Fleksibilitet i Tyskland – hva er trendene, driverne og barrierene?

Flexnett Workshop

Halden, 18.10.2017

Christian Kunze, Smart Innovation Norway

SMART INNOVATION NORWAY

Agenda

Background and status: Generation mix and renewable sources in Germany

What drives Flexibility and DSM initiatives?

Trends: Flexibility and DSM status in and forecast for Germany

Barriers for Flexibility and DSM initiatives

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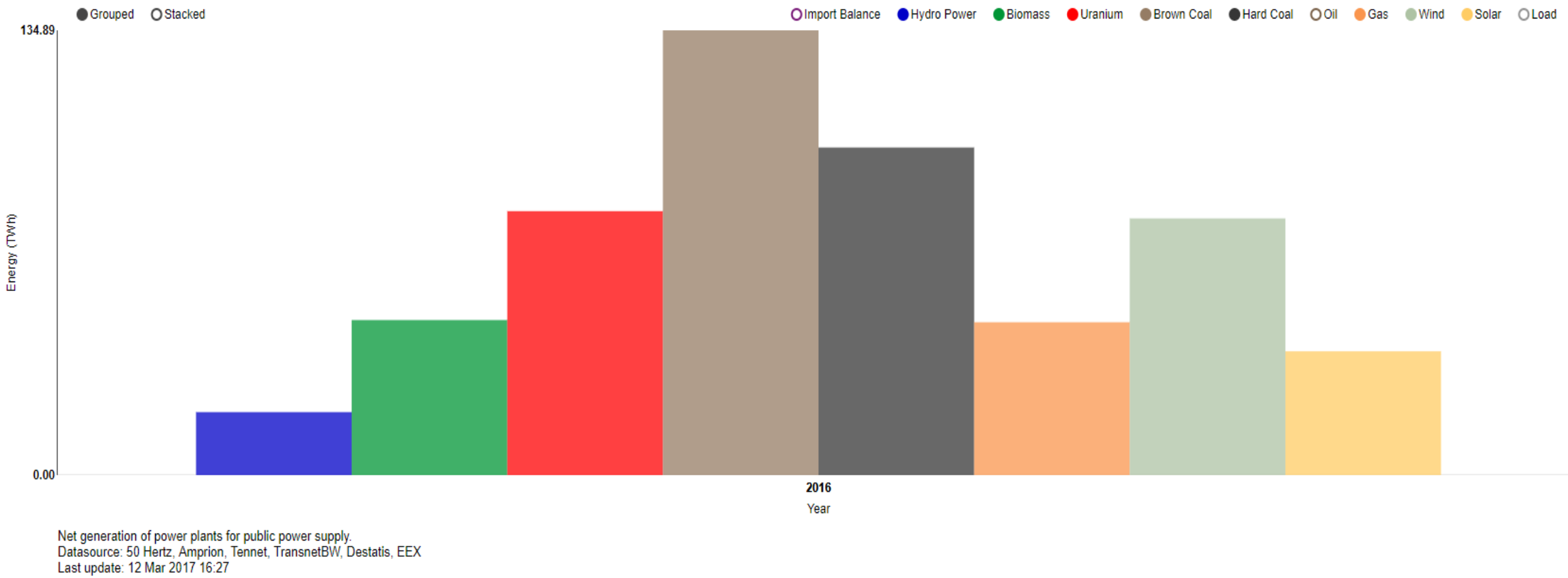
Annual electricity generation in Germany 2016



Source: www.energy-charts.de

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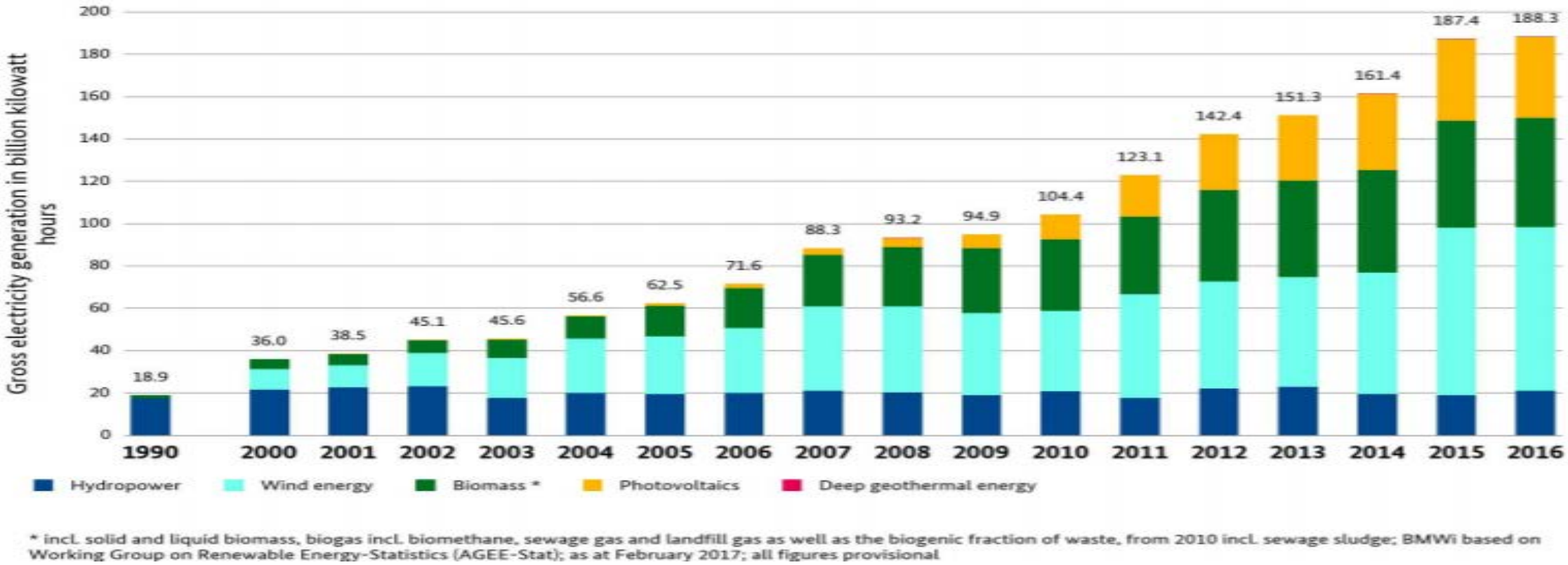
Annual renewable electricity generation in Germany 1990 - 2016



* incl. solid and liquid biomass, biogas incl. biomethane, sewage gas and landfill gas as well as the biogenic fraction of waste, from 2010 incl. sewage sludge; BMWi based on Working Group on Renewable Energy-Statistics (AGEE-Stat); as at February 2017; all figures provisional

Source: German Federal Ministry for Economic Affairs and Energy

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Current status of renewable generation in Germany

- Green energy record by generating 35% of power from renewables in the first half of 2017
- Solar and wind supplied close to 80% of peak power demand at specific times of the day from 2014
- New record for renewable energy on the 30th of April 2017:

→ Sustainable energy from wind, solar, biomass and hydro power provided 85 per cent of the country's total energy demand

→ Priority dispatch of renewables: coal-fired power stations were only operational between three and four in the afternoon (production of less than eight gigawatts of energy (max. output 50 GW))

→ Target: 50% renewable generation average share by 2030

Sources: Wacket, Markus / Kirschbaum, Erik (2017): Germany breaks green energy record by generating 35% of power from renewables in first half of 2017, in: The Independent, Monday 3 July 2017; Martinot, E. (2015): How is Germany Integrating and Balancing Renewable Energy Today? Educational Article, Renewable Energy Futures to 2050 [Weblog], January 13, 2015; England, Charlotte (2017): "Germany breaks renewables record with coal and nuclear power responsible for only 15% of country's total energy", in: The Independent, Friday 5 May 2017.

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DSM drivers

- **Cost reduction/profit potential and environmental motives**
  - Utilities: Avoidance or delay of building additional generation capacity, financial incentives (e.g. flexibility premium according to Renewable Energy Act (EEG))
  - Consumers: Avoidance of peak prices; efficient, sustainable consumption, financial incentives (e.g. state-funded flexibility programs), «Energiewende» from the bottom
  - Prosumers: As consumers and power sale adjustment to market prices (e.g. biomass)

- **Reliability and network motives**
  - Utilities: Reduction of network constraints and related curtailment cost, avoidance or delay of investment into new grid infrastructure
  - Consumers: support of the local utility to maintain a reliable energy supply

- **Political and regulatory provisions**
  - EU Clean Energy Package («winter package»)
  - Regulatory cost/efficiency targets

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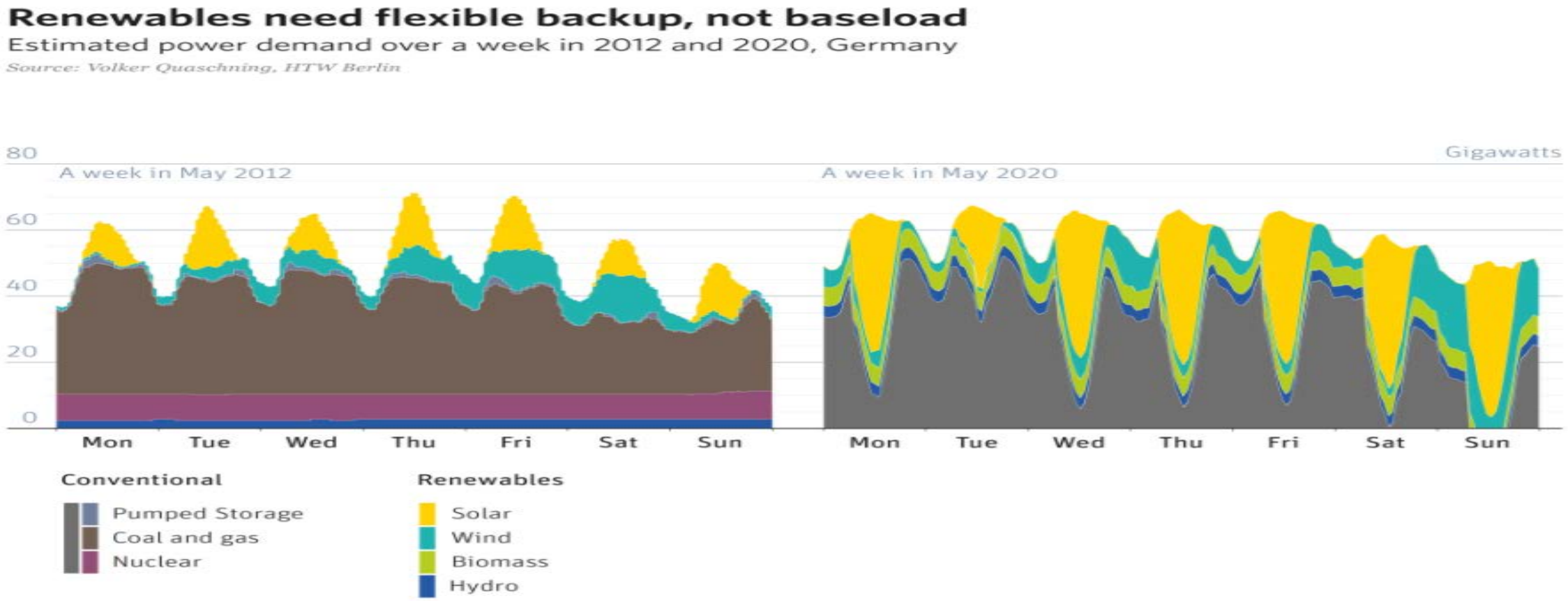
Driver grid reliability: Power demand in Germany 2012 vs. 2020



Source: www.energytransition.de

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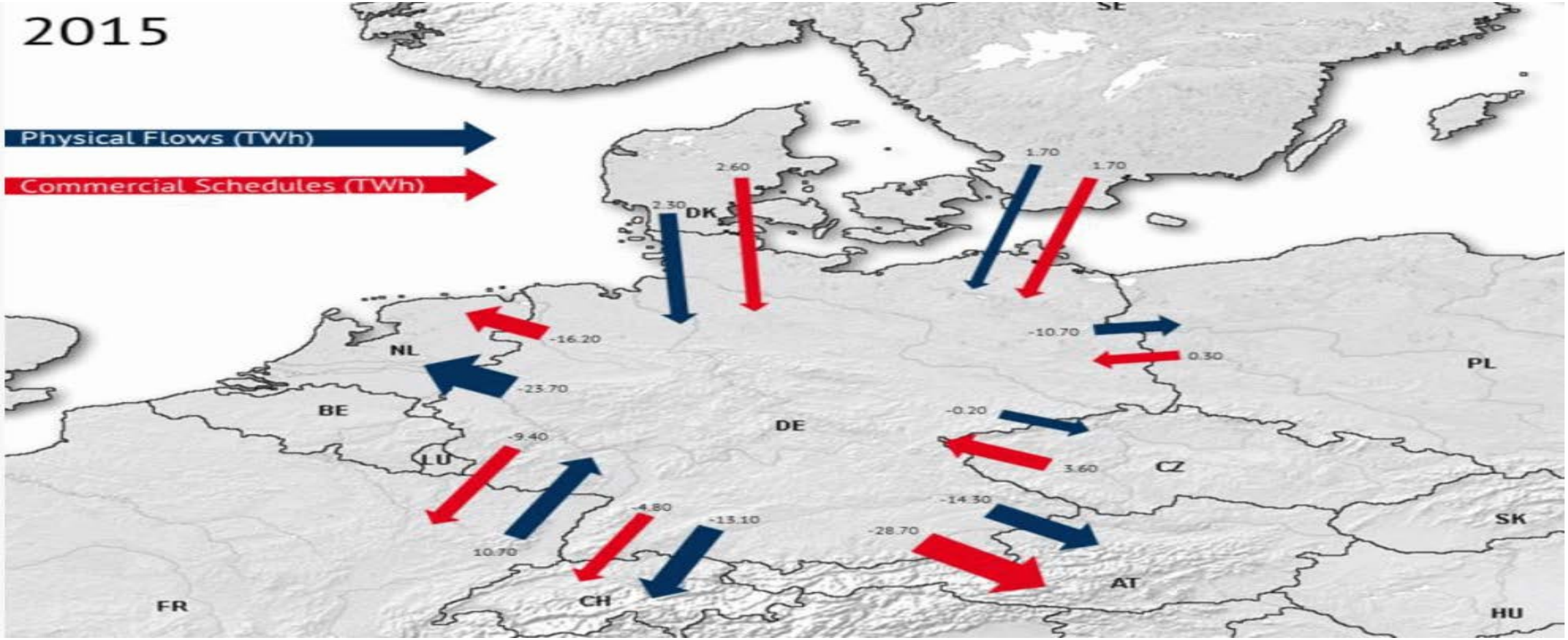
Driver grid reliability: Commercial and physical flows DE and electricity neighbors



Source: Energybrainpool based on data of the Federal Grid Agency and ENTSO-E

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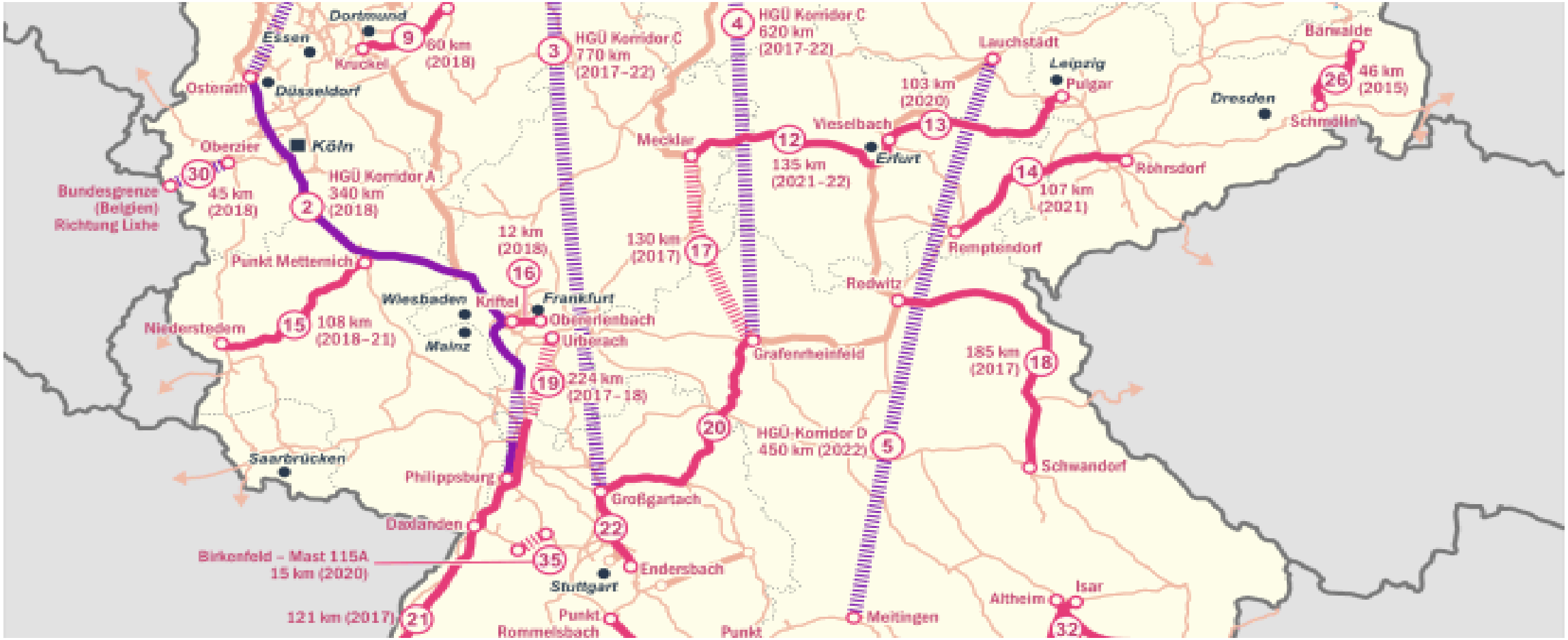
Driver grid reliability: Planned North-South transmission lines in Germany



Source: Federal Grid Agency (2016)

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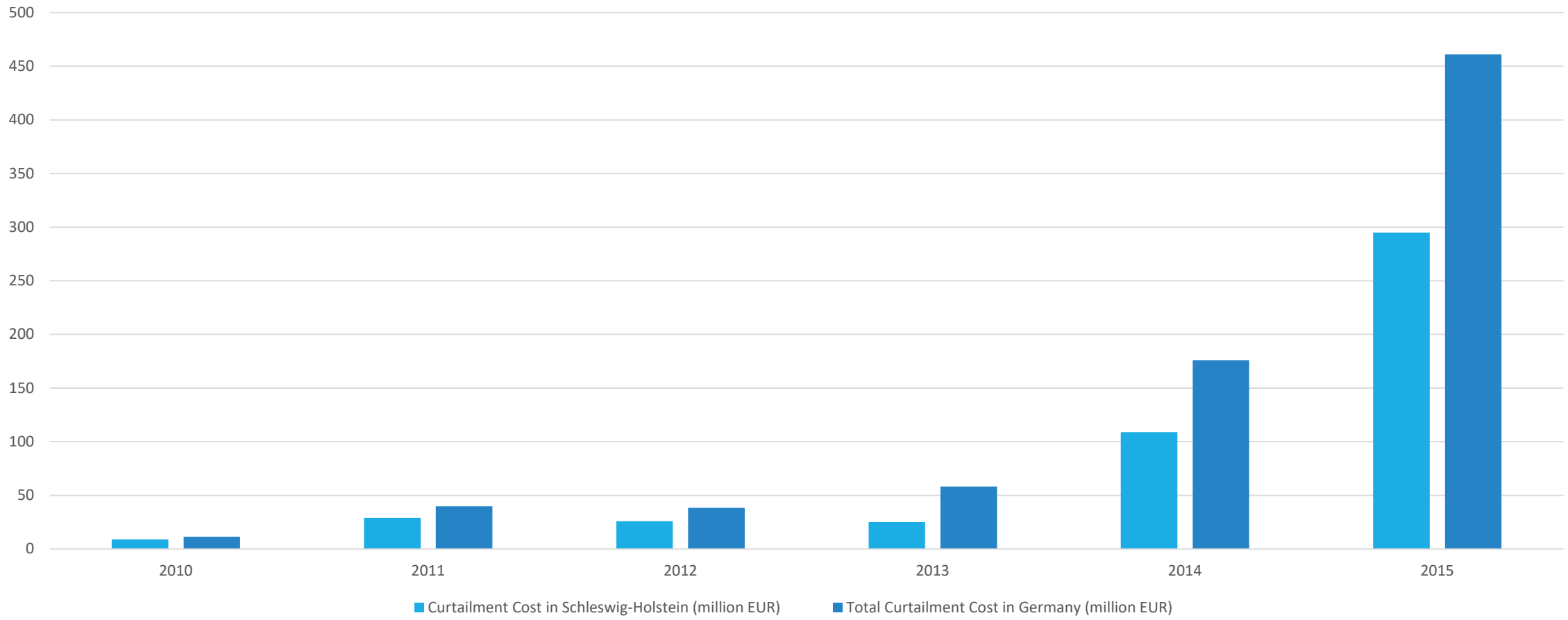
Driver cost reduction: Renewable power curtailment cost in Germany 2010 - 2015



Source: Ministerium für Energiewende, Landwirtschaft und ländliche Räume Schleswig-Holstein (2016)

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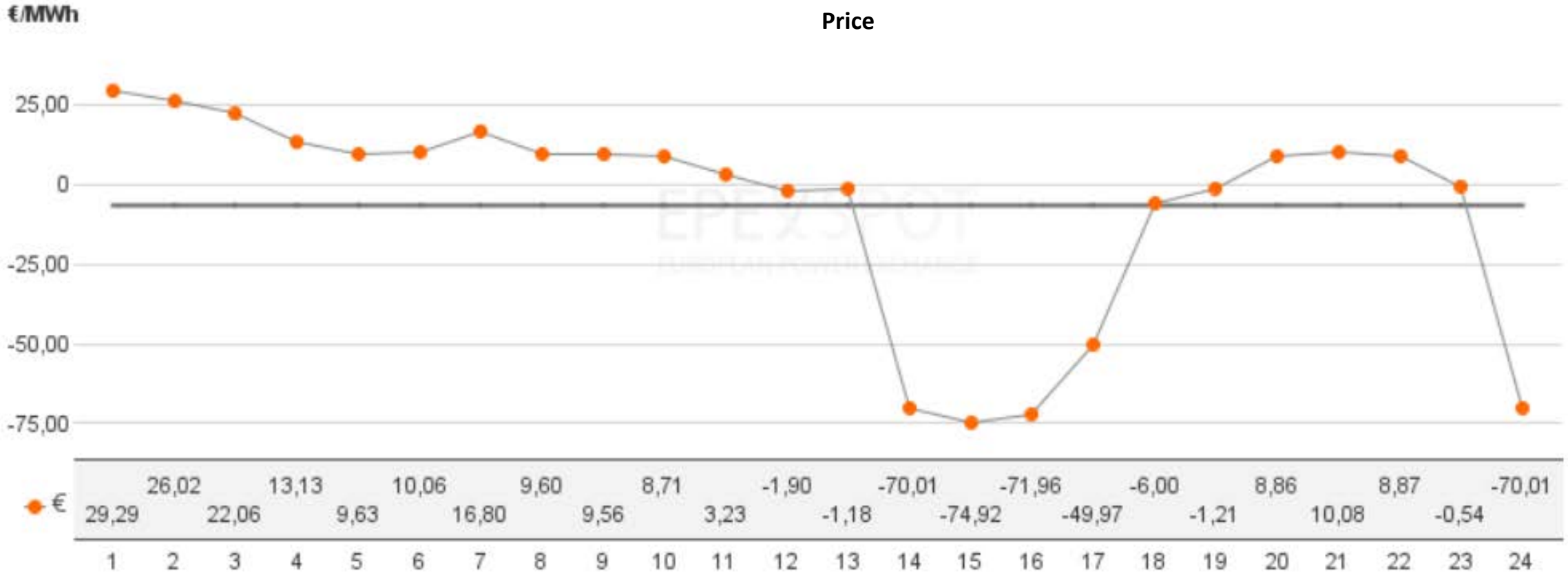
Driver profit potential: EPEX Spot day-ahead auction results for April 30th, 2017



Source: EPEX Spot

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Driver profit potential: Flexibility of demand-oriented biomass generation

Source: www.next-kraftwerke.de

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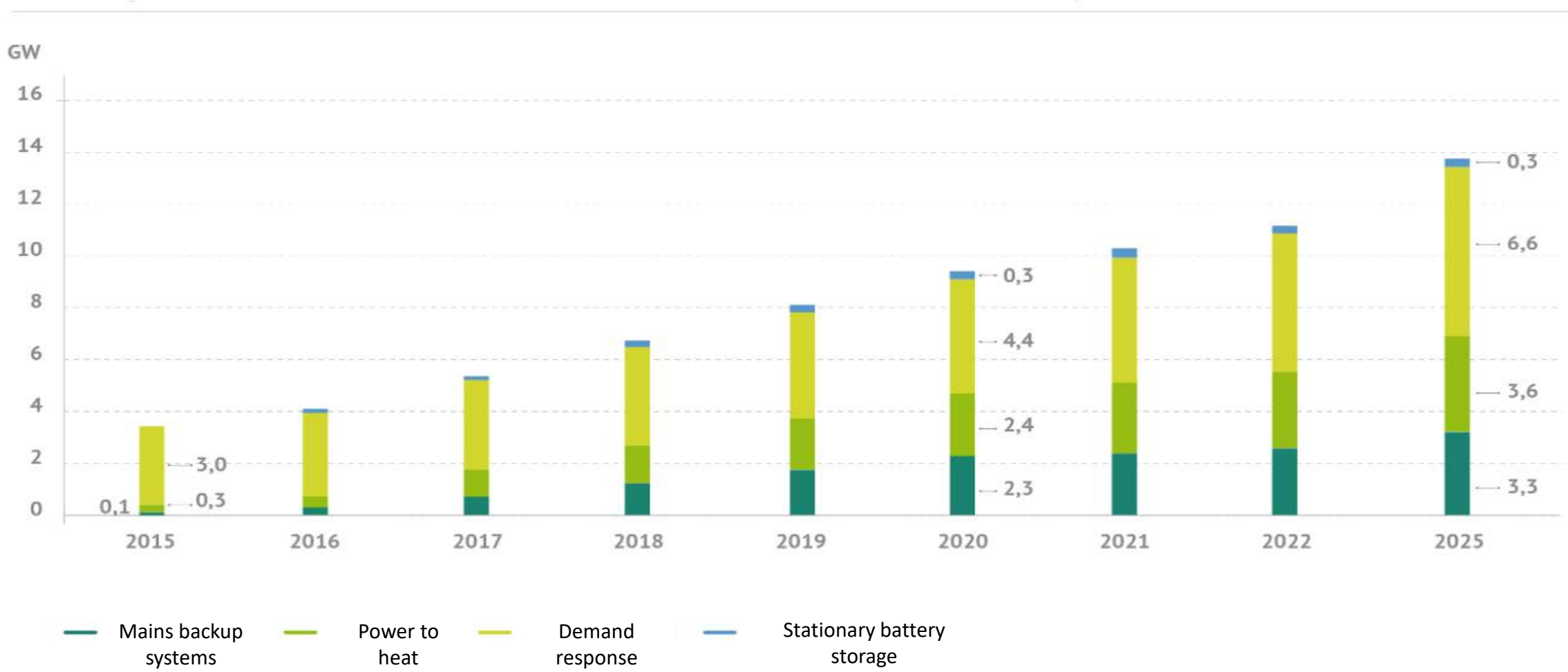
Technical potential of flexibility options in Germany until 2025



Source: www.next-kraftwerke.de

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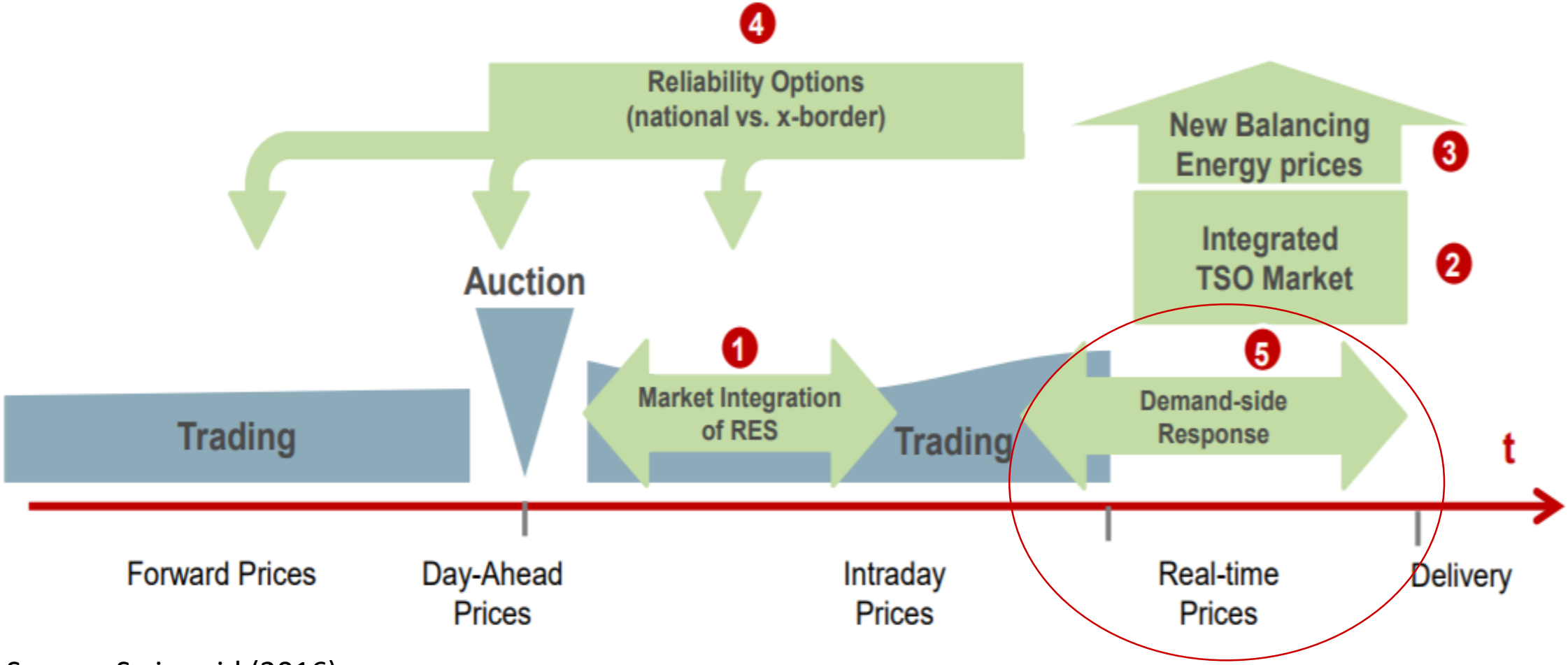
Flexibility barriers: Overall price signal



Source: Swissgrid (2016)

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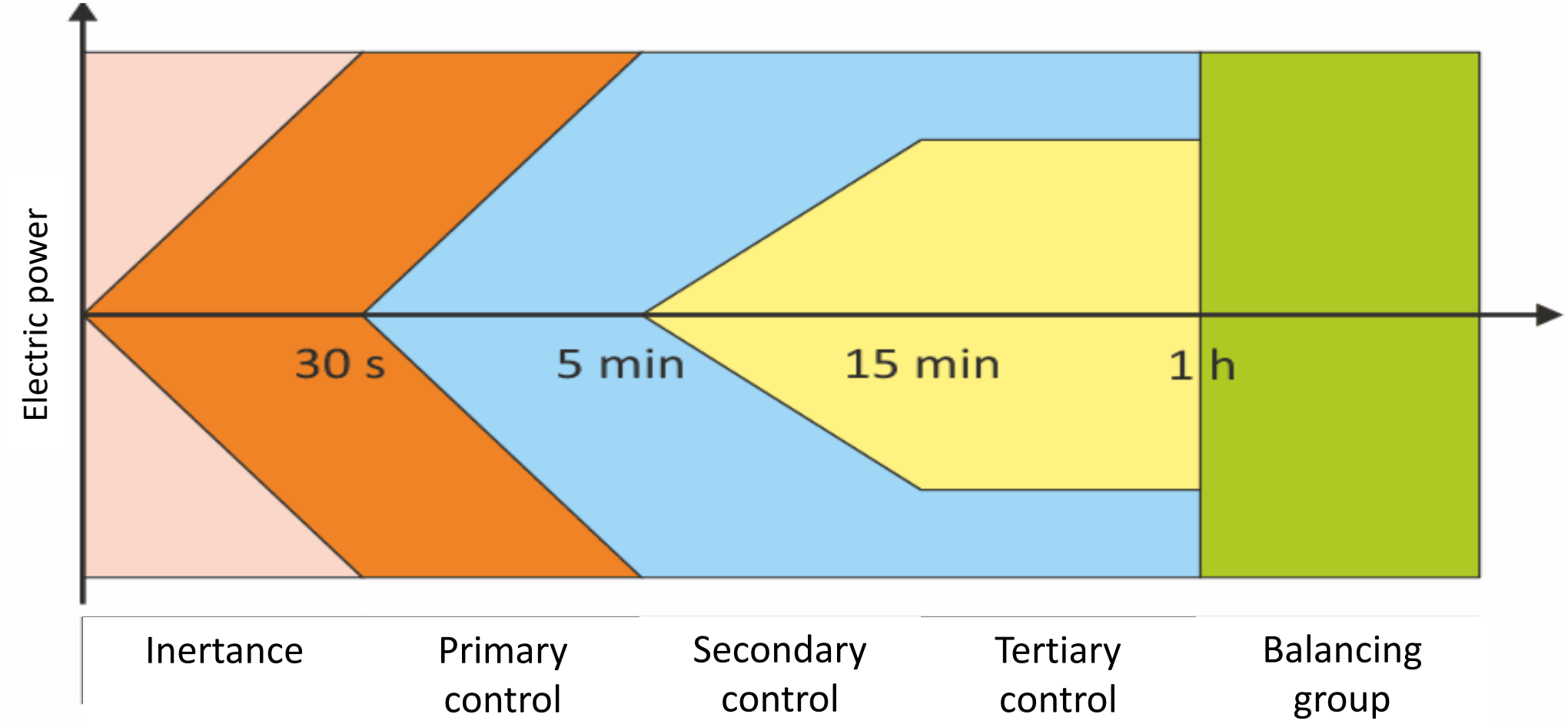
Driver profit potential: Balancing power segments of the German electricity market



Source: www.fenecon.de

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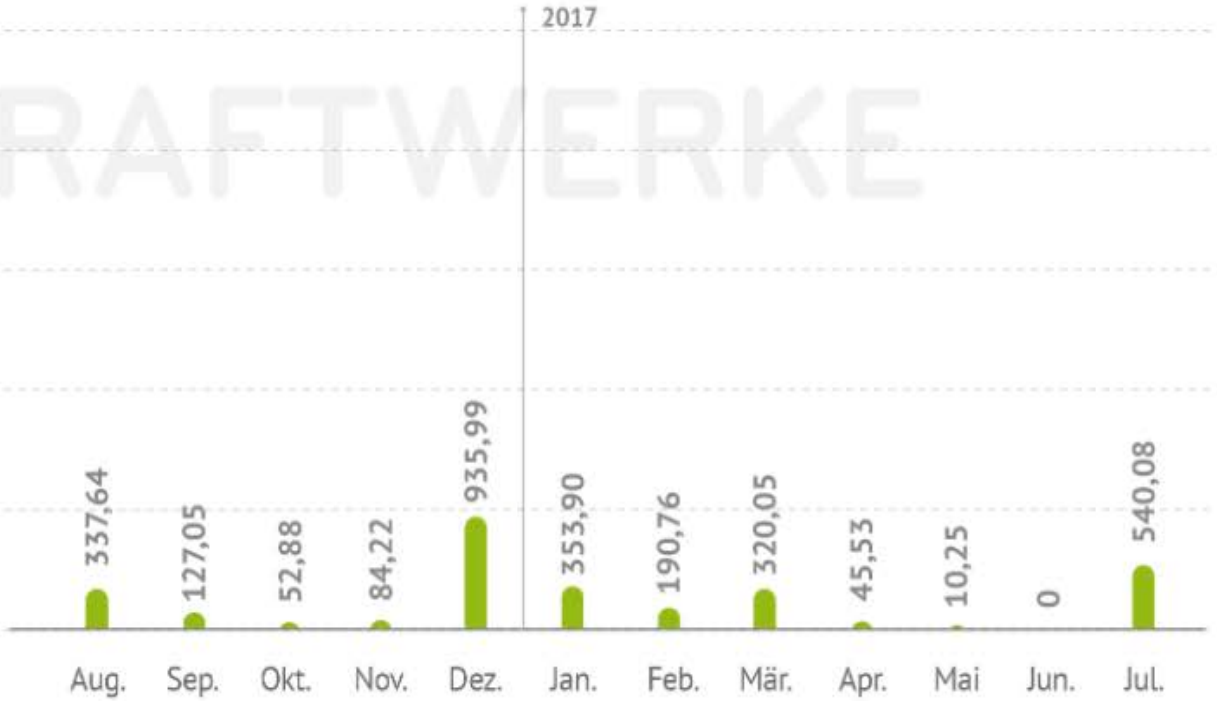
Medium demand charge for negative tertiary control in Germany

Annual average price €/MW

Monthly average price €/MW



Source: www.next-kraftwerke.de

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Medium demand charge for positive tertiary control in Germany

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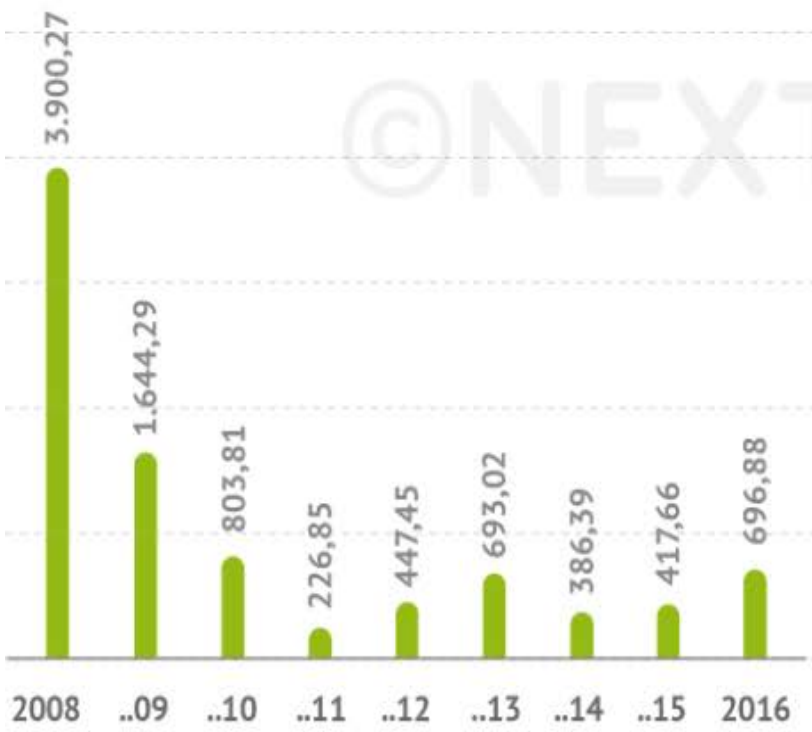
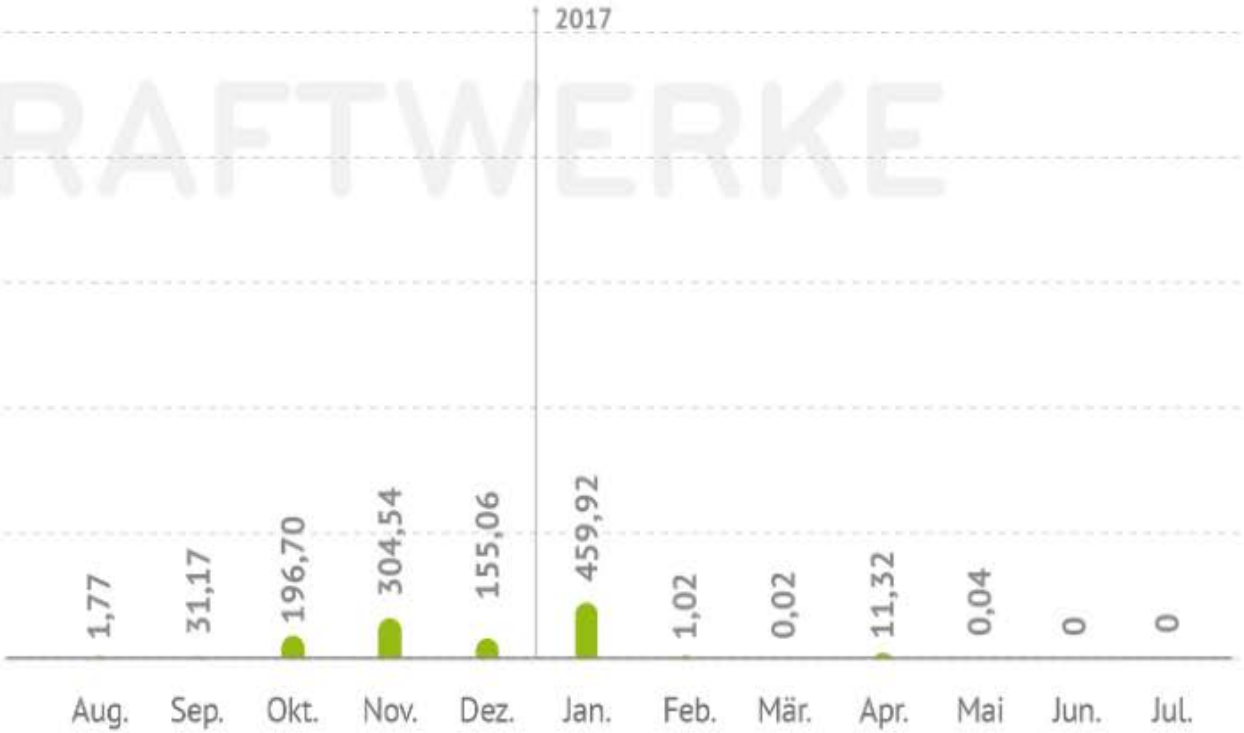


Monthly average price €/MW



Source: www.next-kraftwerke.de

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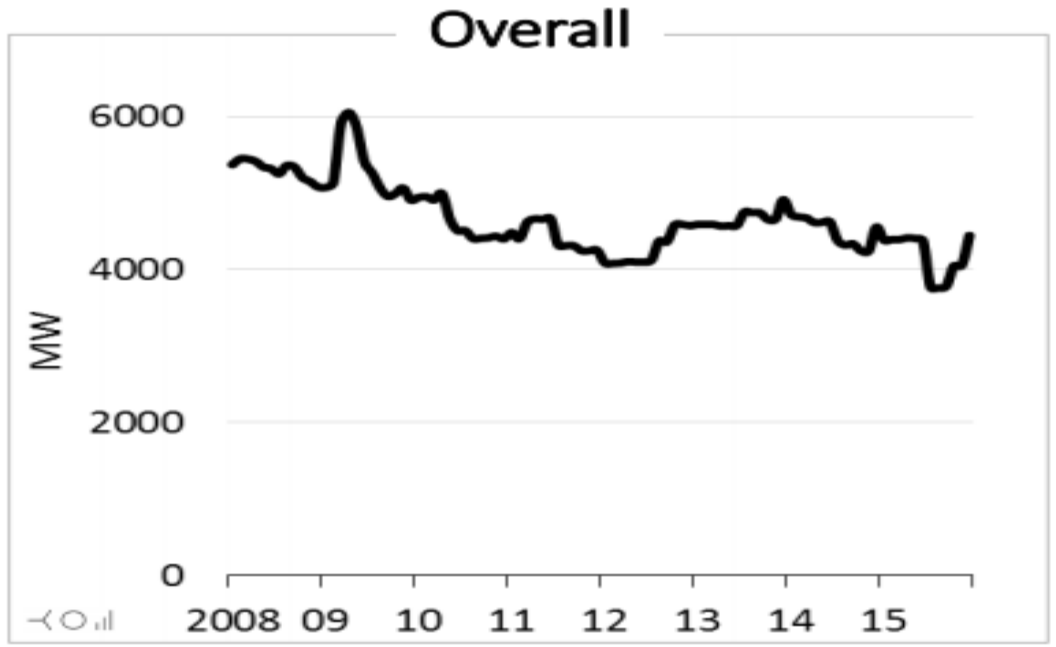
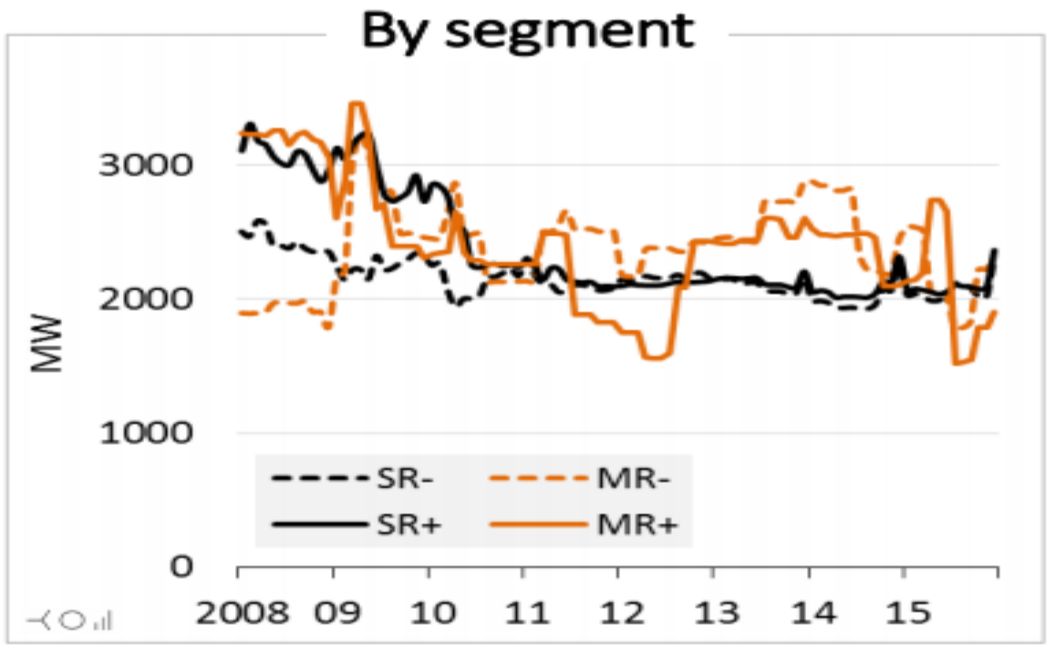
German paradoxon: Secondary and tertiary balancing reserve in DE 2009 – 2015



Neon analysis. Based on data from Bundesnetzagentur, Regelleistung.net, TSO websites. Power (capacity) payments only. Secondary and tertiary only.

Despite seasonality, the trend is clear: less and less balancing reserve is needed.



Neon analysis. Based on data from Bundesnetzagentur, Regelleistung.net, TSO websites. Power (capacity) payments only.

Procured volumes decline across product types.

Source: www.neon-energie.de

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Flexibility barriers

Economics

- High opportunity cost for DSM implementation – low balancing market returns

→ DSM subsidy schemes (i.e. subsidize services for subsidized renewable generation)?

Pre-qualification process for balancing markets

- Pre-qualification process is long, time consuming and not always transparent

→Process simplification and standardization required

Balancing market products

- Reduction of required bid volume during the previous years (tertiary control = 5 MW)
- Balancing market design is historically related to centralized generation units

→ Adjustment in terms of minimum bid volume, long balancing energy call windows, restrictions for the pooling of processes, short lead time in case of calls, very low variations of load are required

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Flexibility barriers

Role distribution balancing group responsible party (BGRP) and flexibility operator

- Central market role of BGRP: intermediary between consumer, suppplier, grid operator
- Flexibility operator requires the permission of the BGRP to conduct DSM activities

Standardized short-term consumer schedule adjustment processes and prices are required

Grid tariffs

- Savings of up to 90% of grid tariffs for companies, if:
  - Peak consumption occurs outside the peak load periods of the local grid
  - Demand is relatively flat and characterized by a high number of grid utilization hours

  → Adjustments required as higher grid tariffs exceed in many cases flexibilisation revenues

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Flexibility barriers

Interruptible load decree («Abschaltbare Lasten Verordnung (AbLaV)»)

- Tenders for interruptible loads of large consumers that are connected to the high or highest voltage grid
- Relatively high compensation for a limited target group of bidders (initially min. 50 MW (now 10 MW) monthly (now weekly) bid size

→Opening of this market segment to smaller, flexible loads is required

Integration of flexibility provisions into energy management measures

- Continuous energy efficiency measures and energy audits in German companies
- Flexibility / DSM potential and effect is not yet integrated into audits

→ Integrate flexibility potential into energy audit DIN EN ISO 50001 bzw. DIN EN 16247-1 a

See also: Deutsche Energie-Agentur (dena): Roadmap Demand Side Management. Industrielles Lastmanagement für ein zukunftsfähiges Energiesystem, Berlin, June 2016; online: https://shop.dena.de/fileadmin/denashop/media/Downloads_Dateien/esd/9146_Studie_Roadmap_Demand_Side_Management..pdf

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Thank you for your attention!

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Back Up

Zieljahr	Maßnahmen	BNetzA	Bund	ÜNB	DSM-Vermarkter	Weitere
2016-2017	Attraktive flexible Stromlieferverträge entwickeln				X	Stromlieferanten
	AG Effiziente PQ Verbrauchsprozesse			X	X	Industrie
	Einheitliche Anwendung der PQ-Kriterien			X		
	Anpassen von Regelleistungsprodukten	X				
	Verankerung SRL-Vermarktung in Bilanzkreisverträgen	X	X		X	Verbände
	Standardisierung/Vereinfachung Bilanzkreiskorrekturprozesse	X		X	X	Verbände, Industrie
	Informationskampagnen DSM		X			Landesministerien, Verbände, IHKs
	DSM-Prüfung in Energieberatung etablieren					BAFA, KfW, IHKs
	Ausnahmeregelungen für Regelleistungsabrufe	X	X			
	Energieeffizienz um Flexibilität erweitern		X			Verbände, Industrie
	Best-Practice-Beispiele kommunizieren		X			Länderministerien, Verbände
	Standardisierung PQ Verbrauchsprozesse			X		Anlagenhersteller, Industrie
	AbLaV: Marktteilnahmebedingungen vereinfachen	X	X	X		
	AbLaV: 2-jährige Befristung und Fortführung in Abhängigkeit BNetzA-Evaluierung	X	X			

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2018-2025	Anreizwirkung Netzentgelte/besondere Netzentgelte überprüfen und weiterentwickeln	X	X			
	Voraussetzungen Anschlussnetzbetreiberbestätigung klarstellen	X				
	EEG-Befreiung um DSM-Potenzialprüfung erweitern		X			BAFA
	Flexibilität in Prozessplanung berücksichtigen					Energieberater, EMS-Anbieter, Anlagenhersteller, Industrie
	Standards für Datenschnittstellen und –übertragung, insbes. bei der Fernansteuerung				X	IKT-Anbieter, Verbände
	DSM-Potenzialprüfung als Bestandteil von Energieaudits		X			
	DSM-Potenzialprüfung in ISO 50001 integrieren					VDE, DIN, ISO

Source: Deutsche Energie-Agentur (dena): Roadmap Demand Side Management. Industrielles Lastmanagement für ein zukunftsfähiges Energiesystem, Berlin, June 2016; online: https://shop.dena.de/fileadmin/denashop/media/Downloads_Dateien/esd/9146_Studie_Roadmap_Demand_Side_Management..pdf

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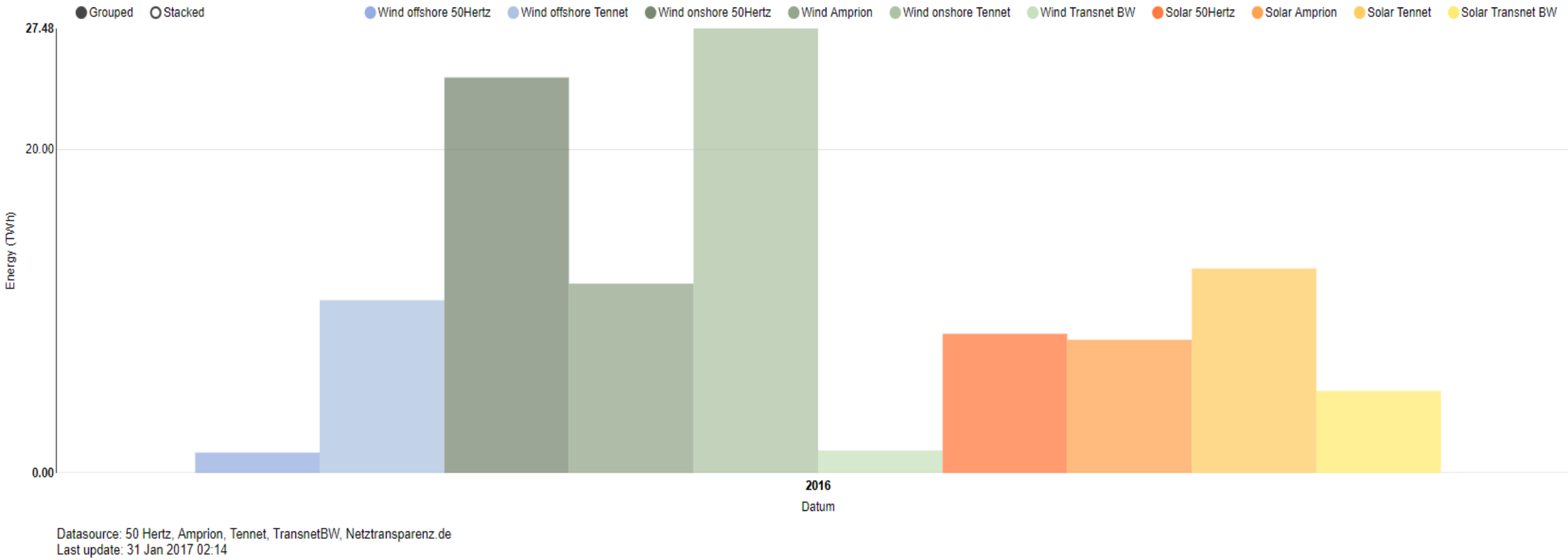
Annual solar and wind electricity generation in Germany in 2016



Source: www.energy-charts.de

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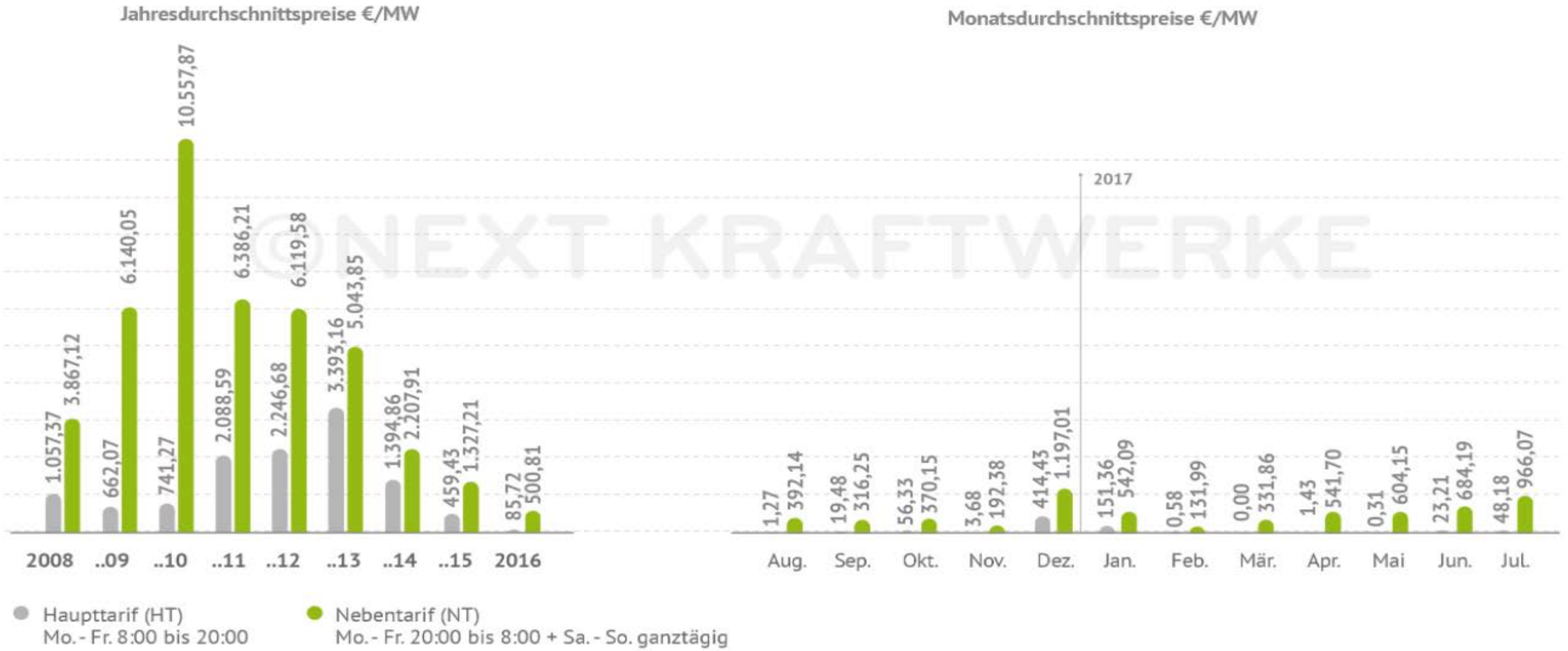
Medium demand charge for negative secondary control in Germany



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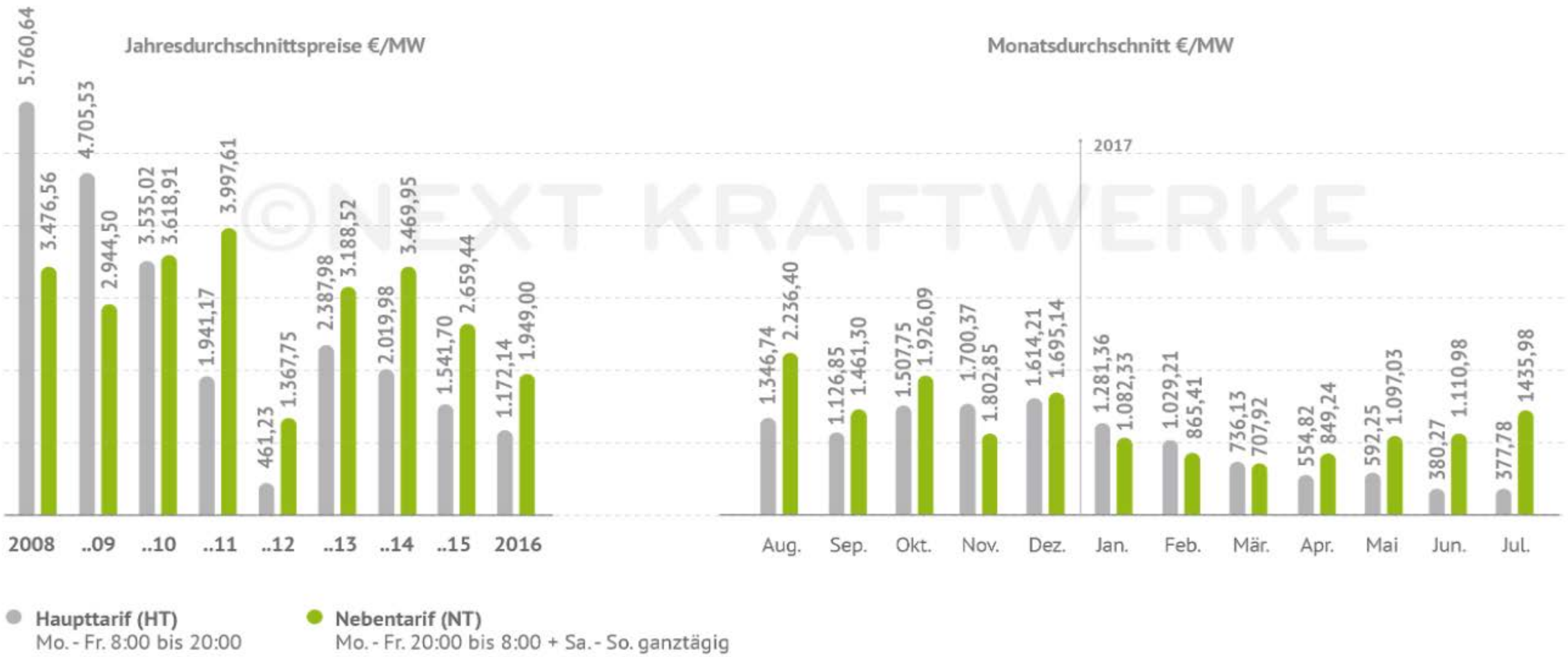

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