

5th Forum on the Climate- Energy Security Nexus

Policies and Practices to Enhance Energy Sector Resilience

George Kamiya and Caroline Lee

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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Acknowledgements

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The workshop was a success thanks to the interesting discussions made possible by insightful meeting participants, inspired by wonderful presentations of the speakers and led by skilful moderators.

Executive Summary

In order to enhance resilience of the energy sector to the impacts of climate change, policy responses at multiple jurisdictional levels are needed. The IEA's 5th *Forum on the Climate-Energy Security Nexus: Policies and Practices to Enhance Energy Sector Resilience* focused on the development of such policies and was structured to answer the following questions: what policies have already been developed and implemented, what gaps exist, and where resilience policies need to move going forward. The workshop agenda was built around the following key issues:

- The emerging policy space: climate impacts and resilience policies in today's environment
- The state of science in defining climate impacts
- National, sub-national and local government policy responses to enhancing resilience
- Private sector and investment responses to enhancing resilience
- International stakeholders and their role in resilience-building

A number of important themes emerged from the discussions, including the urgency of resilience-building, the inter-linkages between climate mitigation and adaptation measures, the critical role of cross-sectoral and cross-jurisdictional collaboration, and the need to mainstream resilience-building practices into government and business policies and practices.

The IEA can play an important role in sharing best practices, facilitating cooperation among countries, providing policy advice, convening forums, engaging the financial community, and facilitating private-public dialogue. The IEA will begin analysis based on the outcomes of this workshop.

Background

On November 4, 2014, the IEA hosted the 5th *Forum on the Climate-Energy Security Nexus: Policies and Practices to Enhance Energy Sector Resilience*. The meeting took place at the IEA headquarters in Paris.

The workshop focused on the policy responses that could facilitate energy sector resilience, and considered the potential role of governments, businesses, and organisations in enhancing energy sector planning and resilience building through regulations, guidelines, and partnerships.

[Over 70 participants](#) from Europe, China, Japan, Korea, the Philippines, the United States, Canada, Mexico, Brazil, and South Africa attended the workshop. Participants represented national, regional, and local governments, insurance and investment companies, industries, scientific institutions, and international organisations.

Welcome and opening remarks

Maria van der Hoeven, Executive Director of the International Energy Agency, and Nicholas Bridge, British Ambassador and Permanent Representative to the OECD, opened the workshop.

Maria van der Hoeven stressed that the IEA's role in ensuring energy security includes considerations for the effects of climate change— both in terms of its impact on production and on demand. She highlighted the impact of extreme events (e.g. Hurricane Sandy, Typhoon Haiyan) on energy infrastructure and services, as well as the impact of droughts and heatwaves on hydro and nuclear power production. She outlined the objectives of the 5th Nexus Forum: to discuss, building on previous workshops, the policy responses required to enhance energy sector resilience, the roles of different stakeholders in the policy development process, and explore ideas for further work.

Nicholas Bridge recognised the political commitment to work on this issue. He stated that nuclear concerns and environment/climate concerns are linked and have created a diversified approach to energy in the UK. He referred to the 2007 flood event, which caused the largest electricity blackout since World War II and spurred the development of the Climate Change Act, which was partly established to reduce the impacts on the energy sector from climate change. He underlined the importance of embedding climate risk and adaptation into wider risk assessments and frameworks, and more broadly, that the energy-climate nexus approach is useful as energy risk and climate risks are closely linked.

Emerging policy space: energy sector adaptation to climate change

Speakers in this session shared their experiences with climate change impacts on the energy sector and policy responses in the United States, the Netherlands, China, and at an international level. This session was moderated by **Didier Houssin**, Director of Sustainable Energy Policy and Technology, IEA.

Alice Hill, Senior Advisor for Preparedness and Resilience at the United States White House, presented examples of recent climate-related impacts and resilience efforts in the United States. Resilience to climate change is a priority for the US, and a matter of national security. All federal agencies are required to engage in adaptation to climate change by developing adaptation plans. Ms. Hill noted the interdependencies between power, fuel supply and other services, in particular transport, health care, and food services, that became especially apparent in the aftermath of Hurricane Sandy. Climate change has affected power production (hydro, nuclear) and transmission across the country, through increased cooling demand of reactors, floods and drought affecting hydro production, and wild fires damaging transmission infrastructure. Considerable oil and gas production/capacity is situated in areas vulnerable to sea level rise. The US approach to resilience involves managing risks, developing national standards to drive local action, providing incentives, and collaboration with other governments. A recent study found that every dollar spent on preparedness saves society four dollars in losses.

Noe van Hulst, Ambassador and Permanent Representative of the Netherlands to the OECD shared the Dutch experience. The adaptation strategy in the Netherlands has been driven by water – 60% of the country is flood prone, and over nine million people live below sea level. An estimated 20 bn euro investment may be required to improve flood protection to 2030 to prepare for a worst case scenario (6°C rise by 2100). A broader adaptation strategy will be finalised by 2017, and both risks and opportunities will be explored. Energy sector adaptation is a work in progress. Ambassador van Hulst highlighted key policy instruments, including legal obligations for grid operators to protect consumers from any threat to the continuity and security of supply. He suggested that the role of the IEA could be to investigate international linkages, to review countries' resilience, and to collect and communicate best practices.

Ding Ding, Director of Policy and Regulation Program, National Center for Climate Change Strategy and International Cooperation (NCSC), China, talked about how China is building resilience in its energy sector. China's draft climate change legislation includes a chapter on adaptation; this chapter includes an overview of the roles of government and enterprises, major systems, and key sectors (e.g. infrastructure). China's energy sector is vulnerable to climate change from sea level rise, extreme weather, floods, and desertification. Coastal areas are highly populated and already facing impacts. Dr. Ding highlighted the importance of designing and implementing a risk management framework and the need for increased private sector investment in resilience.

Joan MacNaughton, Executive Chair of the World Energy Council Trilemma provided an international perspective to the session. The World Energy Trilemma reports have stimulated dialogue with energy executives, governments, the financial community and development banks, culminating in the 10-Point Agenda for Change. She identified key resilience issues, including integrating risk management (although inter-linkages create additional risk), allocation of risk and accountability, and political risks. Enhancing resilience requires a flow of investments to build

resilience in new infrastructure. Insurance communities in particular are good at identifying risks and the IEA could engage with this community. Regulation will be necessary, but other measures may also be needed, including incentives, and measures encouraging innovation. The IEA could facilitate dialogue among key stakeholders and identify best practices as well as what shouldn't be done. As a final thought, Ms. MacNaughton noted that it does not seem that the resilience issue has the political urgency it merits.

A discussion followed the four speakers, where speakers and participants raised the following points:

- There is a need to prepare for the entire range of possible climate impacts. Cost assessments should consider a range of temperature changes.
- IPCC reports have expressed urgency, yet this is not necessarily reflected in the dialogues happening around the world.
- It is important to characterise the consequences and costs of inaction and cost of what is already happening, on different actors. The IEA and other international organisations could play a role in this.
- Emphasis is needed on the link between those who study impacts and those who need the information to enact policy.
- Proactive steps should be taken to avoid being surprised, including investments into infrastructure, e.g. following Hurricane Sandy, New York-based utility Con Edison is now considering future sea level rise and storm surge while it rebuilds its infrastructure.
- Aging infrastructure needs to be replaced but should happen with the assessment of climate change impacts and future climate conditions that will be different from historic ones.
- Inaction now will cost society much more later.

Climate change science

Dr. Jean Jouzel from the **Institut Pierre Simon Laplace, Laboratoire des Sciences du Climat et de l'Environnement, author of several WG I IPCC Assessment reports**, shared key findings from the IPCC's Fifth Assessment Report (AR5). The concluding Synthesis Report was released in Copenhagen just days prior to this meeting. Dr. Jouzel reported that recently observed climate changes are unprecedented and that greater warming increases the likelihood of severe, pervasive, and irreversible impacts. The highest modelling scenarios see 6-7°C warming and 1 m sea level rise by 2100. Limiting warming to 2°C (at >66% probability) requires cumulative anthropogenic CO₂ emissions below 790 GtC (2900 GtCO₂). Over 2/3 have already been emitted, leaving 250 GtC in the budget corresponding to ~25 years at the current rate of emissions. Dr. Jouzel mentioned the critical importance of immediate action, e.g. investments in renewable energy now.

Government policies and initiatives to enhance resilience of the energy system

National, regional and local governments may play different roles in securing resilience of the energy sector to climate change impacts. Speakers in this session, representing different levels of government from around the world, shared their experiences, approaches, and thoughts on policy interventions. This session was moderated by **Takashi Hattori**, Head, Environment and Climate Change Unit, IEA.

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Yann Françoise, Head of Climate-Energy Division at the City of Paris, outlined the city's resilience challenges and actions. Paris is a robust city, but heat waves and floods are a problem. In particular, the city's extensive underground networks of electric cables and gas pipes are vulnerable to flood impacts. He echoed earlier speakers in discussing the "domino effect" of impacts from climate change, which impact health, transportation, economic activities and so on. The city is working to decrease the population impacted by electricity failures during floods. In the private sector, a financial rationale can help drive investment to enhance resilience to a certain extent. Mr. Françoise reported that cities need national tools downscaled to the local level, and the authority to implement regulations that are based on the future rather than historical changes.

Baltz Tribunalo Jr., Head of the Provincial Disaster Risk Reduction and Management Office in Cebu provided the latest on resilience efforts in the Philippines, including lessons learned from Typhoon Haiyan, which killed nearly 8000 people in 2013. The Philippines felt heavy economic losses from natural disasters in 2013, totalling US \$10.4bn. He noted that the impacts of natural hazards have social, environmental, economic, and political dimensions, and that adaptation is not an isolated process – it includes considerations for food security, water sufficiency, environmental security, and sustainable energy. Sound policy should promote adaptation, mitigation, and risk management, putting increased emphasis on preparedness and less on response and recovery. Mr. Tribunalo highlighted the importance of capacity development – risks must be understood even at the local level. Renewable energy development is a priority intersection in Cebu for mitigation and adaptation efforts. Cebu offers incentives for renewables, and a national sustainable energy finance program has approved over \$147m in renewables projects (e.g. biomass, wind). Interlinkages between environmental protection and climate change mitigation/adaptation is a priority for both President Aquino and Cebu Governor Davide III, which is reflected at the provincial level policy formulation in Cebu.

Mary-Ann Wilson, Chair of the Energy and Adaptation Working Group, Natural Resources Canada shared Canada's adaptation experience. Canada faces impacts to demand, supply, and transmission of energy through extreme weather, warmer temperatures, and changes to water availability. She finds that collaboration is essential – public and private, cross-sectoral and cross-border, to allow efficient resource use and sharing of data and experiences. The Adaptation Platform has been in operation since 2011, consisting of a main plenary of senior representatives and working groups feeding into each plenary. These working groups contain multi-jurisdictional government representatives, professional organizations, and private sector representatives. The priorities of the Energy Working Group are to mainstream adaptation into decision making, develop information and tools, and disseminate knowledge. Ms. Wilson highlighted that learning and understanding how to apply current policies can bridge the existing gap of policy application, and that buy-in is enhanced through stakeholder involvement.

Kazushige Tanaka, Energy Advisor/Counsellor at the Permanent Delegation of Japan to the OECD, provided an overview of the lessons learned from the 2011 Great East Japan earthquake

and tsunami. Japan faced oil supply disruptions in the wake of the disaster, and distribution emerged as the most crucial issue: Japan had stocks but transportation networks were damaged. Through this experience, Mr. Tanaka highlighted the importance of developing a resilient regional supply chain (the Oil Stockpiling Act was amended in 2012 as a result). In terms of electricity, 40% of electricity supply capacity of Tokyo Electric Power Company was lost after the earthquake and tsunami. The initial demand was controlled through planned rolling blackouts (2 hrs/day), while the summer peak demand was set to be reduced by 15% through information campaigns to households, voluntary measures for small commercial users, and law enforcement for large industrial users. The results highlight the importance of coordination between stakeholders such as government and industry and the provision of reliable information.

Andrew Robertson, Energy Analyst in the Emergency Policy Division at IEA provided an overview of the IEA's role in global energy security and emergency preparedness. Although the IEA has historically focused on oil security, it is now working with member countries on emergency response policies for gas and electricity, which have regional rather than global markets. Looking at climate or weather as risks to supply is still in emerging phases. The IEA conducts emergency response exercises to simulate emergency scenarios – the causes can be geopolitical, climate-related, etc. IEA works to improve resilience of member countries, for example, following Katrina (2005) and Sandy (2012) in the US. Mr. Robertson discussed the “all hazards” approach, which is growing across countries. Flexibility is crucial with efficient & transparent markets accompanied by resilient government policies and energy infrastructure. Policies should be consistent, avoid crowding out clean and innovative technology, and induce demand-side response.

Following the presentations, the **discussion** focused on the importance of collaboration between stakeholders and levels of government, and the role of other players in building resilience (e.g. international organisations, businesses).

- It is difficult to bring resilience front-of-mind to citizens during disaster-free periods.
- International organisations can help to show future needs, risks and costs; the insurance sector could help in this regard.
- Additional study of impacts on sectors and vulnerabilities of sectors is needed.
- Decision-making roles should be downscaled to the local level.
- It is important to integrate the adaptation/mitigation agenda to businesses.
- Incremental investments could be more climate-resilient.
- Multi-stakeholder collaboration is critical for bringing together traditionally disparate groups.

Business and investment players' practices to improve climate change resilience of their assets, operations, and investments

Speakers representing upstream and downstream energy companies and the finance and insurance sectors discussed their experiences in improving climate resilience of their assets and investments. This session was moderated by **Philippe Benoit**, Head of the Energy Efficiency and Environment Division, IEA.

Djamila Amimer, CO₂ Market Development Manager at Shell opened the session with Shell's perspective and experience. Regardless of how we move to decarbonise, we will need to adapt to climate change. For Shell, climate change poses risks to all aspects of its oil and gas operations, e.g. exploration, production, pipelines, communities. This risk is a function of *hazard* and *vulnerability*: climate change may alter the *hazard* severity, adaptation can reduce *vulnerability*. Shell's adaptation management plan includes: 1) modelling impacts on assets (collaboration with UK Met Office), 2) management of climate risk within operating procedures, and 3) impacts "outside the fence line" (outside of Shell operations). Modelling of future scenarios also helps inform investment and design of new projects. For existing assets, the screening approach is taken (based on climate forecasts, Shell's portfolio of assets is ranked).

Jean-Yves Caneill, Head of Climate Policy at Électricité de France (EDF) shared the EDF Group experience. EDF has already experienced considerable financial consequences of climate change, e.g. EUR 300m from higher temperatures in 2003. Plans have been developed for heat waves, floods, and cold spells. EDF's strategy includes adapting existing assets, mainstreaming resilience into future assets, and boosting resilience to extreme climate events. He noted that assets must be resistant to climate hazards yet resilient following extraordinary events to guarantee service to customers – what is the appropriate balance? Dr. Caneill discussed the difference between resistance (capacity to resist climate hazards) and resilience (capacity to face extraordinary events and recover), and the importance of both elements in a changing climate.

Craig Davies, Senior Manager of Climate Change Adaptation at the European Bank for Reconstruction and Development (EBRD) used a case study in Tajikistan to illustrate how climate resilience can be addressed in the hydropower sector. Hydropower is of particular interest to EBRD as it dominates energy generation in a number of EBRD countries (e.g. Central Asia) and is very sensitive to climate change. Dr. Davies used the 126 MW Kairakkum Hydropower Project in Tajikistan (98% hydro) for his case study. This plant had not been renovated since the 1950s. First, the team assembled and digitised hydrological data, and developed multiple climate scenarios for Tajikistan to 2080s to simulate flow and model energy generation. The team used modelling results and min-max analysis to identify the turbine upgrade that gave the best economic performance across the entire range of projected climate change scenarios. The team also selected best practices of similar projects around the world and drew lessons from the experience Canadian operators such as Hydro Quebec. Dr. Davies highlighted the importance of documenting experiences around the world and sharing best practice. The case study revealed that investments in dam upgrades should also include institutional capacity building, such as data management, and modelling and forecasting capabilities.

Rowan Douglas, CEO of the Capital Science & Policy Practice at the Willis Group, provided a perspective from the insurance industry. There is a general understanding that we face climate risks in the not-so-distant future, but a lack of effort to break the cycle of 'business as usual'. There is a challenge in translating 'abstract' climate change to concrete events. He mentioned an

initiative announced at the UN Secretary-General's Climate Summit in September which aims to integrate climate risk in investment decisions. Mr. Douglas suggested that a systematic transformation is needed to fully account for risks – such that risks are evaluated and priced, and resilience behaviour appropriately rewarded. He introduced the “Gearbox” analogy, wherein one can find a gearbox to properly and proportionately address climate risks in energy systems, where it is not currently accounted for. Therefore: 1) risk needs to be properly discounted and 2) action needs to be rewarded.

The follow-up discussion included the following points:

- Emphasis on the relationship between demand-side responses (mitigation measures) and resilience-building e.g. reducing hydroelectric demand can be categorized as adaptation (as is done by EBRD) or mitigation
- The carbon budget idea (that not all oil and gas assets can be burned) could be better reconciled, understood, and communicated with oil and gas planning, given different projections of energy demand, natural gas supply, and CCS potential as well as potential impacts on and constraints for future infrastructure from climate change impacts.

Role of international stakeholders and processes in developing resilience awareness, policies and approaches

While climate change impacts are location specific and responses to them are best when developed on the ground, international stakeholders and processes play an important role in raising awareness, providing guidance and policy advice, stimulating financing and creating vehicles for exchange of information and best practices. Speakers from four international organisations discussed the role of international stakeholders in resilience. This session was moderated by **Ellina Levina**, Energy Analyst, IEA.

Yunus Arikan, Head of Global Policy and Advocacy at ICLEI talked about the role of cities in energy resilience. As cities grow, blackouts and other supply issues can impact a growing number of people – i.e. energy access is not only an issue in developing countries. International frameworks exist (SE4All, UNFCCC) but are they sufficient to ensuring energy/electricity-sector resilience? How do we replicate successful programs on a global scale (e.g. One Less Nuclear Power Plant program in Seoul to enhance energy self-sufficiency by reducing energy demand through energy efficiency)? Looking ahead to COP21 in Paris, Mr. Arikan suggested that global partnerships need to drive local action: a city-specific agreement in the Paris 2015 agreement would be of value. He highlighted the role of his institution in bringing stakeholders together and identifying solutions.

Lijin Zhong, Senior Associate and China Water Lead at the World Resources Institute, focused on the water-energy nexus in China. Climate change poses water challenges for China in terms of water shortages and flooding. As more non-traditional sources of water are needed, energy needs for water extraction increase (energy for water issue). In China, most new proposed coal and natural gas plants are located in areas of water stress (water for energy issue). Dr. Zhong outlined potential solutions, including demand side management for both water and energy, tariff and tax reform, and continued research. Improved collaboration is also important, between water managers and energy managers. The role of the WRI is to facilitate the exchange of information and views among all stakeholders in this project and provide targeted analysis that can help the Chinese government to identify policy interventions.

John Harding, Programme Officer at UNISDR spoke about the role of international stakeholders and processes in developing resilience awareness, policies and approaches. The global risk environment has changed drastically. Over the last decade, the Hyogo Framework has been a mechanism to increase coherence between international frameworks to reduce disaster losses. One successful element has been the development of networks of constituents e.g.: public, private sector, self-organizing committees, donor groups. In most regions, there is a downward mortality trend due to disasters although exposure is rising along with cost of damages. In a future agreement, disaster risk reduction could involve components including global targets for resilience, systematic assessment of risks, standard setting and common terminology.

Matti Goldberg, Programme Officer at UNFCCC provided his perspectives on energy resilience in the context of the UNFCCC framework. Although the UNFCCC focuses on climate change at the state level (and not the sector level), there are possible links between its work and energy sector resilience, including the Nairobi Work Programme (adaptation knowledge hub involving governments and NGOs), National Adaptation Plans (guidelines for identifying adaptation needs), and Green Climate Fund (50% allocated over time to adaptation). Mr. Goldberg emphasised the

importance of finding the optimal policy mix by identifying the strengths of various actors on this field, building on those strengths, and promoting cooperation between different organizations.

The **discussion** included the following points:

- In tandem with the “gearbox” analogy, we should also be striving towards a “navigation system”
- Important to identify policy gaps and how best to fill them. There is an “optimal mix” of policies rather than a silver bullet
- There is no mitigation without adaptation.

Closing remarks

Didier Houssin, Director of Sustainable Energy Policy and Technology at the IEA, thanked speakers and participants for their engagement and offered closing remarks:

There is urgency to understand climate impacts and integrate this understanding into decision-making. The climate/energy nexus is very important and deserves serious attention and in-depth analysis. Mitigation is an integral part of adaptation. If we do not work on mitigation we will not be able to adapt, as the magnitude of impacts will be too big.

Policy responses are needed. Much more still needs to be done. The costs of impacts and resilience building should be characterised to mobilise resilience work. The cost of not adapting should be clearly identified as well as the incentives to build resilience.

Investments in the energy sector face uncertainties posed by climate change; examples demonstrate how this can be managed.

Cooperation and partnerships, such as public-private partnerships, play an essential role in building resilience. Institutional linkages and cooperation are very important and need to be established and strengthened to optimize resilience policy-making.

The IEA can play an important role in sharing best practices, facilitating cooperation among countries, providing policy advice, convening forums, engaging the financial community, and facilitating private-public dialogue. The IEA will begin analysis based on the outcomes of this workshop.

Annex: Agenda

5th Forum on the Climate-Energy Security Nexus Policies and Practices to Enhance Energy Sector Resilience

Tuesday, 4 November 2014

International Energy Agency, Room 1, 9 rue de la Fédération, Paris, France

Climate change could affect our energy systems, and thereby our energy security, in several ways: by altering energy demand, disrupting energy supply and damaging energy infrastructure.

Energy demand is expected to change, potentially dramatically in some areas, as a result of increasing temperatures, changing weather patterns, etc. with effects on heating and cooling demand and other end-uses. **Energy supply** will face changing conditions and production, including reduced efficiency of thermal plants, cooling constraints on thermal and nuclear plants, and pressure on transmission systems; electricity generation from hydro, wind and other renewable and biofuel production will also be affected. **Energy infrastructure** could be exposed to more frequent and intense extreme weather events including increased wind speeds and ocean storminess. These may threaten coastal power generation infrastructure, on-shore transmission and distribution infrastructure, as well as offshore installations and pipelines and could ultimately lead to various interruptions of energy delivery systems.

To deal with these threats, the energy sector will need to develop resilience through technological solutions, flexible management practices as well as preventive emergency preparedness and response measures. To facilitate these processes and enhance their effectiveness, policy and institutional responses will be needed. This meeting will focus on policy responses that could facilitate the resilience building of the energy systems. The meeting will consider the potential role for governments, regulations, guidelines, public/private partnerships, and international institutions in enhancing energy sector planning and resilience building. Policy development and implementation with respect to the following aspects could be considered in the meeting:

Risk identification and management:

- data and modelling approaches for long-term planning
- risk evaluation and monitoring
- insurance policies

Preparedness and emergency response planning:

- preparedness for threats to generation capability, peaks in demand, extreme events
- emergency response measures (load allocation; forced shut-downs) and recovery timelines
- building in flexibility to respond to long-term changes

Technological resilience and related standards and permits:

- Robustness of equipment and processes to withstand extreme weather events
- Flexibility of technologies and processes to adapt quickly to changes in supply and demand
- Diversity of response measures including back-up resources and demand-side measures

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Institutional and regulatory support:

- Institutional structures, responsibilities and coordination
- Legislation, rules and standards
- Market arrangements
- Providing information to public and private stakeholders on the risks of a changing climate

8:30 - 9:00	Registration - coffee
9:00 - 9:20	<p>1. Welcome and opening remarks</p> <p>Maria van der Hoeven, Executive Director, International Energy Agency Nick Bridge, British Ambassador and Permanent Representative to the OECD & IEA</p>
9:20 - 10:40	<p>2. Emerging policy space: energy sector adaptation to climate change</p> <p>This session will address the role of policy in building the energy sector's resilience to climate change. It will include examples of the ongoing work, approaches, and achievements in the area of enhancing the energy sector's resilience through policy.</p> <p>Speakers:</p> <p>Alice C. Hill, Senior Advisor for Preparedness and Resilience, United States White House Noé van Hulst, Ambassador, Permanent Representative of the Netherlands to the OECD & IEA Ding Ding, Director of Policy and Regulation Program, National Climate Change Strategy and International Cooperation Center, China Joan MacNaughton, Executive Chair of the World Energy Council Trilemma</p> <p>Discussion questions:</p> <p>What are current approaches by governments in addressing energy sector resilience? Are there any lessons learnt so far? What are current challenges?</p>
10:40 - 11:00	<p>3. Climate change science</p> <p>A well-known French scientist, one of the authors of the IPCC 5thAR WG I report will explain latest findings on climate change and possible impacts on the energy sector.</p> <p>Jean Jouzel, lead author of IPCC WG I reports</p>
11:00 - 11:30	Coffee break

11:30 - 13:00

4. Government policies and initiatives to enhance resilience of the energy system (demand, supply, infrastructure) to gradual and extreme changes in climate

National, regional and local governments may play different roles in securing resilience of the energy sector to climate change impacts. Speakers in this session, representing different levels of government, will share their experiences, approaches, and thoughts on policy interventions.

Speakers:

Yann François, Head of Climate-Energy Division, City of Paris
Baltazar S. Tribunalo Jr., Head, Cebu Provincial Disaster Risk Reduction and Management Office and Coordinator of the Resilience Task Force, Philippines
Mary-Ann Wilson, Energy Working Group Chair, Regional Adaptation Collaborative, Natural Resources Canada
Kazushige Tanaka, Counsellor, Permanent Delegation of Japan to the OECD & IEA
Andrew Robertson, Emergency Policy Division, International Energy Agency

Discussion Questions:

What are some lessons that can be learned from on-the-ground experiences in enhancing resilience through policy and management practices?
What are gap areas in policy development?
How does the policy response for adapting to extreme events differ from that for gradual changes?
What is the role of climate and energy modelling in developing energy resilience policy?
What information is being used to develop policies and practices?

13:00 - 14:00

Lunch

14:00 - 15:20

5. Business and investment players' practices to improve climate change resilience of their assets, operations, and investments

This session will explore decision-making practices and guidelines that energy companies adopt to build resilience of their operations to climate change. It will also explore how companies and investors are incorporating future climate change risks into their decision-making. The session will also touch on the role of insurance in stimulating company-level decision-making that takes possible future climate impacts into account.

Speakers:

Djamila Amimer, CO2 Market Development Manager, Shell
Jean-Yves Caneill, Head of Climate Policy, Électricité de France (EDF)
Craig Davies, Senior Manager, Climate Change Adaptation, European Bank for Reconstruction and Development
Rowan Douglas, CEO Capital Science & Policy Practice, Willis Group & Chairman, Willis Research Network

Discussion Questions:

How do energy companies evaluate future climate risks?
What does the energy sector require in terms of supportive policy?
Are climate risks factored into insurance policies?
Do investors take climate risks into account? Are there any specific guidelines?

15:20 - 15:45

Coffee break

15:45 - 17:15

6. Role of international stakeholders and processes in developing resilience awareness, policies and approaches

While climate change impacts are location specific and responses to them are best when developed on the ground, international stakeholders and processes play an important role in raising awareness, providing guidance and policy advice, and stimulating financing. Speakers from UNFCCC and other agencies will provide perspectives on the roles that international institutions play in developing resilience of the energy sector to climate change impacts. Speakers will share their work on the issue of the energy sector resilience at the international level and how they assist governments and other stakeholders with their work.

Speakers:

Yunus Arikian, Head of Global Policy and Advocacy, ICLEI
 Lijin Zhong, Senior Associate, China Water Lead, World Resources Institute
 John Harding, Programme Officer, UNISDR
 Matti Goldberg, Programme Officer, UNFCCC

Discussion questions :

What is the role of the international community in developing and implementing resilience policy?
 What analytical support is needed and can be helpful for governments? Can the international level have a role in providing this?
 How can companies, different levels of government and other stakeholders work together to ensure more cohesive policy responses?

17:15 - 17:30

Closing remarks

Didier Houssin, Director, Sustainable Energy Policy and Technology, IEA

17:30

Forum closes

17:45 - 19:00

Networking reception

l'Atome, 29 boulevard de Grenelle (4 min walk from IEA)



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