# RESEAUX ELECTRIQUES INTELLIGENTS - SMART GRIDS FRANCE

Press Kit

Uniting … Promoting

Academy … University Campuses … Value Creation

Smart Grid Deployment

Innovative Solutions … R&D Strategy

Standardization … Start-Ups

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# /OVERVIEW

## “Réseaux Electriques Intelligents – Smartgrids France”

With the creation of the professional association “Réseaux Electriques Intelligents – Smartgrids France”, one of the ten actions set out in the “Smart Grids Plan” roadmap for a New Industrial France became reality. The plan had been presented to the President of France on May 7, 2014 by Dominique Maillard, then Chairman of the RTE and spearhead to the “Smart Grids Plan”.

The association, ultimately aimed at creating a “French National Team” on Smart Grids, was tasked with providing the sector’s participants with the support needed so that, by 2020, it can boast more than 25 000 direct jobs in France, €6 billion in sales revenue, at least 50% of which is to be derived from the export market, and be one of the leading forces on a global market estimated at €30 billion per year.

“Réseaux Electriques Intelligents – Smartgrids France”, which signed its articles of association on April 16, 2015, is intended to play an active part in developing the sector, in France, Europe and beyond.

Until September 2015, the association was chaired by Dominique Maillard, spearhead of the ““Réseaux Electriques Intelligents” plan and former Chairman of Executive Board at RTE. The new Chairman is Philippe Monloubou, Chairman of the Executive Board at ERDF. Its members hail from the corporate sector, academic community, government agencies and electricity sector. They include such names as Alstom, Schneider, EDF, the CEA, Mines ParisTech, SAGEMCOM, Gimelec, Cofely Ineo, Siemens, Atos, Cap Gemini, Cahors, Itron, and Michaud, along with the competitiveness clusters positioned on Smart Grids. Association members must commit to take action to promote French know-how on smart grids, keeping in line with competition law. They are all engaged in industrial, research or educational activities in France and in connection with smart grids (+ refer to the Appendix for the complete list of member associations).

In addition to the support provided to other initiatives undertaken as part of the “Smart Grids Plan”, the Business Directorate maintains presence alongside the association through the observer’s chair it holds, as provided for by its own articles of association, as well as those of the French Energy Regulatory Commission.

The association is in charge of:

- Organizing, in France and abroad, events to promote know-how on smart grids and represent its members;
- Keeping an inventory of the smart grids sector and its showrooms in France, giving special emphasis to achievements abroad;
- Creating a catalogue of existing training programs and fostering the creation of new programs;
- Communicating on issues and challenges in the smart grids sector, in France, Europe and beyond;
- Providing representation for its members, with the public authorities in France, as well as with European and international institutions;
- Supporting its SME/SMI members in their development.

# KEY FIGURES

By 2020, in France, the sector will amount to:

More than 25 000 direct jobs in France

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| 100 demonstrators (one region having deployed smart grids at an industrial scale) | More than 100 member associations |
| €6 billion in sales revenue, 50% of which will come from export | A global annual market estimated at €30 billion |

# DEMONSTRATORS

Today, France is home to a large number of experimental smart grid projects, most notably the demonstrators to which the Investments for the Future Programme has provided €85 million in support. These projects are aimed at testing, under real-life conditions, various functionalities and services such as the contribution of intermittent production to local management, variation in demand and possible related grid constraints, and assistance to achieve better energy efficiency.

**A3M**
developing communicating meters for local distribution companies

**Afficheco**
Determining the impact of energy consumption display on energy efficiency

**Concept Grid:**
An experimental platform unmatched across the world, designed to anticipate and support the transition from electrical systems to smart grids

**Crome**
Creating an interoperable European platform on electromobility. A cross-border Franco-German experiment.

**Eguise**
Developing an ecosystem to manage energy consumption by vehicles at the global level, working from a given set of vehicles

**EPI 2.0**
Developing an open information system to steer energy in the eco-neighborhoods and cities of the future.

**Issy Grid**
Optimizing energy at the level of a neighborhood

**Greenlys**
Upstream/downstream integration around the Linky meter in urban areas

**Houat et Hoëdic**
Securing power supply for two islands through optimized energy allocation

**Millener**
Improving the integration of intermittent renewable energies in island zones

**Modelec**
A project testing multiple energy effacement models for consumers

**Nice Grid**
Contributing to a smart solar neighborhood. Managing consumption peaks and maximizing photovoltaic energy.

**Poste intelligent**
An optimized version of the ERDF-RTE interface at the source-station level, designed to reinforce safety in the electricity system

**Premio**
Optimizing power generation and distribution in real time, thanks to energy effacement, electricity storage and load management.

**Reflexe**
Optimizing grid management in order to facilitate integration of the photovoltaic and wind power system.

**Rider**
Optimizing power within a building or group of buildings using an ICT solution and energy challenges

**Smart Electric Lyon**
Raising consumer awareness about issues in energy demand management

**Smart Electricity**
Developments, tests and improvement to a smart electricity chart

**Smart Grid Vendée**
Optimizing energy at the territorial level

**Smart ZAE**
Demonstrating that an Economic Activity Zone can be a building block to a smart electricity grid

**So Grid**
Developing a current-carrying line communications chain to be used in steering a distribution grid

**Watt et Moi**
Providing the customer with electricity consumption data on a website

**Venteea**
Incorporating high-capacity wind production into a rural grid

# THE TEAM

## Philippe Monloubou,
Chairman, Réseaux Électriques Intelligents – Smartgrids France
Chairman of the ERDF Executive Board

## Olivier Grabette,
Vice-President,
Director of R&D and Innovation, RTE

## Antoine de Fleurieu
Treasurer
General Delegate, Gimelec.

# Commission Chairpersons

## Nouredine Hadjsaid,
Chair of the Scientific Board
Professor at Institut Polytechnique in Grenoble.

## Nadia Maïzi,
Chair of the Training Commission
Professor and Director of the Research Laboratory at MINES Paris Tech

## Bernard Mahiou,
Chair of the SMEs and Innovation Commission
Managing Director of the Competitiveness Cluster, CAPENERGIES

## Laurent Schmitt,
Chair of the International Commission
Vice-Chairman, Smartgrids Solutions ALSTOM.

# THE MEMBERS

| Grid managers | | Public institutions |
|---|---|---|
| Solutions Manufacturers | Reseaux Electriques Intelligents - Smart Grids France | Electricity suppliers / generators |
| | Schools and Research Institutions | |

Associate Members
ABB, Alcatel Lucent, Alstom Grid, Atos, Capgemini, CEA, EDF, ERDF, Ernst & Young, Gimelec, Grenoble INP, INEO, Mines Paris Tech, Omexom (Vinci), RTE, SAGEMCOM, Schneider Electric, Setec, Siemens.

Observing Members
CRE (French Energy Regulation Commission), DGE (French Business Directorate).

Partner Members
Actia Group, ADEUNIS, Cahors, Centrale / Supelec, Ciac international, École des Ponts, Effigénie, Ericsson, General Electric, IJENKO, Itron, Laboratoire national de métrologie et d'essais, Landis &Gyr, Michaud, Monabee, Neoen, SAFT, SDCEM, SENSEOR, SEE, Seifel, Serce, Smartfuture, Socomec, The Cosmo Company, WIT, Yélé, 3M.

10 competitiveness clusters: Alsace Energievie, Cap énergies, Derbi, Images et Réseaux, Minalogic, SCS, Sytematic, Systematic Advancity, S2E2, Tenerrdis.

8 local distribution companies (ELDs): Anroc, ES réseaux, FNSICAE, GEG, Geredis, RSEIPC, URM, and others).

# ACHIEVEMENTS

## The French smart grids sector, united around key initiatives, has already secured the following outcomes:

## SOCIO-ECONOMIC PROMOTION

### Cost-benefits studies – the leading methodology used in smart grid assessment

Thanks to the efforts of a working group, consisting of smart grid solutions manufacturers, electricity systems participants, academics and government agency players around RTE, including the French Energy Regulatory Commission, there is now a methodological reference framework for conducting comparative cost-benefit analysis of smart grids from the economic, environmental and social standpoints. The methodology can be applied to any context and any country.

The working group's first task was to identify a perimeter of advance smart grid functions addressing different criteria adapted to the framework of the "Smart Grids Plan":

- Technological maturity and participation in consolidating the industrial sector;
- Ability to provide effective support in the energy transition;
- Performance in managing and optimizing electricity grids.

The perimeter of the advanced functions studied may be extended to flexibility (flow modulation) and observability (dynamic grid state estimation) services.

As to the methodology's economic component, it is important to note that it assesses value for the local authority. Furthermore, the economic component is based on an assumption of pure and perfect competition, and takes into account gains on all of the power system's cost centers.

It studies:

- The supply/demand balance with the aim of measuring the value of smart grids functions to manage the supply/demand relationship – analysis based on the new Flexis model;
- Impact assessment on smart grid levers on economic prioritization factors relating to grid development.

The environmental component makes it possible to quantify environmental impacts over the entirety of a product's or service's life cycle, from the extraction of the raw materials that compose it up to production, transport, use and, lastly, end-of-life disposal.

The employment component measures the net effect of deploying advanced functions on employment levels in France.

The first results, based on a context scenario consistent with public action in terms of energy transition show that:

- All of the solutions selected thus far appear profitable or near-profitable.
- A positive environmental balance overall.
- The net effect of deploying smart grid functions on employment is positive.

**In conclusion, the methodological framework dedicated to socio-economic assessment of smart grids, developed and shared by a large range of players, makes it possible to compare the value of smart grid functions on a uniform basis and provides added value to the industrial sector's consolidation.**

**The study summary and results can be found in the appendix; the complete document is available upon request at: associationrei@rte-france.com.**

## FLEXIBILITY

**A comprehensive view of the French electricity system and its ability to handle flexibility**

Over the past few years, the French electricity system has experienced major developments subsequent to changes in the technical or political contexts.

The first development has to do with growing awareness of **environmental issues** which set off a wave of energy transitions in Europe and many countries across the world. Renewable energies, for instance, are being given an increasing part to play in energy mixes. As they are generally variable and decentralized, however, substantial changes are required to both grid architectures and operating modes in order to integrate them into the current landscape.

The second major change impacting the electricity system is the **development of information and communications technologies.** In the near future, electricity generation methods and electricity uses at the individual level, with the Internet of Things, for instance, will be steered and optimized round the clock, at different geographic layers, with the aim of achieving a broad optimum at the level of a country or even continent.

The key component in this new architecture in the electricity system is flexibility – the ability to steer load and production sources. A shift is underway, from a system controlled by major operators who run centralized production to a much more decentralized system in which decisions are made at different levels.

There are three key issues at stake in this new system:

- As a result of the energy transition, the system will draw largely – and increasingly – upon **renewable energy sources.** As new electricity uses, such as electrical vehicles, reach maturity, the electricity system will have to respond to the challenge of variability.
- The second issue is economic in nature. The system needs to be brought into the future at a controlled optimized cost, steering clear of the surplus investments which oversized infrastructures or needlessly sophisticated systems entail. It will be a tremendous challenge for stakeholders to successfully reshuffle their structures and business model in search of good **economic efficiency.**
- Last but not least, the **safety and reliability of the economic system** are issues of fundamental importance. The new system must offer at least the same degree of availability as the traditional system, drawing upon communication systems that will in turn need to be well-suited technically and both fully reliable and secure.

In the full text of the White Paper found in the appendix, **the analytical section goes into three points: the need for flexibility in the electricity system,** sources of flexibility and how to use them. The document is based on the industrial experience of energy system players in France and shows how new smart grid functions can be incorporated into a well-developed electricity system.

## The "Réseaux Electriques Intelligents" Campus

One of the major lines of action set out in the industrial "Réseaux Electriques Intelligents" Plan consisted of bringing greater depth and breadth to the already-sizeable research & development teams working at a limited number of campuses, so as to guarantee the new sector the innovation platform it needs. Assisted by an assessment committee of national and international experts, the Scientific Council of the Association REI-Smartgrids France selected 4 out of 7 projects submitted for its label.

**The next stage will be aimed, by interoperating the campuses, at forming a national distributed research, innovation and training platform designed to serve the Smart Grids sector, which will also be a protected testing ground for the most innovative solutions. This platform – unparalleled across the world – will further strengthen the international standing of French academic and technological research.**

In the future, other projects may receive the label further to other calls for projects.

## Four campuses selected

**Achievements**

**The Smart Grids Campus project was initiated by the French government under the "Réseaux Electriques Intelligents" Industrial Plan.**

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| RTI Lille – Representing 11 academic and industrial partners rooted in Northern France, MEDEE's CAMPUS Project is built on the concept of intelligent transport systems. The RTI Lille Campus is structured around the experimental platform L2EP (EPM Lab) and, supplementing it, the UTC platform.<br>The EPMLab platform in Lille specializes in real-time simulation of electricity grids. The platform offers a number of functionalities that are unique in France.<br>The PLER-SIRTEX Platform is located in Compiègne and will be dedicated to smart grid interfacing.<br>The platforms will be full-fledged enablers, making it possible to ramp-up collaborative R&D programs, dedicated initially to the general issue of developing High Voltage Direct *Current* (*HVDC*) grids and interconnection for European grids, focusing on :<br>- The massive integration of power electronics in grids;<br>- Grid connection for renewable and intermittent electrical energy sources;<br>- The transport system/transmission grid interface. | The Rhône-Alpes Smart Grid campus – A campus focused on the electricity transmission grid and how it interacts with the electricity system, this is a place of experimentation, research and training that aims to develop a platform fully-dedicated to innovation in the field.<br>Bolstered by its dynamic activity in smart electricity grids, the Rhône-Alpes Region is now home to nearly 40% of France's demonstrators. The Smart Grid Campus has attracted public institutions, private initiatives and academics, all innovating in the field of renewable energy integration, storage and other means of securing flexibility in smart grid systems.<br>What makes the Rhône Alpes Campus stand out is its ability to cover the entirety of the value chain, incorporating more specifically the developments that have taken place in the electricity transmission system, and focusing in particular on effectively managing the interface between the transport system and the electricity transmission grid. |

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| **LiveGrid at Paris-Saclay** – With dormitories, offices, teaching facilities and laboratories all supplied by advanced energy transmission, the University of Paris-Saclay is going to be at the cutting edge of innovation. The LiveGrid Paris-Saclay Project will develop new applications and innovative services around smart energy management at the scale of the urban campus, in interaction with the electricity system and with the active participation of industrial, service-sector and residential users. It will draw upon the smart grid components set up across the campus: a smart electricity grid, photovoltaic solar panels, communicating meters, electrically-powered mobility and storage. It will enable simulation and experimentation for training, research, innovation and technological transfer at the University of Paris-Saclay.<br><br>The LiveGrid Consortium, which includes major players in higher education, research, industry, local governments and a competitiveness cluster, has set out to make the Paris-Saclay Campus the starting point from which a leading economic hub in smart grids will develop. | Smart Campus Sophia Antipolis – Set on the French Riviera, this project is aimed at developing a "Smart Campus" which will first take shape around the existing SophiaTech site and, thereafter, the Eco-Campus currently being built in Nice Meridia. It draws upon the skills of its laboratories and a powerful industrial partnership, around five key themes, which also form the ecosystem's salient features: behavioral sociology, smart building, data sharing, cyber-security and auto-production/auto-consumption.<br>By setting up an experimental smart grid on the SophiaTech Campus, designed as a full-fledged innovation platform itself, the project was designed with the aim of galvanizing a strong partnership between the public and private sectors in order to pool the strengths mobilized to develop a unique testing ground. There are great ambitions for the future partners: to enable the emergence of seed companies and start-ups in the fields of energy and information and communication technologies, as well as the development of degree programs in smart grids, to ultimately put together a showcase for France's know-how in Europe and on the international scene. |

As these new challenges take shape, the principles liability which the electricity system is run and supervised will also have to be fundamentally rethought in order to make them smarter in turn.

**As key components in the energy transition**, the future-building solutions discussed here will need to be deployed with a long-term perspective and open up new horizons for France's new electricity and IT sectors.

# /APPENDIX – SUPPLEMENTING DOCUMENTS

Promoting Smartgrids at the Socio-Economic Level

White Paper on Flexibility