

Operation and repowering in the context of the energy transition: Challenges for the future electricity mix

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Agenda

1. Role of wind power for the energy transition
2. Wind capacity leaving remuneration mechanisms
3. Recent developments on the electricity markets
 - 4.1. Price development
 - 4.2. Market design changes
 - 4.3. Reserve power markets considering wind
4. Conclusions

Role of wind power for the energy transition

■ Energy policy targets:

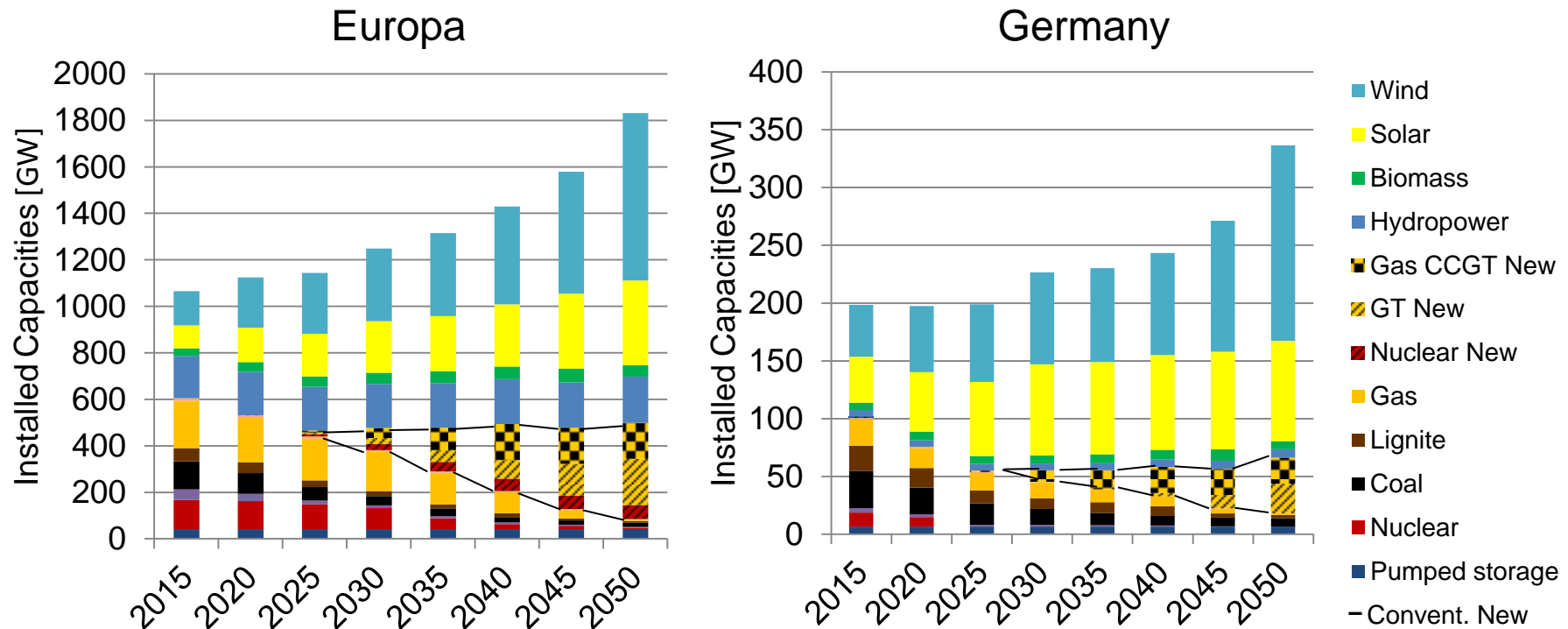
- European Union aims to reduce greenhouse gas (GHG) emissions by 80% in 2050 compared to 1990 emissions
- Germany and France have ambitious targets for GHG reduction and renewable exploitation

Targets	France	Germany
GHG 2030	-40%	-55%
GHG 2050	-75%	-80% overall, -90-95% (electricity)
Energy consumption	-50% (overall)	-80% (heat sector) -40% (transport)
Renewable share in 2030 In 2050	32% (final energy)	50% (electricity mix) 80%

■ Renewable energies play a major role for GHG emissions reduction

Role of wind power for the energy transition

Cost optimal scenario achieving CO₂ targets

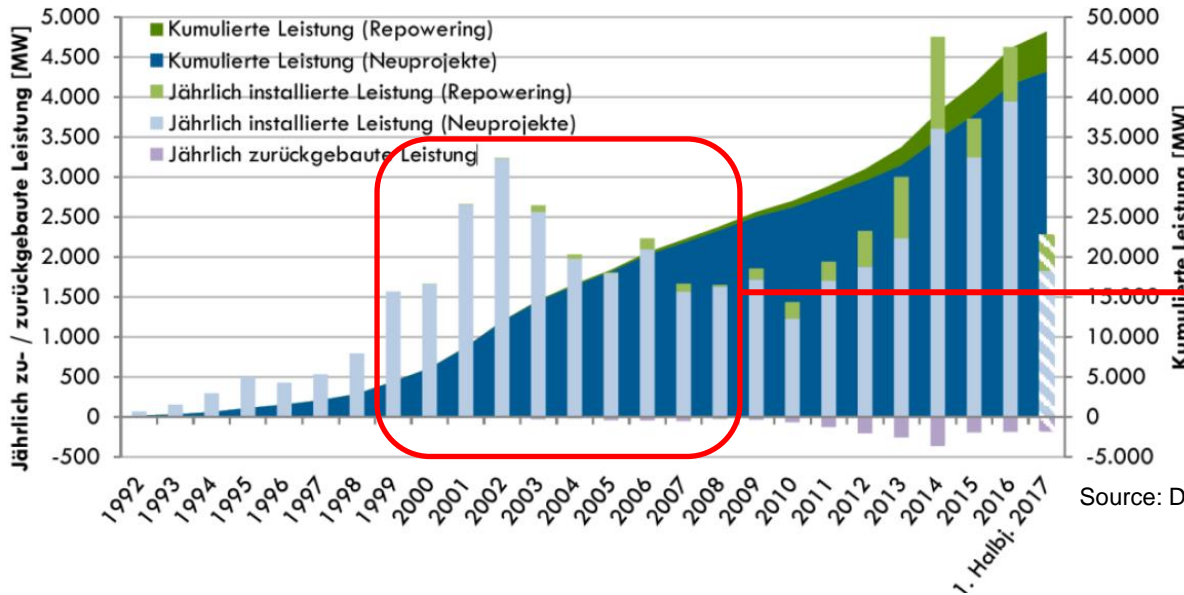


Source: DESK project, 2018

- Energy transition and achieving CO₂ reduction targets requires a high renewable share in Europe and Germany
- Wind power has the highest share among RES

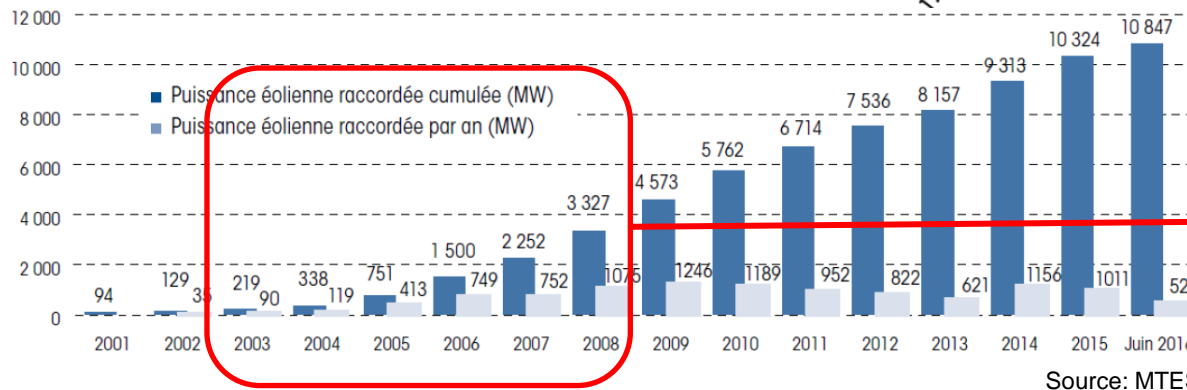
Wind Capacity Leaving Remuneration

Development of installed and added wind capacity in Germany (top) and France (bottom)



Germany: More than 20 GW will be older than 15 years by 2023

Source: Deutsche WindGuard



France: Around 3 GW will be older than 15 years by 2023

Source: MTES

Price development in CWE

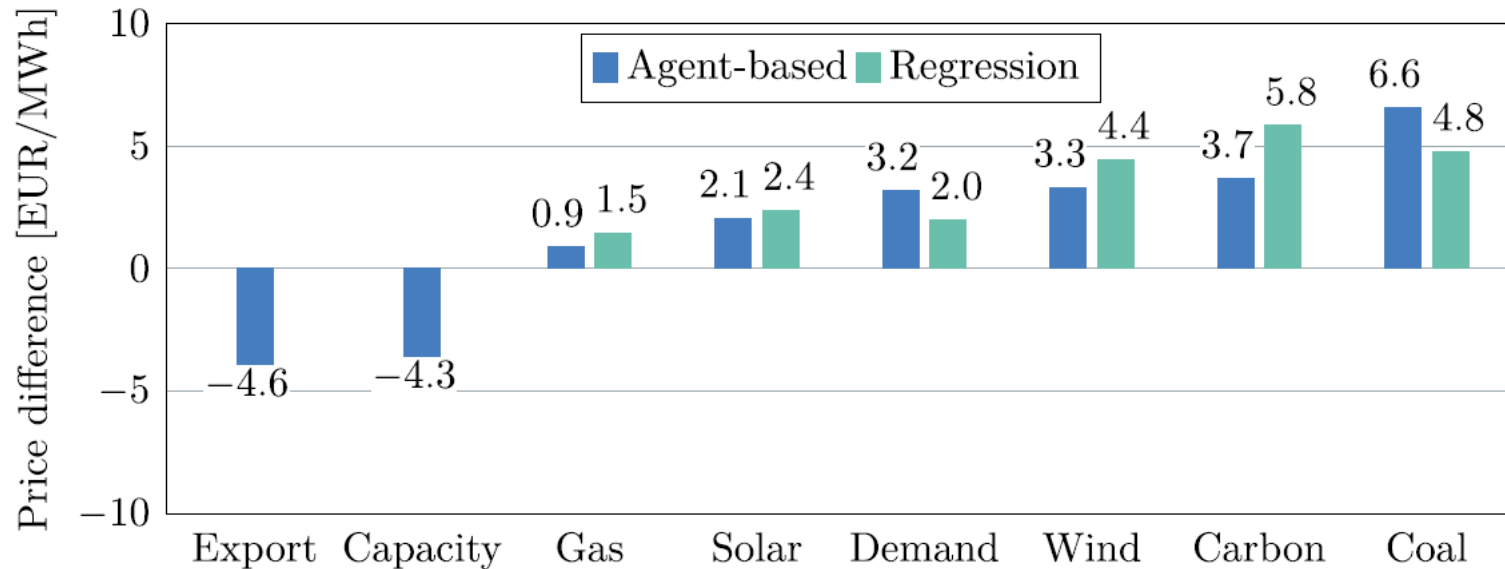
[€/MWh]	CH		DE		FR	
year	Mean	Std	Mean	Std	Mean	Std
2011	56.18	13.65	51.12	13.6	48.89	16.15
2012	49.52	21.19	42.6	18.69	46.94	37.29
2013	44.73	18.83	37.78	16.46	43.24	20.34
2014	36.79	12.82	32.76	12.78	34.63	13.91
2015	40.30	13.15	31.63	12.66	38.48	12.95
2016	37.88	16.78	28.98	12.48	36.75	24.44

Source: EPEX Spot data

- Strong decline not only of mean level,
 - Profitability of power plants and energy storages got worse
 - The market value of wind is even smaller due to the merit order effect, (wind power can rarely earn profits in peak price hours)

Main drivers of price decline in Germany

- Price difference with c.p. analysis (one fundamental fixed to 2011) compared to 2015 price level

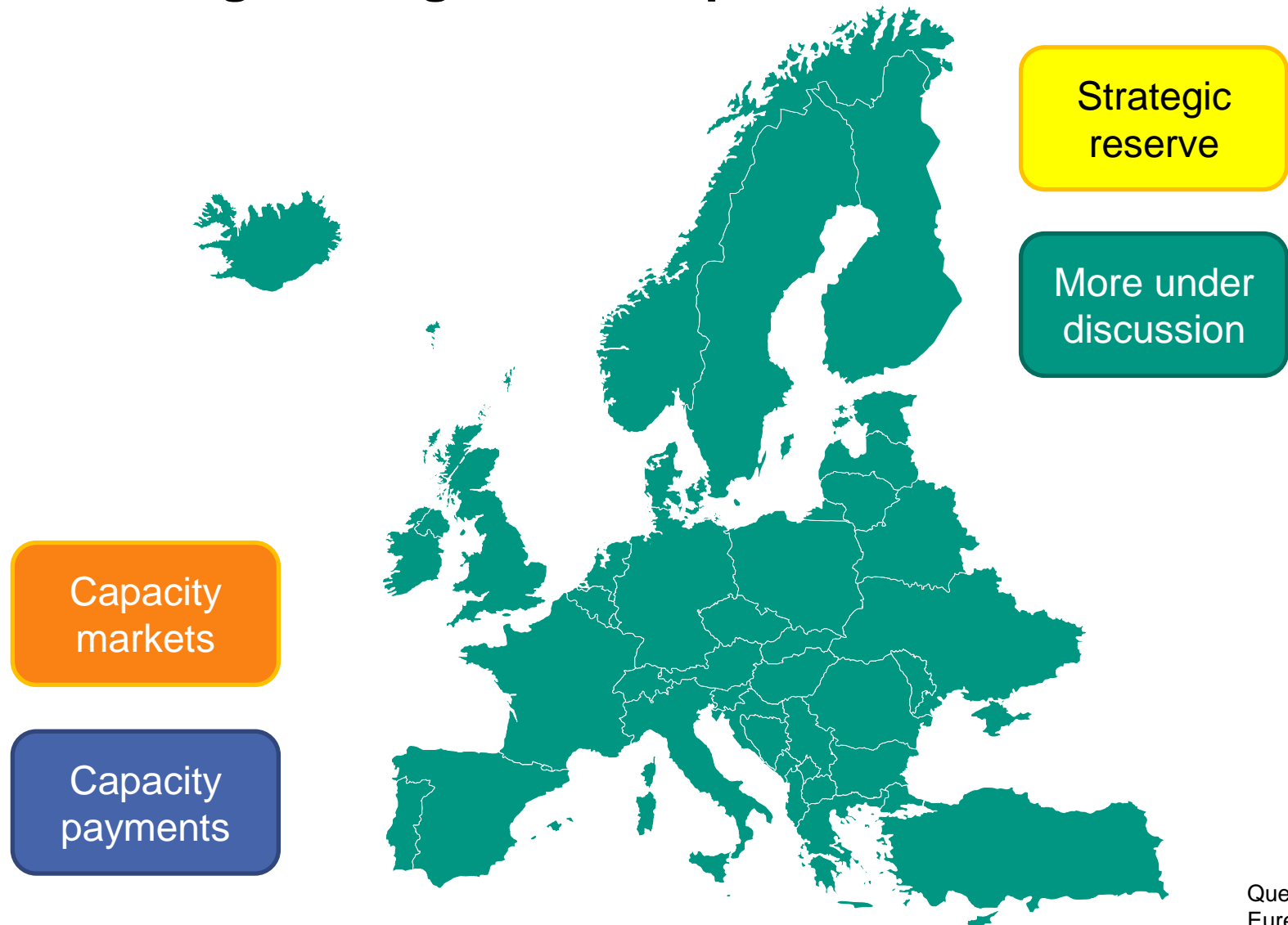


Source: Bublitz et al. (2017)

CO₂ and coal price decrease (-54% and -35% resp.) are major source of electricity price decline

→ Price recovery very likely if CO₂ and coal prices increase again

Market design changes in Europe



Quelle:
Eurelectric 2016

Reserve Power Markets Considering Wind

- German Reserve Power tendering scheme will be changed in July 2018
- Major changes for secondary reserve (aFRR):
 - Gate closure: weak ahead to day ahead
 - Bid volume: reduction from 5 MW to 1 MW
 - Product duration: 4-h-time slices instead of HT and NT (Peak and Off-Peak)
 → Enabling market access for smaller players and RES with limited predictability – particularly for wind power

- Future revenue potential difficult to estimate due to two-part auction and expected changes

Weighted average capacity price per auction [€/MW*week]	2016	2017
Negative SR HT*	21.86	15.59
Negative SR NT**	129.23	157.20
Positive SR HT*	263.36	151.68
Positive SR NT**	430.85	250.42

Focus of wind

* HT: working days 8am-8pm;

** NT: working days 8pm-8am, weekend and holidays

Source: regelleistung.net, German TSOs

Conclusions

- High GHG and renewable energy targets requires a high share of wind entering and remaining in the energy system
- Around 20 GW in GER and more than 3 GW wind power in FR is expected to leave remuneration mechanisms in the next years
- Under current regulation, they need to be operated in the liberalized markets
 - Spot market prices dropped strongly, can recover if carbon prices recover
 - France: Additional revenues potential through newly introduced capacity mechanism (see Kraft 2017)
 - Adjustment of reserve power markets with a shorter time period to gate-closure allows wind to bid in these markets (negative reserve power)
- Profitability of wind parks operating in the electricity market is questionable and needs case-by-case calculation

References and further readings

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