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Europäische Technologieplattform (ETP) SmartGrids

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Summary

The concept of "SmartGrids" will fundamentally change 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.

In April 2006 the Advisory Council of the Technology Platform for Europe's Electricity Networks of the Future presented its Vision for SmartGrids. The Vision, for both transmission and distribution networks, is driven by the combined effects of market liberalization, the change in generation, storage and electricity consumer technologies to meet environmental targets and the future uses of electricity.

In 2007 year the Strategic Research Agenda (SRA) was published. It describes the areas to be investigated, technical and non-technical. In 2008 and 2009 the Strategic Deployment Document (SDD) was written. It describes the priorities for the deployment of innovation in the electricity networks and the benefits that such innovation will deliver to all stakeholders. It also gives a timeline for deployment. The SDD intends to engage with all stakeholders in the electricity supply chain: governments, policy makers, regulators, network operators, network users – generators, consumers and storage responsible - network equipment manufacturers, system consultants, suppliers of household and industrial appliances and ICT, and other service providers.

These three documents have identified clear objectives and propose an ambitious strategy forward for SmartGrids. For the ETP, Europe's electricity markets and networks lie at the heart of the European energy system which must evolve to meet the new challenges. Both the future trans-European transmission and also the active distribution grids must provide all consumers with a highly reliable, cost-effective and sustainable power supply, fully exploiting the use of both large centralized generators, a massive number of small distributed power sources and storage devices throughout Europe and the adjacent regions.

In May of 2009 the SmartGrids ETP has been restructured: The Advisory Council – the former lead group initiating the three above mentioned documents - was formally dismissed, as well as working groups that were not active. A new group of industry and key SmartGrids areas related leaders have substituted the Advisory Council. The main goal of the "new SmartGrids ETP" is to take over the lead in the coordination of the future European SmartGrids related processes. This coordination could include interfaces to all involved stakeholders, including the European Commission and the member and associated states.

1. The “new SmartGrids ETP” (Creation 20 May 2009)

The (previous) SmartGrids European Technology Platform (SmartGrids ETP) worked out a Vision paper in 2006 and a Strategic Research Agenda (SRA) in 2007. A draft version of a Strategic Deployment Document (SDD) has also been published in 2008. These documents are internationally recognized and have been instrumental in putting smart electricity grids on the political agenda.

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.

Recently, a stakeholder group has revisited the SmartGrids ETP terms of reference and its structure, having in mind to jump start the deployment of the SmartGrids based on the Strategic Energy Technology Plan (SET Plan) of the European Commission. In particular, the new SmartGrids ETP should act as a catalytic meeting place coordinating European SmartGrids developments, rather than a structure to set detailed agendas for all the SmartGrids actors.

After that, in 2009, developments in the SmartGrids ETP (meetings of Mirror Group and Advisory Council 19th-20th of May 2009) have lead to a restructuring: The Advisory Council – the former lead group initiating the three above mentioned documents - was formally dismissed, as well as working groups that were not active.

Some member of the previous Advisory Council remain active to finalise the task of completing the Strategic Deployment Document (SDD). For all other activities, the old Advisory Council is substituted by a group of industry and key SmartGrids areas related leaders.

The Mirror Group – representing the national views of the European member and associated states and integrated into the SmartGrid ETP decision processes - currently remains in a waiting position, ready for future collaborations and interactions with Platform and other SET-Plan related initiatives that eventually will define needs and roles of the Mirror Group.

A new group of industry and key SmartGrids areas related association leaders have substituted the Advisory Council on 20 May 2009. The main goal is to take

over the lead in the coordination of the future European SmartGrids Technology Platform processes.

The new ETP SmartGrids Platform intends to set the new programme of activities and will initiate and coordinate activities with the various players in the European Commission (DG-RESEARCH, DG-TREN; ERA-Nets, Mirror Group, other Technology Platforms and their Joint Technology Initiatives, the European Research Alliance, FP7, SET Steering Group, SETIS Information system). The new SmartGrids Technology Platform has been established to support these players with the expertise and experience of the new platform members and in order lead the European SmartGrids Platform towards successful deployment.

This is different from the role of the previous Advisory Committee: Until the dismissal of the Advisory Council the main role of the ETP SmartGrids was setting the vision and strategy for Europe's electricity networks of the future. Clearly, the deployment of SmartGrids must now be structured and coordinated. For this to happen, a suitable organizational structure has been set for the new SmartGrids platform

The initial structure of the SmartGrids Forum is an executive group of twelve individuals representing the following key groups of SmartGrids stakeholders.

TSO (Transmission System Operators), DSO (Distribution Operators), Regulator, Centralized generators, Customer demand and metering, Renewable generators, Electric Utility Research & Development, SmartGrids Users, Academic Research & Development, Electrotechnology manufacturers, ICT (Information Communication Technology) service providers, Metering manufacturers

Prof. Ronnie Belmans (K.U.LEUVEN-ELIA) is the Chairman of the new SmartGrids ETP.

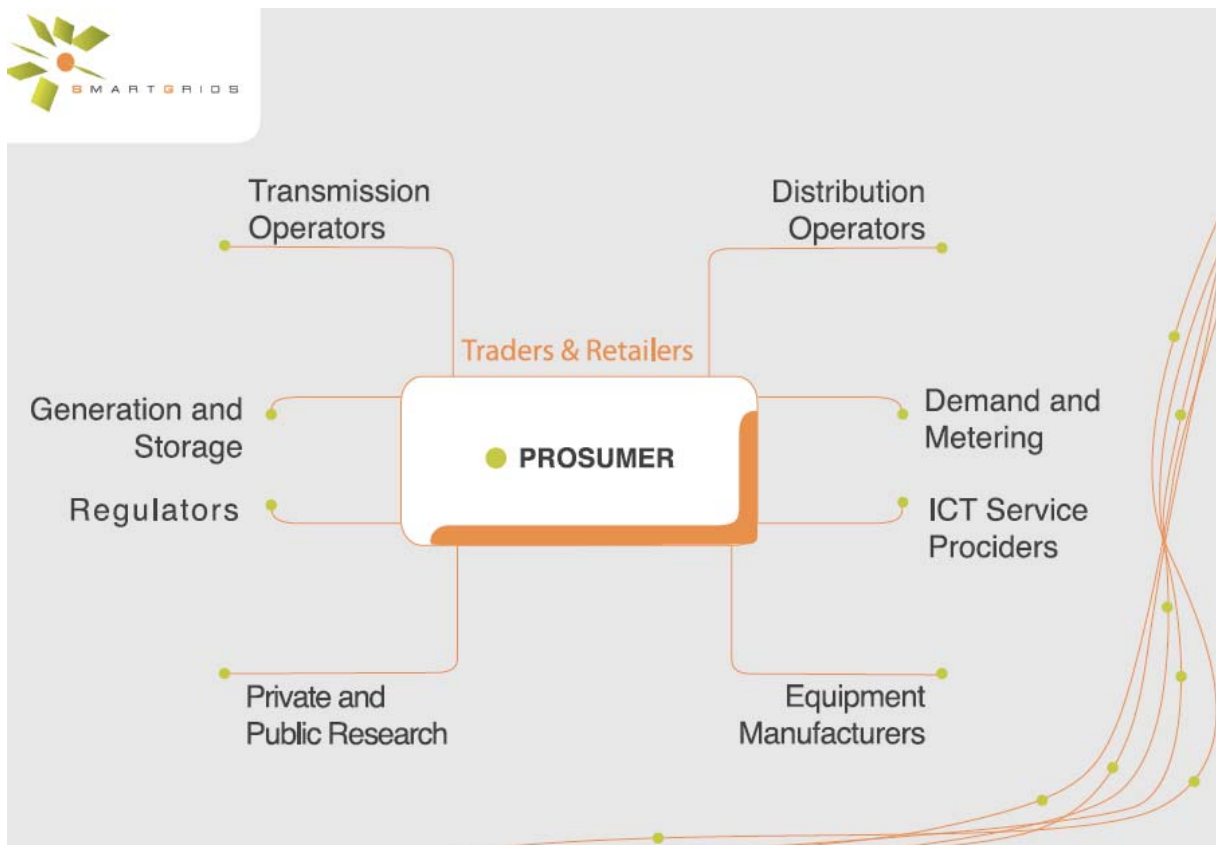


Figure 1: SmartGrids ETP Stakeholders around the Prosumer (Producer and Consumer)

2. New SmartGrids Platform: Mission, Objectives and Strategy

SMARTGRIDS PLATFORM MISSION:

The main mission of the “New SmartGrids Platform” is to foster and support the deployment of SmartGrids in Europe advising and providing coordination to the various SmartGrids stakeholders¹ among projects and parallel related initiatives, to facilitate the smooth and efficient running of the European Technology Platform SmartGrids ensuring its strategic relevance and its consistency with EU policy.

The “New SmartGrids Platform” also intends to link with relevant technology platforms dealing with energy matters that have an impact both at the generation and the demand side, on the future of the grid. Also the “New SmartGrids Platform” wants to provide relevant input to the EU initiatives such as SET-plan and its European Industrial Initiatives.

¹ European Commission, TSO, DSO, Energy System and Component vendors, Energy Research Centres, Smart Metering Industry, Energy Consumers, Energy Generators, Utilities Telecom Providers, Grid Regulators, Power Balance Groups, Zonal power aggregators

SmartGrids Platform Objectives:

- To build and maintain a shared vision for the future of Europe's electricity networks and to be a catalyst for its implementation.
- To ensure that the vision and its implementation remain focused on responding to the needs of prosumers (generators and consumers with storage) and the delivery of European Energy Policy.
- To maintain a high level strategic overview of sector developments, opportunities and threats, bringing forward issues of priority for attention.
- To be a facilitator, working with the grain of sustainable energy policy for a competitive Europe.
- To promote SmartGrids research, development, demonstration and deployment projects

SmartGrids Platform Strategy:

- Advise and provide inputs to projects, initiatives, policy makers and other EU institutions (e.g. the SET-plan)
- Monitor and facilitate the deployment stage ensuring efficient use of resources both private and public (e.g. European Industrial Initiatives)
- Encourage timely attention to catalyst projects to ensure that potential technical, regulatory and commercial barriers are not over-looked.
- Identify and promote opportunities for collaboration at all stages in the innovation chain including access to funding sources (for instance European Institute of Technology EIT, Knowledge Innovation Communities KICK, EERA, or SETIS)
- Involve customers and increase awareness of SmartGrids value to society
- Continue building-up on technical working groups and provide potential response in setting-up other working groups or core advising groups that can reply to the requests from stakeholders and the European Commission

3. New SmartGrids Platform: Secretariat and Experts

The new SmartGrids Platform will deliver the following contributions, assisted by its secretariat, its associated experts and other groups established for the purpose:

- Coordination by active participation in other SmartGrids related initiatives - European Industrial Initiatives, Green Cars, Smart Cities, Wind Energy, Zero Emissions, Solar Energy, Nuclear, Hydrogen Fuel Cells
- A European Roadmap for Smart Electricity Grids

The SmartGrids Platform will ensure that the following activities are fully addressed, by means of its own resources, with the support of the secretariat or through other means of support:

- Lead and development of the structure of the platform, including working groups and ad-hoc task forces.
- Develop recommendations for policy development, projects and other initiatives. The secretariat intends to contribute objectively by providing advice, feedback, representation and reporting on key issues (legislation, incentives, financing) that affect development of electricity networks of the future.
- Develop and ensure the implementation of a communications strategy with the support of the secretariat
- Complementary initiatives: exchange information, support to coordination, and explore mechanisms of collaboration with other initiatives. Establish appropriate contacts and dialogue with other relevant bodies, such as the various committees of the European Parliament.

4. New SmartGrids Platform: Interfaces to European Bodies and funding

The European Commission has presented a strategic plan to accelerate the development and deployment of cost-effective low carbon technologies (**Strategic Energy Technology Plan (SET Plan)**), see Fig. 2. This plan comprises measures relating to planning, implementation, resources and international cooperation in the field of energy technology.

The **Seventh Framework Programme (FP7)** bundles all research-related EU initiatives together under a common roof playing a crucial role in reaching the goals of growth, competitiveness and employment; along with a new Competitiveness and Innovation Framework Programme (CIP), Education and Training programmes, and Structural and Cohesion Funds for regional convergence and competitiveness. It is also a key pillar for the **European Research Area (ERA)**. The broad objectives of FP7 have been grouped into four categories: Cooperation, Ideas, People and Capacities. For each type of objective, there is a specific programme corresponding to the main areas of EU research policy. All specific programmes work together to promote and encourage the creation of European poles of (scientific) excellence. The objective of the ERA-Net scheme is to step up the cooperation and coordination of research activities carried out at national or regional level in the Member States and Associated States through networking of research activities conducted at national or regional level, and the mutual opening of national and regional research programmes. The ERA-NET scheme therefore has a long-term perspective that must also consider the way that research is organized in different European Member and Associated States.

Joint Technology Initiatives (JTI) are proposed as a means to implement the Strategic Research Agendas (SRA) of European Technology Platforms (ETPs, see

below). The scale and scope of the objectives is such that loose co-ordination through ETPs and support through the regular instruments of the Framework Programme (e.g. FP7) for Research and Development are not sufficient. Instead, effective implementation requires a dedicated mechanism that enables the necessary leadership and coordination to achieve the research objectives. To meet the needs of this small number of ETPs, the concept of "Joint Technology Initiatives" has been developed.

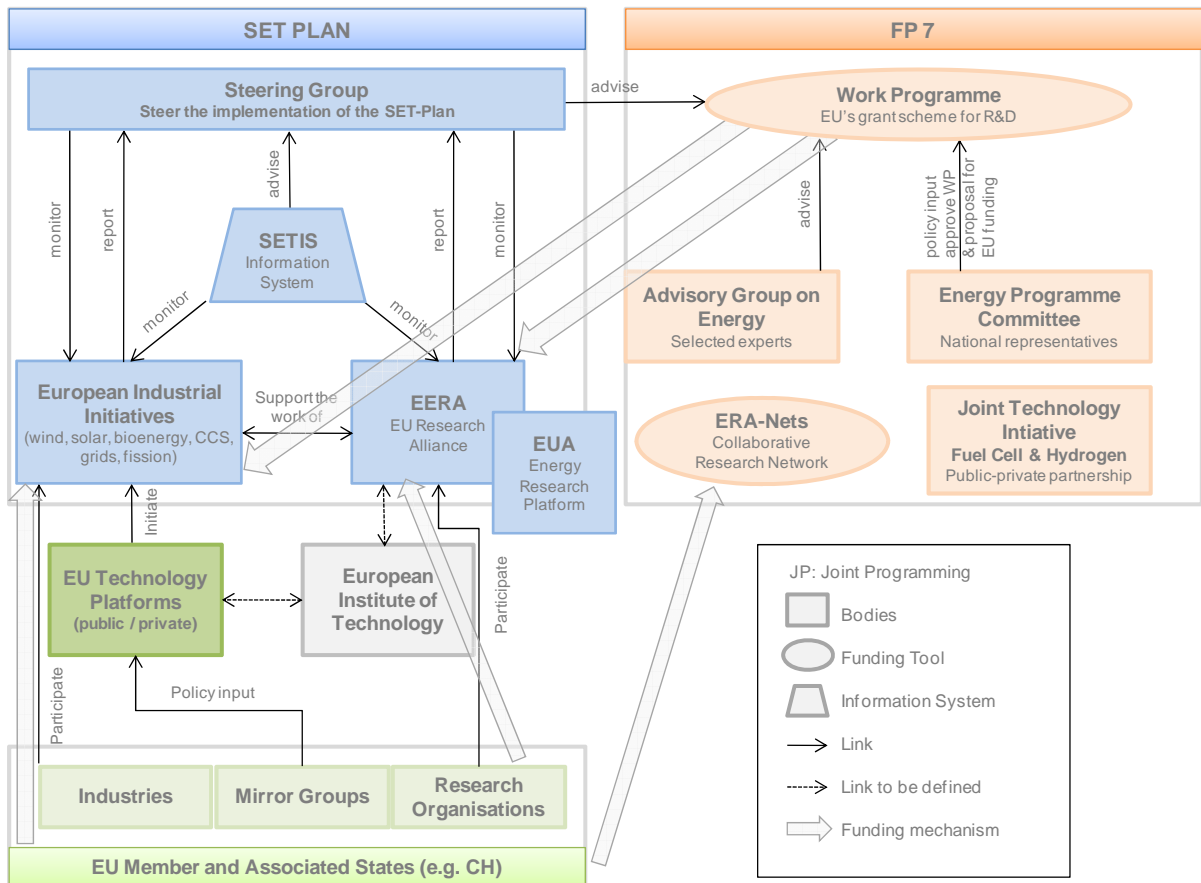


Figure 2: Bodies and Funding tools in Europe related to Energy innovation and research

The **Steering Group**, the governance body for the implementation of the SET Plan is composed of high level energy and research representatives of the Member States. With a mandate from the Council, its remit is to help implement a European Energy Technology Policy, aimed at an accelerated development and wide-scale application of clean, sustainable and efficient energy technologies.

SETIS's (the Information System of the European Strategic Energy Technology Plan (SET-Plan) purpose is to efficiently collect, harmonise, validate, analyse and disseminate information on the priority energy technologies identified by the SET Plan, across the EU. The goal is to provide undisputed and transparent data and methodologies to support the strategic planning, monitoring and evaluation of the European Energy Technology policy. SETIS is managed by the European Commission, with its Joint Research Centre (JRC) at the heart, assuring the neutrality and objectivity of the data.

European Industrial Initiatives (EIIs): The currently discussed set of EIIs contains among other the following key issues:

- *Solar Europe (PV and CSP)*: Enhance the multi GW production (new processes and machinery, new materials at low cost), Build integrated and adapted PV, Recycle systems for PV modules, Expand building resource capacity, interaction between solar perspective and CSP
- *European Wind*: Increase the capacity flow – fast manufacturing processes, improve reliability and cost efficiency of turbines, assess resources for improved wind turbines design, demonstrate successful grid connection (offshore and possibly large scale storage capacity, e.g. hydropower),
- *Bio-Energy Europe*
- *European CO2 capture, transport & storage*: Create conditions for bold industrial investments, coordinate and effectively support CCS demonstration projects, accelerate investments in R&D to bring down the costs for CCS, initiate a European CO2 infrastructure, address and contribute to the solution of environmental issues.
- *European electricity grid*: The future energy mix in the EU area requires an in-depth re-engineering of transmission and distribution networks, a process which will go much beyond the “business as usual” approach where network evolutions anticipate electricity consumption forecasts and react to network ageing issues. This re-engineering process will encompass the whole network, justifying a novel integrated TSO/DSO approach to simultaneously address four issues:
 - Technical issues, where ways to make the transmission and distribution networks smarter and stronger are proven at appropriate scales for replication in Europe.
 - Market design issues, where intermittent energy sources and active demand are integrated into new market rules, allowing prosumers to participate in energy markets.
 - Organizational and data exchange issues, where pan-European coordination tools at TSO level, joint innovation activities at DSO level and daily data exchanges between TSOs and DSOs allow the whole system to work at affordable costs while maintaining reliability levels in line with the European economy and prosumer requirements.
 - Regulatory issues, where network costs are charged according to rules which are fair and transparent in order to further optimize European electricity consumer welfare, while at the same time both reinforcing the single European electricity market and enabling European power technology manufacturers to place themselves at the cutting edge on a global level.

The electric system optimization process will change, requiring networks to become smarter and stronger, favor decentralized storage and allow bi-directional power flows. Operators must coordinate more on a day-to-day basis down to even quarter-hourly or faster intervals to keep the whole electric system reliable at affordable costs. This paradigm change will trigger both a mutation and a joint new vision for TSOs and DSOs:

- From 'supply-follows-load' to 'load-follows-supply': This new approach allows more flexibility to react to changing demands, potentially cheaper to run than the existing system.
 - Increased importance of real-time balancing: The importance and complexity of real-time balancing markets run by the TSO with regional support from DSO or other entities will increase.
 - Introduction of power aggregators: The role of power aggregators representing small and possibly medium-size prosumers will become significant, leaning on more active distribution networks to better integrate local supply and load. These aggregators will not only buy and/or sell energy on behalf of smaller participants, but will also market their ability to contribute to system balancing and/or control for DSOs or TSOs.
 - More hierarchical control structure: The future control structure of the whole electricity system will become more hierarchical, with System Operators interacting with large generators and aggregators, and the power aggregators communicating with individual prosumers connected to the Distribution Network.
- *Sustainable nuclear fission (gen-IV)*

The basic principles of the **European Industrial Initiative** are described by attributes such as "Led by industry", "Boosting research and innovation", "Accelerating deployment of technology", "Delivering progress beyond business-as-usual", "Defining & realising clear targets (quantified objective)" and "Contributing to political goals (energy & climate change)". Strong concepts behind the European scope of the EII are risk sharing, using a pool of both public and private financing, to foster public–private partnership and to leverage any available resources on a European scale.

EUROPEAN EDUCATIONAL RESEARCH ASSOCIATION (EERA): EERA was founded to encourage collaboration amongst educational researchers in Europe, promote communication between educational researchers and international governmental organizations and to disseminate and highlight the findings of educational research. EERA membership is made up of 23 national and regional Educational Research Associations from all parts of Europe. It is governed by the Council and the Annual General Assembly. The academic work is organized in 25 thematic networks. From 1994 to 2008 EERA was constituted as a Charity under British Law and was based in Scotland. Since 2008 EERA has been based in Berlin, Germany and is constituted as a "Verein" (i.e. Charity under German Law)

EERA is dependent on the participation of the national associations to take forward its mission of promoting educational research in Europe and of fostering cooperation between associations of educational researchers.

European University Association (EUA) - European Platform of Universities engaged in Energy Research (EPUE): The task for EUA is to establish an efficient way to identify university-based research capacity in energy-related fields (both in new technology development and basic research in energy) and to raise awareness of the EERA initiative in Europe's universities. In this context,

the EUA is building a European Platform of Universities Engaged in Energy Research (EPUE). This will give greater visibility to university activity in the field and will point towards the potential contribution both to EU R&D programmes and to joint research programmes between national and European funding agencies.

European Technology Platforms (ETPs): ETPs provide a framework for stakeholders, led by industry, to define research and development priorities, timeframes and action plans on a number of strategically important issues where achieving Europe's future growth, competitiveness and sustainability objectives is dependent upon major research and technological advances in the medium to long term.

They play a key role in ensuring an adequate focus of research funding on areas with a high degree of industrial relevance, by covering the whole economic value chain and by mobilising public authorities at national and regional levels. In fostering effective public-private partnerships, technology platforms have the potential to contribute significantly to the renewed Lisbon strategy and to the development of a European Research Area of knowledge for growth. As such, they are proving to be powerful actors in the development of European research policy, in particular in orienting the Seventh Research Framework Programme (FP7) to better meet the needs of industry.

ETPs should also address technological challenges that can potentially contribute to a number of key policy objectives which are essential for Europe's future competitiveness, including the timely development and deployment of new technologies, technology development with a view to sustainable development, new technology-based public goods and services, technological breakthroughs necessary to remain at the leading edge in high technology sectors and the restructuring of traditional industrial sectors.

Currently the following ETPs have energy and environment related goals:

- ETP for the Electricity Networks of the Future – SmartGrids
- ETP for Wind Energy
- ETP on Photovoltaics
- ETP on Biofuel
- ETP on Zero Emission Fossil Fuel Power Plants – ZEP
- ETP on Road Transport - ERTRAC
- ETP on Renewable Heating & Cooling - RHC
- ETP on Sustainable Nuclear Technology – SNETP

Mirror Groups (MG): The mission of MGs is to take forward and consolidate the “vision” of the respective ETP at EU Member and EU Associated State level by deepening co-operation among European States and with the European Activities on technical and non-technical matters relating to the ETP, with a view to promoting a European Research Area, facilitating public/private partnerships and removing national barriers to commercial development and exploitation and by contributing to the realization of a consistent European policy framework.

European Institute of Innovation and Technology (EIT): The European Institute of Innovation and Technology (EIT) is a European Community body which aims to emerge rapidly as a key driver of sustainable European growth and competitiveness through the stimulation of world-leading innovation, with a strong impact on economy and society. The mission of the EIT is to grow and capitalize on the innovation capacity and capability of actors from higher education, re-

search, business and entrepreneurship from the EU and beyond, notably via the creation of highly integrated Knowledge and Innovation Communities (KICs). KICs are intended to be dynamic communities, adaptable to change. Gérard de Nazelle (France) has been appointed Director of the European Institute of Innovation and Technology (EIT) as of 16 Sept 2009. EIT headquarters are in Budapest.

5. Next steps for the new SmartGrids Platform

The new SmartGrids platform will continue in its role as central European information point for all SmartGrids stakeholder related activities. As first activity in its new role, it intends to review the EEGI (European Electricity Grid initiative) and will feed this analysis back to the EEGI, the SET Steering group and the European Commission. This is shown in Fig. 3.

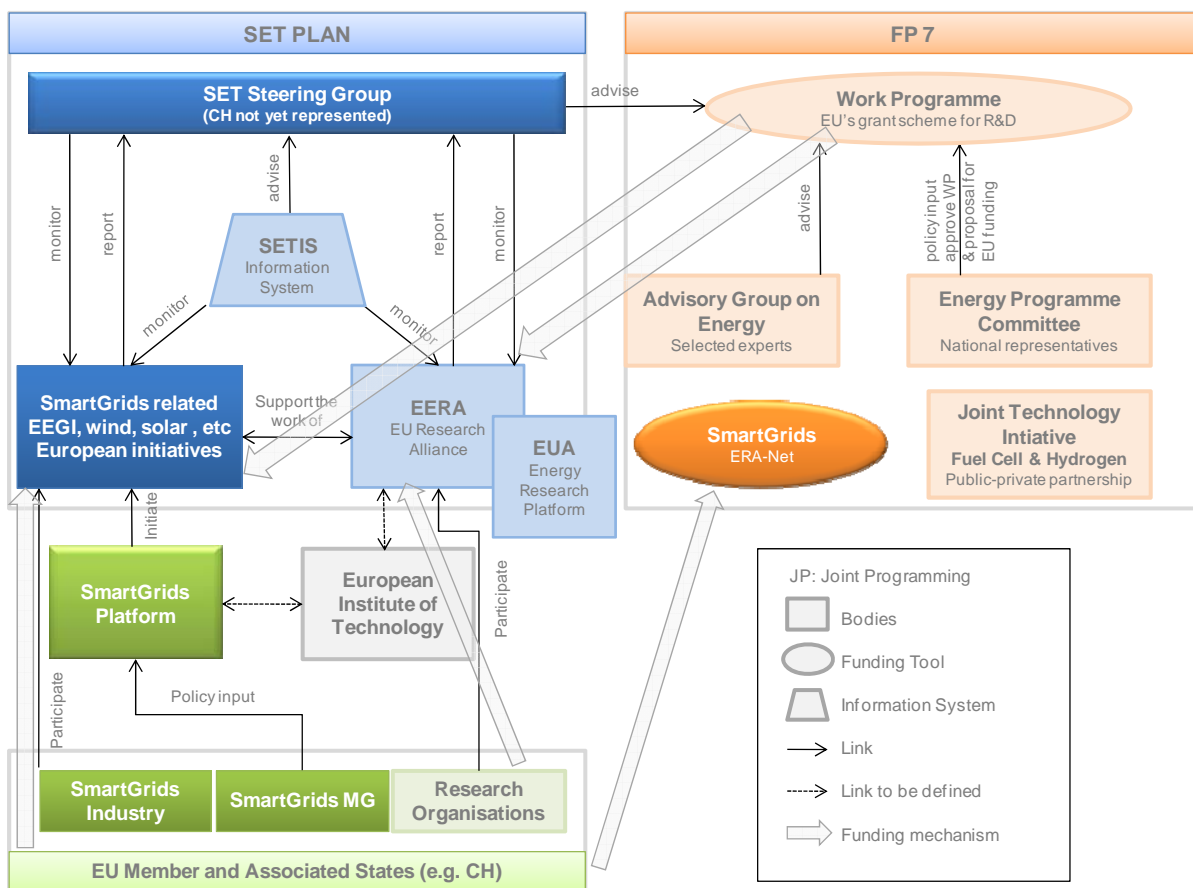


Figure 3: SmartGrids related main bodies (highlighted) and the SmartGrids related European Electricity Grid Initiative

The new SmartGrids platform intends to play a key role in the coming SmartGrids related strategies and steps necessary to reach the EU energy and environmental goals.