



Germany: firm commitment to energy transition

Dr Alfredo Huertas

sameBoat International Energy & Management



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2019



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Member of

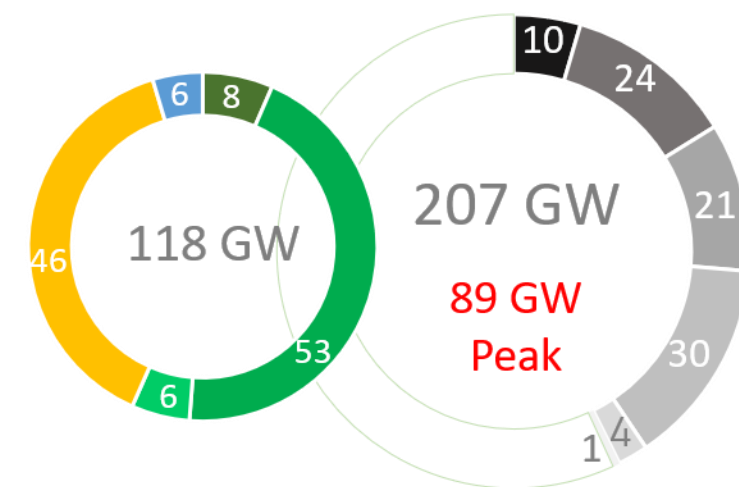
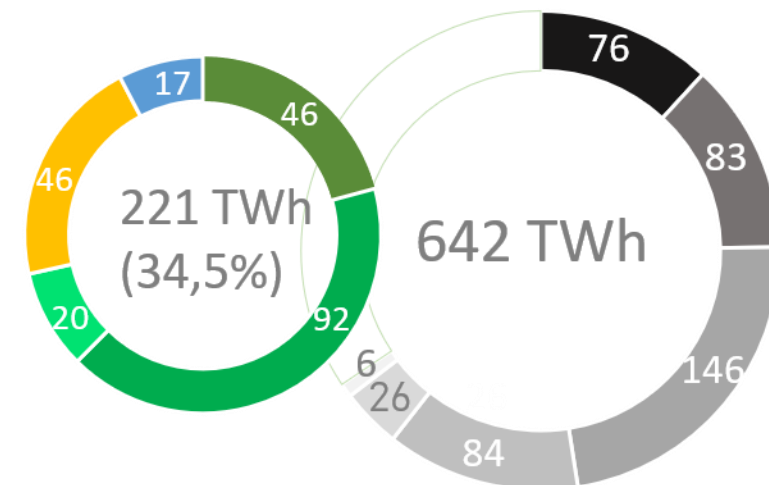
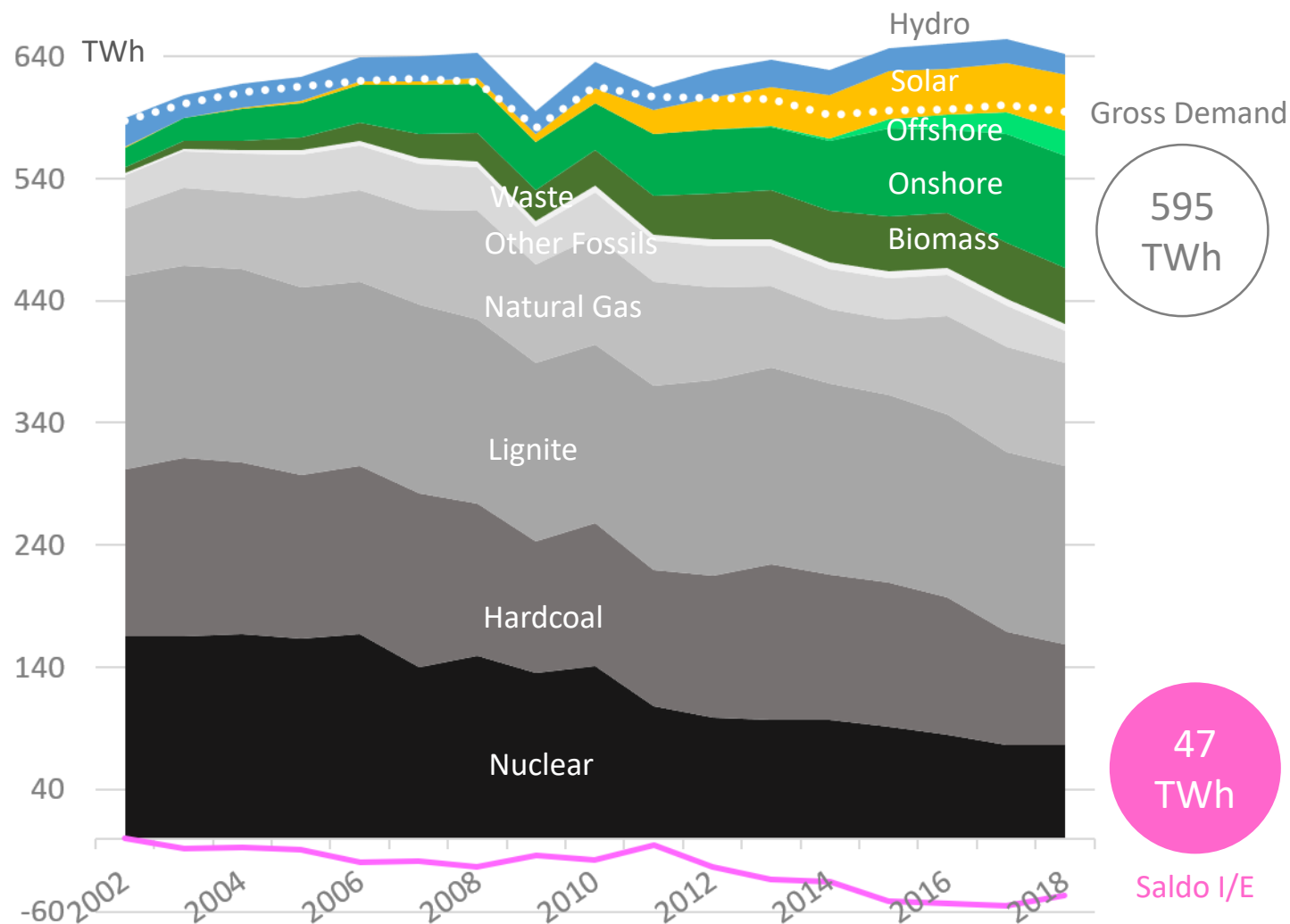
DDIM.
Dachgesellschaft Deutsches
Interim Management e.V.



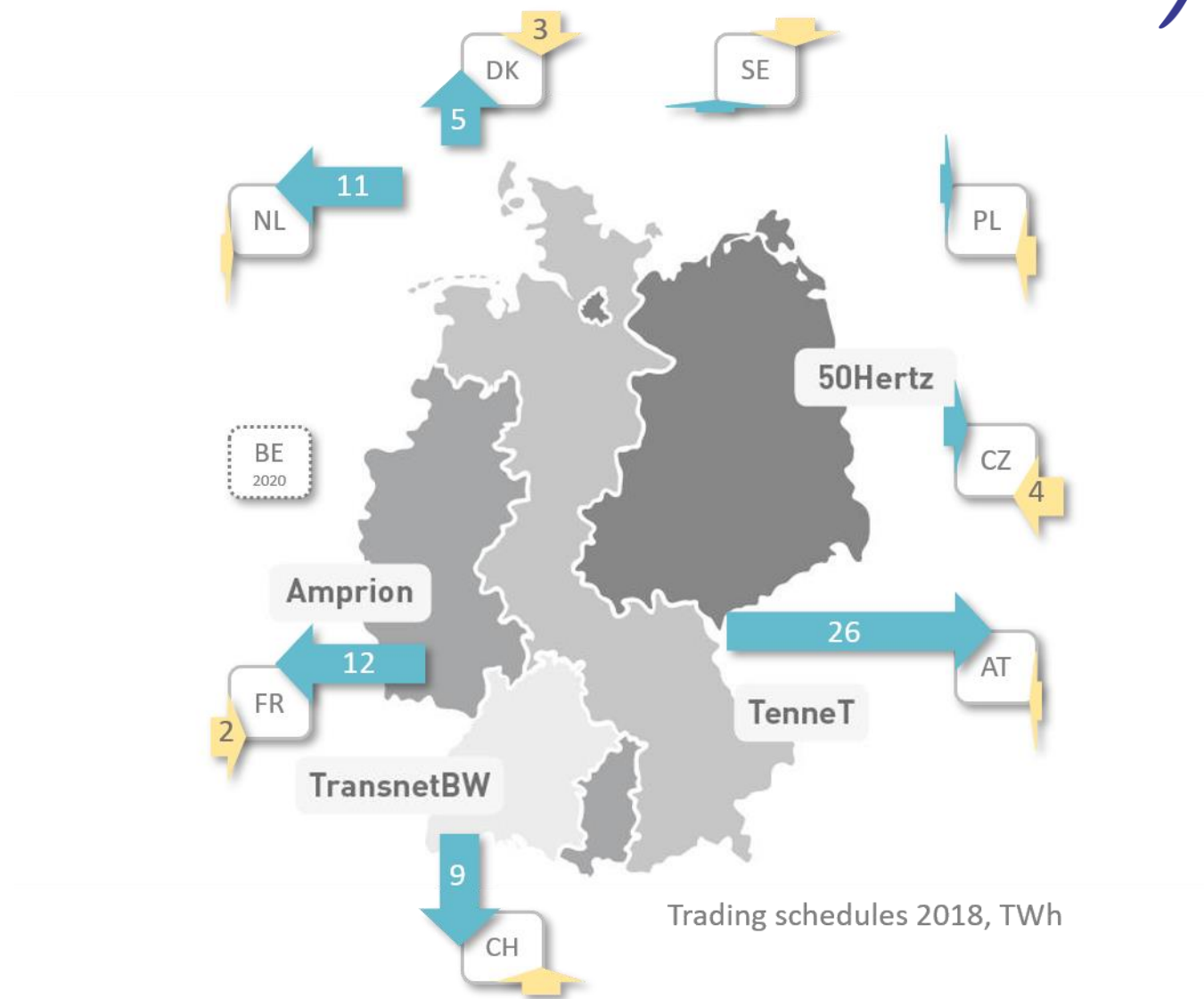
1. Electricity: generation & cross trade



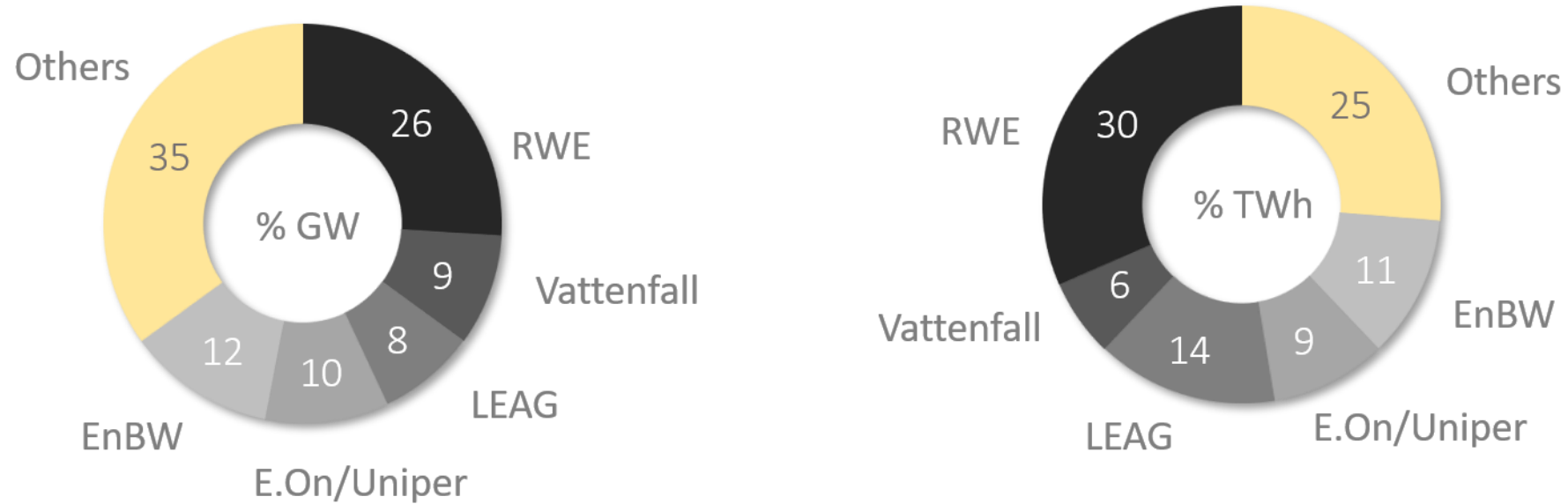
One third of the produced energy is of renewable origin



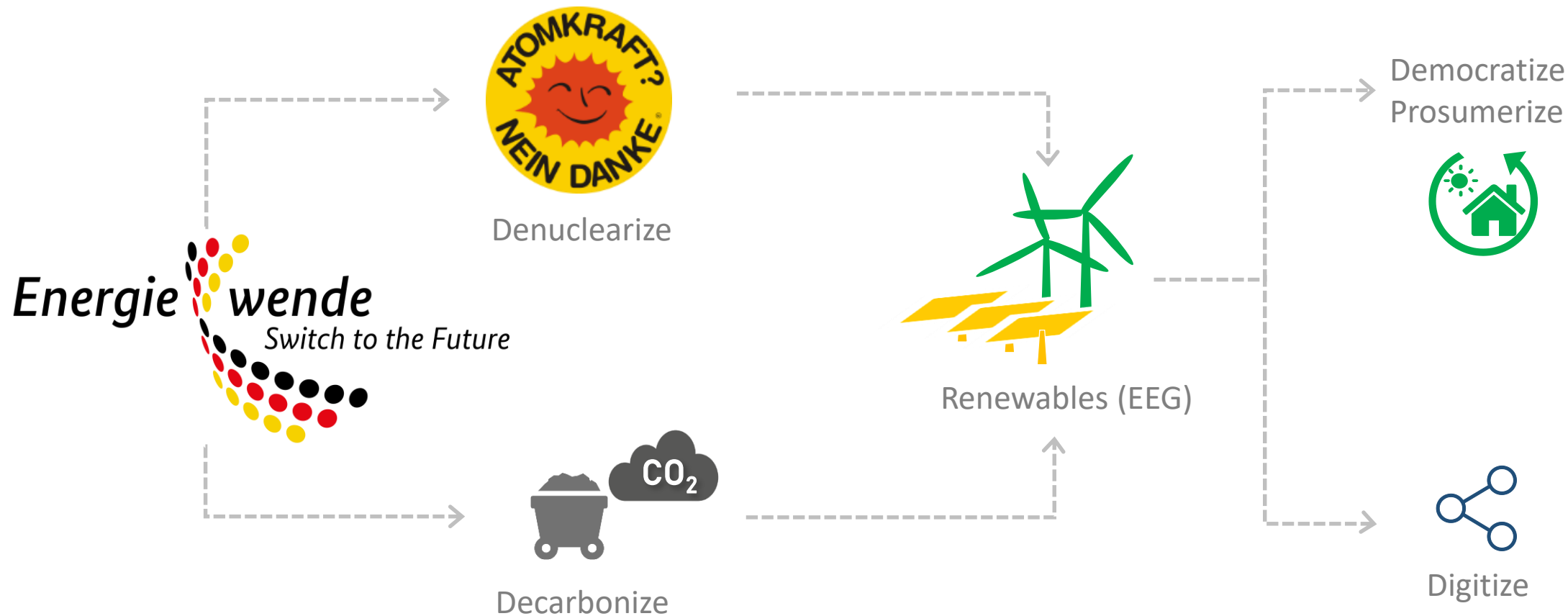
A German tradition:
net exporter (47 TWh)



The big 5 retain more than 65% of dispatchable generation

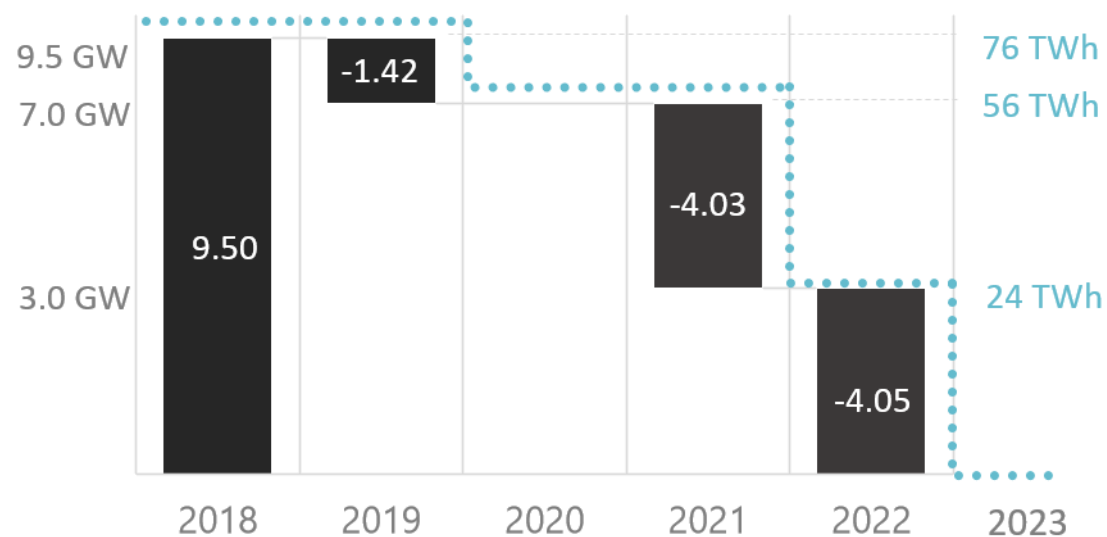


Generation capacity and production, without renewables, railways and selfconsumption, according to the definition of the Bundesnetzagentur



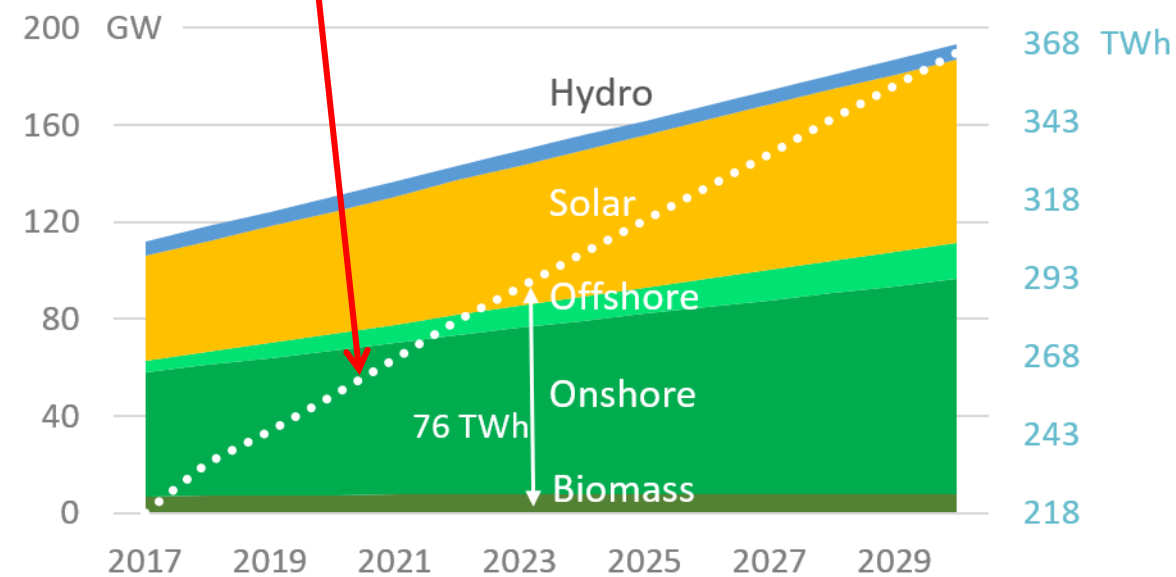
76 TWh nuclear to be replaced by 2023

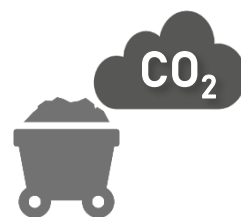
Nuclear phase-out plan



First 4.4 GW onshore
out of EEG in 2020

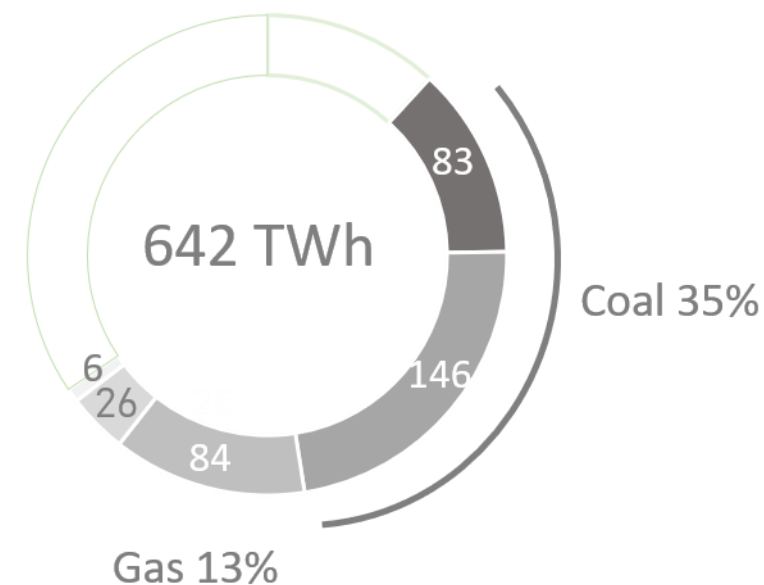
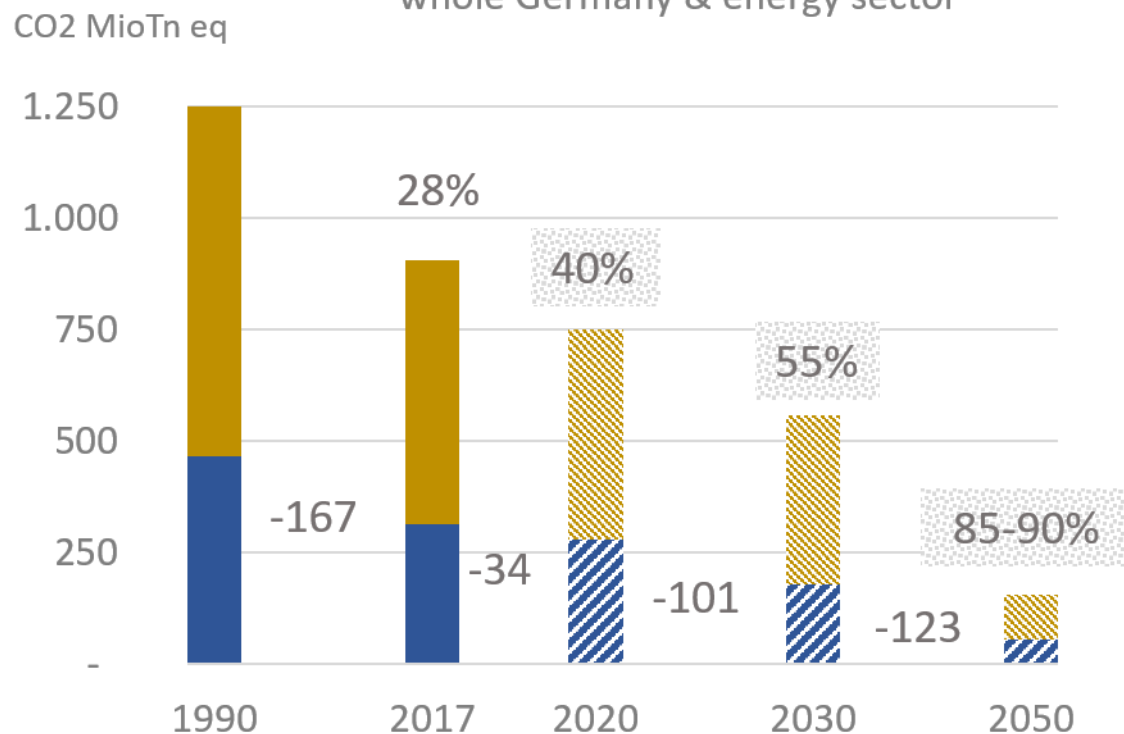
EEG renewables plan

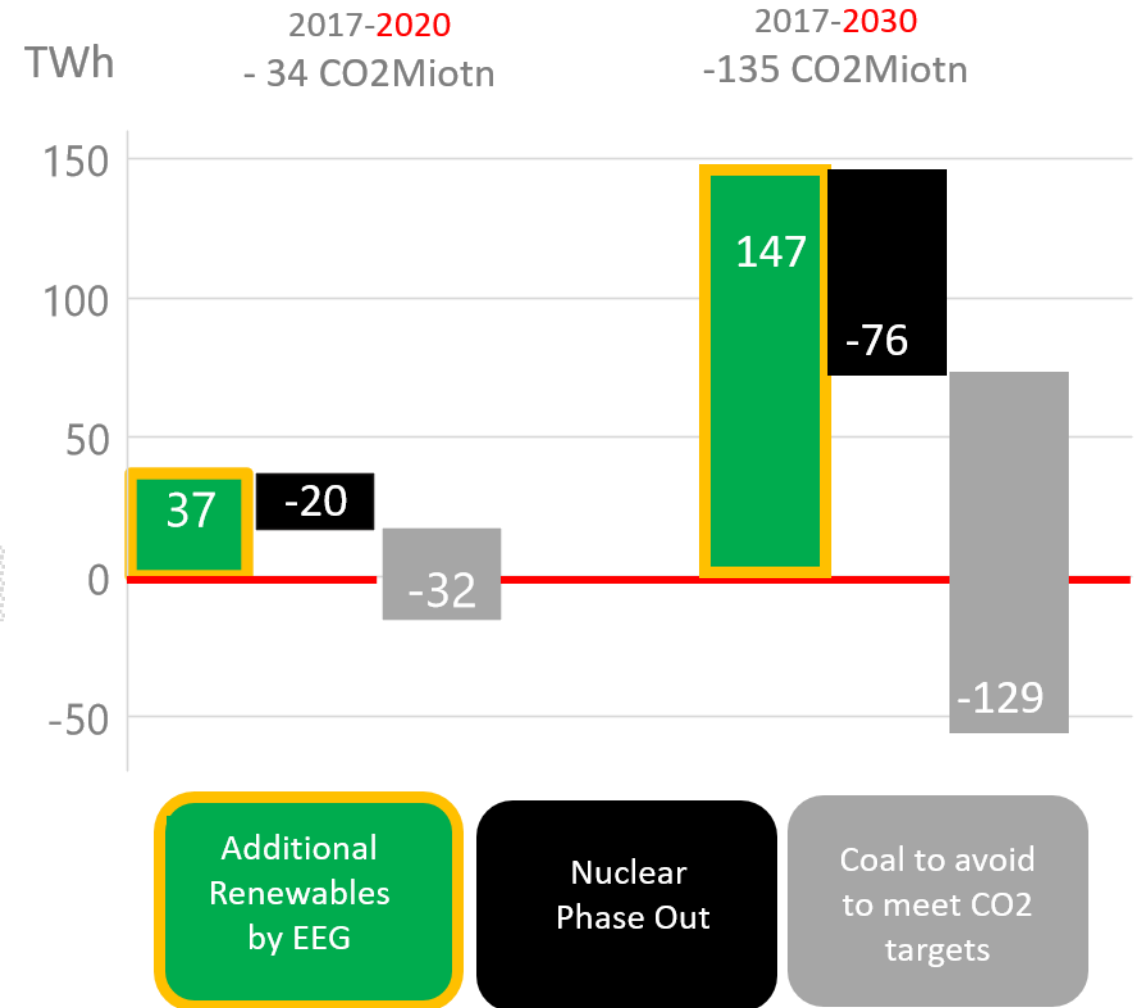
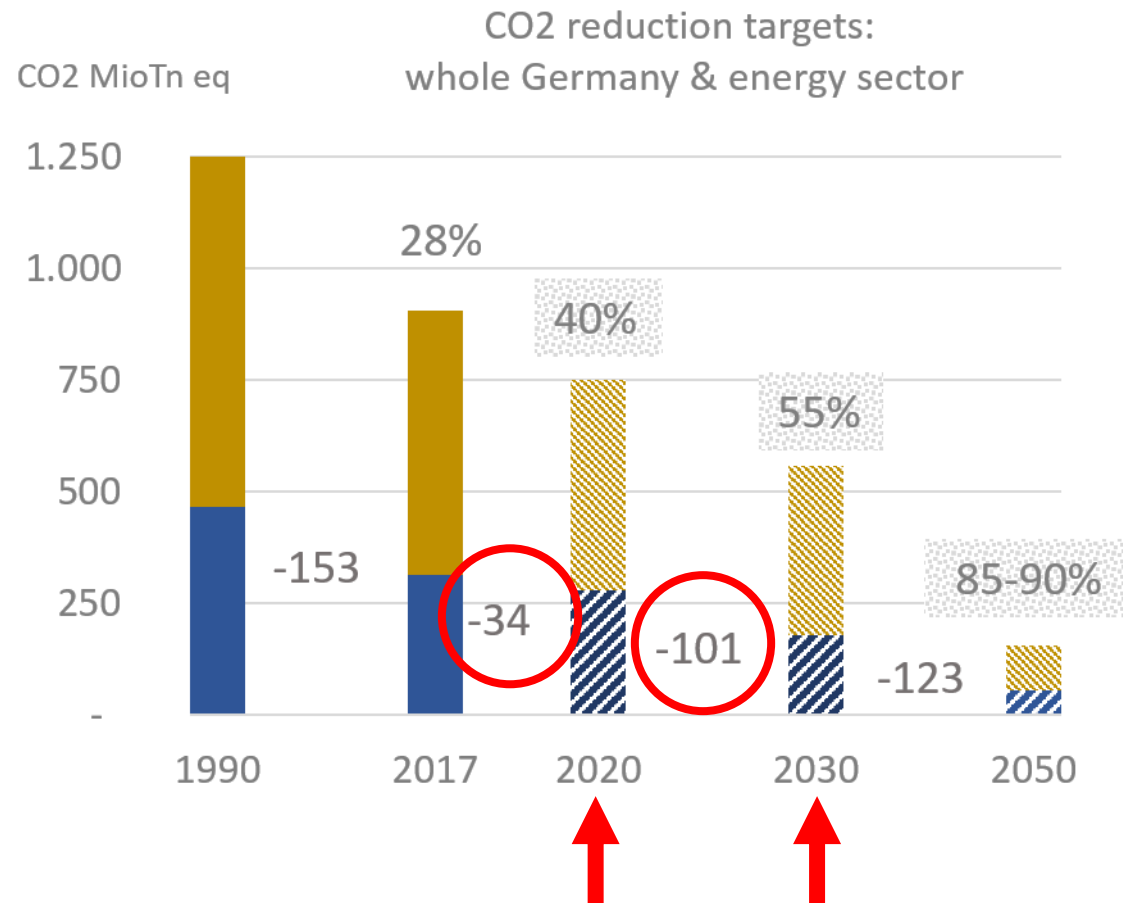




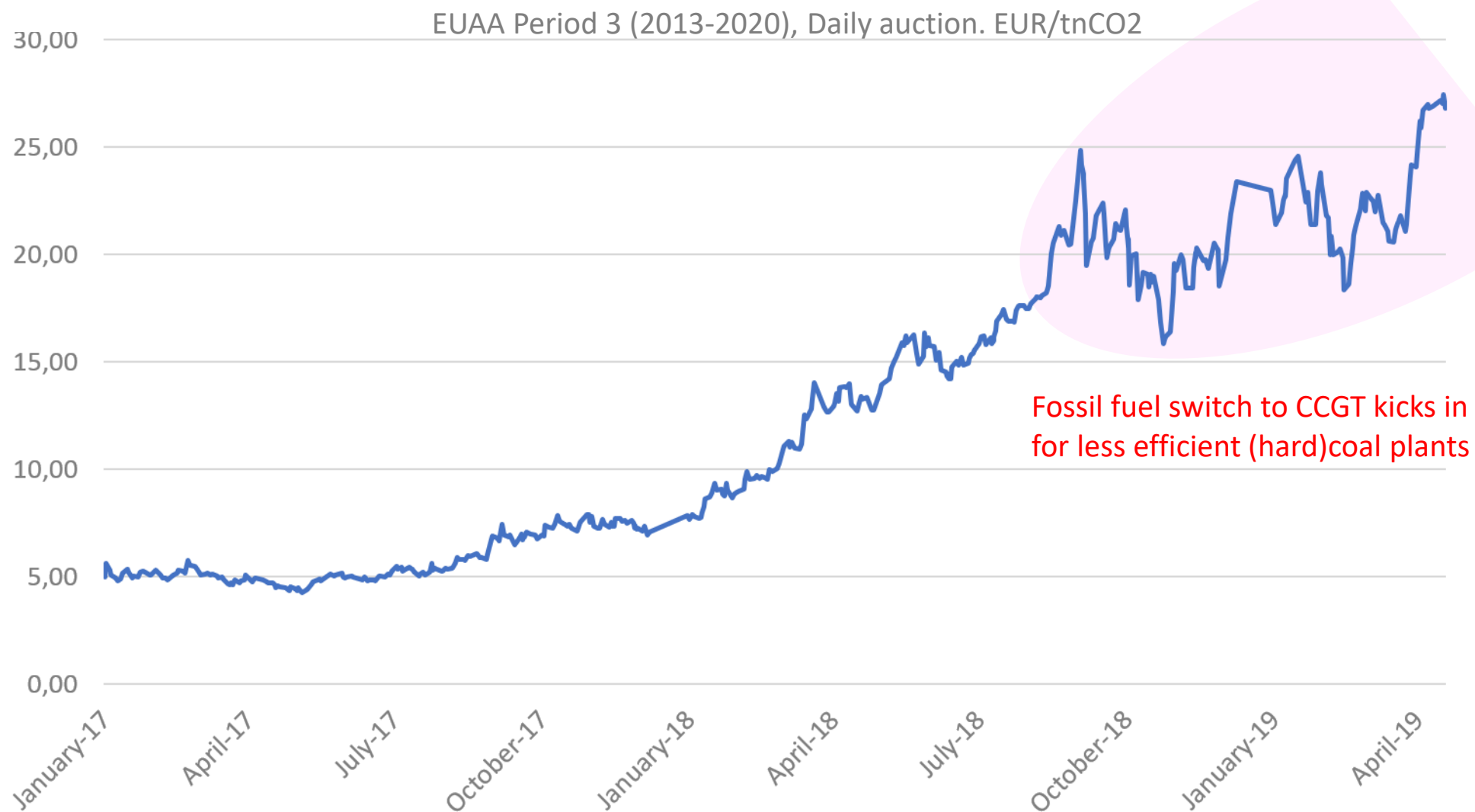
Decarbonize

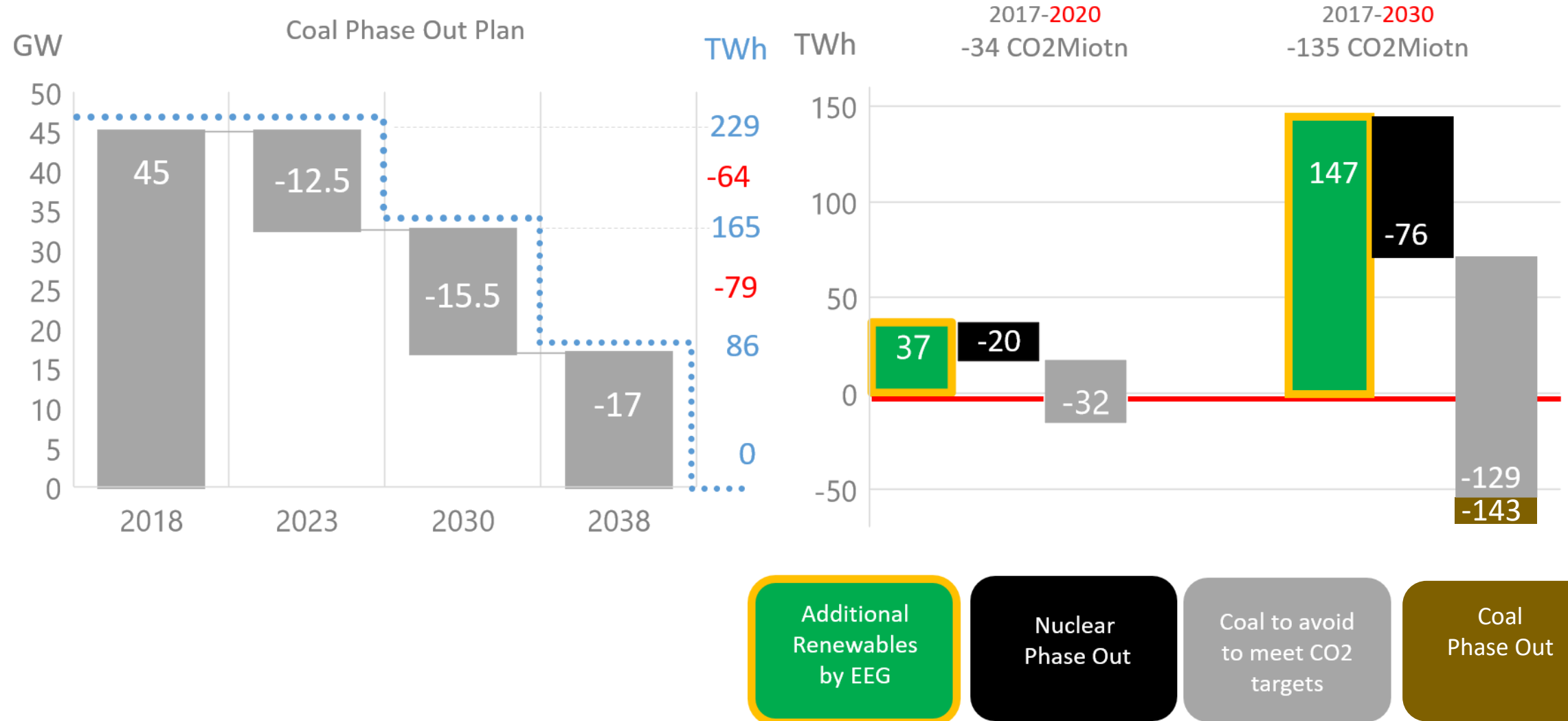
CO2 reduction targets:
whole Germany & energy sector





How can market forces push coal out of merit?



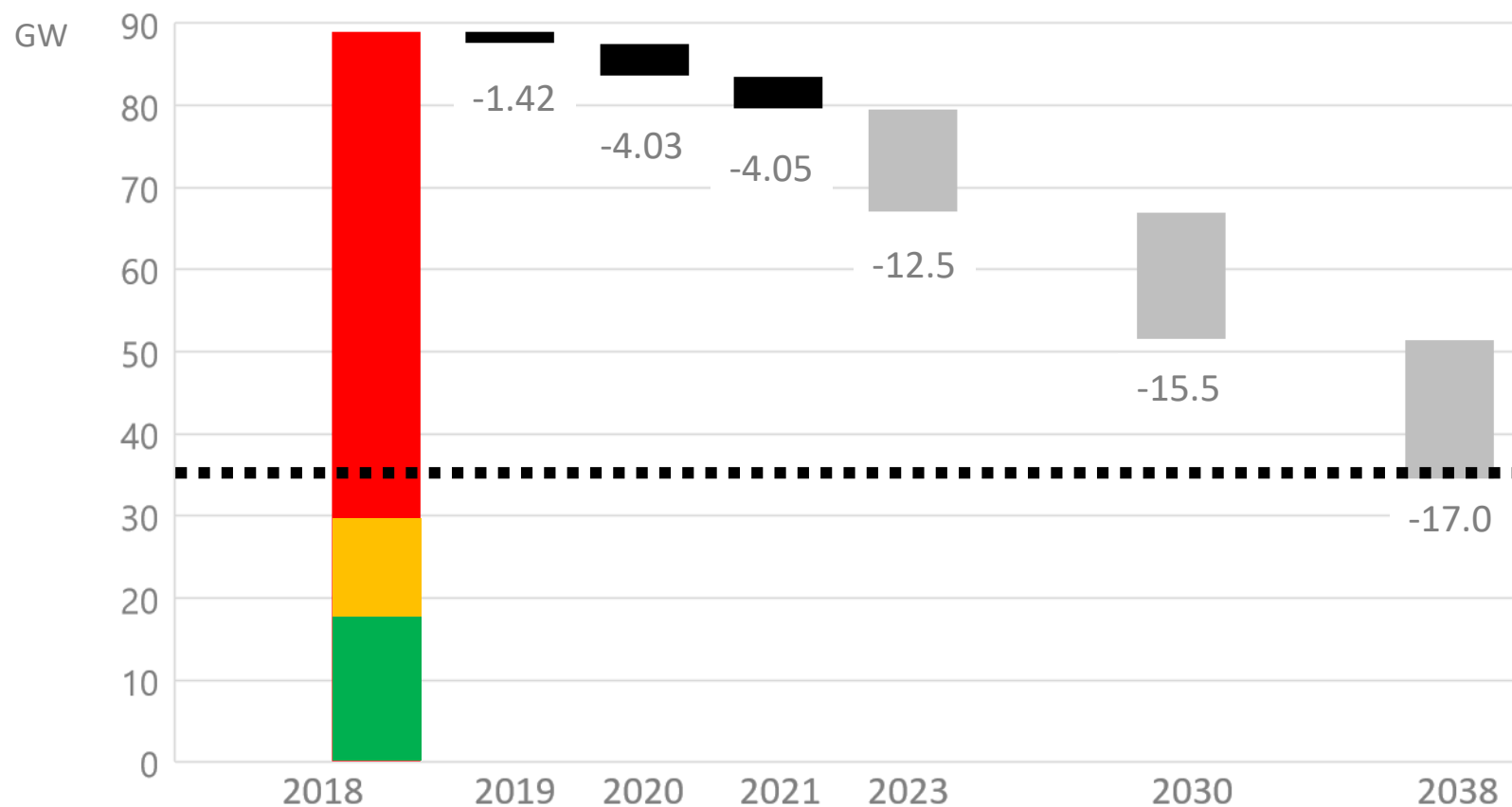


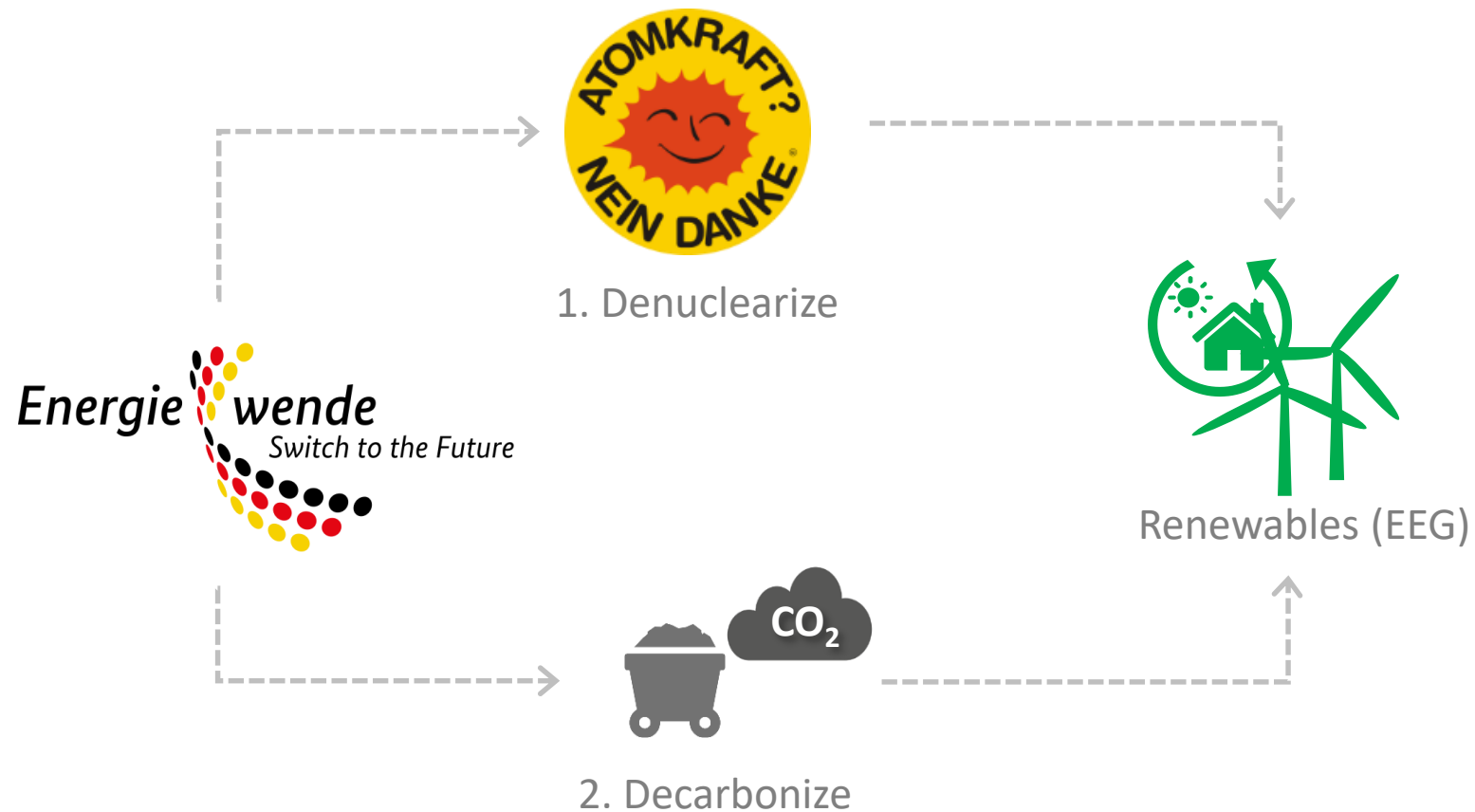
Could security of supply be in jeopardy?

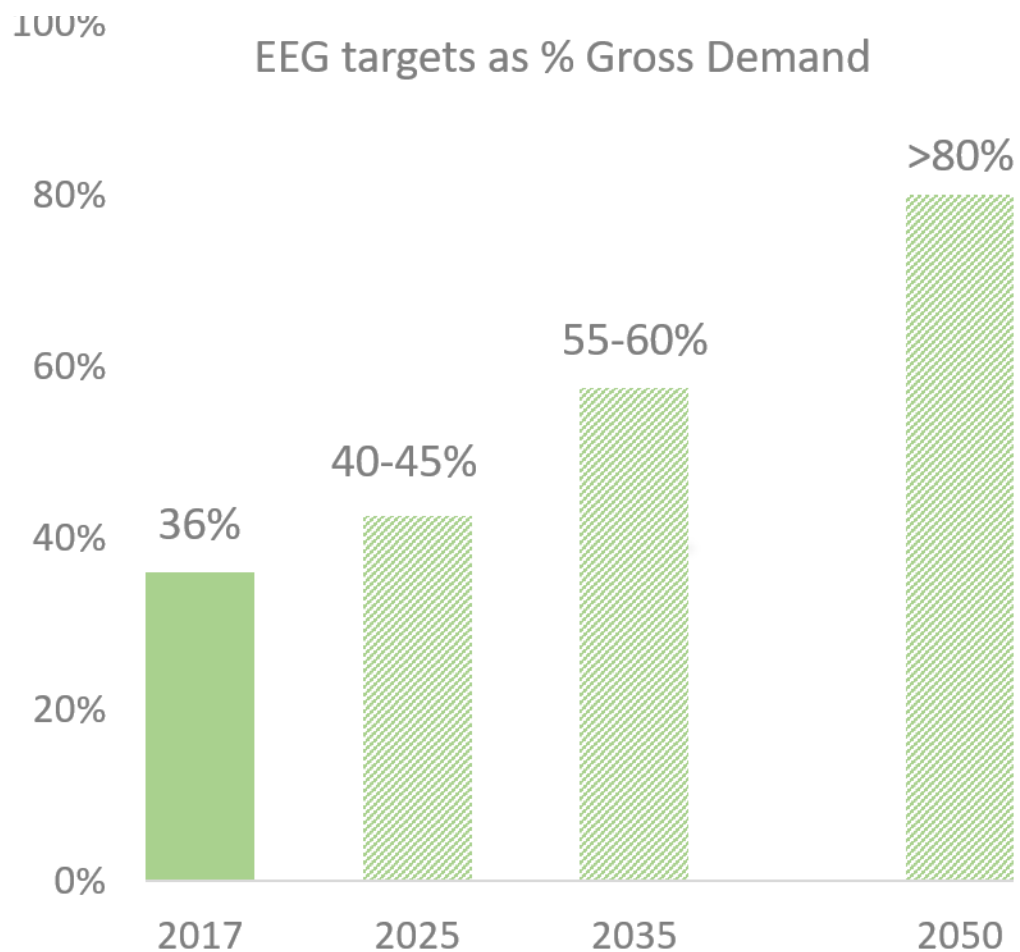
Peak Demand 2018

23.02.2018@11:00

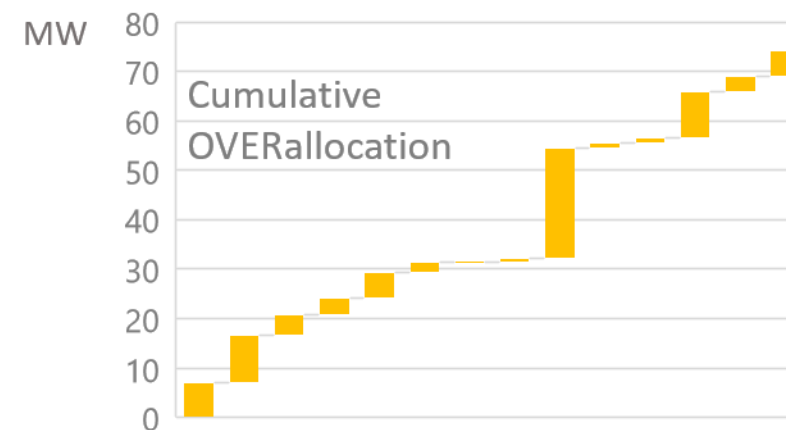
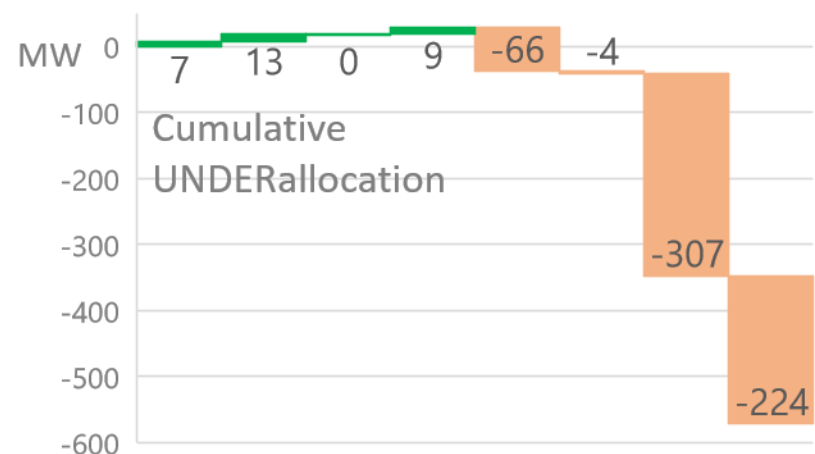
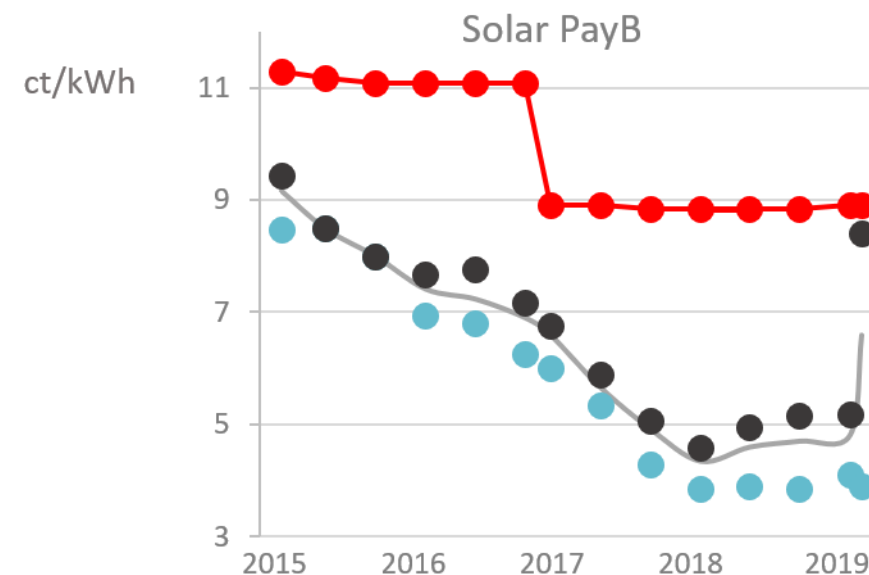
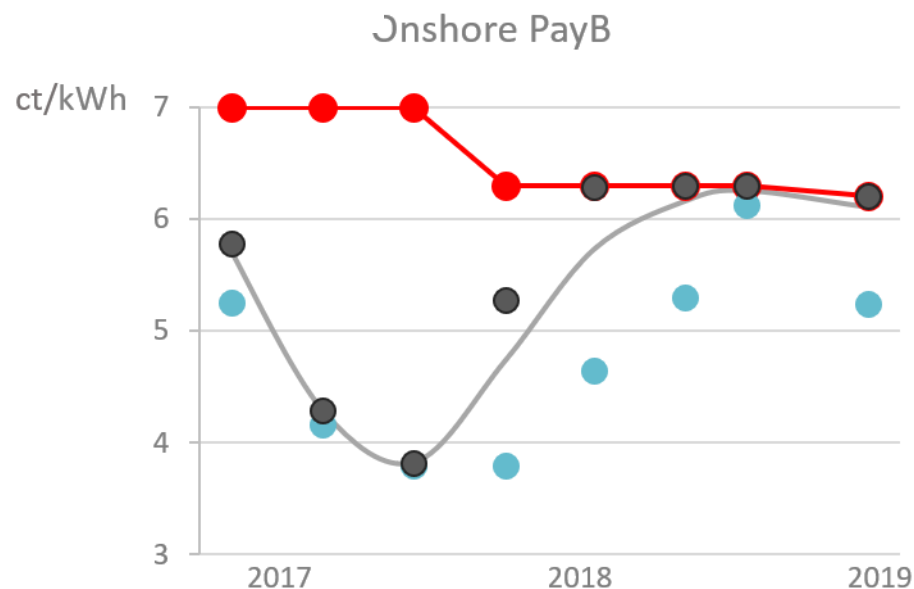
Nuclear & Coal Phase Out







BIOMASS	0.15 GW/a	2017-19
Tenders >0.15MW	0.20 GW/a	2020-22
ONSHORE	2.8 GW/a	->2019
Tenders >0.75MW	2.9 GW/a	2020->
OFFSHORE	6.5 GW	by 2020
	15 GW	by 2030
SOLAR	2.5 GW/a	2017->
Tenders >0.75MW		
Extra tenders: Date tbd.		
Technologies: Specific & Blind		

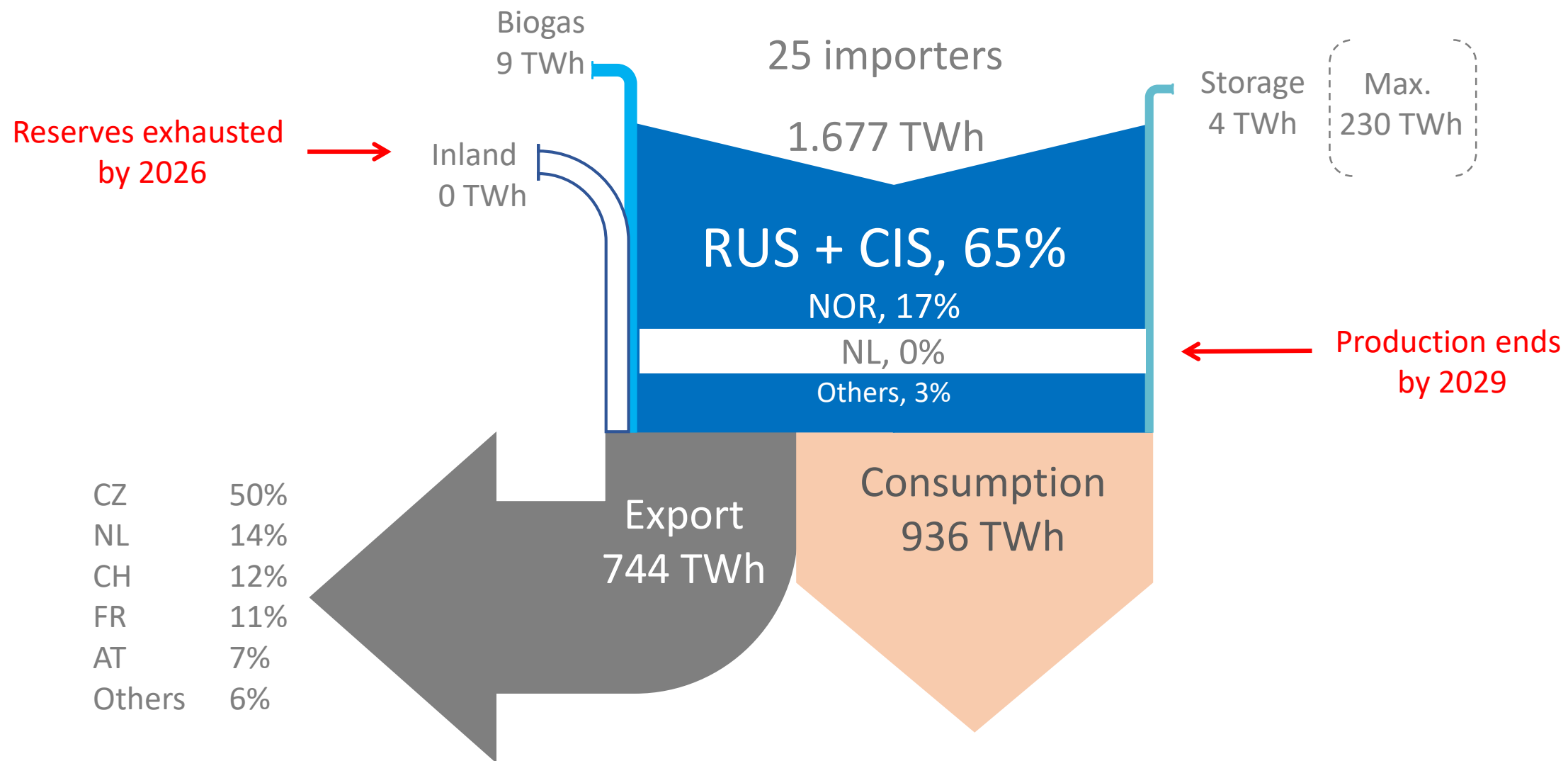


2. Natural gas:

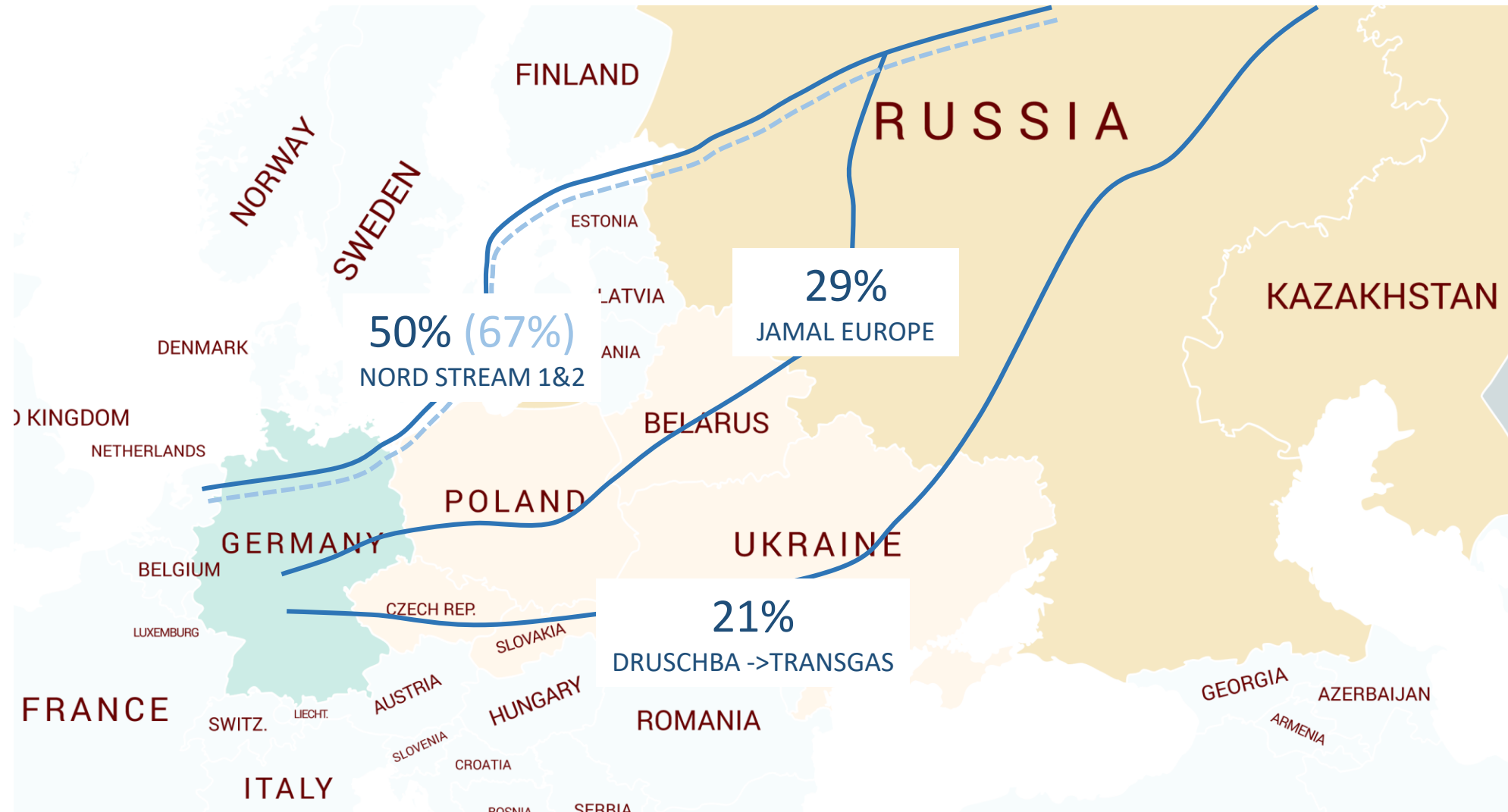
production & cross trade



Gas Production, imports and transit.



Strong geopolitic quarrel behind Nordstream lines



Low and High calorific gas markets

L-Gas ends by 2030.
Pipeline conversion
programme.



H-Gas covers
over 70% demand.

TSOs:

- Gaspool (GLP)
- NetConnectGermany (NCG)

which operate both L- and H-Gas markets

Price formation and adjustment mechanisms in Germany

Dr. Carsten Trapp
Senior Analyst, Wattsight

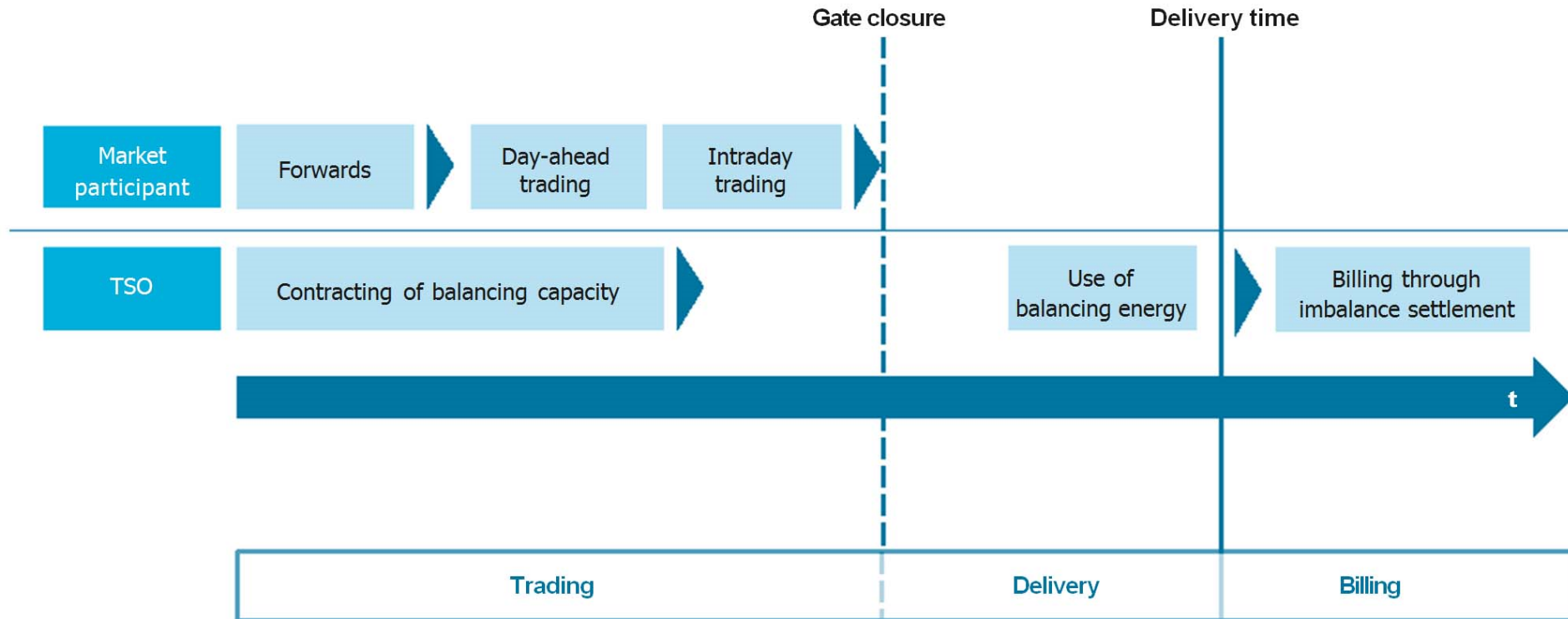
About Wattsight

- We are a leading **provider of data, analysis** and consulting services to the European energy market.
- Formerly known as MKonline, Wattsight was demerged from the Norwegian portfolio management firm Markedskraft in 2017
- **Over 350 subscribing customers**, including some of Europe's largest power and energy companies and financial institutions.
- **Over 35 employees** including experts in power and energy markets, climate policy, mathematical and economic modelling, forecasting methodologies and market reporting.
- Offices in **Arendal, Oslo and Berlin**



Wholesale market

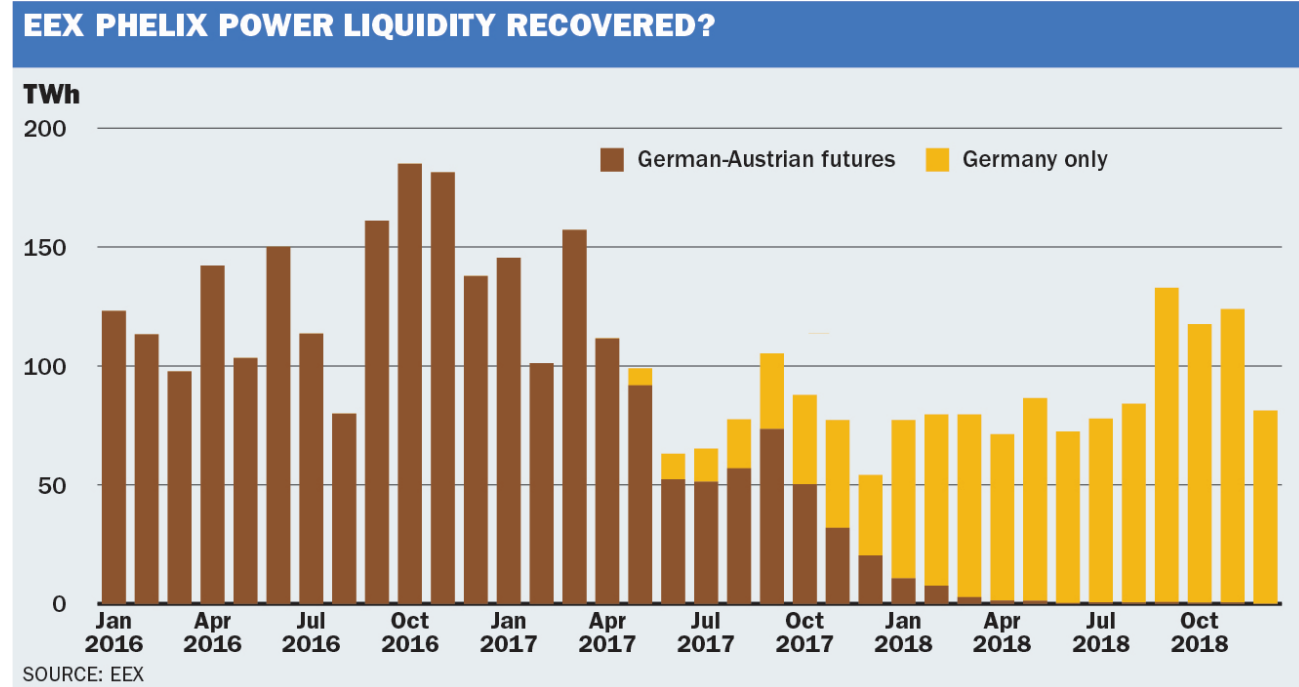
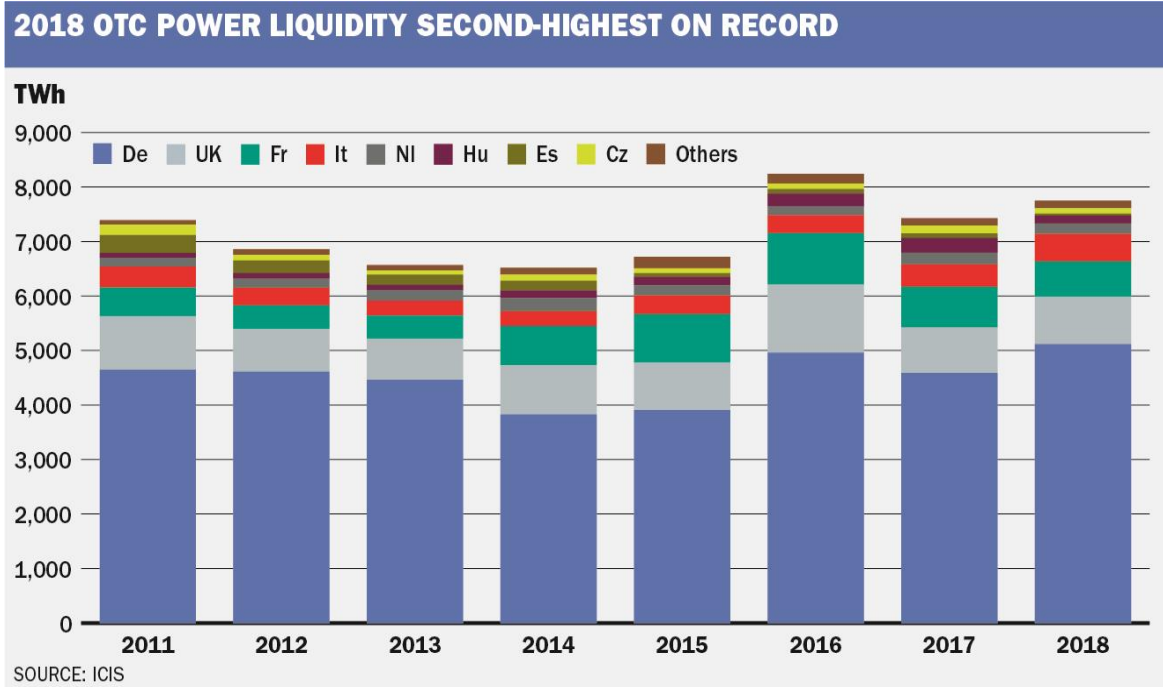
Submarkets of the electricity market in Germany, chronological representation



Source: Own graphic based on data provided by Frontier

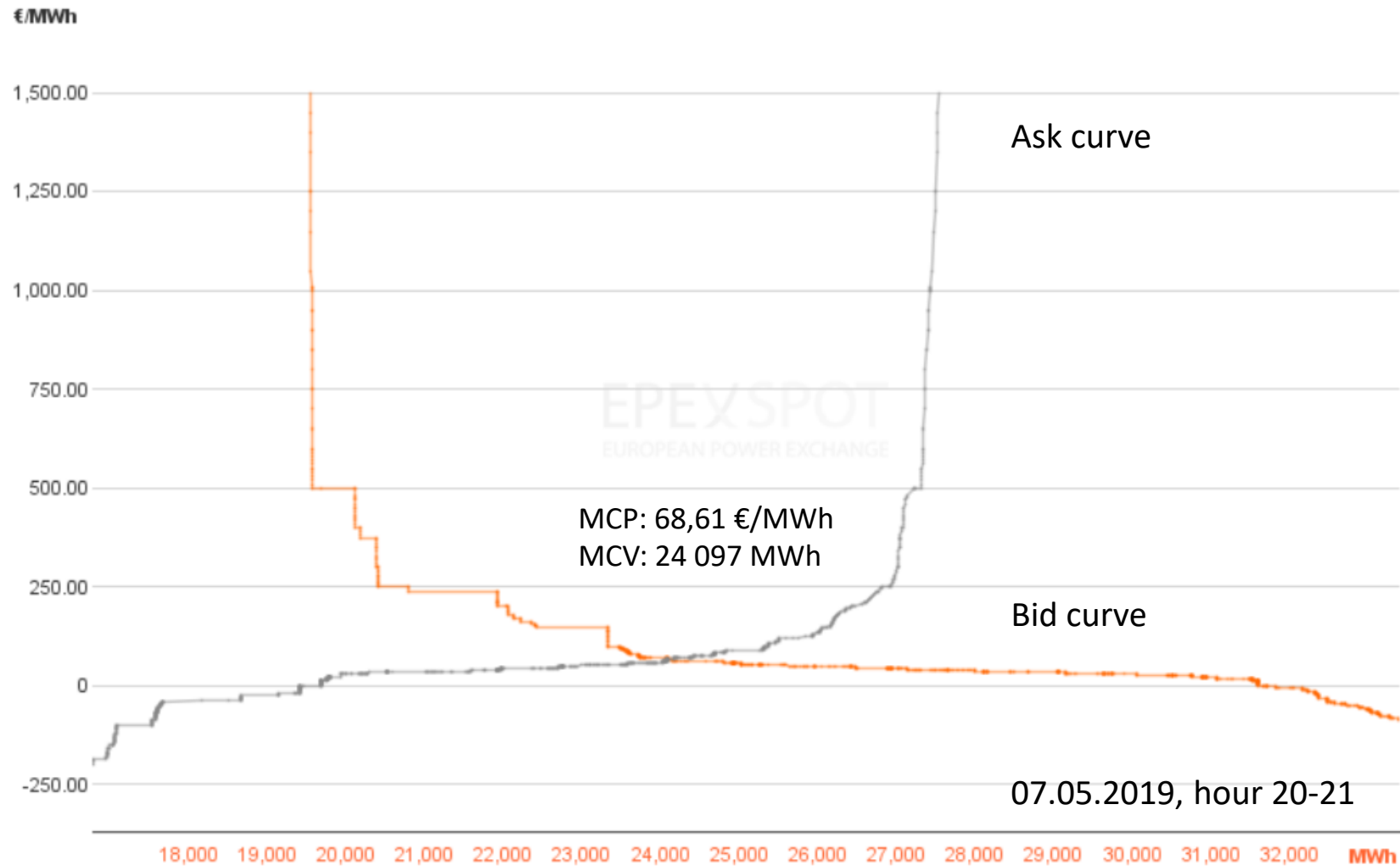
SMARD: www.smard.de

Forward: OTC and Exchange trading



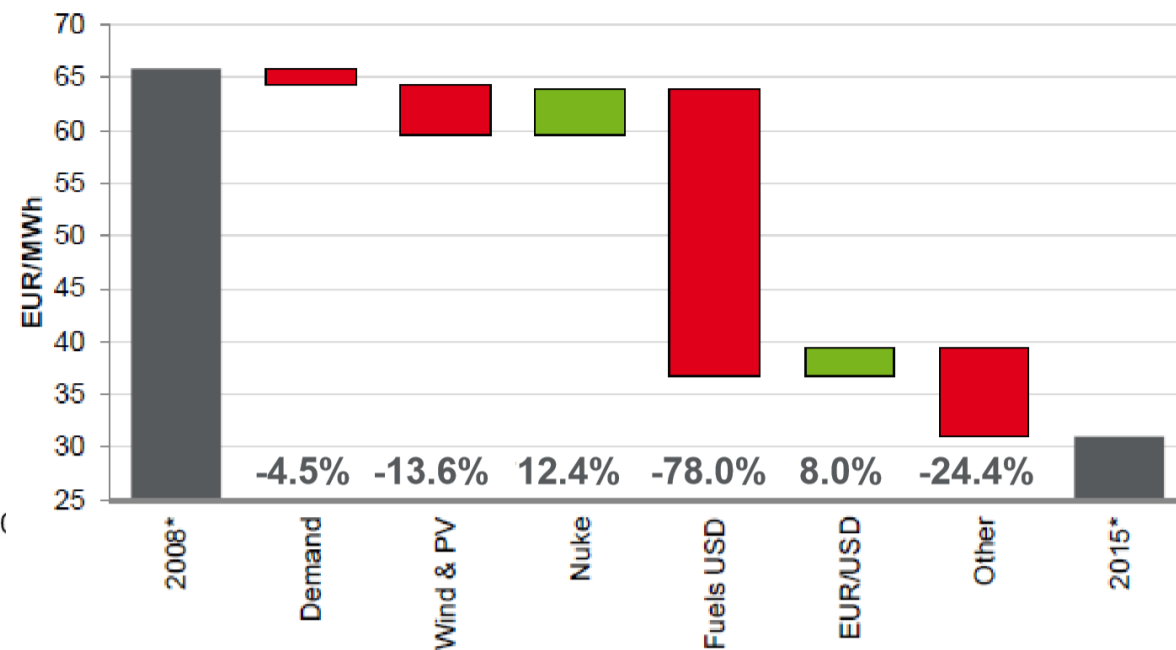
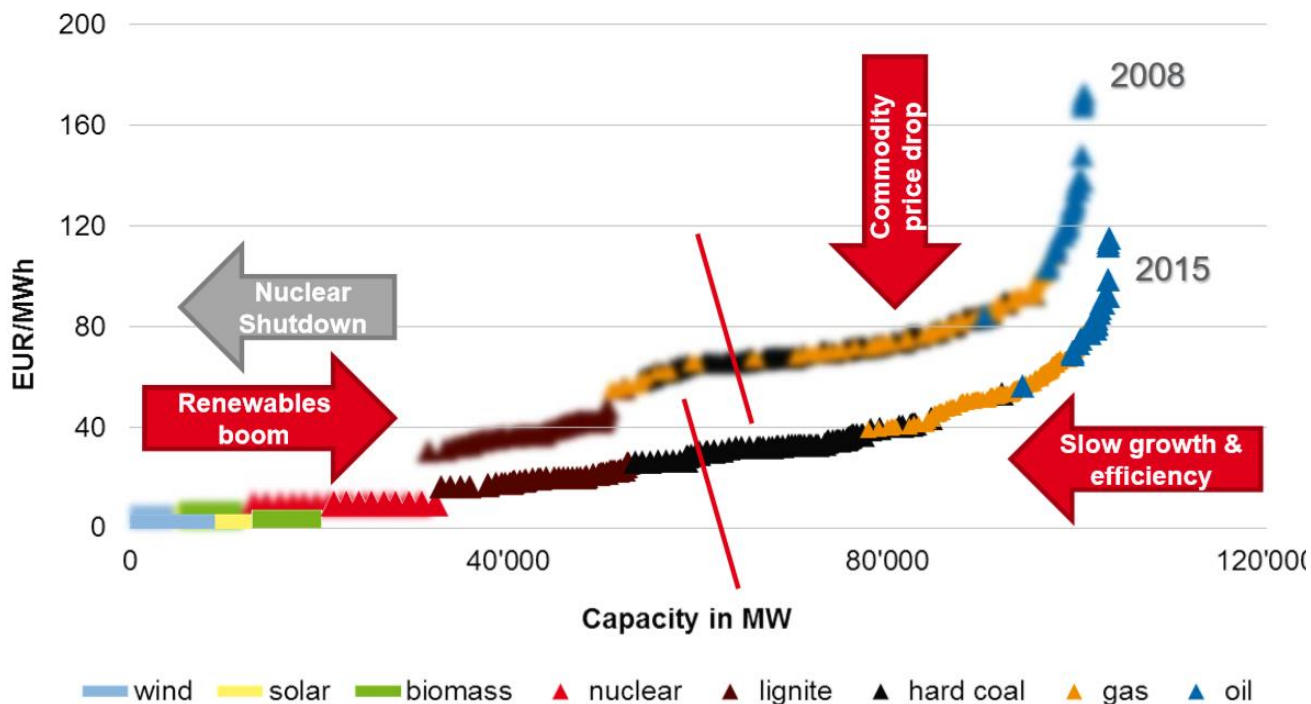
- 20-30% of trading volume through exchanges
- German-Austrian price zone split 1 October 2018

Day-ahead: Market coupling price



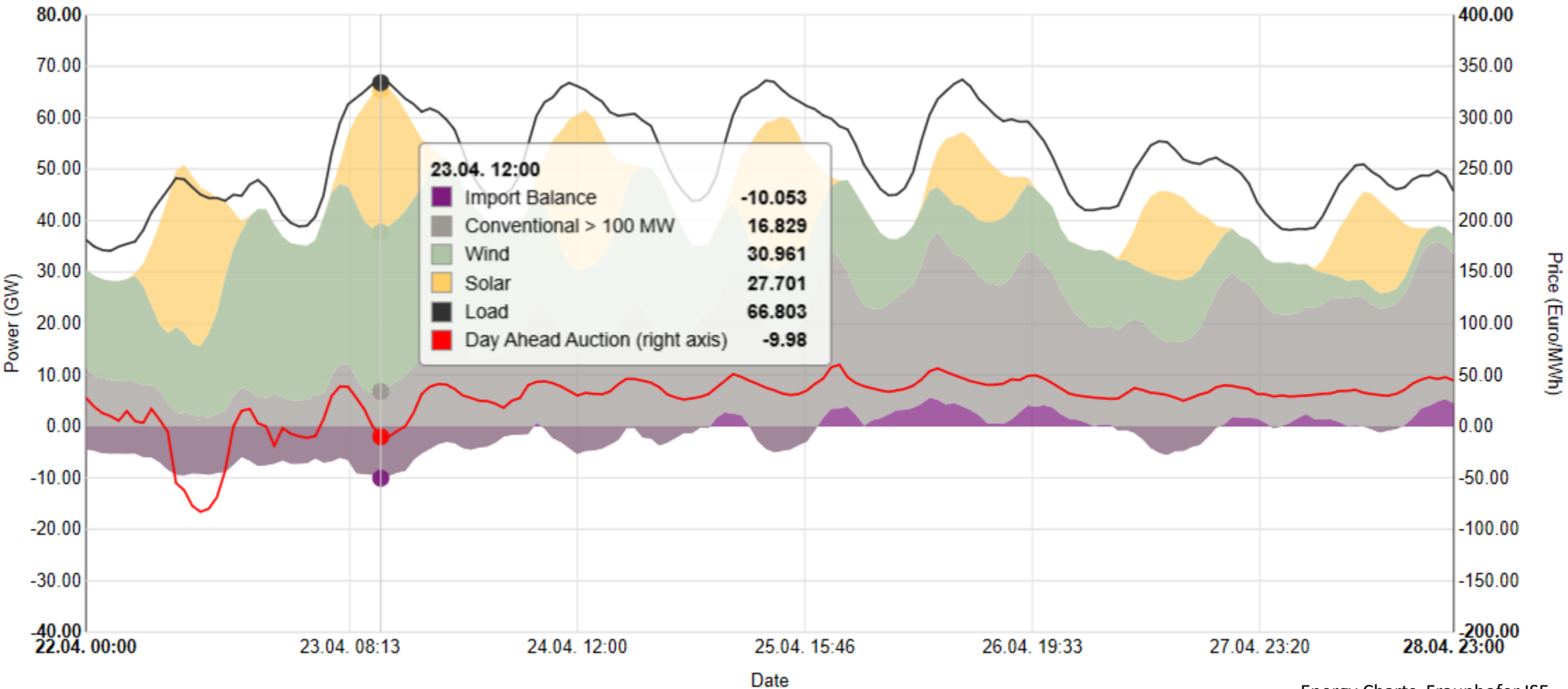
Day-Ahead: Evolution of German merit-order

Merit-Order Germany 2008 vs 2015



European Power Market Summit 2016, European Power grids and markets: View from the Trading Floor; Axpo; 2016

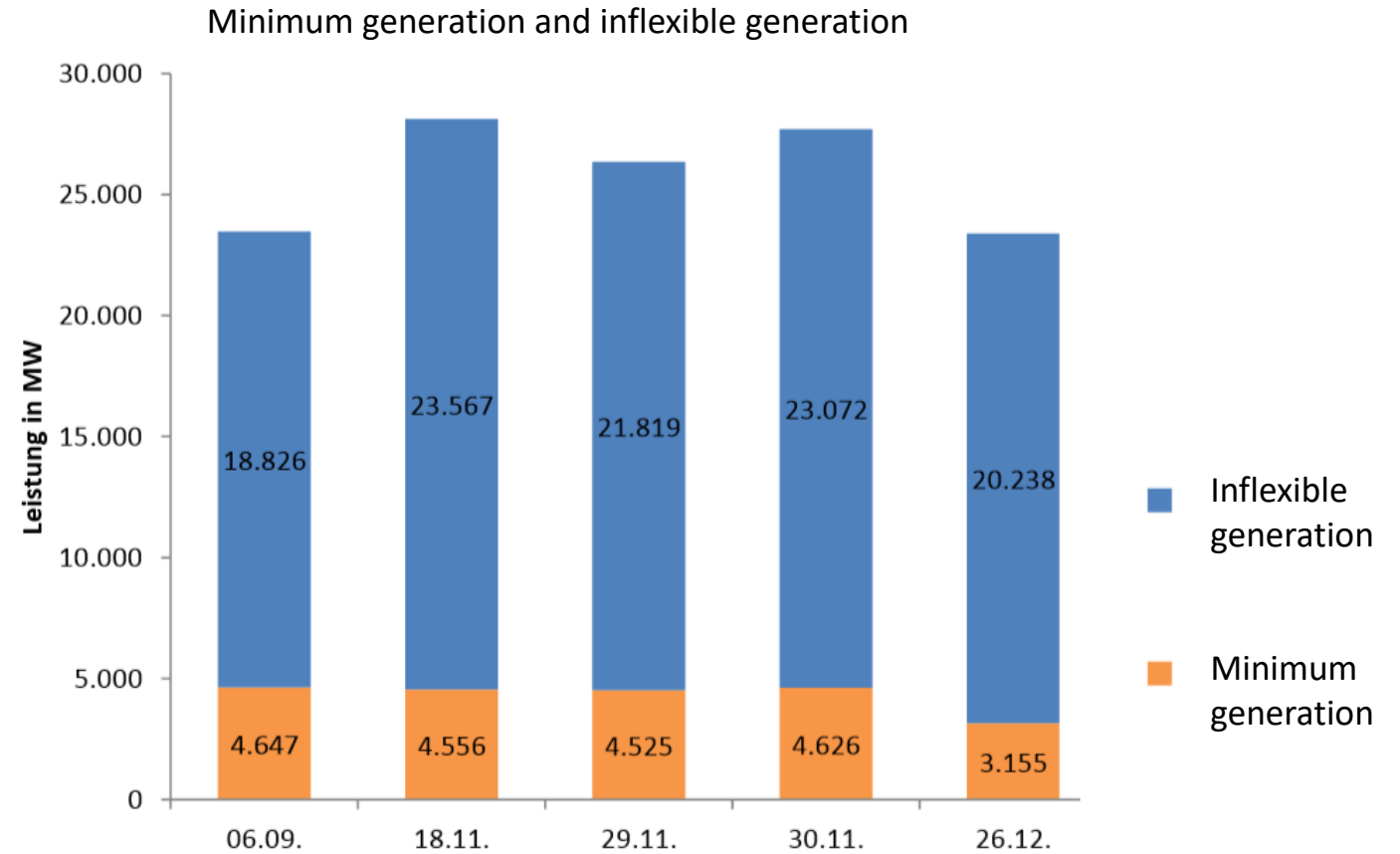
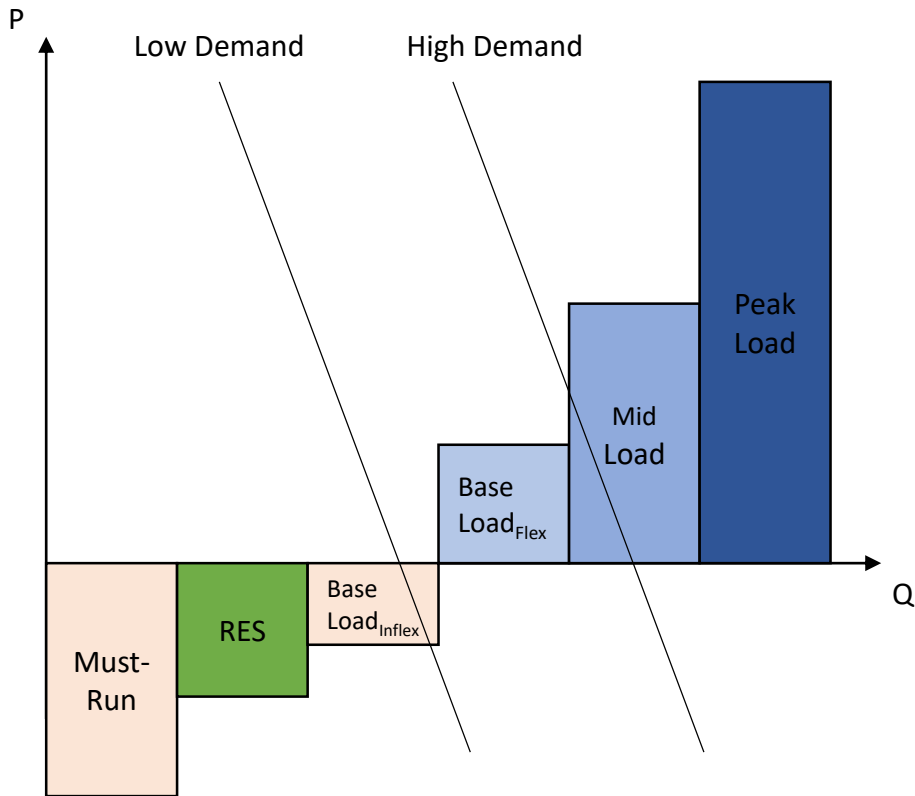
Day-Ahead: Negative prices



Datasource: 50 Hertz, Amprion, Tennet, TransnetBW, EEX, EPEX SPOT

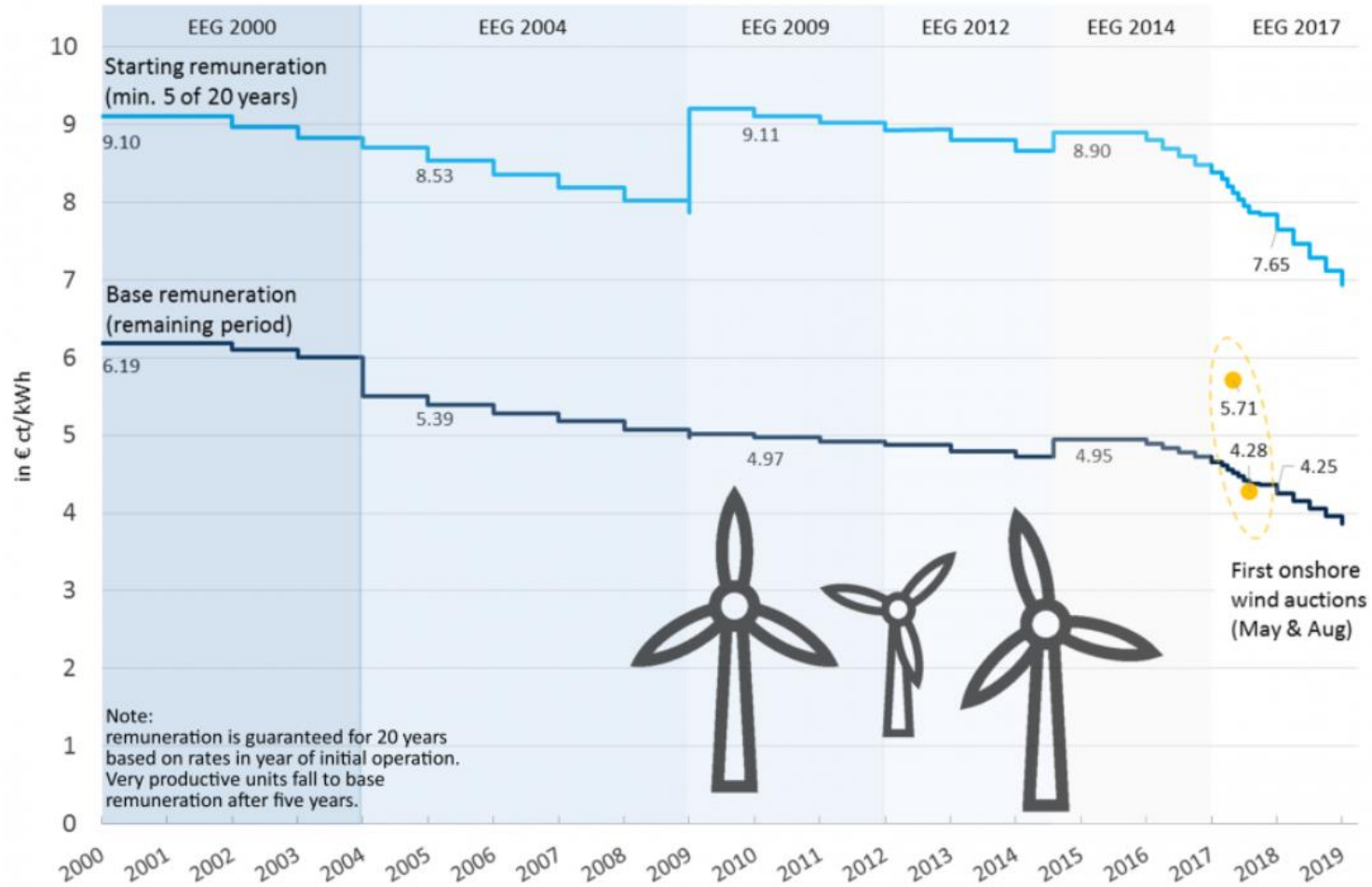
Energy Charts, Fraunhofer ISE

Day-Ahead: Negative prices



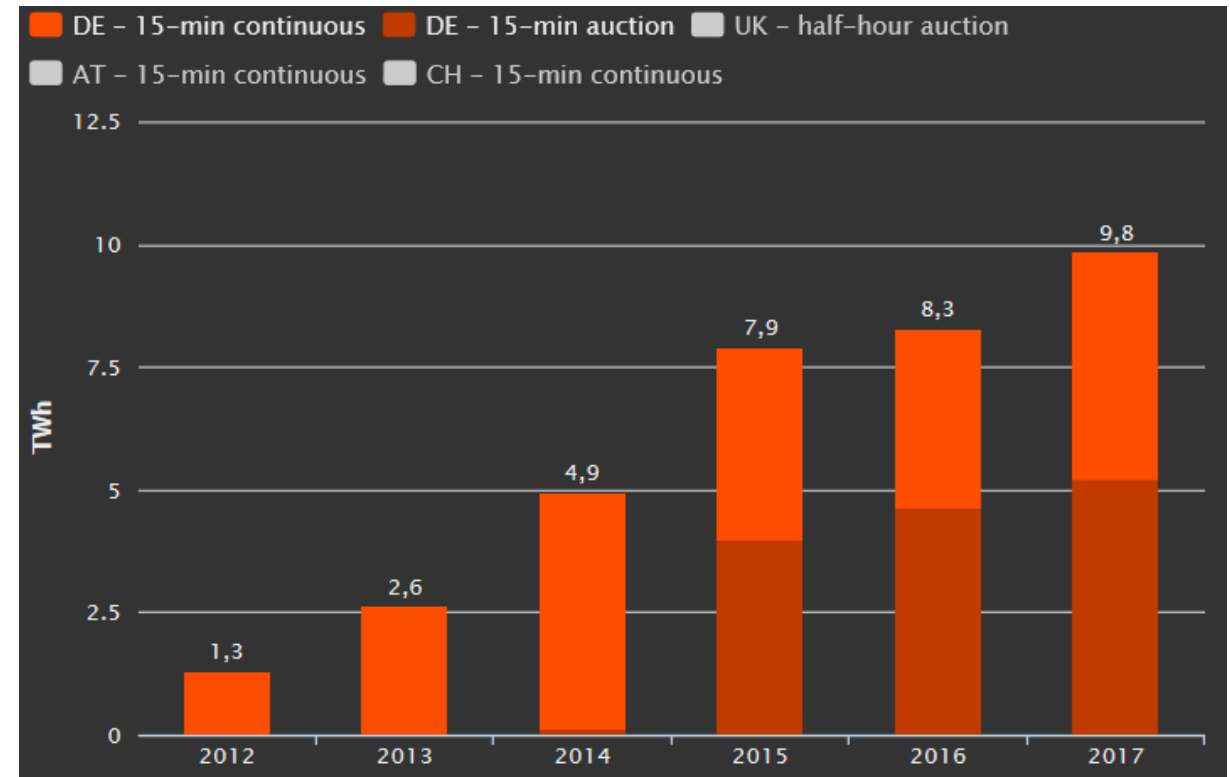
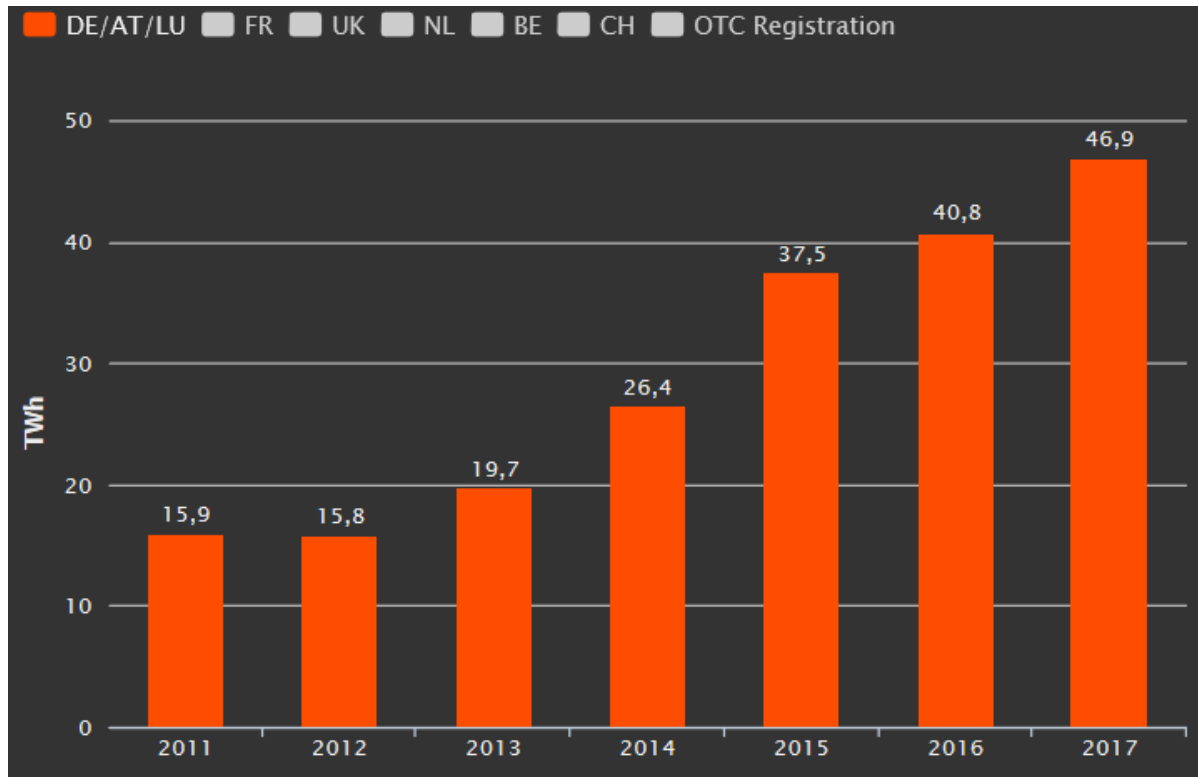
BNetzA, Bericht über die Mindesterzeugung, 2017

Feed-in tariffs: Example onshore wind



Clean Energy Wire, Data: BNetzA 2017, Windmonitor Fraunhofer IWES

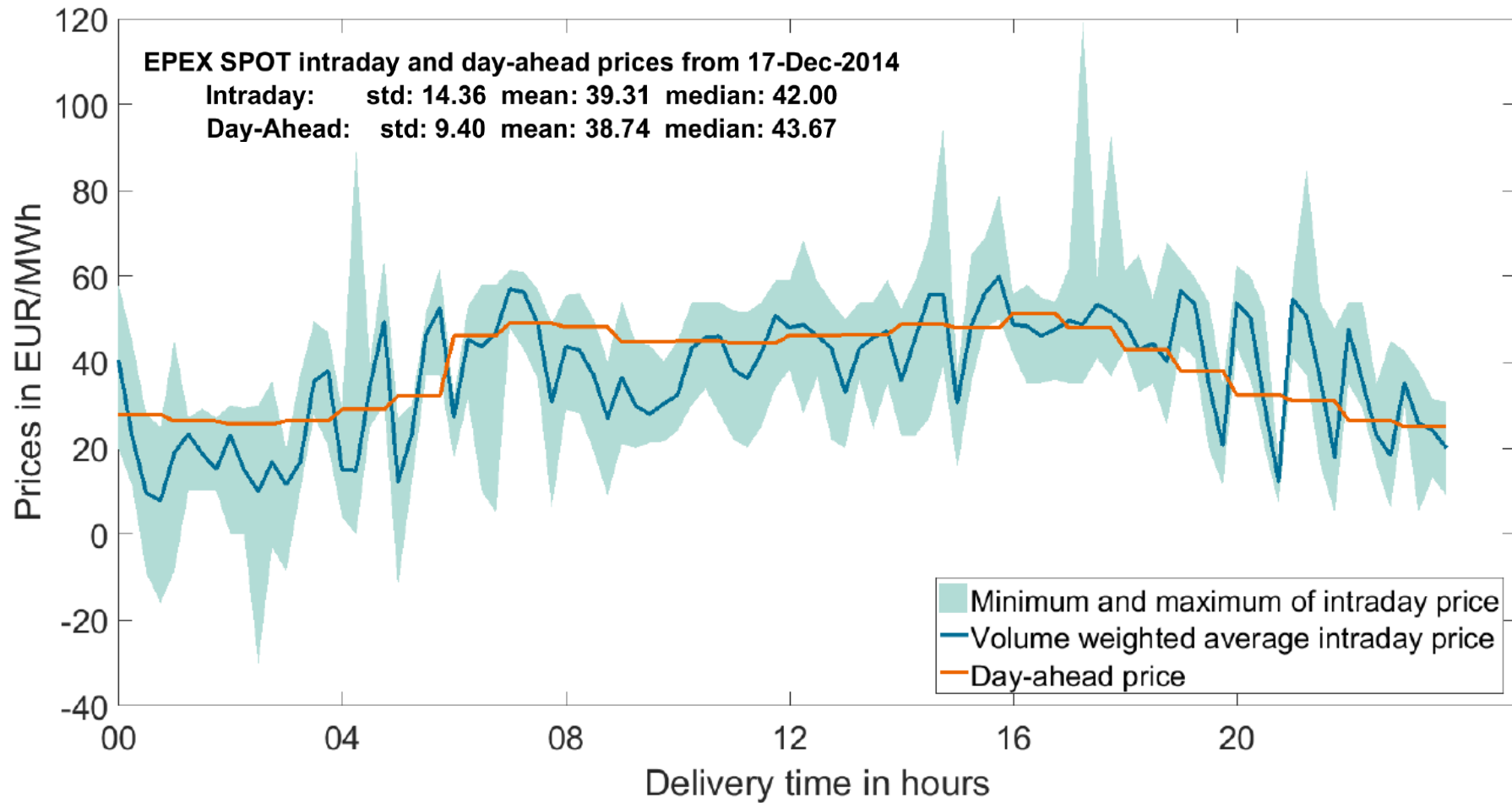
IntraDay: Trading volumes



EPEX Spot, www.epexspot.com

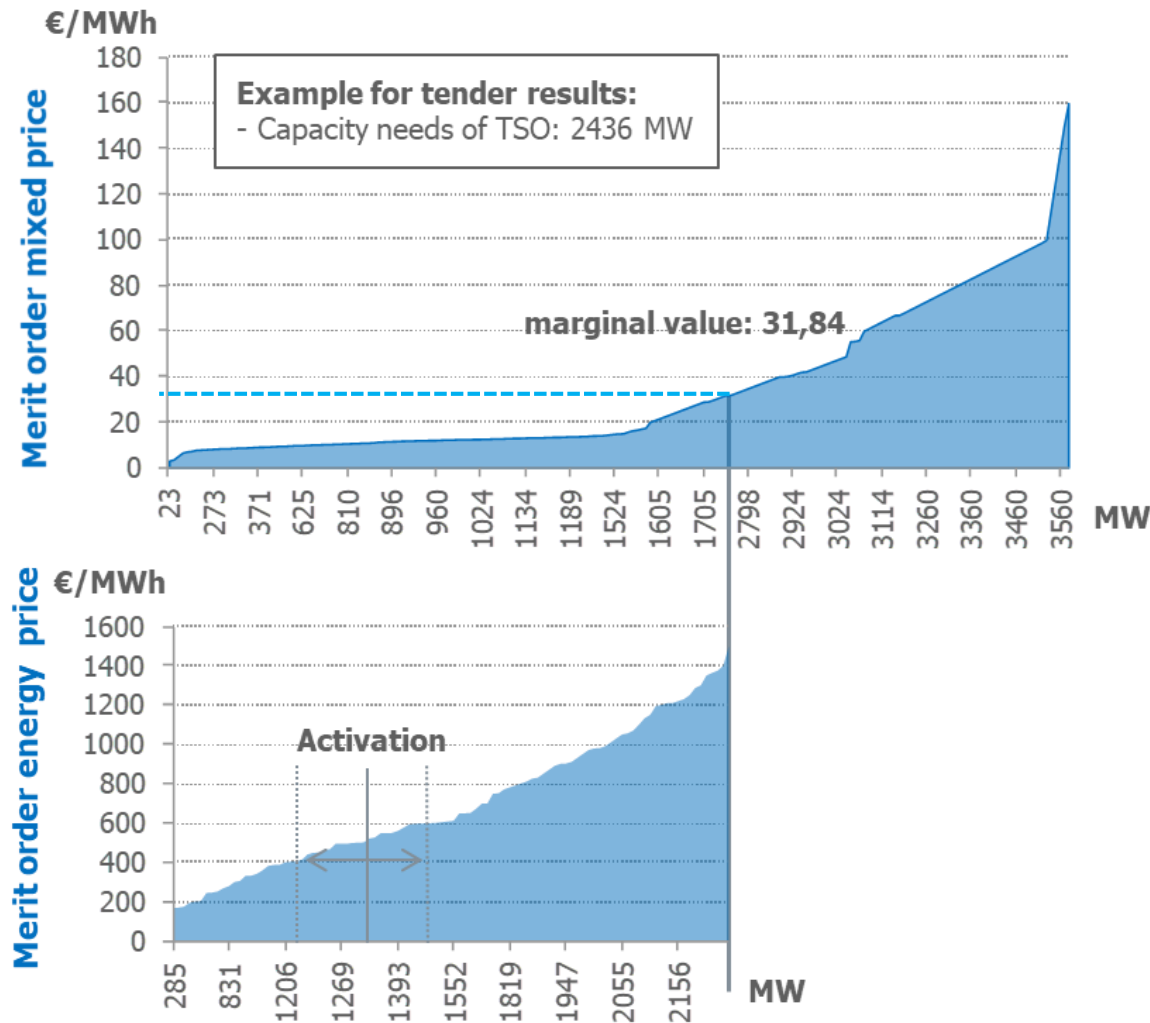
- Hourly & 15-min continuous trading (pay-as-bid based on limit order book)
- 15-min auction (uniform clearing price using EUPHEMIA algorithm)

IntraDay versus Day-Ahead price



Martin, German Intraday Electricity Market Analysis and Modeling based on the Limit Order Book, 2018

Balancing market

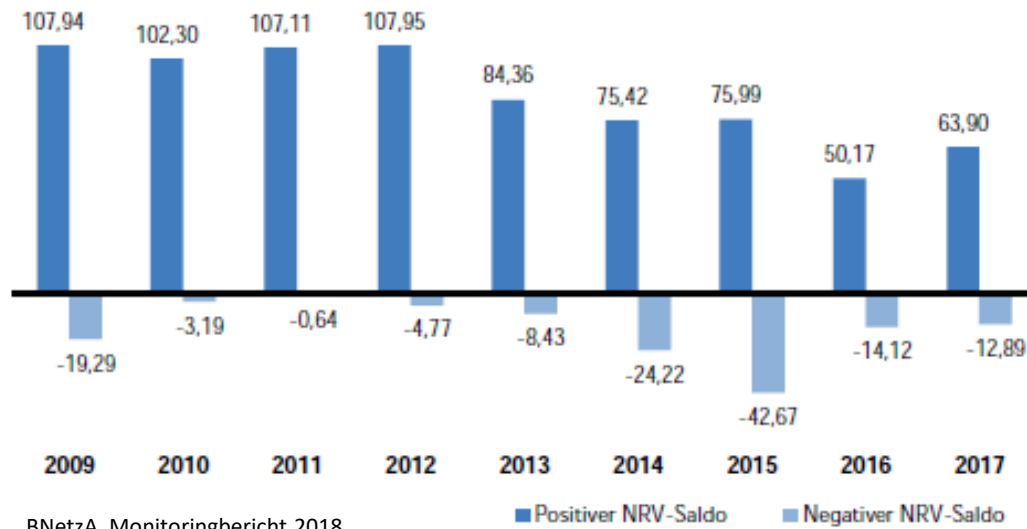


- Suppliers receive capacity price for securing reserve capacity and energy price when being activated (pay-as-bid system)
- Tendering: merit order based on *mixed price = capacity price + energy price * activation probability*
- Activation: merit order based on energy price

Balancing market

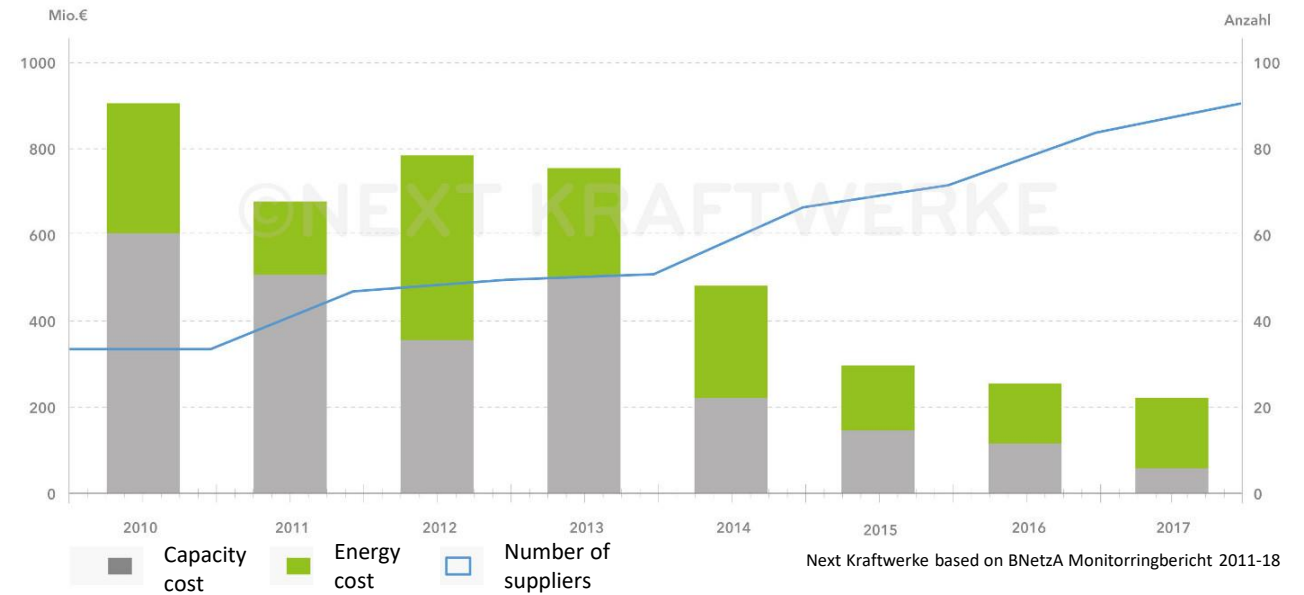
Average Balancing price

in Euro/MWh



BNetzA, Monitoringbericht 2018

Balancing market development



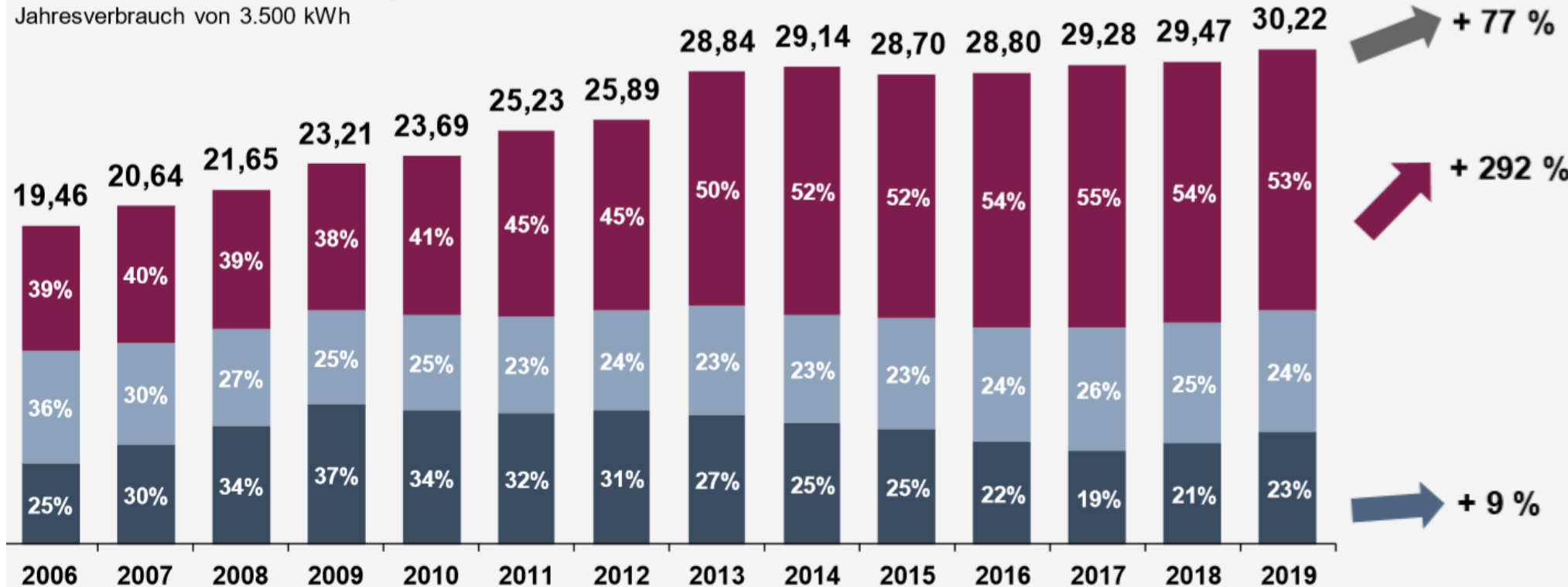
Next Kraftwerke based on BNetzA Monitoringbericht 2011-18

- Uniform balancing energy price (reBAP) for whole Germany per ¼ hour
- Price based on TSO's payments for activated control energy

Electricity price for households

Durchschnittlicher Strompreis für einen Haushalt in ct/kWh und Anteile in %

Jahresverbrauch von 3.500 kWh



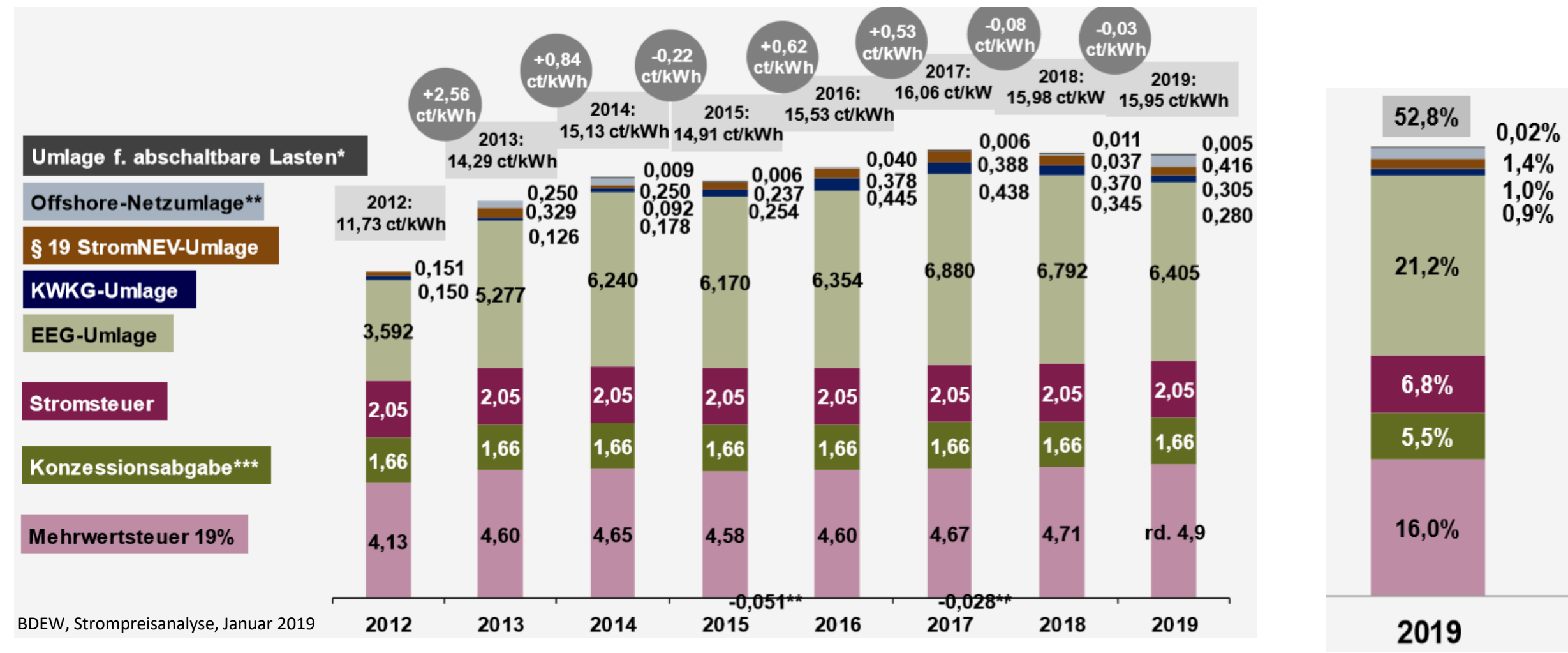
■ Steuern, Abgaben und Umlagen

■ Netzentgelt inkl. Messung, Messstellenbetrieb, (Abrechnung*)

■ Beschaffung, Vertrieb

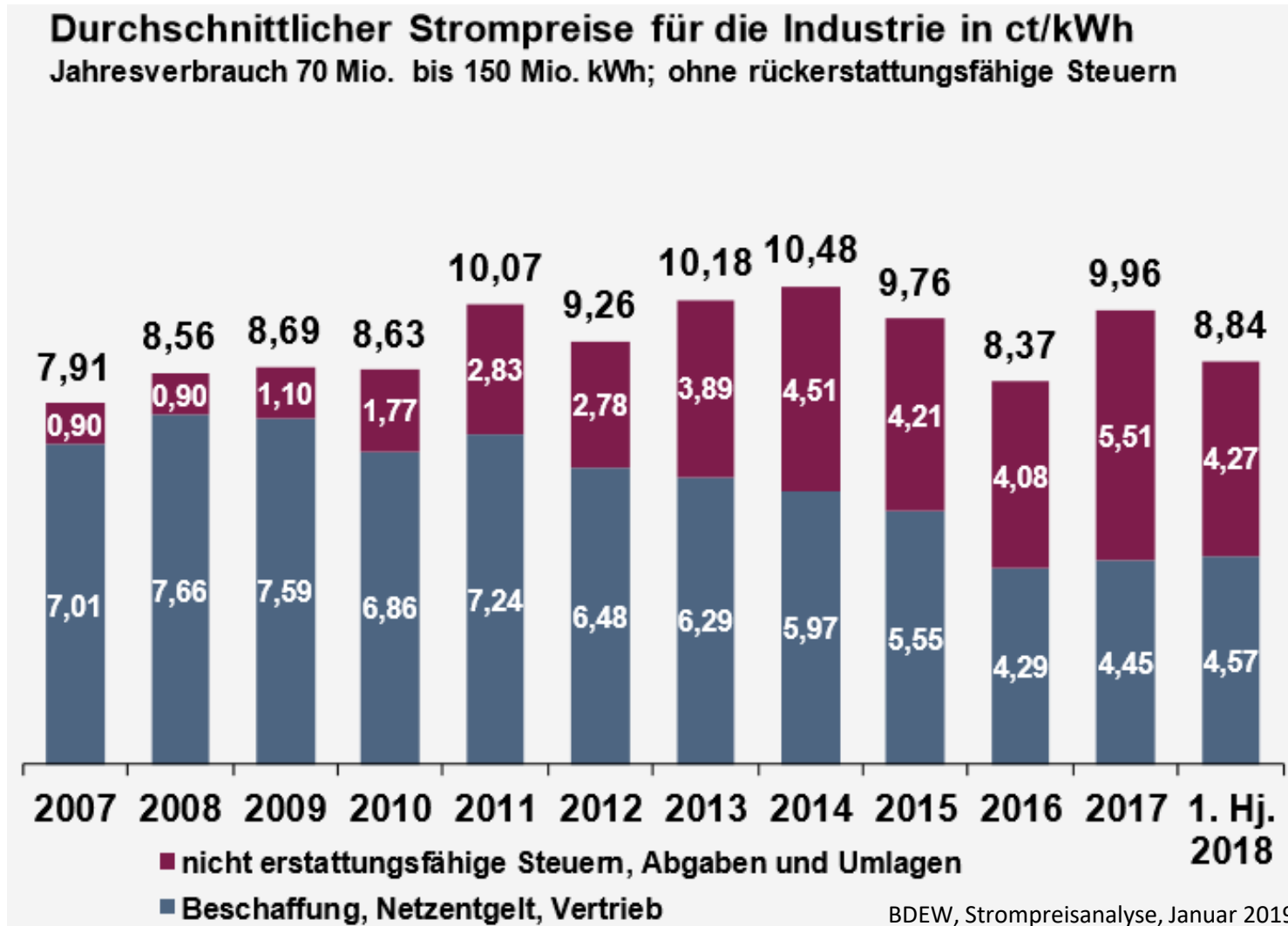
BDEW, Strompreisanalyse, Januar 2019

Taxes, levies & surcharges for households



BDEW, Strompreisanalyse, Januar 2019

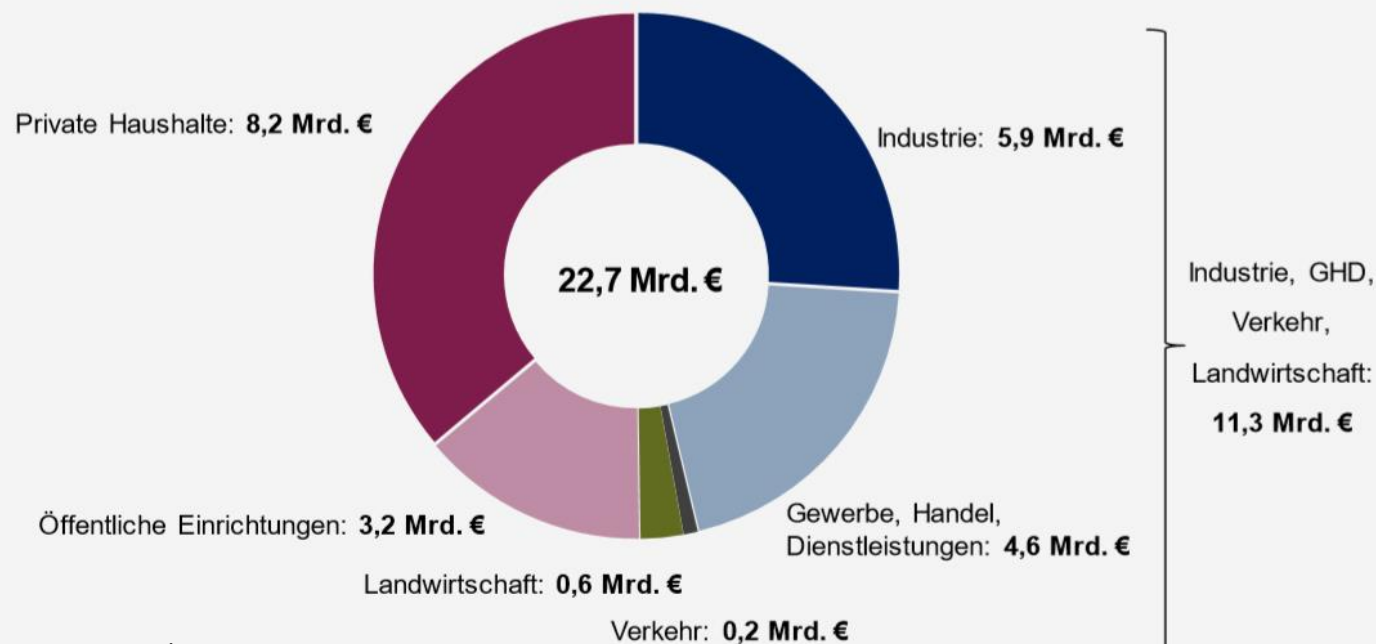
Electricity price for industry



BDEW, Strompreisanalyse, Januar 2019

Renewable surcharge – Who pays?

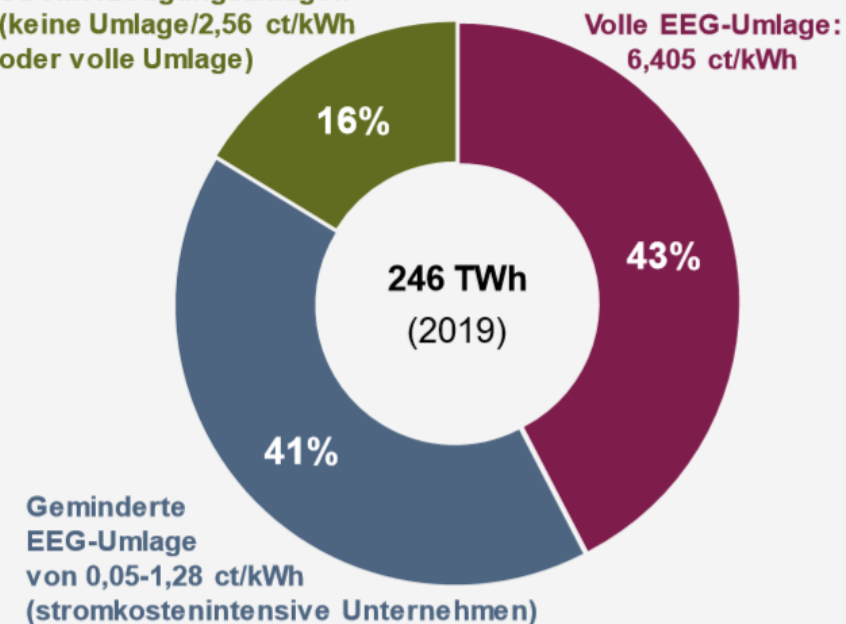
Von den Verbrauchern zu tragende Kosten* für das EEG 2019: **22,7 Mrd. €**



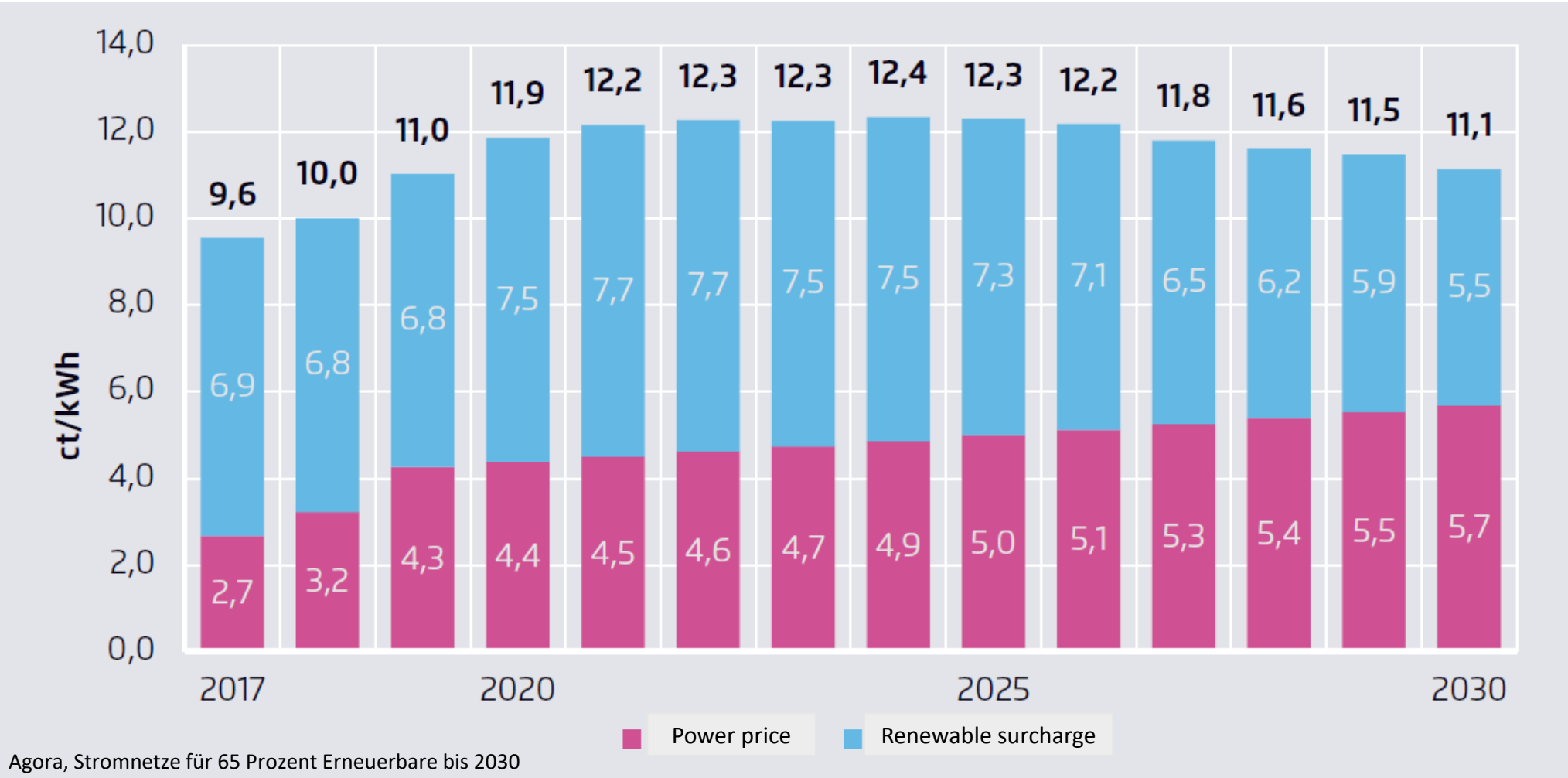
BDEW, Strompreisanalyse, Januar 2019

Stromverbrauch der Industriebetriebe

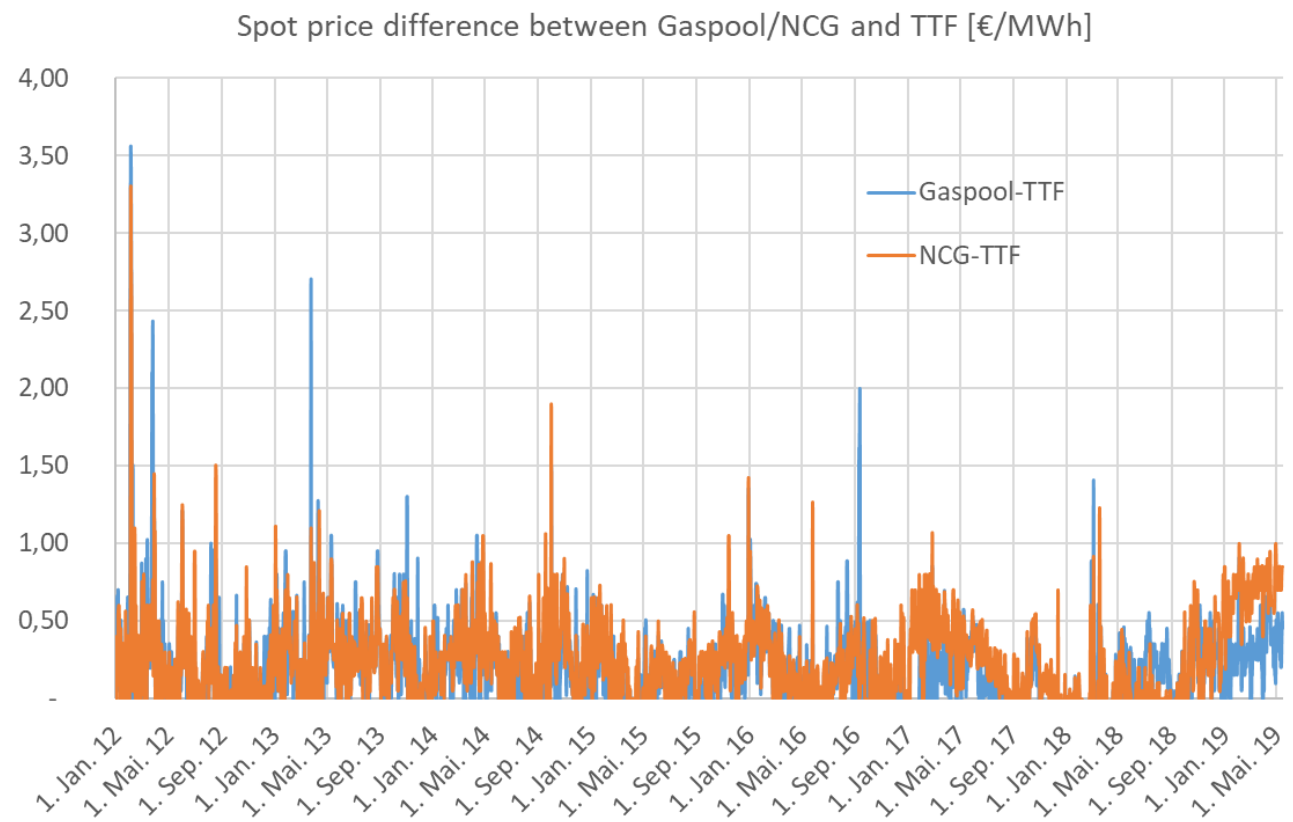
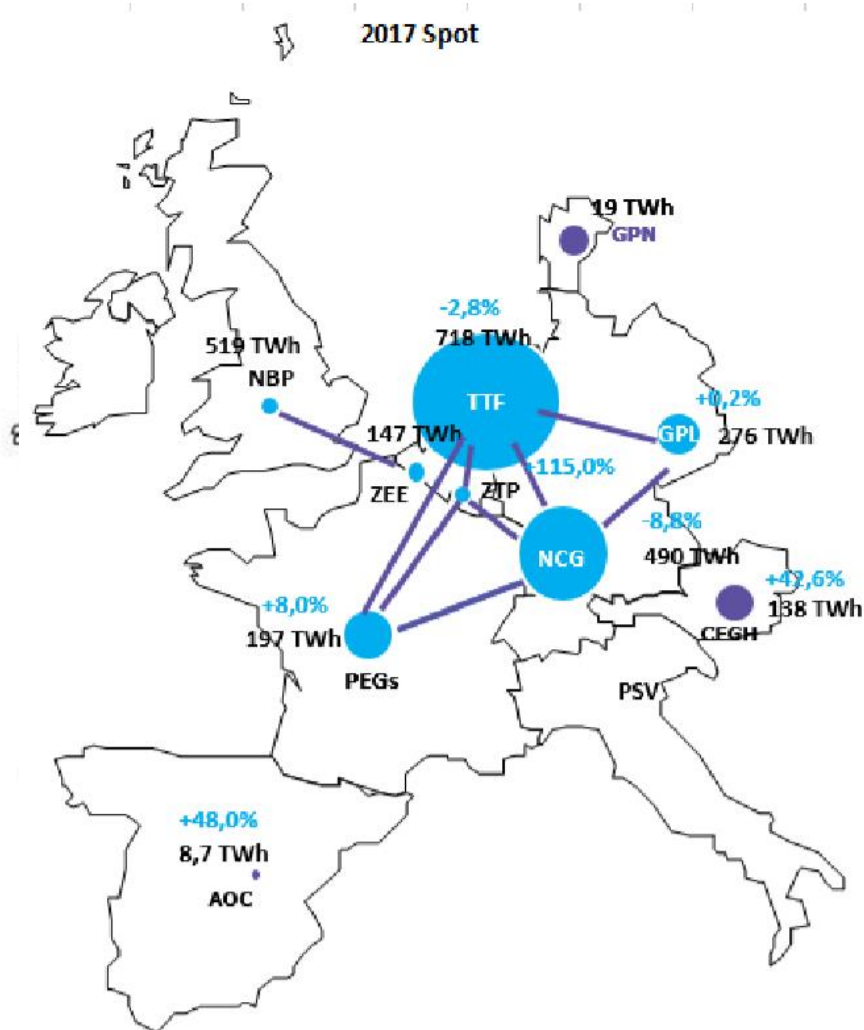
Selbstverbrauch aus eigenen Stromerzeugungsanlagen (keine Umlage/2,56 ct/kWh oder volle Umlage)



Development of renewable surcharge



Gas market: NCG and Gaspool

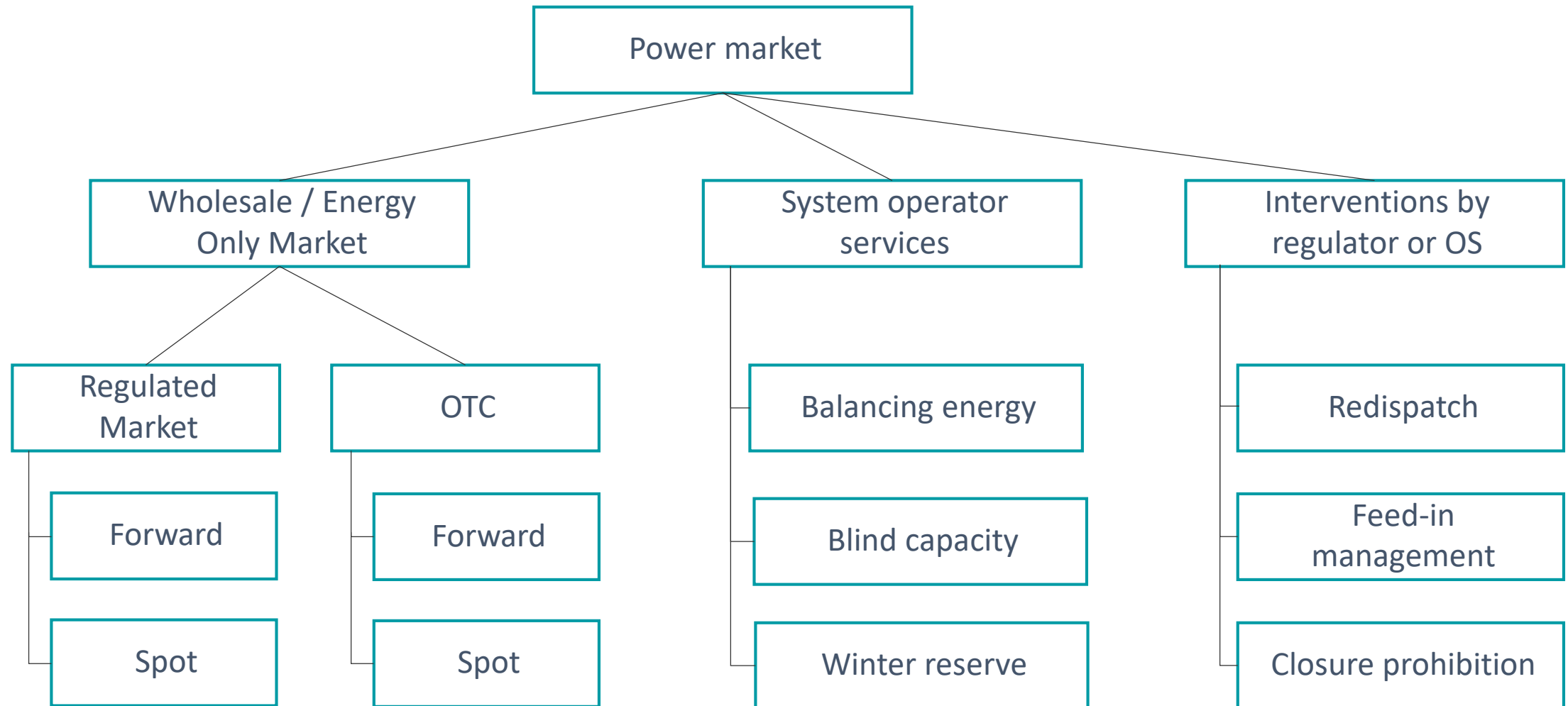


Data: Metanopoly

The German Power Market

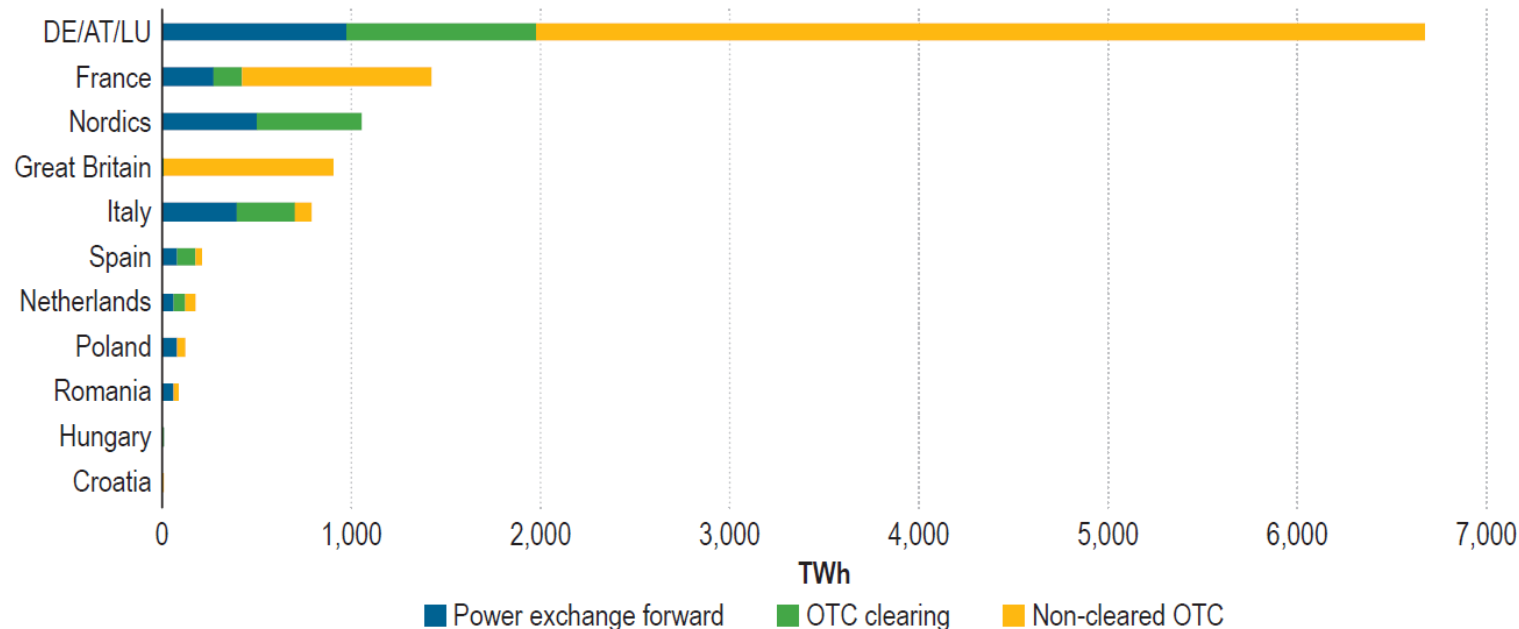
Juan Bajo
innogy

Power market design



Wholesale market liquidity (I)

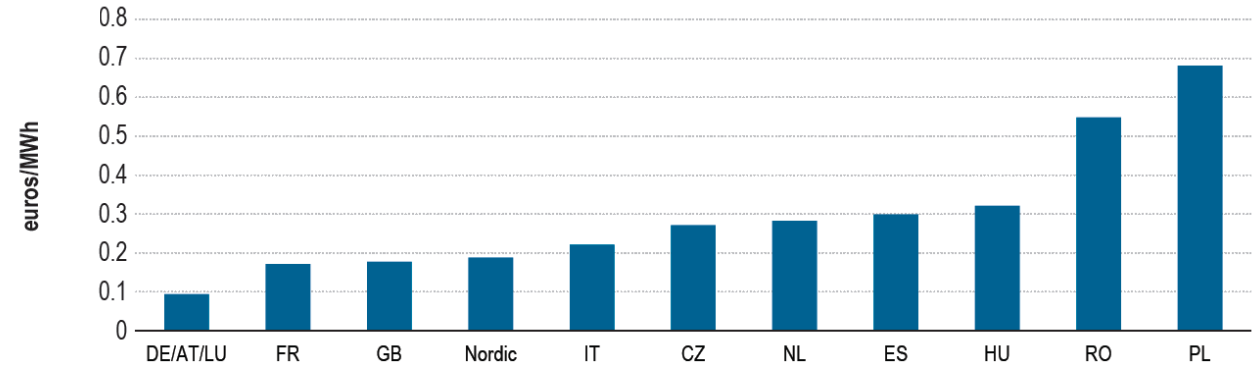
Figure 20: Forward market trading volumes per type in the biggest European forward markets – 2017 (TWh)



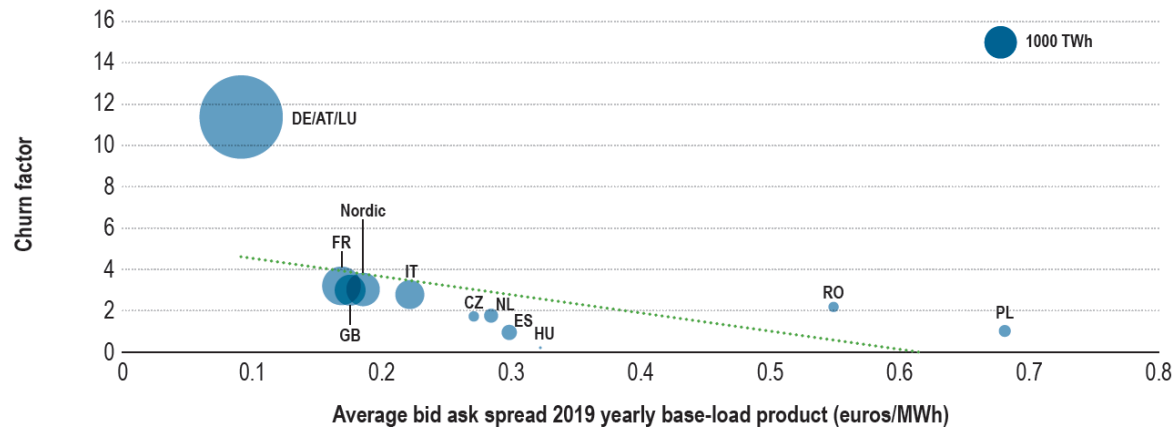
- Germany is a very liquid market in comparison to Spain
- Physical deals are more common than financial
- Narrow spreads up to Cal+3

Wholesale market liquidity (II)

Average bid-ask spreads (yearly product, 2019 delivery) in European forward markets – (euros/MWh)















Forward market churn factors and volumes (2017) and average bid-ask spreads (yearly product, 2019 delivery) in European forward markets – (TWh and euros/MWh)















Wholesale market liquidity (III)

PhelixDE Baseload Year Futures

Name	Best Bid	Best Ask	Anzahl Kontrakte	Letzter Preis	Abs. Veränd.	Letzte Zeit	Letztes Volumen	Abr. Preis	Vol. Börse	Vol. Trade Registration	Anzahl offener Kontrakte
Cal-20	49,15	49,30	98	49,15	0,33	09:26	17.568	-	597.312	263.520	69.691  
Cal-21	47,40	47,60	12	47,40	0,33	09:38	26.280	-	105.120	-	13.319  
Cal-22	48,10	48,40	-	-	-	-	-	-	-	-	4.263  
Cal-23	49,10	49,75	-	-	-	-	-	-	-	-	669  
Cal-24	-	-	-	-	-	-	-	-	-	-	35  
Cal-25	-	-	-	-	-	-	-	-	-	-	-  

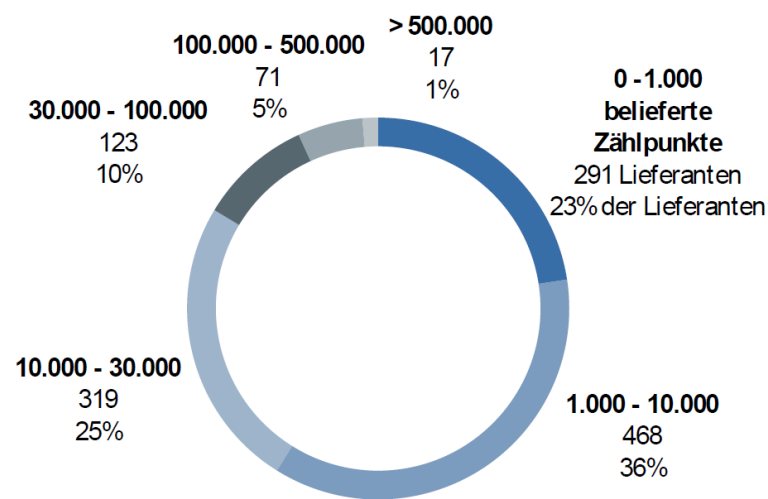
Spanish Baseload Year Futures

Name	Best Bid	Best Ask	Anzahl Kontrakte	Letzter Preis	Abs. Veränd.	Letzte Zeit	Letztes Vol.	Abr. Preis	Vol. Börse	Vol. Trade Registration	Anzahl offener Kontrakte Vortag
Cal-20	55,60	-	-	-	-	-	-	-	-	-	2.126  
Cal-21	-	-	-	-	-	-	-	-	-	-	568  
Cal-22	-	-	-	-	-	-	-	-	-	-	298  
Cal-23	47,00	-	-	-	-	-	-	-	-	-	300  
Cal-24	46,00	-	-	-	-	-	-	-	-	-	295  
Cal-25	-	-	-	-	-	-	-	-	-	-	12  

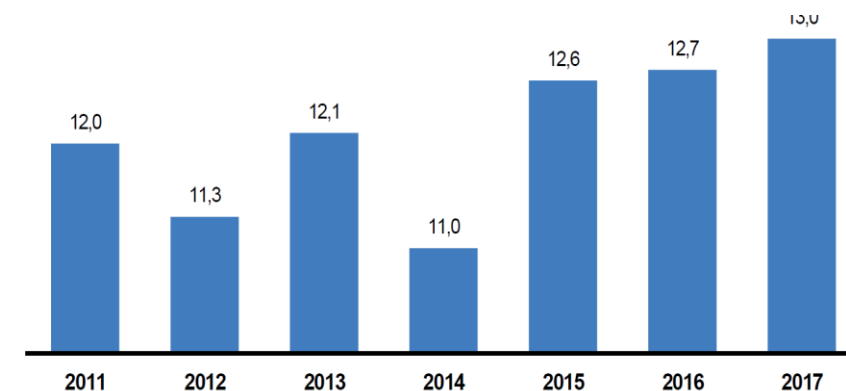
Retail market

- Retail market very fragmented
- Switching increasing but still not in UK levels
- Very developed digitalization

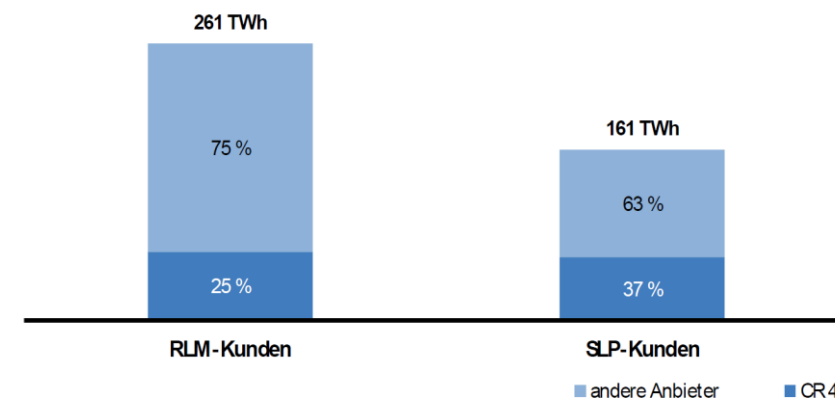
Suppliers by number of customers



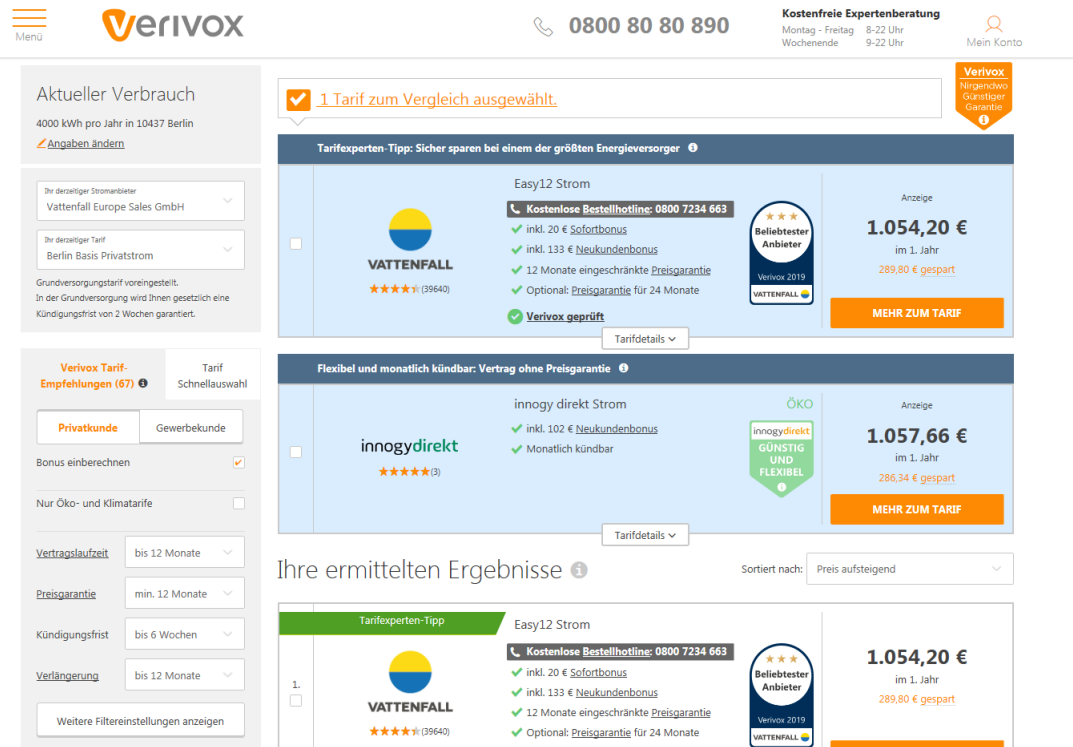
Development of supplier switching (no household customers)



“Big four” retail market share



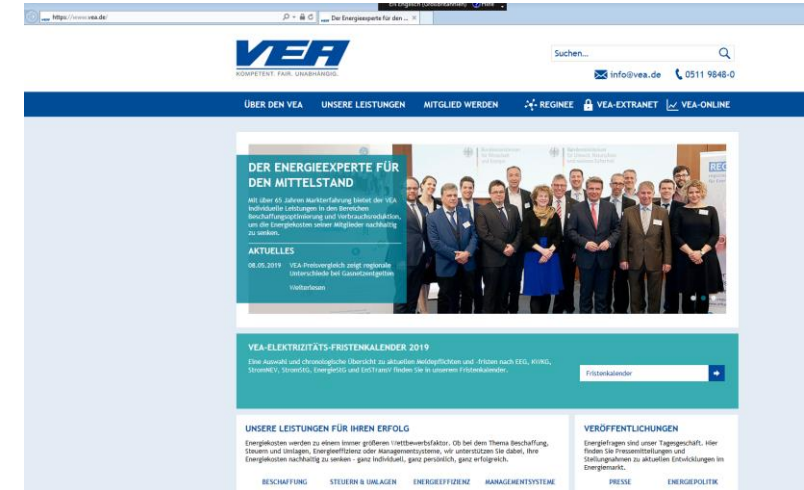
Market access & digitalization



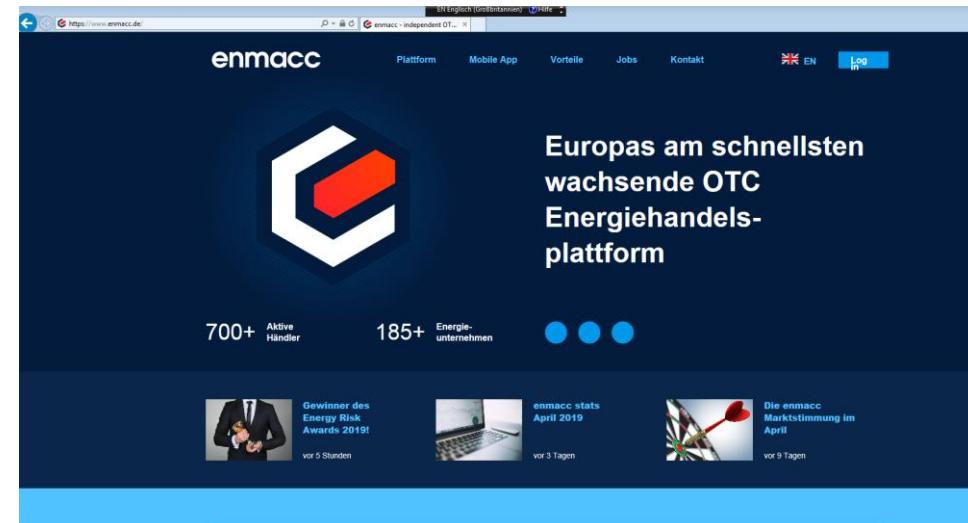
The screenshot shows the Verivox website interface. On the left, there's a sidebar with filters for 'Privatkunde' (Private customer) and 'Gewerbekunde' (Business customer), and a 'Tarif Schnellauswahl' (Quick tariff selection) section. The main content area displays two energy tariffs side-by-side:

- Vattenfall Easy12 Strom:** Price of 1.054,20 € per year. Features include a 20 € instant bonus, 133 € customer bonus, 12 months limited price guarantee, and optional 24-month price guarantee. It is marked as 'Beliebtester Anbieter' (Most popular provider) and 'Verivox geprüft' (Verified by Verivox).
- innogydirekt innogy direkt Strom:** Price of 1.057,66 € per year. Features include a 102 € customer bonus and a monthly cancellation option. It is marked as 'GÜNSTIG UND FLEXIBEL' (Favorable and flexible) and 'ÖKO' (Eco).

Below the comparison, there's a section titled 'Ihre ermittelten Ergebnisse' (Your determined results) with a sorting option set to 'Preis aufsteigend' (Price ascending).



The screenshot shows the VEA (Verband der Energieversorger) website. The header includes the VEA logo and navigation links: 'ÜBER DEN VEA', 'UNSERE LEISTUNGEN', 'MITGLIED WERDEN', 'REGISTRIEREN', 'VEA-EXTRANET', and 'VEA-ONLINE'. The main content area features a large photo of a group of people and a headline: 'DER ENERGIEEXPERTE FÜR DEN MITTELSTAND'. Below this, there's a section titled 'VEA-ELEKTIZITÄTS-FRISTENKALENDER 2019' and a section for 'UNSERE LEISTUNGEN FÜR IHREN ERFOLG' (Our services for your success).



The screenshot shows the enmacc website. The header includes the enmacc logo and navigation links: 'Plattform', 'Mobile App', 'Vorteile', 'Jobs', and 'Kontakt'. The main content area features a large headline: 'Europas am schnellsten wachsende OTC Energiehandels-plattform' (Europe's fastest growing OTC energy trading platform). Below this, there are statistics: '700+ Aktive Händler' (Active traders) and '185+ Energie-unternehmen' (Energy companies). The footer includes a section for 'Gewinner des Energy Risk Awards 2019' and a section for 'enmacc stats April 2019'.

Regulatory cornerstones: Climate Change and Renewables

Dr Maximilian Uibeleisen

Ashurst LLP

Starting Point – Climate Protection Plan 2050

- Paris Convention (2015): limitation of global heating to 1.5 °C
- German “Climate Protection Plan 2050”: reduction of CO₂ emissions compared to 1990 levels:
 - 2020: 40%; 2030: 55%; 2040: 70%; 2050: 80-95%
 - CO₂ Reduction across five sectors:

Handlungsfeld	1990 (in Mio. t CO ₂ -Äq.)	2014 (in Mio. t CO ₂ -Äq.)	2030 (in Mio. t CO ₂ -Äq.)	2030 (Minderung in % ggü. 1990)
Energiewirtschaft	466	358	175 – 183	62 – 61 %
Gebäude	209	119	70 – 72	67 – 66 %
Verkehr	163	160	95 – 98	42 – 40 %
Industrie	283	181	140 – 143	51 – 49 %
Landwirtschaft	88	72	58 – 61	34 – 31 %
Teilsomme	1209	890	538 – 557	56 – 54 %
Sonstige	39	12	5	87%
Gesamtsumme	1248	902	543 – 562	56 – 55 %

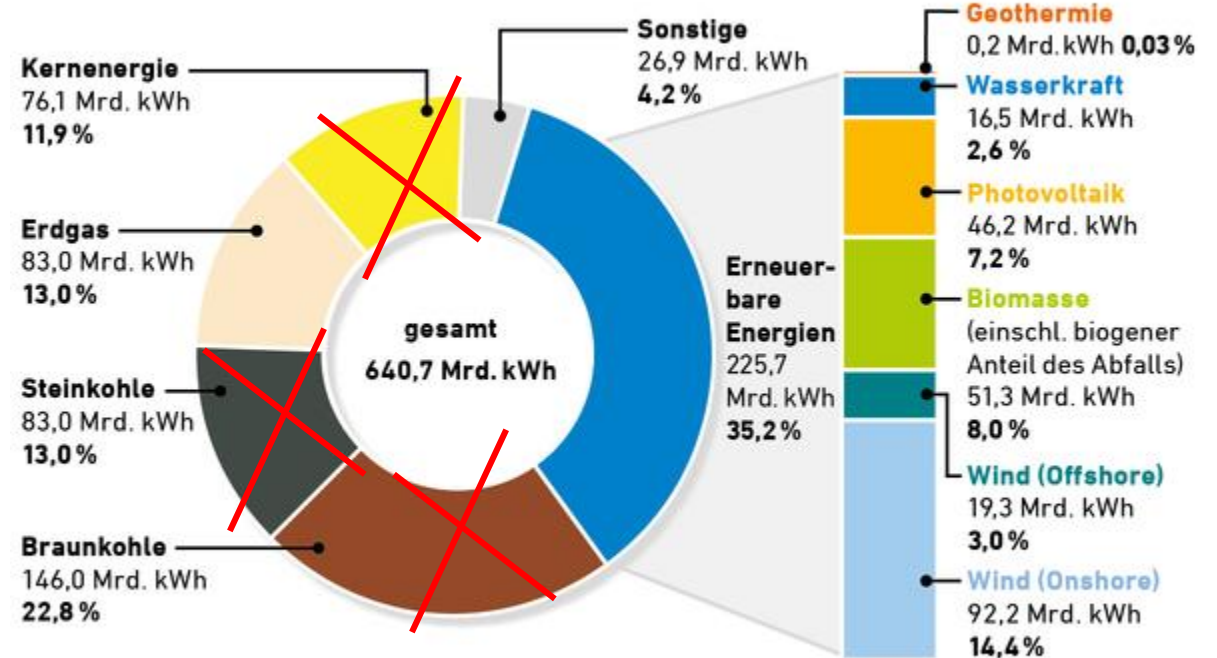
Energy Sector: „Energy Transition“

- Mix of different measures, in particular:

- Exit from nuclear by 2022
- Exit from coal by 2038
- Massive increase in renewables
- Increase energy efficiency

Der Strommix in Deutschland im Jahr 2018

Mit rund 226 Milliarden Kilowattstunden lieferten Erneuerbare Energien mehr als ein Drittel der deutschen Bruttostromerzeugung. Ihr Anteil am Bruttostromverbrauch betrug 38 Prozent.



Quellen: AGEB, AGEE-Stat
Stand: 3/2019

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Increase in Renewables: The aim

German RES Act 2017

**Aim: Increase RES share
in gross energy
consumption to at least
55-60% in 2035 and 80%
in 2050**



Regulatory
expansion targets



2,500
MW/year
(additional
amounts for
2019-21)



2,900 MW/year
(additional
amount of 4 GW
for 2019-2021)



15,000 MW by 2030
(7,700 MW by end
of 2020)



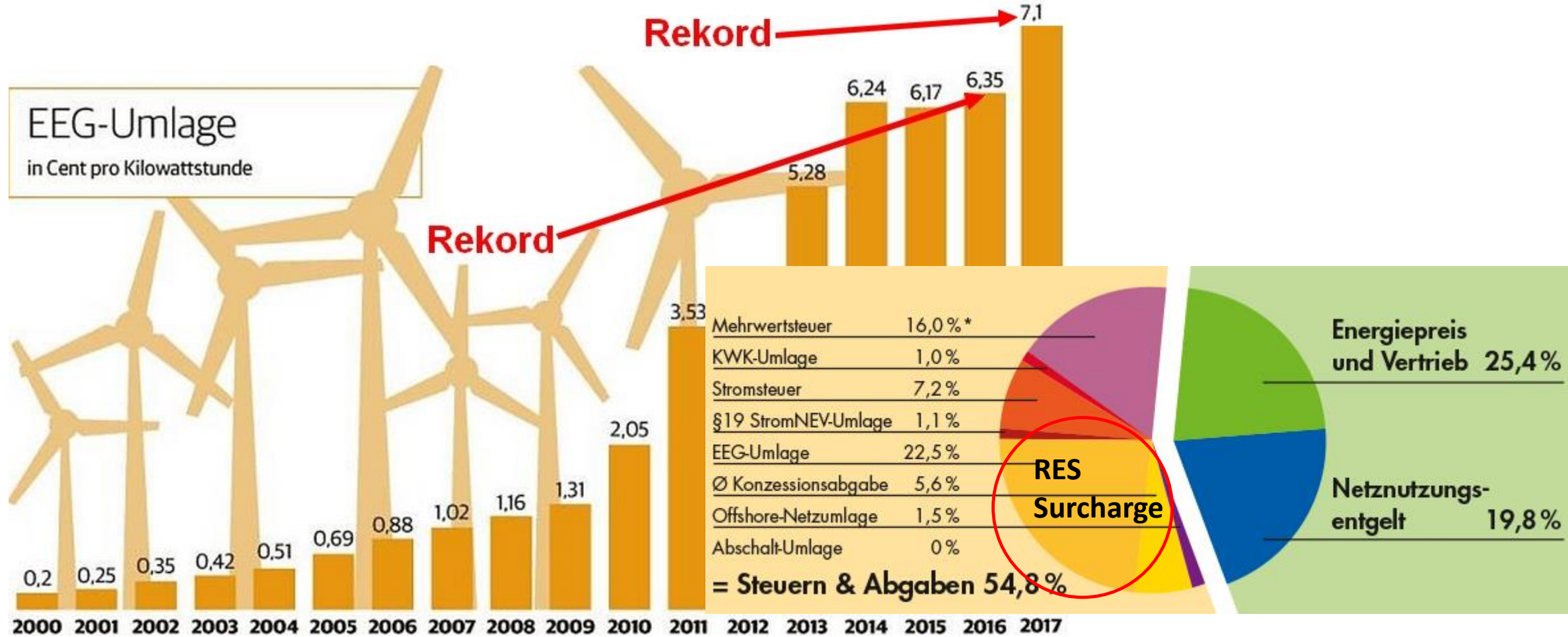
200 MW 2020-2022

Costs: About 15 bn EUR/year



Strong need for investments!

Increase in Renewables: Costs



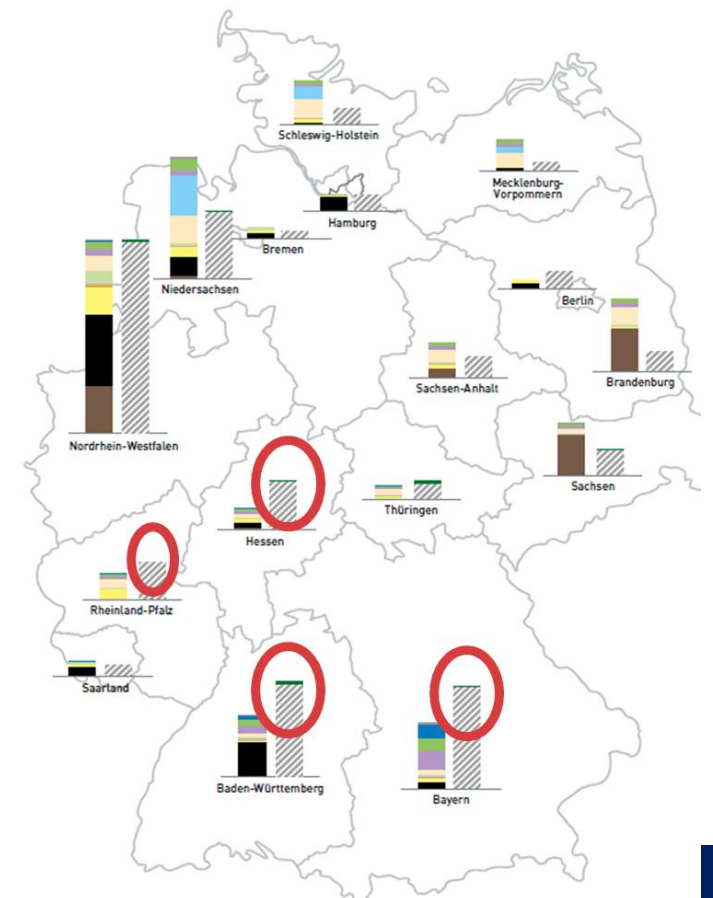
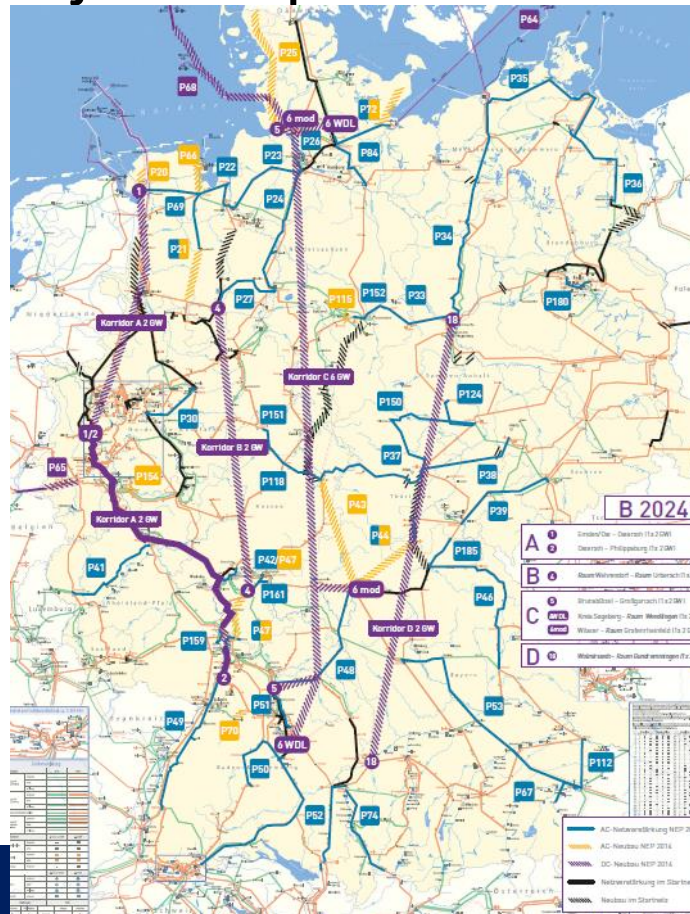
Renewables: Support scheme

- Since 2017: Introduction of auctions for tariffs instead of statutory FiT
- Result: Significant decrease in tariffs
 - e.g. offshore wind 19,4 ct./kWh to average price of 5 ct/kWh (!) for projects to be realised between 2021-2025
- Further risks associated with tariffs: permit, penalties, etc.
- Pressure on suppliers: e.g. insolvency of Senvion
- Awards partly below targets (e.g. onshore wind 2018 only 2,340 MW instead of available 2,800 MW)

Increase in Renewables: Obstacles

- Public acceptance: Increasing pressure by NGOs, municipalities, politics against new projects – permits missing
- Grid expansion:

Need for new transmission grids: **About 6,500 km** (1,500 built so far)



Subsidy-free RES – PPAs?

- Favourable regulatory regime ✓
- Business case: ✓
 - Low tariffs in auctions; further restrictions to participate in auctions
 - LCOE and capture price for RES decreasing, market price for electricity potentially increasing (e.g. higher price under EU ETS, introduction of CO₂ price, exit from coal, use of expensive gas peakers)
 - About **25 GW** of RES plants in Germany approach end of tariff period by 2025
- But: Still young and intransparent market, lack of experience (e.g. „cannibalisation effect“ of RES, volatility)

Thank you!