

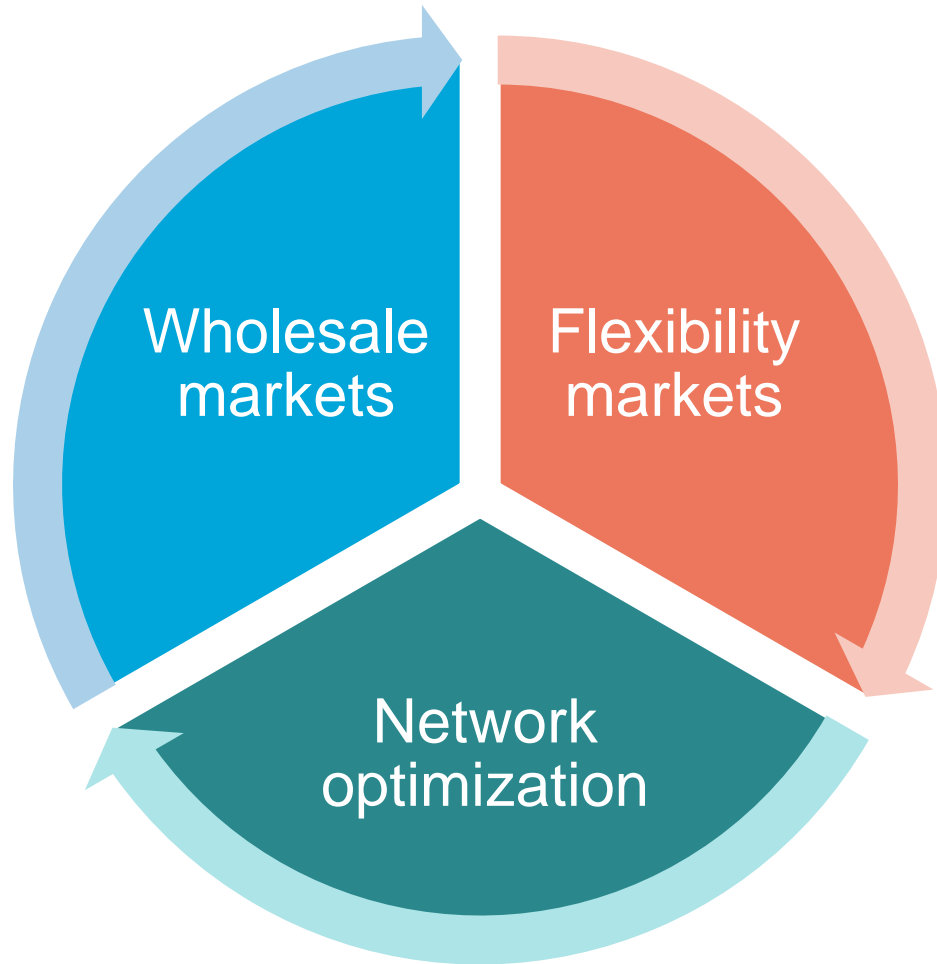


10/10/2017

Market integration of RES in France

Colas Chabanne – Head of Capacity & Demand Response Market Design - RTE

**Energy
&
Capacity**



**Balancing
&
Congestion
management**

Network development and management



Wholesale market integration



Feed in premium principles in France

Energy
market
revenues



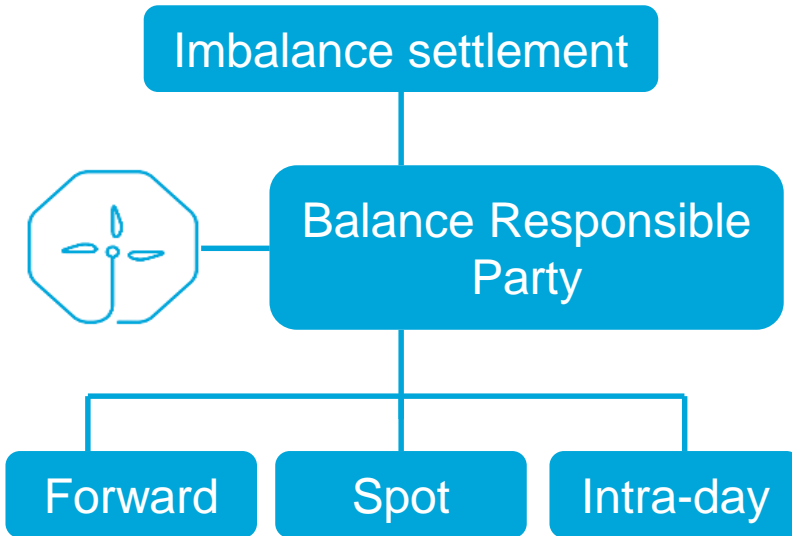
Capacity
market
revenues



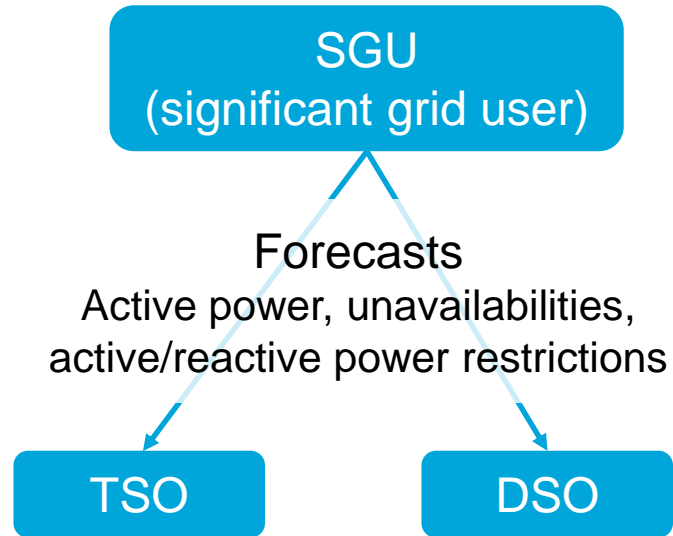
Feed-in
premium

Energy market integration

Balance responsibility



Scheduling



The capacity market : rationale

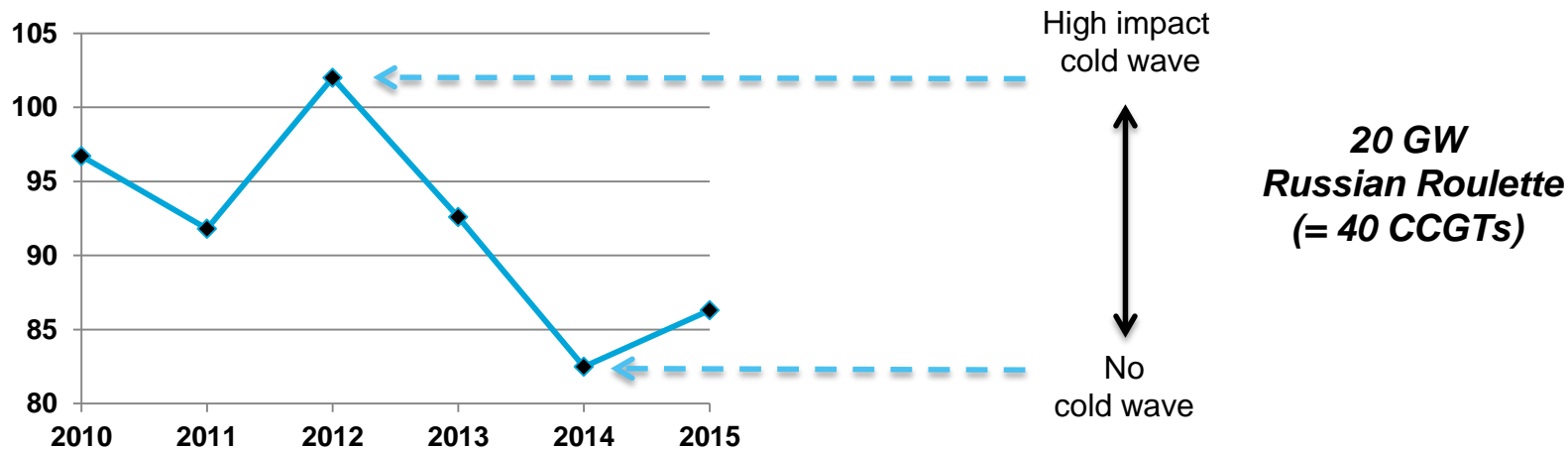
**1ST challenge
(medium term)**

**Winter peak
demand**

Very high temperature sensitivity : + 2.4 GW / °C

High impact cold waves = random events

Winter Peak Demand (GW)



**2nd challenge
(long term)**

Energy transition

Need to secure the energy transition

The capacity market : main design choices

Market Based

“BRP-like” market design
(individual forecast & hedging, organised & OTC market, imbalance settlement)

No administrative capacity target

Full market transparency (market fundamentals & transactions)

No distortions

Market wide

Technology neutral (generation, storage, DSR, RES,...)

No capacity autarchy (XB contribution)

SoS oriented

Forward looking (market starts 4 years ahead, 1 year product)

Certification = individual contribution to SoS

Capacity Obligation = individual contribution to adequacy risk



The capacity market : main design choices

Market Based	<p>“BRP-like” market design (individual forward contracts, organised & OTC market, imbalance settlement)</p> <p>Administrative capacity target</p> <p>Adequacy (market fundamentals & transactions)</p>
No distortion	<p>Market wide</p> <p>(SR, RES,...)</p> <p>(...tion)</p>
SoS oriented	<p>F</p> <p>(1 year product)</p> <p>to SoS</p> <p>Capacity Obligation – individual contribution to adequacy risk</p>

DG COMP approved

Reinforced competition measures

Explicit XB participation

Capacity CFD for new capacities

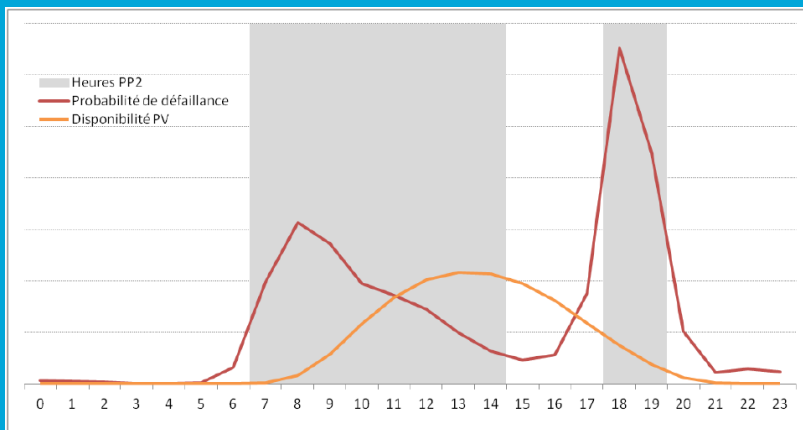
RES integration in the capacity market

Principle 1

RES contribute to SoS and therefore receive capacity certificates

Principle 2

Derating factors to account for technical specificities of RES



Principle 3

Optional regime for RES

=

No imbalances in case of low generation caused by weather conditions



2

Balancing and congestion management



The balancing market in France

GCT = 1h

Before GCT

BRPs

- Hedge their positions with energy markets
- Financially responsible for imbalances
- Generation schedules sent to RTE

After GCT

RTE

- Balances the system
- Performs congestion management
- Manages reserves

Starting in day ahead

RTE monitor system state based on schedules and forecasts



The balancing market in France

Cross border Balancing

50% of upward activations

30% of downward activations

DSR & distributed flexibilities

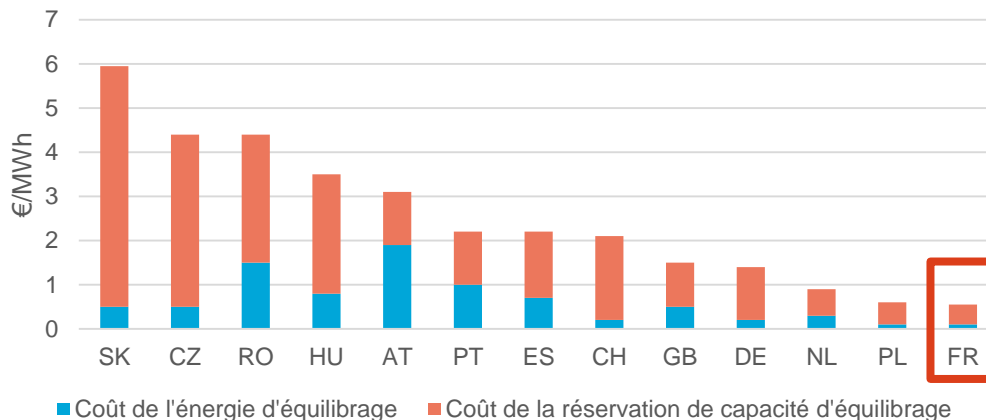
2/3 of contracted mFRR & RR

Non contracted « free bids »

Dynamic reserves sizing

One of the most cost efficient in Europe

Overall costs of Balancing over national electricity demand in a selection of European markets (ACER)



Evolution for better RES integration

Scheduling	Scheduling extended to RES generators Schedules sent to the DSO and the TSO Finer time resolution
Balancing market	Extended aggregation possibilities Participation possible without BRP agreement
Reserves	Shorter procurement periods Symmetric reserves → Asymmetric reserves
Congestion management	Automated activation Simplified bidding process



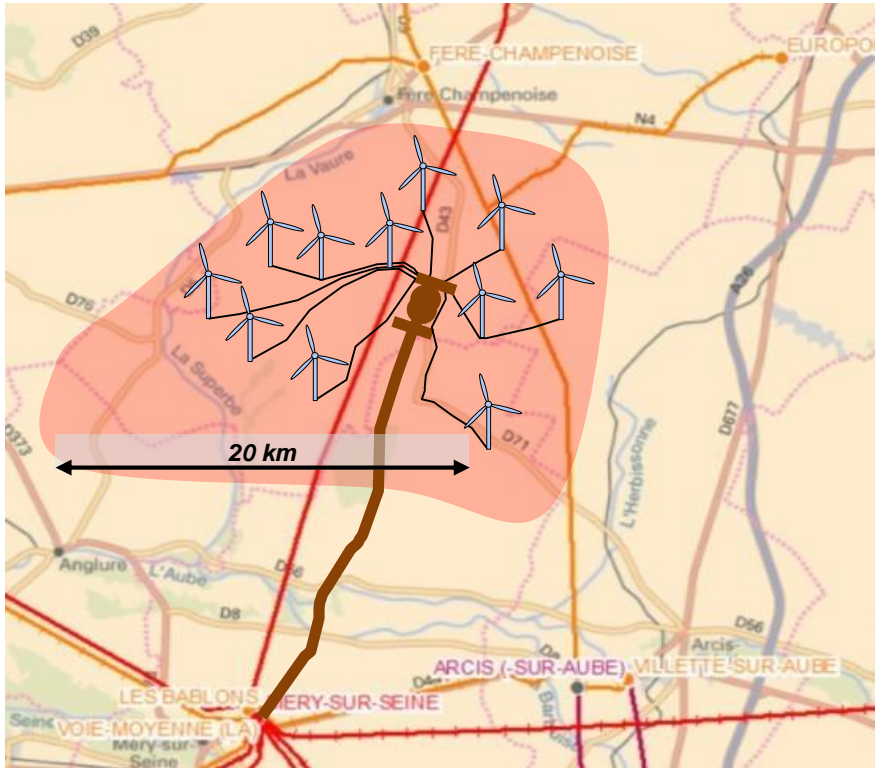
3

Network optimization





Regional Plans for RES Connection (S3RENR)



Optimized RES connection capacity
with limited network development

Transparency on network development
for stakeholders

Anticipated network development

Cost sharing for connected generators

Connection : an economic challenge

Paid by system operators

250 M€

175 M€ RTE
75 M€ Enedis

In grid reinforcements

2 215 M€

1 800 M€ RTE
415 M€ Enedis

For the initial state

685 M€

275 M€ RTE
410 M€ Enedis

In new assets

*Shared by generators
(« quote-part » in €/MW)*

27.4 GW

Of RES connection capacity

33

**New TSO/DSO substations
(28 for Enedis)**

24 GW

**Of reserved capacity
(RES generators >100 kVA)**

Figures for the 2012-2020 period

Network development optimization

How to maximize RES connection capacity at minimal cost ?

Guiding principles

No gold plating

Development of the meshed transmission grid above the connection for
90% P_{max} for windfarms
95% P_{max} for PV

Flexibility

Automatic RES curtailment in case of anticipated constraints or after a grid fault to allow the operation of the grid at higher limits.

Innovation

Dynamic line rating
Power flow control with dynamic line reactance
...

**Very limited impact on RES generation
(<0.01%)**



Thank
you