



Demand-response, flexibility and smart grid planning: status and discussions in France

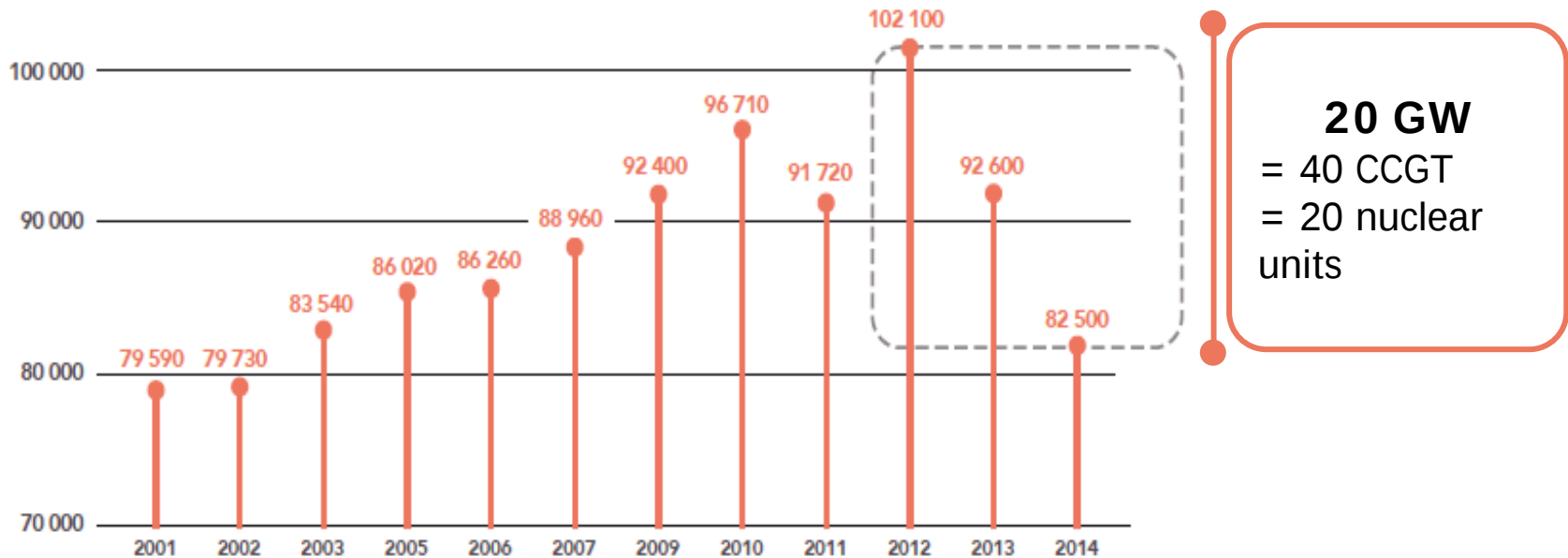
Workshop on Role and Responsibilities in Smart Networks –February 29th 2016

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1st challenge: tackle the peak load issue

This issue is clearly identified by RTE in its adequacy reports since 2010. It needs to be dealt with asap.

- Important increase of the peak load during cold waves
- Extreme volatility of the peak load



Evolution of the peak load in France since 2001

To tackle this issue, France has conducted an in-depth market reform for demand-response (DR) (1 / 2)

Competition can only take place if DR and supply can be unbundled

- Aggregators can operate independently of suppliers (special license)
- DSR services can be offered by traditional suppliers and independent operators (unbundled offers)

In order to allow this unbundling, regulatory barriers have been addressed

- **Free access to consumers**
 - An aggregator should not have to require any authorization from the supplier to operate (competition to get access to consumers)
- **Confidentiality**
 - Finding flexibility resources and convincing consumers to participate are core business activities of aggregators, and represent a significant cost.
 - Ensuring the confidentiality is key to ensure a level playing field.

To tackle this issue, France has conducted an in-depth market reform for DR (2/2)

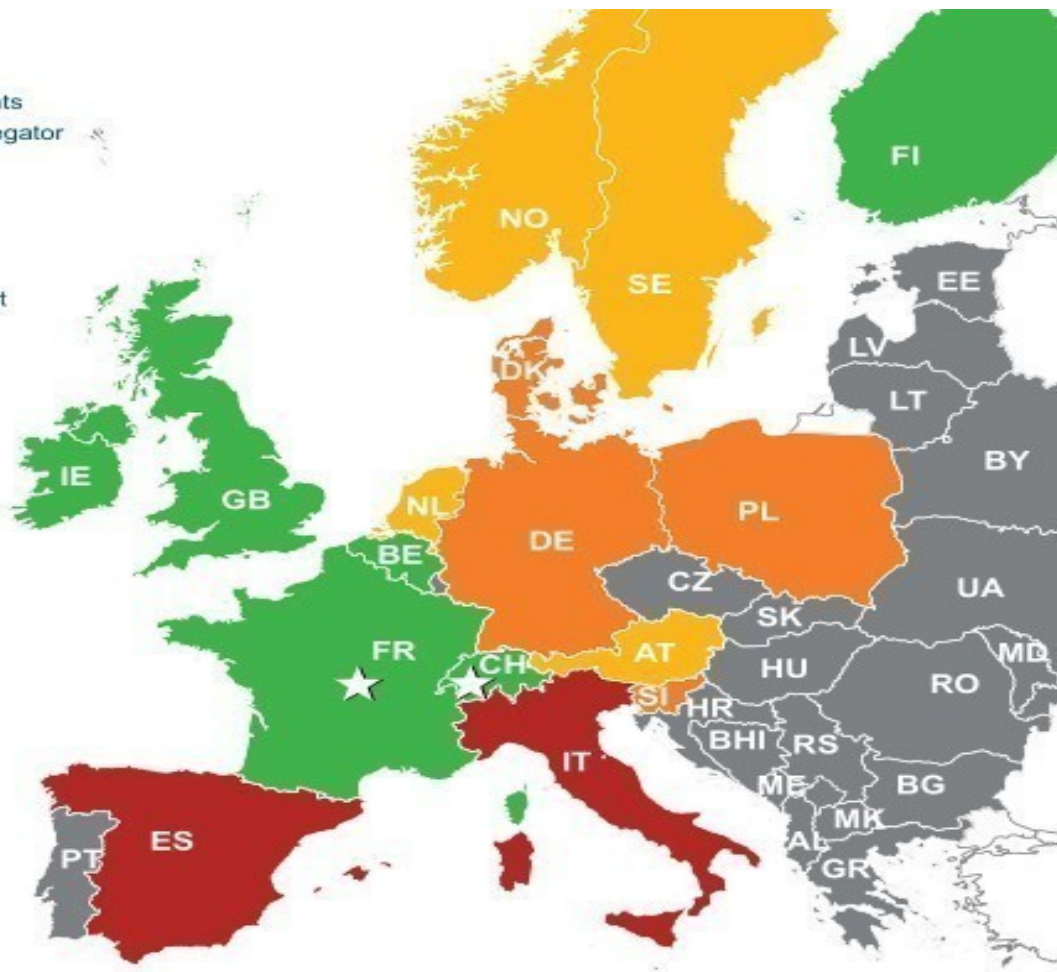
From 2010 to 2015, RTE has implemented an ambitious program to address technical barriers and propose a new deal for aggregators:

- **Multi-tout aggregation:** DR operator can now aggregate capacities regardless of the BRP, the supplier, the size and the connection grid of consumers.
- **New control measures:** aggregation is encouraged through adapted control methods (baseline).
- **Use of DR operators' data:** data collected by DR operators can be used under a regulated regime in the absence of smart meter or if TSO/DSO data proved insufficient

This market reform allows DR to be effectively able to participate in all markets (day-ahead, intraday, balancing, ancillary services, reserves, capacity).

France is now considered as the 1st country regarding DR participation

- ★ Commercially active, standardised arrangements between BRP and aggregator in place
- Commercially active
- Partial opening
- Preliminary development
- Closed
- Not assessed



SEDC, 2015

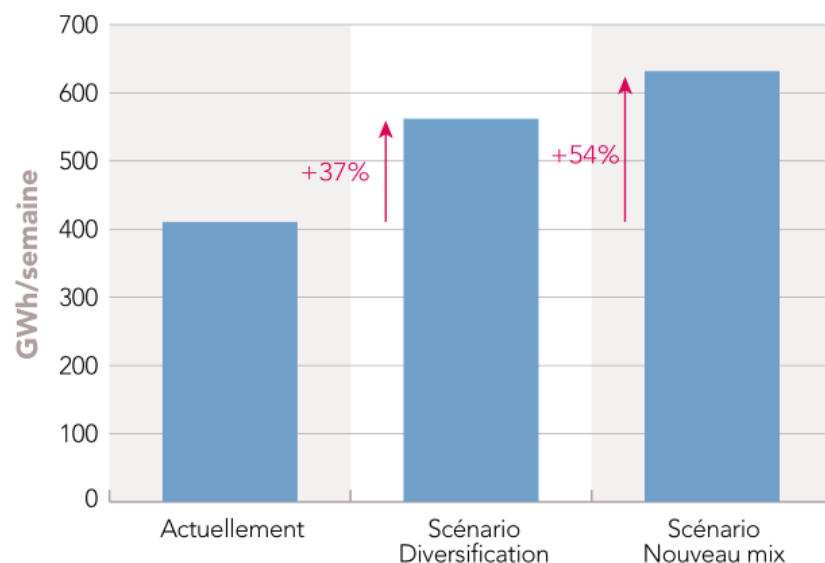


- Aggregators are now able to compete on a level playing field with suppliers on upstream markets and with producers on downstream markets.
- **Around 10 DR operators are “active” in France.**
- **10 % of the French frequency containment reserve (FCR) is procured through DR.**
- **Up to 500 MW out of 1500 MW of the French frequency restoration reserves (mFRR) and replacement reserves (RR) is procured through DR (available twice a day).**

2nd challenge: cope with intermittent generation and preparing the system for the energy transition

The role of electricity is deemed to increase in the future to achieve EU decarbonisation target. The flexibility of the power system is a common issue for European countries.

- An emerging challenge with limited impacts for the time being in France...
- But... a key-element for the achievement of the ongoing French energy transition policy.



French weekly variability of residual demand in 2030 (in energy) against different scenarios

France already relies on flexible resources within its balancing market

3 traditional sources of flexibility (current situation):

- Generation (mostly Hydro) in France
- **DR in France**
- **Flexible capacities outside of France**

The French balancing market is already largely open to XB exchanges:

- Cross-border exchanges with Germany and Switzerland represent up to 30% to upward activated balancing energy bids and reduce the balancing costs up to 15 %.
- France exports FCR to Belgium.
- RTE is involved the TERRE project (early-implementation of the network code on Electricity Balancing). It touches more or less 80% of TSOs using replacement reserves and 50% of EU citizens.

France will continue to increase the participation of flexibilities to short-term markets

Better integration of RES:

- Revision of the French RES support schemes is on-going.
- RES will become balance responsible parties.
- **RES can be certified to participate to ancillary services and their participation to the balancing market could increase.**

Evolution of the ancillary services framework:

- A new version of the rules regarding the procurement of ancillary services will allow stakeholders to separate their upwards and downwards offers. **This provision is particularly favorable to flexible resources.**
- RTE is cooperating with its neighbors in order to discuss possible scenarios for XB exchanges of ancillary services.

RTE will publish a roadmap dedicated to the evolutions of the French balancing market

- The draft network code on Electricity Balancing offers a number of options for transposition which need to be properly assessed (incl. regarding the integration of flexibilities).



- To pave the way towards the full implementation of the code, **RTE is going to publish a roadmap which includes: a work program for the next years + an economic analysis of different options (incl. a benchmark with European countries).** This study will include evaluation from academics / consultants.
- **Stakeholders' feedback will be required and an updated version will describe the main target for the evolution of the French balancing market along with a work program.** It will be submitted to the Regulator.
- RTE will be particularly careful in order to ensure that future evolutions of the balancing market do not lead to step backwards regarding to the current participation of flexible resources.

3rd challenge: increase the visibility on potential business cases for investors

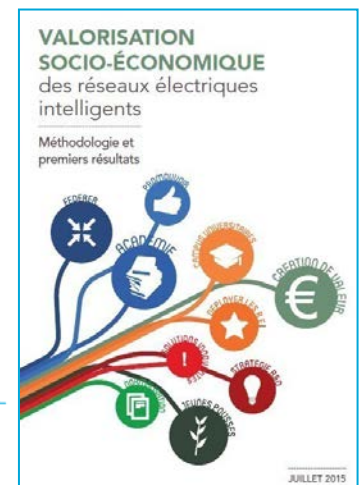
In 2014, the French government has mandated RTE to lead a workgroup in charge of:

- Defining a reference methodology that can be used to assess and compare the value of flexible resources (incl. RES, storage, DR).
- Providing a 1st cost-benefit analysis related to the deployment of those technologies in the French power system.

The aim was to provide robust economic studies for stakeholders (and to go beyond the mere intuition that flexible resources provide added-value to the power system) through **a specific effort in modelling short term markets** (intraday, reserve, ancillary services, balancing, etc.).

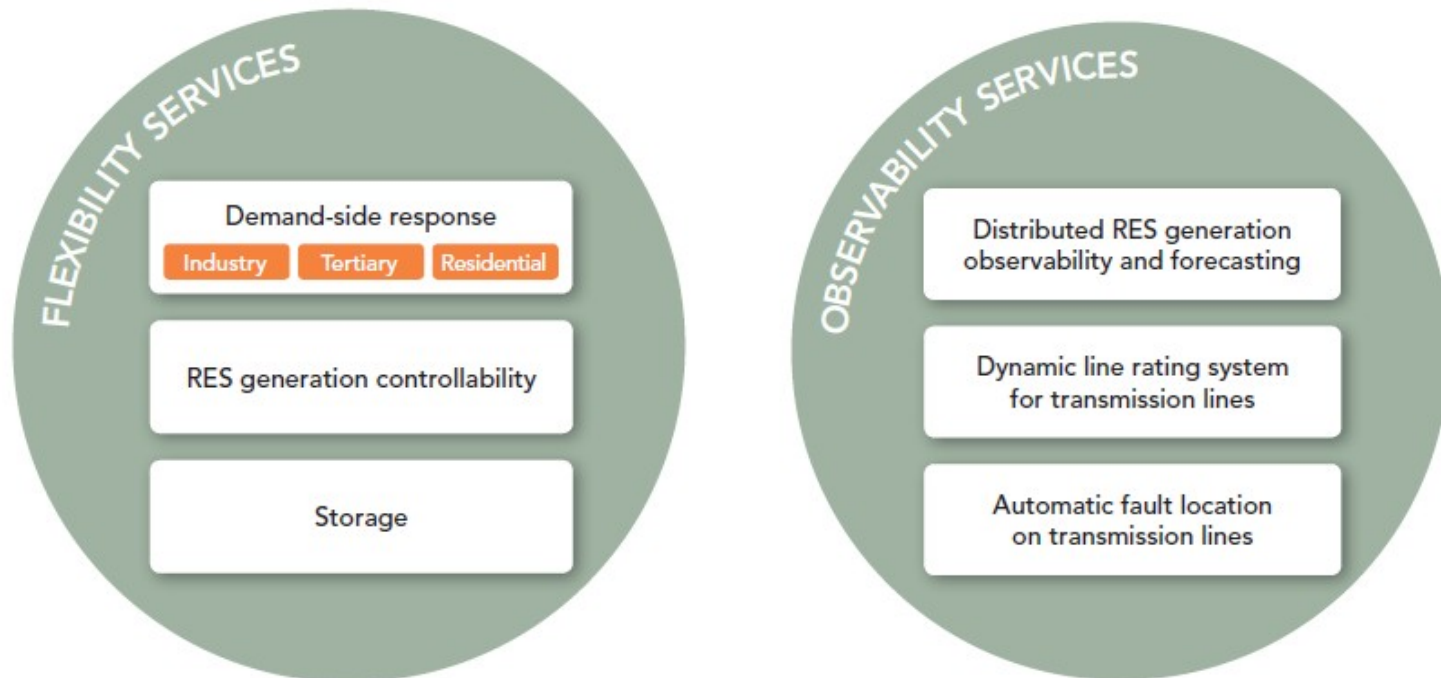
This study was published in July 2015.

Click here to read RTE's report on smart grids



An assessment of large perimeter of smart grid solutions

Main technologically mature solutions have been assessed (except specific solutions for distribution)

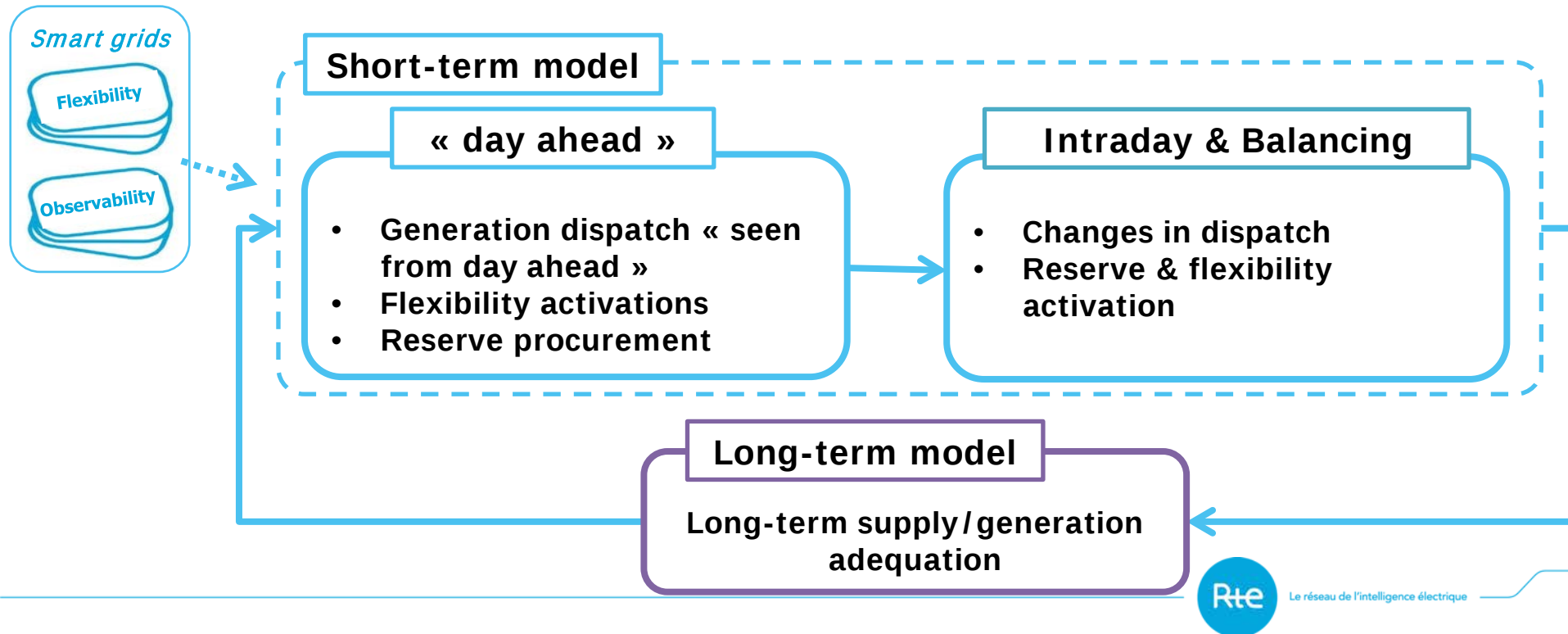


A dedicated methodology to assess the economic value (social welfare) of smart grid solutions

Smart grid solutions (flexibility and observability) provide a specific added value on the short-term management of power systems

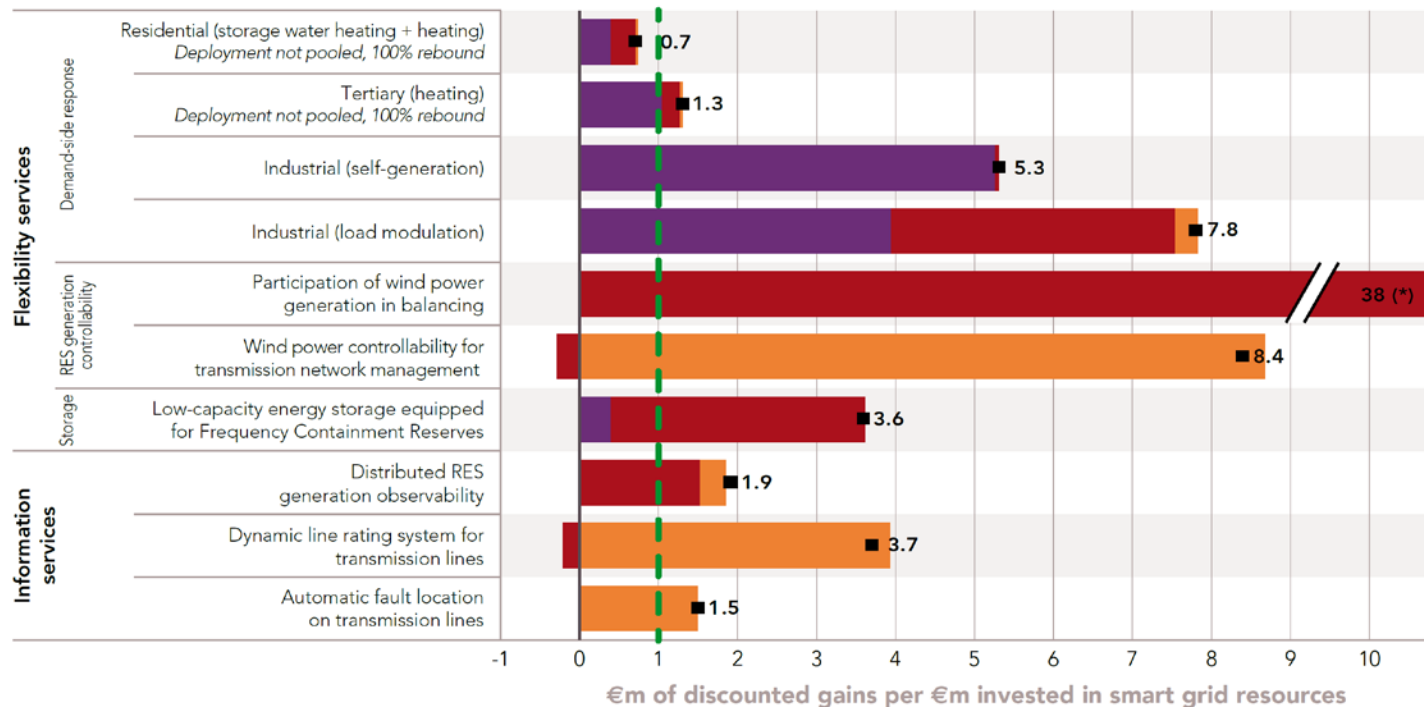
A dedicated simulation tool in order to capture the economic value of smart grids :

Simulation of the power system taking into consideration, technical constraints on generation assets, reserve and ancillary services, uncertainties, short term markets => a focus on the “close to real time” timeframe



Economic issues of smart grids deployment in France

Flexibility



■ Fixed costs of generation capacities avoided
■ Transmission network reinforcement costs avoided (and value of impact on power quality)
■ Fuel costs avoided
--- Breakeven point
■ Net gain

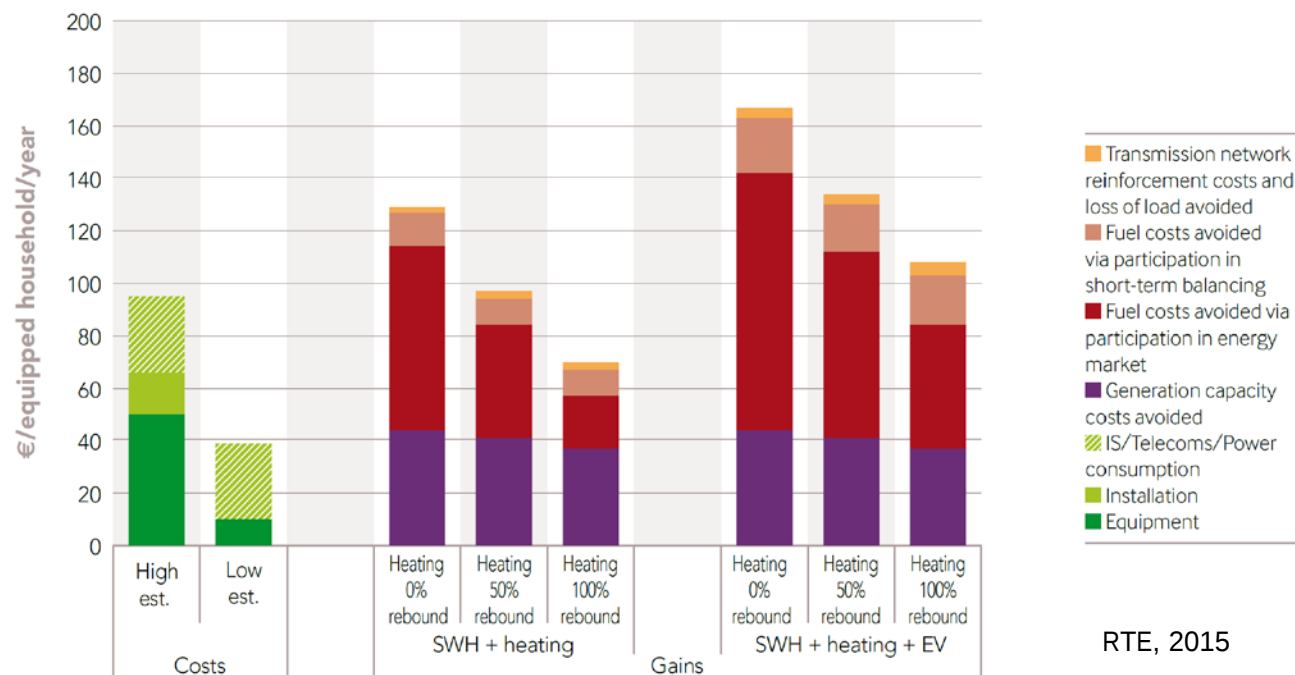
RTE, 2015

* This particularly high ratio reflects very low equipment costs.

In a power system with a high share of RES, the flexibility and observability solutions assessed have a positive or almost positive CBA

Focus on residential Demand Side Response

- In an ambitious energy transition context, **benefits of residential DSR are higher than 50 €/household**
- These benefits could make some technical solutions profitable** (if combined with other services at home)
- Benefit of residential DSR are strongly linked to the energy postponed after a demand reduction period**

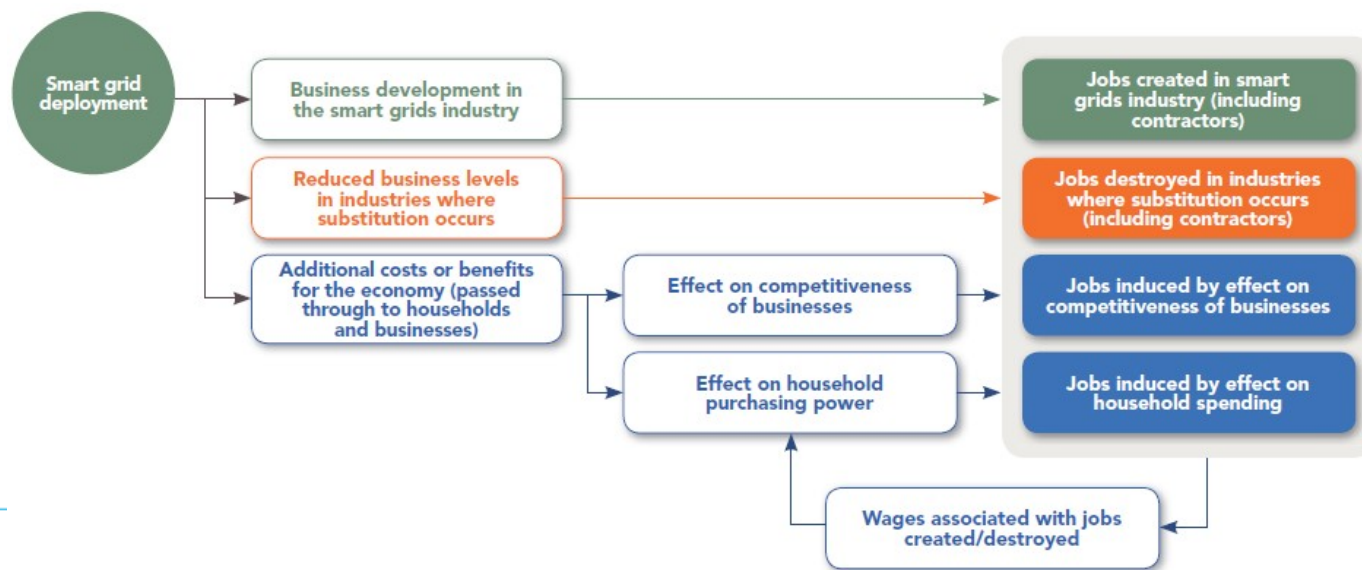


RTE, 2015

Assessment of the effects on employment of smart grids deployment

Quantification of a net effect of smart grids deployment on employment in France

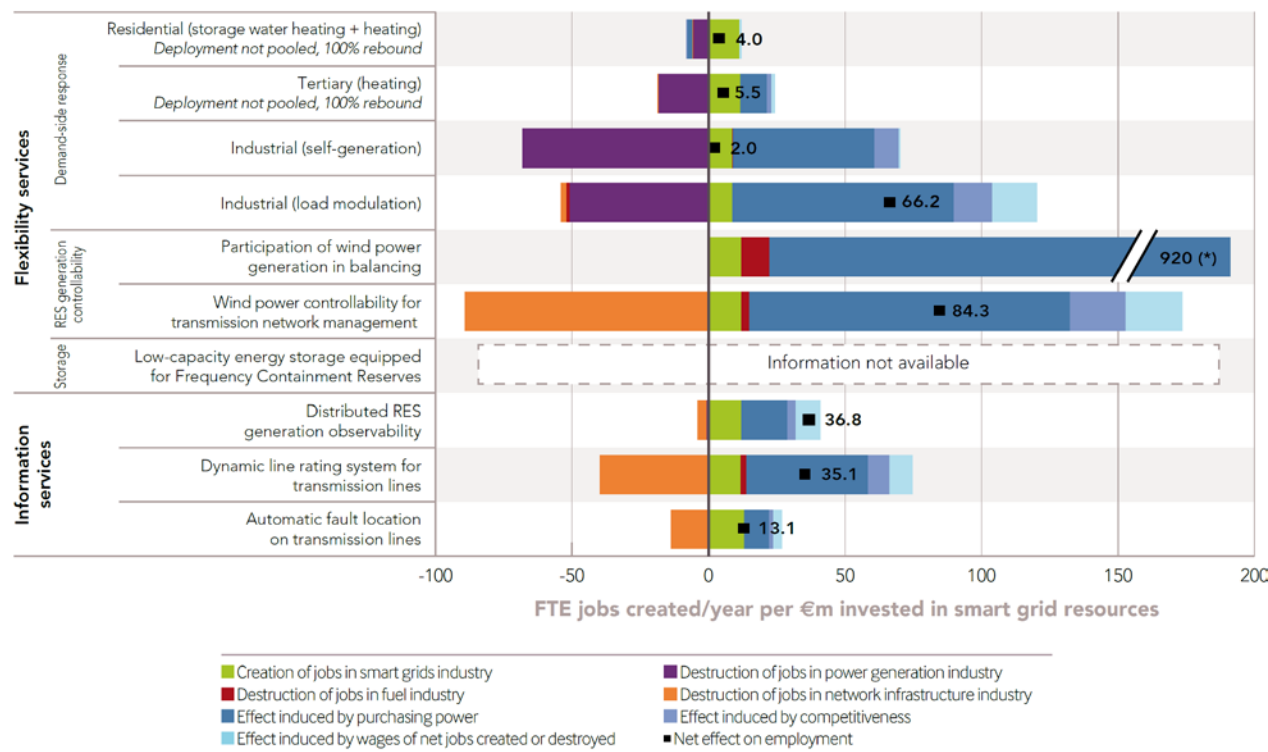
- Jobs created directly in the smart grids sector or indirectly in their suppliers;
- Jobs lost directly in sectors where substitutions occur: power generation, fuels, network expansion, or indirectly in their suppliers;
- Jobs induced in the rest of the economy (particularly distribution through electricity bills of the benefits to end customers : effects on household purchasing power and competitiveness of businesses



Employment issues of smart grids deployment in France

Flexibility

Observability



RTE, 2015

The deployment of smart grids in France has a positive net effect on employment in France (even if manufacturing occur outside France).

Job intensity (in French jobs) is greater in smart grids than in traditional activities of energy system (fuel import)

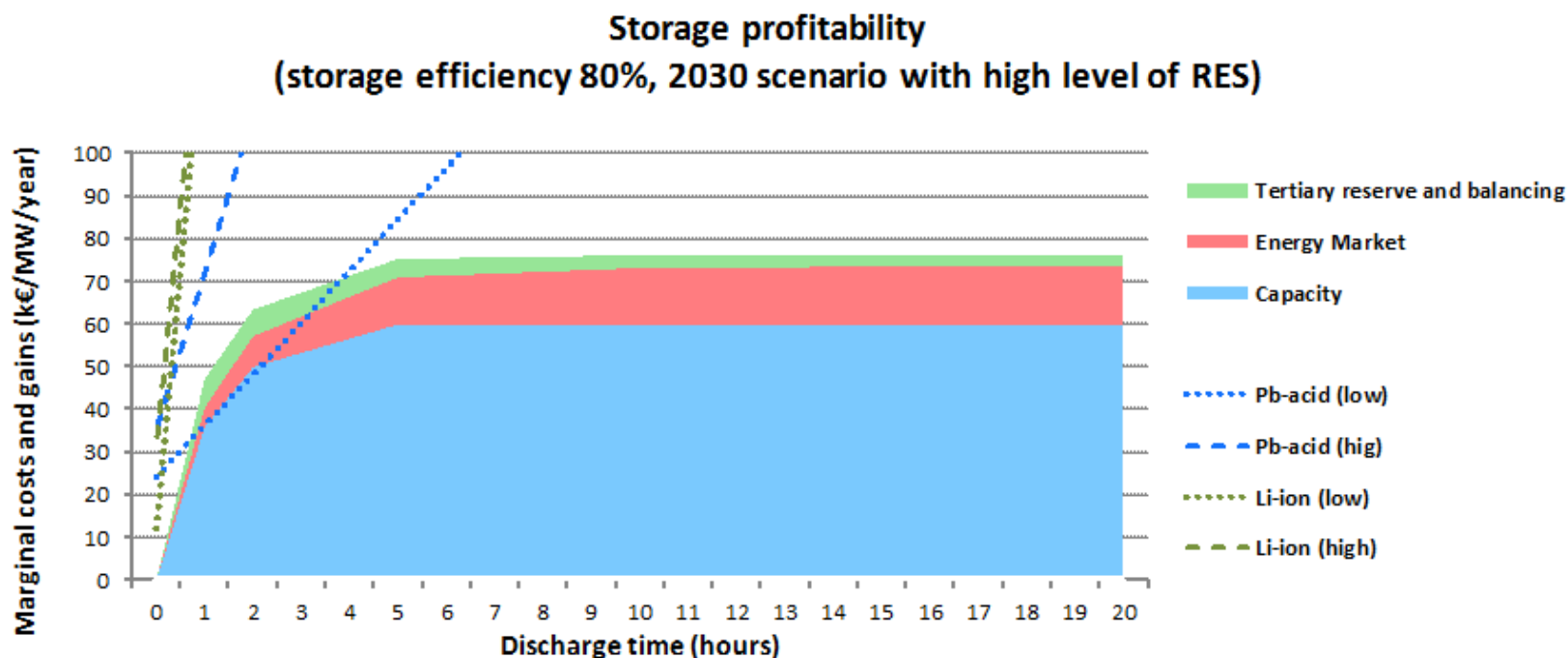
Smart grid deployment provide economic benefits for all sectors

Rte

Le réseau de l'intelligence électrique

Cost-Benefit Analysis of batteries

- With today's hypothesis of costs, batteries seems not to be profitable in 2030 even in a power system with high share of RES
- Nevertheless, low capacity (~2-4 hours) batteries seems to be the most interesting solution.



A 2nd round of studies is being conducted by RTE and ADEME, together with DSOs and other stakeholders. They will notably assess the effective business cases for stakeholders and identify remaining regulatory barriers to the deployment of those resources. This report will be published in Summer 2016.

Main topics :

Business cases for stakeholders

- From social surplus to business models
- Regulatory barriers

Large scale implementation of several smart grid functions

- “deposit” of flexibilities and their cost (e.g. DR)
- level of deployment dependant costs
- Interactions between solutions : pooling of resources or foreclosure effect

Assessment of the value for distribution grids

Avoided / reported reinforcements of distribution grids through smart grids

Sensitivity to other energy contexts

RES penetration, fuel and CO2 costs, ...

Assessment of other smart grid solutions

Wide range of storage solutions



Thank you for your
attention!

