

## **6<sup>th</sup> Forum on the Climate-Energy Security Nexus**

*Emerging Best Practices and Lessons for North America in Enhancing Energy Sector Resilience*

7 June 2016

Fairmont Château Laurier, Ottawa, Canada

In North America (Canada, US, and Mexico), climate change – through extreme weather events, rising average temperatures, and hydrological changes – poses risks to our energy systems, and thereby our energy security, by altering energy demand, disrupting energy supply and damaging energy infrastructure:

- Increasing frequency and magnitude of extreme weather events cause physical damage to energy infrastructure including electricity transmission and distribution, generation, and transportation, causing disruptions in the supply of electricity and other fuels. Coastal and off-shore infrastructure including oil refineries, power plants, and oil and gas infrastructure may be especially vulnerable due to sea level rise, flooding, and extreme winds.
- Increasing water stresses have direct repercussions on hydropower generation, which in Canada comprises almost two-thirds of the electricity generation mix. Thermal power generation (using fossil fuels and nuclear power) is also highly dependent on the availability of water for steam cooling. Rising water constraints can increase cooling costs for power plants and may require adoption of alternative cooling technologies or improved water management practices. Oil and gas extraction, especially secondary and tertiary (enhanced) oil recovery and unconventional gas extraction, are also dependent on water.
- Rising temperatures reduce the efficiency of electricity transmission and distribution lines, as well as that of thermal processes in power plants. These changes will also affect energy demand, by reducing space heating demand in the winter but increasing cooling demand during the summer months.
- Looking ahead, a decarbonising energy system characterised by increased electrification, more variable renewable energy, and other low-carbon energy technologies (e.g. CCS) may alter the nature of the climate-resiliency challenge, including changes to water demand, the ability to localise and buffer supply disruptions, and risks from extreme weather events.

This event is the sixth in the series of Climate-Energy Security Nexus Forums, launched by the IEA in 2012 to raise awareness about the risks faced by the energy sector from climate change and to facilitate dialogue between businesses, researchers, and policy-makers to explore and share ideas on enhancing energy sector resilience to potential impacts. This 6<sup>th</sup> Nexus Forum will:

- a) highlight examples of practices by North American companies and utilities in dealing with climate change impacts, with a focus on the electricity and oil and gas sectors;
- b) identify best practices and innovative models for financing resilience-building investments;
- c) identify needs and opportunities for policy interventions;
- d) explore opportunities to strengthen North American and international collaboration in resilience.

## AGENDA

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

<b>8:30-9:00</b>	<b>Registration/Coffee</b>										
<b>9:00-9:30</b>	<b>Welcome and Opening Remarks</b>										
	<table> <tr> <td><b>Moderator:</b></td><td><b>Philippe Benoit</b> <i>International Energy Agency</i></td></tr> <tr> <td><b>Natural Resources Canada</b></td><td><b>Judith Bossé</b> Assistant Deputy Minister and Chief Scientist, Earth Sciences Sector</td></tr> <tr> <td><b>Secretaría de Energía de México (SENER)</b></td><td><b>César Contreras Guzmán</b> Chief Technical Adviser to the Deputy Secretary for Planning and Energy Transition</td></tr> <tr> <td><b>US Department of Energy</b></td><td><b>Craig Zamuda</b> Senior Policy Advisor, Energy Policy and Systems Analysis</td></tr> </table>	<b>Moderator:</b>	<b>Philippe Benoit</b> <i>International Energy Agency</i>	<b>Natural Resources Canada</b>	<b>Judith Bossé</b> Assistant Deputy Minister and Chief Scientist, Earth Sciences Sector	<b>Secretaría de Energía de México (SENER)</b>	<b>César Contreras Guzmán</b> Chief Technical Adviser to the Deputy Secretary for Planning and Energy Transition	<b>US Department of Energy</b>	<b>Craig Zamuda</b> Senior Policy Advisor, Energy Policy and Systems Analysis		
<b>Moderator:</b>	<b>Philippe Benoit</b> <i>International Energy Agency</i>										
<b>Natural Resources Canada</b>	<b>Judith Bossé</b> Assistant Deputy Minister and Chief Scientist, Earth Sciences Sector										
<b>Secretaría de Energía de México (SENER)</b>	<b>César Contreras Guzmán</b> Chief Technical Adviser to the Deputy Secretary for Planning and Energy Transition										
<b>US Department of Energy</b>	<b>Craig Zamuda</b> Senior Policy Advisor, Energy Policy and Systems Analysis										
<b>9:30-10:40</b>	<b>1. Climate Risks Faced by the North American Energy Sector</b>										
	<p><i>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.</i></p> <ul style="list-style-type: none"> <li>• What are the main climate risks faced by the North American energy sector and what policies/programs are governments undertaking to address these risks?</li> <li>• How do these risks differ among regions and countries? Among energy sub-sectors?</li> <li>• What climate data and tools are available to identify and assess these risks?</li> </ul> <table> <tr> <td><b>Moderator:</b></td><td><b>Philippe Benoit</b> <i>International Energy Agency</i></td></tr> <tr> <td><b>Natural Resources Canada</b></td><td><b>Mary Preville</b> Director General, Strategic Policy and Operations</td></tr> <tr> <td><b>Secretaría de Energía de México (SENER)</b></td><td><b>César Contreras Guzmán</b> Chief Technical Adviser to the Deputy Secretary for Planning and Energy Transition</td></tr> <tr> <td><b>US Department of Energy</b></td><td><b>Craig Zamuda</b> Senior Policy Advisor, Energy Policy and Systems Analysis</td></tr> <tr> <td><b>National Oceanic and Atmospheric Administration</b></td><td><b>Andrew Hoell</b> Research Meteorologist, Earth System Research Laboratory</td></tr> </table>	<b>Moderator:</b>	<b>Philippe Benoit</b> <i>International Energy Agency</i>	<b>Natural Resources Canada</b>	<b>Mary Preville</b> Director General, Strategic Policy and Operations	<b>Secretaría de Energía de México (SENER)</b>	<b>César Contreras Guzmán</b> Chief Technical Adviser to the Deputy Secretary for Planning and Energy Transition	<b>US Department of Energy</b>	<b>Craig Zamuda</b> Senior Policy Advisor, Energy Policy and Systems Analysis	<b>National Oceanic and Atmospheric Administration</b>	<b>Andrew Hoell</b> Research Meteorologist, Earth System Research Laboratory
<b>Moderator:</b>	<b>Philippe Benoit</b> <i>International Energy Agency</i>										
<b>Natural Resources Canada</b>	<b>Mary Preville</b> Director General, Strategic Policy and Operations										
<b>Secretaría de Energía de México (SENER)</b>	<b>César Contreras Guzmán</b> Chief Technical Adviser to the Deputy Secretary for Planning and Energy Transition										
<b>US Department of Energy</b>	<b>Craig Zamuda</b> Senior Policy Advisor, Energy Policy and Systems Analysis										
<b>National Oceanic and Atmospheric Administration</b>	<b>Andrew Hoell</b> Research Meteorologist, Earth System Research Laboratory										
<b>10:40-11:00</b>	<b>Coffee break</b>										

## 11:00-12:45 2. Best Practices in Building Resilience into Energy Infrastructure

*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?

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

**12:45-13:45 Lunch**

### 13:45-15:00 3. Investing in Resilience Infrastructure

*In this session, speakers will discuss different ways to finance resilience-building actions, as well as the regulatory challenges for approving resilience investments.*

- What are some successful models being used to finance infrastructure hardening projects and other resilience-building activities?
- Where are the gaps in financing resilient infrastructure?
- 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?
- What data and/or tools do utilities need to build a business case to access funding for resilience-building (e.g. raising consumer rates)?
- How can regulators/utility commissions facilitate resilience building activities?

<b>Moderator:</b>	<b>Nick Xenos</b> Natural Resources Canada
-------------------	---

<b>Center for Climate and Energy Solutions (C2ES)</b>	<b>Janet Peace</b> Senior Vice President, Policy and Business Strategy
---	---

<b>Chartered Professional Accountants of Canada</b>	<b>Sarah Keyes</b> Principal, Sustainability
---	---

<b>California Public Utilities Commission</b>	<b>Kristin Ralff Douglas</b> Senior Policy Analyst, Climate Change
---	---

<b>McKinsey &amp; Company</b>	<b>Becca O'Brien Kuusinen</b> 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.*

<b>Moderator:</b>	<b>Mary-Ann Wilson</b> Natural Resources Canada
-------------------	--

### 15:40-16:00 Coffee Break

## 16:00-17:00 5. International Perspectives and Collaboration

*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?

**Moderator:** **Mary Preville**  
 Natural Resources Canada

**International Energy Agency** **Philippe Benoit**  
 Head, Energy Environment Division

**World Energy & Meteorology Council** **Alberto Troccoli**  
 Managing Director

**Ouranos** **Marco Braun**  
 Hydroclimatology Specialist

## 17:00-17:30 6. Wrap-up session: gaps and opportunities

*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?

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

## 17:30-17:45 Closing Remarks

**Natural Resources Canada** **Mary Preville**  
 Director General, Strategic Policy and Operations

**International Energy Agency** **Philippe Benoit**  
 Head, Energy Environment Division