



EDF Smart Grid activities

IEEE PES Conference on Innovative
Smart Grid Technologies

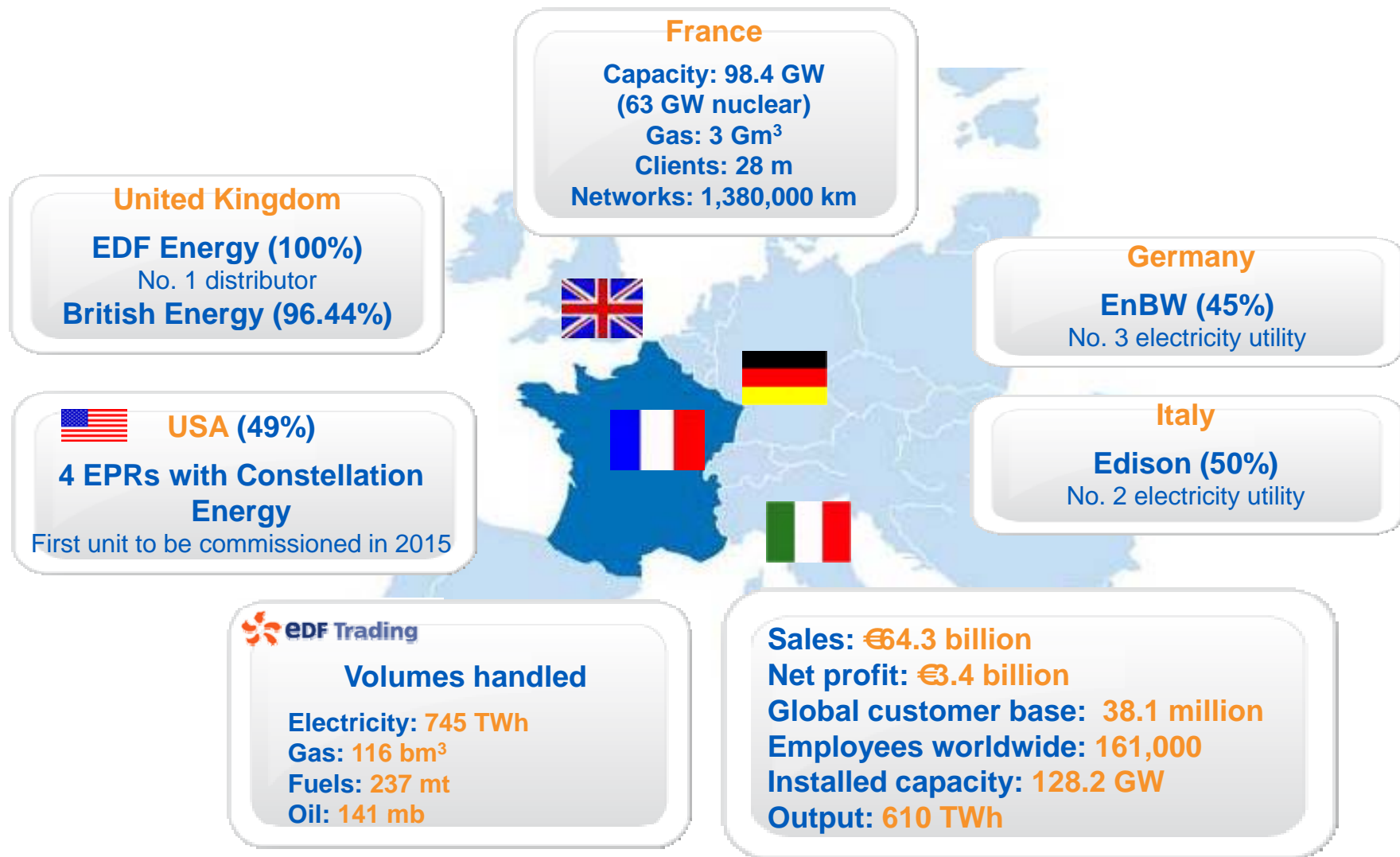
19-21 January 2009

Xavier Mamo

International R&D Program Manager



EDF, a global low carbon energy leader



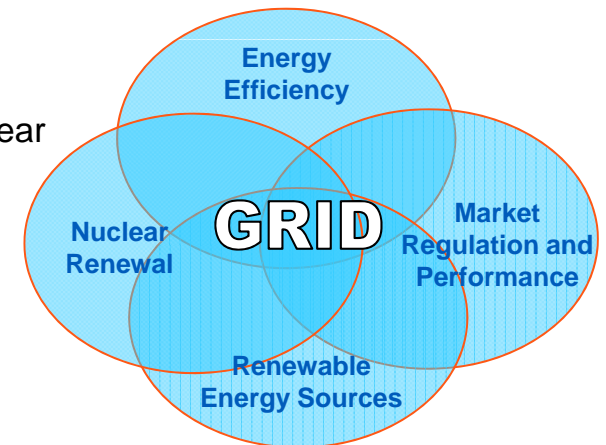
Energy policy overview

▶ Energy policy targets – European Union

- Reducing greenhouse gas emissions by 20% in 2020
- Improving energy efficiency by 20% in 2020
- Raising the share of renewable energy to 20% in 2020

▶ Energy policy targets – France

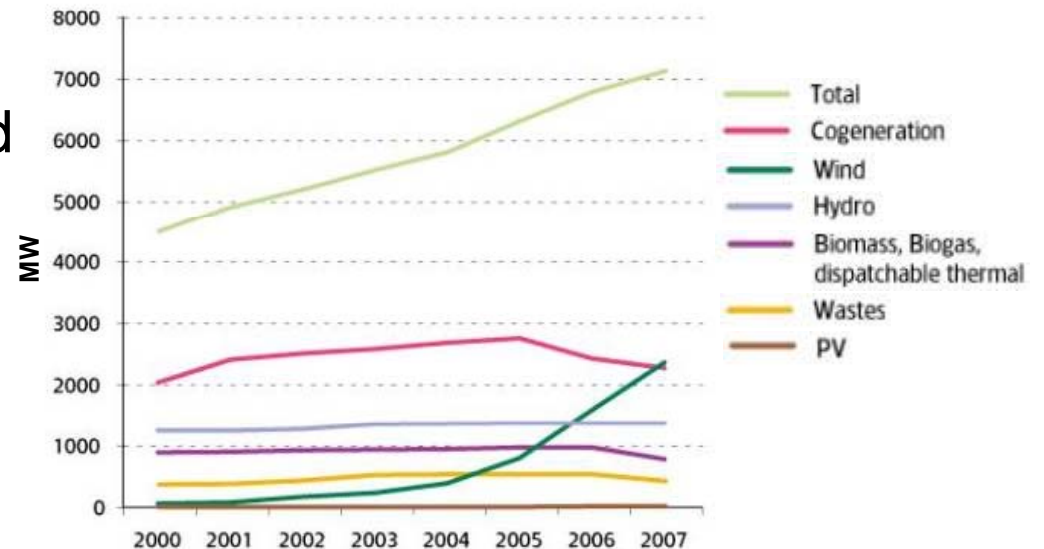
- Greenhouse gas emission: reduction by a factor 4 compared to the 1990 levels in 2050
- Energy efficiency
 - Old houses: 38% reduction in 2020
 - New constructions: primary energy consumption less than 50kWh/m²/year
- Development of renewable: 23% by 2020
 - 25,000 MW wind (19,000 MW inland – 6,000 MW offshore)
 - 5,400 MW solar
 - 2,300 MW biomass



▶ Smart Grid identified as an enabler to achieve the targets

Electricity sector in France

- ▶ Fully open market since 2007
- ▶ Legal separation of T&D activities (2003 European Directive)
 - Regulated activities: RTE (transmission), ERDF (distribution)
 - Competition: Generation, Trading, Supply market
- ▶ Sustained development of renewable energy connected on distribution networks
 - Wind: **4,046 MW** installed (Q3 2009)
4,298 MW in projects (+106%)
 - PV: **141 MW** installed (Q3 2009)
1,659 MW in projects (+ 1177%)
- ▶ Dynamic tariffs
 - TOU rate (1965): 33% residential – 20 TWh
 - CPP rate (EJP – 1982): about 2 GW
 - Tempo rate (TOU+CPP – 1996): 150-300 MW



R&D: the first step towards Smart Grid

▶ EDF R&D challenges (2003 – 2009)



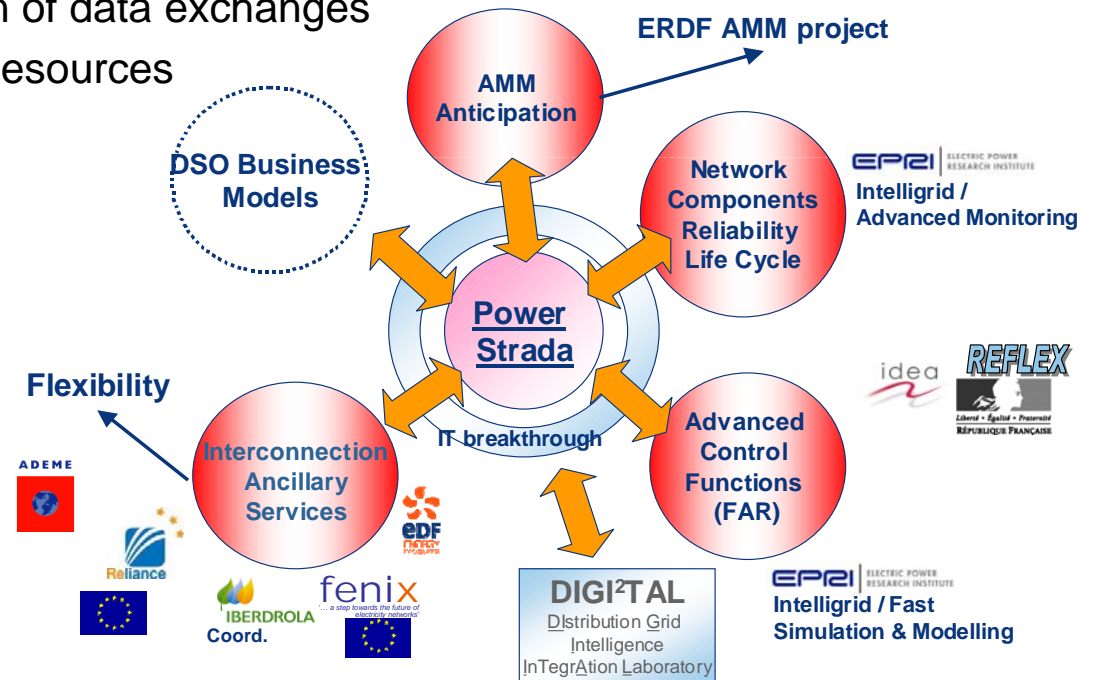
EDF R&D at a glance : 2,000 individuals, 420 million €/ year

Zoom: Preparing the distribution for 2015

▶ Leveraging Smart Grid to address identified risks and opportunities on distribution systems

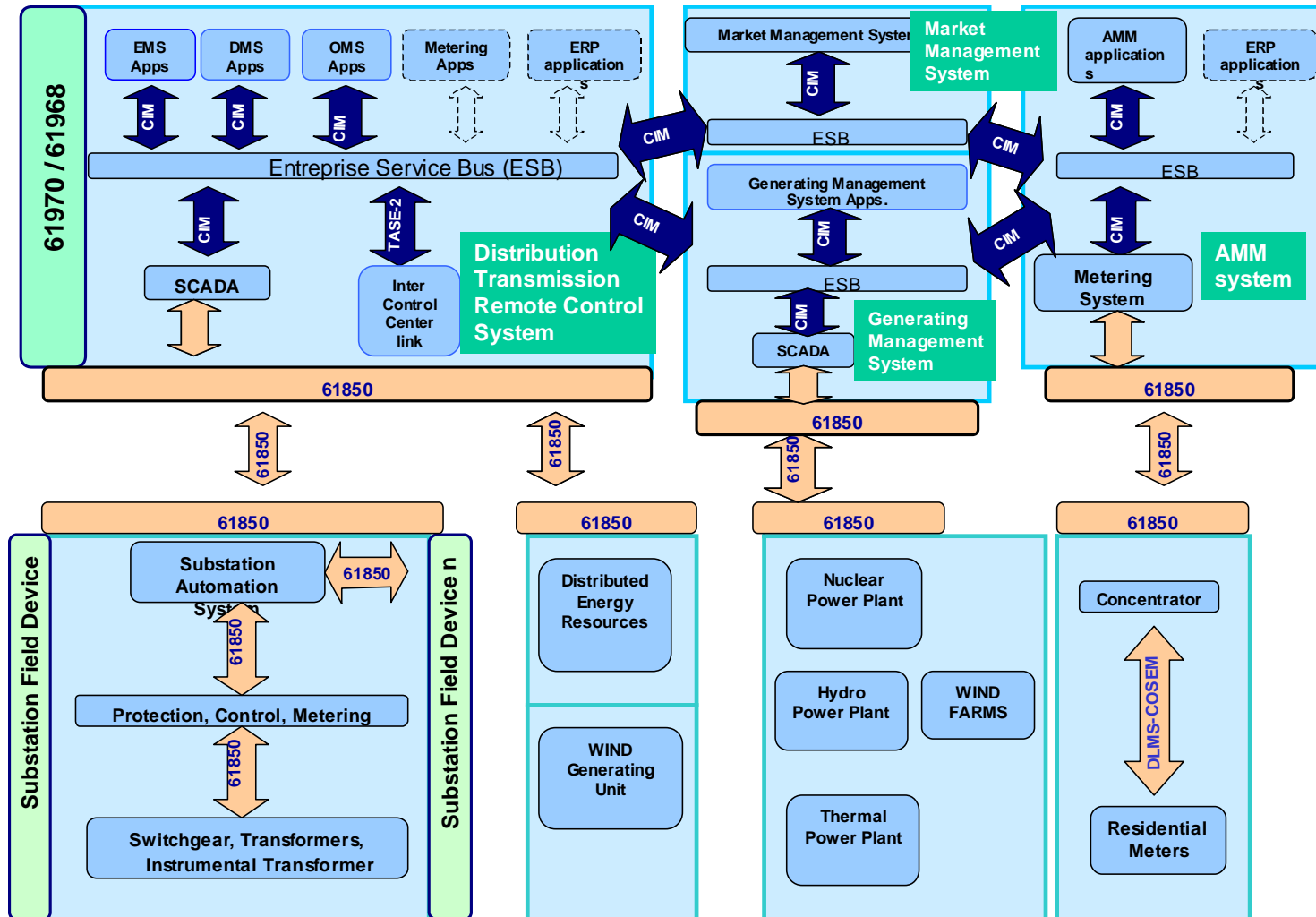
- Advanced Metering
- Ageing Assets
- Advanced control and operation
- Interoperability and standardization of data exchanges
- Integration of Distributed Energy Resources
- Communication technologies

▶ Building on European and international partnerships



Zoom: Preparing the distribution for 2015

► Developing a standard architecture reference model

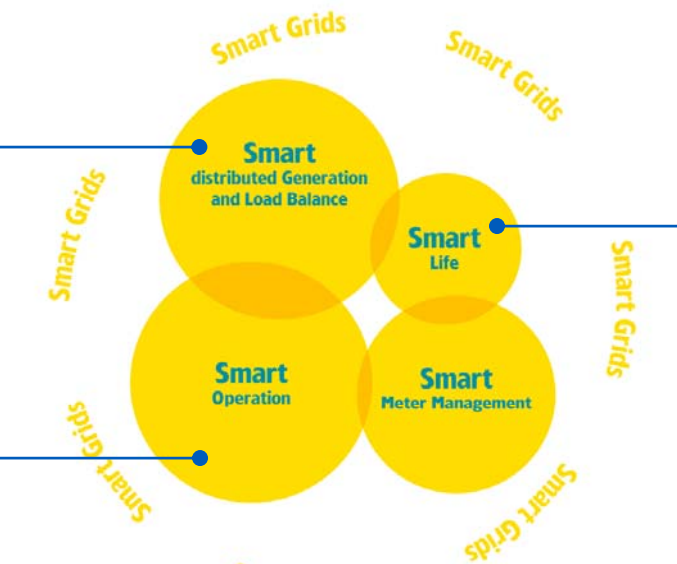


Moving forward: Smart Grid at ERDF

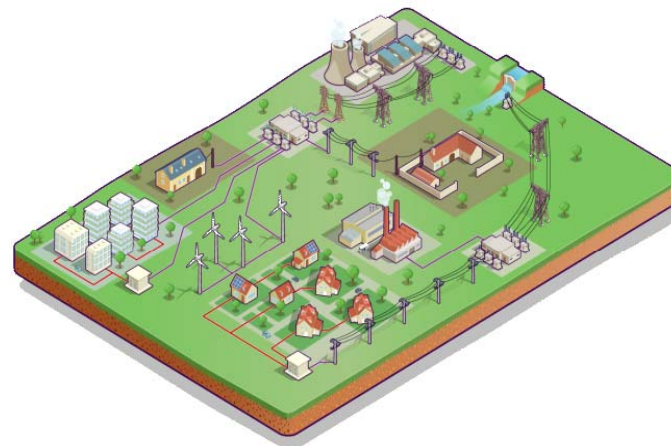
Smart Grids : ERDF's vision

Integration of renewable
(wind, PV)
Plug-in Electric Vehicles
Load Management
Storage

Improvement of network
operation and control
(fault location, isolation,
self-healing grid)
Workforce management
Mobile applications



Optimization of maintenance
and component replacement
(online, offline diagnosis,
condition based maintenance,
risk analysis)

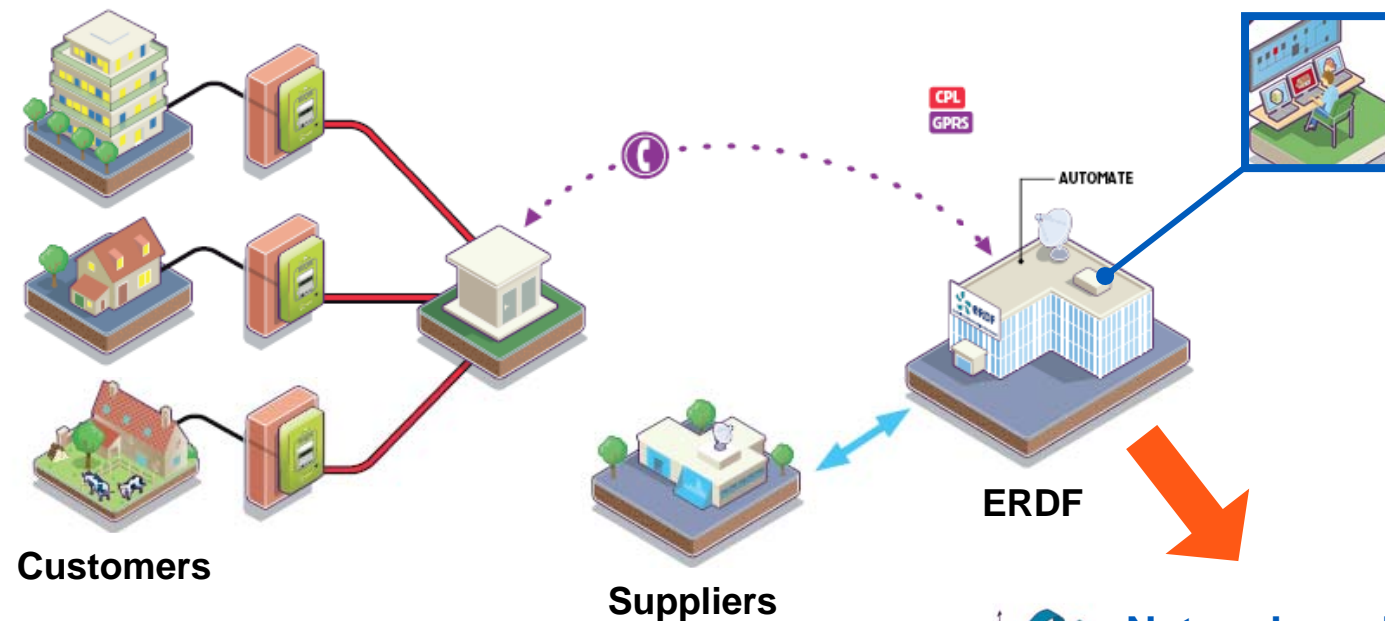


ERDF Smart Meter Management

Linky
le nouveau compteur communicant

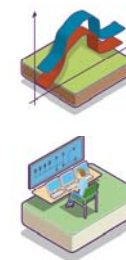


Advanced Metering pilot architecture



To prepare the massive roll-out

- 2 pilots: Tours (rural) and Lyon (urban)
- 300,000 meters
- 7,000 data concentrators

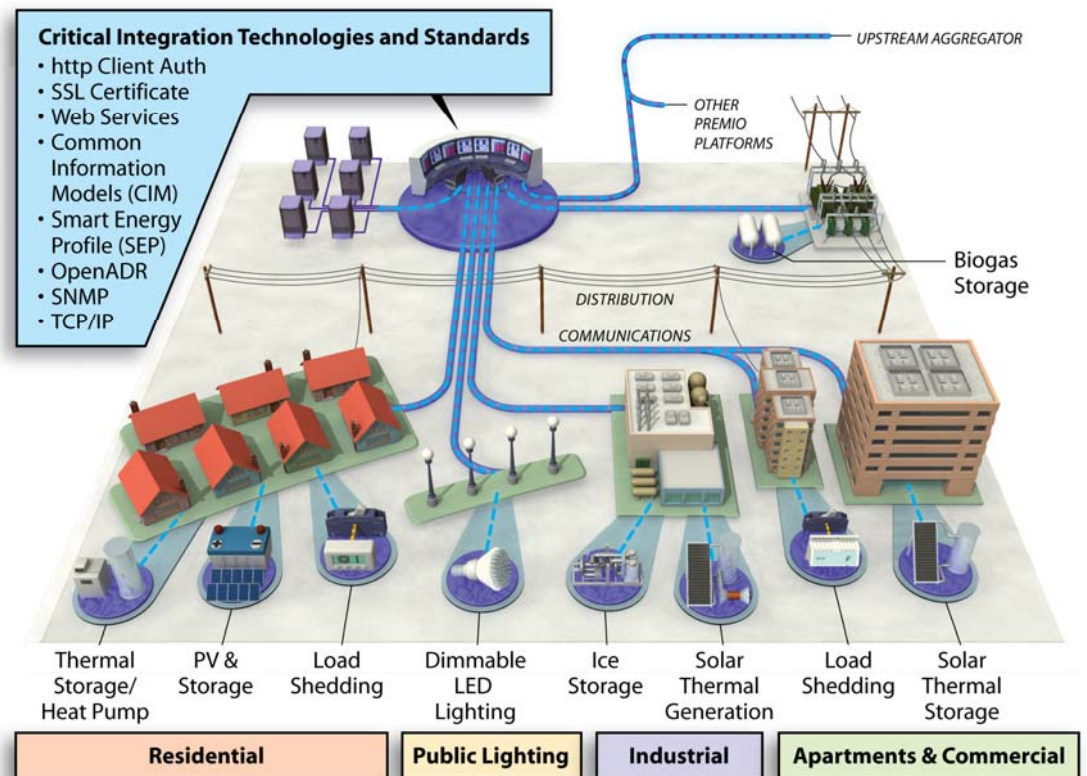


- ### Network applications
- Planning
 - Monitoring & Control
 - Power Quality

Demand response on the customer side

► PREMIO Demonstration in the South of France

- To demonstrate an **innovative, open, and repeatable architecture** to optimize the **integration of distributed energy resources** in order to provide load relief, local network support and reduce CO2 emissions
- Extremely constrained local system
- 9 families of experiments
- Architecture leveraging IP based standards
- Day Ahead & Intra-day (10 min) Pricing/event notification



Other initiatives within the EDF group

▶ EnBW – Road to Minimum Emission Regions

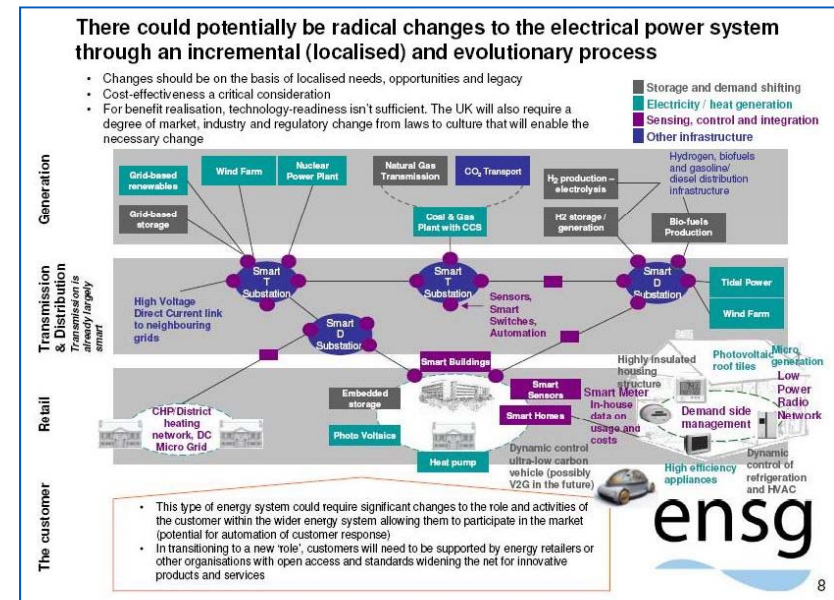
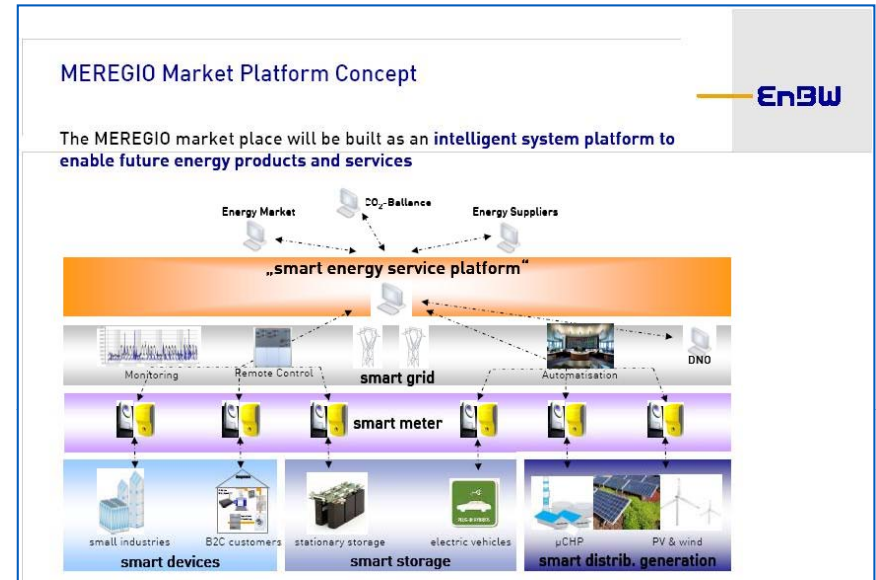
- Under the “E-Energy” program
- 4 year / 60ME on 6 projects

▶ UK – Electricity Networks Strategy Group

- Developing a Smart Grid vision & roadmap
- CBA analysis

▶ UK - Department of Energy and Climate Change

- UK Smart Grid Demonstration Fund – 6M£
- 500M£ over 5 year for large scale demonstrations



Next steps

▶ Remaining questions

- Global economic / investment strategy to finalize
- Societal acceptability
- New economic and regulatory models to define

▶ Need for more demonstrations and R&D...

- Europe: call 30M€ and European Industrial Initiative (DSO)
- France: ADEME Demonstration Fund: 400M€ for demonstrations
- Under preparation
 - Low energy buildings
 - Storage and energy inverters
 - Smart Grids (30M€)

▶ ... aligned with the legislative calendar

- Final decree for AMI deployment
- Reform of the energy market / tariffs

Thank you for your attention !

