

TheFutureEconomy.ca

Industry Roadmap Event Series:

The Future of Oil & Gas 2017

EVENT SUMMARY AND RECOMMENDATIONS REPORT





TheFutureEconomy.ca—part of Milestone GRP—is a publishing house and event organizer focused on the ongoing transformation of the Canadian economy. We produce original print and digital content—as well as aggregate insightful third party content—focused on the innovative and sustainable future of Canada's key industries, regions and cities. We also curate the Industry Roadmap series of events, which draw together thought leaders from business, government, academia and all relevant stakeholder groups to discuss the challenges their industry faces, the opportunities these challenges represent, and how they must adapt to be future-ready.

Report produced in collaboration with **DelphiGroup**
Environmental Strategies. Business Solutions.

This report was written in collaboration with The Delphi Group (www.delphi.ca), a leading strategic consultancy in the areas of climate change and corporate sustainability. Delphi was TheFutureEconomy.ca's partner for The Future of Oil & Gas 2017 event.



1. Executive Summary

Canada's oil and gas sector sits at a crossroads. Global commodity prices are expected to remain low and the price placed on carbon emissions through government policy and regulations is increasing, to drive Canada towards a low carbon economy. At the same time, global energy demand is expected to continue to rise, with particularly strong and synergistic opportunities in Asia, and now is the time for Canada to make sure it can compete on cost and carbon, to capture a fair share of that growing market.

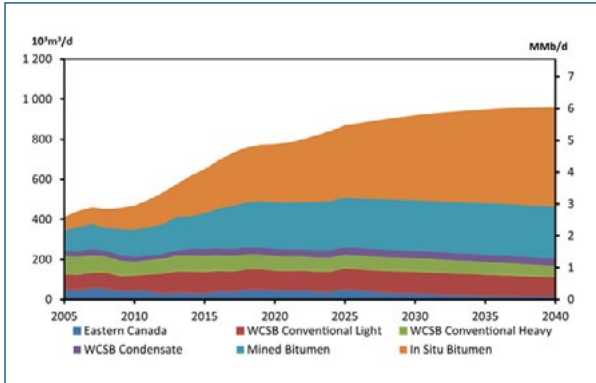
To get there, the oil and gas sector will need to accelerate the pace of innovation and technology commercialization, and continue to increase productivity. The *Future of Oil & Gas 2017* event's panel and breakout discussions provided many good examples, learnings and tools to do so, and specific recommendations for key stakeholders involved in the sector's transition to a low carbon industrial economic engine in Canada.

Although much of Canada's current hydrocarbon production exists because of innovation, accelerating low carbon solutions will require upping our game by intentionally fostering a culture of innovation backed by accountability and a transparent system, by sharing information to develop better solutions and by accepting failure as an oft needed step in achieving success.

Innovation can only be successful if it includes commercialization of technologies, and the Canadian innovation funding agencies need to balance the current focus on technology readiness with putting more emphasis on, and support for, commercial readiness. Both innovation and commercialization will benefit from greater collaboration between those seeking solutions and those providing them, whilst respecting industry needs to use the technologies that result from collaboration, and the needs of solution providers to benefit from the investments made to develop intellectual property.

Furthermore, governments play a key role in enabling innovation and commercialization through setting environmental performance objectives and adjusting regulatory systems to allow for flexibility in meeting those objectives. Government also has a key role in taking on some of the risks in advancing solutions that benefit the whole sector, which in turn, provides environmental and economic benefits to Canada.

Canadian Oil Production



Source: National Energy Board, January 2016

Canadian GHG Emissions Projections by Economic Sector

Sector	Historical		Projected		Change 2005 to 2030
	2005	2014	2020	2030	
Oil and Gas	159	192	201	233	74
Electricity	118	78	64	34	-84
Transportation	171	171	168	157	-14
Heavy Industry	88	76	85	97	9
Buildings	85	87	89	94	9
Agriculture	70	73	72	74	4
Waste & Others	56	54	51	53	-3
Total	747	732	731	742	-5

Source: Environment and Climate Change Canada, Jan 2017

Although sustained low oil and gas prices have driven productivity gains, Canada's oil and gas sector will need to continue to increase productivity through focusing on flexibility for employees, continuing to look at new business models and practices, and using tools such as artificial intelligence and big data analytics to further enhance productivity.

The long term financial health of the oil and gas sector will be impacted by sustainability reporting, which can support enhanced innovation and productivity as sustainability is further embedded into the sector. Finally, the oil and gas sector should further leverage the capacity of post-secondary institutions to train new and existing employees and solution providers in advancing innovation and technology commercialization, which in turn benefits productivity gains.

WTI Crude Oil Price (US\$/barrel)



Source: Bloomberg, Feb 2017

Global Supply & Consumption of Petroleum and Other Liquids (million barrels per day)

Global Petroleum and Other Liquids				
	2015	2016	2017	2018
Supply & Consumption	(million barrels per day)			
Total World Production	96.83	97.17	98.24	99.91
Total World Consumption	95.12	96.64	98.15	99.74

Source: EIA Short-term Energy Outlook, Feb 2017

2. Introduction

The Industry Roadmap: The Future of Oil & Gas 2017 event was convened by TheFutureEconomy.ca—a Milestone GRP company—in Calgary, Alberta, on January 17, 2017. The event brought together public- and private-sector leaders to explore how the Canadian oil and gas industry can reinvent itself in order to emerge as a global energy leader in the low-carbon economy. Speakers and participants addressed and discussed the key challenges facing the oil and gas sector:

- The Innovation Challenge: How can we instil a stronger culture of serial innovation within Canada's oil and gas companies' practices, strategies and DNA?
- The Commercialization Challenge: How can we accelerate the path to local and international commercialization for Canadian oil and gas innovation?
- The Productivity Challenge: How can we increase the speed at which we integrate productivity-boosting technologies and best practices within Canadian oil and gas companies' operations and organizations?

The document highlights high-level recommendations that arose out of these discussions. The findings are organized by session as follows:

- Keynote: “Canada’s Asia Strategy: Opportunity, or Opportunity Lost?” – Section 3
- Panel discussion: The Innovation Challenge – Section 4
- Panel discussion: The Commercialization Challenge – Section 5
- Keynote: “Not So Fast: Automotive Trends” – Section 6
- Panel discussion: The Productivity Challenge – Section 7
- Breakout sessions – Section 8
- Next Steps: Future Events & Additional Materials – Section 9
- Acknowledgements – Section 10
- Appendices: Media Coverage & Attendees



3. Keynote: “Canada’s Asia Strategy—Opportunity, or Opportunity Lost ?”

Stewart Beck, President and CEO of the Asia-Pacific Foundation of Canada



“Consider this winning symmetry: we possess significant accessible crude oil and natural gas energy reserves, while Asia is progressively depleting its domestic fuel reserves and needs to secure a diverse and uninterrupted supply to meet its growing energy needs, spurred by a burgeoning middle class.”

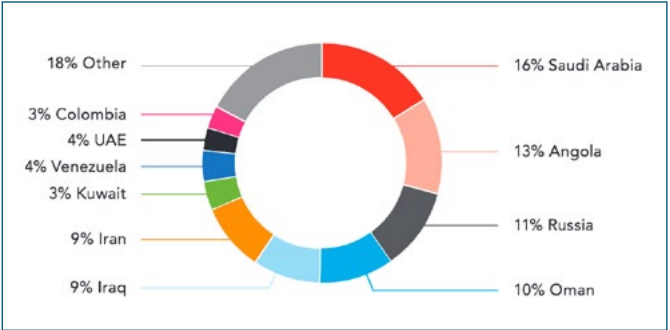
STEWART BECK
Asia Pacific Foundation of Canada

Canada exports its oil and gas almost exclusively to the United States. Being dependent on a single market is risky. The Canadian federal government's recent approval of the Kinder Morgan pipeline expansion through British Columbia acknowledges the need to diversify into Asia. Keynote speaker, Stewart Beck, reiterated that Asia represents a tremendous opportunity for Canadian energy exports. As more and more people move into middle-class lifestyles in that region, energy consumption will continue to grow.

In fact, by 2035 Asia will consume half of the world's energy, and account for 44% of global gross domestic product (GDP). Oil use is projected to jump by 41% and natural gas use by 100%. The result? Depleted domestic fuel reserves.

Today, 60% of China’s oil is imported, primarily from the Middle East and from other regions characterized by geopolitical instability. Since 1990, coal imports to India have risen from 2% to 60%, with oil imports increasing from 37% to 82%. In both cases, Canada can provide a geopolitically stable source of oil and gas. In addition, shipping oil off Canada’s east coast is attractive to India because it avoids traveling the treacherous Strait of Malacca. Indian companies are amongst those that have agreed to purchase oil from the proposed Energy East pipeline.

China Crude Oil Imports by Source Country



Source: EIA, Feb 2016

Canada is widely regarded throughout Asia as a trustworthy partner with high-quality products, political stability and good governance structures. Support for free trade agreements in the Asia-Pacific region is increasing and, with protectionist sentiments on the ascendant in other countries, there is a tremendous opportunity for Canada to capture a large share of the burgeoning Asian market. Canada would benefit from shedding its U.S and Euro-centric focus given the Asian market could be vital to Canada's long-term prosperity.

However, Canada must try to avoid pricing itself out of the market. While Asian nations are willing to pay a premium for a Canadian product, there are limits. Mr. Beck underlined the importance of a national energy strategy and roadmap for capturing market share in Canada's priority regions.

Becoming a strategic energy partner for Asian countries would also open up a variety of lateral economic opportunities for Canada. Asian businesses and governments are actively seeking to form partnerships with countries like Canada that can assist them in establishing innovation ecosystems powered by growing local entrepreneurship. Governments and companies in Canada should therefore commit to establishing global centers of excellence in energy research and technology that would place Canada within the energy research and innovation space and cement our position within the global energy economy of the future.

With the Asian market beckoning and the United States continuing its march towards protectionism, Mr. Beck concluded his call to action on Asia by asking the critical question: “Are we ready to seize the opportunity, or is it up to us to lose it? ”

Recommendations

- The government and private sector must work to position Canada to benefit from Asia’s increasing demand for fossil fuels by establishing export routes to Asia off the West Coast.
- By working together on establishing export routes to Asia from Canada’s West Coast, governments and industry can better position Canada to benefit from Asia’s increasing demand for energy. Canada can also look to leverage being a strategic energy partner in the Asia Pacific to benefit from other economic opportunities.



4. The Innovation Challenge

Panelists

- **Gordon Lambert (Moderator)**, Chair of Alberta Climate Leadership Task Force on Technology & Board Member of Alberta Innovates
- **Brett Henkel**, Vice President, Commercial Development at Inventys
- **Joy Romero**, Vice President, Technology & Innovation at Canadian Natural Resources Ltd (CNRL)
- **Suzanne West**, President and CEO of Imaginea Energy
- **Alexander Zahavich**, Vice President, Corporate Development and Applied Research at the Southern Alberta Institute of Technology (SAIT)

The panel explored how the pace of innovation and adoption must accelerate if Canada’s oil and gas industry is to be a preferred supplier globally. Below are the major themes and recommendations that emerged from this discussion.

4.1. The Importance of Fostering a Culture of Innovation

The panel posited that, if an individual is provided with a sense of ownership over his or her idea—and given the ability to test the idea—it can create a powerful innovation cycle. If they are not provided ownership or allowed to test their idea, they may be deterred from generating ideas in the future. Without structures that enable meaningful evaluation of an idea, innovators will become discouraged, fewer ideas will be brought forward, and innovation will stagnate.



“We have to stop playing whack-a-mole with our employees. Allow them to fail because that’s how you’re going to learn. Fail fast, fail first and get on with that experience that we gain from those things.”

ALEX ZAHAVICH
Southern Alberta Institute of Technology

Some companies in the oil and gas sector utilize teams that can move ideas rapidly through the pipeline and into the testing phase. In this model, if the idea fails, it will fail quickly, enabling the innovator to re-start the innovation process.

Recommendations

Large and small organizations can encourage and progress innovative ideas—and demonstrate that the organization is committed to innovation—by creating and enabling internal structures that promote innovative thinking and allow employees’ ideas to be tested in a timely manner with meaningful feedback throughout the process. This includes allowing ideas and people to fail, to learn from the process and apply lessons to next steps.

Considerations for these structures:

- Employees must be able to see that their ideas are given meaningful consideration, tested and examined. The internal vetting process should be transparent and the timeline and process for communicating decisions should also be clear.

Recommendations (CONTINUED)

- Senior leadership must take an active role and demonstrate the culture of innovation, either by generating innovative ideas or by actively participating in the innovation process, e.g., sitting on funding committees, performing a final review, or providing meaningful feedback
- If ideas are left on the shelf, while the company fails to reap any financial benefits, employees will become disillusioned. New ideas must be considered in a timely way.
- Youth can inject new ideas and new ways of looking at a problem but may feel insecure about sharing these ideas with more experienced colleagues. This can be addressed by fostering a “What if? ” line of thinking, collaborating across organizational boundaries and silos, and encouraging employees to question and solve problems without a fear of failure.

4.2. Managing Creative Tension

The panel explored how to create the incentive to drive innovative thinking while ensuring that innovators aren’t demoralized as a result of an unrealistic process. They suggested that it is a fine balance. Without targets and timelines that push people—if things are too easy—creative thinking tends to stagnate. However, if the targets and timelines are unrealistic—and/or if there is no flexibility in the process—an organization could be perceived as setting its people up to fail, which undermines motivation.

Internally, organizations need to set stretch targets that motivate people to come up with new ideas because the old ways of doing things aren’t going to be ambitious enough. And, while solution providers need to be given aggressive but achievable milestones, industry needs to have the patience to work through the steps to find the right solution. A tracking and reporting system that ensures that there is a feedback loop during the innovation process—and ensures there is accountability for the innovation—is also helpful.

In addition, providing some flexibility around timelines can be beneficial. So can looking at creative “failure” as not the end of the process, but an input into the ongoing innovation process (i.e., a failure could be the foundation for the next stage of innovation).

Finally, by engaging early and providing guidance on the nature of the challenges that require solutions, oil and gas companies can foster innovation within smaller teams and companies. Oil and gas companies that work closely with entrepreneurs can also help accelerate the commercialization cycle by providing direction on the challenges the industry is facing.



“A dedicated team within these oil and gas companies that deals with the innovation cycle from start to finish and actually shelters the technology provider within the organization would be very powerful.”

BRETT HENKEL
Inventys

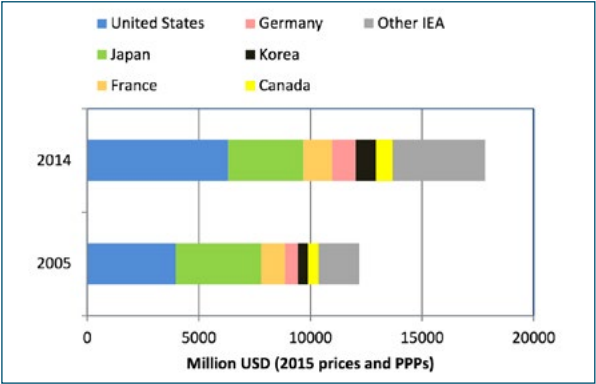
Recommendations

- Oil and gas companies need to set aggressive but achievable milestones, while providing flexibility around timelines.
- Oil and gas companies should work closely with SMEs from early on in the process to define a solution, which will in turn enable employees at the SME to creatively focus on the target knowing there is value in the end product/technology they are creating.

4.3. Moving Away from Direct Competition and Towards Productive Collaboration

Many companies in the oil and gas sector, in addition to academic and research institutions, are spending time and money conducting similar research. While these processes will eventually result in a solution, they also result in redundancy, inefficiency and waste. The panel explored whether there is a way to maintain companies’ competitive advantage while also streamlining innovation.

Total Public Energy RD&D by IEA Member Countries



Source: International Energy Agency, 2016

Canadian Expenditure on Total Energy RD&D by Technology Area

	Federal (2014/15)	Provincial and territorial (2014/15)	Industry (2013)
	(\$ millions)		
Fossil fuels supply (including carbon capture and storage)	99	274	1,532
Renewable and clean energy supply	217	167	273
Energy end use	100	79	197
Total energy RD&D	416	520	2,001

Source: Natural Resources Canada, 2017

The Alberta Oil Sands Technology and Research Authority (AOSTRA) developed the steam-assisted gravity drainage (SAGD) in situ bitumen extraction process that is ubiquitous in industry today. Oil and gas companies have modified the SAGD process to their own needs, but the general idea was borne out of a collaborative, risk-taking, innovative research program that would benefit the entire industry.



“I have the great displeasure of seeing the same thing invented many times with people thinking they have an “a-ha!” moment in institution after institution. This is one of the saddest travesties of our country. Because it wastes the human capital that if innovation and knowledge was better shared—if it was more open—people would be building on that knowledge versus repeating it.”

JOY ROMERO
Canadian Natural Resources Henkel (CNRL)

In an increasingly complex world with an accelerated pace of change, the old model of innovating in silos behind closed doors will not arm the oil and gas sector for the changes to come. It is estimated that 60% of the jobs in 15 years do not exist today. There must be a sense of urgency to share more information to ensure that, if such significant changes do occur, the sector is prepared—and prepared to capitalize on them. If we want to change the world, we need to maximize our financial and human capital.

Recommendation

In resource-constrained times, deeper collaboration can enable more efficient resource allocation for sector wide benefits. Oil and gas companies and research bodies should look to existing collaborative models and be more open about their challenges and research efforts to avoid unnecessary duplication of work.

4.4. The Key Role of Government in Creating the Enabling Environment to Accelerate Innovation

Great innovations are by nature disruptive and have altered the status quo. For example, in the oil and gas sector, horizontal drilling has been tremendously disruptive and led to the U.S. shale gas revolution that has impacted many people, both positively and negatively.

The panel suggested that governments set bold and aspirational targets and desired outcomes, and then allow the private sector to play to its strengths and come up with the solutions. Governments can help to ensure that SMEs are nimble and can respond quickly to market conditions. Governments are also in a position to provide financial assistance on products and projects deemed too risky by investors or industry. Overall, the government should create the conditions that will enable innovation to proceed, then get out of the way and let the innovators innovate.

Recommendation

Canadian solution providers and industry will benefit from a regulatory environment that enables innovation, i.e. through setting ambitious targets for environmental performance, eliminating red tape, and providing funding and other resource support for higher-risk projects.



5. The Commercialization Challenge

Panelists:

- **Bruce Edgelow (Moderator)**, Vice President, Strategic Initiatives at ATB Corporate Financial Services
- **Richard Adamson (Panelist)**, Former President of CMC Research Institutes & Principal at Adamson StrAdvisory
- **Stephen Kaufman (Panelist)**, General Manager, External Innovation at Suncor
- **Alicia Quesnel (Panelist)**, Partner at Burnet, Duckworth & Palmer LLP
- **Marty Reed (Panelist)**, CEO of Evok Innovations

Ultimately, ideas will not deliver the intended economic and environmental benefits if a path to deployment and commercialization is not prioritized. Below are the major themes and recommendations that emerged from the discussion on the challenges associated with commercialization of innovative solutions in the oil and gas sector.

5.1. Shifting the Focus from Technology Readiness to Commercial Readiness

One of the primary barriers to rapid commercialization is focusing exclusively on the technical progression of a solution, which innovators often do. This hinders the commercialization process because possibilities and opportunities are ignored. Instead, the panel suggested that innovators should be prioritizing commercial readiness.

Current innovation funding agencies in Canada do not readily enable that thinking. This is because many funding agencies focus exclusively on technology readiness levels (TRLs) for funding approval. A shift in focus towards providing a readily implementable solution to a customer’s problem (i.e. a focus on commercial readiness) would be a beneficial change in mindset for innovators and funders going forward.

Recommendations

- Shift customer and funder emphasis away from technical progress and towards the commercial readiness of solution providers.
- Educate innovators on how to advance commercial readiness.



“Companies don’t buy technology readiness levels, they buy solutions.”

MARTY REED
Evok Innovations

5.2. Sharing and Leveraging Existing Information While Protecting IP

A significant barrier to accelerating commercialization is companies’ reluctance to share information that has been gathered for competitive or other purposes. This reluctance has a negative impact on solution providers, as it is often difficult to identify the real industry challenges and the costs involved. This hinders the commercialization of solutions and wastes human capital and financial capital in both the oil and gas company and the technology provider. In addition, people and SMEs from other parts of the world are becoming more aware of the challenges in the Canadian oil and gas sector. By releasing data more transparently, Canadian companies can engage entrepreneurs from around the world to help solve sector challenges.



“Often the end users in the oil and gas sector don’t engage and convey in a way that’s detailed enough that the innovators understand what actually has to be solved and what the problem looks like.”

RICHARD ADAMSON
Adamson StrAdvisory

A similar stumbling block for innovators is the fear that oil and gas companies will seize their technology. While entrepreneurs are not typically looking for ownership rights, they require the ability to buy and operate the technology in an unencumbered manner. In addition, restricting innovators from using case examples of their own technology (e.g. first customer requires a non-disclosure on effectiveness of operations) is not helpful. This lengthens the innovation cycle as innovators must prove that their technology works despite possessing all the evidence already. While innovators are generally wary of signing these kinds of agreements, they might feel they have no choice because of the need to generate sales and revenue.



“Let’s be more articulate about what exactly is the nature of the [...] challenge that we have and what are the kinds of things that can help address that.”

STEPHEN KAUFMAN
Suncor

While finding a solution to these challenges is far from simple, the panel confirmed that it’s possible to find models that enable collaboration while also protecting IP. For example, in an effort to break down barriers and more effectively leverage data, COSIA has developed reference facilities for in situ and mining. Innovators can use these facilities to develop techno-economic assessments and ensure their financial calculations are more credible. In addition, a water test pilot facility is under development. Innovators can use this facility to test their technology on-site, bridge the commercialization gap and de-risk the process.

Recommendations

- Increased collaboration, pooling of resources and more open source innovation can support an accelerated path to commercialization. The oil and gas industry should release generic, yet meaningful data that can be used by innovators to create solutions to existing challenges.
- Innovators should reach out to companies early on in the innovation cycle and companies should be clear and open with innovators about the specific challenges they need a solution for, with agreement on the level and extent of information sharing for mutual benefit.

5.3. The Key Role of Government in Supporting and Enabling Commercialization

Governments have an important role to play in shaping the innovation and commercialization ecosystem. The key role of government is to prescribe the desired performance or outcomes, but not the technology or product that will achieve the result. Creating regulatory flexibility is critical, since disruptive technologies typically break the mould and don’t fit within existing regulations.

The panel reviewed the activities that governments can undertake to ensure the regulatory system supports and enables the commercialization of innovative solutions, such as:

- Removing regulatory barriers
- Providing consistency and certainty with respect to regulations, e.g. approvals for new facilities, for expansions, etc.
- Incenting companies to be first movers
- Ensuring regulations are time sensitive to the needs of business
- Ensuring regulations align with international standards to enable innovations to enter the market from other areas of the world

Recommendation

Government should examine current policies, regulations and support mechanisms to ensure they support and enable the commercialization of innovative solutions, and are built around the principles of achieving outcomes while allowing for flexibility.



“Work that needs to be done here, in Alberta in particular, is to really focus on how we create a regulatory framework and regulatory processes that take innovation to commercialization and adoption.”

ALICIA QUESNEL
Burnet, Duckworth & Palmer LLP

5.4. Recasting Failure

The panel agreed that, if you’re going to commercialize, you’re going to fail along the way. This can prove catastrophic for smaller enterprises. However, entrenching this fear can limit the innovative process and become a self-fulfilling prophecy. Industrial customers that are in the position of picking “winners” and “losers” should continue to work with the smaller solution providers even if the first attempt at a solution is unsuccessful. The learnings could prove very valuable and a second attempt may yield the desired results.

Recommendation

Expect failure to be part of a successful innovation and commercialization process, and plan for learning from failure to achieve desired outcomes.

5.5. The Role of Financing in Commercialization

While this topic wasn’t addressed in depth during the session, panelists suggested that it is important to remember that oil and gas remains a capital-intensive sector. Institutional investors can help to free up patient capital by putting a value on the social return from resource sustainability and carbon reduction.

One US based example that helps close the financing gap is the ARPA-E program. It has been successful at commercializing cutting-edge technologies by utilizing a full commercialization team with world-class experts.



“The fail fast needs to be a commitment to pause and reflect on how we can build on what we’ve just learned in order to build something successful and remain committed to that relationship with those companies because if it’s failing fast, moving on and leaving small technology companies on the trash heap of history, that really doesn’t build a great culture.”

RICHARD ADAMSON
Adamson StrAdvisory



6. Keynote: “Not So Fast: Automotive Trends”

Don Romano, President and CEO of Hyundai Auto Canada



“The oil and gas industry and the automotive industry have had this symbiotic relationship for a long time. But I don’t think we’ve ever had more in common than we have right now at this time. The amount of change that’s going to take place in the automotive industry in the next 5 years is going to exceed what we’ve experienced in the last hundred.”

DON ROMANO
Hyundai Auto Canada

Media reports have enthusiastically trumpeted the age of the electric car, and suggested that the increase in ride-sharing services will negate the need for vehicle ownership. Keynote speaker, Don Romano, considered whether the era of the internal combustion engine vehicle is actually coming to an end.

The answer is far more complex than the media headlines make it seem. Romano pointed out that the first electric car manufacturer set up shop in 1907. Throughout the past century, electric vehicles have emerged to face many of the same challenges they do today: cost, range, battery life, power output, and refueling infrastructure. Despite all the technical advancements of the last 100 years, these remain real technical concerns.

In addition, while demand for electric vehicles is growing, the demand is not at rates that will make the internal combustion engine obsolete. One of the main drivers is that baby boomers are “out to play.” With no kids and fewer financial obligations, they are buying SUVs and trucks, which are well suited to towing trailers, jet skis, boats, or just for long road trips. Romano also acknowledged that ride sharing has increased, particularly among millennials. However, once this group begins to have children, or have long commutes to work, they will likely find that it isn’t practical or cost effective to rely on ride sharing alone.

What does the future hold? Romano sees a mixture of vehicle fuel types dominating the future automotive industry, not a one-size-fits-all solution. He pointed out that plug-in electric hybrid vehicles offer the best of both worlds. Offering batteries and a gas tank in addition to reduced greenhouse gas (GHG) emissions, these vehicles can eliminate range anxiety while still operating solely on electricity for short trips. Hydrogen fuel cell vehicles, which can refuel much faster than battery electric vehicles, are another vehicle type in the future mix. However, as of today, there are limited refueling stations and the vehicles remain quite expensive relative to their internal combustion engine analogs.

There remain other ways to improve internal combustion engine vehicles, including reducing friction, improving aerodynamics, recovering waste heat, using lighter weight components and conducting emission reduction research. Romano identified an opportunity for the automotive industry to collaborate with the oil and gas sector on maximizing fuel quality so that automakers can extract as much energy as possible from fuels. Despite increasing electric vehicle sales, internal combustion engine vehicles aren’t going anywhere, anytime soon.

Recommendation

Closer collaboration between the Canadian automotive and oil and gas industries to explore ways of extracting as much energy as possible from the fuel powering the internal combustion engine.

7. The Productivity Challenge

Panelists

- **Dan Zilnik (Moderator)**, President of Oil and Gas Sustainability
- **Jean-Michel Gires (Panelist)**, CEO of NextTier Energy Solutions & former President & CEO of Total E&P Canada
- **Steven Koles (Panelist)**, President & CEO of Hifi Engineering
- **Todd Parker (Panelist)**, CEO of Blue Spark Energy
- **Cecile Siewe (Panelist)**, Director General of CanmetEnergy Devon, Natural Resources Canada

Below are the major themes and recommendations that emerged from the discussion on the challenges associated with productivity in the oil and gas sector.

7.1. Focusing on Productivity, not Growth, to Compete

In the early 2000s, when oil prices were around \$100 a barrel, the oil and gas sector was focused on expanding production. Since oil prices collapsed over two years ago, companies have been forced to become leaner and more operationally efficient to survive. Achieving productivity gains has come from not only scrutiny of processes, systems and technologies, and the use of tools like data analysis, but also by creating buy-in across organizations—from front-line workers all the way to senior leadership. With sustained low oil prices, companies are expected to continue to focus more on productivity and less on growth.



“There’s definitely that theme that seems to be residing right now so far in 2017...:it’s not about growth at any cost [but] about operational efficiency which effectively is productivity.”

STEVEN KOLES
Hifi Engineering

Canada’s oil and gas sector competes against other countries, basins and even internally. In some cases we are competing against other countries, for example, the United States and their shale revolution that has sunk oil prices as they are now the swing producer. In terms of heavy oil, we compete against Venezuela and Mexico. Everyone is competing against everyone else in terms of human capital.

During the high growth periods of the last decade, capital intensity became very high. In the era of lower oil prices, smaller, more modular, less capital intensive projects that are easier to finance are more likely to proceed. Canada has resources that are costlier than other jurisdictions, thus there is a need to be more efficient and work smarter—not necessarily longer—to drive productivity gains.



“We have a resource that has a high cost of production relative to others... We could work 50-hour weeks or we could work 60-hour weeks, but we are competing against resources that can produce cheaper than we can so we have to work smart.”

CECILE SIEWE
CanmetEnergy Devon, Natural Resources Canada

Recommendations

Companies can continue to improve productivity by:

- Sourcing new ideas and practices from employees at all levels, suppliers and peers
- Using tools such as data analysis
- Looking at different business models and investment opportunities to enhance capital productivity

7.2. Human Capital and its Role in Productivity Gains

Employees play a critical role in improving productivity, yet at the same time might fear impacting their job by suggesting or implementing efforts that increase productivity. Employees should be inspired from the first day to achieve great things, yet, often at the beginning new employees are underutilized, costing both the employees and the company in productivity. By engaging the human spirit, ensuring that employees feel a purpose and are participating in meaningful work, productivity has been shown to go up. Flexibility in work schedules and location, and supporting enabling work environments, are key to employee productivity. Human productivity is less about hours and more about what is accomplished.

Recommendations

Companies can continue to improve productivity by:

- Ensuring that employees feel their work is purposeful and meaningful
- Allowing for flexibility in work schedules
- Eliminating distractions



“If we want to go further in productivity improvement we definitely need to use and leverage our people much better, especially the creative aspect of our people... and empower them to bring their ideas to the table and work on those ideas correctly so they can be identified and put in practice as best practices.”

JEAN-MICHEL GIRES
NextTier Energy Solutions

7.3. Government’s Role in Increasing Sector Productivity

Governments can help by identifying sectoral productivity gains that may be achieved. Natural Resources Canada’s CanMET laboratory in Devon, Alberta focuses on research and development and collaborates with industry and academia to drive further improvements in the sector. Government can also help by funding programs that help to de-risk technologies that can improve productivity by funding the demonstration of these technologies and helping to enable their commercialization.



“A more constructive use of government resources would be funding and available programs geared towards softening the landing for first movers moving along the learning curve without the deathblow to fail fast. Not picking winners, but setting legislative outcomes versus very prescriptive paths that companies have to follow. This would be a good way of starting to move in the direction of government support for companies to improve their productivity by trying new things without a fatal failure out of the gate.”

TODD PARKER
Blue Spark Energy

Recommendations

Government can support increased productivity in the oil and gas industry by:

- Investing in research and development resources to help solve sectoral challenges
- Sharing risk with industry and investors by funding programs that support the demonstration and commercialization of technologies that will improve productivity



8. Breakout sessions

Following the panel sessions, five breakout sessions were held to explore the following themes.

- GHG Reduction—A Focus on Methane
- AI and the Digital Transformation of Oil & Gas
- Educating Tomorrow’s Innovators
- Climate Risk and Disclosure: Managing Ever-Increasing Expectations
- Cleantech in the Oil and Gas Sector

8.1. GHG Reduction—A Focus on Methane

Facilitated by Dr. Mark Summers, Director, Projects for Emissions Reduction Alberta (ERA) and Jackson Hegland, Executive Director of Methane Emissions Leadership Alliance (MELA)



“We have a looming methane reduction target in 2025, which is really not that many years away, and an aggressive reduction target of 45%. So it’s very timely and pertinent to talk about how we accelerate the deployment of practices and technology and otherwise to meet those targets.”

DR. MARK SUMMERS
Emissions Reduction Alberta (ERA)

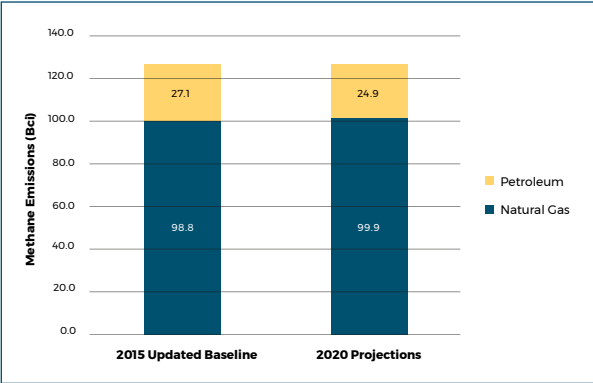
This breakout session explored the components and support mechanisms available to establish a competitive methane reduction technology cluster in Canada.

For methane reductions to be pursued in Canada, or for reduction technologies to be considered by the market, a precursor for action is to have a credible methane inventory. Participants in the session indicated that a current baseline for emissions in the sector is not well defined and recognized as accurate enough to inform decision making. In order to set the baseline and achieve reductions, several recommendations were provided by the group:

- Regulators will need to establish data collection protocols to ensure a level playing field for all participants, and potentially make the data available to the public.
- Operators will need to identify the opportunities to achieve many of the large reductions desired (identify super-emitters).
- Industry participants and innovators need to communicate more effectively with each other with respect to technical needs and challenges.
- Federal and provincial governments can provide incentive mechanisms that are specific to methane and can be costed into current pricing/incentive structures¹.

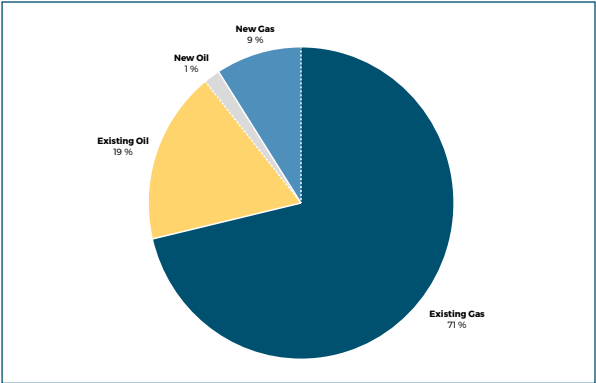
¹The recommendation is that If carbon (CO2) is priced at \$25/tonne, then methane should be priced or incentivized at a point that considers its Global Warming Potential (GWP). \$25/tonne CO2 * 25times GWP for methane = \$175/tonne of methane. This is inherently captured where carbon pricing is applied to CO2equivalencies, but perhaps making this fact more explicit will draw more attention to this specific challenge.

Canadian Oil & Gas Methane Emissions Projections to 2020



Source: ICF International, Sep 2015

Distribution of Canadian Oil & Gas Methane Emissions in 2020



Source: ICF International, Sep 2015

In order for new technologies to achieve methane reductions at lower costs in the long run, another suggested approach is for industry to acquire a test site where operators could collaboratively test, prototype and refine technologies and methodologies, in order to exploit economies of scale, and share ideas and results that can lead to faster deployment of methane reduction projects in Canada.

Session participants identified opportunities to accelerate the uptake of emerging methane reduction technologies, including:

- Specific to the recent ERA call for funding for methane reduction technologies, bringing multiple applications in a funding process together to create a joint solution
- Industry providing more information to the innovation community on their needs with respect to methane emission reduction technologies, and ensuring the right data on current emissions and technology performance is in front of the people who can have the most impact
- Creating a network to effectively communicate between innovators and industry.

To overcome a low risk tolerance for new technologies in the industry, session participants suggested that:

- Government at the federal and provincial levels take a larger role in helping to backstop trials and investment, while at the same time incentivizing early adopters. Company boards can take a leadership role in this area by linking results to compensation for company decision makers.
- Industry and solution providers should better leverage funding and research that is available at post-secondary institutions to reduce the cost of advancing reduction options.
- Lower the cost of data, intellectual property (IP), and lawyer time.

In summary, the session identified five keywords that describe the state of the current discussions on methane emissions reduction:

- **Certainty**—required for deployment of capital, but also avoiding penalizing early adopters;
- **Transparency**—a need for all those involved to be clear around the various processes being undertaken;
- **Efficiency**—using the most efficient mechanisms to solve problems;
- **Innovation**—extending beyond technology to policy, customer service to innovate in all aspects of the methane reduction solution space; and
- **Collaboration**—a need for systems level approach to innovation, and for key players to collaborate to move innovation forward.

8.2. AI and the Digital Transformation of Oil & Gas

Facilitated by Caroline Ong, Lead Partner—Business Analytics and Cognitive Services at IBM Global Business Services

This breakout session explored the applications and uses of Artificial Intelligence (AI) and digitization within the oil and gas sector.

There is a significant amount of data collected by oil and gas companies. AI can potentially provide value when these companies consider large amounts of data or information by:

- Rapidly sorting through and identifying what’s important and what is not in a large data set
- Troubleshooting problems, e.g. predicting maintenance and where failures may occur in the near future
- Processing drilling data and identifying optimal conditions and locations to drill.

Artificial Intelligence was also examined with respect to employee capacity building. An AI system could:

- Train new employees quickly
- Act as a central repository of the knowledge of all employees, enabling information to be disseminated quickly when needed
- Simulate various scenarios or identify how systems link together, identifying unexpected linkages or potential pain points



“AI really is focused on scaling human expertise in an organization.”

CAROLINE ONG
IBM Global Business Services

Applying AI in these ways could save time and allow companies to allocate human capital to other operational activities. Companies in other sectors have adopted AI and found that it has improved productivity, reduced maintenance and/or increased efficiency. However, introducing AI can be challenging. Employees may feel their jobs are threatened and thus may not buy in to the new technology—or they may not see the immediate value that AI can provide. In addition, AI will ultimately get faster and smarter, but there will continue to be tasks that only humans can perform so companies should maintain their focus on education and training.

Session participants agreed that oil and gas companies should consider AI as a means to streamline workflow, more effectively process data, and store historical data. First steps could include:

- Examining how AI is being used by oil and gas companies in other parts of the world, and how it has benefitted their operations
- Conducting an internal review of operations and consider how AI can assist in improving productivity.

Session participants also explored why most of the data collected by the oil and gas sector is not effectively utilized. Participants identified that there is simply too much data collected on a daily basis to analyze, and that much of the data is kept in silos and isn’t shared across companies. This leads to a large amount of duplication of data, and wasted human and financial capital exploring similar data sets and arriving at the same conclusions.

8.3. Educating Tomorrow’s Innovators

Facilitated by Lynne Allan, Dean of the MacPhail School of Energy, Southern Alberta Institute of Technology (SAIT); and David Ower, Dean of the School of Business, SAIT

Educating tomorrow's innovators is critical to the future success of the oil and gas sector. The following suggestions for nurturing innovation were discussed during this breakout session:

- What has emerged is a need to not only instruct people on the skills or technical know-how associated with innovation, but how to problem solve in entrepreneurial settings.
- Consideration of global perspectives—different ways to think about problems from around the world—challenges people to think more broadly.
- In the energy sector there is a tendency to think about innovation as technology. However, as the most recent economic downturn has shown, innovative thinking around process and operational improvements—which is how work gets done at a lower cost—must be inculcated in tomorrow’s innovators.
- Participants identified a fear of failure, personal and social risk, and IP risks as barriers to innovation risk and capacity. Others thought a generational gap may also be limiting innovation because of differing views on how innovation should proceed. Canada often compares itself to the United States, and it’s possible that Canada has an inferiority complex that is restricting innovation. Educators need to consider these barriers, whether they are real or perceived, and educate innovators and entrepreneurs on ways to avoid or overcome them.
- Educating tomorrow’s innovators involves helping them identify opportunities and providing an environment in which they are encouraged to bring ideas forward. Participants identified approaches for accomplishing this goal, such as valuing different perspectives, creating two-way trust between employees and management, introducing incentive systems, making systems more adaptable, and continually building on the past by using lessons learned from previous experience.
- Agile and change leadership is needed to support Innovation. Ideas included structuring governance models appropriately to allow for this kind of leadership to flourish. Significant discussion took place regarding millennials and how they are more prepared and skilled than the current generation in leadership roles.
- It is critical to educate, mentor and support young innovators as they journey through the innovation life cycle. Provide them with a license to fail and ensure that, if they do fail, learnings can be taken forward.



“We’re seeing disruptive change in all industries, including this one and it is actually very important that we make progress here. Education is part of the answer but it needs to be focused at all levels—it can’t just be youth. [...] It’s also the people who are already in industry both at the front line as well as the leadership level and all the way to the board level, because that education is key and critical to get everyone to think differently and actually start to break down some of the barriers that we have.”

LYNNE ALLAN
Southern Alberta Institute of Technology

8.4. Climate Risk and Disclosure: Managing Ever-Increasing Expectations

Facilitated by Reinier Deurwaarder, Partner KPMG LLP and Sander Jansen, Manager, KPMG LLP

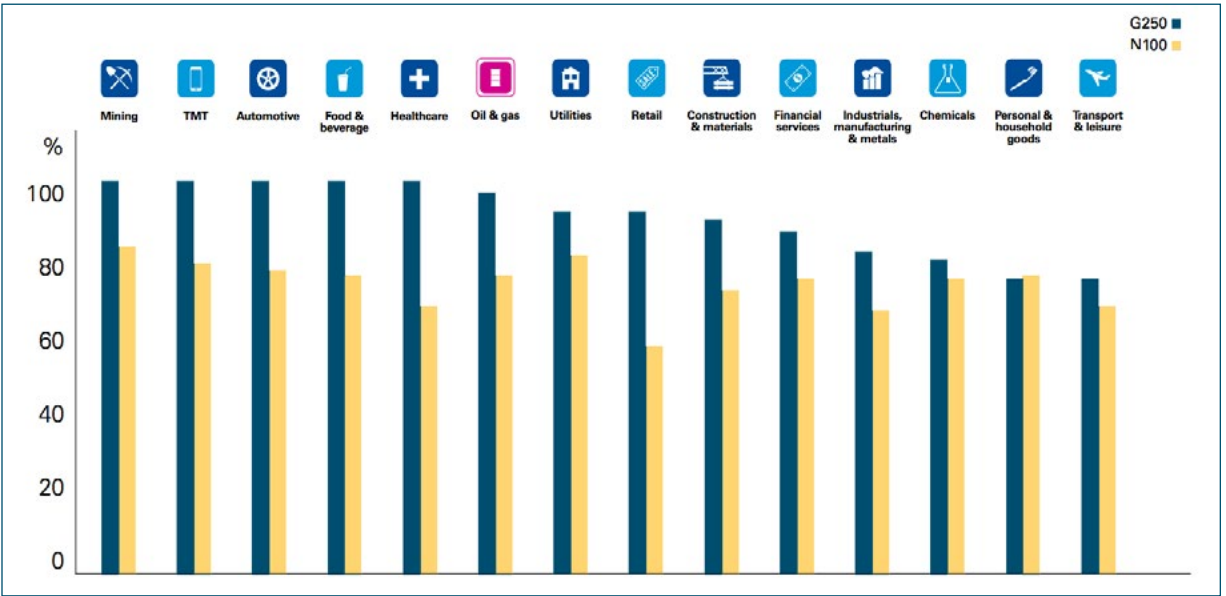
here is a growing appetite in the investment community for disclosure of non-financial information related to environmental, social and governance (ESG) issues. Two in every three portfolio managers in Canada and the US now weigh in ESG considerations into their investment decision-making², shareholder resolutions calling for more transparent disclosure of non-financial risk are on the rise, and new best practices are emerging. This includes the Financial Stability Board’s Taskforce on Climate-related Financial Disclosures (TCFD) first Recommendations Report, which addresses providing investors with more information on climate related risk.

In response, sustainability reporting is emerging as a common practice. Sustainability reporting is now performed by 76% of all large companies in 45 countries globally, including 76% of oil and gas companies, and 81% of all large Canadian companies³.

The trend towards increased disclosure is already impacting the oil and gas sector in Canada, and the ramifications of this trend were explored during this breakout session. This is what was discussed:

- The oil and gas industry should broaden their reporting beyond financial statements. Sustainability reporting provides the industry with an opportunity to highlight its successes and to break down myths and misconceptions about the sector. It allows companies to respond in a more coordinated and comprehensive fashion to the increasing number of investor information requests. And it provides an opportunity to create and communicate internal goals that inspire employees and embed a culture of sustainability within the organization.
- More clarity is needed. Currently, companies can choose between a wide variety of sustainability reporting frameworks, standards and metrics, as the basis for report preparation, including: GRI Standards, Sustainability Accounting Standard Board (SASB), Carbon Disclosure Project (CDP), <IR> Framework, UN Sustainable Development Goals (SDG). It is difficult to draw comparisons if companies are not measuring and reporting sustainability data in the same way. Participants raised the value of a common industry

Corporate Responsibility Reporting Rates by Sector



Source: KPMG, Sep 2015

² CFA Institute (2015). ESG Issues in Investing: Investors Debunk the Myths https://www.cfainstitute.org/ethics/Documents/issues_esg_investing.pdf

³ KPMG (2016). Corporate Responsibility Reporting in the Oil & Gas Sector – Key findings from the KPMG Survey of Corporate Responsibility Reporting 2015. <https://assets.kpmg.com/content/dam/kpmg/pdf/2016/06/corporate-responsibility-in-the-o-and-g-sector.PDF>

framework, which sets minimum reporting standards recognizing company specifics and the wide variety of stakeholders. Here, there could be a key role for industry associations.

- Participants acknowledge the increasing interest in the financial implications of climate risks. However, various hurdles need to be overcome first, if the industry were to report on this externally, including: (1) the absence of a framework to monetize climate risks, (2) uncertainty related to different carbon regimes compromising data quality, (3) the absence of a common methodology, presenting the risk of companies producing conflicting data, and raising confusion.



“It is important for companies to report more than just the financials, as stakeholders increasingly look for and weigh in the story beyond the numbers in their decision-making. This is already true for companies around the world, and increasingly a reality for oil and gas companies in Alberta.”

REINIER DEURWAARDER
KPMG

8.5. Cleantech in the Oil and Gas Sector

Facilitated by Brent Lakeman, Executive Director, Technology Partnerships and Investments, Alberta Economic Development and Trade

Session participants were provided with an overview of broad technology areas that could impact the oil and gas sector, including energy efficiency, water management, waste management and recycling, low-carbon electricity systems, green products and services, sustainable mobility, cleaner oil and gas, clean hydrocarbons, clean value creation, bitumen beyond combustion, clean consumption and CO₂ utilization.

In terms of feedback on the broad technology areas, discussions centred on the need for clarity around government purchase of and support for renewable energy. Opportunities for renewable energy integration in the oil and gas sector are not well defined. Participants did not expect that Alberta will develop or innovate around solar photovoltaics or wind turbines, as these are both well established; however, niche manufacturing of various value-chain components is a real possibility for Alberta. Consideration was also given to geothermal, nuclear, and co-generation; however, the opportunities for geothermal in Alberta have already been reviewed and are limited at best. Participants raised the notion of an AOSTRA 2.0, although the exact makeup of such an undertaking required further consideration.

The biggest challenges facing cleantech SMEs and entrepreneurs working in the oil and gas sector were identified as follows:

- They are faced with a longer technology development cycle than in other sectors. Longer development cycles require more support from external funding agencies and governments if companies are going to cross the “valley of death” from prototype to commercialization. Oil and gas companies and government have critical roles to play in providing funding, testing and information support.
- Significant human and financial capital is often wasted developing solutions that are of little to no value because industry has not communicated its challenges clearly, and/or innovators find out late in the game what is truly required. The oil and gas industry should provide more information regarding the challenges they face, and in a way that SMEs and entrepreneurs can understand. Innovators can then respond with meaningful, innovative solutions. Example: COSIA-ARCTIC Challenge process.
- Entrepreneurs often lack business development, sales and marketing capacity. Programs like Alberta Innovates (e.g. Commercialization Associates, Voucher Program) are very helpful. SMEs and entrepreneurs also need help navigating all the support programs that can provide assistance, and in this respect a concierge or one-stop-shop could be very valuable.

- Eliminating red tape that leads to wasted time and money for SME—both of which are in short supply—will help innovation occur faster. Accelerators to rapidly bring ideas to market would also be valuable.



“Sometimes we’re missing the bigger picture and that was one of the gaps we ultimately identified: there exists great engineering skill in the province but sometimes a bit of a gap in terms of being able to convert that into the sales and the business role that we need to move forward, particularly when it comes to the global market opportunities.”

BRENT LAKEMAN
Alberta Economic Development and Trade



9. Next Steps

The Industry Roadmap: The Future of Oil and Gas 2017 Event assembled key thought leaders and practitioners to advance the ongoing dialogue concerning how to accelerate the sector’s transition to a low carbon industry. Many recommendations emerged for industry, solution providers, government, academia and post-secondary institutions and other stakeholders in Canada’s oil and gas sector. Given the urgency to compete on cost and carbon in the global market, the recommendations need to become common practice, with a view to continuously innovate and capitalize on new opportunities the future will bring.

Future Events & Additional Materials: TheFutureEconomy.ca

- The Future of Oil and Gas 2018

TheFutureEconomy.ca is organizing the next event in its Industry Roadmap series: The Future of Oil and Gas 2018. As per the stated mission of this event series, the conference will address issues that are key to shaping an increasingly innovative, productive and sustainable future for Canada’s oil and gas industry.


- Interviews and News on TheFutureEconomy.ca

Access video and written interviews with Canada’s business thought leaders from a variety of industries that are key to the country’s economic future to learn how their organizations and industries are working towards a more innovative, sustainable and prosperous future.

- Newsletter and Social Media

Sign up for TheFutureEconomy.ca’s newsletter and follow us on Twitter (@futureeconomy) and LinkedIn (TheFutureEconomy.ca) for daily innovation news across Canada’s key sectors

www.TheFutureEconomy.ca

 TheFutureEconomy.ca  @futureeconomy @milestone_grp #IndustryRoadmap

10. Acknowledgements

TheFutureEconomy.ca would like to thank the sponsors and partners of The Future of Oil & Gas 2017 for their support in making possible the conversations that led to the above recommendations:

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- ATB Financial
- Burnet, Duckworth & Palmer LLP
- Southern Alberta Institute of Technology (SAIT)
- Blue Spark Energy
- KPMG
- University of Calgary

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- Evok Innovations
- PSAC
- The Canadian Chamber of Commerce
- Calgary Economic Development
- Energy Futures Lab
- CFA Society Calgary



Appendix A

The Future of Oil & Gas 2017 Media Coverage

Business News Network: Interview with Stewart Beck, President & CEO at the Asia Pacific Foundation
www.bnn.ca/video/commodities-for-tuesday-january-17-2017~1032795 (20'30")

Business News Network: Interview with Don Romano, President & CEO at Hyundai Canada
www.bnn.ca/video/future-of-oil-gas-2017-automotive-innovation~1037274

Business News Network: Interview with Joy Romero, VP Innovation at CNRL
www.bnn.ca/video/environmental-innovation-only-complements-performance-says-canadian-natural-re-sources~1037376

Business News Network: Interview with Gordon Lambert, Director at Alberta Innovates
www.bnn.ca/video/alberta-playing-offence-on-climate-initiatives-alberta-innovates~1037152

Calgary Herald: Oilpatch Transformation Requires Forward Thinking
calgaryherald.com/business/energy/yedlin-oilpatch-transformation-requires-forward-thinking

Daily Oil Bulletin: Leveraging Tech Start-Ups, Removing Fear Of Failure Could Drive Innovation In Oil And Gas
www.dailyoilbulletin.com/article/2017/1/25/leveraging-tech-start-ups-removing-fear-failure-co/

CBC—Jean-Michel Gires, CEO at NextTier Energy Solutions
www.cbc.ca/player/play/857681987904



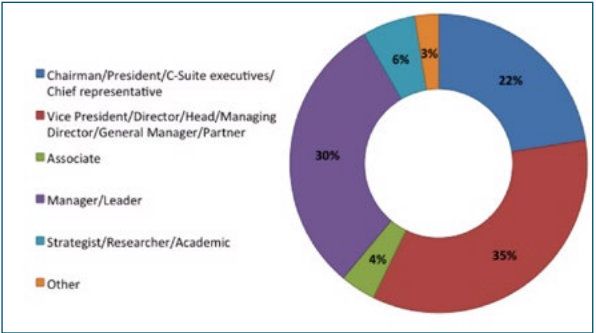
Appendix B

The Future of Oil & Gas 2017 Attendees

Participating Organizations

Absolute Combustion International Inc.
Acra Energy Ltd.
Actions Matter, Inc
Adamson StrAdvisory
Alberta Clean Technology Industry Alliance
Alberta Climate Leadership Task Force on Technology
Alberta Department of Energy
Alberta Economic Development & Trade
Alberta Enterprise Corporation
Alpine Engineering Ltd.
Alpine Insurance & Financial Inc.
AltaGas Ltd.
Altex Energy
ambyint
Argus Machine Co Ltd.;
Asia Pacific Foundation of Canada
ATB Corporate Financial Services
ATB Financial
Atoll Financial
Automated Rig Technologies Ltd.
BDP Advisory Ltd.
Bennett Jones LLPP
Blackline Safety
Blouz Energy Projects
Blue Spark Energy
BNN
Burnet, Duckworth & Palmer LLP
Business Development Bank of Canada (BDC)
Cadeon
Calgary Economic Development
Calgary TELUS Convention Centre
Canadian Chamber of Commerce
Canadian Coalition for Green Finance
Canadian Council for the Americas
Alberta
Canadian Energy Infrastructure Corporation
Canadian Energy Research Institute
Canadian Fuels Association
Canadian Global Exploration Forum
Canadian Western Bank
CanmetEnergy Devon, Natural Resources Canada
CAODC
CAPP
CBC
Cenovus Energy
CERI
Cisco
City of Dawson Creek
Clean Blue Energy Canada
CMC Research Institutes
CNRL
Conference Board of Canada
ConocoPhillips
Consulate of Mexico in Calgary
Corporate Capital Solutions
Creative Links
Crescent Point Energy
CrossingsCloud
Deloitte
Dentons Canada LLP
Di-Corp
DIRTT Environmental Solutions
Emissions Reduction Alberta
Enbridge
Endeavor Technologies
Energy Auctions Inc
EnergyNow
Enerplus Corporation
EnerTech Capital
Enform
ENGpm Trade Consultancy
Environmental Refuelling Systems Inc.
Ernst & Young
Evok Innovations
Feiko Consulting
Ferus Natural Gas Fuels Inc.
Financial Post
Fio Connect
Foresight Cleantech Accelerator
Fractal Systems Inc.
Friction Tool Solutions
Fuzeium Innovations Inc.
GE Oil & Gas Canada
GE Power
geoLOGIC systems
Global Affairs Canada
Government of Alberta
Grant Production Testing Services
Grant Thornton LLP
Green Fuse Inc.
Halliburton Group Canada
Haskayne School of Business
Hekla Consulting Ltd.
Hemisphere Capital Management
Hicks & Associates Intellectual Property
Hifi Engineering
Husky Energy
Hyundai Auto Canada
IBM Global Business Services
IBM Natural Resources Solution Centre
International Emissions Trading Association (IETA)
IFP Technologies (Canada)
Imaginea Energy
Indian Resource Council
Indigenous Center of Energy
Innovate Calgary
Insigniam
International Oilfield Equipment
Inventys
JLG Industries Inc.
JWN Energy
Keyera Corp.
Kinetica Ventures
KOGAS CANADA LTD.

Audience Profile of The Future of Oil & Gas 2017



57% of attendees were C-suite executives or Direct reports
89% of attendees were Manager and Leadership level or above

KPMG
Lawson Projects
Ledcor Group of Companies
Luxmux Technology Corp
Matco Investments Ltd.
Matcor
Maxfield
MBM Intellectual Property Law
McLaren Chase
McRock Capital
MNP
Modern West Advisory
NAIT
National Research Council
NCS Multistage
NEX Technology Capital
Nexen
Nexergy Clean Power
NextTier Energy Solutions
nFluids
NRStor
Nuun Ventures
Odgers Berndtson
Oil & Gas Sustainability Ltd.
Optimize Consulting
Paradigm Capital
Petroleum Technology Alliance Canada (PTAC)
Pinnacle Consulting Services Inc.
Proceed Solutions
Process Ecology Inc
PwC
Questor Technology Inc.
Raven Bay
RBC Capital Markets
RBC Dominion Securities
ReGenerate Alberta
Repsol Oil and Gas Canada Inc.
ReSourceYYC
SAIT Polytechnic
Saskatchewan Research Council
Schlumberger
Scottish Development International
Secure Energy
SemCAMS ULC
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Shell Canada
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SNC Lavalin
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Strategy Portal Inc
Stream-Flo Industries ltd
Sun God Resources
Suncor Energy
Supreme Group LP
Sustainable Development Technology Canada
SustainablEarth BD - LATAM
Taryncroft Equities
Tenaris
The Calgary Herald
The Delphi Group
The Natural Step Canada
The Pembina Institute
The School of Public Policy University of Calgary
TMX Group
TransAlta
Transcend Management Advisors
Trillium Measurement and Control
United Kingdom Department for International Trade, British Consulate-General Calgary
University of Calgary
Upstream, International Oil & Gas Newspaper
Ventus Development Services
VON Resource Management
Western Economic Diversification Canada
Yager Management Ltd.
Zedi
Zone Startups

