”The perspectives of the future European Electricity Grid"

2011 Elcom Forum

University of Fribourg

Daniel Dobbeni

entsoe

Reliable Sustainable Connected

Outline

- **ENTSO-E: role, membership, structure, …**
- **What will it look like in 10 years?**
- **Priorities …**

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ENTSO-E role

41 TSO members from 34 countries

Major responsibilities

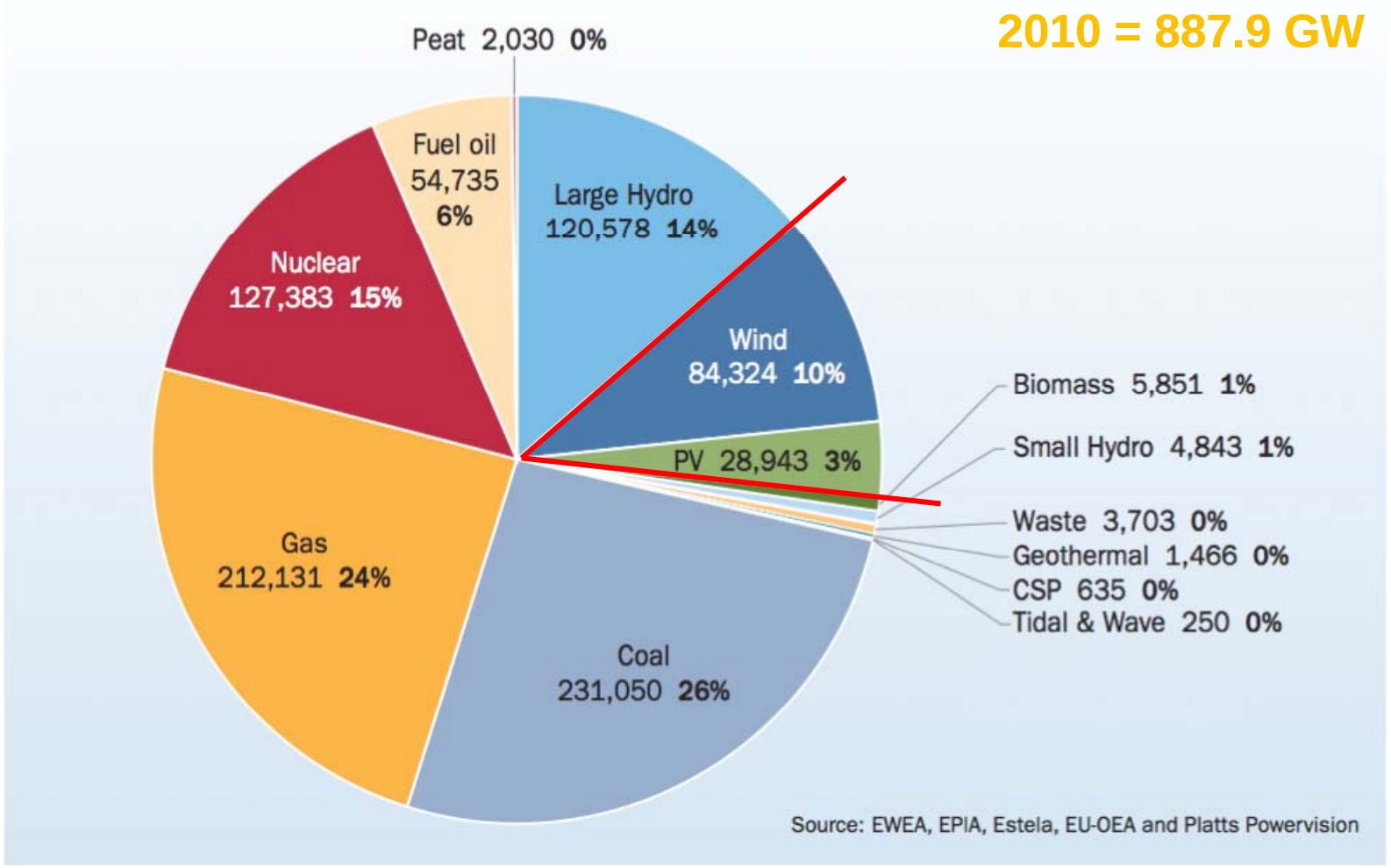
- Network codes
- 10 year network plans
- Adequacy Forecasts
- Tools and processes for market integration
- R&D Plan

Through its members deliver infrastructure and market tools

Outline

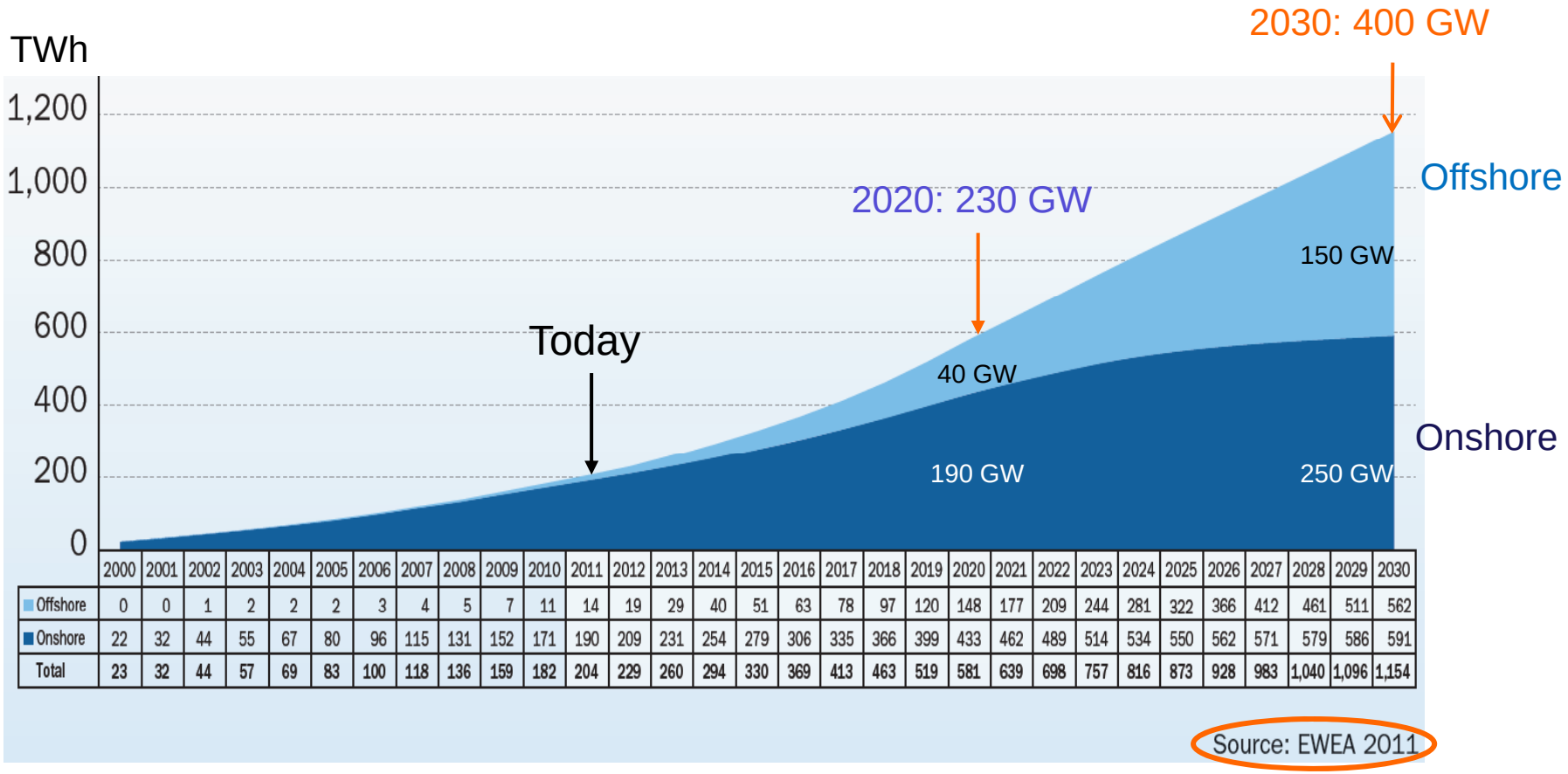
- ENTSO-E: role, membership, structure, …
- **What will it look like in 10 years?**
  - **Hardware**
- Priorities …

1. Major shift: EU Power Capacity Mix from 2000 to 2010



Moving higher towards 2030 and later…

Wind share of demand: 2010 = 5,3% → 2020 = 23% → 2030 = 36%

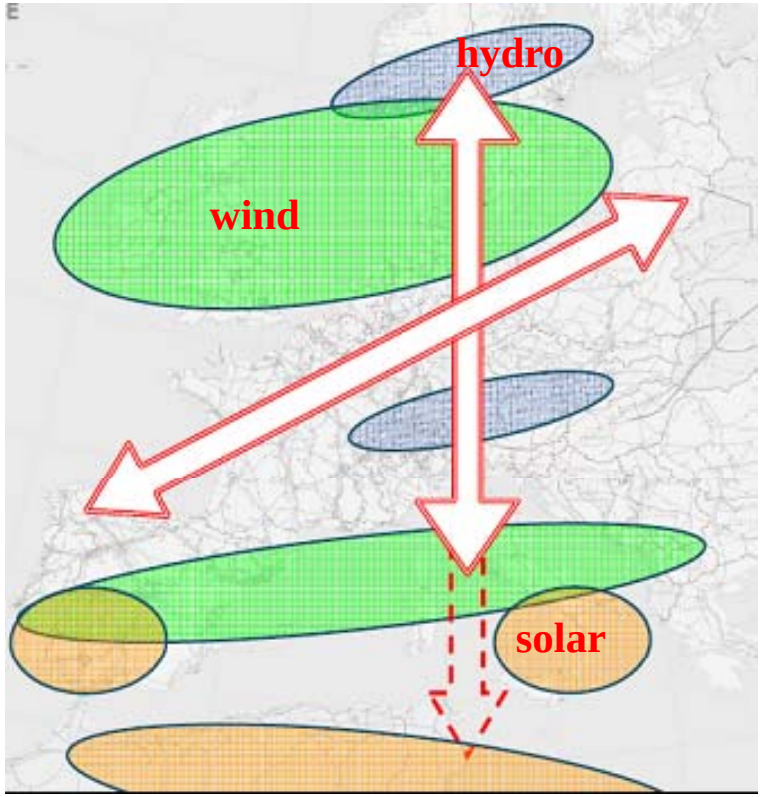


	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Offshore	0	0	1	2	2	2	3	4	5	7	11	14	19	29	40	51	63	78	97	120	148	177	209	244	281	322	366	412	461	511	562
Onshore	22	32	44	55	67	80	96	115	131	152	171	190	209	231	254	279	306	335	366	399	433	462	489	514	534	550	562	571	579	586	591
Total	23	32	44	57	69	83	100	118	136	159	182	204	229	260	294	330	369	413	463	519	581	639	698	757	816	873	928	983	1,040	1,096	1,154

Source: EWEA 2011

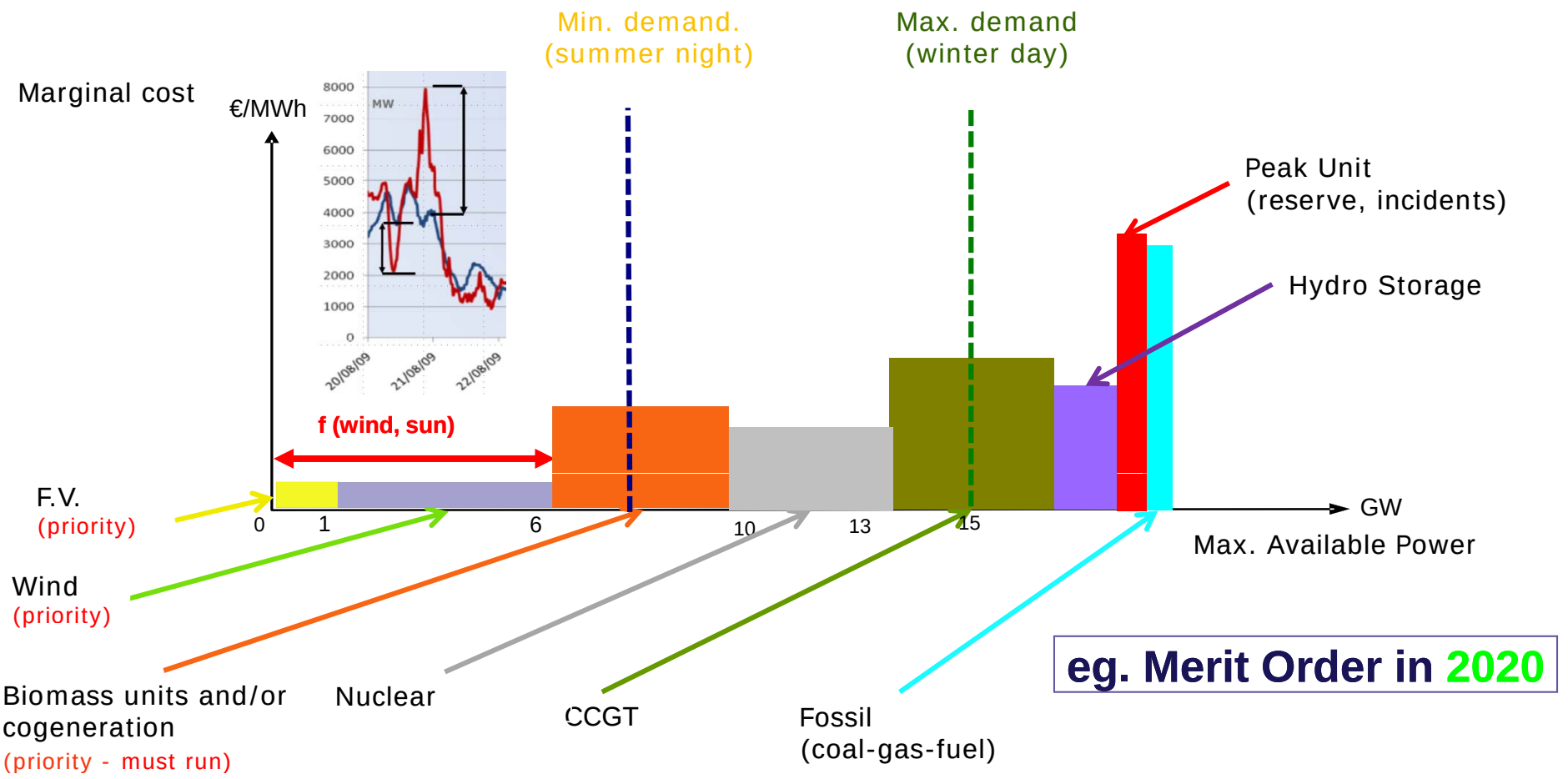
2. A Grid for all kind of Power flows

a. Large varying flows all over EU



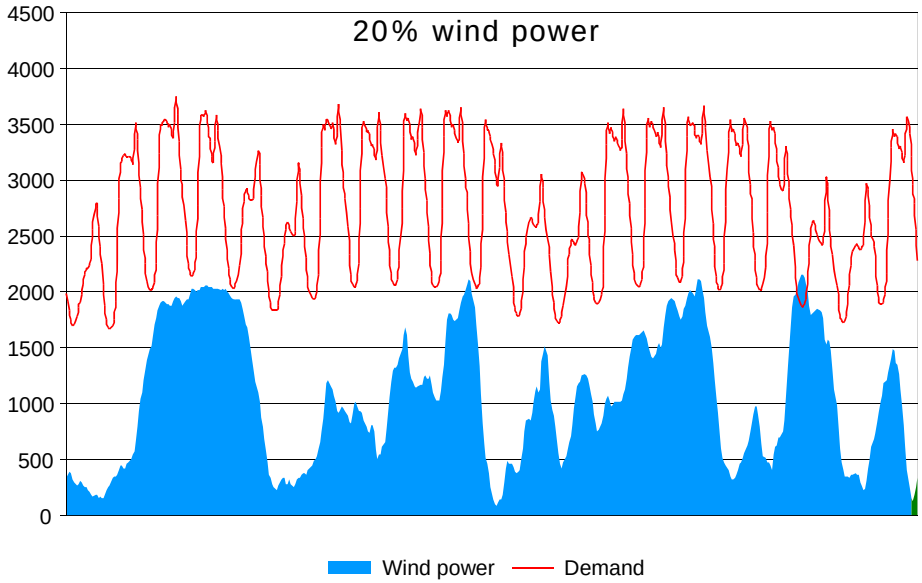
b. Thousands of (small) power plants

3. Which role for conventional power plants?



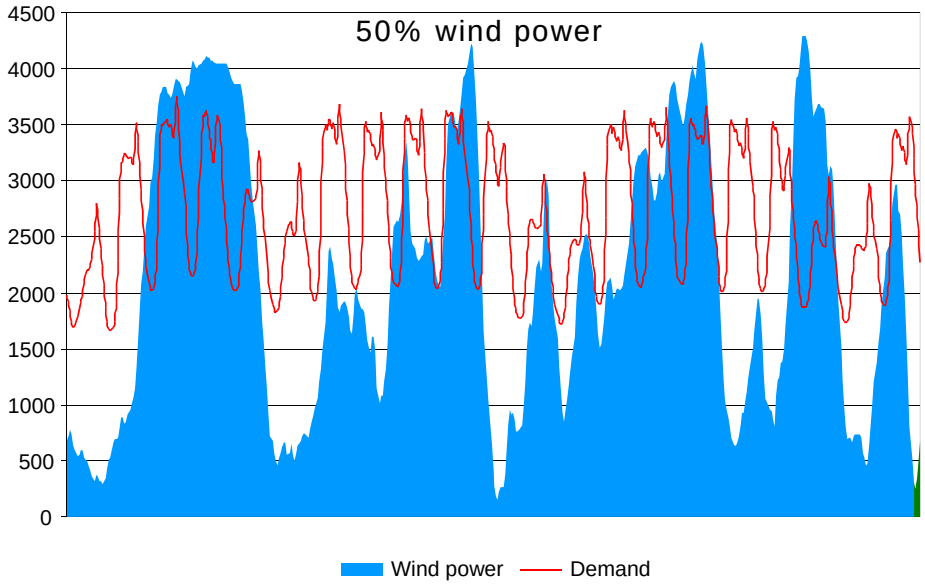
4. Who will deliver flexible reserve energy for balancing?

Denmark 2008



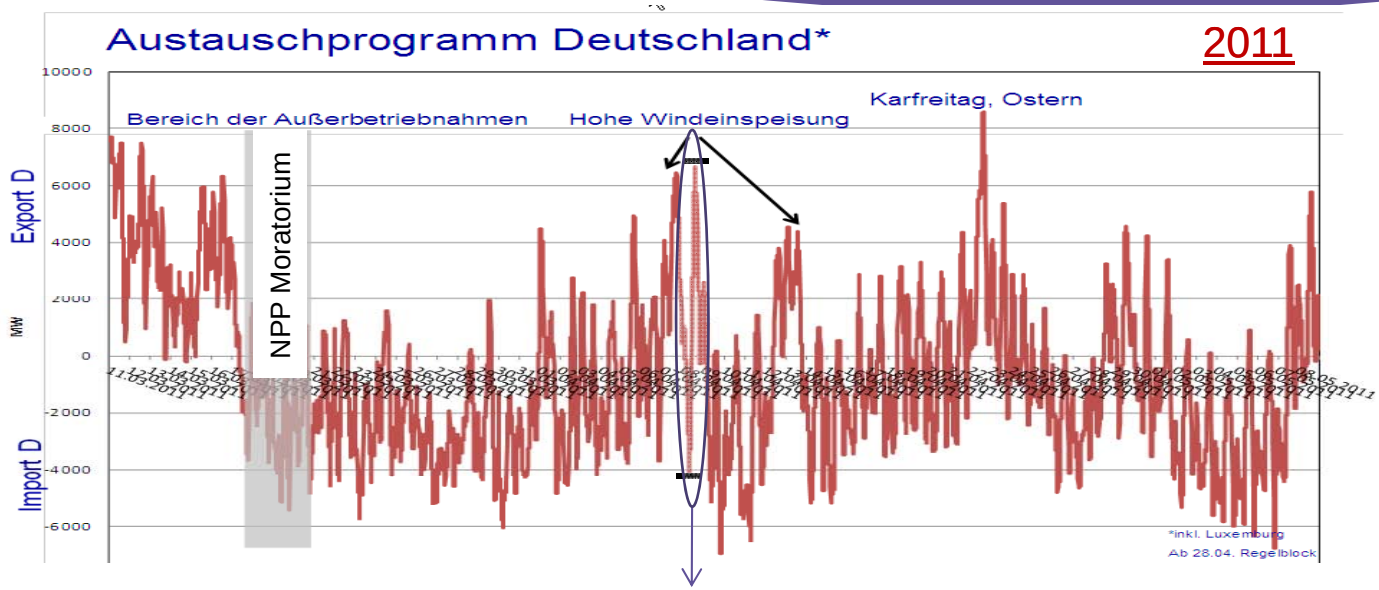
Wind power covers total demand in ~200 hours
(West DK)

Tomorrow (2025)



In 2025 wind power will exceed total demand in more than 1,000 hours

→ An important issue today?



7000 MW export to **4000 MW import** in less than **24h**

↓

the interconnected systems implicitly have to deliver a flexibility equivalent to

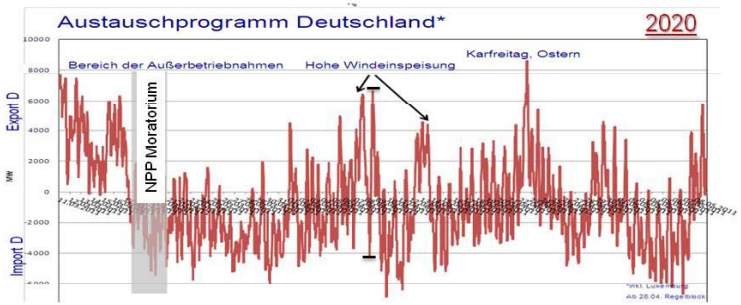
↓

18 CCGT plants of 400 MW reducing from 100% output to 0%

↓

followed later on with 18+10 CCGT plants of 400 MW increasing from 0% to 100%

→ And tomorrow?



Solar & Wind capacity share = 2010 * ~2,25

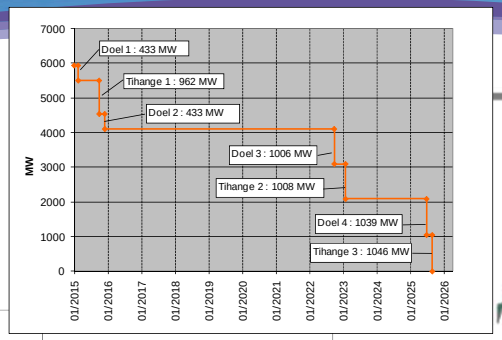
More than 60 CCGT of 400MW whose outputs depend on weather conditions in Germany

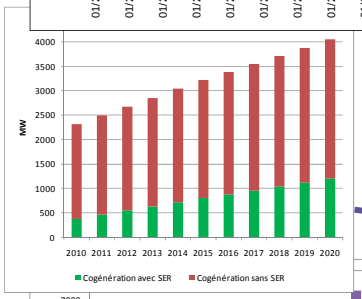
+ where?

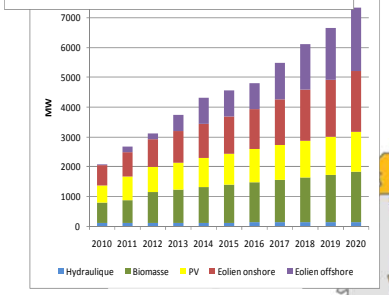
Who will invest in these plants, running full power a few hundred hours per year?

- What **incentives for plant investment** if marginal cost becomes RES-driven?
- How to manage **T/DSO interventions on RES** if support schemes are “output” driven?

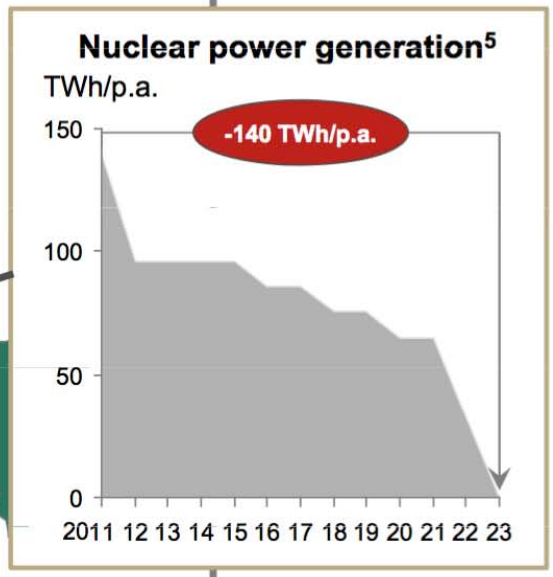
From vision to field reality: some "hardware" issues !

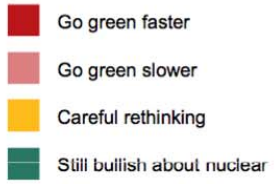






From CREG study



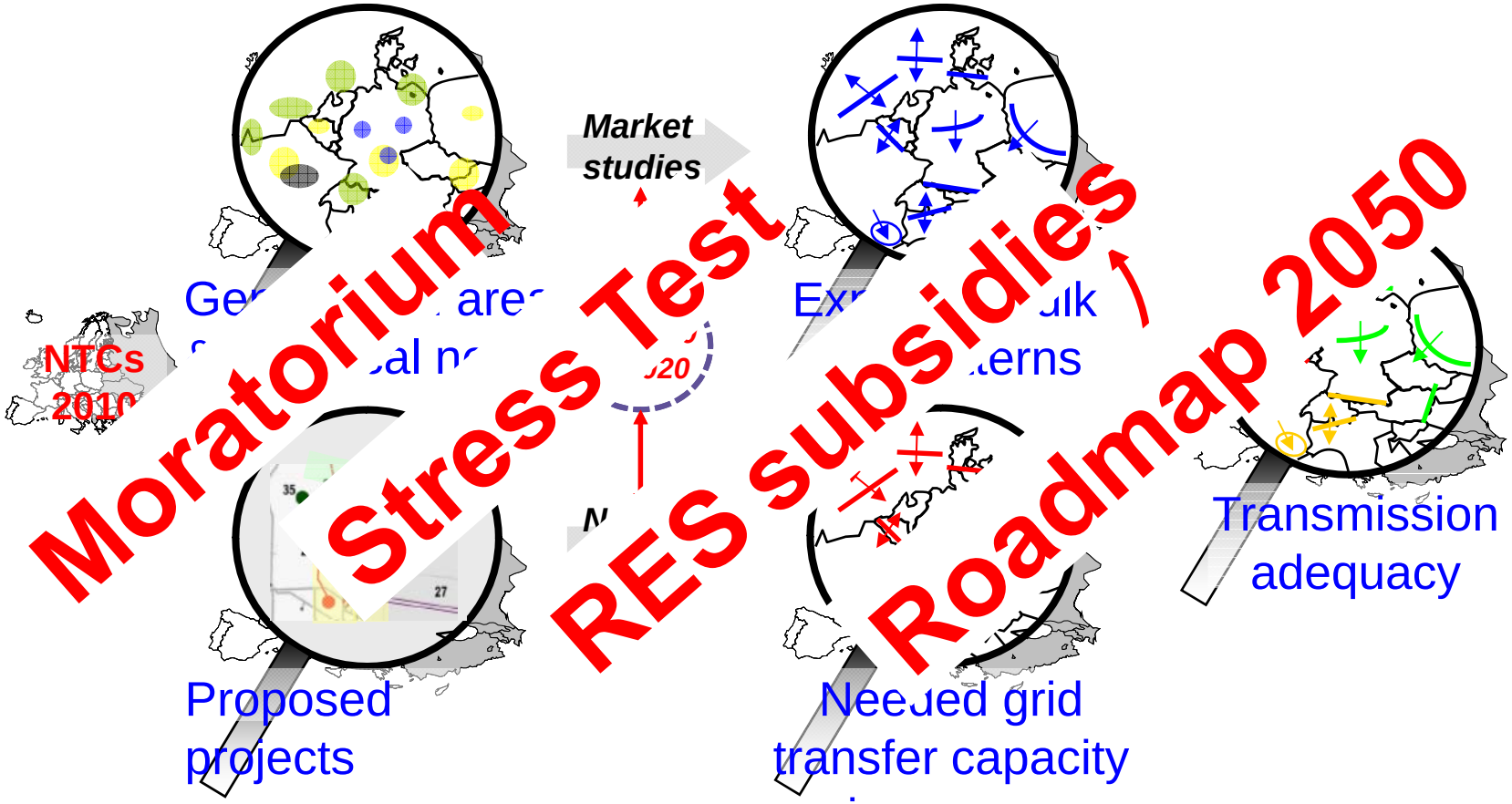


1. Planning of the first nuclear power
power plants; exit planned by 2034
5. Based on average annual generat
Source: BCG analysis

I not to build new nuclear

From vision to field reality: some "hardware" issues !

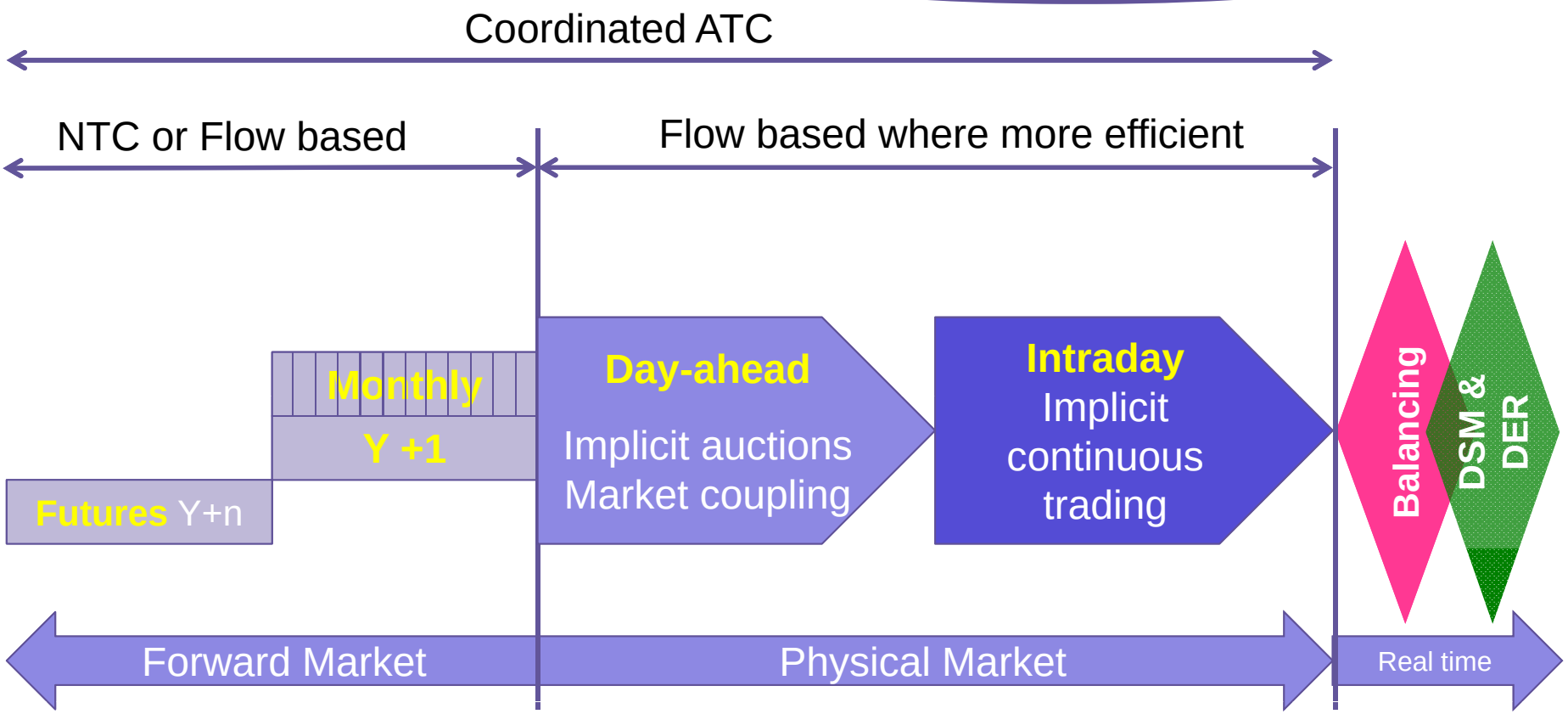
→ Reality: TYNDP chases a moving target ... 2012 ... 2014 ...



Outline

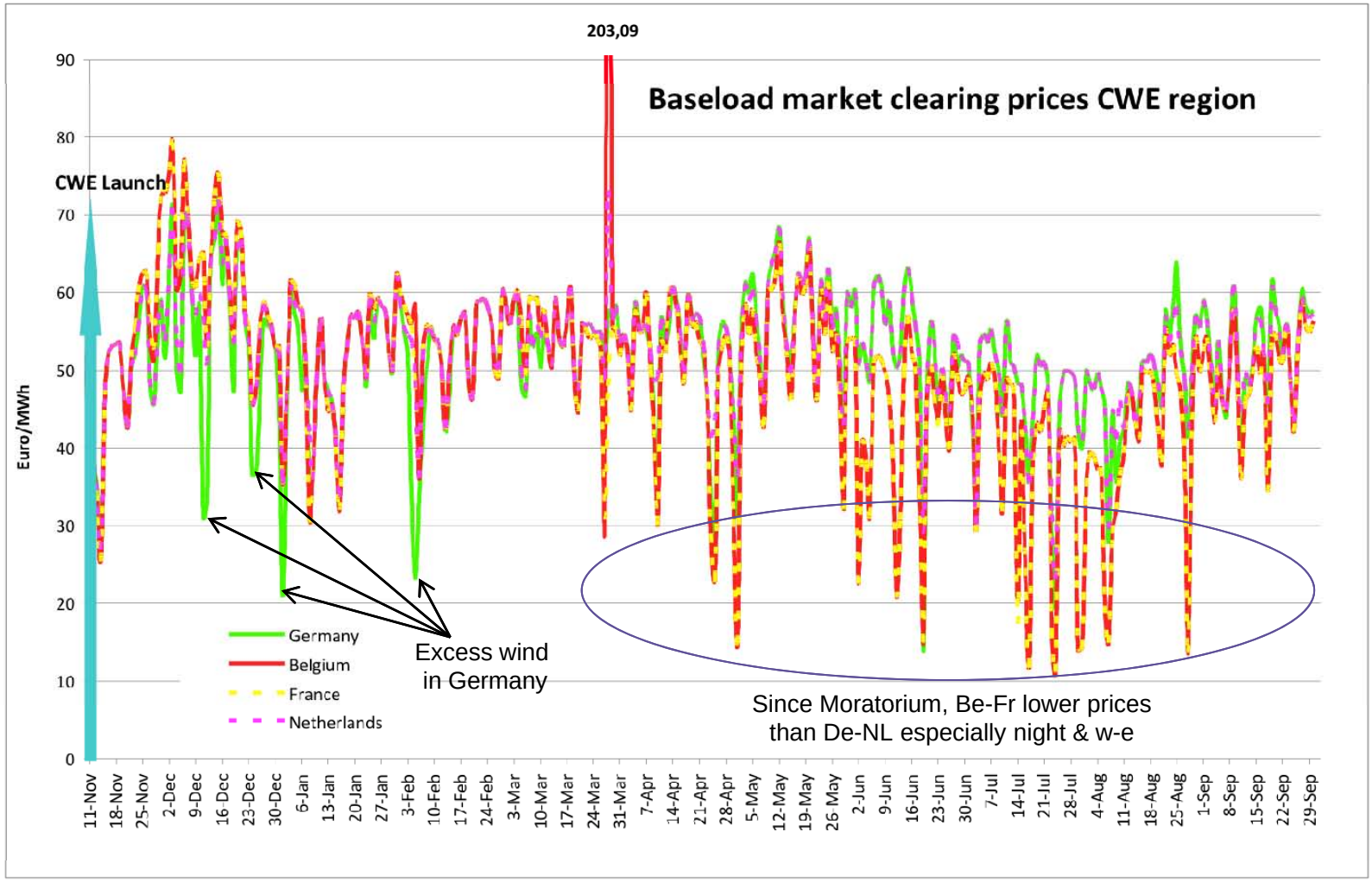
- ENTSO-E: role, membership, structure, …
- **What will it look like in 10 years?**
  - **Software**
- Priorities …

a Common Market Model in .. 2014 !



But ... for the software to work ... a well functioning hardware is a prerequisite !

A competitive wholesale market with a fast increasing RES share?



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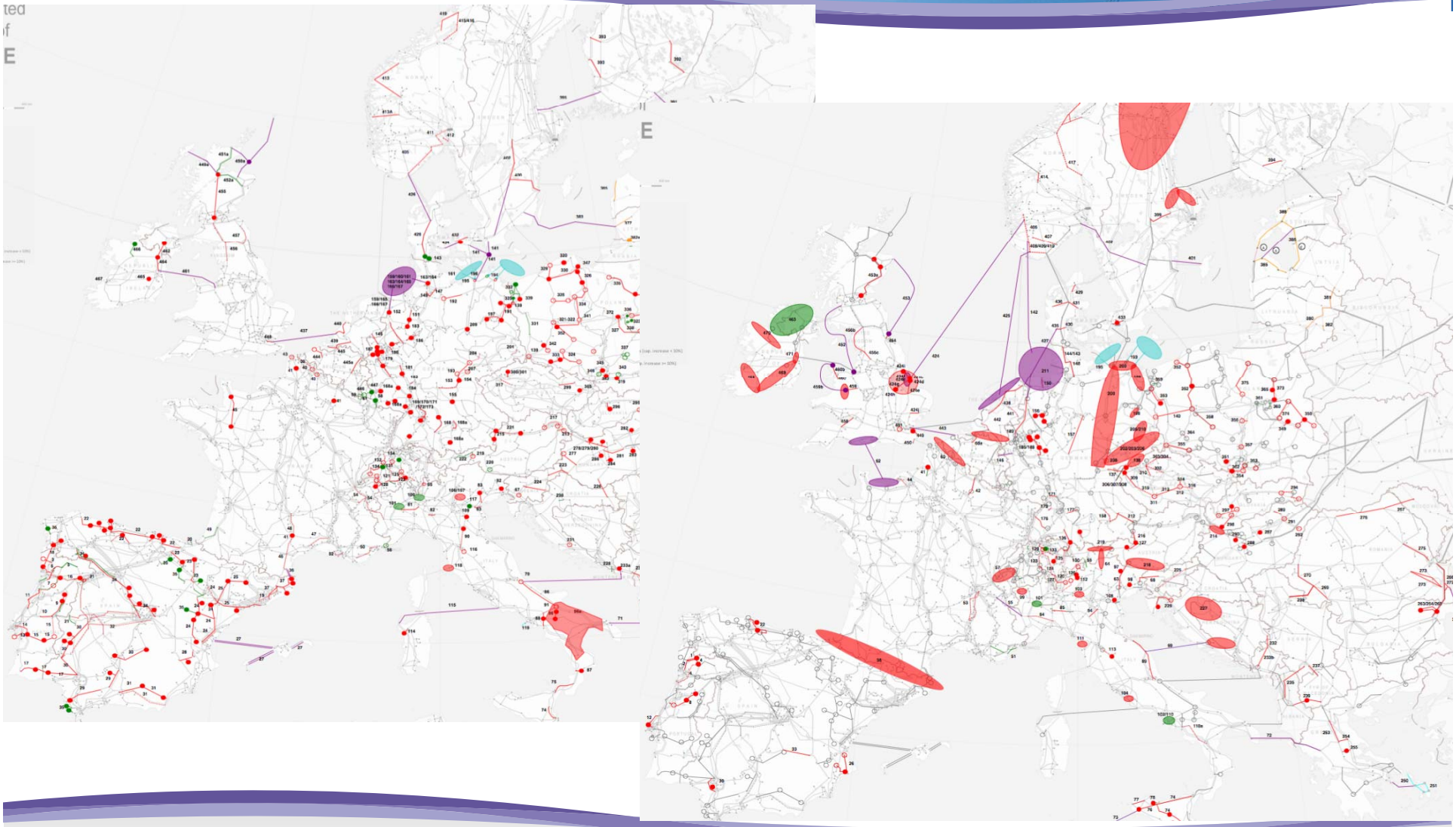
1. At EU level: reinforce ASAP bulk transmission capacity

Main investment projects in line with EIP:

- North-South power flows
  - RES: North Seas, South to EU
  - Load in Italy, South Germany
- Better integration
  - Baltic states,
  - British islands,
  - Iberian peninsula
- East-West flows in S-E Europe

.. At EU level: cross-border AND within the member states



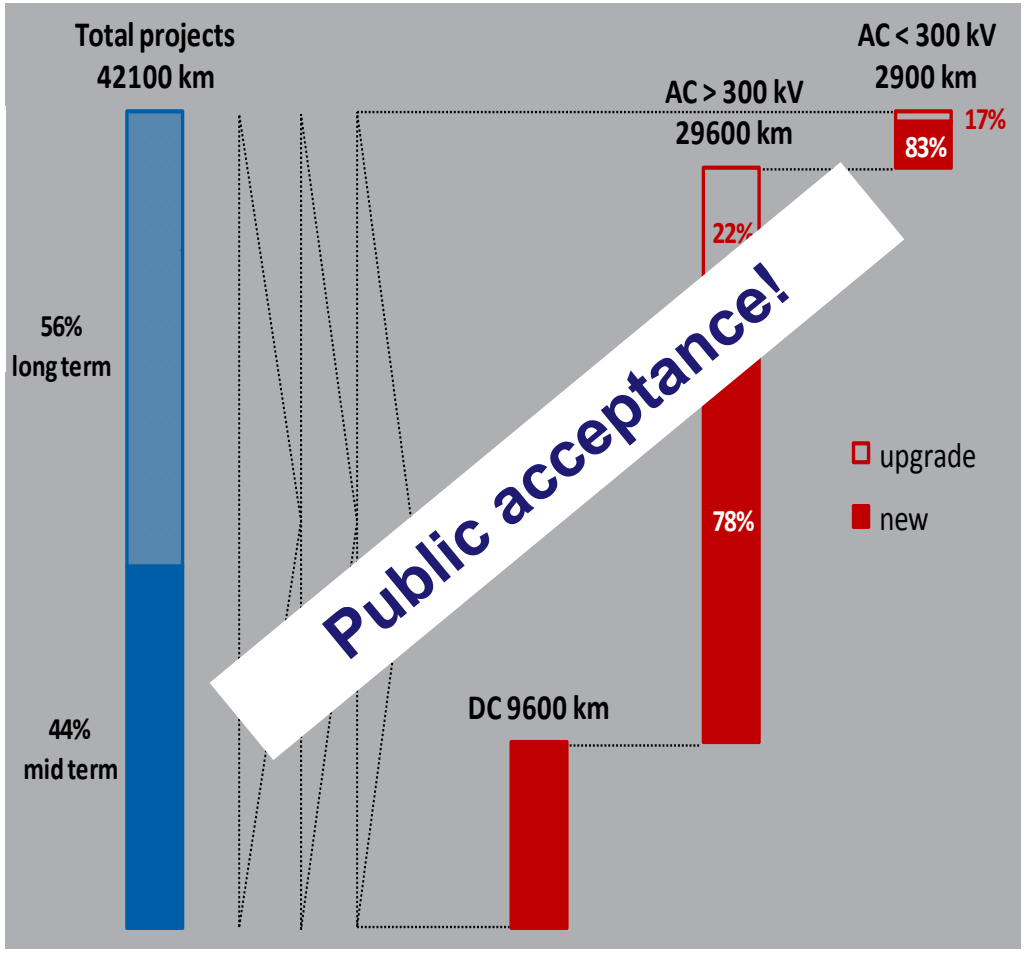
.. at EU & MS level: create context … OR … change targets !

+14% compared to EU grid

500 projects (all needed)

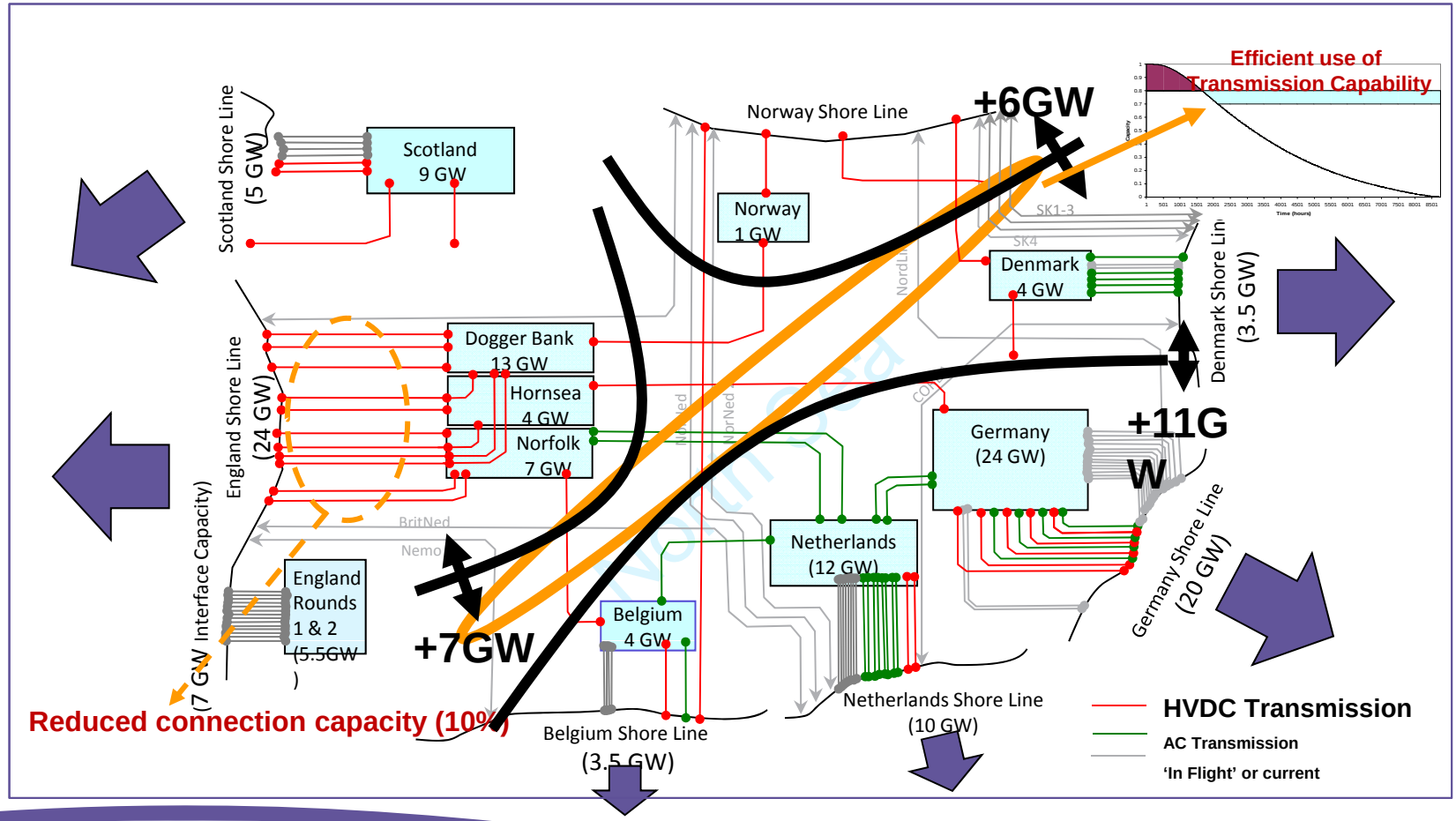
Roughly € 100 billion
without grids in sea & E-highways

on top of investments for slightly growing demand and **aging assets**!



2. Testing ASAP new technologies in the EU grid

Innovation, field testing: eg. **DC Grids**… imply… **DC switchgears**



3. A stable and attractive regulation looking forward !

Conclusions of the European Council
4 February 2011

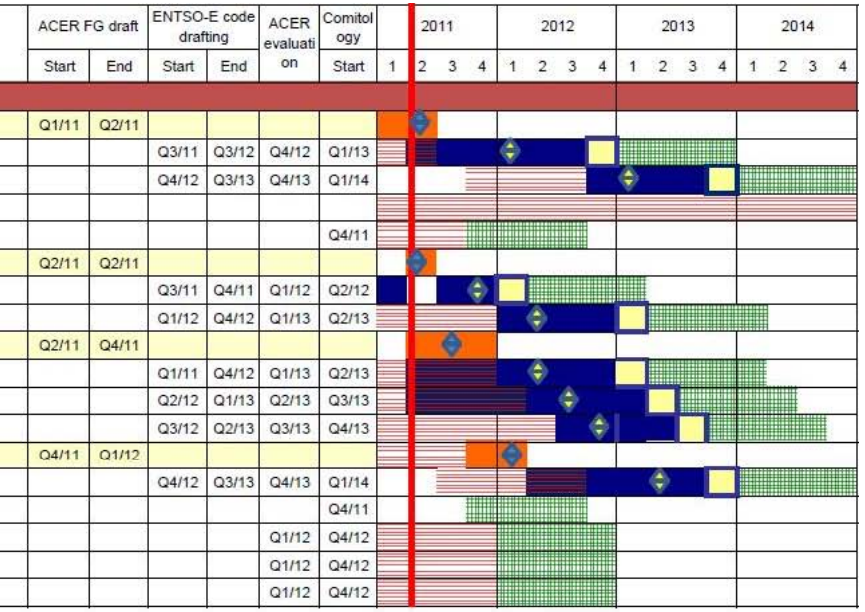
"It is important to streamline and improve authorisation procedures, while respecting national competences and procedures, for the building of new infrastructure;"

"The bulk of the important financing costs for infrastructure investments will have to be delivered by the market, with costs recovered through tariffs. It is vital to promote a regulatory framework attractive to investment".

4. Adequate timing given available resources: eg ENTSO-E

Electricity

Deliverable	ACER FG draft		ENTSO-E code drafting		ACER evaluation	Comitology
	Start	End	Start	End		Start
Products/legislation relevant for effective implemention of the IEM						
FG on capacity allocation and congestion management	Q1/11	Q2/11				
NC on capacity allocation and congestion management [1]			Q3/11	Q3/12	Q4/12	Q1/13
NC on forward markets [2]			Q4/12	Q3/13	Q4/13	Q1/14
Regional progress, setup and testing (incl. AESAG process and Regional Initiatives Work Program)						
EC comitology guideline on governance [3]						Q4/11
FG on network connection [4]	Q2/11	Q2/11				
NC on generation connection [5]			Q3/11	Q4/11	Q1/12	Q2/12
NC on DSO and industrial load connection			Q1/12	Q4/12	Q1/13	Q2/13
FG on system operation [6]	Q2/11	Q4/11				
NC on operational security			Q1/11	Q4/12	Q1/13	Q2/13
NC on operational planning and scheduling			Q2/12	Q1/13	Q2/13	Q3/13
NC on load-frequency control and reserves			Q3/12	Q2/13	Q3/13	Q4/13
FG on balancing	Q4/11	Q1/12				
NC on balancing [7]			Q4/12	Q3/13	Q4/13	Q1/14
EC comitology guideline on transparency						Q4/11
Possible Guidelines / FG on incentives to TSOs to increase cross-border trade					Q1/12	Q4/12
Possible Guidelines on investment incentives to TSOs					Q1/12	Q4/12
EC Comitology Guideline on tariffs					Q1/12	Q4/12



LEGEND

FG Framework Guideline

NC Network Code

Common scoping discussions

ENTSO- E work

ACER work

Preparatory work including codes consistency work

ACER evaluation of NC

Comitology process (including EC input to Comitology)

ACER consultations

ENTSO-E consultations

COMMENTS

1 CACM NC includes Capacity Calculation, Intraday Platform and Day Ahead issues; beginning of formal 12 months NC period started with within Q3/11

2 NC might start already in the end of Q3/2012 and end in the beginning of Q3/2013

3 Approved guidelines will be available on the end of Q3/12

4 Unofficial work of ERGEG, then shortened 3 months by ACER

5 Parallel FG/NC work is a (well reasoned) exception.

... ~90 groups requiring ~19500 mandays/y from TSOs experts!

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ENTSO-E structure: tackling EU and Power systems complexity !!