



# With the Future Internet towards a Smart Grid

**EU FP7 FI-PPP FINSENY  
(Future Internet for Smart Energy)**

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on behalf of the FINSENY project**



# Outline



- **Project Motivation**
- **FINSENY project details**
- **FINSENY's approach**
- **First ICT requirements**
- **Conclusion**

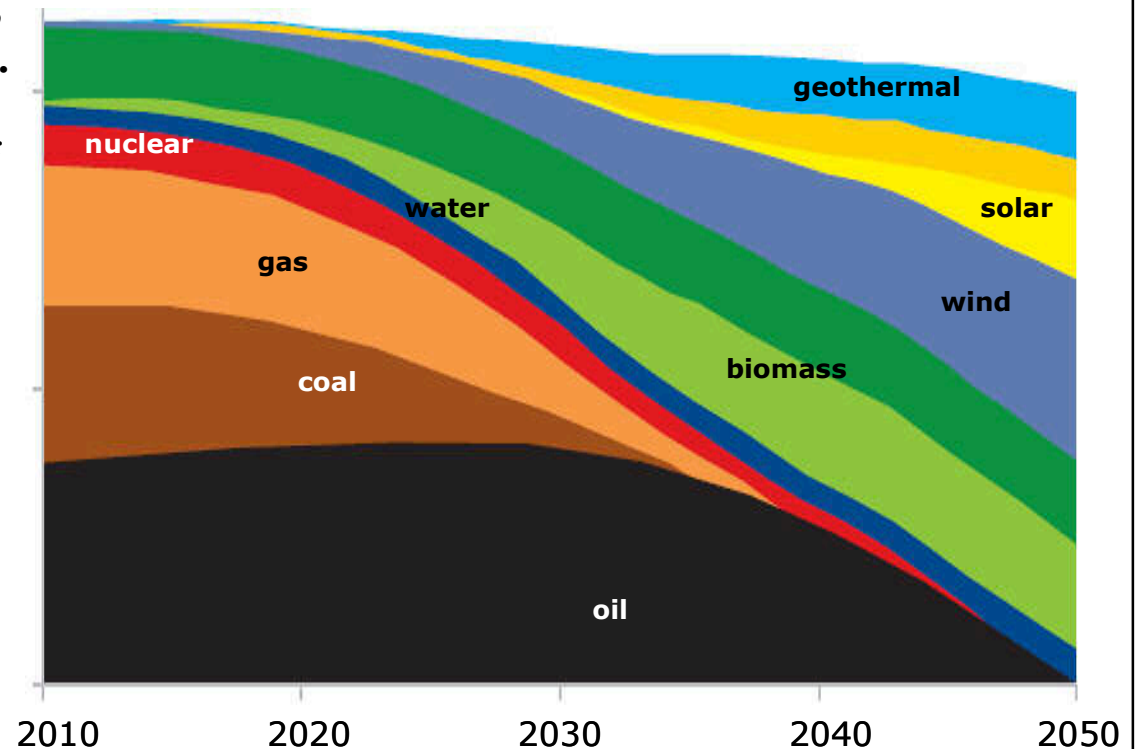


# Motivation



## EU's climate change objectives for 2020

- reduce greenhouse gas emissions by 20% (w.r.t. 1990)
  - to increase the share of renewable energy to 20%
  - to make a 20% improvement in energy efficiency
- Managing production and consumption is a prerequisite to achieve renewable power supply





# Project motivation



- In search of a sustainable energy system
  - limit climate change
  - replace nuclear power generation
- Renewable & decentralised energy generation
  - need to cope with volatility
  - need to optimally use existing grid infrastructures
- Liberalisation of energy markets
  - new services
  - new market roles
- Combination of action fields
  - smart grid and smart home
  - smart grid and electric mobility
  - ...

**ICT is the key  
enabler for the  
smart energy  
world!**



# FINSENY objectives

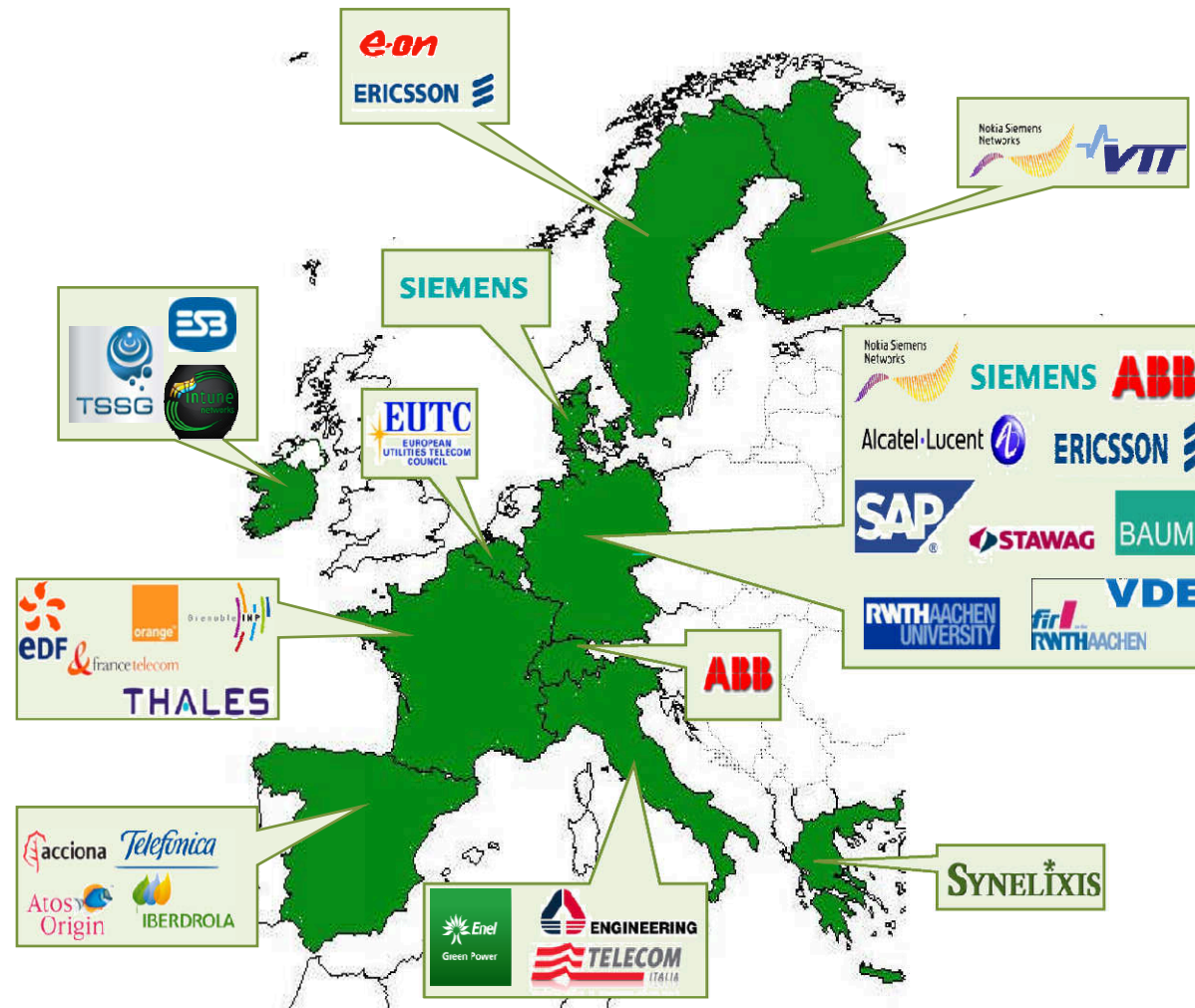


**Shape the Future Internet ICT platform(s) for European Smart Energy. Analyse scenarios, identify requirements, develop reference architectures and prepare pan-European use case trials.**

- **Objective 1: Analysis of scenarios, identification of requirements, and development of reference architectures**
- **Objective 2: Identification of generic enablers, together with the other FI-PPP projects**
- **Objective 3: Provision of selected domain-specific enablers**
- **Objective 4: Preparation of pan-European use case trials**
- **Objective 5: Development of a cross-industry standardisation strategy**

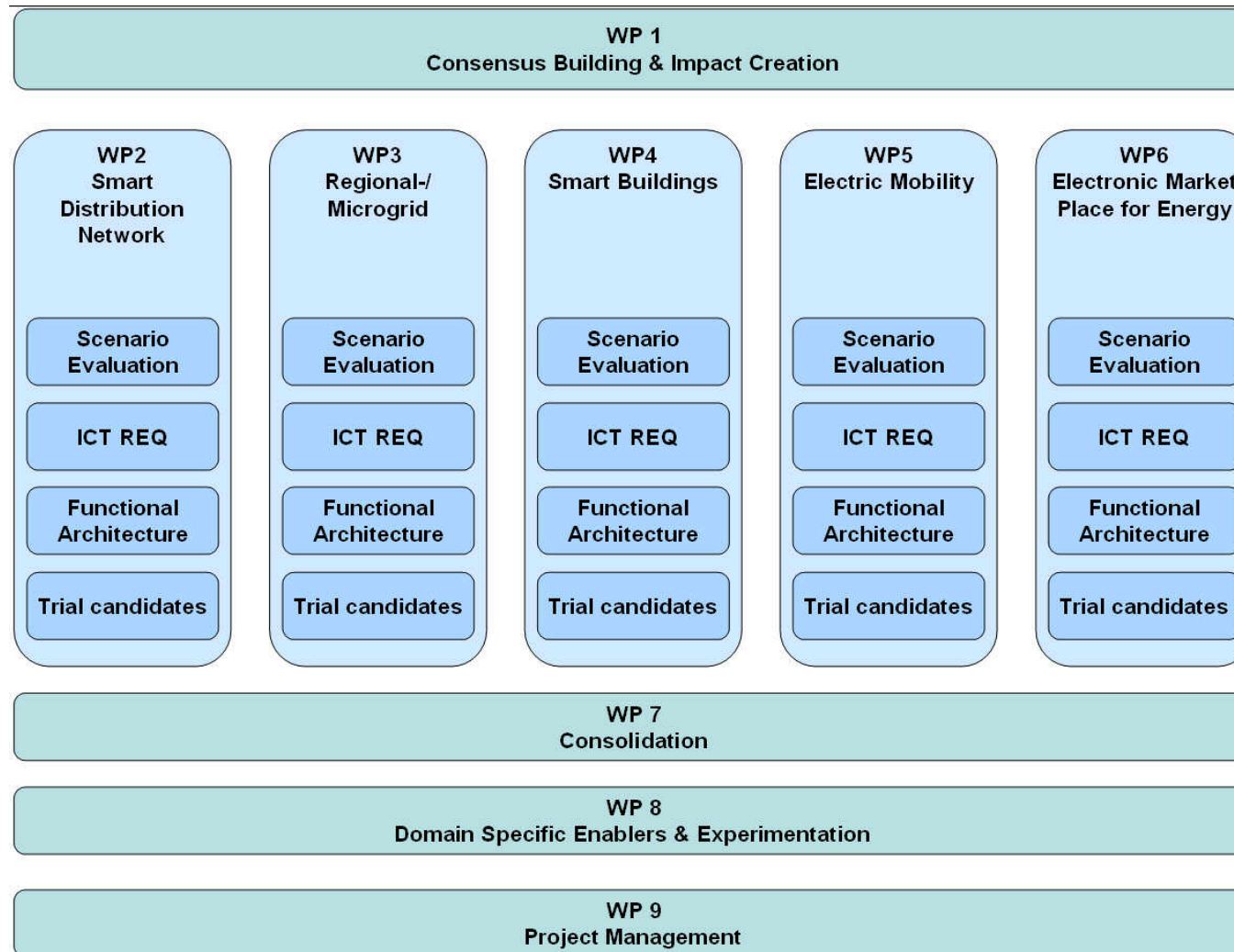


# Major European partners joined the FINSENY consortium





# FINSENY Work Packages





# FINSENY's Approach



- **Focus on five selected Smart Energy scenarios**
- **FINSENY will analyse these scenarios in terms of:**
  - **Scenario description**
    - describe scenario specific and typical building blocks
    - define prominent applications, architecture, major players, roles and responsibilities
  - **ICT requirements**
    - define control information, data type & flows, reliability and real time/deterministic level, processing needs
    - identify suitable communications and control network structures
  - **Functional ICT Architecture**
    - identify key building blocks, interfaces and data models
    - develop ICT architecture based on common enablers (Tech. Foundation) and domain specific enablers (WP8)
  - **Trial candidates**
    - identify trial candidates taking into account relevance, trial setup and reuse of existing trials
    - supports trial planning of WP7





# Example for ICT requirements: Monitoring & Control



- **Monitoring & control of energy systems (critical infrastructure!)**
- **Requirement:**
  - Quality of Service, e.g. deterministic communication on different time-scales
  - High availability and reliability
  - Critical ICT infrastructure has to survive electric supply failures
  - Mission critical parts have to function even when ICT fails
  - Integrating legacy devices (long lifetimes of equipment)
  - Different control methods (from direct control to agent-based)
  - Scalability
  - Security



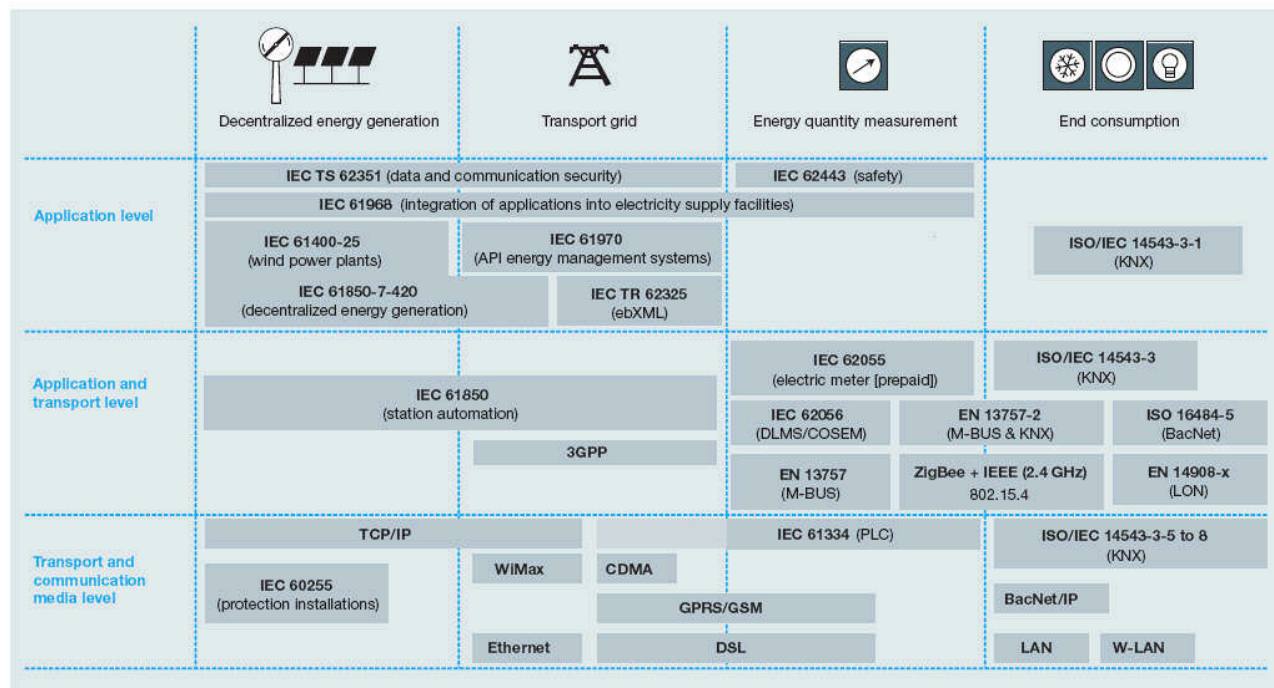
# Example for ICT requirements: Interoperability



- Smart Grid Applications cover different domains and a large set of different devices and standards (e.g. from intelligent loads to large wind turbines)

## Requirement:

- Interoperability for seamless integration
- Harmonization of different standardized object models



Source: BDI initiative Internet of Energy (2008)





# Example for ICT requirements: Auto-configuration



- **Plug & Play functionality is needed at different levels in the Smart Grid**
  - Plug&Play of Smart Appliances in house
  - Registration of electricity network devices at a control center (sensors, circuit switches, relays, ..)
  - Registration of Distributed Energy Resources (e.g. photovoltaics) and Home Energy Management Systems at a control center
- **Requirements:**
  - Remote access to the device in the private LAN
  - Common information model for describing the capabilities of the device
  - Secure and trusted access by a third party depending on specified access rights



# Internet Technologies in Energy Automation



- **Communication infrastructure:**
  - Private, public or network service provider?
- **Internet technologies are used widely also in private networks of utilities**
  - Industrial Ethernet, e.g. GOOSE (Generic Object Oriented Substation Event)
  - IP to the Field, e.g. IEC 61850 Client/Server communication
  - Web Services (SOAP/WSDL), e.g. in IEC 61400-25
  - Security (SSL/TLS), e.g. in IEC 62351
  - Embedded web servers for engineering or failure tracking



# Conclusion



- **Conclusion for the Energy Domain**
  - We must act now! The system must become smart(er)!
  - We need more ICT elements!
  - Some ICT elements are domain specific. Some can be supplied as generic enablers by the Future Internet core platform
- **FINSENY will provide domain specific enablers in the ICT domain to integrate both sectors**
- **Demonstration projects show viability and help define the framework**
  - EC funded: FENIX, BeAware, PREMIO, Web2Energy, SAVE ENERGY, ADDRESS etc.
  - national programs: E-Energy (DE), Energy@Home (IT), SG Model Regions (AT)
  - **industry initiatives**



**Thank you for your attention!**