

**Summary – Workshop on Clean Energy and Smart Grids in the Gulf: Potential and Applications
President’s Boardroom, Masdar Institute 10-11 June 2012
Co-organised by EPFL and Masdar Institute**

The workshop on ‘Clean Energy and Smart Grids in the Gulf: Potential and Applications’ was co-organised by EPFL and the Masdar Institute and aimed at identifying the challenges and the opportunities regarding the transition towards intelligent and clean energy practices in the United Arab Emirates and the wider MENA region.

Bringing together policy makers, managers from the private and the public sectors and academics – predominately from the region –, we tried to provide a comprehensive approach of the current and future practices and to explore the institutional challenges arising from the deployment of smart and clean technologies for the energy system, taking into account the impacts on sustainability and the specific characteristics of the region.

The presentations and discussions offered a unique opportunity to exchange information and ideas, as they covered among others: the under-development of research projects, the solutions offered by the private sector, the exploratory activities by the government and regulatory agencies, as well as conceptual and visionary approaches.

The workshop was opened by Prof. Joseph Checchi, Provost of Masdar Institute, who welcomed the participants. The opening was followed by the first session titled: ‘Advances in Smart Grids Research’ during which multidisciplinary academic views were presented. The next session entitled ‘Challenges in Smart Grid Applications’ offered insights into the implementation of smart grids as well as into the challenges posed by efficient data analysis. During the last session of the day titled: ‘Smart Grids: the Governance Perspective’ the floor was given to the government and policy makers to present their approaches and activities. On the second day the session ‘Clean Energy and the Gulf Region’ offered a overview of the current state of clean energy in the region and beyond and of the clean energy vision for the UAE, as well as a more comprehensive and global approach of technological challenges. The presentations and issues covered during the workshops are summarized below:

Day 1, 10 June 2012

Advances in Smart Grids Research

Sgouris Sgouridis, Masdar Institute, after welcoming the participants summarized the purpose of the workshop and presented the experimental research that is planned to evaluate different demand response incentive schemes relevant for the region including: information and peer knowledge, time-of-use pricing, time-of-use rewards, and energy credits.

Matthias Finger, EPFL, after welcoming the participants made an introduction to the objectives of the workshop highlighting the importance of the deployment of intelligence in energy systems and other network industries; the latter is the subject of the umbrella project: Intelligent Governance of Large Urban Systems. Following a stakeholders approach, Professor Finger discussed the relationship between institutions and technology, pointing out the distinction between policy and regulation as well as the challenges for governance and regulation to promote performance.

Peter Armstrong, Masdar Institute, presented an ongoing research project of Masdar Institute which studies the usage of low lift cooling systems (LLCS) for the pre-cooling of buildings' slabs aiming to reduce peak hour cooling demand. After explaining the operations of LLCS and the implementation using building thermal mass, Dr. Armstrong explained how predictive cooling is achieved and discussed the expected energy savings.

Challenges in Smart Grid Applications

Osman Ahmed and Shashavali Punnur, Siemens, presented Siemens Smart Grid applications and smart building program.

Tim Peck, IBM, discussed the challenges and opportunities of using knowledge to significantly change and improve the way power is used including both the conversion of streams of data – that become available from the usage of new technologies – into useful knowledge, as well the ability to present it in a way that will positively impact change in use of power.

Dohyun Goh, Global Green Growth Institute (GGGI) Abu Dhabi, after presenting the vision, mission and activities of the GGGI, outlined South Korea's smart grid road map targeting to build by 2030 the world's first nationwide smart grid. After discussing the five strategic areas of focus namely smart power grid, smart place, smart transportation, smart renewable and smart electricity service, Mr Goh referred to Jeju Island's pilot program.

Smart Grids: the Governance Perspective

Ramiz Alaileh, Regulation and Supervision Bureau Abu Dhabi, presented a pilot project that is currently being launched in Abu Dhabi and which involves the installation of 400 smart meters in houses in order to observe behavioural changes of consumers in response to information about their energy consumption.

Bruce Smith, Abu Dhabi Water and Electricity Authority (ADWEA), discussed the role of smart meters in a subsidised energy market. Starting with a review of the characteristics and benefits of the smart grid, Mr. Smith referred to ADWEA's smart grid program and concluded that, in the subsidised market of Abu Dhabi, standard operational benefits do apply, but that the potential of implementing dynamic tariffs is less attractive. Other benefits in the future may have to do with the implementation of energy efficiency programs.

Katarina Uherova Hasbani, Dubai Supreme Council of Energy, spoke about the mission and activities of the Dubai Supreme Council of Energy.

Day 2, 11 June 2012

Clean Energy and the Gulf Region

Pierre Rossel of EPFL offered an extensive perspective of smart grids considering innovation as a key element. After a discussion of the general characteristics of smart technologies, Dr. Rossel explored the concept of grids and extended it to other domains for which smart technologies have applications. He indicate emerging challenges, searching for the fundamentals of intelligent technologies and pointing out the vulnerabilities of an interconnected world. Referring to the current

state of technology as presented in this workshop, Dr. Rossel concluded with a reference to future energy challenges.

Hannes Reinisch, PricewaterhouseCoopers, presented an overview of energy production and clean energy potentials in the region.

Sgouris Sgouridis, Masdar Institute, presented a clean energy vision for the UAE based on an integrated energy model for the Emirates and on financial and performance analysis of different options for a sustainable energy transition.

Our long term objective to create a community of experts in matters of management and governance of intelligent urban energy systems was shared by the participants and the proposal to have a follow-up meeting after 6 to 9 months was broadly accepted.

Later, Dr. Sgouridis published some thoughts as developed from the workshop in Metering International:

“[In a subsidized tariff] environment where costs are not internalized, it would seem at first glance that smart-grid applications have limited, if any, usefulness for demand response purposes. I submit that this is not the case. Fit-for-purpose smart grid applications combined with an enabling scheme of positive incentives could effectively provide benefits in terms of energy conservation and load shifting even in subsidized electricity systems.

There are two behavioral mechanisms that can be leveraged to effect demand response in this case: (i) peer comparison and community consciousness on the one hand, and (ii) positive rewards on the other. Peer comparison schemes rely on creating a positive competition for reductions in resource consumption among a set of peers (households or businesses). They do so by providing real time feedback on energy consumption for a household on a scale that makes intuitive sense (i.e. green to red, a fresh to dry leaf etc) and comparison with an average sample of equivalent units. Positive rewards go one step further and monetize any helpful change in behavior. They rely on mathematical regression models of historical consumption for each household and for the environmental conditions – if the energy consumption pattern is lower than expected by the model then the household is offered a share from the gains the utility company has from not deploying that marginal capacity. These potential “gains” reduce the energy bill of the user and can be continuously posted on the smart screen and/or sent as electronic messages to the users. To facilitate user response, direct control of non-critical appliances from the utility through the smart-meter should be an available option. The understanding is that any rewards would be cancelled if the user overrides the control. Common problems to utility controlled appliances in the form of equipment malfunction liability could be addressed by including only appliances whose compatibility is certified by the manufacturer.

Time-of-use rewards invert the time-of-use pricing approach and therefore are a potentially game changing tool for cases where the consumers’ energy use is already subsidized. A successful implementation would require a rethinking of the utility’s responsibilities and a clear cost accounting across the entire energy value chain (or in –co nomenclature: DISCO, TRANSCO, GENCO, FUELCO) that will help in defining the total value of the reward and what entity should be responsible for providing it. “