

4th IEA Forum on the Climate-Energy Security Nexus: Water and Energy

In partnership with

World Business Council

for Sustainable Development

12 June 2014

Julie Oesterlé, WBCSD

Ellina Levina, IEA

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.

IEA member countries:

Australia
Austria
Belgium
Canada
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Japan
Korea (Republic of)
Luxembourg
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States

© OECD/IEA, 2014

International Energy Agency
9 rue de la Fédération
75739 Paris Cedex 15, France

www.iea.org

Please note that this publication is subject to specific restrictions that limit its use and distribution.

The terms and conditions are available online at <http://www.iea.org/termsandconditionsuseandcopyright/>

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

Table of contents

Table of contents.....	1
Acknowledgements.....	2
Executive Summary.....	3
Background and objectives	4
Session 1: How climate change-induced water stress affects the energy sector	4
Session 2: Making the Power System More Resilient to Climate Change-Induced Water Stresses .	5
Session 3: What are the opportunities for climate and energy models integration?.....	6
Breakout group discussion	7
Session 4: Next steps.....	8
Conclusions	10
Annex: Meeting agenda	11

Acknowledgements

The Fourth Nexus Forum **on the Climate-Energy Security Nexus: Water & Energy** was jointly organized by the IEA and the World Business Council for Sustainable Development (WBCSD). The following team members prepared the agenda, identified and invited speakers, sent invitations to the meeting participants and took care of other details related to the workshop organization: Joppe Cramwinckel, Maria Mendiluce, and Julie Oesterlé from the WBCSD and Takashi Hattori, Ellina Levina and Caroline Lee from the IEA.

The IEA is grateful to the WBCSD for providing an excellent meeting venue and taking care of the meeting logistics.

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:

Takashi Hattori, Head of the Environment and Climate Change Unit, IEA

Philippe Joubert, Senior Advisor, WBCSD

Bruce Stewart, Director Climate and Water, World Meteorological Organisation

Bjorn Kjetil Mauritzen, Head of Climate Policy, Norske Hydro

Maria Mendiluce, Director Climate and Energy, WBCSD

Betsy Otto, Director, Water Initiative, World Resources Institute

Anne Bolle, Head of Climate Policies, Statkraft

Andrea Valcalda, Head of Environmental Policies and Climate Change, ENEL Spa

Henri Paillere, Analyst at OECD Nuclear Energy Agency

Marco Braun, Senior Hydrometeorologist, Ouranos Consortium

Nadia Maïzi, Director, Centre de Mathématiques Appliquées, MINES Paris Tech

Betsy Otto, Director, Water Initiative, World Resources Institute

Christian Plüss, Managing Director Hydro Power Generation, Alpiq

Joppe Cramwinckel, Director Water, WBCSD

Claude Nahon, Senior VP, Sustainable Development, EDF Group

Mats Eriksson, Director, Climate Change and Water, Knowledge Services, Stockholm International Water Institute

Jeremiah Lengoasa, Deputy Secretary General, World Meteorological Organisation

Craig Zamuda, Department of Energy, United States Government

Executive Summary

The energy system is projected to face multiple effects from gradual changes in the temperature and availability of water, as well as from extreme events tied to water, such as hurricanes and droughts. These various ‘water stresses’ or events can affect the system in various ways. The Fourth Nexus Forum **on the Climate-Energy Security Nexus: Water & Energy** organized jointly by the IEA and WBCSD focused on inter-linkages between water and energy in the context of changing climate and addressed the following key issues:

Page | 3

- possible impacts of climate-induced water stresses on the energy systems,
- businesses practices in dealing with some of the impacts,
- needs and opportunities for policy interventions, and
- financial implications of addressing the issue of resilience.

One of the challenges facing policy makers and businesses is ‘understanding’ and projecting the potential impact of climate change on water availability and other weather events – and by extension, the impact on energy systems. This will require better integration of climate models and energy system models. The Forum also addressed this issue, by examining possibilities for integrating climate and energy modelling to improve national and global forecasts for the energy sector.

In the conclusion, Didier Houssin, Director, Sustainable Energy Policy and Technology, IEA, and Philippe Joubert, Advisor, WBCSD welcomed the interdisciplinary collaboration and highlighted the interaction between climate and energy, particularly around modelling, sharing responsibilities, conflicts of usage, and policy response needs to be further analysed. The next IEA Nexus Forum will focus on policy responses to the energy sector’s resilience. It will take place at the IEA in Paris in November 2014.

Background and objectives

On June 12, 2014 the IEA in partnership with the WBCSD organized the 4th Forum **on the Climate-Energy Security Nexus: Water & Energy**. The meeting took place at the WBCSD headquarters at the Maison de la Paix in Geneva.

Page | 4

The workshop focused on water and energy inter-linkages in the context of Climate and Energy Security. About 60 participants from Europe, the USA, Canada, Australia, New Zealand and Japan attended the workshop. Participants represented governments, industry, businesses, scientific institutions, international organizations, and NGOs. A good business representation offered useful insights and real-life experiences and considerations related to building resilience of the energy sector and developing relevant business models.

The meeting included four sessions and a breakout group discussion.

Peter White, Chief Operating Officer at the WBCSD and Didier Houssin, Director of the Directorate on Sustainable Energy Policy and technology at the IEA opened the workshop.

Session 1: How Climate Change-Induced Water Stress Affects the Energy Sector

The first session was chaired by Takashi Hattori, Head of the Environment and Climate Change Unit at IEA, and considered how climate change induced water stress affects the energy sector. It focused on such issues as hydropower and its sensitivity to water availability, water use for cooling in power generation; water quality in the context of the differences between water withdrawal by power plants (when some water is put back into ecosystems after being used) and water use. Three presentations set the stage before the discussion.

- Maria Mendiluce, Director, Climate and Energy, WBCSD, presented findings from the WBCSD recent study *Water, Food and Energy Nexus Challenges*. Some of these findings include: major water deficits are expected in many regions and they will be exacerbated with climate change. While historical water trends are no longer reliable, energy demand could also grow exponentially, as well as associated water requirements. The team at WBCSD, through integrated action and interdisciplinary work, is tasked to help companies understand the linkages and create new business models to manage risks and integrate resilience. This will have to be accomplished while facing scientific uncertainty and considering local circumstances, and can be fostered through enabling frameworks.
- Betsy Otto, Global Director of the Water Program at WRI, highlighted the dynamic tensions and challenges that we are facing on water and energy. When trying to fix an energy problem, stresses on the water system can be caused. The Aqueduct project of the WRI with its core information on baseline water stress can help meet the demand for consistent global information from various stakeholders. A challenge for companies is to determine where to focus and what indicators to use. Betsy presented a map of new coal projects, applied over water stress maps – in China for instance, where over 50% of total proposed power generation capacity was as of July 2012 located in areas with high or extremely high baseline water stress. This was the opportunity to reiterate that energy efficiency is by far the most effective strategy for reducing both greenhouse gas emissions and water impacts, given the size of the energy sector's water demands. She informed that the first-ever global maps of water risks to shale gas will be released by WRI during the next World Water Week.

- Bjorn Kjetil Mauritzen, Head of Climate Policy, Norske Hydro, highlighted the implications of climate change for business (water stress but also periods of too much water, such as high water flows from episodes of heavy rainfall, seasonal snowmelt or precipitation, in-land flooding, coastal flooding, and sea level rise). Water has emerged as one of the pre-eminent sustainability issues in the mining and metals sector. One difficulty is being able to know when to adapt according to the available information: what kind of averages are to be used when planning operations. Water risks need to be looked at very specifically and locally, in consideration of other water users within an area, with high resolution models.
- The discussion focused on:
 - using non-traditional water sources (saline, brackish, produced water) and reusing water in energy production in relation with the fit for purpose concept,
 - definitions (withdrawals/consumption),
 - conversion of plant technologies,
 - the local and global pictures of the issue,
 - the need for better modelling by including local/ site specific features to trigger action on the ground,
 - water quality aspects, and
 - the need to alter the financial system and capital risk (the way this risk is accounted for / priced/ encoded in the insurance system). Some companies suggested considering the inclusion of disaster risks into financial operations and evaluations of companies to reward resilience actions by companies.

Session 2: Making the Power System More Resilient to Climate Change-Induced Water Stresses

The second session focused on resilience of the power sector to water stresses and was chaired by Philippe Joubert, Senior Advisor, WBCSD. This session explored responses undertaken by the power sector to build resilience to climate change-induced water stresses and other water events and to develop strategies to cope with gradual long term climate change-induced impacts, as well as options for policy responses. It also explored the costs that such measures may imply and their impact on energy sector business models of the future.

- Anne Bolle, Head of Climate Policies, Statkraft, stressed that climate change already affects the assets of their company (e.g. more frequent floods in Norway, creating more damages); therefore it is vital to predict and prepare. Operations are managed differently compared to what would have been the case with market signals only. She emphasized the multipurpose uses of dams (irrigation, flood control, navigation, urban water supply schemes, hydropower generation, flexibility and balancing the energy system), which can help increase resilience. There will be future conflicts in regards to how to use water, but with proper water management, collaboration and resilience, win-win solutions can be created. She posed some questions to the audience: How do we prioritise? How can we put a value on the other services? How can we reward resilience in the market place?
- Andrea Valcada, Head of Environmental Policies and Climate Change, Enel, stressed the importance of enhanced consistency, coherence and balance of energy, environment, water and adaptation policy frameworks. He presented some measures that are being implemented by Enel, both in the short and long-term: back-up system of pumps to allow the water

pumping from low levels, operational & engineering measures to enhance wastewater treatment and reuse, and natural infrastructure to improve drainage and prevent floods.

- Henri Paillere, Analyst at OECD NEA, accepted the invitation to join the panel on the spot and spoke about climate change impacts on nuclear power plants, distinguishing between new built and existing fleet. He highlighted that in addition to the cooling needs that nuclear shares with fossil-fired thermo-electric power plants, decay heat removal capacity is also needed when the power plants are shut down, and this is a safety requirement that is carefully monitored and regulated. Improved safety is always a driver for changes. He pointed out seasonal aspects (possible impacts of summer droughts and heat waves for example) as well as economic conditions - market signals need to be there as well to incentivize building resilience. Adaptation requires long-term perspectives, together with a reflection on best available technologies and an assessment of how environmental regulations are likely to evolve over several decades.
- Niels Vlaanderen could not make it to the meeting but provided written statements. The Dutch central government currently sets the standards for the national freshwater supply and the 'sequence of priorities' for water allocation in case of water shortages, with four user categories in the sequence of priorities.
 - Category 1 includes freshwater use for safety and the prevention of irreversible damage (e.g. ensuring the stability of flood defence structures, settling and subsidence of peat bogs and moorland, nature dependent on soil conditions)
 - Category 2 includes drinking water supply and energy supply
 - Category 3 includes small-scale, high-quality uses, such as temporary spraying of capital-intensive crops and process water.
 - Category 4 has the highest exposure to risk of shortage and includes shipping, agriculture, nature (as long as no irreversible damage occurs), industry, water recreation and lake fishing
- During the discussion the following topics emerged:
 - increasing public awareness (including on costs of business as usual and cost/benefits of investments to build resilience) and support,
 - making data externally available to all stakeholders,
 - reducing the uncertainty through climate modelling,
 - building a business case (some benefits are not only on water but on reducing discharge reusing water and reusing consumption is in some cases a by-product) and gaining competitive advantage by raising the bar on best practices, and
 - adjusting portfolios to be resilient – diversification across regions for utilities to benefit from regional differences in climate impacts.

Session 3: What are the opportunities for climate and energy models integration?

Session 3 was chaired by Bruce Stewart, Director Climate and Water, World Meteorological Organisation and was devoted to the discussions on modelling: how can climate modelling help decision-makers, what are the gaps in downscaling global climate models; how the climate and energy models could be integrated?

It was clear that there is a lot of interest in using modelling to assist the energy sector with understanding the climate-induced risks and building the sector's resilience. Experiences of modelling some constraints for the energy sector caused by climate-induced water stresses already exist although are still very limited.

- Marco Braun, Senior Hydrometeorologist, Ouranos Consortium, pointed out that climate models are independent virtual worlds offering the advantage to play through future options. Climate experts should help interpreting and making use of the data. He showed two examples of leveraging climate data in the adaptation of hydro power equipment in Canada, bringing together climate experts, engineers and operators.
- Nadia Maïzi, Director, Centre de Mathématiques Appliquées, MINES Paris Tech, demonstrated their experience with building several scenarios of water availability into TIMES energy system model. These scenarios were built on various assumptions of water consumption related to different cooling options and pollution control additions to power plants.
- Betsy Otto, Global Director of the Water Program, WRI, introduced the information that is available for companies in the Aqueduct project. It incorporates data from 15000 catchments and is trying to assess future flood and drought stresses. The purpose of this database is not to make site-specific assessments. The database aims to provide consistent global data, yet still lacks the data on groundwater stress. It uses GHG scenarios and socio-economic modelling to project future demand for water and global climate models to model the supply side (of water). By matching the two, the model identifies baseline (even under the baseline some areas are already water stressed) and possible future water stresses related to climate change.
- Christian Plüss, Managing Director Hydro Power Generation, Alpiq, emphasized economic (the 1st one being the historical low of electricity prices), regulatory, and environmental challenges facing the sector. Climate modelling is highly important for investment decisions and allows them to look at long term changes (for instance in the Gorner glacier, affecting operation of hydropower facilities) and make projections. Better seasonal forecasts would be helpful for business operations, as well as coupling demand side models with production models based on climate projections.
- The discussion stressed the importance of clearly formulating questions before using models to answer them. It was noted that the more global models are disintegrated and loaded with various constraints, the less certainty there will be in the results that emerge.

Breakout group discussion

Before the final session all the participants were divided into three discussion groups (four groups were proposed but those participants who were interested in modelling discussions joined the group on competing uses of water that also discussed modelling) to identify gaps and areas for future work:

- one group focused on the business case for resilience and suggested the following areas for future work: proactive decision making (rather than the reactive approach that has been more common), establishment of standards and codes for operations that are water sensitive, pricing policies to address risks through punishing risk-prone practices and awarding resilience building.
- another group focused on communications and stressed that there has been very limited success in communicating scientific risks to policy-makers and business decision-makers. The way uncertainties are communicated is unproductive in stimulating appropriate actions, and

businesses are used to making multi-million decisions with much lesser certainty than some scientific assessments come with and yet, the way scientific uncertainties are communicated creates the tendency of waiting for further certainty before acting.

- the third group discussed competing demands for water and the use of models for identifying water stresses and concluded that on a regional and local levels models and cost-benefit analysis could be used to develop strategic plans for the power sector and have already been used, the data are available but it takes time and complicated analysis to work out a comprehensive strategy taking energy, climate and water aspects into account.

Session 4: Next steps

The final session investigated developments that could support an enhanced response to the current gaps in knowledge. The discussion, facilitated by Joppe Cramwinckel, Director of Water, WBCSD, focused on identifying the next steps in building the energy sector resilience to climate-induced water stresses, including policy responses, best practices development and sharing, as well as modelling support.

- Claude Nahon, EDF Group, highlighted that innovation will be the key moving forward, not only technical but also social and financial. We need to bring many stakeholders together, build trust between decision makers, scientific community and businesses and build resilient structures (businesses and communities as a whole) in the future with the help of standards, also bringing long-term perspectives into decision making. Cooperation between operators when facing disasters will have to be fostered to enhance reaction.
- Mats Eriksson, Director, Climate Change and Water, Knowledge Services, SIWI, stated that since we have the figures on water stressed areas this is an opportunity because we can act on the basis of these data. We also have opportunities in urban areas that aren't yet developed (e.g. low-carbon electrification). He mentioned the necessary promotion of the regional dimension, the need for accurate pricing of energy and water, the cost of inaction that is mostly felt by poor people, the necessity of PPPs and invited all participants to further discuss these issues during the next World Water Week.
- Jeremiah Lengoasa, Deputy Secretary General, World Meteorological Organisation, reminded the audience that the past is no longer a good indicator of the future. He said that there is a lot of information available but research has become inaccessible and there is a gap between our understanding and scientific research. Data need to be made available on a regular and reliable basis to decision-makers, using numbers and graphics. WMO's Global Framework for Climate Services is driven by user demand – they choose what science needs to respond to, building on new partnerships for instance with the World Health Organisation. GFCS operates at 3 levels, the highest impact being at national level (e.g. collaboration of electricity utility with meteo services for development of climate services). He stressed the importance to understand who needs what information, when and how, in which form and how often and that different ways exist for building resilience.
- Craig Zamuda, Senior Advisor at Department of Energy, US Government, said that we all pay for a lack of resilience. We need to bring parties together and be smarter about what our current system is costing. Policies need to be better integrated and better exploit productive synergies among water and energy systems (e.g., zero energy consumption wastewater treatment plants, insurance premiums to help drive investment in resilience). Lessons can be learned and shared more broadly when we deal with disasters, in order to have everyone moving in the right direction – the good examples shown today need to be the rule and not the exception. He introduced the audience to a report issued last year by the US DOE on the

US energy sector vulnerabilities to climate change and extreme weather, and the upcoming report on gaps and investment needs for modelling and policy responses.

Conclusions

The workshop was concluded by the IEA and WBCSD. Didier Houssin, Director, Sustainable Energy Policy and Technology, IEA, welcomed the interdisciplinary collaboration and said that the interaction between climate and energy, particularly around modelling, sharing responsibilities, conflicts of usage, policy response need to be further analysed. Policy responses will be addressed during the IEA Fifth Nexus Forum meeting in November. Philippe Joubert suggested that more joint work is needed around a common vocabulary, including on the true cost/ value of water. The following key points were underlined by the final remarks:

Page | 10

- climate/water/energy nexus is very important and deserves serious attention and in-depth analysis;
- addressing the challenge of climate-induced water stresses may require technological, social and financial innovations;
- policy responses are needed while very little work has so far been done in this area;
- costs of impacts and resilience building should be characterised;
- financial tools, including insurances need to be examined further;
- institutional linkages need to be established to optimize resilience policy-making;
- public-private partnerships will be very important in dealing with the water/climate-energy issues and cooperation between IEA and WBCSD could be useful in this respect;
- existing forums should be used to exchange information, best practices, ideas.

Annex: Meeting agenda

4th Forum on the Climate-Energy Security Nexus: Water & Energy

Exploring impacts of climate change on the water-energy equation and emerging policy responses; and how to improve integration of climate and energy system modelling

Page | 11

Thursday, 12 June 2014 - Maison de la Paix, Chemin Eugène-Rigot, 1211 Geneva

Background

1. Climate Change, Water and Energy: The energy system is projected to face multiple effects from gradual changes in the temperature and availability of water, as well as from extreme events tied to water, such as hurricanes and droughts. These various ‘water stresses’ or events can affect the system in various ways.

- For example, a higher temperature of cooling water can have a dual impact on electricity supply: through a direct reduction in thermal plant efficiency and through regulatory constraints limiting the temperature of water discharged by power plants. In addition, the availability of cooling water may also be reduced. These events would lead to reduced output by coal, gas and nuclear plants, as well as concentrated solar power plants. This constrained output may coincide with increased demand for power from increased needs for air-conditioning, water pumping for agricultural irrigation, etc. Hydro-reservoirs will also be affected, albeit with great variations from one location to the next. More significant snowfall and/or rain could enhance supply in some regions, while an increase in the number and severity of droughts would reduce it in others. Changes from snowfall to rainfall in winter could change the seasonal distribution of water availability.
- Water availability can also affect fossil fuel supplies – some restrictions on the use of water for fracking have been applied in drought-hit areas in the US. Coal, oil and gas supplies are also exposed to weather-related supply disruptions, with Hurricane Katrina providing the most striking example in recent years. Even when the destruction of infrastructure is avoided, precautionary measures in the expectation of these events usually mean reduced output. Flooding has also affected mining operations or disrupted the transport of coal and oil – which is also exposed to low river water depth in times of droughts.
- Energy assets in coastal areas could also be exposed to more numerous/intense extreme weather events as well as a gradual sea level rise threatening both coastal power generation and transmission infrastructure. Some energy supply infrastructure is located in permafrost areas which would be affected by increased temperature, limiting road transport and access to production sites, as well as affecting the bearing capacity of the soil. This could disturb oil and gas extraction as well as pipeline infrastructure. Pipelines may also be vulnerable to weather-related accidents such as landslides and flooding.

The Fourth Nexus Forum will: (a) discuss these and other possible impacts of climate-induced water stresses on the energy systems, (b) illustrate examples of businesses practices in dealing with some of the impacts, (c) identify needs and opportunities for policy interventions, and (d) identify the financial implications of addressing the issue of resilience.

2. Integrating Climate/Water and Energy Modelling. One of the challenges facing policy makers and businesses is ‘understanding’ and projecting the potential impact of climate change on water availability and other weather events – and by extension, the impact on energy systems. This will

require better integration of climate models and energy system models. This is an issue which the World Meteorological Organization (also located in Geneva) and other groups are analyzing in increasing detail. The forum will also address this issue, by examining possibilities for integrating climate and energy modelling to improve national and global forecasts for the energy sector.

Agenda

8:30- 9:00	Registration - coffee
9:00-9:15	Welcome and opening remarks Peter White, Chief Operating Officer, WBCSD Didier Houssin, Director, Sustainable Energy Policy and Technology, IEA
9:15-10:45	<p>1. How climate change-induced water stress affects the energy sector</p> <p><i>Review the role of water in various energy sector activities (including thermal power generation; hydropower generation; oil and gas exploration; and supporting feedstocks for bioenergy), and how climate change will affect water.</i></p> <p>Moderator: Takashi Hattori, Head of the Environment and Climate Change Unit, IEA</p> <p>Panellists: Bjorn Kjetil Mauritzen, Head of Climate Policy, Norske Hydro Maria Mendiluce, Director Climate and Energy, WBCSD Betsy Otto, Director, Water Initiative, World Resources Institute</p> <p>Discussion questions:</p> <ul style="list-style-type: none"> • What are the water stresses that climate change will intensify? • What is the role of water in fossil fuel power production? What are the current and expected impacts from climate-induced water stresses? How does the water issue affect CCS? • What are the expected impacts of climate change in hydropower production (by region)? • How will climate induced water stresses (including permafrost melting, sea level rise, and water shortages and flooding) affect oil and gas exploration (onshore and offshore), refineries and LNG plants? • What are the expected impacts from water stresses on feedstock for bioenergy?
10:45 – 11:15	Coffee Break
11:15-12:15	<p>2. Making the Power System More Resilient to Climate Change-Induced Water Stresses</p> <p><i>This session will explore responses being taken by the power sector to build resilience to climate change-induced water stresses and other water events and to develop strategies to cope with gradual long term climate change-induced impacts, as well as options for policy responses. It will also explore the costs that such measures may imply and their impact on energy sector business models of the future.</i></p> <p>Moderator: Philippe Joubert, Senior Advisor, WBCSD</p> <p>Panellists: Anne Bolle, Head of Climate Policies, Statkraft Andrea Valcalda, Head of Environmental Policies and Climate Change, ENEL Spa Niels Vlaanderen, Senior Policy Advisor, Directorate General for Spatial Development and Water Affairs, the Netherlands (<i>excused</i>)</p> <p>Discussion Questions:</p> <ul style="list-style-type: none"> • Greater water scarcity and power production: policy responses, company-level best practices and associated costs. Including, changes in average winter and summer temperatures – impacts on

	<p>energy demand and supply: policy responses, company-level best practices</p> <ul style="list-style-type: none"> • Sea level rise and coastal power plants and transmission lines: policy responses, company-level best practices. • Extreme events – droughts and power plants (responses to changes in energy demand and also own operation in extreme conditions): policy responses, company-level best practices • Extreme events – storms (snow fall, wind) and power plants, including transmission lines: policy responses, company-level best practices • Estimates of costs of impacts from climate-induced water stresses for the energy sector (national and company level) and estimates of costs of adaptation measures (national and/or company)
12:15 – 13:30	Lunch
13:30 - 15:00	<p>3. Modelling challenges in understanding the climate change/water/energy nexus: how can climate modelling help decision makers? Where are the current gaps/barriers in downscaling global climate models to regional/local levels? What are the opportunities for climate and energy models integration?</p> <p><i>This session will consider the need to harness existing climate information and channel it to better inform both policy decision makers and the business community. Discussion will focus on the opportunities for developing climate models and energy models to work better together as well as how regional information can be extrapolated to support locally adapted responses.</i></p> <p>Moderator: Bruce Stewart, Director Climate and Water, World Meteorological Organisation</p> <p>Panellists: Marco Braun, Hydroclimatology Specialist, Ouranos Consortium Nadia Maizi, Director, Centre de Mathématiques Appliquées, MINES Paris Tech Betsy Otto, Director, Water Initiative, World Resources Institute Christian Plüss, Managing Director Hydro Power Generation, Alpiq</p> <p>Discussion questions:</p> <ul style="list-style-type: none"> • What parameters in climate models can be used by policy makers and company decision makers, how can they be communicated better? • Can climate change parameters be integrated into energy models on both, supply and demand sides? <ul style="list-style-type: none"> - What are these parameters? - At what scale can they be integrated? - Which of them would determine restrictions/limitations in power production scenarios building (e.g., water scarcity in certain areas as a restriction to new-build fossil power capacity)? - Which ones would determine the change in energy demand? <ul style="list-style-type: none"> ○ Residential sector heating and cooling demand ○ Electricity for water pumping in agriculture ○ Cooling and heating in industrial sectors ○ Transport sector: fuel and/or electricity for cooling and heating • What are the next steps in integrating climate and energy models?
15:00 -16:00	<p>Coffee break and breakout discussion</p> <p>4 breakout groups to discuss:</p> <ul style="list-style-type: none"> • How to link energy modelling with water and water/climate and at what level does it make sense (global, regional, local)? • How to improve the communication of climate science to businesses and policy-makers? • What is the business case for disaster risk reduction and gradual adaptation, and how should we coordinate action? • With the expected competing demands for water from different sectors, how can modelling and/or policy interventions help make long term planning decisions? <p>In each of the breakout groups, representatives from scientific community, businesses and government,</p>

	<p>will structure their discussion around the following three pillars:</p> <ul style="list-style-type: none"> • What are the gaps? • What is the role of business? • How can public policies and government action contribute?
16:00-17:30	<p>4. Discussion and next steps <i>The final session will investigate potential partnerships that could support an enhanced response to the current gaps in knowledge and to the current action needs, and chart a course for future work. The discussion will focus on identifying the next steps in building the energy sector resilience to climate-induced water stresses, including policy responses; best practices development and sharing, as well as modelling support.</i></p> <p>5 min reports from each of the 4 breakout groups. 10 min presentations of each of the panellists.</p> <p>Moderator: Joppe Cramwinckel, Director Water, WBCSD</p> <p>Panellists: Claude Nahon, Senior VP, Sustainable Development, EDF Group Mats Eriksson, Director, Climate Change and Water, Knowledge Services, Stockholm International Water Institute (SIWI) Jeremiah Lengoasa, Deputy Secretary General, World Meteorological Organisation Craig Zamuda, Department of Energy, United States Government</p> <p>Discussion questions :</p> <ul style="list-style-type: none"> • What policy responses need to be developed to assist the energy sector with building its resilience to climate-induced water stresses? What are the critical parameters in the regulation of the energy sector that need to be adjusted as climate changes? • Who pays and who benefits from investments in building resilience in the energy sector? • What institutional links and coordination need to be established to assist the energy sector in building resilience to climate-induced water stresses? • How can we increase sharing best practices in building resilience to climate change impacts in the power sector? What kind of mutual aid organizations can be created to assist energy companies in the case of extreme events?
17:30 -17:45	<p>Closing remarks Philippe Joubert, Senior Advisor, WBCSD Didier Houssin, Director, Sustainable Energy Policy and Technology, IEA</p>
17:45	<p>Forum closes</p>



International
Energy Agency

Online bookshop

Buy IEA publications
online:

www.iea.org/books

PDF versions available
at 20% discount

A number of books printed before January 2012
are now available free of charge in pdf format
on our website

International Energy Agency • 9 rue de la Fédération • 75739 Paris Cedex 15, France

iea

Tel: +33 (0)1 40 57 66 90

E-mail:
books@iea.org

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

IEA Publications
9, rue de la Fédération, 75739 Paris cedex 15

Printed in France by IEA, 27 June 2014