IEA Committee on Energy Research and Technology

EXPERTS' GROUP ON R&D PRIORITY SETTING AND EVALUATION

RD&D NEEDS FOR ENERGY SYSTEM CLIMATE PREPAREDNESS AND RESILIENCE

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UTRECHT, THE NETHERLANDS

13-14 NOVEMBER 2013

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Rationale

As a result of the changing global climate, local effects of such changes are increasingly apparent and well documented. Many of the changes are accompanied by heightened risks and vulnerabilities for energy infrastructure. The consequences of these changes, including extreme weather events, when combined with vulnerable energy systems, result in large-scale societal impacts. These impacts are increasingly disruptive and costly. As a result, it is now widely accepted that strategies to address climate change must focus on both mitigation and adaptation.

For energy infrastructure, this means identifying actions to enhance climate preparedness and expanded efforts to develop and deploy clean, sustainable and climate-resilient energy technologies. Extreme weather events threaten electricity generation and transmission and distribution, as well as oil and gas production and delivery. Warmer air and water temperatures, and heat waves result in both short term peaks in energy demand for cooling while at the same time diminish electricity supply. Droughts affect water availability required for cooling thermoelectric power plants. Sea level rise and flooding also pose risks for energy infrastructure, for example as evidenced by Hurricane Sandy that caused more than USD65 billion in damages along the East Coast of the United States in 2012 and resulted in the loss of electricity for more than 8.5 million people.

Some of these effects will occur across all regions, while other effects may vary more by region, but impacts will occur across all regions and energy technologies. In addition, the impacts on the energy sector will in turn impact other dependent sectors including communications, transportation, and health. Thus, understanding the impact of climate change on existing energy technologies, prioritising risks and adaptation needs, and identifying opportunities to develop more climate-resilient energy technologies, is becoming critically important. This includes assessing the vulnerabilities of existing technologies, monitoring activities to improve them, and identifying the relevant high-priority energy technology research, development and demonstration (RD&D) gaps and opportunities.

Current Activities

Significant actions are being taking by the public and private sector to assess vulnerabilities to the energy sector and develop response strategies. These efforts include assessment of the physical and economic vulnerabilities of the energy sector, adaptation planning efforts, development and deployment of energy technologies that are more climate-resilient, and development of policies that can facilitate these efforts. The pace, scale and scope of these efforts, however, is inadequate and must increase, given the challenge.

In November 2012, the IEA initiated a dialogue through its Climate-Energy Security Nexus (the Nexus Forum) on energy security impacts of climate change with a select group of companies from the energy and manufacturing sectors, other sectors such as insurance and banking, and from governments for an exploratory discussion on the threats to energy systems from climate change. The IEA has expanded upon this initial meeting with a subsequent meeting in June 2013 focused on issues for cities and for the insurance industry, and is planning to host a third forum in October 2013 focused on electricity.

Meeting Scope

In conjunction with the Nexus Forum, the Expert Group on Energy R&D and Priority Setting (EGRD) will host a workshop on 13-14 November 2013 in Utrecht, the Netherlands. This workshop will focus on the technology RD&D aspects related to climate resilience of the energy system. The workshop will address a range of climate trends (e.g. increasing air and water temperatures, decreasing freshwater availability, and increasing intensity and frequency of storm events, flooding and sea level rise) and how these trends impact both energy supply and demand.

With inputs from speakers representing various sectors and regions, the workshop will result in a summary that identifies climate change challenges, highlights a broad sampling of activities underway in various countries and industries, and identifies high-priority gaps and opportunities for RD&D planners.

Particular emphasis will be placed on opportunities for accelerating technical progress and cost reductions. The workshop will build on previous work of the IEA and the EGRD. Selected experts from IEA's Climate-Energy Security Nexus Forum will be invited, as will the representatives from the IEA energy technology network - Working Parties, Experts' Groups, and the Implementing Agreements.

Questions to be addressed by the participating technology experts include:

KEY QUESTIONS:

- *What components of your country's energy system have shown to be vulnerable to climate change and extreme weather? Are there data available?*
- *Given increasing climate change impacts on the energy system, what are the key steps towards developing and deploying climate resilient energy technologies, and increasing climate preparedness and resilience in the energy system for difference zones (e.g. coastal, semi-arid/desert, permafrost)?*
- *What are the major barriers inhibiting greater development and deployment of climate resilient energy technologies? Can these be characterised by category such as: (a) policy; (b) socio-economic; and (c) technical and/or cost?*
- *What are the most important actions that IEA member countries might take to address barriers and enhance climate preparedness and resilience of the energy systems?*
- *What are the highest priority energy technology RD&D gaps and opportunities to address energy system vulnerabilities?*
- *What is the proper role of government vs the private sector to develop, demonstrate and deploy climate resilient and flexible energy technologies?*
- *What programmes, policies or incentives are needed to accelerate the pace at which climate resilient technologies are developed and/or deployed?*

ADDITIONAL QUESTIONS:

- *How would you define climate preparedness and resilience for energy systems?*
- *Is climate resilience a factor in prioritisation of RD&D portfolios and funding?*
- *What tools, data, and information would be helpful in evaluating climate preparedness and resilience?*
- *What lessons can be learned from the private sector, or from public-private partnerships in developing response strategies and deploying climate-resilient energy technologies?*
- *What are the elements of an effective, integrated framework for monitoring, evaluating and communicating progress towards a climate resilient energy system?*
- *What approaches would be most effective to communicate results of energy sector vulnerability assessments to climate change, and to inform decision-making for prioritization or restructuring of research investments and related policies, and achieve desired outcome?*

Target Audience:

In addition to EGRD national experts, we are seeking input from RD&D decision-makers, strategic planners, and programme managers from industry concerned with energy systems and climate preparedness and resilience.

Useful References:

Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Summary for Policy Makers. IPCC, 2012. http://ipcc-wg2.gov/SREX/images/uploads/SREX-SPMbrochure_FINAL.pdf

U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather. U.S. DOE, July 2013.
http://energy.gov/articles/climate-change-effects-our-energy

Effects of Climate Change on Federal Hydropower; Report to Congress. U.S. DOE, August 2013.
http://www1.eere.energy.gov/water/pdfs/hydro_climate_change_report.pdf

AGENDA
Day 1

9:00		Welcome	*Bert Stuij, Manager Energy Strategy and Transition, Nl Agency*
9:10		Introductions Meeting Objectives	*Rob Kool, Manager, Chair EGRD, NL Agency*
9:30		Opening Remarks	*Robert Marlay, Vice Chair EGRD, US*
OVERVIEW OF ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE			
Moderator: Craig Zamuda			
10:00	1	IEA Energy Security Nexus Forum Initiative	*Takashi Hattori, IEA/SPT/EED*
10:30		Break	
11:00	2	Energy Preparedness and Resilience: A Netherlands Perspective	*Pieter Boot, Netherlands Environmental Assessment Agency (PBL)*
11:30	3	U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather	*Craig Zamuda, Senior Advisor, Office of Climate Change Policy and Technology, U.S. Department of Energy*
12:00	4	Climate Impacts on Renewable Resources in the Nordic Countries	*Árni Snorrason, Director-General at Icelandic Meteorological Office*
12:30		Discussion	
13:00		Lunch	
ENERGY PRODUCTION AND CLIMATE RESILIENCE STRATEGIES			
Moderator: *Birte Holst Jørgensen*			
14:00	5	Integrating Climate Resilience in Renewable Energy Investments in The North Sea Area	*Professor Kirsten Halsnaes, DTU Management Engineering, Technical University of Denmark*
14:30	6	Oil and Gas Production	*Jan Dell, Supply Chain Sustainability ConocoPhillips, U.S.*
15:00	7	RD&D activities, gaps and opportunities: Électricité de France Perspective	*Dr. Jean-Yves Caneill, Head of Climate Policy, Électricité de France*
15:30	8	Thermoelectric Power Plants	*Brent Dorsey, Entergy, U.S. (via webinar)*
16:00		Break	
ENERGY DISTRIBUTION /DEMAND AND CLIMATE RESILIENCE STRATEGIES			

Moderator: *Birte Holst Jørgensen*			
16:30	9	Hydropower	*Hoyt Battey, U.S. Department of Energy*
17:00	10	Climate change and the electricity infrastructure - exploring why, where, how and when to adapt.	*dr.ir. Gerard P.J. Dijkema, Faculty of Technology, Policy and Management, TU Delft, the Netherlands*
17:30	11	Near future challenges for R&D in the District heating and Cooling sector	*i. A. Dr.-Ing. Ingo Weidlich Forschung und Entwicklung*
18:00		Discussion	
18:30		Close Day 1	
		Dinner	

AGENDA
Day 2

RD&D ACTIVITIES UNDERWAY AND PRIORITY GAPS AND OPPORTUNTIIES FOR CLIMATE RESILIENCE AND PREPAREDNESS			
Moderator: Rob Kool			
9:00	12	RD&D activities, gaps and opportunities: Water and energy	*Ipo Ritsema, Director, Deltares*
9:30	13	RD&D activities, gaps and opportunities: IEA Perspective	*Christelle Verstraeten, IEA*
10:00	14	RD&D activities, gaps and opportunities: Energy & Water Nexus - U.S. perspective	*David Hunter, Electric Power Research Institute , U.S.*
10:30	15	RD&D activities, gaps and opportunities: wind and electric grids	*Peter Vaessen, Principal Consultant, DNV GL Group*
11:00	16	RD&D activities, gaps and opportunities: Nuclear Power: OECD NEA Perspective	*Dr Henri Paillere OECD Nuclear Energy Agency*
11:30			
12:00		Discussion	
12:30		Lunch	
FRAMEWORK FOR ACCELERATING RD&D INVESMENT IN CLIMATE RESILIENT ENERGY TECHNOLOGIES			

Moderator: Herbert Greisberger			
14:00	17	Barriers and Incentives for Future Investment – IEA Perspective	*Takashi Hattori, IEA/SPT/EED*
14:30	18	Barriers and Incentives for Future Investment – U.S. Perspective	*Craig Zamuda, Senior Advisor, Office of Climate Change Policy and Technology, U.S. Department of Energy*
15:00		Discussion	
SYNTHESIS AND CONCLUSIONS			
Moderator: Robert Marlay			
15:30		Discussion and key recommendations	
16:30		Workshop conclusions	
17.00		End of workshop	