achieved. In every iteration, the dollar values of all physical inputs to and outputs from electricity generation across all regions (including the United States) are summed together. The total is compared across iterations, and once the difference falls below a threshold value, the model is considered to have achieved convergence for that simulation year and moves on to the next.

2.1.4. Declining capital costs

When the declining capital cost function applies to a technology or technology component that appears in both gTech and IESD, the function considers cumulative production across the two models. The sharing of information around declining capital costs ensures that, as experience with the technology increases over time, the capital cost declines consistently in both models. This dynamic is important for the batteries used in both electric vehicles (gTech) and for storage by the electricity sector (IESD), the electrolysis technology used by both industry (gTech) and the electricity sector (IESD) to produce hydrogen, and other technologies such as fuel cells and carbon capture and storage.

2.2. Modeling Scenarios

This section outlines the scenarios that we modeled to examine the economic impacts of various scenarios on the Saskatchewan economy. In this document, a *policy* refers to a grouping of policy inputs. A *sensitivity* refers to a variation on a policy scenario where we examined the impact of different input assumptions for technology costs and performance, but with the same climate and energy policies in place.

2.2.1. Policies

Two policy scenarios were modeled in this analysis – Saskatchewan's Affordable Power Plan (SAPP) and the Government of Saskatchewan (GoS) CER Compliance Scenario (SK-CER).

Saskatchewan's Affordable Power Plan

This scenario simulates the set of policy changes assumed to be in place under SAPP. These policies are:

- a specific electricity capacity mix out to 2035, shown in Table 5 below;
- maintaining the federal carbon pricing backstop at $65/t$CO_2$e in nominal terms with an output-based pricing system (OBPS) in place;
- exclusion of the electricity sector from carbon pricing in 2026 onwards;
- federal support of 75% of capex for a 300MW Small modular nuclear reactor (SMnR); and
- federal support of 50% of capex for renewables deployment, up to $6 billion (inclusive of existing policy supports, such as the Clean Electricity Investment Tax Credit).

We have assumed the above adjustments to carbon pricing policy begin in the 2026-2030 model period, since gTech-IESD simulates in five-year increments. All other existing provincial and federal policies remain in place; Appendix B details the full list of policies simulated.

The Table below summarizes SAPP electricity capacity in Saskatchewan under gTech-IESD using SaskPower's baseline costs. New available import capacity is assumed to cost $1,593 per kW (2022$) across all scenarios, as per the SaskPower baseline costs. Additional detail on the cost assumptions is provided in Section 2.2.2.

Table 5: SAPP electricity sector parameters: gTech-IESD and SaskPower supply plan

Item	Source	2020	2025	2030	2035
Coal	gTech-IESD	1421	1143	0	0
	GoS	1421	1143	0	0
Natural Gas	gTech-IESD	2,159	2,527	2,946	2,853
	GoS	2,123	2,527	2,946	2,853
Renewables	gTech-IESD	283	817	1,645	1,645
	GoS	282	856	1,645	1,494
Coal with CCS	gTech-IESD	92	110	110	110
	GoS	110	110	110	110
Natural gas with CCS	gTech-IESD	0	0	0	300
	GoS	0	0	0	300
SMnRs	gTech-IESD	0	0	0	315
	GoS	0	0	0	315
Hydro	gTech-IESD	864	864	864	924
	GoS	863	863	863	924
Availability of imports	gTech-IESD	456	456	790	1,290
	GoS	102	290	790	1,290
Other	gTech- IESD[10]	419	420	431	427
	GoS	25	111	95	94

Government of Saskatchewan CER Compliance Pathway

This scenario simulates GoS's CER compliance pathway and assumes the following:

- The CER is implemented as per the Draft Regulations, published in August 2023.
- The federal carbon pricing backstop rises at \$15/tCO_2e per year to \$170/tCO_2e by 2030, in nominal terms, with the OBPS in place;
- The electricity sector is included in the OBPS;
- Federal support for electricity generation technologies does not extend beyond the announced Investment Tax Credits.

All other existing provincial and federal policies remain in place; Appendix B details the full list of policies simulated.

[10] Other capacity in gTech-IESD this is behind the fence cogeneration and not part of SaskPower's fleet.

In February 2024, the federal government released an update on the CER.[11] The proposed changes are not reflected in this modeling, and the proposal was announced following the initiation of this modeling work, which is based on the draft regulations published in the Gazette.

The Table below summarizes CER electricity capacity and demand in Saskatchewan under gTech-IESD using SaskPower's baseline costs. Note that the capacities presented here may differ from those presented in the final results. New available import capacity is assumed to cost $1,593 per kW (2022$) across all scenarios, as per the SaskPower baseline costs. Additional detail on the cost assumptions is provided in Section 2.2.2.

Table 6: SaskPower CER electricity sector parameters: gTech-IESD and supply plan

Item	Source	2020	2025	2030	2035
Coal	gTech-IESD	1421	1143	0	0
	GoS	1421	1143	0	0
Natural Gas	gTech-IESD	2,159	2,527	3,236	2,137
	GoS	2,123	2,527	3,236	2,137
Renewables	gTech-IESD	282	817	2,745	3,494
	GoS	231	856	2,745	3,494
Coal with CCS	gTech-IESD	92	110	110	0
	GoS	110	110	110	0
Natural gas with CCS	gTech-IESD	0	0	0	622
	GoS	0	0	0	622
SMnRs	gTech-IESD	0	0	0	315
	GoS	0	0	0	315
Hydro	gTech-IESD	864	864	864	924
	GoS	863	863	863	924
Availability of imports	gTech-IESD	456	456	790	1,290
	GoS	102	290	1,290	1,290
Other	gTech- IESD[12]	422	420	434	433
	GoS	25	53	95	94

In addition to aligning with SaskPower's CER compliance pathway, the Draft CER policy has been modeled endogenously in gTech-IESD, such that generators must comply with the prescribed performance standards or limit generation to 450 hours per year, ~5% capacity factor. The parameters of the draft CER are summarized in the Table

[11] Government of Canda (2024) Clean Electricity Regulations – Public update. Available from: https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/clean-fuel/electricity/clean-electricity-regulations-public-update-16022024.pdf

[12] Other capacity in gTech-IESD this is behind the fence cogeneration and not part of SaskPower's fleet.

below. This results in a different capacity mix based on Navius' in-house library of technology costs and performance, instead of GoS's assumptions.

Table 7: CER policy characterization in gTech-IESD

Draft CER model implementation
This policy is explicitly modeled in gTech-IESD, as per the draft regulations published by the federal government in August 2023. Key features of this policy include: ■ a 30 tCO_2e/GWh performance standard for all electricity generation, with limited exemptions for generators with CCS and cogeneration to emit at 40 tCO_2e/GWh; ■ an End-of-Life provision for generators commissioned before 2025 to avoid the need to comply until 20 years after their commission date; and ■ a provision for power plants that do not comply with the regulations to generate for 450 hours per calendar year. The policy will come into force in 2035.

Policy interactions

As part of this analysis, we have assessed the marginal impact of each policy difference isolate the impact of the CER relative to other changes between the CER compliance scenario and the SAPP.

It is important to understand the interaction of climate and energy policy in Canada since layering on additional policies, such as the CER, could affect the stringency of existing policies. For example, the market for credits in the OBPS requires sufficient credit demand to achieve the carbon price backstop. The supply of credits in the OBPS, and therefore the policy stringency, could be influenced by other policies. Further, the SAPP and SK CER scenarios have different assumptions regarding the evolution of carbon pricing and federal support for renewables and SMnRs.

2.2.2. Sensitivities

The cost of electricity technologies will be influential on the impact that the CER has on Saskatchewan's electricity grid. We modeled three sensitivities as part of this analysis:

- GoS baseline costs assumptions for generation technologies
- GoS high cost assumptions for generation technologies

- National Renewable Energy Laboratory (NREL) costs, as used in the gTech-IESD reference case

Each sensitivity uses different costs for the electricity generation technologies simulated in gTech. The capital cost (capex) and fixed operating cost (fopex) values for each sensitivity are summarized in the Tables below, with the costs used in the CER Regulatory Impact Assessment Statement (RIAS) presented as a reference. Other technoeconomic assumptions, including declining capital cost assumptions are available in Appendix C.

GoS's estimates of some generation technology costs are materially higher than both the NREL and CER RIAS costs. For example, the capex for gas turbine technologies (both with and without CCS installations) is between 1.5 to 2.5 times higher under the GoS assumptions than the RIAS costs.[13] According to SaskPower, these technology costs represent the best available information for the Aspen Power Station. These costs represent a significant adjustment from the expected deployment costs for Aspen.[14] In the past, cost overruns of this magnitude can occur in large scale utility projects. For example, the Hinkley Point nuclear plant in the UK has seen costs increase over 50% since 2022.[15] Based on this assessment, we are comfortable modeling the capex costs provided by GoS as part of this analysis.

[13] Government of Canada. (2023). Clean Electricity Regulations: Canada Gazette, Part I, Volume 157, Number 33. Available from: https://www.gazette.gc.ca/rp-pr/p1/2023/2023-08-19/html/reg1-eng.html

[14] Saskatchewan Power Corporation (2023). Aspen Power Station Detailed Project Description. Available from: https://iaac-aeic.gc.ca/050/documents/p84525/153093E.pdf

[15] BBC News. (2024). Hinkley C: UK nuclear plant price tag could rocket by a third. Available from: https://www.bbc.com/news/business-68073279

Table 8: Comparison of capex by technology and sensitivity ($/kW, C$2022)

Technology	SaskPower Baseline	SaskPower High	NREL (gTech-IESD reference)	CER RIAS[16]
Coal	N/A	N/A	4,159	3,825
Coal-CCS	N/A	N/A	7,495	8,111
Coal to Gas Conversion	302	452	N/A	N/A
CCGT (Natural Gas)	3,888	5,055	1,404	1,571
SCGT (Natural Gas)	3,172	4,123	1,247	1,625
Natural Gas-CCS*	8,012	12,018	3,336	3,310
Hydro	14,139	21,208	5,848	7,071
Wind*	2,356	2,592	1,631	2,117
Solar*	2,121	2,333	1,328	1,825
Batteries (4-hour)*	1,998	2,398	1,120	1,409
Nuclear (SMnR)	10,981	21,962	10,795	N/A
Nuclear (Conventional)	N/A	N/A	10,065	9,120

*Technologies are subject to a declining capital cost function in gTech-IESD. gTech-IESD costs represent the values in year 2025.

Table 9: Comparison of fopex by technology and sensitivity ($/kW-year, $2022)

Technology	SaskPower Baseline	SaskPower High	NREL (gTech-IESD Reference)	CER RIAS
Coal	N/A	N/A	100	47
Coal-CCS	N/A	N/A	169	95
Coal to Gas Conversion	66	86	N/A	N/A
CCGT (Natural Gas)	66	86	38	26
SCGT (Natural Gas)	80	104	28	20
Natural Gas-CCS*	104	135	91	51
Hydro	7	9	102	137
Wind*	38	41	58	51
Solar*	19	21	31	18
Batteries (4-hour)*	33	43	5	11
Nuclear (SMnR)	240	361	152	N/A
Nuclear (Conventional)	N/A	N/A	197	167

*Technologies are subject to a declining capital cost function in gTech-IESD. gTech-IESD costs represent the values in year 2025

For the purposes of this analysis, CCS facilities are assumed to achieve a capture rate of 95% in order to be compliant with CER requirements. This is above levels performed

[16] Included for reference, but not simulated in gTech-IESD

by existing CCS facilities paired with electricity generation facilities, such as Boundary Dam.

2.3. Modeling Assumptions

This section summarizes data sources and assumptions used to characterize Saskatchewan's energy-economy to 2035. It begins with an overview of the various data sources to which the model is calibrated. Assumptions about future economic growth, energy prices, and oil and gas activity are then provided.

2.3.1. Calibration Sources

To characterize Saskatchewan's energy-economy, gTech is calibrated to a variety of data sources. Key calibration data sources include:

- Government of Saskatchewan's Budget 2023/24
- SaskPower's Long Term Supply Plan
- Environment and Climate Change Canada's National Inventory Report[17]
- Statistics Canada's Supply-Use Tables[18]
- Natural Resources Canada's Comprehensive Energy Use Database[19]
- Statistics Canada's Annual Industrial Consumption of Energy Survey[20]
- Statistics Canada's Report on Energy Supply and Demand[21]
- Canada's Energy Future 2023[22]
- National Renewable Energy Laboratory[23]

[17] Environment and Climate Change Canada. National Inventory Report. Available from: www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html

[18] Statistics Canada. Supply and Use Tables. Available from: www150.statcan.gc.ca/n1/en/catalogue/15-602-X

[19] Natural Resources Canada. Comprehensive Energy Use Database. Available from: http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive_tables/list.cfm

[20] Statistics Canada. Annual Industrial Consumption of Energy Survey. Available from: www.statcan.gc.ca

[21] Statistics Canada. Report on Energy Supply and Demand in Canada. Available from: https://www150.statcan.gc.ca/n1/en/catalogue/57-003-X

[22] Canada Energy Regulator. (2023). Canada's Energy Future 2023. Available from: https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2023/

[23] National Renewable Energy Laboratory (2023). Annual Technology Baseline. Available from: https://atb.nrel.gov/

- Statistics Canada datasets on the electricity sector[24]
- Navius' technology database

Each data source is generated using different methods, so the data sources are therefore not necessarily consistent with one another. For example, expenditures on gasoline by households in Statistics Canada's Supply-Use tables may not be consistent with fuel consumption reported by Natural Resources Canada's Comprehensive Energy Use Database. Further, energy expenditures are a function of consumption and prices, so if prices vary over the course of the year, it is difficult to perfectly align consumption and expenditures.

gTech's calibration routine places greater emphasis on some data sources relative to others. This approach means that gTech achieves near perfect alignment with data sources receiving the highest priority weight, but alignment starts to diverge from data sources that receive a lower weight.

For this project, the datasets that receive the highest weight are:

- Government of Saskatchewan's Budget 2023/24
- SaskPower's Long Term Supply Plan
- Environment and Climate Change Canada's National Inventory Report
- Natural Resources Canada's Comprehensive Energy Use Database
- Navius' technology database

2.3.2. Electricity sector

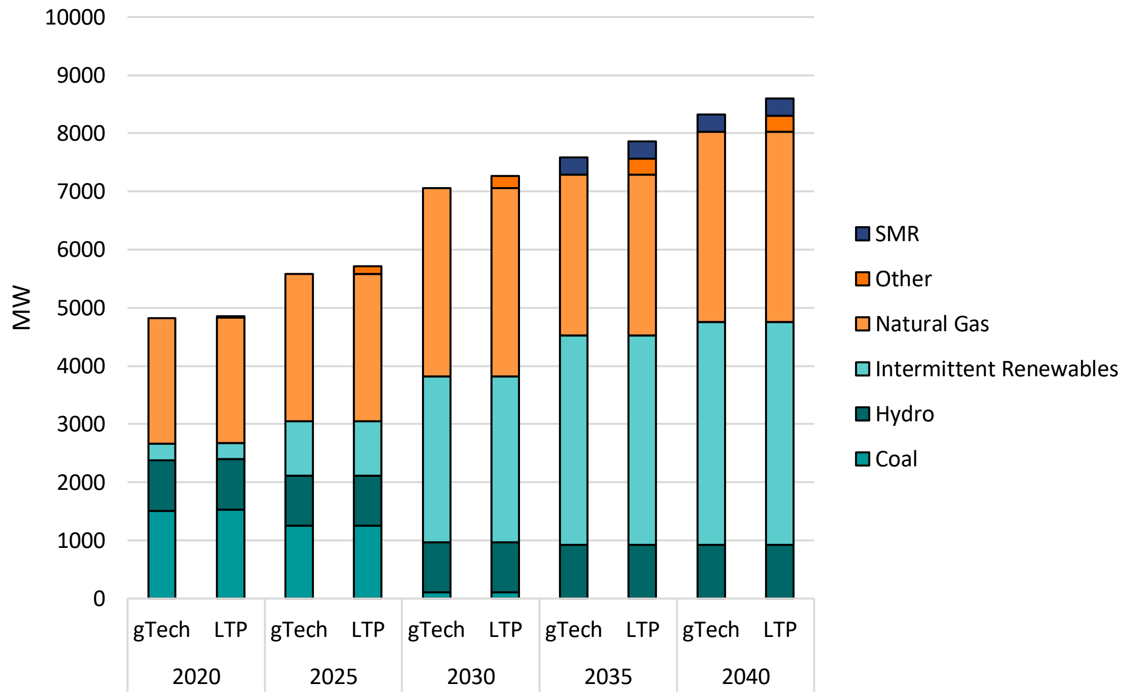
The electricity sector in this model is calibrated to SaskPower's Long Term Supply Plan (LTP), including electricity capacity and demand by source. The LTP differs from the two policy scenarios simulated in this analysis.

Calibration to the LTP means key variables like GDP, oil and gas production, and other variables are assumed to grow in line with their calibration sources, e.g., the Saskatchewan Budget 2023/24, when electricity prices reflect those under the LTP. As we simulate the SAPP and CER policy scenarios, the electricity capacity mix will deviate from the LTP and may cause changes to electricity prices, which could have second

[24] Statistics Canada. (n.d.). *Data.* Available from: https://www150.statcan.gc.ca/n1/en/type/data?subject_levels=25%2C2504

order effects on outputs, such as GDP and oil production. The Figure below summarizes electricity capacity in the LTP and the calibration in gTech-IESD.

Figure 6: Saskatchewan installed capacity, gTech-IESD calibration and SaskPower LTP



The electricity dispatch and capacity expansion module (IESD) simulates grid reliability via assumptions about reserve requirements and forced outage rates for generators.

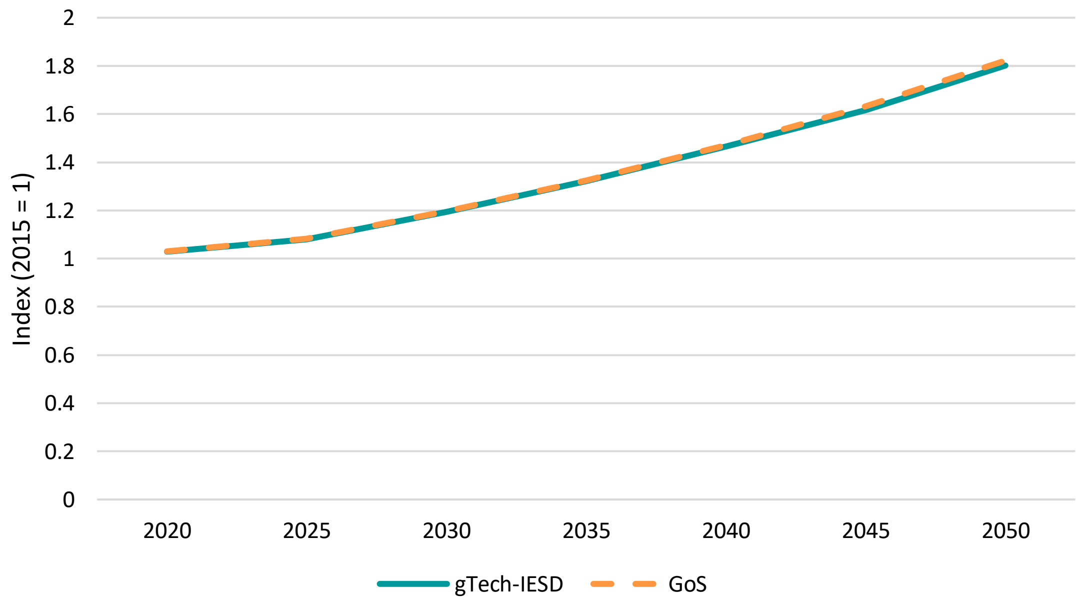
- For this analysis, IESD requires both spinning reserves and regulatory reserves for dispatchable generation units. The spinning reserve requirement is 3% of hourly load and the regulatory reserve requirement is 1% of hourly load. This version of the model does not have a firm capacity requirement but has an hourly load balance requirement and assumes a 15% forced outage rate for all firm generation.
- Availability of wind and solar resources are based on provincial wind speed and solar irradiation. Capacity factors for wind and solar technologies in IESD are based on hourly generation profiles, representative of hourly resource availability in 2015. Capacity factors in Saskatchewan average 19% for solar generation and 37% for wind generation, which evolve over time.

Wind technologies are grouped by generation profile and distance from load centers. Each group has its own generation profile and capex to reflect the heterogeneity of resource quality and transmission infrastructure requirements. Solar resources have a uniform generation and capex profile. Both technology types are subject to a declining capital cost function, as presented in Appendix C.

2.3.3. GDP

GDP is calibrated to the Government of Saskatchewan Budget 2023/24 forecast for Saskatchewan and Canada's Energy Future 2023 for other provinces [25]. Figure 7 provides the GDP forecast for Saskatchewan. GDP by sector is largely determined by this rate of growth and the relative capital and labour productivity of each sector (i.e., the value of goods and services produced for a given amount of capital and labour inputs). In other words, the overall economic growth is 'allocated' amongst sectors based on historical data regarding the structure of the economy in Canada and the US, and changes brought on by policy and other factors.

Figure 7: GDP in Saskatchewan, gTech-IESD calibration and GoS Budget 23/24 forecast



[25] Canada Energy Regulator. (2021). *Canada's Energy Future 2021.* Available from: https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2021/index.html

2.3.4. Energy Prices

Oil and natural gas price are exogenous[26] inputs to the model (i.e., based on an assumed global price). The Henry Hubb natural gas price and the reference WTI oil price are calibrated to the Government of Saskatchewan Budget 2023/24 forecast.

Table 10: WTI oil price forecast assumptions (2022 USD/bbl)

Sensitivity	2025	2030	2035	2040	2045	2050
gTech-IESD	71.64	71.66	69.72	68.00	66.50	65.24
SK Budget 2023/24	70.67	71.08	69.02	67.01	65.07	63.19

Table 11: Henry Hub natural gas price forecast assumptions (2022 USD /mmBTU)

Sensitivity	2025	2030	2035	2040	2045	2050
gTech-IESD	4.26	4.18	4.06	3.98	3.86	3.64
SK Budget 2023/24	4.19	4.22	4.09	3.95	3.80	3.64

The price for other energy commodities is determined by the model based on demand and the cost of production. For example, the price of gasoline depends on a variety of factors that are accounted for by the modeling, such as:

- The cost of producing gasoline while meeting policy constraints.
- The cost of maintaining the transportation network.
- Any taxes on or subsidies to the sector.

2.3.5. Oil and Gas Production

Oil and gas production is calibrated to the Government of Saskatchewan Budget 2023/24 forecast for Saskatchewan and the 2023 version of Canada's Energy Future

[26] An exogenous input refers to an input that is not solved for by gTech but is instead set from an external source.

for other provinces. Figure 8 shows the oil production forecast in Saskatchewan, while Figure 9 shows the natural gas production forecast.

Figure 8: Saskatchewan oil production, gTech-IESD calibration and GoS Budget 23/24 forecast

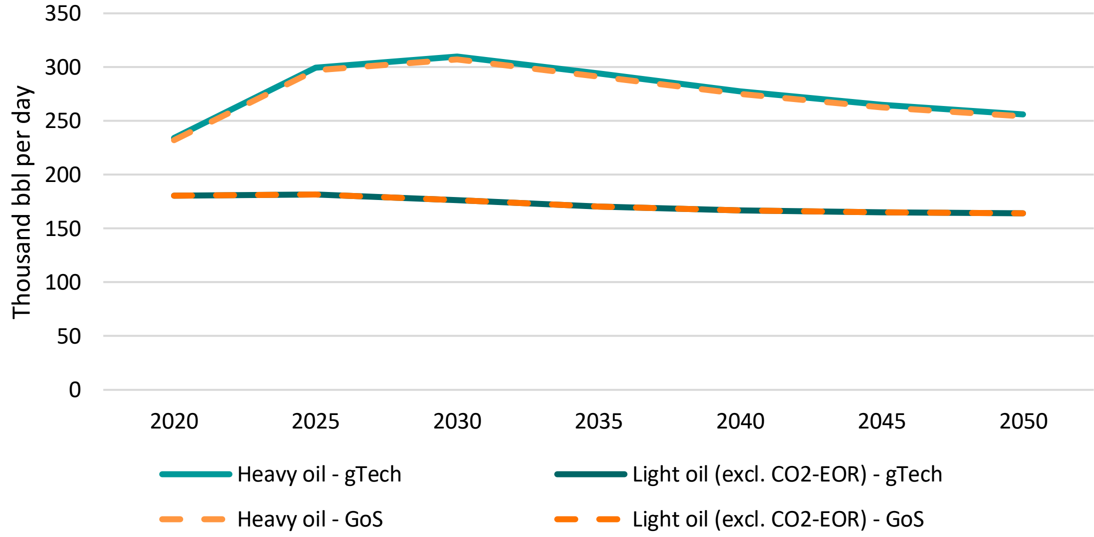
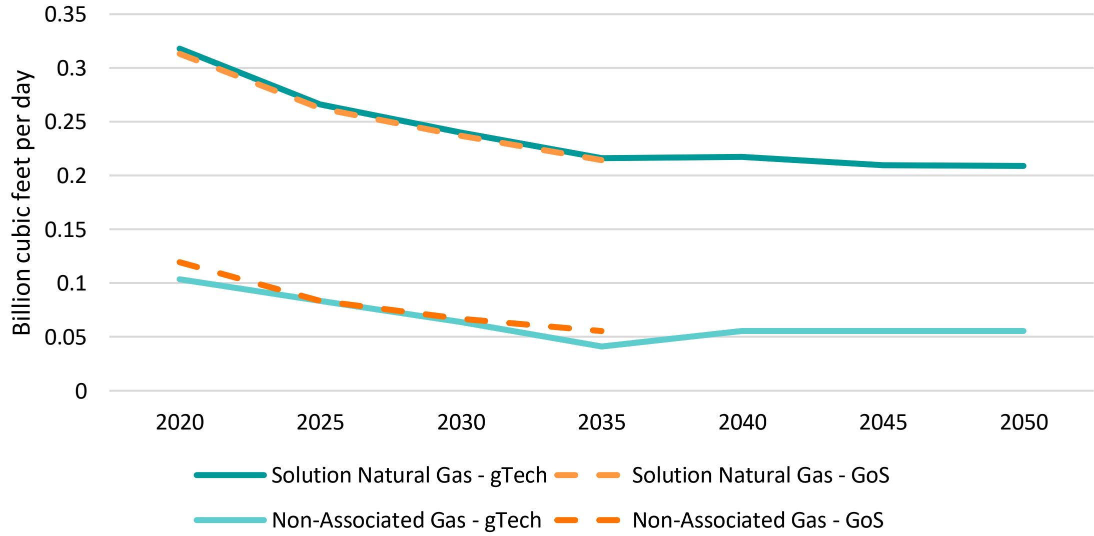


Figure 9: Saskatchewan natural gas production, gTech-IESD calibration and GoS Budget 23/24



3. Impact analysis

This section presents results from scenario analysis of the SK-CER and SAPP policies out to 2035. Our analysis focuses on the period up to and including 2035, with some consideration of impacts in future years out to 2050. Results covered in this section span five key subject areas:

- Emissions and capacity mix;
- Electricity market;
- Macroeconomics;
- Technology adoption; and
- Impacts beyond 2035.

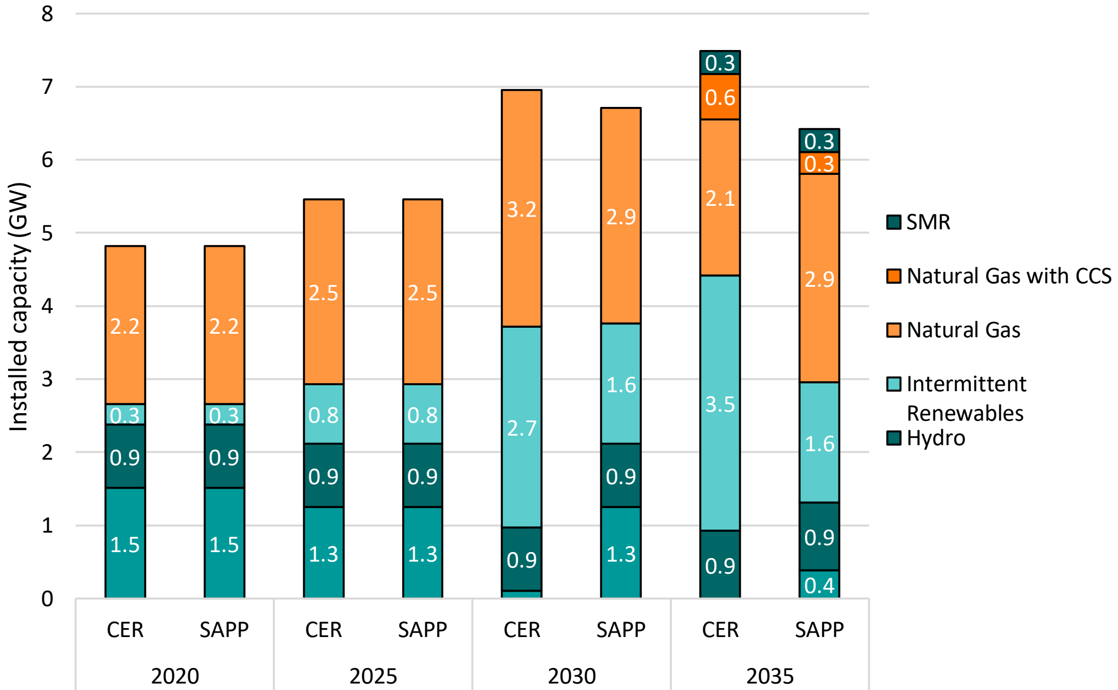
Results refer to the GoS Baseline cost sensitivity, unless otherwise specified. Where possible, ranges of impacts are presented to account for uncertainty in technology costs, i.e. including the GoS high cost and NREL cost sensitivities. We also assess the relative impact of each policy component as part of a waterfall analysis.[27]

3.1. Emissions and capacity mix

Figure 10 presents installed capacity under each policy scenario and model year, following the prescribed supply plans provided by the GoS. Expansion of intermittent renewables capacity accelerates under the SK-CER pathway relative to the SAPP. The SAPP supply plan delays the phase out of coal-fired power and extends gas-fired power plants to the end of their useful life, as they continue to be economic under a lower carbon price. The provision of higher capacity factors and additional firm capacity from dispatchable generators, i.e. coal and gas plants, leads to a lower total required installed capacity in 2030 and 2035 under the SAPP relative to the SK-CER.

[27] This includes reference to SAPP and CER policy simulations ran in gTech-IESD that allow for an endogenous solve of electricity generation capacity, i.e. they do not follow a prescribed capacity supply plan

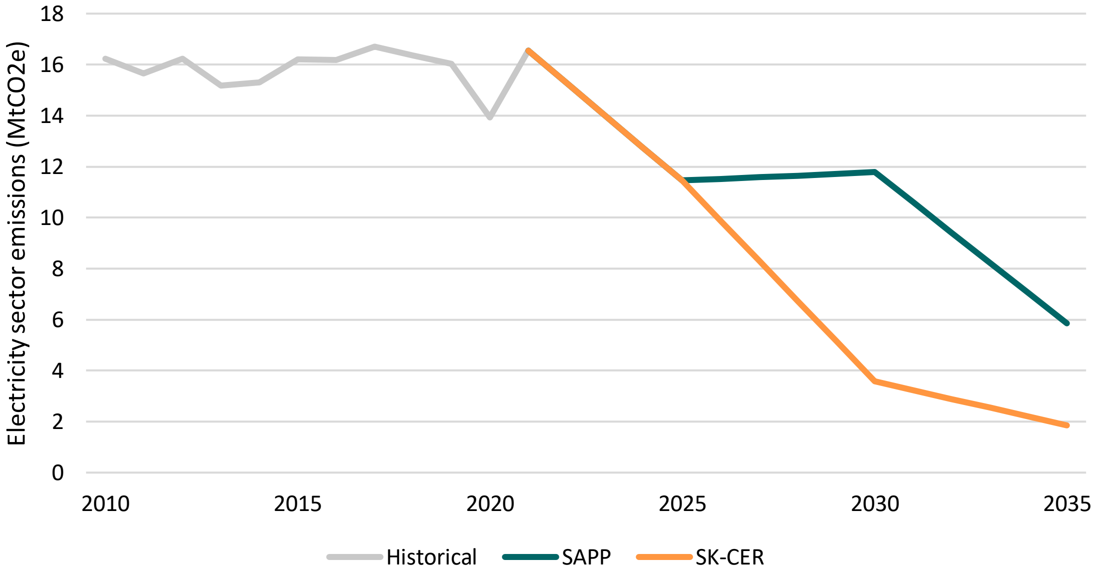
Figure 10: Installed capacity under each policy scenario and model year



The capacity mixes presented in Figure 10 represent the GoS supply plans and are constrained to capacity mixes provided by the GoS. To supplement these supply plans, we used gTech-IESD to simulate the SAPP and CER policy scenarios without constraints on Saskatchewan's electricity capacity mix. These unconstrained runs are discussed further in Appendix A.

Annual emissions from electricity generation in Saskatchewan decline under both the SAPP and SK-CER scenarios (Figure 11). In both scenarios, the retirement of coal-fired power stations drives reductions in electricity sector emissions. By 2035, annual electricity sector emissions (including cogeneration) under the SAPP total 5.9 $MtCO_2e$ and 1.9 $MtCO_2e$ under the SK-CER. This emissions level in 2035 under the SAPP is equivalent to a 58% reduction in electricity generation emissions relative to 2020 while the SK-CER achieves an 87% reduction. Cumulative emissions from the electricity sector between 2026 and 2035 are 53.0 $MtCO_2e$ higher under the SAPP relative to the SK-CER compliance pathway.

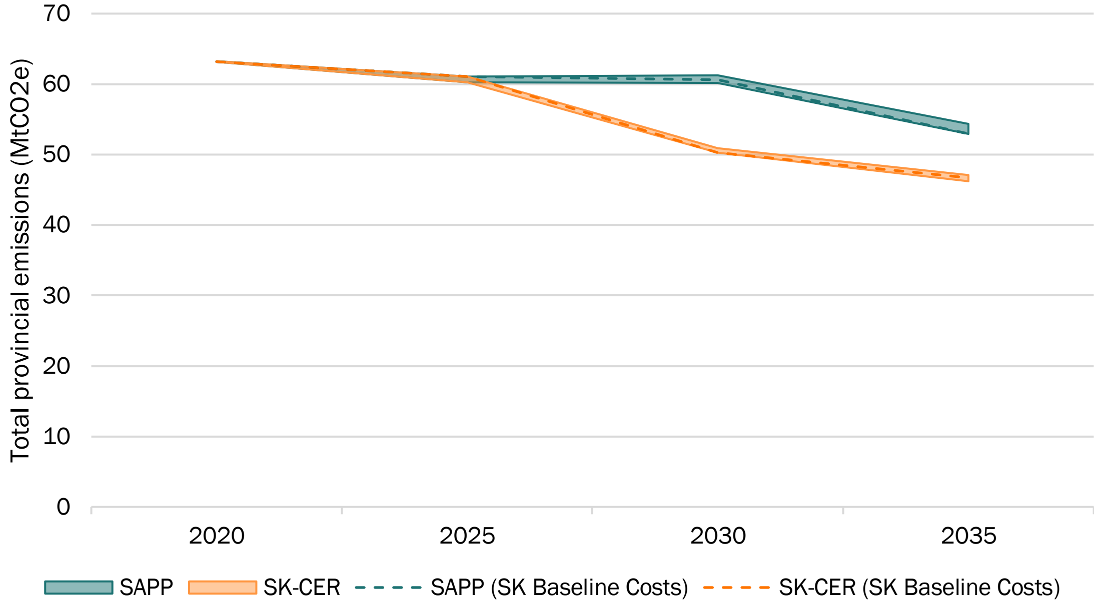
Figure 11: Total electricity sector emissions in Saskatchewan, including cogeneration



The SAPP scenario has higher GHG emissions in 2030 due to the use of unabated coal generation, made more economic by a lower carbon price. In 2035, coal is replaced with natural gas, and emissions decline, but not to the level achieved by implementing the CER compliance plan. The SAPP continues to trend toward lower annual emissions beyond 2035, as discussed in Section 3.5.

Reductions in total emissions in Saskatchewan under the SAPP and SK-CER are predominantly due to emissions reductions in the electricity sector. By 2035, total emissions in Saskatchewan are between 52.9 and 54.2 $MtCO_2e$ under the SAPP, which represents a 14-16% reduction below 2020 levels (Figure 12). Reduction in electricity sector emissions makes up 53-60% of this reduction, depending on the cost sensitivity. Provincial emissions under the SK-CER are 5.7 to 8.0 $MtCO_2e$ lower than the SAPP in 2035, representing a 25-27% reduction below 2020 levels.

Figure 12: Total provincial emissions in Saskatchewan under SAPP and SK-CER



3.2. Electricity market

This section explores impacts of the SK-CER and SAPP policy scenarios on Saskatchewan's electricity market, including prices, demand and electricity trade. gTech-IESD allows for variation in provincial electricity demand in response to electricity prices and the cost of alternative fuels. This functionality allows for insight into how different capacity mixes affect Saskatchewan's electricity system balance.

3.2.1. Electricity prices

Electricity prices increase out to 2035 under all scenarios but they grow at a faster rate under the SK-CER relative to the SAPP. Table 12 summarizes electricity prices in 2035 under the two scenarios. Consumers in Saskatchewan pay 2.7 to 3.1 cents per kWh (C$2022) more for electricity in 2035 under the SK-CER, depending on the type of consumer. The average four-person household[28] in Saskatchewan will pay $241 per year more for electricity under the SK-CER scenario in 2035, a 14% increase from the SAPP. Commercial and industrial consumers will pay $888 and $1,429 more for electricity per year, an 18% and 22% increase from the SAPP, assuming annual usage of 30 MWh and 50 MWh.

[28] SaskPower (2024). Home Power Use. Available from: https://www.saskpower.com/Power-Savings-and-Programs/Home/Tools-to-Analyze-Your-Power-Use/Home-Power-Use

Table 12: Electricity price impacts of SK-CER relative to SAPP in 2035 (C$2022)

	2025 Electricity Prices (c/kWh	2035 Electricity Prices (c/kWh)		Net increase (CER vs SAPP)	
Consumer type	All scenarios	SAPP	SK-CER	Rate change (c/kWh)	Annual cost per consumer[29] ($)
Generator	7.4	7.6	10.3	2.7	
Residential	22.6	22.6	25.7	3.1	$241
Commercial	16.3	16.5	19.4	3.0	$888
Industrial	12.7	12.9	15.8	2.9	$1,429

The magnitude of impact varies by the assumed costs for deploying electricity generators. Cost assumptions are important as system costs are a function of the cost to deploy and operate generators. Generation costs are 2.7 cents per kWh higher under the SK-CER when assuming GoS Baseline costs but only 1.6 cents per kWh higher when assuming NREL costs.[30] The difference in costs for deploying SMnRs, natural gas with CCS, and renewables drives the result differential.

To fully understand the impact of the CER, it is important to consider each policy difference between the SAPP and SK-CER scenarios. The SAPP includes multiple policy changes from the current climate policy suite in Canada, including freezing the economy-wide carbon price at $65 per tonne, exempting the utilities sector from carbon pricing, and providing additional federal funding for renewables and SMnRs.

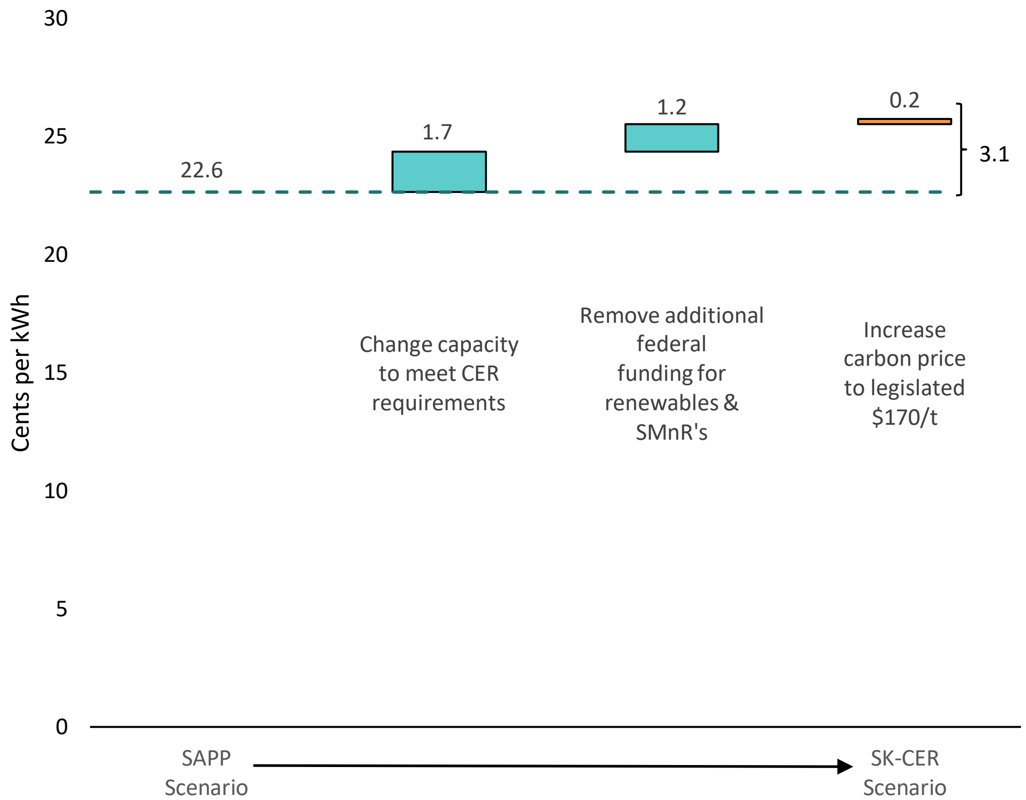
Figure 13 provides a waterfall chart detailing the impact on wholesale electricity prices of each change. Moving left to right on the Figure, policy changes are made to the SAPP to reflect legislated policies that are included in the SK-CER scenario.[31] The changes to electricity capacity under the CER account for 55% of the increase in price between the SAPP and SK-CER, while the remaining 45% can be attributed to differences in other policies. This assessment helps isolate the price impact that is attributable to compliance with the draft CER, and the impact that is attributable to exempting utilities from carbon pricing and providing higher federal investment tax credits under the SAPP.

29 Assumes annual consumption of 7.8 MWh for residential, 30 MWh for commercial and 50 MWh for industrial consumers.

30 See Section 2.2.2 for more information on cost sensitivities.

31 Legislated carbon tax reflects $170/t price level and the inclusion of the electricity sector under the OBPS. Removal of additional fed funding means reducing the ITC's assumed in the SAPP to announced policy levels of 12% of capex on renewables and 24% on SMR's in 2035.

Figure 13: Household electricity price policy impact in 2035 (C$2022)



3.2.2. Electricity demand

In 2035, total electricity demand is 0.9 to 1.7 TWh lower in Saskatchewan under the SK-CER relative to the SAPP. This difference is driven primarily by lower demand from mining, oil extraction, and pipelines. These sectors are emissions-intensive and therefore particularly affected by differences in carbon pricing. Figure 14 presents the range of electricity demand under the SK-CER and SAPP scenarios.

Lower electricity demand under the SK-CER is primarily driven by the difference in carbon price leading to lower overall activity. When controlling for the carbon price, electricity demand is only 0.7 TWh lower under the SK-CER than the SAPP, despite a 2.0 cents per kWh difference in wholesale electricity prices. This indicates that lower demand under the SK-CER is driven by lower activity in emissions-intensive sectors, such as mining, oil extraction and pipelines.

Figure 14: Total electricity demand by scenario

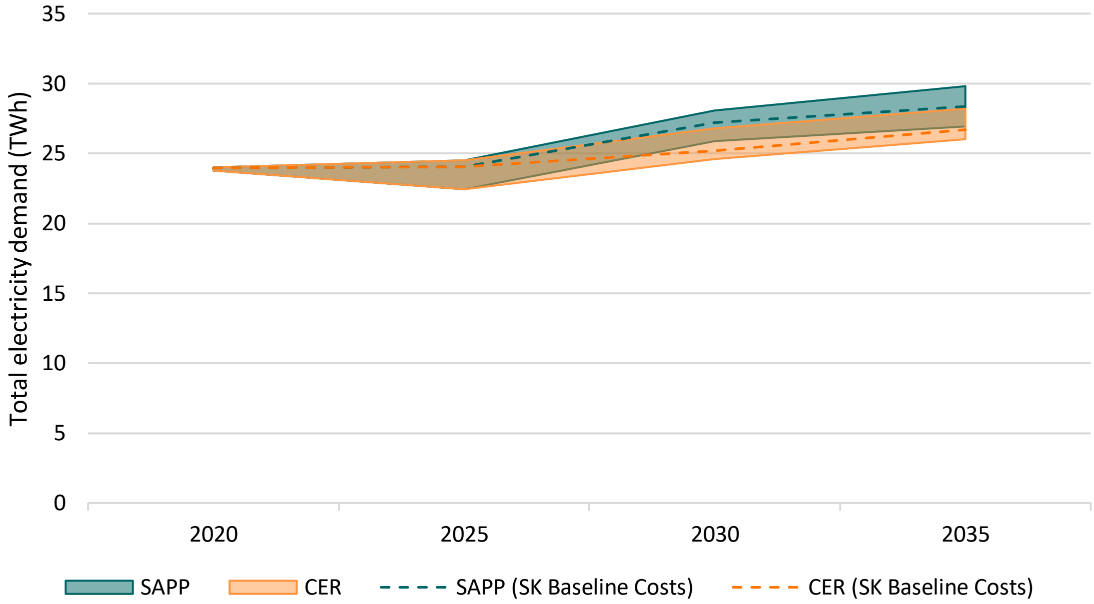


Table 13: Electricity demand (incl. cogeneration) by sector (TWh)

Sector	2025	2035 Electricity demand			Change in demand	
	All scenarios	SAPP	SAPP + $170/t carbon price	CER	SAPP minus CER	SAPP + $170/t minus CER
Commercial	5.0	5.8	5.8	5.8	0.0	-0.1
Oilfields	4.4	4.7	4.5	4.4	-0.3	-0.1
Mining	3.9	4.6	4.2	4.1	-0.5	0.0
Residential	3.7	4.7	4.9	4.8	0.0	-0.1
Pipelines	3.0	3.4	3.5	3.4	0.0	-0.1
Farm	1.2	1.3	1.3	1.3	0.0	0.0
Utilities	1.4	1.9	1.9	1.8	-0.1	0.0
Other[32]	4.3	5.0	4.3	4.2	-0.8	-0.2
Total	**27.0**	**31.4**	**30.4**	**29.7**	**-1.7**	**-0.7**

Lower electricity demand under the SK-CER is robust to variation in the electricity generation technology costs. Across all cost sensitivities tested in this analysis, electricity demand is between 0.9 TWh and 1.7 TWh lower under the SK-CER than the SAPP.

[32] Includes pulp and paper, steel, refineries, chemicals and other sources of electricity demand.

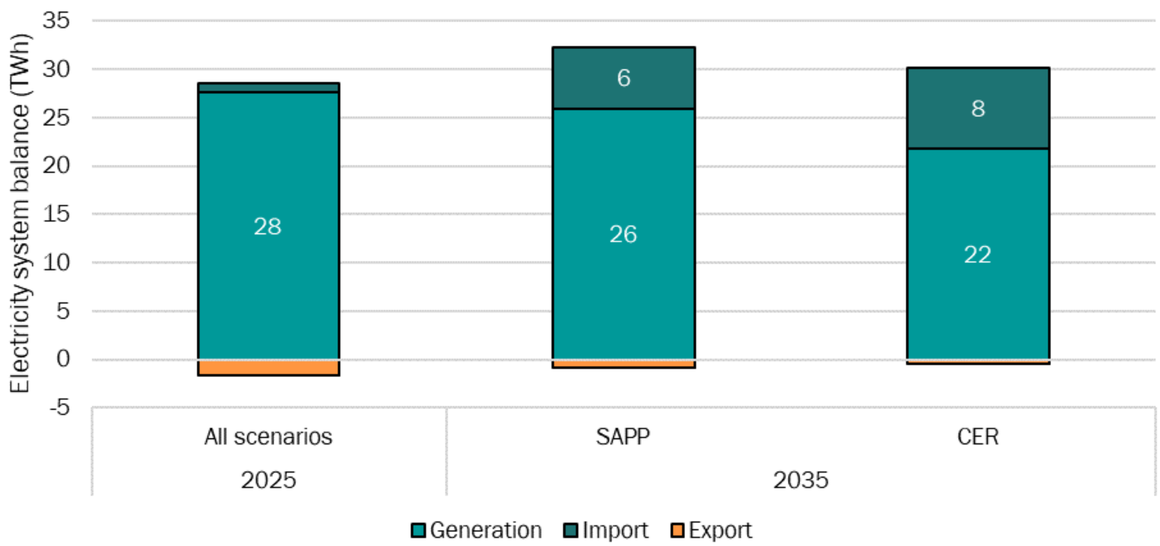
3.2.3. Electricity trade

Electricity prices and the availability of interties between Saskatchewan and neighbouring jurisdictions will impact electricity trade outcomes and reliance on domestic generation.

In 2035, domestic electricity generation is lower under the SK-CER relative to the SAPP. Reduced generation is due to both lower domestic consumption and an increased reliance on imports. Figure 15 shows the electricity system balance in 2025 and 2035. The impact of the SK-CER compliance pathway on electricity trade is robust to differences in assumed costs of deploying electricity capacity.

Both scenarios assume increased interconnection between Saskatchewan and the United States by 2035. Relatively cheaper electricity from the United States offsets some domestic generation in Saskatchewan, as the province makes use of increased import capacity. Inflation Reduction Act policies in the United States, such as the Renewable Electricity Production Tax Credit[33], help to lower the marginal cost of generation and increases trading opportunities with interconnected provinces.

Figure 15: Electricity system balance in Saskatchewan



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[33] United States Environmental Protection Agency (2022) Renewable Electricity Production Tax Credit Information. Available from: https://www.epa.gov/lmop/renewable-electricity-production-tax-credit-information

3.3. Macroeconomy

This section presents the impacts of the SK-CER and SAPP on Saskatchewan's macroeconomy, including Saskatchewan's GDP, labour market, and households.

3.3.1. Gross Domestic Product

Saskatchewan's annual GDP (C$2015) is $0.9 billion to $1.0 billion lower in 2035 under the SK-CER relative to the SAPP. The GDP impact referenced in Table 14 compares the SAPP scenario against the SK-CER, as defined in Section 2.2. Consumption, exports, and government expenditure are all lower under the SK-CER, with investment increasing in response to the additional deployment of generation capacity under the SK-CER. The cumulative GDP impact of the SK-CER between 2026 and 2035 is $7.1 billion to $8.0 billion, which is a function of compliance with the CER and changes to carbon pricing and federal investment tax credits.

Table 14: GDP impacts of SK-CER relative to SAPP in 2035 (C$2015)

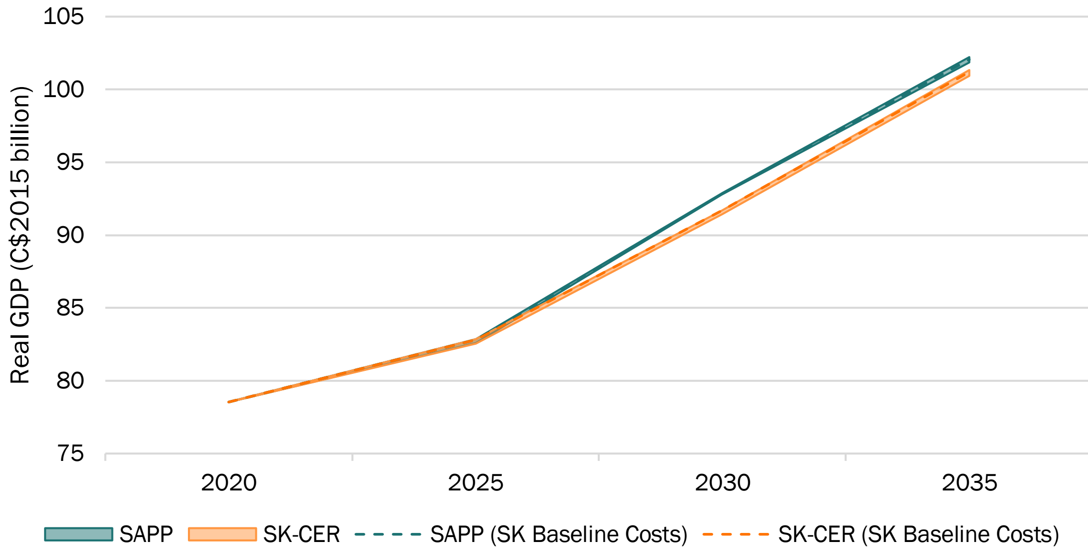
Sector	2025 GDP	2035 GDP		SK-CER impact		
	All ($bn)	SAPP ($bn)	SK-CER ($bn)	Annual ($bn)	2026-2035 cumulative ($bn)	2026-2035 CAGR[34] (%)
Consumption	43.1	56.0	55.5	-0.5	-3.5	-0.09%
Investment	17.8	19.7	20.2	0.5	2.3	0.26%
Government	16.9	21.1	21.0	-0.1	-0.5	-0.05%
Exports	54.8	64.3	63.2	-1.1	-8.1	-0.18%
Imports	-49.8	-59.1	-58.7	0.3	2.8	-0.06%
Total	**82.8**	**102.1**	**101.2**	**-0.9**	**-7.1**	**-0.09%**

When assessing GDP by sector, services (-$0.7 billion), mining (-$0.3 billion), oil and gas (-$0.2 billion), and agriculture and forestry (-$0.2 billion) all contribute less to Saskatchewan's GDP under the SK-CER. This scenario spurs additional activity from the utilities (+$0.5 billion) and construction (+$0.1 billion) sectors, in response to additional investment in Saskatchewan's electricity grid.

The SAPP has higher GDP than the SK-CER under all cost sensitivities. Saskatchewan's GDP in 2035 ranges from $0.9 billion to $1.0 billion larger under the SAPP. Figure 16 presents the range of GDP outcomes under the SAPP and SK-CER policy scenarios.

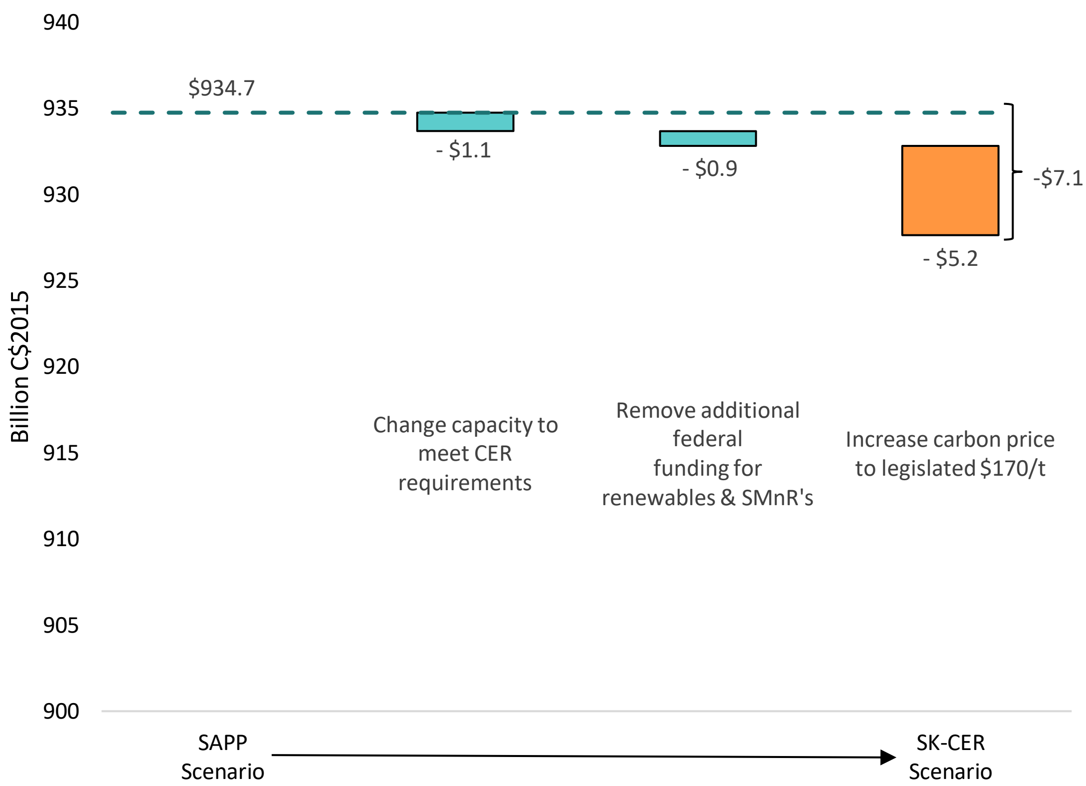
34 Compounded Annual Growth Rate

Figure 16: Range of GDP impacts under the SAPP and SK-CER



It is important to consider each policy difference between the SAPP and SK-CER scenarios when assessing GDP impacts. Figure 17 breaks down the relative impact of each policy change on GDP between 2026 and 2035. Of the $7.1 billion difference in cumulative GDP between the SAPP and SK-CER, $1.1 billion is due to compliance with the CER, and $6.0 billion is due to changes to carbon pricing and federal investment tax credits. When compared to electricity prices, the difference in carbon pricing policy between the two scenarios is more influential on GDP impacts than the change in electricity capacity mix. This assessment highlights the relative impact of CER compliance and other policy differences between the two scenarios.

Figure 17: Non-discounted cumulative expenditure GDP 2026-2035 (deflated)



3.3.2. Employment

There are fewer jobs in Saskatchewan under the SK-CER relative to SAPP. In 2035, there are 4.2 thousand (0.6%) fewer full-time equivalent (FTE) jobs in Saskatchewan under SK-CER. Most of this difference occurs in the services sector (2.9 thousand FTEs), due to the sector making up more than half of total employment in the province. There are also fewer jobs in manufacturing (1.0 thousand FTEs), mining (0.5 thousand FTEs), and agriculture and forestry (0.2 thousand FTEs). The construction sector is the only sector to register a net employment increase under the SK-CER (0.9 thousand FTEs), driven by increased construction of electricity generation capacity.

Table 15: Saskatchewan jobs by sector (thousand FTEs)

	2025 jobs	2035 jobs		SK-CER impact
	All scenarios	SAPP	SK-CER	SK-CER minus SAPP
Transportation	5.7	6.2	5.9	-0.3
Utilities	4.2	4.6	4.4	-0.1
Oil & gas	16.3	15.2	15.2	0.0
Mining	18.4	18.3	17.8	-0.5
Manufacturing	60.9	68.5	67.5	-1.0
Services	435.7	496.8	493.9	-2.9
Agriculture & forestry	47.3	44.8	44.5	-0.2
Construction	57.2	59.4	60.3	0.9
Total	**645.6**	**713.7**	**709.5**	**-4.2**

The employment result is robust for all cost sensitivities tested in this analysis. The total job impact in 2035 ranges from 3.2 thousand FTEs to 4.3 thousand FTEs, depending on the cost of generation capacity. The difference in jobs is largest when deployment costs are lower, as there are fewer construction jobs to offset losses in other sectors. Similarly, the difference in employment outcomes is smallest when deployment costs are higher, since the construction sector employs more workers.

3.3.3. Household impacts

Consumption

Total real household consumption is approximately 1% lower under the SK-CER scenario across all households. Household consumption reflects total expenditures on goods and services by households.

The decline in consumption under the SK-CER is largely concentrated in the top 40% of income earners. Lower income households change consumption the least under the SK-CER (0.1-0.5%), while higher income households reduce their consumption the most (1.0-1.2%), indicating that policy costs skew to wealthier households.

The difference in impacts between lower and higher income households is because lower income households receive more transfers from carbon pricing rebates under the SK-CER scenario. Under SK-CER, households receive 2.3 times more rebates ($440) than in the SAPP scenario. Lower income households are the primary beneficiaries of carbon pricing transfers and this partially offsets the impact of higher electricity prices on these households.

Table 16 shows the effect of the CER and other policies on household consumption across income quintiles[35]. The change in electricity capacity mix between the SK-CER and SAPP accounts for approximately half the reduction in consumption between the two scenarios, with changes to carbon pricing and federal funding accounting for the other half.

Table 16: Annual household consumption per capita (C$2022)[36]

	2025	2035			SK-CER Impact
Household Income Quintile	All scenarios	SAPP	SK-CER capacity & legislated Fed funding	SK-CER	SK-CER minus SAPP
Min - 50,086	16,588	19,910	19,830	19,883	-0.13%
50,087 - 73,507	25,943	31,796	31,651	31,622	-0.55%
73,508 - 102,063	36,892	44,879	44,645	44,505	-0.83%
102,064 - 141,258	47,027	55,551	55,202	54,969	-1.05%
141,259 - Max	71,136	79,981	79,425	79,005	-1.22%
Total	**39,517**	**46,423**	**46,151**	**45,997**	**-0.92%**

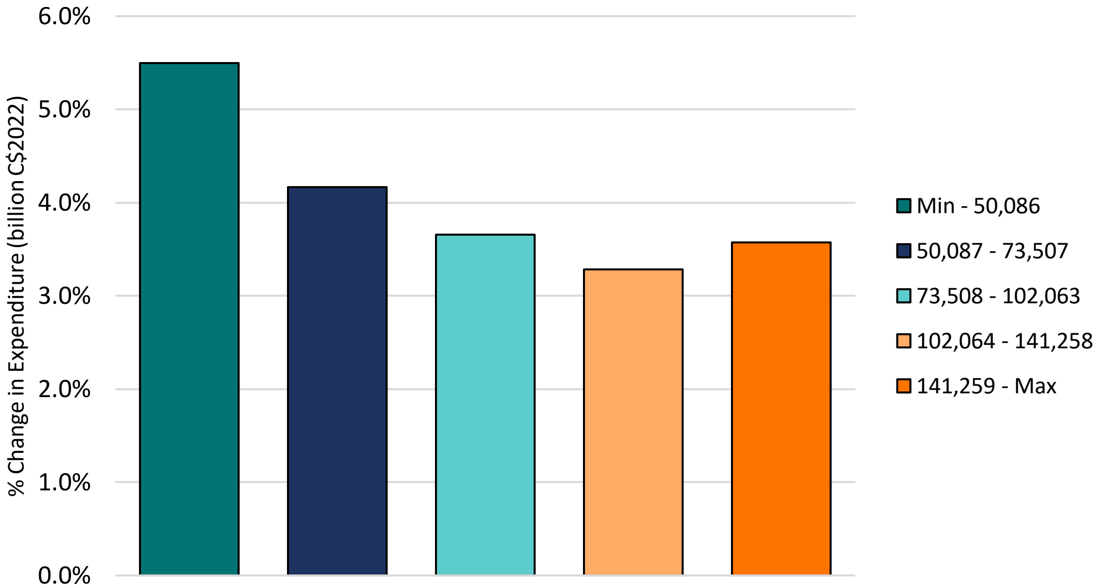
Energy Demand

Household expenditure on energy is 3.7% higher under the SAPP relative to the SK-CER. The lowest income quintile sees the largest difference in energy expenditure (5.5%) while the top 20% of earners see the smallest difference (3.6%). Figure 18 shows the change in energy expenditure in 2035 under SK-CER relative to the SAPP. The difference between policy scenarios is sensitive to cost assumptions, with the total increase in energy expenditure ranging from 2% under low-cost assumptions to 4% with high cost assumptions.

[35] Based on 2015 values from Statistics Canada. Quintiles have been converted to C$2022.

[36] Annual household consumption by quintile calculated from expenditure GDP in constant chained C$2015. Values deflated using Fisher Price index. Population for per capita calculation referenced from Canada Energy Regulator 2021. Canada Energy Regulator. (2021). Canada's Energy Future 2021. Available from: https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2021/

Figure 18: 2035 change in energy expenditure per capita under SK-CER by income quintile [37]



Household energy demand across all fuel types is 2% lower in 2035 under the SK-CER, with an increase in electricity use and reduction fossil fuel demand. Electricity demand grows by less than 1%, while fossil fuel demand declines between 2-5% across cost sensitivities. The growth in electricity demand despite higher electricity prices under the SK-CER highlights the effect that carbon pricing has on household fuel switching behaviour.

Expenditure on electricity increases by four percentage points (39% to 43%) as a percentage of total energy expenditure. Low-income households face the highest percentage increase in energy expenditure under the SK-CER. However, high-income households face the highest increase in absolute terms. This result occurs because higher income households consume more energy than lower income households.

Welfare

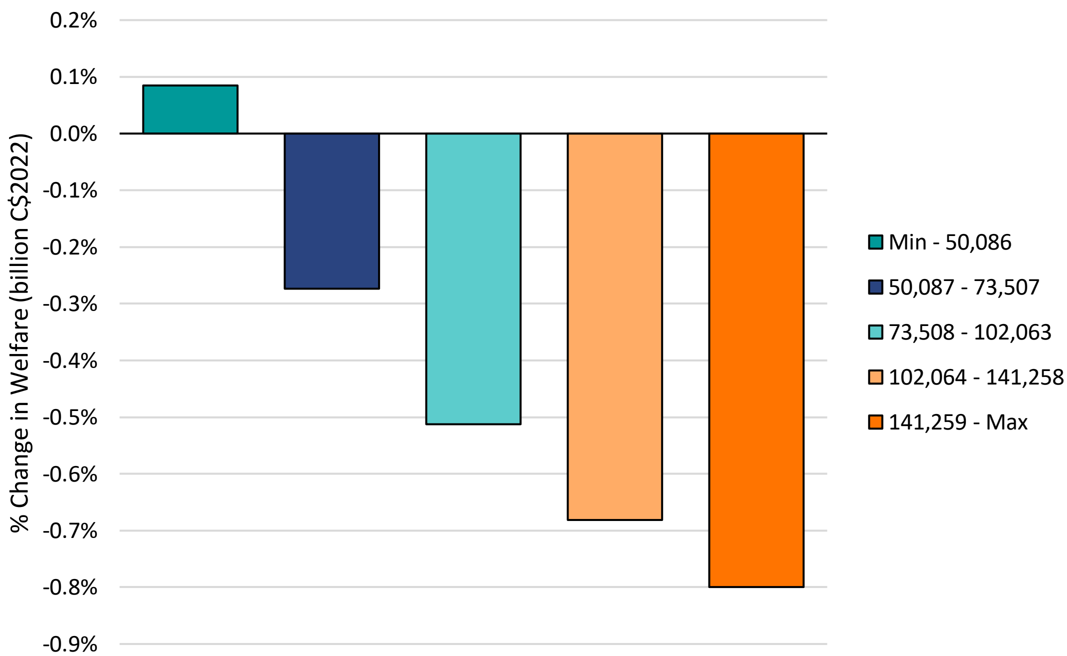
We use welfare as a proxy for living standards, which in this context means consumption and the availability of leisure time. By including leisure time as well as consumption, the metric provides a view of overall living standards. Leisure time is assigned a value based on the wage rate of the occupation that each person belongs

[37] Calculated based on total household consumption of fuel at basic prices, deflated using CPI. Prices used in this calculation exclude carbon pricing and therefore do not capture impacts of carbon pricing on fuel prices.

to, since we measure household metrics in dollars. These values are then summed across all households to determine overall welfare.

As with consumption, SK-CER has the greatest welfare implications for the top 40% of income earners, as illustrated in Figure 19. Conversely, the lowest quintile experiences a negligible difference in welfare in 2035. Both high- and low-income households reduce consumption due to higher prices, however lower income households are able to maintain their level of welfare due to transfers. Breaking down the policy changes between the SAPP and SK-CER, we find that approximately half the reduction in welfare can be attributed to changes in the electricity sector to comply with the CER.

Figure 19: 2035 change in welfare per capita under SK-CER by income quintile



3.4. Technology mix

This section presents results related to technology adoption in Saskatchewan. Results cover transportation, household heating, and CCS deployment.

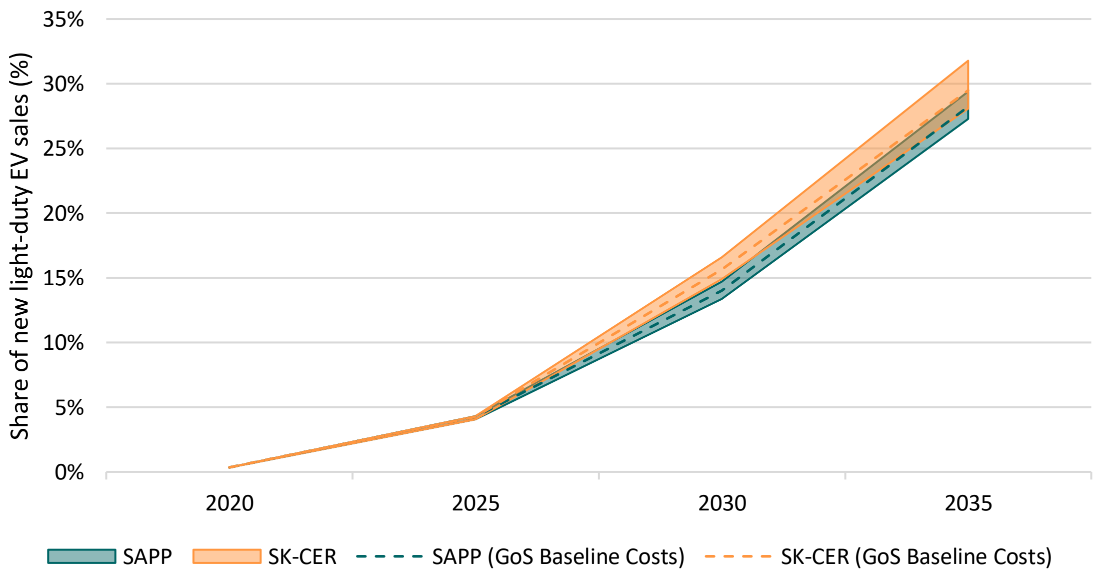
3.4.1. Transportation

The share of new vehicles on the road in Saskatchewan is impacted by several factors, including the price of fuel, the cost of EV batteries and the price for electricity.

Figure 20 shows that there is a higher percentage of light-duty EV sales in the SK-CER scenario. The higher carbon price in the SK-CER scenario makes it more expensive to operate internal combustion engines (ICEs), increasing the market share of ZEVs. Increased electricity prices under the SK-CER disincentivizes low-carbon vehicle adoption but this effect is more than offset by the impact of a higher carbon price on ICE adoption.

As with other results, we can isolate the effects of differences to the electricity capacity mix and changes to carbon pricing under the SK-CER relative to the SAPP. When examining the SK-CER supply mix with the same carbon price as the SAPP, light-duty EV sales are 1% *lower* than the SAPP. When including the differences in carbon pricing, light-duty EV sales are 2% *higher* under the SK-CER than the SAPP. This result provides insight into the relative impacts of electricity prices and carbon pricing when comparing EV uptake in the two scenarios.

Figure 20: Share of new light-duty EV sales in the SAPP and SK-CER scenarios



3.4.2. Household heating technology

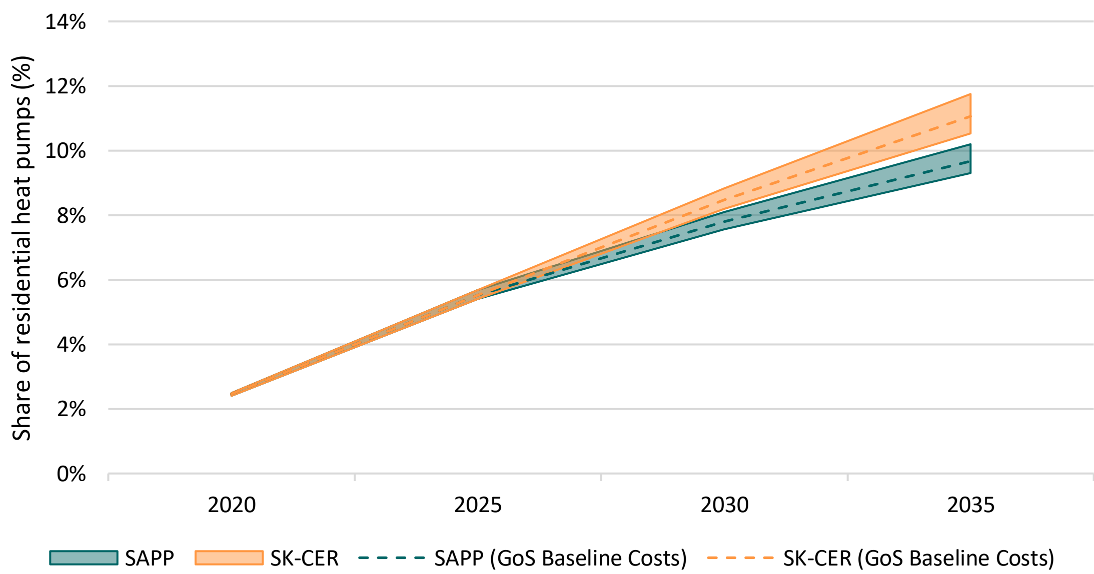
Electricity and fuel prices impact individual choices for home heating technologies: lower fossil fuel costs or higher electricity prices tend to reduce electrification. Heat pumps have a high upfront cost but use less electricity than electric baseboards and thus are more likely to make financial sense when both fossil fuel and electricity costs are high.

The use of heat pumps for home heating is higher under the SK-CER scenario than the SAPP. Increased electricity prices lead to a higher cost for heat pumps under the SK-CER, but this effect is more than offset by the impact of a higher carbon price on carbon-intensive home heating technologies, such as gas-fired boilers. Figure 21 shows the total market share of heat pumps in Saskatchewan.

The width of the bars in Figure 21 for the SAPP and SK-CER scenario show the impact of the different technology cost assumptions. There is the lowest market share of heat pumps under the GoS high-cost assumptions and the highest market share under the NREL cost assumptions.

As with EV uptake, it can be helpful to isolate the different impact of the changes to the electricity capacity mix and the carbon price. When we compare heat pump adoption with the CER supply mix and the same carbon price as the SAPP, the heat pump share is 1% *lower* under the CER supply mix than the SAPP, due to higher electricity prices caused by the CER. However, when we compare the SK-CER with the full $170/tonne carbon price to the SAPP, we see the heat pump share is 1% *higher* in the SK-CER, illustrating the greater impact of the higher carbon price compared to the electricity price differential.

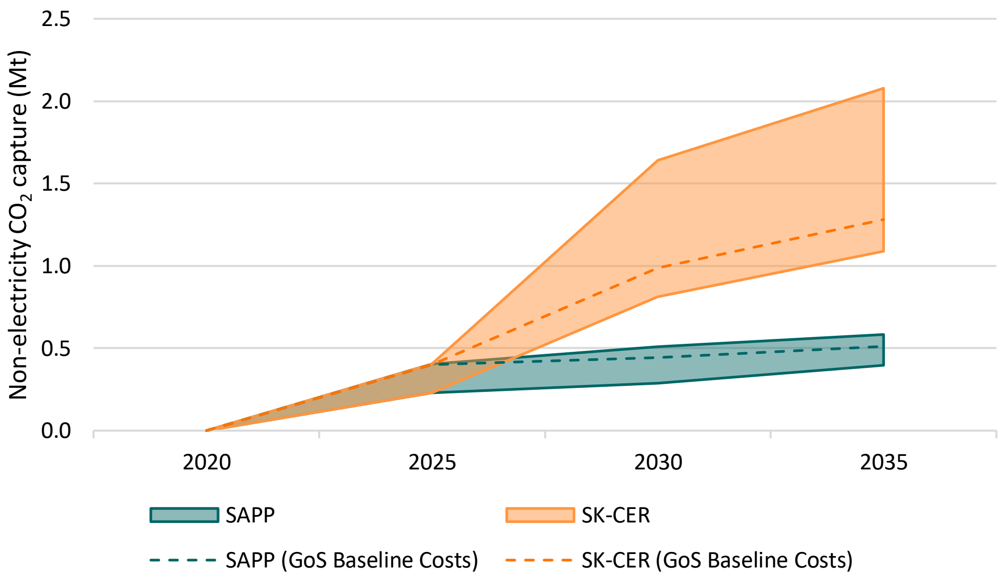
Figure 21: Total market share of resiential heat pumps in Saskatchewan



3.4.3. Carbon capture and storage

There is more uptake of CCS for industrial heat and hydrogen production in the SK-CER scenario relative to the SAPP scenario. This difference is driven primarily by the higher carbon price in the SK-CER scenario. Figure 22 illustrates the uptake of CCS in the SK-CER scenario relative to the SAPP scenario, excluding CCS in the electricity sector. In both policies, there is greater CCS adoption when technology costs are lower.

Figure 22: CO_2 captured in Saskatchewan, excluding the electricity sector



The usage of CCS in the electricity sector is sensitive to technology cost assumptions, but CCS capacity in the sector is fixed by scenario. The variation in CO_2 capture occurs because, while the capacity of coal and natural gas plants with CCS is fixed in the SAPP and SK-CER scenarios, the amount of generation at CCS-equipped facilities can vary based on the relative generation costs in each scenario.

3.5. Impacts beyond 2035

This impact analysis has predominantly focused on impacts of the SK-CER compliance pathway between 2026 and 2035. However, it is important to consider impacts beyond 2035, on the basis that full compliance under the Draft CER is not necessarily required until 2045, depending on the year a generator is commissioned.[38] This subsection explores trends beyond 2035 for some key metrics discussed in the previous sections, including:

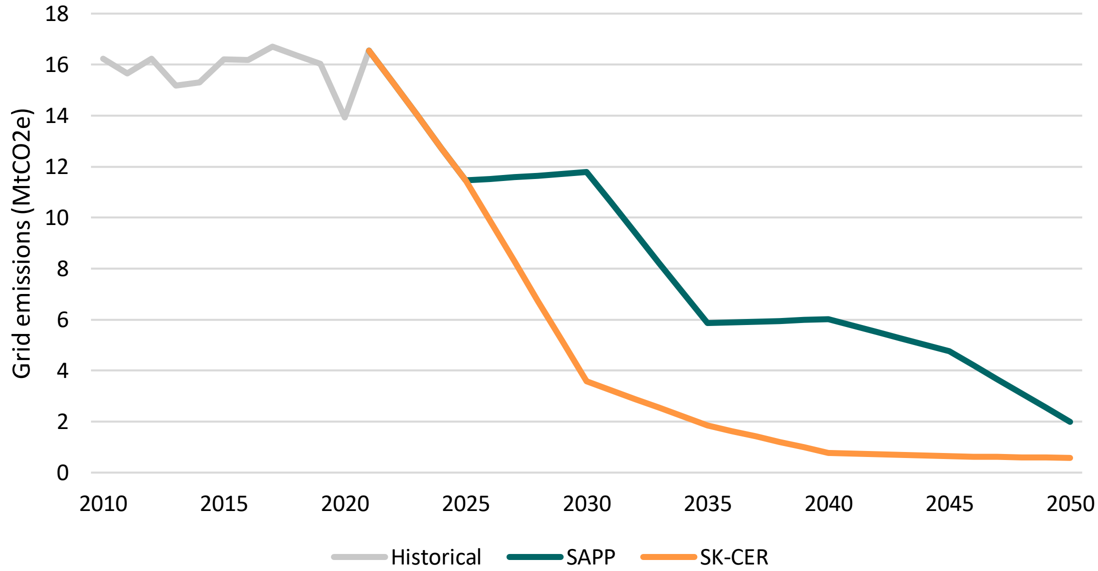
- Greenhouse gas emissions
- Electricity prices; and
- GDP.

Emissions

Electricity sector emissions continue to decline under both the SAPP and SK-CER (Figure 23). Under the SK-CER, electricity emissions fall to 0.8 $MtCO_2e$ in 2040 and 0.6 Mt CO_2e in 2045 and 2050. Residual emissions in the SK-CER come from non-captured CO_2 from natural gas with CCS facilities, and cogeneration. Under the SAPP, electricity emissions remain at 5.8-6.0 $MtCO_2e$ in 2035 and 2040 before declining to 4.8 Mt CO_2e in 2045 and 2.0 Mt CO_2e in 2050. The higher emissions level under the SAPP is driven by extending the life of the natural gas turbine fleet, which are partially phased out between 2040 and 2050. The gas turbine fleet is mostly replaced by intermittent renewable capacity in 2050.

[38] Government of Canada (2023) Canada Gazette, Part I, Volume 157, Number 33: Clean Electricity Regulations. Available from: https://www.gazette.gc.ca/rp-pr/p1/2023/2023-08-19/html/reg1-eng.html

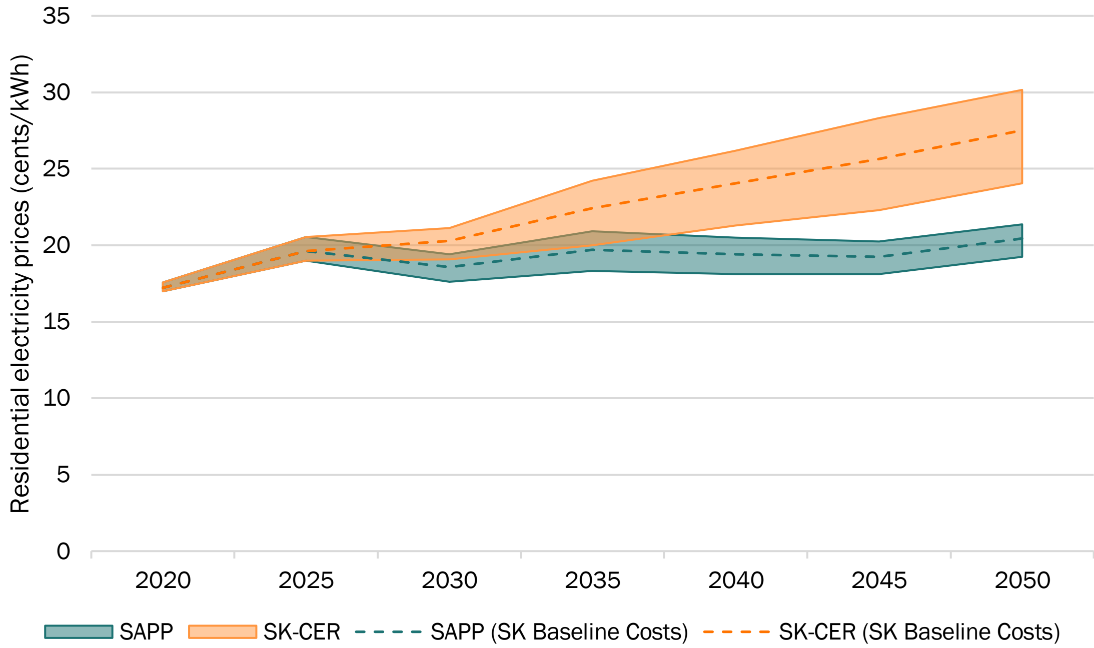
Figure 23: Electricity grid emissions under the SAPP and SK-CER, extended to 2050



Electricity prices

The difference in electricity prices between the SAPP and SK-CER increases out to 2050 (Figure 24). By 2050, residential electricity prices are 4.8 to 8.8 cents per kWh higher under the SK-CER compared to the SAPP, with 88% of the increase resulting from compliance with the SK-CER. This difference is 1.5 to 2 times higher than the gap in 2035, due to full CER compliance coming into effect in 2045. The decision to deploy novel generation technologies, such as SMnRs and natural gas with CCS, drive much of the cost difference between the two scenarios. Further, the electricity sector is excluded from the OBPS under the SAPP, such that carbon intensive generation does not incur a carbon cost.

Figure 24: Residential electricity prices under the SAPP and SK-CER, extension to 2050



Gross Domestic Product

GDP under the SK-CER continues to grow at a slower rate than the SAPP after 2035 (Table 17). By 2050, annual GDP is $2.5 billion (2015$) lower under the SK-CER. This difference is made up of reduced consumption ($2.0 billion), investment ($0.6 billion), government expenditure ($0.4 billion) and exports ($1.9 billion). Saskatchewan also imports fewer goods and services, which partially offsets the decline in GDP. The cumulative GDP impact between 2036 and 2050 is $19.7 billion.

Table 17: GDP impact of the SK-CER, extended to 2050 (C$2015)

	2050 Total		SK-CER impact	
	SAPP	CER	Annual ($bn)	2036-2050 cumulative ($bn)
Consumption	86.7	84.7	-2.0	-16.4
Investment	24.9	24.2	-0.6	8.0
Government	30.2	29.8	-0.4	-2.5
Exports	76.8	75.0	-1.9	-23.9
Imports	-78.7	-76.3	2.4	15.0
Total	**139.9**	**137.4**	**-2.5**	**-19.7**

4. Key insights

This impact assessment has produced six key insights.

Insight 1: The SK-CER drives deeper emissions reductions in Saskatchewan than the SAPP. The change in emissions from the electricity sector makes up most of the province's emissions reductions in both scenarios. The SAPP scenario has higher GHG emissions in 2030 due to the use of unabated coal generation, made more economic by a lower carbon price. In 2035, coal is replaced with natural gas causing emissions to decline under the SAPP, but not to the level achieved by implementing the CER compliance plan.

Insight 2: Higher electricity prices and carbon pricing under the SK-CER lead to lower energy demand and increased reliance on imported electricity. Household electricity rates (C$2022) are 1.9 to 3.8 cents per kWh higher in 2035 under the SK-CER than the SAPP. Province-wide electricity consumption is 0.9 to 1.6 TWh lower under the SK-CER in 2035. Further, higher costs of domestic generation result in additional imports from the United States, making use of additional interconnection between Saskatchewan and the United States.

Insight 3: Saskatchewan's GDP is higher under the SAPP than under Saskatchewan's CER compliance pathway. Saskatchewan's GDP (C$2015) is $0.9 billion to $1.0 billion (0.9%) lower in 2035 under the SK-CER relative to the SAPP, with a cumulative GDP loss of $7.1 billion to $8.0 billion between 2026 and 2035. There are three to four thousand fewer full time equivalents jobs in Saskatchewan under the SK-CER in 2035. Some of this change is attributable to the electricity sector's response to the CER, but most of the GDP impact is a result of a lower economy-wide carbon price under the SAPP.

Insight 4: Household consumption of goods and services is lower under the SK-CER. Aggregate consumption is 1% lower under the SK-CER relative to the SAPP scenario. High-income households reduce consumption the most under SK-CER and see greater welfare impacts relative to low-income households. This distributive impact is due to higher energy expenditure in high-income households and more transfers from carbon pricing rebates to low-income households.

Insight 5: Low carbon technology adoption, including electrification of transportation and CCS deployment outside of the electricity sector, is higher under the SK-CER. This result occurs despite higher electricity prices under the SK-CER. Technology choice decisions, such as the decision to purchase a zero-emission vehicle or adopt CCS, are influenced more by the carbon price differential between the two scenarios than the electricity price differential.

Insight 6: The economic impact of the SK-CER scenario is due to both compliance with the CER and changes to other federal policy. The electricity rate impact in Saskatchewan is predominantly driven by the change in electricity generation capacity to comply with the CER. However, most of the SK-CER scenario's GDP impact is due to a higher economy-wide carbon price and less federal funding for renewables and SMnRs, relative to the SAPP.

Appendix A: Comparison to other Navius analysis

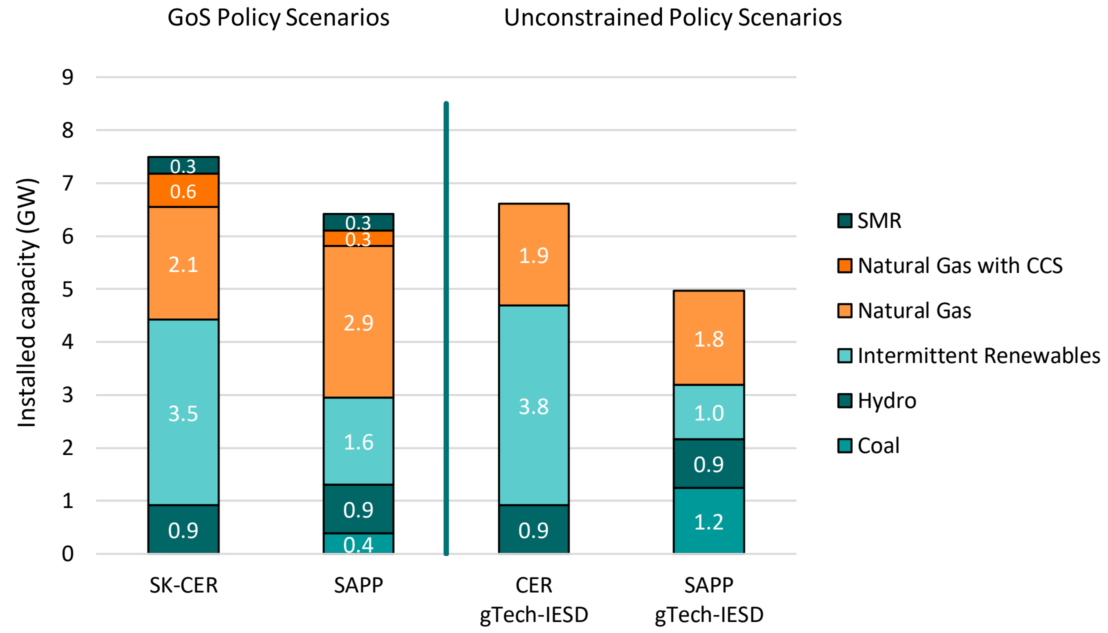
To supplement the GoS supply plans, we used gTech-IESD to simulate the SAPP and CER policy scenarios without constraints on Saskatchewan's electricity capacity mix. In these runs, the electricity system is still bounded by assumed reserve requirements (see Section 2.3.2) but is likely to underestimate the reliability standards used by SaskPower in producing supply plans.

Capacity

In 2030 and 2035, the unconstrained runs result in similar types of installed capacity as the GoS supply plans, with the exception of CCS and SMnRs (Figure 25).

- gTech-IESD continues the use of fossil fuel power plants under SAPP in response to the exclusion of the electricity sector from the carbon price, and a \$65/tCO_2e carbon price for other sectors of the economy.
- Under the CER policy, the unconstrained run produces an acceleration of intermittent renewables deployment, similar to the SK-CER supply plan.
- Across both scenarios, the unconstrained runs resulted in less installed capacity than the GoS supply plans, due in part to differences in electricity demand between gTech-IESD and the GoS supply plans and different reliability requirements.

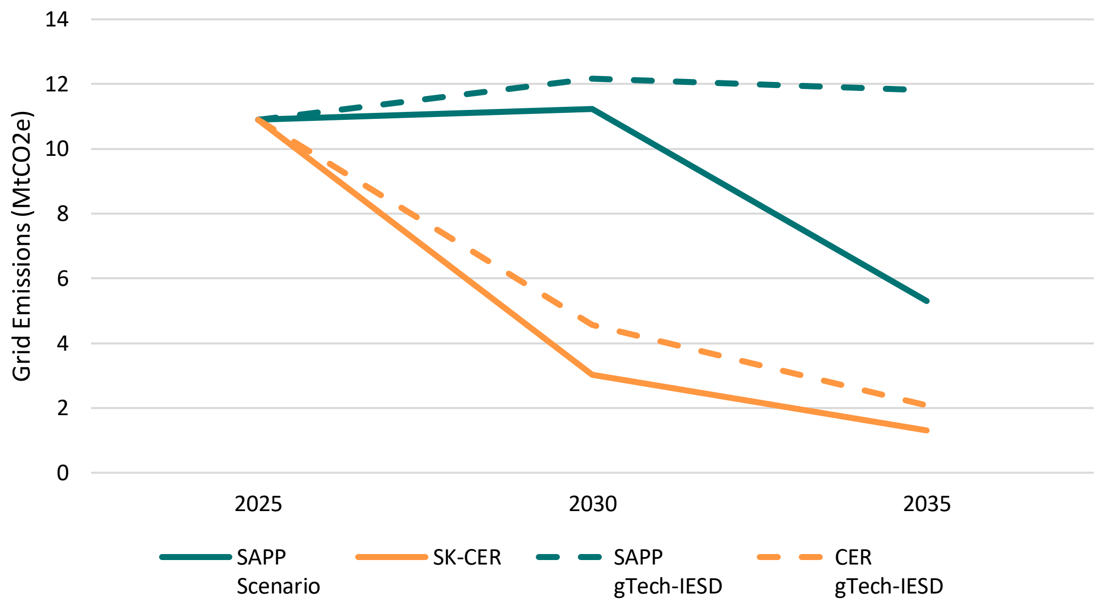
Figure 25: 2035 Installed capacity under constrained & unconstrained policy scenarios



The unconstrained scenarios produce higher emissions in both the SAPP and SK-CER.

- In the SAPP scenario, emissions diverge in 2035 due to significantly more coal generation in the unconstrained case.
- Emissions under the SK-CER scenario follow a similar path under both the constrained and unconstrained case, with a 2 MtCO2e difference in 2035. Higher emissions come from higher capacity factors for natural gas plants. Lower capacity build out in both scenarios leads to higher capacity factors on existing fossil fuel and new natural gas facilities.

Figure 26: Total electricity grid emissions in Saskatchewan constrained & unconstrained scenarios

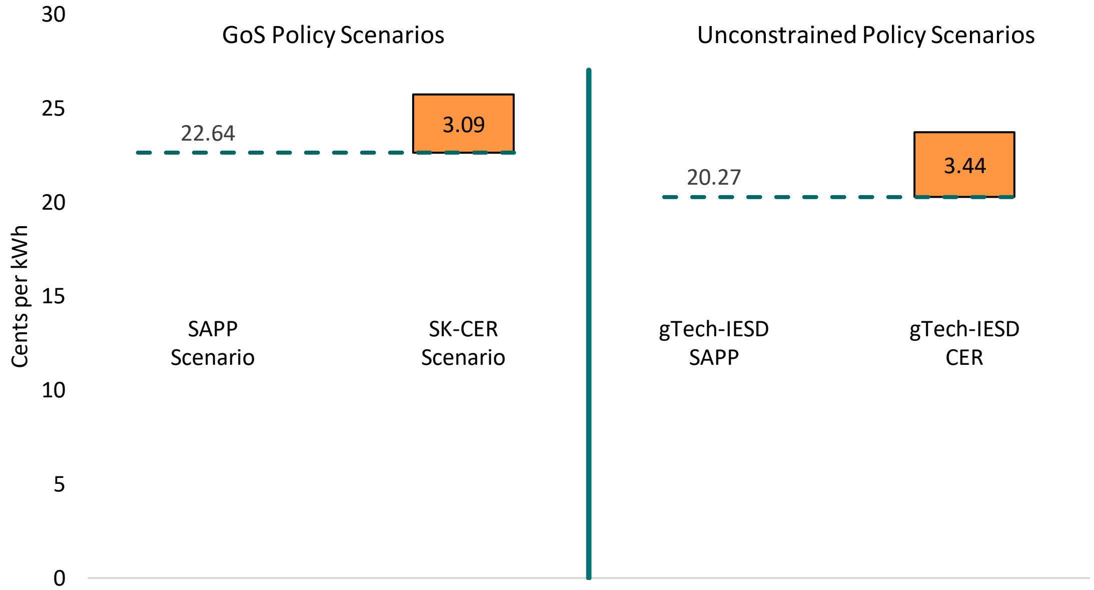


Electricity prices

Figure 27 presents the electricity price impact under the GoS policy scenarios and the unconstrained policy scenarios. The right-hand side of Figure 27 shows prices under the SAPP and CER scenarios where the capacity mix is determined endogenously by IESD.

- Allowing gTech-IESD to solve endogenously for the capacity mix under the SAPP policy suite and CER policies leads to lower electricity prices than the respective runs with prescriptive capacity mixes.
- This result is largely due to less capacity deployment in both scenarios, meaning less grid investment to recover from consumers.
- The results from gTech-IESD are likely to underestimate SaskPower's reliability requirements and may therefore produce a result with less installed capacity.

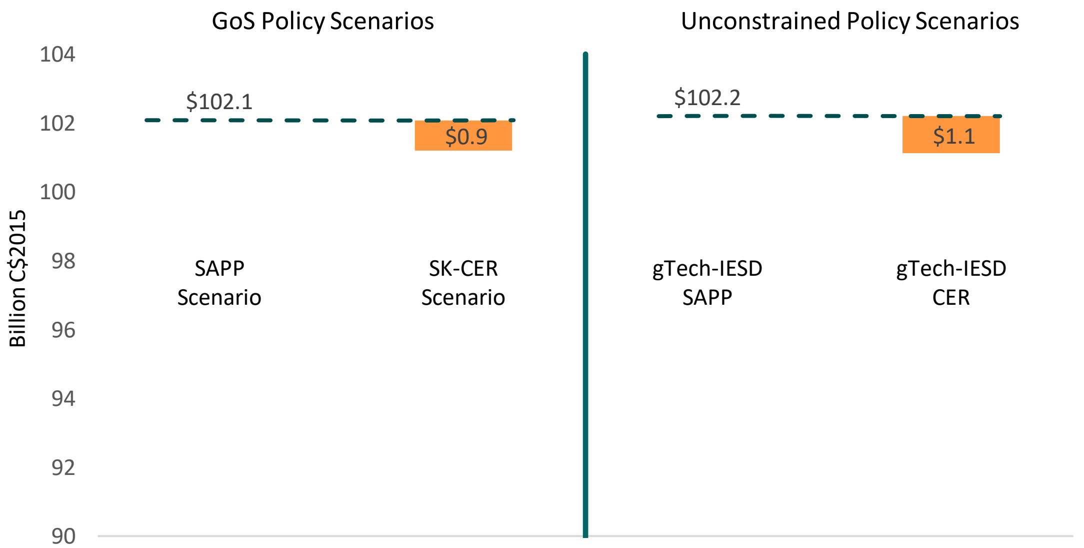
Figure 27: Household electricity prices in 2035 under GoS supply plan and unconstrained scenarios



Gross Domestic Product

The difference in GDP under the SAPP and CER scenarios in the unconstrained case is similar: GDP in the unconstrained scenario is negligibly different to the SK-CER scenario. As previously noted, total capacity is lower in the unconstrained case leading to lower levels of investment. Conversely, lower electricity prices lead to higher levels of consumption and exports as other areas of the economy benefit from lower prices.

Figure 28: Expenditure GDP in 2035 under GoS supply plan and unconstrained scenarios



Appendix B: Legislated Federal and Provincial Policies

This Appendix describes key climate and energy policies included in this analysis. Carbon pricing policies, including the federal fuel charge and OBPS., are excluded from the Tables below as they follow different treatments in this analysis, as per the scenario design in Section 2.2. Note that we do not include provincial policies in the list below if there is an equally or more stringent federal policy (e.g., federal methane regulations for oil and gas).

Federal policies

Table 18: Federal policies included in gTech-IESD

Policy	Description
Multi-sectoral	
Investment tax credit for Carbon Capture, Utilization, and Storage[39]	This policy is an investment tax credit for 50% of upfront costs for carbon capture, utilization, and storage, 60% for Direct Air Capture, and 37.5% for related transportation infrastructure capital investments. The government expects this policy to cost about $2.6 billion dollars between 2022 and 2026, and $1.5 billion annually from 2027 to 2030. The tax credit rates will be reduced by 50% starting in 2031 and phased out after 2040.
Tax Credit for Clean Hydrogen Investment[40]	Budget 2023 introduces details on the Clean Hydrogen Investment Tax Credit (ITC), which subsidizes eligible project costs by between 15% and 40%, depending on the life cycle carbon intensity (CI) of the hydrogen produced. The ITC will cover between 15% and 40% of eligible project costs, with the projects that produce the cleanest hydrogen receiving the highest levels of support (assuming labor requirements are met): ▪ 40% for hydrogen with a CI smaller 0.75 kg/kg H2

[39] Government of Canada. (2022). Budget 2022. Tax Measures: Supplementary information. Available from: Archived - Tax Measures: Supplementary Information | Budget 2022 (canada.ca).

[40] Government of Canada. (2023). Budget 2023. Available from: https://www.budget.canada.ca/2023/pdf/budget-2023-en.pdf

Policy	Description
	■ 25% for hydrogen with a CI between 2kg and 0.75kg ■ 15% for hydrogen with a CI between 4kg and 2kg ■ 0% for hydrogen with a CI greater 4kg The tax credit is phased out starting in 2034, whereby property that becomes available for use in 2034 can receive half the credit rate and property that becomes available after 2034 can no longer receive the tax credit.
Tax Credit for Clean Technology Investment[41]	The 2022 Fall Economic Statement and Budget 2023 provide details on the Clean Technology Investment Tax Credit. The Tax Credit refunds 30% of capital investments by taxable entities (e.g., excluding Crown Corporations) in low-carbon electricity (including nuclear), electricity storage systems, low-carbon heat and electricity equipment, and industrial off-road zero emission vehicles. It is available for technologies purchased between 2023 and 2034.
Tax Credit for Clean Electricity Investment[42]	In addition to the 30% investment tax credit (ITC) for taxable entities, Budget 2023 introduces a 15% ITC for eligible investments made by non-taxable entities (e.g., Crown Corporations). The ITC is available for investments in non-emitting electricity systems, including nuclear and abated natural gas, storage, and interprovincial transmission equipment. The tax credit is available for projects constructed between 2023 and 2034.
Canada Infrastructure Bank Spending[43]	The Healthy Environment and Healthy Economy federal climate plan states that the Canada Infrastructure Bank (CIB) has a long-term investment target of $5 billion for clean power projects. It further outlines that the CIB has committed $1.5 billion for zero emission buses, $2.5 billion for low-carbon power projects, including storage, transmission, and renewables, over 3 years, and $2 billion for commercial building retrofit upfront costs. The ERP mentions that CIB will receive a total of $35 billion with priorities to invest in green infrastructure ($5 billion), public transit ($5 billion) and clean power ($5 billion). Budget 2023 announced that the CIB will invest at least

[41] Government of Canada. (2023). Budget 2023. Available from: https://www.budget.canada.ca/2023/pdf/budget-2023-en.pdf

[42] Government of Canada. (2023). Budget 2023. Available from: https://www.budget.canada.ca/2023/pdf/budget-2023-en.pdf

[43] Government of Canada. (2020). A Healthy Environment and a Healthy Economy. Available from: https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/climate-plan/healthy_environment_healthy_economy_plan.pdf & Government of Canada. (2022). 2030 Emissions Reduction Plan. Available from: https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/erp/Canada-2030-Emissions-Reduction-Plan-eng.pdf

Policy	Description
	$10 billion through its Clean Power priority area, and at least $10 billion through its Green Infrastructure priority area.
Low carbon fuel fund[44]	The Healthy Environment and Healthy Economy Plan and Budget 2021 announced that $1.5 billion will be provided over five years to support the production and use of low carbon fuels.
Buildings	
Energy efficiency regulations[45]	Federal standards exist for space conditioning equipment, water heaters, household appliances, and lighting products. Major standards include a minimum annual fuel utilization efficiency of 95% for natural gas furnaces, a minimum energy factor of 0.61 for gas water heaters and ban of incandescent light bulbs.
Greener Homes Grant[46]	$2.6 billion for residential energy efficiency improvements over seven years. 700,000 grants of up to $5,000 to help homeowners make energy efficient retrofits to their homes.
Greener Homes Loan Program[47]	Budget 2021 also allocated $4.4 billion on a cash basis ($778.7 million on an accrual basis over five years, starting in 2021-22, with $414.1 million in future years), to the Canada Mortgage and Housing Corporation to provide interest-free loans up to $40,000 to low-income homeowners for home retrofits. Budget 2022 allocates an additional investment of $458.5 million into the low-income loan program.
Increase energy efficiency in community buildings[48]	The A Healthy Environment and a Healthy Economy plan proposed to invest $1.5 billion over three years for repairs and efficiency upgrades in community buildings and for building new energy efficient community buildings.

44 Government of Canada. (2021). Budget 2021. Available from: https://www.budget.gc.ca/2021/home-accueil-en.html

45 Natural Resources Canada. (n.d.). Canada's Energy Efficiency Act and Energy Efficiency Regulations. Available from: www.nrcan.gc.ca/energy/regulations-codes-standards/6861

46 Government of Canada. (2020). Fall Economic Statement. Supporting Canadians and Fighting Covid-19. Available from: https://www.budget.gc.ca/fes-eea/2020/report-rapport/toc-tdm-en.html

47 Government of Canada. (2021). Budget 2021. Available from: https://www.budget.gc.ca/2021/home-accueil-en.html & Government of Canada. (2022). Budget 2022. Available from: https://budget.gc.ca/2022/report-rapport/chap1-en.html#2022-1

48 Government of Canada. (2020). A Healthy Environment and a Healthy Economy. Available from: https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/climate-plan/healthy_environment_healthy_economy_plan.pdf

Policy	Description
Transportation	
Clean Fuel Regulation[49]	The Clean Fuel Regulation is a performance-based fuel supply standard with annual reduction requirements. The regulations requires liquid fossil fuel suppliers to reduce the lifecycle greenhouse gas intensity (CI) of their fuels, starting with 3.5 gCO_2e/MJ in 2023 and increasing annually until reaching 14 g CO_2e/MJ in 2030. Note that this policy is not included in the set of Current Policies calibrated to in SK gTech-IESD. However, it can be included in the SAPP and SK CER scenarios.
Regulations Amending the Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations[50]	The national government has proposed amending the Heavy-Duty Vehicle Emissions Standard to increase the vehicle emission stringency for vehicles manufactured in model years 2018 to 2027.
Regulations Amending the Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations[51]	New passenger vehicles and light-commercial vehicles/light trucks sold in Canada must meet fleet-wide GHG emission standards between 2012 and 2016, and between 2017 and 2025. Fleet targets for passenger cars are aligned with US regulation.
Renewable Fuels Regulation[52]	Specifies a minimum renewable content of 5% for gasoline and 2% for diesel, by volume. This will become part of the Clean Fuel Regulation (CFR) once the CFR comes into force in 2023.
Light-Duty ZEV Subsidy[53]	Light-duty vehicle subsidies are available at $2,500 for short-range plug-in hybrids and $5,000 for long-range plug-in hybrids, hydrogen vehicles, and battery electric vehicles. The government committed an additional $1.7 billion over five years, starting in 2022-23, with $0.8 million in remaining amortization, to Transport Canada to extend the Incentives for Zero-Emission Vehicles (iZEV) program until March 2025.

[49] Government of Canada. (2022). Clean Fuel Regulations: SOR/2022-140. Canada Gazette, Part II, Volume 156, Number 14. Available from: https://www.gazette.gc.ca/rp-pr/p2/2022/2022-07-06/html/sor-dors140-eng.html

[50] Government of Canada. (2018). Regulations Amending the Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations and Other Regulations Made Under the Canadian Environmental Protection Act, 1999: SOR/2018-98. http://gazette.gc.ca/rp-pr/p2/2018/2018-05-30/html/sor-dors98-eng.html

[51] Government of Canada. (2018). Regulations Amending the Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations. http://www.gazette.gc.ca/rp-pr/p2/2014/2014-10-08/html/sor-dors207-eng.html

[52] Government of Canada. (2013). Renewable Fuels Regulations: SOR/2010-189. Available from: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2010-189/index.html

[53] Government of Canada. (2022). Eligible vehicles. Available from: https://tc.canada.ca/en/road-transportation/innovative-technologies/zero-emission-vehicles/light-duty-zero-emission-vehicles/eligible-vehicles.

Policy	Description
Heavy-Duty Zev Subsidy[54]	Funding of $547.5 million over four years, starting in 2022/23, will be available to Transport Canada to launch a new purchase inventive program for medium- and heavy-duty zero-emission vehicles which provides rebates of up to $200,000.
ZEV Charging Infrastructure Subsidy[55]	Federal funding of $400 million over five years, starting in 2022/23, is committed to funding the deployment of zero-emission vehicle (ZEV) charging infrastructure in sub-urban and remote communities through the Zero-Emissions Vehicle Infrastructure Program (ZEVIP).
Large Truck Retrofits[56]	The ERP includes a $199.6 million subsidy for retrofitting large trucks currently on the road.
Electricity Generation	
Regulations Amending the Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations[57]	This policy requires coal-fired power plants to be closed by 2030 unless they emit less than 420 tonnes CO_2e/GWh.
Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity[58]	This policy limits the emissions intensity of natural-gas fired electricity generation to 420 tonnes CO_2e/GWh.
Renewable Electricity Investments[59]	Budget 2021 allocated $964 million over four years for renewable electricity generation. An additional $600 million will be invested in

54 Government of Canada. (2022). Medium and heavy-duty zero-emission vehicles. Available from: https://tc.canada.ca/en/road-transportation/innovative-technologies/zero-emission-vehicles/medium-heavy-duty-zero-emission-vehicles .

55 Government of Canada. (2022). Budget 2022. Available from: https://budget.gc.ca/2022/report-rapport/chap1-en.html#2022-1

56 Environment and Climate Change Canada. (2022). 2030 EMISSIONS REDUCTION PLAN Canada's Next Steps for Clean Air and a Strong Economy. Available from: En4-460-2022-eng.pdf (publications.gc.ca)

57 Government of Canada. (2018). Regulations Amending the Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations: SOR/2018-263. Available from: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-167/page-2.html#h-4

58 Government of Canada. (2018). Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity: SOR/2018-261. Available from: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2018-261/index.html

59 Government of Canada. (2021). Budget 2021. Available from: https://www.budget.gc.ca/2021/home-accueil-en.html & Government of Canada. (2020). A Healthy Environment and a Healthy Economy. Available from:

Policy	Description
	renewable electricity and grid modernization and $250 million to support large clean electricity projects.
Industry	
Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds[60]	Oil and gas facilities must adopt methane control technologies and practices.
Net Zero Accelerator[61]	A Healthy Environment and a Healthy Economy announced an investment of $3 billion over 5 years for the Net Zero Accelerator, which provides funding for development and adoption of low-carbon technologies in all industrial sectors. Budget 2021 provided an additional $5 billion over seven years for the Net Zero Accelerator.

Provincial policies

Provincial policies included in the model, other than carbon pricing, are described below.

Table 19: Provincial policies included in gTech-IESD

Province	Policy	Description
Alberta	Renewable Electricity Act[62]	Legislation establishing a target that 30% of electricity produced in Alberta come from renewable sources by 2030. Interim targets of 15% by 2022, 20% by 2025, and 26% by 2028 have been established.

https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/climate-plan/healthy_environment_healthy_economy_plan.pdf

60 Government of Canada. (2020). Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector): SOR/2018-66. Available from: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2018-66/index.htm

61 Government of Canada. (2021). Budget 2021. Available from: https://www.budget.gc.ca/2021/home-accueil-en.html.

62 Alberta. (2020). Renewable Electricity Act. Statutes of Alberta, 2016 Chapter R-16.5. Available from: https://www.qp.alberta.ca/1266.cfm?page=r16p5.cfm&leg_type=Acts&isbncln=9780779814060.

Province	Policy	Description
Alberta	Carbon capture and storage investments[63]	Alberta has contributed funding to several CCS projects, including the Shell Canada Energy Quest Project and the Alberta Carbon Trunk Line.
Alberta	Renewable Fuels Standard[64]	Alberta requires a minimum annual average of 5% and 2% renewable content in gasoline and diesel respectively.
British Columbia	Clean Energy Act[65]	A minimum of 93% of provincial electricity generation must be provided by clean or renewable sources. The Clean BC Roadmap to 2030[66]. announced plans to increase electricity from renewable sources to 100% of supply by 2030 through phase out of remaining gas-fired facilities by 2030.
British Columbia	Low Carbon Fuel Requirement Regulation (part of the Low Carbon Fuel Standard)[67]	British Columbia introduced this policy in 2008. This regulation requires a decrease in average carbon intensity of transportation fuels by 10% by 2020 and by 30% by 2030 relative to 2010. Fuel suppliers can meet the second requirement by acquiring credits generated from fueling electric vehicles. The Clean BC Roadmap to 2030[66]. announced plans to expand coverage to marine and aviation fuels.
British Columbia	Zero Emission Vehicle Standard[68]	Requires a minimum share of light-duty vehicles sold in BC to be zero-emission. This mandate achieves 10% electric vehicles sales by 2025, 30% by 2030 and 100% by 2040. The Clean BC Roadmap to 2030[66]. announced plans to accelerate the light-duty ZEV sales targets under the ZEV mandate to 26% by 2026, 90% by 2030 and 100% by 2035.

63 Natural Resources Canada. (2018). Shell Canada Energy Quest Project. Available from: www.nrcan.gc.ca/energy/funding/cef/18168. & Natural Resources Canada. (2016). Alberta Carbon Trunk Line (ACTL). Available from: www.nrcan.gc.ca/energy/publications/16233.

64 Alberta Regulation 29/2010. (2020). *Renewable Fuels Standard Regulation.* Available from: https://www.alberta.ca/renewable-fuels-standard-resources

65 Government of British Columbia. (2010). Clean Energy Act. Available from: http://www.bclaws.ca/civix/document/id/lc/statreg/10022_01

66 British Columbia. (2021). cleanBC. Roadmap to 2030. Available from: https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_roadmap_2030.pdf

67 Government of British Columbia. (2020). Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act, SBC 2008, c. 16. Available from: https://www.bclaws.ca/civix/document/id/complete/statreg/08016_01

68 Government of British Columbia. (2019). Zero-Emission Vehicle Act. SBC 2019, Chapter 29. Available from: https://www.bclaws.ca/civix/document/id/complete/statreg/19029

Province	Policy	Description
British Columbia	Light-Duty ZEV subsidies[69]	Provides incentives at $1,500 for short-range plug-in hybrids and $3,000 for long-range plug-in hybrids, battery electric vehicles, and hydrogen vehicles. It is unclear how long the incentives will be available for; the province has extended the policy multiple times since funding ran out since its introduction.
British Columbia	Technology and Retrofit Incentive Programs[70]	Programs offering incentives for energy efficiency measures in residential, commercial, and industrial buildings. CleanBC Better Homes programs include rebates for households including the Indigenous Community Heat Pump Incentive (funding for heat pump installation in residential and community buildings in Indigenous communities), rebates for heat pumps, electric service upgrades, and new construction programs for the construction of high-performance electric homes. The Better Buildings program provides incentives for commercial buildings including: support for upgrades, heating equipment conversions, low interest financing and ISO 5001 incentive (co-managed with federal government), and implementation of energy management systems in industrial facilities.
British Columbia	PST Exemption[71]	Use of electricity in residential and industrial buildings is exempt from provincial sales tax.
British Columbia	Industrial Electrification[66]	Supply electricity to power natural gas extraction in the Peace region, and other large industrial operations.
British Columbia	Organic waste diversion[72]	Divert 95% of organic waste from landfills.
British Columbia	Landfill Gas Management Regulation	Simulated as a requirement to reduce landfill methane emissions by 75%.

[69] Government of British Columbia. (2020). Go Electric Passenger Vehicle Rebates. Available from: https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program/passenger-vehicles

[70] cleanBC. Better Homes. Available from: https://betterhomesbc.ca/ & cleanBC. Better Buildings. Available from: https://betterbuildingsbc.ca/.

[71] Government of British Columbia. (2017). Provincial Sales Tax (PST). Tax Rate. Available from: https://www2.gov.bc.ca/gov/content/taxes/sales-taxes/pst.

[72] Government of British Columbia (n.d.) *About Climate Change - Waste*. Available from; https://cleanbc.gov.bc.ca/about-climate-change/drivers/waste/

Province	Policy	Description
Manitoba	Biofuels Mandate Amendment[73]	Renewable fuel content requirement at 10% for gasoline and 5% for diesel by volume.
Manitoba	Coal phase-out[74]	Manitoba Hydro phased out its last coal-fired generating unit in 2018.
Manitoba	Keeyask Hydro-electricity Project[75]	A hydro project with a capacity of a 695-megawatt (MW).
New Brunswick	Renewable Portfolio Standard[76]	The renewable portfolio standard requires NB Power to ensure that 40% of in-province electricity sales are from renewable energy by 2020. Imports of renewable energy from other jurisdictions qualify for compliance, as do energy efficiency improvements.
Newfoundland and Labrador	Muskrat Falls Hydro Project[77]	A hydro project with a capacity of 824 MW.
Nova Scotia	Cap on GHG emissions from electricity generation[78]	This policy requires emissions from the electricity sector to decline to 4.5 Mt by 2030.
Nova Scotia	Renewable Portfolio Standard[79]	This renewable portfolio standard requires that 25% of electricity consumption be provided from renewable resources in 2015, increasing to 40% by 2020 and 80% in 2030.
Nova Scotia	Maritime Link[80]	This transmission line will connect Nova Scotia to hydroelectric generation from Newfoundland Labrador (and in particular, to the Muskrat Falls hydroelectric project).
Ontario	Coal Phase-out[81]	Ontario phased out its last coal-fired generating unit in 2014. In 2019, approximately 94% of

[73] Government of Manitoba. (2020). Biofuels Mandate and Renewable Fuels in Manitoba. Available from: https://reg.gov.mb.ca/detail/3340256

[74] Manitoba Hydro. (n.d.). Generation Stations. Available from: https://www.hydro.mb.ca/corporate/facilities/generating_stations/

[75] Manitoba Hydro. (n.d.). Keeyask Generating Station. Available from: https://www.hydro.mb.ca/projects/keeyask/

[76] Government of New Brunswick. (2015). New Brunswick Regulation 2015-60 under the Electricity Act (O.C. 2016-263). Available from: www.gnb.ca/0062/acts/BBR-2015/2015-60.pdf

[77] Naclor Energy. (2019). Muskrat Falls Project: Project Overview. https://muskratfalls.nalcorenergy.com/project-overview/

[78] Government of Nova Scotia. (2013). Greenhouse Gas Emissions Regulations made under subsection 28(6) and Section 112 of the Environment Act. Available from: www.novascotia.ca/JUST/REGULATIONS/regs/envgreenhouse.htm

[79] Government of Nova Scotia. (2020). Renewable Electricity Regulations made under Section 5 of the Electricity Act. Available from: https://novascotia.ca/just/regulations/regs/elecrenew.htm

[80] Emera Newfoundland & Labrador. (2014). Maritime Link. Available from: http://www.emeranl.com/en/home/themaritimelink/overview.aspx

[81] Government of Ontario. (2020). The End of Coal. Available from: https://www.ontario.ca/page/end-coal#:~:text=Ontario%20enshrined%20its%20commitment%20in,to%20generate%20electricity%20in%20Ontario & https://www.opg.com/powering-ontario/our-generation/biomass/

Province	Policy	Description
		Ontario's electricity generation was emissions free. Commitments were made under the Cessation of Coal Regulation (2007) and Ending Coal for Cleaner Air Act (2015). In 2014, the Atikokan Generating Station was converted from coal to biomass.
Ontario	Nuclear Power-plant Refurbishment[82]	Refurbishment of 10 nuclear power plants which together will provide more than 9,800 MW emissions-free capacity. Long term project in place that has been ongoing since 2016.
Ontario	Cleaner Transportation Fuels: Renewable Content Requirements for Gasoline and Diesel Fuels (O. Reg 663/20)[83]	Regulation specifying a minimum renewable fuel content of 4% for diesel, by volume. Renewable diesel life cycle GHG emissions are required to be at least 70% lower than standard petroleum diesel. Specifies a minimum renewable fuel content for gasoline of a specified amount, which increases each calendar year: 11% in 2025, 13% in 2028, 15% in 2030. Gasoline must have an average of 50% less life cycle GHG emissions than standard petroleum gasoline (previously was 45%). This is a new regulation as of November 25 2020, that replaces the now revoked O. Reg. 535/05 (Greener Gasoline) and O. Reg. 97/14 (Greener Diesel).
Ontario	Steel project decarbonization investments[84]	Two major steel companies in Ontario, ArcelorMittal and Algoma, announced that they will upgrade their steel plants, which will result in greenhouse gas reductions of about 3 Megatonnes in each plant.

[82] Government of Ontario. (2018). Chapter 2. Ensuring a Flexible Energy System. Available from: https://www.ontario.ca/document/ontarios-long-term-energy-plan-2017-order-council-21202017/chapter-2-ensuring-flexible-energy-system#section-8

[83] Ontario. (2020). Increasing renewable content in fuels. Available from: https://ero.ontario.ca/notice/013-4598#:~:text=Regulatory%20impact%20statement,of%20greenhouse%20gas%20emission%20reductions.

[84] ArcelorMittal. (2021). ArcelorMittal and the Government of Canada announce investment of CAD$1.765 billion in decarbonisation technologies in Canada. Available from: https://corporate.arcelormittal.com/media/press-releases/arcelormittal-and-the-government-of-canada-announce-investment-of-cad-1-765-billion-in-decarbonization-technologies-in-canada & Algoma. (2021). Government of Canada Endorses Algoma Steel's Transformation Plan for Green Steel. Commitment of up to $420 Million. Available from: https://algoma.com/government-of-canada-endorses-algoma-steels-transformation-plan-for-green-steel-commitment-of-up-to-420-million/ & Government of Canada. (2022). Government investing in Hamilton's steel industry to support good jobs and significantly reduce emissions. Available from: https://www.canada.ca/en/innovation-science-economic-development/news/2021/07/government-investing-in-hamiltons-steel-industry-to-support-good-jobs-and-significantly-reduce-emissions.html

Province	Policy	Description
Québec	Renewable Natural Gas Regulation[85]	This regulation requires a minimum renewable fuel content of 1% in distributed natural gas in Québec as of 2020, rising to 2% in 2023, and 5% in 2025. A recently developed amendment will increase the minimum renewable fuel content to 7% in 2028 and 10% in 2030.
Québec	Biofuels mandate[86]	In 2019, Québec released a draft regulation that would require a minimum blend of 10% renewable fuel in gasoline and 2% in diesel by volume starting in 2021 and rising to 15% for gasoline and 4% for diesel by 2025.
Québec	Zero Emission Vehicle Standard[87]	Automakers that sell over 4,500 vehicles in the province are required to meet a minimum zero-emission vehicle credit quota. The credit requirement is set to rise from 3.5% in 2018 to 22% of non-ZEV sales by 2025. A recently developed amendment will change the credit accounting system and ZEV sales targets for the years 2025 and thereafter. Under the revised system, the sale of one new light-duty zero emission vehicle equals one credit. The minimum sales targets for post 2025 have been set to increase from 12.5% in 2025 to 65% in 2030 and 100% in 2035.
Québec	Electric Vehicle Incentives[88]	Provides incentives between $4,000 and $8,000 for the purchase of a zero-emission vehicle.

85 Gouvernement du Québec. (2019). Québec encadre la quantité minimale de gaz naturel renouvelable et met en place un comité de suivi. Available from https://www.quebec.ca/nouvelles/actualites/details/quebec-encadre-la-quantite-minimale-de-gaz-naturel-renouvelable-et-met-en-place-un-comite-de-suivi#:~:text=Il%20pr%C3%A9cise%20%C3%A9galement%20la%20progression,5%20%25%20%C3%A0%20compter%20de%202025. & Gazette Officielle Du Québec, 22 juin 2022, 154e année, no 25. Règlement modifiant le Règlement sur le prélèvement du Comité paritaire de l'entretien d'édifices publics, région de Montréal. Available from: https://cdn-contenu.quebec.ca/cdn-contenu/environnement/territoire/Documents/AIR_PojetRG_Quantite_gaz_naturel_renouvelable_MERN.pdf?1655990587

86 Gouvernement du Québec. (2019). Projet de règlement. Volume minimal de carburant renouvelable dans l'essence et le carburant diesel. Available from: https://cdn-contenu.quebec.ca/cdn-contenu/adm/min/energie-ressources-naturelles/publications-adm/lois-reglements/allegement/PR_Volume_minimal_carburant_renouvelable_MERN.pdf?1570737693.

87 Québec. (2017). chapter A-33.02, r. 1. Available from: https://www.legisquebec.gouv.qc.ca/en/document/cr/A-33.02,%20r.%201/ & Gazette Officielle Du Québec, January 26, 2022, Vol. 154, No. 4. Available from: http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=1&file=105485.pdf

88 Gouvernement du Québec. (2019). Discover electric vehicles. Available from: http://vehiculeselectriques.gouv.qc.ca/english/

Province	Policy	Description
Québec	Québec New Oil Heating Ban[89]	The province is banning the installation of oil heating systems in new buildings starting 2021 and the installation in existing buildings will start in 2023.
Québec	Québec Chauffez Vert Program[90]	Québec is expecting to spend 179 million between 2022 and 2027 on the Chauffez vert program, which provides financial support for replacing oil or propane heating with a renewable heating system.
Saskatchewan	Boundary Dam Carbon Capture Project[91]	This project stores and captures CO_2 emissions from a 115 MW coal plant.
Saskatchewan	Ethanol Fuel (General) Regulations[92]	Regulation requiring a minimum renewable fuel content of 7.5% for gasoline by volume.
Saskatchewan	The Renewable Diesel Act[93]	Requirement for a minimum renewable content in diesel of 2%.

89 Gouvernement du Québec. (2022). Plan De Mise En Œuvre 2022-202. Available from: https://cdn-contenu.quebec.ca/cdn-contenu/adm/min/environnement/publications-adm/plan-economie-verte/plan-mise-oeuvre-2022-2027.pdf?1652278896

90 Québec. (2022). Plan pour une économie verte 2030. Plan de mise en œuvre 2022 2027. Available from: https://cdn-contenu.quebec.ca/cdn-contenu/adm/min/environnement/publications-adm/plan-economie-verte/plan-mise-oeuvre-2022-2027.pdf?1652278896 & Québec. (n.d.). Chauffez vert. Available from: https://transitionenergetique.gouv.qc.ca/en/residential/programs/chauffez-vert

91 SaskPower. (2019). Boundary Dam Carbon Capture Project. Available from: https://www.saskpower.com/our-power-future/infrastructure-projects/carbon-capture-and-storage/boundary-dam-carbon-capture-project

92 Government of Saskatchewan. (2020). Ethanol Fuel (General) Regulations (E-11.1 Reg 1). Available from: https://publications.saskatchewan.ca/#/products/1064.

93 Government of Saskatchewan. (2011). *The Renewable Diesel Act (Chapter R-10.001).*

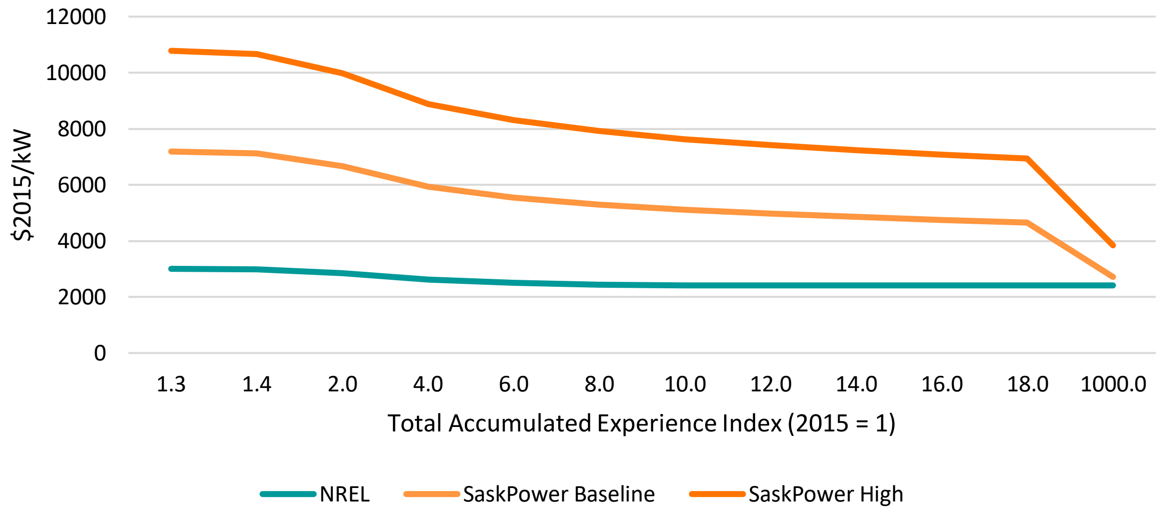
Appendix C: Technoeconomic assumptions

This Appendix describes additional technoeconomic assumptions related to electricity generation technologies in gTech-IESD.

Table 20: Dispatchable technology assumptions

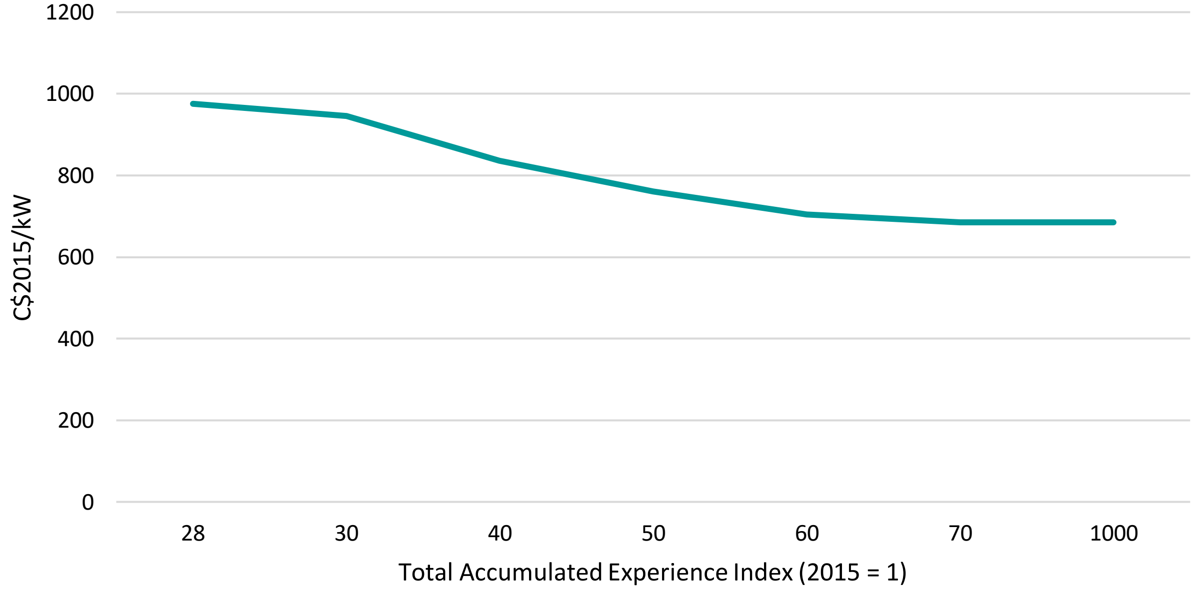
Technology	GJ fuel per MWh electricity	Maximum capacity utilization
Natural gas combined cycle	7.72	0.85
Natural gas single cycle	11.79	0.85
Natural gas with CCS	8.70	0.85
Coal (new)	10.28	0.85
Coal with CCS (new)	11.43	0.85
Diesel	11.38	0.85
Cogeneration	6.78	0.85
SMnR	11.02	0.927

Table 21: Capital cost* for Natural Gas with CCS under each technology cost sensitivity



The total accumulated experience index in 2025 is estimated to be ~1.36; index of 1000 represents minimum

Table 22: Capital cost for battery storage under each technology cost sensitivity



The total accumulated experience index in 2025 is 27.82; index of 1000 represents minimum

Table 23: Capital cost for onshore wind under each technology cost sensitivity

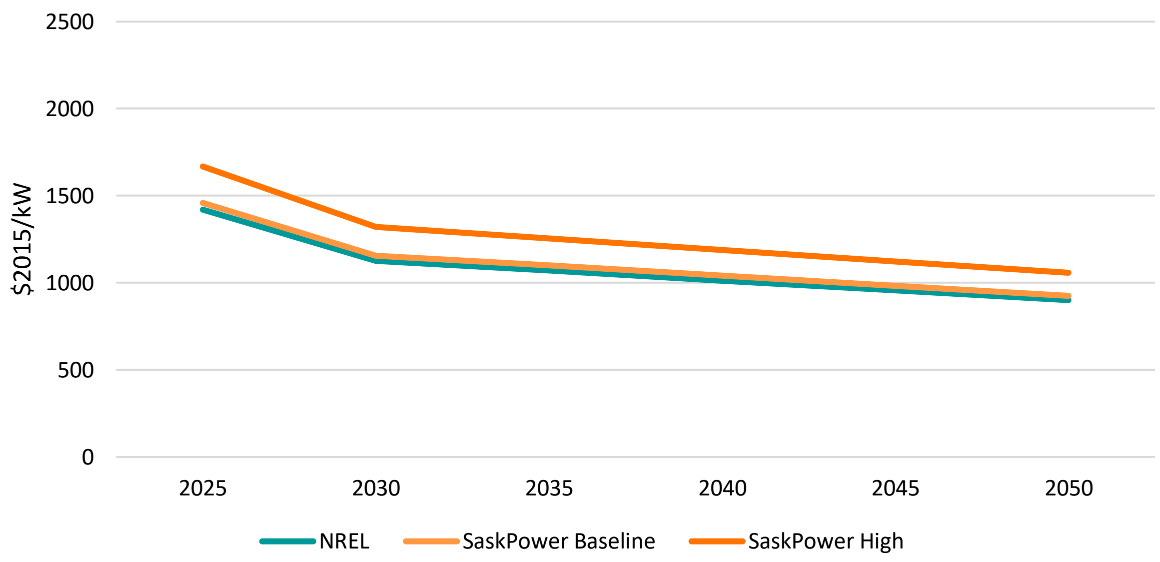
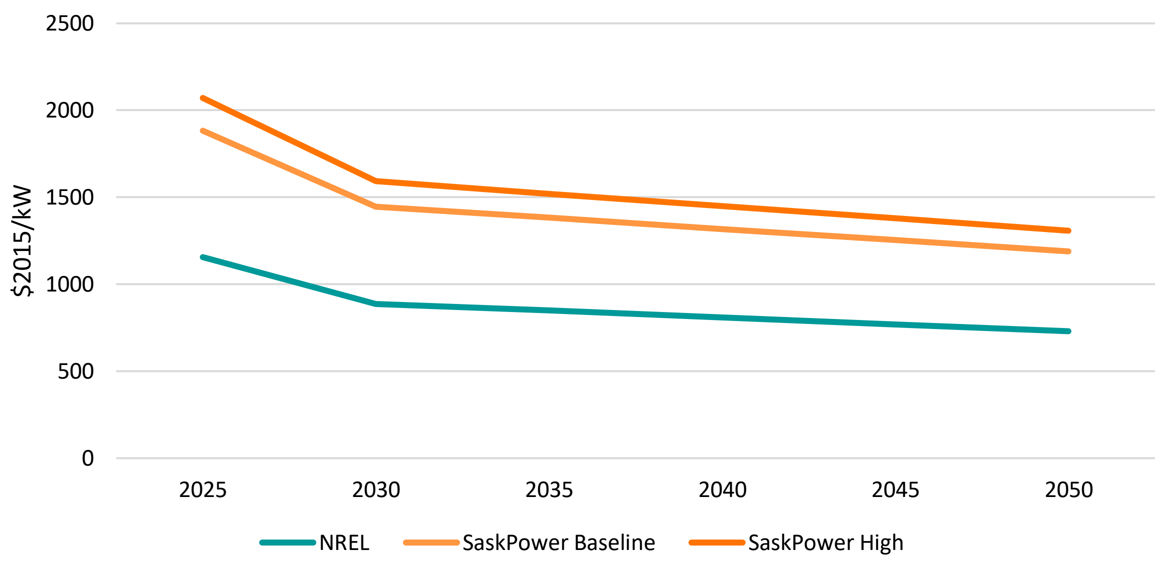


Table 24: Capital cost for solar under each technology cost sensitivity



Appendix D: Supplementary results

Table 25: Greenhouse gas emissions (Mt CO_2e) in 2035 by sector

	NREL costs		GoS baseline costs		GoS high costs	
	SAPP	SK-CER	SAPP	SK-CER	SAPP	SK-CER
Transportation	**3.82**	**3.48**	**3.81**	**3.24**	**3.82**	**3.49**
Truck	1.36	1.31	1.36	1.31	1.36	1.31
Rail	0.83	0.74	0.83	0.51	0.84	0.74
Air	0.28	0.23	0.28	0.23	0.28	0.23
Transit	0.19	0.13	0.19	0.14	0.19	0.14
Pipelines	0.95	0.85	0.93	0.84	0.93	0.86
Other Transportation	0.23	0.22	0.23	0.22	0.23	0.22
Utilities	**6.73**	**1.60**	**5.47**	**1.46**	**5.37**	**1.45**
Electricity Generation	6.57	1.44	5.30	1.31	5.21	1.29
Natural Gas Distribution	0.16	0.16	0.16	0.16	0.16	0.16
Oil & gas	**13.39**	**12.14**	**13.39**	**12.97**	**13.38**	**13.03**
Conventional Light Oil Production	6.27	5.93	6.26	6.10	6.25	6.09
Conventional Heavy Oil Production	3.78	3.39	3.77	3.73	3.76	3.72
Upgrading	1.92	1.65	1.95	1.88	1.96	1.92
Petroleum Refining	1.03	0.83	1.04	0.90	1.04	0.93
Natural Gas	0.39	0.35	0.36	0.36	0.37	0.36
Mining	**2.88**	**2.77**	**2.85**	**2.72**	**2.84**	**2.73**
Mining	2.87	2.77	2.85	2.72	2.84	2.73
Coal Mining	0.01	0.00	0.00	0.00	0.00	0.00
Manufacturing	**1.96**	**1.19**	**1.92**	**1.26**	**1.96**	**1.31**
Chemicals	0.96	0.45	0.98	0.42	1.05	0.47
Other Manufacturing	0.46	0.35	0.48	0.43	0.49	0.45
Metals	0.16	0.14	0.15	0.14	0.15	0.14
Biofuels Production	0.17	0.15	0.17	0.17	0.17	0.17
Paper	0.17	0.07	0.11	0.04	0.08	0.04
Hydrogen Production	0.03	0.03	0.03	0.06	0.03	0.04
Agriculture & forestry	**16.47**	**16.39**	**16.45**	**16.34**	**16.44**	**16.29**
Agriculture	16.41	16.34	16.40	16.29	16.39	16.24
Forestry	0.05	0.05	0.05	0.05	0.05	0.05
Construction	**0.20**	**0.19**	**0.20**	**0.19**	**0.20**	**0.19**
Services	**4.74**	**4.65**	**4.76**	**4.66**	**4.77**	**4.70**
Households	**3.93**	**3.77**	**3.97**	**3.83**	**4.00**	**3.91**

TOTAL	54.12	46.17	52.81	46.66	52.79	47.10

Table 26: Electricity demand (TWh) in 2035 by sector

	NREL costs		GoS baseline costs		GoS high costs	
	SAPP	SK-CER	SAPP	SK-CER	SAPP	SK-CER
Transportation	**3.90**	**3.81**	**3.67**	**3.66**	**3.52**	**3.58**
Truck	0.04	0.05	0.04	0.04	0.04	0.04
Rail	0.00	0.00	0.00	0.00	0.00	0.00
Air	0.00	0.00	0.00	0.00	0.00	0.00
Transit	0.05	0.07	0.04	0.07	0.04	0.07
Pipelines	3.67	3.55	3.44	3.40	3.31	3.33
Other Transportation	0.14	0.14	0.13	0.13	0.13	0.13
Utilities	**1.98**	**1.94**	**1.90**	**1.84**	**1.81**	**1.79**
Electricity Distribution	1.95	1.92	1.87	1.82	1.79	1.77
Natural Gas Distribution	0.02	0.02	0.02	0.02	0.02	0.02
Oil & gas	**6.81**	**6.84**	**6.72**	**6.35**	**6.39**	**6.17**
Conventional Light Oil Production	1.02	1.01	1.01	0.92	0.94	0.91
Conventional Heavy Oil Production	3.65	3.67	3.60	3.36	3.38	3.31
Oil and Gas Services	0.11	0.10	0.11	0.10	0.10	0.10
Upgrading	1.83	1.84	1.82	1.79	1.79	1.69
Petroleum Refining	0.10	0.11	0.10	0.10	0.09	0.09
Natural Gas	0.10	0.10	0.09	0.08	0.08	0.08
Mining	**4.66**	**4.25**	**4.59**	**4.12**	**4.32**	**4.05**
Coal Mining	0.01	0.00	0.01	0.00	0.01	0.00
Mining	4.65	4.25	4.58	4.12	4.31	4.05
Manufacturing	**3.31**	**2.18**	**2.68**	**1.89**	**2.27**	**1.78**
Chemicals	0.44	0.42	0.43	0.40	0.40	0.39
Other Manufacturing	0.31	0.32	0.31	0.30	0.30	0.30
Metals	0.75	0.70	0.74	0.67	0.71	0.65
Biofuels Production	0.08	0.08	0.07	0.07	0.07	0.08
Paper	1.72	0.65	1.12	0.42	0.78	0.34
Hydrogen Production	0.01	0.02	0.01	0.03	0.01	0.02
Agriculture & forestry	**1.40**	**1.30**	**1.30**	**1.28**	**1.30**	**1.28**
Agriculture	1.40	1.29	1.30	1.28	1.29	1.27
Forestry	0.01	0.01	0.01	0.01	0.01	0.01
Construction	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
Services	**5.85**	**5.87**	**5.79**	**5.77**	**5.74**	**5.72**
Households	**4.91**	**5.00**	**4.73**	**4.76**	**4.59**	**4.60**

TOTAL	32.84	31.19	31.38	29.68	29.93	28.97

Table 27: Income GDP (deflated 2015$) in 2035 by sector

	NREL costs		GoS baseline costs		GoS high costs	
	SAPP	SK-CER	SAPP	SK-CER	SAPP	SK-CER
Transportation	**5.02**	**5.05**	**5.03**	**5.05**	**5.02**	**5.01**
Truck	1.96	1.96	1.95	1.96	1.95	1.95
Rail	0.58	0.58	0.58	0.61	0.58	0.58
Air	0.12	0.12	0.12	0.12	0.12	0.11
Transit	0.39	0.40	0.39	0.40	0.39	0.40
Pipelines	1.21	1.23	1.23	1.22	1.23	1.21
Other Transportation	0.76	0.75	0.76	0.75	0.75	0.75
Utilities	**2.77**	**3.05**	**3.01**	**3.53**	**3.17**	**3.85**
Electricity Generation	1.07	1.40	1.36	1.94	1.58	2.29
Electricity Distribution	1.29	1.25	1.23	1.19	1.18	1.15
Natural Gas Distribution	0.41	0.39	0.41	0.40	0.41	0.40
Oil & gas	**8.61**	**8.53**	**8.53**	**8.29**	**8.41**	**8.10**
Conventional Light Oil Production	2.61	2.49	2.59	2.45	2.57	2.42
Conventional Heavy Oil Production	3.72	3.69	3.66	3.59	3.62	3.51
Enhanced Oil Recovery	0.38	0.50	0.39	0.40	0.31	0.30
Oil and Gas Services	0.91	0.91	0.91	0.91	0.91	0.91
Upgrading	0.15	0.13	0.16	0.14	0.16	0.16
Petroleum Refining	0.77	0.75	0.77	0.75	0.77	0.75
Natural Gas	0.07	0.05	0.06	0.05	0.06	0.05
Mining	**7.41**	**7.14**	**7.33**	**7.02**	**7.29**	**6.93**
Mining	7.40	7.14	7.32	7.02	7.28	6.93
Coal Mining	0.01	0.00	0.01	0.00	0.01	0.00
Manufacturing	**6.09**	**6.07**	**6.07**	**6.05**	**6.07**	**6.00**
Chemicals	0.83	0.87	0.83	0.86	0.82	0.84
Other Manufacturing	5.11	5.09	5.13	5.08	5.14	5.07
Metals	0.00	0.00	0.00	0.00	-0.01	-0.01
Biofuels Production	0.06	0.06	0.06	0.06	0.06	0.06
Paper	0.07	0.03	0.04	0.02	0.04	0.01
Hydrogen Production	0.01	0.02	0.01	0.02	0.01	0.02
Agriculture & forestry	**12.49**	**12.29**	**12.43**	**12.25**	**12.38**	**12.17**
Agriculture	12.31	12.18	12.29	12.15	12.25	12.07
Forestry	0.18	0.11	0.14	0.10	0.13	0.10

Construction	**7.14**	**7.13**	**7.13**	**7.19**	**7.12**	**7.25**
Services	**52.70**	**52.02**	**52.50**	**51.77**	**52.28**	**51.55**
TOTAL	**102.2**	**101.3**	**102.0**	**101.1**	**101.7**	**100.9**

Table 28: Investment in 2035 by sector (2015$)

	NREL costs		GoS baseline costs		GoS high costs	
	SAPP	SK-CER	SAPP	SK-CER	SAPP	SK-CER
Transportation	2.18	2.11	2.19	2.15	2.15	2.07
Utilities	2.52	2.87	2.67	3.52	2.83	3.99
Oil and gas	3.92	3.95	3.90	3.80	3.85	3.70
Oil sands	0.07	0.10	0.07	0.07	0.06	0.08
Support activities for mining and o&g	0.15	0.15	0.15	0.15	0.15	0.15
Refining	0.14	0.15	0.14	0.15	0.14	0.15
Mining	3.34	3.22	3.30	3.13	3.28	3.01
Chemical industries	0.16	0.23	0.16	0.22	0.18	0.24
Other manufacturing	0.53	0.55	0.54	0.55	0.54	0.54
Metal	0.18	0.18	0.18	0.17	0.17	0.16
Paper	0.02	0.01	0.01	0.00	0.01	0.00
Non-metalic minerals	0.01	0.01	0.01	0.01	0.01	0.01
Resource	2.09	2.08	2.08	2.07	2.07	2.07
Construction	0.62	0.63	0.61	0.64	0.62	0.67
Service	3.56	3.55	3.55	3.55	3.55	3.56

Table 29: Imports and exports of electricity to Saskatchewan in 2035 (TWh)

	NREL costs		GoS baseline costs		GoS high costs	
	SAPP	SK-CER	SAPP	SK-CER	SAPP	SK-CER
Exports from Saskatchewan to:	**0.81**	**0.34**	**0.87**	**0.49**	**0.98**	**0.52**
Alberta	0.32	0.24	0.65	0.40	0.73	0.41
Eastern United States	0.50	0.09	0.21	0.09	0.25	0.11
Imports to Saskatchewan from:	**5.73**	**9.21**	**6.60**	**8.80**	**5.71**	**8.54**
Alberta	0.89	0.97	0.48	0.82	0.39	0.78
Manitoba	0.94	1.25	1.08	1.19	1.05	1.18
Eastern United States	3.90	6.98	5.04	6.80	4.28	6.58

Table 30: Thousands of full-time equivalent jobs in 2035 by sector

	NREL costs		GoS baseline costs		GoS high costs	
Jobs by Navius Economic Sector	**SAPP**	**SK-CER**	**SAPP**	**SK-CER**	**SAPP**	**SK-CER**
Transportation	**6**	**6**	**6**	**6**	**6**	**6**
Air	1	1	1	1	1	1
Rail	5	4	5	4	5	4
Pipelines	1	1	1	1	1	1
Utilities	**5**	**5**	**5**	**4**	**4**	**4**
Electricity Distribution	3	3	3	3	3	3
Natural Gas Distribution	1	1	1	1	1	1
Oil & gas	**15**	**15**	**15**	**15**	**15**	**15**
Conventional Light Oil Production	2	2	2	2	2	2
Conventional Heavy Oil Production	2	2	2	2	2	2
Enhanced Oil Recovery	0	0	0	0	0	0
Oil and Gas Services	9	9	9	9	9	9
Petroleum Refining	2	2	2	2	2	2
Upgrading	0	0	0	0	0	0
Mining	**18**	**18**	**18**	**18**	**18**	**18**
Coal Mining	0	0	0	0	0	0
Mining	18	18	18	18	18	18
Manufacturing	**69**	**68**	**68**	**67**	**68**	**67**
Chemicals	6	6	6	6	6	5
Other Manufacturing	56	56	56	56	57	56
Metals	6	5	6	5	6	5
Biofuels Production	0	0	0	0	0	0
Paper	1	0	1	0	1	0
Hydrogen Production	0	0	0	0	0	0
Agriculture & forestry	**45**	**45**	**45**	**45**	**45**	**44**
Agriculture	45	44	45	44	45	44
Forestry	0	0	0	0	0	0
Construction	**59**	**60**	**59**	**60**	**59**	**61**
Services	**498**	**495**	**497**	**494**	**496**	**494**
TOTAL	**715**	**711**	**714**	**710**	**713**	**710**

Table 31: Energy consumption by fuel type (PJ) in 2035

	NREL costs		GoS baseline costs		GoS high costs	
	SAPP	SK-CER	SAPP	SK-CER	SAPP	SK-CER
Biofuels	5	5	5	5	5	5
Biomass	14	10	11	9	10	8
Coal & coke	32	0	30	0	27	0
Electricity	118	112	113	107	108	104
Hydrogen	2	5	2	7	2	2
Natural Gas	365	309	341	296	339	295
Natural Gas Liquids	5	5	5	5	5	5
Refined Petroleum	177	171	177	168	178	172
TOTAL	**717**	**616**	**684**	**596**	**672**	**592**

CER Economic Impact Assessment Tribunal

Quantitative analysis study report

April 4, 2024

About Navius

Navius Research

Navius Research is a Canadian consulting firm that uses energy-economy models to analyze the impacts of climate and energy policies.

Our analytical framework is used by clients across the country to inform greenhouse gas abatement strategy and economic impacts of policy.

We work for governments, industry, and non-profits across Canada and have been working directly with the Government of Saskatchewan for the past 18 months.

Project scope

This study report was requested by the EIAT through Crown Investments Corporation (CIC) as the referring agency. CIC contracted Navius Research to examine the economic impacts of CER on Saskatchewan between now and 2035.

Our impact analysis covers five key areas:

1. Emissions and capacity mix
2. Electricity market
3. Macroeconomy
4. Technology mix
5. Impacts beyond 2035

gTech-IESD links macroeconomic breadth with electricity sector granularity

Figure 1: the gTech-IESD model

Electricity sector information
(prices, fuel costs, etc.)

Macroeconomy

gTech provides insight into how climate policy affects:

- Greenhouse gas emissions
- Technology adoption
- Economic activity

Electricity

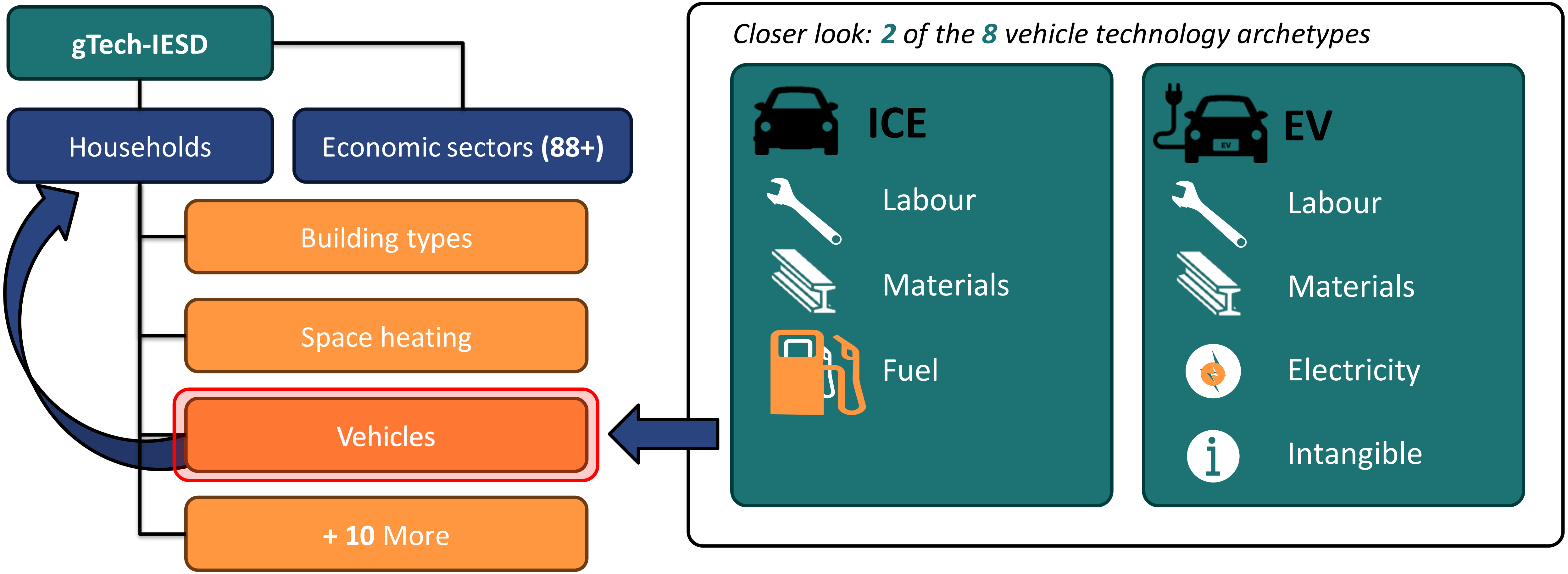
IESD provides insight into the electricity sector including:

- Hourly electricity supply and demand
- Electricity prices
- Electricity trade

Electricity sector information
(capacity mix, generation, load, etc.)

gTech simulates decision making via a technology choice module

Figure 2: Technology competition in the gTech-IESD model



Saskatchewan model customizations

Navius has worked with the Government of Saskatchewan to customize gTech-IESD for this analysis, including:

- Calibrating GDP, oil and gas production, and commodity prices to GoS Budget 2023/2024
- Calibrating electricity demand and capacity mix from SaskPower under the Long Term Plan
- Updating methane abatement archetypes to reflect costs for reducing emissions from leaks, vents and surface casing vent flows
- Detailing emissions by source for the oil and gas sector beyond publicly available data
- Adding in model features to reflect the design of the Saskatchewan Output Based Performance Standard

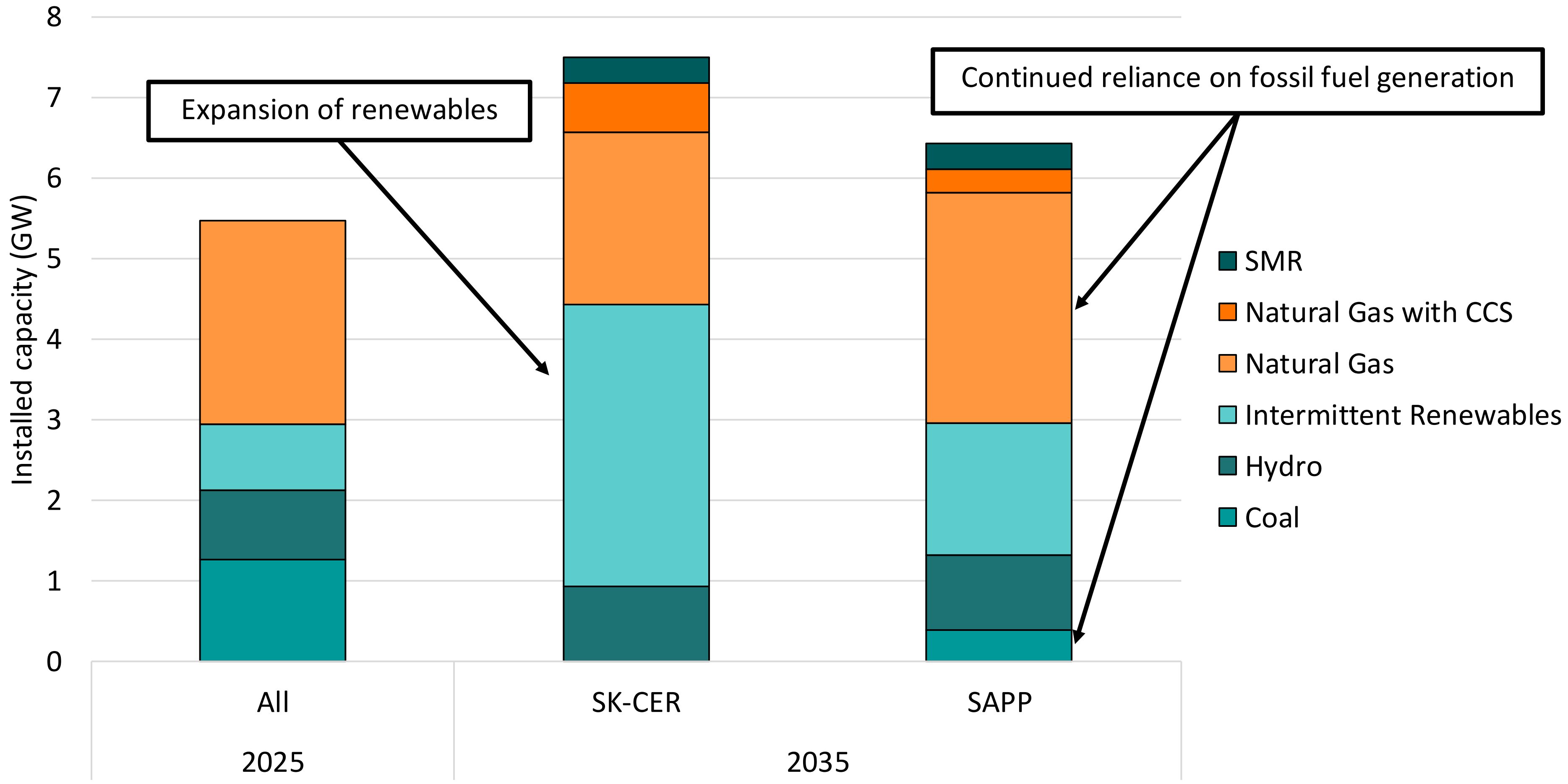
Policy scenario design

Table 1: Policy scenario design features

Policy area	Saskatchewan Affordable Power Plan (SAPP)	Saskatchewan CER Compliance Pathway (SK-CER)
Electricity capacity mix	SAPP supply plan	SK CER compliance pathway supply plan
Clean Electricity Regulations	Not implemented	CER implemented as per the Draft Regulations published in August 2023
Carbon price level	Maintaining the federal carbon pricing backstop at $65/tCO2e in nominal terms	The federal carbon pricing backstop rises at $15/tCO2e per year to $170/tCO2e by 2030, in nominal terms
Carbon price coverage	Exclusion of the electricity sector from carbon pricing in 2026 onwards	Electricity sector is included in the OBPS
Federal Investment Tax Credits	75% capex for a 300MW Small modular nuclear reactor (SMnR) 50% of capex for renewables deployment, up to $6 billion	Announced Investment Tax Credits
Technology cost sensitivities	GoS baseline cost assumptions for generation technologies GoS high-cost assumptions for generation technologies National Renewable Energy Laboratory (NREL) costs, as used in the gTech-IESD reference case	

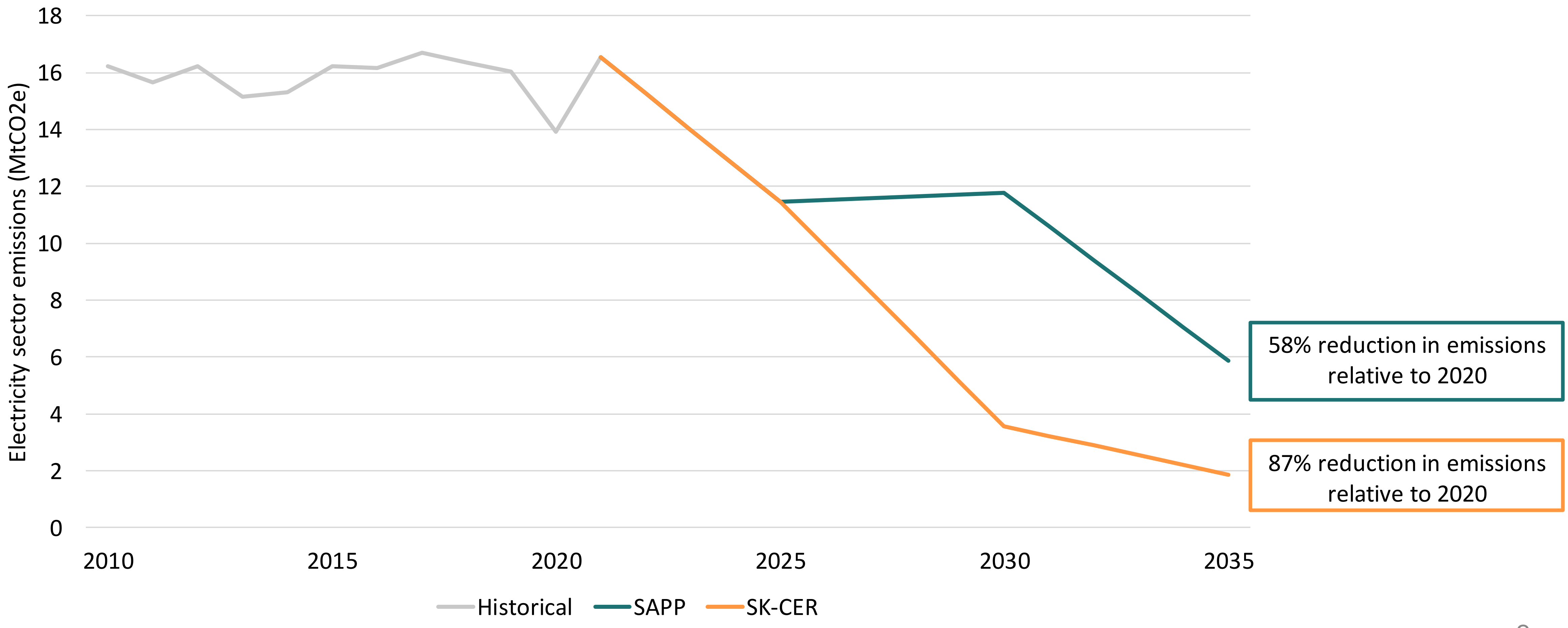
SaskPower capacity mix

Figure 3: Installed capacity mix under each policy scenario – aligned to SaskPower forecasts



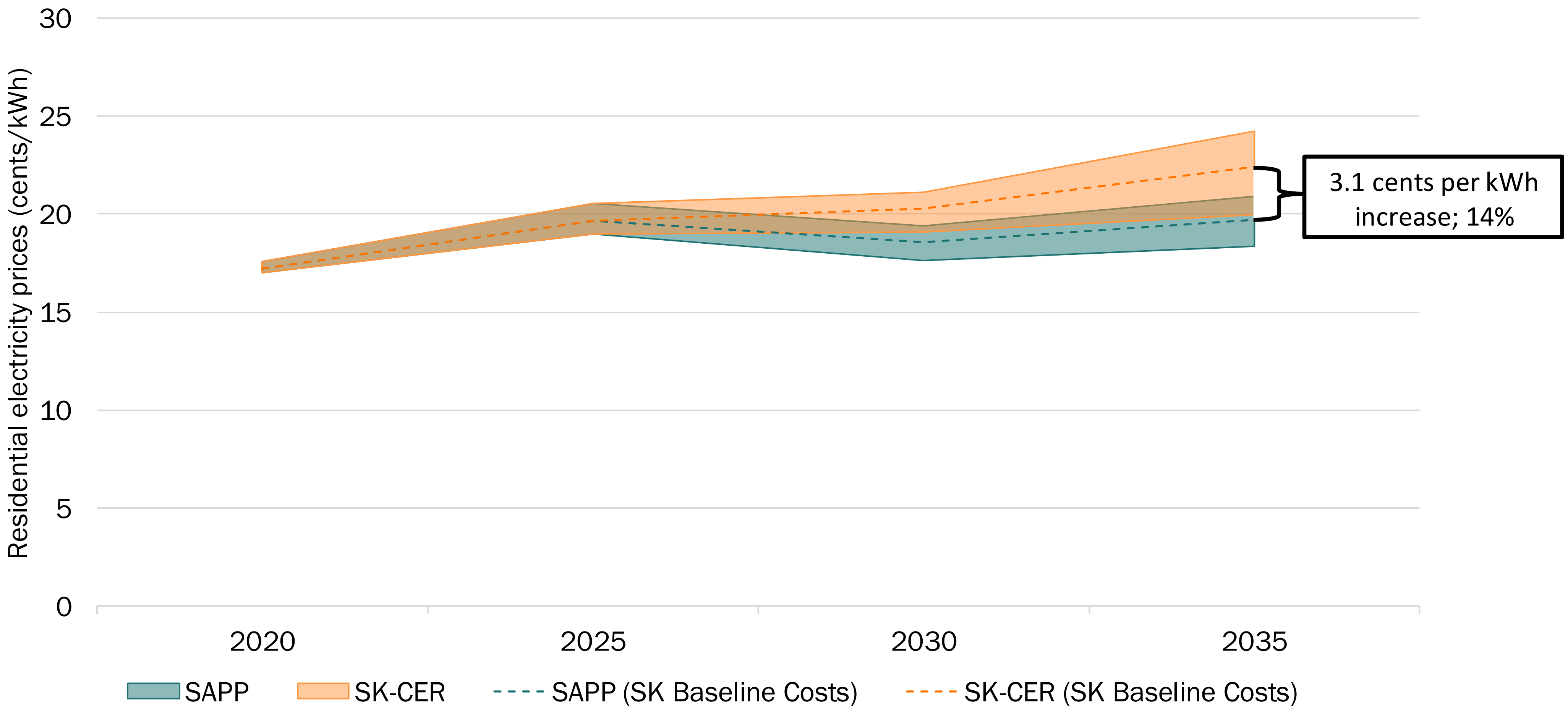
SK-CER drives deeper emissions reductions than the SAPP

Figure 4: Total electricity sector emissions in Saskatchewan, including cogeneration



SK-CER increases prices which leads to lower energy demand and more imported electricity

Figure 5: Residential electricity price ranges under each policy scenario (C$2022)



SK-CER increases prices which leads to lower energy demand and more imported electricity

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- Residential electricity rates are 9-16% higher in 2035 under the SK-CER relative to the SAPP, depending on the cost sensitivity
- Average four-person household pays $147 to $296 per year more for electricity in 2035
- Higher prices for electricity leads to lower overall electricity demand under the SK-CER; a reduction of 0.9-1.7 TWh or 3-6% of demand under SAPP
- More expensive domestic electricity leads to an increased reliance on imported electricity from Manitoba and the United States

Table 2: Electricity price impacts of SK-CER relative to SAPP in 2035 (C$2022)

	2035 Electricity Prices (¢/kWh)		Net increase (CER vs SAPP)		
Consumer type	SAPP	SK-CER	Rate change (¢/kWh)	Rate change (%)	Annual cost per consumer ($)[1]
Generator	7.6	10.3	2.7	35%	
Residential	22.6	25.7	3.1	14%	$241
Commercial	16.5	19.4	3.0	18%	$888
Industrial	12.9	15.8	2.9	22%	$1,429

[1]Assumes annual consumption of 7.8 MWh for residential, 30 MWh for commercial and 50 MWh for industrial consumers.

SK-CER increases prices which leads to lower energy demand and more imported electricity

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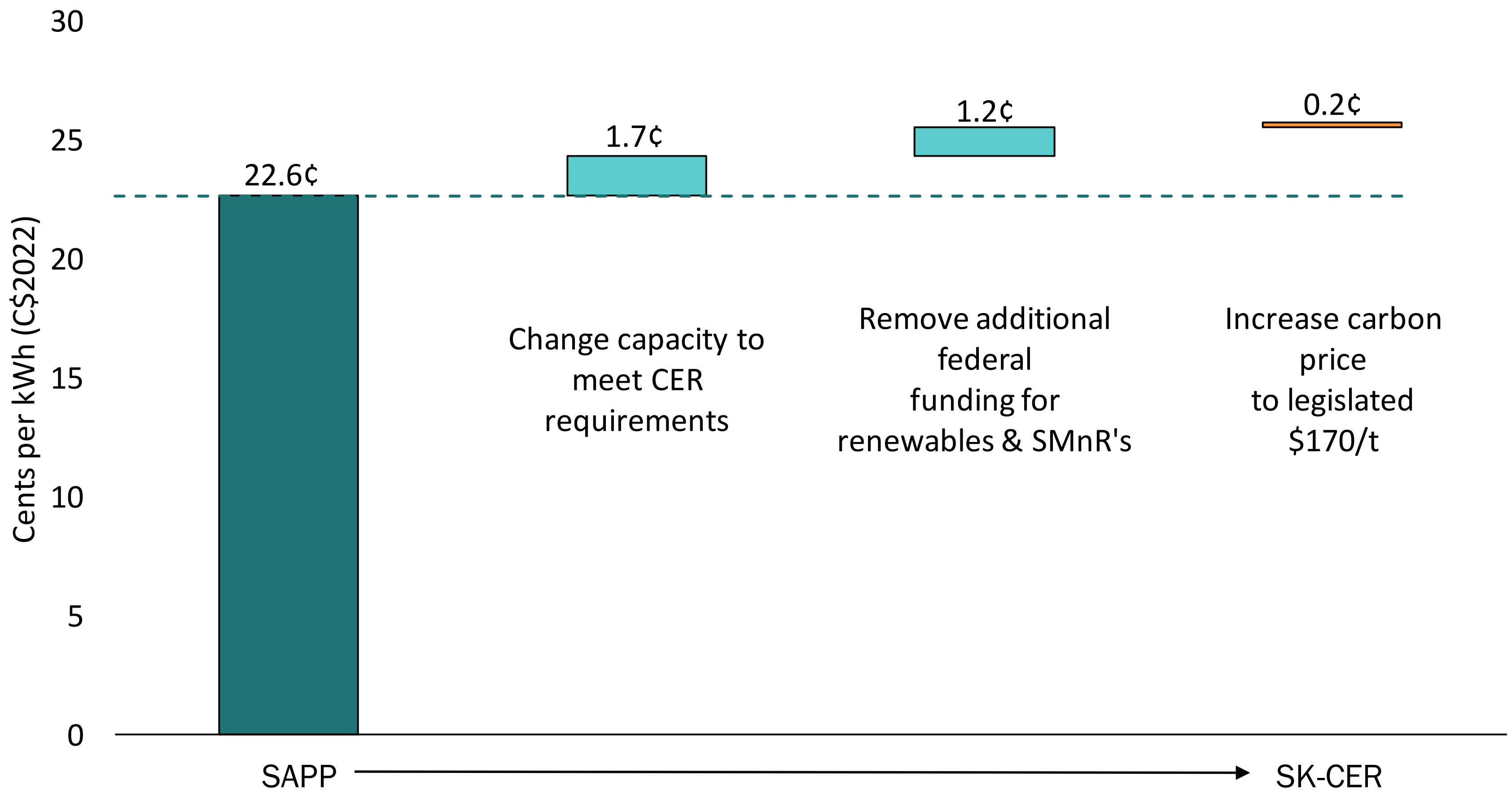
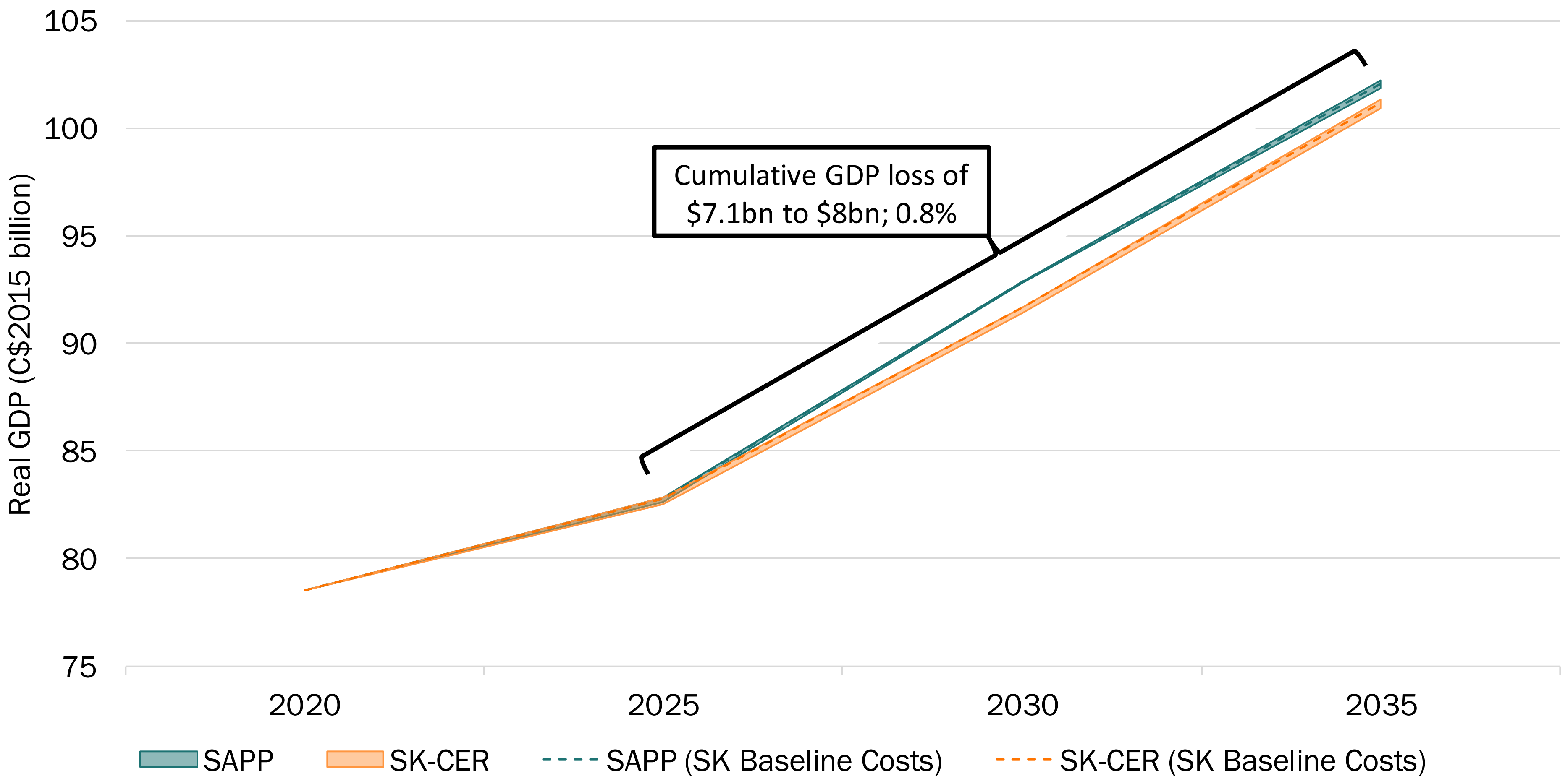
Overview | Approach | **Impact analysis** | Key insights

Figure 6: Marginal impact of policy change between the SAPP and SK-CER scenarios on residential electricity rates



Saskatchewan's GDP is higher under the SAPP than SK-CER

Figure 7: Range of GDP impacts under the SAPP and SK-CER (C$2015)



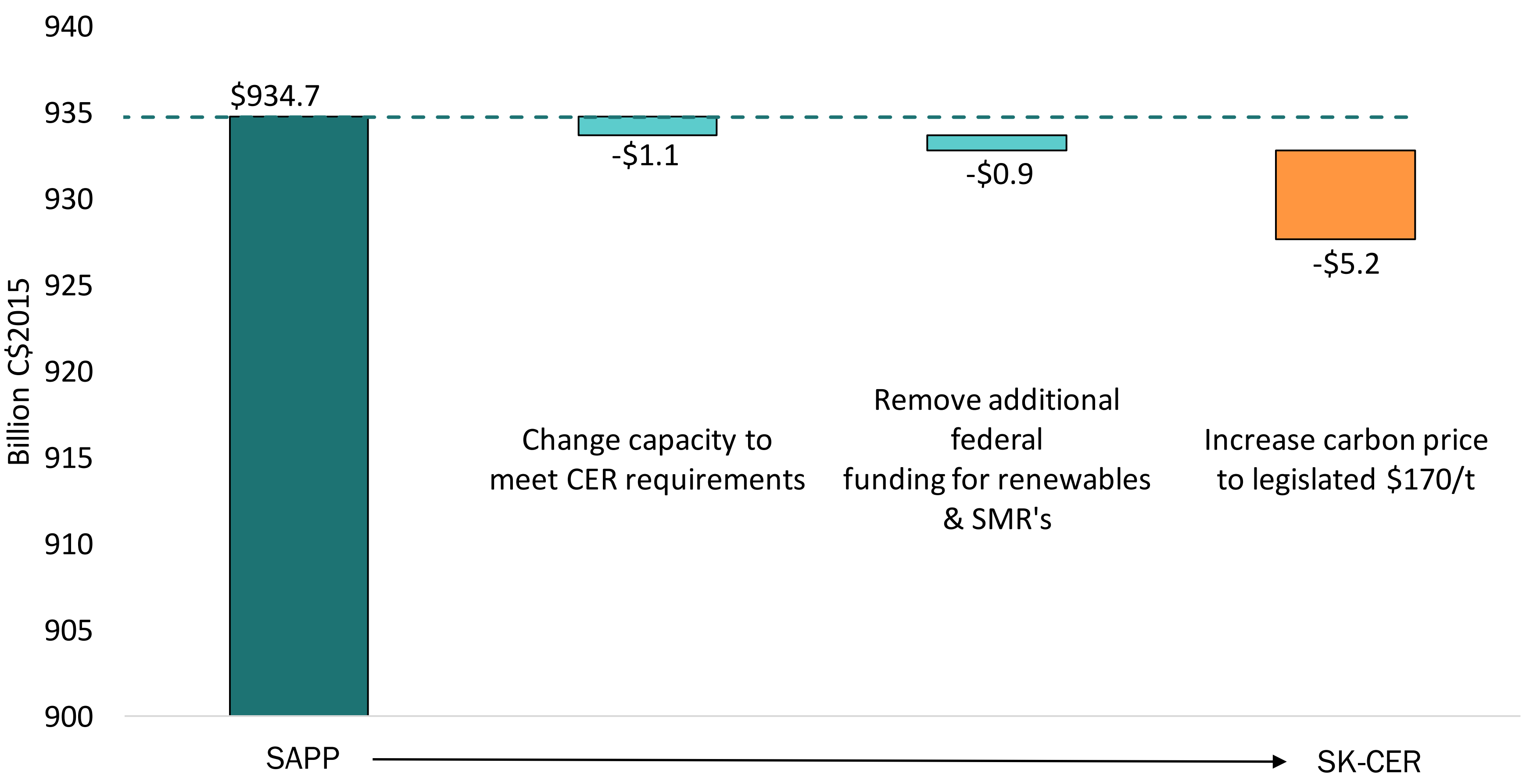
Saskatchewan's GDP is higher under the SAPP than SK-CER

Table 3: GDP impacts of SK-CER relative to SAPP (C$2015)

Sector	SK-CER impact in 2035		
	Annual ($bn)	Annual (%)	2026-2035 cumulative ($bn)
Consumption	-0.5	-0.9%	-3.5
Investment	0.5	2.6%	2.3
Government	-0.1	-0.5%	-0.5
Exports	-1.1	-1.7%	-8.1
Imports	0.3	-0.6%	2.8
Total	**-0.9**	**-0.9%**	**-7.1**

Saskatchewan's GDP is higher under the SAPP than SK-CER

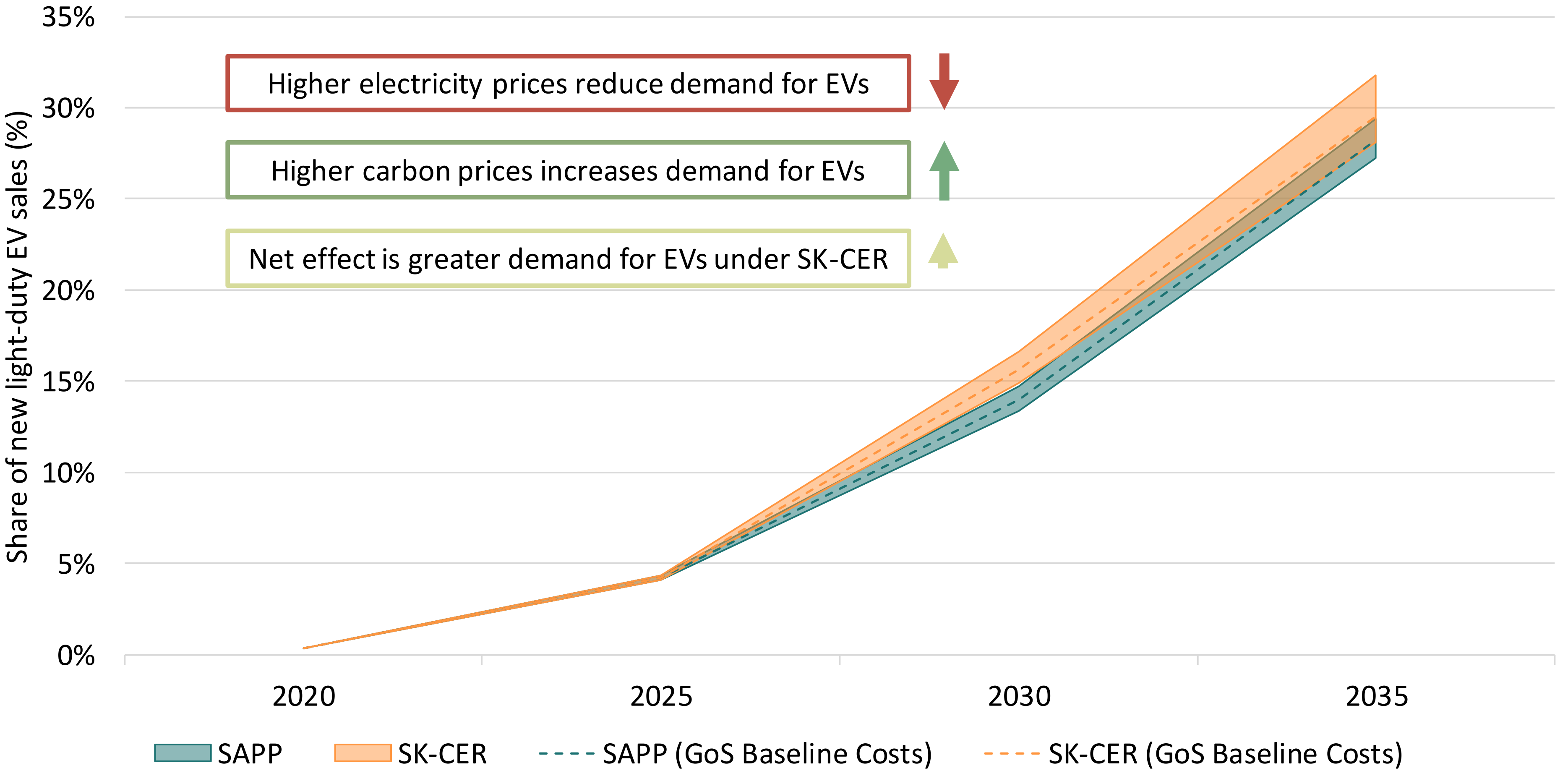
Figure 8: Marginal impact of policy change between the SAPP and SK-CER scenarios on cumulative GDP, 2026-2035



Low carbon technology adoption is higher under the SK-CER

Overview | Approach | **Impact analysis** | Key insights

Figure 9: Share of light-duty EV sales in Saskatchewan under each policy scenario



Key insights

Insight 1: The SK-CER drives deeper emissions reductions in Saskatchewan than the SAPP

Insight 2: SK-CER increases prices which leads to lower energy demand and more imported electricity

Insight 3: Saskatchewan's GDP is higher under the SAPP than SK-CER

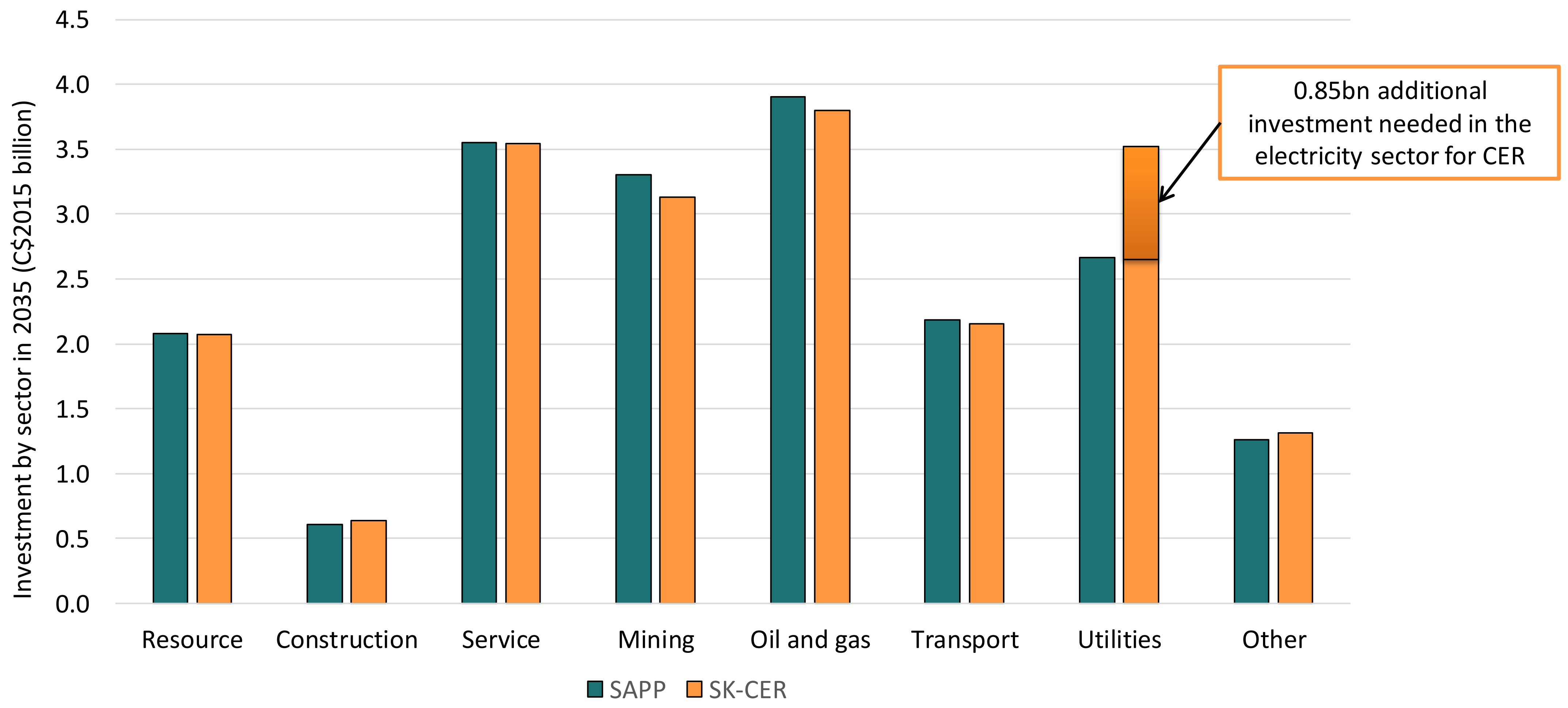
Insight 4: Household consumption of goods and services is lower under the SK-CER

Insight 5: Low carbon technology adoption is higher under the SK-CER

Insight 6: SK-CER impact is due to both compliance with the CER and changes to other federal policy

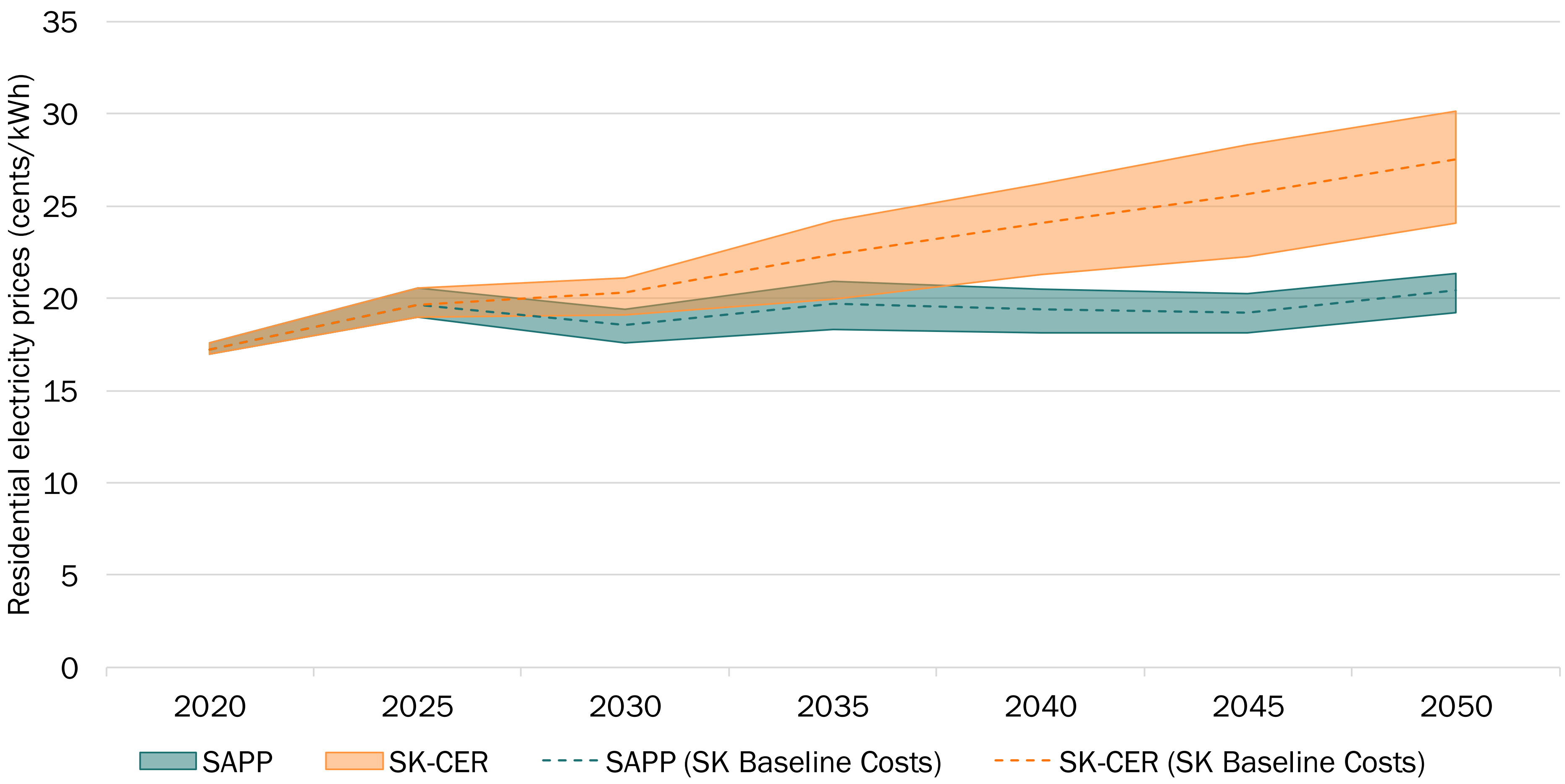
Supplementary slides

Investment


4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Investment by sector in 2035 (C$2015 billion)
0.85bn additional investment needed in the electricity sector for CER
Resource
Construction
Service
Mining
Oil and gas
Transport
Utilities
Other
SAPP
SK-CER

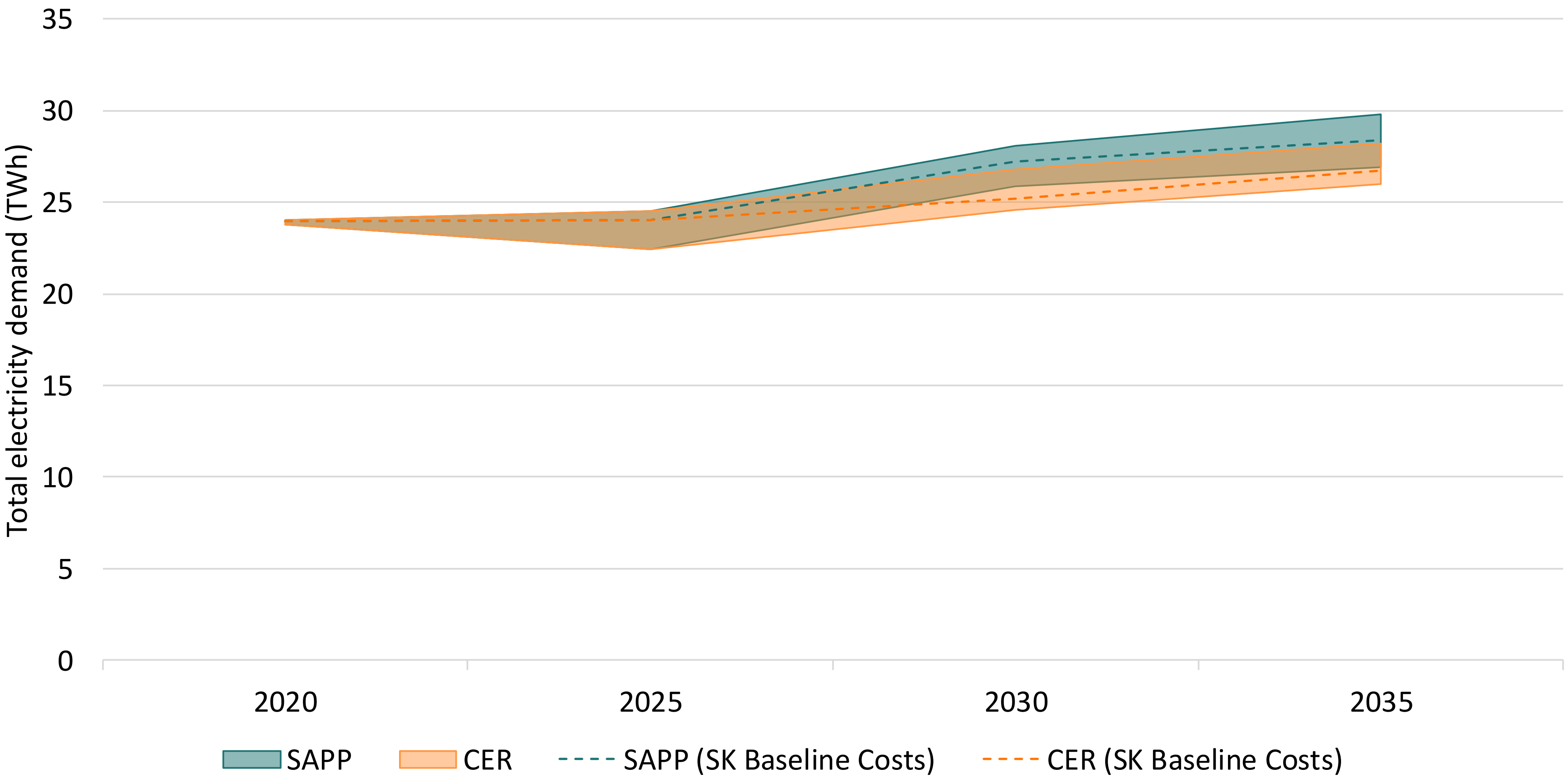
Residential electricity prices

Overview | Approach | **Impact analysis** | Key insights

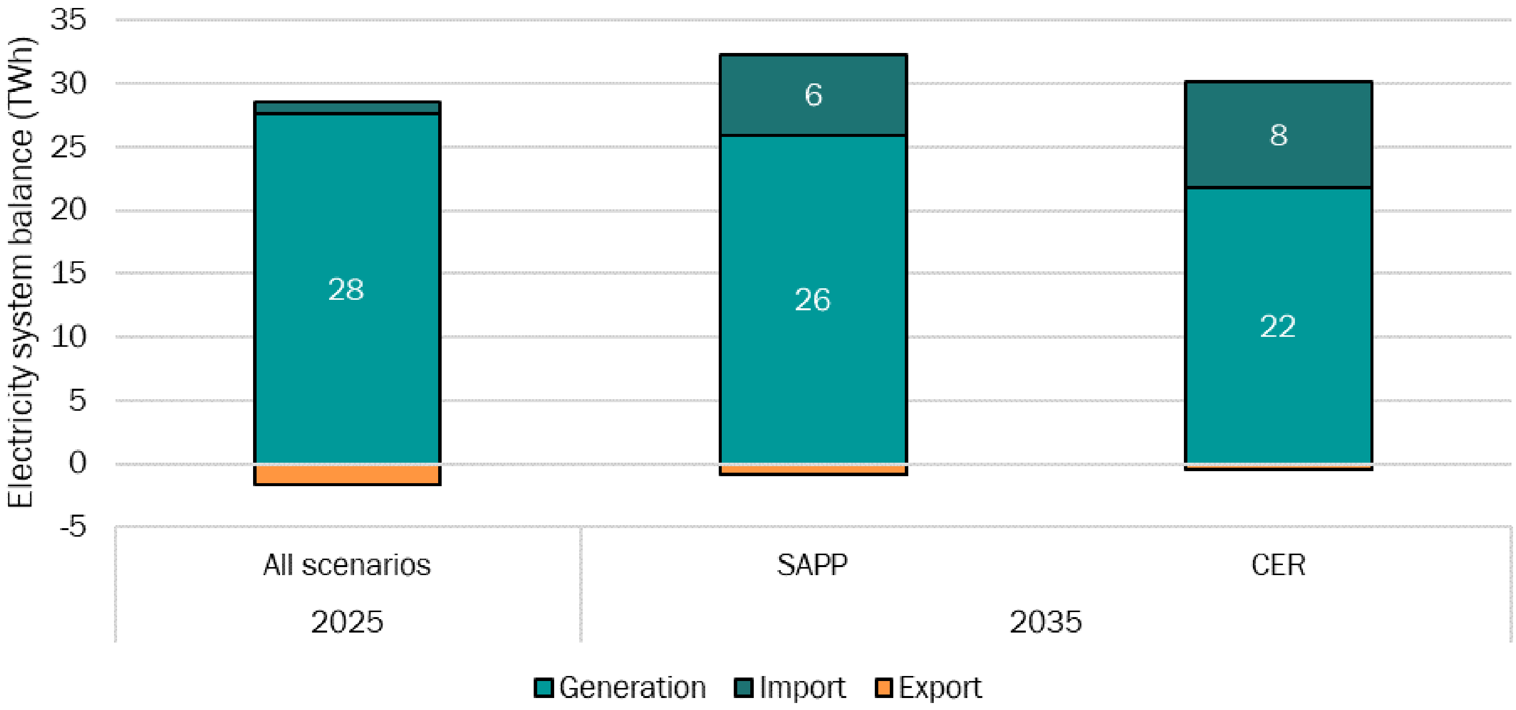


Electricity demand

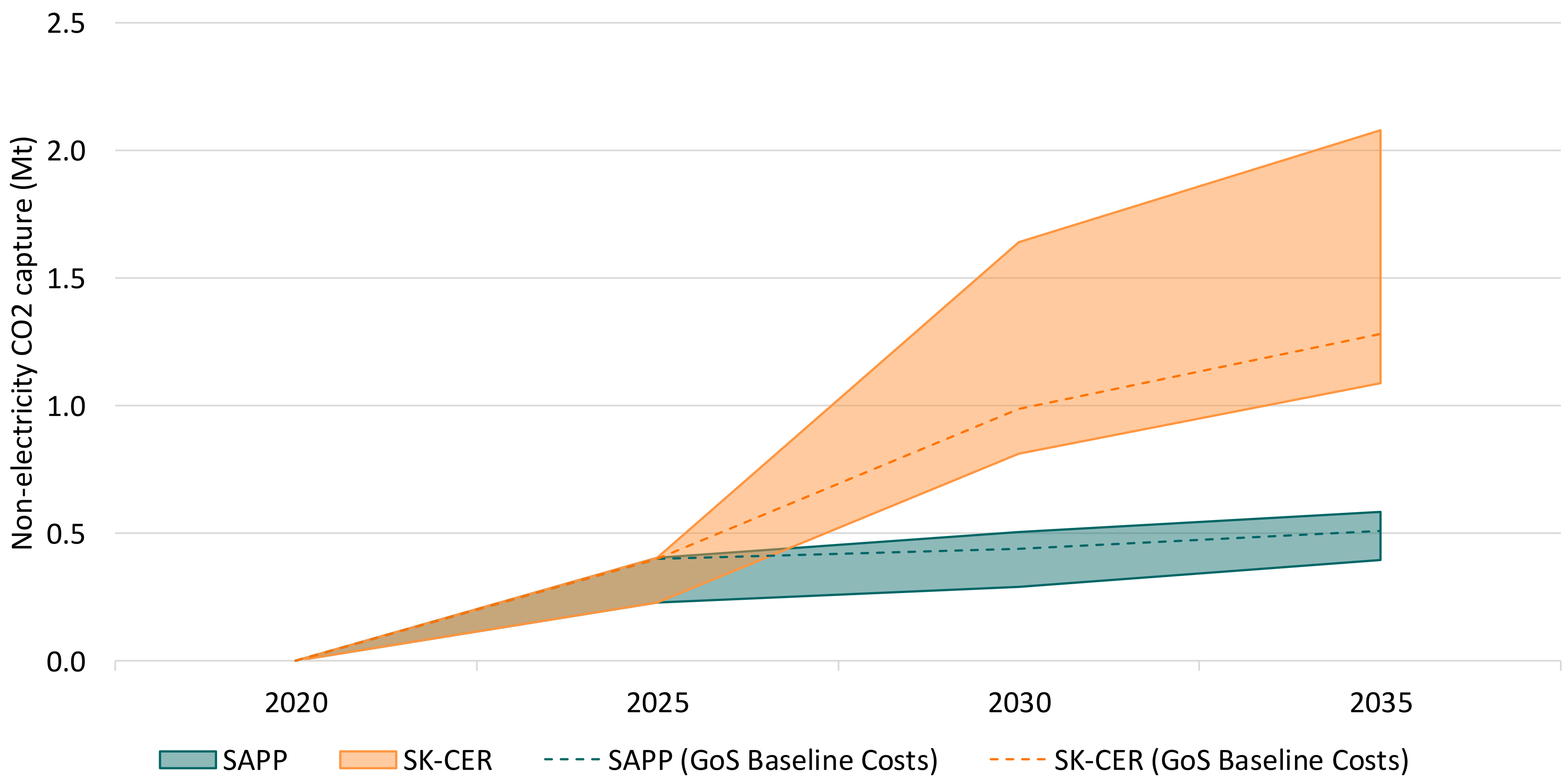
Overview | Approach | **Impact analysis** | Key insights



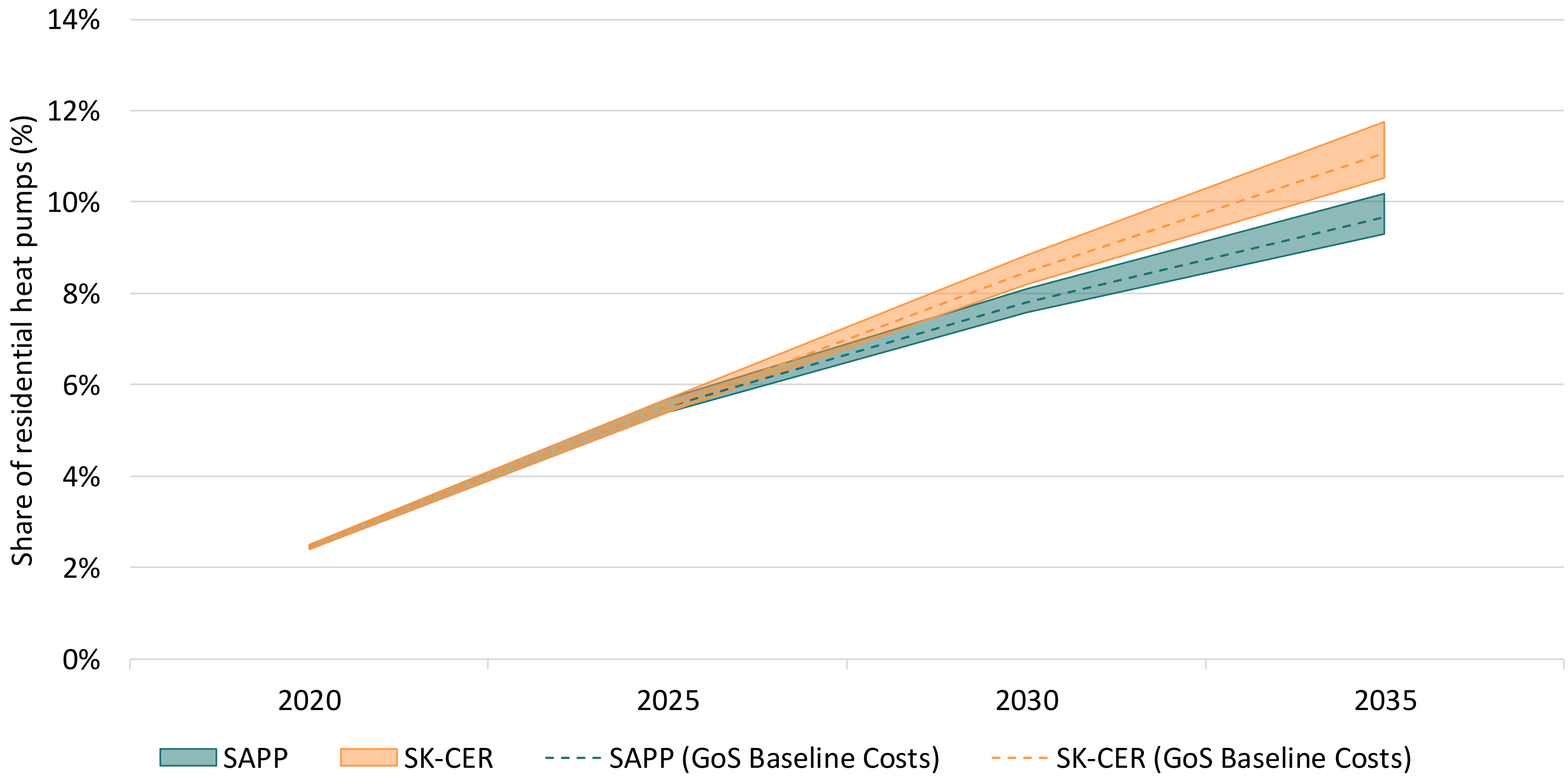
Electricity system balance



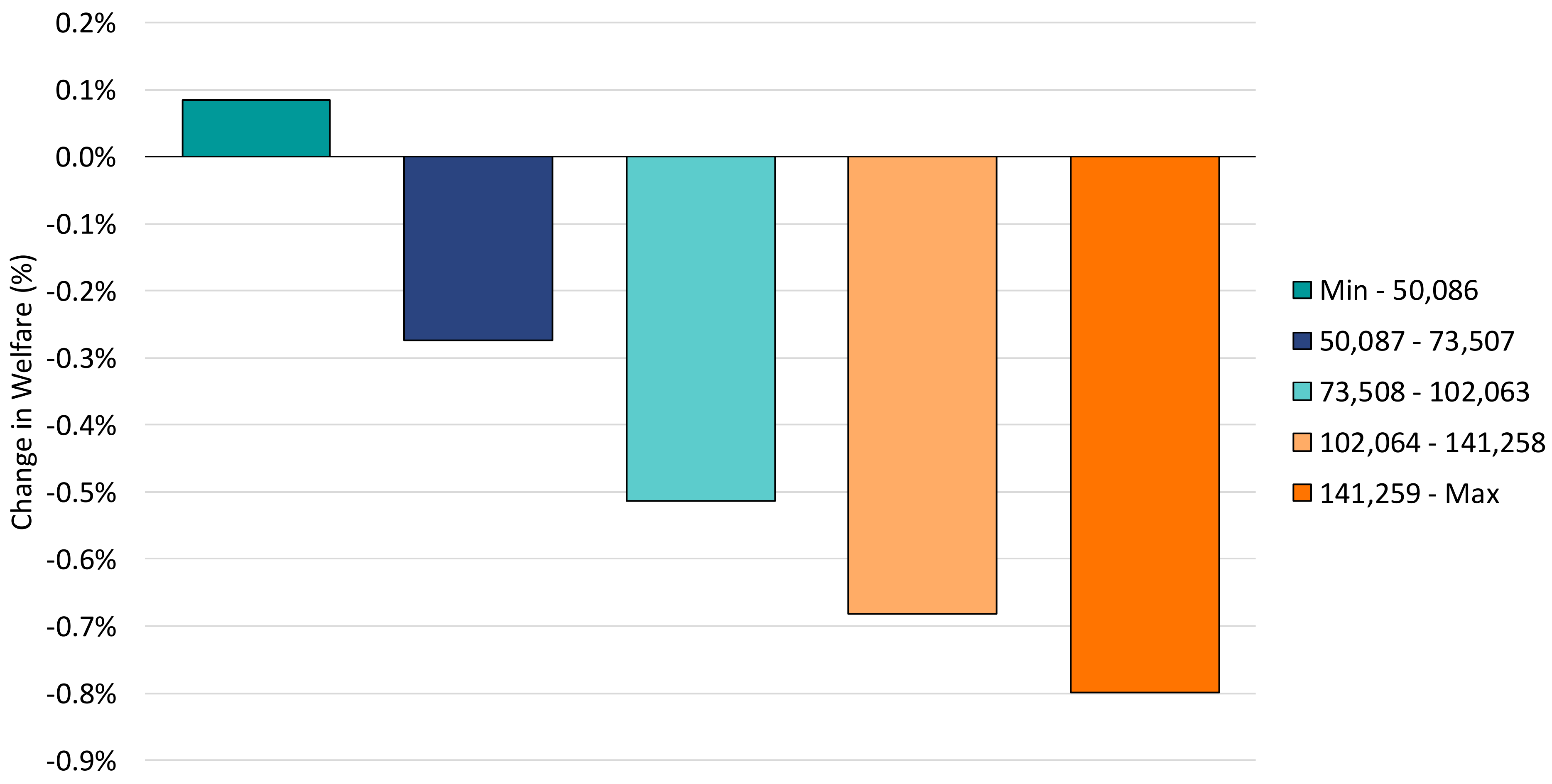
Tech adoption - CO_2 captured in Saskatchewan, excluding the electricity sector



Tech adoption – Total market share of residential heat pumps

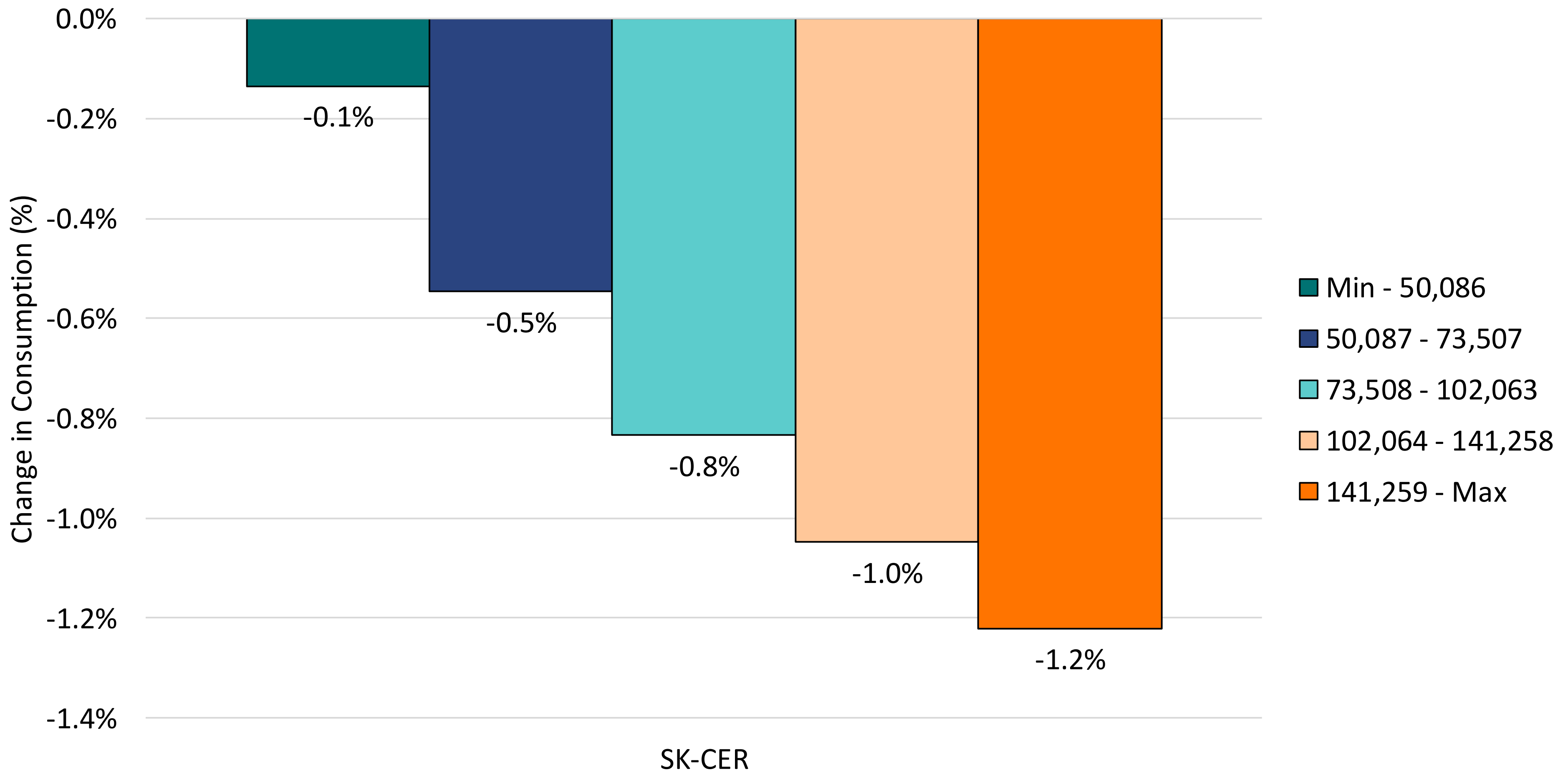


2035 change in welfare per capita under SK-CER by income quintile

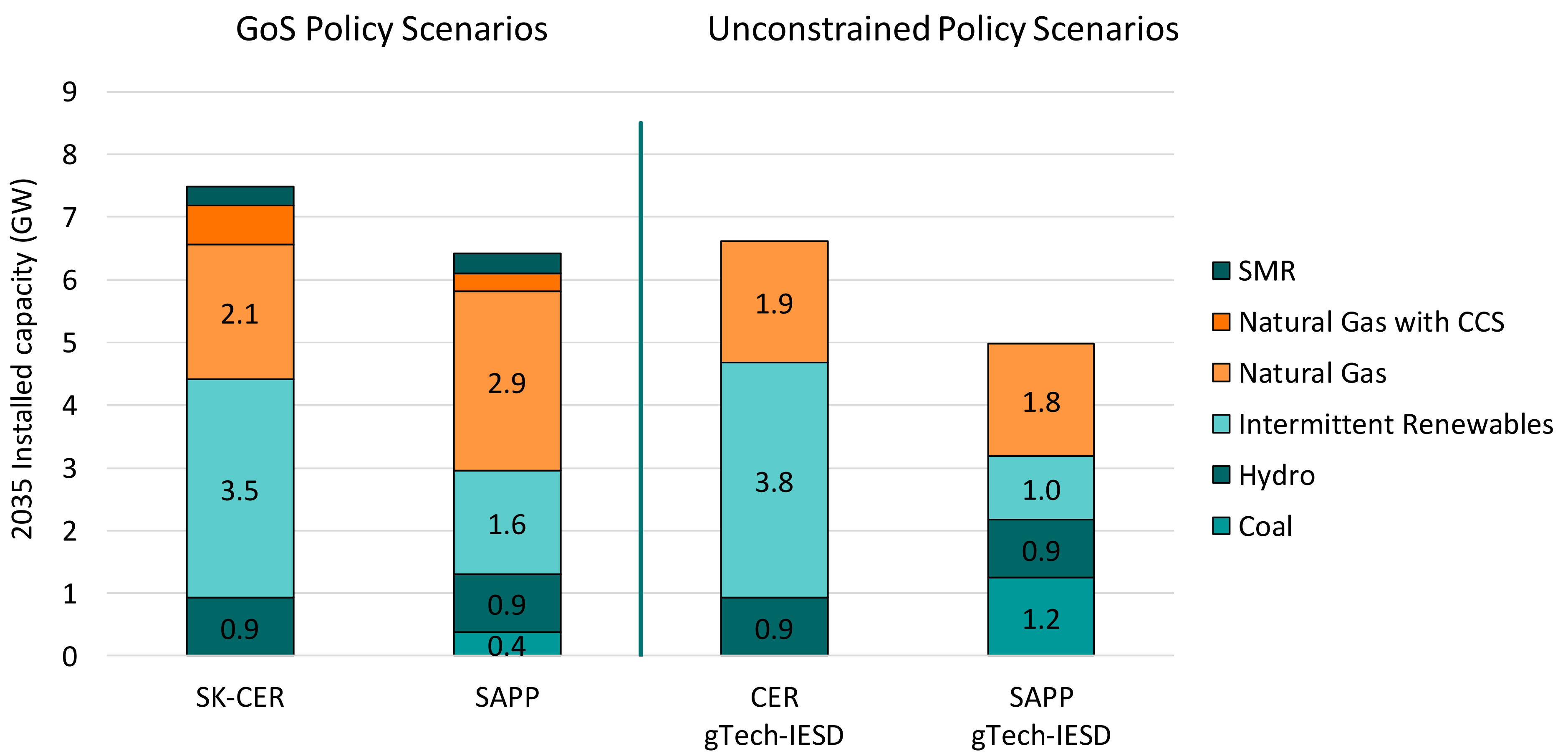


2035 change in household consumption by income quintile

Overview | Approach | **Impact analysis** | Key insights

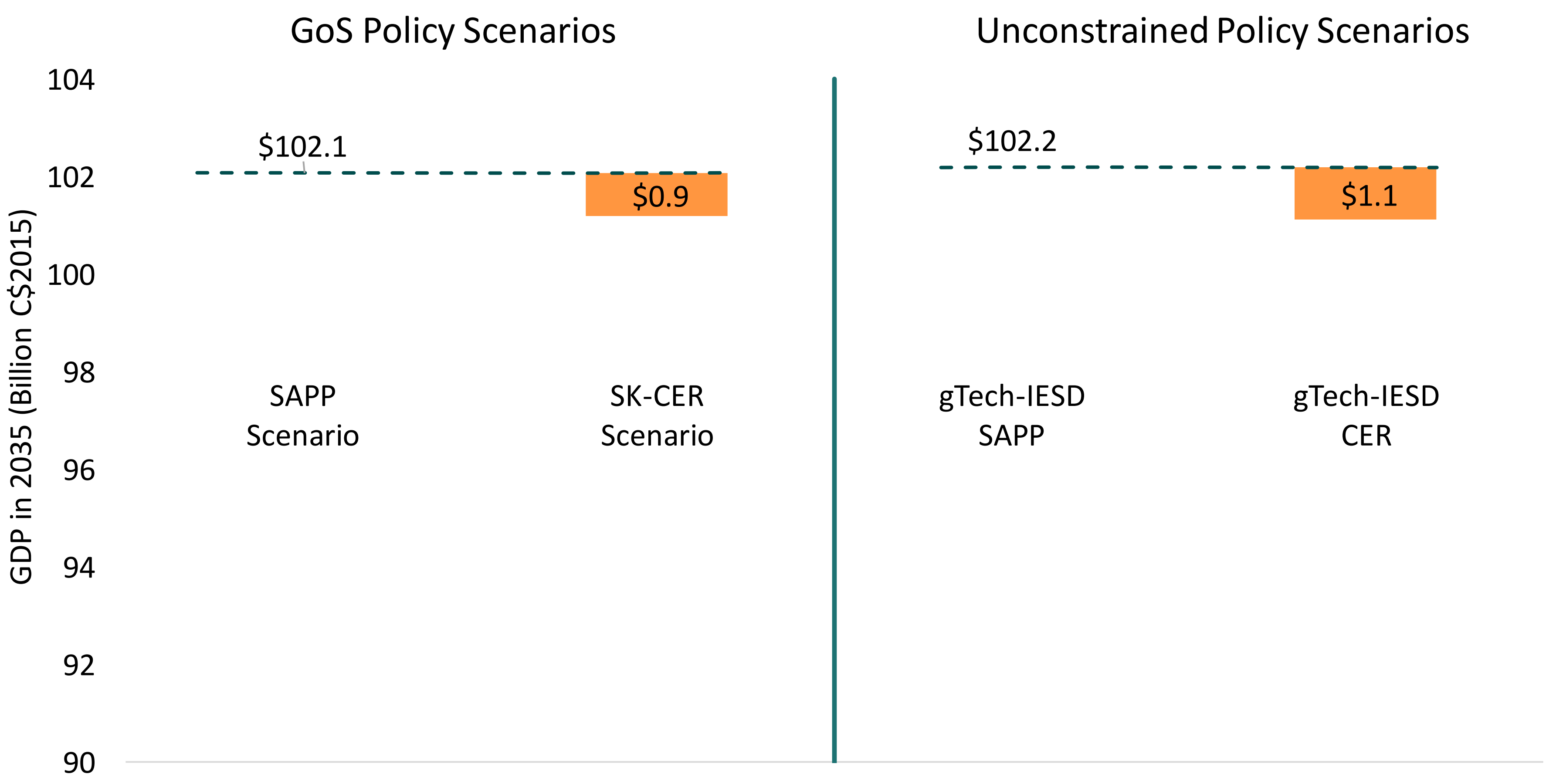


Installed capacity under constrained & unconstrained policy scenario

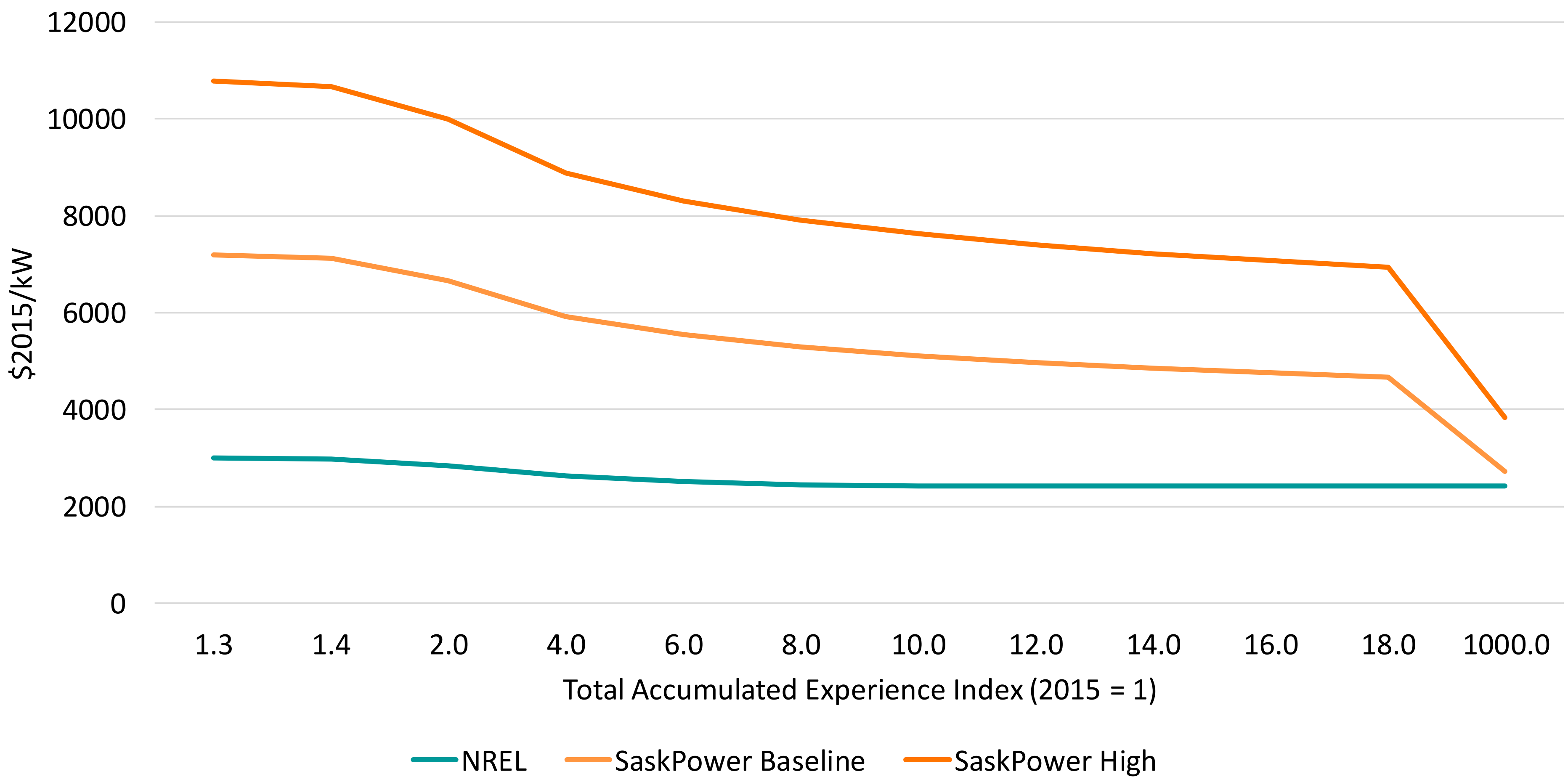


Expenditure GDP in 2035 under GoS supply plan & unconstrained scenario

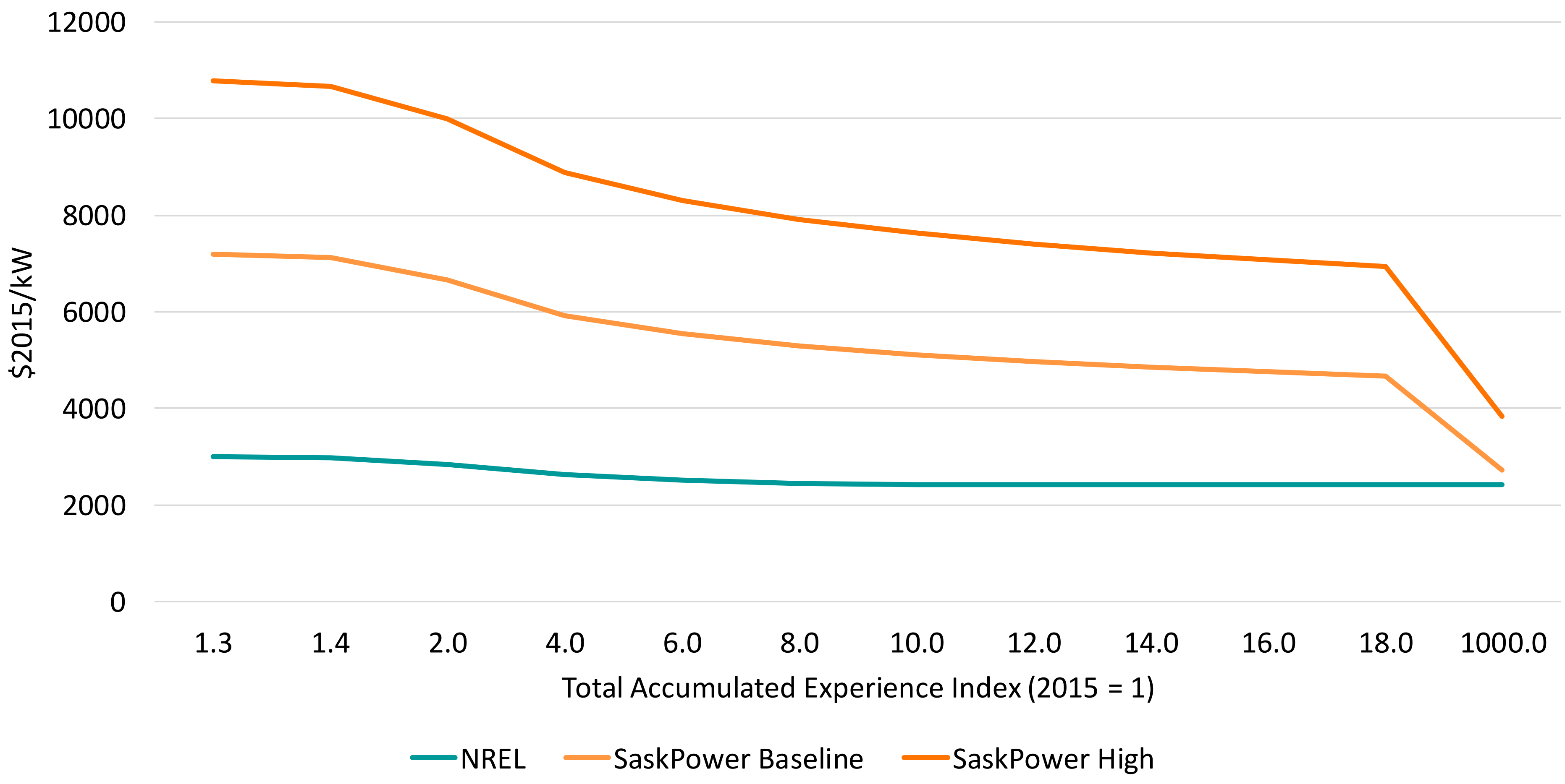
Overview | Approach | **Impact analysis** | Key insights



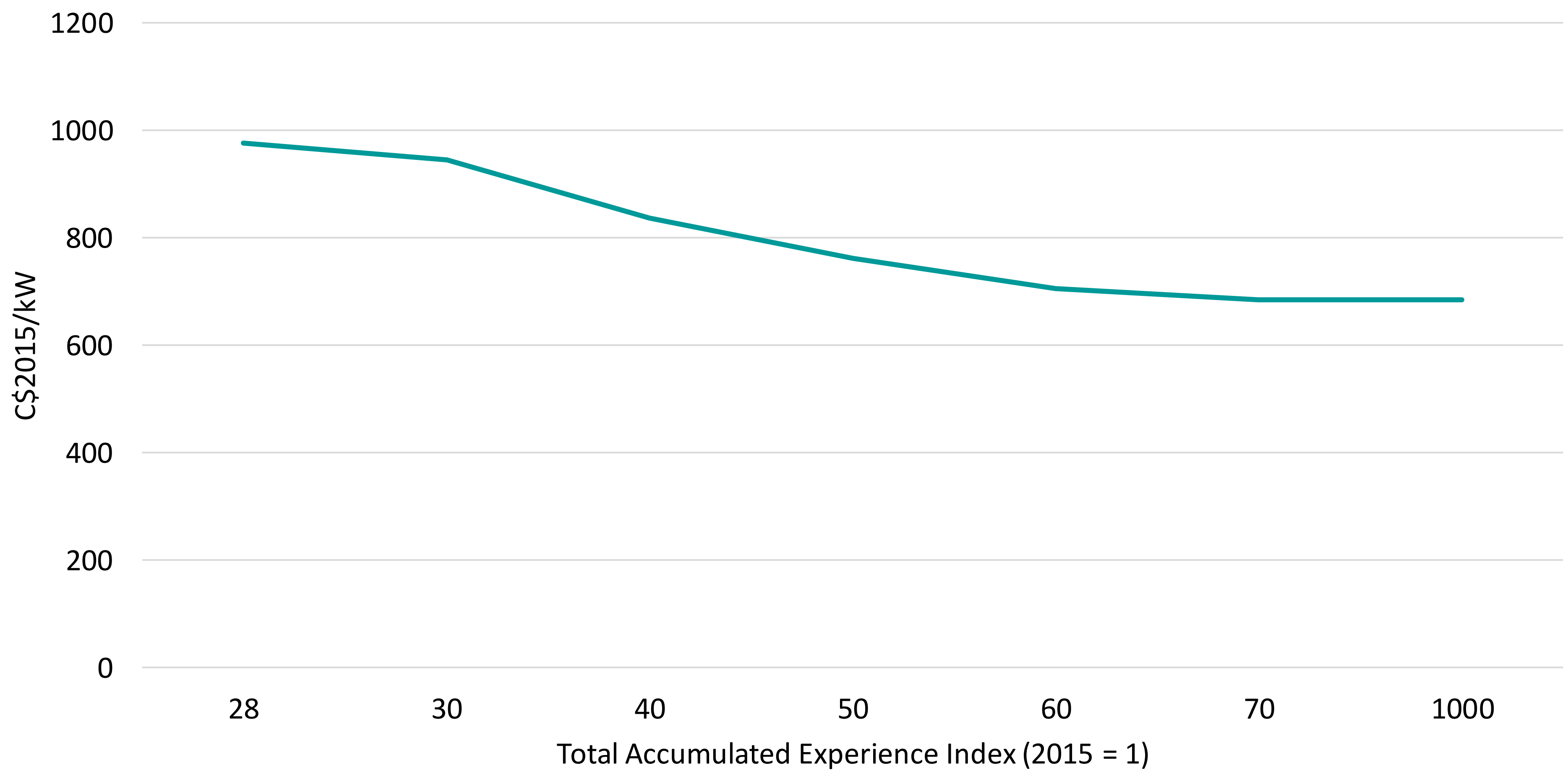
Declining capital cost functions – Natural Gas with CCS



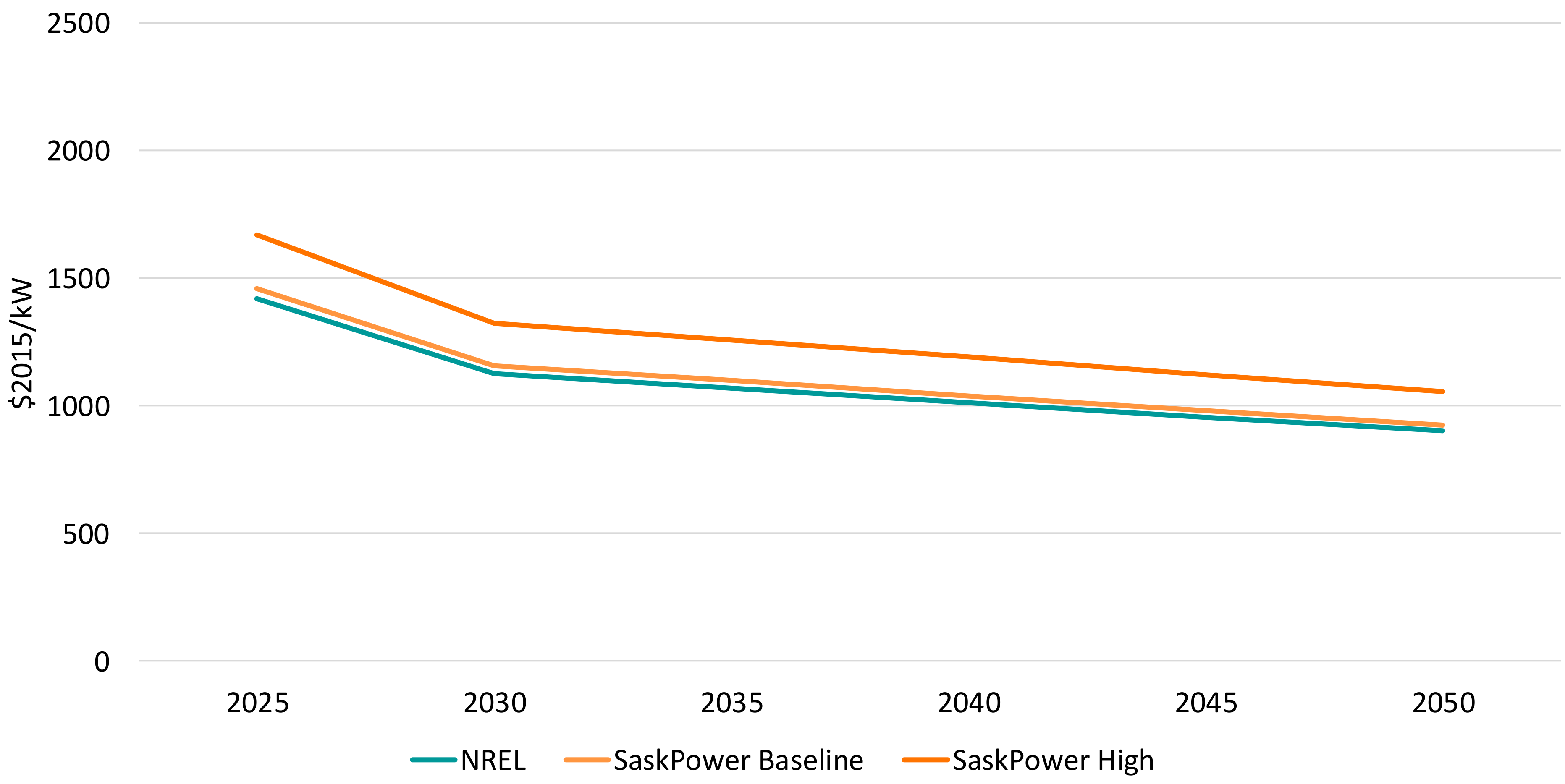
Declining capital cost functions – Natural Gas with CCS



Declining capital cost functions – Battery Storage



Declining capital cost functions – Onshore Wind



Declining capital cost functions – Onshore Wind