




Climate Technology Task Force:

Report to the Government of Alberta

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EXECUTIVE SUMMARY

On September 19, 2016, in support of Alberta's Climate Leadership Plan, the Government of Alberta announced the establishment of a Climate Technology Task Force (Task Force) to lead stakeholder engagement and to provide recommendations on a provincial Climate Change Innovation and Technology Framework (Framework). The Framework will guide Alberta's investments and accelerate the development and deployment of innovative, game changing technology that will reduce Alberta's greenhouse gas (GHG) emissions and grow the Alberta economy.

The Task Force embraced the opportunity to provide input into a framework that will guide Alberta investments in transformative innovation and technology. The Framework aims to address the challenge of building a low-carbon future and focusing market forces on combating climate change in a global economy. Addressing these challenges effectively can result in sustainable economic growth and environmental and societal benefits for all Albertans. International commitments to address climate change at the 21st Conference of the Parties (COP21), coupled with the Government of Canada's pronouncement on a pan-Canadian carbon tax and its stated intent to eliminate fossil fuel subsidies, have underscored the importance and urgency associated with developing a Team Alberta approach to reduce GHG emissions and to ensure economic prosperity.

In this spirit, the Task Force developed a goal statement, or 'grand challenge', of decoupling economic growth from GHG emissions and developing a vibrant, diverse economy that grows and creates jobs while reducing GHGs. The grand challenge, together with a clean innovation strategic approach that specializes in creating products, processes and policies specifically linked to reducing environmental impacts or improving environmental outcomes, will enable us to reduce GHG emissions while creating new economic opportunities for Albertans.

In accordance with the mandate given, and to inform the development of the Framework, the Task Force conducted a literature review, solicited written submissions from Albertans and conducted workshops, meetings and teleconferences with innovation and technology stakeholders throughout Alberta, Canada and internationally. Invaluable advice was provided, carefully considered, and reflected in the recommendations provided to the Government of Alberta.

The important contribution of the oil and gas sector to Alberta's prosperity, today and into the future, is clearly recognized, as is the significant, emerging opportunity for the accelerated development of Alberta's clean technology industry. Innovation and technology investments are viewed as mission critical to the challenge of reducing GHG emissions while simultaneously growing a sustainable diversified economy for the 21st century.

Visionary and transformative long-term innovation and technology investments will be required to support the transition to a low-carbon economy. We must invest early and boldly in research, development, and demonstration at scale, that leads to commercialization, in partnership with industry, and in adjacent disruptive areas to accelerate the pace of change to a high value, low-carbon economy.

The Framework recommendations presented below, when implemented together, will position Alberta, through transformative clean innovation, for a low-carbon economy that is prosperous and resilient while generating significant environmental and economic benefits.

Recommendations:

1. Adopt a "Team Alberta" common vision, mission, direction, and strategies on the Climate Change Innovation and Technology Framework.
2. Provide significant, long-term clean innovation funding with an initial five-year investment of $2B and future sustained levels of investment based upon critical evaluation.
3. Create a single point convener for the clean innovation ecosystem.
4. Establish an arm's length independent approach for resource allocation to invest in clean innovation.
5. Invest more effectively across the clean innovation ecosystem:
   a. Invest effectively in innovation projects – getting technology to deployment,
   b. Invest effectively in capabilities – people, research and innovation infrastructure, networks, strategic partnerships etc.
6. Leverage non-financial instruments to enable a clean innovation culture.

1.0 SETTING THE CONTEXT

1.1 Alberta Climate Leadership Plan and Climate Technology Task Force

In response to the Climate Change Advisory Panel (Advisory Panel) recommendations on November 20, 2015, the Government of Alberta announced the Climate Leadership Plan. The Climate Leadership Plan sets the path forward for Alberta to become one of the world's most progressive and forward thinking energy producers. It outlined the government's commitment to move forward in four key areas including:

- Implementing a new carbon price on GHG emissions;
- Ending pollution from coal-generated electricity by 2030;
- Developing more renewable energy;
- Capping oil sands emissions to 100 megatonnes per year; and
- Reducing methane emissions by 45% by 2025.

In the near to medium-term (now to 15+ years), technologies allowing for the production of oil and gas with significantly lower GHG emissions and energy input costs will be crucial to maintaining the province's resource value. Alberta's challenge will be to maintain position as a preferred, low-cost and low-emissions supplier in a potentially low-growth market. In the long-term, Alberta's hydrocarbon resources will have even higher-value as non-combustion uses are developed. These uses may include carbon fibre, plastics, and chemicals.

Sustaining Alberta's economy, while protecting the environment, will require significant additional leveraged investments in Alberta's research and innovation system. The Advisory Panel recommended that one area where carbon levy funds should be targeted is innovation and technology – the transformative research and innovation needed to accelerate the province's ability to achieve its climate change objectives and aspirations. To achieve the objectives of the Climate Leadership Plan, the Advisory Panel's report also identified key considerations on the role of innovation and technology in achieving the province's climate change ambitions, specifically:

- Refocusing toward a portfolio-driven and outcome-based funding approach;
- Investing in riskier ventures;
- Reducing barriers to the deployment of new technology; and
- Considering the full range of clean innovation solutions to climate change.

Climate Technology Task Force

In response to the Advisory Panel recommendations, as outlined in the Climate Leadership Plan, on September 19, 2016 the Government of Alberta announced the establishment of a Task Force to lead stakeholder engagement and to provide recommendations on a framework to guide Alberta's investments in GHG reduction innovation and technology.

The Task Force was given a mandate to:

> "Lead an engagement of leaders in Alberta's research and innovation system to provide input into a Framework that:
>
> - Advances government priorities;
> - Aligns Alberta's research and innovation system;
> - Accelerates provincial climate change objectives; and
> - Includes an evaluation approach on demonstrating value from investments in the short and long term."

The proposed Climate Change Innovation and Technology Framework is intended to:

- Provide a holistic, system-based investment approach;
- Ensure coordinated, impactful investments in research, innovation, and technology;
- Support alignment of the research and innovation system's current capacity; and
- Advance government climate change and economic objectives by effectively deploying the resources within the research and innovation system to accelerate the development and deployment of innovative and transformative technologies that will reduce GHG emissions related to Alberta's emission profile, contribute to national and international emissions reductions, and support economic diversification.

1.2 Factors Influencing the Mandate

1.2.1 External Environment

At the outset, the Task Force identified a range of international commitments, new policy initiatives and new funding commitments to provide the necessary background and context to respond to their mandate.

Canada has made several commitments that will impact how Alberta responds to the challenges and opportunities associated with reducing GHG. At COP21 (United Nations Framework Convention on Climate Change) in Paris, Canada, along with 195 countries, made unprecedented commitments to address climate change via emissions reduction commitments, environmental initiatives and funding commitments. Canada is also participating in "Mission Innovation," through which 21 of the world's wealthiest countries have pledged to double investment in clean energy innovation over five years. Collectively, these 21 partners represent well over 80% of global public investment in clean energy research and development, currently totaling approximately $15 billion per year. The Government of Canada has also proposed a pan-Canadian approach to pricing carbon pollution starting at a minimum of $10 per tonne in 2018 and rising by $10 a year to reach $50 per tonne in 2022. Federal carbon pricing applies to a broad set of emission sources throughout Canada with increasing stringency over time to reduce GHG emissions at the lowest cost to businesses and consumers, as well as to support innovation and clean growth. Finally, as a member of the G7, Canada agreed to a deadline for the elimination of most fossil fuel subsidies by 2025.

These policy initiatives and international commitments have sent a signal to the market that it is a competitive imperative to act now and invest in a cleaner future. While energy system transition is a long-term process, it is important that we begin creating our energy future in Alberta now and at an urgent pace. The global economy has clearly started the shift towards cleaner and more sustainable growth and Alberta is well positioned, through the Climate Leadership Plan and mandate given to the Task Force, to respond to these challenges and related opportunities.

1.2.2 Economic Factors

The strategic importance of the oil and gas sector to Canada and Alberta is clearly recognized, as is the emerging opportunity associated with the transition to a clean energy industry. Canada's oil and natural gas industry is the single largest private sector investor in the country, investing $81 billion in capital projects in 2014, and supporting over 440,000 direct and indirect jobs across Canada.[1] In 2014, approximately 133,053 people were employed in Alberta's upstream energy sector, which includes oil sands, conventional oil, gas and mining.[2] Alberta produced about 80% of Canada's crude oil, including oil sands, and 68% of its natural gas. Gross revenues of $63.3 billion were generated (a decrease of 39% from the previous year due to falling oil prices) representing 19.4% of Alberta Gross Domestic Product (GDP).[3]

While fossil fuels remain the foundation of global energy supply, the world faces an uncertain period of adjustment, both to today's market conditions and, over the longer term, to the prospective post COP21 landscape.[4] Recently, the International Energy Agency forecasted that gasoline demand has peaked. However it still forecasts overall oil demand growing gradually for several decades, before beginning to decline in response to the Paris Agreement, because of higher consumption of diesel, fuel oil, and jet fuel by the shipping, trucking, aviation, and petrochemical industries. Government policies are expected to play an important role in dictating the pace of the growth and the degree to which GHG emissions follow the same path.[5]

While it is clear that the world will continue to need affordable energy, the future of global fossil fuel energy demand is less certain. The resiliency of the Alberta economy, in both the near and long-term, requires going beyond reducing emissions in the fossil fuel sector. Alberta must move towards the creation of non-emitting products from hydrocarbons and biomass and the reuse of combustion byproducts with carbon capture and utilization technology. It must also address emissions in other segments of the economy through cleaner generation of electrical energy, lowering emissions in transportation, buildings, agriculture, and other industries through more effective clean technology solutions.

While recognizing the influence and impact of Alberta's oil and gas sector, it is also clear that addressing the environmental issues associated with fossil fuel extraction and use is both a challenge and an opportunity. Alberta has an international reputation for excellence in industrial digital solutions that contribute significantly to energy efficiency gains, water and

waste management and green products and services. Considering these and other opportunity areas across the Alberta economy, it is estimated that nearly 1,330 companies directly employ over 38,000 people and contribute over $5.8 billion annually to the provincial GDP through clean technology activities.[6] Capabilities, technologies and approaches developed to address the issues in the oil and gas sector have the potential to be applied to adjacent industries – water treatment and waste management will increase in importance as the non-Organization for Economic Co-operation and Development (OECD) countries raise the standard of living for hundreds of millions of people around the world.

Clean technology is a small, but growing opportunity for Alberta that will need substantial focus in order to capitalize upon technologies developed to mitigate and reduce GHG as well as to create the products and services in demand in very large global markets. In 2012, the global market for clean technologies, broadly defined, was estimated to be approximately $5.8 trillion, and growing at a rate of over 3% per year.[7]

Countries around the world are mobilizing sizeable resources to support the competitiveness of their firms and secure local economic benefits from the transition to a low-carbon economy as they recognize it as the largest wealth creation opportunity of the 21st century.

1.2.3 Related Climate Leadership Plan Initiatives

The Climate Leadership Plan is a strategy based on recommendations put forward by the Advisory Panel and is specifically designed for Alberta's unique economy. The government has moved forward on several key initiatives, such as:

- Establishing organizations to help improve energy efficiency (e.g., Energy Efficiency Alberta);
- Adding renewable energy capacity (e.g., Renewable Electricity Program);
- Investing in "green" infrastructure; and
- Establishing advisory panels to further guide and inform work in support of oil sands emissions (e.g., Oil Sands Advisory Group) and energy diversification (e.g., Energy Diversification Advisory Committee).

The work of the Task Force, in providing input to develop the Framework to guide innovation and technology investments, is designed to be complementary, synergistic and supportive of other policy and implementation tools within the Climate Leadership Plan. The intent is to accelerate emissions reductions and strengthen Alberta's position in global energy markets.

1.2.4 Alberta's Research and Innovation System

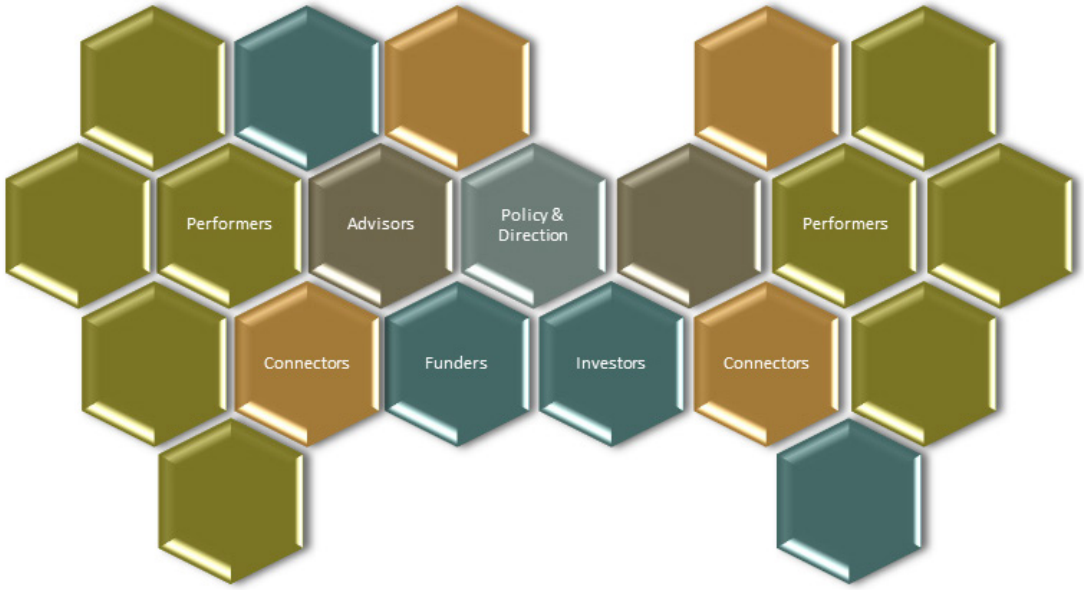
Innovation ecosystems are complex, interconnected systems of actors, institutions and networks. Each actor within the ecosystem plays a unique role / function – their collective effective performance can turn ideas into remarkable innovations.

The core roles / functions within Alberta's ecosystem include:

- Policy and Direction - The Government of Alberta establishes provincial direction on research and innovation through policy and strategy development, funding, and program delivery to support Alberta's public and industry knowledge needs. It also undertakes demand-driven applied research and technology development and demonstration.
- Advisors - Advisory bodies, such as Alberta Research and Innovation Advisory Committee, provide advice and recommendations to the Government of Alberta pertaining to Alberta's research and innovation ecosystem. These bodies include representation from industry, researchers, innovation service providers, and provincial, national, and global jurisdictions.
- Funders and Investors - Public and private investors strategically invest resources in support of research and innovation initiatives, as well as those that invest in early-stage companies.
- Performers - Performers, including post-secondary institutions, industry, small business, entrepreneurs, etc., undertake leading-edge research, pursue innovation, and commercialize new and improved products, services, and processes.
- Connectors - Ecosystem connectors, such as Connectica, facilitate innovation by connecting researchers, innovators, entrepreneurs, and companies to appropriate resources such as information, expertise, and advice.

The complex inter-relationships, among the actors and institutions in Alberta's innovation ecosystem*, are necessary to achieve a highly effective and efficient system is depicted in the following illustration. Innovation stakeholders noted that, within the existing system, the convening leadership role is absent and many actors struggle to communicate effectively across boundaries in pursuit of common or shared outcomes.

Alberta actively engages and collaborates with the Government of Canada and other national partners to establish a shared vision for research and innovation in Canada. In addition, international connections are vital to Alberta's success, as provincial outcomes are developed that intersect with critical efforts and initiatives within the global research and innovation enterprise.



**The innovation ecosystem is a group of government, industry, post-secondary institutions, advisory, program delivery, connector and other organizations engaged in research and innovation in Alberta.*

2.0 UNDERSTANDING PUBLIC INVESTMENT IN INNOVATION

As demonstrated by the outcome of COP21, there is widespread consensus on the critical role of innovation and global adoption of low-carbon technologies in achieving needed reductions in GHG emissions. Decarbonizing the global energy system requires both incremental and transformative innovation.

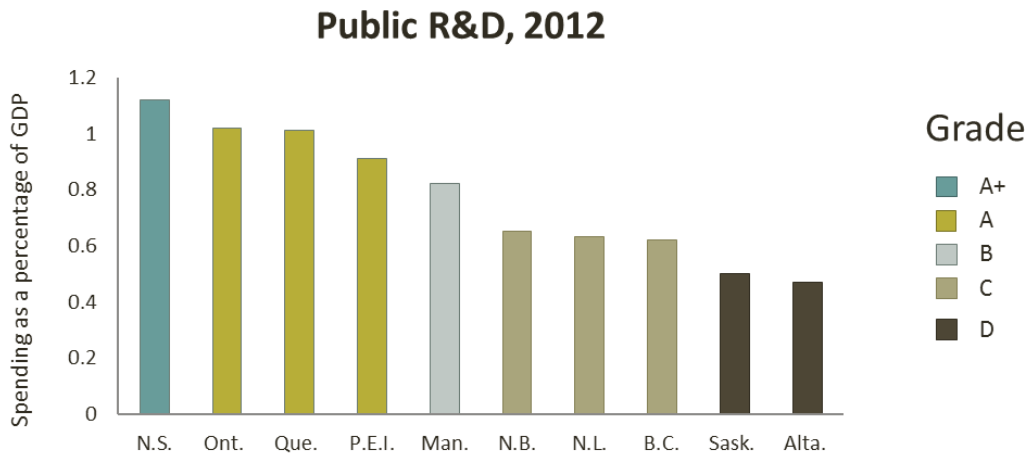
Innovation investment needs to be viewed as "*mission critical*" to the challenge associated with decoupling economic prosperity from GHG emissions. Alberta is at an inflection point where bold, decisive innovation investment, in partnership with others, is required to diversify our economy and support the transition to a low-carbon economy.

Addressing climate change requires a decades-long commitment to develop and deploy low-carbon technologies around the world. A portfolio of technologies is needed, including proven technologies available today, and new technologies not yet developed. This represents a tremendous opportunity for companies to innovate, prosper and lead the way.

However, the current modest pace of technology development and adoption is part of the problem. A step change in global technology advancement is needed to transform how the world produces and consumes energy – a transformation that requires a shared vision along with government, industry, and public action. Long-term, predictable policy frameworks must send clear signals and certainty to markets and Canada should draw on its inventiveness and ability to create new products, services and processes.

The case for significant additional public investment in innovation in Alberta is compelling:

- Market failures result in private sector underinvestment in innovation, thus reinforcing the need for public investment.[8]
- While the carbon levy provides incentives for the development of low-carbon alternatives, this incentive is likely not strong enough as it does not reflect the full cost of carbon.[9]
- Significant risk for continued erosion of market share and economic prosperity, due to the higher carbon content of Alberta heavy oil/oil sands and lack of clean energy innovation.
- Other leading jurisdictions are investing heavily in innovation to support the transition to a low-carbon economy. Maintaining status quo levels of investment will not improve our carbon competitiveness and will likely result in lost economic opportunities in a rapidly expanding clean technology marketplace.
- Innovation investments are required to be at a scale commensurate with the sectors relevant to Alberta.
- Significant capital requirements associated with the energy industry, and related clean energy investments, coupled with the absence of "patient capital" due to long development timelines and lack of early adopters, have resulted in low rates of technology adoption and commercialization.[10]
- Alberta ranks last in Canada in public spending on R&D as a percentage of GDP and is near last in overall (general) expenditures on R&D per dollar of GDP.[11]



Source: Statistics Canada; The Conference Board of Canada

3.0 LEARNINGS FROM STAKEHOLDERS

3.1 What We Heard

To inform the development of the Framework, the Task Force used three approaches to engage stakeholders:

- Invitation-only engagement sessions;
- Targeted one-on-one meetings / teleconferences with experts and expert organizations; and
- Dedicated email account to receive submissions from interested Albertans.

Over 120 technology and resource-based representatives from industry, academia, small business and not-for-profit environmental, and research and technology-based organizations, were engaged through the sessions held in Edmonton, Calgary, Lethbridge, and Grande Prairie. Expert organizations and individuals, such as: the University of Alberta, the University of Calgary, Climate Change and Emission Management Corporation (now Emissions Reduction Alberta), Genome Alberta, Smart Prosperity, Alberta Innovates, Enviroeconomics, McKinsey & Company, and Resources for the Future, were willing to lend their views and expertise to the deliberations of the Task Force.

The Task Force also received online submissions from 57 unique individuals, technology companies, industry associations and business organizations. These comments were considered and aggregated with input from engagement sessions and one-on-one meetings. It was noted that eight respondents (15% of total submissions) did not agree with the Task Force mandate and/or disagreed with the need for a carbon levy, while 21% of responses were considered to be outside the mandate of the Task Force. The majority of respondents (64%) were from individuals, companies or business associations/organizations that either provided advice to the Task Force and/or sought investment support for specific technologies, products, or processes.

Engagement session participants were asked to share their insights, opinions, and thoughts as to the current and future state of Alberta's innovation ecosystem in the context of its ability to effectively and efficiently make investments in innovation and technology.

Collectively, session participants' view of the current state of Alberta's innovation ecosystem can be summarized as:

- Alberta's innovation ecosystem is a complex system with many actors filling unique and diverse roles. They struggle to communicate effectively across boundaries and may not have shared outcomes aligned with government priorities.
- The overall convening, leadership role within the innovation ecosystem is absent.
- Individuals and companies often experience challenges in accessing and navigating the innovation ecosystem.
- Funding resources for many innovation ecosystem functions were considered insufficient.
- Existing regulations fail to adequately recognize new technologies and may present barriers to technology development and adoption.

Collectively, the session participants' views for the future of Alberta's innovation ecosystem can be summarized as:

- Alberta's future innovation ecosystem needs to be focused on clean innovation with clear outcomes related to the policy agenda.
- Need to shift the paradigm to have both sustainable economic and environmental performance.
- Actors need to be:
  - Aligned with outcomes;
  - Responsive, adaptive, collaborative, and organized to achieve the outcomes; and
  - Interact with each other in a dynamic, supportive manner.
- The innovation ecosystem requires sufficient levels of resources across all functions.

Engagement session participants were also invited to provide what they thought were the strengths, opportunities, aspirations, and results they expected from Alberta's innovation ecosystem, as it related to achieving the province's climate change objectives. Analysis of the ensuing dialogue across all sessions is summarized in the following table.

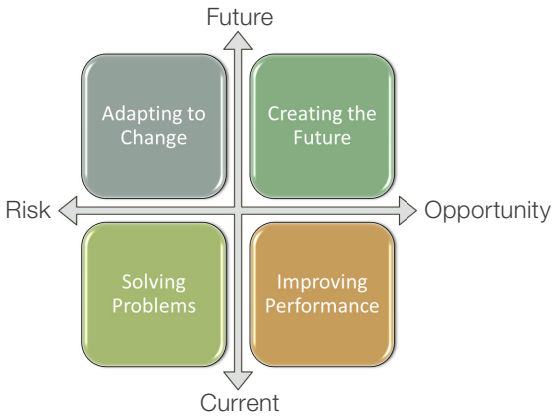
Summary of feedback received from Stakeholders organized by key themes	
Strengths • Alberta has a strong, educated, young and diverse workforce that embraces a culture of entrepreneurship. • Our existing universities, colleges, and polytechnics provide leading edge fundamental and applied research capabilities. • A progressive climate change policy is supported by a predictable and comprehensive regulatory framework. • The Alberta economy is anchored by strong, nimble small and medium-sized enterprises with a global outlook who embrace innovation and work collaboratively within networks, alliances, and partnerships.	**Opportunities** • Alberta has a proven track record of leading research and innovation in unlocking the potential of oil sands. A focus on leveraging our natural resources strengths, reducing GHG emissions from hydrocarbons and building renewable industries is critical as we transition to a low-carbon economy. • Enhanced clarity of a shared vision, mission, and desired outcomes as well as better communication, coordination, and alignment of funding models within the innovation ecosystem will be critical to realizing Alberta's full potential in a 21st century economy.
Aspirations • Albertans clearly conveyed a desire for a sustainable, clean, diversified, and resilient economy that retains our international competitiveness while reducing our carbon footprint. • These aspirations need to be supported by a resilient innovation ecosystem that embraces risk, long-term thinking and is responsive to changing economic, political, and social drivers of change. • Strong leadership, diversity in our people and economy, coupled with world-class education and skills for the 21st century, will provide the foundation for future success.	**Results** • With a focus on the future, participants articulated a vision for a new Alberta that; · is clean, diversified, and prosperous. · has an economy that seeks to increase value from our natural resources, reduce our GHG emissions, attract new investment, and engage all Albertans, including Indigenous people. · is supported by a globally connected and internationally recognized innovation ecosystem that accepts risk and market failure as we move to a low-carbon future.

3.2 Strategic Intent of Future Innovation and Technology Investment

Innovation stakeholders were also asked to consider the strategic intent of future public sector investment in clean innovation outcomes. To guide this conversation, a model of Strategic Intent was presented that used two axes – view of change: risk vs. opportunity, and time: current vs. future. Each of the resulting quadrants has been labelled based on the driving force for change, as illustrated in the following diagram.

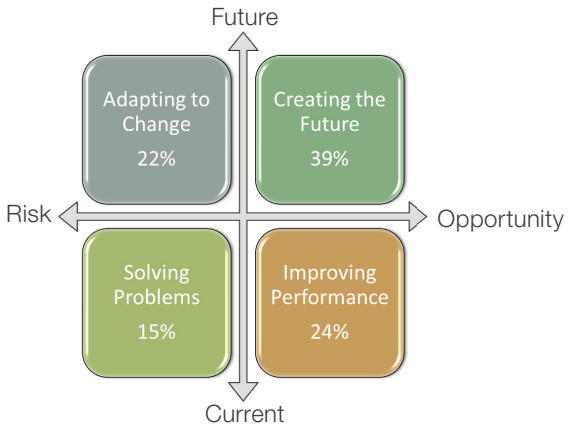
"Problem Solving" and "Performance Improvement" quadrants typically involve "quick wins" or benefits that are realized by existing capital stock or operations. Generally these investments are relatively less risky and the time to payout is sufficient to attract private sector capital.

"Adapt to Change" and "Create the Future" quadrants reflect areas where risks are generally more significant both in terms of timelines required for development and deployment, and in the risk of failure. Leveraged public funding with private capital should be maximized to ensure market relevance for the product, service or technology. However, for very early-stage ideas there can be circumstances where co-funding by innovators cannot be made a mandatory requirement given the market may not yet exist.



To capitalize upon the strengths, realize the opportunities and the desired results that had been identified, participants were then asked to consider where public sector resources should be directed in order to support transformative innovation and change. How participants viewed the strategic intent of future innovation and technology investment is summarized in the following figure.

Stakeholders recognize the importance of continued public investment for near-term technology development and commercialization. They also acknowledge the need to focus the majority of available resources on climate change innovation and technology to assist Alberta's economy as it transitions towards a prosperous, sustainable, low-carbon economy.



3.3 Task Force Reflection

Upon reflection of the considerable, insightful advice and feedback the Task Force received from stakeholders, the Task Force identified three key challenges / opportunities for Alberta's innovation system, specifically:

a) Paradigm shifts within the ecosystem are required:

- The grand challenge of decoupling GHG emissions and diversification requires a paradigm shift that embraces a holistic approach towards clean innovation.
- The need for, and understanding of, innovation is not well understood. Innovation is a complex undertaking that is fraught with uncertainty and is prone to risk and failure in pursuit of disruptive or transformative technologies.
- Traditional methods of establishing outcomes and measuring success need to be adjusted to reflect organizational innovation and the long timeframes associated with successful research and innovation best practices.

b) New models of collaboration are required:

- Existing innovation system actors struggle to communicate effectively, often working in silos, resulting in an ineffectual ecosystem that is often not aligned with Alberta's priorities.
- New entrants have difficulty entering and navigating the system.
- A significant gap exists between demonstrated and commercially deployed technology in part due to the existence of few early adopters of new technology.
- Collaboration beyond Alberta's borders will be necessary for success –Alberta actors and institutions must align with the growing ambition and investment with national and international initiatives.

c) Financial resources need to be commensurate with the challenge:

- Resources within the clean innovation ecosystem need to be invested more effectively and efficiently.
- Promising research/technologies developed in Alberta are often stranded or commercialized elsewhere due, in part, to inadequate resources and poor connectivity amongst innovation system throughout the innovation cycle.
- Clean energy and clean technology typically has long technology development and adoption cycles and significant capital requirements. These factors impact the ability of private sector actors to attract patient capital from the investment community.

4.0 PUTTING THE PIECES TOGETHER

At a global scale, it is clear that the way we think, act and innovate is changing. The recognition that climate change is influenced by our actions points to the need to interact with our environment along a different path. For success in the 21st century, Alberta must be globally carbon competitive. The term 'carbon competitiveness' captures the need to be both cost competitive and value-creating, while simultaneously achieving a significantly lower carbon economy and footprint. There are some who say we cannot afford to engage in climate solutions and that a carbon price is unaffordable and will make us uncompetitive. The reverse view is that we can't afford not to aggressively pursue innovation that improves our carbon competitiveness with a carbon price being a key enabler of creating markets and incentive for better performance and new products and services. Complacency will make us uncompetitive, particularly as a relative high supply cost and carbon-intensive energy producer.

We need to embark on bold and accelerated innovation now versus assuming the world will allow us to be complacent and defensive of our current environmental performance and technologies. Doing the same things the same way with more enthusiasm, while assuming international action on climate change will not occur, is a recipe for failure.

- ***The world is moving toward a low-carbon economy***
- ***Alberta's Climate Leadership Plan embraces Alberta's unique climate change challenges***

This situation presents a *mission critical, opportunity rich* paradigm for Alberta's innovation ecosystem.

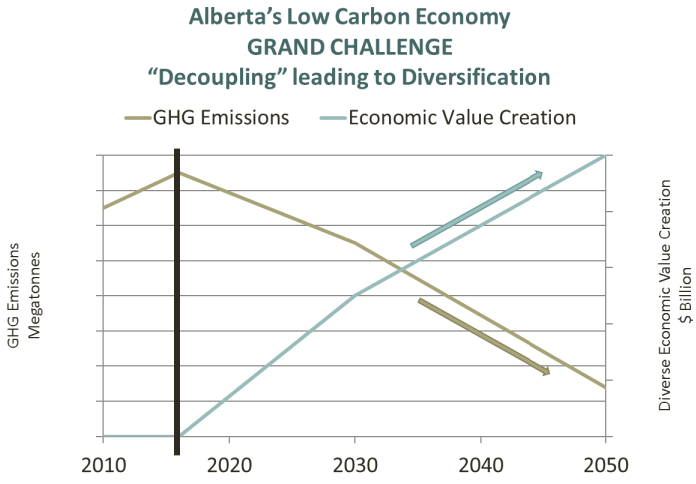
Based on a synthesis of the advice received from stakeholders, review and analysis of relevant literature, our need in Alberta is clear – clean innovation done differently and done more effectively and efficiently.

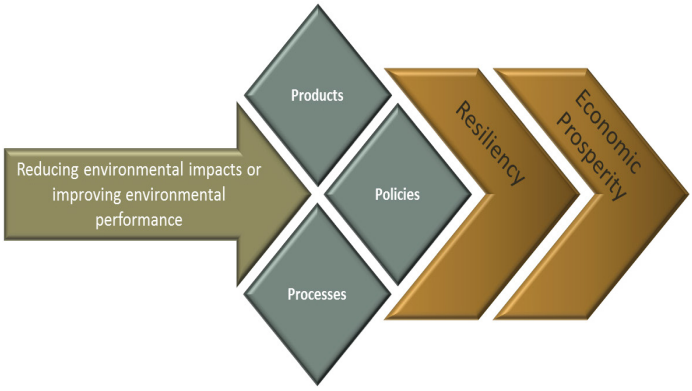
This section presents the architecture thinking the Task Force considers key to its mandate.

4.1 Strategic Goal

Alberta's future economic prosperity will depend on the ability to simultaneously address, through clean innovation, the challenge of:

- Energy industry transition
  - Value-add from hydrocarbons beyond combustion, enhanced bitumen upgrading, advanced recovery (low/no carbon extraction).
- Economic transition
  - Diversification through clean technology, advanced materials/manufacturing, nanotechnology, health industries, biotechnology, information technology, etc.
- Low-Carbon competitiveness
  - Generating economic prosperity while simultaneously reducing GHG emissions per unit of production.





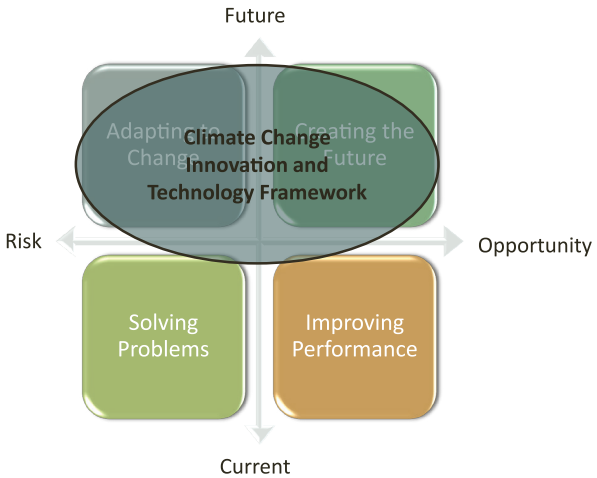
Economic value creation will come from multiple, diverse sources of low-carbon economic opportunities. By realizing new opportunities, diversification of Alberta's economic base can be achieved.

This decoupling will only be possible through embracing clean innovation to develop and deploy technologies, products, processes and policies that deliver transformational solutions. What is clean innovation? Clean innovation is economic prosperity and resilience based on a trajectory that specializes in creating products, process and policies specifically linked to reducing environmental impacts or improving environmental outcomes.[12]

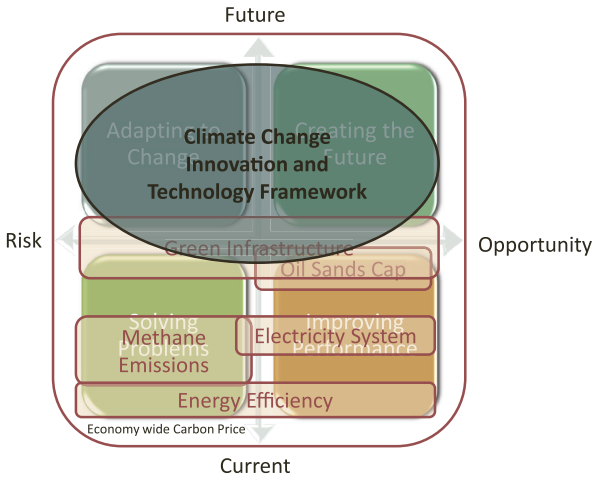
4.2 Strategic Intent

Using the strategic intent model presented to stakeholders, and consistent with advice received from knowledgeable innovation stakeholders, the areas of strategic intent for future public sector innovation investment derived from the carbon levy should focus on "Adapting to Change" and "Creating the Future" for Alberta in a low-carbon economy.

The Task Force also recognized there exist some short term opportunities in "Solving Problems" and "Improving Performance" that will provide a compelling business case for public innovation investment as long as it doesn't crowd out private sector capital.



The Climate Change Innovation and Technology Framework should be considered as part of an overall approach to achieve the low-carbon future envisioned by Alberta's Climate Leadership Plan. Other policy instruments, such as Energy Efficiency Alberta, Green Infrastructure, etc., play important roles in working with industry, entrepreneurs, and Albertans to realize the near-term potential. Mapping the proposed Climate Change Innovation and Technology Framework with other Climate Leadership Plan initiatives demonstrates its complementarity and synergistic relationship with other policy and implementation approaches being developed.



4.3 Design Principles

The following six key design principles are intended to guide and inform the development of the proposed Climate Change Innovation and Technology Framework.

A. Bold, aspirational and future orientated

Recognizing that transformative research and innovation investment will be required over the long term (to 2050) to transition to a low-carbon economy, the Framework is bold in its reach, ambitious in securing funding commitments, and compelling to all Albertans in the pursuit of a sustainable, resilient, and diversified economy. A laser sharp focus on the achievement of shared, bold outcomes will be key to the successful development of the Framework, which must be stable and enduring over the long-term.

B. Flexible, nimble, open and responsive architecture

Alberta's transition to a low-carbon economy will require stakeholders to embrace innovation in technology, processes, policy, relationships, and interactions within all parts of the innovation ecosystem. Mission specific approaches that target areas of high impact and potential over the medium-to-long term will require an innovation and technology framework that is risk tolerant, open, transparent, and highly adaptive, as well as responsive to new information and the emergence of disruptive or breakthrough technologies. This requires continuous evaluation of system performance.

C. Excellence and expertise

The Framework is intended to be guided, informed, and implemented by those with knowledge, experience, and expertise on innovation, technology, and creating additional value for hydrocarbon resources in a carbon constrained world. The best entrepreneurial thinking will drive successful innovation investment. Participation from industry, academia, government, business, and not-for-profit organizations will be supported and encouraged. "Best fit" people, resources, and existing strengths, capabilities and networks will be identified and engaged in pursuit of excellence of design and implementation.

D. Collaborative, inclusive, connected and convergent innovation ecosystem

All parts of the innovation ecosystem need to be aligned, connected and focused on achieving shared outcomes. The Framework needs to welcome and embrace new entrants, including the Indigenous community, and enable convergence of all parts and actors in the innovation ecosystem. Collaborative verses competitive behaviors need to be supported and encouraged.

E. Portfolio approach that is outcome focused

The need for multiple pathways to success, to be pursued simultaneously, will require a framework that embraces a portfolio approach to managing risk and enabling a diversity of projects (project size, time to market, type of recipient) from research to commercialization along the innovation continuum. The Framework will facilitate and accelerate promising, impactful projects in areas of jurisdictional or competitive advantage that support the achievement of shared outcomes while avoiding tendencies to attempt to pick "winners". Incentives should be used to mitigate the risk of new technology development and adoption in partnership with the private sector and others.

F. Addresses all barriers to clean innovation

Innovation in technology, processes, policy, relationships, and interactions will be necessary to enable the pursuit of clean innovation. An effective, aligned and engaged innovation ecosystem will require supportive innovation policy, consistent and targeted public investments in research, development, demonstration and early deployment, as well as nimble, connected public institutions that can hand-off new ideas and new technologies for commercialization by the private sector.

4.4 Attributes of Success

Complex systems don't change overnight – it's a trajectory, a journey to a desired future state. In assessing success, the emergence of the following attributes within Alberta's clean innovation ecosystem will demonstrate the ecosystem is moving in the right direction:

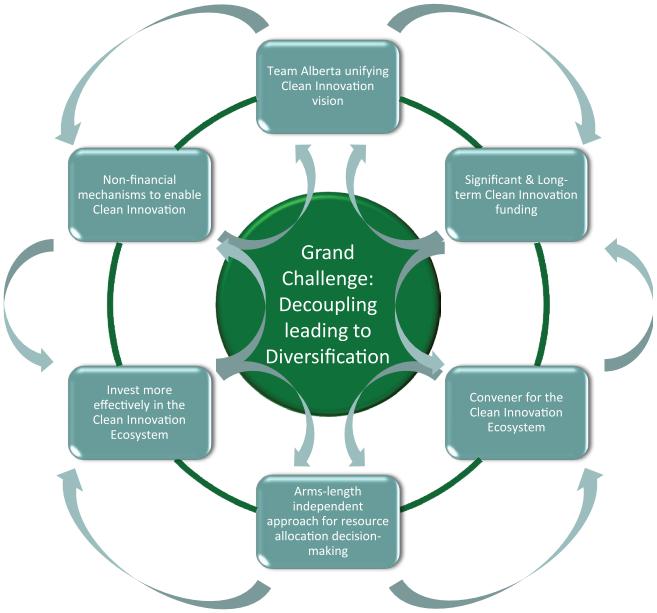
- A healthy, supported innovation ecosystem that is open, welcoming and supportive to new entrants.
- Enthusiastic alignment and intentional collaboration amongst innovation system actors who would work towards common outcomes.
- Significant, sustained financial resources that would support promising ideas, technologies, and processes throughout the innovation lifecycle continuum.
- Effective and efficient execution of program investments in projects and in necessary capability (people, infrastructure, networks partnerships, environment).

When considered together the result would be a healthy, supported, aligned, collaborative, agile clean innovation ecosystem that propels Alberta forward to being a global leader in clean innovation.

5.0 RECOMMENDATIONS

In order to move Alberta toward the goal of decoupling economic growth from GHG emissions, the Task Force presents the following set of six interdependent, mutually-reinforcing recommendations.

The implementation of these recommendations, based on the architecture described in the preceding section, will propel Alberta forward as a global leader in the sustainable extraction and use of hydrocarbon resources in a low-carbon economy. Broader strengths will be developed and benefits derived across new areas of clean technology development while shifting to a more renewable energy mix.



Recommendation #1

Adopt a "Team Alberta" common vision, mission, direction, and strategies on the Climate Change Innovation and Technology Framework

Based upon innovation ecosystem stakeholder feedback, it was apparent that it is critical to develop a common mission and vision associated with efforts to decouple economic growth from efforts to reduce GHG emissions.

A "Team Alberta" approach that embraces innovation as mission critical to the future prosperity of Alberta should create excitement, build momentum and allow the engagement of all parts of the innovation ecosystem in collaborative solution development. A compelling case needs to be articulated that a "business as usual" or incremental investment approach will not lead to the transformative change that is required to respond to the challenges and realize the opportunities associated with transitioning the Alberta economy to a low-carbon future in the medium to long-term.

The need to work together collaboratively in service of a common vision, rather than in service to an individual organization needs and wants, would provide further alignment of interests, resources, and efforts from multiple innovation actors both within and external to the existing innovation ecosystem.

In support of this recommendation, the Task Force provides the following draft vision and mission for consideration:

Vision:

Alberta's low-carbon economy is prosperous and resilient through transformative clean innovation, generating significant environmental and economic benefits.

Mission:

Transition to a high value, low-carbon economy that will result in:

- Alberta becoming a leader in the development and deployment of clean innovation;
- Enabling new, more diverse and resilient sectors that will provide sustainable economic growth and jobs for current and future generations; and
- Alberta meeting or exceeding its climate objectives.

Pursuit of this mission will be enabled through a collaborative, transparent, single point convener approach (discussed in Recommendation 3) and shared outcomes.

Recommendation #2

Provide significant, long-term clean innovation funding with an initial five-year investment of $2B and future sustained levels of investment based upon critical evaluation

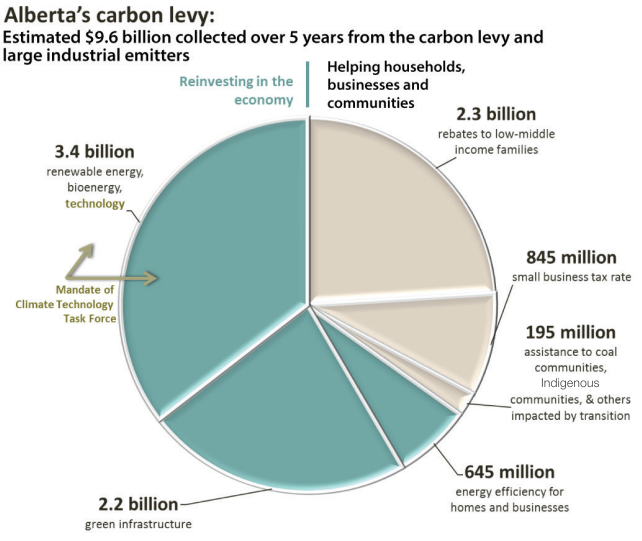
If innovation is mission critical to Alberta's challenge of decoupling economic prosperity from GHG emissions in

a low-carbon economy and Alberta wishes to be among the credible leaders in clean innovation, it is imperative that investment funds made available from the carbon levy are significant on a national and international scale. Historically, Alberta has ranked the lowest in Canada on public R&D spending as a percentage of GDP and near last on gross expenditures on R&D as a percentage of GDP.[13]

To achieve a meaningful impact in catalyzing and developing existing and new clean innovation in capital-intensive industries like energy and environment, Alberta has to engage and collaborate with world-class partners, organizations, and industry to pursue transformative, higher risk, game changing innovation over timeframes consistent with COP21 (to year 2050).

Long-term, stable and scalable funding will provide investor certainty and opportunity to realize the full range of social, economic, and environmental benefits associated with a transition to a low-carbon economy.

An initial $2B investment phased over five years (reflecting a shift to R&D investments of a percentage of GDP that is beginning to bring Alberta more in line with the Canadian average) will provide multiple partnering opportunities with the federal government (e.g.: Low Carbon Economy Trust Fund ($2B), Climate Change Leadership and Clean Technology Industry development ($1B) etc.), industry, and others who have also committed significant funding ($30B/year by 2021) in pursuit of clean energy and clean innovation. In addition to clean energy development, there exist high value-added clean technology opportunities that contribute to lower GHG emissions and economic sustainability including energy efficiency, technical and environmental services, bio-industrial and green building products and solutions, water technology and renewable energy technology.



Alberta funds will be leveraged as appropriate to maximize the impact and benefits that accrue to Alberta.

Recommendation #3

Create a single point convener for the clean innovation ecosystem

There exists a need to improve the innovation ecosystem performance to accomplish the Climate Leadership Plan outcomes. Currently, the innovation ecosystem is seen as siloed, closed to new entrants, and actors are more focused on organizational objectives verses broader Government of Alberta priorities on climate innovation and technology.

The establishment of a single point ecosystem convener would result in the required leadership to advance the vision, mission, direction, and strategy that focuses on shared outcomes (not technologies) and orchestrates overall ecosystem efficiencies and effectiveness. Improving the openness and transparency of the innovation ecosystem would help to break down silos of information, expertise, and resources and improve overall connectivity of ecosystem participants by building upon existing strengths and capabilities.

The convener role must be fulfilled by people(s) who are entrepreneurial, highly knowledgeable, and possess a depth of internationally recognized experience and expertise. Key competencies will include:

- Ability to identify and generate a substantial pipeline of opportunities.
- Ability to connect and invest across the entire innovation ecosystem from idea to implementation.
- Ability to create the chain of early adopters through open sourcing results of deployed technologies.
- Ability to make effective, timely decisions in a risk environment.
- Ability to establish effective relationships and networks.
- Ability to direct and manage a diverse portfolio of investments across the innovation continuum from research to commercialization.

Single point accountability would be provided by the ecosystem convener for overall leadership, stewardship, integration, and collaboration across the clean innovation ecosystem.

Recommendation #4

Establish an arm's length independent approach for resource allocation to invest in clean innovation

The successful implementation of the Climate Change Innovation and Technology Framework will be highly dependent upon the organizational model chosen to support this effort. An agile, responsive, independent entity that supports the marshaling of the best, most highly capable entrepreneurial and experienced people will support efforts to reduce GHG emissions and capture related economic opportunities associated with technology development and adoption.

Principles outlined in a report "Getting the Institutions Right: Designing the Public Sector to Promote Clean Innovation"[14] need to be explicitly considered in the decision regarding the establishment of an effective model including; mission orientation, competence, credibility, stability, flexibility, embeddedness in policy networks, autonomy from short-term political pressure and private interests, comprehensiveness, and accountability.

In addition to the principles outlined above, Task Force members also identified a number of key factors that should be considered in the organizational model or approach chosen to support resource allocation decisions:

- Time to implementation (need to hit the ground running, invest in some early opportunities and be fully operational within one year).
- Dedicated resource envelope for initial five years ($2B) needs to be identified and committed to provide organizational stability and independence, investor certainty and credibility with national and international partners.
- Highly knowledgeable, capable people that are entrepreneurial and have a depth of internationally recognized experience and expertise.

In Savoie's exploration of "What is Government Good At?"[15] he concludes that government is at its best when looking to the long-term, grappling with complex or "wicked" problems, and making visionary investments. These are tasks particular to government administration and the objectives to keep in mind when evaluating public sector initiatives.

An independent, entrepreneurial organizational model will allow the carbon levy funds to be invested quickly and strategically in areas that will yield the highest likelihood of achieving desired outcomes of carbon competitiveness, energy industry transition, and economic transition to a 21st century diversified, sustainable economy.

Recommendation #5

Invest more effectively across the clean innovation ecosystem:

A. Invest effectively in innovation projects – getting technology to deployment

The adoption and deployment of advanced technology is one of the key components of innovation and technological development. This leads to benefits including cost reduction, the expansion of product and service lines, and productivity gains. In the current business environment however, the risk-reward balance for early-stage investing in potentially transformative technology is unlikely to meet the market tests of traditional angel or venture capital investors. This market failure can be addressed by a dramatically scaled up public research pipeline where a portfolio of promising ideas and technologies can be jointly supported by government and the private sector who have the skills and expertise to drive innovation from the lab to the marketplace – across the innovation continuum.

Business support programs need to address "market push" and "market pull" dimensions. Early stage innovation and technology needs greater levels of public financial support that develops and de-risks the technology through programs such as small business innovation research (SBIR) type programs and incentive prizes, to address market failure in regards to new technology development, adoption, scale up, and deployment. Market pull mechanisms such as the establishment of "green funds" and loan guarantees are also required to accelerate adoption and commercialization of clean innovation while avoiding the crowding out of private capital. Supporting and enabling the development and adoption of cost-effective energy and clean innovation technologies will promote investment, jobs, and lower GHG emissions.

The following investment approach is recommended to guide effective investments in innovation projects:

Criteria:

- Investments must be aligned with achievement of desired/shared outcomes.
- Investments should be evidence based – independent experts/advisors engaged to provide technology foresighting and assessment.
- Net benefits of investment will accrue to Alberta.

Methodology:

- Project selection (based upon clear criteria) made by qualified professionals that understand the clean innovation ecosystem.
- Entrepreneurial/business risk-based approach that is agile, responsive, and focused on problem solving.
- A "one pipeline" approach used to support the development of a large intake of high quality projects, which will be validated, and, development of most promising ones, accelerated.
- Collaborative/consortia approach encouraged and enabled among project proponents.
- Suites of well-designed incentives are deployed to ensure successful development, deployment, and commercialization of technology (e.g.: encourage early adopters, open source results, right to exploit intellectual property).
- Resources are concentrated and focused on most impactful ideas from research to commercialization.
- Funding provided to a portfolio of multiple technologies within chosen focus area(s) for a given outcome.
- Regular, rigorous assessment of project progress against milestones and regular portfolio evaluation by experts.

Priority Given to:

- Collaborative, inclusive, and connected projects that attract partners within and external to the existing innovation ecosystem.
- Scalable investments that can expand over time based upon success.
- Powerful, highly impactful ideas that are transformative in nature or application.

B. Invest effectively in capabilities – people, research and innovation infrastructure, networks, strategic partnerships etc.

To accelerate the development and deployment of clean innovation technological advancements and transformational solutions that will reduce GHG emissions and create jobs, investments in key enablers will be required:

- Highly skilled people: Trained, talented people that can take advantage of opportunities and address challenges in climate change innovation and technology.
- Infrastructure: State-of-the-art facilities and equipment are required to explore new ideas, tailoring, adapting, testing, and validating technologies for eventual deployment.
- Innovation and business environment: Technological, policy, social, and organizational environments that function to discover, develop, deploy, and adopt climate change innovations and technologies.
- Networks: Collaboration, integration, and coordination amongst governments, industries, post-secondary institutions, non-government organizations, and the financial community.

While recognizing the need for innovation in technology, processes, policies, relationships, and interactions, investing in people and building on the existing research and innovation infrastructure and networks will help achieve desired outcomes. This includes everything from research to commercialization. Building on systems that are already working will improve overall effectiveness, efficiency, and timelines.

In addition to networks and strategic partnerships, governments also have a critical role to play in supporting the development of consortia or clusters in areas of jurisdictional or competitive advantage. By providing the necessary infrastructure, encouraging collaboration between government, industry, small business, entrepreneurs, and academia, facilitating connections with national and international networks, and supporting the rapid and direct exchange of knowledge between all the parties, the rate and pace of innovation can be accelerated.

Recommendation #6

Leverage non-financial instruments to enable a clean innovation culture

In support of getting technologies to deployment, a comprehensive suite of policies, programs and initiatives, enabled by supportive regulation, is essential to developing a holistic solution that embraces multiple parallel, but complementary pathways to success.

Policy consistency and coherence is required to provide the long-term certainty that will attract investment in new innovation and technologies and accelerate the transition to a low-carbon economy. New and enhanced flexible regulatory approaches will spur innovation through the rapid testing and deployment of impactful technologies. Government procurement programs are powerful instruments of public policy, both economically and socially, and can help grow technologies to full scale commercialization as has been done successfully in other jurisdictions.

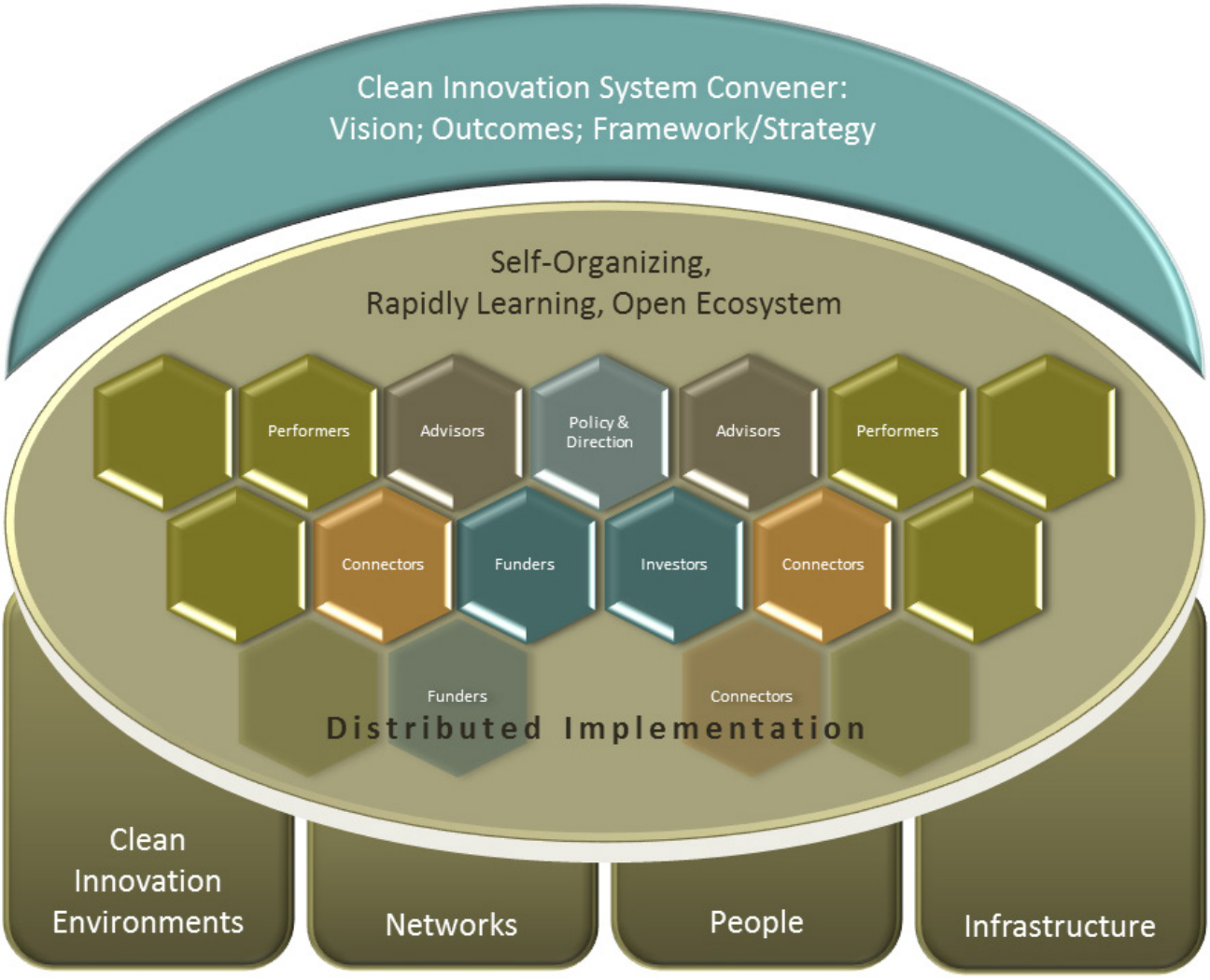
To enable a clean innovation culture, the active involvement and engagement of all Albertans will be required. Innovation stakeholders indicated a keen interest in being further involved, engaged, and informed on the status of the Framework as well as the Climate Leadership Plan. A comprehensive communications strategy will be required to fully inform, educate, and engage Albertans on the mission critical aspects of the Framework.

CONCLUSION

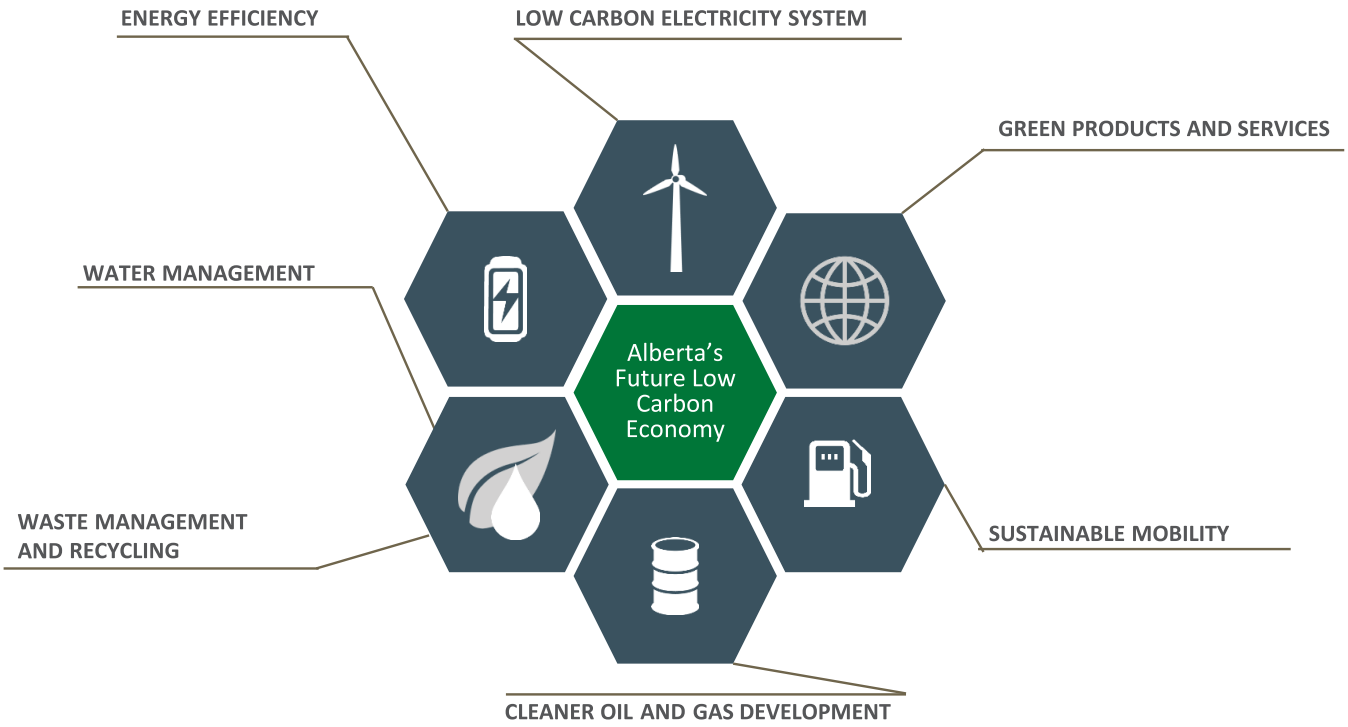
The Task Force members are pleased to submit these six interdependent, mutually reinforcing recommendations for consideration and input into Alberta's Climate Change Innovation and Technology Framework.

The innovation ecosystem architecture that would result from the six interdependent, mutually reinforcing recommendations is illustrated below. By focusing, leveraging, and building upon the existing capabilities and the strong foundation of Alberta's innovation ecosystem, system performance can be improved to address the grand challenge of decoupling economic growth from GHG emissions in a low-carbon economy.

Bold, visionary steps are required to advance government priorities, align Alberta's research and innovation system, accelerate provincial climate change objectives, and to invest effectively over the short and long term. Significant clean innovation investment can result in a fundamental paradigm shift and decoupling of economic growth from GHG emissions. Alberta can, and will, be seen as a preferred innovation partner where exciting ideas get exceptional support to achieve our climate change and economic objectives.



As Alberta pursues a clean innovation future, there are significant opportunities to grow a resilient, diversified and sustainable 21st century economy that creates new jobs and protects our environment. By building upon existing strengths and capabilities in areas of jurisdictional or competitive advantage, Alberta can create a new starting point towards a future low-carbon economy.



APPENDICES

Annex 1 - Climate Technology Task Force Members

Gordon Lambert, Chair

Mr. Gordon Lambert retired from Suncor Energy on January 1, 2015. He is currently the Suncor Sustainability Executive in Residence at the Ivey School of Business and has established GRL Collaboration for Sustainability as a consulting practice.

He is an advisor and frequent speaker on energy, the environment, and innovation. He was instrumental in the creation of Canada's Oil Sands Innovation Alliance (COSIA) and in 2014, was a speaker on Innovation and Collaboration at the World Economic Forum in Tianjin China. In 2015/16 he has been a member of the WEF Global Council which helps shape the future agenda of the organization including its work on the future of oil and gas.

With Suncor Energy Mr. Lambert served as the VP Sustainability and in 2013, he was appointed Executive Advisor Sustainability and Innovation where he supported the CEO, senior executive team and the Board of Directors. He has 36 years' experience in the energy sector including 17 years with Suncor, two years with TransAlta and 15 years with Imperial Oil. He was a recent member of the Alberta Climate Leadership Advisory Panel to the Environment Minister and the Premier.

Dr. Vic Adamowicz

Dr. Vic Adamowicz is Vice Dean in the Faculty of Agricultural, Life and Environmental Sciences, and a Distinguished University Professor in the Department of Resource Economics and Environmental Sociology, University of Alberta. He obtained his BSc and MSc from the University of Alberta and his PhD from the University of Minnesota.

His research has focused on the economic valuation of environmental amenities and ecosystem services and the incorporation of environmental values into economic analysis, with applications to forestry, water quality, air quality, endangered species, and agriculture. His research involves the analysis of choice behavior with applications to food demand, recreation, and environmental quality.

Dr. Adamowicz is the Research Director of the Alberta Land Institute. He was the Scientific Director of the Sustainable Forest Management Network of Centers of Excellence, from 1998 to 2004. He was a Canada Research Chair (Tier I) from 2001 to 2008 and was an Associate Dean (Research) from 2007 to 2009. He is a Fellow of the Royal Society of Canada, Academy II – Social Sciences (awarded in 2007). He became a Fellow of the Canadian Agricultural Economics Society in 2011. He was awarded the Canadian Institute of Forestry's Canadian Forestry Scientific Achievement Award in October, 2004.

Shelly Vermillion

Ms. Shelly Vermillion has several years of experience working with a wide variety of small to medium enterprises – predominantly in the Indigenous entrepreneur marketplace. She has spent much of her career working with First Nation communities and the citizens from communities struggling to launch and grow their businesses.

Ms. Vermillion has been actively involved with many not-for-profit organizations. Her latest community involvement includes the launching of Aspiring Women in Leadership and Legacy. Ms. Vermillion is the Chairperson for Apeetogosan Métis Development Inc. and former Chair for the National Aboriginal Capital Corporation Association (NAACA). Ms. Vermillion is the recipient of the 2015 Aboriginal Women Entrepreneur Award of Distinction from the Alberta Chamber of Commerce.

Suzanne West

Ms. Suzanne West is the President and CEO of Imaginea Energy. Imaginea is her latest venture and one of five companies that, over the past 15 years, she has built from scratch. With Imaginea, Ms. West wants to discover a better way of developing energy resources and creating solutions and new possibilities to transform the energy industry.

Ms. West has an engineering degree from the University of Calgary, and spent the first 11 years of her career as a reservoir engineer and in various leadership positions in large corporations. She has also been a fitness instructor for 21 years and participates in philanthropic projects that are very near to her heart; those that involve children, animals, and homelessness.

Dr. Sara Hastings-Simon

Dr. Sara Hastings-Simon is the Director of the Pembina Institute's Clean Economy program in Alberta. She has deep experience in clean technology, renewables, and energy efficiency, through the lenses of policy, business, and technology. Her work has included research and presentations on success factors in the clean technology industry, international and domestic policy for climate change and emissions reduction, consulting work on key business issues in the clean technology sector with utilities, solar developers, venture capital firms and governments, and development of a detailed model of the North American power sector.

Prior to joining the Pembina Institute, Dr. Hastings-Simon was the Manager of the Cleantech Practice at McKinsey and Company, a global management consulting firm. She holds a PhD in Physics from the University of Geneva.

Annex 2 - Terms of Reference

Task Force for
Climate Change Innovation and Technology Engagement
Terms of Reference

Strategic Intent

A holistic, system-based approach to innovation and technology investment in order to accelerate the development and deployment of innovative and transformative, game changing technologies that will reduce GHG emissions related to Alberta's emission profile and contribute to national and international emissions reductions.

Mandate

An independent Task Force will lead an engagement of leaders in Alberta's research and innovation system to provide input into a provincial Climate Change Innovation and Technology Framework that advances government priorities, aligns Alberta's research and innovation system, and accelerates provincial climate change objectives, including an evaluation approach on demonstrating value from investments in the short and long term.

Period of Work

August to November 2016.

Task Force Composition

- The Task Force will be made up of a Chair and four members representing critical roles and perspectives relevant to research, development, and deployment of climate change-related innovation and technology, and reflecting Alberta's diverse communities.
- The Task Force will include representatives from business, government, academia, and financial and investment communities that function within and in support of Alberta's clean technology sectors.
- Task Force members will be strategic thinkers with a systems perspective on science, research, innovation, and technology.

Task Force Scope and Responsibilities

- Conduct targeted, regionally dispersed, invitation-only engagement sessions with knowledgeable innovation and technology stakeholders in Alberta.
- Focus on the transformative innovations and technologies that can contribute to a global low carbon economy.
- Provide recommendations on specific outcomes for a Climate Change Technology Framework and advice on how Alberta's research and innovation system could be improved to meet provincial Climate Change technology objectives.
- Provide recommendations for how to effectively demonstrate value (economic, environmental, and social) derived from long-term clean/green technology within the short and long term.

Deliverables

- Four stakeholder engagement sessions and two direct engagement sessions with CCEMC and Alberta Innovates.
- Written report to be delivered November 2016, summarizing the findings of the engagement and recommending to government a provincial Climate Change Innovation and Technology Framework.
- The Framework will be developed and finalized by Government and submitted for Government approval by November 2016.

Outcomes of the Framework

A provincial Climate Change Innovation and Technology Framework will:

- Identify core investment principles, functions, and success factors needed to guide funding.
- Identify measurable outcomes to achieve the Climate Leadership Plan targets.
- Provide advice on the structure of governance with reference to national and international best practices.
- Inform the deployment of funding to accelerate provincial climate change and economic objectives.

Secretariat Support

- A secretariat from Economic Development and Trade and the Climate Change Office will support the Task Force. Alberta Innovates and CCEMC will be active stakeholders in the development of the framework.

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