CLIMATE POLICY INITIATIVE

RE-Shaping
Shaping an effective and efficient European renewable energy market

DIW BERLIN

Smart power markets for Europe

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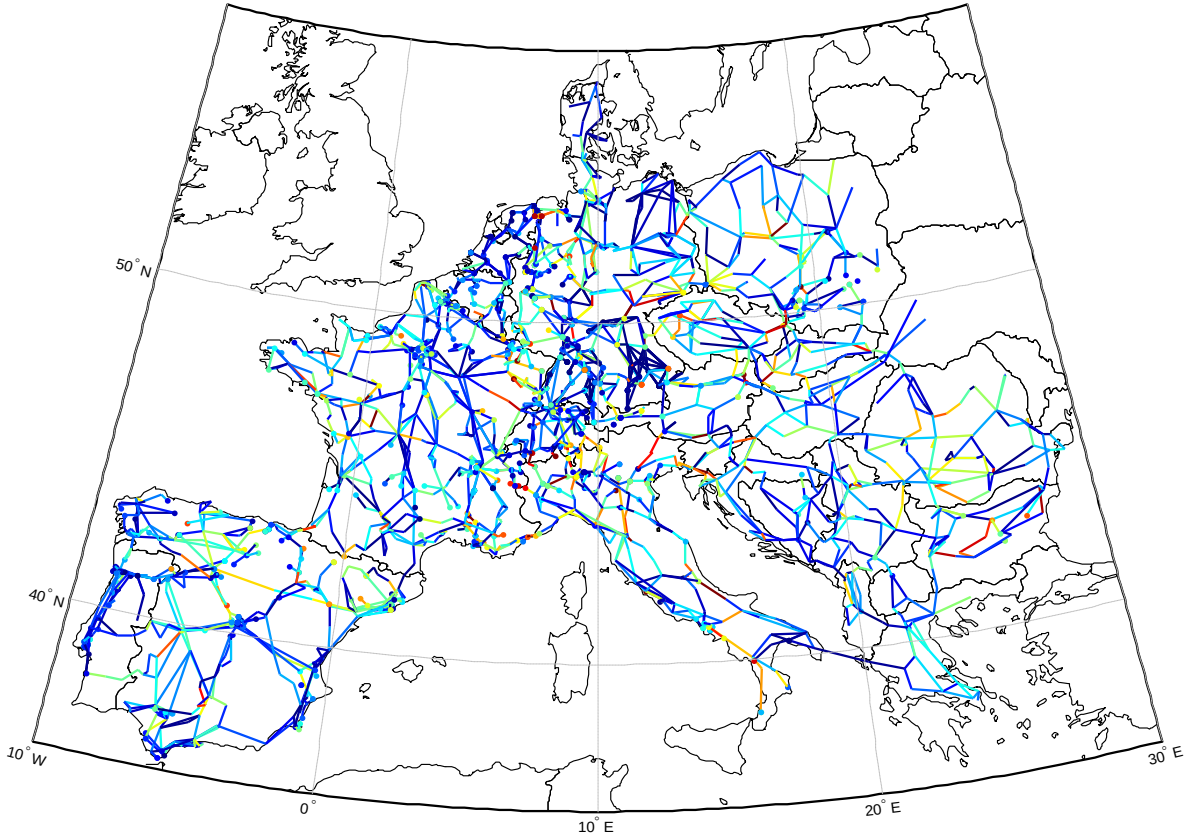
Smart power markets for Europe

EU Renewables Directive: 20% renewable in final energy by 2020. (Almost 200GWs new renewables connected to grid)

- Sharing of transmission capacity to limit grid needs & avoid connection delays
- Wind forecasts improve significantly intraday, but currently system-wide optimisation only in day-ahead market
- Investors in demand response, generation and grid (including off-shore and DC) need clarity and transparency for investment horizon

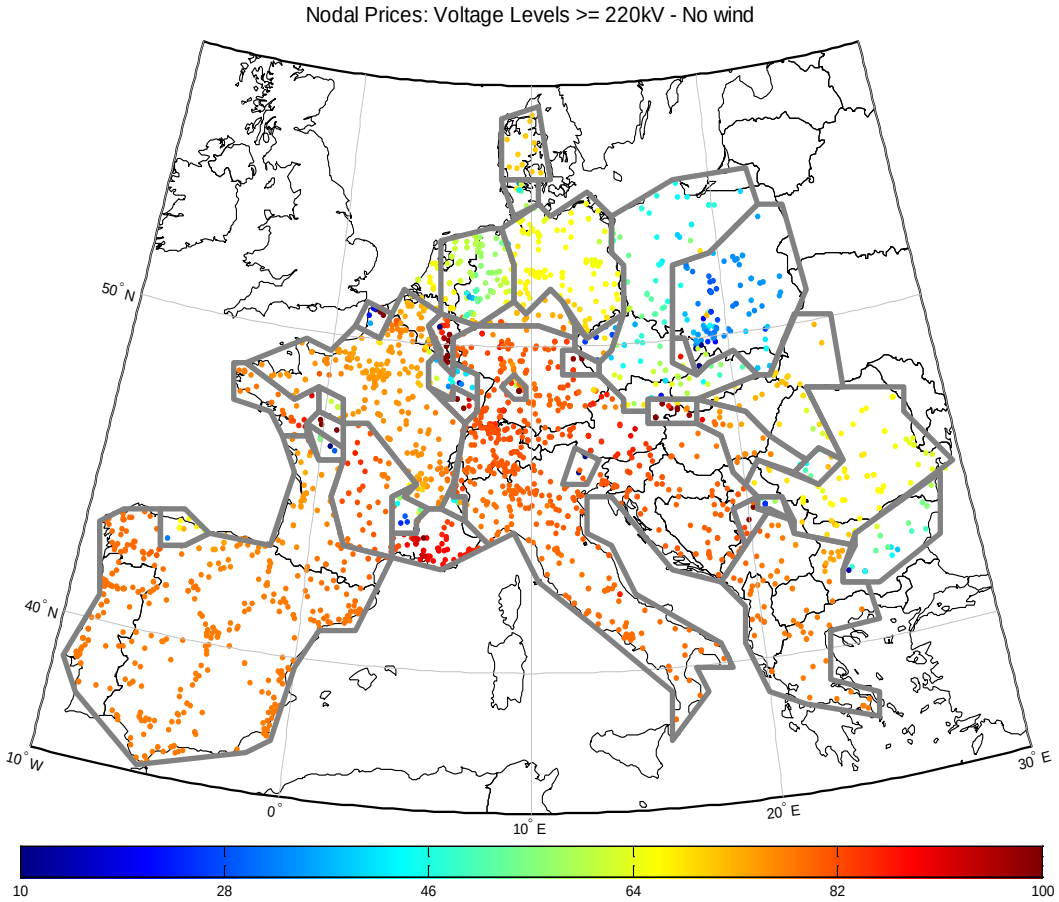
Congested Lines are within and between EU Countries



- Transmission not allocated within market TSO have to buy back capacity
  -> inefficient, costly and creates opportunities for gaming.
- TSO not informed about state of the European power system
  - make very conservative use of transmission lines
  - lack of information exchange main cause for black-outs

Zones for zonal pricing do not match national borders

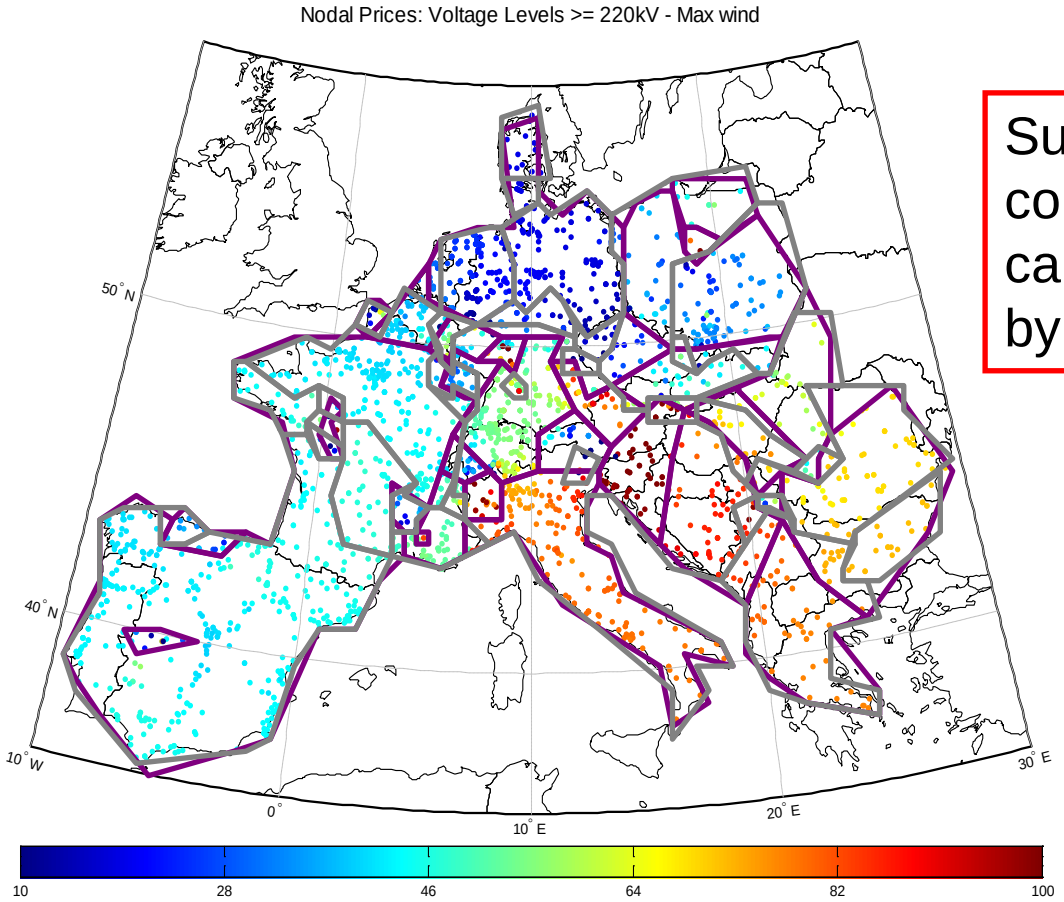
No wind



Source: Model results from the Intelligent Energy Europe project Re-shaping

And zones with similar price change with wind output

Max wind



Suitable zones in congested network can change hour by hour

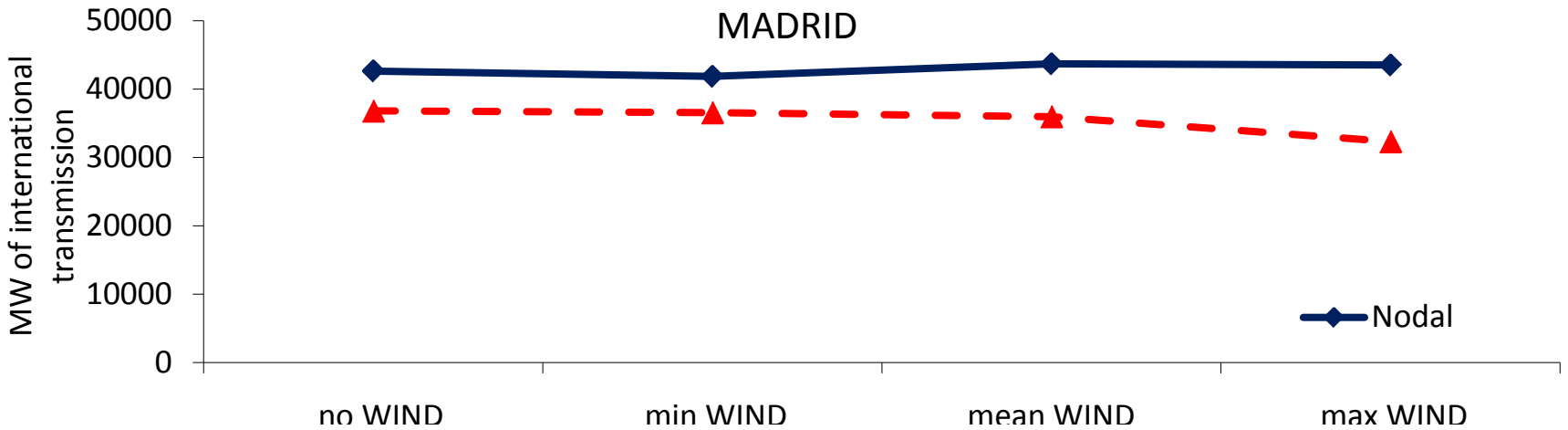
Source: Model results from the Intelligent Energy Europe project Re-shaping

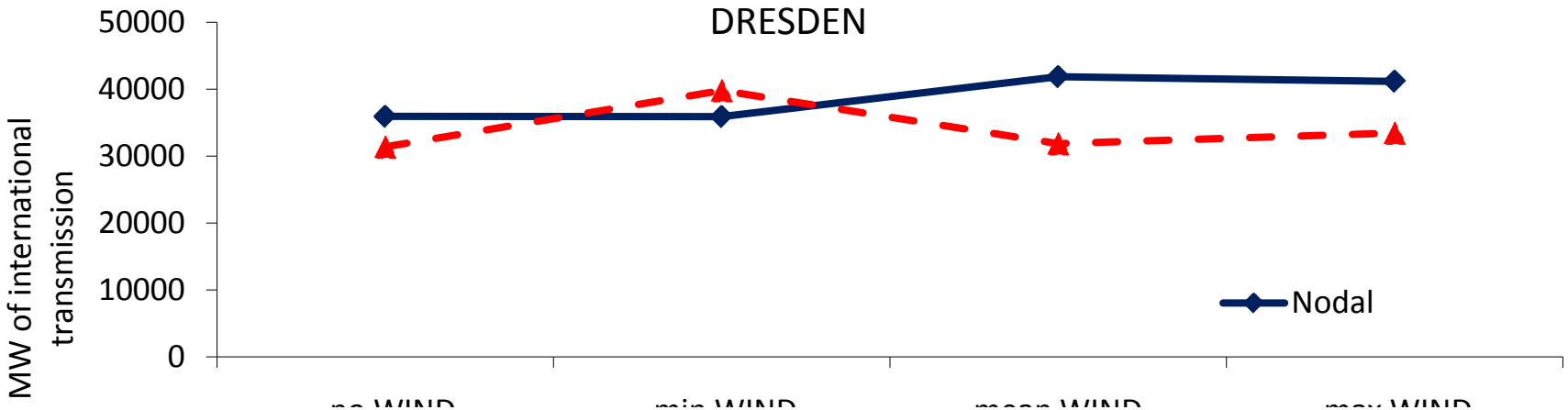
Evaluation of congestion-management approaches

	(i) Integration with domestic congestion management	(ii) Joint allocation of international transmission rights	(iii) Integration with day ahead energy market	(iv) Integration with intraday/ balancing market	(v) Transparency of congestion management
Bilateral transmission rights auction	No	No	No	No	No
Joint multi-country auction of NTC rights	No	Yes	No	No	No
Multi-region day-ahead market coupling (zonal pricing)	No (only at zonal level)	Possible	Yes	No	No
Nodal pricing	Yes	Yes	Yes	Possible	Yes

Source: Congestion Management in European Power Networks: Criteria to Assess the Available Options, Neuhoff, Hobbs, Newbery

Simulation of nodal versus zonal pricing

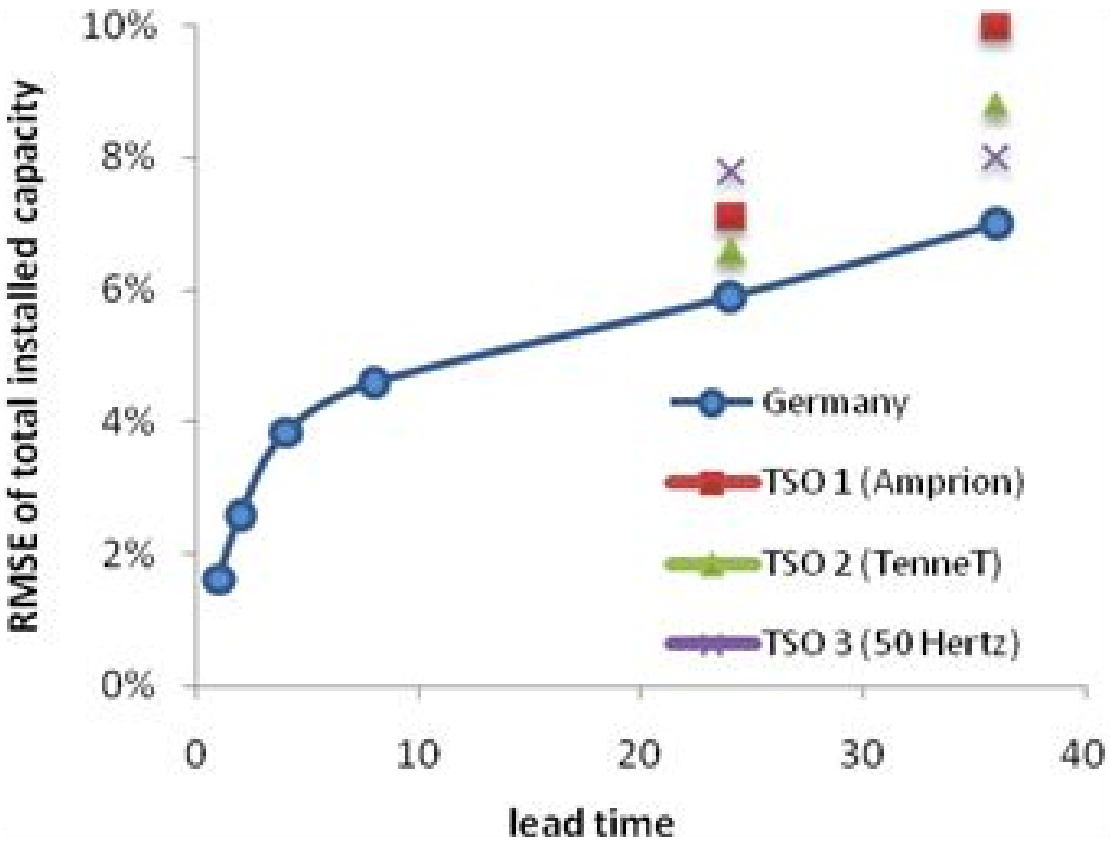




Annual savings 0.8-2 billion Euros from better system operation

Dealing with uncertainty from wind

Wind forecasts improve 4 hours before real time



- Currently trading/transmission allocation focused day ahead
- Many power stations/grid can respond short time
- But power market design limits participation of actors

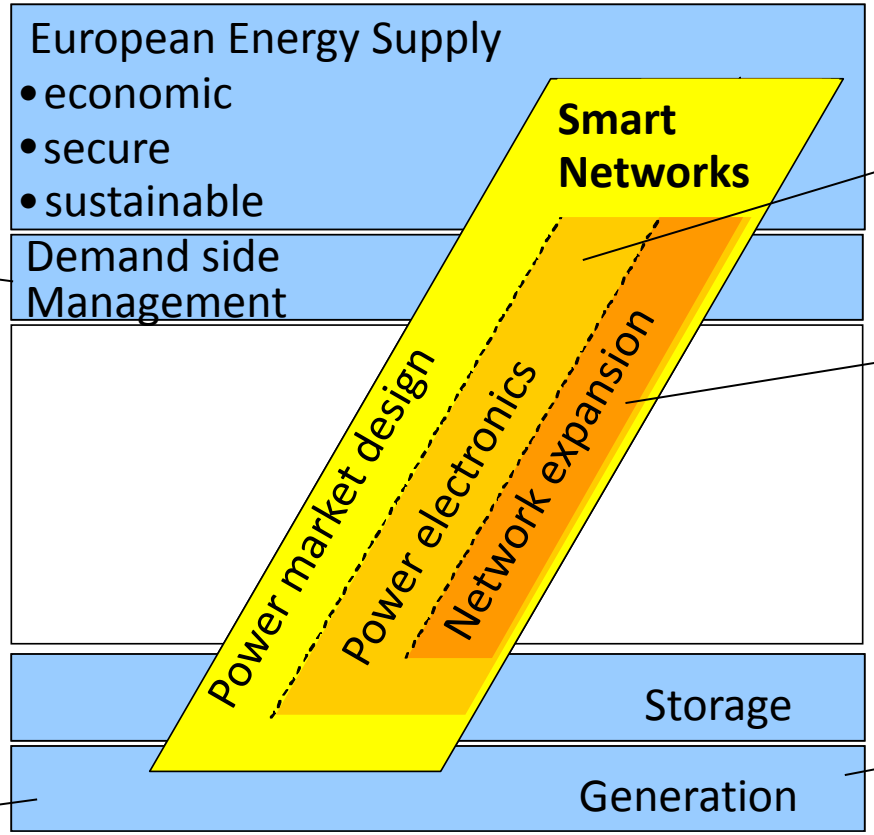
Source: Estimation for Germany based on Roon and Wagner [2009], DENA II [2010]

Evaluation of balancing&intraday market performance

	Dispatch adjusted during day	Balancing requirements / provision adjusted during day	Flexible use of individual power stations	International integration of intraday & balancing markets	Integration of demand side response services	Effective monitoring of market power possible
UK System				N/A		
German system		N/A				
Nordpool						
Spanish system				N/A		
Nodal pricing system						

Based on: Borggrefe and Neuhoff 2010: Balancing and Intraday Market Design – Options for wind integration

The benefits of an effective European Power Market



Robust interface for innovation

Reduce costs and emissions
- Use network effectively
- System wide optimization

Decouple projects from delays in grid expansion

Integration of DC and FACTs

Transparency to guide network expansion:
-Identify needs
-Planning
-Communicate

Financing against robust regulatory frameworks

Nodal pricing is a well established and effective power market design.

Effective power market design necessary, NOT sufficient for large-scale renewables integration.