IEA-ISGAN Workshop

Flexibility in future energy systems

11th October 2016, Paris

Union Internationale des Chemins de Fer (UIC), 16 rue Jean Rey 75015 Paris

09h30 - 17h30

This workshop is organised by the IEA and ISGAN, in partnership with the European projects ELECTRA, GRID+STORAGE and ERA NET Smart Grids plus. The focus of the workshop is the increased need for flexibility in the present and future energy system using smart grids as an important enabling technology, in order to accommodate the increasing share of variable renewable energy, address problems related to ageing infrastructure and managing the rapid growth of electrification in both developing and developed economies.

Renewable energies are a key pillar of power sector decarbonisation. The IEA estimates that through continued policy support, cost reductions and ambitious climate goals in a 2-degree scenario the share of renewables would rise to almost 60% and that of wind and solar combined (variable renewables) to over one-quarter of the power mix by 2040. Even in more conservative, business-as-usual scenarios, variable renewables become the largest source of electricity generation in the 34 years to 2050.

Due to the variability and uncertainty they add, integrating high shares of variable renewables in power systems becomes a key priority for a cost effective decarbonisation. Governments and regulators are concerned that current market arrangements will not meet future power systems needs at low cost and the need for institutional change in this respect has received increasing attention. Beyond renewables, electricity grids are facing important challenges and opportunities:

- The markets for the electrification of industrial and consumer applications, including mobility and heating (power to heat) are steadily growing, potentially causing power flows exceeding the design limits of existing electricity distribution networks;
- The growth of distributed generation creates opportunities for consumers to provide flexibility services to the market but might also put pressure on the distribution network operators to accommodate flexibility services as well as increased network protection systems.
- The development of stand-alone solutions including packages locally balancing generation, consumption and providing an adequate storage capability are motivating the grid-defection options for an increasing number of users, thus jeopardising the remuneration of the services delivered by network operators, and revolutionising the relationship between the traditional actors of the energy system.

One keyword can express the solutions to these concerns: Flexibility. This is the ability of a power system to maintain reliability and continuous service in the face of rapid and large swings in supply or demand. Future energy systems will require much greater amounts of flexibility, which will necessitate a broad platform of smart grid and ICT technologies spanning all areas of the electricity system:

- **Flexible system operation** extracts flexibility out of existing systems. This includes making decisions closer to real time and more frequently, improved use of wind and solar forecasting and better collaboration with neighbouring networks. Without sufficient flexibility, system operators may need to frequently curtail wind and solar generation or shed loads causing limited or extended blackouts;
- **Flexible generation**. Power plants that can ramp up and down quickly and efficiently and run at low output levels;
- **Flexible transmission and distribution**: ensuring networks can access a broad range of balancing resources, including sharing between neighbouring power systems, and with smart network technologies that better optimize transmission and distribution usage;
- **Flexible demand-side resources** are the incorporation of smart grids to enable customers to value their flexibility by responding to market signals or schemes including direct load control;
- **Storage solutions** might also deliver increased flexibility either as an integrated part of demand side flexibility or as stand-alone resources connected directly to the network.

The goal of the workshop is to discuss the need for institutional change to enhance the flexibility of the grids and the state of the art of such flexibility options. In order to support decision makers and regulators in identifying the optimal solutions in a system in constant evolution, the workshop will highlight best practices that can serve as examples for implementation in specific situations. Particular attention will be devoted to the research and demonstration needs, at the light of the recent results achieved in regional, national and international collaborative projects. Outputs from the workshop will also be used to develop the IEA's technology roadmap on Smart Energy Systems

Workshop Program

Workshop overview and purpose

09h30	**Introduction speeches**	
	Kamel Ben Naceur	Director, Sustainability, Technology and Outlooks, **IEA**
	Michele de Nigris	ISGAN Chair

Session I: What level of flexibility is needed?

09h45	**Edwin Haesen, Ecofys (DE)**		Future demand for flexibility; power system needs to supply reliable power from variable energy resources
10h00	**Eric Peirano, Technofi (FR)**	Grid+Storage Project	
10h15	**Simon Mueller, IEA**	IEA GIVAR Project	
10h30	**Discussion**		
	Moderator: Klaus Kubeczko, AIT (AT)		
11h15	**Break**		

Session II: Flexibility solutions I: Energy Storage

11h30	**Namgil Paik, KEPCO (KR)**	ESS for Frequency Regulation	Current trends, deployment prospects
11h45	**Thierry Le Boucher, EASE (EU)**		
11h30	**Cedric Christensen, CESA (US)**		
12h15	**Discussion**		
	Moderator: Bo Normark, Power Circle (SE)		
13h00	**Lunch**		

Session III: Flexibility solutions II: Demand response and cross-sectoral developments

14h00	**Aalborg University (DK), *tbd***		Demand response barriers, coordination of the electrical grid with other forms of carriers
14h15	**WEB Windenergie (AT), *tbd***	Thermo Active Building Systems	
14h30	**Renault/Bouygues (FR), *tbd***	ELSA Project	
14h45	**Discussion**		
	Moderator: Henrik Dam, EC		
15h30	**Break**		

Session IV: Flexibility solutions III: Large-scale power transmission

15h45	**Hannele Holttinen, VTT (FN)**	IEA Wind Task25 findings	Issues expanding balancing areas, technology, regulatory/public acceptance barriers
16h00	**Xianzhang Lei, SGCC (CN), *tbd***	SGCC on HVDC	
16h15	**GO15 (US), *tbd***		
16h30	**Discussion**		
	Moderator: Ludwig Karg B.A.U.M. (DE)		

Concluding remarks

17h15	**Concluding remarks** **Jean-Francois Gagné**	Division head, Energy Technology Policy Division, **IEA**
17h30	**Meeting ending**	

About the IEA roadmaps

The IEA Technology Roadmaps Programme aims to build an international consensus on the status, potential and barriers to deployment of key energy technologies necessary to achieve secure, economically and environmentally sustainable energy systems. Founded by the G8 countries in 2008, a new roadmap series is now being launched by the IEA targeted towards accelerating local implementation of energy technologies and priority short-term actions. Within this context, the first technology focus in this series has been selected as 'Smart Energy Systems'. The IEA previously published a Smart Grids roadmap in early 2011, and tracks smart grid deployment in its annual Tracking Clean Energy Progress (TCEP) publication. Given the substantial deployment and the regulatory, policy and market changes in recent years, IEA member countries have requested a new roadmap on Smart Grids, expanded to include linkages with sectors beyond electricity (heat, electric mobility); and with a closer look at the role of big data, end consumers and emerging business models. The new roadmap will aim to provide a globally recognized, consensus view of current and future smart transmission, distribution and end-use technology development and deployment across different world regions.

Visit our roadmap website
https://goo.gl/H8fLjW

About ISGAN

ISGAN is the International Energy Agency (IEA) Technology Collaboration Programme on Smart Grids, and an initiative of the Clean Energy Ministerial. ISGAN facilitates dynamic knowledge sharing, technical assistance, and project coordination, where appropriate. ISGAN participants report periodically on progress and projects to the Ministers of the Clean Energy Ministerial, in addition to satisfying all IEA Implementing Agreement reporting requirements. Membership in ISGAN is voluntary, and currently includes Australia, Austria, Belgium, Canada, China, Denmark, European Commission, Finland, France, Germany, India, Ireland, Italy, Japan, Korea, Mexico, the Netherlands, Norway, Russia, Singapore, South Africa, Spain, Sweden, Switzerland and the United States.

ISGAN's vision is to accelerate progress on key aspects of smart grid policy, technology, and related standards through voluntary participation by governments in specific projects and programs. ISGAN facilitates dynamic knowledge sharing, technical assistance, peer review and, where appropriate, project coordination among participants. ISGAN activities center on those aspects of the smart grid where governments have regulatory authority, expertise, convening power, or other leverage, focusing on five principal areas: 1. Policy standards and regulation, 2. Finance and business models, 3. Technology system development, 4. Workforce skills and knowledge, 5. Users and consumers engagement

Visit the ISGAN website
http://www.iea-isgan.org