# Integration of Demand Side Management, Distributed Generation, Renewable Energy Sources and Energy Storages

State of the Art report

Content

Workshop in Petten





- 1 Introduction
- 2 IEA DSM Task XVII
  - 2.1 Objectives
  - 2.2 Approach





#### 3 Technologies

- 3.1 Main characteristics of the Distributed Energy Resources (DER)
- 3.2 Smart grid concepts
  - 3.2.1 General
  - 3.2.2 European SmartGrids Technology Platform
  - 3.2.3 GridWise™ Alliance
  - 3.2.4 IntelliGridSM
- 3.3 Technologies needed for network and market integration
  - 3.3.1 The optimisation of the operation of DER
  - 3.3.2 Management of integrated DER portfolio
  - 3.3.3 Control in virtual power plants
  - 3.3.4 Local and remote control of DER
  - 3.3.5 Metering 18
  - 3.3.6 ICT infrastructure
  - 3.3.7 Interoperability and standardisation
  - 3.3.8 User/usability aspects... (user interfaces, experiences, socio/economic issues)





# 4 Analytical tools and analysis methods for the assessing the effects of integration

- 4.1 Analysis of tools
- 4.2 Resource planning and policy analysis
- 4.3 Macro-scale power system analysis
- 4.4 Network simulation tools
  - 4.4.1 General purpose tools for electrical network
  - 4.4.2 Simulation tools for gas network
  - 4.4.3 Others
- 4.5 Customer-level simulation tools
- 4.6 Simulation and optimization tools for DR, DG and energy storage operation on the market
  - 4.6.1 Operational use
  - 4.6.2 Assesment use
- 4.7 Forecasting tools
  - 4.7.1 Wind power generation forecasting
  - 4.7.2 Load forecasting
  - 4.7.3 Market price forecasting





## 5 Policy, regulation, market in participating countries

- 5.1 Electric Industry: market structure and market actors
  - 5.1.1 Market structure
  - 5.1.2 Market actors
- 5.2 Demand Response: demand response efforts
- 5.3 Market Transactions: electricity market transactions
- 5.4 DG and renewables
- 5.5 Energy storages: overview of energy storages
  - 5.5.1 Large scale energy storage
  - 5.5.2 Customer level
- 5.6 Driving forces
- 5.7 Network access
- 5.8 Stakeholders and their roles
  - 5.8.1 Consumers
  - 5.8.2 Energy retail companies
  - 5.8.3 Energy traders
  - 5.8.4 Local grid operators (Distribution System Operators or DSOs)
  - 5.8.5 Transmission System Operators (TSO)
  - 5.8.6 Network of autonomous grids
- 5.9 Problems and future development



## 6 Business opportunities

- 6.1 Benefits of different actors related to the integration of DR with DG
- 6.2 Forms in which DER can be offered to the market
  - 6.2.1 Incentive based DER
  - 6.2.2 Market based DER
- 6.3 How to satisfy, possibly conflicting, simultaneous optimisation goals
- 6.4 Products already on the market
  - 6.4.1 Examples of business models





- 7 Experiences from the pilot case studies
  - 7.1 Autonomous grids, microgrids
  - 7.2 Balancing DG units
  - 7.3 Aggregation of units and virtual power plant
  - 7.4 Traditional DR/DSM
  - 7.5 Delay network investments
  - 7.6 Potential studies
  - 7.7 Conclusions from the case studies
- 8 Vision of successful integration and conclusions

Annexes
Country reports



