



AS THE WEATHER CHANGES

How clean growth and climate action in Canadian communities will be shaped by global economic trends

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About the PLACE Centre

The PLACE Centre, which stands for Propelling Locally Accelerated Clean Economies, focuses on the complex challenges limiting clean economic growth in Canadian communities. Our core approach is “place-based”, meaning the PLACE team works with all levels of government, industry, and civil society organizations to ensure regions across Canada have the solutions needed to overcome the challenges they face in advancing clean economic growth. With this approach, the PLACE team can create practical, place-based recommendations where everyone involved can collaborate and work towards making progress in solving these problems. That way, every region and community across the country can be included in, and benefit from, Canada’s growing clean economy.

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About Smart Prosperity Institute

Smart Prosperity Institute is a national research network and policy think tank based at the University of Ottawa. We deliver world-class research and work with public and private partners—all to advance practical policies and market solutions for a stronger, cleaner economy.

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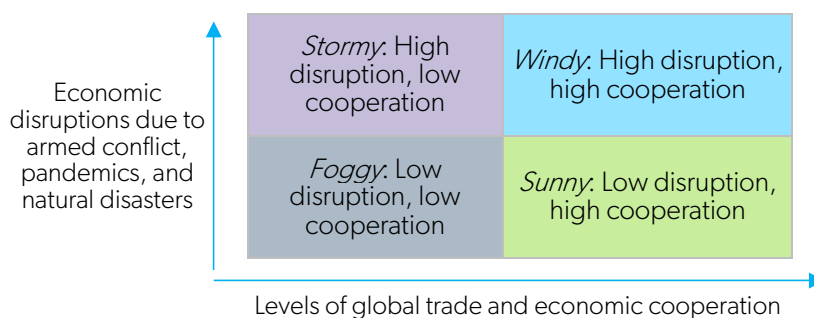
Executive summary - English

The global economy is changing. The war in Ukraine, shifts towards more protectionist economic stances, the ongoing global pandemic, and increasing natural disasters from climate change have raised the cost of living for households and slowed economic growth across the world. Policymakers in all levels of governments across the country face a challenge in navigating a future beset by uncertainty about how each trend might play out in the coming years, and how Canadians might be affected. Yet not every change happening globally will be negative for communities across Canada. Climate action, and the shift towards a zero-carbon economy, will create millions of jobs and attract hundreds of billions of dollars in investment for regions across the country. By developing smart and thoughtful approaches and policies, each community has opportunities to grab a piece of this multi-trillion-dollar market opportunity.

The choices communities make to grow their clean economies will be shaped by trends occurring outside our borders. Disruptions to supply chains from conflict, pandemics, and increasing natural disasters will impact the costs of commodities like oil, gas, and critical minerals. Increases or decreases in trade or protectionism will influence how much other countries prioritize climate action as well as change the costs and availability of low-carbon technologies. While we cannot know exactly how each trend will play out in the coming years, policymakers looking to advance clean growth across the country need to be prepared to navigate them. This report is a foresight exercise to help Canadian policymakers across the country develop smart and thoughtful clean growth policies that create jobs and attract investment in an uncertain global future. This work models four potential global futures in which Canada meets its 2030 greenhouse gas emissions reduction target using existing provincial and federal policies. This report then details how jobs and investment in the provinces and territories could be affected by these changes in the global economy under each future, and offers recommendations for what is needed to ensure prosperity. Each of the four global scenarios represents a future for Canada shaped by two global trends:

1. Global disruptions to the economy due to armed conflict, pandemics, and natural disasters.
2. Changes in the levels of global trade and economic cooperation.

Figure 1: Four scenarios used in this report to represent the world in the coming decade



Key findings from this report

- **Clean growth and climate action will create jobs, attract investment and benefit Canada's economy, regardless of what occurs globally by 2030.** Across all scenarios, climate action in Canada will create tens of thousands of jobs and attract tens of billions in investment. The best outlook - a *Sunny* future (low disruption, high cooperation) - will create over 300,000 new jobs within the decade. The least favourable outlook - a

Foggy future (low disruption, low cooperation) - will still create almost 28,000 jobs.¹ Levels of investment will also increase by tens of billions (\$29 billion - \$49 billion) into the clean economy by 2030 across any future.²

- **Zero emissions electricity generation, transportation, and distribution infrastructure – i.e. clean power – is a smart investment to create jobs and improve energy.** Investment into Canadian utilities (a category that includes electricity generation, transmission, and distribution) looks set to grow by \$13 billion – \$21 billion within the decade. Additionally, the utilities sector looks set to create between 6,100 – 13,900 jobs across the country by 2030. This sector offers a stable economic outlook across scenarios, making it a smart investment. Additionally, under all scenarios except *Stormy*, job growth in clean energy is expected to outpace job growth in the oil and gas sector, even if it attracts less investment.
- **Canada’s construction sector will be the country’s largest clean economy job creator by 2030.** The construction sector is the largest creator of new jobs in all futures except one. Yet even in *Sunny*, a future where manufacturing creates 162,000 new jobs, the construction sector is expected to create 142,000 new roles. In oil and gas-producing Alberta and Saskatchewan, the construction sector is expected to create at least twice as many jobs as the combined oil and gas production, distribution and services industries across all futures.
- **Canada’s forestry sector is expected to grow across all futures, while jobs in agriculture are expected to decline – in every province and territory, and almost every future.** Across all futures, jobs in forestry are set to grow nationally by 6,000 – 8,500 roles, while agricultural roles are set to decline by 17,300 – 38,700 roles. Critically, this growth in forestry jobs and decline in agriculture roles occurs in every province and territory across multiple futures, with only a few exceptions. However, this analysis does not incorporate any reductions in wood fibre supply or take the growth of seasonal farm workers into account, which could change these results for both sectors.
- **Oil and gas production, refining, distribution, and services only creates jobs in a world with high levels of economic disruption, but increased investment does not always lead to more jobs.** Additional jobs in the oil and gas industries are only seen in scenarios where global disruptions are high. This occurs because global disruptions are associated with increases in commodity prices, making additional production more economically viable. However, this analysis shows increased investment in oil and gas industries does not always create jobs. In a *Foggy* future, investment into these sectors increases by roughly \$7 billion dollars, but the sectors still lose approximately 14,000 jobs by 2030.

Which regions across Canada are expected to be impacted by 2030?

- Growth in electricity generation, transmission, and distribution will create between 6,100 – 14,500 jobs in Canada’s growing clean electricity sector. Many of these jobs will be created in regions with high potential for renewables, and could include **the Annapolis Valley, South Shore, and Bay of Fundy regions in Nova Scotia; the Inuvik region and Sahtu Region in the Northwest Territories; the Mayo, Gwich’in, and White River First Nation communities in the Yukon; and the Kivalliq Region of Nunavut.**
- The outlook for job growth in manufacturing will range between creating 162,000 jobs, to declining by 31,400 roles across the country. This varies based on the costs of commodities and technology. Communities that could be affected most by this change in jobs include **the Pembina Valley region, and the regions around Winnipeg and Portage la Prairie, in Manitoba; communities such as Windsor, Woodstock,**

¹ *Stormy* and *Windy* result in the creation of 104,000 and 61,000 jobs by 2030 respectively.

² *Stormy* and *Windy* result in the attraction of approximately \$45 billion and \$40 billion of investment by 2030 respectively.



London, Guelph, and Kitchener in Southwestern and Southern Ontario; and Quebec City, boroughs around Montreal such as Saint Laurent, and smaller cities like Saint Jean sur Richelieu in Quebec.

- Agriculture is expected to experience job declines across all scenarios. However, the sector may see some job creation Atlantic Canada. In some scenarios, hundreds of new jobs could be created in and around **regions such as Stratford, Summerside, Kensington, and North Wiltshire in Prince Edward Island.**
- Canada's forestry sector is expected to create between 6,000 – 8,500 jobs across the country, with job growth concentrated in regions where forest jobs are prevalent. These could include **the Cariboo economic region (Prince George, Williams Lake, and Quesnel) in British Columbia; and regions surrounding Edmundston and Miramichi, New Brunswick.**
- Jobs in oil and gas production, distribution and services are heavily influenced by global factors. The industry could either grow by 59,000 jobs or decline by 29,000 roles. This could impact **the Wood Buffalo-Cold Lake region in Alberta; Clarendville-Bonavista and the Avalon and Burin Peninsulas in Newfoundland and Labrador; and, regions around Lloydminster, Kindersley-Kerrobert, Swift Current, and Weyburn-Estevan in Saskatchewan.**
- Changes in the production of biofuels, a sector that will create between 1,900 – 9,500 jobs, will have the largest impacts on jobs in regions where biofuel production is already occurring. These could include **regions around Lethbridge and Lloydminster in Alberta; Weland, Sarnia, and Hamilton in Ontario; Belle Plains in Saskatchewan; and Brooklyn and Port Hawkesbury in Nova Scotia.**

Recommendations

1. **Canada should continue implementing existing and pledged climate policies, regardless of what happens globally**, including those outlined in the federal *Healthy Environment, Healthy Economy Plan*, and the *Emissions Reductions Plan*.
2. Canada should take a place-based approach to supporting this growth by:
 - a. **Invest in emerging clean growth clusters in regions who will be hit hardest by global trends** using federal programs like the Strategic Innovation Fund and the Canada Growth Fund.
 - b. **Ensuring regions primed for growth in periods of change have everything they need to realize these opportunities** by working with provincial governments to build more housing, improve access to capital for SMEs to scale their operations, and reduce interprovincial trade barriers.
3. **Governments need to prepare as tens, or even hundreds, of thousands of new workers move between industries in communities across the country** by growing programs like the Sectoral Workforce Solutions Program, and advancing the Sustainable Jobs Training Centre.
4. **Canada needs to strengthen greenhouse gas regulations on the oil and gas sector to ensure global volatility does not derail our climate goals** by implementing a stringent emissions cap on oil and gas and tight regulations on methane emissions.

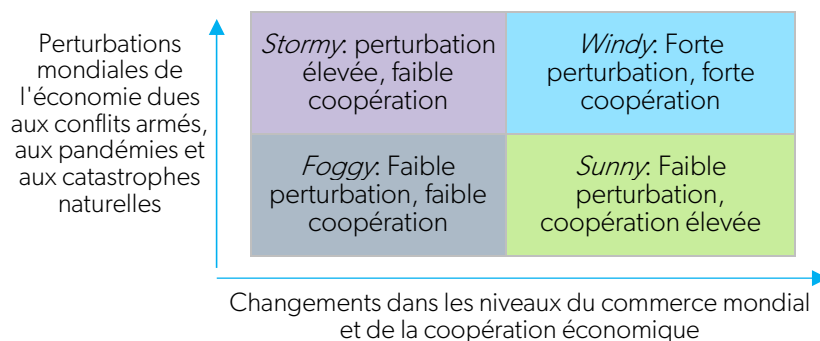
Résumé exécutif - Français

L'économie mondiale est en train de changer. La guerre en Ukraine, l'évolution vers des positions économiques plus protectionnistes, la pandémie mondiale en cours, et les catastrophes naturelles dues au changement climatique ont augmenté le coût de la vie pour les familles, et ralenti la croissance économique. Tous les niveaux de gouvernement à travers le pays doivent relever le défi de naviguer dans un avenir en proie à l'incertitude quant à la façon dont chaque défi pourrait se dérouler dans les années à venir et comment les Canadiens pourraient être affectés. Pourtant, tous les changements qui se produisent à l'échelle mondiale ne seront pas négatifs pour toutes les collectivités du pays. L'action climatique et la transition vers une économie sans carbone créeront des millions d'emplois et attireront des centaines de milliards de dollars d'investissements dans toutes les régions canadiennes. En développant des approches et des politiques intelligentes et réfléchies, chaque communauté a la possibilité de saisir une partie de cette opportunité de marché.

Les choix que font les communautés pour développer leurs économies propres seront façonnés par les tendances qui se produisent à l'extérieur de nos frontières. Les perturbations des chaînes d'approvisionnement dues aux conflits, aux pandémies et à l'augmentation des catastrophes naturelles auront un impact sur les coûts des matières premières telles que le pétrole, le gaz et les minéraux dans l'économie. L'augmentation ou la diminution du commerce, ou du protectionnisme, influencera la priorité accordée par les autres pays à l'action climatique et modifiera les coûts et la disponibilité des technologies à faible émission de carbone. Bien que nous ne puissions pas savoir exactement comment chaque tendance se déroulera dans les années à venir, les leaders qui cherchent à faire progresser la croissance propre à travers le pays doivent être prêts à y faire face. Ce rapport est un exercice visant à aider les leaders canadiens à élaborer des politiques de croissance intelligentes et réfléchies et créer des emplois pour attirer des investissements dans un avenir mondial incertain. Ce travail modélise quatre versions de cet avenir dans lesquelles le Canada atteint son objectif de réduction des émissions de gaz à effet de serre de 2030 en utilisant les politiques provinciales et fédérales existantes. Ce rapport détaille ensuite comment les emplois et les investissements dans les provinces et les territoires pourraient être touchés par ces changements dans l'économie mondiale, et propose des recommandations sur ce qui est nécessaire pour assurer la prospérité. Chacun des quatre scénarios représente un avenir pour le Canada façonné de deux tendances mondiales :

1. Perturbations mondiales de l'économie dues aux conflits armés, aux pandémies et aux catastrophes naturelles.
2. Changements dans les niveaux du commerce mondial et de la coopération économique.

Figure: Quatre scénarios utilisés dans ce rapport pour représenter le monde dans la décennie à venir



Principales conclusions de ce rapport

- **La croissance propre et l'action climatique créeront des emplois, attireront des investissements et profiteront à l'économie canadienne, peu importe ce qui se passe à l'échelle mondiale d'ici 2030.** Dans tous les scénarios, l'action climatique au Canada créera des dizaines de milliers d'emplois et attirera des dizaines de milliards d'investissements. Les meilleures perspectives - un avenir Sunny (peu de perturbations, forte coopération) - créeront plus de 300 000 nouveaux emplois au cours de la décennie. Les perspectives les moins favorables - un avenir Foggy (faible perturbation, faible coopération) - créeront tout de même près de 28 000 emplois.³ Les niveaux d'investissement augmenteront également de dizaines de milliards de dollars (29 milliards de dollars - 49 milliards de dollars) dans l'économie propre d'ici 2030, quel que soit l'avenir.⁴
- **L'infrastructure de production, de transport et de distribution d'électricité à zéro émission - c'est-à-dire l'énergie propre - est un investissement intelligent pour créer des emplois et améliorer l'énergie.** Les investissements dans les services publics canadiens (une catégorie qui comprend la production, le transport et la distribution d'électricité) devraient augmenter de 13 à 21 milliards de dollars au cours de la décennie. De plus, le secteur des services publics devrait créer entre 6 100 et 13 900 emplois à travers le pays d'ici 2030. Ce secteur offre des perspectives économiques stables dans tous les scénarios, ce qui en fait un investissement intelligent. De plus, dans tous les scénarios à l'exception de *Stormy*, la croissance de l'emploi dans l'énergie propre devrait dépasser la croissance de l'emploi dans le secteur pétrolier et gazier, même si elle attire moins d'investissements.
- **Le secteur canadien de la construction sera le plus grand créateur d'emplois de l'économie propre du pays d'ici 2030.** Le secteur de la construction est le plus grand créateur de nouveaux emplois dans tous les futurs sauf un. Pourtant, même à Sunny, un avenir où la fabrication crée 162 000 nouveaux emplois, le secteur de la construction devrait créer 142 000 nouveaux emplois. Dans les régions productrices de pétrole et de gaz de l'Alberta et de la Saskatchewan, le secteur de la construction devrait créer au moins deux fois plus d'emplois que les industries combinées de la production, de la distribution et des services de pétrole et de gaz à l'avenir.
- **Le secteur forestier du Canada devrait croître dans tous les futurs, tandis que les emplois dans l'agriculture devraient diminuer - dans chaque province et territoire, et presque tous les futurs.** Dans tous les futurs, les emplois dans le secteur forestier devraient augmenter à l'échelle nationale de 6 000 à 8 500 postes, tandis que les postes agricoles devraient diminuer de 17 300 à 38 700 postes. Cette croissance des emplois forestiers et le déclin des rôles agricoles se produisent dans chaque province et territoire dans de multiples futurs, à quelques exceptions près. Cependant, cette analyse n'intègre aucune réduction de l'offre de fibre de bois ni ne tient compte de la croissance des travailleurs agricoles saisonniers, ce qui pourrait modifier ces résultats pour les deux secteurs.
- **La production, le raffinage, la distribution et les services de pétrole et de gaz ne créent des emplois que dans un monde marqué par de fortes perturbations économiques, mais l'augmentation des investissements ne conduit pas toujours à davantage d'emplois.** Des emplois supplémentaires dans les industries pétrolières et gazières ne sont visibles que dans les scénarios où les perturbations mondiales sont importantes. Cela se produit parce que les perturbations mondiales sont associées à des augmentations des prix des produits de base, ce qui rend la production supplémentaire plus viable économiquement. Cependant, cette analyse montre que

³ *Stormy* et *Windy* entraînent la création de 104 000 et 61 000 emplois d'ici 2030 respectivement.

⁴ *Stormy* et *Windy* attirent respectivement environ 45 milliards de dollars et 40 milliards de dollars d'investissements d'ici 2030.



l'augmentation des investissements dans les industries pétrolières et gazières ne crée pas toujours d'emplois. Dans un avenir brumeux, les investissements dans ces secteurs augmenteront d'environ 7 milliards de dollars, mais ces secteurs perdront encore environ 14 000 emplois d'ici 2030.

Quelles régions du Canada devraient être touchées par ces tendances d'ici 2030?

- La croissance de la production, de la transmission et de la distribution d'électricité créera entre 6 100 et 14 500 emplois dans le secteur en pleine croissance de l'électricité propre au Canada. Bon nombre de ces emplois seront créés dans des régions à fort potentiel d'énergies renouvelables, et pourraient inclure **la vallée d'Annapolis, la rive sud et la baie de Fundy en Nouvelle-Écosse; la région d'Inuvik et la région du Sahtu dans les Territoires du Nord-Ouest; Mayo, les communautés Gwich'in et les communautés de la Première Nation de White River au Yukon; et la région de Kivalliq au Nunavut.**
- Les perspectives de croissance de l'emploi dans le secteur manufacturier oscilleront entre la création de 162 000 emplois et une baisse de 31 400 postes à l'échelle du pays. Cela varie en fonction des coûts des matières premières et de la technologie. Les collectivités qui pourraient être les plus touchées par ce changement d'emplois comprennent **les régions autour de Winnipeg et de Portage la Prairie, et la région de Pembina Valley au Manitoba; des collectivités comme Windsor, Woodstock, London, Guelph et Kitchener dans le sud-ouest et le sud de l'Ontario; et, la ville de Québec, les arrondissements autour de Montréal comme Saint Laurent et les petites villes comme Saint Jean sur Richelieu au Québec.**
- L'agriculture devrait connaître des baisses d'emplois dans tous les scénarios. Cependant, le secteur pourrait connaître une certaine création d'emplois au Canada atlantique. Dans certains scénarios, des centaines de nouveaux emplois pourraient être créés dans et autour **de régions telles que Stratford, Summerside, Kensington et North Wiltshire à l'Île-du-Prince-Édouard.**
- Le secteur forestier canadien devrait créer entre 6 000 et 8 500 emplois à travers le pays, la croissance de l'emploi étant concentrée dans les régions où les emplois forestiers sont répandus. Ceux-ci pourraient inclure **la région économique de Cariboo (Prince George, Williams Lake et Quesnel) en Colombie-Britannique; et les régions entourant Edmundston et Miramichi, Nouveau-Brunswick.**
- Les emplois dans la production, la distribution et les services pétroliers et gaziers sont fortement influencés par des facteurs mondiaux. L'industrie pourrait soit croître de 59 000 emplois, soit décliner de 29 000 postes. Cela pourrait avoir des répercussions sur **la région de Wood Buffalo-Cold Lake en Alberta, sur les péninsules d'Avalon et de Burin et sur Clarenville-Bonavista à Terre-Neuve-et-Labrador; et les régions autour de Lloydminster, Kindersley-Kerrobert, Swift Current et Weyburn-Estevan en Saskatchewan.**
- Les changements dans la production de biocarburants, un secteur qui créera entre 1 900 et 9 500 emplois, auront les impacts les plus importants sur les emplois dans les régions où la production de biocarburants est déjà en cours. Celles-ci pourraient inclure **des régions autour de Lethbridge et Lloydminster en Alberta; Weland, Sarnia et Hamilton en Ontario; Belle Plains en Saskatchewan; et Brooklyn et Port Hawkesbury en Nouvelle-Écosse.**

Recommandations

1. Le Canada devrait continuer à mettre en œuvre les politiques climatiques existantes et promises, peu importe ce qui se passe à l'échelle mondiale, y compris celles décrites



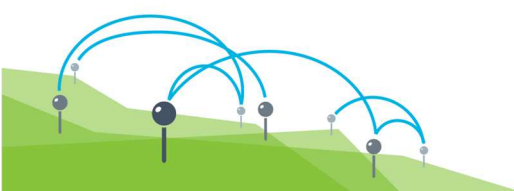
dans le plan fédéral pour un environnement sain, une économie saine et le plan de réduction des émissions.

2. Le Canada devrait adopter une approche axée sur le lieu pour soutenir cette croissance en :
 - a. Investir dans les grappes émergentes de croissance propre dans les régions qui seront les plus durement touchées par les tendances mondiales en utilisant des programmes fédéraux comme le Fonds stratégique pour l'innovation et le Fonds de croissance du Canada.
 - b. Veiller à ce que les régions prêtes à croître en période de changement disposent de tout ce dont elles ont besoin pour concrétiser ces opportunités en veillant à ce que le gouvernement provincial établisse des objectifs de construction de logements municipaux, améliore l'accès au capital pour les PME afin d'étendre leurs activités et réduit les obstacles au commerce interprovincial.
3. Les gouvernements doivent se préparer alors que des dizaines, voire des centaines de milliers de nouveaux travailleurs se déplaceront entre les industries dans les communautés à travers le pays en développant des programmes comme le Programme de solutions sectorielles pour la main-d'œuvre et en faisant progresser le Centre de formation pour des emplois durables.
4. Le Canada doit renforcer la réglementation sur les gaz à effet de serre dans le secteur pétrolier et gazier pour s'assurer que la volatilité mondiale ne fait pas dérailler nos objectifs climatiques en mettant en place un plafond d'émissions rigoureux pour le pétrole et le gaz et une réglementation stricte sur les émissions de méthane.



Table of Contents

Executive summary - English	3
Key findings from this report.....	3
Which regions across Canada are expected to be impacted by 2030?	4
Recommendations	5
Résumé exécutif - Français	6
Table of Contents	10
Introduction	11
Overview of analysis	12
Overview of the four scenarios.....	12
How results are shown in this report	16
Limitations of this analysis	16
National profile: Canada	17
Provincial profile: Alberta.....	19
Provincial profile: British Columbia.....	21
Provincial profile: Manitoba	23
Provincial profile: New Brunswick	25
Provincial profile: Newfoundland and Labrador	27
Provincial profile: Nova Scotia.....	29
Provincial profile: Ontario	31
Provincial profile: Prince Edward Island	33
Provincial profile: Quebec	35
Provincial profile: Saskatchewan	37
Territorial profile: Northwest Territories, Nunavut and Yukon.....	39
Key findings	41
Recommendations	43
Conclusion	45
Appendices/Annexes	47
Appendix 1: Description of gTech model used for analysis in this report	47
Appendix 2: Overview of climate policies modelled in each scenario	47
Appendix 3: Overview of four scenarios modelled in this report, with assumptions used in each scenario	48
References	51



Introduction

The global economy is changing. Ambitious investments in the clean economy are reducing greenhouse gas emissions, creating jobs, and attracting investment all over the world, with the global cleantech market expected to reach \$3.3 trillion CAD in 2022 (Borish, 2020). However, this global shift towards a zero emissions world is happening as the economy changes in other ways. Disruptions from global conflicts like the war in Ukraine, the COVID-19 pandemic, and natural disasters such as hurricanes, floods, and droughts have negatively impacted growth and trade. The International Monetary Fund stated that 2023's global growth outlook is the worst in the last twenty years (International Monetary Fund, 2022). Additionally, decreased rates of economic cooperation and changes in trade patterns as countries look inward could cost countries billions in the coming decade through tariffs and trade barriers (International Monetary Fund, 2022). These global trends will affect every country and every industry in world in the years to come, including Canada.

However, even if future global economic disruption and cooperation affect regional economies across Canada, they do not fundamentally change the benefits of Canada acting boldly to grow its clean economy and reduce its own greenhouse gas emissions. Canadian communities still have an opportunity to attract investment into emerging clean growth clusters across the country, create millions of new jobs, and reduce the cost of living for households while improving our energy security. Yet as a nation whose wealth is partially reliant on exporting commodities, goods, and services, Canadians understand what happens beyond our borders affects our domestic choices. These two trends – increases in economic disruption from conflict, natural disasters and pandemics, and changes in global trade and economic cooperation – will indisputably impact the growing clean economy of communities across the country in the years to come. Regions aiming to create jobs and attract investment this decade will need to address these challenges.

Exactly how regions should tackle this will depend on what occurs in the world in the coming decade. Disruptions due to conflicts and natural disasters can raise the costs of energy and limit access to many of the metals and minerals needed to manufacture clean technologies. However, a lack of disruption can remove these risks, and offer stability for growing sectors. Additionally, decreased cooperation globally can reduce the ambition of other countries climate policies as well as slow the development and deployment of new clean technologies. Yet increased cooperation can do the inverse: it can increase the rate of developing new technologies, support access to commodities through trade, and lead to greater global action on reducing greenhouse gas emissions. Combined, these trends will also change the rate of growth for the economy, and costs for commodities and technologies, across the globe. No one scenario is an absolute “good” or “bad” for the outlook of every regional economy across the country. Canada exports a number of commodities, and higher prices benefits jobs and investment in these commodity sectors across the country. These same higher costs can also reduce a more attractive outlook for sectors that use commodities as inputs into their production processes. Given that even small changes in global growth, commodity costs, the costs and availability of technologies, and the ambition of other nations could lead to tens of thousands of new jobs created in one industry versus another, Canadian governments and institutions need to be prepared for a range of futures. Understanding these impacts is important as we plan for the decade ahead.

This report is a foresight exercise that shows how these trends could affect industries in Canada, and help policymakers plan ahead in an uncertain future. This analysis models existing federal climate policies that have been put in place to help Canada reach its 2030 GHG emissions reduction target in four different scenarios of what might occur in the world by 2030. This report then compares the impacts of each of these scenarios by province and for the territories to better understand the impacts of each future on regions and industries across the country. Finally, this



report ends by offering insights and recommendations to help policymakers generate an action plan that will benefit Canadians, whatever the future may bring. Even if much of what impacts Canada’s clean growth future is outside of its control, the country can still navigate its uncertain future to ensure Canadians thrive in the years to come.

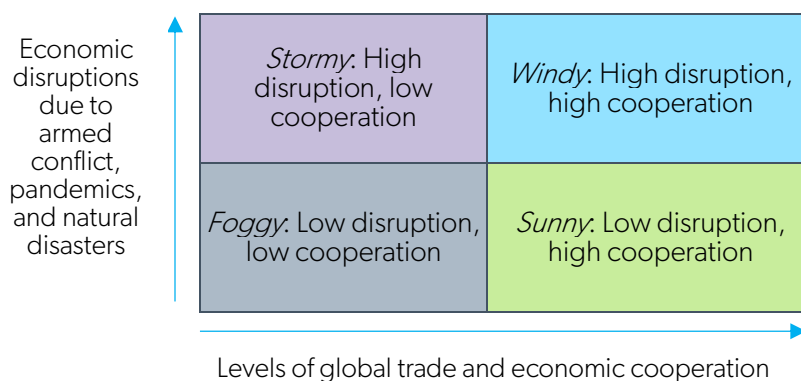
Overview of analysis

This report is a foresight exercise that compares four different global futures Canada could experience as it pushes to meet its 2030 GHG emissions reduction target. Foresight exercises are a type of analysis that explore multiple potential futures at the same time that are illustrative, yet credible, and do not make predictions about which one might be most likely to occur. They are designed to allow for the consideration of multiple possible futures and let decision makers compare the impacts that their decisions or choices might have in each potential future. Foresight exercises can be helpful for policymakers to plan for a future that is effectively impossible to accurately predict, given uncertainties around how the world will decarbonize, potential disruptions from conflict, pandemics and natural disasters, and future changes in global trade and economic cooperation – to name only a few challenges.

This report’s foresight analysis models four different scenarios or global futures in which Canada meets its target of reducing GHGs by 40% by 2030. In all four scenarios, Canada meets this target by implementing ambitious climate policy, which includes the full suite of policies outlined in the federal Emissions Reduction Plan (ERP). A full list of these policies can be found in Appendix 2, and includes: a federal carbon price rising to \$170 CAD/tonne by 2030, an emissions cap on the oil and gas sector, major investment in renewable energy and electrified transportation, and implementing a new net-zero emissions buildings strategy.

The four scenarios are designed around how two trends – 1) economic disruption due to armed conflict, pandemics, and natural disasters, and 2) changes in global trade and economic cooperation – could impact decarbonization. These include the costs and availability of technologies, commodity prices, rates of technology sharing, and the international ambition to reduce greenhouse gas emissions, among others. These four scenarios are constructed along the following axes, as shown in Figure 2, and described below.

Figure 2: Four scenarios used in this report to represent the world in the coming decade



Overview of the four scenarios

Sunny: This global future is characterized by low levels of disruption, and high levels of economic cooperation. In this future, armed conflicts decline by mid-decade and the world does not experience another major conflict or disruption (including a new pandemic, although some natural disasters remain) between now and 2030. Trade and economic cooperation remain high, and

multilateral climate cooperation accelerates as countries all over the world meet their climate targets. Economic growth increases globally, and Canada's real GDP grows at roughly 3% annually starting the middle of the decade. Rates of technology sharing are high between nations, and many emerging technologies become available for commercialization within the decade. Commodity costs decline back to pre-crisis levels, including food, energy, and metal prices. Clean technology costs are quickly lowered as investment in new technology increases and companies benefit from per-unit cost reductions and see improved technical performance from learning-by-doing.

Windy. This global future is characterized by high levels of disruption, and high levels of cooperation. In this future, ongoing and future conflict, natural disasters, and future pandemics increase levels of disruptions to supply chains, trade, and economic growth. Global growth slows to roughly 1.8% annually. However, levels of trade and economic cooperation remain high, as governments and industries attempt to weather disruptions by deepening global economic ties with one another. In this future, many nations prioritize managing ongoing disruptions in lieu of climate action, but not all. Canada implements a border carbon adjustment scheme to ensure its industries remain competitive as it continues to decarbonize. There is less technology sharing, and the costs of clean technologies are higher due to supply chain disruptions. Costs of energy, food and metals remain at elevated levels through the decade.

Stormy. This global future is characterized by high levels of disruption, and low levels of cooperation. In this future, global growth slows to under 2%, and Canada's slows to roughly 1.5% annually, as disruptions increase and trade decreases. Countries increasingly look domestically or regionally to address challenges, and rebuilding following disasters takes precedence over international action. However, some countries opt to rebuild their economies in climate-friendly ways, and moderate levels of global action to tackle climate change continue. In this future, commodity costs are higher than any other. Energy and food costs are high in these scenarios, as supply chain disruptions become chronic and levels of trade decline. In response, some regional supply chains for metals and minerals develop, but costs still remain high. Clean technology costs increase and technology development slows, with some emerging technologies not being ready for commercialization by the end of the decade.

Foggy. This global future is characterized by low levels of disruption, and low levels of cooperation. It assumes that the ongoing conflicts will be resolved by mid-decade and that there won't be any other major disruptions to the global economy (including another major conflict or a global pandemic) between now and 2030. In this future, Canada's economy grows at 2.5% annually until the end of the decade. However, economic cooperation and trade decline as countries begin to focus more on domestic or regional economic challenges. Some countries maintain ambition to meet climate targets, while others do not, with remaining climate ambitions advanced through regional blocs. In response to low levels of cooperation, Canada implements a border carbon adjustment scheme. Technology costs decline moderately, and commodity prices stabilize at 2021 levels, but levels of technology sharing are low internationally.

This report models these four potential futures using Navius Research's gTech, a computable general equilibrium model that represents the Canadian economy. As mentioned, these four scenarios are illustrative of how global trends could impact the Canadian economy, but none make specific predictions about the likelihood of a given trend unfolding. The gTech has been extensively used to model energy, technology, and climate policy changes in Canada to better understand their economic effects, including previously by the Smart Prosperity Institute to analyze the impacts reaching net-zero emissions will have on jobs and skills (Canadian Climate Institute, 2021; Clean Energy Canada, 2021; Smart Prosperity Institute, 2022). A detailed overview of the gTech is included in Appendix 1. There are three sets of variables that can be adjusted within the gTech to represent changes in the world:



- The cost, availability, and performance of technology:** Scenarios account for changes in the per unit cost of technologies, their performance, and when they become available for commercial use. They capture changes in costs of raw materials like critical minerals by changing the per unit costs of clean technologies that use them as inputs. Availability and cost of technologies are changed depending on the amount of global or regional trade cooperation that could occur in the coming years. Lower rate of cooperation is expected to delay the development of certain early-stage technologies since it would lead to less collaboration on research and development alongside trade between non-friendly governments. This could both slow the pace of developing new technology and make new clean technology inventions inaccessible to Canadian governments and companies if nations choose to hold onto key technologies for political or security reasons. Additionally, low trade cooperation could also raise the costs of production, although these changes could be offset by the development of regional supply chains for certain commodities.
- International commodity prices for energy and food:** Scenarios account for changes in energy prices (oil and gas) and agricultural commodity prices (wheat, corn, oilseeds, and soybeans). This allows scenarios to show how an increase in commodity costs impacts economic activity. Increased rates of disruption and economic cooperation often raise the price of oil and natural gas, which influences the choices of consumers and households. Increased commodity costs can make investments in oil and gas production more attractive, although future oil production is not purely linked to pricing within this analysis. Factors such as existing transportation bottlenecks, and the duration of investment and development cycles for new offshore oil and liquified natural gas projects, have been incorporated to simulate the link between commodity cost increases and changes in production more realistically.⁵ Additionally, these scenarios also include the costs of agricultural commodities and consider whether changes in agricultural commodity prices might drive increased investment into agriculture or change the economics of energy sources like biofuels.
- The stringency of international climate policies:** Scenarios also represent global levels of ambition in reducing greenhouse gas emissions. These impacts are used to better understand how global levels of global ambition might lower per-unit technology costs through increased overall investment as well as influence the development of emerging technologies and future policies. This ambition is accounted for both directly and indirectly. Direct impacts include setting a global cap on emissions from the neighbouring United States of America, which is used as a benchmark within the gTech to represent global ambition. Indirect impacts include changes in commodity prices of energy and metals. Indirect impacts are also measured through the implementation of border carbon adjustment schemes in scenarios where global ambition to combat climate change and/or cooperation on trade are low.

Additionally, scenarios detail differences between rates of economic growth in Canada to consider how each future could impact the broader economy. Details about each scenario can be seen in Table 1.

⁵ The duration of investment and development cycles for both offshore oil production, and new liquified natural gas development, often exceeds ten years (PwC, 2014). Therefore, this analysis notes that no new developments are likely within the next decade in Canada, even if oil prices remain high.



Table 1: Overview of four global futures outlined in this report

Global future	Stormy	Windy	Sunny	Foggy
What trends are shaping the world?	High levels of disruption, low levels of economic cooperation	High levels of disruption, high levels of economic cooperation	Low levels of disruption, high levels of economic cooperation	Low levels of disruption, low levels of economic cooperation
Canada's economic growth (measured in GDP)	Slows to 1.5% annually, as global growth slows in line with Fall 2022 IMF World Economic Outlook	Slows to 1.8% in 2023, growth remains at that level until 2030	Increases to 3% annually until 2030	Increases to 2.5% annually until 2030
Level of international climate ambition	Low. World is not on track meet GHG reduction targets. Canada does not implement border carbon adjustments, as rebuilding takes precedence.	Low. World is not on track to meet GHG targets. There is little cooperation in developing new technologies. Canada implements border carbon adjustments.	High. World is on track to meet GHG targets. High rates of cooperation and sharing of new technologies. Canada does not implement border carbon adjustments.	Medium. World shifts towards smaller, regional climate agreements. Some countries are on track to meet targets, others are not. Canada implements border carbon adjustments.
Which emerging technologies would be available for commercialization at scale by 2030?	-Direct air capture, at high cost	-Low GHG steel -Smaller modular reactors/advanced nuclear	-Direct air capture -Low GHG steel -Smaller modular reactors/advanced nuclear	-Direct air capture, at high cost
Commodity and technology prices across scenarios				
Cost of oil (per bbl) ⁶	\$62.71-\$144.21	\$62.71-\$101.86	\$46.80 - \$70.57	\$62.71-\$83.12
Cost of gas (per mmBTU) ⁷	\$3.13-\$3.75	\$3.13-\$4.03	\$3.13-\$3.93	\$3.13-\$3.88
Cost of food (shown in wheat prices) ⁸	Prices rebounds past 2022 peak (\$450/tonne)	Prices stabilize at summer 2022 peak (\$350/tonne)	Prices return to 2015 levels by 2025 (\$185/tonne)	Prices stabilize at 2020-2021 levels by 2025 (\$250/tonne)
Cost of battery packs in ZEVs ⁹	\$110/kWh by 2030	\$80/kWh by 2030	\$65/kWh by 2030	\$110/kWh by 2030
Cost of renewable electricity generation	+10 \$MWh from baseline value	No change from baseline	-5 \$MWh from baseline value	+5 \$MWh from baseline value

⁶ Oil prices shown for 2020-2030 ranges in WTI Oil prices, 2022 USD. This analysis also incorporates oil prices from Western Canadian Select.

⁷ Natural gas prices represented for 2020-2030 ranges in Henry Hub prices, 2015 USD. This analysis also incorporates gas prices from AECO and British Columbia's Station #2.

⁸ Food prices are shown using the real price of wheat in Chicago (CBOT) as an indicator. This work assumes the costs of corn, oilseeds and soybeans follow a similar trajectory based on their own 2015 and 2022 costs. All costs represented in 2015 USD.

⁹ Costs for batteries and renewable energy generation shown in 2022 CAD.



How results are shown in this report

This work outlines the impacts of each potential global future from 2020 to 2030 for the country, and in each province and territory on two metrics: jobs created and levels of investment,¹⁰ with findings shown per sector for both. The model used for this analysis has limited insights within the territories, so findings are aggregated for all three territories into a single profile. Results are presented in the following order:

- Canada
- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Newfoundland and Labrador
- Nova Scotia
- Ontario
- Prince Edward Island
- Quebec
- Saskatchewan
- Territorial profile: Northwest Territories, Nunavut, and the Yukon

Limitations of this analysis

- Metals and minerals are not modelled individually. Rather, their costs and availability are cumulatively represented as an aggregate “metals” commodity within the model. This means that the analysis could not compare disaggregated trends within critical minerals, nor compare how cost increases across individual critical minerals might affect the broader economy.
- This analysis does not directly link price changes in metals or minerals to changes in employment within the mining sector. This is an indirect change that is not captured within this modelling exercise. This effect is significant as it means that increases in commodity costs for critical minerals does not directly translate into increased employment in Canada’s mining industry.
- This analysis does not explicitly link changes in food prices to land-use decisions. This is, in part, due to the fact that decision making about which crops to plant in the agricultural sector are not purely responsive to market demand. Rather, they are the result of multi-year planning that includes annual crop rotations, meaning decisions are often planned months in advance. However, there remains some flexibility within the industry to adapt planting decisions to market or environmental conditions, and these flexibilities are not captured within this analysis.
- This work does not touch on the cost impacts on households and consumers that each future could bring or the wage levels of newly created jobs. This analysis is focused on the economic impacts global trends could have on Canadian climate action in two economic categories: jobs and investment. However, these factors will have an impact on the cost of living for Canadians, as increases in food, energy, and metals costs due to disruption and decreased economic cooperation. This work on the intersection between clean growth, high-quality jobs, and affordability will be the focus of future PLACE Centre reports.
- International ambition is measured through a benchmark of reductions in greenhouse gas emissions within the United States, since the gTech is a CGE model of a subset of North America’s economy. The model therefore does not capture the full range of mitigation action that could be taken internationally.

¹⁰ All investment figures shown in this report are shown in 2022 CAD.

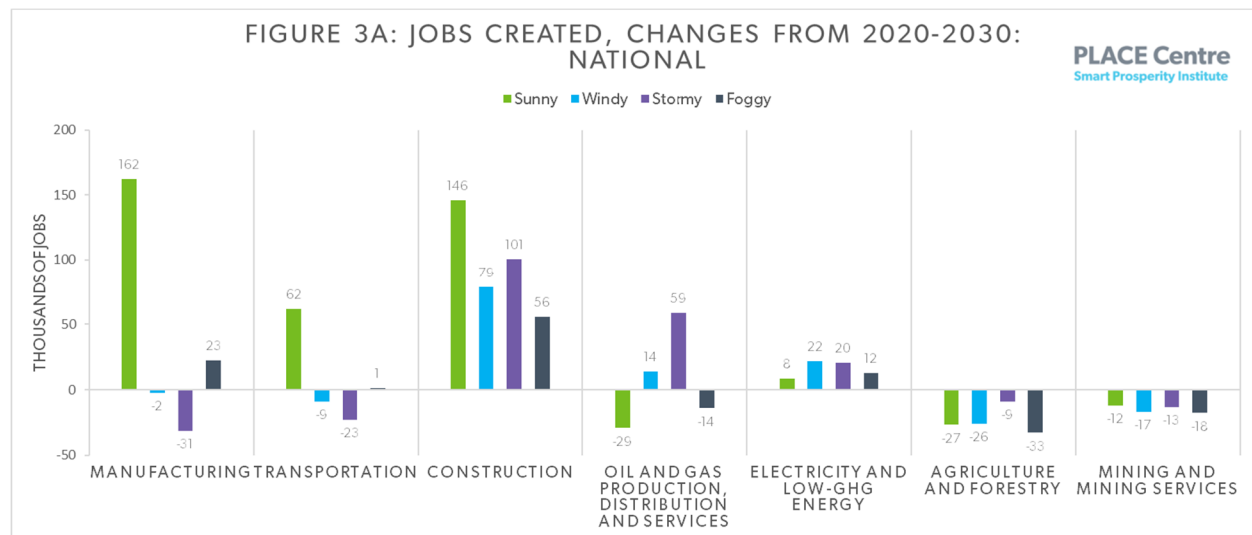


National profile: Canada

Canada is well positioned to capitalize on the opportunities presented by clean growth and climate action. The country is expected to increase jobs and investment in pursuit of its 2030 climate targets across all four scenarios. All futures show Canada’s economy having positive annual GDP growth out to 2030, but there are major variations between scenarios. The strongest annual growth is found in *Sunny* at 2.8%, as compared to the lowest annual growth rate of 1.5% in *Stormy*.

Impacts on jobs

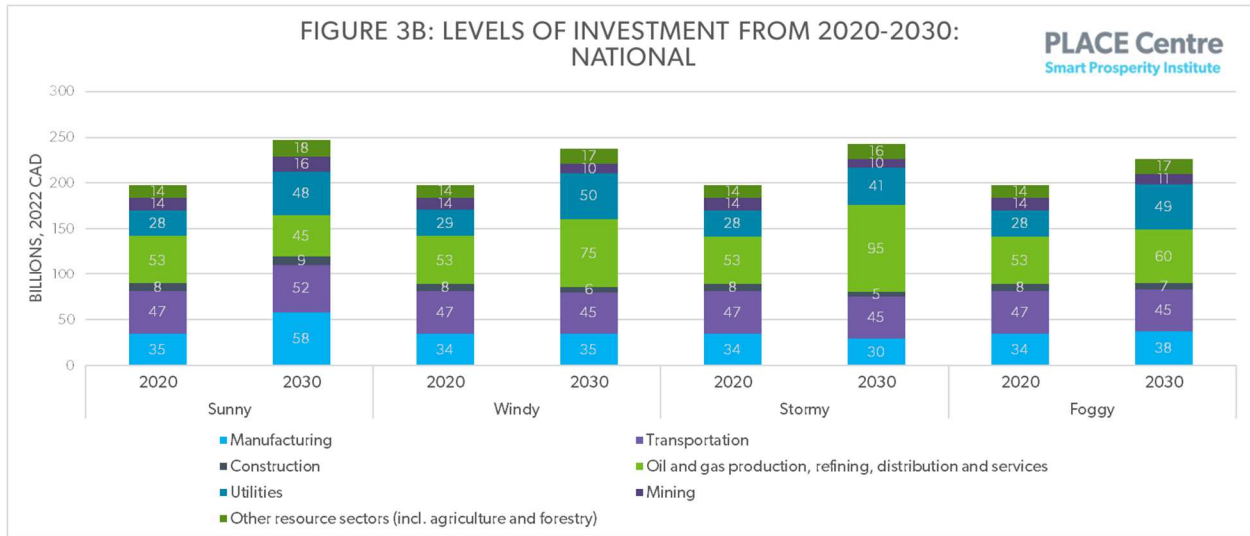
Employment in manufacturing and transportation is heavily driven by levels of economic cooperation and trade. Manufacturing grows in the *Sunny* scenario by as much as 162,000 jobs by 2030. This growth is likely driven by capitalizing on international opportunities in manufacturing like electric and transportation vehicles, food and beverages, and low-carbon plastics. Construction is expected to grow, creating between 56,000 jobs (*Foggy*) – 146,000 jobs (*Sunny*), as more large-scale and capital-intensive projects are advanced. Changes in jobs between futures can be attributed to higher costs of materials and more competition from resource sectors in lower-oil price futures. Electricity and low emissions energy production show strong growth opportunity across all scenarios as provincial electricity grids phase out coal-fired electricity generation and provinces increase investments in zero emissions energy. The jobs outlook of the oil and gas industry will vary across futures, largely due to the price of oil and natural gas as compared to renewables. The sector’s jobs outlook ranges from either losing 29,000 jobs (*Sunny*) or gaining 59,000 positions (*Stormy*).



Impacts on investments

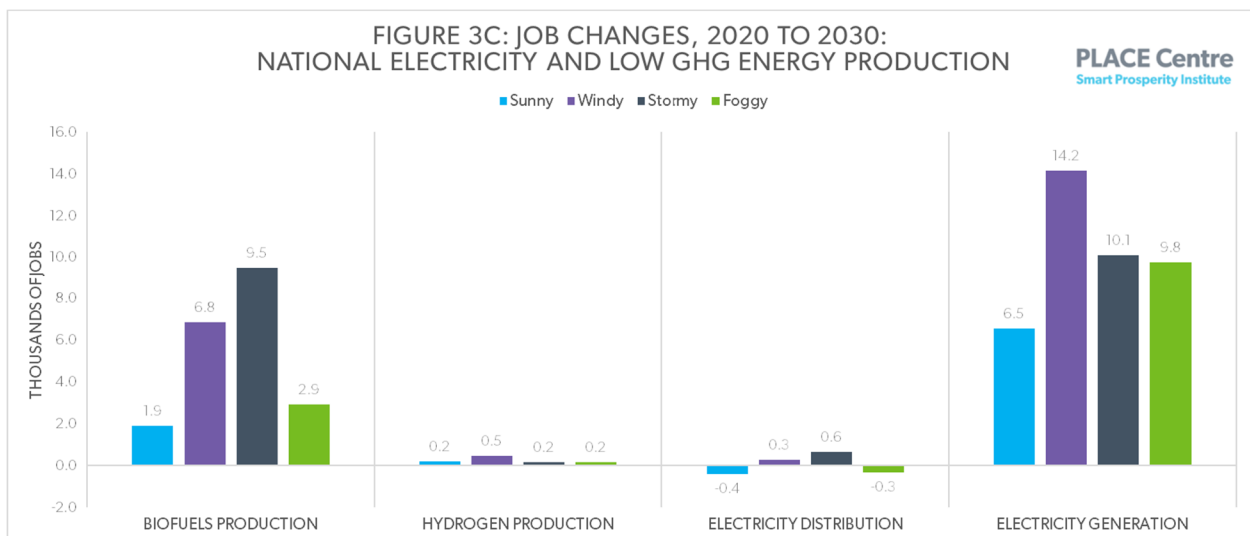
Investment into Canada’s clean economy increases out to 2030 in all futures, with total growth ranging between \$29 billion (*Foggy*) – \$49 billion (*Sunny*). On a sectoral basis, we see that manufacturing and construction are the most susceptible to changes in international conditions, as investment growth stagnates or even falls in scenarios with ongoing global conflict. However, when there is available international capital, reliable supply chains, and open international markets, Canada is an extremely attractive option for manufacturing, with investment growth of as much as \$23 billion in *Sunny*. The utilities industry is positioned to attract high levels of growth in investment in all scenarios, attracting as much as \$21 billion in *Windy* scenario as clean energy replaces carbon-intensive energy sources. In the *Sunny* scenario, where we see greater demand for critical minerals for batteries and electrification, investment in mining rises from \$14 billion to \$16 billion. But in all other scenarios, investment in the sector is projected to decline.





Sector spotlight: Electricity and Low-GHG Energy, National

Electricity and low emissions energy are a stable source of future employment, and an essential component of our Canada’s clean economic future, regardless of what occurs globally. The Canadian Climate Institute’s report *Bigger, Cleaner, and Smarter* projects that to meet emissions goals, we will need to increase total electricity capacity by 2.2x – 3.4x larger than our current capacity (Canadian Climate Institute, 2022). Given the interconnected nature of provincial grids, the need for larger-scale transmission projects, and the impact of split jurisdictions on existing clean energy projects like the Churchill Falls hydroelectric dam and the Muskrat Falls project, electricity generation and transmission will remain a distinctly national challenge going forward. In the coming decade, the majority of job creation is likely to come from renewable energy generation, not hydrogen production. Given development timelines for hydrogen infrastructure projects, it is unlikely to be a significant creator of jobs within this decade outside of jobs in the construction sector. Investment in biofuels is likely to occur in regions where much biofuel production is already occurring, including close to Lethbridge and Lloydminster in AB; Weland, Sarnia, and Hamilton in ON; and Belle Plains in SK (Government of Canada, 2022).

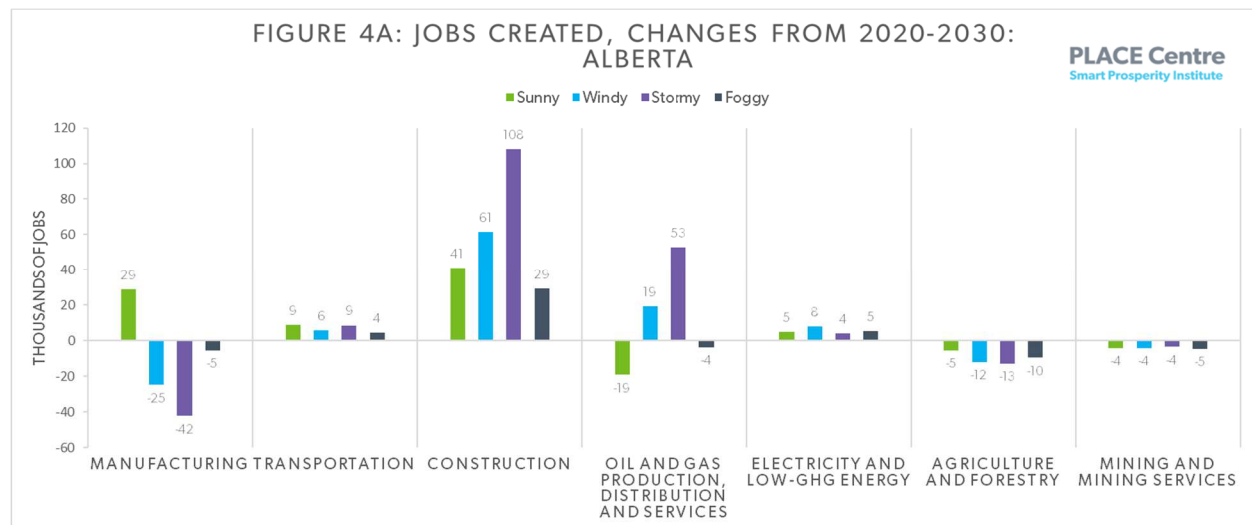


Provincial profile: Alberta

Across all scenarios, Alberta’s economy is expected to grow by at least 2.5%. Out of the four, *Sunny* is best for annual GDP growth (3.1%) while *Stormy* experiences the lowest rate of annual GDP growth (2.5%). Additionally, jobs and investment increase across all futures. However, the outlook for jobs and investment in Alberta is not directly tied to changes in GDP. While *Stormy* is the future with the lowest GDP growth, it is the future with the highest number of jobs created (115,000 jobs). This is due to decreases in trade that darken the economic outlook for the province.

Impacts on jobs

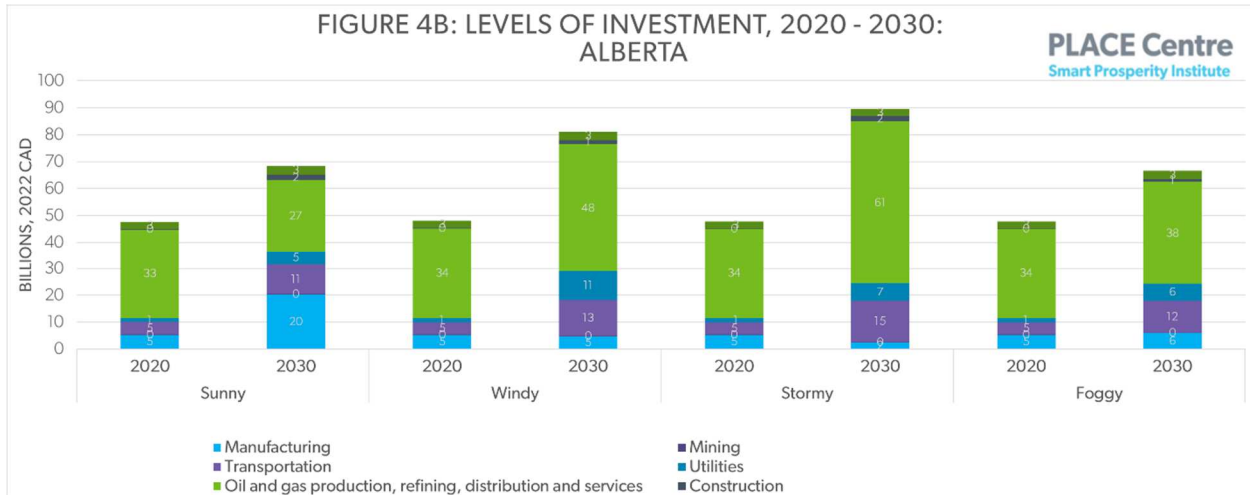
Alberta is expected to create jobs across all scenarios. For jobs, *Stormy* is the best scenario for Alberta, with 115,000 new jobs created by 2030, led by the construction sector and the oil and gas sector. At a sectoral level, the Albertan construction sector will create the most jobs by 2030 across all four scenarios. This is due to the high carbon intensity of Alberta’s electricity grid spurring greater investment into more energy efficient buildings and homes. 108,000 jobs are added to this sector in the best-case scenario (*Stormy*) and 29,000 in the worst-case scenario (*Foggy*). On the other hand, agriculture and forestry alongside mining suffer job declines in all scenarios. Irrespective of the scenarios, transportation, construction, and clean energy will continue adding jobs despite varying international factors, showing the potential of these sectors to form stable, high-quality career paths within Alberta.



Impacts on investments

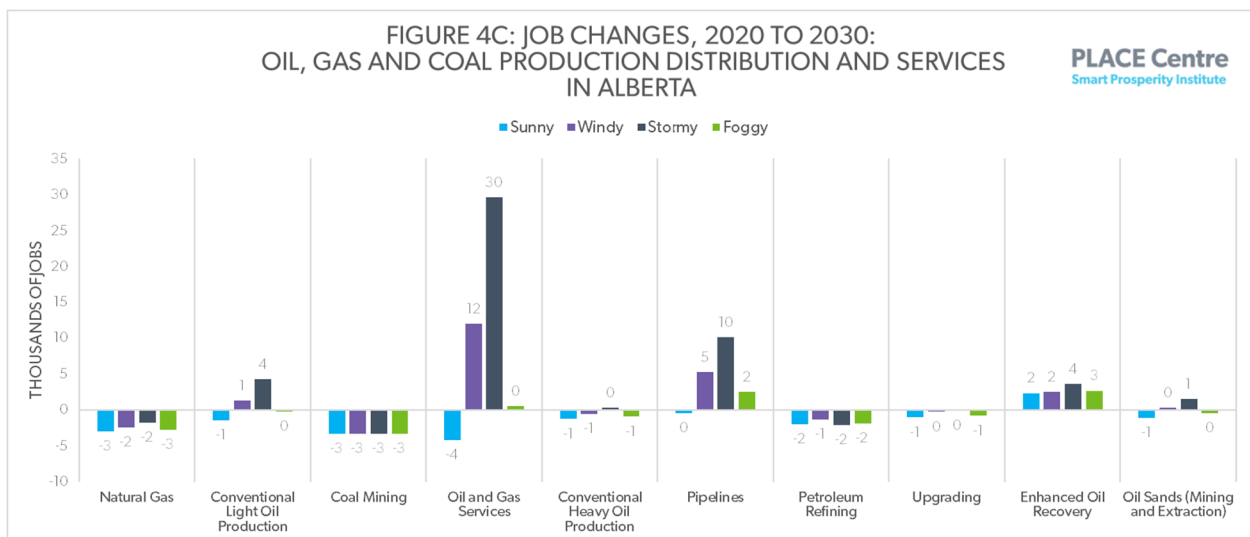
Investment levels increase in all four scenarios, from a low of \$19 billion (*Foggy*) to a high of \$42 billion (*Stormy*). These investment levels follow the same trends as job creation across different futures; *Stormy* will attract the most investment by 2030 (\$42 billion) while *Foggy* will attract the least investment by 2030 (\$19 billion). Of all sectors, investments in the oil and gas sector are the most vulnerable to changing scenarios, with outlooks ranging from a decline in oil and gas investment by \$6 billion (*Sunny*) to an increase in investment by \$27 billion (*Foggy*) by 2030. Investment into other sectors, including utilities (\$4 billion – \$10 billion) and transportation (\$6 billion – \$10 billion), is expected to grow across all futures. For other sectors, such as manufacturing, investment is expected to grow by \$15 billion in *Sunny*, but either decline or be largely not affected in others.





Sector spotlight: Oil and gas production, distribution and services

Alberta’s combined industries for the production, distribution and services of oil, gas, and coal make up almost a quarter of the provincial GDP (Wang, 2021) and 6% of provincial employment (Statistics Canada, 2021). The outlook of the industry depends heavily on global trends, even with ambitious climate action. In some futures, the oil and gas sector adds almost 53,000 jobs to the economy (*Stormy*) or 19,000 (*Windy*). In others, the sector is expected to lose between 4,000 jobs (*Foggy*) - 19,000 (*Sunny*). These job gains are attributable to the impact international disruptions would have on oil and gas prices, and the link between high oil prices and increased investment into the industry. Within the sector, jobs in oil and gas services specifically grow more than in any other subsector. Jobs in this subsector by almost 30,000 by the end of the decade in the best-case scenario (*Stormy*), but fall by 4,000 jobs in the worst-case scenario (*Foggy*). Investment in the fossil fuel sector leads to growth in most oil and gas sectors, with exceptions for natural gas, coal mining, and petroleum refining. Most of the job impacts within these sectors will be concentrated in the Wood Buffalo-Cold Lake economic region.

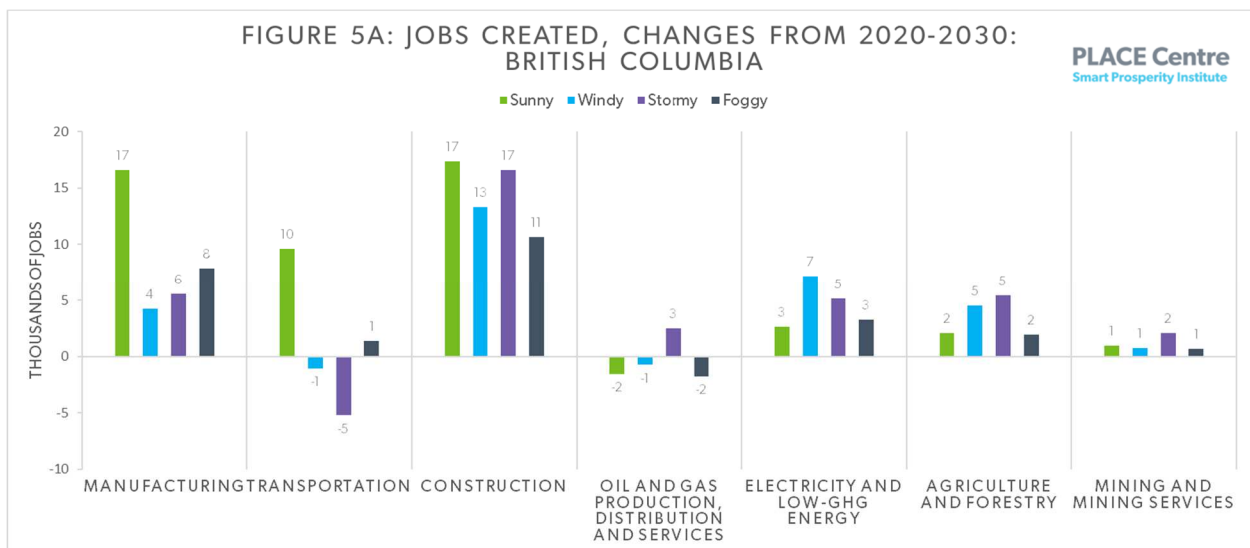


Provincial profile: British Columbia

Achieving Canada’s 2030 GHG emissions targets will support growth in British Columbia’s economy. The *Sunny* scenario leads to the highest annual average GDP growth rate (2.9%) while *Stormy* leads to the lowest annual GDP growth rate (1.5%). Overall, jobs and investment are expected to grow across all futures, with *Sunny* being the most favourable scenario for both jobs and investment.

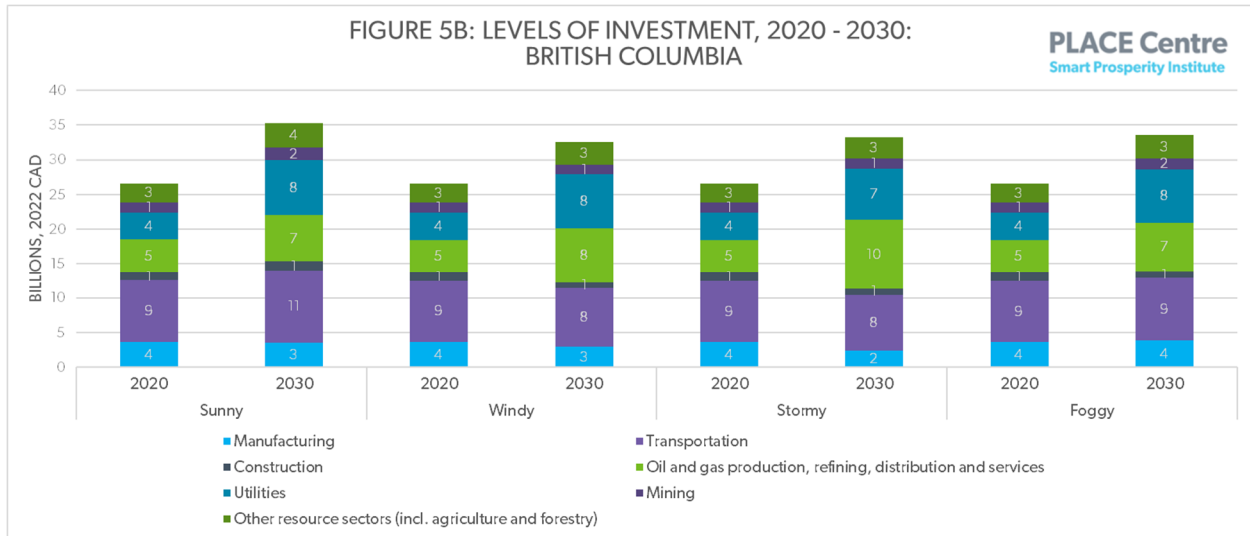
Impact on jobs

Jobs are expected to increase consistently across all four global futures in British Columbia. Ultimately, *Sunny* is the most favorable scenario with almost 48,000 jobs created by 2030. *Foggy* is the least favorable scenario with 24,000 jobs created across the province. This growth is led by the construction and manufacturing sectors. Growing international cooperation benefits these sectors, as costs of clean technologies fall while they are scaled and developed more rapidly across the globe. Transportation and oil and gas are the only sectors that experience job declines in most of the scenarios. Jobs in transportation however, do increase in *Sunny* where increased international cooperation and low levels of disruption prove favorable for job creation in clean transportation.



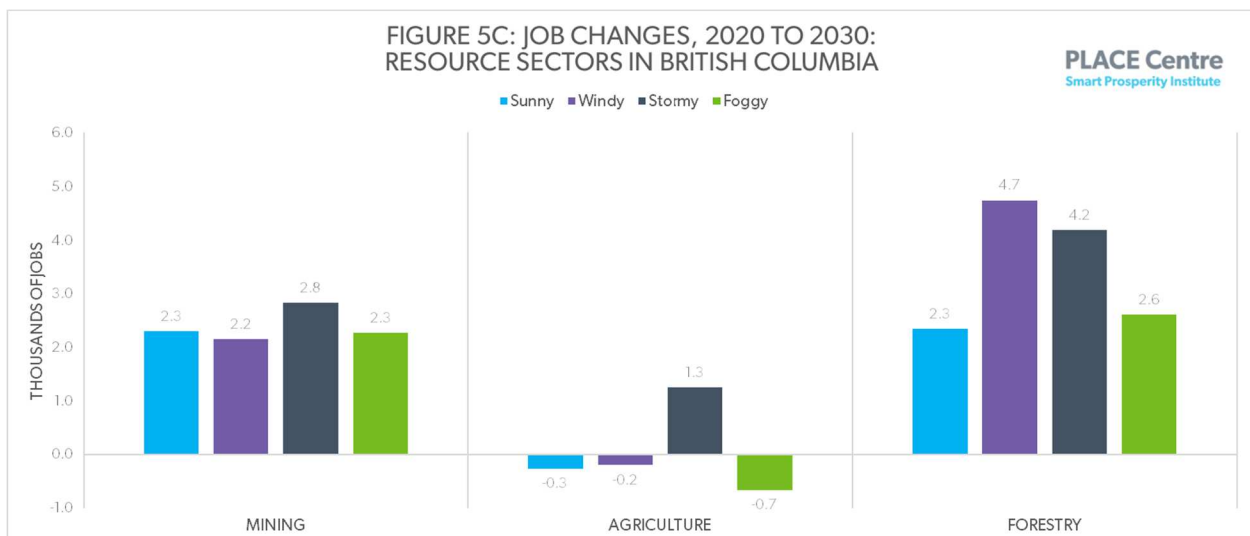
Impact on investments

Investment levels in the province stay fairly consistent across all scenarios, with all futures leading to investment increases between \$5 billion – \$6 billion. Investment in the utilities sector increases by \$3 billion across all four scenarios, showing that the utilities sector is resilient to a number of international factors identified in this report. Investment levels in manufacturing and construction do not change significantly up to 2030, even as these two sectors are creating the greatest number of jobs. Oil and gas production, distribution and services are expected to decline slightly in all scenarios except *Stormy*, where investment in oil and gas increases by \$4 billion.



Sector spotlight: Resources (Forestry, agriculture and mining)

While the resource sectors (Agriculture, Forestry, and Mining) employ only 3% of the labour force (Statistics Canada, 2021), the forestry sector made up almost 30% of total commodity export value (2020 BC Forest Sector -Statistics Summary, n.d.). All four scenarios have a comparable impact on jobs in these sectors, highlighting their relatively stable nature in the face of global trends. Across all futures, *Stormy* is the most favourable scenario option for these resources sectors as it adds over 8,000 jobs through the decade. This is due to increased reliance on domestic resources as economic trade and cooperation decline. Forestry is the strongest sector here, adding jobs across all futures, ranging from 2,300 jobs (Sunny) – 4,700 jobs (Windy). Most of these jobs are expected to be in logging communities in and around the Cariboo economic region (Prince George, Williams Lake, and Quesnel) – the number one lumber producing region in the province (BC Council of Forest Industries, 2019).

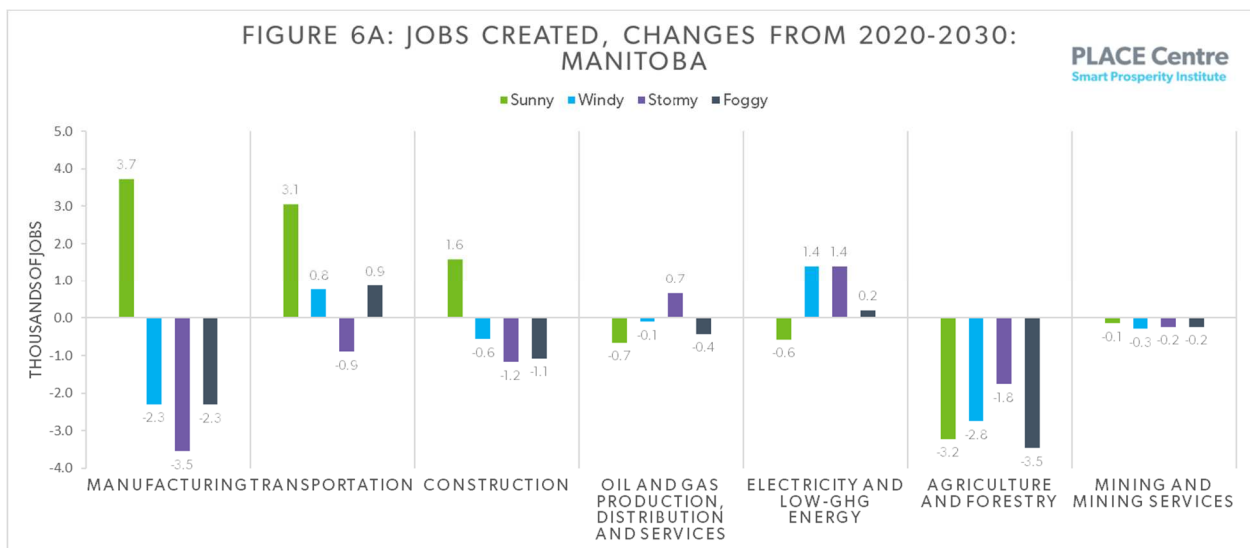


Provincial profile: Manitoba

The economy in Manitoba continues to grow across the four scenarios up to 2030. The province experiences the highest annual GDP growth rate in *Sunny* (3%) while *Stormy* yields the lowest annual GDP growth rate (1.6%). Jobs are expected to grow only in *Sunny* and decline across all other scenarios. Investment is expected to remain approximately the same, or decline slightly, across all four futures.

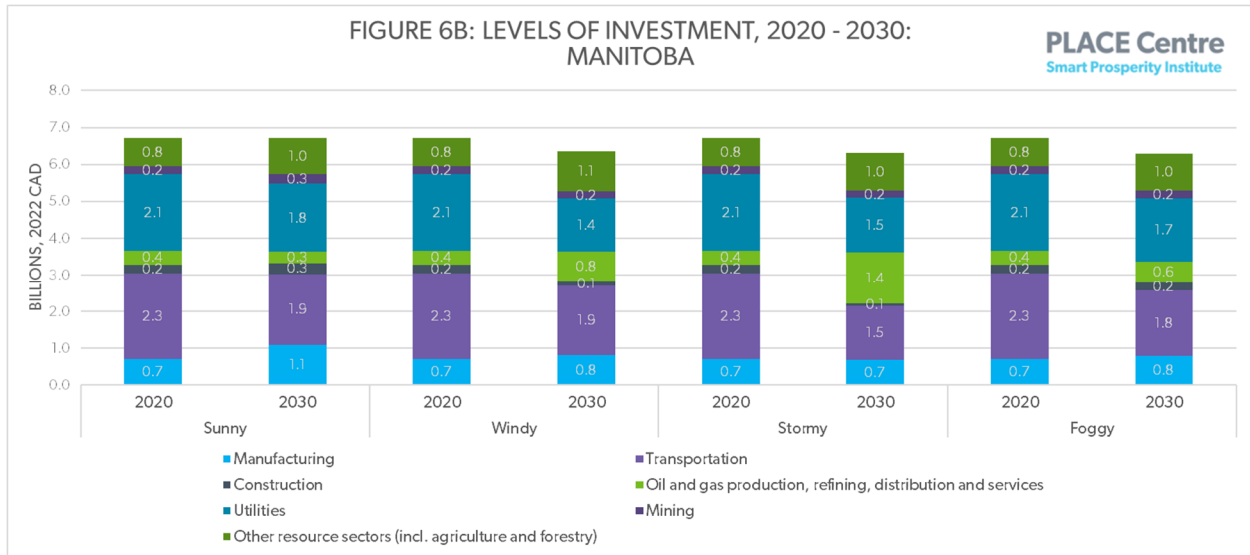
Impact on jobs

Job growth is expected across only one of the four scenarios (*Sunny*). In this scenario, jobs grow by almost 3,800 by 2030 led by manufacturing, transportation, and construction sectors. Across other scenarios, job gains are expected in only some sectors, with the province experiencing employment declines as a result of global trends. Increases in conflict and declines in trade do not favour many sectors in Manitoba's economy. *Foggy*, where protectionism increases, is the least favourable overall scenario with jobs declining by 6,500 roles overall. In all four scenarios, jobs in agriculture and forestry shrink with the largest job declines in *Foggy* and the smallest in the *Stormy* scenario. Jobs in the manufacturing sector also shrink by 2,300 – 3,500 by the end of the decade. The exception for manufacturing is *Sunny*, where the sector is expected to grow by 3,700 jobs.



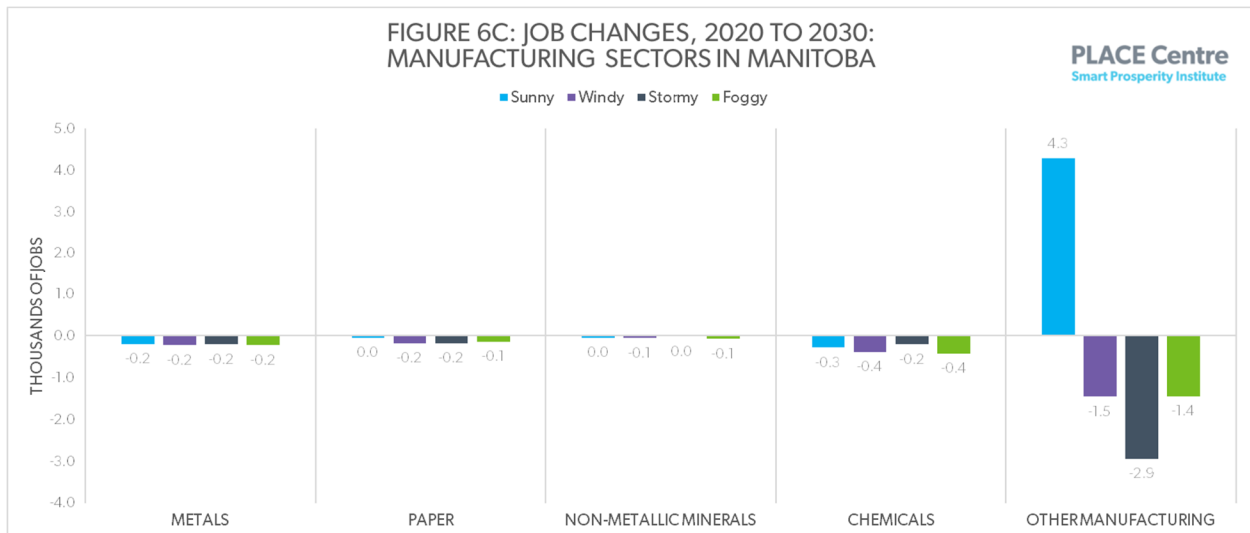
Impacts in investments

Overall, investment is expected to either remain steady or slightly decline as a result of global trends. In *Sunny*, the net change in investment levels is expected to be minimal. In the other three scenarios, investments across these sectors are expected to decline by approximately \$400 million. In the three scenarios where declines are expected, investment increases are expected in the oil and gas sectors as well as agriculture and forestry. Declines are anticipated in transportation (-\$400 – \$800 million) and utilities sectors (-\$300 – \$700 million).



Sector spotlight: Manufacturing

Manufacturing is the largest contributor to provincial GDP (Province of Manitoba, n.d.) and makes up 9% of provincial employment (Statistics Canada, 2021). The manufacturing sector sees 3,700 jobs created in the Sunny scenario by 2030, but loses between 2,300 – 3,500 across the other three scenarios. Several manufacturing sectors are impacted by rising costs of technologies spurred on by international disruptions and reduced cooperation in the three scenarios. Within the sectors, industries in “other manufacturing”¹¹ are impacted the most. These industries include food, fabricated metal, machinery, transportation equipment, plastics, textile, clothing, and leather manufacturing, among others. These industries together add 4,300 jobs in the *Sunny* scenario, but witness employment shrinking in the other three futures. In Manitoba, most of these manufacturing industries are concentrated in and around Winnipeg, the Central Plains region, and the Pembina Valley. Despite the increase in manufacturing jobs, up to at least 2025 around 51% of these are expected to be replacements for workers exiting the sector (Government of Manitoba, n.d.).



¹¹ This sector is coded differently in the gTech model and includes all manufacturing sectors other than 3311, 3312, 3313, 3314, 322, 32731, 3274, 32511, 32512, 32518, 32519, 32531, 32412, 32419, and 32532, 3254, 3255, 3256, and 3259

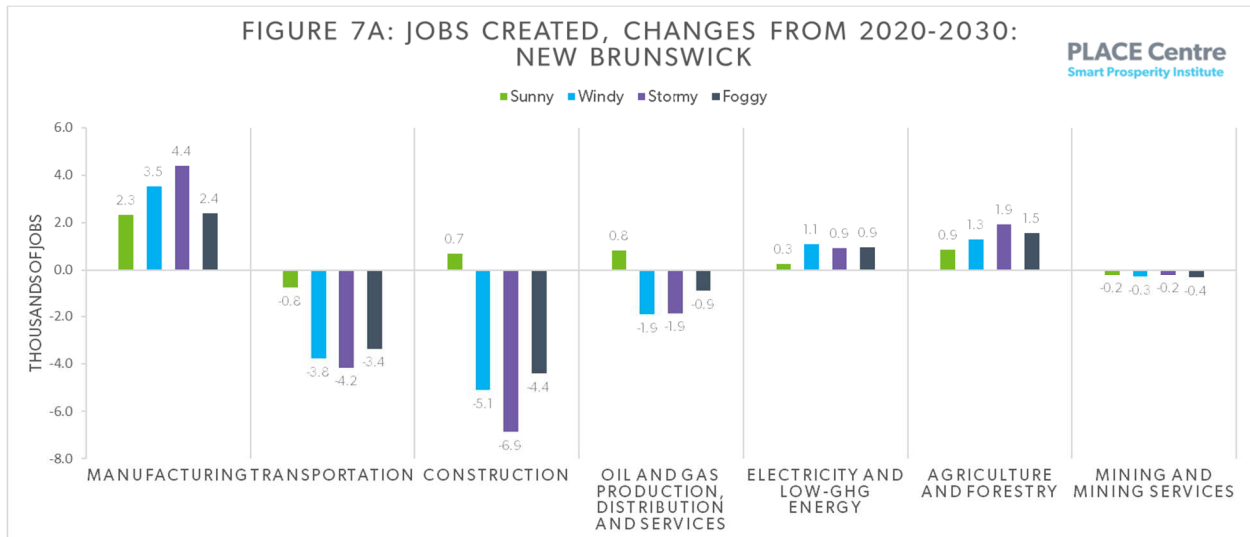


Provincial profile: New Brunswick

Outside of the *Sunny* scenario, we see New Brunswick facing the significant challenge of losses in both jobs and investment. Across the four futures, GDP growth is only expected in *Sunny*, with 1.9% annual GDP growth. However, manufacturing, clean energy, and agriculture and forestry remain strong attractors of investment and creators of jobs across all futures for the province.

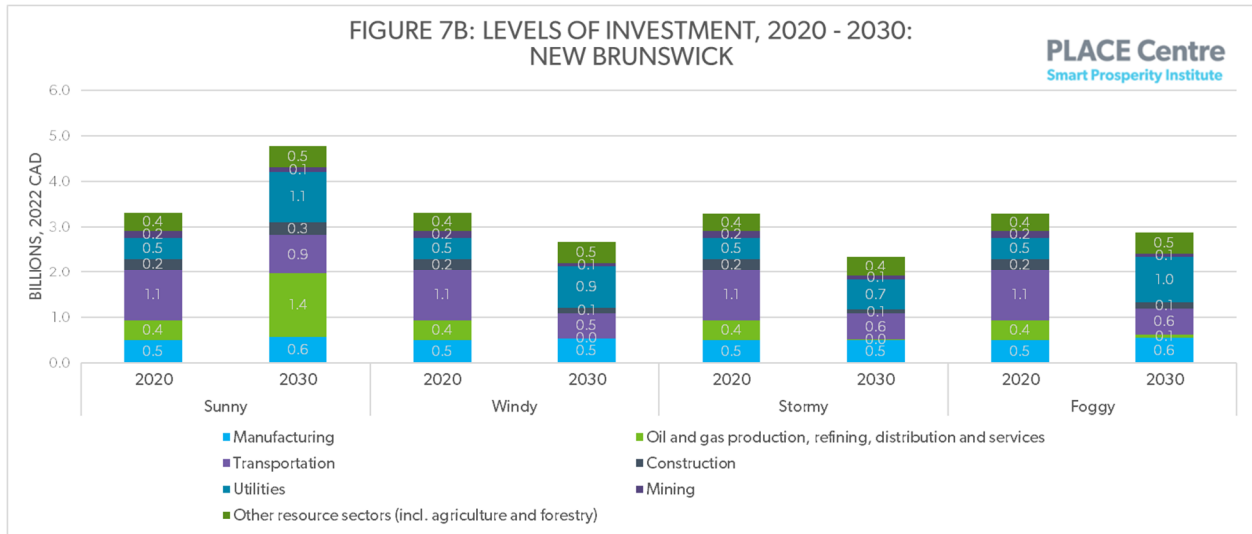
Impact on jobs

Across all four scenarios, the outlook for jobs is fairly similar for New Brunswick. Manufacturing, electricity and low emissions energy, and agriculture and forestry show growth across all scenarios. However, sectors such as transportation, construction, oil and gas sectors, and mining sectors are expected to decline. Mining and mining services alongside electricity and low emissions energy sectors remain the least affected through all scenarios, with mining experiencing minor job declines and electricity and low-GHG energy seeing jobs gains. The *Sunny* scenario presents the rosier picture of job growth in the province, with an estimated addition of 3,900 positions concentrated in the manufacturing and forestry sectors. However, even in *Sunny*, there will still be losses in transportation (800), as seen across the other three scenarios.



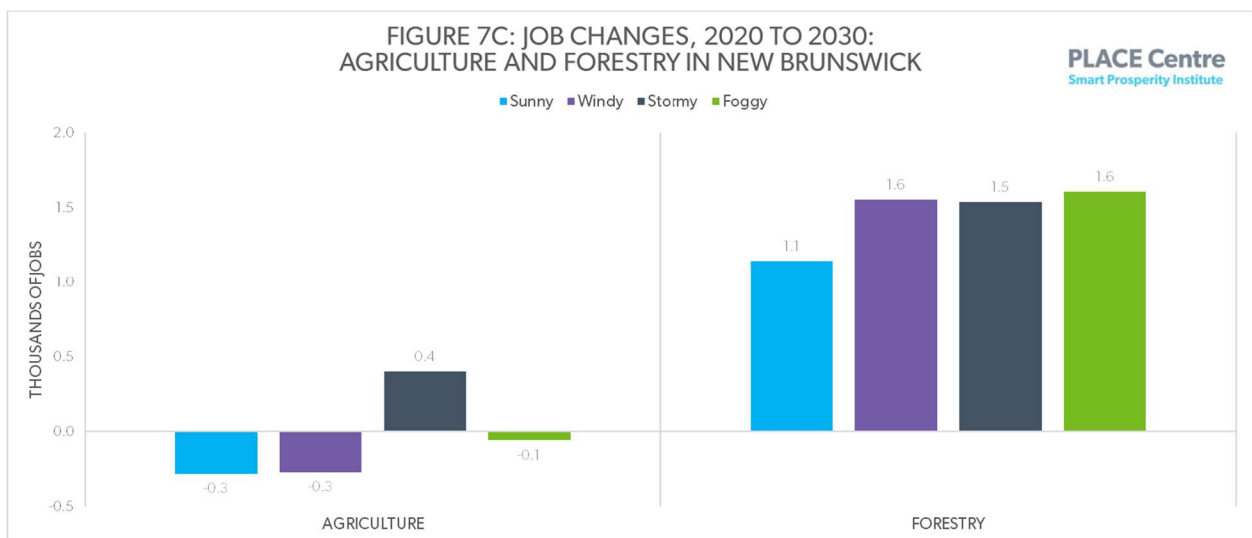
Impact on investments

Within New Brunswick, investment is only expected to grow in *Sunny*, with an additional \$1.5 billion expected to be invested across the province. However, in the other three futures, investment in the province is projected to decline by 2030, with the most significant reductions occurring in transportation and the oil and gas sectors. This reflects the wider move towards electrification and away from oil and gas as new fossil fuel projects are cancelled or reduced in scope, exemplified by moves such as ORLEN Upstream Canada removing their wells near Moncton (ORLEN Upstream Canada Ltd., 2022). Investment in construction, manufacturing, and mining are projected to remain similar to 2020 levels across the three sectors. For all futures, the utility sector is estimated to attract significant levels of increased investment, driven by greater investments in in renewables. Investment is expected to increase by \$400 million – \$600 million in all scenarios except *Stormy*, where an increase of only \$200 million is anticipated.



Sector spotlight: Agriculture and forestry

New Brunswick’s agriculture and forestry sectors are strong economic contributors to the provincial economy, adding \$1.18 billion to the provincial GDP in 2021 (Statistics Canada, 2022). In 2022, agriculture employed 6,100 individuals in New Brunswick as compared to 12,400 across forestry, logging, paper, pulp, and wood processing (Statistics Canada, 2022). Throughout all scenarios, forestry is projected to have strong and consistent job growth while agriculture is expected to have either small increases or decrease in employment. In *Stormy*, agriculture is likely to create 400 additional jobs as a result of small increases in investment. This is most likely due to rising food prices and international food security concerns driving greater investment into Canadian agriculture. Job growth in the forestry sector across all scenarios suggests persistent high demand for lumber and timber products both in domestic and international markets. Job growth in New Brunswick’s forestry sector is most likely to be concentrated in the more rural Northeast and Northwest economic regions of the province, which include cities like Edmundston and Miramichi as well as smaller surrounding towns. These communities already have the highest proportion of logging and forestry jobs in the province, as well as significant employment in associated secondary industries like pulp, paper, and sawmills (Government of New Brunswick, 2018).

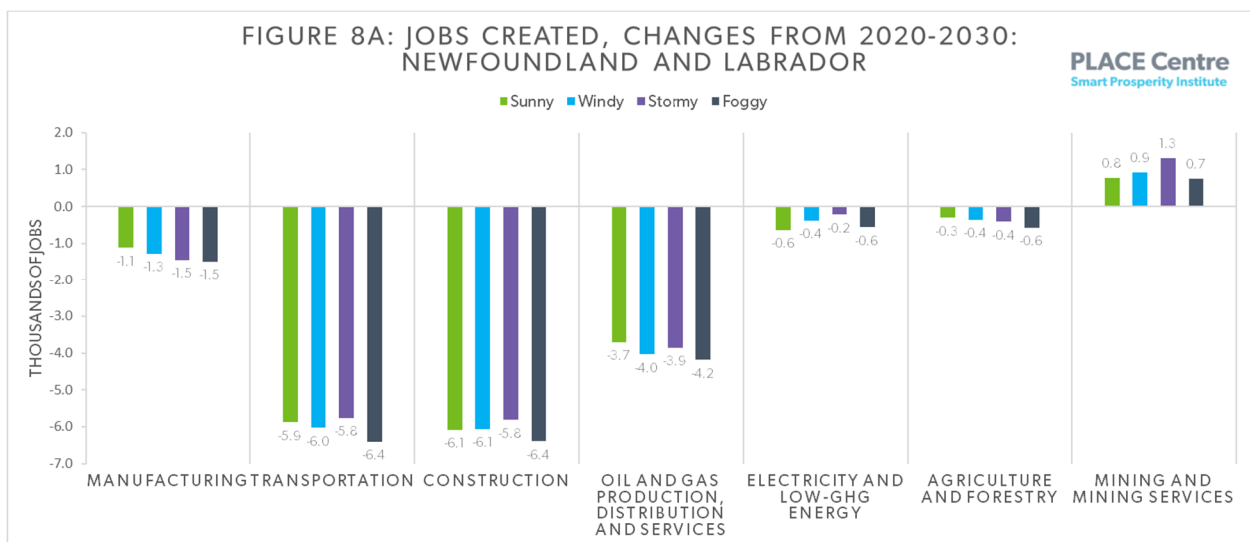


Provincial profile: Newfoundland and Labrador

Across all futures, global trends are expected to negatively impact the province of Newfoundland and Labrador. The province will face job declines and reductions in investment across all scenarios in all industries, outside mining and mining services. The outlook for GDP growth is not favourable, with some estimates suggesting negative yearly GDP growth out to 2030. Even in *Sunny*, GDP growth is only projected to rise by 0.1% annually. Some sectors will be particularly hard hit, including significant reductions in employment for transportation and construction. Oil and gas investment is not protected from this turmoil, with significant declines in investment anticipated despite changes in global markets.

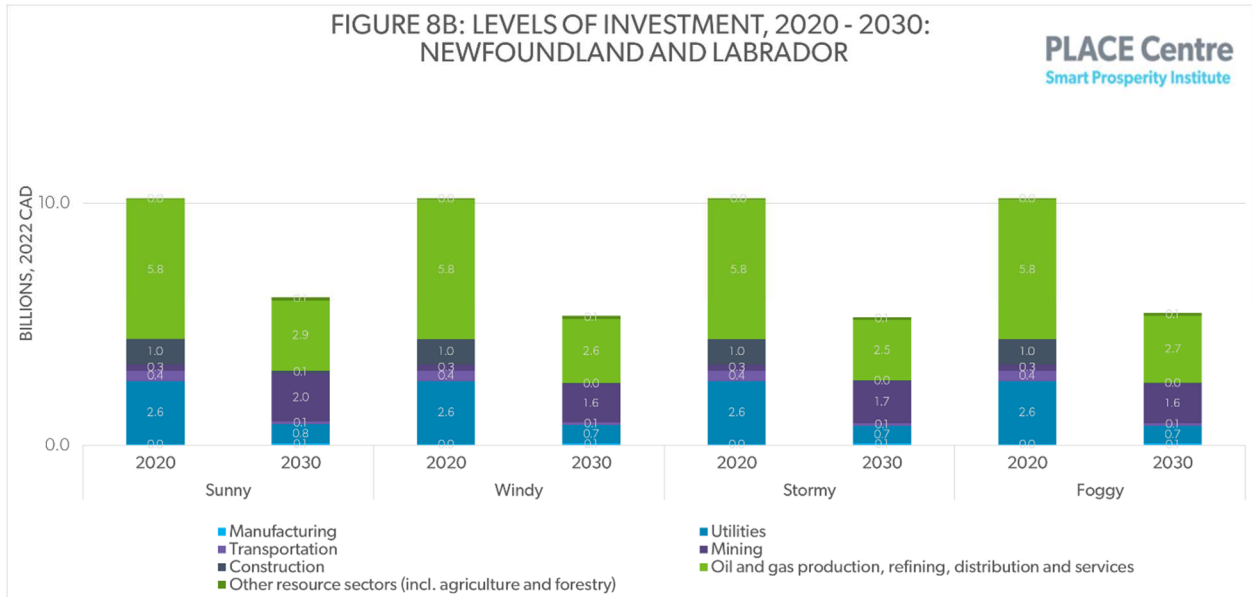
Impact on jobs

Across all scenarios, job declines are expected to be consistent, with some sectors experiencing more significant losses than others. The agriculture and forestry industries alongside the electricity and low emissions energy industries, only see minor reductions in jobs across all scenarios. Mining and mining services will experience some job gains (Government of Newfoundland and Labrador, 2022). However, job losses in transportation, oil and gas, and construction are significant across all scenarios. This is due, in part, to projected job opportunities leading to declines in provincial employment, and to the costs of developing offshore oil and gas projects in Newfoundland and Labrador being less competitive than opportunities in other provinces.



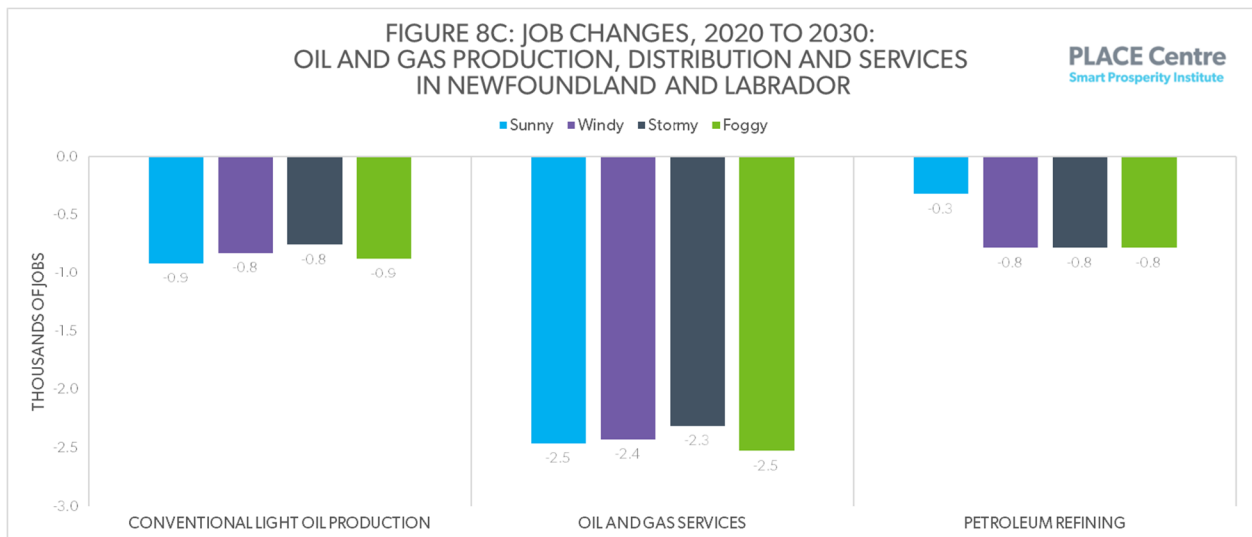
Impact on investments

Investment in Newfoundland and Labrador is projected to decline across all global futures by between \$4.1 billion (*Sunny*) – \$5.0 billion (*Windy*), despite some sectors maintaining similar levels of investment to 2020 levels. This is in part due to large reductions in oil and gas investment, with the exception of the Bay Du Nord project. Mining is expected to see an increase in investment across all models due to high demand for critical materials such as iron ore, nickel, and copper (Government of Newfoundland and Labrador, 2022). Manufacturing and transportation investment are expected to remain at low or non-significant levels regardless of global conditions, as will investment in agriculture. Notably, this analysis does not factor in projects such as the announced \$12 billion green hydrogen project near Stephenville, showing that greater investment opportunities for the province are present when growing the clean economy (von Kursk, 2022).



Sector spotlight: Oil and gas production, distribution and services

Despite the recent publicity of projects like the Bay Du Nord, all projected scenarios see a significant decrease in employment within the oil and gas production, distribution and services sector by 2030. This stands at odds with provincial targets set in The Way Forward Plan (Government of Newfoundland and Labrador, 2017). Reduced demand, higher costs associated with offshore production projects, and lengthy construction timelines all lead to greater investment in less carbon intensive projects. Given the relative size of the sector in the province, which employed around 9,000 individuals in 2020, these reductions would cause serious economic disruption (Newfoundland & Labrador Oil & Gas Industries Association, 2020). These job impacts, if they were to occur in regions where existing projects like Hibernia (1,500 jobs in 2019), Terra Nova (490 jobs in 2022) and White Rose (330 jobs in 2021) are located, would negatively affect regions such as the Avalon and Burin Peninsulas and Clarenville – Bonavista (Government of Newfoundland and Labrador, 2021). Additionally, the refining and services subsector job losses would significantly affect communities like Come by Chance, where the sole provincial oil refinery directly employs over 500 workers and is a major local economic driver for secondary and ancillary industries (Government of Newfoundland and Labrador, 2021).

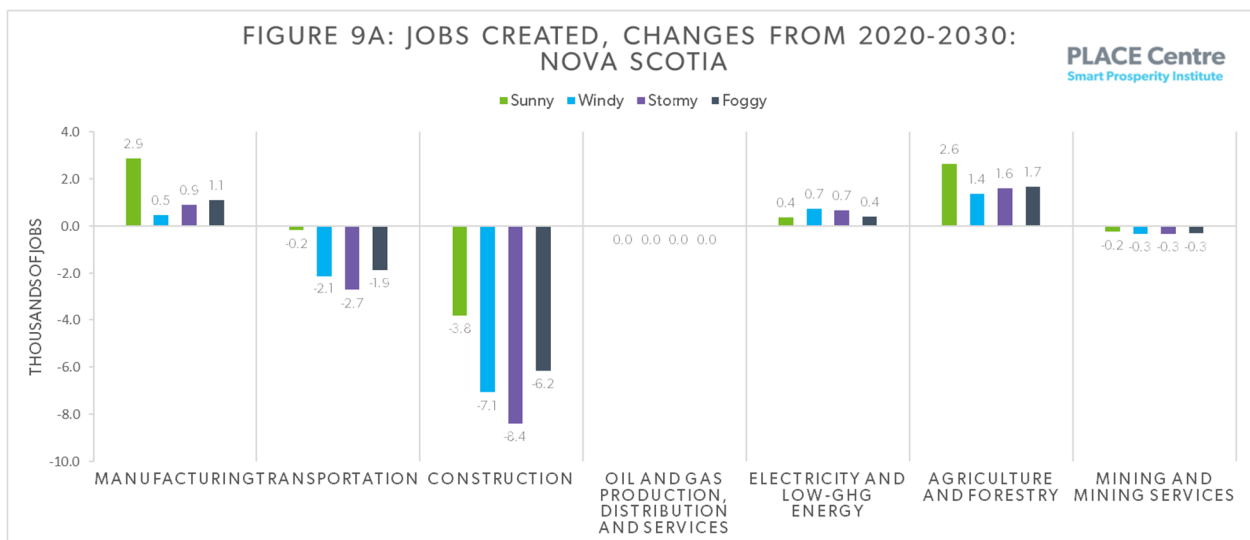


Provincial profile: Nova Scotia

Across futures, Nova Scotia’s economy is vulnerable to global trends. Annual GDP growth in the province will grow across all four scenarios, but slowly, ranging from 0.1% (*Stormy*) – 1.8% (*Sunny*). This growth is largely attributable to the continued growth of the province’s services sector. The overall outlook in this analysis is fairly consistent, with job growth and declines occurring in similar sectors across all four futures. However, investment levels are more heavily impacted by reduced trade and supply chain disruptions than most, making Nova Scotia’s trade-dependent economy particularly vulnerable to protectionism.

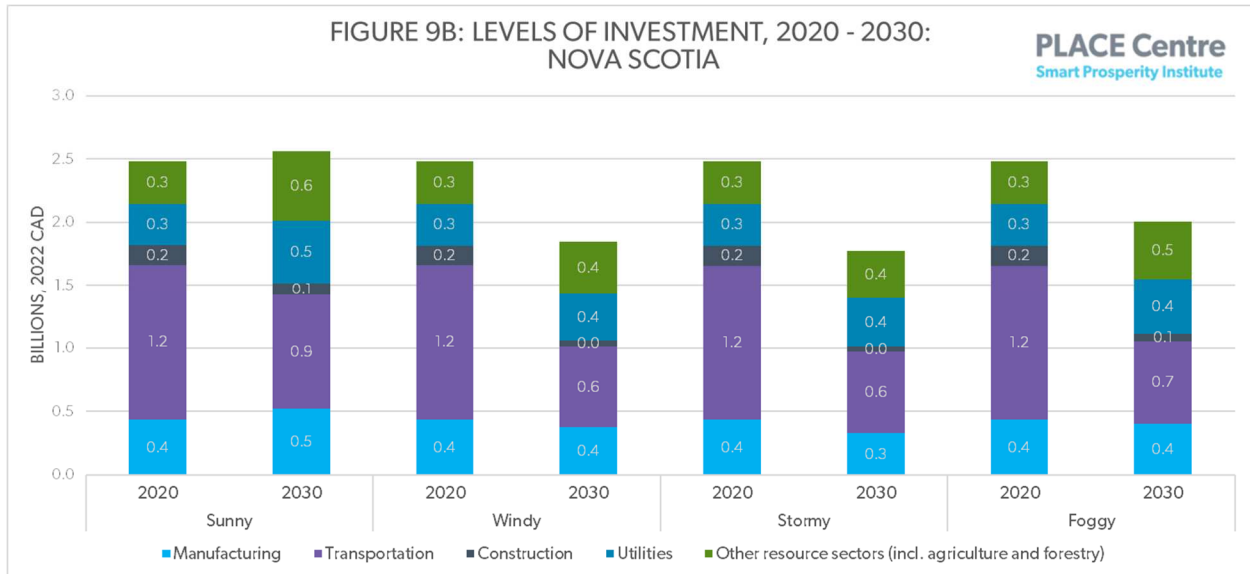
Impact on jobs

Overall, *Sunny* is the only scenario with a favourable overall outlook for jobs, with employment opportunities in manufacturing, electricity and low greenhouse gas energy, and agriculture and forestry. In fact, across all futures, these industries will create jobs in the province. In *Sunny*, they will cumulatively create over 5,000 new roles within the decade. Across futures, transportation and construction are particularly vulnerable to job declines. This is due to lower levels of trade reducing demand for global shipping, and rising material prices impacting the number of construction projects advanced in the province. The mining and electricity and low emissions energy sectors both show low relative change across scenarios to 2030, suggesting stability in these two sectors.



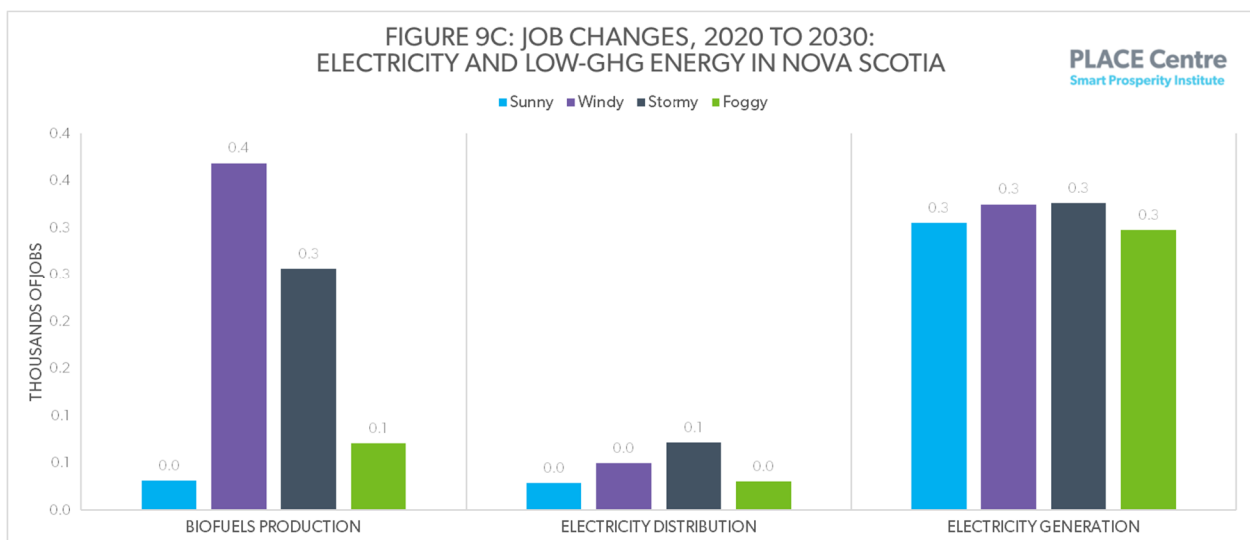
Impact on investments

Investment looks to either remain stable or decline across all four futures, ranging from increasing by \$200 million (*Sunny*) to declining by \$1.3 billion (*Windy*). Manufacturing, utilities, and agriculture and forestry all have fairly stable outlooks, with more growth opportunities in projections where there is less global economic disruption. The province is most negatively affected by the *Windy* scenario, where high disruption to the global economy reduces the availability of investment capital. In particular, disruption looks set to have significant impacts on the transportation sector, which is expected to decline by \$300 million (*Sunny*) – \$600 million (*Windy*).



Sector spotlight: Electricity and Low-GHG Energy

In 2021, the provincial utilities sector employed 4,700 workers, which represented a significant increase from pre-pandemic levels of 3,500 in 2019 (Statistics Canada, 2022). Electricity generation presents strong growth opportunities across all scenarios. Investment into the sector will be needed as the province moves away from coal-fired electricity generation. This will lead to expected job declines in more urban areas where coal-fired generating stations are currently located, including Tufts Cove, Trenton, and Cape Breton, and job gains in regions where wind and solar generation potential are higher (Government of Nova Scotia, 2017). This includes coastal and rural regions such as the Annapolis Valley, the South Shore, and the Bay of Fundy (Government of Nova Scotia, 2017). Depending on where projects are built and their associated infrastructure needs, this may lead to more jobs being created in electricity transmission and distribution. Across futures, the biofuels sector is also expected to create up to 400 jobs, although these expected impacts are anticipated to vary greatly across scenarios depending on levels of global disruption. Under the *Windy* and *Stormy* scenarios, we would also expect to see the biofuels facilities in Brooklyn and Port Hawkesbury to expand their employees (Government of Nova Scotia, 2017).

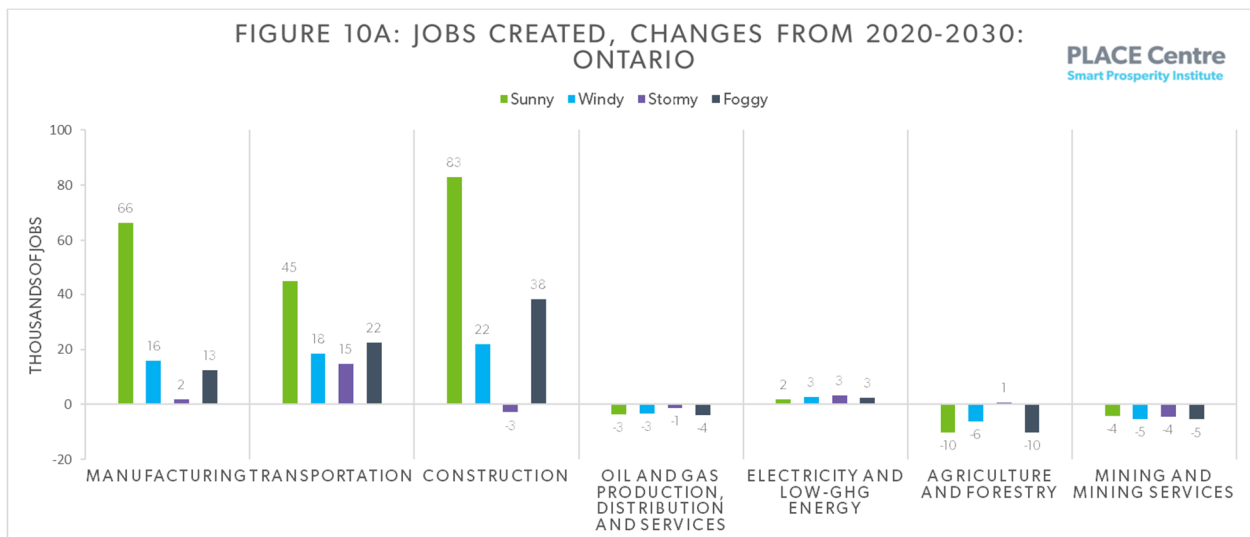


Provincial profile: Ontario

Overall, global trends will lead to strong job creation and investment in Ontario’s clean economy. Ontario’s annual GDP growth is expected to grow by 1.4% (*Stormy*) – 3% (*Sunny*) annually out to 2030. Additionally, jobs are created in numerous sectors across all scenarios, with communities throughout the province benefitting from this strong economy.

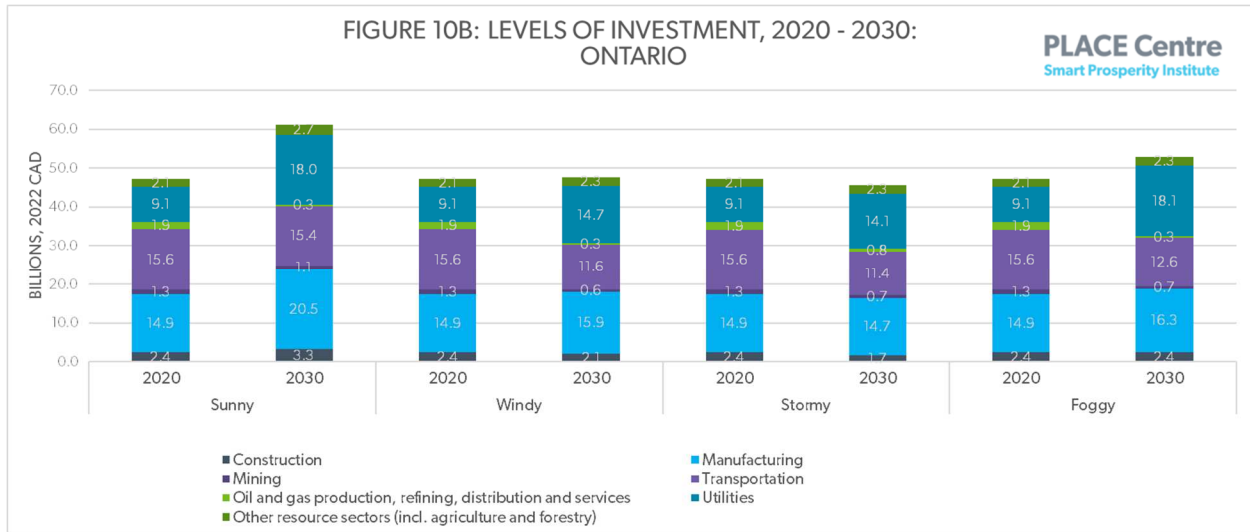
Impact on jobs

Across all scenarios, jobs grow in the province of Ontario. However, the outlook is very dependent on what is occurring globally, with the number of jobs created ranging from 12,000 (*Stormy*) – 178,000 (*Sunny*). Manufacturing, construction, and transportation are expected to experience significant growth across all scenarios, with the only exception being a slight decline in construction employment in *Stormy*. Small job declines are expected in sectors surrounding oil and gas production, distribution and services, agriculture and forestry, and mining and mining services. Importantly, these modelling figures do not include any jobs created from potential future investments in mining for critical minerals in Central and Northern Ontario. Across all scenarios, investments in renewable electricity and low greenhouse gas emissions energy are expected to create between 2,000 – 3,000 additional jobs within the province.



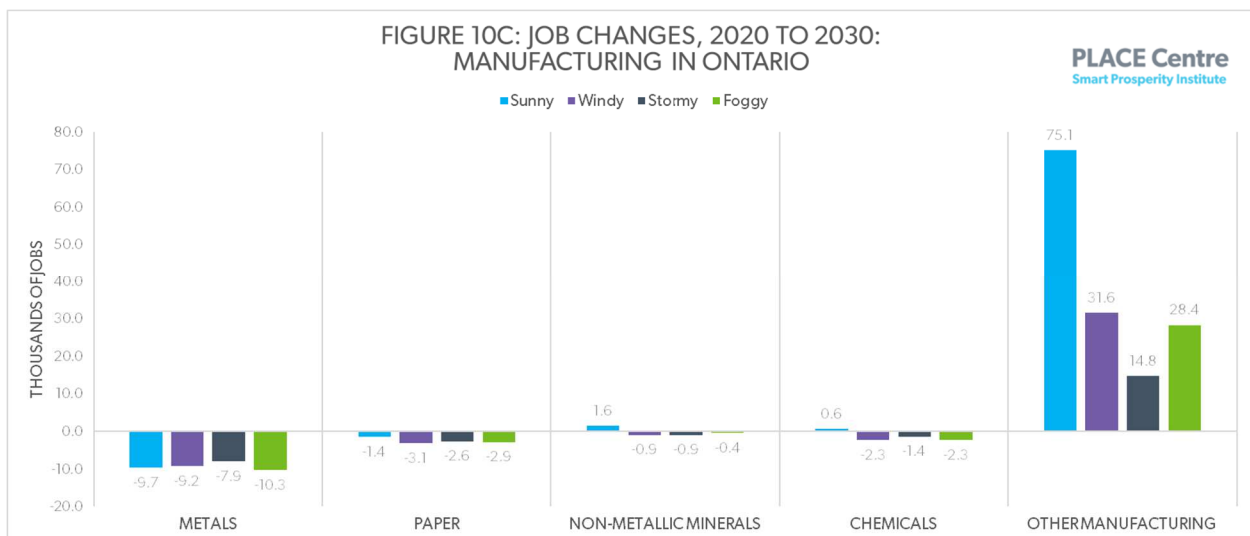
Impact on investments

Investment in Ontario is anticipated to increase by \$400 million (*Windy*) – \$14 billion (*Sunny*) in all scenarios except *Stormy*, where a decline of \$1.6 billion from 2020 levels is expected. Across all futures, billions in additional investment is expected into the province’s utilities sector, as clean energy scales up in the province. This investment is expected either into new renewable electricity capacity, refurbishment projects for existing nuclear facilities in Pickering and Bruce County, or to support the growth of additional nuclear capacity through projects at Darlington. Additionally, investment in manufacturing is expected across all scenarios except *Stormy*, where investment is expected to remain similar to 2020 levels. The investment outlook for sectors associated with mining and oil and gas shows expected declines by 2030 without additional action being taken. The degree of decline in both varies based on commodity costs. Transportation also receives less investment in all outcomes, except in *Sunny*, where it roughly breaks even with 2020 levels.



Sector spotlight: Manufacturing

The manufacturing sector is responsible for slightly over 10.5% of total provincial employment (Statistics Canada, 2022). Though all scenarios do see some level of positive growth (ranging from an additional 2,000 jobs (*Stormy*) to 66,300 (*Sunny*)), what is clear is that the outlook for Ontario manufacturing depends on high levels of trade and economic cooperation. Overall, the strongest outlook is for “other manufacturing,”¹² a sector comprised of food, fabricated metal, machinery, transportation equipment, plastics, textile, clothing, and leather manufacturing, among others. These sectors will see between 14,800 (*Stormy*) – 75,100 (*Sunny*) new jobs created in the province by 2030. Importantly, these figures do not account for worker retirements, meaning that there may be additional positions that need to be filled. New opportunities in these manufacturing sectors represent strong growth opportunities for communities like Kitchener and Guelph, as well as Southwestern Ontario communities like including London and Woodstock. However, declines are also expected in metals, paper, and chemicals manufacturing. Cities like Hamilton and Sarnia with large manufacturing bases will be vulnerable to these shifts in employment.



¹² This sector is coded differently in the gTech model and includes all manufacturing sectors other than 3311, 3312, 3313, 3314, 322, 32731, 3274, 32511, 32512, 32518, 32519, 32531, 32412, 32419, and 32532, 3254, 3255, 3256, and 3259.

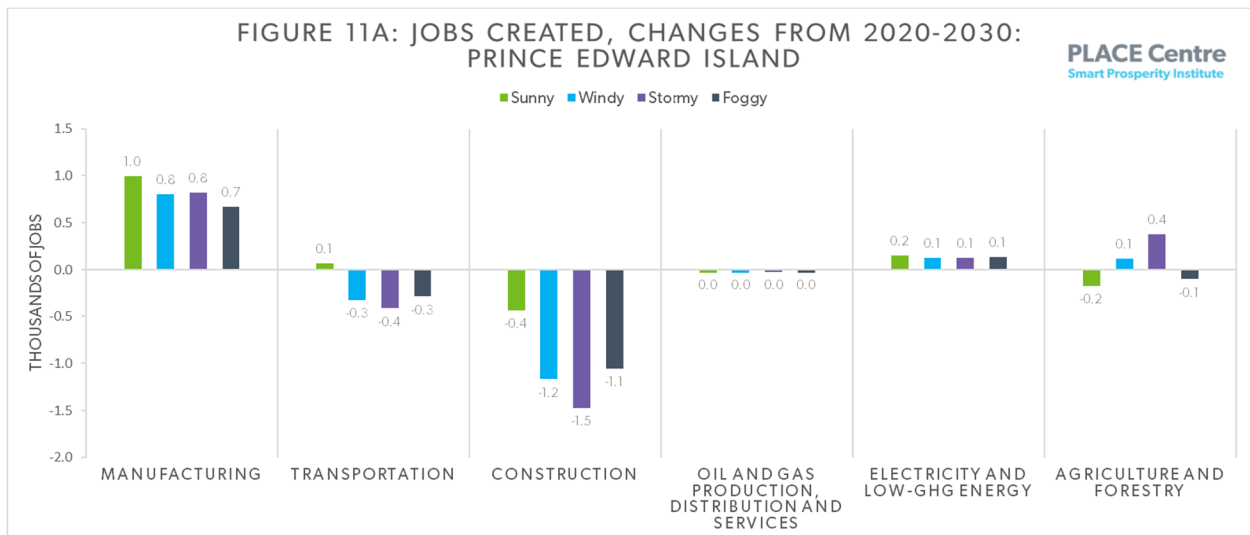


Provincial profile: Prince Edward Island

This analysis shows that the economic outlook for Prince Edward Island is favourable overall, with annual GDP growth expected to grow at 1.1% (*Stormy*) – 2.3% (*Sunny*). However, much of this outlook is attributable to the growth of Prince Edward Island’s services sector. In all scenarios, jobs are expected to decline and investment is expected to remain similar to 2020 levels.

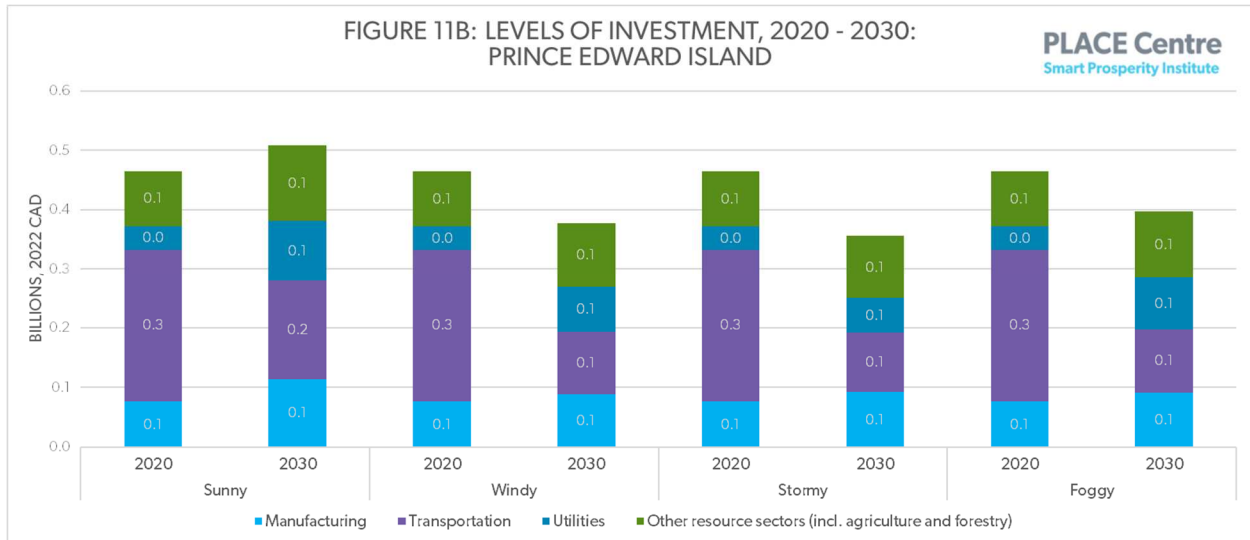
Impact on jobs

Overall, only *Sunny* is expected to lead to job growth within the province, with this future creating 600 new roles. These roles would be created in a variety of different industries, including manufacturing, clean electricity, and transportation, leading to the creation of 1,300 new roles across these sectors. These job gains would be offset by declines in construction as well as agriculture and forestry. Across all other futures, Prince Edward Island is expected to see a decline of 500 jobs (*Windy*) – 700 jobs (*Foggy*) in the below 2020 levels. In all futures, these changes will not be evenly distributed. Sectors such as manufacturing, and clean electricity and low greenhouse gas emission energy, are likely to experience job creation across all scenarios. Sectors like construction and transportation look likely to experience job declines.



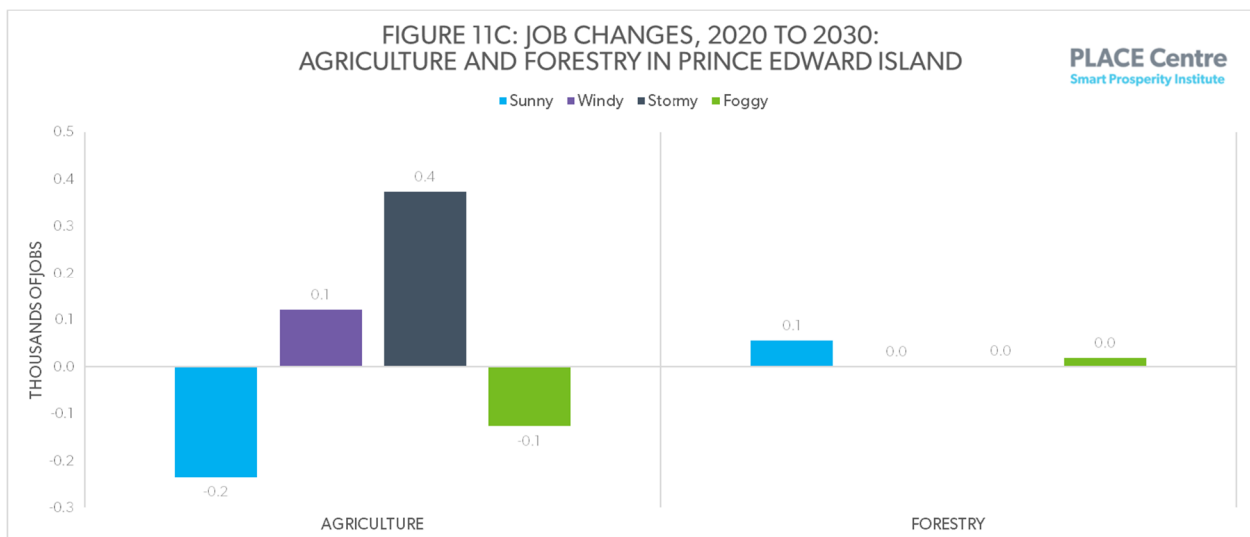
Impact on investments

Investment is expected to increase only in *Sunny* (by roughly \$140 million), with small declines expected across all other scenarios, from \$100 million (*Stormy*) – \$200 million (*Windy*). In all scenarios, additional investment is expected into the provincial utilities sector, while investments into manufacturing and agriculture and forestry are expected to remain relatively constant (with the exception of *Windy*, where investment into agriculture and forestry declines). The biggest difference in investment can be seen in transportation, where declines are expected across all futures. This is likely due to declines in investment in shipping and trucking as international trade is adversely impacted. These findings align somewhat with current trends that are being observed in Prince Edward Island. In 2021, manufacturing was a leading growth sector in the province (up by 6.3%) yet is expected to see investment levels decline. However, transportation declined by 4.4%, and this trend is expected to be reflected in future investment (P.E.I. Statistics Bureau, 2022).



Sector spotlight: Agriculture & Forestry

Prince Edward Island has nearly 42% of its land area dedicated to agriculture and has been the largest potato producing province in Canada (Agriculture Information Desk, 2020). Along with forestry and fishing, agriculture contributed to 7.1% of the provincial GDP (P.E.I. Statistics Bureau, 2022). Additionally, agriculture made up roughly 4.5% of the provincial workforce in 2021. Our analysis finds that the agricultural sector will add approximately 400 jobs under *Stormy*, while declines are expected in both *Sunny* and *Foggy*. Given that job growth is expected in scenarios where supply chain disruptions will be higher, this can be attributed in part to changes in agricultural commodity prices leading to more growth in the sector. This is expected to increase job growth in and around regions such as Stratford, Summerside, Kensington, and North Wiltshire. Within the province, forests make up roughly 44% of total land. The forestry sector is expected to be largely unaffected by global trends, with employment levels remaining similar to 2020 levels. However, the sector is expected to contribute to the growth of manufacturing in the province, including manufacturing wood and paper products.

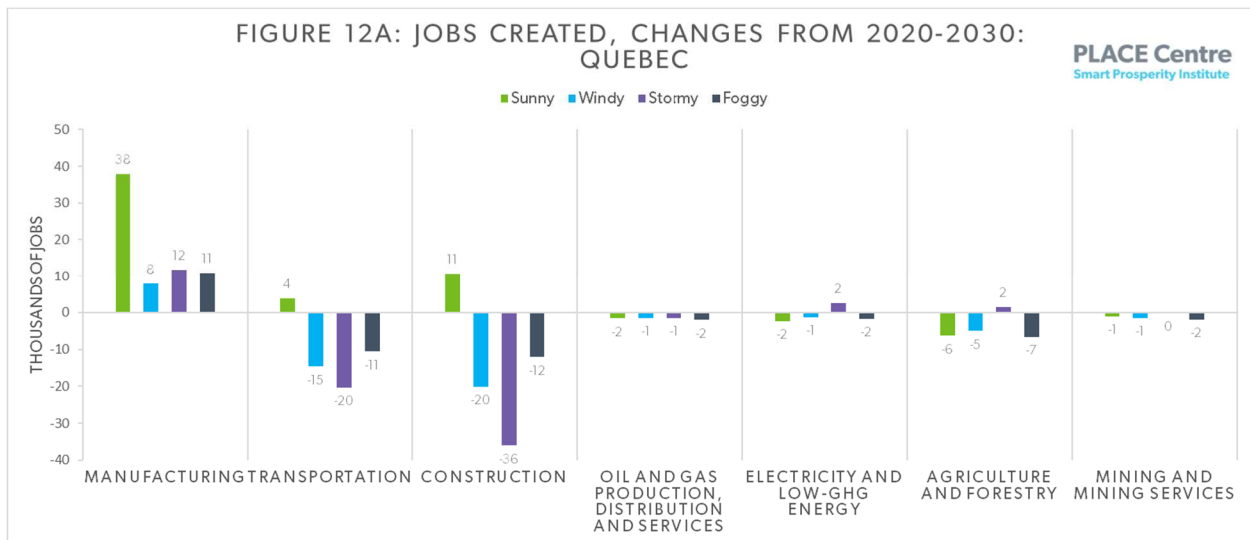


Provincial profile: Quebec

Across all scenarios, the province of Quebec will have positive economic growth as a result of climate action and clean growth. This analysis shows that the province's GDP is expected to grow annually by 0.9% (in the scenario *Stormy*) – 2.4% (in the scenario *Sunny*). However, growth in jobs and investment is expected only in *Sunny*. Across other scenarios, the province is expected to see job declines and declines in investment.

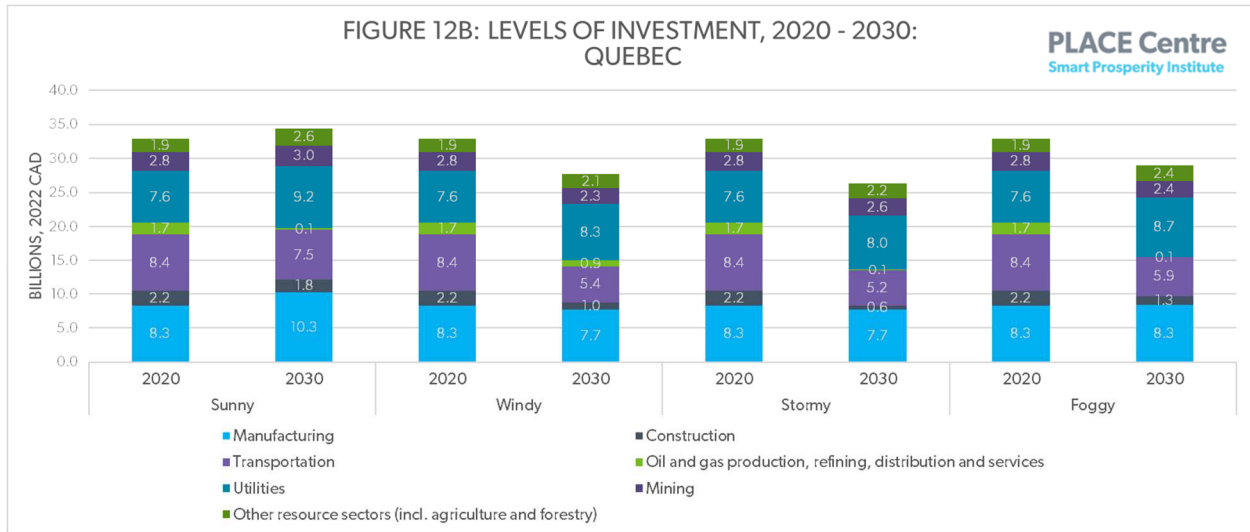
Impacts on jobs

Across all futures, only *Sunny* sees overall job gains within the province above 2020 levels. This growth is largely driven by increases in employment in manufacturing, transportation, and construction. Within a *Sunny* future, approximately 41,000 new jobs would be created in the province by 2030. Across all futures, manufacturing is expected to see job growth. However, for transportation and construction, job growth is only expected in the scenario *Sunny*. Across all other scenarios (*Windy*, *Stormy*, and *Foggy*), Quebec may experience a decline in the number of jobs between 2020 to 2030. Sectors such as oil and gas industries, agriculture and forestry, and mining and mining services are expected to experience declines. However, in *Stormy*, some jobs are created in clean energy and in agriculture and forestry. This is due to higher costs for agricultural commodities and oil and gas creating more economic activity in these two sectors.



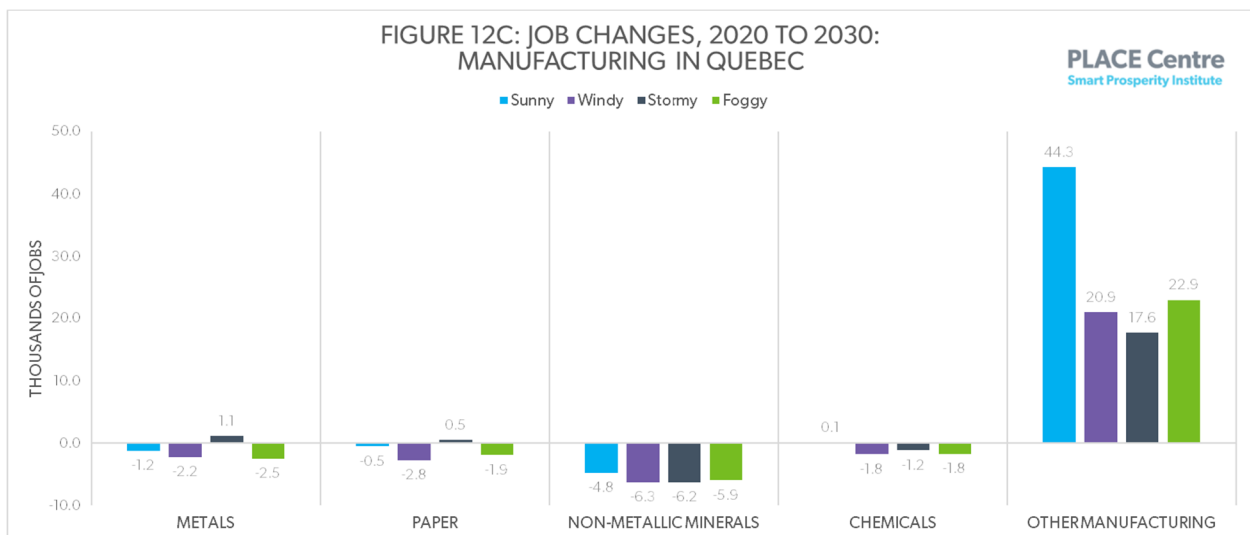
Impacts on investments

Across all four scenarios, investments only increase in *Sunny*. In the *Sunny* scenario, the province will attract an additional \$1.5 billion in total investments across different sectors, primarily into manufacturing, utilities, and the mining sector. However, in other scenarios, investments are expected to decline by \$3.9 billion (*Foggy*) – \$7.3 billion (*Windy*). The manufacturing and utilities sectors will attract investment above 2020 levels in all scenarios, while the construction and oil and gas sectors will likely experience investment declines. The growth in manufacturing expected in these scenarios is aligned with current policy actions of the Quebec Government. Some examples include the Digital Transformation Strategic Initiative and Productivity Innovation Initiative which are aimed at transforming manufacturing (Investissement Québec International, 2021).



Sector spotlight: Manufacturing

Manufacturing makes up slightly over 11% of provincial workforce in Quebec. The majority of the new jobs will be created in “other manufacturing,”¹³ a sector comprised of food, fabricated metal, machinery, transportation equipment, plastics, textile, clothing, and leather manufacturing, among others. Across scenarios, job growth in other manufacturing will be between 17,600 jobs (*Stormy*) – 44,300 jobs (*Sunny*). Importantly, these figures do not account for worker retirements, meaning that there may be additional positions that need to be filled. New opportunities in these manufacturing sectors represent strong growth opportunities for communities like those in the Montreal borough of Saint Laurent, Quebec City, and smaller towns such as Saint Jean sur Richelieu. However, declines are also expected in metals, paper, and chemicals manufacturing.



¹³ This sector is coded differently in the gTech model and includes all manufacturing sectors other than 3311, 3312, 3313, 3314, 322, 32731, 3274, 32511, 32512, 32518, 32519, 32531, 32412, 32419, and 32532, 3254, 3255, 3256, and 3259.

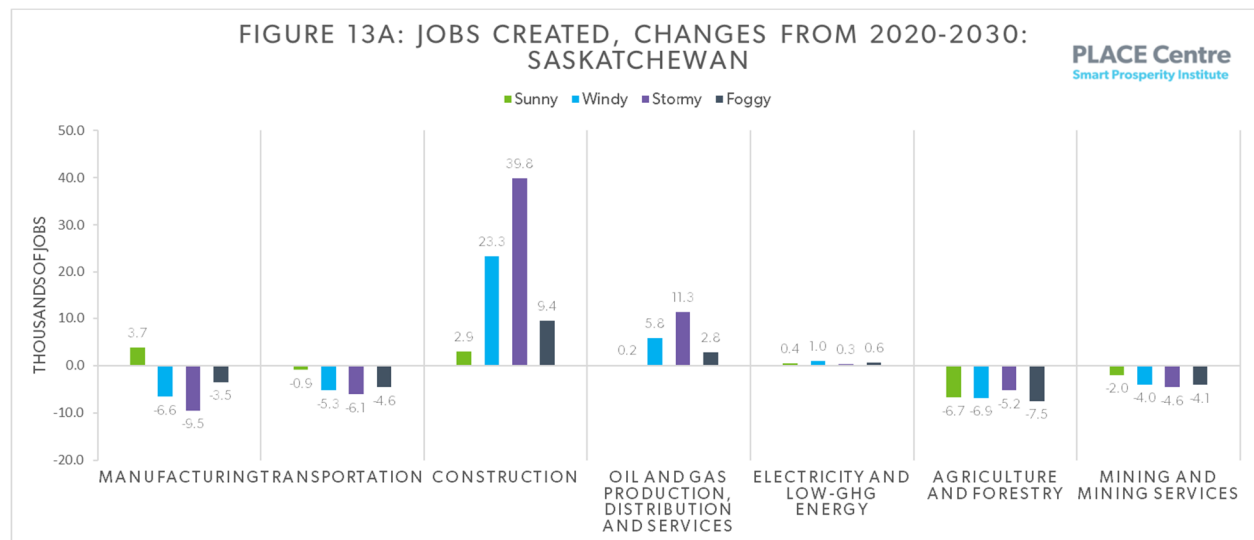


Provincial profile: Saskatchewan

Saskatchewan’s economy has grown steadily over the past decade. Across futures, between 2020 and 2030, this analysis shows the annual GDP growth rate for the province will range from 2.8% (*Stormy*) – 3.1% (*Sunny*). Investment is expected to increase all futures, but only *Windy* and *Stormy* see the number of jobs grow between 2020 and 2030.

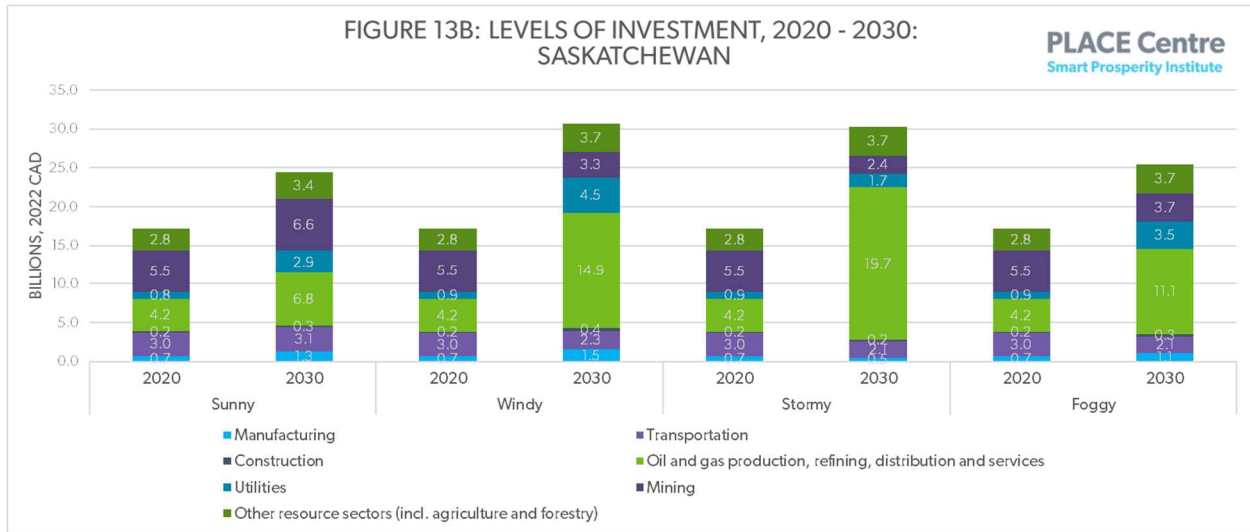
Impacts on jobs

Overall, job creation is expected to be positive in *Windy* and *Stormy*. In these scenarios, job creation is expected to be strongest in the construction sector and the oil and gas sectors. Notably, in all scenarios, the construction sector creates the most jobs of any one sector, with job growth between 2,900 (*Sunny*) – 39,800 (*Stormy*) expected by 2030. The highest number of jobs are created in *Stormy*, with the province expected to see 26,000 new jobs overall. This is attributable to high commodity prices driving increased investment into both oil and gas production and the construction sector. The growth in construction is attributable to increased energy efficiency measures, which become more economic as the costs of heating homes and buildings increase in higher oil price futures. Across all futures, jobs are expected to be created in the electricity and low emissions energy sector as well.



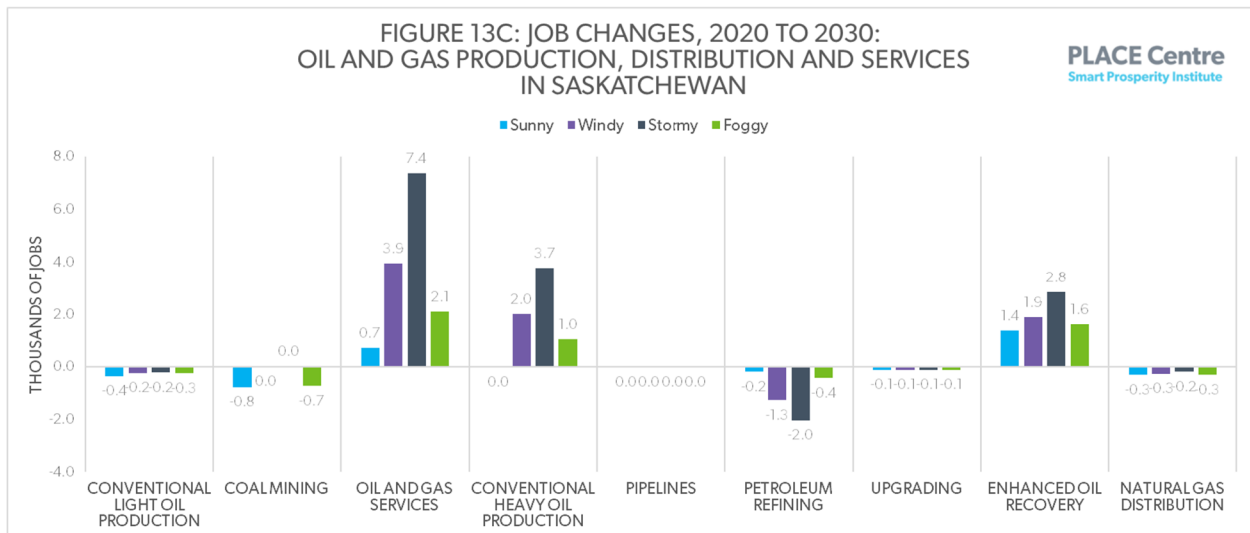
Impacts on investments

Across all futures, investment into Saskatchewan will grow between \$8.3 billion (*Sunny*) – \$13.1 billion (*Stormy*). Investment into construction, oil and gas production, distribution and services, utilities, and agriculture are expected to increase in all futures. In these three sectors, job growth is also expected. For certain sectors in Saskatchewan, additional investment is not directly correlated to job increases. For example, in manufacturing, investment is set to increase across all scenarios except *Stormy*, but job increases are only seen in *Sunny*. This is likely attributable to investments in equipment that are likely to improve efficiency by making manufacturing processes more productive. Additionally, investment in agriculture is expected to increase across by \$600 million (*Sunny*) – \$900 million (*Stormy*) across all futures.



Sector spotlight: Oil and gas production, distribution and services

Saskatchewan’s oil and gas production, distribution and services sectors made up roughly 6% of provincial employment in 2021 (Statistics Canada, 2022). This analysis finds that the province will create between 700 jobs (*Sunny*) – 7,400 jobs (*Stormy*) across oil and gas sectors. Most of the growth in the sector will be concentrated in oil and gas services, conventional heavy oil production, and enhanced oil recovery. Job gains are attributable to the impact international disruptions would have on oil and gas prices, which are expected to increase as disruptions grow. In all other sectors (including conventional light oil production and transportation and distribution infrastructure), jobs are expected to decline. Critically, as this sector aims to create roles, it will need to ensure its growth is aligned with provincial and federal greenhouse gas emissions reduction targets. Many of these new roles will be found in regions around Lloydminster, Kindersley-Kerrobert, Swift Current, and Weyburn-Estevan.



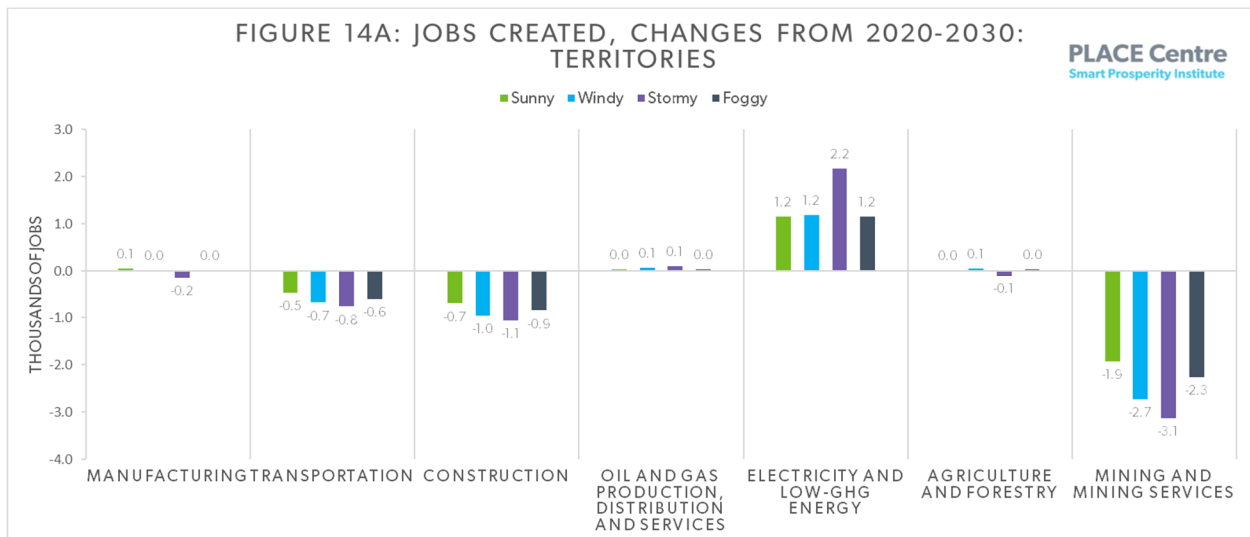
Territorial profile: Northwest Territories, Nunavut and Yukon

The model used for this report amalgamates results from all three territories, limiting the insight that can be generated into how global trends will affect each territory. Results are therefore presented for the Northwest Territories, Nunavut, and the Yukon in one profile.

Across all futures, jobs and investment are expected to decline across the Territories. The expected annual GDP growth rate between 2020 and 2030 for the three territories ranges from -0.1% (*Stormy*) – +0.9% (*Sunny*).

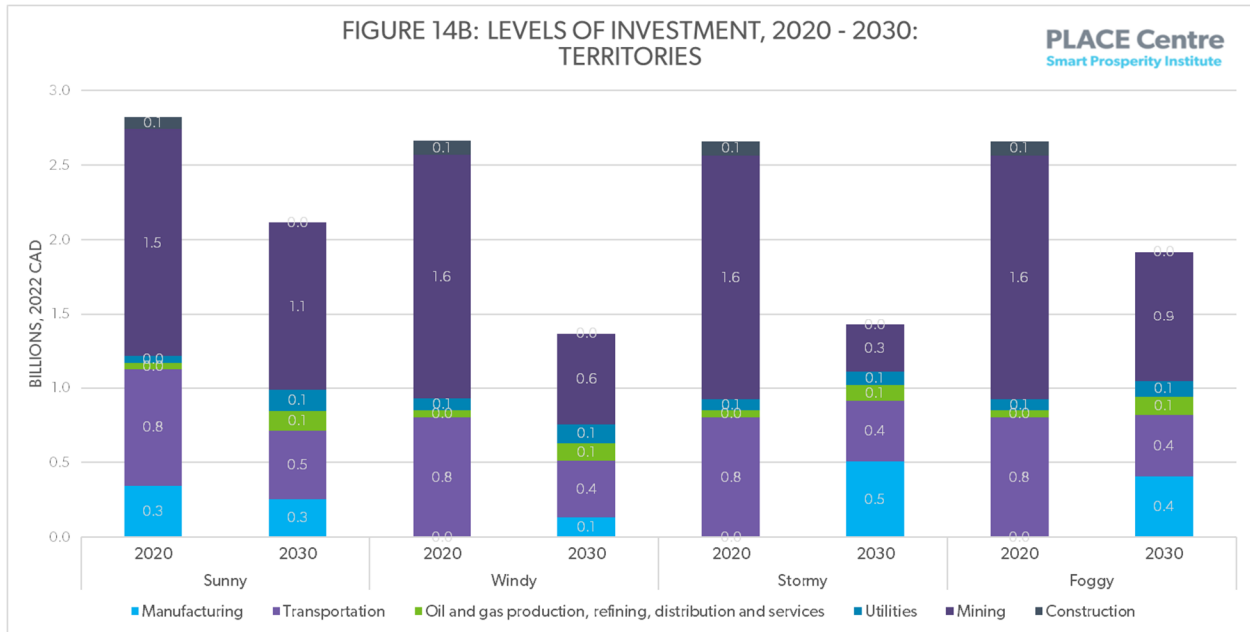
Impact on jobs

Overall, job declines are expected across all futures within the Territories as a result of global trends. The only sector where robust job growth is expected is electricity and low emissions energy, with job creation ranging from 1,200 (*Sunny*) – 2,200 (*Stormy*). Much of this job growth is expected in renewable energy generation and in bioenergy production. For other sectors, such as transportation, construction and mining and mining services, job declines are expected across all scenarios. This could impact several mining projects around the Yellowknife region. Notably, this analysis does not account for any additional mining projects around critical minerals that could emerge through the Territories. Jobs in the oil and gas sectors and manufacturing are expected to remain relatively constant from 2020 – 2030 across all futures.



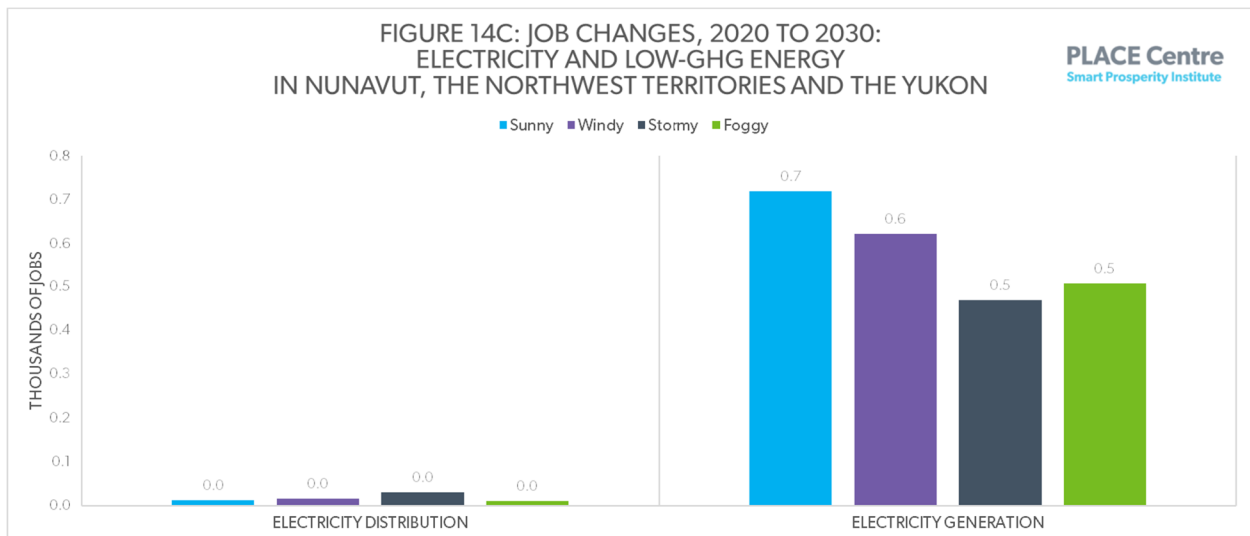
Impact on investments

Investment levels are expected to decline across all futures from \$700 million (*Sunny*) – \$1.3 billion (*Windy*). Investments are expected to increase in all forms of energy, including electricity and oil and gas sectors. However, there is limited additional investment expected into the oil and gas sector, despite the fact that one of the territories, the Northwest Territories, holds slightly over 1/3 of Canada’s marketable light oil and natural gas reserves (Industry, Tourism and Investment, 2022). This is due to the high costs associated with developing many reserves within the region and transportation, making it unlikely that new projects advance. In all other sectors, investment levels decline across all futures. The one exception is manufacturing, where multiple scenarios result in an additional \$100 million (*Windy*) – \$400 million (*Stormy*) across the three territories.



Sector spotlight: Electricity

The Northwest Territories, Yukon, and Nunavut have adopted several policy measures to build a sustainable and affordable energy system, with new renewable energy generation being deployed across every territory. This analysis identifies electricity generation, including from renewables, will create between 500 (*Foggy*) – 700 (*Sunny*) jobs by the end of the decade. All three territories have policies to support the deployment of renewable energy. This job creation reflects a positive aspect of low-carbon transition in the territories. These may benefit several areas such as the Inuvik Region and the Sahtu region that have been identified for renewable energy expansion by 2030 (Government of NWT, 2020). Similarly, areas in Yukon such as Mayo, the Gwich'in communities, the White River First Nation communities (Government of Yukon, 2020) alongside the Kivalliq region of Nunavut (Nunavut Impact Review Board, 2022) are exploring more renewable energy for heating and electricity.



Key findings

Clean growth and climate action will create jobs, attract investment and benefit Canada’s economy, regardless of what occurs globally by 2030. Across all scenarios, climate action in Canada will create tens of thousands of jobs and attract tens of billions in investment. However, the difference between futures is significant. The best outlook – a *Sunny* future (low disruption, high cooperation) – will create over 300,000 new jobs within the decade. The least favourable outlook – a *Foggy* future (low disruption, low cooperation) – will create less than 28,000 jobs.¹⁴ Levels of investment increase by tens of billions across all scenarios this decade. Yet they are also impacted, albeit less than jobs, by different futures. By 2030, Canada’s economy will attract between \$29 billion (*Foggy*) – \$49 billion (*Sunny*) in investment capital.¹⁵ This clearly shows that climate action and clean growth remain critical for advancing economic growth nationally, regardless of what may be occurring in the world.

The best overall future for climate action in Canada is *Sunny*, and the worst overall future for is *Foggy*. Climate action in Canada will create the highest number of net new jobs and attract the most investment if supply chain disruptions cease and rates of trade and economic cooperation remain high. In a *Sunny* world, job creation will be highest in manufacturing (approx. 162,000 new jobs) and construction (approx. 146,000 new jobs). Investment will be highest in manufacturing (approx. \$23 billion in additional investment) and the utilities sector (approx. \$20 billion in additional investment). A *Foggy* future, in contrast, will create only 28,000 net new jobs and attract only \$29 billion in additional investment by 2030. Manufacturing (approx. 23,000 new jobs) and construction (approx. 56,000 new jobs) remain the largest creators of new jobs, but these are offset by expected declines in resource sectors such as oil and gas, mining, and agriculture and forestry. Investment will be highest in this future in the utilities sector (approx. \$21 billion in new investment) and oil and gas production, distribution and services (approx. \$7 billion in new investment). Additionally, in a *Foggy* future, only Ontario, Alberta, and British Columbia experience net job gains, with all other provinces and territories experiencing declines in the overall number of jobs.

The level of economic disruption required to meet the 2030 climate target is far higher in certain futures than in others, and policymakers need to prepare to manage this level of disruption. Each prospective future offers a different picture of Canada’s economic path to climate action, but all will require enormous action. In a *Sunny* world, hundreds of thousands of new jobs will be created in the manufacturing, construction, and transportation sectors across the country as investments pour into clean energy and advanced manufacturing. In a *Stormy* world, clean energy and construction jobs will grow alongside jobs in oil and gas production, distribution and services, while jobs in manufacturing and transportation decline. Investment in oil and gas grows by over 180% in this future, which also see investment levels decline in almost every other sector. These two scenarios alone capture the range of economic impacts global trends will bring, even if climate action is pursued in a similar way. This scale of change will need to be managed, as workers, communities, households, and industries will be affected in every province and territory across Canada. Even in a *Foggy* future, where only 28,000 new jobs are created, tens of thousands of workers will be required to move into, or between, industries or occupations. Regions with the largest number of workers impacted by disruption will be in the most populous provinces (Ontario, Alberta, Quebec, and British Columbia), where tens of thousands of workers will likely enter new roles.

¹⁴ Stormy and Windy result in the creation of 104,000 and 61,000 jobs by 2030 respectively.

¹⁵ Stormy and Windy result in the attraction of approximately \$36 billion and \$32 billion of investment by 2030 respectively.

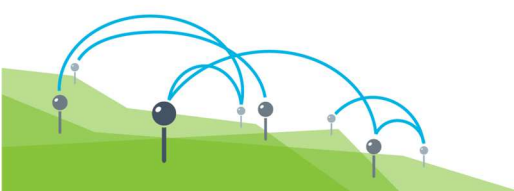


Technologies that form the backbone of Canada’s mitigation action by 2030 – zero emissions electricity generation and transportation and distribution infrastructure – are safe bets to create jobs and invest in across all futures. Across all scenarios, investment and job growth is expected into Canada’s clean electricity sector. Across all scenarios, investment into Canadian utilities (an investment category made up of electricity generation, transmission, and distribution) will grow by \$13 billion – \$21 billion within the decade. Additionally, the utilities sector looks set to create approximately 6,100 – 13,900 across the country by 2030. This sector offers the most stable economic outlook across scenarios, making it a smart investment, regardless of what occurs into the future. The investment case for clean electricity generation capacity and infrastructure is stronger given the price volatility other futures would create for the costs of alternatives, such as gasoline, natural gas, and diesel. Additionally, under all scenarios except *Stormy*, job growth in clean energy is expected to outpace job growth in the oil and gas sector, even if it attracts less investment. This analysis shows the largest number of jobs in clean energy will be created in Alberta, British Columbia, Quebec, and Saskatchewan. The only province where job declines in clean energy are expected is Newfoundland and Labrador, although this analysis does not account for job creation from projects like the upcoming green hydrogen facility near Stephenville. Overall, this analysis shows that clean electricity is a safe bet for jobs and investment across all futures, while other energy industries have far more uncertain outlooks.

Canada’s construction sector will be the country’s largest net job creator. In all scenarios save one, the construction sector is the largest creator of new jobs across sectors. Even in *Sunny*, the future where manufacturing creates the most net new jobs (162,000), construction creates the second most (142,000). This trend is not solely national. In fact, construction jobs will grow the most in oil and gas producing provinces. In both oil and gas-producing Alberta and Saskatchewan, across any future, the construction sector is expected to create at least twice as many jobs as the combined oil and gas production, distribution and services industries. Given ongoing challenges with labour shortages in the construction sector, this job growth reveals an urgent need to train and recruit more workers in construction. However, this trend is not evenly distributed across the whole country. Across all futures, construction jobs are expected to decline in Quebec, as well as all of the Atlantic Canadian provinces and the territories.

Canada’s forestry sector is expected to grow across all futures, while jobs in agriculture are expected to decline in every province and territory, and almost every future. Across all futures, jobs in forestry are set to grow nationally by 6,000 – 8,500, while agricultural roles are set to decline by 17,300 – 38,700 roles. Critically, this occurs in every province and territory across multiple futures. The growth of the forestry sector is expected to be driven by increased use of wood as a building material. It is also not an absolute negative outlook for jobs in Canada’s agriculture. Some growth in agriculture will still be expected in some futures – for example, Prince Edward Island’s agricultural sector will create between 100 – 400 new jobs in *Windy* and *Stormy*, respectively. However, it is likely that there are job declines in agriculture across the country moving forward. These figures should be interpreted with two limitations of this analysis in mind. First, this work does not account for any changes in yield from wood fibre that might impact the growth of the forestry sector going forward, which could impact the output of sawmills and wood products manufacturers. Second, job figures in this work include only “full-time equivalents,” a metric that does not include seasonal workers who might work less than 120 days in an industry. Therefore, this analysis cannot offer insight into how many seasonal farm workers could be needed moving forward. These two limitations will change the outlook of these figures, and should be considered when interpreting these results.

Oil and gas production, distribution and services only creates jobs in a world with high levels of economic disruption, but increased investment does not always lead to more jobs. In the two scenarios where supply chain disruptions from conflict, pandemics, and natural disasters are expected to decline, job losses are expected in oil and gas. However, in futures where they are expected to increase, job growth occurs. This is largely due to the expected



impacts disruption would have on oil and gas prices. However, this analysis does show that increased investment in oil and gas production, distribution and services does not directly lead to job creation. In a *Foggy* future, investment into these sectors increases by roughly \$6 billion dollars, but they still lose approximately 14,000 jobs by 2030. In this future, job growth in oil and gas is only expected in Saskatchewan, with all other provinces and territories expected to either maintain their 2020 levels of jobs or see job numbers decline.

The future of Canadian manufacturing is advanced manufacturing of value-added goods and components. This analysis identifies that numerous Canadian manufacturing sectors – metals, paper, chemicals, and non-metallic minerals – are expected to experience small employment declines within the coming decade. However, across all futures, other forms of manufacturing, including advanced manufacturing, are expected to create jobs in provinces such as Ontario, Quebec, Manitoba, and British Columbia. These forms of manufacturing include key opportunities such as building mass timber panels in British Columbia, developing zero emissions vehicle and battery components in Ontario and Quebec, and food manufacturing facilities for plant protein-based products in Manitoba.

Recommendations

1. **Regardless of what is occurring globally, Canada should remain ambitious in advancing climate action and clean growth.** The analysis in this report clearly shows that no matter what occurs in the world, clean growth will create tens of thousands of new jobs, and drive billions in investment, across the country. Industries like construction and clean energy will serve as the backbone for this job creation across all futures, even in oil and gas producing provinces. Existing and pledged policies should be developed, implemented, and advanced to ensure Canada can reap the benefits of creating jobs and attracting investment into the growing clean economy across the country.
2. **Canada needs to double-down on place-based policy approaches that centre around helping clean economy clusters across the country grow.** As the provincial and territorial analysis contained in this report shows, the industries that create jobs and drive investment will differ substantively across different global futures. Governments need to ensure regions have the talent, capital, regulatory environment, and cost of living needed to drive clean growth in regions across the country. This means taking two kinds of approaches:
 - a. **Invest in clean growth clusters in regions who will be hit hardest by global trends using federal programs like the Strategic Innovation Fund and the Canada Growth Fund.** The global trends modelled in this report are expected to hit some regions hard. However, this analysis cannot capture everything, and no forecast of the future should be confused with fate. Governments can support additional investment and job creation in clean economy clusters across the country in regions where results show some sectors might decline. These investments can help realize existing potential, or scale success stories, for clean economies across the country. Importantly, they can also help advance opportunities that regions identify as pressing or critical for their own prosperity in a clean economy. For example, the green hydrogen production facility planned in Stephenville, Newfoundland is not captured in this modelling, but is a core part of Newfoundland's clean economic future. This announced project will contribute investment and jobs to the regional economy of Western Newfoundland, and will increase job and drive investment into the province's construction, electricity, and zero carbon energy industries (von Kursk, 2022). More projects like these should be supported, targeted at sectors where modelling shows results that do not

illustrate the full potential of regional growth. These regional industries include: food manufacturing around Portage La Prairie, Manitoba, and Regina, Saskatchewan; sustainable mining operations across the territories; and, new forest products manufacturing opportunities in pulp and paper communities in Atlantic Canada, including those in Pictou County, Nova Scotia, Edmunston, New Brunswick, and, Corner Brook, Newfoundland. Governments already have spending and support programs capable of lending support, including the Canada Growth Fund and the Net-Zero Accelerator Initiative. These two funding programs, along with others advanced through Canada’s Regional Development Agencies, should be directed to target regions where growth potential exists and help communities realize the opportunities that might be present in their clean economies. The federal government has already begun the process of identifying these opportunities in tandem with provinces through programs like the federal Energy and Resource Tables. The next step is to ensure funding existing funding programs align with priorities selected, so communities can receive the support needed to advance their ambitions.

- b. Ensure regions primed for growth in periods of change have everything they need to realize these opportunities through federal and provincial action on housing, improving access to capital for small to medium sized businesses to scale their operations, and reducing trade barriers.** Some regions are poised to thrive across a range of futures, often in the largest provinces. These include construction near Alberta and British Columbia’s major cities as well as advanced manufacturing and transportation in the Windsor to Quebec City corridor. While additional investment from governments may be required in sectors such as manufacturing, many of the challenges these regions face will emerge from trying to manage growth. Ensuring new workers have places to live, expediting approval timelines for new projects, and creating skills training programs capable of growing the workforce at the pace required will be essential to realizing these opportunities. To achieve this, the leadership of provincial and territorial governments is needed. Provinces need to expedite and enable the development of tens or hundreds of thousands of additional housing units in communities where job growth is expected. Setting municipal housing completion targets, as Ontario has done, is one way provincial governments can ensure communities have the housing needed to meet supply. The decisions made about where these targets should be set needs to incorporate potential job creation from clean economy spending as well, to ensure provinces are prepared to accommodate this growth. Additionally, provinces should take steps to ensure small to medium-sized enterprises (SMEs) poised to create jobs have access to the capital needed to scale their operations. Existing interprovincial trade barriers should also be lowered to allow successful Canadian companies to sell to Canadian customers. Manufacturers making ground-source heat pumps in Abbotsford, British Columbia, should not face higher barriers for selling their products to the residents of Yellowknife or Gander than they do to sell into markets in the United States. If these challenges are tackled, communities developing Canada’s clean economic future can also help other regions achieve their climate ambitions.

- 3. Governments need to prepare as tens, or even hundreds, of thousands of new workers move between industries.** Across all of these futures, tens to hundreds of thousands workers will need to fill new jobs. Major investments in education, skills training, and worker supports will be required to ensure workers are prepared. However, more will be needed than simply issuing tax credits. Offering tax credits to lower the costs of worker retraining for individuals will not be effective if colleges, universities, technical colleges, and training providers do not have programs with enough capacity to support expected

increases in demand. Governments need to work with labour unions, third-party trainers, colleges, universities, technical colleges, and private trainers to ensure existing programs can be updated to offer the skills workers will need as well as to offer the support needed to create new programs for emerging sectors. Existing federal initiatives, or those under development, including the Sectoral Workforce Solutions Program, the Community Workforce Development Program, and the Sustainable Jobs Training Centre, could play a critical role in supporting additional training depending on how they are designed, operated, and administered. To ensure these programs can support greater overall impact, programs should avoid duplicating existing provincial, industry, or labour-led initiatives. Another useful role for governments would be offering common standards, approaches, and best practices across industries advancing clean growth opportunities in regions across the country, many of whom may not have the resources to identify and research how a given opportunity changes skills needs for workers.

- 4. Canada needs to strengthen greenhouse gas regulations on the oil and gas sector to ensure global volatility does not derail our climate goals.** Global volatility has the potential to drive enormous investment into oil and gas production, distribution and services across the country. Even when taking into account regulatory factors and development timelines, investment into oil and gas looks to increase across all futures except *Sunny*. Canada needs to ensure this additional investment and development does not derail the country's ability to meet its 2030 climate goals. Recent analysis from the Canadian Climate Institute identified that without successful implementation of a stringent oil and gas emissions cap and tighter regulation of methane emissions, beyond existing policies, emissions from oil and gas activities risk derailing the country's ability to meet its 40% reduction target by 2030. Canada needs to rigorously implement these two policies, and any additional ones needed for the oil and gas sector to align emissions reductions with the GHG reduction pathways outlined in the federal Emission Reductions Plan.

Conclusion

Uncertainty hangs over the global economy. Major conflicts, protectionism, climate change, and the future risk of pandemics are darkening our vision for a better future for Canada. Yet this analysis shows that, by acting ambitiously on clean growth, Canada can create hundreds of thousands of jobs and attract of billions of dollars in investment across the country. Despite what occurs globally, clean growth remains an effective way to create jobs and attract investment. Economic opportunities like scaling Canada's renewable energy capacity, building more energy efficient housing, and manufacturing zero-emissions vehicles can drive growth in regions like Western Newfoundland, Northern Alberta, and Southwestern Ontario. In fact, in sectors like renewable energy, job opportunities will be largely unaffected by global changes. This means that communities across the country will see investment and high-quality jobs emerging from these clean growth opportunities for their residents, whatever news that might be filling social media timelines in the coming years.

To ensure communities prosper amidst this global uncertainty, Canadian decision makers need to do more than hope for sunny days. The best way Canada can ensure its economy continues to grow amidst uncertainty is to continue acting boldly on clean growth today. The country also needs to consider developing stronger place-based approaches to clean growth to help each region advance the solutions that make sense for them. For some regions, where job growth is expected to be enormous, government support will be needed to ensure communities are prepared. Support for more affordable housing, developing skills training and education programs capable of training individuals at scale, and lowering the barriers to growth will be critical. For other regions, where modeling shows job figures may decline, policymakers need to think differently. This modelling does not fully capture the potential emerging clean growth clusters across the country could offer by 2030. Making strategic investments in economic



opportunities within these regions, which include the Cariboo Economic Region in British Columbia, and Kindersley-Kerrobert in Saskatchewan, will help communities across the country see themselves in a clean growth future. Additionally, policymakers need to ensure the country has enough effective skills training and education programs in place to support the hundreds of thousands of workers who could move between industries within the decade. Stringent emissions policies are also needed for the oil and gas sector to ensure economic activity driven by commodity markets does not negatively impact Canada's climate efforts.

This analysis makes one point evidently clear: Canada's economic future will not rise or fall based on global trends or climate action, but by the actions of its rich and diverse communities and regions. Across the country, from the Inuvik region to the Gulf of the St. Lawrence, opportunities to create jobs and attract investment into the clean economy can be found. These opportunities represent good, high-quality careers for thousands across the country building Canada's clean economic future. These investments can support local economies, help create jobs, and generate revenues to reinvest in our prosperity. To seize these opportunities, communities need effective policies and investment to help them thrive. If we can ensure our focus for policy is on designing practical solutions for our communities, then the story of Canada's next generation of climate action and clean growth can be one of prosperity and success for our communities; of innovators creating careers across the country; and, of investing in the foundations of our regional identities while we move towards a stronger, more inclusive, net-zero emissions future for this country. The best way to turn this story into a reality is for all regions to continue acting boldly in clean growth and climate action, and to ensure Canadian policies support this vision – whatever the weather.



Appendices/Annexes

Appendix 1: Description of gTech model used for analysis in this report

The scenarios modelled for this report were modelled using Navius' gTech model. The gTech is well-suited to offer insight into how Canadian climate action would be affected by the changes in technology and commodity cost and availability, brought on by the scenarios outlined in this report. The gTech is a computable general equilibrium (CGE) model that represents transactions between all sectors of the economy as measured by Statistics Canada's national accounts. It captures sector activity, gross domestic product, trade of goods and services, and the transactions that occur between households, industries, and government. This model provides a forecast both of how government policy, but also commodity and technology costs, can affect different economic indicators. The model also simulates how households and firms adopt technologies to meet their energy needs. The models incorporate behavioural dynamics alongside financial costs to more closely represent how policies will influence the buying choices of households and firms. Additionally, it connects changes in commodity prices to products developed by industries, allowing changes in technology costs to be represented by changes in economic structure and the labour market. The gTech has been used by organizations such as Smart Prosperity Institute, the Canadian Climate Institute, and Clean Energy Canada, and was also responsible for conducting emissions modelling for the federal Conservative climate plan introduced in the 2021 federal election (Canadian Climate Institute, 2021; Clean Energy Canada, 2021; Navius Research Inc., 2021; Smart Prosperity Institute, 2022.)

Appendix 2: Overview of climate policies modelled in each scenario

All of the scenarios in this analysis model include already implemented or announced provincial and federal climate policies. These include the full suite of policies announced in the federal Emissions Reduction Plan (ERP), first announced in 2020. Given that many of these policies have not yet been fully implemented or detailed, the analysis in this report contains assumptions about how they might work in practice. Additionally, given this analysis' stated objective of comparing how global trends could impact clean growth in Canada, an emissions cap of reducing GHGs by at least 40% below 2005 levels by 2030 was added to each scenario. This was added to ensure each scenario showed the level of economic activity required for Canada to meet a 40% reduction of greenhouse gas emissions, and allow for comparisons of economic activity across scenarios. The representation of the ERP includes the following policies:

- Carbon price rising to \$170/tCO₂e by 2030 (as a fuel charge or as a credit price in output-based pricing systems).
- An emissions cap on the oil and gas sector at 140 MtCO₂e/yr in 2025 and 110 MtCO₂e/yr in 2030.
- A regulation that reduces methane emissions from the oil and gas sector by 75% below 2012 levels by 2030 and an additional regulation that requires roughly half of all landfills to manage landfill gas emissions.
- A clean electricity standard requiring net-zero GHG emissions from the electricity sector by 2035, with a linear reduction in GHG intensity from levels in 2025 to the 2035 target.
- The Clean Fuels Regulations as legislated.
- A zero-emissions vehicle standard for light-duty vehicles coming into force sometime in 2023, and trending towards 65% sales in 2030 and 100% sales in 2035 (based on policy targets discussed in Québec).
- An emissions standard for medium and heavy-duty vehicles that is aligned with California's Clean Trucks Regulation that requires 30-50% zero-emission vehicle sales by 2030, depending on vehicle class.

- A national net-zero emissions building strategy, where new building envelopes must be net-zero energy ready by 2030 (i.e. could potentially produce as much energy as they consume over each year if they developed on-site renewable power generation).
- An investment tax credit for carbon capture and utilization or storage. This is simulated as a \$2.6 billion subsidy over four years for carbon capture and storage and direct air capture projects starting in 2023, and a \$1.5 billion annual subsidy from 2027 to 2030.
- Canada Infrastructure Bank spending, simulated as a \$1.5 billion subsidy for zero-emission buses, \$500 million for electric charging and hydrogen refueling infrastructure, a \$5 billion subsidy for renewable electricity generation and storage, and \$2 billion for high efficiency building shells and heating technologies in commercial and institutional buildings over three years.
- Incentives for zero-emission vehicles program (iZEV) and the incentives for medium and heavy-duty zero-emission vehicles program (iMHZEV). These are simulated as a \$1.7 billion subsidy, additional to historic and remaining iZEV funds for zero emission light-duty vehicles and a \$547.5M subsidy allocated equally per year from 2022 through 2026 for medium and heavy-duty vehicles.
- Interest-free home retrofit program and residential efficiency retrofit incentives, simulated as a combined \$2.8 billion subsidy available from 2023 to 2030 for efficient residential building shells and heating technologies.
- Community building upgrades and low-carbon economy fund, simulated as a \$3.7 billion subsidy available from 2023 to 2030 for efficient commercial and institutional building shells and heating technologies.
- Renewable electricity investments, simulated as \$1.8 billion subsidy over four years for new renewable electricity generation.

Appendix 3: Overview of four scenarios modelled in this report, with assumptions used in each scenario

Table 2: Comparison of major trends detailed across each scenario

Factors	Sunny: High cooperation, low disruption	Windy: High cooperation, high disruption	Stormy: Low cooperation, high disruption	Foggy: Low cooperation, low disruption
Climate Policy in Canada	All current and announced climate policies in Canada are included. This includes the carbon price rising to \$170/tCO _{2e} across Canada by 2030 and the policies announced in the federal emissions reduction plan. The scenarios also include an emissions cap that ensures Canada at least reaches the low end of the 2030 GHG target (at least a 40% reduction relative to 2005).			
Overall economic prosperity	<i>Highest: Global econ. growth increases</i> Post-COVID recovery settles into sustained growth. Canada's real GDP grows at an average annual rate of ~3% to 2030	<i>Low: Global econ. growth declines somewhat</i> Assume Canada's real GDP growth is consistent with 2022 projection by Parliamentary Budget Officer. Slows to ~1.8%/yr after 2023	<i>Lowest: Global growth declines severely</i> Consistent with continuation of IMF World Economic Outlook from June 2022. Global GDP growth slows to ~2.0%/yr after 2023. Canadian growth slows to 1.5%/yr	<i>High: Global econ. growth increases somewhat</i> Canada's real GDP grows at ~2.5% to 2030
Multilateral climate cooperation	<i>Highest: Most countries on track for 2030 GHG targets, technology sharing</i>	<i>Lowest: Most countries not meeting 2030 GHG</i>	<i>Low (rebuilding takes priority): Most countries not meeting 2030 GHG</i>	<i>High within interested trade blocs: Most countries not meeting 2030 targets, some technology sharing</i>



	Generally low GHG abatement technology costs. US policy consistent with Canada (same % reduction by 2030).	<i>targets, little technology sharing</i> Generally high abatement technology costs/low availability. US policy stalls (no GHG cap by 2030), Canada implements border carbon adjustments at same costs as carbon price.	<i>targets, some technology sharing</i> “Moderate” abatement technology costs/availability, with exceptions for ZEVs and renewable energy (see below) US policy consistent with Canada (same % reduction by 2030).	“Moderate” abatement technology costs/availability. US policy consistent with Canada (same % reduction by 2030). However, there is less international climate action and Canada implements border carbon adjustments at same cost as carbon price.
Multilateral trade	<i>Highest: Free flow of raw materials</i> Consistent with lowest abatement costs for ZEVs and renewable generation (e.g., key metal prices remain low).	<i>High: Global trade generally continues</i> No specific adjustment for the cost of ZEVs or renewable generation related to metal prices.	<i>Lowest: Very low global trade, lower access to raw materials</i> High costs for ZEVs and renewable power driven by high metal prices.	<i>Low: Some constraints on trade of raw materials resulting in higher prices</i> “Moderate” costs for ZEVs and renewable power, assuming that regional supplies of key metals are developed.
Energy costs	<i>Lowest: Crude oil prices stabilize at pre-war rates but remain profitable for oil companies. Start to decline mid-decade.</i> WTI Oil price stabilizes at pre-war levels and decline to ~60 USD/bbl by 2030.	<i>High: Continue increasing dues to conflict, stabilizing mid-decade.</i> WTI Oil price stabilizes around 100 USD/bbl by 2025	<i>Highest: Impacted by both conflict and regionalization of trade.</i> WTI Oil price stabilizes around 140 USD/bbl by 2025	<i>Low: Prices stabilize, but are higher than in Sunny.</i> WTI Oil price stabilizes around 80 USD/bbl by 2025
Food prices (Using the real price of wheat at Chicago (CBOT) as an indicator, where the price of corn and oilseeds follow a similar trend)	<i>Lowest: Prices decline from 2022 peak, becoming consistent with trend in previous decade</i> Wheat price returns to 2015 levels by 2025 (about 185 USD/tonne)	<i>High: Food prices continue increasing, stabilizing mid-decade</i> Wheat price stabilizes around the summer 2022 values by 2025 (about 350 USD/tonne)	<i>Highest: Conflict and constraints on trade result in highest food costs.</i> Wheat price rebounds past the 2022 peak hitting 450 USD/tonne by 2025.	<i>Low: Prices decline from current levels and stabilize at a level higher than in scenario 1.</i> Wheat price, stabilizes at pre-war 2020-2021 levels by 2025 (about 250 USD/tonne)

Table 3: Technology availability and cost assumptions across each scenario

Technology	Sunny: High cooperation, low disruption	Headwinds: High cooperation, high disruption	Stormy: Low cooperation, high disruption	Foggy: Low cooperation, low disruption
Direct air capture of CO ₂	Available by 2030, with moderate costs	Not available by 2030	Available by 2030, with higher costs	Available by 2030, with higher costs
Direct reduced iron, with hydrogen (low GHG steel)	Available by 2030	Available by 2030	Not available by 2030	Not available by 2030
Small modular nuclear reactors for electricity generation	Available by 2030	Available by 2030	Not available by 2030	Not available by 2030



2nd generation bioenergy (gaseous and liquid fuels from biomass)	Lower capital cost assumptions	Higher capital cost assumptions	Moderate capital cost assumptions	Moderate capital cost assumptions
Carbon capture and storage cost (post-combustion for electricity generation and heat)	Lower capital cost assumptions	Higher capital cost assumptions	Moderate capital cost assumptions	Moderate capital cost assumptions
Electric vehicles	Low cost: Battery pack costs may decline as low as \$65/kWh (2022 CAD)	Moderate cost: Battery pack costs may decline as low as \$80/kWh (2022 CAD)	High cost: Battery pack costs may decline as low as \$110/kWh (2022 CAD)	High cost: Battery pack costs may decline as low as \$110/kWh (2022 CAD)
Hydrogen production and fuel cell vehicles	Low cost	Moderate cost	High cost	High cost
Renewable electricity generation	Lowest cost: -5 \$MWh from baseline value	Low cost: No change from baseline	Highest cost: +10 \$MWh from baseline value	High cost: +5 \$MWh from baseline value



References

- *2020 BC Forest Sector -Statistics Summary*. (n.d.). Ministry of Forests, Lands, Natural Resource Operations and Rural Development.
- *2022 Ontario Economic Report* (p. 72). (2022). Ontario chamber of Commerce. <https://occ.ca/wp-content/uploads/2022-Ontario-Economic-Report.pdf>
- Agriculture Information Desk. (2020). *Agriculture on PEI*[Government]. <https://www.princeedwardisland.ca/en/information/agriculture-and-land/agriculture-pei>
- Atiq, Mohsina, Coutinho, Aline, Islam, Anik & McNally, John. (2022). *Jobs and skills in the transition to a net-zero economy*. Smart Prosperity Institute. https://institute.smartprosperity.ca/sites/default/files/Jobs_and_Skills_in_the_Transition_to_a_Net-Zero_Economy.pdf
- BC Council of Forest Industries. (2019). *Contributing to a Better B.C. 2019 Forest Industry Economic Impact Study*.
- Borish, Michael. (2022). *Canada's Cleantech Future Looks Bright*(p. 19). Export Development Canada'. <https://www.edc.ca/en/guide/canada-cleantech-future.html>
- Canada Energy Regulator. (2022, June 28). *Provincial and Territorial Energy Profiles—Nova Scotia* [Government]. Provincial and Territorial Energy Profiles – Nova Scotia. <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-nova-scotia.html>
- Canadian Climate Institute. (2021). *Canada's net-zero future: Finding our way in the global transition*. https://climatechoices.ca/wp-content/uploads/2021/02/Canadas-Net-Zero-Future_FINAL-2.pdf
- Clean Energy Canada. (2021). *The new reality*. Clean Energy Canada. https://cleanenergycanada.org/wp-content/uploads/2021/06/Report_CEC_CleanJobs2021.pdf
- Equinor. (2022, June 9). *The Bay Du Nord Project* [Private]. The Bay Du Nord Project. <https://www.equinor.com/where-we-are/canada-bay-du-nord>
- Government of Canada. (2022a, July 28). *Provincial and Territorial Energy Profiles – Canada*. <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-canada.html>
- Government of Canada. (2022b, October 25). *Labour Market Bulletin—New Brunswick: September 2022* [Government]. Labour Market Bulletin - New Brunswick: September 2022. <https://www.jobbank.gc.ca/trend-analysis/job-market-reports/new-brunswick/bulletin>
- Government of Canada, S. C. (2015, January 28). *Add/Remove data—Employment by industry, annual, provinces and economic regions, inactive*. <https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1410009201>
- Government of Manitoba. (n.d.). *Manitoba Labour Market Outlook 2021-2025*. 92.
- Government of New Brunswick. (2018). *New Brunswick Regional Profile Reports* (Regional Profile Reports) [Government]. Government of New Brunswick: Post-Secondary Education, Training and Labour. <https://www.nbjobs.ca/stats/regional#:~:text=In%20New%20Brunswick%2C%20the%20are,%2C%20Southwest%2C%20Central%20and%20Northwest.>
- Government of Newfoundland and Labrador. (2017, March 1). *Double Oil and Gas Production in Newfoundland and Labrador* [Government]. The Way Forward. <https://www.gov.nl.ca/thewayforward/action/double-oil-and-gas-production-in-newfoundland-and-labrador/>

- Government of Newfoundland and Labrador. (2021). *Report of the Newfoundland and Labrador Oil and Gas Industry Recovery Task Force* (p. 35) [Government]. Government of Newfoundland and Labrador. https://www.gov.nl.ca/iet/files/NL-Oil-and-Gas-Industry-Recovery-Taskforce-March-12_2021_FINALfor-submission.pdf
- Government of Newfoundland and Labrador. (2022, October 24). *Mining In Newfoundland and Labrador* [Government]. Industry, Energy, and Technology. https://www.gov.nl.ca/iet/files/2020_MNL_Overview.pdf
- Government of Nova Scotia. (2022). *Budget 2022-2023: Solutions for Healthcare Solutions for Nova Scotians* (Budgets, p. 82). Government of Nova Scotia. <https://beta.novascotia.ca/sites/default/files/documents/6-3059/ftb-bfi-044-en-budget-2022-2023.pdf>
- Government of NWT. (2020). *2030 Energy Strategy: A Path to More Affordable, Secure and Sustainable Energy in the Northwest Territories*. https://www.inf.gov.nt.ca/sites/inf/files/resources/gnwt_inf_7272_energy_strategy_web-eng.pdf
- Government of Yukon. (2020). *Our Clean Future: A Yukon strategy for climate change, energy and a green economy*. Yukon. <https://yukon.ca/en/our-clean-future-yukon-strategy-climate-change-energy-and-green-economy>
- Hjartarson, Josh, McGuinty, Liam, Boutilier, Scott, & Majernikova, Eva. (2014). *Beneath the Surface: Uncovering the Economic Potential of Ontario's Ring of Fire*. Ontario chamber of Commerce.
- Ibarra-Gutiérrez, S., Bouchard, J., Laflamme, M., & Fytas, K. (2022). The potential of lithium in Quebec for the electric vehicle market: State of the art, opportunities and challenges. *International Journal of Mining, Reclamation and Environment*, 36(1), 68–80. <https://doi.org/10.1080/17480930.2021.1965316>
- Industry Canada. (2021). *Trade Data Online* [Government]. <https://ised-isde.canada.ca/site/trade-data-online/en>
- Industry, Tourism and Investment. (2022). *Oil and Gas* [Government]. Industry, Tourism and Investment. <https://www.itl.gov.nt.ca/en/oil-gas>
- Institut de la statistique du Québec. (2022a). *Produit intérieur brut par industrie au Québec* (ISSN 1715-6327; p. 36). Government of Quebec.
- Institut de la statistique du Québec. (2022b, August 30). *Québec's real GDP at basic prices up*. Government of Quebec. <https://statistique.quebec.ca/en/communiquer/quebec-real-gdp-basic-prices-up-0-point-1-percent-may-2022>
- International Monetary Fund. (2022). *Countering the Cost-Of-Living Crisis* (World Economic Outlook Report, p. 186). International Monetary Fund. <https://www.imf.org/en/Publications/WEO/Issues/2022/10/11/world-economic-outlook-october-2022>
- Investissement Québec International. (2021). *Québec, a North American leader in the manufacturing sector*. <https://www.investquebec.com/international/en/press-room/news/Quebec-a-North-American-leader-in-the-manufacturing-sector.html>
- Karl, T. L. (2004). Oil-Led Development: Social, Political, and Economic Consequences. In *Encyclopedia of Energy* (Vol. 4). Elsevier. <https://swap.stanford.edu/was/20141110193621/https://politicalscience.stanford.edu/sites/default/files/documents/KarlEoE.pdf>
- Lee, Caroline, Dion, Jason, & Guertin, Christiana. (2022). *Bigger, Cleaner, Smarter: Pathways for Aligning Canadian Electricity Systems with Net Zero* (p. 80). Canadian Climate Institute.

- Moffat, Mike, Coutinho, Aline, & McNally, John. (2021). *Made in Ontario: A Provincial Manufacturing Strategy*(p. 30). Smart Prosperity Institute.
- Montreal International. (2020). *Greater Montréal boosting innovative manufacturers*. https://www.montrealinternational.com/app/uploads/2020/12/industry_profile_innovative_manufacturing_2020.pdf
- Navius Research Inc. (2021). *Assessing the impacts of the Conservative Plan to combat climate change*. Navius Research Inc. <https://www.naviusresearch.com/publications/conservative-plan-2021/>
- Newfoundland & Labrador Oil & Gas Industries Association. (2020, May 7). *Offshore Oil & Gas Industry Facts*[Government]. Energy NL. <https://energy.nl.ca/wp-content/uploads/2020/05/Offshore-Industry-Facts-Official-2020-05-07.pdf>
- Nunavut Impact Review Board. (2022). *Nunavut Clean Energy Project: Rankin Inlet and Baker Lake*. <https://www.nirb.ca/project/125450#:~:text=The%20Rankin%20Inlet%20Clean%20Energy,of%20Rankin%20Inlets%20total%20electricity.>
- NWT Bureau of Statistics. (2022). *NWT Gross Domestic Product at Basic Prices Millions of Chained (2012) Dollars*[Government]. NWT Bureau of Statistics. <https://www.statsnwt.ca/economy/gdp/>
- ORLEN Upstream Canada Ltd. (2022). *Environmental Impact Assessment (EIA) Registration: Stoney Creek Oil and Gas Wellfield Decommissioning Project Westmorland and Albert Counties, New Brunswick*(p. 228). Dillion Consulting. <https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/Registrations-Engregistremets/documents/eia-registration-1596.pdf>
- *Our Electricity Future: Nova Scotia's Electricity Plan 2015-2040*(p. 46). (2015). [Government]. Government of Nova Scotia. <https://energy.novascotia.ca/sites/default/files/Our-Electricity-Future.pdf>
- Parades, D., & Fleming-Munoz, D. (2021). Automation and robotics in mining: Jobs, income and inequality implications. *The Extractive Industries and Society*, 8(1), 189–193. <https://doi.org/10.1016/j.exis.2021.01.004>
- Patel, B. (2003). *New oil and gas incentives in Saskatchewan*. PricewaterhouseCoopers LLP. <https://inis.iaea.org/search/searchsinglerecord.aspx?recordsFor=SingleRecord&RN=35020335>
- P.E.I. Statistics Bureau. (2022). *Prince Edward Island 48th Annual Statistical Review*(p. 118). Government of Prince Edward Island. https://www.princeedwardisland.ca/sites/default/files/publications/web_asr.pdf
- Pietroforte, R., & Gregori, T. (2003). An input-output analysis of the construction sector in highly developed economies. *Construction Management and Economics*, 21(3), 319–327. <https://doi.org/10.1080/0144619032000056153>
- Price Waterhouse Cooper. (2014). *The progression of an LNG project: Canadian LNG projects*. Price Waterhouse Cooper Canada. <https://www.pwc.com/gx/en/mining/publications/assets/pwc-lng-progression-canada.pdf>
- Province of Manitoba. (n.d.). *Province of Manitoba | Manufacturing and Processing*. Province of Manitoba. Retrieved November 10, 2022, from <https://www.gov.mb.ca/looknorth/invest/manufacturing.html>
- Ro, C. (2022, September 14). Renewable Energy Costs Have Dropped Much Faster Than Expected, But There's A Catch. *Forbes*. <https://www.forbes.com/sites/christinero/2022/09/14/renewable-energy-costs-have-dropped-much-faster-than-expected-but-theres-a-catch/?sh=1e64cc2e3164>

- Saskatchewan Bureau of Statistics. (2021). *Saskatchewan Economic Review 2021* (p. 38). Government of Saskatchewan.
- Sawyer, D., & Griffin, B. (2022). Oil and gas emissions will overshoot 2030 goals without tougher regulation. *Canadian Climate Institute: The 440 Megatonnes Project*. <https://440megatonnes.ca/insight/oil-and-gas-emissions-will-overshoot-2030-goal-without-tougher-regulation/>
- Statistics Canada. (2022, January 7). *Labour force characteristics by industry, annual (x 1,000)*[Government]. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410002301>
- Statistics Canada. (2021, January 8). *Employment by industry, annual, provinces and economic regions, inactive (x 1,000)*. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410009201>
- Statistics Canada. (2021, May 20). *Labour statistics consistent with the System of National Accounts (SNA), by job category and industry*. [Government]. Natural Resources Canada. <https://cfs.nrcan.gc.ca/statsprofile/employment/NB>
- Statistics Canada. (2022, November 8). *Gross domestic product (GDP) at basic prices, by industry, provinces and territories, growth rates*. Statistics Canada GDP Data. <https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3610040202>
- von Kursk, Harold. (2022, August 30). World Energy GH2 pushes \$12B N.L. hydrogen plant, wind farm. *Sustainable Biz*, 2.
- Wang, W. (2021, July 28). *The oil and gas sector in Canada: A year after the start of the pandemic*. <https://www150.statcan.gc.ca/n1/pub/36-28-0001/2021007/article/00003-eng.htm>



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