REstore
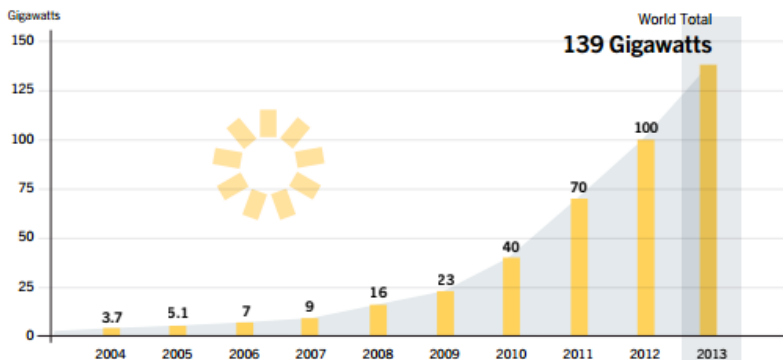
DEMAND SIDE RESPONSE A NO REGRET OPTION

REstore

London | Antwerp | Paris

www.restore.eu

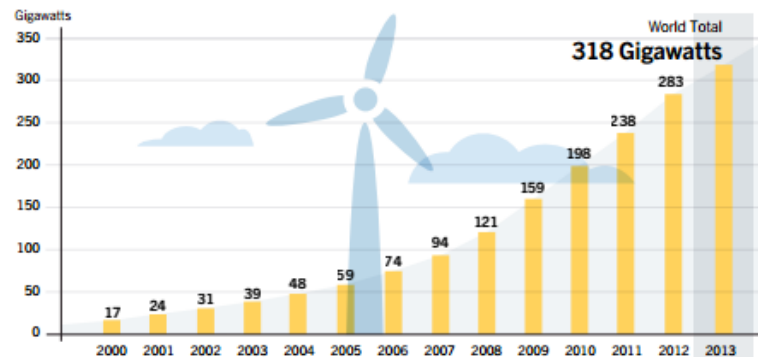# Renewables will mostly likely remain part of the solution to tackle climate change and keep growing
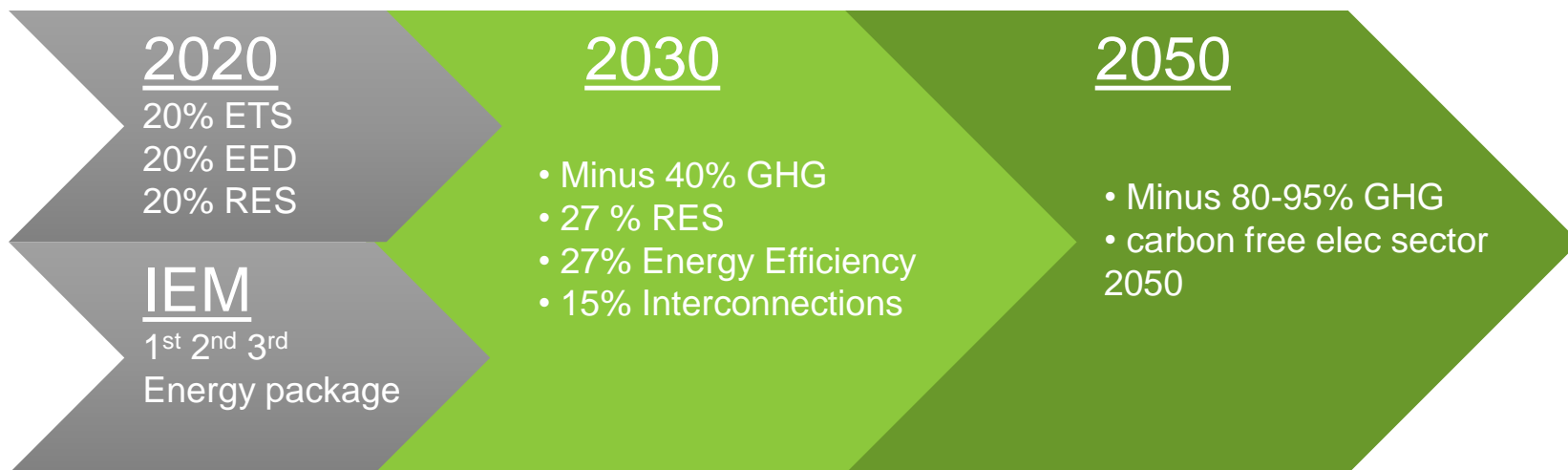
☀ SOLAR PV

Solar PV Total Global Capacity, 2004–2013

Gigawatts

World Total
139 Gigawatts

Year	Value
2004	3.7
2005	5.1
2006	7
2007	9
2008	16
2009	23
2010	40
2011	70
2012	100
2013	139

Source: REN21: key findings 2014

⚙ WIND POWER

Wind Power Total World Capacity, 2000–2013

Gigawatts

World Total
318 Gigawatts

Year	Value
2000	17
2001	24
2002	31
2003	39
2004	48
2005	59
2006	74
2007	94
2008	121
2009	159
2010	198
2011	238
2012	283
2013	318

EU Climate & Energy framework

2020
20% ETS
20% EED
20% RES

IEM
1st 2nd 3rd
Energy package

2030
• Minus 40% GHG
• 27 % RES
• 27% Energy Efficiency
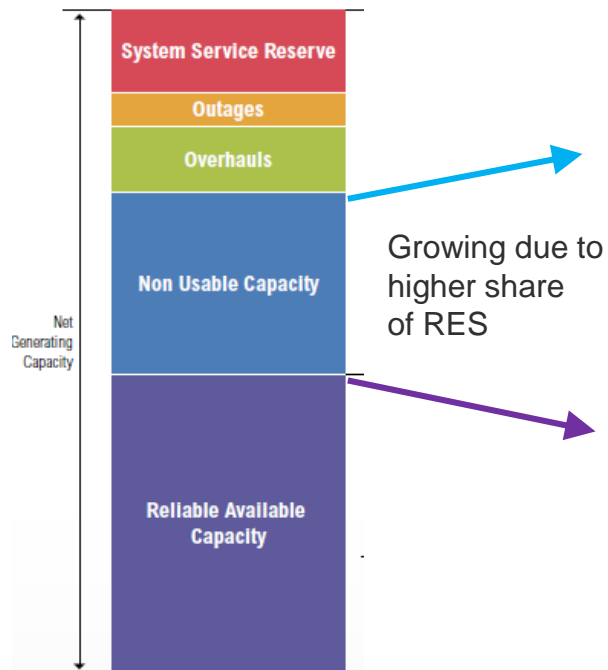• 15% Interconnections

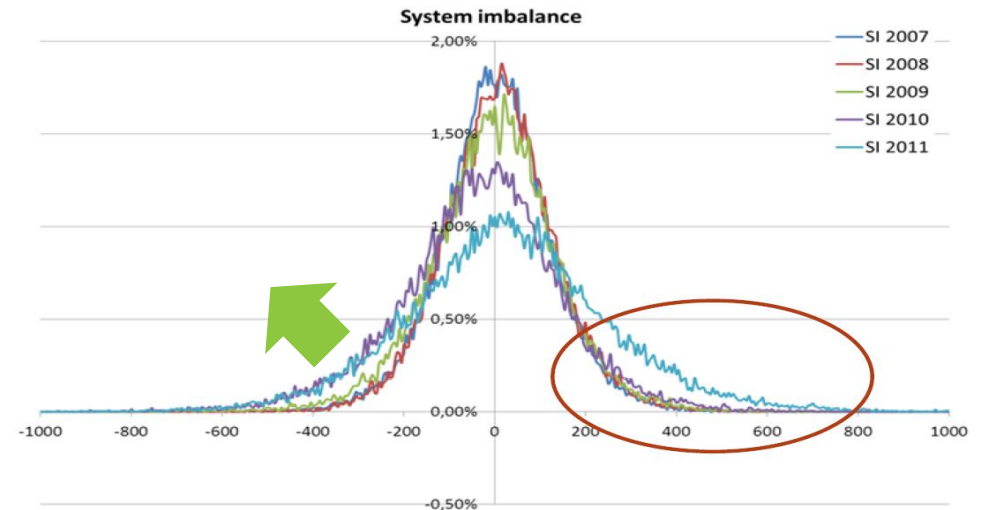**2050**
• Minus 80-95% GHG
• carbon free elec sector 2050

Growing share of renewables leads to several challenges in the electricity system

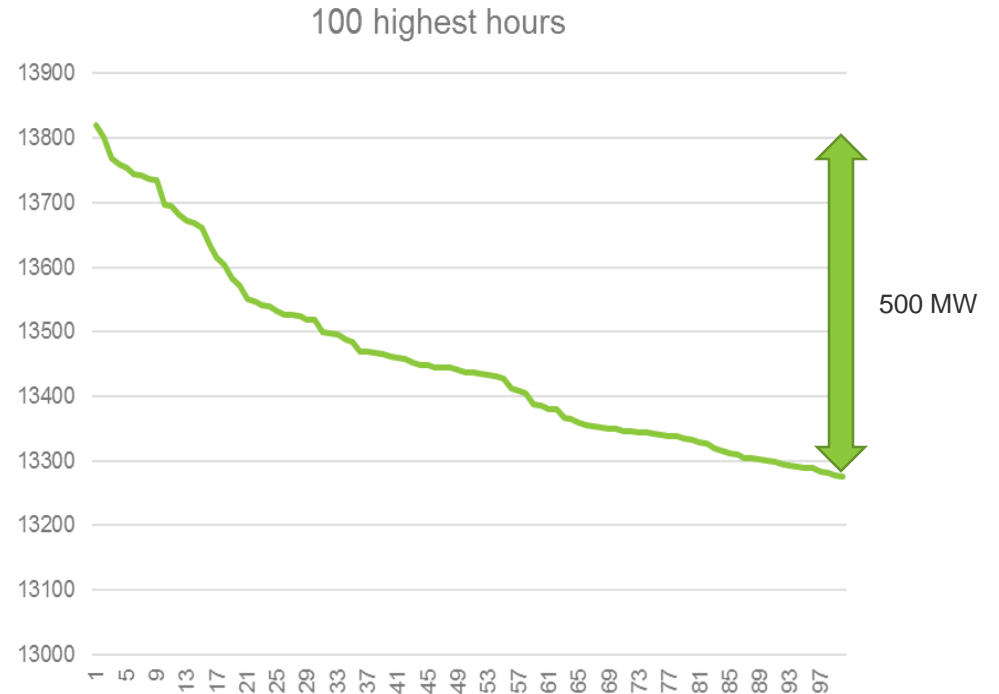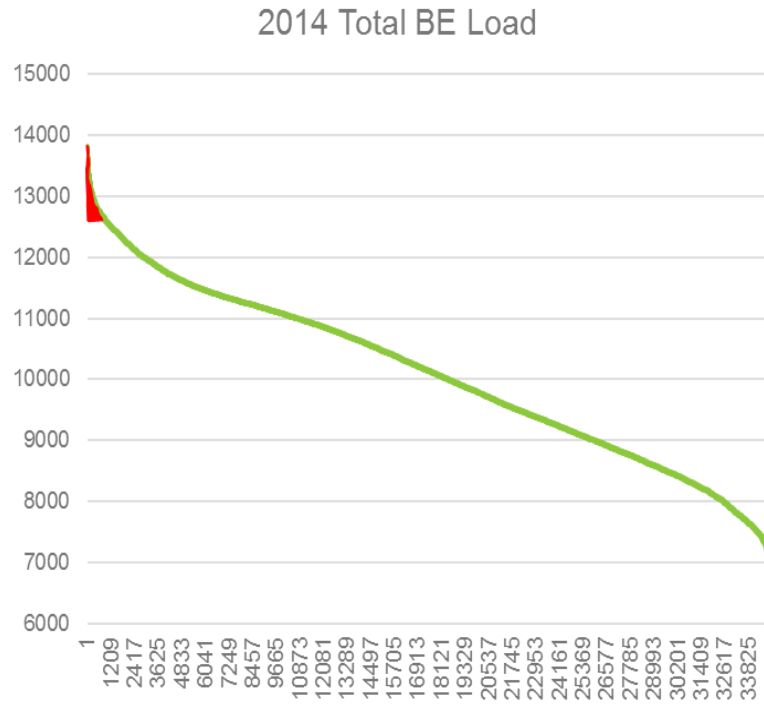**Long term adequacy**
Less running hours for reliable capacity

Short term balancing
Increasing number & size of imbalances…

Growing due to higher share of RES

Source: ENTSO-e

Source: Elia Group

Voluntary demand side response is part of the solution to manage the transition in a cost effective way

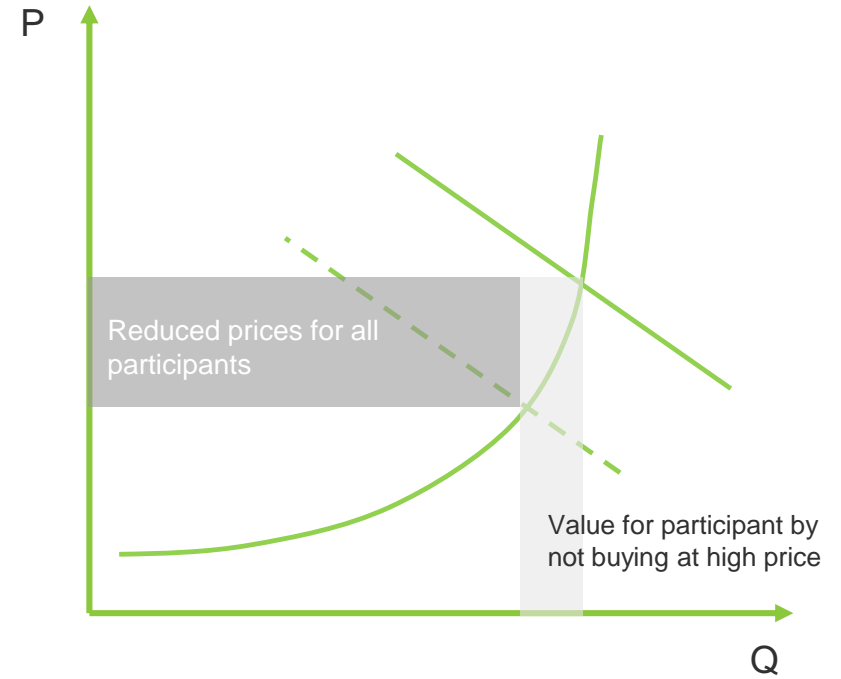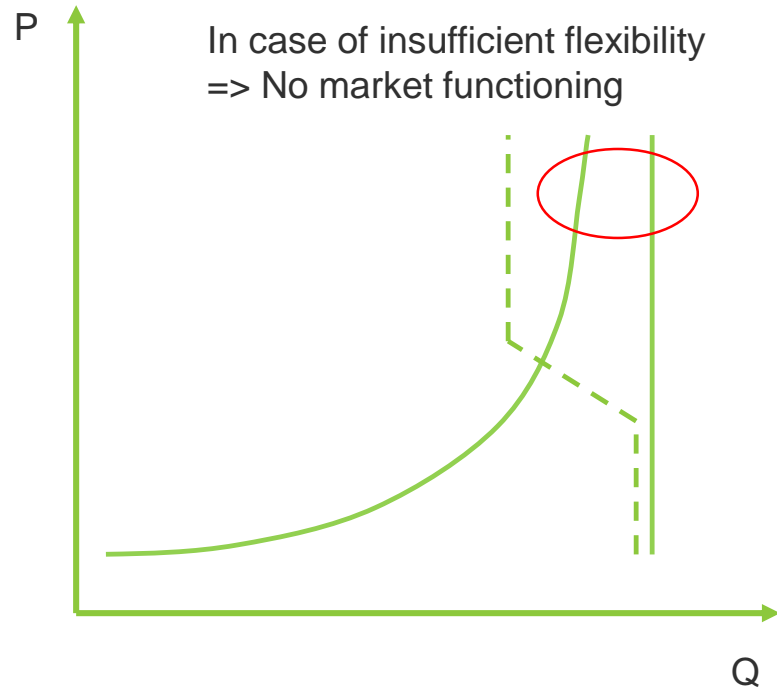2014 Total BE Load

100 highest hours

500 MW

Investing into new generation units to cover the very exceptional high load hours is uneconomical

REstore's technology platform FlexpondTM is the only platform in Europe capable of offering Primary Reserve with a DR portfolio. In 2014 it achieved a track record of delivering 100% of the requested power
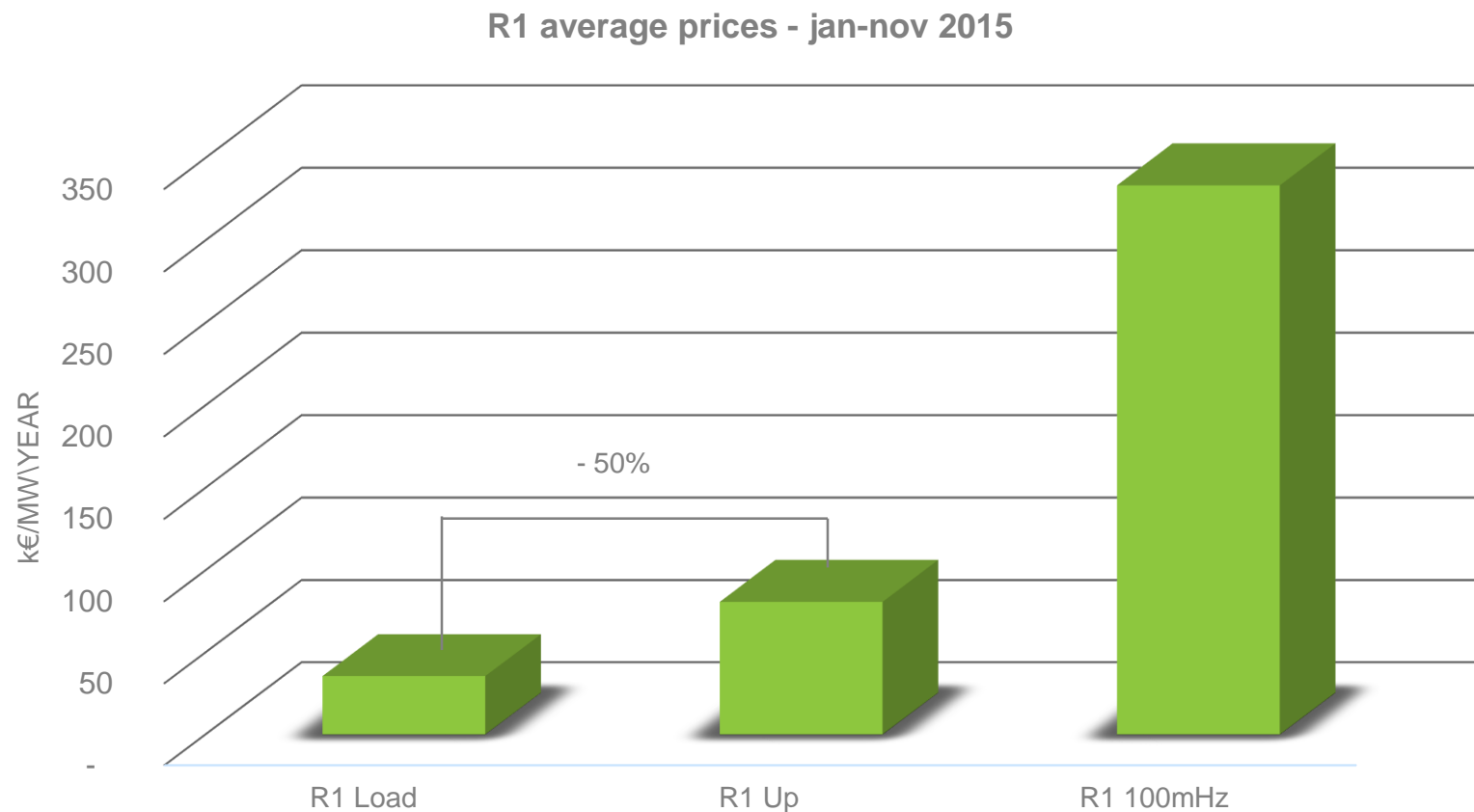

R1 Calibration
Click and drag in the plot area to zoom in

REstore
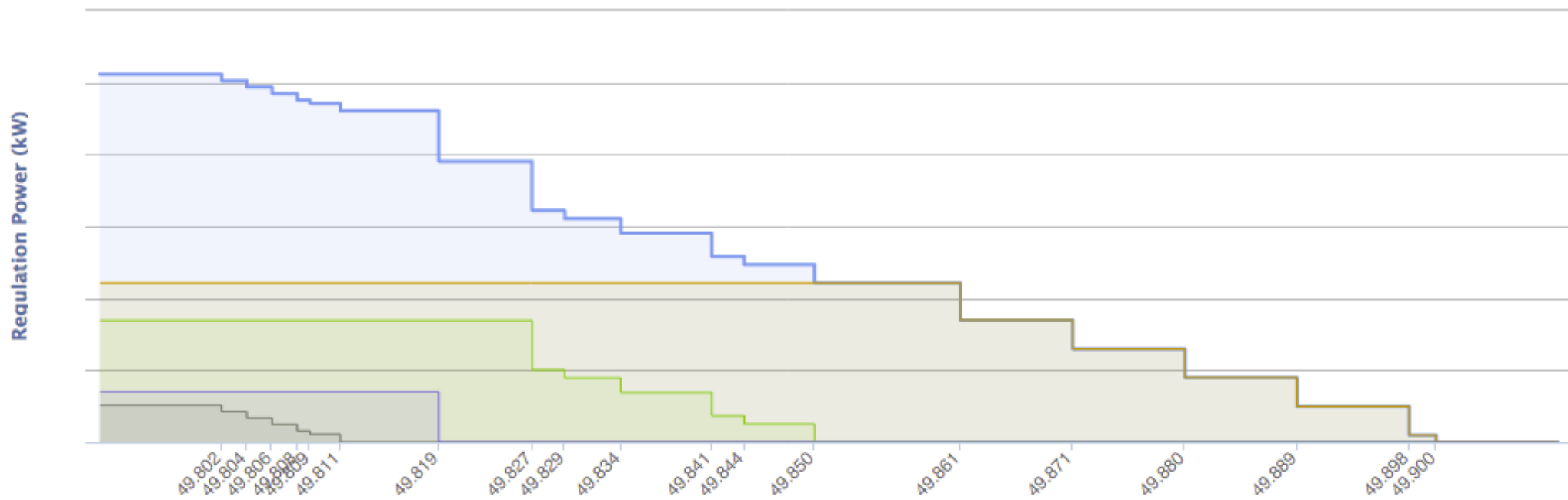
Demand side response is a must in a well functioning market

P

In case of insufficient flexibility
=> No market functioning

Q

P

Reduced prices for all participants

Value for participant by not buying at high price

Q

Demand Side Response is proven to be a very cost-effective solution (1)

R1 average prices - jan-nov 2015

k€/MWYEAR

350
300
250
200
150
100
50
-

- 50%

R1 Load   R1 Up   R1 100mHz

Source: Elia website   ■ Mean (jan-nov)
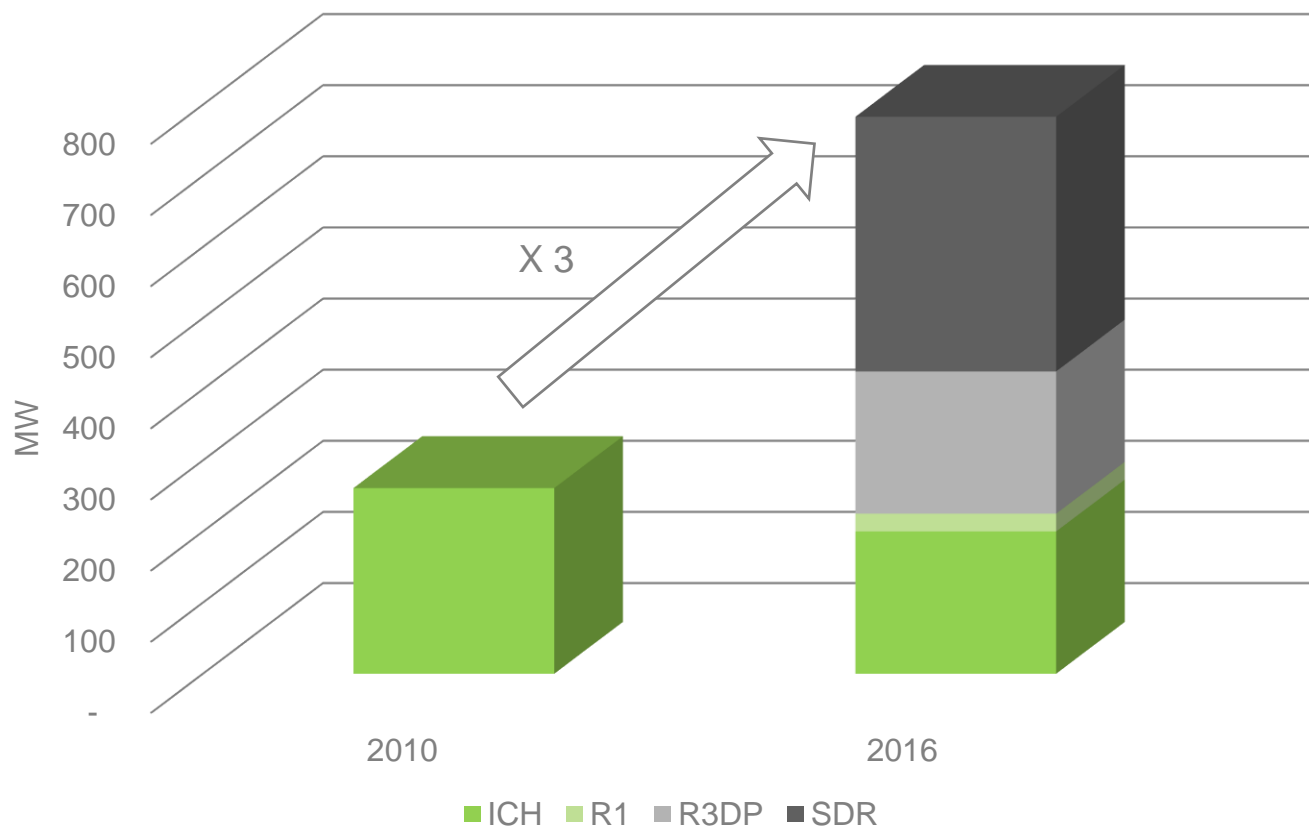
← Load →   ← Production →

REstore

Demand Side Response is proven to be a very cost-effective solution (2)
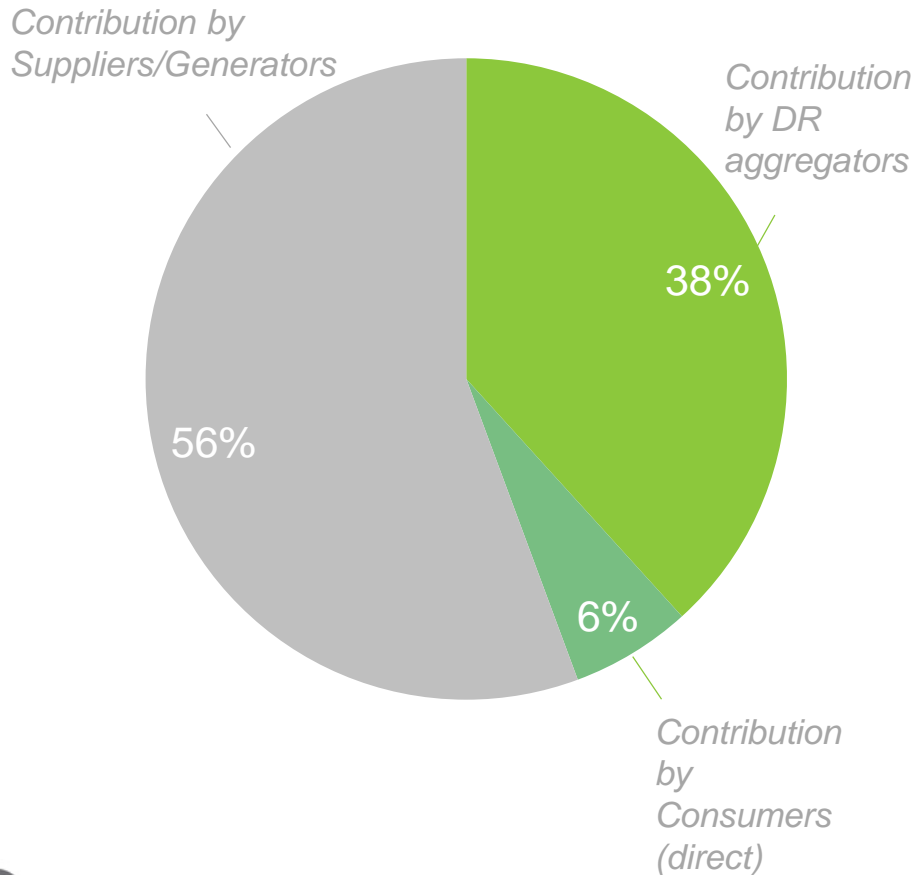

Source: Elia website

REstore
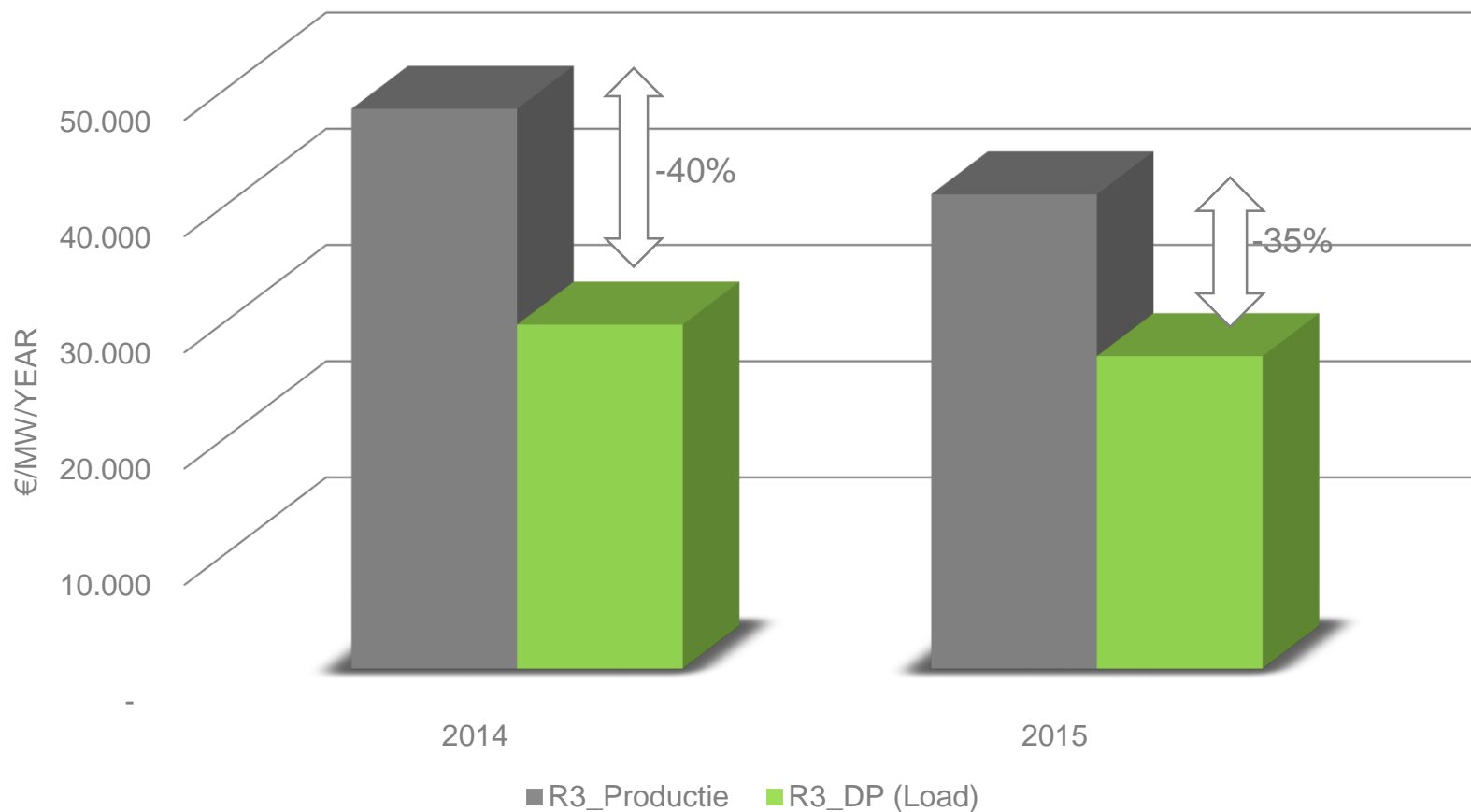
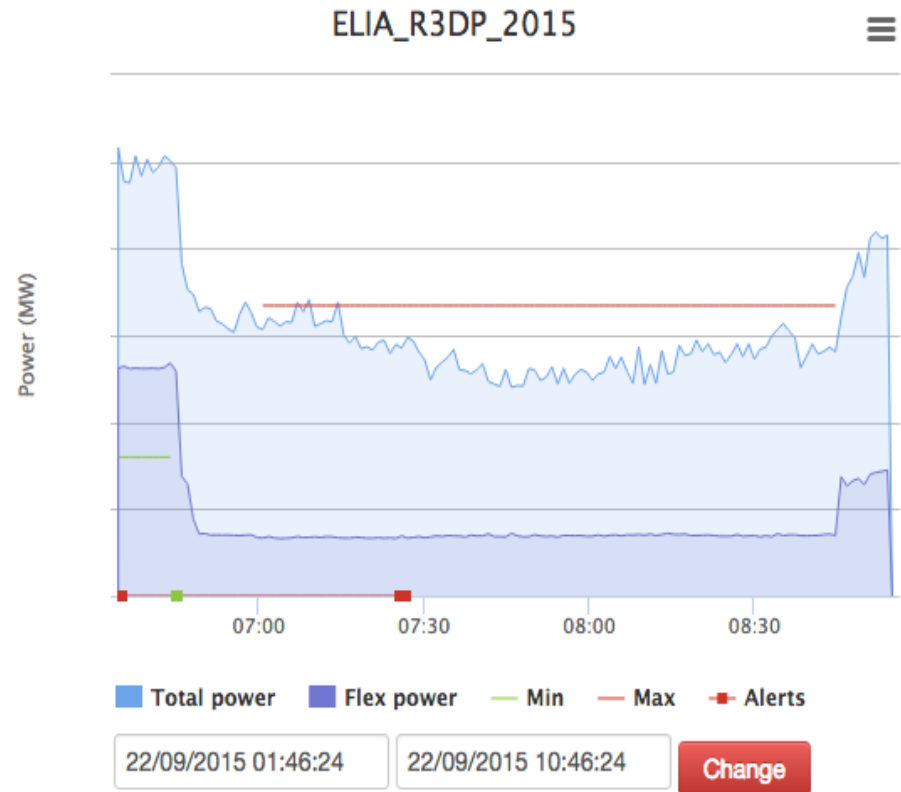## Demand Side Response volumes have tripled over the last 6 years

REstore

When given a fair chance, independent DR aggregators deliver above expectations, both in terms of additional liquidity as well as on reliability

% of DR in Strategic Reserves (BE)

Contribution by Suppliers/Generators

Contribution by DR aggregators

38%

56%

6%

Contribution by Consumers (direct)

DR delivered (BE)

ELIA_R3DP_2015

Power (MW)

07:00   07:30   08:00   08:30

Total power   Flex power   — Min   — Max   ■ Alerts

22/09/2015 01:46:24   22/09/2015 10:46:24   Change

REstore

How flexible will industry need to be ?

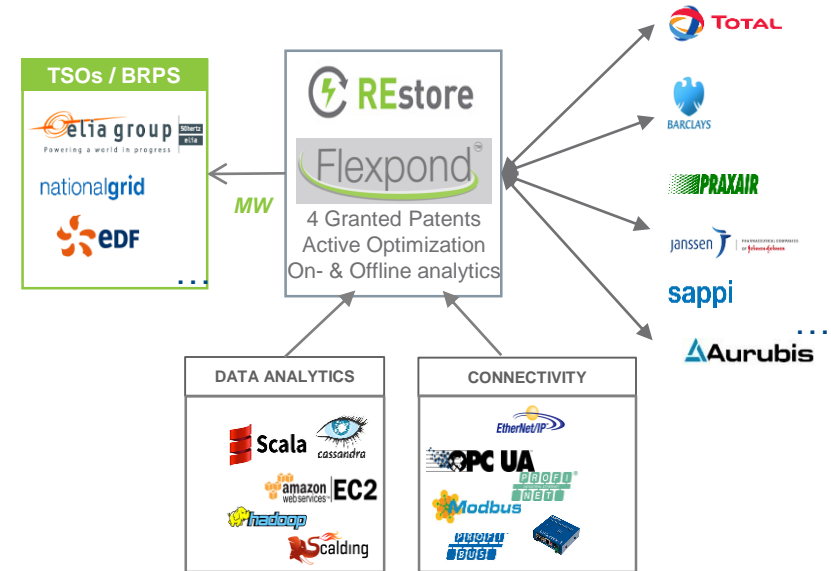**The initial aggregation role was to 'pull the plug' on a set of loads**

Old – Demand Response

DR Aggregation 1.0

- Pure **intermediary**
- Helping the grid operator to **'pull the plug'** on a group of loads
- **Passive portfolio effect**

REstore

DR Aggregation 2.0: Through Big Data analytics, and "Internet-of-Things" connectivity, Flexpond identifies and smartly controls flexible power. Flexibility that was useless or untouchable yesterday can be valorized today.

Old – Demand Response

DR Aggregator 1.0

- Pure **intermediary**
- Helping the grid operator to '**pull the plug**' on a group of loads
- **Passive portfolio effect**

Demand Response 2.0

TSOs / BRPS

elia group

nationalgrid

EDF

REstore

Flexpond®

4 Granted Patents
Active Optimization
On- & Offline analytics

MW

TOTAL
BARCLAYS
PRAXAIR
janssen
sappi
Aurubis

DATA ANALYTICS

Scala
cassandra
amazon web services | EC2
hadoop
Scalding

CONNECTIVITY

EtherNet/IP
OPC UA
PROFI NET
Modbus
PROFI BUS

- **100% Automated**
- **Active portfolio management**
- **Risk Management**
  - Protecting Industrial Boundaries
  - Increasing Revenues

REstore

REstore's **patented technology platform** Flexpond™ enables to increase availability, speed up reaction times and consequently create more value

Demand Response 2.0

- **REstore's Active Portfolio Management**

- **REstore is 100% Automated** Proprietary Flexpond™ platform

- **REstore's Risk management**

HOW ? Granted patents:

- **US 2012/013 3337 May 2012**
- **US 8 417 391   Apr 2013**
- **US 2013/017 8991 Jul 2013**
- **US 2013/017 8993 Jul 2013**
- **US 8 825 219   Sep 2014**
- **US 8 838 281   Sep 2014**
- **US 2015/005 7824 Feb 2015**

REstore has minimized *"operational impact* on a manufacturing plant"* from DR programs (through use of its Flexpond™ platform)

	Perception	**Reality**
Loss of control?	*" Automated Demand Response implies that REstore, a third party, acquires direct control over our manufacturing plant "*	■ REstore never controls plant machinery directly. REstore only sends *requests*, which can be accepted /rejected by the consumer's control system / operator. ■ Availability of flexible power is determined by Industrial Boundaries pre-defined by the consumer.
No flexible power available?	*" We do not have any flexible power at hand in our manufacturing process"*	■ Processes that have a less-than-perfect availability can be valorized through REstore's active portfolio management. ■ REstore has a team of Industry Experts that actively works with customers to identify flexible power. They are experienced industrialists and ex-plant managers.
Plant output affected?	*"Any activation of flexible power will reduce the output of the manufacturing plant, so reduce its utilisation rate"*	■ A large potential of flexible power is found in buffered processes. ■ REstore typically contracts plant machinery which is not a bottleneck process. Curtailment of such machinery will therefore not affect plant output.

REstore

REstore has been awarded for its leadership

Frost & Sullivan

Platts Global Energy Award

Storage Award – European Utility Week

Global Cleantech Cluster Association

REstore

Industrial consumers work with REstore for reasons of technology-enabled "access-to-market" and "risk management". REstore is the European leading aggregator.

Selection of Flex-providers:

Various Industrial Sectors