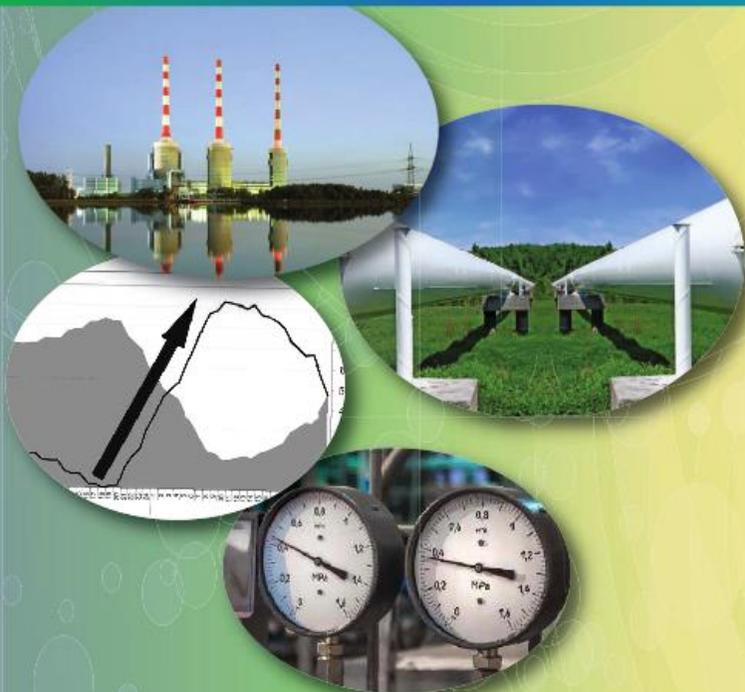




FLEXIBLE GAS MARKETS FOR
VARIABLE RENEWABLE GENERATION



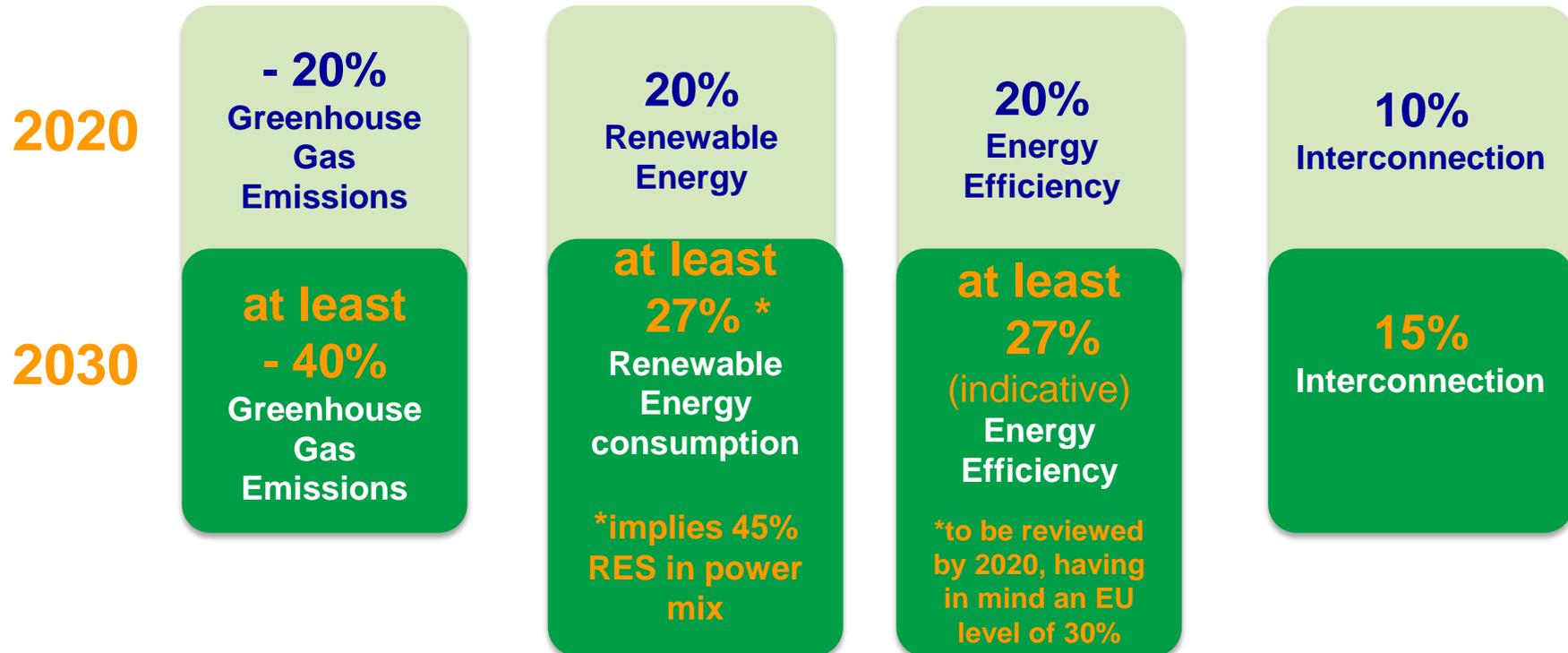
Flexible gas markets for variable renewable generation

Marion LABATUT
EURELECTRIC,
Advisor Wholesale markets – electricity and gas

UNECE TF
Brussels, 2nd December 2015

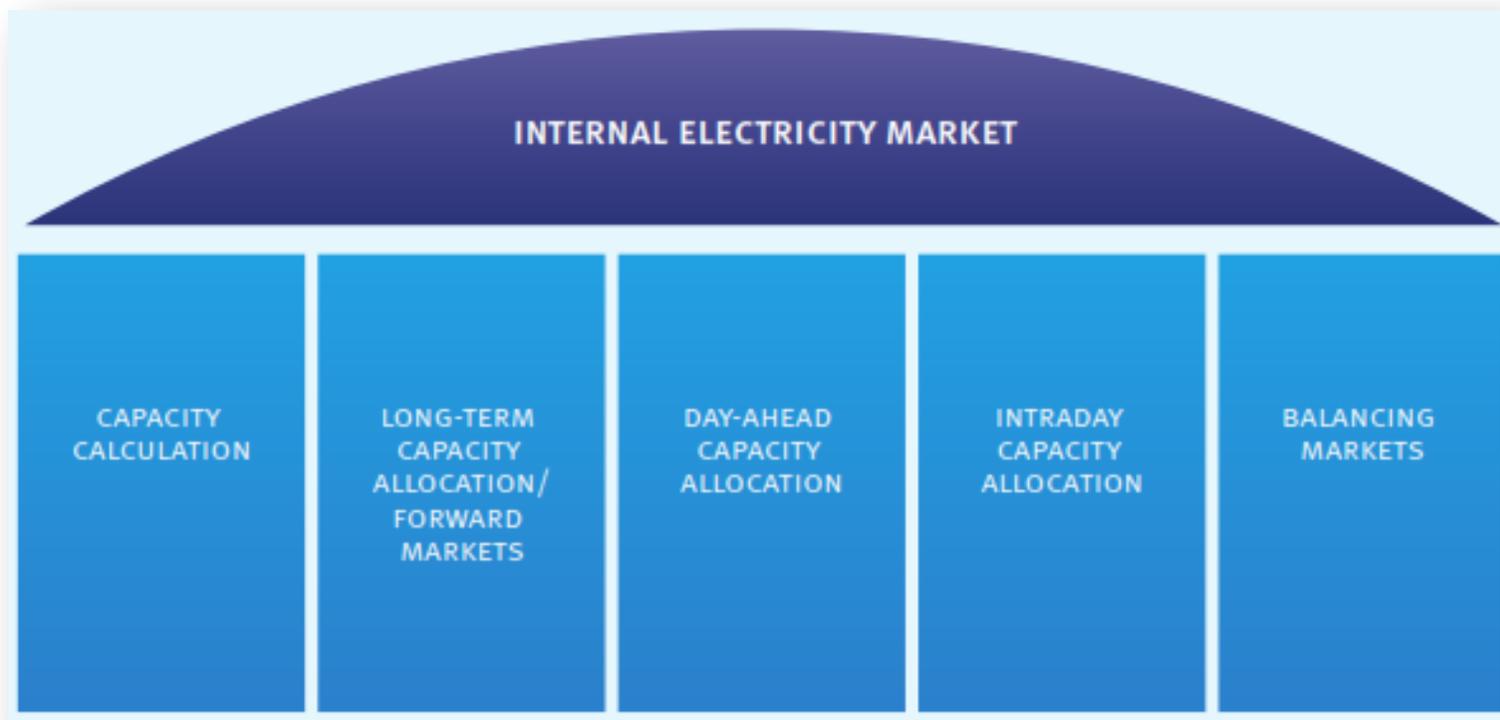


2030 Framework for Climate and Energy Agreed Headline Targets





The completion of the Internal Energy Market is fundamental to accomplish the transition in power systems in a cost-efficient way



All market developments head towards **completing the Internal Energy Market**

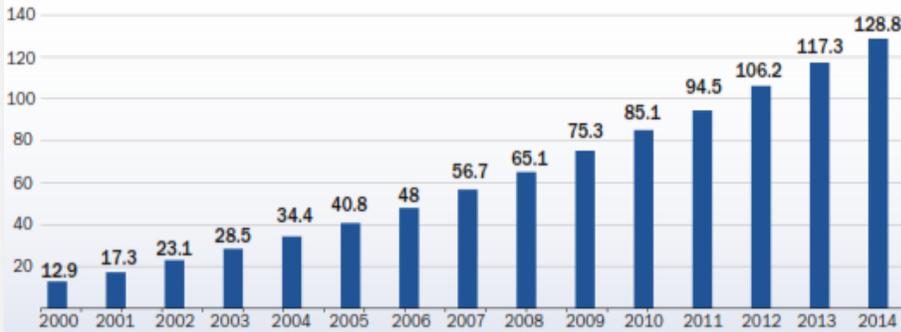
- **Implementation of the Third Energy Package**
- **Integration of wholesale markets across all timeframes**



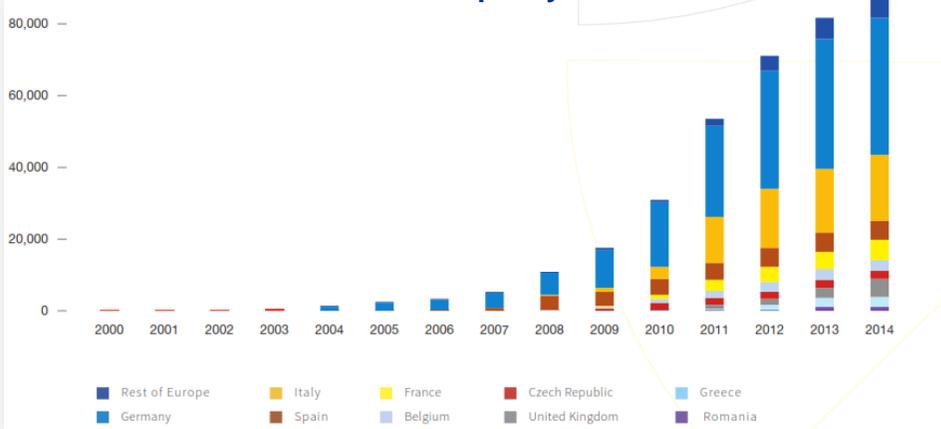
The growth of renewables, which is necessary to pursue the European targets, brings a new reality to power systems.

Over 150GW of solar and wind installed in 10 years

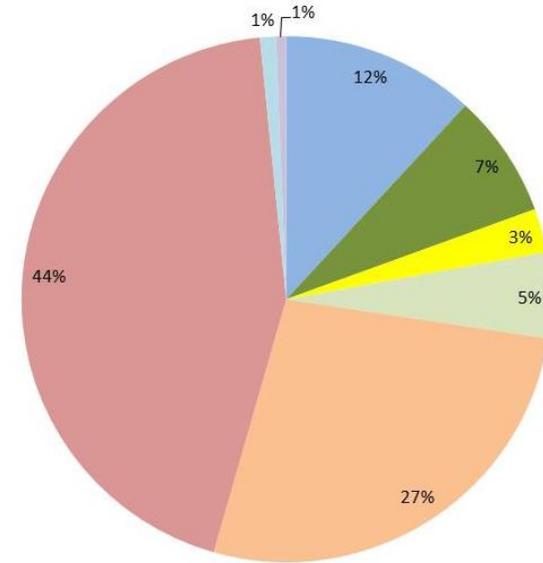
EU Cumulative wind power installed capacity



EU Cumulative PV installed capacity



Low carbon generation leading the way (EU 28, 2013)



Renewable hydro Wind Solar Other RES Nuclear Fossil fuels Pumped hydro Other sources

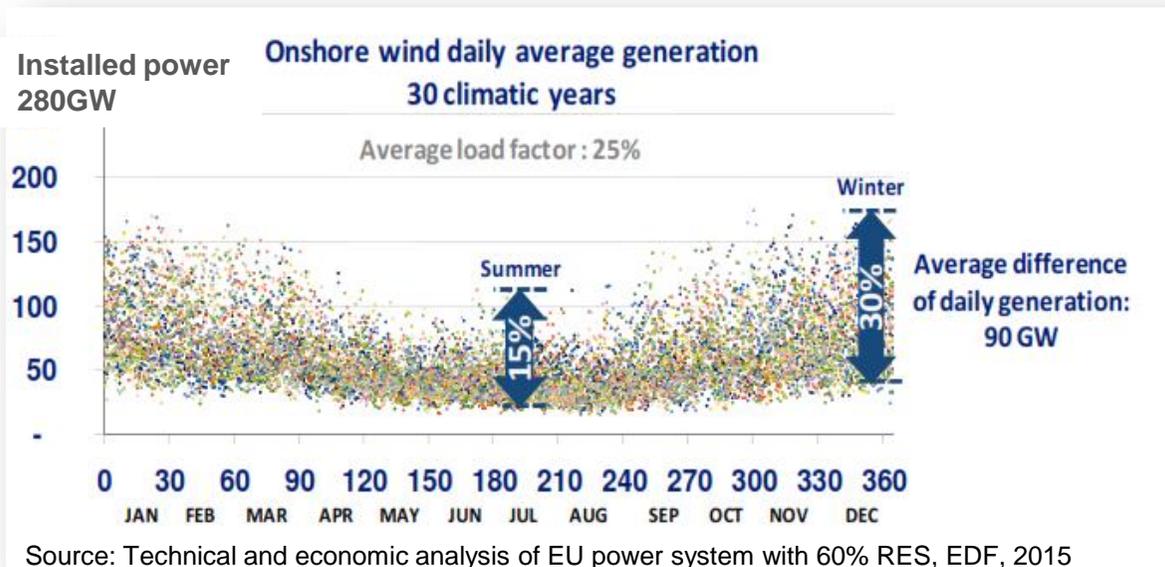
The total electricity production in 2014 amounts to **3025 TWh**, RES contributing to this total with **28%**.

Wind and solar contributed with over 10%, gas 15%.



Intermittent Renewables' generation varies greatly

Projections of EU power system with 40% PV and wind



Modelling of EU power markets with 40% of wind and PV shows that the **daily average of wind generation would vary between 40 and 170GW** depending on wind conditions!

Germany's installed wind power capacity is estimated above 44 GW, with at least 5 GW of new capacity added over the past 12 months,

Wind power output is forecast to jump above 30 GW Wednesday, with peaks forecast between 32 GW and 35 GW, which would be a new all-time high, according to sources. (



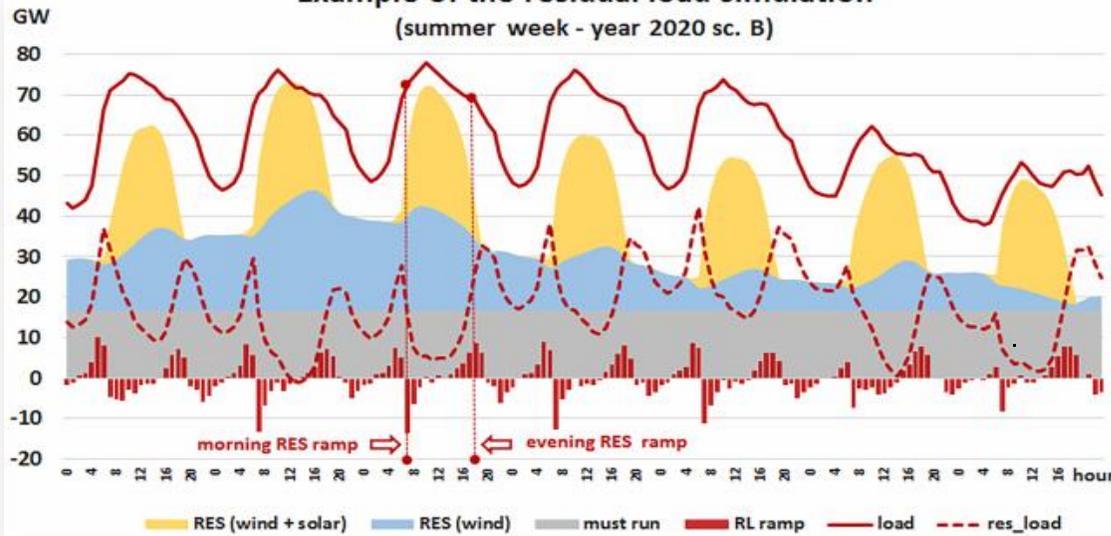
PLATTS

McGRAW HILL FINANCIAL

18 November 2015 – European Power Daily

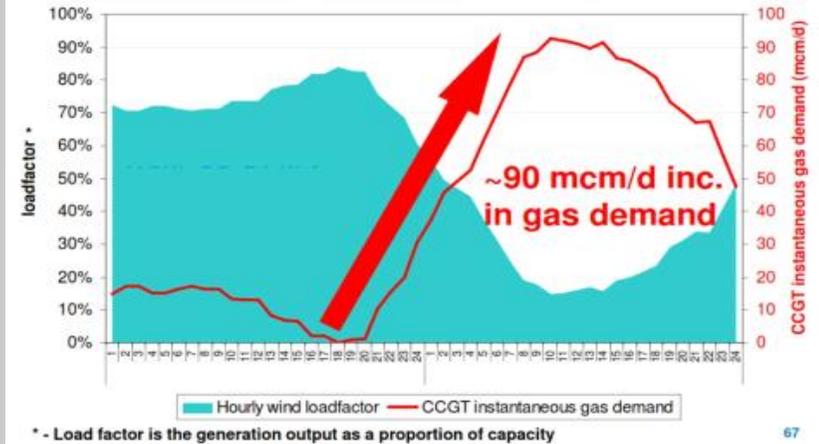
Power systems with broad generation variations from intermittent renewables need both firm capacity (“back up”) and flexibility resources

Example of the residual load simulation
(summer week - year 2020 sc. B)

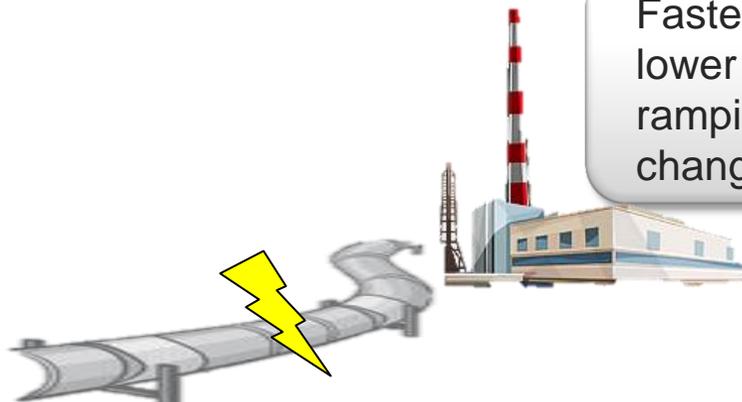


Source: ENTSO-E, SOAF 2015

A potential extreme event
2020/21: 30GW wind capacity



Faster start-ups and shut-downs,
lower minimum generation, higher
ramping rates, and more frequent
changes in generation



CCGTs have already adapted their load profiles *Example from Spain*

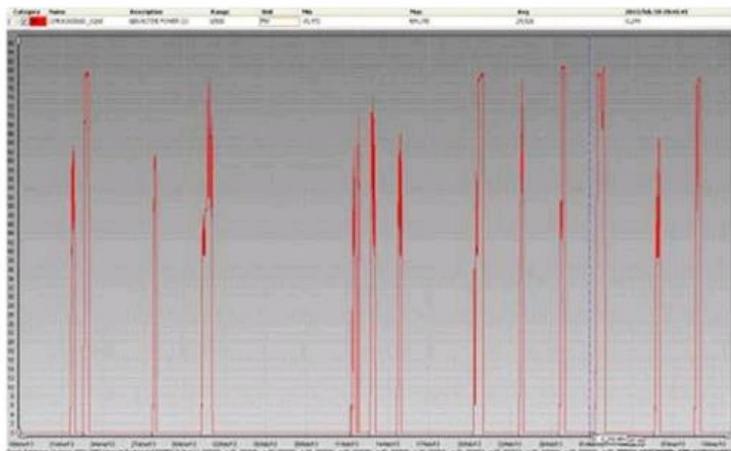


Figure 11A – CCGT starts in a six weeks period (Source UNESA)

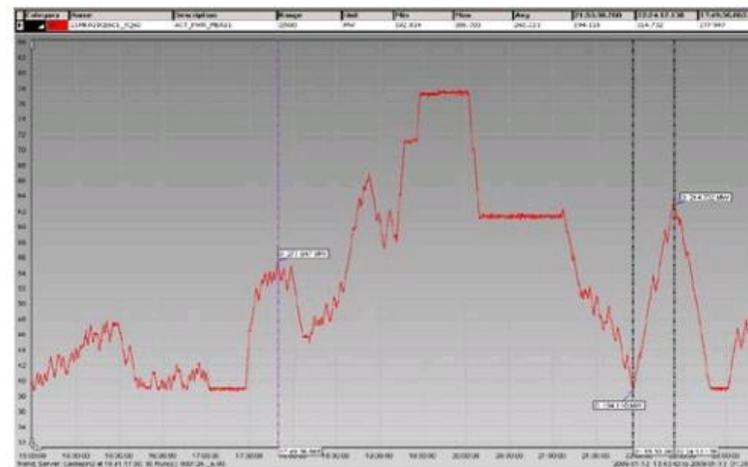


Figure 11B – CCGT running in automatic grid control operation (Source UNESA)

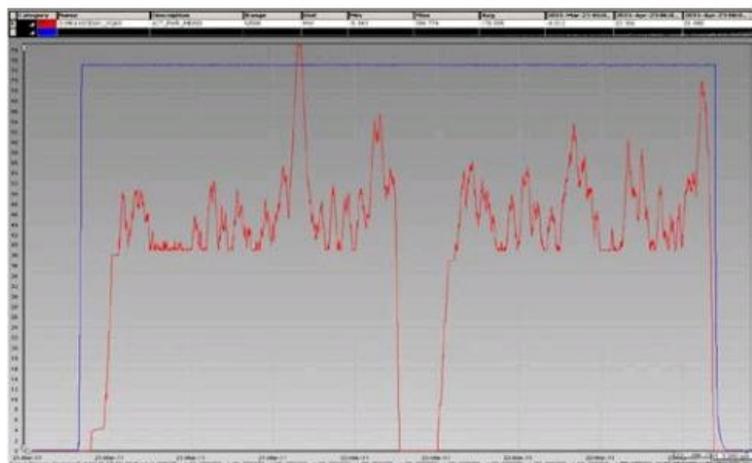
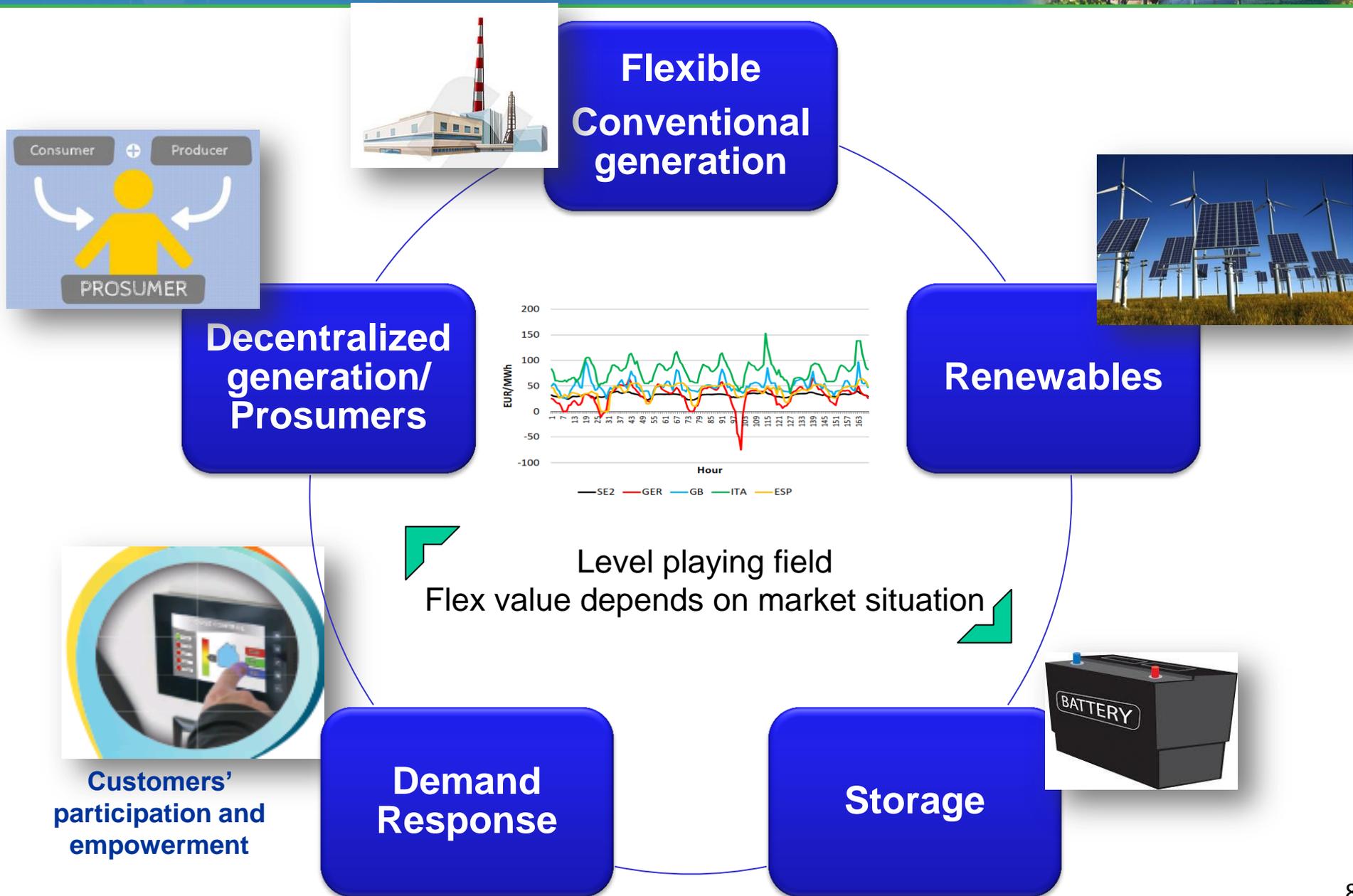


Figure 11C – CCGT running in idle operation (Source UNESA)

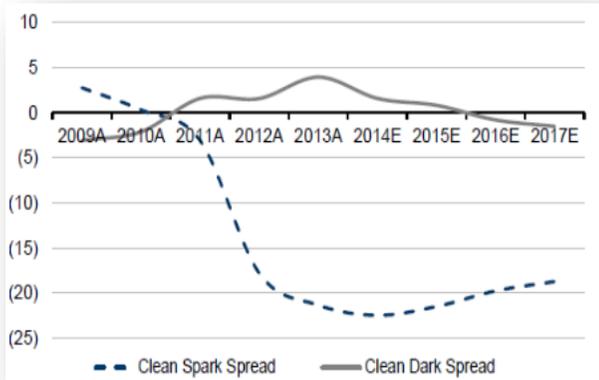


Figure 11D – CCGT running in low load operation (Source UNESA)



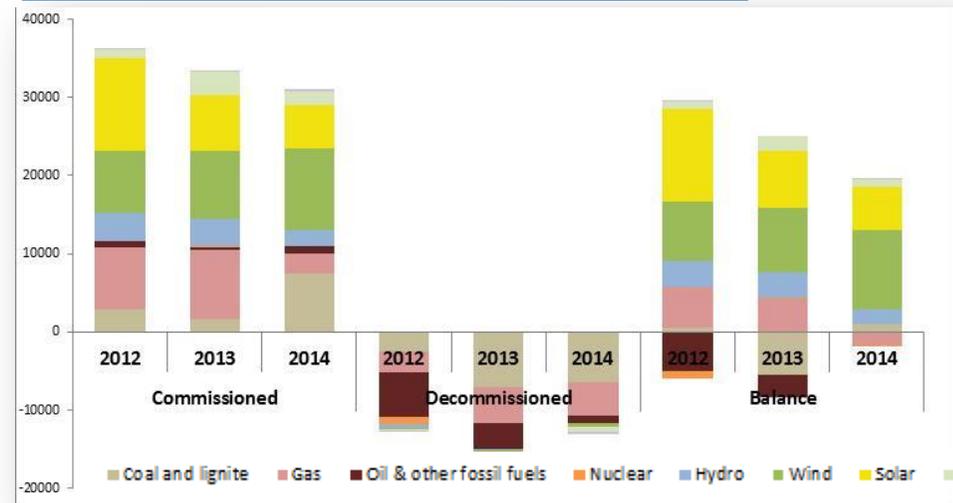
What will be the role of thermal generation? Recent decommissioning trends reduces the availability of flexible gas assets in the power system.

CCGTs revenues fell drastically



Source: Crédit Suisse Utilities Big Book: H1 2015

In 2013-2014 more thermal capacity decommissioned than commissioned

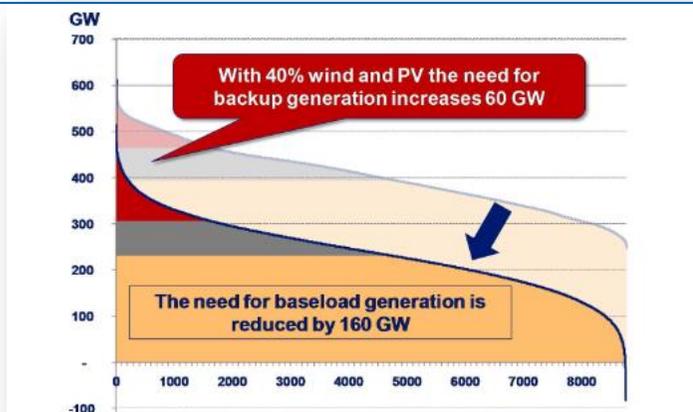


Source: EURELECTRIC

Commissioning of gas fired capacity slowed down in 2014, while decommissioning continued.

In 2013 and 2014 more capacity was decommissioned than added to the system.

European load duration curve with 60% RES



Network codes and interconnections for flexible power markets



Implement day-ahead market coupling and the central intra-day trading platform without delay



Achieve Electricity Balancing Network Code and implement the regional pilot projects (2017?)



Provision of ancillary services based on commercial arrangements between plant and system operator



Build more interconnectors to trade energy and flex cross-border (subject to CBA)

Future proof market environment for flexible assets, storage, demand response

Key principles for efficient flexibility markets: Day-Ahead, Intraday & Balancing

Maximum possibilities
to balance demand and
supply before the
actual balancing period
(Forward, DA, ID)

Liquid
continuous
(cross border)
intraday market
in all Member
States

Balancing market
and intraday
market must not
overlap

Common balancing
products & a
common imbalance
settlement period,
subject to robust
CBA



TSOs need to consider the impact of increased variable generation on their networks

Gas and electricity TSOs should work closely together at national and EU level through ENTSOG and ENTSOE

Investments & operating rules should be predicated on consistent scenarios of power station running hours and ramp rates

TSOs and MS should consider the issues of security of gas and electricity in a joined-up manner

TSOS considerations should be reflected in the preventative action plans and emergency plans drawn up by MS

-  Access to liquid gas markets will be vital for gas-fired generation with variable load
-  Within day obligations should be minimized
-  Capacity allocation and cross border rules should assist cross-border trading
-  Storage will play an important role in providing physical gas flexibility
-  1 Within day capacity products should not be subject to multipliers greater than 1
-  Market participants need timely information on balance and system status
-  Efficient connection arrangements are needed

Detailed recommendations



Access to liquid gas markets will be vital for gas-fired generation with variable load

Access to a liquid wholesale gas spot or intraday market to buy and sell gas either directly or indirectly in response to changes in load requirements

The EU model of TSO entry/exit systems incorporating virtual trading points is a sound basis for this

Licensing and reporting requirements should not be too bureaucratic to encourage new entrants to national gas wholesale markets

NRAs could consider introducing market makers to kick-start spot liquidity in nascent markets



Within day obligations should be minimised

- **Daily balancing regimes with no WDO offer the most flexibility to power station operators to deal with increased variability of generation**
- **If TSOs need to introduce WDO then system-wide obligations should be preferred ahead of portfolio or entry/exit point obligations**
- **Trading / balancing platforms must operate on a 24/7 basis**
- **Linepack flexibility services should be offered by TSO on an ex-post basis**
- **Tolerances could be a mechanism for TSOs to provide greater flexibility to gas-fired power station operators but they should not be obligatory**
- **Ramp rates and notice periods applied to gas-fired power stations should not be set idealistically**



Capacity allocation and nomination rules should assist cross-border trading

- **Bundled capacity should help to simplify the process and transaction costs for power station operators to acquire cross-border capacity directly**
- **Same for standardised capacity allocation timescales**
- **TSOs should strive to reduce renomination lead times as much as possible**
- **TSOs should only consider measures which restrict a network user's right to renominate against cross-border capacity as a last resort**
- **In the absence of firm capacity TSOs should make interruptible capacity available within day in an easily accessible form**



Storage will have an important role in providing physical gas flexibility

- **Gas-fired power station operators should be entitled to contract for storage capacity, as a shipper, in their own right**
- **They should not be limited to just booking flat seasonal storage products**
- **Storage operators should work closely with them to design products and storage bundles most suited to their requirements**
- **All storage capacity within a market area should be made available to market participants on an equal non-discriminatory basis**
- **Holding back capacity for TSOs for reasons other than what is needed for managing the network safely will reduce the flexibility available to the market**
- **Placing restrictions on the periods when storage can be filled or emptied prevents storage from being fully optimised**



Short-term capacity products should not be subject to multipliers greater than 1

- **Multipliers and seasonal factors applied to firm within day cross-border capacity products should not be set disproportionately high and should always be less than or equal to 1**
- **TSOs should explore options for offering gas-fired power station more flexible exit capacity products and charges**



Market participants need timely information on balance and system status

- **Power station operators should receive sufficient information about their gas offtakes to efficiently manage their exposure to imbalance charges particularly where WDO apply**
- **Accurate near real time information about flows at other system relevant entry and exit points will play an essential role in understanding the drivers behind supply and demand within each market area**
- **Same with information about TSOs' balancing actions and the imbalances of their systems as a whole**



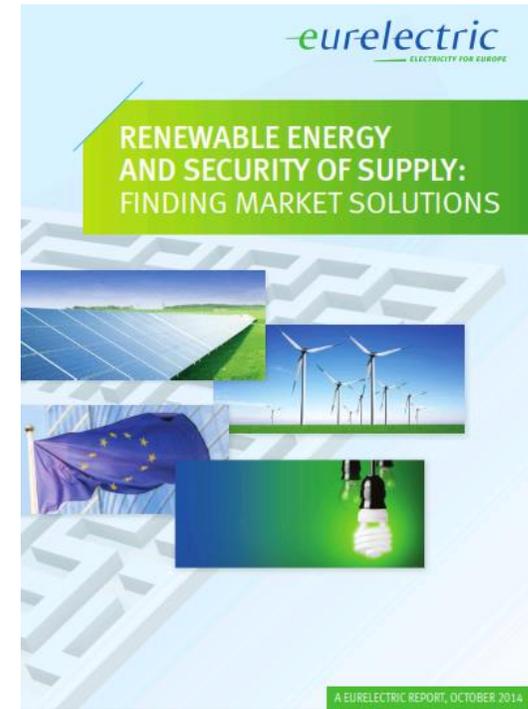
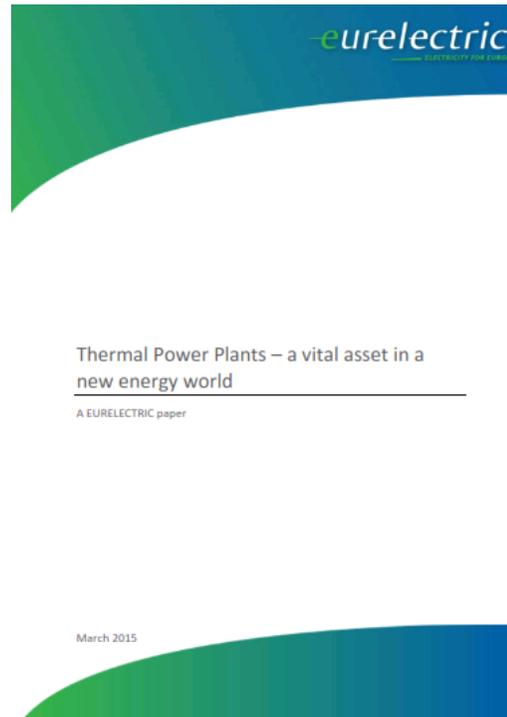
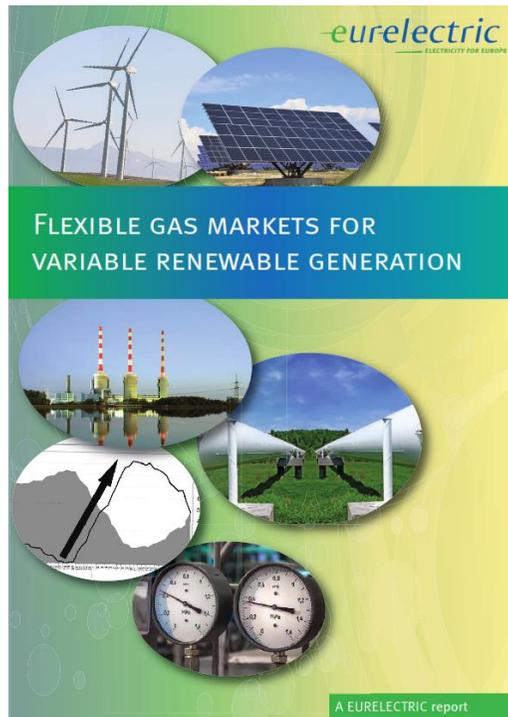
Efficient connection arrangements are important

- **Network operators' connection policies and services should be efficient and predicated on the principle of shallow connection charging**
- **Network operators should also work closely with power station developers to coordinate their respective investment timescales**



Our reports are available on our website

www.eurelectric.org



THANKS FOR LISTENING!

**A FUTURE PROOF MARKET DESIGN
VALUES THE NEEDED ENERGY, FLEXIBILITY AND CAPACITY**

ENERGY

- Efficient dispatch
- Forward, day-ahead, intraday markets
- Ongoing market integration

FLEXIBILITY

- Short term system adequacy
- Day ahead, intraday and balancing, ancillary services for which market participants are duly remunerated
- Ongoing market integration

CAPACITY

- Long term system adequacy
- Capacity market
- National initiatives...going towards more integration?