INTERNATIONAL ENERGY AGENCY

WORKSHOP REPORT 2016

# Sixth Forum on the Climate-Energy Security Nexus

*Emerging Best Practices and Lessons for North America*

*George Kamiya*

## INTERNATIONAL ENERGY AGENCY

The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA carries out a comprehensive programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency's aims include the following objectives:

- Secure member countries' access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.
- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
- Improve transparency of international markets through collection and analysis of energy data.
- Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
- Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations and other stakeholders.

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The European Commission also participates in the work of the IEA.

International Energy Agency
Secure Sustainable Together



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# Acknowledgements

The workshop was organised by the International Energy Agency (IEA) Energy Environment Division (George Kamiya), Natural Resources Canada (Catherine Marchand; Mary-Ann Wilson) and the US Department of Energy (Craig Zamuda) with support from Secretaría de Energía de México (Leonardo Beltrán Rodríguez, Karina Lopez Sanchez, Rodrigo Jimenez Silva). Philippe Benoit (Head, IEA EED) and Takashi Hattori (Head, IEA Environment & Climate Change Unit) provided overall guidance. Sarah Kennedy and Nicholas Gall (IEA) provided administrative support.

The workshop was funded by Natural Resources Canada and initiated under Canada's Adaptation Platform Energy Working Group.

# Introduction

This document provides a summary of the presentations and discussions from the *Sixth Forum on the Climate-Energy Security Nexus: Emerging Best Practices and Lessons for North America* held in Ottawa on 7 June 2016. The workshop is an activity under the North American Energy Ministers trilateral Memorandum of Understanding Concerning Climate Change and Energy Collaboration and the outcomes will support identifying potential trilateral activities to further climate change adaptation and resilience.

Over 60 representatives from industry, government, and NGOs from organisations in Canada, the United States, Mexico, France, Switzerland, and the United Kingdom participated in the one-day workshop:

- AECOM
- Argonne National Laboratory
- AVANGRID
- California Public Utilities Commission (CPUC)
- Canadian Association of Petroleum Producers (CAPP)
- Canadian Electricity Association (CEA)
- Canadian Gas Association
- Canadian Hydropower Association
- Canadian Nuclear Association
- Canadian Nuclear Safety Commission (CNSC)
- Canadian Solar Industries Association (CanSIA)
- Center for Climate and Energy Solutions (C2ES)
- Chartered Professional Accountants of Canada (CPAC)
- Comisión Federal de Electricidad (CFE)
- Electric Power Research Institute (EPRI)
- Engineers Canada
- Environment & Climate Change Canada (ECCC)
- Insurance Bureau of Canada
- International Energy Agency (IEA)
- IQCarbone
- International Organization for Standardization (ISO)
- Manitoba Hydro
- McKinsey & Company
- Meteorological Service of Canada
- National Energy Board
- New Brunswick Power Corporation
- New York City
- National Oceanic and Atmospheric Administration (NOAA)
- Natural Resources Canada (NRCan)
- Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR)
- Ontario Energy Board
- Ontario Power Generation
- Ouranos
- Pembina Institute
- Public Safety Canada
- QUEST Canada
- Sacramento Municipal Utility District (SMUD)
- Secretaría de Energía de México (SENER)
- Southern California Edison
- Toronto Hydro
- University of East Anglia
- University of Calgary
- University of Waterloo
- US Department of Energy (US DOE)
- World Meteorological Association (WMO)
- World Energy and Meteorology Council (WEMC)
- Zizzo Law

The workshop agenda and presentations are available online at:
http://www.iea.org/workshops/6th-nexus-forum-north-america.html

# Welcome and opening remarks



Senior representatives from Natural Resources Canada (**Judith Bossé**), Secretaría de Energía de México (**César Contreras Guzmán**), and the US Department of Energy (**Craig Zamuda**) welcomed participants and asserted the importance of this event to promote dialogue across North America (and beyond) to enhance climate resilience in the energy sector.

Canada, Mexico, and the United States are strongly committed to addressing the climate challenge through domestic and international efforts on mitigation and adaptation. Speakers highlighted examples of recent collaborative efforts involving the three countries (e.g. North American Energy Ministers Action Plan; Mission Innovation), and noted this workshop's importance as a formal short-term trilateral deliverable of the North American Energy Ministers' Action Plan under the MOU on climate change and energy collaboration, to promote trilateral exchange of best practice on adaptation in the energy sector.

# Session 1: Climate risks faced by the North American energy sector



Government representatives from the energy ministries of Canada, Mexico, and the United States provided an overview of the climate risks facing the North American energy sector, with presentations from **Mary Preville** (NRCan), **César Contreras Guzmán**, (SENER), and **Craig Zamuda** (US DOE). **Andrew Hoell** (NOAA) discussed the availability and role of climate data and projections to identify, assess, and prioritise risks. **Philippe Benoit** (IEA) moderated the session.

- **Canada** is already facing average warming of 1.5°C and increased precipitation trends, with large variations between regions (e.g. 2.5°C warming in the north). Projected increases in extreme weather events, warmer temperatures (contributing to sea level rise and increased likelihood of wildfires), and changes to water availability are expected to impact energy demand, supply, and transmission. Canada's Adaptation Platform (chaired by NRCan) is working to generate and share knowledge to enhance resilience. Speakers in other sessions (Toronto Hydro, Ouranos) spoke about some of the projects under the Adaptation Platform's Energy Working Group.
- **Mexico's** energy demand and $CO_2$ emissions are expected to grow over the next 15 years, driven by a growing (and increasingly urban) population with higher vehicle ownership rates. Recent legislation (e.g. 2012 General Law on Climate Change, 2015 Energy Transition Act) and associated instruments (e.g. Special Program on Climate Change) aim to mitigate and adapt to the impacts of climate change. Mexico is looking at how climate change scenarios may result in increased frequency of tropical cyclones, heavy precipitation events, and extreme heat days. SENER has also mapped renewable energy potential (solar, wind, geothermal) across the country.
- Climate change and extreme weather are already affecting the energy sector across all regions of the **United States** and all energy technologies. Projected climate trends, including increases in air and water temperatures, increasing probability of heat events, decreasing water availability, sea level rise, and increased storm events are likely to impact the energy sector; recent events across the country illustrate the energy sector's vulnerability to changing climatic conditions. The US Department of Energy is supporting efforts to integrate climate resilience into energy infrastructure design by: improving understanding of climate change at the regional level (2015 report); improving methodologies, tools, and information for climate resilience planning; collaborating with other agencies and organisations to provide down-scaled climate science information (e.g. climate resilience toolkit); establishing public-private partnerships to accelerate investments in climate resilience infrastructure (e.g. Partnership for Energy Sector Climate Resilience); and conducting research, development, demonstration and deployment of innovative "climate resilience" energy technologies.
- **Climate models** replicate the physics of the climate system by separating the Earth and its atmosphere into finite areas and solving the equations in those finite areas. Climate models can be used for seasonal forecasts (e.g. North American Multi-Model Ensemble) and long-term projections. Long-term projections of surface temperature and precipitation at regional scales should be used with caution: the IPCC AR5 noted lower confidence of model capability at regional scales; in particular, for precipitation. Downscaled climate projections such as the NASA NEX-GDDP dataset are available, comprised of downscaled climate scenarios for the globe derived from the General Circulation Model (GCM) runs conducted under CMIP5 and across the four GHG emissions scenarios (RCPs). With increasing shares of weather-dependent renewables

(e.g. wind), knowledge of both inter-annual variations of wind and solar resources, and of their long-term trends with climate change, will be important for the future grid.

- The current pace, scale, and scope of combined public and private efforts to improve climate change preparedness and resilience need to increase, given the challenges identified. Governments in partnership with other stakeholders can play a critical role in enhancing climate-resilient energy technologies, fostering enabling policies at all levels, providing technical information and assistance, and convening and partnering with stakeholders.



**Related resources:**

- Canada's Adaptation Platform
- The Adaptation Platform Webinar Series
- Natural Resources Canada (2014) Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation
- Natural Resources Canada (2016) Canada's Marine Coasts in a Changing Climate
- North American Cooperation on Energy Information (NACEI) CCMEO's Mapping of Energy Infrastructure
- Secretaría de Gobernación México Programma Especial de Cambio Climático (Special Program on Climate Change 2014-2018).
- US Department of Energy (2015) Climate Change and the U.S. Energy Sector: Regional Energy Sector Vulnerabilities and Resilience Solutions
- US Department of Energy (2016) Climate Change and the U.S. Electricity Sector: Guide for Assessing Vulnerabilities and Developing Resilience Solutions to Sea Level Rise
- US Department of Energy (2015) Quadrennial Technology Review
- US Department of Energy (2015) Quadrennial Energy Review
- US Department of Energy US Climate Resilience Toolkit
- US Department of Energy Partnership for Energy Sector Climate Resilience
- National Oceanic and Atmospheric Administration (NOAA). North American Multi-Model Ensemble
- NOAA Climate Change Web Portal
- NASA NEX Global Daily Downscaled Climate Projections

# Session 2: Best practices in building resilience into energy infrastructure



Speakers from government and industry (oil & gas and electricity sectors) presented case studies highlighting best practices in building resilience into energy infrastructure, from risk identification and assessment to resilience-building actions. The panel consisted of **Devin McCarthy** (Canadian Electricity Association), **Hani Taki** (Toronto Hydro), **Guenter Conzelmann** (Argonne National Laboratory), **Ke Wei** (New York City), and **Jan Dell** (AECOM). **Craig Zamuda** (US DOE) moderated the session.

- The Canadian Electricity Association (CEA) report, *Adapting to Climate Change: State of Play and Recommendations for the Electricity Sector in Canada* (2016), outlines the climate risks and opportunities for the **electricity sector in Canada**. Major climate risks include changes in electricity demand (increase in summer, decrease in winter), impacts on supply (e.g. changes in hydro availability, reduced transmission at higher temperatures, changes in wind patterns), and risks to infrastructure (e.g. flooding). Electric utilities can better adapt to these risks by: 1) addressing data requirements; 2) developing adaptation management plans; 3) understanding climate risks from multiple perspectives; 4) exchanging best practices in the incorporation of climate models; 5) reviewing electricity system standards; and 6) piloting and deploying technology solutions. CEA has outlined recommendations for federal and provincial/territorial governments:
    - Federal governments: 1) Develop a national adaptation strategy; 2) Support scientific research and event-driven climate data development; 3) Improve national understanding of climate change impacts; 4) Enable cross-border coordination and risk management; 5) Improve flood plain mapping and building codes; 6) Export the Adaptation Platform model.
    - Provincial/territorial governments: 1) Require municipalities to develop adaptation plans to operationalize provincial objectives; 2) Establish policies recognizing the economics of addressing climate risks in electricity; 3) Work with legislators and regulators to define appropriate investment mechanisms (e.g. rate-setting, dedicated cost recovery, performance-based regulation).
- **Toronto Hydro** has conducted a climate change vulnerability assessment of its entire distribution system (Phase 2, completed June 2015) covering a range of parameters (e.g. >40°C days, high winds, freezing rain, extreme rainfall) using Engineers Canada's Public Infrastructure Engineering Vulnerability Committee (PIEVC) Engineering Protocol. Outputs such as risk maps and other findings are feeding back into current planning and actions. Ongoing system resilience enhancements include tree trimming standards, overhead infrastructure relocation, and the use of new technologies (e.g. breakaway connectors, stainless steel submersible transformers).
- **Argonne National Laboratory** has broad energy resilience capabilities, from scenario definition to physical impact assessment, system modelling to system restoration modelling (i.e. from data to resilience options). Recently, Argonne has been doing work for the US Department of Defence, downscaling global climate data (250km) into high-resolution (12km) climate projections/probabilities for regional assessments, which they will soon make available to the public (for all of North America). A guide on how to incorporate these products into vulnerability and impact assessments has been developed. Argonne has a number of energy sector resilience modelling tools for

different purposes, e.g. EPFAST: impacts of power outages on large electric grids, NGfast: natural gas – electric interdependency, POLfast: impacts to petroleum sector. Argonne is also doing work on regional energy resilience for the Department of Homeland Security (DHS) looking at multiple infrastructure systems at the same time, e.g. impacts in Maine.



- **New York City** has coordinated and led energy system resilience efforts prior to and since Hurricane Sandy in three areas: utilities, liquid fuels, and infrastructure. NYC collaborated with Con Edison (which provides electricity and gas to most NYC residents) on storm-hardening projects focused on minimising and mitigating the effects of flooding, storm surge, and high winds on critical equipment, and supporting a fast, flexible system recovery. Risk and asset prioritisation modelling was informed by a societal cost-benefit analysis. On liquid fuels, NYC is working to assess key fuel terminals for climate vulnerability and to develop a communications protocol and an emergency fuel plan. The Climate Change Adaptation Task Force (CCATF), established in 2008, recently reconvened in June 2015. The group aims to identify critical infrastructure at risk from the effects of climate change, facilitate knowledge sharing, develop coordinated adaptation strategies, and communicate these findings and recommendations.
- The **oil & gas sector** has projects and operations in regions of greatest projected temperature rise and impact (Arctic) and potential sea level rise, and operations that demand large volumes of water (e.g. shale gas). Climate impacts can affect exploration, production, transport, terminals, pipelines, refining & processing, and neighbouring communities. Upstream-midstream-downstream oil and gas operations/facilities are generally resilient to weather-related events now and projected impacts of climate change in next 40 years, *within* fenceline operations. Generally, projects have been designed with safety factors for extreme events (e.g. 100-yr wave height or flood event). The Hurricane Isaac (2012) experience demonstrated effective resilience planning by the oil and gas sector. However, climate change impacts, particularly extreme events, have the greatest impact to the industry through the damage caused to communities and disruptions *outside* of facility fencelines. Looking ahead, the industry aims collaborate further with external groups to develop forward-looking datasets with granularity needed for input into design and operation.

**Related resources:**

- Canadian Electricity Association (2016) Adapting to Climate Change: State of Play and Recommendations for the Electricity Sector in Canada
- ZizzoAllan (2014) Understanding Canadian Electricity Generation and Transmission Sectors' Action and Awareness on Climate Change and the Need to Adapt
- Public Infrastructure Engineering Vulnerability Committee (PIEVC) Engineering Protocol
- Strategic Environmental Research and Development Program (2016). Use of Climate Information for Decision-Making and Impacts Research: State of Our Understanding
- Argonne National Laboratory Resilient Infrastructure Capabilities
- Argonne National Laboratory Resilient Infrastructure Publications
- Building the Knowledge Base for Climate Resiliency: New York City Panel on Climate Change 2015 Report

# Session 3: Investing in resilience infrastructure

In this session, panellists **Janet Peace** (C2ES), **Sarah Keyes** (Chartered Professional Accountants of Canada), **Kristin Ralff Douglas** (California Public Utilities Commission), and **Becca O'Brien Kuusinen** (McKinsey & Company) discussed different ways to finance resilience-building actions, as well as the regulatory challenges for approving resilience investments. The session was moderated by **Nick Xenos** (NRCan).

- The **Center for Climate and Energy Solutions** (C2ES) report, *Weathering the Next Storm: A Closer Look at Business Resilience*, examines how companies are preparing for climate risks and the barriers to investment in climate resilience (e.g. lack of awareness, misaligned incentives, uncertain returns). A number of options and emerging financing models can help to overcome some of these barriers, e.g., energy resilience banks (New Jersey), resilience bonds (e.g. Swiss Re and RMS), and green bonds (e.g. Climate Bond Initiative, DC Water Authority green bond).
- Climate change is a strategic priority for the **Chartered Professional Accountants of Canada** (CPA). With enormous costs of inaction and infrastructure investment gaps, accountants and the broader financial sector have a role to play in enhancing energy sector resilience. CPA has conducted a series of adaptation case studies, including at Horizon Utilities in Ontario, where CPAs played a leadership role in risk management, capital budgeting and maintenance planning, and in ensuring data accuracy and quality. Demonstrating costs of action vs. inaction, using innovative financing structure and models (e.g. PPPs, green bonds), and open dialogue and collaboration among stakeholders to raise awareness can help build the business case for resilience infrastructure investments.
- **Regulators / utility commissions** have an important role to play in financing adaptation to climate change in the electricity sector. With new assets planned and coming on line, this is a key opportunity to build resilient infrastructure. Increased attention (and priority) towards adaptation and resilience investments requires a clear problem statement and time horizons, clear investment signals through regulatory certainty, and a clear supply curve of solutions. However, cost, cost-effectiveness, and cost-allocation are major barriers to investment (consumers cannot be expected to pay for everything). Utilities can use a number of tools to build a business case to finance resilience investments, including climate projections/scenarios, vulnerability assessments, resilience plans, and a robust decision-making framework.
- A new **McKinsey** report, *Financing change: How to mobilize private-sector financing for sustainable infrastructure*, examines how infrastructure (including energy), will be climate resilient, be socially inclusive (by diminishing poverty or increasing employment), and reduce carbon emissions. Attracting investment from all actors (governments, private sector, development banks, etc.) requires overcoming traditional barriers, such as lack of viable funding models, high development and transaction costs, inadequate risk-adjusted returns, and unfavourable regulatory and tax policy. Pulling the right levers can increase investment from private institutions by USD 1.2 trillion per year, e.g. using development capital to finance sustainability premiums, encouraging procurement processes that incorporate sustainability criteria, and adapting financial instruments to channel investments to sustainable infrastructure and increase liquidity. There are new opportunities for resilience investments through cat bonds, new modelling, (e.g. evaluating the value of green infrastructure) and pension funds.

**Related resources:**

- Center for Climate and Energy Solutions (2015) Weathering the Next Storm: A Closer Look at Business Resilience
- Chartered Professional Accountants of Canada (2015) Horizon Utilities: Adapting to climate change (Case study 5)
- California Public Utilities Commission (2016). Climate Adaptation in the Electric Sector: Vulnerability Assessments & Resiliency Plans
- CalAdapt Data Access
- McKinsey & Company (2016) The next generation of infrastructure

# Session 4: Tour de table

Participants were invited to briefly share insights and perspectives from their region and sector. The session was moderated by **Mary-Ann Wilson** (NRCan).



- The **Global Framework for Climate Services** (GFCS) is a UN-led initiative to guide the development and application of science-based climate information and services to support decision-making in climate-sensitive sectors, including energy.
- Participants noted the emerging importance of **climate risk and carbon disclosure** for corporate boards and financial markets. One participant reported that over 75 companies on the Toronto Stock Exchange (TSX) are now disclosing their climate risk. There is increasing appetite for corporate boards to have access to non-financial information (e.g. environmental) to better assess risk and develop strategy.
- **Sacramento Municipal Utility District** (SMUD) participates in the **Capital Region Climate Readiness Collaborative**, a forum for local and regional public and private organisations pursuing resilience-building activities.
- Engineers Canada has been working on adaptation for over 15 years and formed the **Public Infrastructure Engineering Vulnerability Committee** (PIEVC). Engineers Canada served as the host of the World Federation of Engineering Organisations - **Committee on Engineering and the Environment**, which engages in a facilitating role among its members and the WFEO community.
- **Quality Urban Energy Systems of Tomorrow (QUEST)** is a non-profit organisation that conducts research, engagement and advocacy to advance Smart Energy Communities in Canada. They recently completed a project/report on adaptation awareness, actions and policies in the energy distribution sector that documents how energy distribution companies are adapting to climate change, and assesses the role of policymakers and regulators in improving the resilience of energy distribution systems across Canada.
- **The Electric Power Research Institute (EPRI)** has initiated a new project on resilience metrics, looking at how to measure resilience and the potential for a standard framework. They are also investigating the implications of new demand (e.g. EVs), as well as cooling and heating rates and impacts on distribution lines under different temperatures.

# Session 5: International perspectives and collaboration



In this session, **Philippe Benoit** (International Energy Agency) and **Alberto Troccoli** (World Energy and Meteorology Council and University of East Anglia) provided an overview of resilience work underway at IEA and WEMC and best practices in collaboration. **Marco Braun** (Ouranos) shared lessons from case studies from around the world. The session was moderated by **Mary Preville** (NRCan).

- Ensuring energy security is a key priority of the **International Energy Agency**, and consequently, resilience is an important and emerging area of work. Resilience is an important issue in all mitigation scenarios (including 2°C), and impacts are already being felt by the energy sector today. With almost all of the projected growth in energy demand occurring outside of OECD countries and the changing (decarbonising) energy sector, the energy resilience effort needs to adapt to the energy sector of the future. Governments are key actors in enhancing resilience: by creating enabling frameworks and incentives to facilitate resilience-building by business; awareness raising and modelling; as services providers (climate services); managing own assets (utilities), financing and facilitating investments; and inter-governmental coordination. IEA is working to enhance energy sector resilience through dialogue facilitation (i.e. Nexus fora), data and modelling (e.g. World Energy Outlook), and policy analysis (e.g. chapter in upcoming Energy, Climate Change, and Environment 2016). OECD is also doing work on resilience infrastructure, and recently completed a survey of OECD countries on climate-resilient infrastructure (report due fall 2016).
- Energy and meteorology are closely connected, and both climate (warming) and energy systems (increased renewables) are changing rapidly, as are disasters related to natural events. Energy infrastructure managers need accessible, trustworthy data, information, and forecasts (e.g. river flow forecast for hydropower in France). The **Global Framework for Climate Services** (GFCS) is a UN-led initiative that provides a worldwide mechanism for coordinated actions to enhance the quality, quantity and application of climate services. Areas of focus for GCFS-Energy are: identification and resource assessment; impact assessments; site selection and financing; operations and maintenance; and energy integration. The **World Energy & Meteorology Council (WEMC)**, based out of the University of East Anglia, aims to enable improved sustainability, resilience and efficiency of energy systems under ever changing weather and climate.
- **Ouranos** has conducted 11 adaptation case studies in North America, Europe, Africa, and Australia covering a range of energy sectors, adaptation types and practices, and organisation. They are summarised in concise reports available online. Barriers to adaptation (e.g. complexity, climate skeptics) can be addressed by collaborating with climate experts, applying the precautionary principle, and avoiding calling warming "climate change". The case studies suggest that adaptation measures are ultimately a decision-making exercise, benefiting from a diverse set of alternative strategies (e.g. low regret options, different levels of trade-offs between resilience, environmental and technical performance, incremental approaches).

**Related resources:**

- IEA Resilience of the energy sector to climate change

- IEA (2015) Making the energy sector more resilient to climate change
- OECD Adaptation to climate change
- Global Framework for Climate Services (GFCS)
- GFCS (2015) Energy Exemplar
- World Energy & Meteorology Council
- Ouranos (2016) Energy Adaptation Case Studies

# Session 6: Wrap-up: gaps and opportunities



**Craig Zamuda** (US DOE) and **Mary-Ann Wilson** (NRCan) facilitated the wrap-up session, which sought to develop a list of potential action items to build on the momentum of the workshop, focusing on opportunities for collaboration to advance energy sector resilience to climate change in a North American context, as well as internationally.

Ten priority areas were identified (listed below) and discussed. From this list, participants were asked to submit their top 3 priority topic areas and a range of areas were highlighted with "Downscaled climate change data for the energy sector" mentioned most frequently. Further, it was noted that these results will help inform discussions for next steps for national and international adaptation and energy action including identifying collaboration activities to further climate change adaptation and resilience under the MOU concerning climate change and energy collaboration.

- **Downscaled climate change data for the energy sector**, including development of standardized/common climate projections (including standardised scenarios and time and space scales) and other related data (e.g. energy infrastructure data)
- **Knowledge, methods, and tools** to conduct vulnerability assessments, integrate climate change considerations into management practices, share lessons learned, financial valuation tools, etc. (including cost-benefit analysis tools to build the business case and justify investment in resilience)
- **Standards** (e.g. updated design standards and industry standards to better reflect changes in climate, extreme weather, and sea level rise)
- **Informing/educating regulators and stakeholders**, including the need to understand the efficacy of investments in resilience
- **Address vulnerability interdependencies** (e.g. supply chain, communication networks, transportation, communities), including vulnerabilities outside the fence line that directly affect energy resilience
- **Climate mitigation and resilience nexus**, including the implications of energy sector decarbonisation on resilience and the potential co-benefits of mitigation and resilience actions
- **Technological innovation**, including research, development, demonstration, and deployment of innovative energy technologies designed to meet current and future climate change threats
- **Governance and collaboration** to overcome cross-jurisdiction issues, particularly at the local and regional levels as 'implementers'
- **Financing mechanisms**, including the need for accepted cost-benefit models and tools to make the business case for resilience investments
- **Metrics for resiliency** for measuring progress and cost savings of resilience investments

# Annex: Agenda

**AGENDA**

Fairmont Château Laurier, Laurier Room - Tuesday, 7 June 2016



| | | |
|---|---|---|
| **8:30-9:00** | **Registration/Coffee** | |
| **9:00-9:30** | **Welcome and Opening Remarks** | |
| | ***Moderator:*** | ***Philippe Benoit***<br>*International Energy Agency* |
| | **Natural Resources Canada** | **Judith Bossé**<br>Assistant Deputy Minister and Chief Scientist, Earth Sciences Sector |
| | **Secretaría de Energía de México (SENER)** | **César Contreras Guzmán**<br>Chief Technical Adviser to the Deputy Secretary for Planning and Energy Transition |
| | **US Department of Energy** | **Craig Zamuda**<br>Senior Policy Advisor, Energy Policy and Systems Analysis |
| **9:30-10:40** | **1. Climate Risks Faced by the North American Energy Sector** | |
| | *Speakers in this session will provide an overview of the climate risks facing the North American energy sector and discuss the availability and role of data and modelling to identify, assess, and prioritize risks.*<br>• What are the main climate risks faced by the North American energy sector and what policies/programs are governments undertaking to address these risks?<br>• How do these risks differ among regions and countries? Among energy sub-sectors?<br>• What climate data and tools are available to identify and assess these risks? | |
| | ***Moderator:*** | ***Philippe Benoit***<br>*International Energy Agency* |
| | **Natural Resources Canada** | **Mary Preville**<br>Director General, Strategic Policy and Operations |
| | **Secretaría de Energía de México (SENER)** | **César Contreras Guzmán**<br>Chief Technical Adviser to the Deputy Secretary for Planning and Energy Transition |
| | **US Department of Energy** | **Craig Zamuda**<br>Senior Policy Advisor, Energy Policy and Systems Analysis |
| | **National Oceanic and Atmospheric Administration** | **Andrew Hoell**<br>Research Meteorologist, Earth System Research Laboratory |
| **10:40-11:00** | **Coffee break** | |

| 11:00-12:45 | 2. Best Practices in Building Resilience into Energy Infrastructure |
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*In this session, speakers will present case studies to highlight best practices in building resilience into energy infrastructure, from risk identification and assessment to resilience-building actions.*

- How have leading companies identified and characterized climate risks?
- What gaps (e.g. data) or barriers are creating challenges for energy operators in identifying climate risks on energy infrastructure?
- What adaptive practices are energy companies doing to address climate risks?
- How can best practices be transferred across the sector and to other sectors?
- How can policy-makers and other actors facilitate implementation?
- What are available technological solutions that can enhance energy infrastructure resilience?

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| ***Moderator:*** | ***Craig Zamuda***<br>*US Department of Energy* |
| **Canadian Electricity Association** | **Devin McCarthy**<br>Director, Generation and Environment |
| **Toronto Hydro** | **Hani Taki**<br>Manager, Standards & Policy Planning |
| **Argonne National Laboratory** | **Guenter Conzelmann**<br>Director, Center for Energy, Environmental, and Economic Systems Analysis |
| **New York City** | **Ke Wei**<br>Senior Policy Adviser for Energy, New York City Mayor's Office of Recovery & Resiliency |
| **AECOM** | **Jan Dell**<br>Vice President, Strategic Development |

| 12:45-13:45 | Lunch |
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| 13:45-15:00 | 3. Investing in Resilience Infrastructure |
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| | *In this session, speakers will discuss different ways to finance resilience-building actions, as well as the regulatory challenges for approving resilience investments.*<br><br>• What are some successful models being used to finance infrastructure hardening projects and other resilience-building activities?<br>• Where are the gaps in financing resilient infrastructure?<br>• What are the respective roles of the public and private sectors in driving resilience-building investment? What role can the insurance sector play in creating innovative risk-sharing models?<br>• What data and/or tools do utilities need to build a business case to access funding for resilience-building (e.g. raising consumer rates)?<br>• How can regulators/utility commissions facilitate resilience building activities? |
| | ***Moderator:*** ***Nick Xenos***<br>*Natural Resources Canada* |
| | **Center for Climate and Energy Solutions (C2ES)** **Janet Peace**<br>Senior Vice President, Policy and Business Strategy |
| | **Chartered Professional Accountants of Canada** **Sarah Keyes**<br>Principal, Sustainability |
| | **California Public Utilities Commission** **Kristin Ralff Douglas**<br>Senior Policy Analyst, Climate Change |
| | **McKinsey & Company** **Becca O'Brien Kuusinen**<br>Associate Principal |
| **15:00-15:40** | **4. Tour de table / Open Roundtable** |
| | *In this open moderated session, all participants are invited to briefly share insights and perspectives from their region and sector.* |
| | ***Moderator:*** ***Mary-Ann Wilson***<br>*Natural Resources Canada* |
| **15:40-16:00** | **Coffee Break** |

| 16:00-17:00 | 5. International Perspectives and Collaboration |
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*Speakers will share lessons from international perspectives, including best practices in resilience building activities and collaboration.*

- What transferrable lessons from the international community can be applied to the North American context?
- How can regulatory solutions enhance climate resilience and ensure universal standards?
- How can governments, businesses, and other actors work to enhance North American collaboration on energy sector resilience?

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|---|---|
| ***Moderator:*** | ***Mary Preville***<br>*Natural Resources Canada* |
| **International Energy Agency** | **Philippe Benoit**<br>Head, Energy Environment Division |
| **World Energy & Meteorology Council** | **Alberto Troccoli**<br>Managing Director |
| **Ouranos** | **Marco Braun**<br>Hydroclimatology Specialist |

| 17:00-17:30 | 6. Wrap-up session: gaps and opportunities |
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*The aim of this session will be to develop a list of potential action items to build on the momentum of the workshop, focusing on opportunities for collaboration to advance energy sector resilience to climate change in a North American context, as well as internationally.*

- How can policy-makers facilitate implementation? What roles can the private sector play?
- How can best practices be transferred across one sector and beyond?
- What opportunities to collaborate can be seized to move forward on infrastructure and climate resilience in a North American and/or international context?

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| ***Moderators:*** | ***Craig Zamuda****, US Department of Energy*<br>***Mary-Ann Wilson****, Natural Resources Canada* |

| 17:30-17:45 | Closing Remarks |
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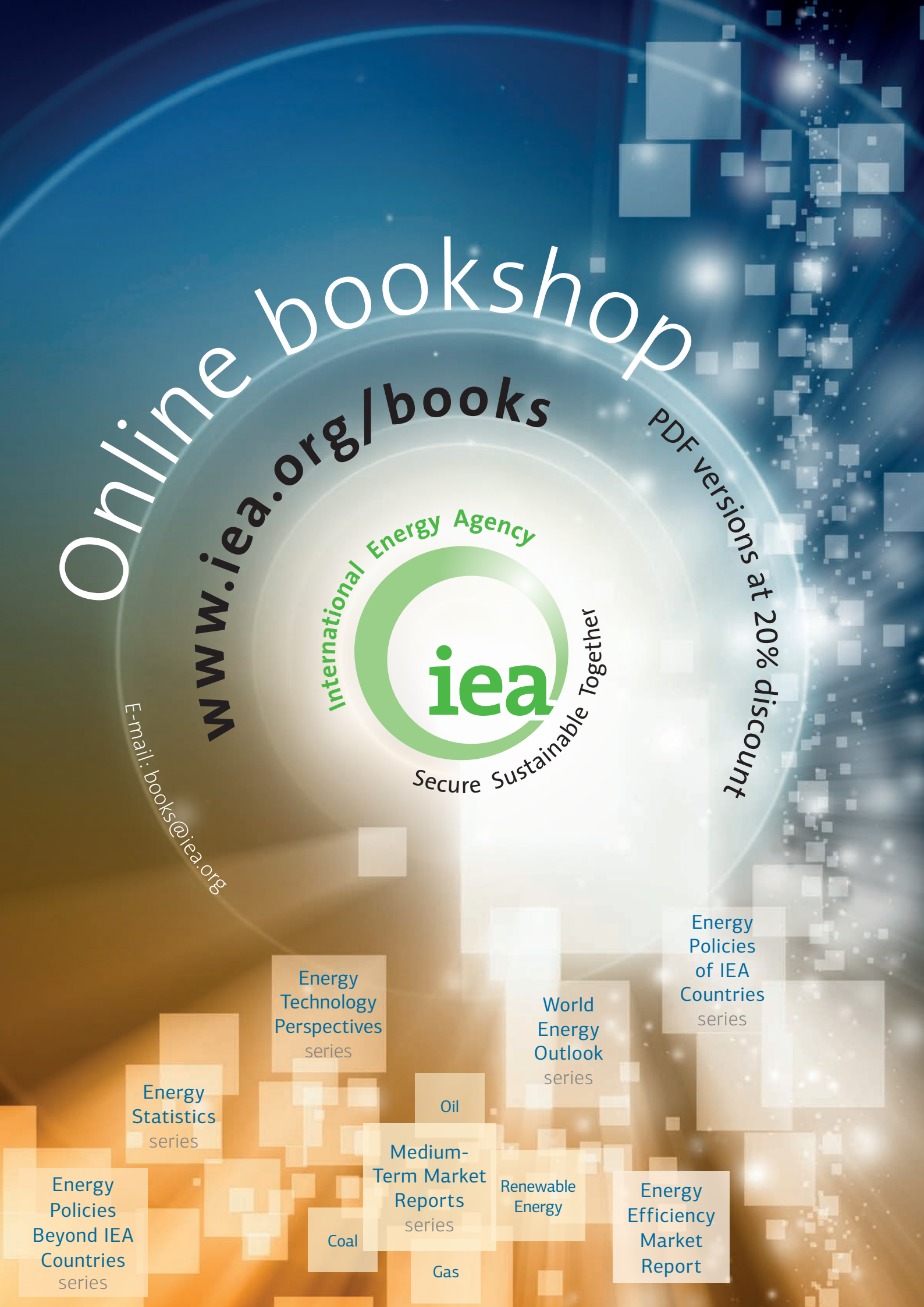
| **Natural Resources Canada** | **Mary Preville**<br>Director General, Strategic Policy and Operations |
| **International Energy Agency** | **Philippe Benoit**<br>Head, Energy Environment Division |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Printed in France by IEA, August 2016