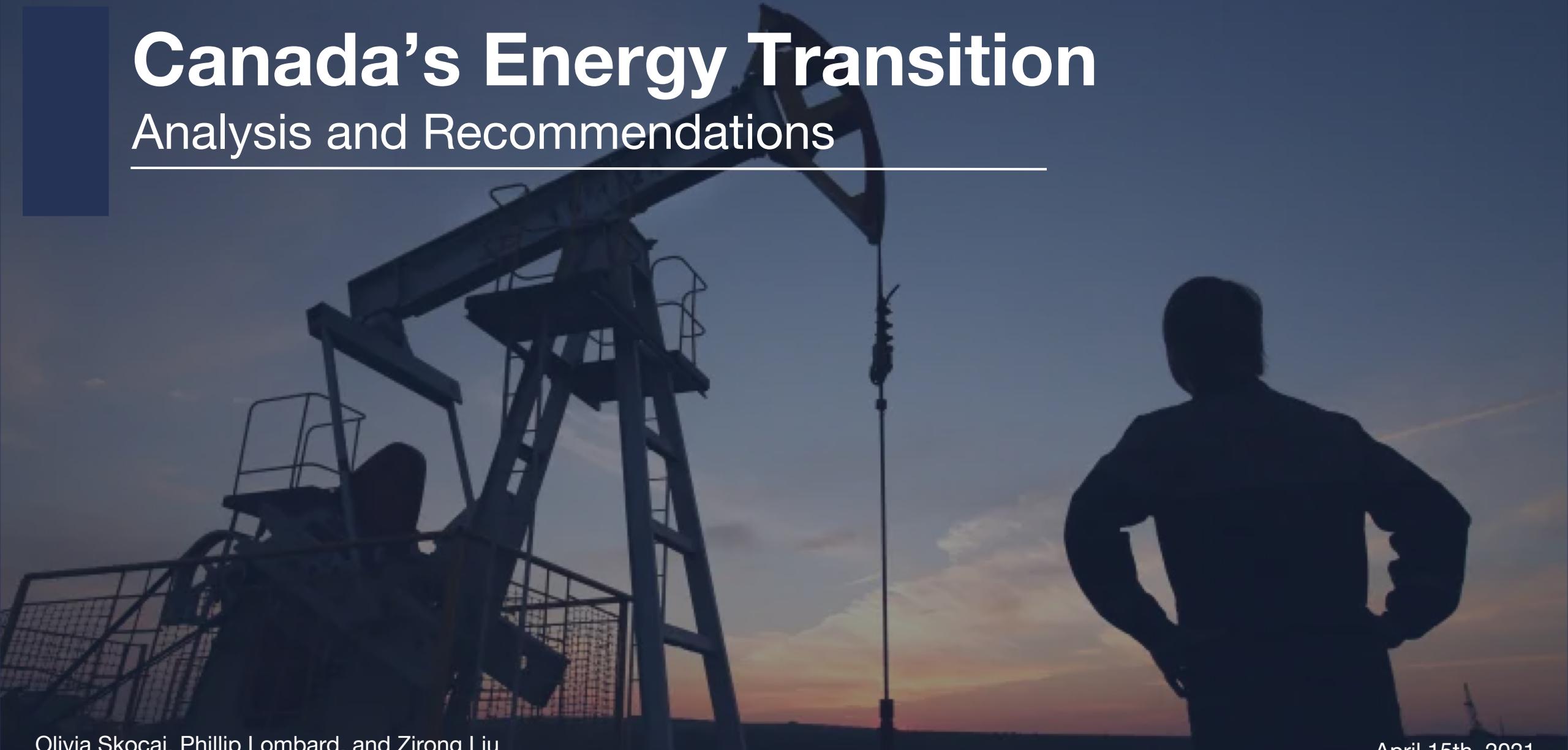


Canada's Energy Transition

Analysis and Recommendations



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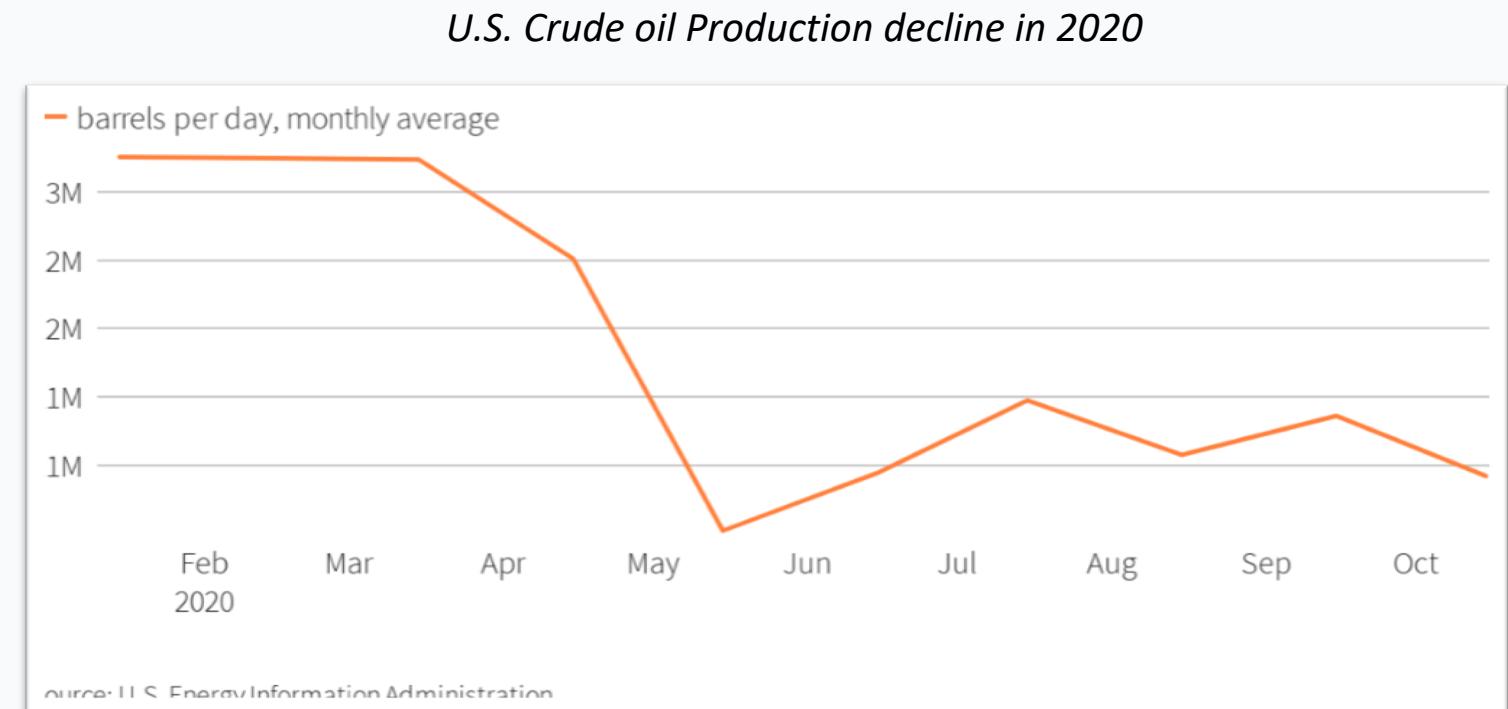
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Public Support and Involvement

The Need for an Energy Transition

A transition from fossil fuel-powered transportation to low carbon electric powered propulsion is underway, unstoppable and underpins the urgent need for a transition plan.

- Declines in global demand for Oil
- Increased demand for low carbon electric vehicles
- Lack of a transition plan in Canada



[1]

Canada's Oil Sector

Globally, Canada is the fifth-largest producer of natural gas and sixth-largest producer of oil

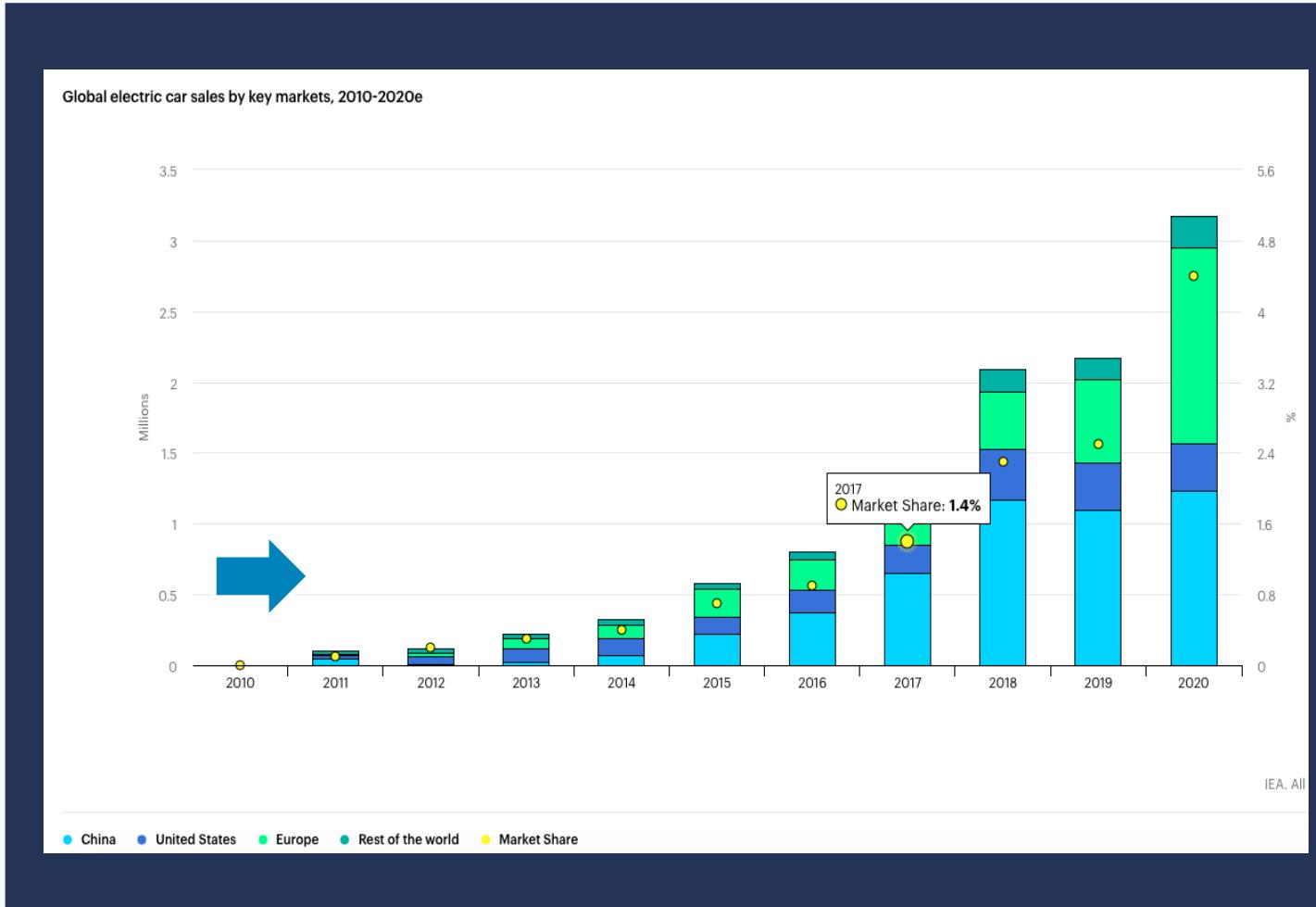
Employment	GDP Contribution	Sector Trends	Product Comparisons
<ul style="list-style-type: none">• 220,021 direct jobs• 381,371 indirect jobs <small>[2]</small>	<ul style="list-style-type: none">• 5.4 per cent of Canada's total GDP <small>[2]</small>	<ul style="list-style-type: none">• Oil demand decreasing globally• Renewable energy investment increasing	<ul style="list-style-type: none">• The Canadian oil sands is labour intensive and expensive

The oil sector's energy transition and digital transformation have been expedited due to COVID-19 and the oil downturn.



Electric Vehicles

Emerging technologies and Trends



Expanding EV Adoption

- Global Trends
- Canadian Trends
- Impact to the Oil Price & Oil Industry

[3]



Electric Vehicles

Emerging technologies and Trends

Global electric vehicle sales increased 39% in 2020

[4]

1. What is slowing down the adoption of EVs?
2. Will that be an issue in future?
3. How many EVs will impact the oil price?
4. How much time do we have left?

Bitumen Beyond Combustion



Currently, 90% of bitumen in Canada is upgraded to combustion fuels. [5]



Platform Chemicals

Petrochemical
feedstock



Carbon Fiber

4% of the cost [6]



Flipping the Barrel

Bitumen becomes high
value

Potential New Sectors

Finding a destination for displaced oil and gas workers

Wind Power

- Can supply 25% of grid electricity ^[7]

Hydro Power

- 4% utilization of 6050 MW available ^[8]

Geothermal

- \$3-6/GJ ^[9]

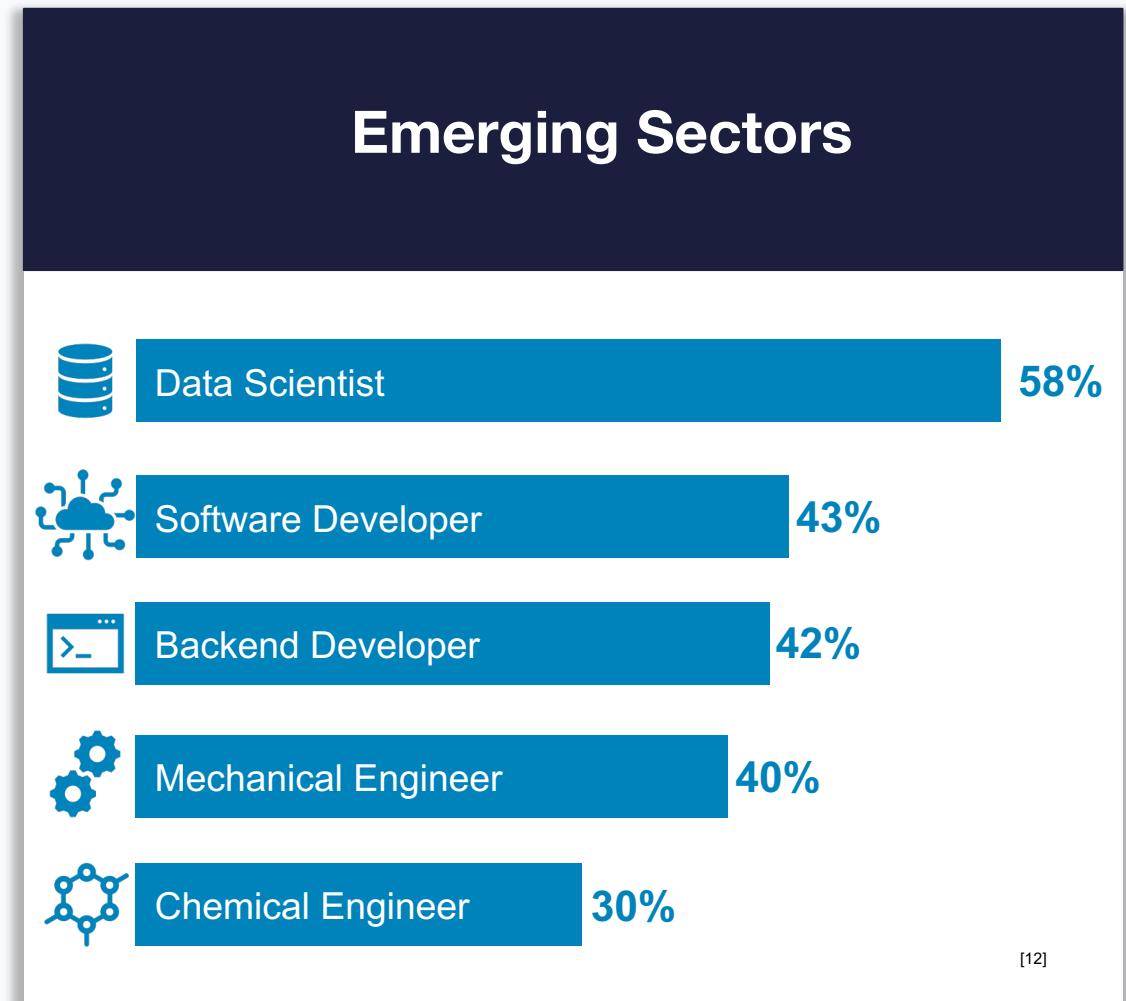
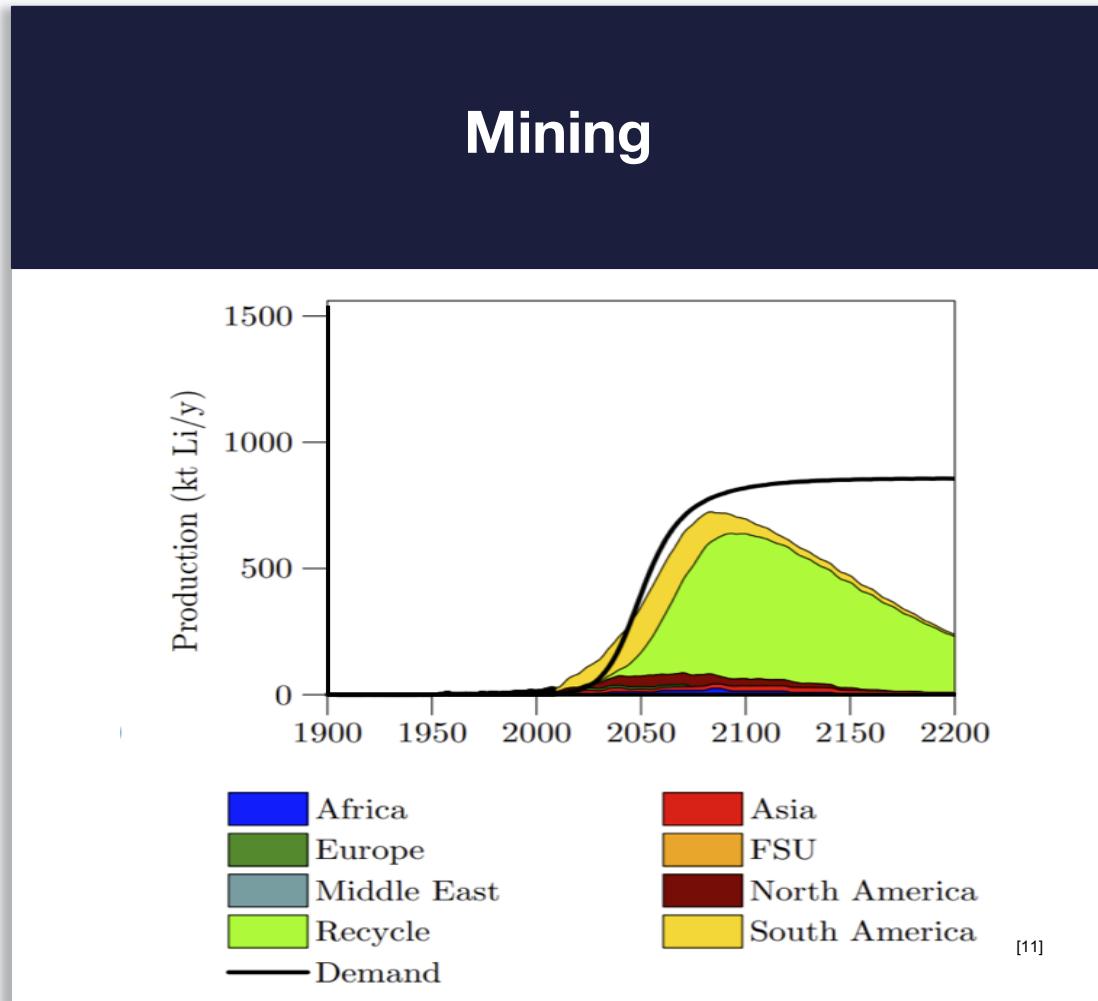
Solar Power

- Calgary Photovoltaic Potential: 1292 kWh/kW ^[9]
- Berlin Photovoltaic Potential: 848 kWh/kW ^[10]



Potential New Sectors

Finding a destination for displaced oil and gas workers



Global Transitions

Roadmaps for an Energy Transition



Sweden

- EU Energy Trading System
- Energy and carbon tax
- Expanding district heating networks
- Expanding public transport systems
- Carbon-free energy production



United Kingdom

- Investments in Renewables
- Maintaining Energy Security
- UK Carbon Trading Scheme
- Energy Savings
- Industrial Energy
- Smarter Systems



Canada

- Transition away from Coal
- Canada's NDC
- Pan-Canadian Framework on Clean Growth and Climate Change



94 of 115 countries have improved their combined Energy Transition Index score since 2015. [13]

The Role of Governments

Federal and Provincial Policy Recommendations



Energy Markets

Raise carbon taxes, remove subsidies & streamline regulation in electricity wholesale and retail markets



Reduce Consumption

Implement energy conservation and efficiency regulations and incentives



Renewable Energy Investments

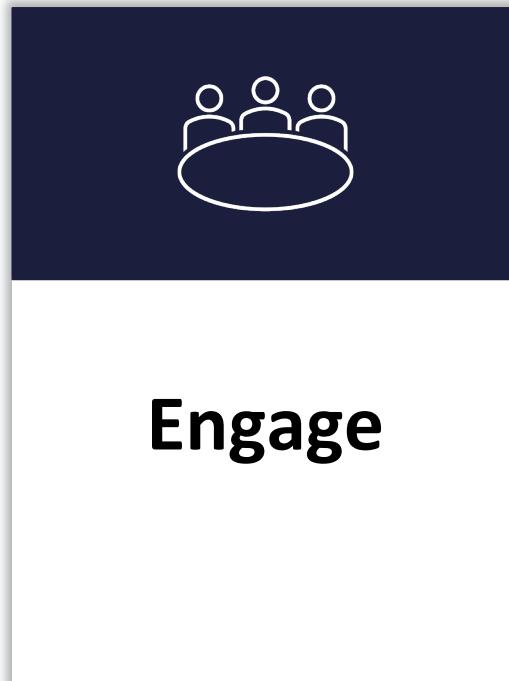
Use fiscal policies to encourage investment in technology and grid systems

All energy options must be assessed by availability, scalability, cost, environmental impacts and alternatives to ensure a viable transition plan.

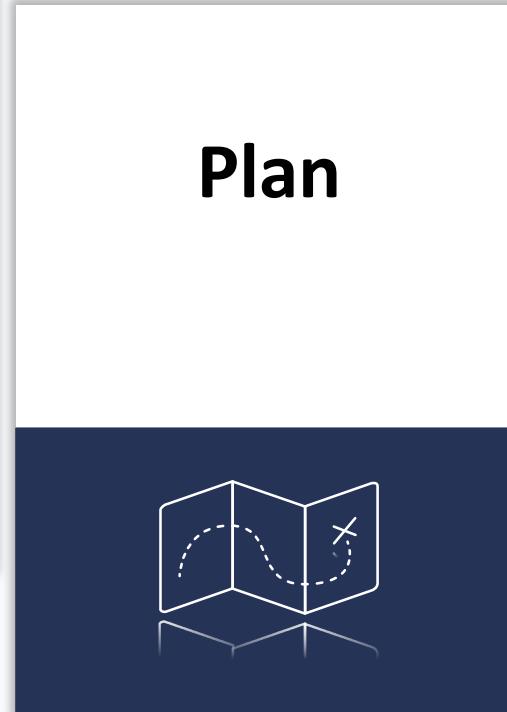


Transition of Businesses

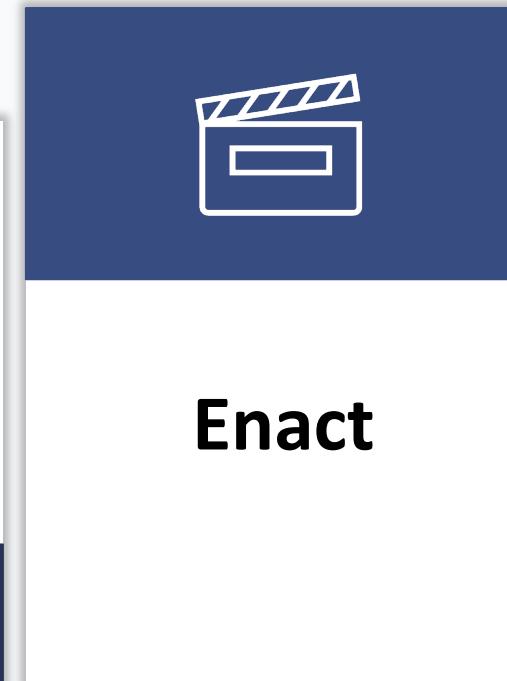
How can businesses take advantage of a transition



Engage



Plan



Enact



68% of investors identified that non-financial information was important to their financial decisions. [14]



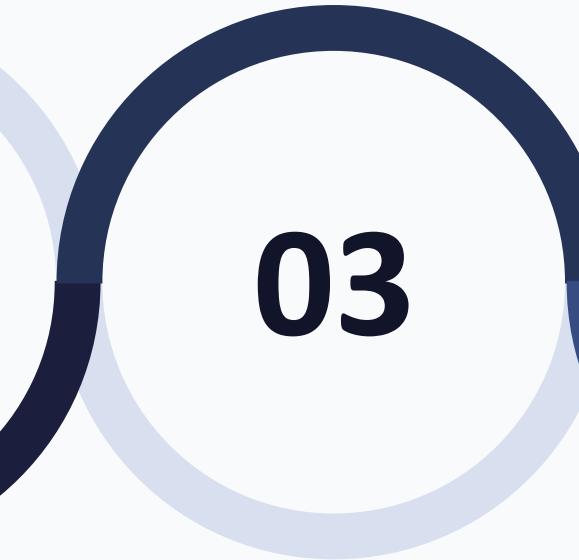
Utilization of Existing Infrastructure

Reduce GHG



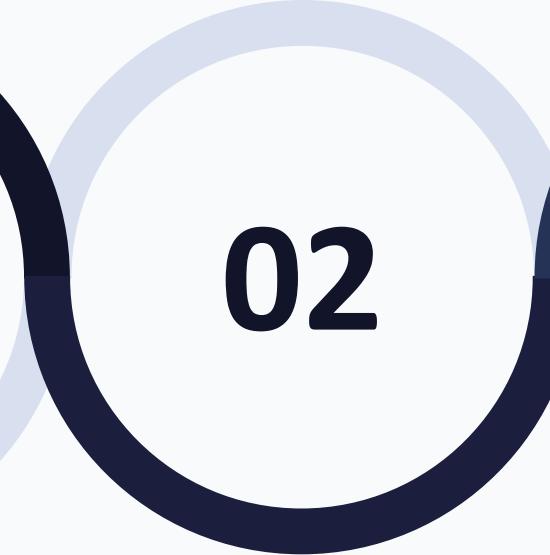
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Regulatory updates

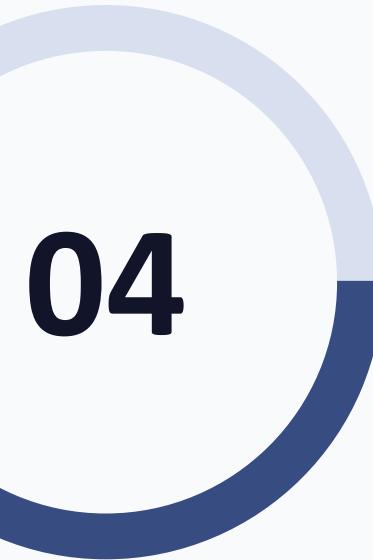


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Integrate renewable
energy



02

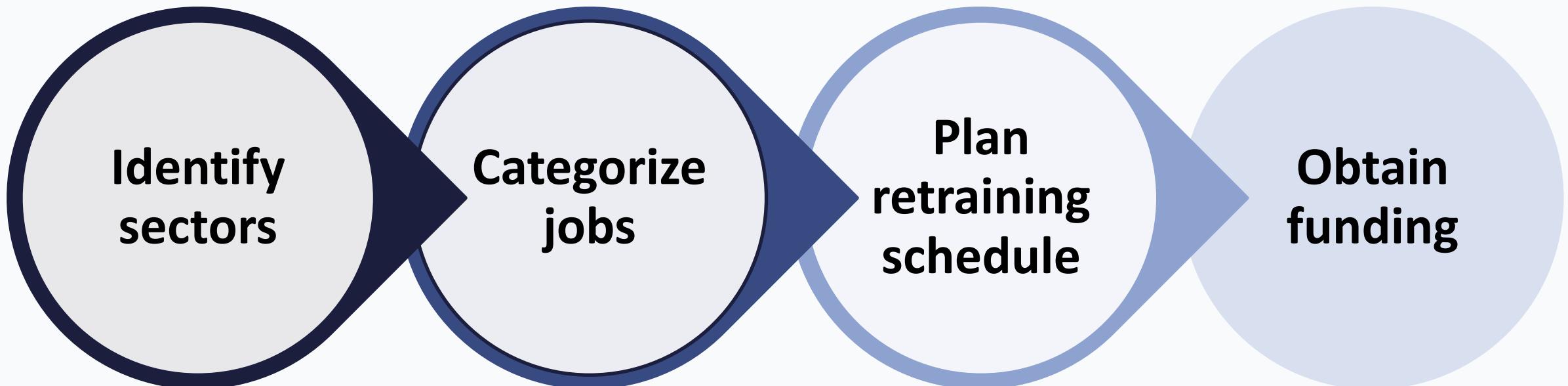


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Diversify product mix

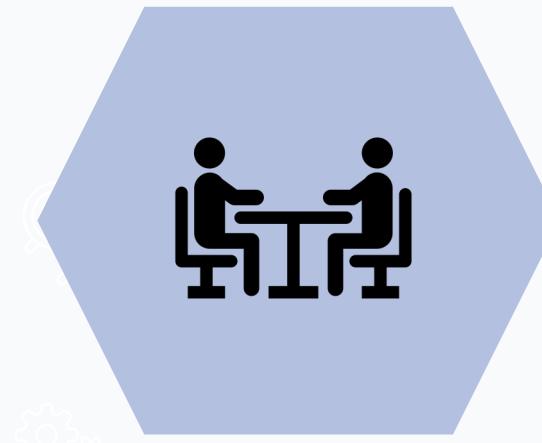
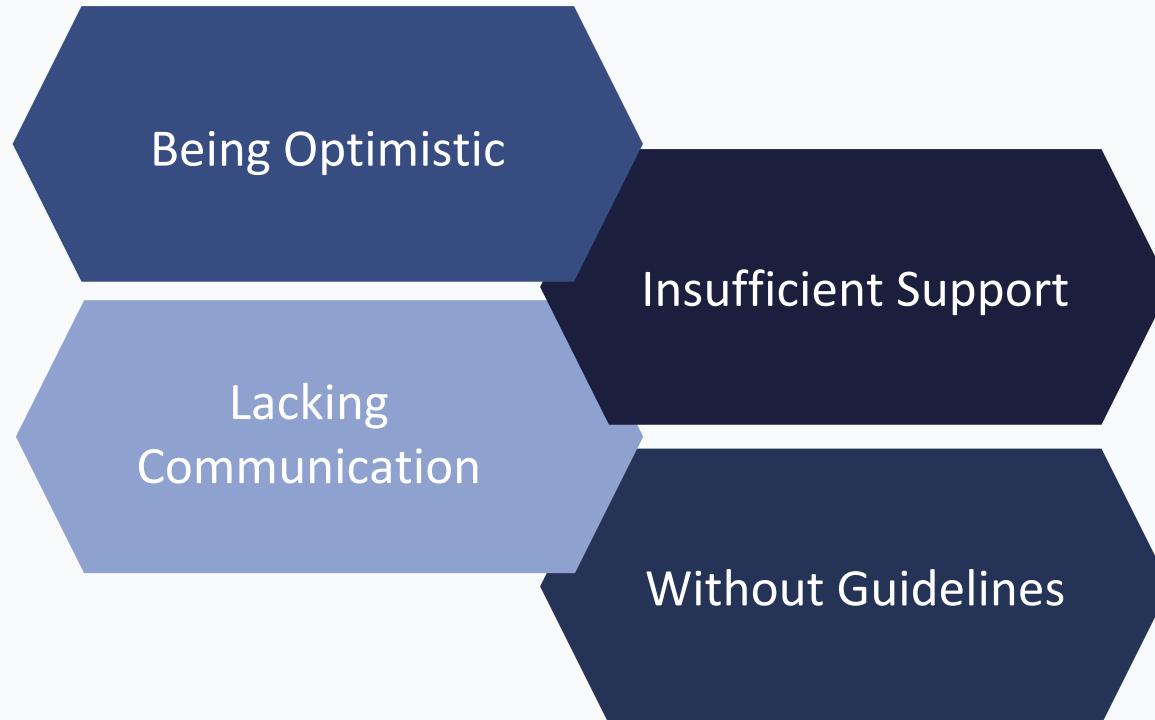
Training and Transitioning of Workers

Planning for a shift in skill demands



Achieving Public Support

The need for an effective communication channel



Community Involvement

Governments shall take the leadership role to make sure sufficient involvement of communities



**Transparent
System**

**Standards
&
Instructions**



**Scientific
Analysis**

Indigenous people are involved in more than 150 large-scale clean energy projects. [15]



Summary

**Global
Transitions &
the Role of
Governments**

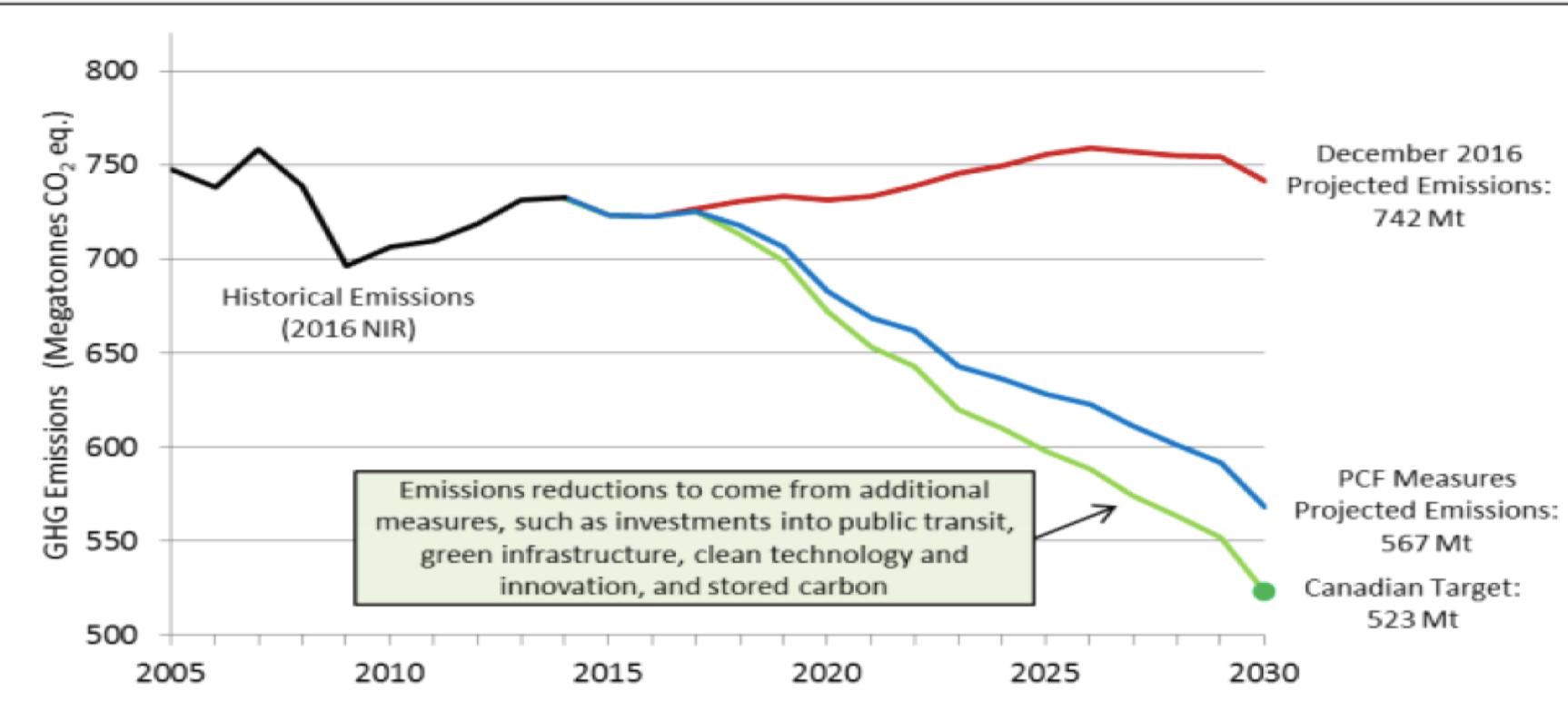
**Transitioning
Businesses &
Infrastructure**

**Transitioning
Workers**

**Public
Support &
Involvement**

We Need Action, Now

Figure 1: Pathway to Canada's 2050 target



¹ For more information on ECCC modeling of GHG projections, please see link.
(<https://www.canada.ca/en/services/environment/weather/climatechange/climate-action/modelling-ghg-projections.html>.)

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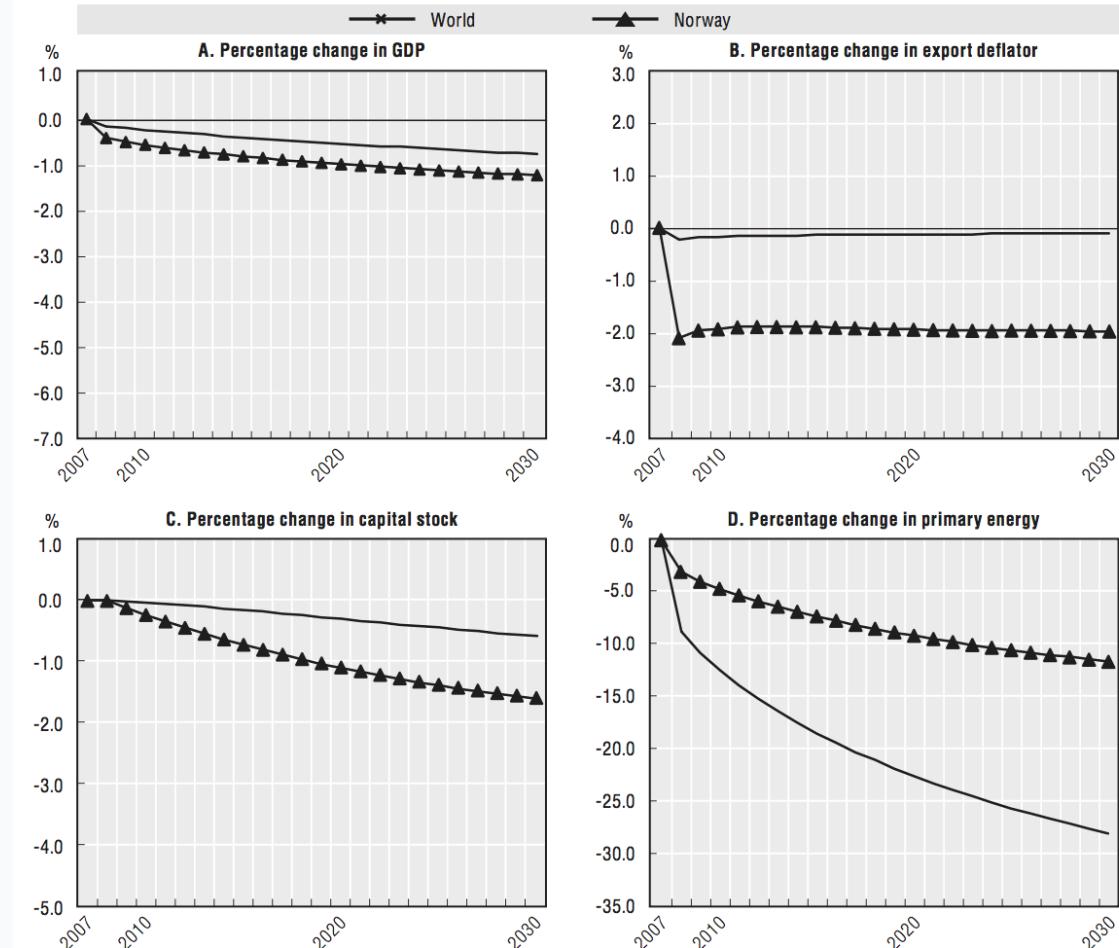
THANK YOU!

QUESTIONS?

Exhibit 1: Carbon Tax Success

- Norway has had carbon taxes since 1991
- The highest carbon tax rate was in 2015 at about \$71 Cdn./tonne of carbon dioxide (CO₂).
- Improved efficiencies resulting in an emissions intensity of 55 kg of CO₂ per tonne of oil equivalent produced, which is much less than the world average of 130 kg,
- Development of carbon capture project that injects CO₂ removed from natural gas into caverns below the sea floor.
- 40-per-cent reduction from 1990 to 2014 in Norway's energy intensity
- Loss in GDP is small

Figure 4. Norway



Source: ENV-Linkages results.

[Source](#)

Exhibit 2: Carbon Fiber

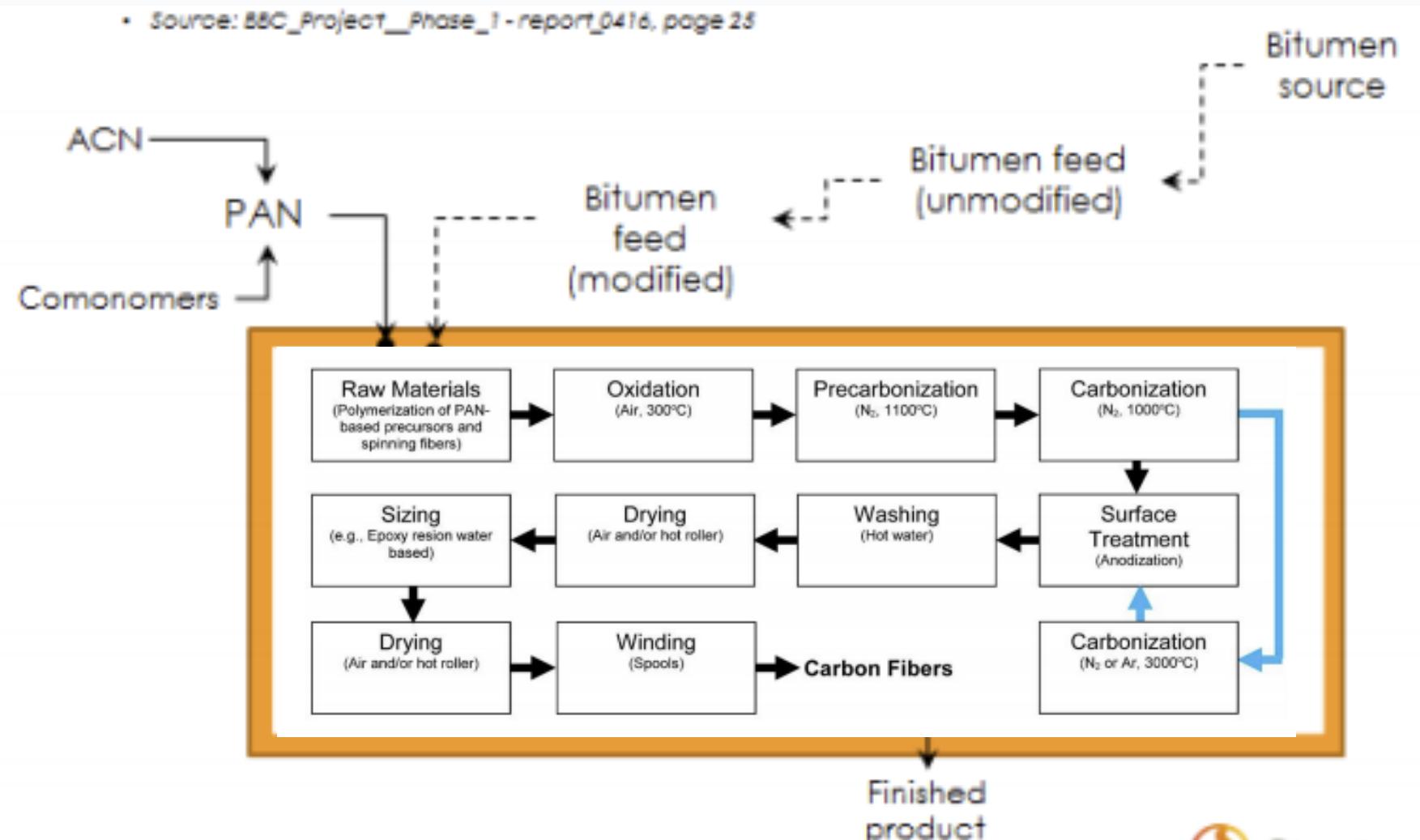


Exhibit 3: Canadian Grid Energy Intensity

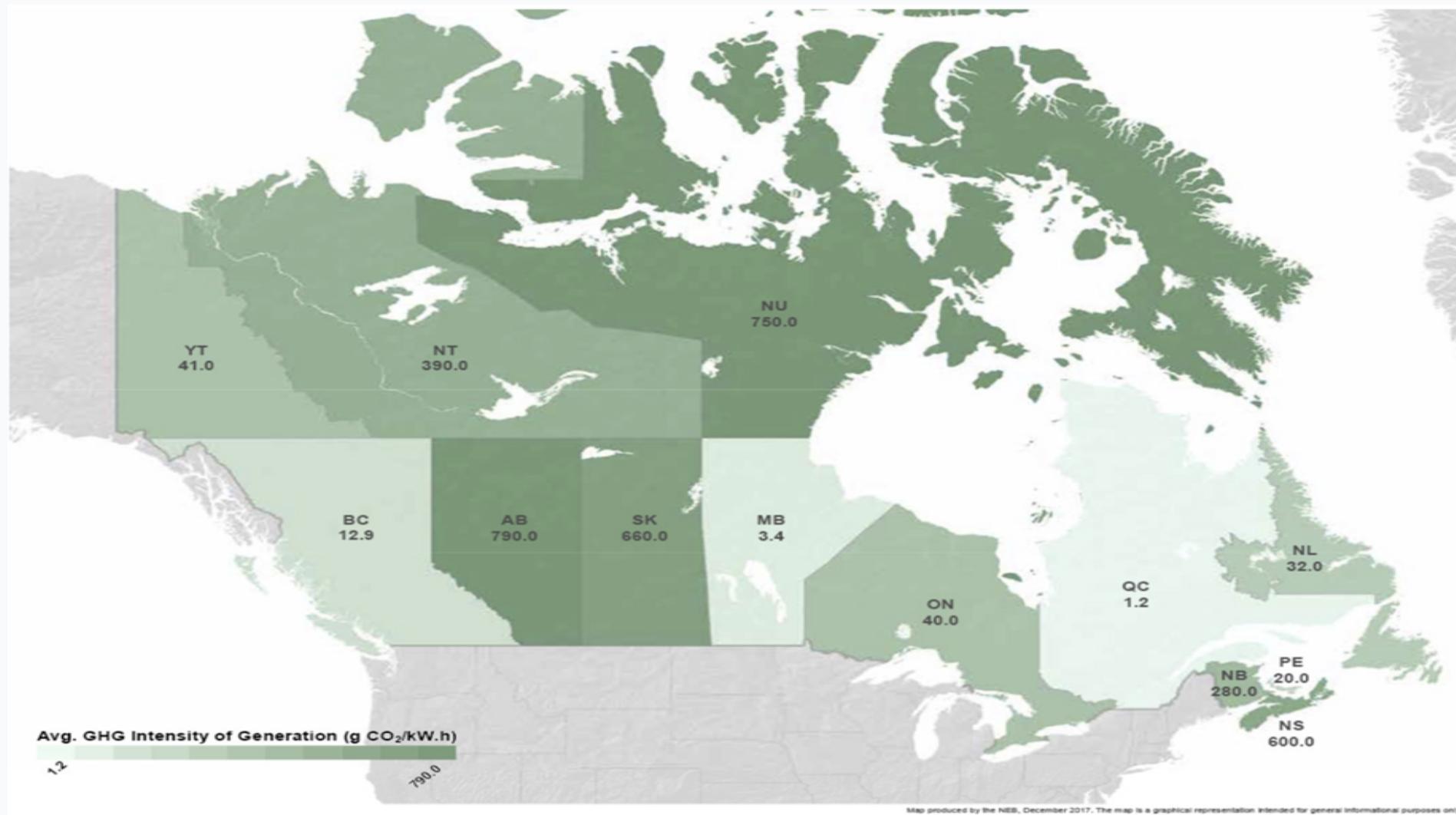


Exhibit 4: Lifecycle Greenhouse Gas Intensity

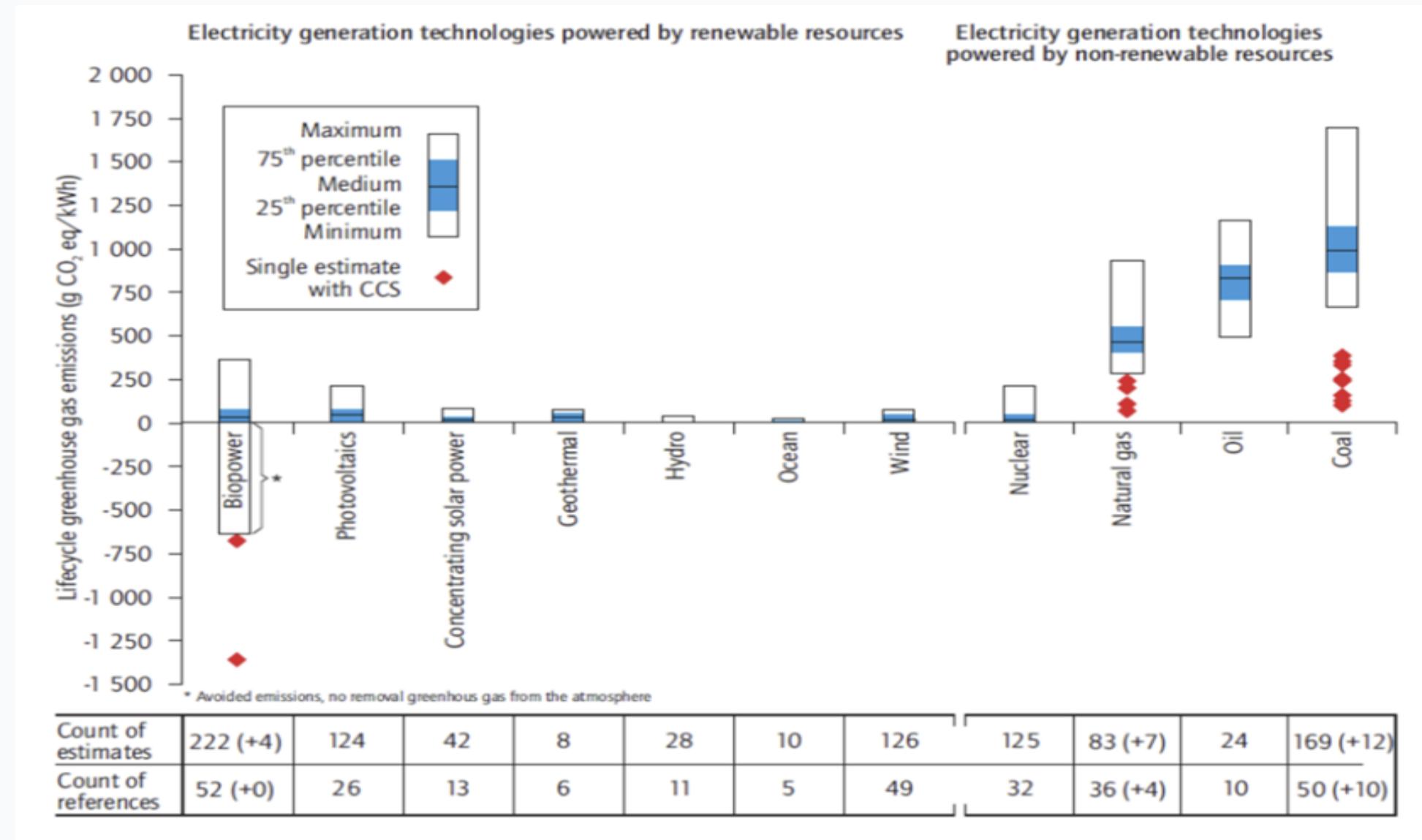
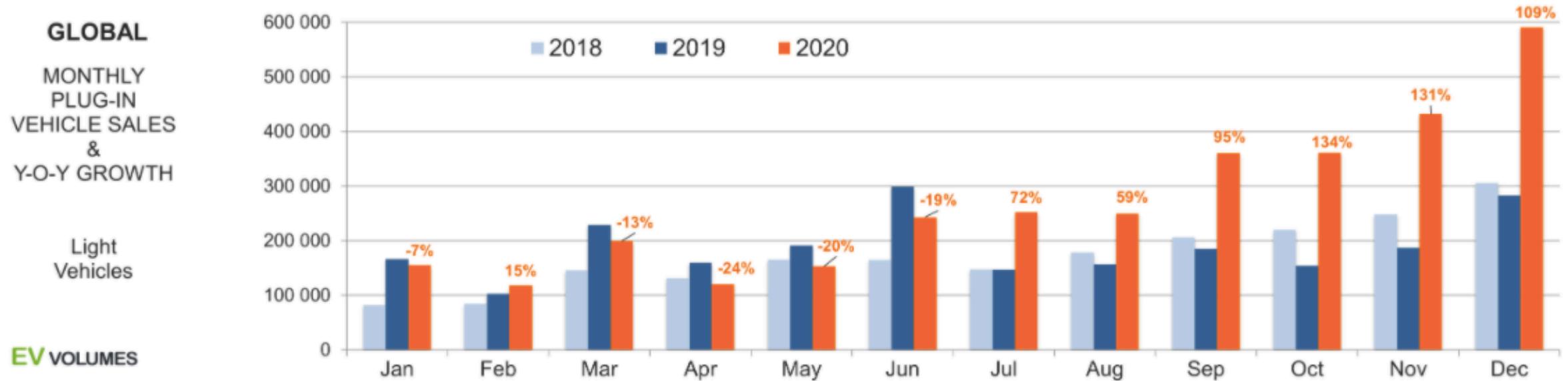


Exhibit 5: Alberta's Energy Outlook

Year	Coal	Cogen	CC Gas	GT	Coal-to-Gas	Hydro	Wind	Solar	Other	Total
2017	6,299	4,934	1,746	916	0	894	1,445	0	479	16,713
2022	3,849	5,024	1,746	1,059	1,581	894	3,045	200	479	17,877
2027	2,904	5,114	2,656	1,249	2,371	894	5,045	400	479	21,112
2032	0	5,204	5,386	1,486	2,371	1,244	6,445	700	479	23,315
2037	0	5,339	6,751	2,769	790	1,244	6,445	1,000	479	24,817

Exhibit 6: Global Monthly Plug-in Vehicle Sales (2018-2020)



Reference: Global Plug-in Vehicle Sales Reached over 3.2 Million in 2020 by Roland Irl, EV-volumes.com

Exhibit 7: Final Recommendations

- 1. Establish competitive and international energy markets in Canada to create an incentive for investments in energy efficient and renewable technologies.**
 - Implement larger carbon tax, sulphur tax, and nitrogen oxide emissions charges to impact price signals.
- 2. Phase out fossil fuel subsidies to reduce consumption.**
- 3. Implement energy conservation and efficiency regulations and incentives.**
 - Improve infrastructure, include building retrofits, develop efficient mass transits systems and enhanced building codes.
- 4. Encourage investment into renewable technology through fiscal policies.**
 - Invest in developing technology that addresses current renewable energy limitations including the intermittency of solar and wind power and backup requirements.
 - Invest in innovative grid systems to support new power demand from the electrification of transport.
 - Improve mandates for fuel-efficiency standards in cars and trucks and implementing fuel taxes to provide incentives for cleaner transportation options.

Exhibit 7: Final Recommendations

5. Engage and consult with workers, their unions, and other stakeholders.

- Ensure open social dialogue so regionally specific transition plans can be built.
- Gather information to improve processes and develop new technologies or innovations capable of reducing emissions and waste or promoting resource efficiency.
- Analyze and agree on different alternatives for climate action by the business or in the sector.
- Forecast and identify pathways to maximize the positive influence of company-wide climate action for its workers and communities.
- Forecast skills required and employment prospects and design appropriate training services.
- Develop and advocate for government policies to support a transition, specifically for workers in high carbon sectors that are vulnerable, and push for job creation and development.

6. Collaborate with various businesses to create a specific, time-bound, plan for a just transition.

- Identify ways that they can reduce emissions in the short, medium, and long term, and evaluate the consequences of implementing them.
- Redeploy workers in new areas or hire additional workers from high-emission areas to clean businesses sectors.
- Include short and long-term targets to produce reductions in emissions company-wide in accordance with emissions reduction targets for net-zero emissions.
- Consider vulnerable workers and communities and the risks that they might face with regards to a just transition and include risk managing steps for these groups.
- Aim to create sustainable and transition-proof jobs within the company and its supply chains.
- Provide infrastructure to reskill and redeploy existing workers in the company's transition.
- Push for investment in community diversification of affected groups.

Exhibit 7: Final Recommendations

7. Continuously monitor, report, and engage in social dialogues to iterate and improve the enacted transition plan.

- Companies should provide continuous training and support to their workers such that their skills remain in demand in a transitioning market.
- Include continuous training and learning opportunities in green business practices.
- Include training and learning opportunities in occupational health and safety.
- Include reskilling and upskilling in sustainable and environmentally friendly innovations.
- Ensure that the company includes training that results in certification.

8. Utilize Existing Infrastructure

- Adapt existing oil extraction infrastructure to upgrade bitumen extracted in the oil sands to synthetic crude oil which can then be refined to different chemical feedstocks.
- Ensure proper closure and regulation of closed wells to reduce methane leakage.
- Reduce life-cycle greenhouse gas emissions for oil and gas extraction lower than competing global markets.
- Implement carbon capture and sequestration technologies.
- Integrate renewable energy as the sole supplier of energy for extraction, includes eliminating natural gas burning to produce steam for SAGD extraction.
- Report consistent regulatory updates by third party assessment to evaluate environmental impact.
- Ensure diversified product mix away from combustible fuels.

Exhibit 7: Final Recommendations

9. Train and Transition Workers to New Sectors

- Consult with community members, workers, unions, and government at all levels to ensure the needs of the economy and the communities are met.
- Identify job specificity to the oil and gas industry, jobs can be categorized into no training required, some training required, and complete retraining required.
- Once equivalent jobs in new sectors are identified, estimate the time and cost required for retraining based on trade schools, licenses, certifications, or college and university training required.
- Include early retirement packages for employees that will be negatively impacted by a transition and are not able to switch careers.
- Encourage, and potentially subsidize, colleges and universities to create specific programs to retrain workers in the fossil fuel industry.
- Be cognisant of communities that will be more heavily impacted by these transitions.

10. Achieve Public Support

- Collaborate between various level of government to build a Canadian energy system.
- Build a government-owned platform, host workshops, or establish an institute that assisting communities to have a clear understanding of standards and instructions on the energy transition.
- Provide scientific analysis and accurate, timely data as the base evidence on communities' decision-making process.
- Construct a transparent communication channel ensures there is no information gap between governments, affected communities, and interested parties.