Energiewende – quo vadis?

Burkhard von Kienitz

Wien, April 2021

e·on

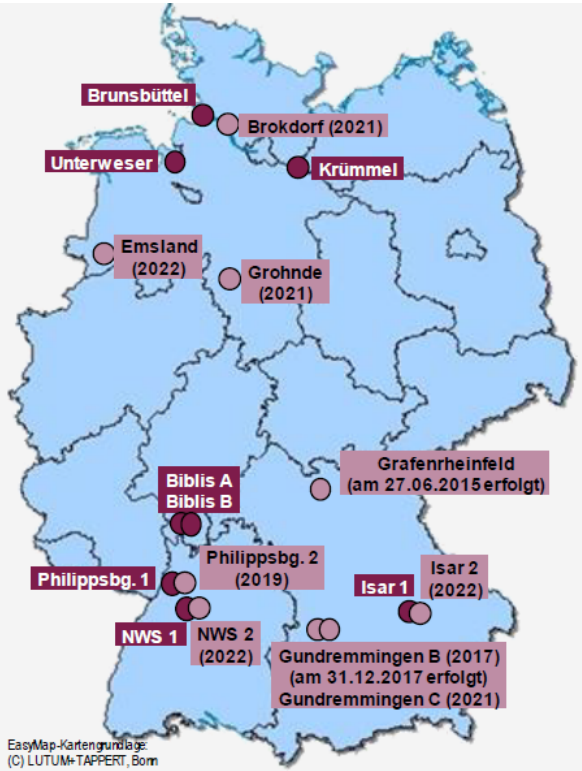
Content

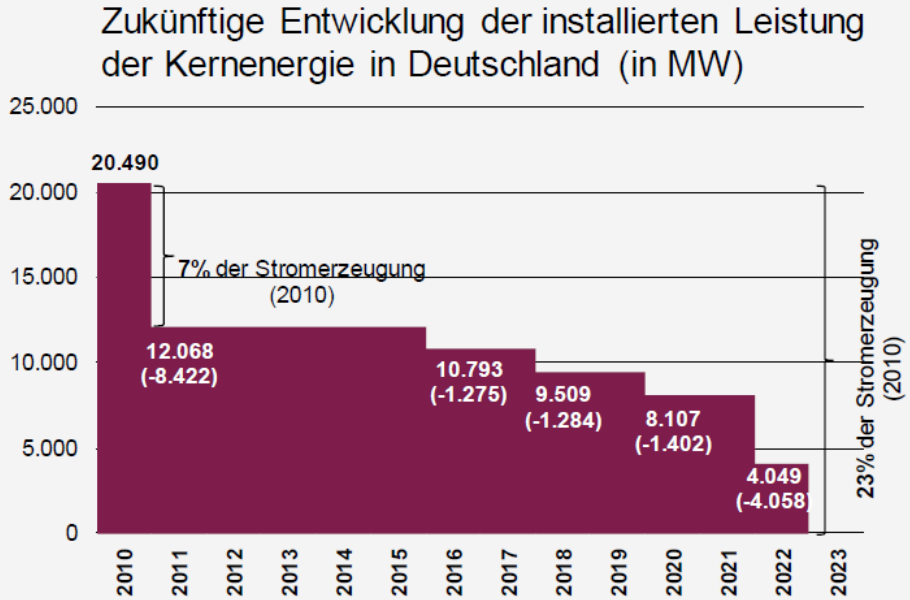
‚Energiewende' started more or less as a power transition – focusing on nuclear exit, renewable increase and CO_2 reduction

Ausstieg Kern-energie

		Stand 2013	2020	2025	2030	2035	2040	2050
Klimaschutz	Senkung der Treibhausgas-emissionen in %	-23.8% (geschätzt)	-40		-55		-70	-80 bis -95
Erneuerbare Energien	Anteil am Stromverbrauch	25.4%	35	40 bis 45	50	55 bis 60	65	80
	Anteil am Endenergieverbrauch	12.4% (2012)	18		30		45	60
Energie-Effizienz	Senkung Primär-energieverbrauch	-3,3 %	-20					-50
	Energieproduktivität	+1.1% p.a.	+2.1% p.a.					

Nuclear phase out until 2022



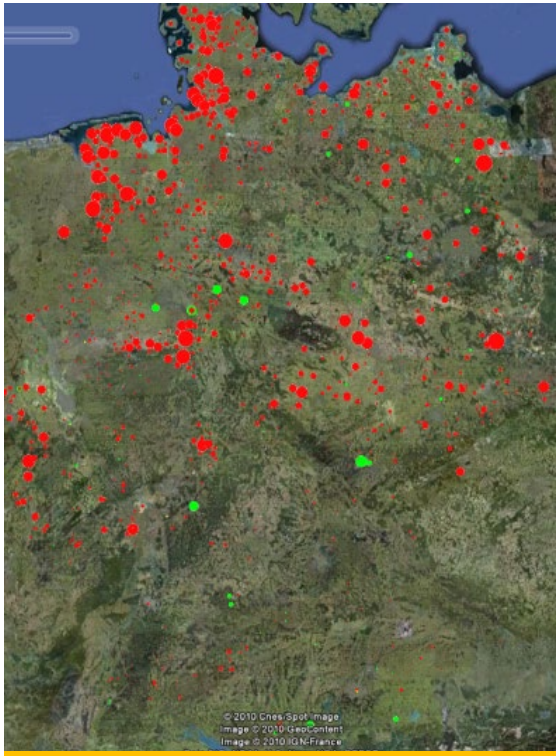


* bei Erreichen der in Anlage 3 AtG festgelegten Reststrommengen, spätestens jedoch mit Ablauf des 31.12. des jeweiligen Jahres

Source: BDEW, 2019

Quelle: Atomgesetz (AtG) §7

Targets become reality



End **2000**
- 30,000 installations*

Source: GTAI (German Trade & Invest)

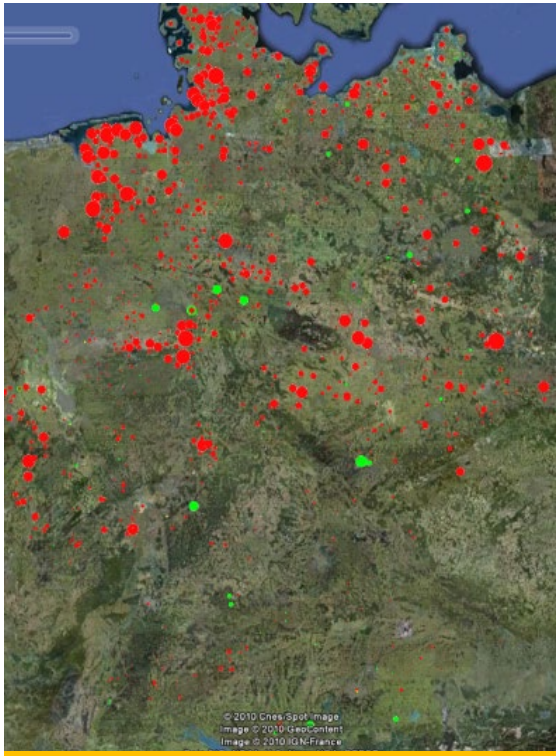
Wind energy

PV

Biomass

The circle **diameter** is proportional to the electrical capacity

Targets become reality



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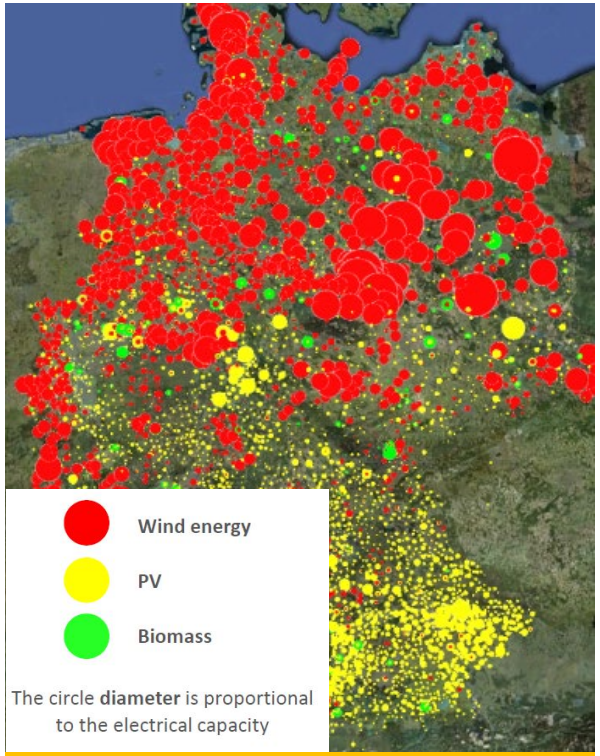
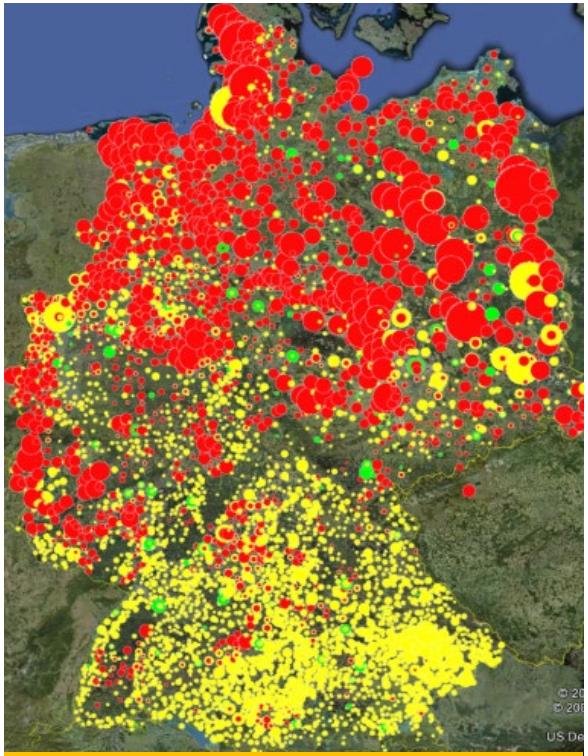
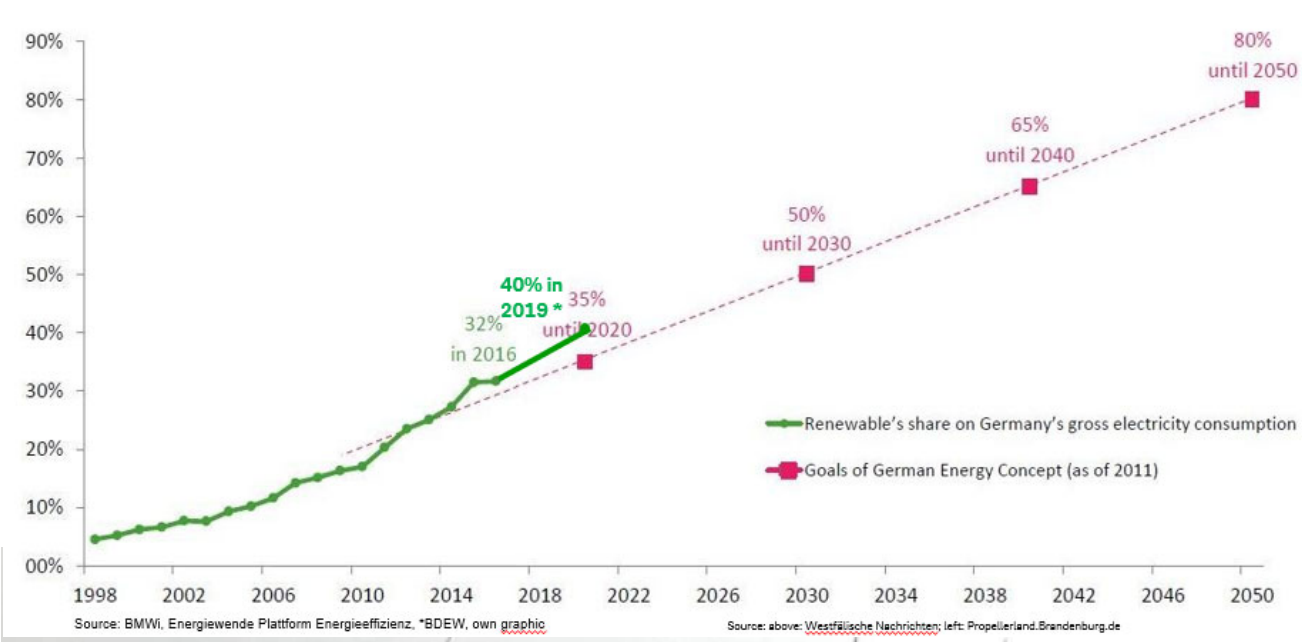


End **2010**
~ 750,000 installations



End **2017**
> 1.600.000 installations

Source: GTAI (German Trade & Invest)



Source: BMWi, Energiewende Plattform Energieeffizienz, *BDEW, own graphic

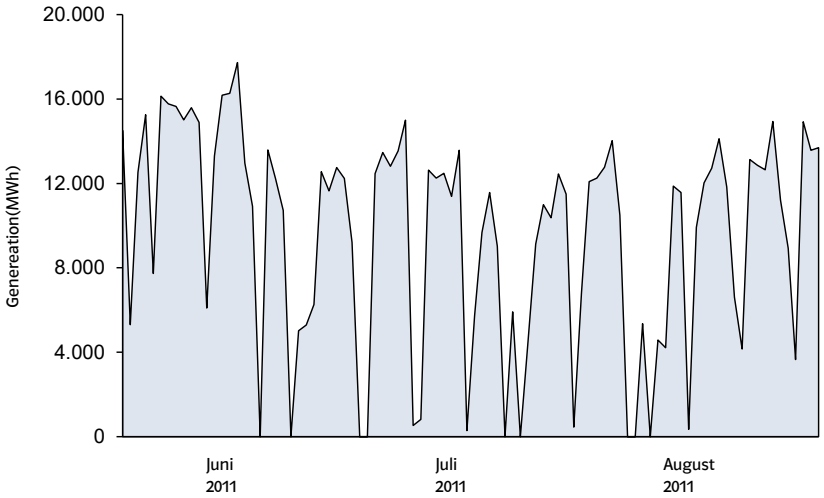
Source: above: Westfälische Nachrichten; left: Propellerland.Brandenburg.de

Source: Bundesministerium für Wirtschaft und Energie, Energiewende Plattform Energieeffizienz, *BDEW

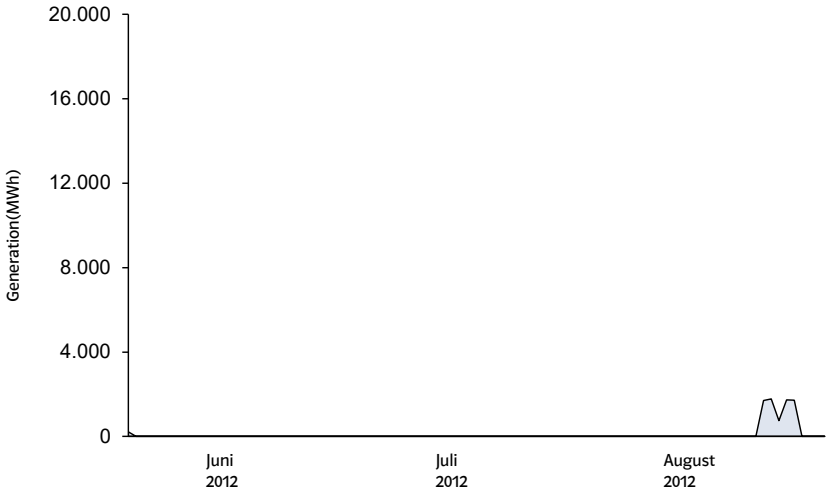
Example Irsching – 2010 world record holder...

… out of the money 2012

Use of Irsching 5: June – August 2011

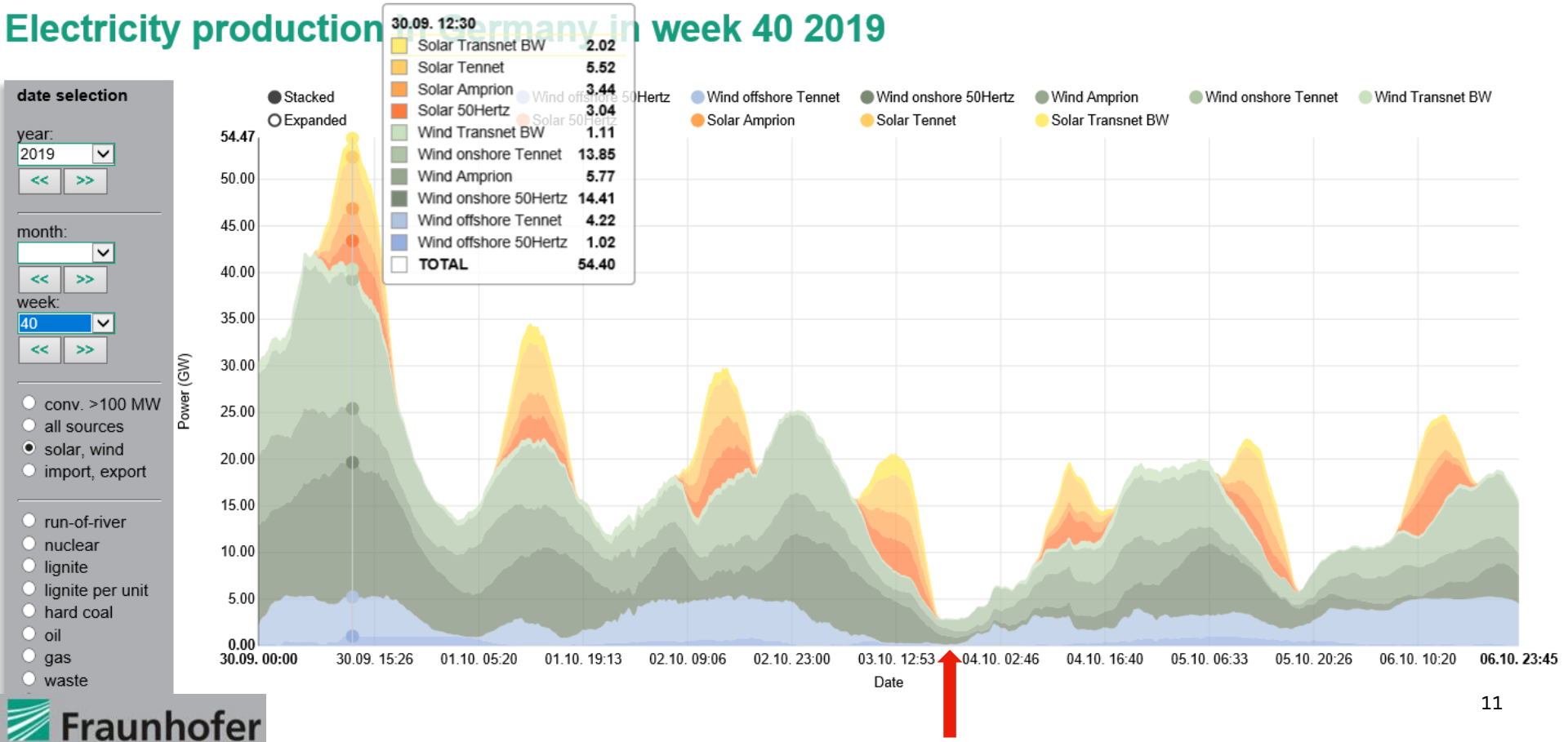


Use of Irsching 5: June – August 2012



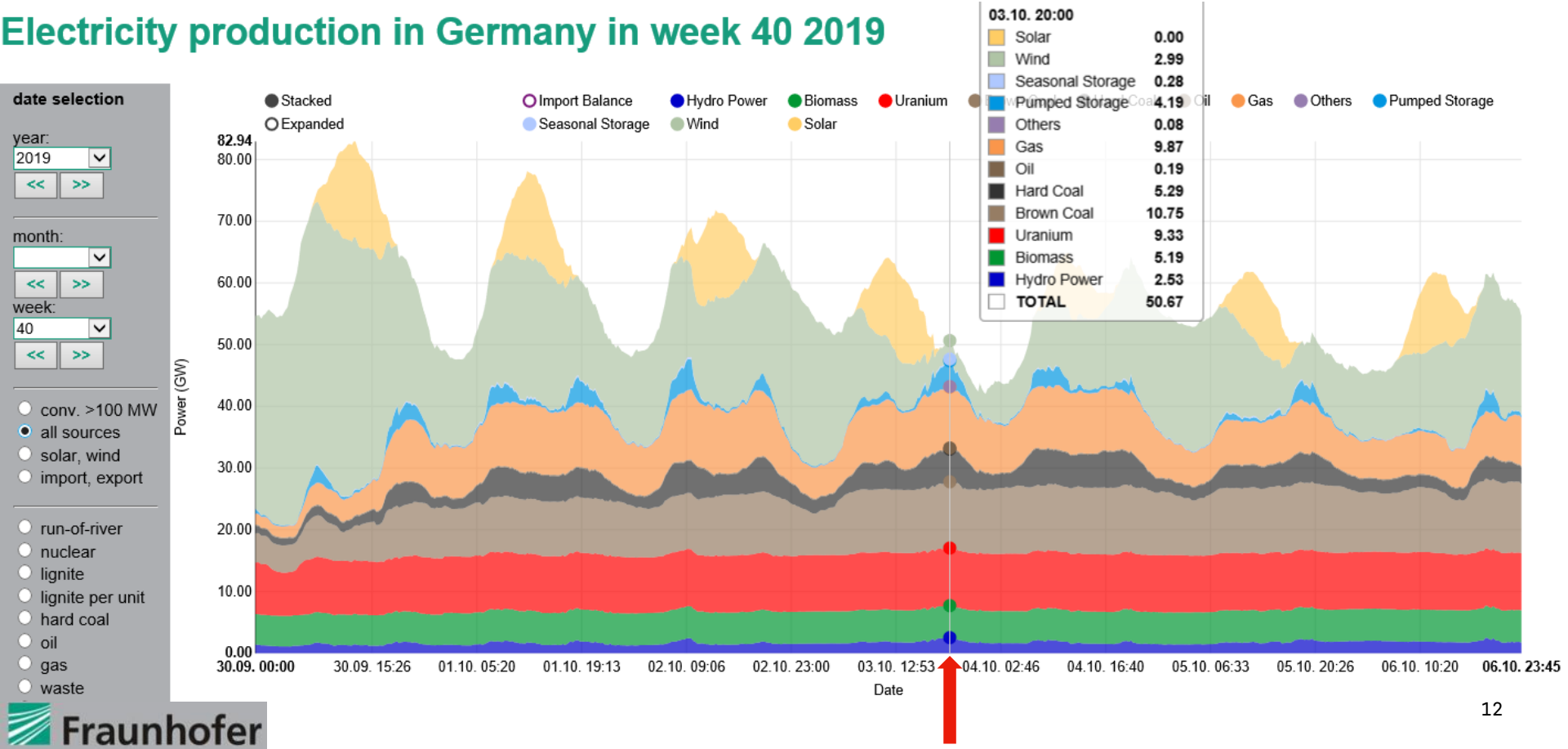
… this picture will not last for ever… but who will go for a long time investment under these cisrumctances?

Generation gets stressed… (1/2)



Generation gets stressed... (2/2)

Electricity production in Germany in week 40 2019



Fraunhofer ISE

Owner request to shutdown

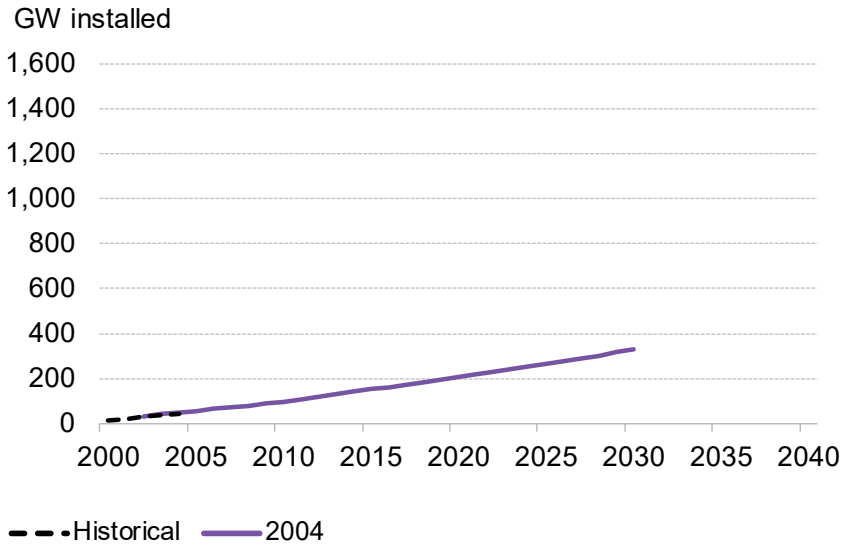
…

denied as system relevant & having to remain as stand-by reserve, despite double digit M€ losses.

Content

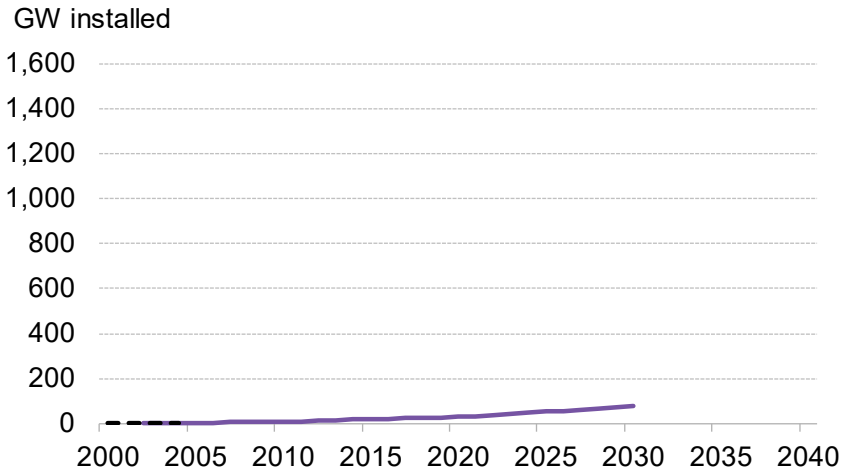
IEA wind & solar capacity forecast evolution

Global cumulative wind installations



Note: 2004-2009 Reference, 2010-2016 New Policies Scenario

Global cumulative solar installations

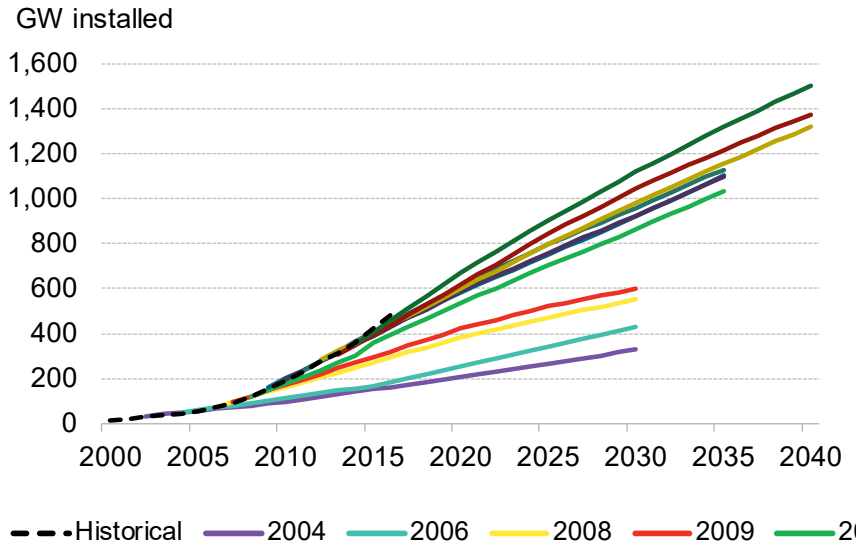


Note: 2004-2009 Reference, 2010-2016 New Policies Scenario

Quelle: BloombergNEF 2018

IEA wind & solar capacity forecast evolution

Global cumulative wind installations



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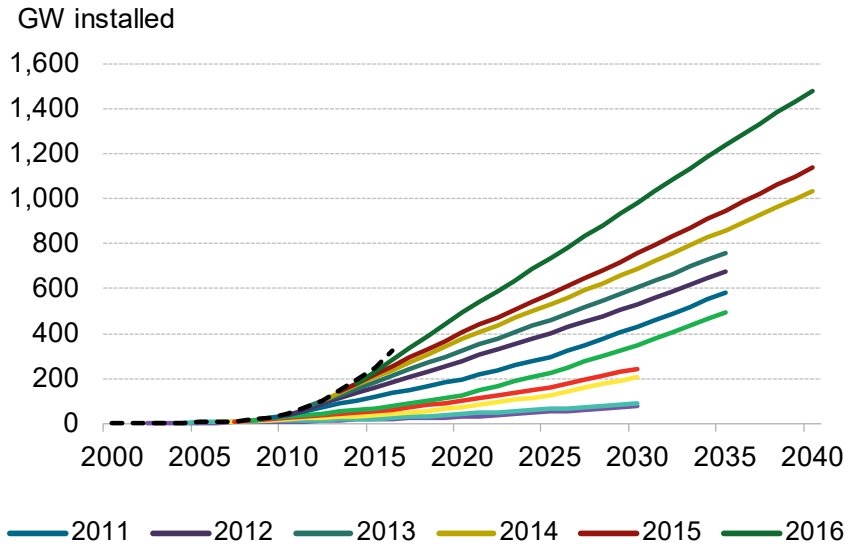
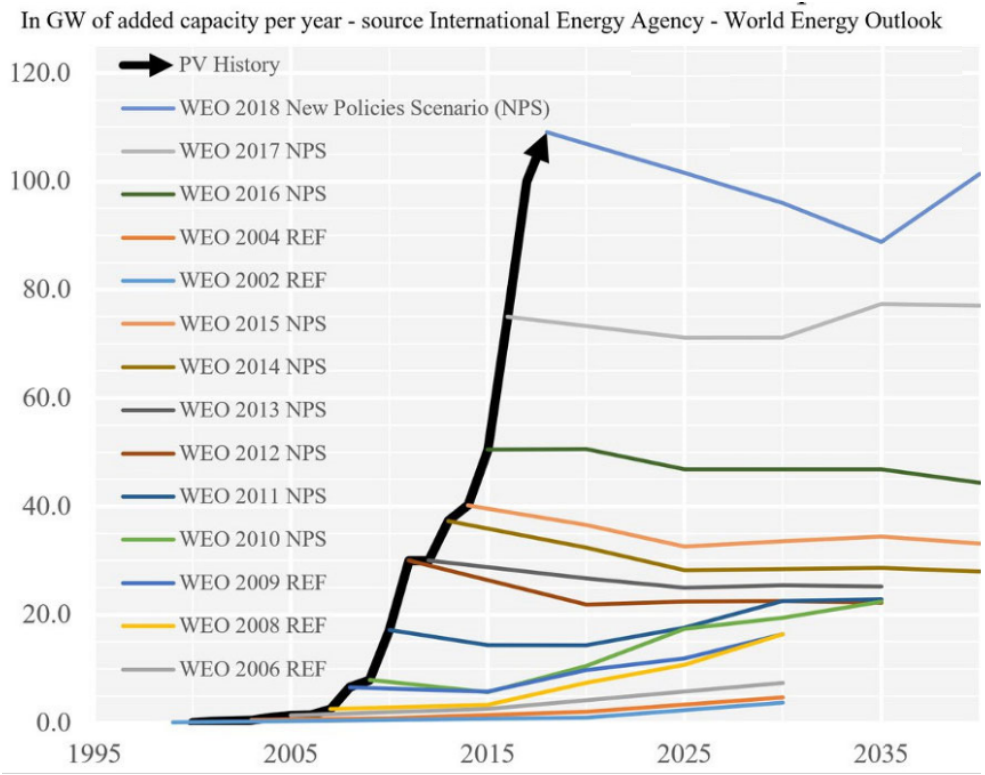
Global cumulative solar installations



Note: 2004-2009 Reference, 2010-2016 New Policies Scenario

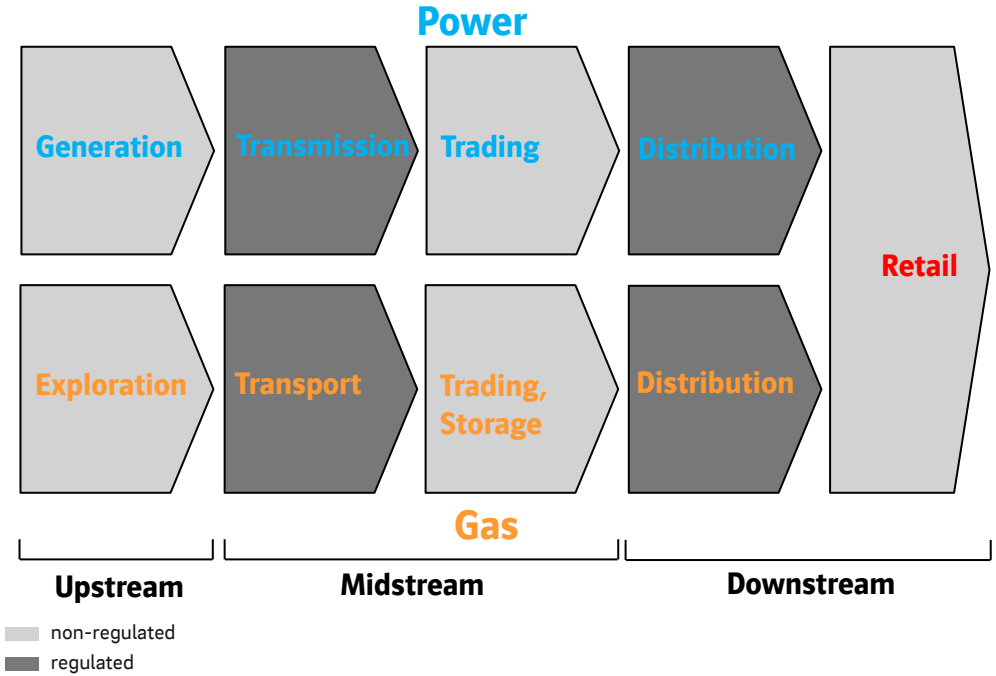
"Forecasting is a difficult art, especially when it means projecting the future"

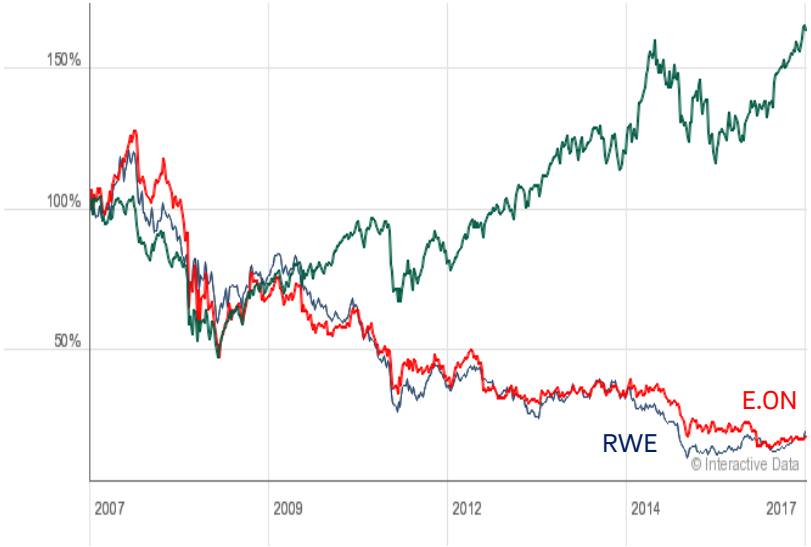
Global annual solar additions - historic data vs IEA WEO predictions



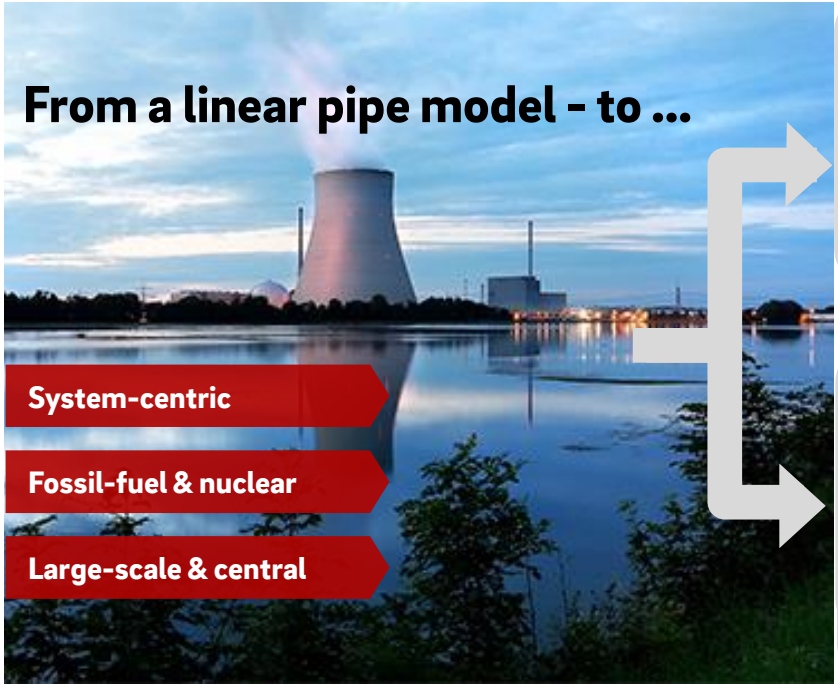
Sources: BloombergNEF, a.e.hoekstra@tue.nl, IEA WEO

Our old integrated business model was falling apart





Sep 2016: Split into two publicly listed competitive companies with distinct identities



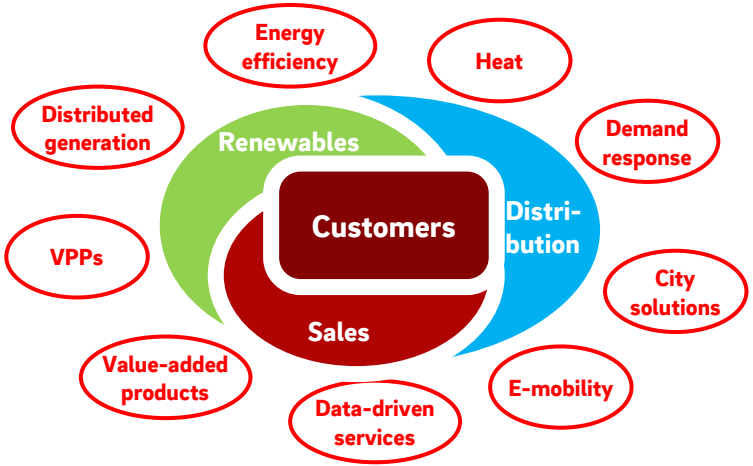
uniper

Shaping markets

Central generation
Upstream
Transmission
Commodity markets

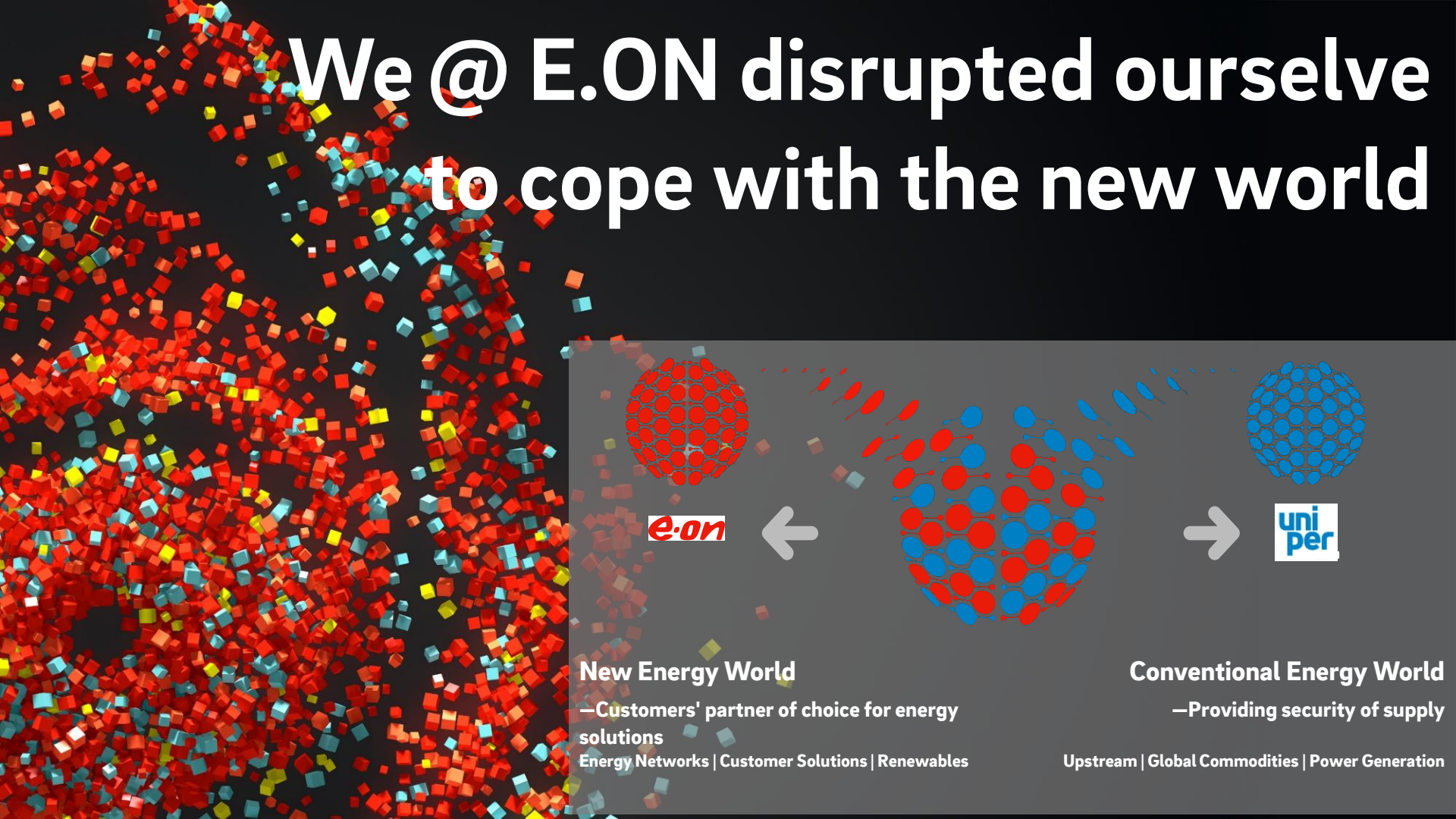
e·on

Empowering customers



Source: E.ON SE

We @ E.ON disrupted ourselve to cope with the new world



New Energy World

—Customers' partner of choice for energy solutions

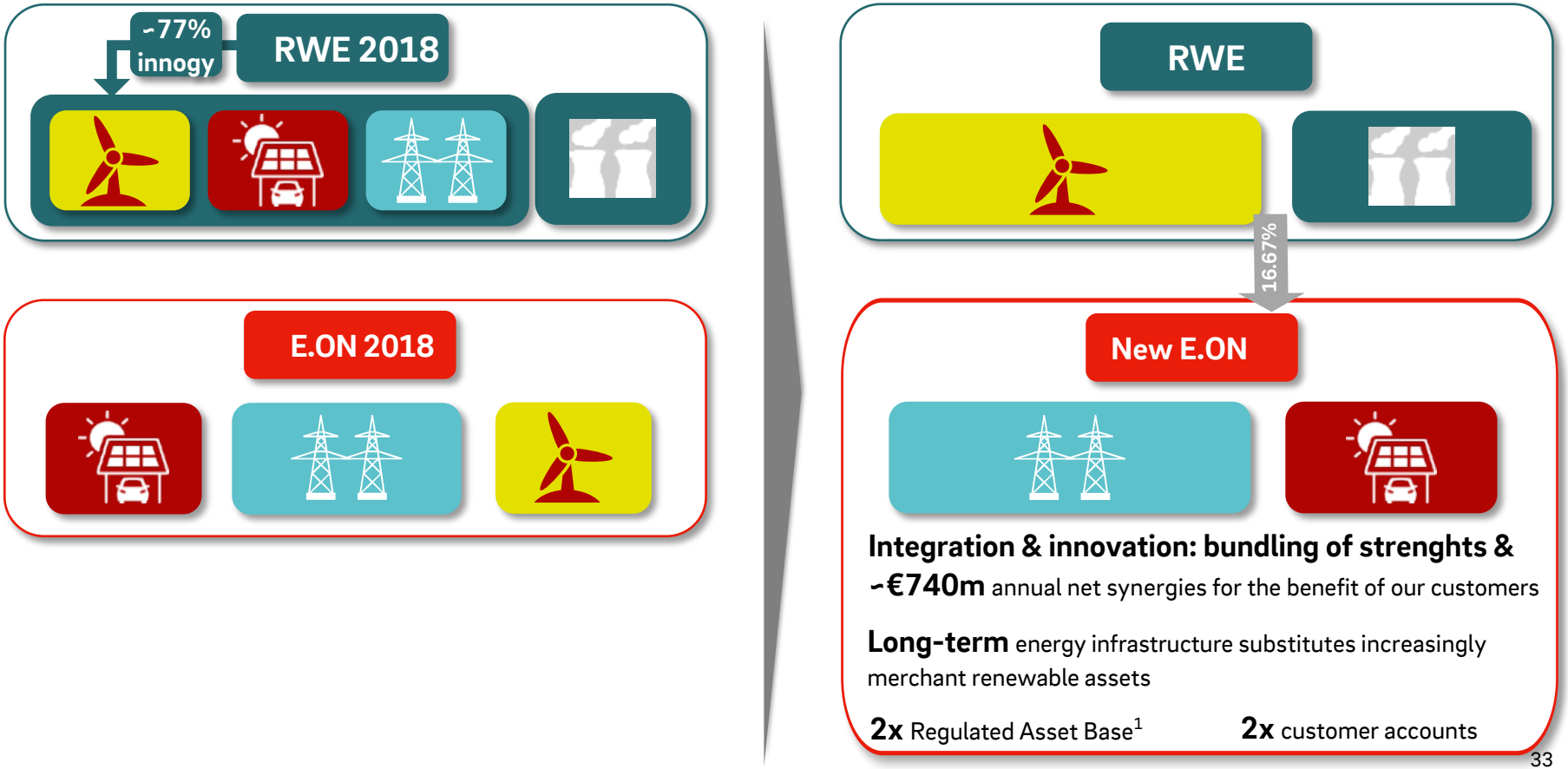
Energy Networks | Customer Solutions | Renewables

Conventional Energy World

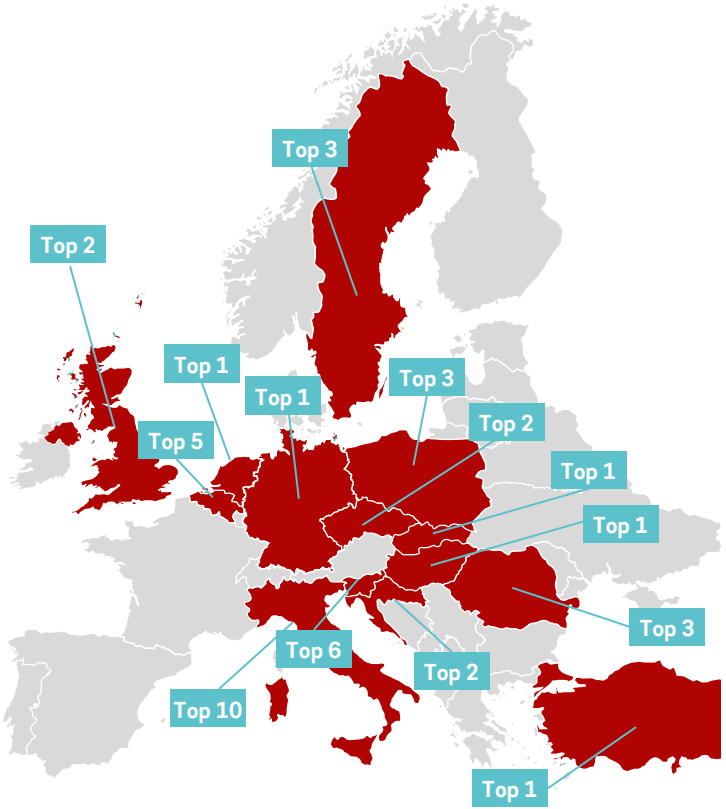
—Providing security of supply

Upstream | Global Commodities | Power Generation

After the game is before the game… Creating two focused energy companies



E.ON's market position in Energy Retail



Customer Solutions

Customer accounts across Europe[1]: 52.6 million

Thereof: electricity customers[1] 41.3 million

gas customers[1] 11.3 million

~33% of adj. EBIT[4] from decentral energy infrastructure

~4.8 m Smart meters rolled out in our customer solutions business

1. Including at-equity participations, earnings of Customer Solutions business of Croatia, Slovenia and VSEH allocated to Energy Networks due to size 2. 2019 adjusted due to the disposal of substantial parts of the heating customer business 3. To standardize reporting, the definition of customers was adjusted for 2019 4. 2019 adjusted for the acquisition of the Dutch energy utility VandeBron 5. 2019 adjusted due to the disposal of EKER in Hungary and first-time consolidation of VSEH in Slovakia

Future Energy Home

Home Heating

Market leading position in several European markets

>50k heating devices sold and installed in 2020

>1.1m active service contracts

Heat pump share more than doubled

Excellent customer experience with >50 NPS score

PV & Storage

Market leading position in residential PV in Europe

>30.000 new residential solar systems sold & installed

Increased installation capacities through acquisitions

Battery share more than doubled (2020 vs. 2019)

E.ON Home

>10,000 customers connected to our secure, smart and efficient home energy management app

Won Red Dot Design award 2020

Available in Germany, UK, Italy, Sweden, and Poland

E.ON eMobility Solutions

eMobility Solutions

Launch of new solutions

Cooperations with other OEMs

- VW to develop mobile quick-chargers
- Nissan to develop vehicle2grid solutions
- BMW partner for charging solutions

~6,000 private charge points installed

Infra-structure

Operating > 13.000 charge points across Europe

Infrastructure in 11 European countries

Strong market position in public networks in Sweden, Denmark, Germany & growing position in Eastern Europe

Consultancy support

Charging infrastructure

Operations & Maintenance

All-inclusive (employee) offer

Green tariffs

Factory quarter Munich

- Most attractive existing quarter solution in Germany
- Area of 88.000 m²
- 1.100 end users
- 50% less CO_2
- 10% lower energy costs
- High level of energy self-sufficiency

werksviertel münchen

Airport Berlin Tegel

- Biggest quarter solution project in Germany
- Reuse of 460.000 m² airport site
- Innovative energy concept with low-ex-grid, feed in possibility for prosumer
- Bidding consortium of E.ON and Berliner Stadtwerke

Elephant & Castle London

- Sustainability at the heart of London: 10.000 Houses
- 1,1 Mio. square meter with business, shops, restaurants
- 100% renewable heating supply from 2023 (biogas)

Energy Networks

Intelligente Netze bilden das unverzichtbare Rückgrat der neuen dezentralen, digitalen und erneuerbaren Energiewelt.

1.500.000 km
Netz

Große Netzkunden-basis
Strom: 28mn
Gas: 6mn

313 TWh
Gas
325 TWh
Strom

~4.2m SmartMeter
rolled out in our grid areas

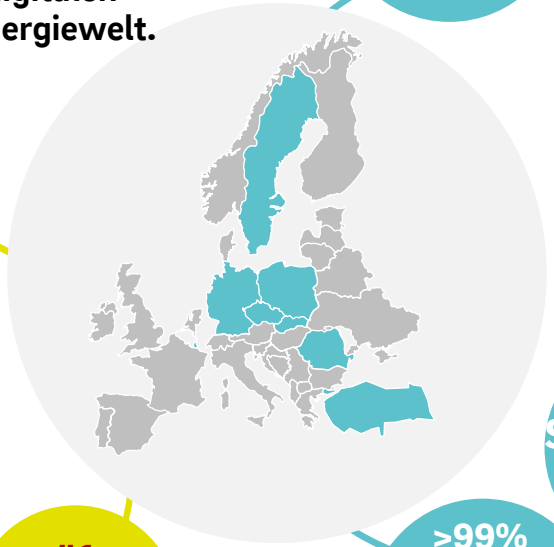
>99% efficiency
Spitzenposition in DE und Schweden

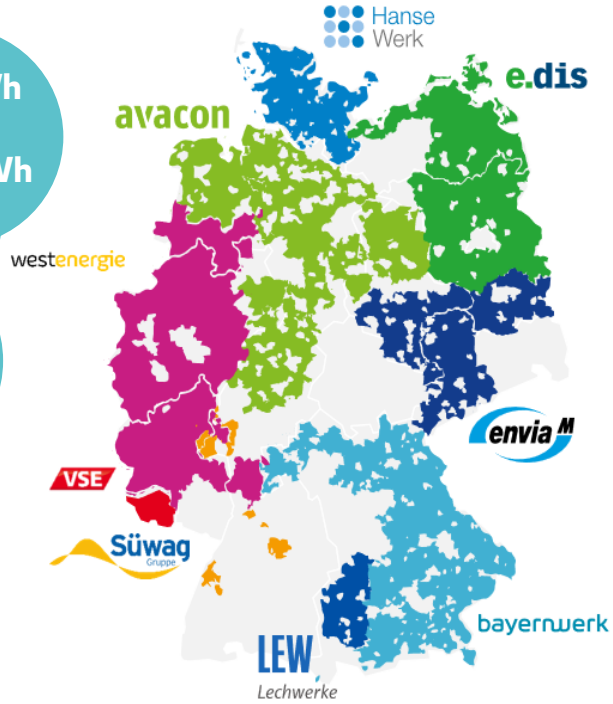
#1
Verteilnetz-betreiber in Deutschland

78 GW Erneuerbare
angeschlossen an E.ON Netze

~70.000
Mitarbeiter

35 Mrd. €
Regulated Asset Base





Our target is to fully automate inspection of overhead lines by 2025

2020

Inspection

...mainly manual operations and less digital data

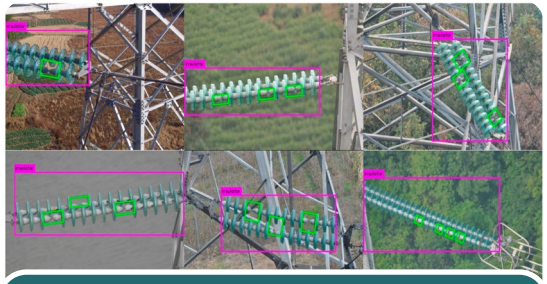
Climb, walk, fly by helicopter

2023

Change Over

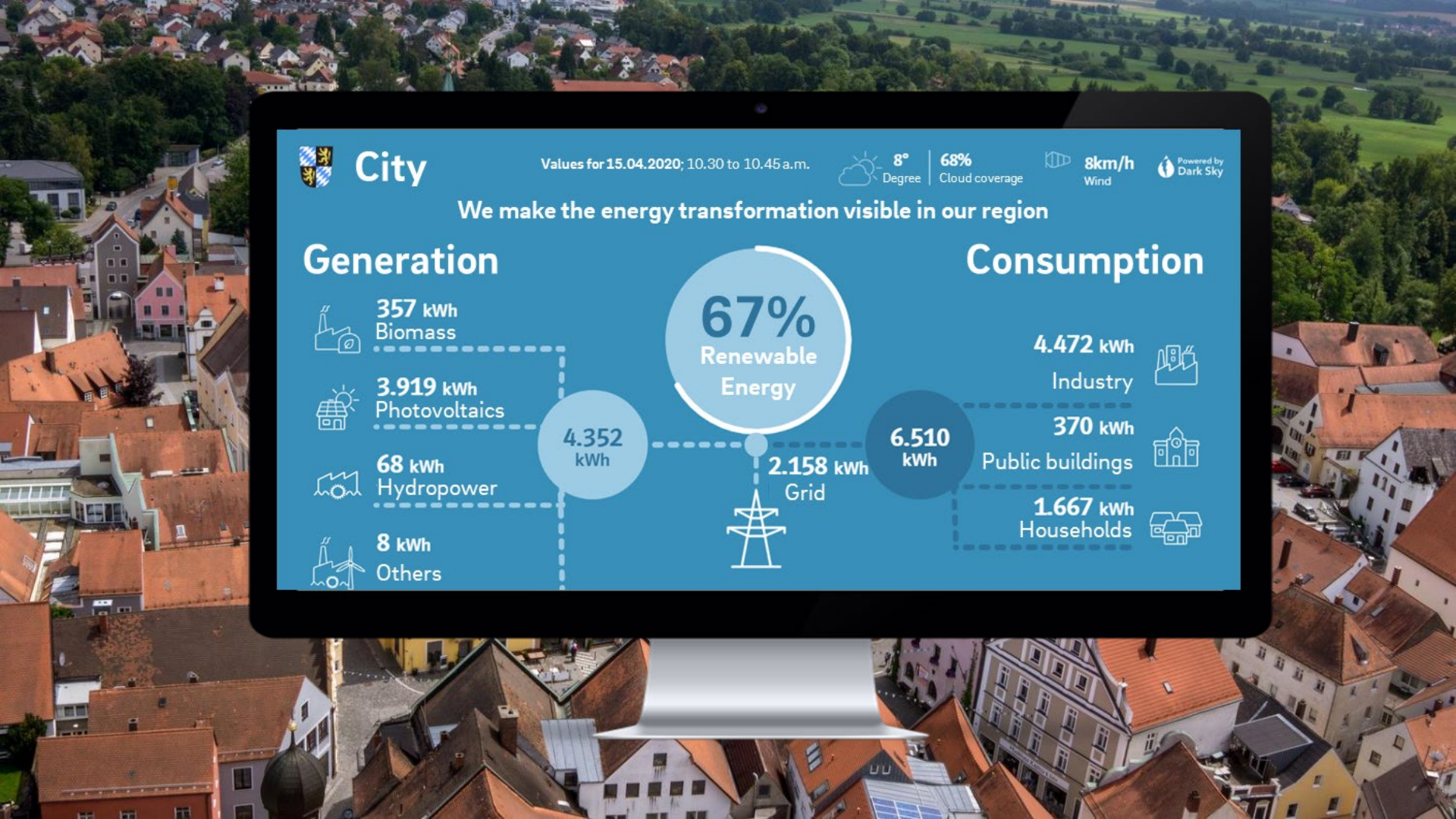
...support for inspection, partial flight with helicopters and drones

2025



Target

... fully automated drone inspection, fault detection and ecological route management


City
Values for 15.04.2020; 10.30 to 10.45 a.m.
8° Degree
68% Cloud coverage
8km/h Wind
Powered by Dark Sky
We make the energy transformation visible in our region
Generation
357 kWh Biomass
3.919 kWh Photovoltaics
68 kWh Hydropower
8 kWh Others
4.352 kWh
67% Renewable Energy
2.158 kWh Grid
6.510 kWh
Consumption
4.472 kWh Industry
370 kWh Public buildings
1.667 kWh Households

Key focus areas of our new CEO

Growth

- Grow power RAB by 4-5% p.a. until 2023 and beyond
- Grow Energy Infrastructure Solutions EBIT by 15% (CAGR 2021-2023)
- Capitalize on opportunities from EU recovery and Green deal

Sustainability

- Make ESG an anchoring theme in everything we do
- Define clear path to net zero by 2040
- Increase transparency on E.ON's sustainability efforts

Digitalization

- Apply technologies to radically change the way we operate
- Drive innovative & digital business models
- Achieve cost leadership through digital platforms

>65%
German onshore connected to E.ON grid

Listed on CDP A list

>GBP100m
New: UK EBIT target 2021

Net zero is the new normal – E.ON is driving carbon reduction

Global challenges	E.ON's contribution	Focus SDGs[5]
IPCC[1] long term goal to limit global warming to **1.5°C**	Avoided emissions together with our clients 2020: **~100m tons CO_2**	
German greenhouse gas emissions to be cut by **55% by 2030[2]**	**One out of five** renewable assets in Europe[3] connected to E.ON's grids	
Green Deal: The EU will be climate neutral by **2050**	E.ON will become carbon neutral[4] by **2040**	

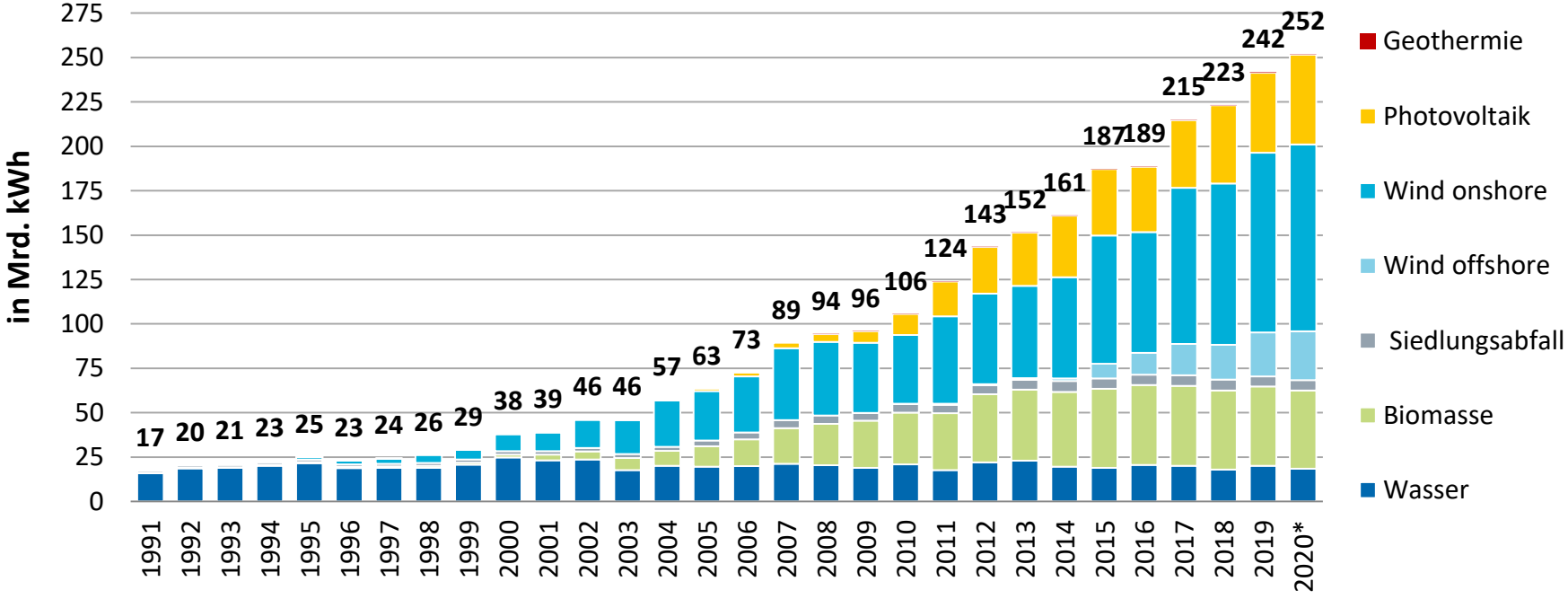
E.ON is the **largest corporate Green Bond issuer** in Germany with€4.6bn Green Bonds outstanding

80-85% EU taxonomy aligned capex (2021-23)[1]

1. Intergovernmental Panel on Climate Change 2. Pre Green Deal 3. Considering EU27 4. Carbon neutrality by 2040 (Scope 1 and 2), 75% carbon reduction by 2030 (Scope 1 and 2), 50% carbon reduction (Scope 3) by 2030, carbon neutrality by 2050 (including Scope 3). Base year: 2019 pro forma 5. UN Sustainable Development Goals

Content

Entwicklung der Stromerzeugung aus Erneuerbaren Energien in Deutschland

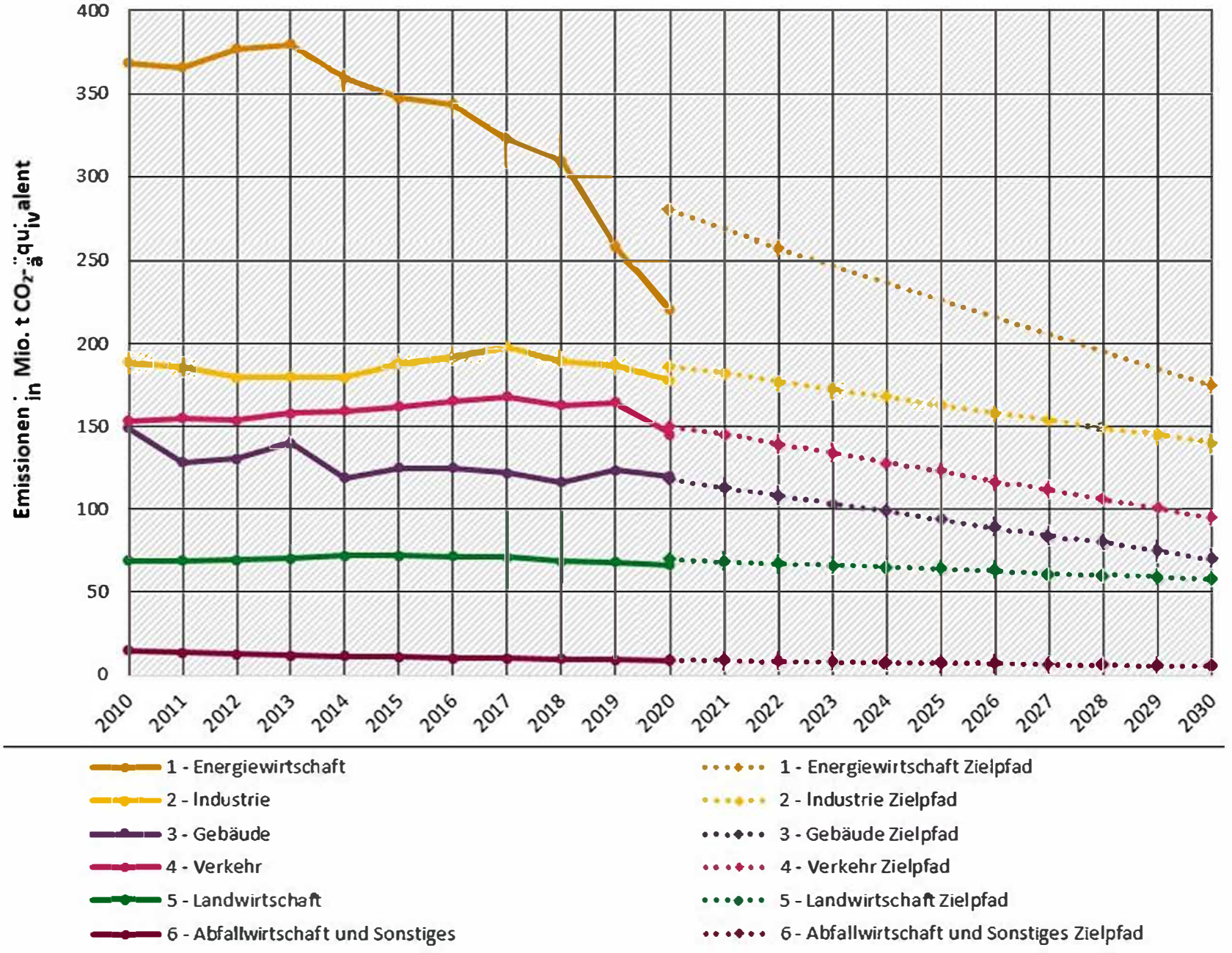


Quellen: Destatis, ZSW, BDEW; Stand: 12/2020

* vorläufig, teilweise geschätzt

Entwicklung und Zielerreichung der Treibhausgasemissionen in Deutschland

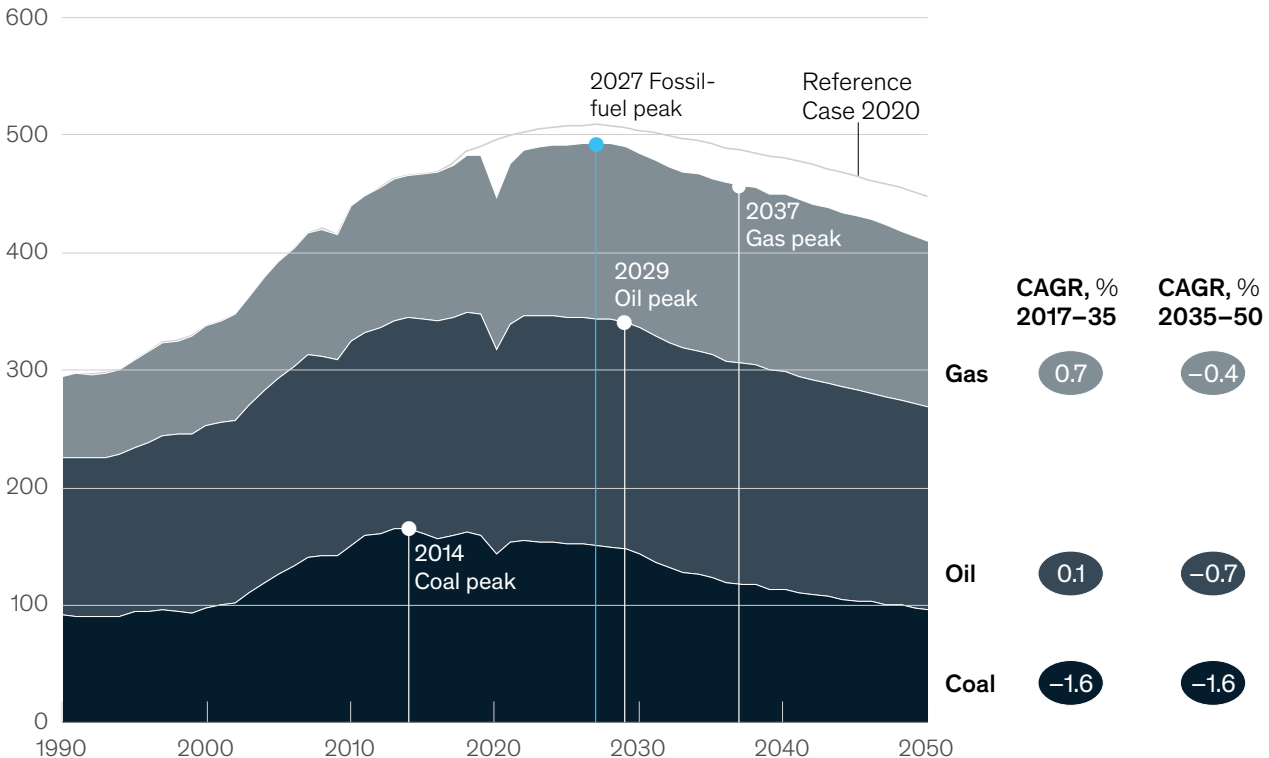
in der Abgrenzung der Sektoren des Klimaschutzgesetzes (KSG)



UBA 2021

Oil demand peaks in the late 2020s and gas in the 2030s, whereas coal shows a steady decline

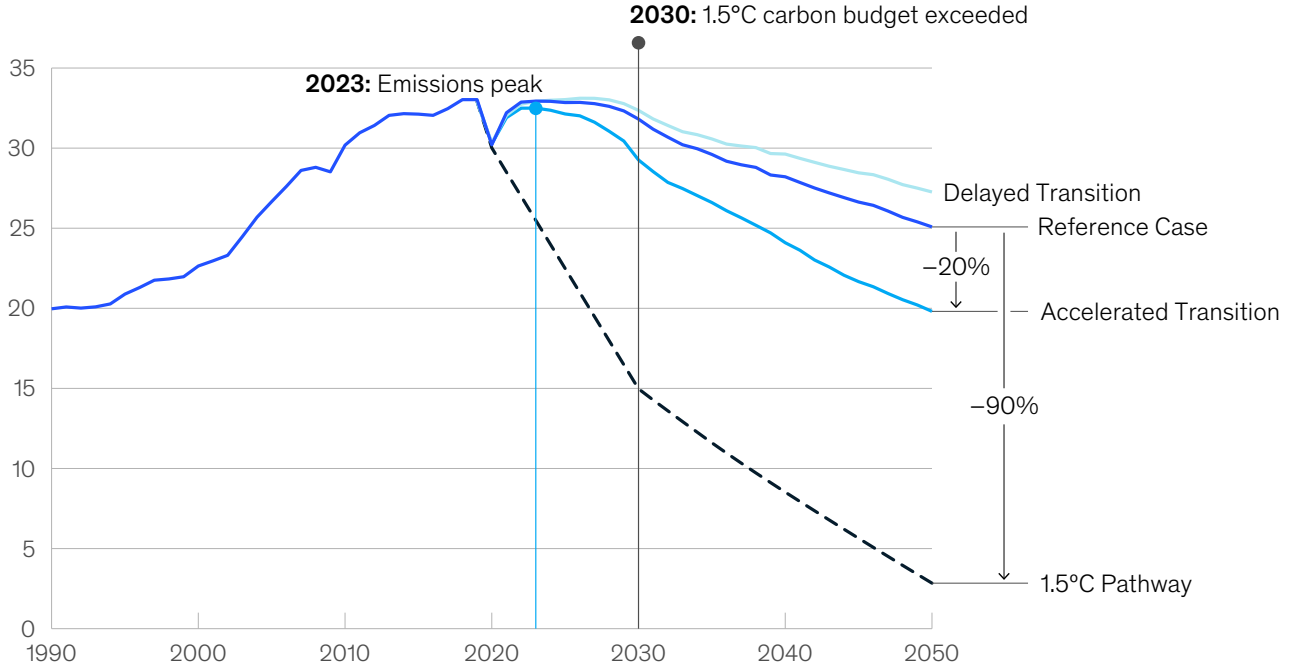
Primary energy demand per fossil fuel, million TJ



Source: McKinsey Energy Insights Global Energy Perspective 2021, December 2020

In the Reference Case, the global carbon budget for 1.5°C Pathway is exhausted by 2030

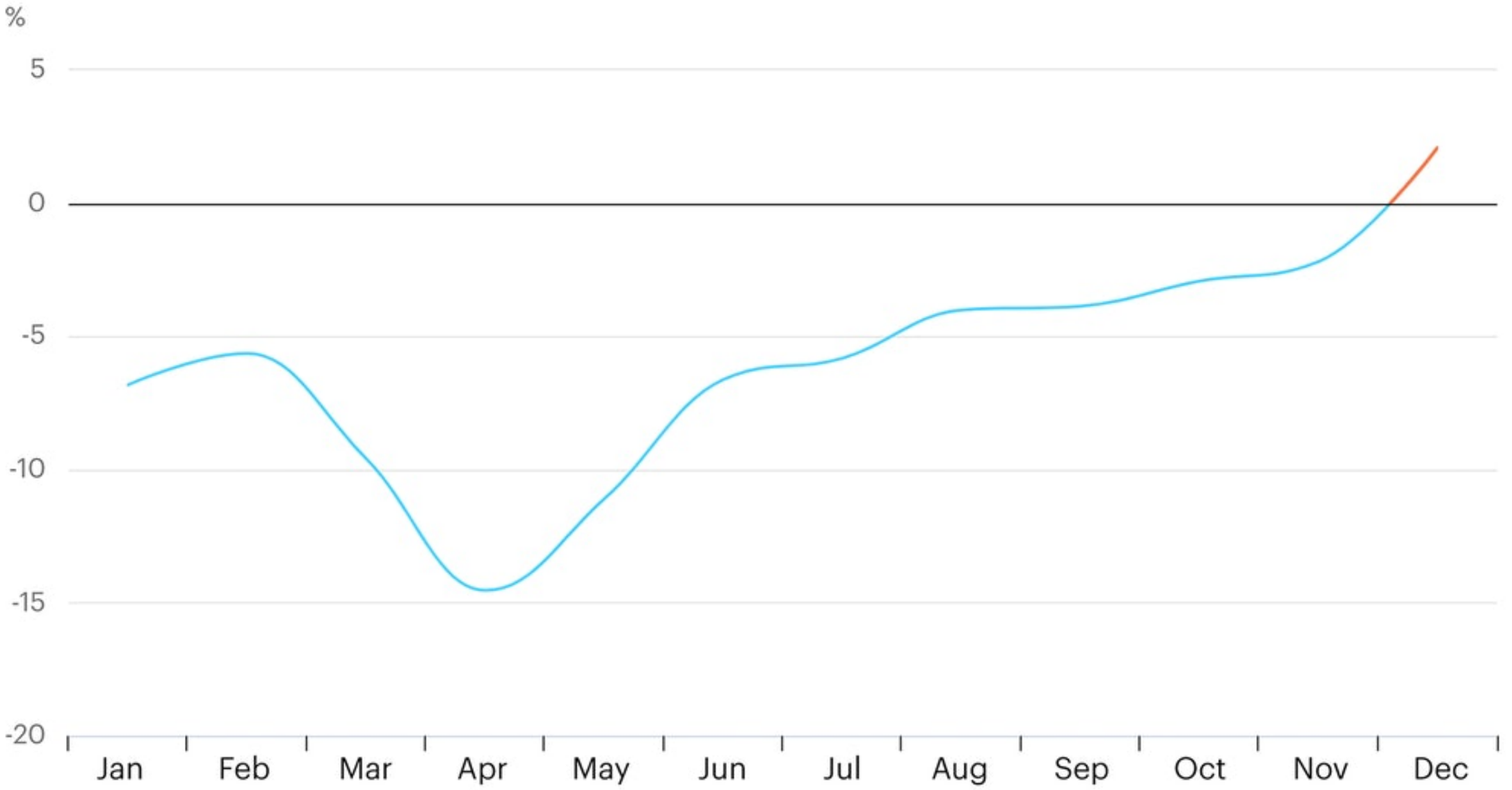
Global energy-related CO_2 emissions, $GtCO_2$ p.a.



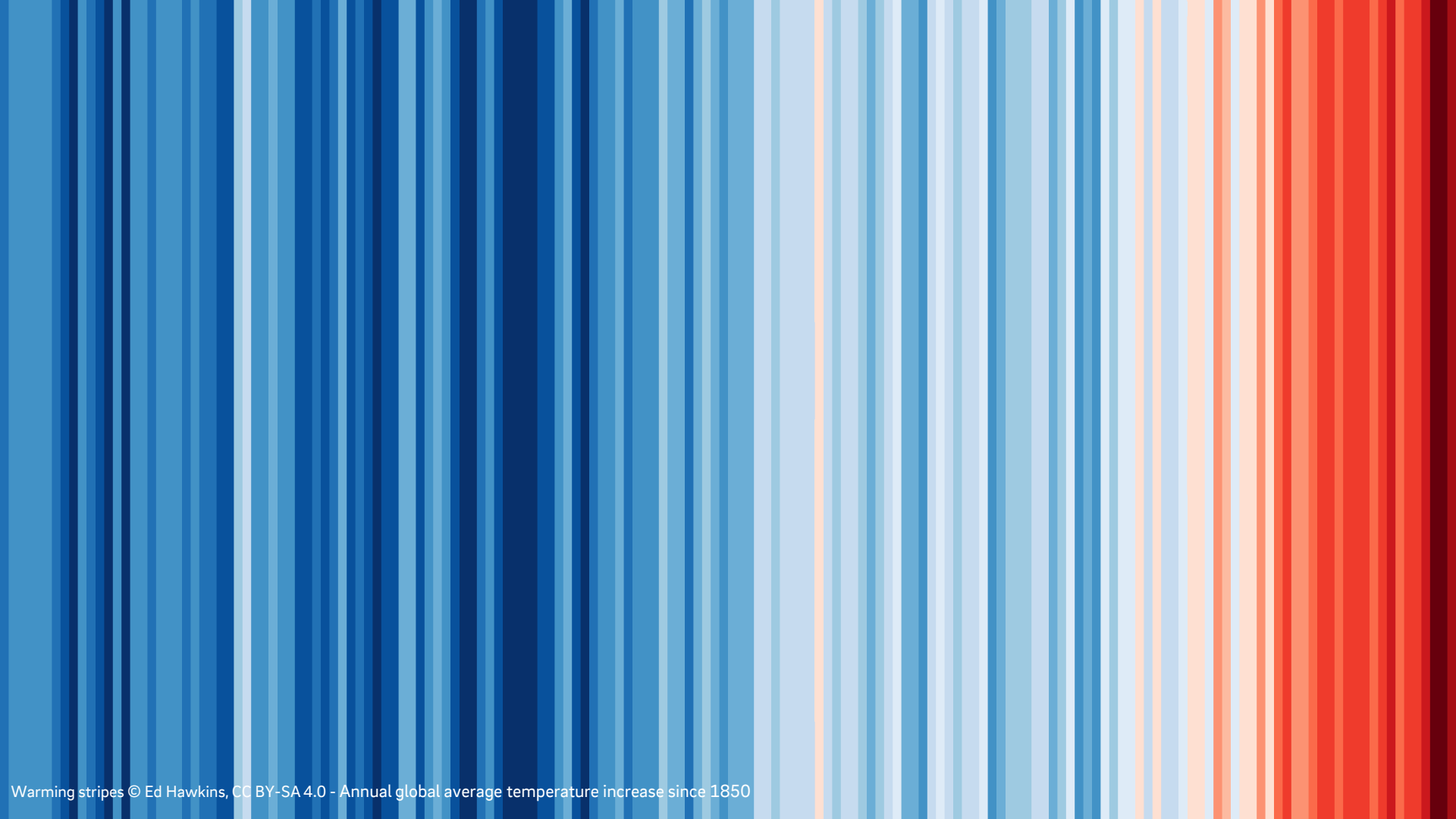
Source: McKinsey Energy Insights Global Energy Perspective 2021, December 2020

Monthly evolution of global CO_2 emissions, 2020 relative to 2019

Global Energy Review: CO_2 Emissions in 2020



International Energy Agency


Warming stripes © Ed Hawkins, CC BY-SA 4.0 - Annual global average temperature increase since 1850

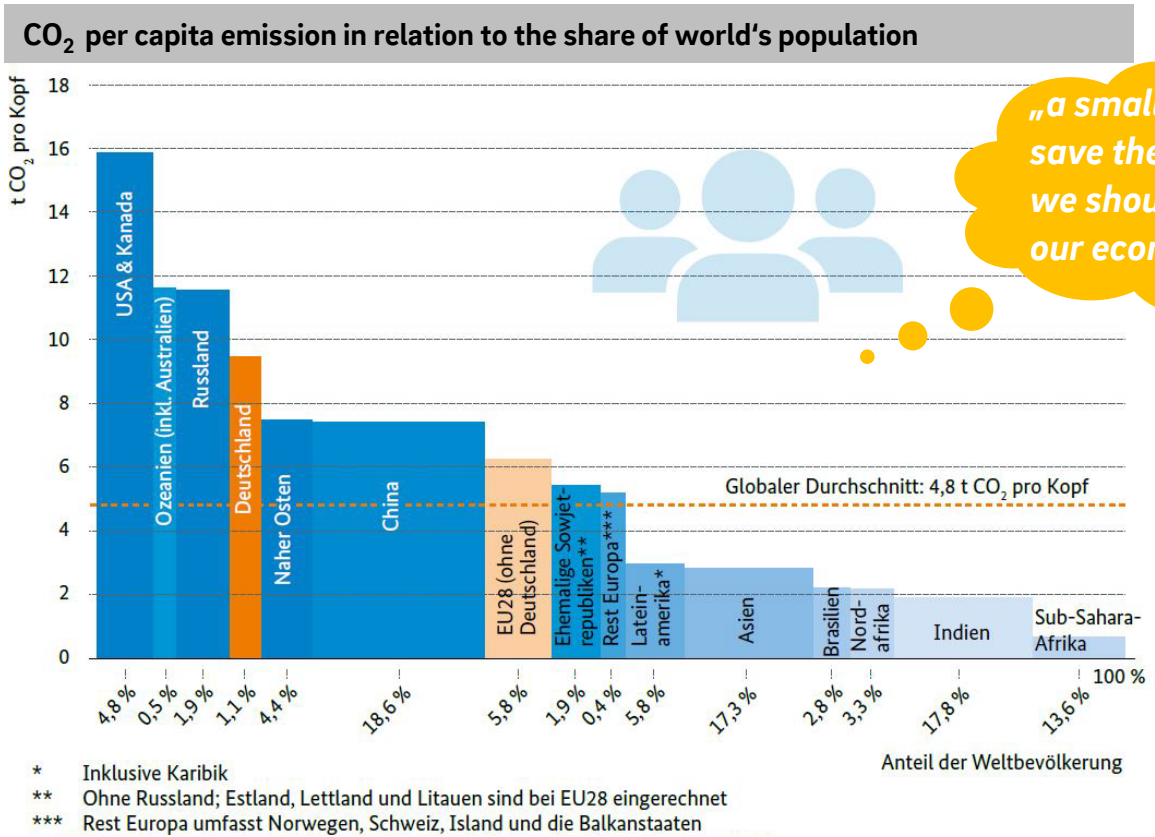
Content

Quo vadis?

Responsibility

Doing the right things right

It matters…
our responsibility

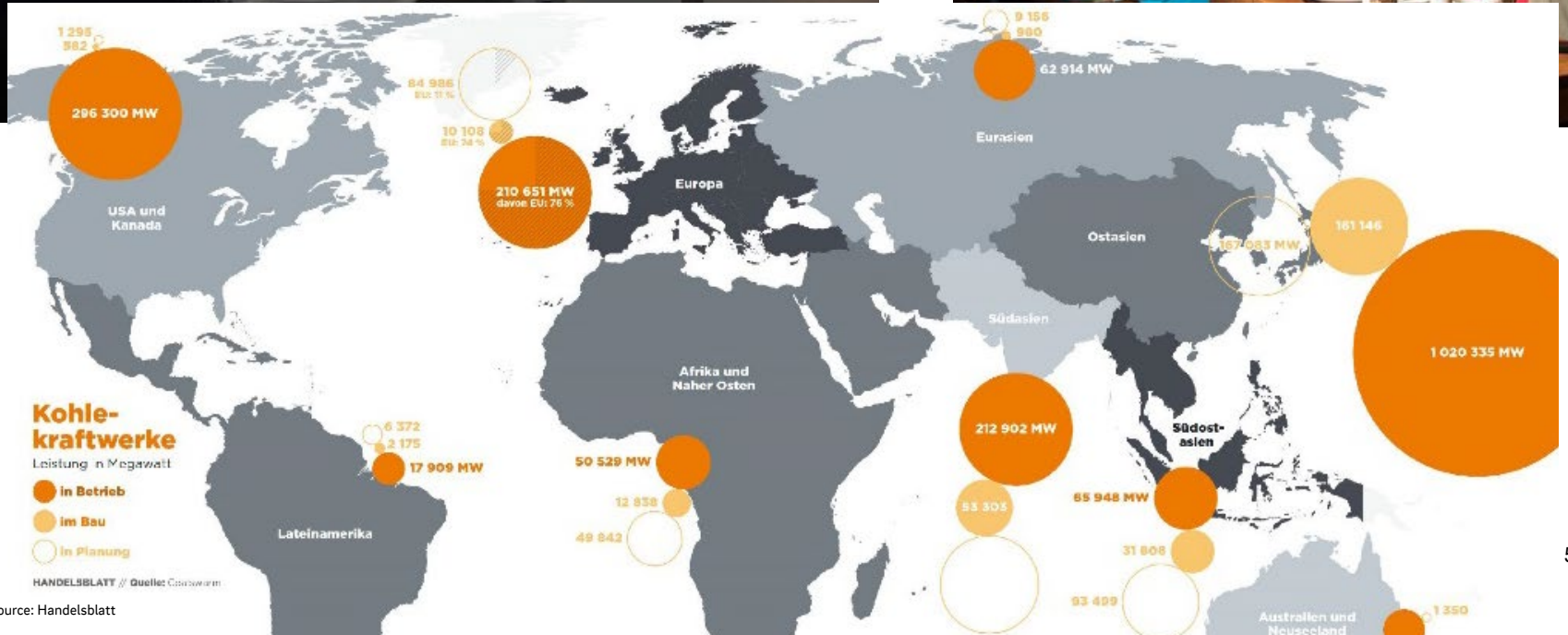


„a small country can't save the world – we shouldn't damage our economy

Source: BMU 2019, World Bank

Chasing The Paris Dream ...

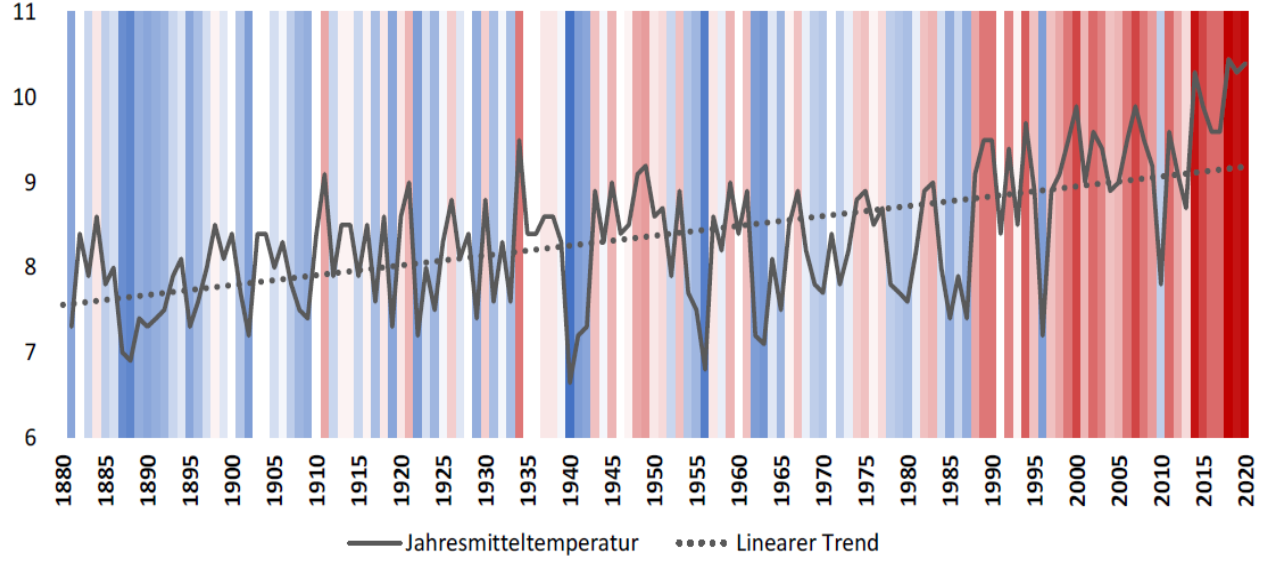
priorities ...



Source: Handelsblatt

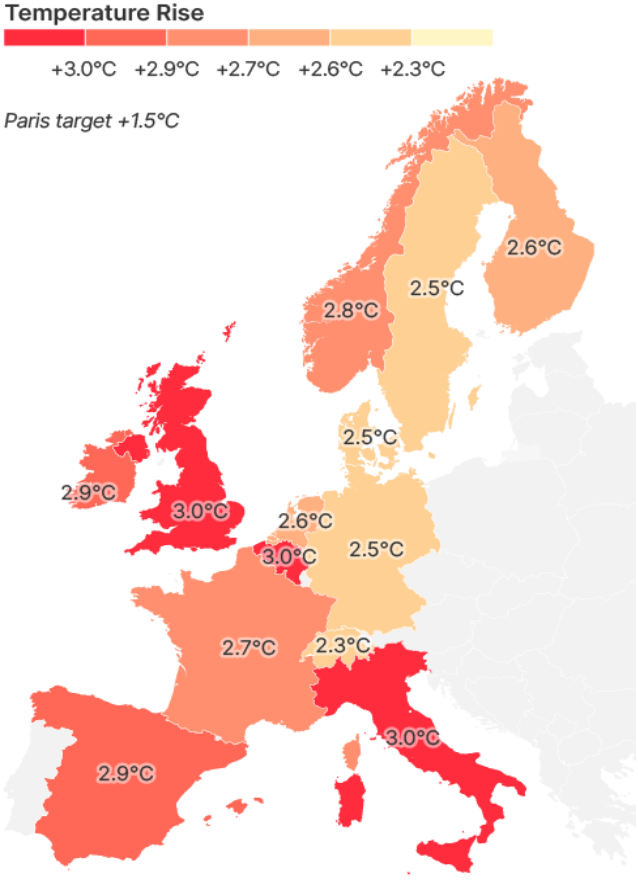
It matters...
our responsibility

Jahresmitteltemperaturen in Deutschland ab 1881



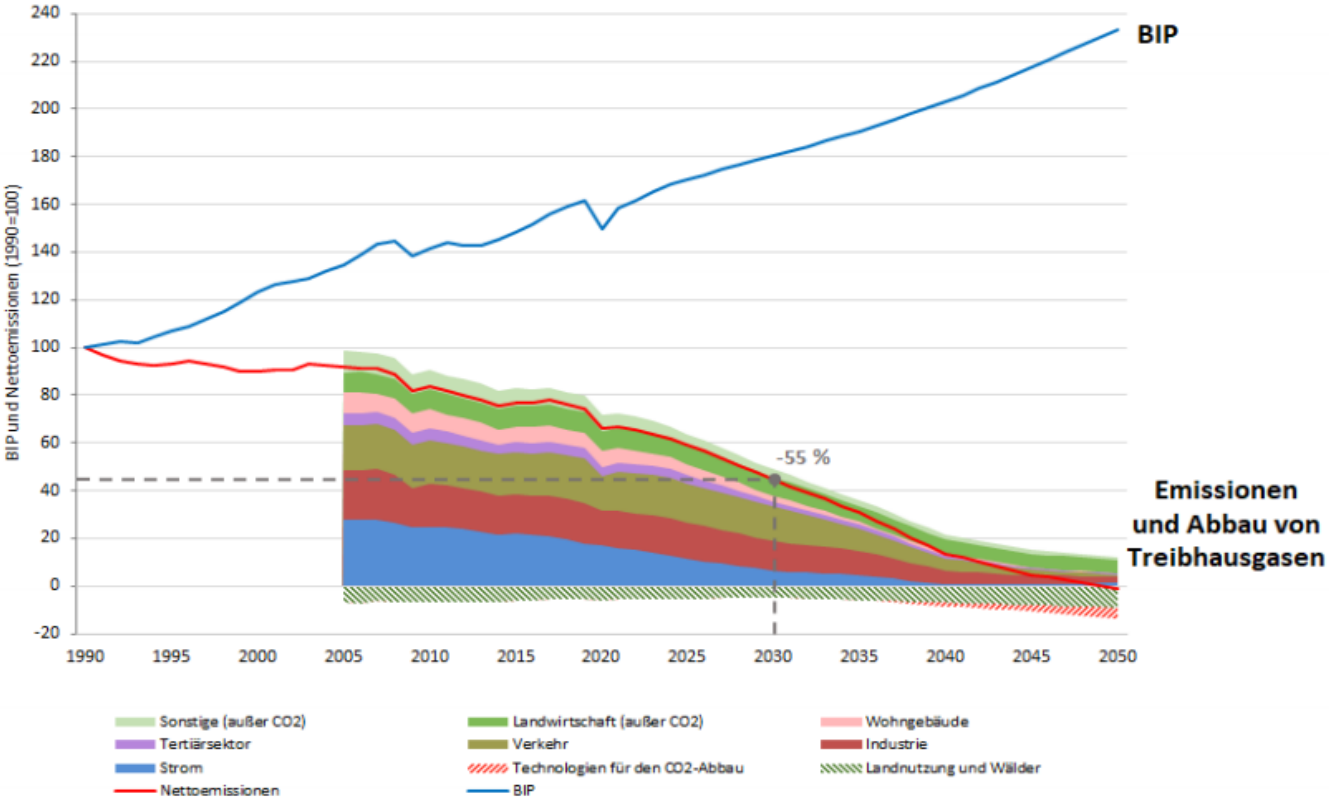
in Grad Celsius

Europe's Running Hot: Companies' current emission plans won't meet Paris Agreement goals

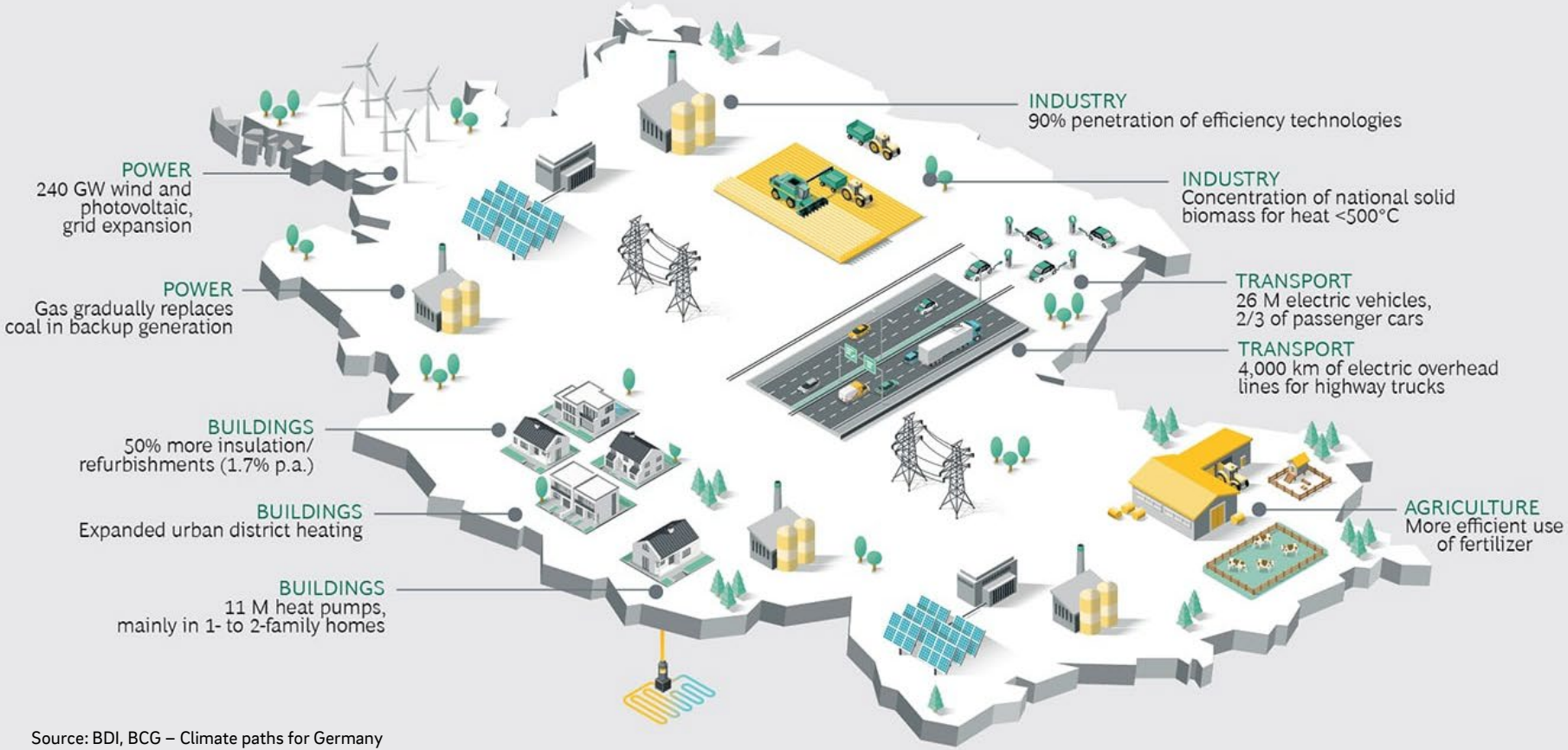


Quellen: BDEW, DWD / Oliver Wyman, Statista

EUROPÄISCHE KOMMISSION

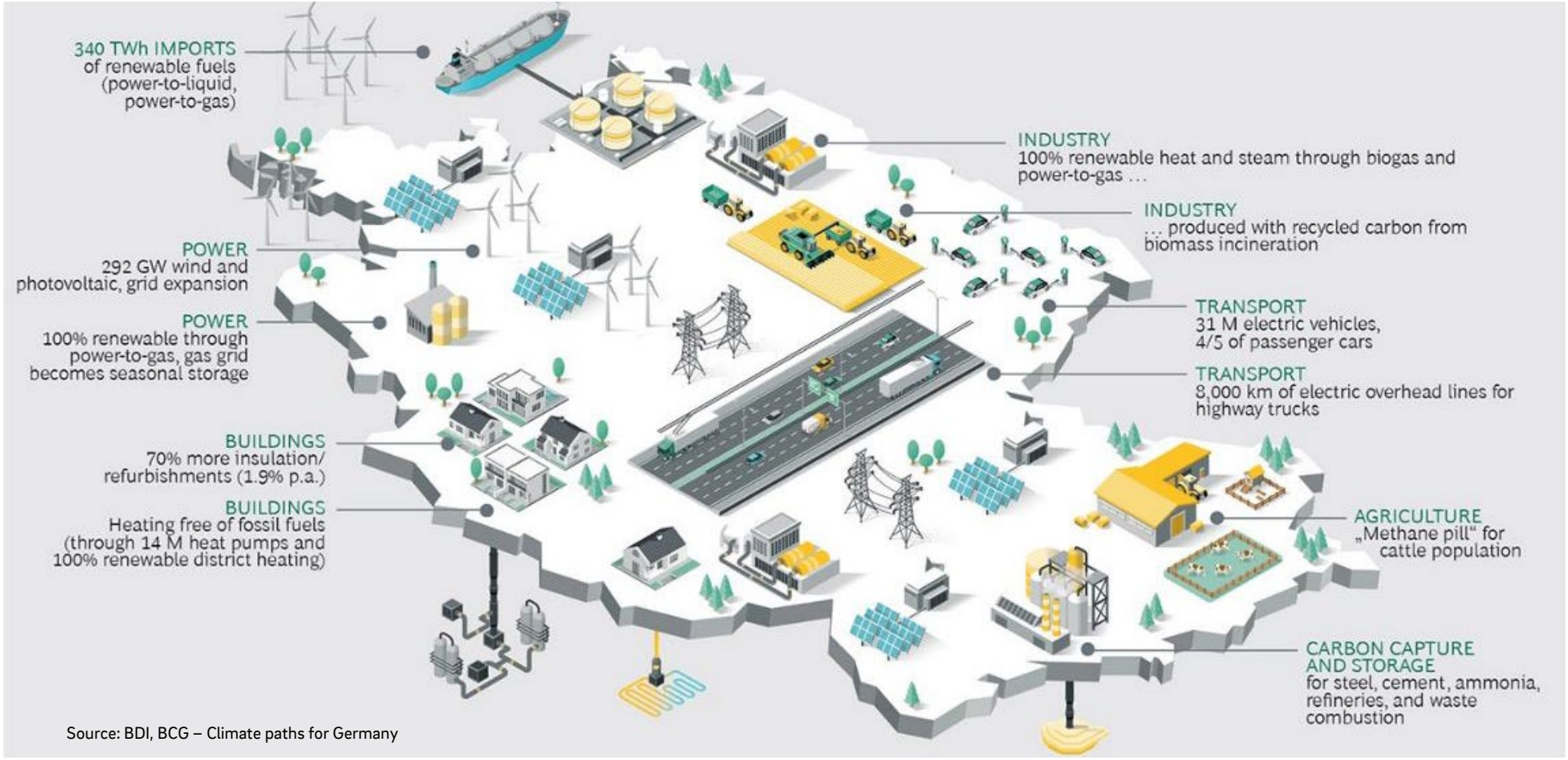


80% GHG reduction - technically feasible macroeconomically viable - assuming an idealistic approach. However, implementation requires significantly stepping up existing efforts, more decisive political steering and, without a consensus on global climate protection, effective carbon leakage protection.



Source: BDI, BCG – Climate paths for Germany

95% GHG reduction pushes the boundaries of technical feasibility & social acceptance. Reduction ¾ more than 80% path. Practically 0 emissions for most sectors required. Phasing out fossil fuels, importing renewable fuels (PtL/G), use of unpopular technologies such as CCS, and reducing emissions from livestock.

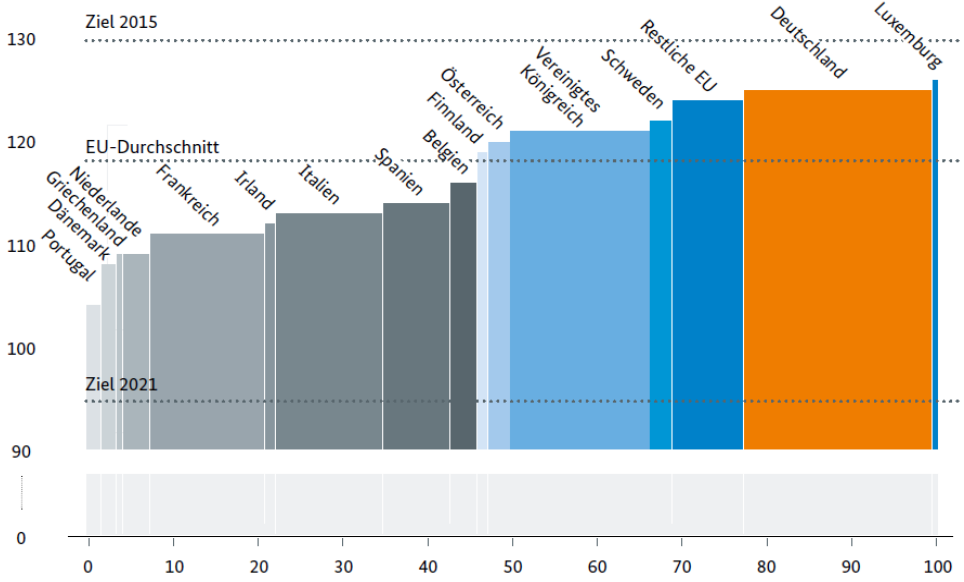


Source: BDI, BCG – Climate paths for Germany

It matters…
behaviour and responsibility

Passenger cars

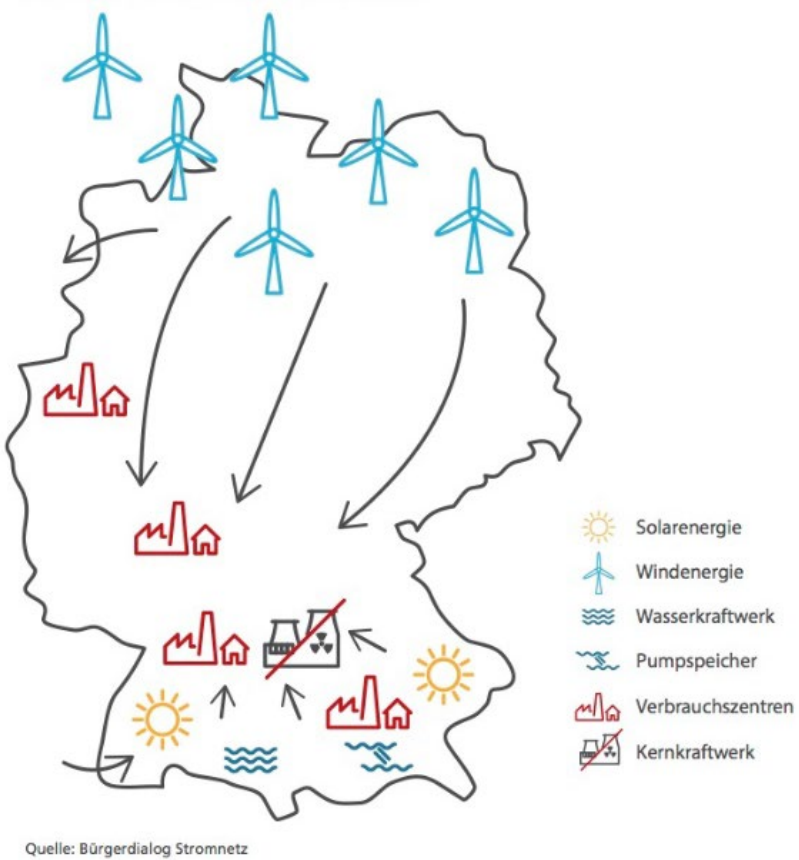
average CO_2-emission per EU member state 2017 (gr/km) / permitted CO_2 limits* (NEFZ) / cumulated market shares in %



Source: BMU, UBA, EEA, ICCT - 2018

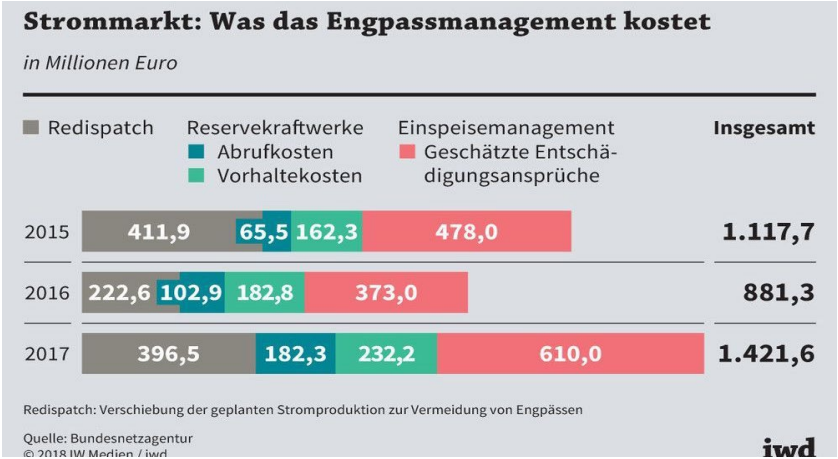
It matters...
behaviour and responsibility

Decentral generation far away from consumption requires new networks – politicians need to persuade and implement …



Quelle: Bürgerdialog Stromnetz

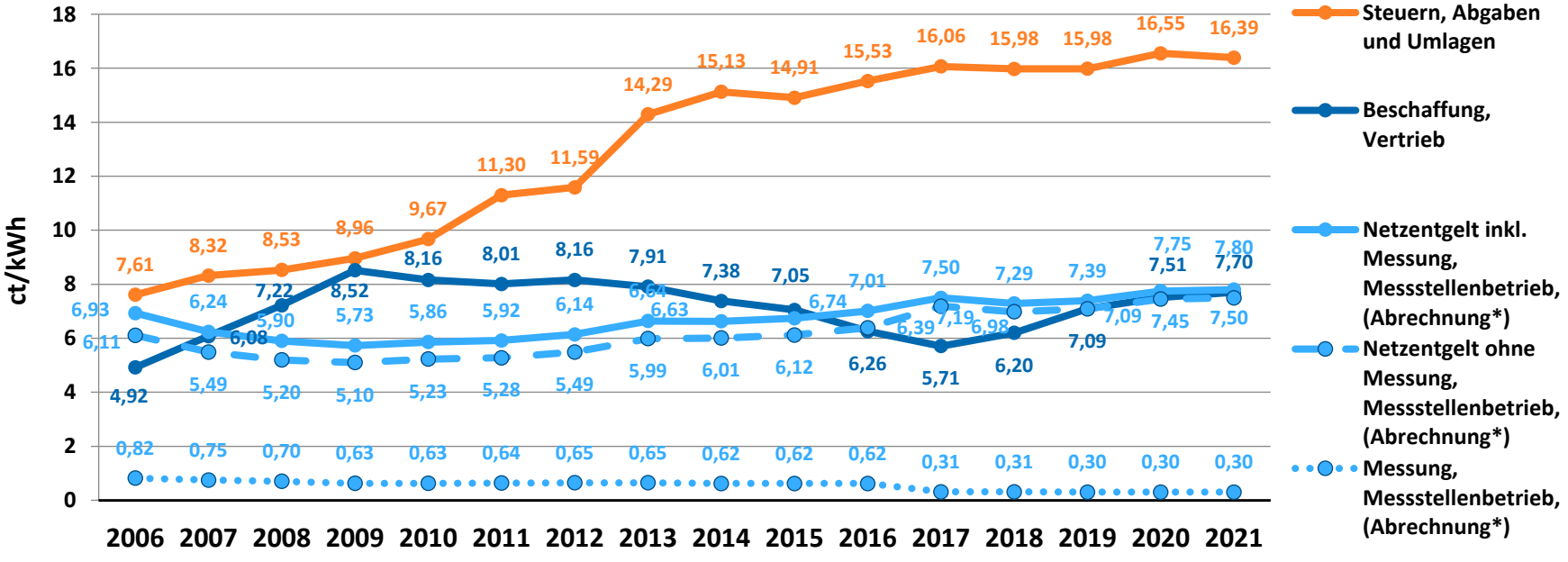
but…



Von der Stromwende zur Energiewende – solange Strom alle Kosten trägt, verlieren Erneuerbare den Wettbewerb bei Wärme und Verkehr

Entwicklung der Strompreis-Bestandteile für private Haushalte

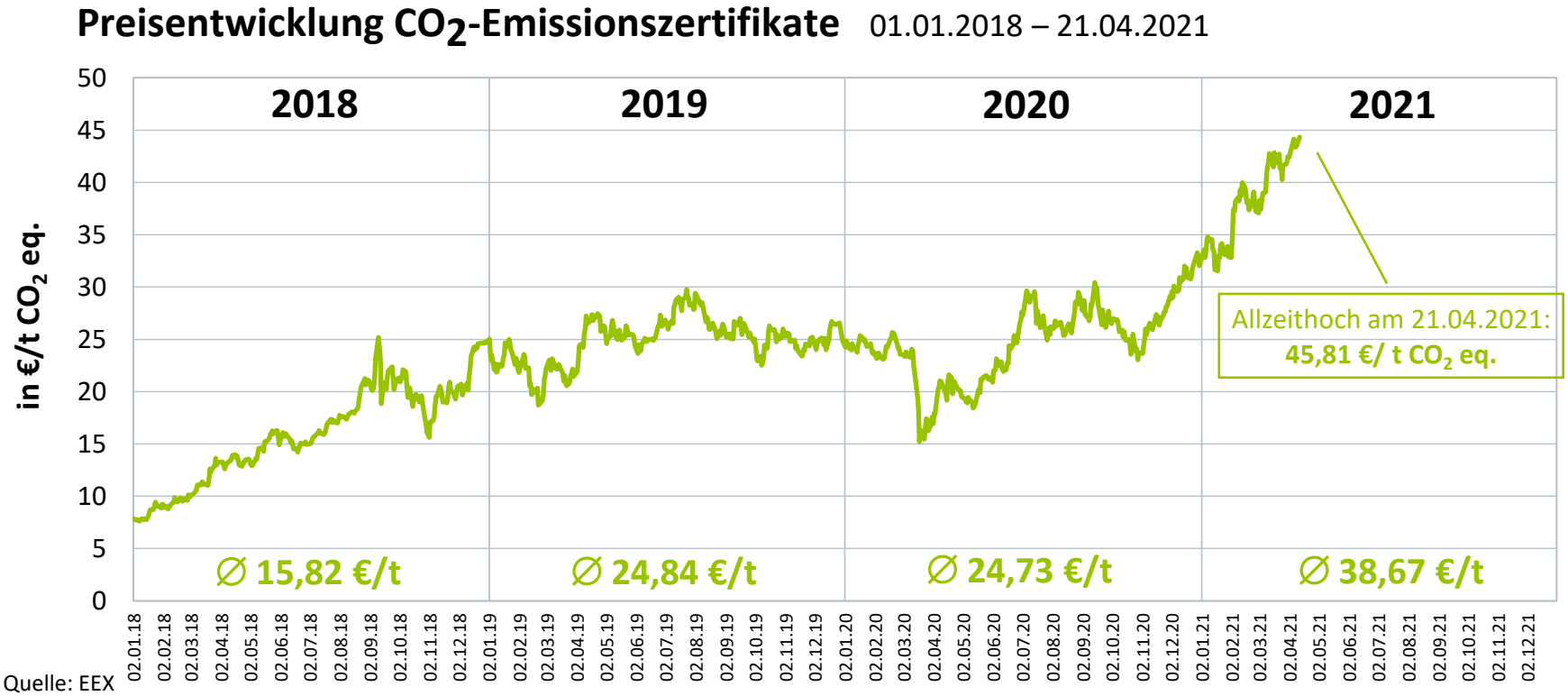
Bestandteile des durchschnittlichen Strompreises für einen Haushalt, Jahresverbrauch 3.500 kWh



Quelle: BDEW, Stand: 01/2021

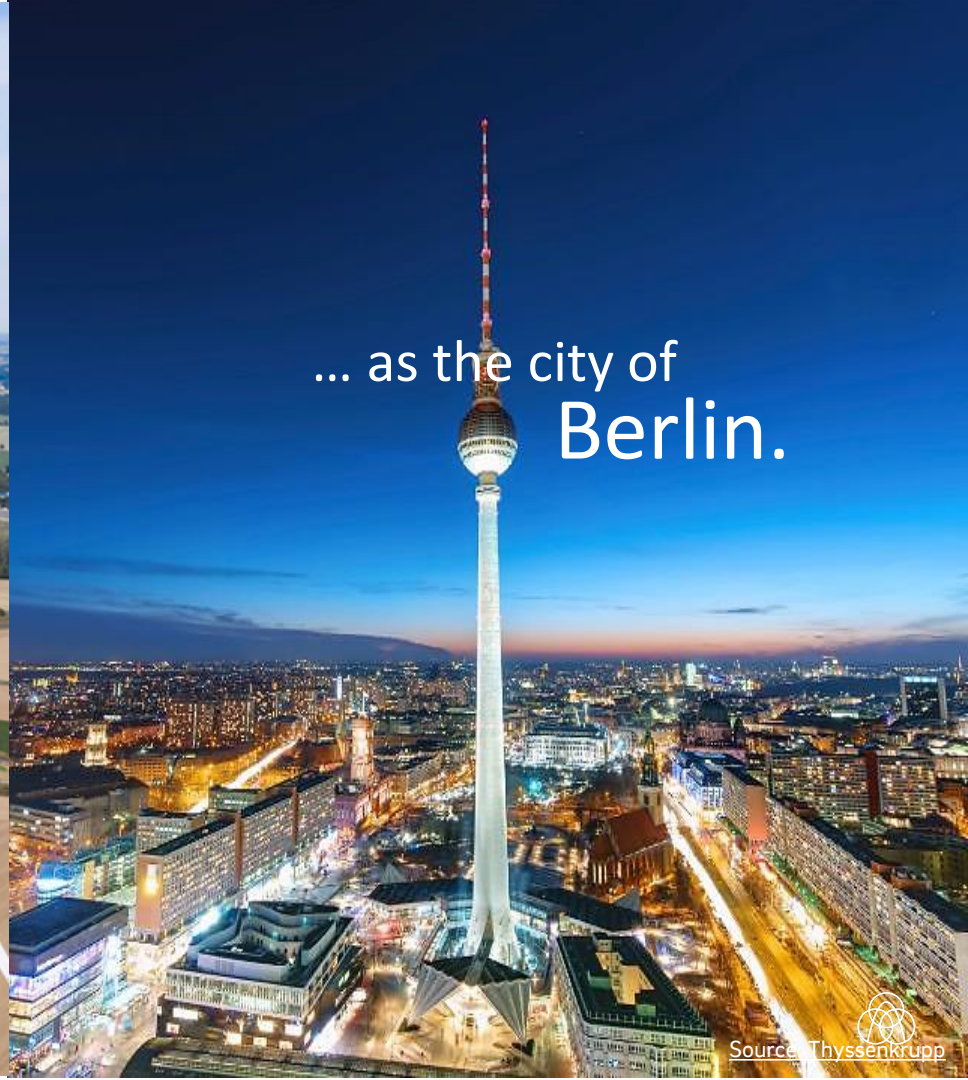
* ab 2017 Abrechnung im Netzentgelt enthalten

Klimaschutz erfordert Preis für alle CO_2 Emissionen – langfristig steigend, planbar, und technologieoffen – keine Planwirtschaft



Quelle: EEX

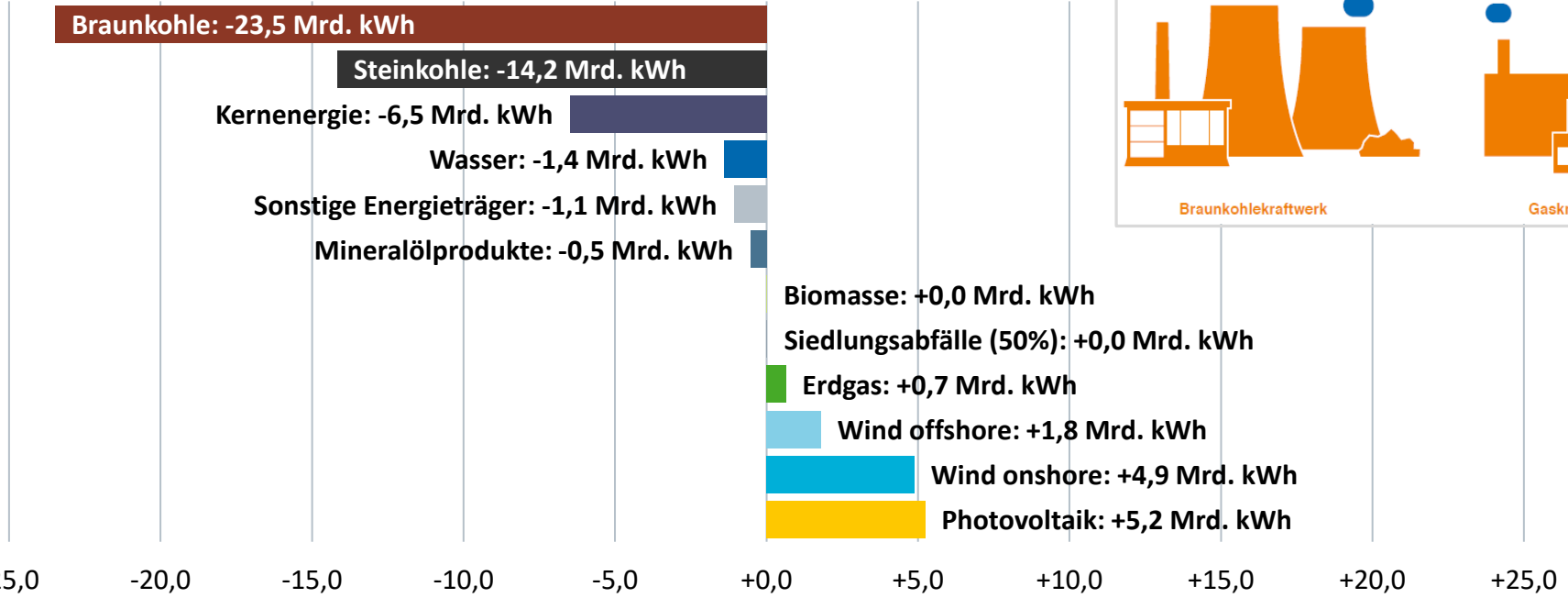

Frankfurter Allgemeine
ZEITUNG FAZ.NET
Finanzen Feuilleton Karriere Sport Gesellschaft Stil Rhein-Main
EMISSIONEN DER STAHLINDUSTRIE
Windräder für die Hochöfen
VON CARSTEN GERMIS, HAMBURG - AKTUALISIERT AM 12.03.2021 - 06:12
A Steel Plant
needs
nearly as much
Energy...

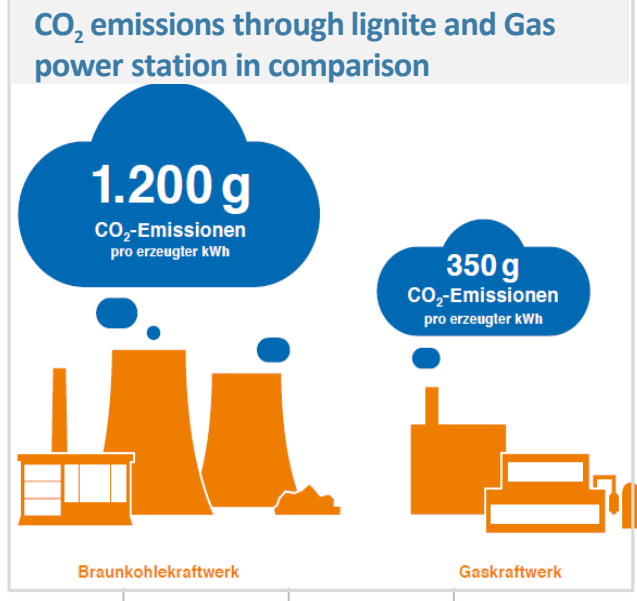

... as the city of
Berlin.
Source: Thyssenkrupp

… über Brücken gehen, nicht erst auf Ideallösung warten

Stromerzeugung der einzelnen Energieträger

Jeweilige Differenz zum Vorjahreszeitraum (Jahr 2019/2020*)





Quelle: BDEW-Schnellstatistikerhebung, Destatis, EEX, VGB, ZSW; Stand 03/2021

* vorläufig

To achieve European Energy Transition targets, significant efforts are needed in electrification, emission-free generation and energy efficiency

EU27+UK energy transition levers

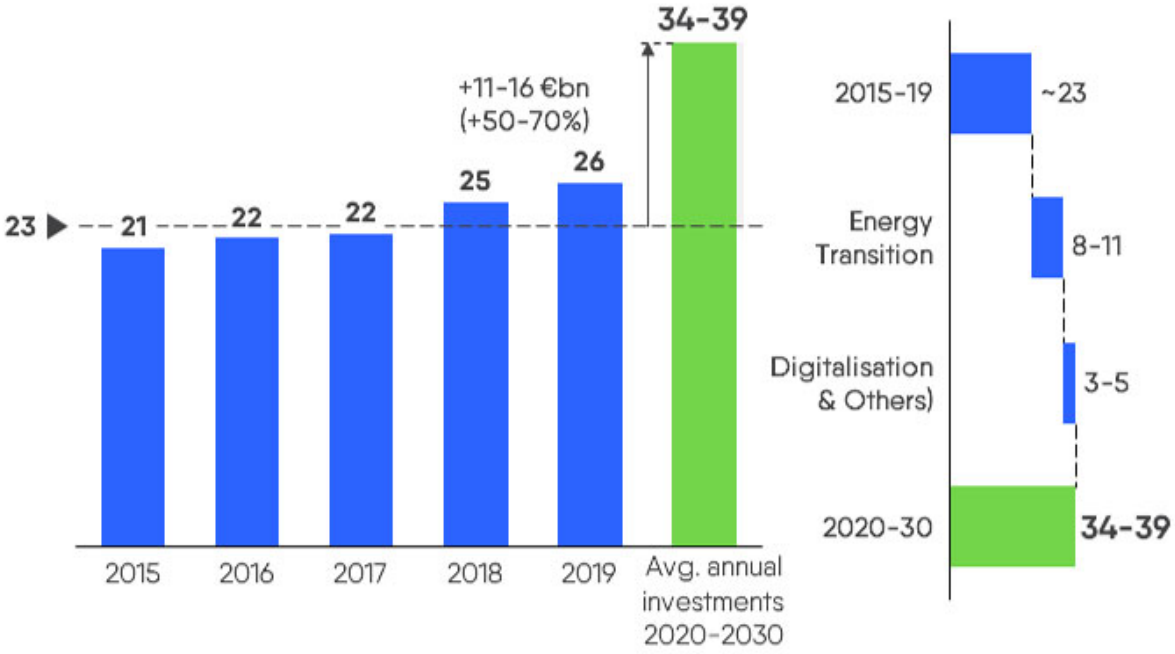
A Electrification	+40-50m(1)	+70m	+335 TWh
B Emission-free generation	+470 GW	+40 GW	>70 % renewable capacity **connected to distribution grids**
C Energy efficiency and conservation	>50 % EV-charging in **off-peak hours**	>80 % penetration of **Smart Meters**	

(1): Estimated heat pumps for residential sector. The figure considers that electricity growth in residential sector is mainly related to new heat pumps

Source: Monitor Deloitte, DSOs

Investment needs to increase by 50-70% to €34-39bn/year

EU27+UK annual investments in power distribution grids and key drivers
(nominal €bn; 2015-2030)



Source: Eurelectric; Eurostat; iea; DSOs and national associations; Monitor Deloitte

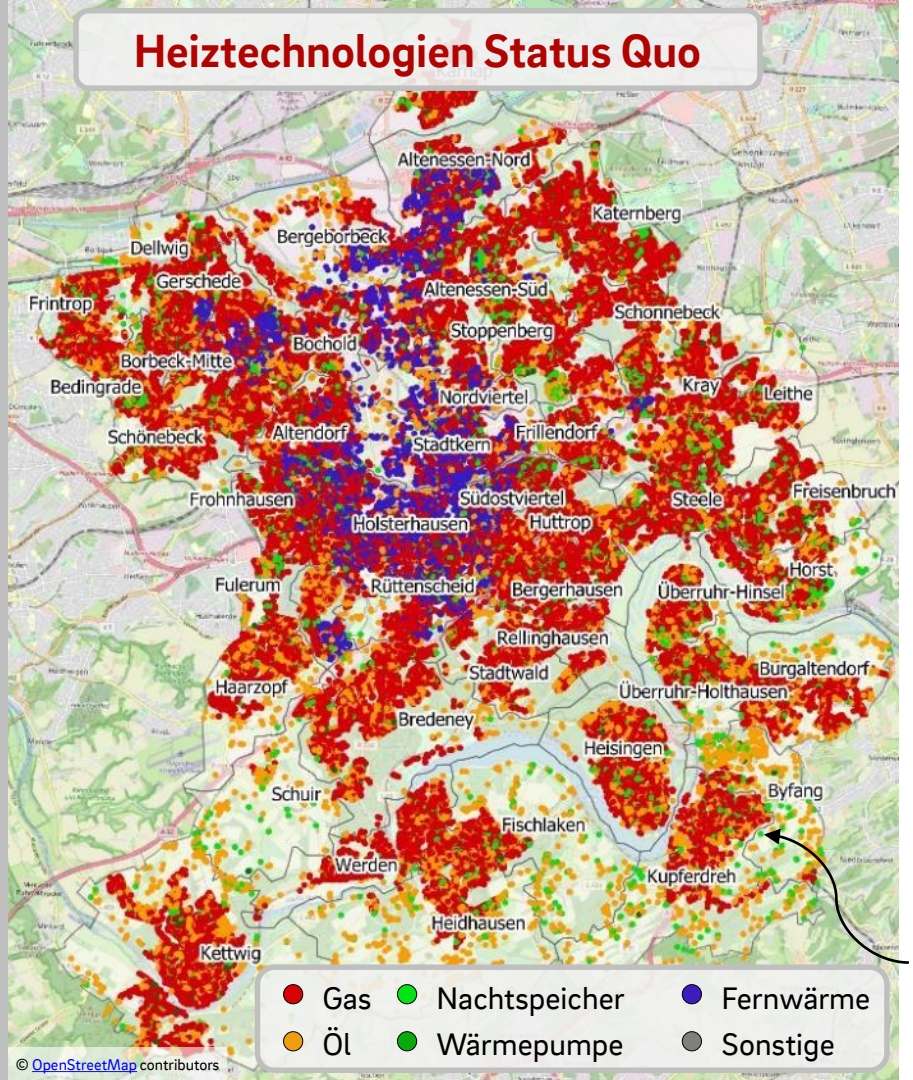
Gerade im Wärmesektor besteht Potential CO_2-Emissionen deutlich zu reduzieren

- Klimaschutz muss sozialverträglich sein.
- Die Wärmewende wird auf lokaler Ebene gestaltet und entschieden.
- Grüne Gase und bestehende Gasnetze sind wichtiger Bestandteil der Lösung.

Die Energiehauptstadt Essen bietet als typisches Beispiel für einen mittel-großen urbanen Raum in Europa eine ideale Analysemöglichkeit.

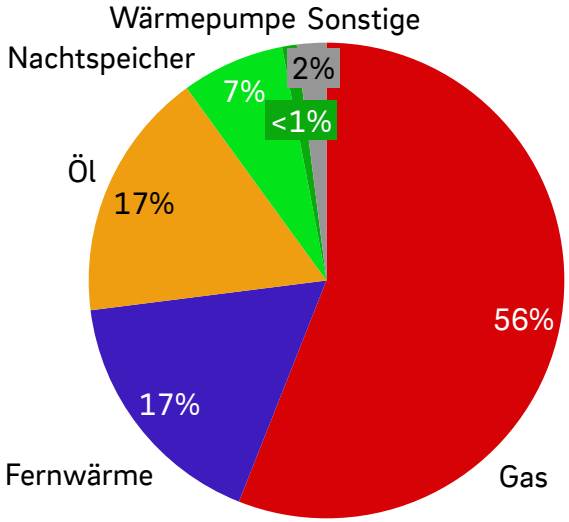
Status Quo

Heiztechnologien Status Quo



Heute dominiert Gas die Wärmeversorgung in Essen

Wärmeversorgung Haushalte in Essen



 # Haushalte
312,239

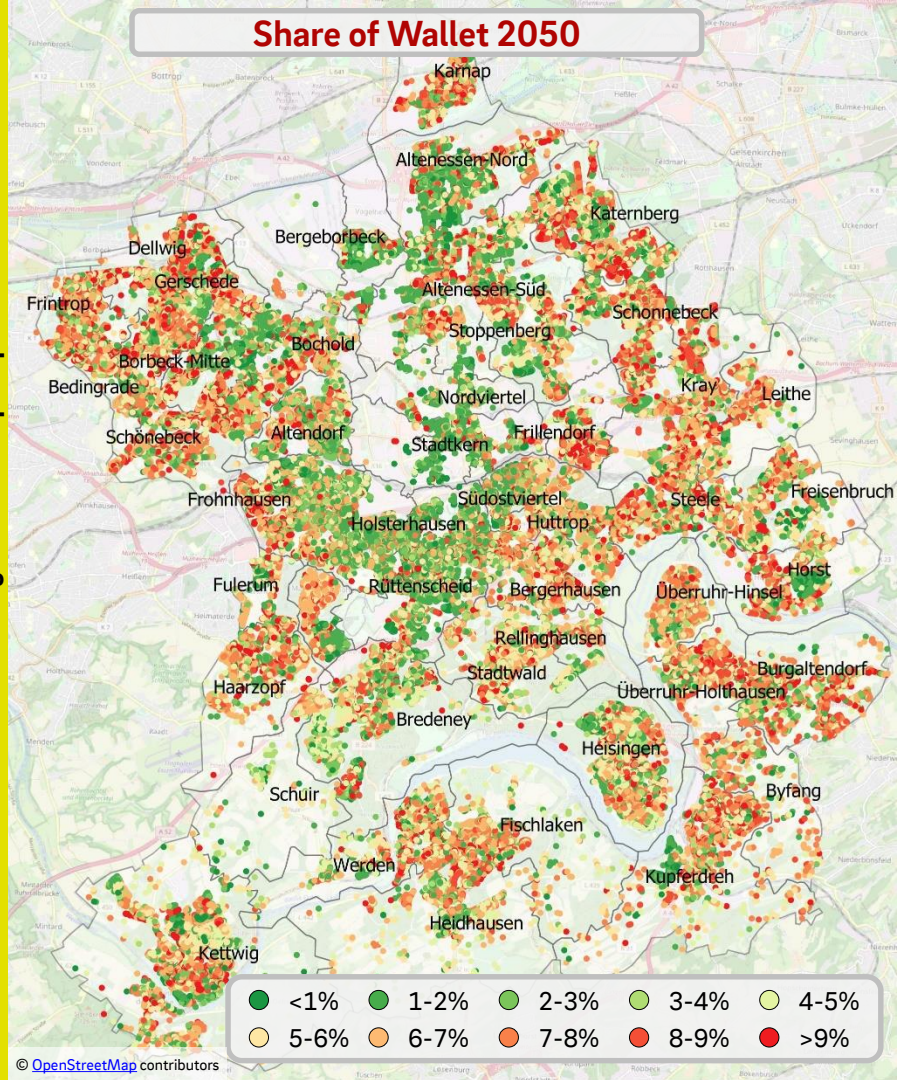
 # Gebäude
101,913

Wärmebedarf
5.2 TWh p.a.

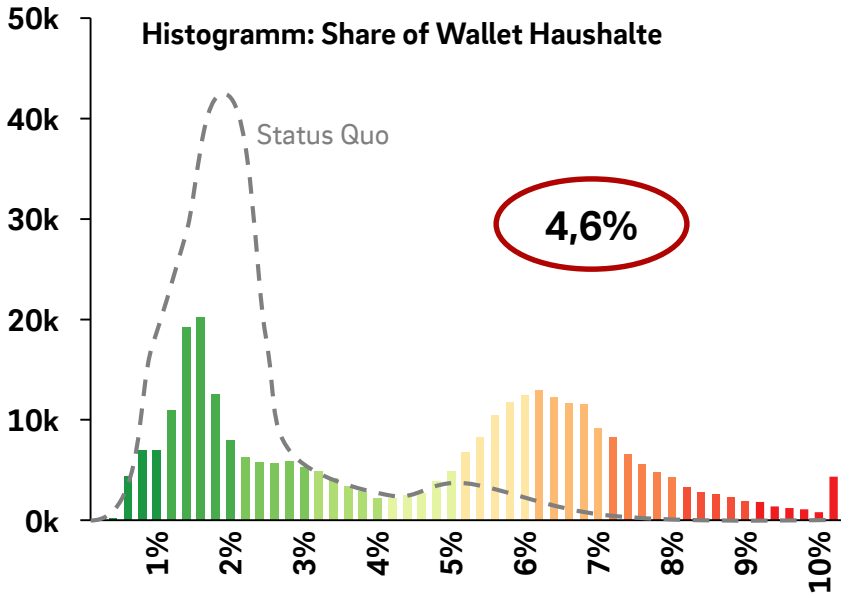
CO_2 Emissionen
1,324,000 t

Modell auf Gebäudeebene
Punkt = Gebäude

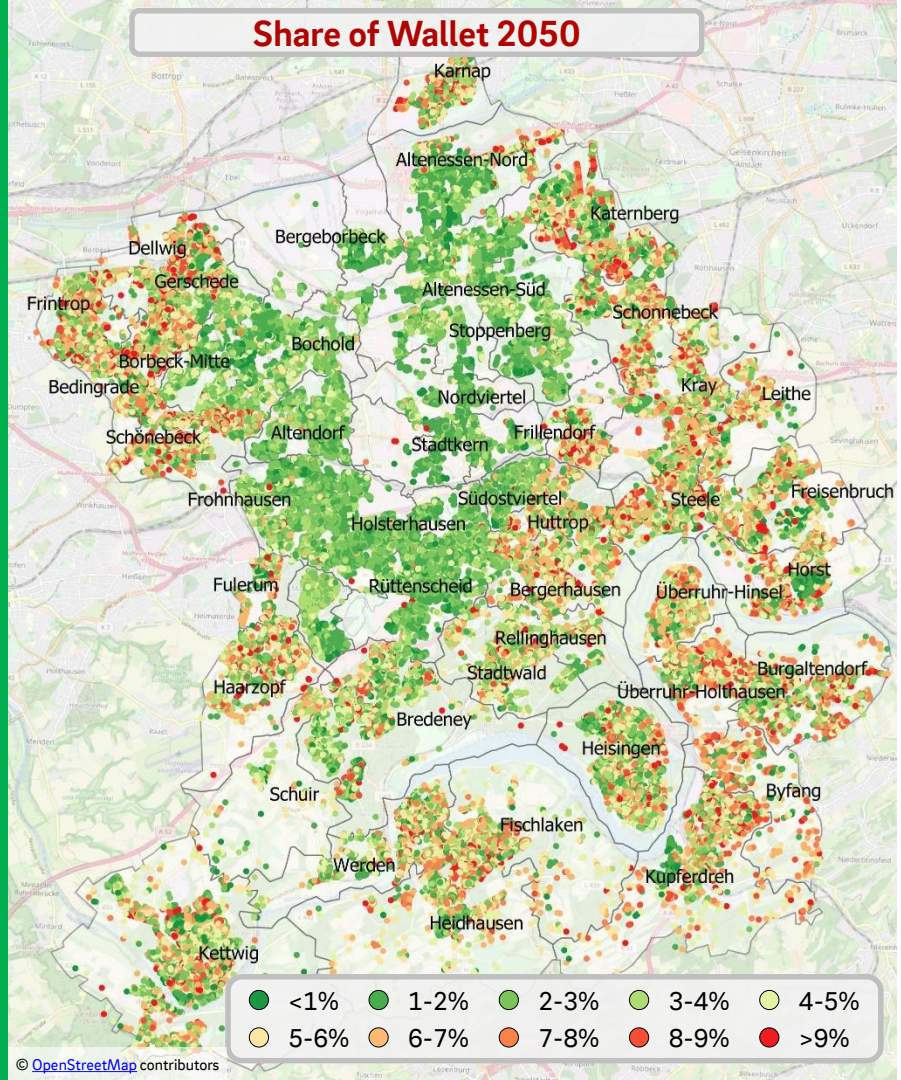
Elektrifizierung mit Wärmepumpen



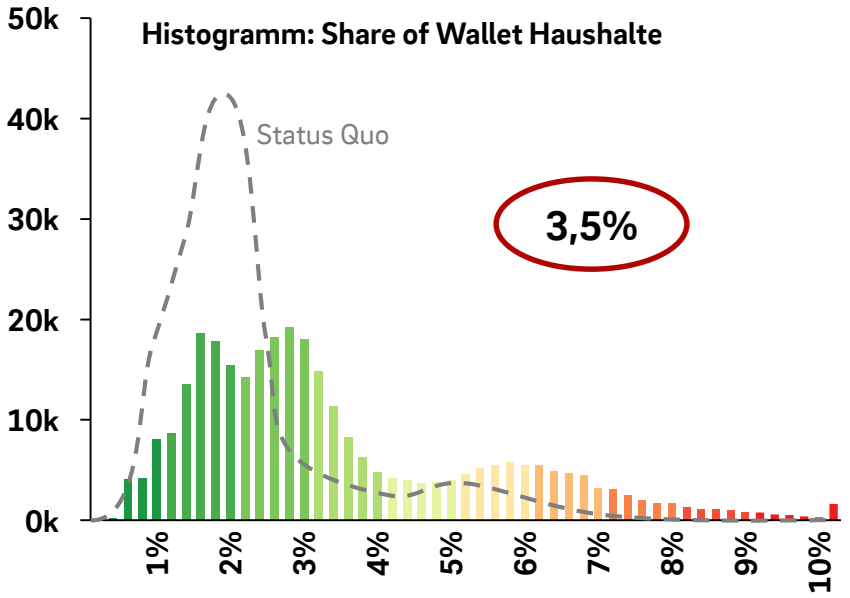
Hohe Belastungen im niedrigen Einkommensbereich



Grünes Gas



Durch grünes Gas Reduktion der extremen Belastungen



You've got to start with the

customer experience

and work back toward the technology
– not the other way around.

Steve Jobs | Apple

Working under voltage

Today

Tomorrow

Inspection of a substation

Today

Tomorrow

Working in a grid control center

Today

Tomorrow

Digital Transformation is a question of culture – not of technology

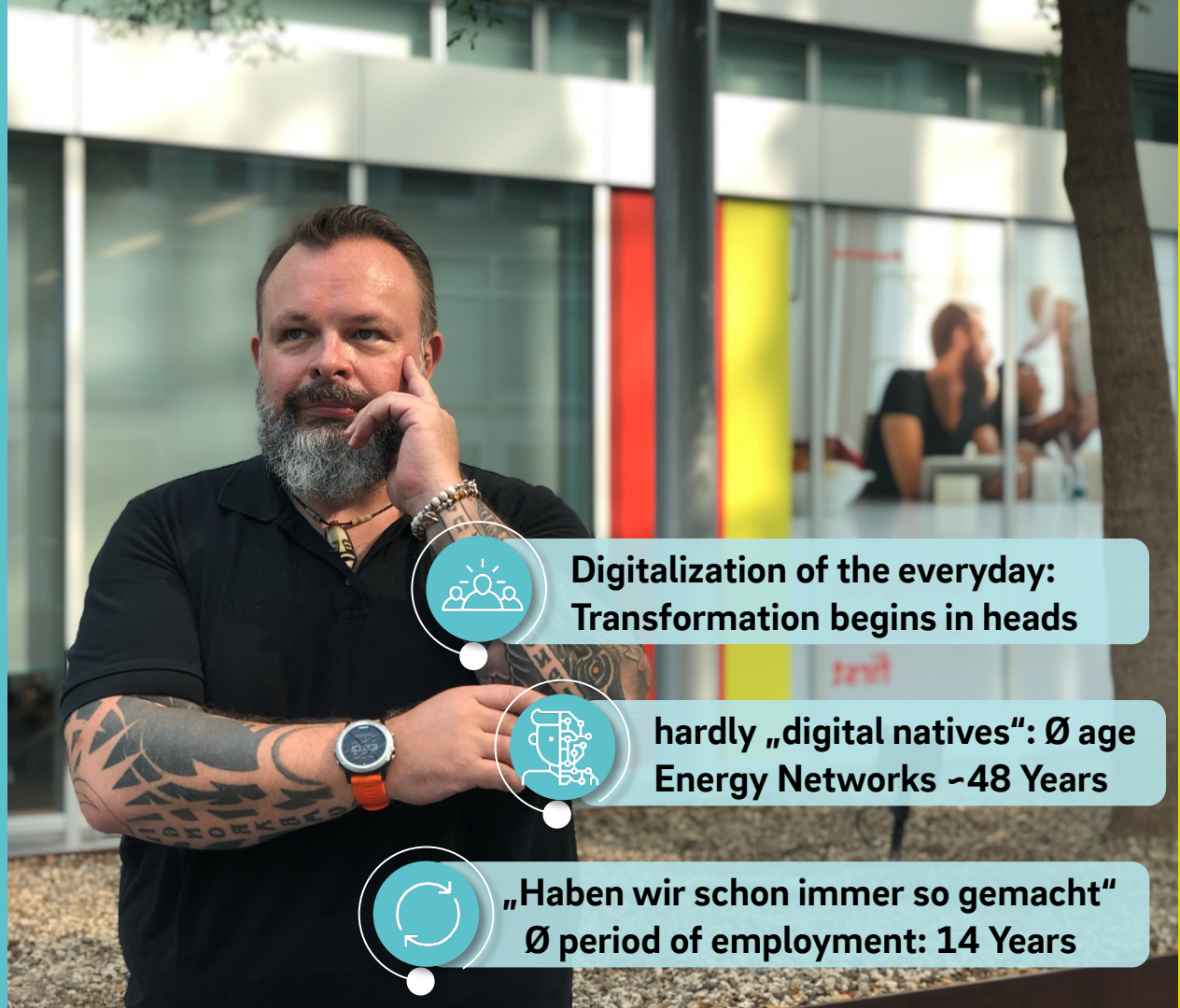


Foto: Mit-Schn

It's all about disruption & innovation

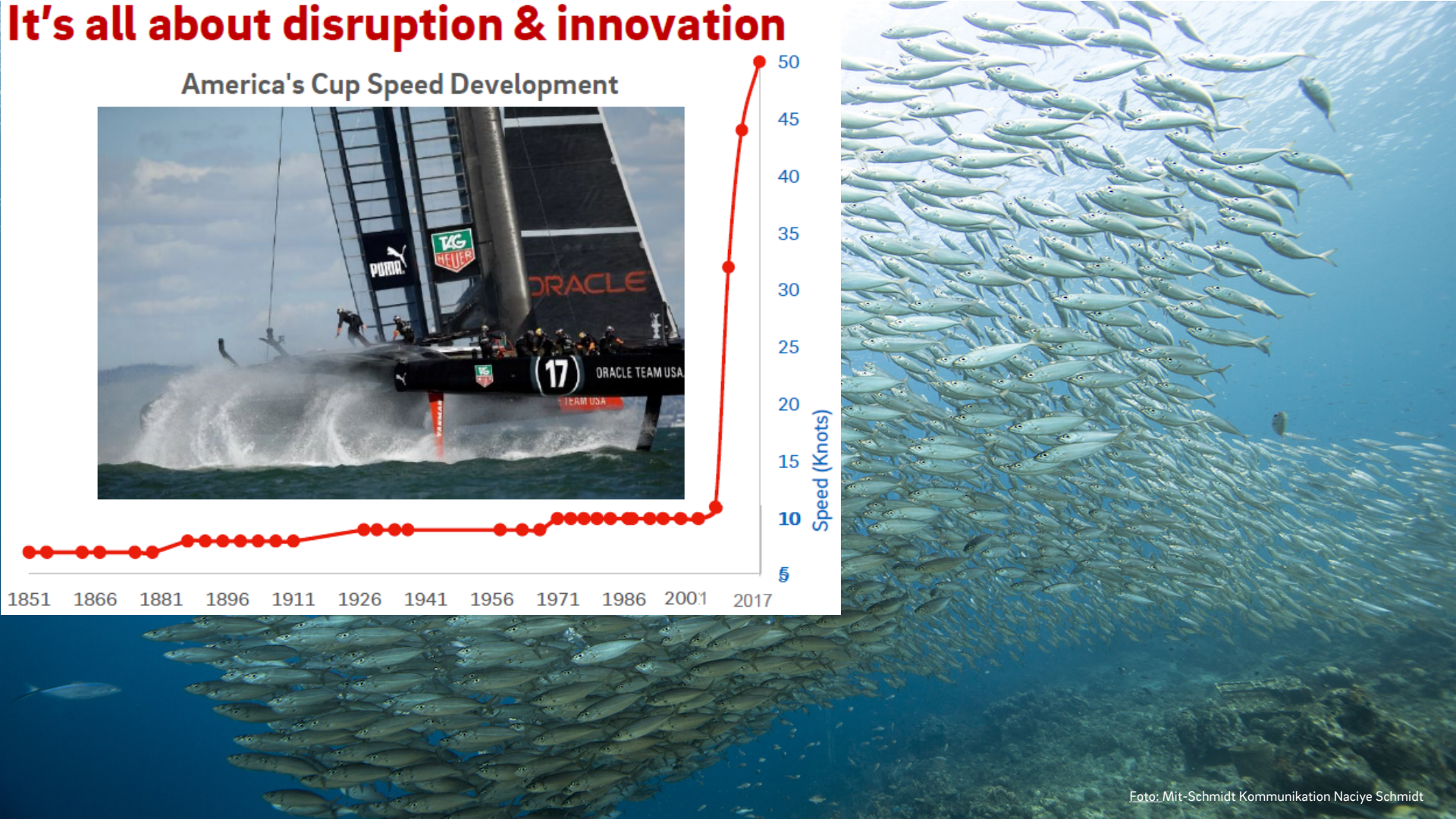


Foto: Mit-Schmidt Kommunikation Naciye Schmidt


e·on