

SEESGEN-ICT

Thematic Network on

ICT for Energy Efficiency in SmartGrids

<http://seesgen-ict.rse-web.it>

Context and Objectives

Achieving the 20/20/20 EU strategy objectives claims for a deep transformation of the Electric System: from a passive network (where basically energy flows from large power plants towards the final users) to a scenario where local generators, distributors and empowered customers co-operate intelligently to ensure a secure operation.

This ongoing evolution to the Smart grids concept affects all aspects of the Electric System: organization, technology, market, regulations & standards and society. Information and Communication Technology (ICT) is essential to support the transformation. ICT provides solution-based tools to overcome fragmentation, i.e. integrating distributed power sources in Smart Grids; creating intelligent management of distributed systems and all their components; monitoring of performances such as recording and accounting of energy fluxes. ICT is also necessary for implementing Energy Efficiency strategies through Demand-side initiatives and to provide the instruments for the effective robust and resilient implementation of the new business models.

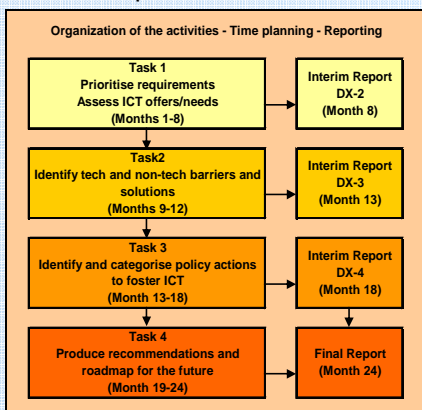
SEESGEN-ICT aims at producing harmonized frame of the priorities to accelerate the introduction of ICT within the complex system of the Smart Distributed Power Generation Grids, exploring requirements, barriers and proposing solutions. SEESGEN-ICT will produce policy recommendations, identify best practices and draw scenarios and roadmaps.

ICT enabling effects

- ICT sector accounts for 2% of global emissions but impacts the other 98% of global emissions.
- ICT could help curb emissions by anywhere between 15 and 40 % (ITU).
- SmartGrids could sustain 8% of emissions abatement target, enabling reduced T&D losses (45%), from RES integration (40%) and change Users behaviour (15%) (Smart 2020)
- Demand Response could contribute 200 TWh annual Energy Savings, avoid 50bn € of investments relating to peak generation capacity and T&D and save 25bn € in bills for customers (Vaasaett)

Summary

SEESGEN-ICT will report state of the art, good practices and recommendations regarding ICT and related successful business cases. It will also address new research and development initiatives to develop the needed solutions.



The TN is designed around the following priorities:

- Intra-grid (Energy and Communication) Management & Operation;
- Data handling and Service Monitoring;
- Demand Side integration;
- Business models and Aggregation potential;
- Environment protection;
- Test Facilities for validation of ICT solutions;

All the specific issues are studied under the same approach: ICT offers and needs; barriers and solutions; ICT and policy actions to end with an ordered list of actions and recommendations per Stakeholder to actively push the participation and deployment of advanced ICT.

Each phase results in public Deliverables, which are available for downloading in the SEESGEN-ICT website.

Milestones and expected results

- Identification and assessment of ICT supporting Energy Efficiency in the SmartGrids of the future.
- Roadmap for development needed in ICT.
- Identification of barriers and solutions to the effective exploitation of ICT.
- Identification of Best Practices for use of ICT and of suitable Business Models.
- Recommendations for policies addressing the widest and effective use ICT.
- Requirements and Directory of existing Test Facilities for validation of ICT.

EUROPEAN
COMMISSION



ICT POLICY SUPPORT
PROGRAMME



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ICT for Energy Efficiency

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Structure of the Thematic Network

SEESGEN-ICT project is organised in six technical Work Packages:

WP 2: ICT for management of SmartGrids with distributed energy resources

Survey and categorise the different ICT-approaches to SmartGrids management and their implementation in the electric grid operation.

WP 3: ICT for Energy Efficiency Monitoring in SmartGrids

Identify and prioritise the new needs, provide good-practice solutions and roadmaps for data handling and inter-stakeholders service monitoring.

WP 4: ICT for demand-side integration

Explore the interaction between demand side requirements and ICT solutions to support an efficient and easy integration of an active customer in an "intelligent" grid.

WP 5: ICT for business models management

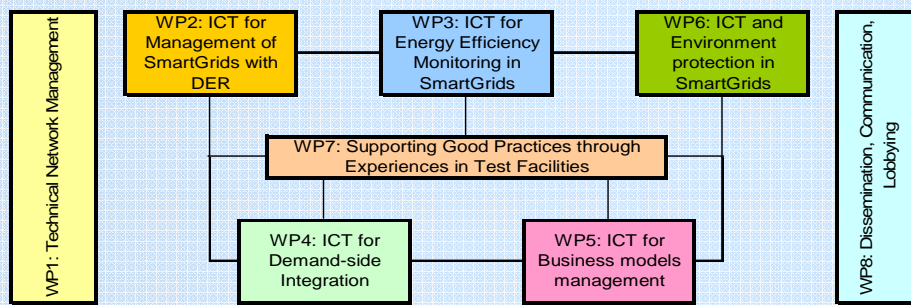
Analyse business models and relevant ICT tools to support the implementation of the energy efficiency, demand management and distributed energy services in SmartGrids in competitive market.

WP 6: ICT and environment protection in SmartGrids.

Energy Efficiency management of ICT-systems for use in Smartgrids and ICT requirements and solutions to support emissions trading models .

WP 7: Supporting Best Practices through Experiences in Test Facilities

Requirements for Test Facilities suitable for the validation of Best Practices of ICT solutions supporting Energy Efficiency in smart generation grids.

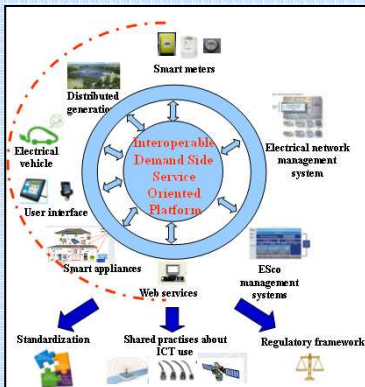


The Consortium

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Final Outputs



The concept of Demand Side Oriented Platform to overcome tech and non-tech barriers to ICT deployment

The results of SEESGEN-ICT are fully described in the public Deliverables, which can be freely downloaded at the project website <http://seesgen-ict.rse-web.it>

SEESGEN-ICT R1: Recommendations Family on "Interoperability, Standardization, Communication, Data Aggregation, Data Handling and Security"

COMMUNICATION & STANDARDIZATION	<ul style="list-style-type: none">Go for interoperable communication protocols and information models based on open standards and open source softwareGo for unified open StandardHarmonize standards & Enforce the Standardization framework
COOPERATION	<ul style="list-style-type: none">Enhance cooperation and funding for researchFoster a cooperation framework on common standardsEnhance exchange of validated descriptive information and grid modelsEnhance exchange, validation and sharing models to develop intra-grid applicationsFavour exchange of information and data and improve coordination among TSOs and DSOsInterconnect local and wide area systems
SECURITY AND PRIVACY	<ul style="list-style-type: none">Strengthen a Legislation Framework to ensure Data Privacy and SecurityEnhance awareness of access to personal data by stakeholdersEnsure safety of Data Handling (through anonymity and aggregation)
RELIABILITY AND SECURITY	<ul style="list-style-type: none">Enhance redundancy of information to improve robustnessMap interdependencies of Infrastructure and decrease vulnerability

SEESGEN-ICT R2: Recommendations Family on "Intelligent embedded ICT components"

EMBEDDED INTELLIGENCE AND MONITORING	<ul style="list-style-type: none">Develop a coherent Technological Ecosystem based on embedded ICT componentsEnsure Inter-changeability and Interoperability of components and applicationsImprove inside the monitoring Network
SERVICE IMPLEMENTATION	<ul style="list-style-type: none">Develop Coordination Mechanisms as the Service Level Agreement for the implementation of ServicesDefine criteria and KPI for the assessment of the Quality of the Active Demand provided by AggregatorsDevelop/Foster Technology for service implementation and security
OPERATIONAL TOOLS	<ul style="list-style-type: none">Develop optimization tools for DER aggregation and managementEnhance Smart Meters functionalities and requirements tied to the applicationsStandardize the exchange of information on demand elasticity and response

SEESGEN-ICT R3: Recommendations Family on "Cross-cutting structural and social issues"

MARKET AND REGULATORY ISSUES	<ul style="list-style-type: none">Ensure adequate market context and regulatory framework to motivate and foster the MarketEnhance shift from passive to active system by incentivizing DGsFoster a specific Market for flexible resources in EuropeFacilitate the Coordination of Aggregators activities with System Operators and rule the management of sensible informationLimit uncertainties to Avoid Economic risk related to market operation
BENCHMARKING	<ul style="list-style-type: none">Put Benchmarking on a firm basis for validation of ICT solutionsAdequate Test Facilities to Benchmarking purposes (especially with ref. to interoperability)
SOCIAL CONSENSUS	<ul style="list-style-type: none">Sustain research and development initiative about economical and sociological aspects of the ICT for DSISurveys on consumersProvide education and awarenessEnsure Data availability and information transparency

SEESGEN-ICT R4: Recommendations Family on "Energy Efficiency and CO2 emissions"

ENERGY EFFICIENCY IN DATA CENTRES	<ul style="list-style-type: none">Promote solutions for saving energy since the design and effective management applications of DCStandardize Energy performance metrics for Data Centres. Encourage metering and benchmarking. Foster labellingIntroduce requirements of best design for efficiency of data centres in commercial building codes and elaborate procurement guidelinesFoster Cloud Computing as an Energy Efficiency solution. Incentivise the use of new technologies. Foster the sharing of the existing resources instead the creation of duplicate solutions
CO2 EMISSIONS AND TRADING SYSTEMS	<ul style="list-style-type: none">Provide a suitable legal framework for the inclusion of distribution companies and consumers in an open Emission Trading SystemStandardise methods and tools for the measurement, calculation, data collection and reporting of CO2 emissions

SEESGEN-ICT R5: Recommendations Family "EU large scale demonstrators, social and economic testing facilities"

RESEARCH INFRASTRUCTURES AND TEST FACILITIES	<ul style="list-style-type: none">Strengthen research infrastructure through reality set-ups and virtual test facilitiesImprove Test Range and Simulation capabilityFoster synergies and complementary activities among the Test Facilities
TEST FACILITIES RELIABILITY	<ul style="list-style-type: none">Improve Test Facilities reliability through the standardization of methods and testsSet up a Mutual Accreditation system for laboratories in the field of the Smartgrids validation
APPLICATIONS NEEDED FOR SMARTGRIDS VALIDATION	<ul style="list-style-type: none">Ferriability and economical benefit of Smartgrids approachImpact of Regulatory policiesCyber securitySocial Barriers and incentivising modelsEducation and awareness
TEST FACILITY INVESTMENTS OPTIMIZATION	<ul style="list-style-type: none">Adopt investment policies for the improvement of TF tied to the application of priority ProjectsFoster investments on synergies and complementarities among the facilitiesCoordinate investments through independent supervisor entity

SEESGEN-ICT R6: Miscellaneous of Recommendations on "Intelligence for the T&D Networks required for SmartGrids"

STANDARDIZATION	<ul style="list-style-type: none">Select scenarios and use cases of true relevance to be used as standard for Smartgrids validationElaborate a common reference (dynamic) architecture to standardization extentsAssess the suitability of current Standards to Smartgrids extents and to ICT specific applications
COMMUNICATION NETWORK	<ul style="list-style-type: none">The CN should suit the QoS in the real-time constraints and the current status, including emergency and critical situations of the electric gridSufficient energy back-up in the communications nodes; path/systems redundancies; self healing capabilities should be suitably consideredConsider diverse information and communication networks and transmission technologies to adapt against huge volume of data in crowded areas
MARKET COMPETITIVENESS AND FLEXIBILITY	<ul style="list-style-type: none">Enhance competition in supplying free communication services in SmartgridsFoster a multiple choice in communication technologies bridging interoperability and the excessive complexityConceive flexible and diverse communication infrastructures suitable to the different criticality of the services
SMART GRIDS ICT CARBON FOOTPRINT	<ul style="list-style-type: none">Adopt actions to limit the carbon footprint of the home distributed smartness

Recommendations and policy actions proposed by SEESGEN-ICT