

# BUILDING A CLEAN ENERGY FUTURE FOR ALL CANADIANS

2017 SUSTAINABLE ELECTRICITY™  
ANNUAL REPORT



Canadian  
Electricity  
Association

Association  
canadienne  
de l'électricité

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Sustainable Electricity™ is a mandatory sustainability program developed and implemented by the corporate utility members of the Canadian Electricity Association (CEA). The goals of the program are to integrate sustainability in company operations; foster continuous performance improvement; and advance the public acceptance and support for utility operations through meaningful engagement, collaboration, transparency and accountability. In that context, this report provides an overview of the sustainability performance of CEA corporate utility members in 2016. CEA would like to thank member companies for reviewing the drafts.

CEA kindly asks that you read this report electronically rather than from a printed copy.

[www.electricity.ca](http://www.electricity.ca)  
[www.SustainableElectricity.ca](http://www.SustainableElectricity.ca)  
[www.SustainableElectricityCompany.ca](http://www.SustainableElectricityCompany.ca)

# HOW CEA MEMBERS ARE ADVANCING SUSTAINABILITY

Because a clean energy future starts today

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# CEA AT 125

2016 marked CEA's 125th anniversary. An integral part of the very fabric of our nation, electricity — along with the people engaged in electrical enterprises — has played a key role in many Canadian innovations and achievements:

- 1891: Canadian Electrical Association is formed.
- 1906: Canada's first movie theatre opens in Montreal.
- 1912: The Steel Company of Canada opens the world's first all-electric steel mill.
- 1918: Canada launches the world's first electrically welded ship.
- 1919: First radio station in the world begins broadcasting in Montreal.
- 1921: Ontario Hydro completes the first hydro plant at Niagara Falls.
- 1923: First radio broadcast of a professional hockey game.
- 1932: The trans-Canada phone system is inaugurated, connecting the country.
- 1951: Dr. John Hopps completes work on the world's first pacemaker in Ontario.
- 1989: Canada opens the world's first fully retractable roof over Toronto's SkyDome.
- 1993: Canada's first commercial wind farm is completed in Alberta.
- 2016: The first tidal generating station in North America goes online in the Bay of Fundy.

Electricity has powered Canadian ideas and idealism for 125 years — and will continue to do so as the country looks ahead to a future powered by clean energy.



# MESSAGE FROM THE PUBLIC ADVISORY PANEL

November 7, 2017

**Mr. Max Cananzi**  
**President, Alectra Utilities**  
**Chair, CEA Board Committee on Sustainability**

The members of the Sustainable Electricity Program's Public Advisory Panel are pleased to submit the 2017 annual letter of advice to the CEA Board Committee on Sustainability and the Board of Directors.

Our intent is to provide a perspective on the environmental, social, and economic performance expectations of the Canadian public with respect to Canada's electricity industry in these dynamic and challenging times. Achieving sustainability is a difficult challenge which requires the sustained and substantial commitment of the leaders of your industry and we appreciate that you support our panel and listen to our advice.

Again, this year, the Panel is generally pleased with the progress made by CEA members on several fronts, including reductions in Sulphur dioxide, and nitrogen oxides. Priority spills continue to challenge but they show a declining trend. Lost time injuries/illnesses remain relatively low but the long-term trend does not show any significant reductions.

It is regrettable that the reported data for 2016 does not show a decrease in greenhouse gas (GHG) emissions. This is a performance parameter of increasing interest to the public, governments and the investment industry and the reported slight increase does not show well. However, the Panel understands that the origin of this data point each year is complicated by the changing number and structure of member companies in the CEA and the nature of their assets. This highlights the importance of consistent methodologies and quality control on the reported numbers. The GHG data reporting structure must be improved.

On the issue of data quality, the Panel is concerned that there is a decline in the quality and credibility of the data being reported to the Sustainable Electricity Program by CEA members. The Panel's work schedule was disrupted this year because the first round of data we reviewed in May, 2017 was inconsistent and contradictory. It took CEA staff several more weeks of iterations with the member companies to come up with a data summary that was

usable. We speculate that the reason for this lies within the management system of some of the member companies themselves. It is as if those tasked with answering the questionnaire do not have the information or access required to accurately/appropriately respond. In addition, because of the number of errors present in the member submissions, it appears that many submissions were not subject to senior management review. Our caution to the Board Committee on Sustainability/Directors is that if this continues it may result in seriously erroneous information being reported to the public.

A case in point is the purported data shows a substantial drop in investments in new and refurbished infrastructure. It is widely discussed in the public forum that substantial increases in investments in infrastructure are necessary going forward to keep the industry viable and reliable. The data shows members have cut capital expenditures by 45% since 2013 and that is cause for alarm. But, for the record, we do not believe these are correct data. They diverge substantially from what StatsCan reports. These data are what the current system generates and that is the argument for more diligence and management oversight of the reporting mechanism. Your true story on infrastructure investment has yet to be told.

The Panel is disappointed to see relatively little action from the member companies on the issue of diversity of its workforce, executive team and Boards of Directors - less than half of respondents reported the proportion of visible minorities in leadership positions. Despite a recommendation in last year's letter to conduct a baseline diversity assessment, followed by a plan for improvement, as far as we are aware based on reporting, few if any member companies did so. It is the recommendation of this panel, based on the concept that 'what gets measured, gets done', that a baseline diversity assessment become enshrined as a minimum requirement for member companies. After that assessment is completed, each company would be expected to prepare a plan to improve upon any obvious gaps identified in the baseline assessment.

Aboriginal relations have become an important and prominent issue in Canada over the past year. Parallel conversations have been occurring to determine if an Aboriginal economic participation goal should be established. Given the increased complexity of these issues in Canada and the significant clout, both economic and political being garnered by Indigenous communities, we strongly recommend that CEA members consider adopting the Canadian Council for Aboriginal Business (CCAB) Progressive Aboriginal Relations (PAR) program. There are a number of CEA members who have embarked on this process which has been advancing their relationships with Indigenous communities and business in a number of areas including engagement, business leadership, procurement and economic participation. This effort would signal a significant shift in thinking and action to not only Indigenous communities but also all Canadians with regards to the importance of sustained effort in building Aboriginal relations.

For a couple of years now the Panel has been recommending that the CEA turn its attention to the escalating public concern over biodiversity loss. We realize that it is difficult for many members to see how biodiversity concerns relate to the activities of electricity utilities. But we note that the CEA found it necessary to submit comments to the federal government consultations on both the Canadian Environmental Assessment Act (CEAA) and the Fisheries Act (FA). Your commenting on these pieces of legislation reveals that biodiversity is an essential element of and can significantly impact upon your business. And, you should know that your submission on the Fisheries Act relating to how fisheries should be defined puts you at odds with much of the biological scientific community as well as some members of this Panel.

That is why we see it as critically important that the CEA develop a biodiversity framework to protect ecosystems and enhance biological diversity. We would exhort you to put some effort into this initiative in order to demonstrate to the public your full commitment to sustainability.

In conclusion, the Panel would like to draw your attention to a few issues that, while not of significant magnitude yet, may emerge to be major influences on your industry and we see merit in your Board allocating some attention to them in the interests of sustainability.

First of these is the future of the electric car fleet. Obviously, the magnitude of fuel shift from petroleum to electricity is important to your industry but what might not be realized is that there are competing visions on how the transportation revolution might evolve and they portend quite different energy demands. Another technology poised to impact your industry and many other aspects of society is artificial intelligence (AI). Reports project that AI as a disruptive technology will have widespread impacts in just a few years. And finally, we draw your attention to the rapidly developing business implications of intellectual property. It is our first impression that your industry may not be aware of the revenue opportunities of some of the intellectual assets you have developed. These at the very least should be documented and protected lest you find yourselves paying royalties on your own inventions. We trust you will find this advice useful as you deliberate areas for improving your future sustainability efforts.

Sincerely,

Gord Miller  
Chair, Public Advisory Panel

# CEA RESPONSE TO THE PUBLIC ADVISORY PANEL

February 12, 2018

**Mr. Gord Miller**

**Chair, Public Advisory Panel**

**CEA Sustainable Electricity Program**

On behalf of Canadian Electricity Association's (CEA) Board Committee on Sustainability, I would like to thank you for your 2017 letter of advice on the electricity sector's sustainability performance. Your independent advice is invaluable for informing the sector's future sustainability efforts and we want to ensure due consideration is given to your recommendations. While we're proud of the sustainability accomplishments of the sector to date, we recognize there are opportunities for further improvement.

In that context, I provide the following responses, including specific follow-up actions where appropriate, to address the issues raised in your letter.

## **Issue 1: Air Pollutants**

I am pleased with your assessment of our performance related to air pollutants. The electricity sector's air emissions have declined significantly over the last decade and will continue to decline as we transition our remaining coal plants to other non/low emitting sources. Follow-up Action: N/A

## **Issues 2: Priority Spills**

As noted in your letter, priority spills continue to decline. As these spills can result from a wide variety of causes ranging from aging transformers and leaking equipment to weather-related incidents, preventing them entirely is a challenge. However, in an effort to reduce and minimize the impact of these spills, CEA members continue to phase-out older equipment and invest in emergency spills response training programs, among various other measures. CEA members will continue to monitor this issue and report on our collective progress in the years ahead. Follow-up Action: Continue to monitor and report progress on priority spills through the annual report.

## **Issue 3: Health and Safety**

On health and safety, lost time injuries/illnesses remain very low, although as you have noted, the long-term trend does not show any significant reductions. CEA members have a long-standing commitment to continuous improvement of their safety performance and protecting the well-being of employees. The sector is continuing to track these injuries and working to build a strong safety culture among all employees, with a focus on improving

communications and incident investigation processes to promote lessons learned. Follow-up Action: CEA OHS committee will continue to investigate ways to improve employee safety culture and report performance through the annual report.

## **Issue 4: Greenhouse Gas Emissions**

While you raised concerns around the slight increase in GHG emissions in the last reporting period, I would like to note that the electricity sector has been one of the leaders in reducing GHG emissions in Canada over the last decade. Currently responsible for about 11 percent of national GHG emissions, the sector has reduced GHG emissions by 30 percent since 2005 and is expected to reduce emissions by another 30 percent or more by the 2030 timeframe. CEA would also like to point out that while absolute emissions increased less than 2% from 2015-2016, emissions intensity from fossil fuel dropped by more than 10%. However, to address your concerns about the robustness of the GHG data, CEA will undertake a review of the GHG reporting methodology to ensure accuracy. Follow-up Action: CEA to review the GHG reporting methodology to ensure it captures the required information accurately.

## **Issue 5: Data Quality**

The concerns raised around data quality is a significant concern to us. Since our meeting with you in November 2017, CEA has taken a series of measures to follow-up with member companies to review the data and their accuracy. As a result, I would like to assure you that the information contained in the 2017 Annual Report is accurate and internally verified. In addition, all future data provided to CEA by member companies will be signed-off by a senior management representative. Follow-up Actions: (1) CEA to ensure future member submissions are signed-off by a senior management representative; (2) CEA to implement measures to prevent data transcription errors within the online database system.

## **Issue 6: Infrastructure Data**

As per your concern around the quality of the infrastructure data, CEA did follow-up with member companies on the infrastructure data deemed too low relative to the industry average. While we found some errors related to the interpretation of the performance

metric and resulting data, there were also genuine business reasons for the decline in the last reporting period. While infrastructure-related investments will continue to fluctuate on an annual basis due to various business factors, CEA will continue to be vigilant on any potential interpretation/transcription errors in the future. Follow-up Action: CEA to provide further guidance to members on the infrastructure metric to avoid any future confusion on what is expected of member companies.

#### **Issue 7: Employee, Management and Board-Level Diversity Baseline Assessment**

CEA member companies recognize that more must be done on employee, management and board-level diversity, including visible minority representation, at senior leadership levels. I am happy to note that Ms. Ave Lethbridge, Executive Vice-President and Chief Human Resources and Safety Officer at Toronto Hydro has agreed to assist CEA's Human Resources Committee to identify the challenges and opportunities related to diversity and provide her recommendations. Action: Work with Ms. Lethbridge and the CEA HR Committee to identify options for moving forward on diversity.

#### **Issue 8: Adoption of the Progressive Aboriginal Relations (PAR) Framework**

Establishing good relations with Aboriginal Peoples is a priority for CEA and its member companies. As you may recall, in 2016, CEA members agreed to a set of national principles on Aboriginal engagement to complement their own relationships at the local level. These activities will continue in the years ahead. The Progressive Aboriginal Relations (PAR) program of the Canadian Council for Aboriginal Business (CCAB) is one mechanism for companies to show their leadership on this issue, but ultimately, this is a decision for individual companies to make based on their existing relationships with local Aboriginal communities. The CEA Indigenous Relations Task Group is aware of the PAR requirements, but has set its sights on addressing the Canadian government's desire to implement the United Nations Declaration on the Rights of Indigenous Peoples and the recommendations of the Truth and Reconciliation Commission. Follow-up Action: Continue to encourage CEA members to consider the adoption of the PAR framework recognizing it is up to the individual companies to decide.

#### **Issue 9: Development of a Biodiversity Framework**

Protecting biological diversity is an important consideration for the sector. While less prominent relative to issues such as climate change, CEA member companies continue to address this issue in project planning, development and day-to-day operations. However, we agree with you that CEA should consider the development of a biodiversity framework to help guide our activity in this important area. Follow-up Action: CEA staff to undertake discussions with members in early 2018 on the development of a biodiversity framework for the sector.

#### **Issue 10: The need to address electrification, artificial intelligence and intellectual property**

We appreciate the forward-thinking advice from the Panel on emerging trends and issues, particularly related to electrification, artificial intelligence and intellectual property. These are all issues that we are grappling with both nationally at the CEA level and at member companies. In fact, just over a year ago, CEA and its members established a National Emerging Issues Committee to identify these issues and trends so that we can effectively address them in the years ahead. Follow-up Action: Update the Panel on the work of the National Emerging Issues Committee.

I trust this letter provides an acceptable framework for moving forward on the recommendations of the Panel. I look forward to working with you and the Panel in 2018 to further improve our sustainability performance.

Sincerely,

**Mr. Max Cananzi**  
**President, Alectra Utilities**  
**Chair, CEA Board Committee on Sustainability**



# CEA MEMBER PERFORMANCE HIGHLIGHTS: 2015- 2016 DATA YEARS

## OUR REPORTING PILLARS

In 2015-2016, CEA Sustainable Electricity program adopted a new set of strategic pillars and performance indicators to better communicate the electricity sector's sustainability goals and commitments:

<b>LOW-CARBON FUTURE</b>	<b>INFRASTRUCTURE</b>	<b>BUILDING RELATIONSHIPS</b>	<b>RISK- MANAGEMENT SYSTEMS</b>	<b>BUSINESS EXCELLENCE</b>
Climate change management and mitigation	Investments in new and refurbished infrastructure	Early engagement and consultation with local communities, stakeholders and Indigenous Peoples	Environmental stewardship	Investments in innovation and technology advancement
Internal energy efficiency and customer conservation programs	Integration of renewable energy	Enhancement of the customer experience	Employee, contractor and public health and safety	Engagement of regulators, supply chain partners and other stakeholders
Electrification of transportation, buildings and processes	System reliability and resiliency against severe weather impacts	Support for low-income customers	Security management systems and standards	Employee recruitment, training and retention

# PERFORMANCE AT A GLANCE

Net generation by fuel type (gigawatt-hours)	2015	2016	Change
Coal	37,351	37,050	↓
Diesel	347	354	↑
Natural gas	17,999	26,493	↑
Oil	2,569	2,372	↓
Hydroelectric	121,079	123,310	↑
Nuclear	48,801	72,316	↑
Renewables (biomass, wind, solar, tidal, biofuel, other)	5,097	5,824	↑
<b>TOTAL NET GENERATION</b>	<b>233,243</b>	<b>267,719</b>	<b>↑</b>
Renewable energy purchased from non-CEA member companies	3,623	4,699	↑
Non-renewable energy purchased from non-CEA member companies	4,057	5,642	↑
Grid-connected renewable generation by customer	2,180	1,244	↓

Low-carbon future	2015	2016	Change
Total carbon equivalent emissions from operations (CO2e megatonnes)	75.2	76.7	↑
Percent of companies with a carbon or carbon equivalent emissions target	18	29	↑
GHG emissions avoided through external energy conservation programs (CO2e megatonnes)	1.5	1.9	↑
Total annual energy saved through external energy conservation programs (MWh/year)	2,658,120	3,545,464	↑
Percent of companies with an internal energy conservation programs? (Y/N)	36	45	↑
Annual savings of companies with an internal energy conservation program	3,146,113	2,183,269	↓

Infrastructure	2015	2016	Change
Total capital expenditures on new / refurbished generation infrastructure (billions \$)	3.27	3.37	↑
Total capital expenditures on new / refurbished transmission infrastructure (billions \$)	2.83	3.60	↑
Total capital expenditures on new / refurbished distribution infrastructure (billions \$)	3.10	2.98	↓
Total investment in infrastructure (billions \$)	9.21	9.96	↑

Building relationships	2015	2016	Change
CEA member companies with a formal stakeholder engagement policy (%)	90	80	↓
CEA member companies that conduct customer satisfaction surveys (%)	63	82	↑
CEA member companies with a program to help low-income customers (%)	44	32	↑
CEA member companies that have formally identified relevant Indigenous groups within their service area (%)	73	80	↑
Value of formal business relationships (supply of products/services, MoUs, joint ventures) with Indigenous communities (\$ billion)	1.032	0.853	↓
CEA member companies with procedures requiring early consultation or engagement with Indigenous communities during project planning/development (%)	89	89	=

Risk-management systems	2015	2016	Change
Total Annual NOX Emissions from fossil generation (tonnes)	91,456	92,868	↓
Total Annual SO2 Emissions from fossil generation (tonnes)	209,857	207,494	↓
Net coal-fuelled intensity of mercury emissions (kilograms per net GWh)	15.93	15.13	↓
Number of priority spills	106	97	↓
All injury/illness frequency rate (injuries per 200,000 hours)	1.66	1.64	↓
Lost-time injury frequency rate (lost-time injuries per 200,000 hours)	0.69	0.66	↓
Lost-time injury severity rate (calendar days lost per 200,000 hours)	18.84	16.25	↓

Business excellence	2015	2016	Change
Total employee compensation (\$ billion)	5.144	6.294	↑
CEA member companies with a formal diversity/inclusion policy (%)	0.44	0.47	↑
CEA member companies involved in robotics and drones (%)	0.25	0.40	↑
CEA member companies involved in home and facility automation (%)	0.40	0.43	↑
CEA member companies involved in smart grid development (%)	0.55	0.69	↑
CEA member companies involved in energy storage (%)	0.45	0.50	↑
Women on board of directors of CEA member companies (%)	26.33	27.94	↑
Visible minorities on board of directors of CEA member companies (%)	4.34	6.70	↑
Women in executive management of CEA member companies (%)	21.12	27.47	↑
Visible minorities in executive management of CEA member companies (%)	4.78	2.70	↓

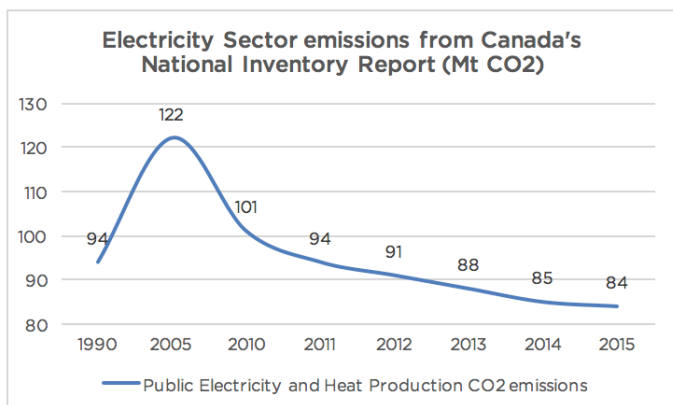
# LOW-CARBON FUTURE

## A CLEAN ENERGY FUTURE STARTS WITH CLEAN GENERATION

In December 2016, the federal government's Pan-Canadian Framework on Clean Growth and Climate Change laid out how Canada will transition to a clean energy future, including meeting its commitment to reduce greenhouse gas (GHG) emissions by 30 per cent by 2030 (compared to a 2005 baseline).

Canada's electricity sector has already cut GHG emissions by more than 30 per cent since 2005, more than any other industrial sector in the country. It is on track to reduce emissions by another 30 per cent by 2030. A decarbonized electricity sector is a real possibility by 2050 as more coal-fired plants across the country are retired, more investments are made in renewable energy sources such as wind and solar, and utilities continue to adopt emission-abatement technologies and other innovations.

Canadian electricity is already among the cleanest in the world, with more than 80 per cent of generated power free of GHG emissions. Regulators, industry and all Canadians have roles to play — by supporting major clean energy projects and adjusting energy-consumption habits — if we were to reach the federal government's aspirational goal of generating 90 per cent clean, non-emitting energy by 2030.







# WHAT WE'RE DOING WELL

Making commitments to reduce CO2 emissions through internal efficiency programs



# WHERE WE COULD DO BETTER

Reducing CO2 emissions through internal and external programs.

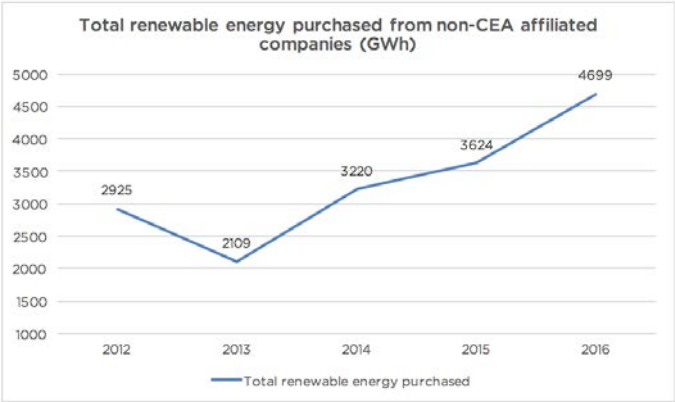
# CLIMATE CHANGE MITIGATION

**One way Canada’s electricity sector is working** to mitigate the impacts of climate change is by reducing the carbon dioxide and other greenhouse gas emissions from its facilities and operations. The total carbon dioxide equivalent (CO<sub>2</sub>e) emissions from CEA members increased slightly in 2016 (by 2 per cent over 2015), however this coincided with a significant increase in net generation of almost 15%, meaning CEA members produced more power at a lower GHG intensity-level. While more companies reported that they had a carbon or carbon equivalent emissions target, there is still more work to be done, with over 70% of companies with no CO<sub>2</sub> or CO<sub>2</sub>e target.

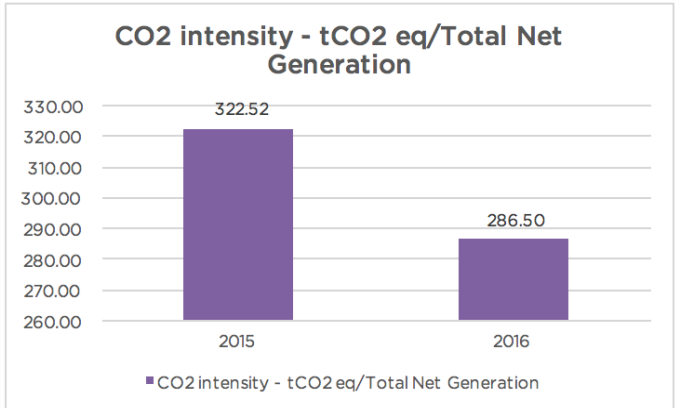
CEA members continue to make new investments in low- or non-emitting fuel sources (including nuclear, wind and biomass) and are purchasing greater amounts of renewable energy from non-CEA suppliers as they strive to further reduce their overall carbon footprint [See chart below]. This has resulted in a drop in CO<sub>2</sub>e emissions intensity by more than 10 per cent compared to the year before, supplying more power with a lower GHG impact per gigawatt-hour.

To facilitate a broad societal shift away from fossil fuels, CEA members are putting an increased emphasis on the electrification of transportation and buildings. In 2016, several utilities launched studies on how best to incorporate electric vehicles into their fleets, while others began planning for new pilot projects on smart-charging stations and other infrastructure needed to accelerate the adoption of electric vehicles in Canada.

	2015	2016
Companies with an internal energy conservation program	18%	29%

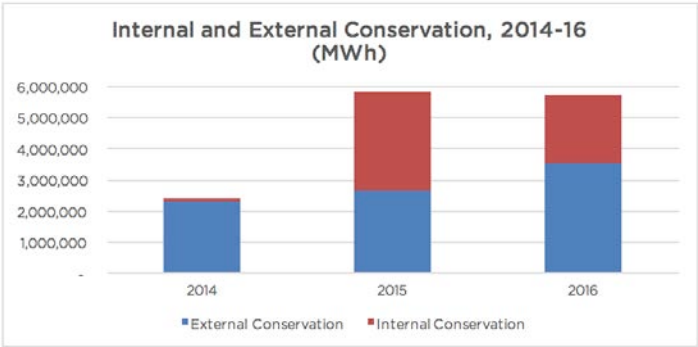


Total CO<sub>2</sub>e emissions from all operations<sup>1</sup> (tonnes)



# ENERGY CONSERVATION

**Cutting back on energy consumption is another** proven way of reducing Canada’s carbon footprint. CEA members are committed to producing, delivering and using electricity in an energy-efficient manner, while promoting a culture of energy conservation in the communities where they operate. In 2016, conservation activities included awareness campaigns and rebates encouraging customers to switch to LED lighting at home, retrofitting municipal roadways with LED lighting, installing advanced smart meters, and providing detailed energy consumption reports to help customers better understand how and where electricity is used. Conservation has two forms, internal (the company reduces its internal consumption) and external (the company incentivizes its customers to reduce consumption). While external conservation rose in 2016 compared to 2015, internal conservation dropped by a greater amount, for a net reduction in conservation of approximately 75.5 GWh. While nearly 2.5% of net member generation was conserved in 2015, only 2.14% was conserved in 2016.



Interestingly, even while the MWh of internal conservation dropped, more members had internal conservation programs in 2016 compared to 2015. This might indicate that while more members are launching programs, these programs are achieving less.

	2015	2016
Companies with an internal energy conservation program	36%	45%



## Alectra Utilities becomes Canada's first ISO 50001 local distributor

After implementing a new energy management policy and following the successful audit of its projects, practices and systems for improving energy consumption and performance at four main facilities, Alectra Utilities (formerly Horizon Utilities, Powerstream, Enersource and Hydro One Brampton) became Canada's first local distribution company to achieve ISO 50001 energy management certification. That accomplishment, in 2016, is part of the utility's ongoing effort to adhere to International Organization for Standardization (ISO) standards including social responsibility (ISO 26000) and environmental management (ISO 14001).

## Municipalities light streets with LEDs from FortisAlberta

Five municipalities will save a combined 1.9 million kilowatt-hours of energy consumption annually thanks to retrofitted streetlights installed by FortisAlberta Inc. Outfitted with energy-efficient LED technology, the new streetlights in Canmore, Crowsnest Pass, Devon, Okotoks and Wetaskiwin will help reduce greenhouse gas emissions and bring down operating costs for the municipalities.

## Hydro One pilots technologies for Ontario's electric vehicle charging network

Supporting the Ontario government's plan to address climate change, Hydro One purchased 10 direct current fast chargers in 2016, testing the technology for potential rollout. The utility's "One Charge" pilot program will see the chargers installed near major highways and high traffic areas across southern Ontario, advancing work toward a widespread and reliable electric vehicle charging network and shedding light on the how electric vehicle charging infrastructure affects the power grid.

## Customers light it forward with Maritime Electric

Maritime Electric Company Limited invested more than \$25,000 in LED lights to engage and educate customers about the value of switching to energy-efficient bulbs in their homes. The utility's month-long Lighting It Forward campaign featured a contest to win packages of LED bulbs and let customers nominate local community buildings for \$2,000 in LED lighting upgrades. In all, 6,902 customers entered the contest and cast 6,220 votes for community centres. The company also produced multiple radio, print and social media advertisements to coincide with the contest.

## Capital Power reduces coal consumption and CO2 with renewable biomass

Capital Power is actively pursuing co-firing of biomass (wood waste) with coal at its Genesee Generating Station, located west of Edmonton. An innovative full-scale biomass co-firing research project was completed in Fall 2016 to test integrating biomass as a supplemental fuel source to reduce coal usage, which has the potential to help Genesee achieve emission reductions, and lower-carbon compliance costs. The project marked the first time in Canada that a test of this magnitude was completed with co-firing wood biomass and coal at a pulverized coal generating station. Integrating biomass into the fuel mix at Genesee could potentially reduce coal usage by up to 30% at Genesee Units 1 and/or 2.

## Saint John Energy's new rental program a Canadian first

From its launch in early 2016 to the end of that year, Canada's first energy-efficient heat pump rental program has helped more than 1,600 Saint John Energy customers cut down their electricity consumption and reduce greenhouse gas emissions. The Fujitsu RLS3H series mini-split ductless heat pumps, designated ENERGY STAR Most Efficient, lowered participating customers' electricity bills by 20-30 per cent on average.

## Nova Scotia Power Focusing on Developing Renewable Energy

Over the past 10 years, Nova Scotia Power has tripled its renewable energy production to 28% and reduced greenhouse gas emissions by more than 30%. It is on track to reach a 58% reduction in emissions, from 2005 levels, by 2030, which will almost double Canada's GHG reduction target. This success has come through investing in solutions that make sense for Nova Scotia, by the development of wind energy and a biomass plant. A large reduction in GHG emissions will be seen once the Maritime Link comes online, linking Nova Scotia with the hydroelectric facility being built at Muskrat Falls in Labrador

**Carbon capture and storage,**  
a modern innovation, has the potential to remove up to 90 per cent of CO<sub>2</sub>e emitted from fossil fuels like coal. The first world's first commercial-scale carbon capture



# INFRASTRUCTURE RENEWAL AND MODERNIZATION

## INVESTING IN CANADA'S CLEAN ELECTRICITY INFRASTRUCTURE

Much of Canada's electricity infrastructure is more than a generation old and reaching the end of its lifecycle. To provide safe, reliable and cost-effective electricity for years to come, investments must be made today to renew and modernize our generation, transmission and distribution systems. With Canada's commitment to meeting the climate and clean growth objectives of the Paris Agreement and the Pan-Canadian Framework, the Conference Board of Canada has updated its 2011 cost estimate for infrastructure renewal from \$350 billion by 2030 to \$1.7 trillion by 2050. This includes updating aging assets and expanding systems to meet future demand, with massive capital projects expected in every part of the country. It excludes day-to-day system updates and repairs.

Further investments must also be made to maintain system reliability in the face of a growing number of severe weather events, and to make the country's power supply even cleaner through the adoption of advanced technologies.

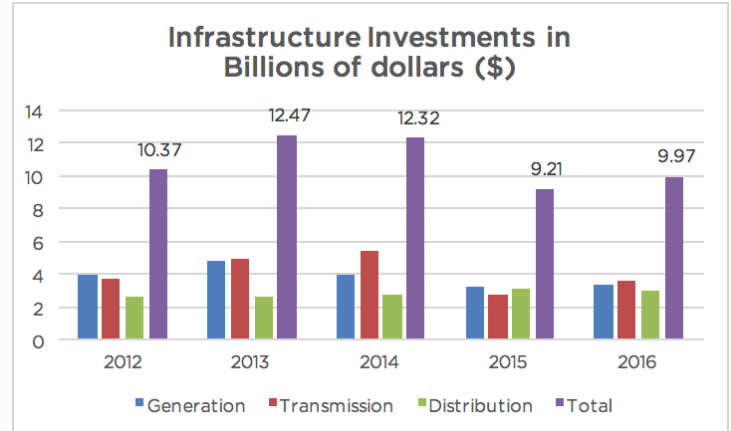


# INVESTMENTS IN NEW AND REFURBISHED INFRASTRUCTURE

From 2012 to 2016, CEA members have invested \$54.34 billion in new and refurbished generation, transmission and distribution infrastructure. This has included \$9.97 billion in 2016, an increase of about \$0.75 billion (or 8.1%) from the year before. The majority of last year's investment (\$3.61 billion) related to transmission equipment, a category in which spending increased by 27 per cent from 2015. Investments in generation infrastructure increased by 3.3 per cent, while distribution investments decreased by 3.8 per cent from the previous year.

To meet Canada's climate and clean energy goals, renewal and modernization must involve greater integration of renewable energy into the overall mix. In 2016, CEA members generated or purchased 11,466 gigawatt-hours of electricity from renewable sources such as wind, solar, biomass, tidal and biofuel. The amount of wind power generated by CEA members continues to grow each year, reaching 5,267 gigawatt-hours in 2016, an increase of 14.1 per cent over 2015. Solar is also a key priority for many utilities, with several new installations and demonstration projects completed over the past year. The total installed solar capacity climbed to a high of 116.51 megawatts in 2016, bringing the amount of solar power generated to 168.11 gigawatt-hours — up 3.9 per cent from 2015 and 162.8 per cent from 2014.

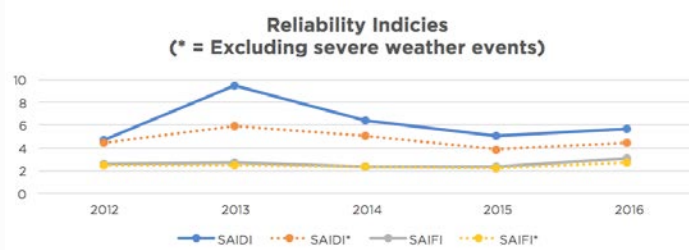
Technologies such as energy storage systems (which store electricity when demand is low and release it when the grid needs a boost) will also play an important role in the infrastructure of tomorrow. CEA members like Hydro One, Hydro Ottawa and Toronto Hydro launched new research and pilot projects looking into how distributed energy storage could be better implemented within the distribution system to improve reliability and quality during periods of peak demand.



# SYSTEM RELIABILITY AND RESILIENCY

With severe weather events increasingly common, preventing and responding to power outages is a top priority for utilities across Canada. CEA members continued to develop programs to proactively identify regions with higher outage risk and harden the system in those areas against extreme weather. They are also leading industry efforts to better understand how climate change affects generation, transmission and distribution. In 2016, there was a slight increase in the duration (measured by the System Average Interruption Duration Index or SAIDI) and frequency (measured by the System Average Frequency or SAIFI) due to a number of significant events, including two separate ice-storms, a lightning storm and the Fort McMurray fires. This handful of events represents 22% of the total hours of outages from 2016, or over 18 million customer hours of outages.

Tree contacts remain the largest contributor to SAIDI, followed by equipment failure. Tree contacts contributed 2.0 hours of the total 5.66 SAIDI hours. The number of tree contacts had increased from 14% (2015) to 16% (2016) of interruptions or almost 10,000 interruptions, and 9,000,000 customer hours. Equipment failure contributed 0.85 hours of the 5.66 SAIDI hours. Even though the SAIDI for equipment failure did not change between 2015 and 2016, the number of interruptions decreased slightly to 18.5% from 20% in 2015.



## Piloting Canada's first virtual power plant at Alectra Utilities

Virtual power plants draw power from solar photovoltaic (PV) panels and lithium-ion batteries installed in customers' homes and can help enhance grid reliability and reusability. Alectra Utilities (formerly PowerStream) piloted Canada's first such virtual plant with 20 customers in 2016. Calling it POWER.HOUSE, the utility tested the model's ability to deliver clean power while protecting against outages, offsetting customers' peak-hour electricity rates (helping lower their bills) and reducing negative impact during peak-system demand.

## ATCO Electric installs environmentally friendly infrastructure after wildfire

ATCO Electric took the opportunity to use more sustainable materials when replacing infrastructure damaged by the fires that swept through Fort McMurray. As chemicals from treated wood poles can contaminate soil and water, the company installed composite poles instead. ATCO Electric hopes that by reducing the potential impacts of its infrastructure, the traditionally rich biodiversity in the Athabasca River area will recover.

## Major investment in hydroelectric infrastructure at Brookfield Renewable

Brookfield Renewable extended the life of one of the floodgates at Powell River by an anticipated 10 years by repairing and replacing key elements of the structure. Work included replacing two 50-foot long sections and the bellows, installing two additional expansion joints and welding steel plates along the penstock. In 2016 the company also embarked on a multi-year project that will replace the 19 spillway gates at the Powell Lake Dam with new steel radial gates, which are expected to last 50 years.

## Northwest Territories Power Corporation solar project cuts community loads

Average community loads in Fort Liard and Wrigley fell by 15 per cent and 12 per cent, respectively, after Northwest Territories Power Corporation brought two more utility-scale solar photovoltaic (PV) projects online in 2016, displacing thermal generation with solar PV energy. The solar arrays have also allowed diesel plant operators to run smaller diesel generators more often (and larger units less), which has resulted in lower loads within their plants.

## Protecting Toronto Hydro's system against extreme weather events

Toronto Hydro Corporation made its system more resilient against climate-change fueled extreme weather events with several initiatives in 2016. These included studying load forecast sensitivity, developing a lightning map, reviewing technical specifications of major equipment, and conducting asset impact and industry review studies. The potential system issues came to light through a climate change vulnerability assessment the utility conducted in partnership with Engineers Canada in 2015.

## Saskatoon Light & Power helps city's renewable energy goals

Saskatoon Light & Power completed a solar power demonstration project that will help Saskatoon City Council achieve its goal of increasing the use of renewable energy for city operations. The project features four ground-mount arrays with a total of 92 solar panels and an energy storage capacity of 30.66 kilowatts. The configuration will provide 40 per cent of the electricity needed to run the utility's Landfill Gas Power Generation Facility — powering cooling and exhaust fans, lights, computers, and other equipment — and provide data on solar power system efficacy and operation in local climate conditions.



# BUILDING RELATIONSHIPS

## FOR ALL CANADIANS MEANS WITH ALL CANADIANS

The investments CEA members make today in clean energy infrastructure will have a direct impact on Canadian communities and their environments. Securing collective buy-in and support is essential to the success of any generation, transmission or distribution project.

The most successful projects always start with open, transparent dialogue with all stakeholders: customers, landowners, community leaders, government agencies, Indigenous groups, non-profits and non-governmental organizations. Given the unprecedented infrastructure investments that must be undertaken between now and 2030, there is a tremendous opportunity for everybody to work together to enable Canada's clean energy future, especially Indigenous communities. With nearly 100 electricity projects on indigenous lands already and another 200 projects in the pipeline, CEA and its members are committed to engaging early and often with Indigenous Peoples.

Throughout 2016, CEA members continued to play an active role in their local communities, delivering education and awareness programs as well as increased support for low-income customers to help ensure a clean energy future remains accessible to all.







# WHAT WE'RE DOING WELL

Early Engagement and partnerships  
with Indigenous people



# WHERE WE COULD DO BETTER

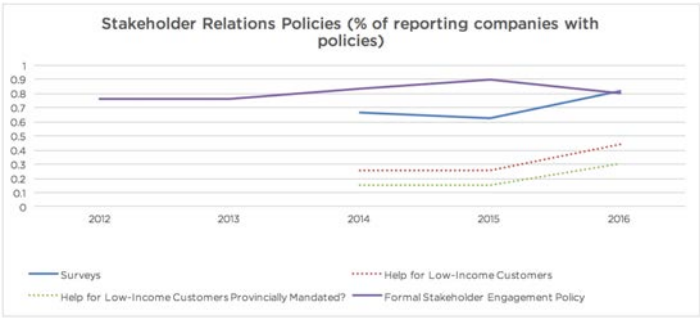
Formalizing stakeholder and  
Indigenous engagement policies



# STAKEHOLDER, PARTNER AND CUSTOMER ENGAGEMENT

**Eighty per cent of CEA members have a** formal stakeholder engagement policy in place and are dedicated to improving the way they solicit feedback on their planned and existing operations. Last year, this included social media campaigns, landowner outreach initiatives, public annual general meetings, community open houses, meetings with local business leaders and environmental interest groups, and more. They also continue to support site visits and other programs to help students learn more about electricity generation, use and conservation.

The majority of CEA members regularly survey customers to better understand their needs and identify areas of concern, allowing them to enhance their services and improve the overall customer experience. Nearly half of all member utilities have implemented programs to support low-income customers, with about three-quarters of those doing so outside of any provincially mandated requirement. These programs help families install energy-efficiency upgrades (such as LED lighting) in their homes, provide grants for customers at risk of having their power cut off and more. As Canada pursues intensive energy system transition, it is crucial that costs to low-income Canadians are minimized to the extent possible

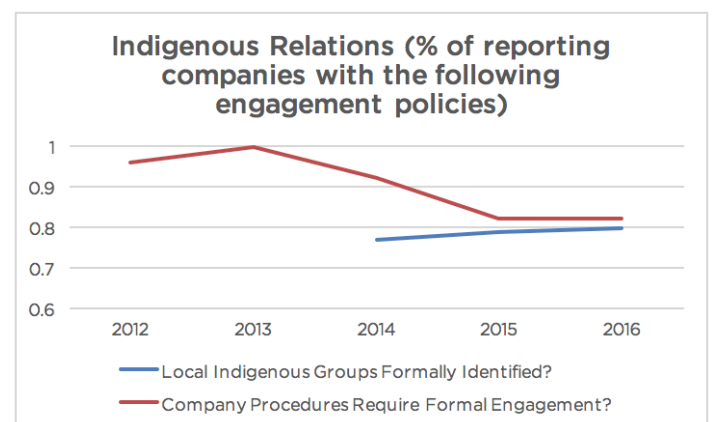
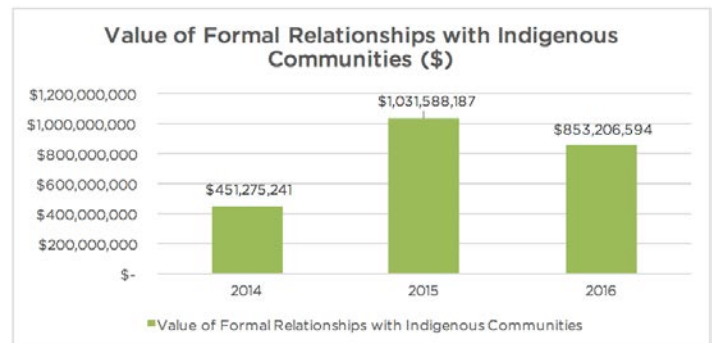


# INDIGENOUS ENGAGEMENT

**Canada's electricity sector considers open and transparent engagement with Indigenous Peoples and communities to be of paramount importance — and is committed to building mutually beneficial relationships based on trust and respect. In 2016, CEA and its members enshrined their longstanding collaborative approach by adopting six national principles that will guide engagement with Indigenous communities across the country. The National Principles for Engagement of Indigenous Peoples are:**

1. Respecting Indigenous culture, traditional values and rights,
2. Nurturing constructive relationships,
3. Enhancing communications,
4. Fostering Indigenous capacity building,
5. Promoting economic prosperity, and
6. Facilitating Crown consultation.

In addition to ensuring Indigenous perspectives are considered in any projects with a potential impact on current or historical Indigenous land use, these principles are designed to deliver mutually advantageous economic relationships and business opportunities for Indigenous communities. This includes education, mentorship and skills training programs as well as the creation of formal business relationships that ensure Indigenous Peoples directly benefit from new infrastructure development. In 2016, the total value of these relationships was \$300.9 million, comprising 310 supply and procurement arrangements, 67 partnerships or memoranda of understanding, and nine joint ventures.





## Columbia Power consults Indigenous Peoples on Slocan Pool

Representatives from the Okanagan Nation Alliance (ONA) joined Columbia Power Corporation at its Slocan Pool site in November 2016 to guide the company's efforts to mitigate erosion in the area where ancestral remains were discovered in 2014. The ONA representatives shared best practices for minimizing disturbances and visual impacts in the eroded area. Columbia Power has arranged a follow-up visit to the site with ONA Elders and technical staff in May 2017 to decide on an approach and timeline.

## Helping Albertans meet energy needs at ENMAX

ENMAX Corporation made a multi-year commitment in 2016 to provide \$400,000 to key Edmonton- and Calgary-based agencies that help vulnerable Albertans manage their basic needs. The commitment flows from the company's philosophy that the best way to aid people who struggle to meet their energy needs is by supporting organizations that have the expertise and experience to make a difference in people's lives.

## Nova Scotia Power Planting Roots in Mi'kmaw Communities

Nova Scotia Power partnered with We'koqma'q First Nation and Lucas Tree Experts to develop a forestry management training program to assist Indigenous community members in developing a trade. A year in the making, the project officially launched in May 2016. We'koqma'q First Nation trainees were provided with essential on-the-ground training for tree cutting, including all safety aspects. As a result of the project, some of the team have gone on to become utility tree workers and others continue to progress as utility ground workers in Truro, NS.

## Ontario Power Generation supports indigenous youth

In 2016, Ontario Power Generation Inc.'s Corporate Citizenship Program funded 87 initiatives to support indigenous people in the province. This included providing key funding for youth science programs, engineering and reading camps, mentorship programs, student awards, as well as cultural initiatives such as pow-wows and special events for National Indigenous Day, which is held annually on June 21.

## Manitoba Hydro enhancements inspired by customers

Manitoba Hydro adjusted its space and water heating fuel options, communication channels, transaction touch points, bill and payment options, and energy efficiency programs and options during 2016 in response to customer feedback. The company gathered the input through customer satisfaction surveys, which it monitors to gauge customer expectations and perceptions, identify areas of concern and opportunities to enhance or change services, investigate energy or utility issues and more.

## First Nations to co-manage Yukon Energy relicensing

A protocol agreement between Yukon Energy Corporation and the Champagne and Aishihik First Nations (CAFN) signed in 2016 signifies a new, more collaborative approach to relicensing the utility's Aishihik Hydroelectric Generating Station in southwestern Yukon. The agreement sets out a process that involves direct input from the First Nations government, a First Nations community-based advisory group, a project steering committee, and numerous technical working groups co-chaired by Yukon Energy and CAFN representatives. The relicensing entails a variety of collaborative environmental and socio-economic studies as well as a CAFN-led comprehensive traditional knowledge study and impact analysis.

# RISK- MANAGEMENT SYSTEMS

## A CLEAN ENERGY FUTURE IS SAFE AND RISK-AWARE

The electricity sector is highly regulated – from pricing to greenhouse gas emissions, the sector is subject to reporting and compliance on a multitude of environmental and health issues. As the federal government looks to modernize laws and regulations including the Fisheries Act, Environmental Assessment Act, and amend and create new climate change mitigation regulations, the electricity sector must be certain it has the people and processes to ensure its day-to-day operations do not conflict with its commitment to protect Canada's ecosystems and biodiversity.

Environmental and regulatory risks are not the only ones to be addressed. CEA members must also take steps to protect the health and safety of employees, contractors and the public. They need to adapt their systems in response to climate change and extreme weather. They also need to keep their own enterprises safe from external harm — especially given the rise in cyber security threats to critical infrastructure around the world.

By implementing risk-management strategies and international standards such as ISO 14001, 18001 and 26000, CEA members are effectively managing and mitigating their impacts on communities, land, air, soil and water. By doing so, they are staying compliant with their regulatory and legal requirements.







# WHAT WE'RE DOING WELL

Reducing atmospheric emissions  
(SO<sub>2</sub>, NO<sub>x</sub>, mercury)

Keeping employees and contractors safe



# WHERE WE COULD DO BETTER

Addressing climate change-related risks  
through adaptation plans

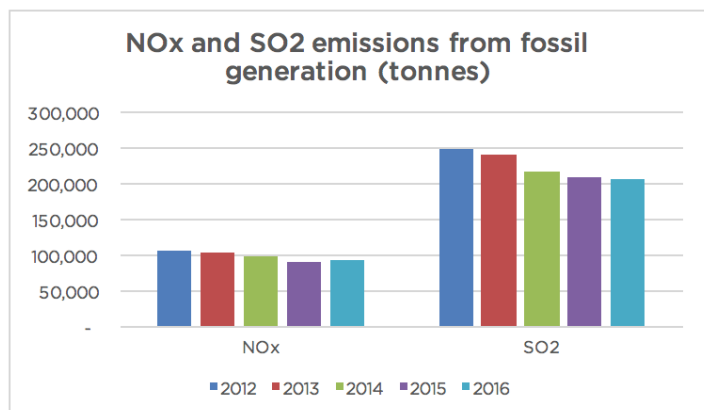
Developing metrics for biodiversity

# ENVIRONMENTAL STEWARDSHIP AND ECOSYSTEM PROTECTION

**CEA members are managing their facilities** and operations to avoid or minimize impacts to the environment (air, land, and water), while also supporting ecosystem protection and conservation of biological diversity.

The electricity sector’s contributions to national air emissions continue to decline steadily. While total sulphur dioxide (SO2), nitrogen oxide (NOx) and mercury emissions were similar to 2015, relative to 2012 levels, CEA members have decreased these emissions by 16.5 per cent, 19.5 per cent and 12.1 per cent, respectively — a reflection of the strong environmental stewardship practices in place throughout the sector.

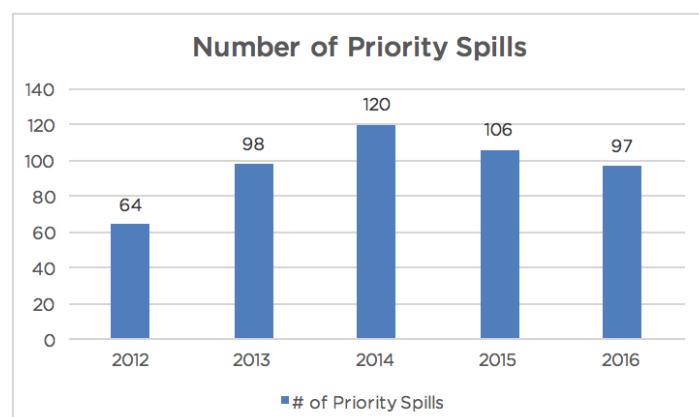
NOX and SO2 emissions



## Spills

Although spills of petroleum or polychlorinated biphenyls (PCBs) can occur for a variety of reasons (e.g., aging equipment, severe weather, vandalism) and are difficult to prevent entirely, last year CEA members reduced the number of priority spills by 8.5 per cent and continued to work to improve spill prevention and response. Examples of these actions include: by upgrading transformers to make them more resistant to corrosion and replacing aging equipment.

Annual priority spills



## Stewardship

The electricity sector works closely with the federal government and other stakeholders to improve the regulatory framework around species conservation and environmental assessment. To further promote a culture of environmental stewardship within the sector, and to provide clarity to utilities on their compliance requirements, CEA worked collaboratively with its members to develop a new best management practices guide on how to protect migratory birds and their nests at their sites.

# CLIMATE CHANGE ADAPTATION

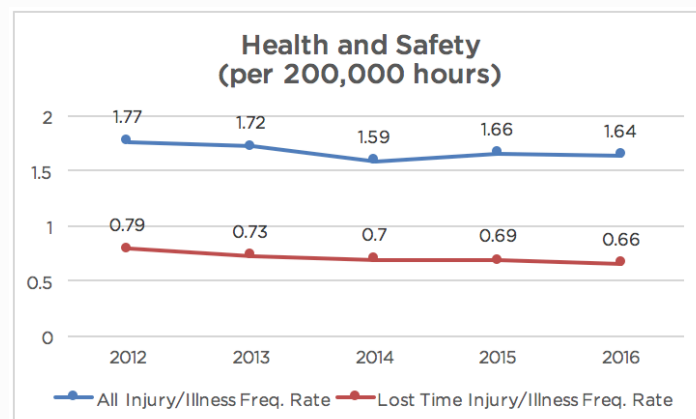
High-impact weather events and other climate scenarios are occurring more often and with greater severity. These have a profound impact on Canada's electricity system, impacting reliability measures such as SAIDI and SAIFI (see Infrastructure, above). Last year, CEA members continued to develop their climate adaptation management plans (with CEA setting a goal of having all members prepare their plans by 2020), incorporate climate scenarios into their load forecasts, and optimize their use of water resources and watersheds. Water use is another critical climate-change related risk, as such, some CEA member companies have started to track and report their total water consumption.

## HEALTH AND SAFETY

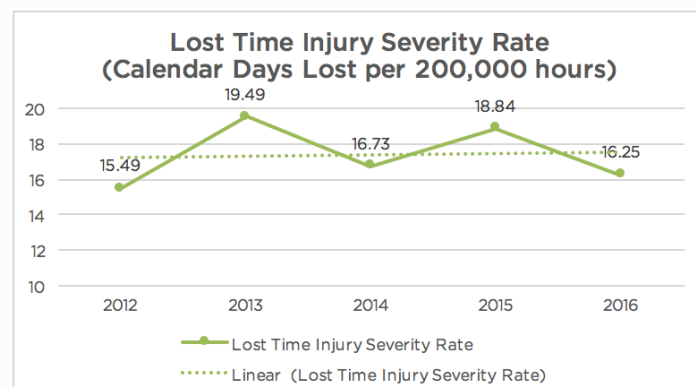
CEA members are committed to providing a safe and healthy workplace for their employees and contractors. Safety performance continues to improve across the sector, with 2016 seeing decreases in the all injury/illness frequency rate, lost-time injury frequency rate and lost-time injury severity rate. These results stem from ongoing use of health and safety management systems and other initiatives implemented throughout the year: task-specific training sessions to reduce common injuries, safety mentors assigned to summer students, safety alerts and newsletters, videos on safe work practices for technicians, mental health awareness campaigns and more. These investments have paid off in lower numbers of Lost Time as well as Total injuries and illnesses. However, between 2012-2016, there has been no discernable downward trend in the number of calendar days lost to injuries, indicating that there is still room to improve.

The sector also continues to promote public safety, reaching out to the community through seminars, demonstrations, open houses, print advertisements and social media campaigns to teach people how to be safe around fallen power lines, transformers and other equipment.

### All injury/illness and lost-time injury frequency rates



### Lost-time severity rate





## Online course at FortisBC targets cyber security threats

A new online course for FortisBC Inc. employees teaches about the policies, procedures and access controls in place to protect the utility's critical cyber assets. The 60-minute course, which FortisBC developed and made mandatory in 2016, is part of the company's efforts to meet the North American Electric Reliability Corporation's critical infrastructure protection standards. To ensure adherence to the measures, FortisBC requires that employees complete the course once a year to refresh their understanding.

## Newfoundland Power promotes electricity safety

Through public education and awareness programs, Newfoundland Power Inc. delivered electricity safety training to more than 300 firefighters and first responders in 2016 and engaged more than 1,000 students. The training was part of the company's public outreach efforts, which it launched over a decade ago. Since then, Newfoundland Power has trained more than 2,300 firefighters and first responders and about 51,000 students.

## Nova Scotia Power – The Bee Story – Protecting Pollinators

Based on the innovative idea of an employee's young daughter to provide large gardens for pollinators to thrive, Nova Scotia Power seeded the capped area of two ash management sites with bee-friendly seed mix. This included an area of approximately 12,000 m<sup>2</sup> at the Abercrombie Ash Management Site and about 89,000 m<sup>2</sup> at the Trenton Ash Management Site. The plan is to also apply a bee friendly hydro seed mix to the remaining 78,000 m<sup>2</sup> at the Trenton site in 2017.

## First David Ellis Safety Award goes to Oakville Hydro

Oakville Hydro's commitment to workplace safety was recognized with the first annual David Ellis Safety Award, which the utility won at Safety Talks 2016. The award, issued by the charity MySafeWork, is given to companies that demonstrate strong leadership in the areas of occupational health, safety and wellness, and that encourage employees to participate in discussions and initiatives promoting workplace safety. Oakville Hydro promotes safety culture through its "Stayin' Alive" safety program, which includes training sessions, quarterly employee newsletters with health and safety tips, recognition of employees who demonstrate health and safety excellence, and more

## Nalcor Energy develops plan to protect rare lichen

Lichen specialists transplanted more than 500 boreal felt lichens in 2016 as part of Nalcor Energy's new rare lichen environmental effects monitoring plan intended to reduce interactions with the protected plant species, which grows in the area where the company is building a new 188-kilometre transmission line. As the area is also important to Newfoundland caribou, the company is using GPS telemetry collars to monitor the caribous' movement and usage patterns to determine the potential impacts of the new line.

## SaskPower supports biodiversity with new strategy

SaskPower firmed up its commitment to biodiversity in 2016 with a new corporate strategy and action plan plus a handful of other initiatives focused on managing impacts to biodiversity. These actions included supporting Environment and Climate Change Canada's 2016 Action Plan for Multiple Species at Risk in Southwestern Saskatchewan, endorsing and consulting on provincial wind power siting guidelines, developing new avian protection standards for SaskPower infrastructure, exploring alternatives to habitat banking systems, and sponsoring several efforts to protect and educate the public about wetland and upland habitats that are important to migratory waterfowl.

## New Nalcor Energy Churchill Falls procedure protects migratory birds

Nalcor Energy Churchill Falls employees have a new procedure to follow when clearing brush, trimming or removing trees, or applying herbicide, designed to protect migratory bird nests and eggs. Vegetation management and construction activities along transmission lines, distribution lines, dykes and dams, facilities, trails and roads are necessary to maintain a safe and reliable electrical system. Under the new procedure, employees must postpone these activities where an active nest is discovered, or apply for a permit to relocate the nest if work can't be delayed until after the birds have moved on.

# BUSINESS EXCELLENCE

## ADOPTING FUTURE- READY BUSINESS MODELS

To remain viable in an ever-changing energy landscape, Canada's electricity sector must innovate. CEA member utilities are engaging with regulators, partners and other stakeholders to optimize their processes, systems and tools and meet their business requirements more sustainably and cost-effectively. They are working constantly to identify supply chain efficiencies and reduce purchasing costs while embracing cutting-edge technologies that will improve day-to-day operations and the effectiveness of the electricity grid as a whole.

Innovation requires strong teams and new perspectives. Companies are diversifying their workforces to bring in new ideas and to better reflect the diversity of the communities they serve. And by encouraging fair treatment for all, executives, management and staff help to create and maintain safe, productive workplaces.







# WHAT WE'RE DOING WELL

Investing in and researching innovative  
new technologies



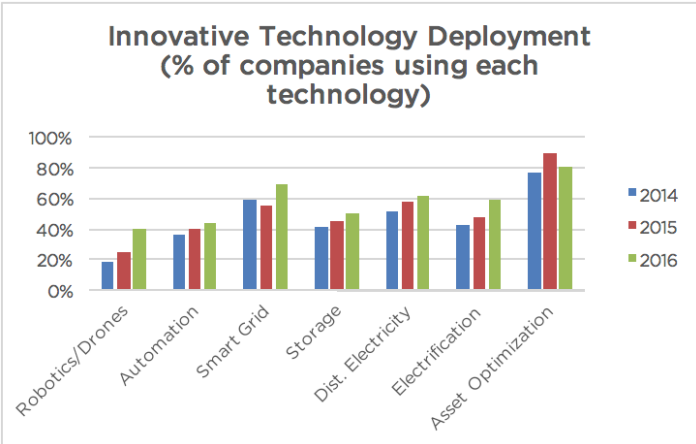
# WHERE WE COULD DO BETTER

Building a more diverse and  
inclusive workplace

# UTILITY LEADERSHIP IN SYSTEM ADVANCEMENT

Investments in new technologies are essential to lowering emissions and increasing the competitiveness of Canadian utilities. They also help Canada's electricity system expand to accommodate new electricity uses, increase responsiveness and storage capacities, and build a two-way grid that benefits all Canadians. An increasing number of CEA members are exploring innovative new technologies in areas such as:

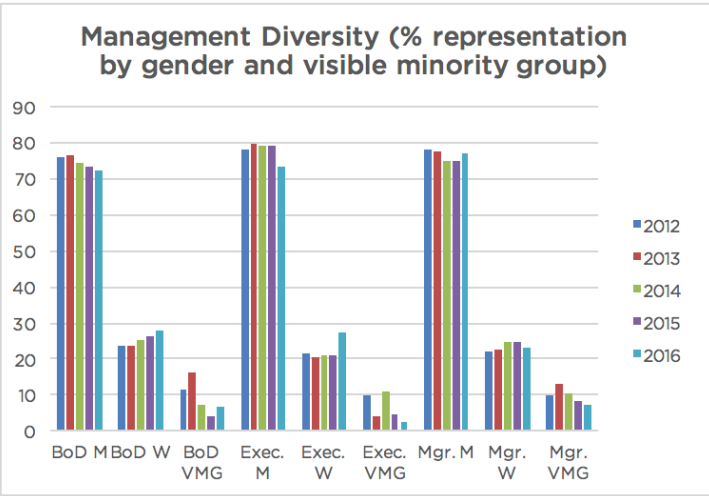
- Robotics and drones to inspect power lines and equipment faster and more safely;
- Home and facility automation technology to dramatically decrease how long it takes to restore power after an outage;
- Smart grid initiatives to help consumers better manage energy consumption while making it possible to pinpoint outage locations for faster response;
- Energy storage technologies to improve system efficiency by storing off-peak electricity energy for use during periods of high demand, and
- Distributed electricity generation to strengthen system resilience through localized, small-scale grids.



# RECRUITMENT, TRAINING AND RETENTION

CEA members support fair recruitment, training and talent retention processes that meet the needs of their operations while ensuring ongoing employee satisfaction, well-being and diversity. They continued in 2016 to strive to ensure their companies reflect the makeup of their local communities, with appropriate representation from women, members of visible minorities, Indigenous Peoples, persons with disabilities, youth and other groups. While there has been steady progress at the Board level for gender representation, women in Executive and Manager positions have seen less consistent improvement. As well, representation of visible minority group members (VMGs) in all three leadership categories appears to have stalled, and many companies have a policy to not report on VMG representation. More work is needed to determine whether companies' leadership teams could better reflect the diversity of their communities.

As business models evolve, employee training and development remains critically important. CEA members completed several training-relating initiatives in 2016, from launching eLearning platforms for employees and contractors to delivering mental health first aid training to managers and supervisors.



**The first arc lamp was switched** on in front of the Davis Hotel in Winnipeg in 1873. Today, energy-efficient CFL and LED bulbs brighten up Canadian homes and workplaces. While we do not know how we'll light our streets and buildings 125 years from now, CEA member companies across the country are setting the foundation for that future by investing in new technologies and business models.



## AltaLink gives students access to leading-edge power system simulator

Electrical engineering technology students at the Southern Alberta Institute of Technology (SAIT) have access to a leading-edge power system simulator thanks to a \$760,000-donation by AltaLink. AltaLink's funding made SAIT the first post-secondary school in Canada to use this type of simulator, which teaches students how to deliver power to industrial, commercial and residential buildings in a safe, cost-effective way. It also allows students to simulate use of intermittent, renewable sources of electricity like wind and solar while maintaining grid stability.

## Employees tackle real business challenges at ATCO Power

In 2016, ATCO Power Canada Ltd. invited employees to submit ideas for solving real business problems as part of its first internal innovation challenge. "Continuous improvement" was the theme, and the problems to solve included reducing operating costs, improving company health and safety performance, connecting more effectively with customers, and promoting knowledge sharing across the company. More than 460 employees participated, submitting a total of 99 ideas and more than 200 comments on others' ideas. A handful of the ideas will be selected for development, testing and, potentially, implementation.

## EPCOR Utilities enhances productivity with digital tools field workers helped develop

Field workers at EPCOR Utilities Inc. now have easy access to plans, blueprints, procedures, and other documents relevant to their task thanks to a 2016 initiative that equipped workers with Surface Pro tablets. The company also developed an app in-house for the tablets that gives field workers the tools to conveniently and reliably create comprehensive safe work plans. Developed with input from field workers, the app includes geo-tagging, time stamping, and other useful features.

## Championing diversity at Hydro Ottawa

A new diversity plan at Hydro Ottawa will help the company cultivate a talented workforce that reflects the diversity of the communities the utility serves. Through the plan, the company hopes to increase the number of women, members of visible minority groups, people with disabilities, youth, LGBTQ, newcomers to Canada, and indigenous people in its workforce. Implementation of the plan, which includes initiatives intended to foster overall inclusion as well as specific initiatives targeting particular groups, will be overseen by Hydro Ottawa's diversity council.

## TransCanada among country's top 100 R&D spenders

TransCanada's commitment to advancing technologies and techniques that help the environment earned it a place on Research Infosource's Top 100 Corporate R&D Spenders list for 2016. Over the last five years the company has invested more than \$141 million in technology that has helped reduce environmental impacts across the industry. Past initiatives include developing a mathematical model to quantify site contamination and reducing the need for invasive testing and extensive site remediation.

# GLOSSARY OF KEY TERMS

**All injury frequency rate** is based on the total number of fatalities and lost-time injuries, plus the total number of medical treatment injuries that occurred in the calendar year. Specifically, the all injury frequency rate =  $[(\# \text{ of fatalities} + \# \text{ of lost-time injuries} + \# \text{ of medical treatment injuries}) \times 200,000] / \text{exposure hours}$ .

**Biodiversity** includes the diversity of ecosystems, the species within those ecosystems and the genetic diversity that exists within species. It is a holistic concept referring to the entire ecosphere, including all of its ecosystems and the evolutionary processes that allow it to function and evolve.

**Capital expenditure** refers to the cost of construction for new generation, transmission and distribution facilities (e.g., units, plants, lines, substations); the cost of refurbished generation, transmission and distribution facilities (e.g. betterments and replacements of existing generating units); and expenditures for the purchase or acquisition of pre-existing facilities.

**Carbon dioxide equivalent (CO<sub>2</sub>e)** is a universal measure of global warming potential for greenhouse gas emissions (GHGs). Carbon dioxide is used as a reference gas against which the other GHGs are measured because it has the smallest global warming potential. The global warming impact of all GHGs is measured in terms of equivalency to the impact of CO<sub>2</sub> via global warming potentials.

**Climate change adaptation** refers to an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

**Lost-time injury frequency rate** is based on the total number of lost-time injuries or illnesses that occurred in the calendar year. Specifically, the lost-time injury frequency rate =  $(\# \text{ of lost-time injuries} \times 200,000) / \text{exposure hours}$ .

**Lost-time injury severity rate** is calculated as follows: lost-time injury severity rate =  $(\# \text{ of lost days} \times 200,000) / \text{exposure hours}$ .

**Priority spills** refers to petroleum spill that is more than 500 litres, contains more than one gram of polychlorinated biphenyls (PCBs), and any volume of petroleum-based or PCB-contaminated substance that enters a water body.

**Sulphur hexafluoride (SF<sub>6</sub>)** is a colourless, odourless and non-flammable GHG with a very high global warming potential. It is used by the electricity industry as a gaseous insulator for high-voltage circuit breakers, switchgear and other equipment, often replacing harmful PCBs.

**System Average Interruption Duration Index (SAIDI)** is defined as the system average interruption duration for customers served per year. Specifically, SAIDI =  $\text{total customer-hours of interruptions} / \text{total customers served}$ .

**System Average Interruption Frequency Index (SAIFI)** is defined as the average number of interruptions per customer served per year. Specifically, SAIFI =  $\text{total customer interruptions} / \text{total customers served}$ .