WORK IN PROGRESS

EMPOWERING CANADA'S WORKFORCE IN THE GLOBAL ENERGY TRANSITION

Your Energy Future

WWW.YOURENERGYFUTURE.CA

Your Energy Future ⚡ Votre avenir énergétique

Your Energy Future is a national policy engagement and leadership development program delivered by the Public Policy Forum in partnership with Action Canada.

www.yourenergyfuture.ca **@YourEnergyFtr**

PUBLIC POLICY FORUM
FORUM DES POLITIQUES PUBLIQUES

PPF

The Public Policy Forum works with all levels of government and the public service, the private sector, labour, post-secondary institutions, NGOs and Indigenous groups to improve policy outcomes for Canadians. As a non-partisan, member-based organization, we work from "inclusion to conclusion," by convening discussions on fundamental policy issues and by identifying new options and paths forward. For more than 30 years, the PPF has broken down barriers among sectors, contributing to meaningful change that builds a better Canada.

www.ppforum.ca **@ppforumca**

ABOUT THE AUTHORS

MADWA-NIKA PHANORD-CADET

Based in Washington, Madwa-Nika Phanord-Cadet is a legal analyst at the World Bank's Development Economics Vice Presidency, within which she analyzes the regulatory framework, the quality of judicial proceedings and the level of protection of minority investors in 190 countries. She holds a Bachelor of Laws and a Master of Business Administration from the Université de Sherbrooke, and a Master in Public Policy from Georgetown University. Having always considered citizen engagement as one of the most effective vectors of social change, Madwa-Nika has also held various leadership roles in youth politics in Quebec, including leading a provincial convention involving more than 400 youth around the theme of social mobility.

KATHERINE PINEAULT

Katherine Pineault holds a Master's degree in Economics from ESG UQAM and also studies adult pedagogy at the graduate level at UQAM. She has previously worked as a research assistant for the Canada Research Chair in Regional Impacts of Globalization. She is a lecturer at the applied economics department of HEC Montréal. As an economist at Ouranos since 2016, she focuses on economic analyses related to climate change, more specifically in the estimation of economic impacts as well as in assessing the profitability of adaptation measures. Her work is split between economic analysis, scientific presentations and meetings with the actors of her fields of study.

KAY SHE

Kay She is currently a lawyer in the energy department of the law firm Bennett Jones LLP. Kay works with a variety of clients on transactional, corporate governance and regulatory matters. Prior to law, Kay spent four years working at the Canadian Association of Petroleum Producers as a

policy and government relations advisor, with a focus on Canada-U.S. energy issues. Kay holds a Bachelor of Arts in Political Science, a Master of Public Policy, and a Juris Doctor degree – all from the University of Calgary. In the community, Kay serves on the Board of Directors of the Young Professionals in Energy – Calgary Chapter.

APOORV SINHA

Apoorv Sinha is the founder and CEO of a Carbon Capture & Utilization technology start-up, Carbon Upcycling Technologies (CUT), that is commercializing a process to convert CO_2 emissions into performance-enhancing fillers for concrete, plastics, pharmaceuticals and batteries. CUT is a semi-finalist in the Carbon X-Prize, was a ERA Grand Challenge Semi-finalist and has received support from various provincial and federal entities in Canada. Apoorv is also the Research Manager for zEroCor Technologies, a Calgary-based oilfield service and technology development firm. As Research Manager, Apoorv manages over 15 active projects for zEroCor Technologies in collaboration with over 10 universities. Apoorv is a member of the Energy Futures Lab, a 2016 Leading Change delegate, a Clean50 Emerging Leader 2016, and serves on the ACTia (Alberta Cleantech Industrial Alliance) Board of Directors.

GRAEME REED

Of mixed Anishinaabe and European descent, Graeme Reed is on a professional and personal journey of self-identification and reconciliation. As a Senior Policy Analyst with the Assembly of First Nations (AFN), he advocates for the inclusion of First Nations in the federal, provincial and territorial climate change and energy policy dialogue. In this role, he has had the opportunity to present to the Canadian Council of Ministers of Environment (CCME), participate in the First Minister's Meeting negotiating the Pan-Canadian Framework on Clean Growth and Climate Change, and represent the AFN on the Multi-Interest Advisory Committee.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

A) VISION

As governments address climate change, policymakers must consider the implications on livelihoods and ensure communities are not left behind. If not properly managed, the transition to clean energy risks significant economic, social and cultural impacts on those dependent on traditional energy businesses such as coal, oil, or gas. Yet little attention has been given to how Canada can support and empower citizens, especially vulnerable groups such as displaced workers, Indigenous peoples and immigrants, to not only participate in this clean energy transition, but to lead it.

We envision a future where Canadians are world leaders in the global energy transition. To be world leaders, our energy workforce must be able to withstand market and policy shocks, respond to labour market signals with agility, and enable the vulnerable, such as displaced workers, immigrants and Indigenous peoples to seize new training and job opportunities.

However uncomfortable and loaded it can be, the conversation on climate change cannot be successful without addressing its impacts on the energy labour market. People must be at the core of our vision for Canada as we strive to be leaders in the global energy transition.

B) SUMMARY OF RECOMMENDATIONS

The complexity of the energy labour market is compounded by factors such as the transition to a low-carbon future, the relative uncertainty of the energy sector, Canada's jurisdictional complexity, and the transformation of the job market itself. This report delves into this complexity by asking: *How do we prepare Canada's workforce to lead in the global clean energy sector*?

To respond to this question, a systems-mapping exercise was used to visualize the supply and demand of the Canadian energy workforce. Through this exercise, three areas of policy recommendations focused on the supply-side of the labour market system were identified.

Once these policy recommendations were identified, information, insights and evidence were gathered from national and international conferences, key informant interviews and in-person workshops across the country. In these discussions, governance emerged as a fourth area of recommendations.

i) Inform

A successful workforce requires: i) reliable and readily available information, ii) information tailored to specific regions, demographics, vulnerable groups, and iii) improved communication of this information to existing and future workers.

Specifically, the appropriate information must be collected from businesses anticipating hiring skilled labour to help individuals inform their career choices, and to aid governments in determining where skill gaps will be and providing training incentives in those areas.

To meet these informational needs, the federal government should:

1. Create a *labour market information* portal as part of the Open Government website to collect, analyze, and disseminate information from all municipal, provincial, territorial and federal labour market efforts.

2. Launch, with support from the Canadian Digital Services, an annual Canadian-wide data analysis competition on *Forecasting Energy Jobs of the Future*, to develop and disseminate predictive algorithms for the energy labour market.

3. Require that any government labor market information (LMI) study allocate 20 per cent of its budget to develop a suite of support mechanisms, including access to qualified professionals, to allow job seekers a *human-face* to ask questions about the LMI study and how it might inform their decision about pursuing new skills and new jobs.

ii) Train

The current and future labour force must be trained with the necessary skills not only to survive, but also to succeed in a volatile energy sector. To do this, training must focus on bridging skills to help workers in the energy sector to move within the industry; on delivering transferable skills to allow workers to transition into and out of the energy sector; and on providing opportunities for energy workers to improve their specific competencies and establish sector-relevant experience.

To act on these requirements, the federal government should:

1. **Assist** workers transitioning into sustainable energy sectors by developing, funding, and, where necessary, implementing short-term and nationally-recognized upskilling programs.

2. **Create** financial and tax incentives for businesses to provide dedicated and paid time for employees to pursue professional development, including following government-led transferable skills curriculums.

3. **Fund** the creation of an apprenticeship program for eligible members of the energy workforce, regardless of experience, with energy-sector related career opportunities provincially, nationally and internationally.

iii) Support

It is integral to the energy transition that vulnerable groups are supported to participate and benefit from the future energy jobs, with special attention to immigrants and Indigenous peoples. Policies should support not only the increased representation of these groups, but also their capacity to participate and contribute to the Canadian economy.

To act on these needs, the federal government should:

1. **Mandate** government-funded projects and Crown corporations to develop inclusive procurement policies specifically inviting Indigenous and immigrant-led businesses to participate;

2. **Support and fund** mentorship programs for Indigenous youth leaving their communities for employment and facilitate their connections, whether through Skype or other means, with working professionals in their field, preferably Indigenous;

3. **Explore the creation** of transition funds in affected areas, following Alberta's example, to promote collaboration between jurisdictions and support affected communities without clawing back other government support.

iv) Governance

The strategies of Inform, Train and Support will only function if there are appropriate governance mechanisms in place. While the federal government can lead this conversation, employment, training and social policy falls under the jurisdiction of provinces and territories. As a result, governments will have to work collaboratively.

To act on these requirements, the federal government should:

1. Direct the Forum of Labour Market Ministers to hold a meeting on the energy-related labour market information within the next fiscal year. The Forum should create a working group with representatives from all governments, including Indigenous governments.

2. Create a Federal Inter-Departmental Task Team mandated for the collection, analysis, and communication of energy-related labour market information. This team should include representatives from Statistics Canada, Employment and Social Development Canada, the National Energy Board, Natural Resources Canada, and Environment and Climate Change Canada, among other relevant federal departments.

It is our hope that this report will start a conversation and provide a bridge between the often-polarized topics of climate and economy, in order to realize a future where all citizens are empowered and nobody is left behind.

INTRODUCTION

It is challenging to discuss how a low-carbon transition will impact people's lives; whether it is their livelihoods, the security of their energy source, or the price they have to pay for energy. The conversation is heavily polarized between the climate and the economy. But however uncomfortable and loaded, the conversation on climate change cannot be successful without addressing the impacts on the economy, and in particular, jobs. People must be at the core of our vision for Canada to become a leader in the global energy transition.

This conversation is currently taking place in Alberta, where the economy suffered following historically low oil prices, with the unemployment rate hitting 9.0% in November 2016, the highest it has been in its past 10 years.[1] As oil prices stabilized, that Alberta's unemployment rate dropped to 6.9 per cent, adding 16,000 full-time jobs to the economy. While a positive step, energy workers continue to face uncertainty because of aggressive government policies and global energy market volatility. In particular, the government's goal to phase out of coal by 2030 has the potential to put 6,000 coal workers out of work. This approach risks significant economic, social and cultural impact on those dependent on coal mining and coal-related businesses. Cognizant of this, Alberta has recently begun developing strategies, such as the Coal Workforce Transition Fund and Coal Community Transition Fund, to reduce the impact that retiring coal-fired power plants will have on communities.

As phasing out coal becomes increasingly popular because it is a relatively high greenhouse gas intensive way to produce electricity, it provides an interesting case study to explore the implications of climate policy on the livelihoods of those in the natural resource sector. According to Natural Resources Canada, this sector employs more than 900,000 Canadians.[2] Successful climate policy cannot ignore this. Policymakers must proactively work with affected communities, Indigenous peoples and other stakeholders to ensure that no one is left behind.

Canada has a precedent of significant events displacing workers. The collapse of the Northern Cod Fishery in 1992 is the most well-known example. Overfishing,

---

1   Government of Alberta. 2018.

2   Natural Resources Canada. 2016-2017. Energy Fact Book.

driven by poor government data and government subsidies for larger fishing vessels, caused the collapse of the fishery. This left more than 35,000 fishers and fish plant workers without work. Other examples, such as the signing of free trade agreements with other countries, arguably displaced textile workers in Quebec and automotive workers in Ontario. The market itself can be equally disruptive in displacing workers; in 2012, historically low oil prices led to the unemployment of more than 200,000 workers in Alberta.

According to the Organisation for Economic Co-operation and Development's ENV-Linkage model, climate policies will induce changes to the sectoral composition of employment, with fewer jobs in fossil fuel-related industries such as oil, gas and coal, and more jobs in renewable energy industries.[3] Research on the transition's impact on jobs has focused heavily on the creation of renewable jobs in the place of fossil fuel-related jobs. However, little attention has been given to what policies and strategies Canada can adopt to support citizens, especially vulnerable groups such as displaced workers, Indigenous peoples and immigrants, to not only participate in this clean energy transition, but to lead it.

What does it mean for the Canadian

workforce to be leaders in the clean energy transition? To us, leadership in this transition means building a workforce that withstands market and policy shocks, responds to labour market signals with agility and protects the vulnerable. It means that Canadian workers are able to adapt to market volatility and policy changes now and in the future. It means that labour market signals are as clear and as timely as possible and the Canadian workforce is agile in adapting to them. In addition, it means that vulnerable groups, such as displaced workers, immigrants and Indigenous peoples, are protected during the transition and empowered to take advantage of this transformational time to seize new training and job opportunities.

This will not be easy. Labour market questions have preoccupied scholars, practitioners, experts, and decision-makers since the beginning of the Industrial Revolution. The transition to a low-carbon future, the relative uncertainty of the energy sector, Canada's jurisdictional complexity, and the transformation of the job market itself make the picture even more complicated.

We hope that this report will launch the conversation and provide a bridge between the often-polarized domains of climate

---

3   Organisation for Economic Co-operation and Development. 2012. The jobs potential of a shift towards a low-carbon economy. Final report for the European Commission, DG Employment.

and energy, in order to pursue a future where all citizens are empowered and none are neglected. This report begins this conversation by outlining:

• A high-level overview of the current context of the energy labour market, exploring the challenges of preparing for an uncertain energy sector and transforming job market;

• An overview of the methodology that we used, including an explanation of systems design and its applicability to policy;

• An explanation of the three major areas of policy recommendations: to inform, train and support Canada's workforce; and

• An overview of the governance structure necessary for the policy recommendations to be successful, focusing on interjurisdictional cooperation and federal leadership.

CONTEXT

A) LABOUR MARKET INFORMATION

In a labour market, workers 'supply' their time and expertise to organisations for a wage while the organizations 'demand' labour in order to produce goods and services. To ensure that the labour market is functioning optimally, a transparent and rapid line of communication needs to exist between the supply and demand-side actors. Labour market information (LMI) are signals used to make labour market decisions. Robust LMI plays an important role for workers, employers and government, as:

• Workers make choices on the skills they learn based on current and future demand, the wages for the skills, the location of the jobs and the quantity of jobs available based on current and future demand;

• Employers provide information to workers about the skills they anticipate they will need, such that they do not become constrained by labour supply when ramping up their production or services;

• Governments provide information to 'correct' aspects of the labour market that are not working optimally, such as when workers do not have the capacity to access training to reskill to meet the future demands of employers.

It is important to have accurate and comprehensive LMI. Without it, there can be labour shortages, mismatches of skills available and skills in demand, as well as misinformed policy choices. Similarly, it is important that signals are identified and communicated as quickly as possible to ensure that policymakers and others make decisions in sync with the market. Although early signals can present challenges with ambiguity and uncertainty, lagging signals are not useful and can even impede the framing of legitimate policies or the effective deployment of appropriate policy measures. Lagging signals in any marketplace erode stakeholder confidence, reduce participation in policy measures and drive down overall market efficiency.

B) LABOUR MARKET INFORMATION IN CANADA

Prime Minister Trudeau's mandate letter to the Minister of Employment, Workforce Development and Labour mandates work to be done to "improve workers' access to good quality job training that provides Canadians with pathways to good careers."[4] Despite having a relatively robust LMI system, there have been

---

4   Office of the Prime Minister. February 1. 2017. Minister of Employment, Workforce Development and Labour Mandate Letter.

contentious and often competing views of the Canadian labour market and its potential shortages. In a member survey of the Council of Chief Executives in 2014, one conclusion was that with regards to skills shortages, such "shortages are limited to certain regions, sectors and occupations in Canada."[5]

The Canadian energy sector was one of the sectors that report identified as having skills shortage. The sector continues to provide significant contributions to Canada's gross domestic product (GDP). Market volatility, government climate and regulatory policies, and an aging workforce have led to uncertainty in the sector. The current global transformation of energy provides additional uncertainty. However, where there are risks, there are also opportunities, and we will explore how Canada can position itself to take advantage of this transformational time.

In a transforming energy sector, skills from today's energy workers could be channelled into tomorrow's needs. The best labour strategy in a changing and unpredictable labour market will be both technology-agnostic, with no preference towards one technology or another if they both achieve similar objectives, and sector-agnostic where we equip workers with a base set of

skills applicable for future jobs, regardless of the industrial sector.

C) FUTURE JOBS IN ENERGY

Globally, the job market is experiencing a deep transformation. As energy production becomes increasing decentralized such that individuals are increasingly about to produce their own electricity, sharp drops in prices and rapid technological advancements will cause changes in the job market inside and out of the energy sector. A report from Wood Mackenzie suggests the energy industry is presenting numerous indications of an industry on the cusp of disruption.[6] As geopolitical power continues to shift, automation grows exponentially and global commodities experience rapid volatility, the global energy systems will indisputably be disrupted.

In addition to disruptions caused by climate policy changes, the disruption caused by artificial intelligence, automation, and the internet of things is likely to be enormous. A McKinsey report predicts, "automation and technological advancements could lead to a net employment impact of more than 5.1 million jobs lost to disruptive labour market

---

5   Canadian Council of Chief Executives, Second Survey Report: Skills Shortages in Canada (Ottawa: Canadian Council of Chief Executives, 2014).

6   Wood Mackenzie. 2017. "Energy market disruption and the role of power markets: are the markets prepared?"

ENERGY JOBS: IN THE CONSTRUCTION & OPERATIONS PHASE

All energy sector jobs are front-heavy in their labor requirements, be they the extractive oil & gas sectors or the renewable sectors. From a labour standpoint, the projects require intensive support in the construction and commissioning phase and usually need much less human capital during general operations. Based on anecdotal evidence collected during our study tours, the following ratio of full-time equivalent construction and operation jobs were produced for varying scales of projects. It is important to note that the long-term impact on job creation is derived almost solely from the operational jobs produced.

Energy Type	Construction Jobs	Operations Jobs
Wind	10	1
Hydro electric	100	1
Solar	3	<1
Oil & Gas	3	1

changes between 2015–20."[7] In the energy sector, three-quarters of all tasks performed by truck drivers in the mining, oil and gas, and forestry sectors could be automated, putting workers in these industries at risk. This may make operations more efficient and reduce the number of workers, but it is plausible that people will still be needed to supervise the automation and create inputs for artificial intelligence.

D) FUTURE JOBS IN ENERGY IN CANADA

In Canada, energy employs annually more than 900,000 people, directly and indirectly. Propelled by the gig economy, the energy job market might require an influx of contract workers. Canadian policymakers will have to strategize to ensure Canadians adapt and thrive in the changing energy industry.

Current employment information is based on the current North American Industry Classification System (NAICS) system definition, which clearly defines extractive and electricity-related jobs, such as oil

---

7   Manyika, J. et al. 2017. A Future That Works: Automation, Employment and Productivity. McKinsey Global Institute.

and gas extraction, coal-mining and natural gas distribution. The NAICS system has a more difficult time capturing jobs in the trades and emerging jobs, such as those in clean tech or energy efficiency. As a result, there is a lack of clear data on the number of existing jobs in the clean energy economy and the potential future jobs in the industry. According to Statistics Canada, an estimated 274,000 jobs in 2016 were attributable to environmental and clean technology activity.[8] This represents around 1.5 per cent of Canadian jobs.

So far, employment policy discourse on the energy sector has focused on potential job displacements in the fossil fuel field because of the urgency of the issue. Few thoughts have been heard on the potential for new technology to displace jobs in existing renewable technologies. Yet Canadian policymakers are increasingly

ENERGY IN THE CANADIAN ECONOMY (2015)

Nominal gross domestic product (in 2015 prices)

Industry	Nominal GDP* ($ billions)	% of Canadian GDP
Energy (Direct)	136	7.3
• Oil and gas**	98	5.3
• Electricity	35	1.9
Energy (Indirect)***	64	3.5
• Oil and gas	45	2.4
Total (Direct + Indirect)	200	10.8
• Oil and gas	142	7.7

Employment

Industry	Nominal GDP* (jobs)	% of total employment
Energy (Direct)	280,365	1.5
• Oil and gas**	191,415	1.0
• Electricity	78,270	0.4
Energy (Indirect)***	625,033	3.4
• Oil and gas	518,133	2.8
• Oil & gas construction	203,065	1.1
Total (Direct + Indirect)	905,398	5.0
• Oil and gas	709, 548	3.9

* Natural Resources Canada (NRCan estimates)
** Oil and gas includes oil and gas extraction, supports activities for oil and gas extraction, natural gas distribution, petroleum refineries, and pipeline transportation.
*** These NRCan estimates include industries that supply goods and services to the energy industry, such as equipment manufacturing, construction and financial services.

8   Statistics Canada. Environmental and Clean Technology Products Economic Account, 2007 to 2016. December 13, 2017.
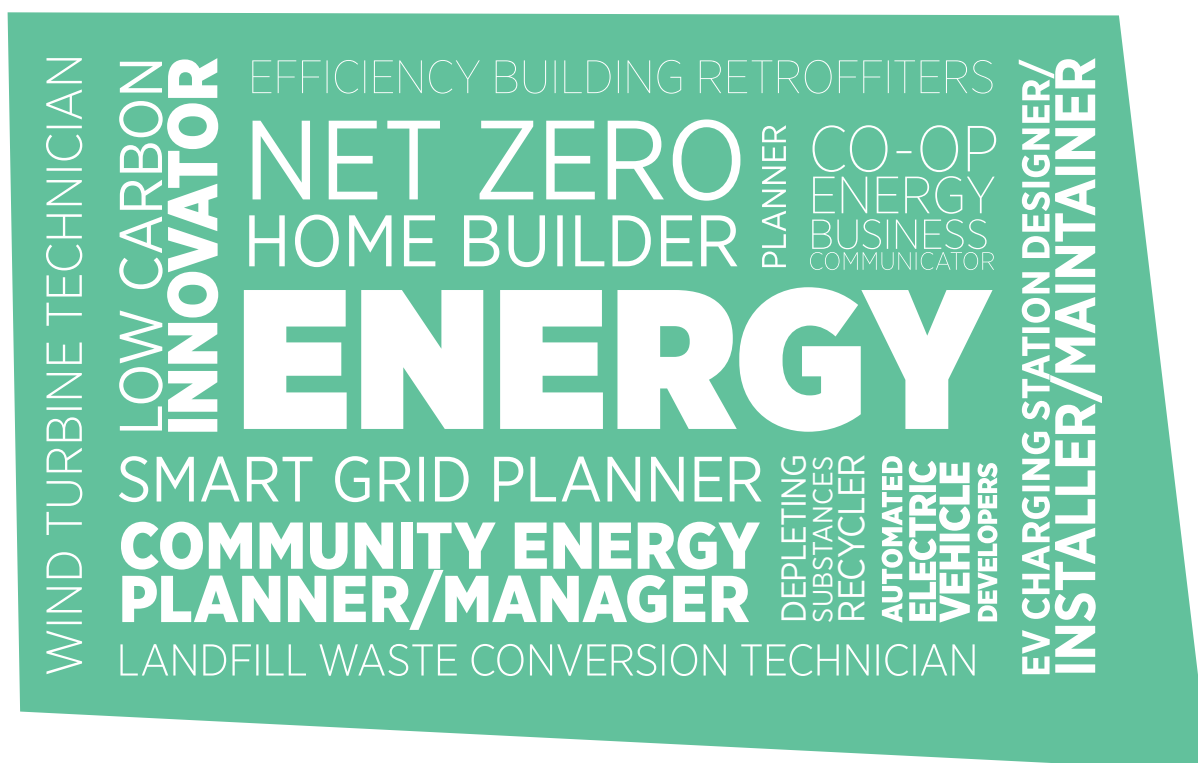
recognizing the challenges that may arise with the future energy transition and are providing solutions to address them.

In the low-carbon transition, however, the organization of labour is shifting. As the clean energy sector will bring solar panel electricians, energy efficiency technicians, net zero home builders and carbon upcyclers (among other jobs, as illustrated in the following word cloud), Canada will have to ensure that these women and men are well-prepared to solve the future challenges of this industry. Canadian policy makers may also have to address an increasing gig economy, which is an economy characterized by short-term contracts, no benefits, no stability and no vacation, also known as precarious work.[9]

Provincial/territorial employment (2015)

Province/territory	Energy sector employment (jobs)	% of total employment
British Columbia	20,400	0.9
Alberta	162,280	6.9
Saskatchewan	19,910	3.3
Manitoba	8,425	1.3
Ontario	37,290	0.5
Quebec	18,880	0.5
New Brunswick	3,300	0.9
Nova Scotia	2,645	0.6
Prince Edward Island	–	–
Newfoundland & Labrador	5,630	2.4
Yukon	215	0.8
Northwest Territories	835	2.6
Nunavut	–	–

WIND TURBINE TECHNICIAN
LOW CARBON INNOVATOR
EFFICIENCY BUILDING RETROFITTERS
NET ZERO HOME BUILDER
PLANNER
CO-OP ENERGY BUSINESS COMMUNICATOR
EV CHARGING STATION DESIGNER/INSTALLER/MAINTAINER
ENERGY
SMART GRID PLANNER
COMMUNITY ENERGY PLANNER/MANAGER
DEPLETING SUBSTANCES RECYCLER
AUTOMATED ELECTRIC VEHICLE DEVELOPERS
LANDFILL WASTE CONVERSION TECHNICIAN

---

9   For more background, refer to "Strategies for a New World of Work," a report from the Expert Panel on Youth Employment.

METHODOLOGY

A) ASSUMPTIONS

We make several assumptions in this report. It is assumed that businesses will continue to want to invest in Canada during this clean energy transition. Through the transition, it is assumed that important transformations in the energy structure of the Canadian and global economy might induce increased volatility on the job market.

It is assumed that as demand for workers in traditional fossil fuel-related industries declines and stabilizes, some of the incumbent workers will leave the energy industry entirely and find employment in other sectors. However, we assume that along with the decreasing demand in fossil fuel-related jobs, there will be an increase in demands for clean energy and less greenhouse gas (GHG) intensive energy production, and hence cleaner energy jobs. The quantity of these cleaner energy jobs is difficult to predict, but it is assumed that if workers are trained with broad skills adaptable for the clean energy sector, they can be ready to fill these energy jobs, helping to establish Canadians as world leaders in the global energy future.

It is also assumed that labour policies are effective when they are based on the most recent and robust information about the skills in demand by businesses. It is only with up-to-date forecasts straight from the companies that will be hiring that policymakers can make informed decisions about how to improve signals and fix disconnects in the labour market to make it more efficient.

B) ITERATIVE PROCESS

The question driving our research was: *How do we prepare Canada's workforce to lead in the global clean energy sector?*

Labour market questions are complex and require systems thinking. We used a systems-mapping exercise, drawing on the examples of the Alberta CoLab,[10] to visualize the supply and demand of the Canadian energy workforce.

---

10   The Alberta CoLab is a design team within the Department of Energy in Alberta. More information about their team, space and approach can be found here: https://medium.com/the-overlap/the-alberta-colab-story-2d409ecf747c

ENERGY WORKFORCE SYSTEMS MAP

SUPPLY

Labor pool

Immigrants

Signals

Mediums to disseminate career-relevant data & trends

Displaced workers

Skill-based Training Expedited Competency Online Learning

Societal changes

Retirement

WORKFORCE GAP

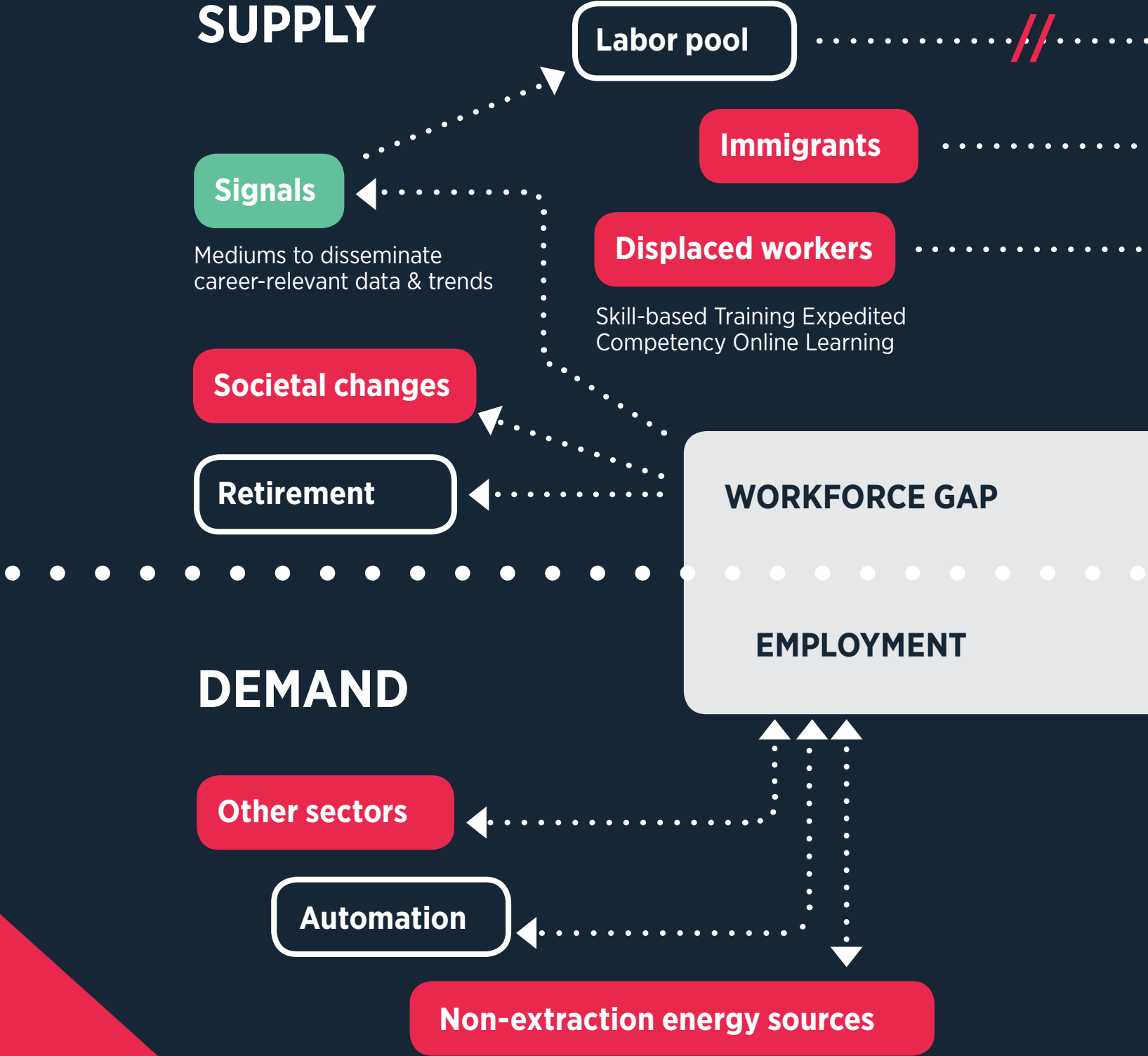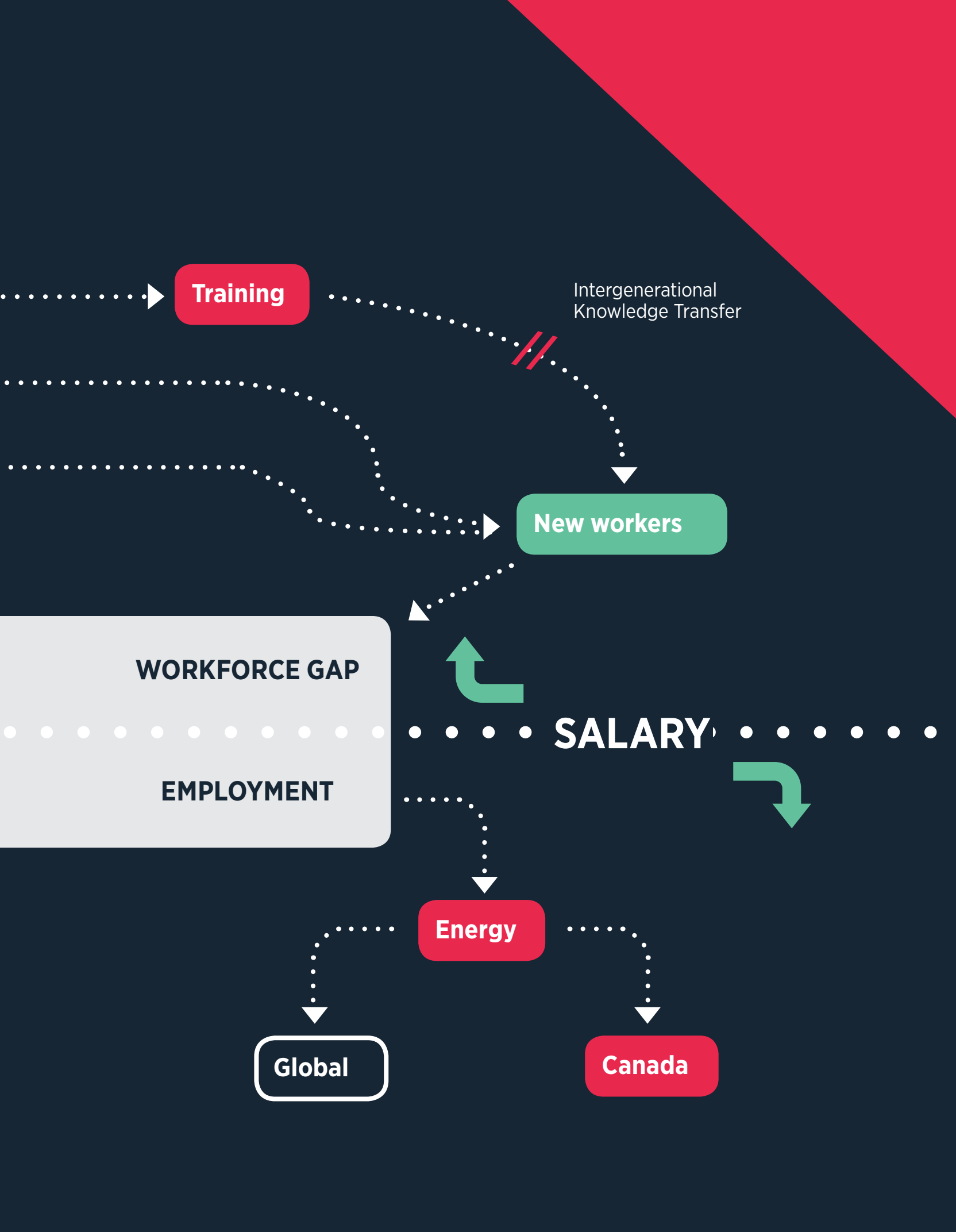**EMPLOYMENT**

DEMAND

Other sectors

Automation

Non-extraction energy sources

Training

Intergenerational
Knowledge Transfer

New workers

WORKFORCE GAP

SALARY

EMPLOYMENT

Energy

Global

Canada

The systems map divides the energy-sector labour workforce into supply and demand sides. The supply side, defined in economics as the supply of labour from workers, focused on the production, training and deployment of labour resources, both nationally and internationally. The demand side, defined as the quantity of labor demanded by employers, was comprised of the employment opportunities available to the existing and future workforce in Canada. This side must to be strong in order for the whole labour market ecosystem to function. More details on the stocks and flows of the systems map can be found in Annex 1.

After internal group discussions and iterative discussions with key informants, including young people, the authors of this report decided to focus on the supply side of the system, identifying three areas that contribute to those employment gaps:

- **Inform**: ensuring the proper information for businesses, current and future workers, and policymakers to make informed decisions;

- **Train**: providing the existing and future labour forces with the necessary skills for the current and future energy jobs;

- **Support**: supporting those who need it most to participate in and benefit from future energy jobs.

The above approach has made it possible to develop recommendations removed from political considerations or subject to market volatility.

Once these areas were identified, information, insights and evidence were gathered from all possible sources. We participated in national and international conferences such as Generation Energy and the Indigenous Conference on Energy and Mining, conducted key informant interviews with experts both young and old, and held workshops in Montreal, Ottawa and Calgary with more than 120 young professionals. Their responses are illustrated in the following word cloud. As a final step, an early version of the report was shared with young professionals for their comments.

DISCUSSION AND RECOMMENDATIONS

A) INFORM

Canadians need accurate, contextualized and timely LMI to make informed employment decisions. Don Drummond, past chair of the Advisory Panel on Labour Market Information, describes good LMI as "not a sufficient condition for effective matching of skills and labour market needs, but it is a necessary condition."[11] Through dialogue with Canadians, a successful workforce requires: i) reliable and readily available information; ii) information tailored to specific regions, demographics, vulnerable groups; and iii) improved communication of this information to existing and future workers.[12]

i) Additional information

In Canada, data on LMI is "fragmented, often hard to access and has many gaps, such as developments in the workplace..."[13] Compounded with an uncertain energy future, it is difficult for workers to predict what and where the jobs will be.

Under the Labour Market Transfer Agreements, provinces and territories assume much of the responsibility for LMI, including the collection and dissemination of region-specific information. The challenge, however, is that data are rarely centralized in one cross-Canada portal. Employment and Social Development Canada's Job Bank has begun posting job openings from across the country, assisting employers to recruit and hire qualified workers, and helping Canadians explore careers using LMI. Yet more can be done to use big data and machine learning for LMI, including capitalizing on the current Open Government initiative.

An improved system would collect information on: short and long-term employment needs; required skills and education; employee layoffs; job vacancy; and current training and education, among other subjects. Statistics Canada's recently revamped Job Vacancy and Wage Survey could be an important tool in collecting this

---

11   Advisory Panel on Labour Market Information. 2009. Working Together to Build a Better Labour Market Information System for Canada. Forum of Labour Market Ministers.

12   Drummond, D. 2014. "Wanted: Good Canadian Labour Market Information," IRPP Policy Insight.

13   Drummond D. and Halliwell, C. 2016. Labour market information: an essential part of Canada's skills agenda. Business Council of Canada.

information. Equally important are surveys of small, medium, and large businesses in the energy sector.

Independent LMI organizations use targeted surveys to understand and assess the status of workforce needs. To design them effectively, four steps can be taken:

- an environmental scan of federal and provincial LMI;

- a direct survey to the utilities and educational institutions to understand the supply and demand;

- key informant interviews; and

- economic modelling based on stakeholders' input.

ii) Better-tailored information

LMI varies from province to province and city to city. Data available through Statistics Canada are not sufficiently disaggregated for workers to understand these differences. As a result, current or prospective workers often have a difficult time identifying what specific skills are required, what specific jobs are available and where specifically they are located. Better-tailored information would empower workers to decide what skills to acquire and to choose their location and aspirations according to the regional distribution of employment opportunities. It would also give a clearer picture of the trends in clean tech, energy efficiency and other areas of work emerging in the energy transition.

Ideally, LMI would also be tailored to certain groups such as women, immigrants and Indigenous peoples. As an example, gender-disaggregated data remains scarce. The report *Profile of Women Working in the Clean Energy Sector in Canada*[14] noted that Canadian women participate in the energy sector at lower rates than in the economy as a whole, with participation rates of between 20-25% and 40–50%, respectively.[15] Indigenous peoples are another example. Because of the historical legacy of colonialism, Indigenous peoples have a much lower economic participation rate than other Canadians. As a result, providing additional resources directly to Indigenous communities would allow them to collect annual labour information, painting a clearer picture about skills and training needs, employment and education. This information would allow the development of targeted initiatives to strengthen skills and community-based capacity.

14   Electricity Human Resources Canada. 2017. Profile of Women Working in the Clean Energy Sector in Canada.

15   Baruah B. 2016. Creating and Optimizing Employment Opportunities for Women in the Clean Energy Sector in Canada.

iii) Better communication

To be useful to workers as they make decisions, LMI, analysis and interpretation must be easily understood and effectively communicated, avoiding jargon. Initiatives such as the Electricity Human Resources Canada and Careers in Oil and Gas are positive examples of industry-specific communication materials. Governments must follow suit. Specific efforts should be undertaken to communicate data in comprehensive, simple and engaging ways, adjusting platforms and media forms for different audiences. For instance, career-counselling professionals could use better data visualization tools to appeal to a younger audience.

Effective LMI studies have one thing in common: providing a human face to the job-seeking process. This meant that qualified professionals were available to respond to the questions of job seekers and businesses, effectively walking through the LMI for them. While not the same as career counsellors, these professionals offered an often-neglected human dimension to the job search.

iv) Recommendations

With this context in mind, the government should:

1. **Create** a *LMI* portal as part of the Open Government website to collect, analyze and disseminate information from all municipal, provincial, territorial and federal labour market efforts.

2. **Launch**, with support from the Canadian Digital Services, an annual Canadian-wide data analysis competition on *Forecasting Energy Jobs of the Future*, to develop and disseminate predictive algorithms for the energy labour market.

3. **Require** that any government LMI study allocate 20 per cent of its budget to develop a suite of support mechanisms, including access to qualified professionals, to allow job seekers a *human-face* to ask questions about the LMI study and how it might inform their decision about pursuing new skills and new jobs.

B) TRAIN

With the rapidly increasing pace of technology adoption and disruption, accurate long-term forecasts and trends in energy jobs will become progressively more difficult to determine. However, efforts like the data analysis competition on *Forecasting Energy Jobs of the Future* explained above should be encouraged, as they are important in facilitating timely and appropriate training for the

energy workforce. Such initiatives could be supported by the "new organization to support skills development and measurement," to which the federal government has committed $75 million annually.[16]

To establish Canadians as global leaders in the energy transition, the existing and upcoming energy workforces must be trained to adapt to a volatile energy sector that will face numerous disruptions in the next 30 years. This requires a focus on training the various elements of the workforce in: (i) bridging skills, to help workers in the energy sector move within the industry; (ii) transferable skills, to allow workers to transition into and out of the energy sector; and (iii) increasing the base skills of workers in the energy sector to increase their specific competencies and establish sector-relevant experience.

16   Government of Canada. 2017. "Budget 2017."

i) Bridging skills

Bridge skill training is for individuals already active in the energy workforce interested in transitioning to sustainable energy sectors. For example, this could include the retraining of coal workers looking to transition into wind or solar energy. Organizations such as Iron and Earth have initiated such efforts by retraining boiler workers and welders laid off in 2014-15 to work on a solar project in the Louis Bull Tribe, a First Nations community in Alberta.

The energy transition to 2050 will involve many intra-industry transitions. It is important to provide workers with access to training programs that allow them to upskill and retrain for the energy economy of the future. Iron and Earth's five-day upskilling program demonstrated that the basic skills used by oil and gas workers can be transferred successfully into the renewable solar energy industry. It also proved the benefits of a process for workers to obtain appropriate certification and recognition of their skills.

THE IRON AND EARTH EXAMPLE

Iron and Earth was launched at the Globe 2016 Conference in Vancouver, in response to falling oil prices and subsequent layoffs in the Albertan oil & gas energy sector. This state of affairs catalyzed Lliam Hildebrand to start an initiative that would ensure the health and equity of workers. Iron and Earth was founded as a platform to engage in renewable energy development issues, and to empower tradespeople, including boilermakers, electricians, pipe fitters, ironworkers, and labourers, to advocate for an energy future. In 2017, Iron and Earth partnered with the Alberta government, the Energy Futures Lab and other organizations to train its associates to install a solar installation at an Albertan First Nation, Louis Bull Tribe, while training 15 trainees.

"I've been working as a boilermaker for over a decade. While working in the Alberta Oilsands, I began discussing my dream of building renewable energy projects with my co-workers. As blue-collar workers, we did not have the influence to implement our ideas, so we founded an organization called Iron & Earth - oilsands workers for renewable energy - with a mission to empower ourselves to build a renewable energy economy. Through our participation in The Natural Step Canada's Energy Futures Lab, we developed a strategy to leverage our nation's industrial expertise in building a new economy that will help Canada meet its climate commitments."

Lliam Hildebrand - Founder, Iron & Earth

This offers an alternative to training programs that lag in response to industry trends, and shows the value of bridging skills in particularly volatile sub-sectors that have short boom-and-bust cycles, such as the extractive oil and gas industry. Offering a national certification to demonstrate completion of the training, such as a "Green Seal," could allow the graduates to seek jobs nationally.

ii) Transferring skills

The energy transition to 2050 will not occur in isolation. Urban mobility, finance and agriculture are being radically disrupted at the same time. To ensure that the Canadian workforce as a whole can exercise mobility and make career transitions as they deem fit, government assistance needs to train workers with skills to be able to pivot professionally as the economy changes. Important skills include literacy, numeracy, oral communication, digital skills and working with others, among others.[17] Applied training in trades that can be applied in a broad array of sectors, such as gas plumbing and electrician work, is also important. Quebec provides an example of this. Under the Apprenticeship Job Creation Tax Credit or Quebec's Workforce Skills Development

and Recognition Act, any company with more than 500 employees needs to spend at least 1 per cent of its payroll expenditures on employee training through approved programs.

Such training should be accessible to energy workers intending to leave the energy workforce as well as those interested in joining it. Disruption of industries like transportation, where self-driving cars could directly affect as many as 59,000 people across Canada [18] could lead to an influx of workers into the sector. A focus on transferable skills will not only facilitate their successful transition into the energy sector but also provide Canadians with a broad array of skills suited for other emerging industries. This will also facilitate the budding of sector-specific entrepreneurship.

iii) Strengthening future skills

Workers should be provided opportunities to upskill within their specific trades and professions between any disruptions. Workers in the extractive energy sector as well as the renewable energy sectors, for example, should be provided opportunities to gain relevant experience in their fields to maintain

---

17   Public Policy Forum. 2017. Workplace Literacy: The Lynchpin of Canada's Inclusive Growth Agenda.

18   Ticoll, D. 2015. Driving Changes: Automated Vehicles in Toronto.

their organizations' and Canada's competitiveness in the energy sector writ large. With the exception of the Green Jobs Science and Technology Internship, delivered through third-party organizations such as ECO Canada and Colleges and Institutes Canada, there are limited programs promoting employment specifically in environment- and clean energy-related fields.[19]

Apprenticeship programs that connect eligible members of the workforce with energy sector-related career opportunities provincially, nationally and internationally would enable Canadians to develop experience in their trade of choice. Such a program should be technology-agnostic and in an energy field; subsidized to allow all Canadian workers to participate; and one to two years in duration, with multinational companies that design, engineer or deploy clean energy projects in Canada or worldwide.

All training programs should be accessible for non-urban populations, particularly those in Indigenous communities. Special attention should be given to the use of technology in developing effective distance training opportunities in partnership with Indigenous communities.

iv) Recommendations

With this context in mind, the government should:

1. Support workers transitioning into sustainable energy sectors by developing, funding and, where necessary, implementing short-term and nationally-recognized upskilling programs.

2. Create financial and tax incentives for small, medium and large businesses to provide dedicated and paid time for employees to pursue professional development, including following government-led transferable skills curriculum.

3. Fund the creation of an apprenticeship program for eligible members of the energy workforce, regardless of experience, with energy sector-related career opportunities provincially, nationally and internationally.

---

19   This is not to say that other employment programs do not exist. In fact, Canada Jobs Grant and the Youth Employment Strategy, and the Aboriginal Skills and Employment Training Strategy are examples of general employment programs.

C) SUPPORT

Inclusive support is an integral part of the solution to ensure the leadership of Canadian workers in the energy sector. Services to train workers and help them transition into clean energy fields must be accessible to marginalized communities, particularly immigrants and Indigenous peoples, who do not participate in the labour market at the same rate of other communities. A fair transition must also ensure income stability for workers who have spent their careers in the energy sector and who were not trained in time to contribute to the energy transition at the level of their potential.

i) Increased representation

Although Canada is known as a land of opportunity, more needs to be done to create a more equitable labour market for all Canadians, especially Indigenous peoples and immigrants to Canada. These groups face historically low labour force participation compared to the rest of Canadians:

- Between 2007-2015, the employment rate for Indigenous peoples off-reserve was 78.4 per cent, compared to 85.9 per cent for other Canadians;

- For those Canadians without a high school diploma, the employment rate was 42.8 per cent, compared to 60.5 per cent for other Canadians.[20]

- In 2015, the employment rate for immigrants to Canada was 76.5 per cent compared to 83.9 per cent for the rest of Canadians, excluding Indigenous peoples.[21]

Aligning the labour market with the needs of the clean energy sector is, in our view, a unique opportunity to shape an inclusive and non-siloed employment policy. Indigenous youth between the ages of 15 and 30 are the fastest-growing population segment in Canada. Over the next decade, approximately 400,000 young Indigenous peoples are expected to join the close to 900,000 Indigenous people already at working age. Combined with the 21.9 per cent of the Canadian population in 2016 that was foreign-born, [22] it is imperative that these growing populations fully participate in the labour market.

20   Moyser, M. 2017. "Aboriginal People Living Off-Reserve and the Labour Market: Estimates from the Labour Force Survey, 2007-2015." Statistics Canada.

21   Statistics Canada. 2015. "Participation, employment and unemployment rates of people aged 25 to 54 by Aboriginal group and immigrant status, 2015."

22   Ibid. 2017. "Thème du Recensement de 2016 : Immigration et diversité ethnoculturelle."

These are many positive examples of businesses increasing diversity in their supply chains.

At Ontario Power Generation, an inclusive procurement policy allocates a certain percentage of sales to local Indigenous businesses.[23] Another example is the City of Toronto's Social Procurement Program, which aims to diversify the supply chain of suppliers doing business with the City for purchases between $3,000 and $100,000. [24,25]

ii) Targeted capacity building

Policies should support not only the increased representation of marginalized groups, but also their capacity to participate and contribute to the Canadian economy. In fact, the lower employment rates and wages of certain groups can be explained in part by a lack of access to training to develop the skills necessary for their professional development. As such, mentorship opportunities are necessary to improve marginalized groups' ability to participate in the labour market. In

Indigenous communities, mentoring programs must be Indigenous-led and culturally-driven, involving Elders and other community members. For example, the non-profit organization Youth Fusion has developed a community-specific and culturally-appropriate science and technology program for First Nations and Inuit youth.[26] This type of model has proven its ability to promote inclusive growth.

iii) Income stability

A fair and equitable energy transition will only take place if it supports those workers who have contributed significantly to the Canadian economy as they developed the current energy sector. Given the geographic concentration of resources, whole communities may be threatened if action is not taken to ensure a smooth transition to a low-carbon economy. Alberta understands this reality; the Alberta Coal Community Transition Fund is a fund created in November 2017 that provides grants to support local economic development to revitalize municipalities

---

23   Ontario Power Generation.

24   City of Toronto. "Social Procurement Program."

25   According to the City of Toronto, a diverse supplier is a business that is at least 51 per cent owned, managed and controlled by an equi-ty-seeking community or social purpose enterprise. These communities include, but are not limited to, women, Indigenous peoples, racial minorities, people with disabilities, newcomers and the lesbian, gay, bisexual, transgender, queer, two-spirit (LGBTQ2) community.

26   Youth Fusion. "Indigenous Youth Engagement Programming."

and First Nations communities affected by the coal phase out.[27] Such funds can support communities by placing them at the heart of the decisions to be made, while stabilizing the incomes of workers in these communities. Importantly, the funds workers receive through these subsidies should be seen as complementary to and not a substitute for other forms of support, such as employment insurance.

iv) Recommendations

With this context in mind, the government should:

1. **Mandate** government-funded projects and Crown corporations to develop inclusive procurement policies specifically inviting Indigenous and immigrant-led businesses to participate;
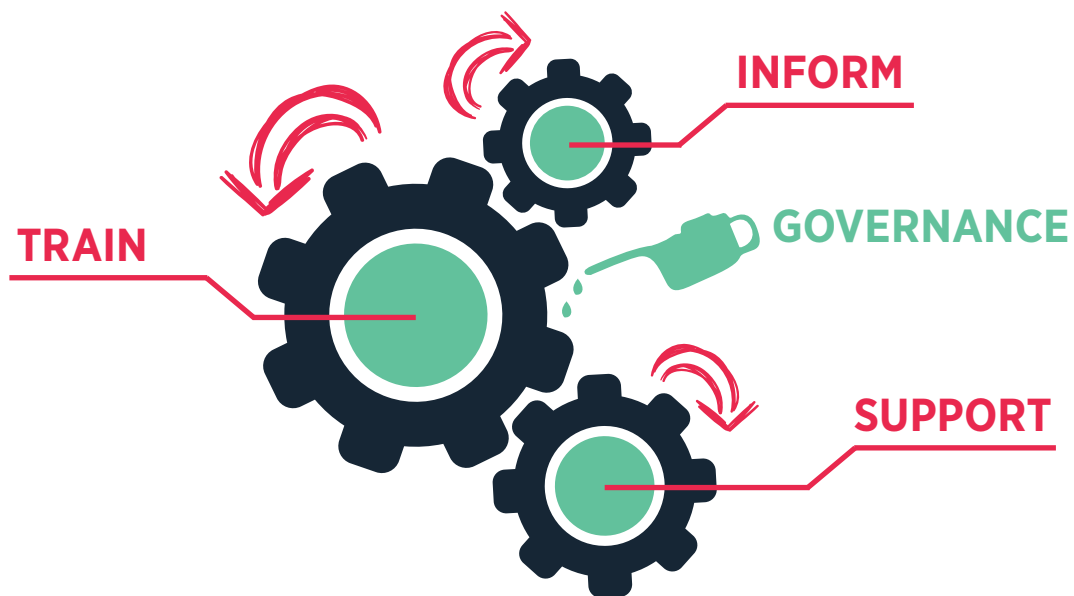
2. **Support and fund** mentorship programs for Indigenous youth leaving their communities for employment and facilitate their connections, whether through Skype or other means, with working professionals in their field, preferably Indigenous;

3. **Explore the creation** of transition funds in affected areas, following Alberta's example, to promote collaboration between jurisdictions and support affected communities without clawing back other government support.

27   Government of Alberta. "Coal Community Transition Fund."

and territories. As a result, governments will have to work collaboratively.

Much of responsibility for LMI is delegated to provinces and territories through Labour Market Development Agreements. As a result, provinces and territories can support their workforce in a way that reflect the "on-the-ground" realities, but this creates challenges in collecting and harmonizing regional-specific information and in working across provincial and territorial borders. Inconsistent provincial certifications prevent qualified workers, such as boilermakers, from exploring employment options outside of their province. The creation of a "Green Seal"—a certification based on renewable energy skill sets—is a possibility to reduce the barriers to interprovincial work. While there has been increased attention to the issue, more can be done to inform, train and support a truly pan-Canadian energy workforce.

D) GOVERNANCE

The strategies of Inform, Train, and Support will only be effective if there are appropriate governance mechanisms in place. While the federal government can lead this conversation, employment, training and social policy is the jurisdiction of provinces

Inter-jurisdictional collaboration is a current priority of the federal government. The federal Minister of Employment, Workforce Development and Labour was mandated to "...rationalize and expand the inter-government agreements that support skill training, including the Labour Market Development Agreements."[28] The main pan-Canadian ministerial body

---

28   Prime Minister of Canada. 2017."Minister of Employment, Workforce Development and Labour Mandate Letter."

responsible for the coordination and communication of Canada's LMI system is the Forum of Labour Market Ministers (FLMM), which meets annually. In their recent Strategic Plan, three objectives were outlined: i) helping all Canadians find and keep jobs; ii) improving alignment of skills with labour market needs; and iii) supporting the creation of efficient labour market—objectives that are similar to our recommendations.

At the federal level, a second important dimension is inter-departmental collaboration. In 2009, the *Advisory Panel on Labour Market Information* found that there was no department responsible for the collection, dissemination and communication of LMI. [29] Instead, multiple departments, such as Statistics Canada, Employment of Social Development Canada, and the National Energy Board, among others, are responsible for energy-related information and LMI. The challenge, however, is ensuring communication and coordination between these departments.

When complex projects require a cross-departmental approach, the relevant departments will often form an interdepartmental task team. An energy labour market task team should prioritize: modernizing a definition of energy sector employment; standardizing systems across the country in all energy sector industries; and collecting LMI from all provinces and territories. This should be done in consultation with workers, businesses, Indigenous peoples and other stakeholders.

i) Recommendations

With this context in mind, the government should:

1. Direct the FLMM to hold a meeting within the next fiscal year to focus on energy-related LMI, including the creation of a Working Group with representatives from all governments, including Indigenous governments.

2. Create a federal inter-departmental task team of representatives from Statistics Canada, Employment and Social Development Canada, the National Energy Board, Natural Resources Canada, and Environment and Climate Change Canada, and other relevant federal departments, specifically mandated for the collection, analysis and communication of energy-related LMI.

---

29   Advisory Panel on Labour Market Information. 2009. "Working Together to Build a Better Labour Market Information System for Canada" retrieved from:

CONCLUSION

Canadian policymakers are at a crossroads. The pursuit of a low-carbon energy future has potentially severe implications for those Canadians working in the energy sector. Whether from government policy, business decisions or increased market volatility, Canadian workers not only need to be protected, but also empowered to maximize this transformational time to seize new training and job opportunities.

To do this, governments, through interjurisdictional and inter-departmental cooperation, and businesses must work together to collect and communicate accurate LMI, provide adaptable training opportunities and offer workers tailored support. Helping displaced workers get back into the labour market, anticipating the skill sets needed for future jobs, and preparing prospective workers with those skillsets are key to protect and support citizens and their economy.

Canada faces an incredible opportunity to transition to a clean energy future, with a skilled and innovative workforce to drive the change. Inclusive policies to include marginalized and historically disadvantaged groups, such as Indigenous peoples, in this shift will make Canada's communities, energy workforce, and economy stronger. With people at the core of our vision for Canada, we can become leaders in the clean energy transition.

ANNEX 1: SYSTEMS MAP EXPLANATION

The systems map includes the following important stocks:

- Workforce gap/employment: means the number of workers currently present in the workforce and employed within the energy industry. Ideally, all possible positions available in the energy sector are filled, and no workers interested in working in the sector are unemployed but this is seldom, if ever, the case in the real world.

- Workforce exit stocks: include retirement, societal redefinition of full-time employment, and the introduction of basic income for all. Each of these stocks indicate possible forces that can reduce the number of workers available to the energy sector.

- Signals: include knowledge resources like workforce statistics, private or government-funded surveys and labour market studies that indicate the status of the workforce gap in a given sector.

- Labour pool: includes all possible people that could comprise an energy workforce, such as youth (including Indigenous and immigrant youth), immigrants, displaced workers, and other citizens eligible and able to participate in the workforce.

- Training: includes the various system-wide education resources such as K-12 schools, colleges, universities, apprenticeships and other programs that help the labour pool gain the skills required for employment in the energy workforce.

- New workers: represents the stock of appropriately trained workers with skills desired by energy employers.

- Demand-side stocks: represent the energy sector, in Canada and globally. Both segments require workers involved in the research, development and deployment of energy projects. Additionally, automation, energy sources such as renewables, and other sectors are also possible sources of labour demand. The supply and demand side of the labour system are equilibrated primarily through salaries (i.e. workforce gap impacts the salaries which, in turn, affects the pool of workers interested in working in the energy sector).

Flows between these stocks determine the state of the workforce gap. Many of these flows are affected by delays, which are labeled with hashed lines. These delays refer to the time lag between when decisions pertinent to a stock are made and the consequences of the implemented change. The thickness of the hashed lines represent the surmised significance of the lag. In particular, the lags between the workforce gap and the signals stocks, and the signals to the labour pool stocks, were determined to be the most critical lags on the supply side of the labour system.

REFERENCES

Advisory Panel on Labour Market Information. 2009. Working Together to Build a Better Labour Market Information System for Canada. Forum of Labour Market Ministers. retrieved from: Alberta Chamber of Resources et al. 2007. A Workforce Strategy for Alberta's Energy Sector.

Baruah B. 2016. Creating and Optimizing Employment Opportunities for Women in the Clean Energy Sector in Canada.

Baylin, M. 2015. Ohhhh Canada! Challenges new immigrants face in Canada's Energy Sector.

Burnaby Intercultural Planning Table. 2017. Immigrants and the Clean Technology Sector. BIPT Sector Profile: Clean Technology.

Christidis, A. et al. 2017. Delivering the Workforce for the Future. Mercer & Oliver Wyman, Marsh & McLennan Companies.

City of Toronto. "Social Procurement Program."

Drummond, D. 2014. "Wanted: Good Canadian Labour Market Information." IRPP Policy Insight.

Drummond D. and Halliwell, C. 2016. Labour market information: an essential part of Canada's skills agenda. Business Council of Canada.

Electricity Human Resources Canada. 2017. Profile of Women Working in the Clean Energy Sector in Canada.

Youth Fusion. "Indigenous Youth Engagement Programming."

Government of Alberta. "Coal Community Transition Fund."

Government of Canada. 2017. "Budget 2017."

Immervoll, H. 2017. "The future of work and current social protection." Policy Options, Institute for Research on Public Policy.

Johal, S. & Thirgood. J. 2016. Working Without A Net - Rethinking Canada's Social Policy in the New Age of Work. Mowat Research #132, Mowat Centre: Ontario's Voice on Public Policy, School of Public Policy & Governance, University of Toronto.

Lamb, C. & Doyle, S. 2017. Future-proof: Preparing young Canadians for the future of work. Brookfield Institute for Innovation + Entrepreneurship.

Lewchuk, W. et al. 2014. The Precarity Penalty: The impact of employment precarity on individuals, households and communities—and what to do about it. Poverty and Employment Precarity in

Southern Ontario research group.

Manyika, J. et al. 2017. A Future That Works: Automation, Employment and Productivity. McKinsey Global Institute.

Mowat Centre. 2017. Fixing Canada's EI system is critical for the future of work. Mowat Centre: Ontario's Voice on Public Policy, School of Public Policy & Governance, University of Toronto.

Moyser, M. 2017. "Aboriginal People Living Off-Reserve and the Labour Market: Estimates from the Labour Force Survey, 2007-2015." Statistics Canada.

Natural Resources Canada. 2016-2017. Energy Fact Book.

Ontario Power Generation.

Organisation for Economic Co-operation and Development. 2012. The jobs potential of a shift towards a low-carbon economy. Final report for the European Commission, DG Employment.

Policy Horizons Canada. 2016. Canada and the Changing Nature of Work.

Prime Minister of Canada. 2017."Minister of Employment, Workforce Development and Labour Mandate Letter."

Public Policy Forum. 2017. Workplace Literacy: The Lynchpin of Canada's Inclusive Growth Agenda.

Statistics Canada. 2015. "Participation, employment and unemployment rates of people aged 25 to 54 by Aboriginal group and immigrant status, 2015."

Statistics Canada, 2017. "Census topic: Immigration and ethnocultural diversity"

Stone, K.V.W. 2014. The Changing Nature of Employment the Vanishing Middle Class and the Implications for Social Policy. Series: "UCLA Faculty Research Lectures."

Stuart, T. et al. Age of disruption: Are Canadian firms prepared? Deloitte LLP.

Thirgood, J. 2017. What if you could take it with you? Mowat Centre: Ontario's Voice on Public Policy, School of Public Policy & Governance, University of Toronto.

Ticoll, D. 2015. Driving Changes: Automated Vehicles in Toronto.

Woetzel, J. et al. 2016. People on the move: Global migration's impact and opportunity. McKinsey Global Institute.

Wood Mackenzie. 2017. "Energy market disruption and the role of power markets: are the markets prepared?"