IEA TCPs Joint Workshop

Energy Efficiency in Future Electricity Systems: The Invisible Fuel

Tuesday 31st January 2017, Milano

RSE – Via Rubattino 54 – 20134 Milano - Italy

10h00 - 17h00

The electricity system can be considered as an energy conversion machine, where a primary source of energy (fossil, nuclear, renewable) is transformed into electricity, transported to a user through a transmission and distribution network and transformed once again into the useful output (mechanical, thermal, electromagnetic etc.). Each step in this transformation process may be subject to energy losses: electricity generation has intrinsic cycle efficiencies (linked with conversion cycle temperatures, materials physics, friction etc.), the conversion and transport of electricity is subject to losses in electrical components and conductors as well as for eddy currents circulation, dielectric behaviour of insulating fluids, the delivery of power is prone to losses in the final conversion cycles and related equipment.

Improving energy efficiency is the most cost-effective concrete action that governments can take in the short term to address climate change and energy security concerns and towards a more sustainable energy system. Energy efficiency is a key potential contributor to the reduction of greenhouse gas emissions: according to the IEA World Energy Outlook, the transition from the business-as-usual situation (resulting in a 6°C global temperature increase by 2025) to the more sustainable situation of 2°C global warming can be reached only through a strong leverage from energy efficiency, contributing to nearly 40% of emissions savings: i.e. the largest share of any fuel.

The electricity sector is one of the frameworks where progress in terms of efficiency has been among the most successful: the transmission and distribution networks show level of efficiency higher than 90%, but a lot can still be achieved through innovation, policy, regulation and user behavior. According to the European Directive on energy efficiency (Directive 2012/27/EC), three main drivers can be considered to foster energy efficiency in the power sector, namely:

- The increase of renewables sources integration (and in particular of variable renewables such as wind and solar and of high efficiency co-generation;
- The reduction of network losses, adopting all technically sound measures and economically sustainable solutions;
- The implementation of demand-response schemes, including demand aggregation, to enhance system flexibility, reduce load peaks, and increase energy conservation.

Clean energy technologies can significantly help to achieve the targets of an increased level of system efficiency. Network automation and smart grids can foster the integration of variable renewables and distributed generation, thus shortening the distance between generation and load, demand side management can be used to shape the energy consumption profile, reducing the peaks and their associated high losses levels, empowering the user with a greater responsibility and action over its energy behavior. Electrical equipment based on high temperature superconductors such as cables, motors, generators, fault current limiters, reduce losses dramatically and increase the ratings thus contributing significantly to the overall system efficiency. Reducing the operational losses (self-consumption, stand-by losses, load losses) of electrical equipment using LED lighting, high efficiency motors, electronic meters, and other electronic devices impact very positively on the sustainability of the power system.

This workshop is jointly organized by four Technology Collaboration Programs (TCPs) of the IEA, namely: HTS (High Temperature Superconductivity), ISGAN (International Smart Grids Action Network), DSM (Demand Side Management) and 4E (Energy Efficiency of Electrical equipment) and is focused on **the energy efficiency along the lifecycle of electricity**: generation, transmission, distribution and end-use.

The goal of the workshop is to discuss the challenges and opportunities for an efficient and sustainable electricity system addressing the different frameworks of relevance for the policy actors: technology and innovation support, regulation, standardization. Recent developments and future developments will be discussed with the aim to collect and analyze information, share expertise and develop greater understanding of policies and practices in the field of energy efficient systems.

The workshop will leverage the experience of the different TCPs involved and will debate, at the light of keynotes, oral presentations and round tables, the following main aspects, also in view of the setting up of a fruitful collaboration among the initiatives and with the Clean Energy Ministerial:

- **Policy, regulations and standards**
  - Smart grids regulations;
  - Energy efficiency standardization and labelling;
  - How to implement demand responses schemes;
  - Testing challenges for HTS cables;
- **Technology developments and application**
  - HTS recent developments and applications;
  - Smart metering energy efficiency;
  - Energy efficiency and DG – the role of smart grids;
  - Demand response: devices and users;
  - Energy efficiency in ICT sector;
- **Efficiency metrics and experiences**
  - Assessing the level of energy efficiency - metrics
  - Specifying efficient power transformers
  - Labelling super-efficient appliances
- **Capacity building**
- **Research needs and global collaboration**
- **Conclusions, lessons learned and call for action**
  - Possible joint activities and annexes among the 4 TCPs and outreach towards CEM

Interested participants and contributors shall send an email to the following reference persons:

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About HTS

The HTS TCP aims to analyze superconductivity technology, monitor developments in industry standards, and assess the benefits and existing barriers to deployment. It brings together utilities, funding agencies, manufacturers, laboratories and trade organizations to enable significant improvements in the generation, transmission, distribution and use of electric power. A recent roadmap was developed by the TCP for the widespread integration of high-temperature superconductors into the electricity supply network and highlights.

Visit the HTS website
http://www.ieahts.org

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. The ISGAN TCP aims to advance policy, technology and related standards for smart grids by raising awareness of their benefits, developing tools for implementation, and co-ordinating joint projects. The annual ISGAN TCP Award of Excellence has become a global mark for outstanding projects and best practices on smart grids development and deployment.

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

About DSM

The DSM TCP focuses on strategies for modifying the demand of energy from end-users using technological solutions, regulatory or financial incentives, and other means of encouraging behavioral change. By reducing or shifting demand according to a power system's needs, investment in power generation and grid capacity can be deferred or avoided, with benefits in both fast-growing economies where much power infrastructure is yet to be built, and in established systems where ageing infrastructure needs to be replaced.

Visit the DSM website
http://www.ieadsm.org

About 4E

The 4E TCP supports sound policy development in the field of energy efficiency end-use equipment by providing a forum for governments and other stakeholders to understand effective approaches to policy making. A comparison of results from 110 LED testing laboratories around the world has helped to improve the reliability of data for lighting products..

Visit the 4E website
http://www.iea-4E.org