

Super, Smart or SuperSmart Grid?

The Grid: enabler of the energy transition

Würzburg

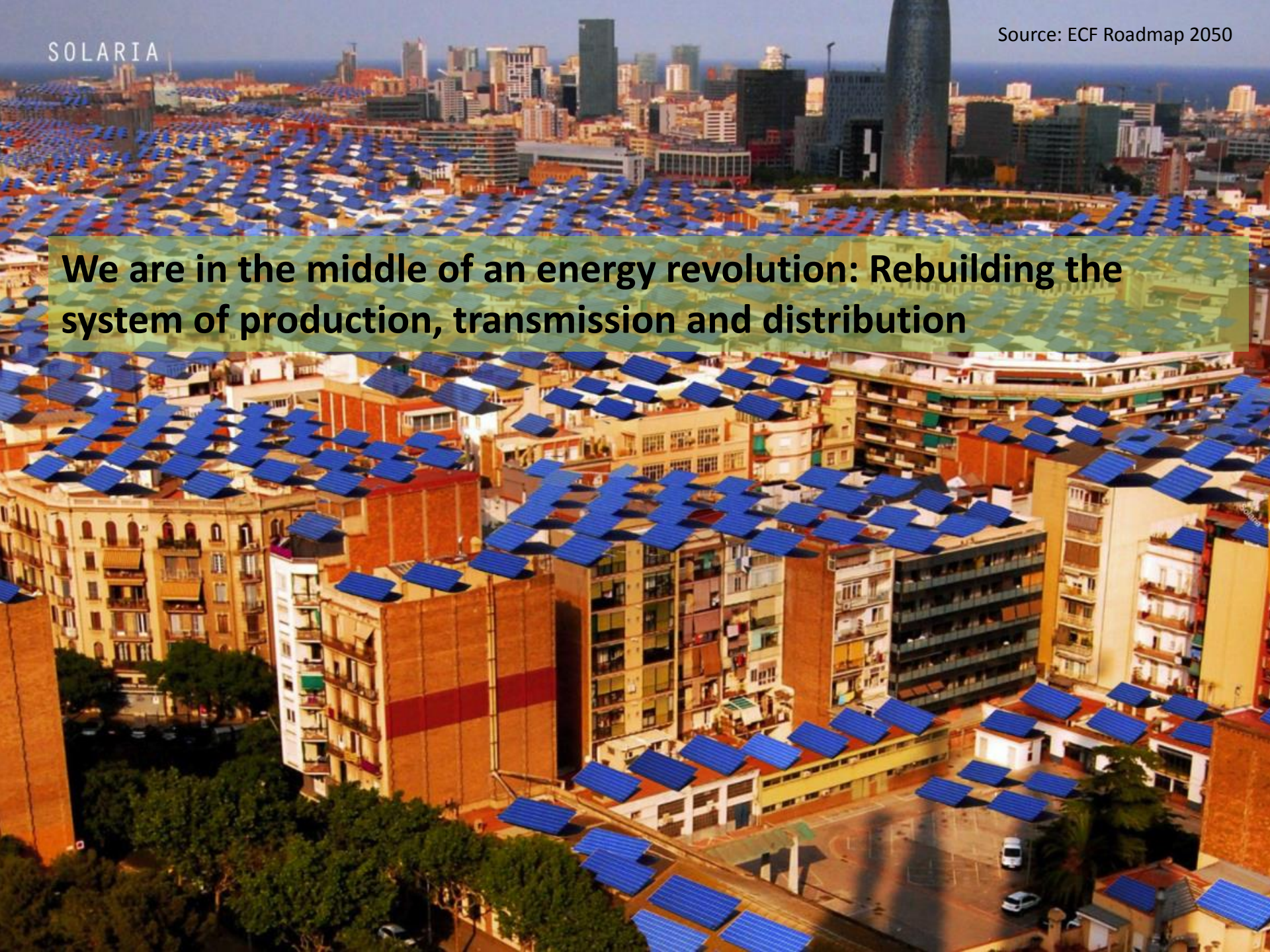
Antonella Battaglini

22 September 2015

Content

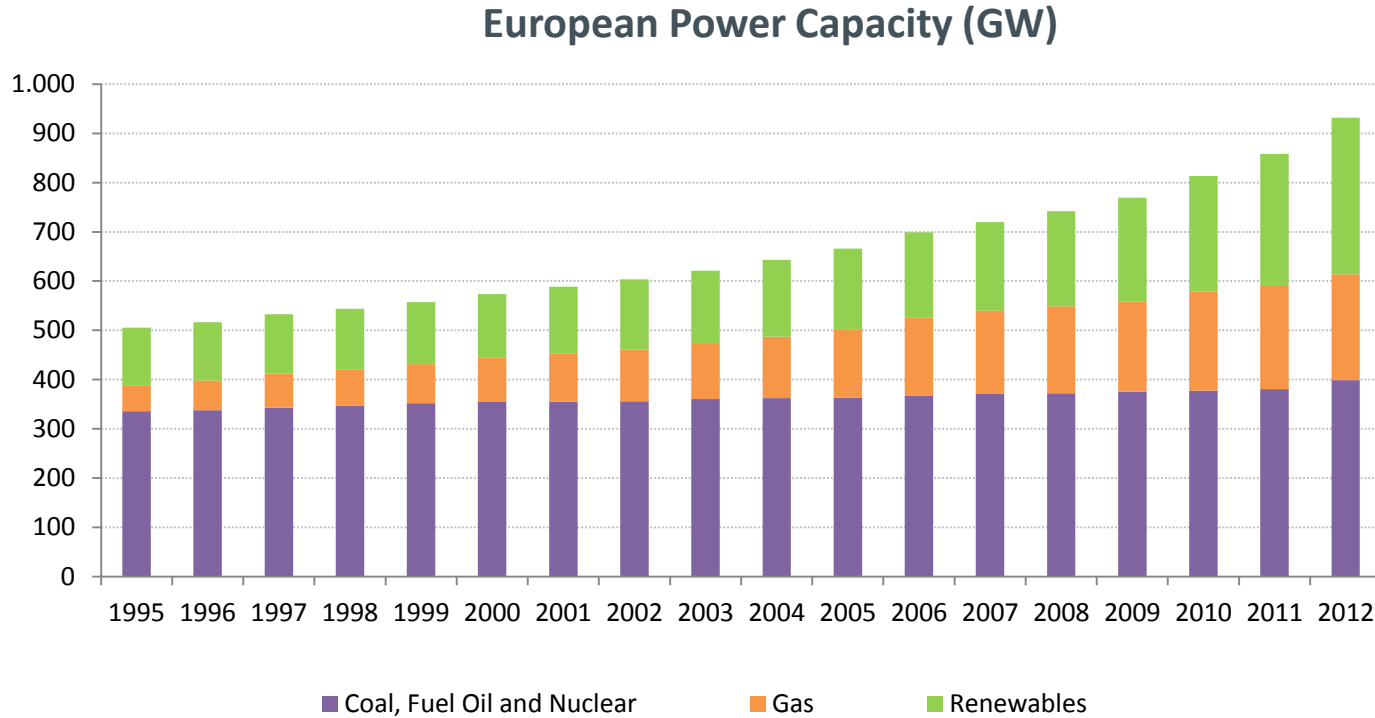
- **Current developments and challenges**
- **Why a SuperSmart Grid is needed**
- **Not only infrastructure matters!**

We are in the middle of an energy revolution: Rebuilding the system of production, transmission and distribution

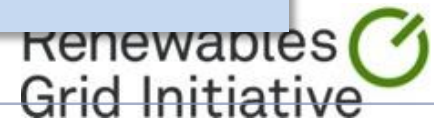


RES development the beginning

Particularly in countries like Spain, Germany and Denmark

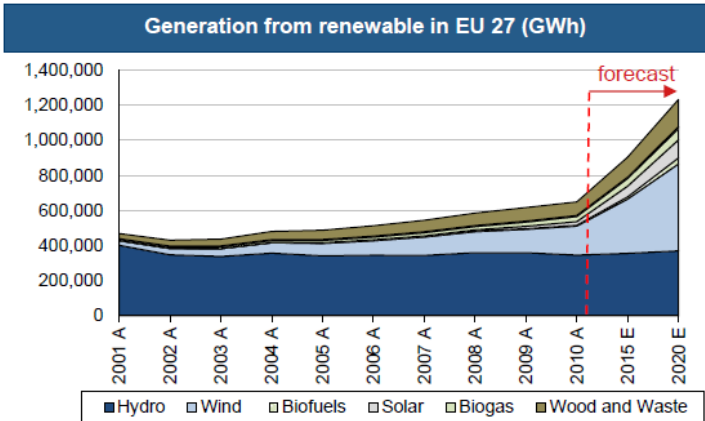


New industries were created by first movers countries...

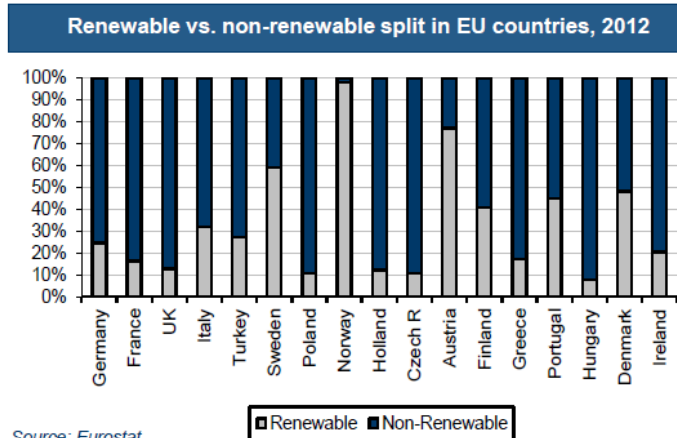


And we now have over 200GW of renewable power

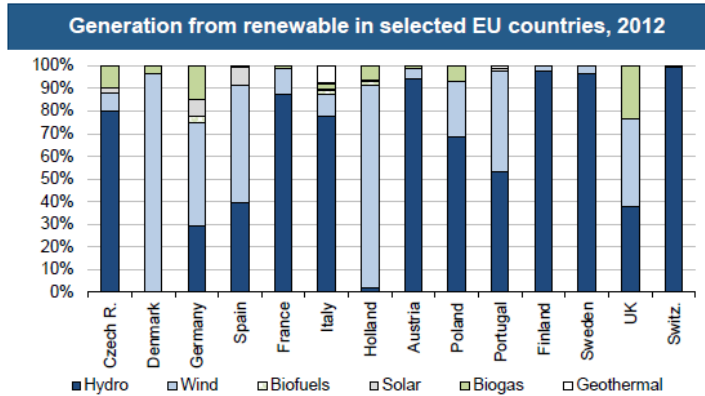
Germany, Spain and Italy have 130GW between them...



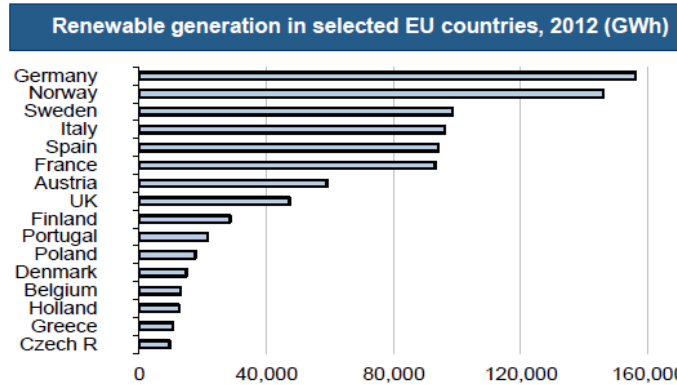
Source: Eurostat, European Environment Agency



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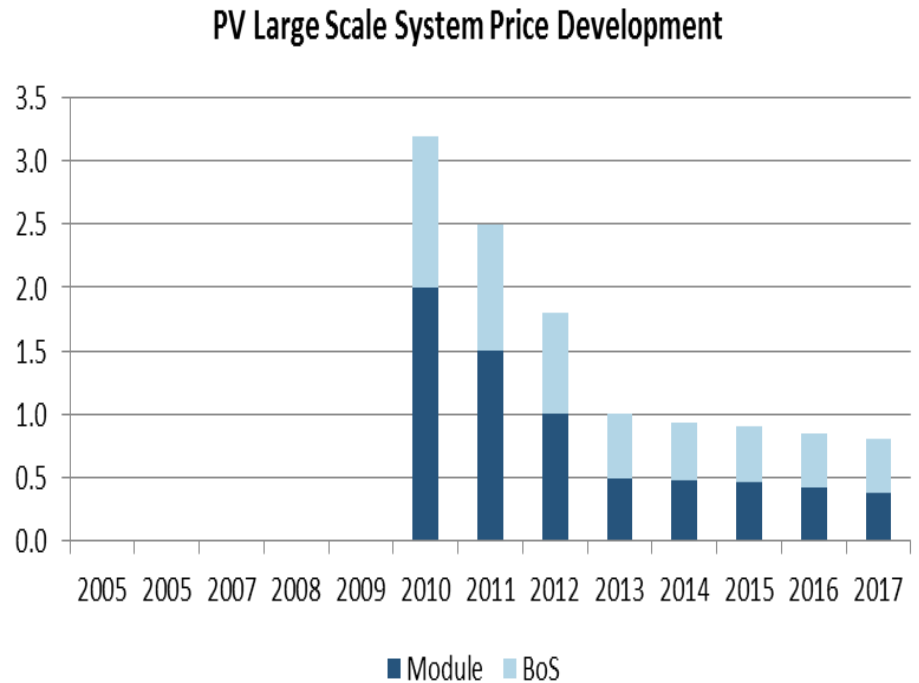
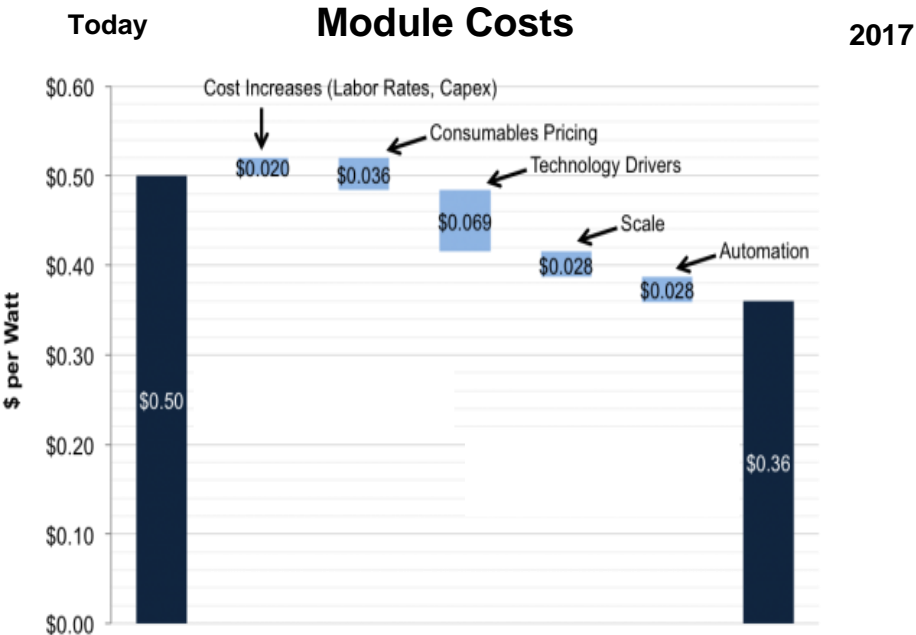


Source: Eurostat

And there is more to come...

Strong move towards decentralised generation

- Solar costs are going to continue to fall...



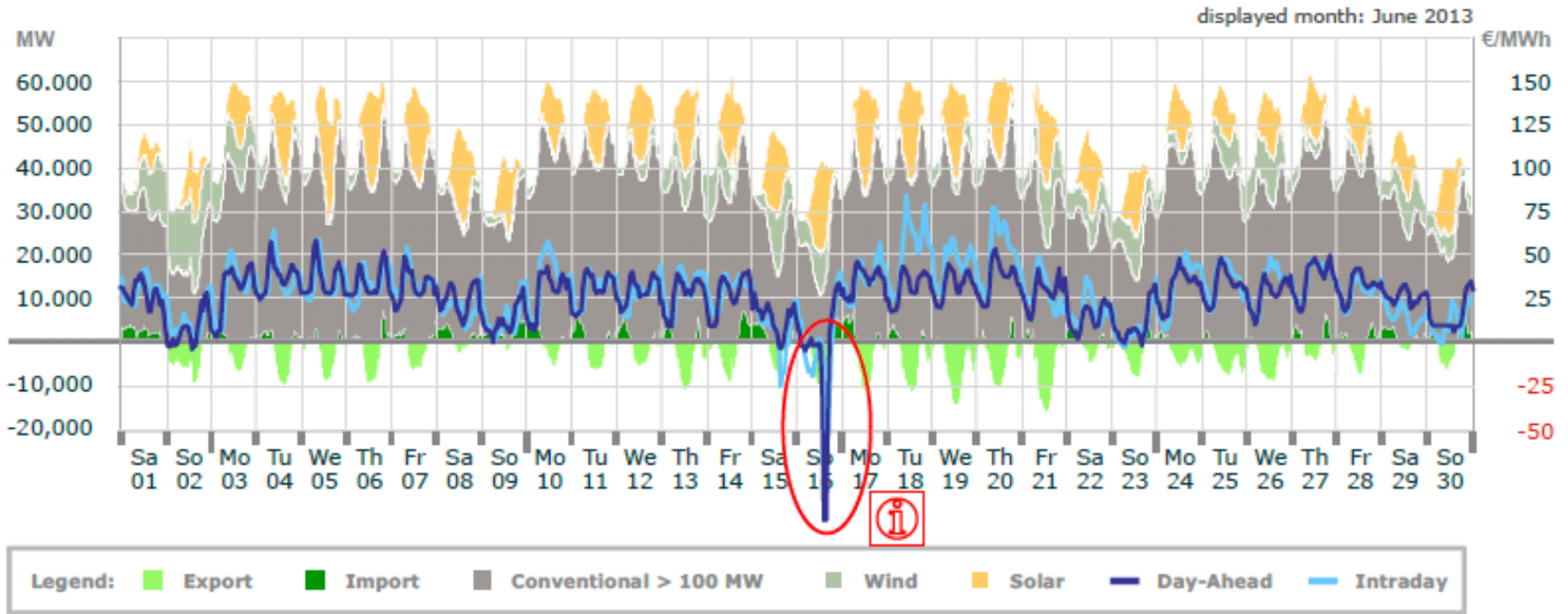
Solar payback model

	Commercial			Household		
	England	Italy	Australia	England	Italy	Australia
Solar system capacity (KW)	1000	1000	1000	10	10	10
Capex (EUR/kW)	800	800	800	1000	1000	1200
Payback time on investment (years)	7.2	4.1	2.7	11.0	5.8	5.5

Which will have impacts on the grid and who pays for what

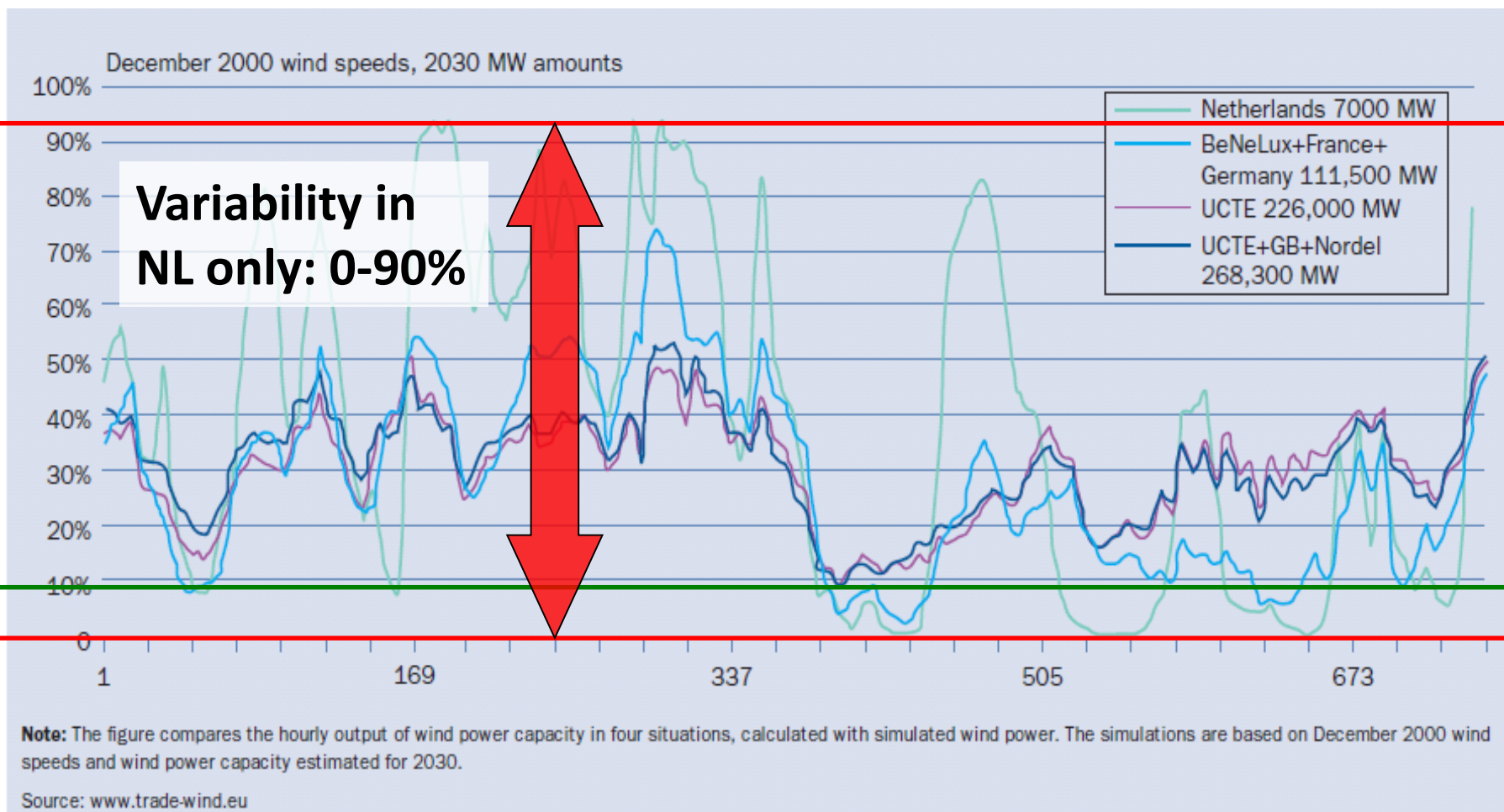
Impacts so far

2. The weather increasingly determines the power price



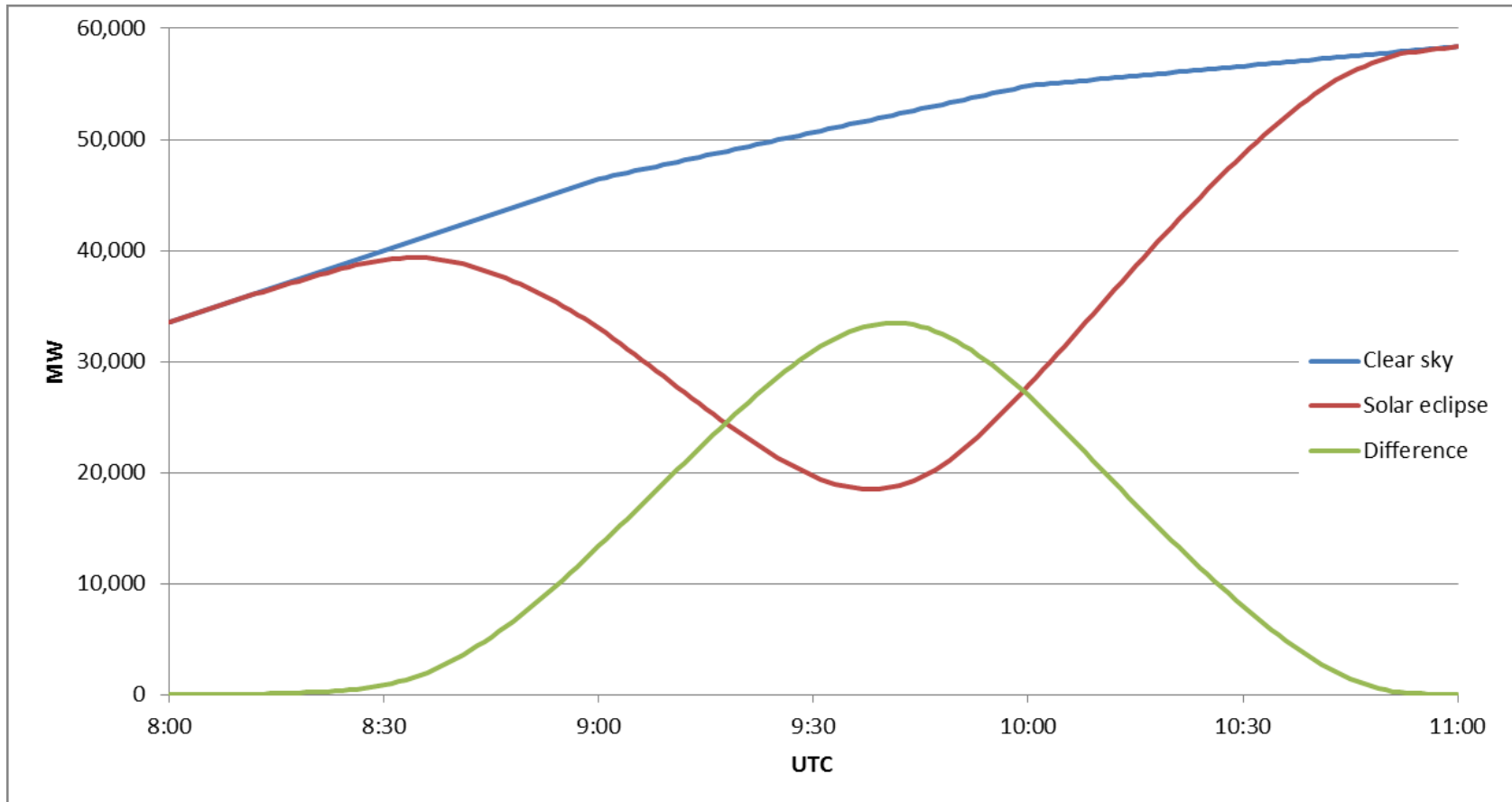
Conventional capacity has to react to intermittent energy changes

Variability is a challenge

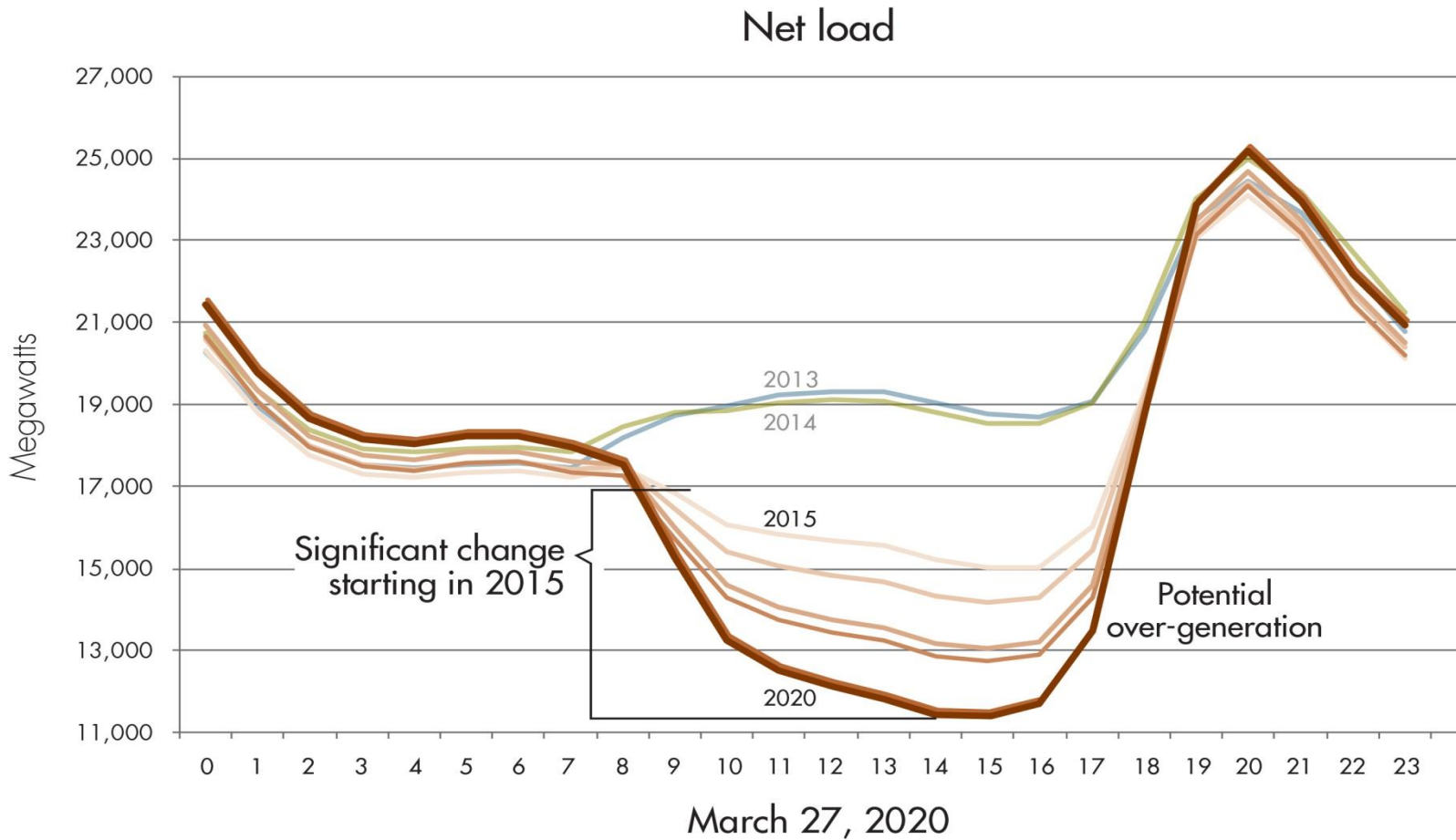


Solar eclipse as a test case for TSO cooperation

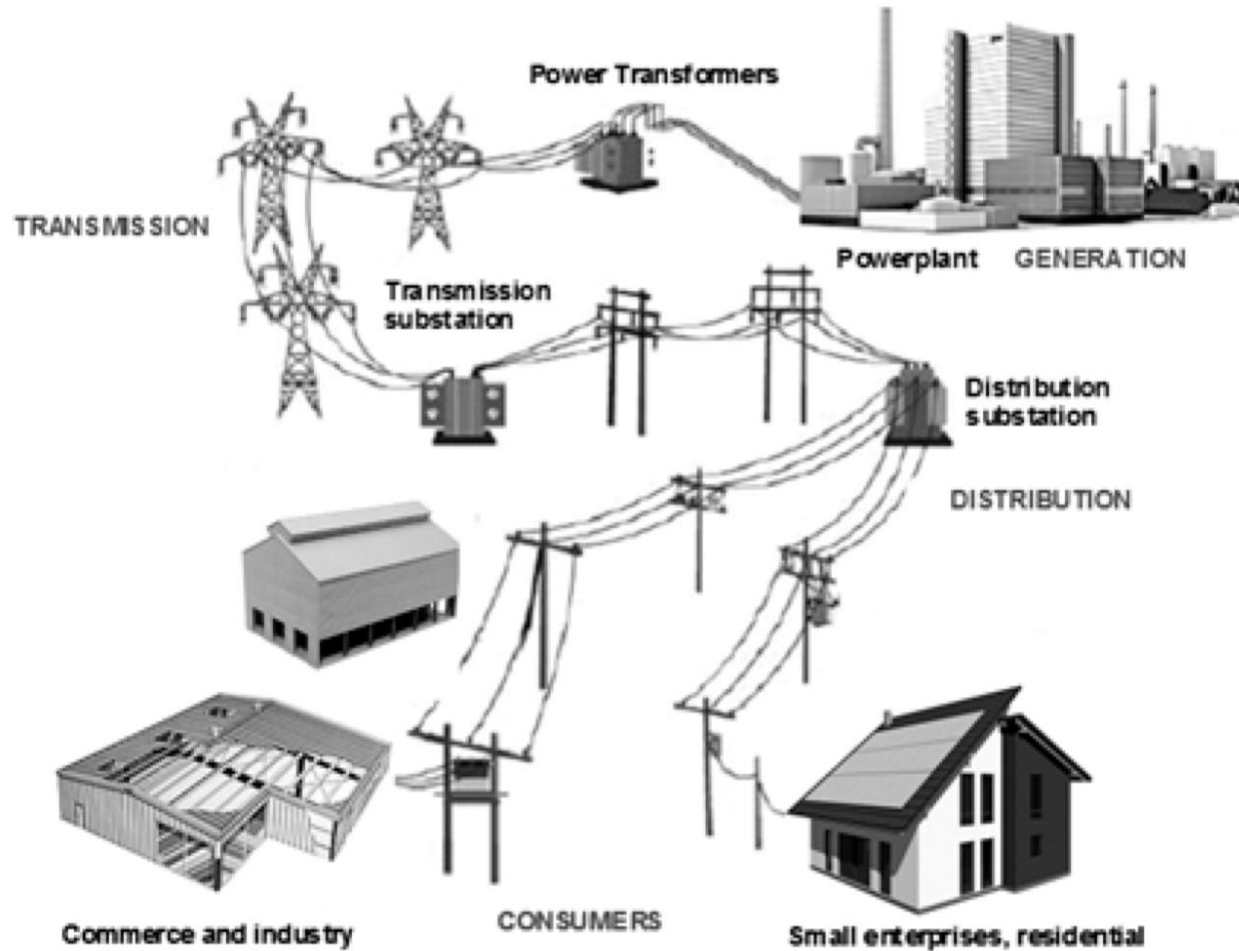
- Comparison of expected infeed from solar on March 20 during clear sky conditions with and without solar eclipse. (EntsoE)



The need for flexibility

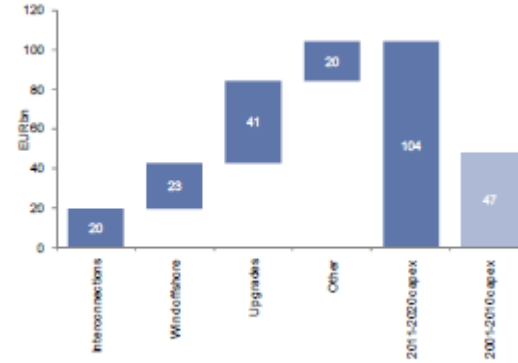
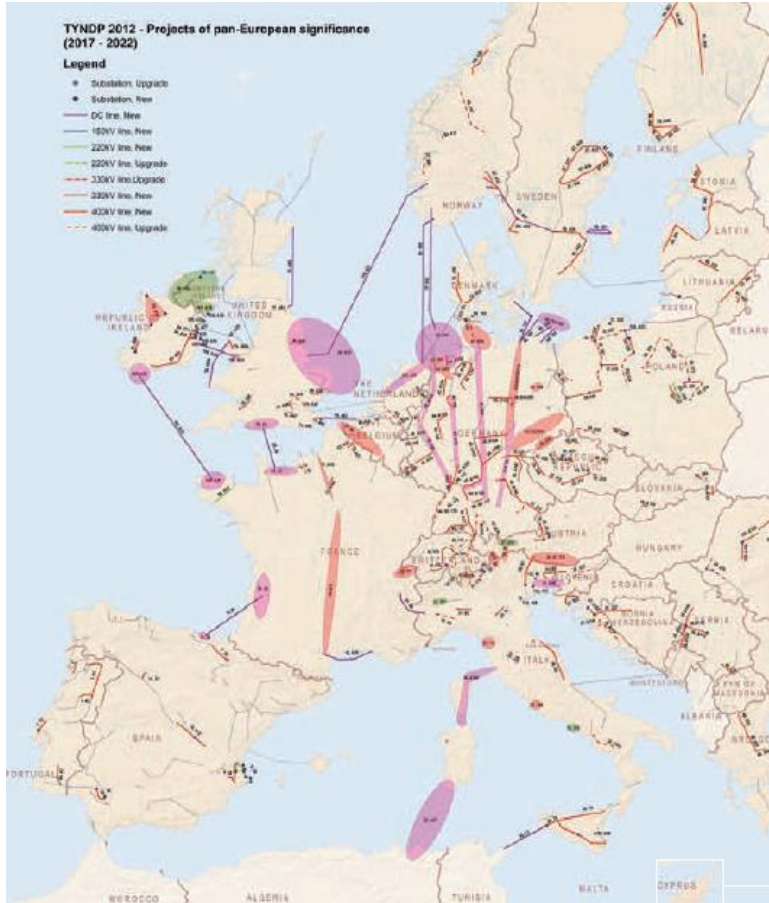


The grid



We are meant to see a big expansion in the grid

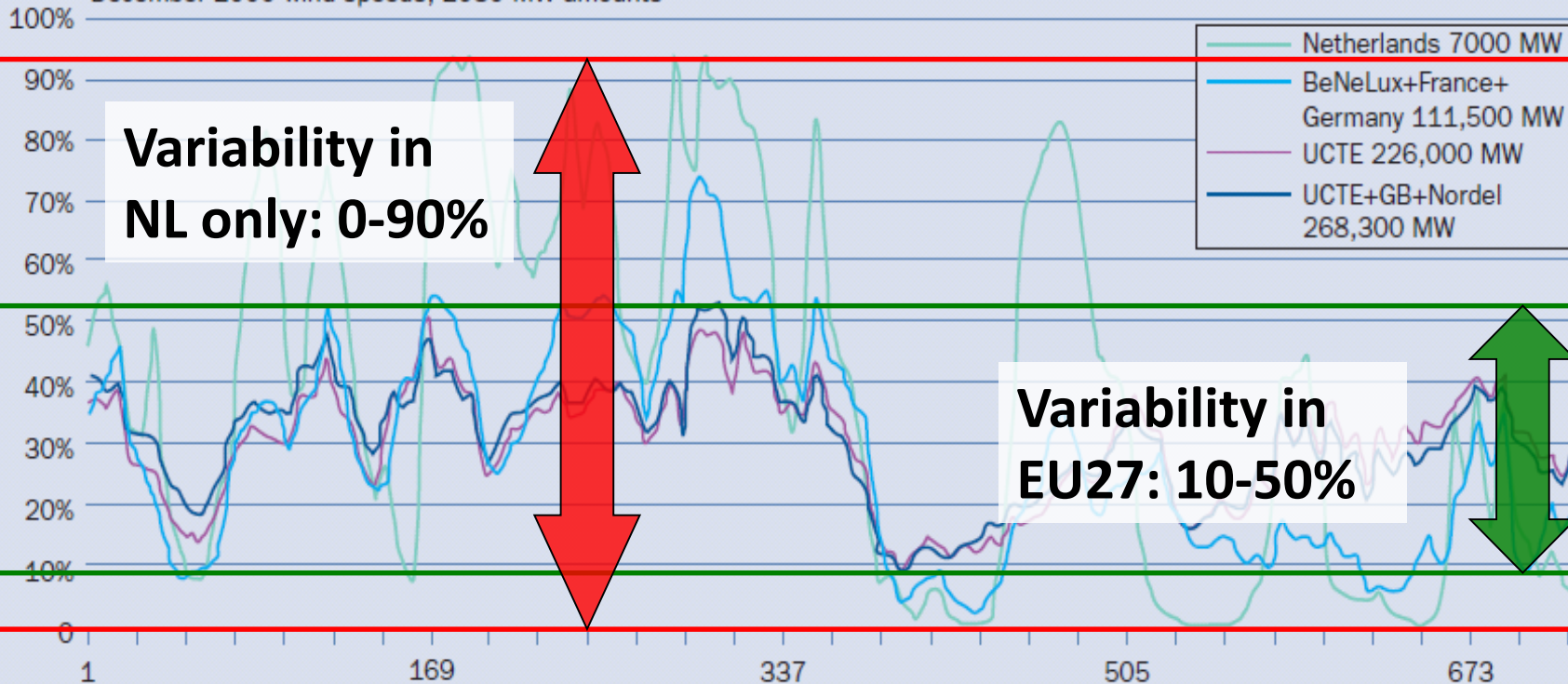
Some €150bn needs to be invested in the grid by 2020



Source: ENTSO-E, EWEA, Goldman Sachs Research estimates.

SuperGrids reduce variability

December 2000 wind speeds, 2030 MW amounts



Note: The figure compares variability in wind power supply on December 2000 wind speeds and wind power capacity estimated for 2030.

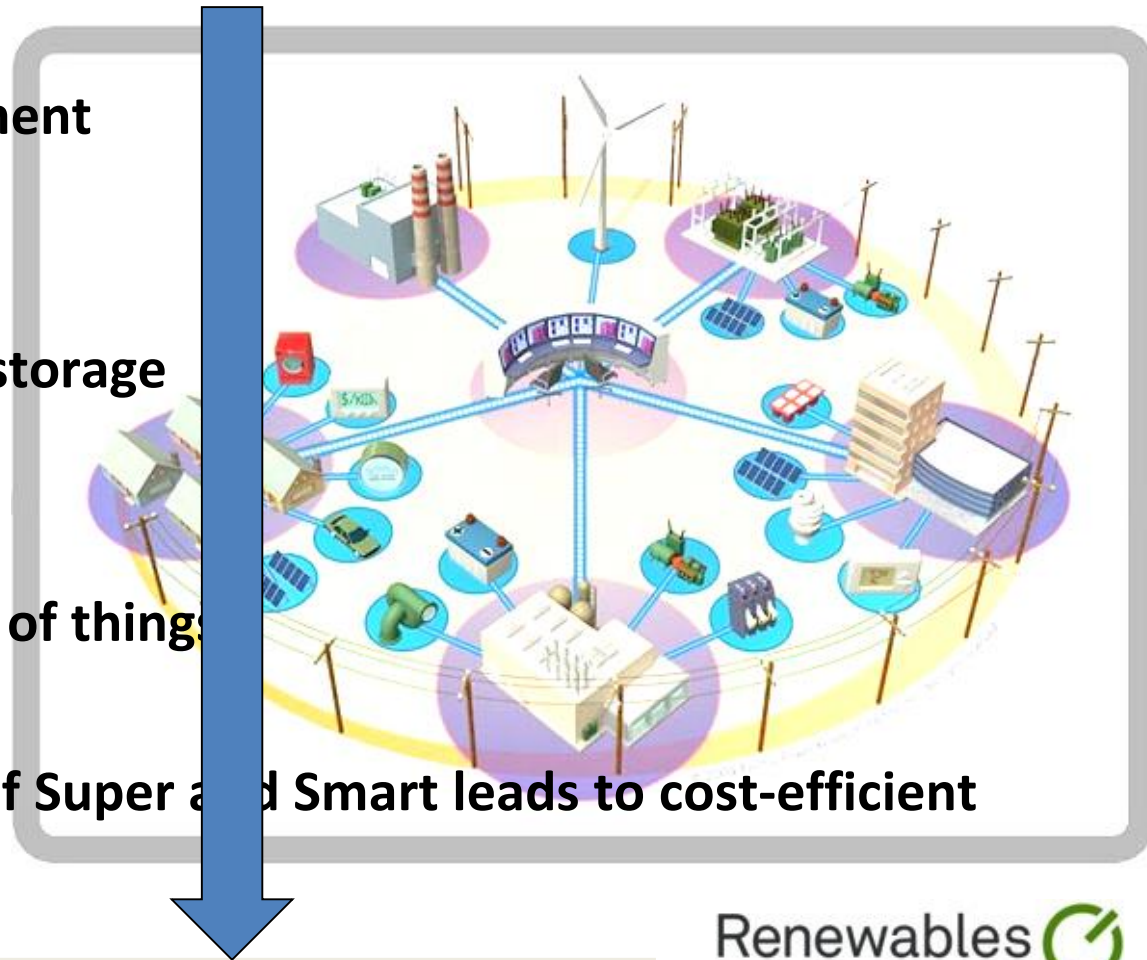
Source: www.trade-wind.com

- Too little supply causes system instability
- Too much supply requires forced shut-downs

Not only Super – but also Smart

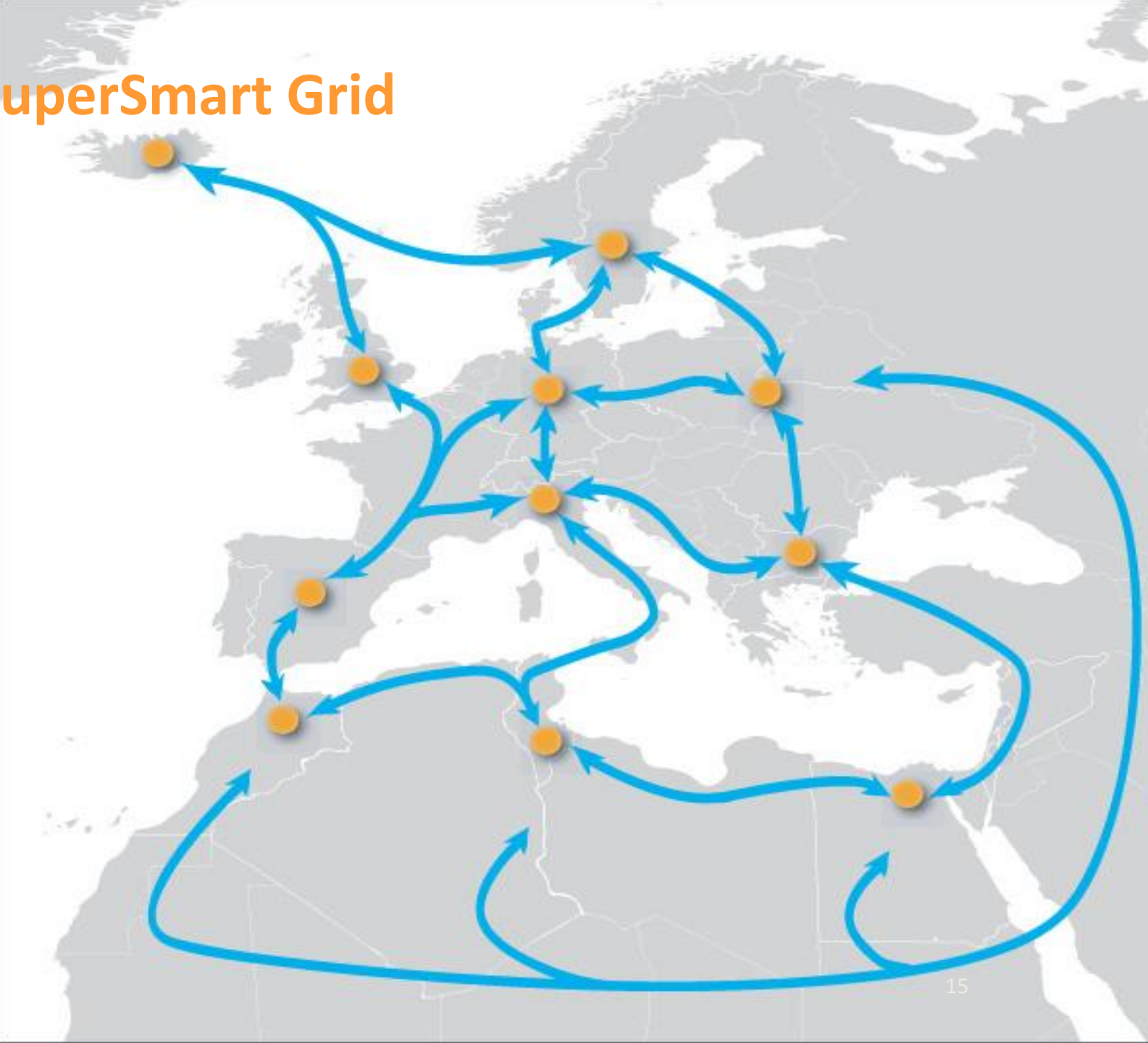


- The more RES, the more decentralized system and more innovations needed
 - Active Load Management
 - Virtual power plant
 - Demand response
 - Home or community storage
 - Power to gas/heat
 - Electro mobility
 - Smart home/Internet of things
 - Smart Cities
- Only a combination of Super and Smart leads to cost-efficient solutions



More people affected

SuperSmart Grid



ERP SCM CRM

Enterprise Services (Energy Footprint, Sustainability)



Capacity Mgmt.



Grid & Data Services



Controllable Local Systems



Dynamic Tariff & Pricing Models



Trading & Portfolio Services



Prosumers & Virtual Powerplants



Investment Operations & Contracting



PIK



Energy Mgmt. for Infrastructures



DSM & DR



Smart Home



Mobile Services (e.g. Bill Shock)



Mobility Services

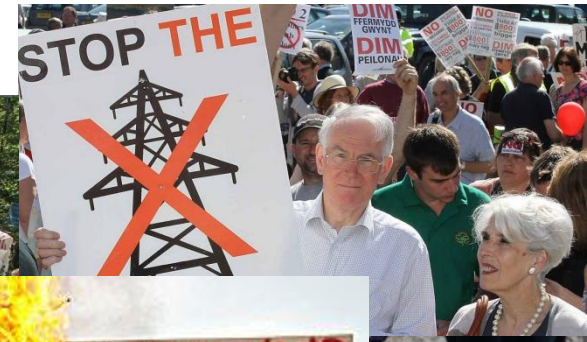
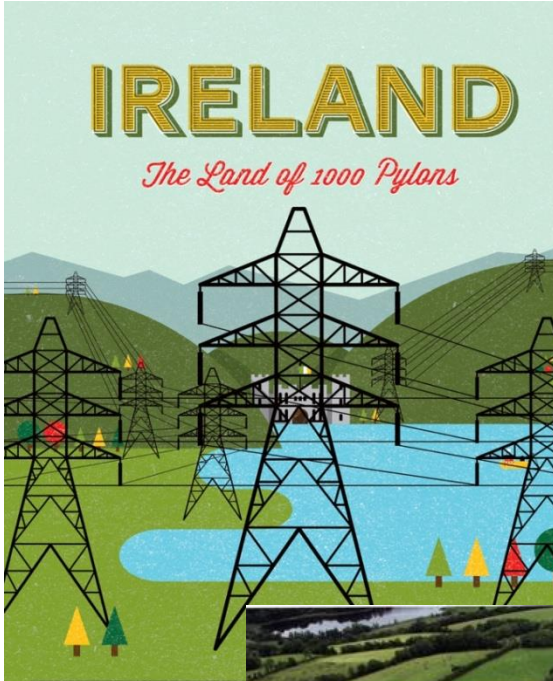
Renewables Grid Initiative

BUT...



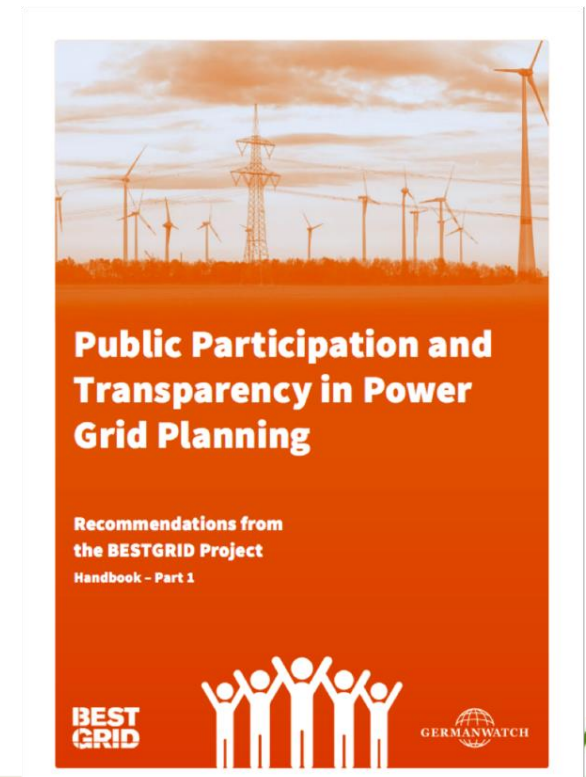
“Communism is Soviet power plus the electrification of the whole country” - Lenin

..not only infrastructure matters

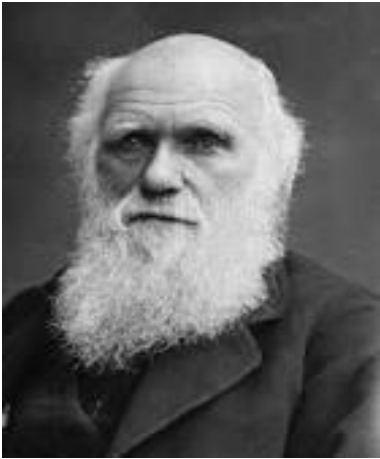


We need to learn!

- Experience from Bestgrid/Inspiregrid
- TSO/NGO cooperation
- Better planning and engagement processes



How to integrate 100% RES?



It is not the strongest or the most intelligent who will survive but those who can best manage change


“The needs of the many outweigh the needs of the few”

Mr. Spock



→ Invent the future together with citizens



Renewables
Grid Initiative 

Thank you very much!

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Renewables-Grid-Initiative

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