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# **Europäische Technologieplattform (ETP) SmartGrids**

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**Auftraggeber:**

Bundesamt für Energie BFE  
Forschungsprogramm Netze  
CH-3003 Bern  
[www.bfe.admin.ch/forschungnetze](http://www.bfe.admin.ch/forschungnetze)

**Auftragnehmer:**

BACHER ENERGIE  
Rütistrasse 3a  
CH-5400 Baden  
[www.BacherEnergie.ch](http://www.BacherEnergie.ch)

**Autor:**

Dr. Rainer Bacher, BACHER ENERGIE, [Rainer.Bacher@BacherEnergie.ch](mailto:Rainer.Bacher@BacherEnergie.ch)

**BFE-Bereichsleiter:** Dr. Michael Moser

**BFE-Programmleiter:** Dr. Rainer Bacher

**BFE-Vertrags- und Projektnummer:** 153225 / 102474

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## **Abstract**

The concept of “SmartGrids” should fundamentally changes traditional electricity networks across Europe. The concept responds to the rising challenges and opportunities, bringing benefits to all users, stakeholders and companies that intend to perform efficiently and effectively. The European Technology Platform (ETP) SmartGrids was set up by the EU in 2005 to create a joint vision for the European networks of 2020 and beyond. The platform includes representatives from industry, transmission and distribution system operators, research bodies and regulators throughout Europe and associated countries such as Switzerland. It has identified clear objectives and proposes an ambitious strategy to make a reality of this vision for the benefits of Europe and its electricity customers. Europe’s electricity markets and networks lie at the heart of our energy system and must evolve to meet the new challenges. The future trans-European grids must provide all consumers with a highly reliable, cost-effective power supply, fully exploiting the use of both large centralized generators and smaller distributed power sources throughout Europe.

# 1. Scope

The EU SmartGrids vision is about a program of research, development and demonstration that charts a course towards an electricity supply network that meets the needs of Europe's future. Europe's electricity networks must be:

- Flexible: SmartGrids must fulfill customers' needs whilst responding to the changes and challenges ahead
- Accessible: SmartGrids must grant connection access to all network users, particularly for renewable power sources and high efficiency local generation with zero or low carbon emissions
- Reliable: SmartGrids must assure and improve security and quality of supply, consistent with the demands of the digital age with resilience to hazards and uncertainties
- Economic: SmartGrids must provide best value through innovation, efficient energy management and "level playing field" competition and regulation.



Figure 1: Driving forces for EU SmartGrids

## 2. Key SmartGrids Elements

Key elements of SmartGrids include:

- The creation of a toolbox of proven technical solutions that can be deployed rapidly and cost-effectively, enabling existing grids to accept power injections from all energy resources;
- The harmonization of regulatory and commercial frameworks in Europe to facilitate cross-border trading of both power and grid services, ensuring that they will accommodate a wide range of operating situations;
- The establishment of shared technical standards and protocols that will ensure open access, enabling the deployment of equipment from any chosen manufacturer;
- The development of information, computing and telecommunication systems that enable businesses to utilize innovative service arrangements to improve their efficiency and enhance their services to customers;
- The successful interfacing of new and old designs of grid equipment to ensure interoperability of automation and control arrangements.

## 3. SmartGrids Objectives

- Develop a shared concept for energy grids and especially electricity grids for the future which encourages the coordinated engagement of multiple, independent stakeholders

- Identify research needs and build support for an increased public and private research effort on electricity networks;
- Align ongoing RTD (research in Transmission and Distribution) projects and new European, national and regional programs on electricity transmission and distribution systems;

## 4. Results 2008: The SDD (Strategic Deployment Document)

Immediately after finishing the Strategic Research Agenda in 2007, the SmartGrids ETP has started the processes for the Strategic Deployment document for Europe's networks of the future. The SmartGrids Strategic Deployment Document has been produced by the Advisory Council in collaboration with the Member States Mirror Group by Sept. 2008. It builds on the SmartGrids Vision and Strategic Research Agenda and incorporates the intensive work and discussions within the four SmartGrids Working Groups and two previous General Assembly meetings. It is the result of the combined efforts of many stakeholders, organizations and individuals involved in the SmartGrids Technology Platform.

As part of the SDD, the following definition has been made for a SmartGrid: *A SmartGrid is an electricity network that can intelligently integrate the actions of all users connected to it - generators, consumers and those that do both – in order to efficiently deliver sustainable, economic and secure electricity supplies. A SmartGrid employs innovative products and services together with intelligent monitoring, control, communication, and self-healing technologies to:*

- better facilitate the connection and operation of generators of all sizes and technologies;
- allow consumers to play a part in optimizing the operation of the system;
- provide consumers with greater information and choice of supply;
- significantly reduce the environmental impact of the whole electricity supply system;
- deliver enhanced levels of reliability and security of supply.

SmartGrids deployment must include not only technology, market and commercial considerations, environmental impact, regulatory framework, standardization usage, ICT (Information & Communication Technology) and migration strategy but also societal requirements and governmental edicts.

The following key challenges have been identified for SmartGrids:

- *Strengthening the grid – ensuring that there is sufficient transmission capacity to interconnect energy resources, especially renewable resources, across Europe;*
- *Moving offshore – developing the most efficient connections for offshore wind farms and for other marine technologies;*
- *Developing decentralized architectures – enabling smaller scale electricity supply systems to operate harmoniously with the total system;*
- *Communications – delivering the communications infrastructure to allow potentially millions of parties to operate and trade in the single market;*
- *Active demand side – enabling all consumers, with or without their own generation, to play an active role in the operation of the system;*
- *Integrating intermittent generation – finding the best ways of integrating intermittent generation including residential microgeneration;*
- *Enhanced intelligence of generation, demand and most notably in the grid;*

- Capturing the benefits of DG and *storage*;
- *Preparing for electric vehicles* – whereas SmartGrids must accommodate the needs of all consumers, electric vehicles are particularly emphasized due to their mobile and highly dispersed character and possible massive deployment in the next years, what would yield a major challenge for the future electricity networks.

Six SmartGrids Deployment Priorities have been identified:

- Optimizing Grid Operation and Use
- Optimizing Grid Infrastructure
- Integrating Large Scale Intermittent Generation
- Information & Communication Technology
- Active Distribution Networks
- New Market Places, Users & Energy Efficiency

The SDD gives the following recommendations: In order for the SmartGrids Vision to become a reality, a plan of actions is needed to allow the many facets of technical, regulatory, environmental and cultural issues to be addressed in an optimized manner. This will provide a coherent deployment of research and development results, integrated with existing infrastructure and technology, delivering early benefits, while maintaining the steady progress and evolution towards the main goals.

The SDD defines this process to allow all stakeholders to take action to meet the urgent timetable driven by the mandated targets, the proposed new European energy market legislation (Third Legislative Package), the new framework for renewables (Green Package) and complements the Strategic Energy Technology (SET) plan.

The SDD not only outlines the SmartGrids deployment steps in terms of technology and time; the roles and responsibilities of different stakeholders, the funding and support options, the required communication strategies are also proposed to promote the SmartGrids deployment.

Key recommendations on the way forward, intended for the European Institutions, Member States, regulators, operators and users of the electricity grids and all other relevant stakeholders are suggested, which when followed, will help mitigate climate change and ensure security of supply to the European Union at the minimum possible cost.

A further key action will be to promote the formation of a SmartGrids Association (SGA) as a delivery vehicle to ensure that the correct focus and resources are provided to drive the SDD objectives forward. Industrial partners willing to fund the Association will be instrumental in driving the SDD agenda forward. This model has successfully delivered the desired outcomes in other sectors.

Finally, while emphasizing the high ambition and priority goals of the SDD, it is important to stress that the SDD does not propose political measures like e.g. creation of one single European transmission system operator or one single European regulator. Whereas such developments might impact the SmartGrids deployment, it is clear that any related decision must be made by the responsible European and Member States' institutions.

## 5. Internet

<http://www.smartgrids.eu>