With the Future Internet towards a Smart Grid

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I. INTRODUCTION

The energy sector has entered a period of major change which will continue for many years to come. The increasing proportion of electricity from renewable sources means that the architecture of the energy grid will have to support the distributed, in addition to the centralised, generation of energy and to adapt to a highly volatile supply e.g. from wind and solar generators. In addition, from the consumption perspective, electric vehicles will demand new load management patterns in the grids and provide energy storage. At the same time, private and commercial consumers are being encouraged to reduce their energy use and electronics manufacturers are striving to reduce the energy use of their products.

As depicted in Figure 1 optimum trade-offs need to be found between sustainability, reliability and costs. The energy supply will need to evolve into a dynamic system to provide the smart energy infrastructure needed to support the society in 2020 and beyond. Future Internet technologies will play a critical role in the development of Smart Energy infrastructures, enabling new functionality while reducing costs.

In the Future Internet Public-Private-Partnership (FI-PPP) project FINSENY, Future INternet for Smart ENergY, key actors from the ICT and energy sectors team-up to identify the ICT requirements of Smart Energy Systems. An overview of the consortium is depicted in Figure 22.

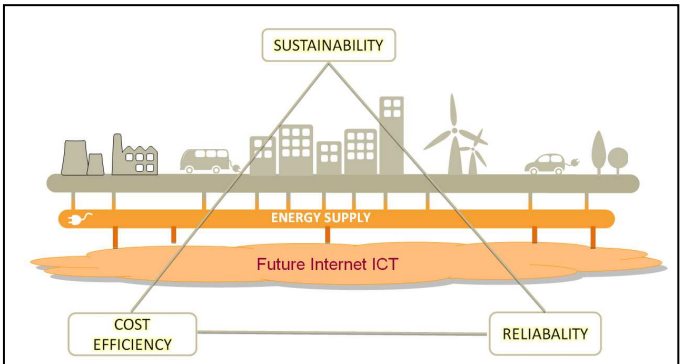

Figure 1: Energy Supply Triangle

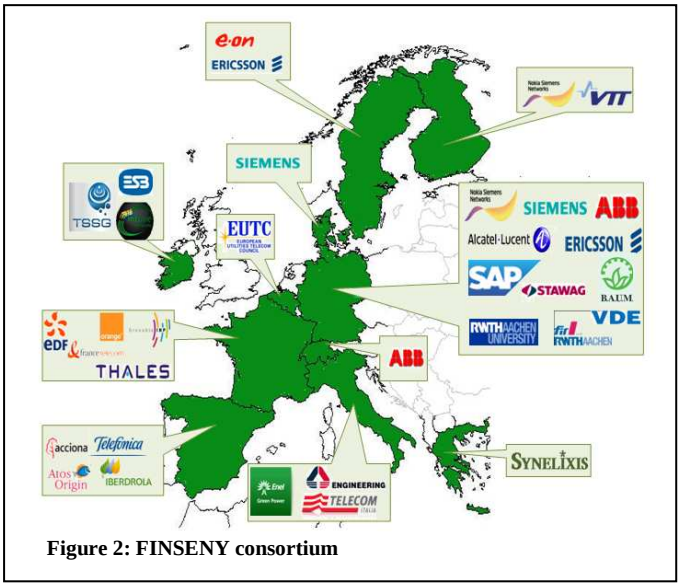

Figure 2: FINSENY consortium

This will lead to the definition of new solutions, architectures and standards, verified in a large scale pan-European Smart Energy trial. Project results will contribute to the emergence of a sustainable Smart Energy infrastructure, based on new products and services, to the benefit of all European citizens and the environment.

II. SCENARIOS IN FINSENY

FINSENY will use scenario techniques to identify the prominent ICT challenges. The term ‘scenario’ refers to an application domain in the evolving Smart Energy landscape, expected to be of significant importance, and requiring advanced ICT technologies.

To focus work on each individual scenario, FINSENY will assume that energy transport and energy distribution takes place solely as electricity. A large number of roles and players have to be considered when analysing these scenarios in detail. The fundamental understanding of these scenarios today and in future will enable FINSENY to identify the required Future Internet ICT enablers.

The selected scenarios are:

- Distribution network
  Advanced automation, control and management of distribution networks are needed in order to meet the anticipated increased use of distributed energy generation and to tackle new challenges such as the charging of electrical vehicles. Interfaces with the relevant stakeholders will play an important role.

- Microgrid
  The large scale introduction of distributed generation supports the establishment of microgrids aggregating and largely autonomously controlling their own supply- and demand-side resources. Interaction with the surrounding distribution network and with the connected prosumers is the key to the efficient control of such grids.

- Smart Buildings
  Efficient energy management in buildings requires extensive use of communication network infrastructure to and in buildings as well as the provision of the necessary interfaces to local appliances, local distributed generation and energy and service providers.

- Electric Mobility
  The large scale introduction of electrical vehicles will have an impact on the energy infrastructure by providing the necessary charging points, but also requires interaction between the energy infrastructure, the transport infrastructure, the vehicle information systems and the communication network infrastructure, in order to collect, process and deliver the needed information.

- Electronic market place for energy
  The introduction of Smart Energy Grids and deregulation is resulting in a transformation of the European energy market. New players are appearing and the roles of incumbent players are changing. An electronic market place for energy must support all these players and roles by providing business models and market rules for a more transparent energy exchange, and the corresponding interfaces and tools. It should also be open to support new applications, players and roles.

For each of these scenarios, the most important building blocks will be identified and analysed in detail during the project runtime.

III. Smart Grid Stakeholder Group

Due to the large scope of Smart Energy, one project partnership alone cannot host all relevant stakeholders. Therefore intensive cooperation is required far beyond the FINSENY consortium. Therefore, the Smart Grid Stakeholder Group (SGSG) has been established in June 2010 to foster the information exchange between ICT and energy industry and thus to better understand each others views.

The organization of the SGSG is a task in FINSENY. At least three workshops are planned to present and discuss project findings and to identify further cooperation opportunities. This group is open for all industrial organizations which are interested in Smart Grid / Smart Energy topics. In case of interest to join that group, please contact the authors of this article.

IV. Outlook

As part of the FI-PPP programme [1],[2], FINSENY will intensively analyse energy-specific ICT requirements. In total the FI-PPP comprises 11 projects: Seven other FI-PPP projects will investigate further usage areas like transport, mobility or public safety. Finally all FI-PPP projects work together to develop solutions addressing these ICT requirements, and to prepare for large-scale trials in the later phases of the programme. These projects are cooperating with the Core Platform projects for a holistic platform-based ICT approach and two coordination actions on potential trial sites and the overall programme coordination.

V. Acknowledgment

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VI. References

[1] Future Internet Public Private Partnership. Available online: http://ec.europa.eu/information_society/activities/foi/lead/fippp/index_en.htm

[2] Future Internet PPP – The future now. Available online: http://www.fi-ppp.eu/