Rethinking the energy system: The potential of distributed energy

The Case of Germany

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Camino a la COP 20|Lima
15 September

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Overview

1. ***the trends*** **|** Germany's energy transition
2. ***the enablers*** **|** Vision, policies, governance
3. ***the impacts*** **|** Busted myths, changed paradigms
4. ***the lessons*** **|** Key take-aways

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1. *the trends*
Germany's Energy Transition

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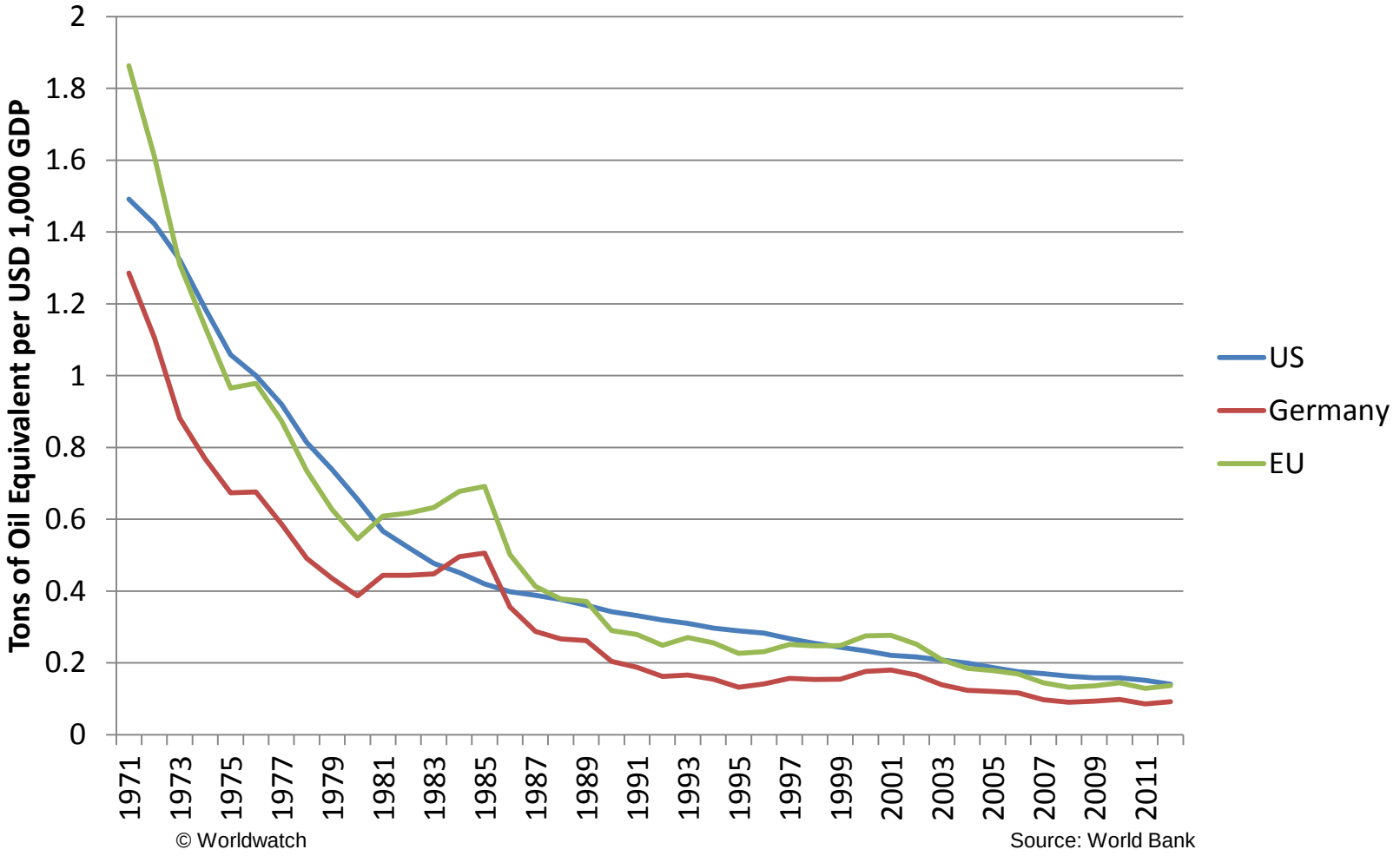
Energy efficiency



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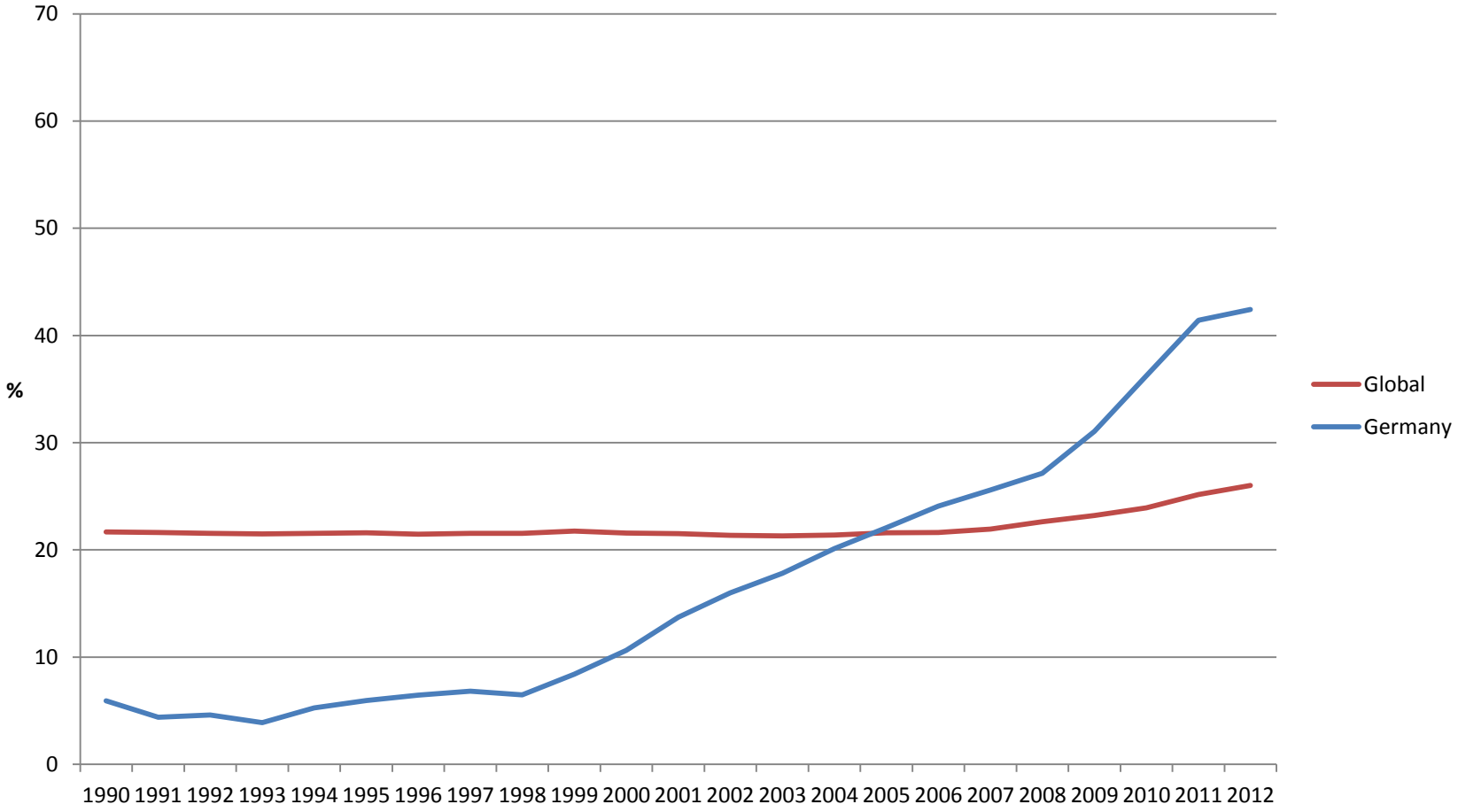
Renewables share in electricity mix



Source 1990-2011: EIA
2011-2012: EC Pocketbook

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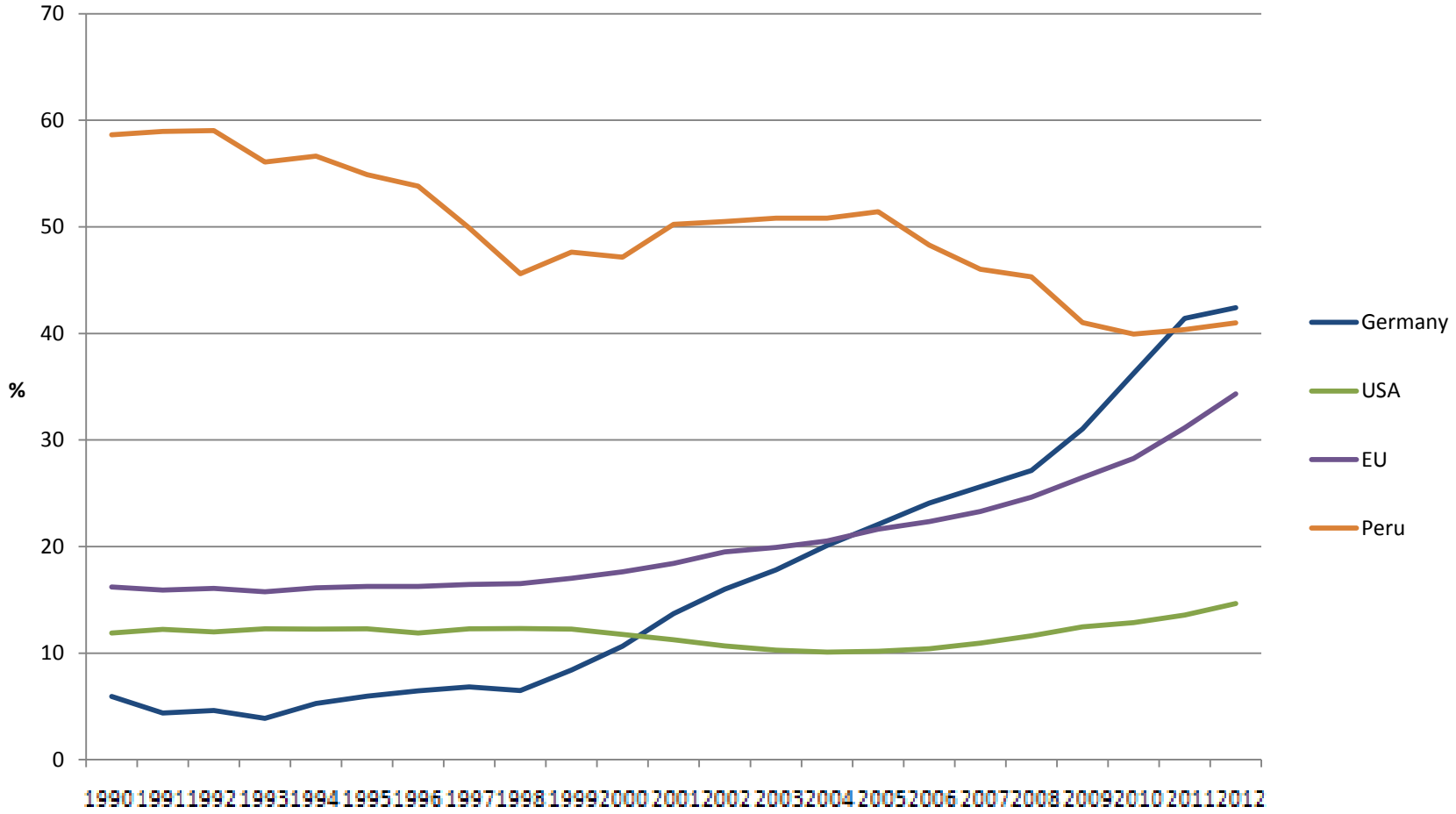
Renewables share in electricity mix



Source 1990-2011: EIA
2011-2012: EC Pocketbook, ClimateScope, EIA

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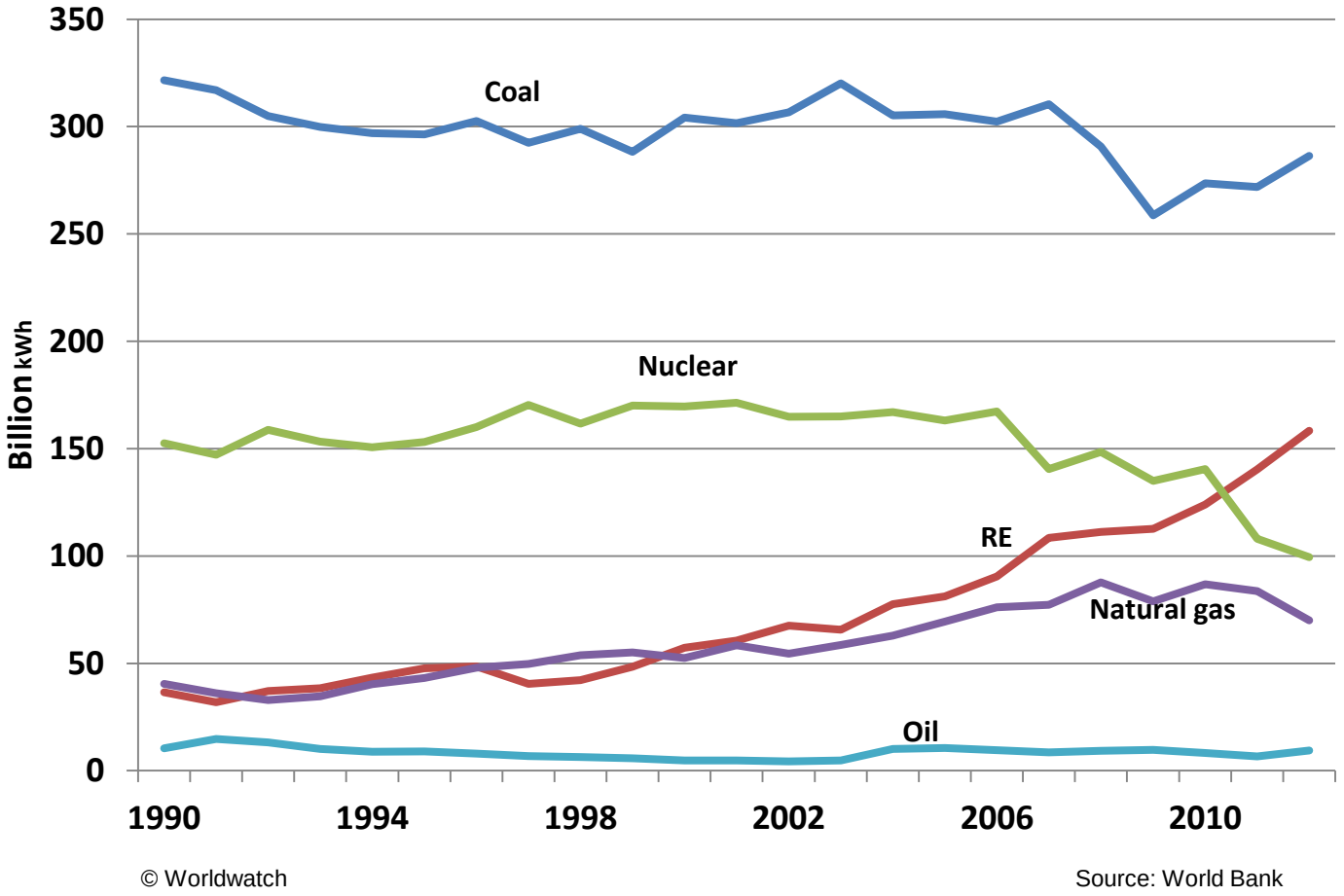
Generation trends in Germany



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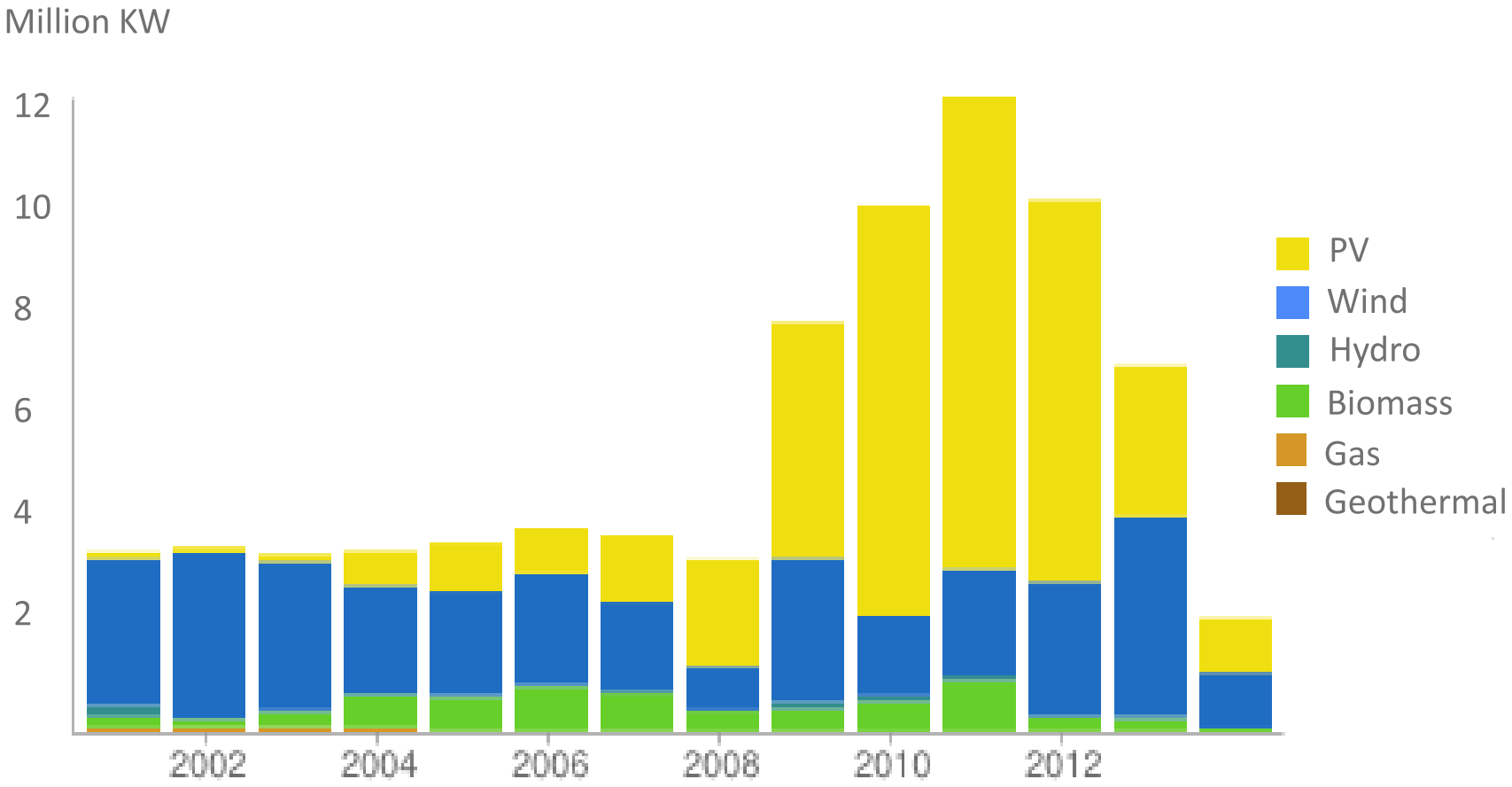
Annual RE additions, Germany



Source: EnergyMap

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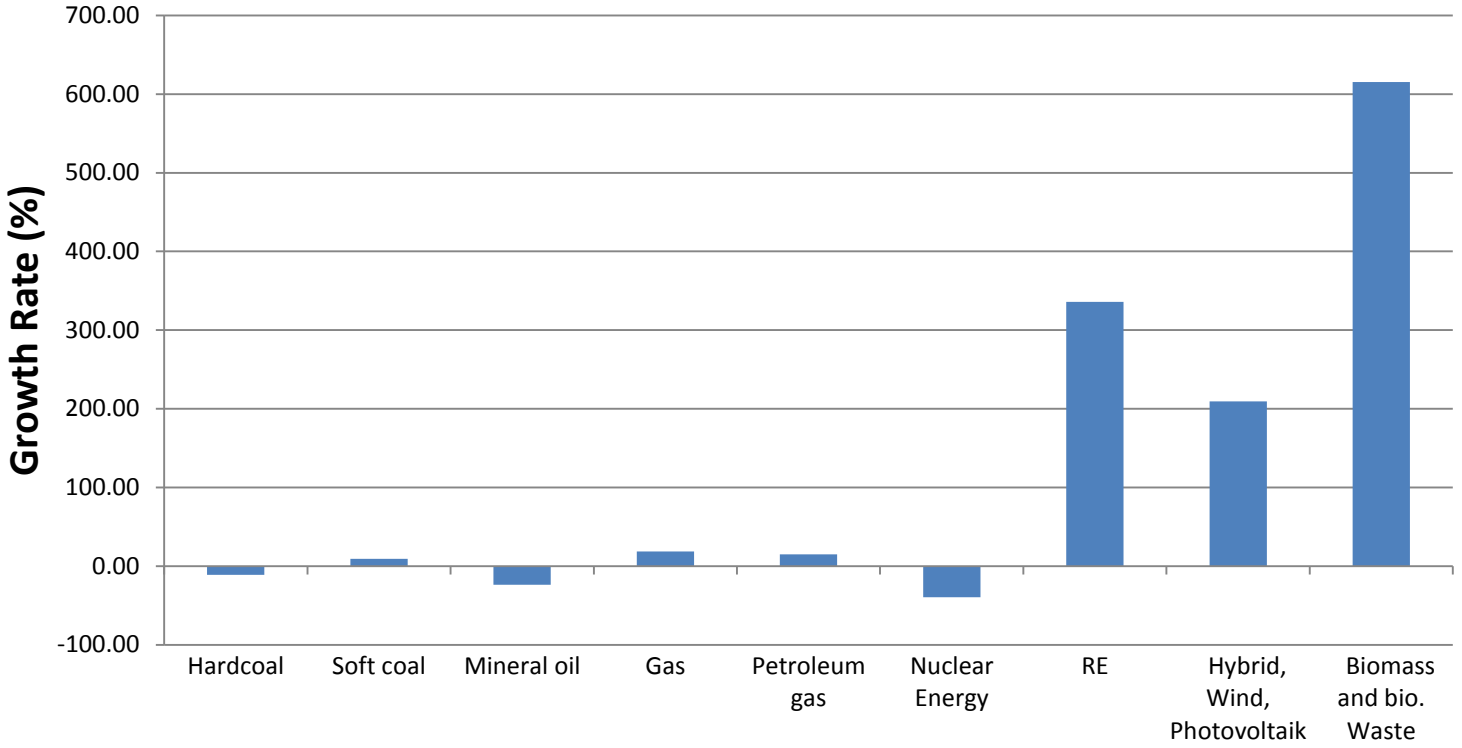
Growth of Technology Germany 2000-2013



Source: AGEB

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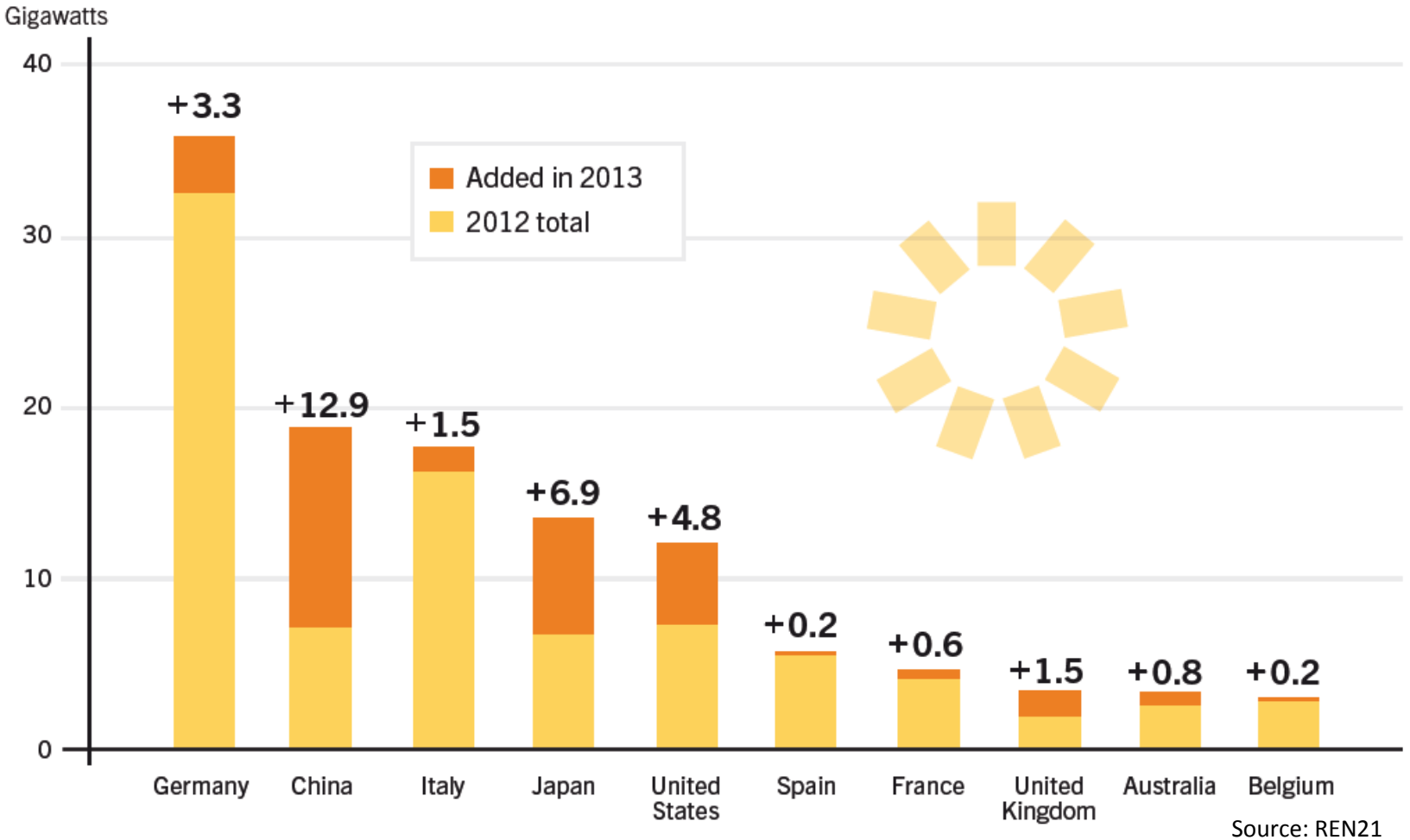
Total Solar PV Capacity
Global Leaders, 2013



Source: REN21

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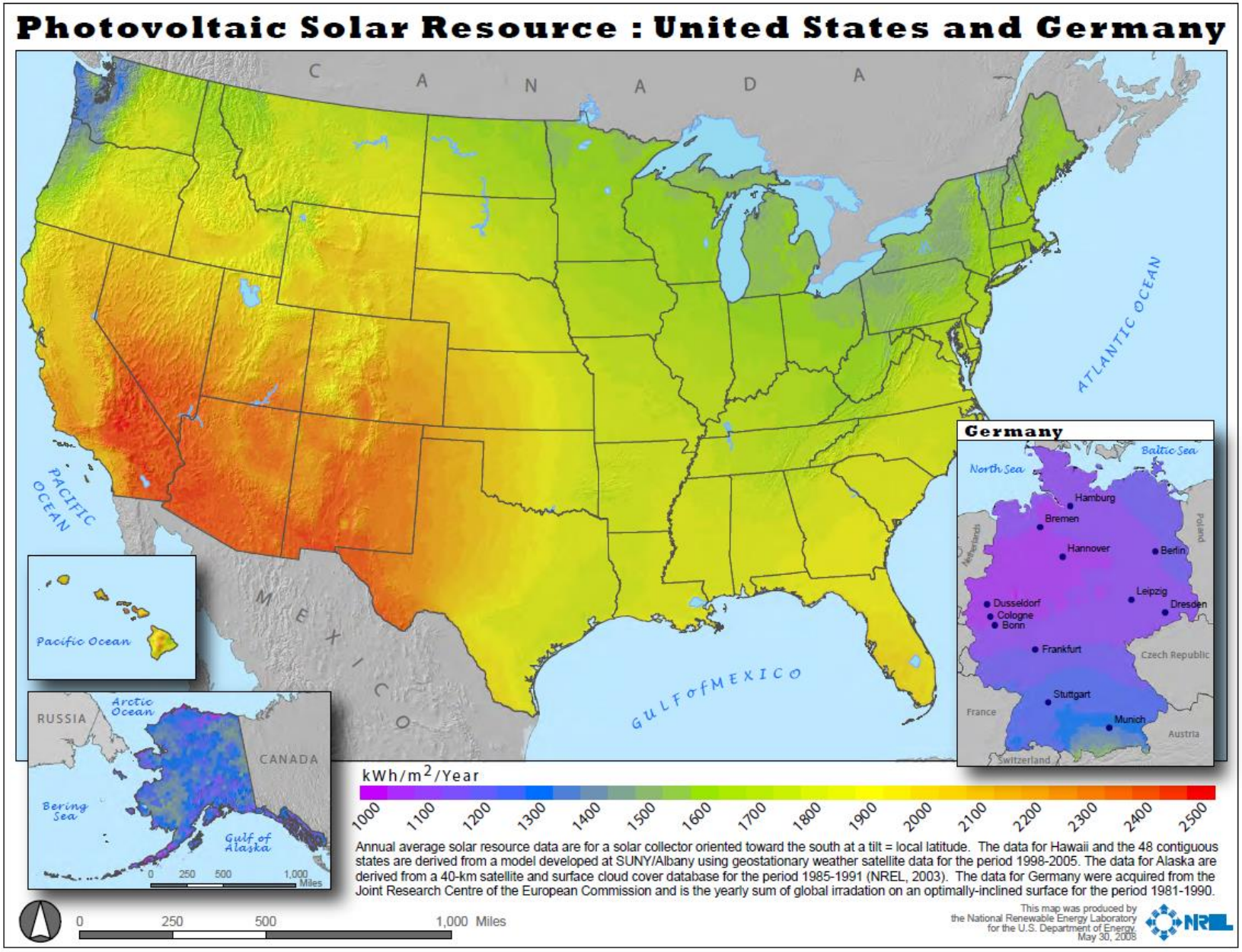

Map credit: NREL

2. *the enablers*

Vision & Goals

Policies & Measures

Effective Governance & Administration

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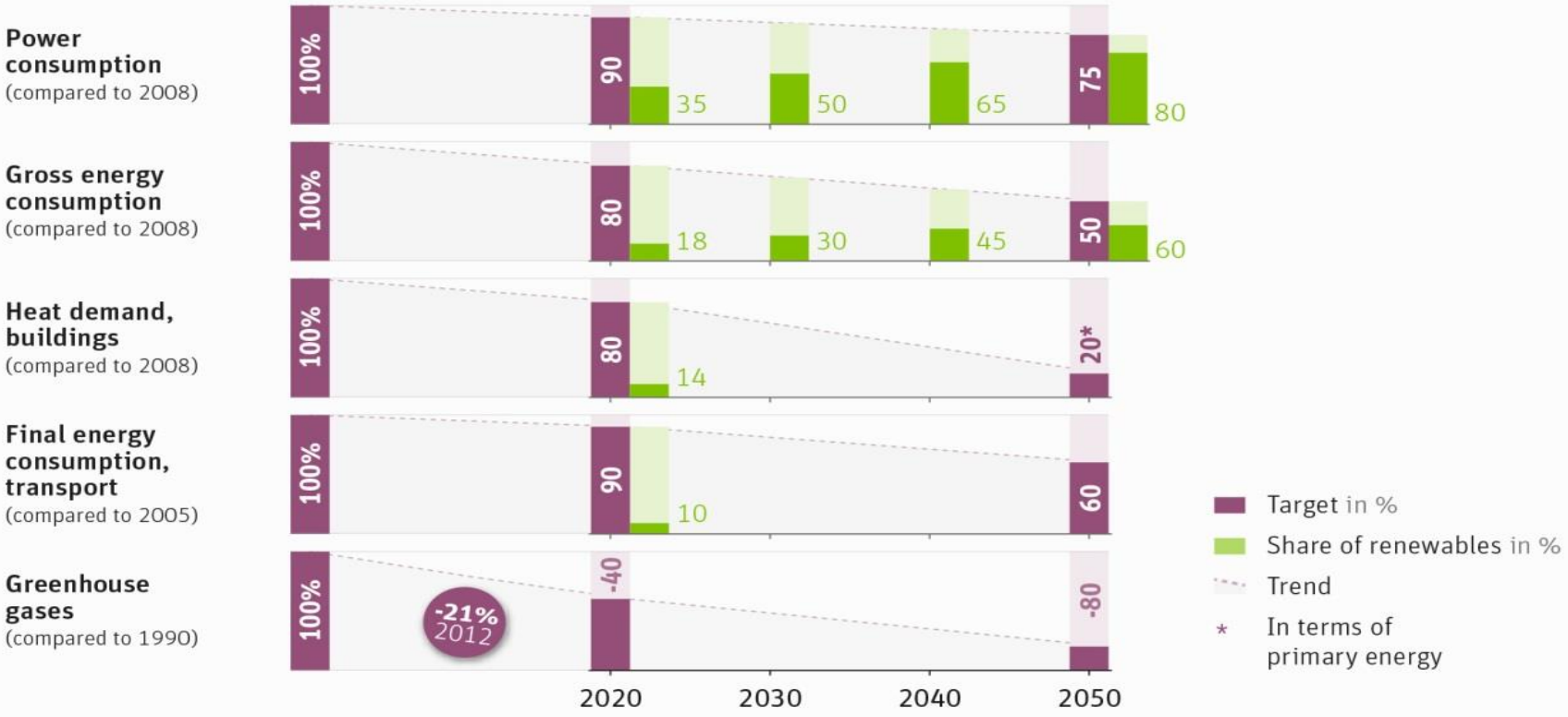
German energy transition: high certainty with long-term targets

Long-term, comprehensive energy and climate targets set by the German government in 2010

Source: BMU



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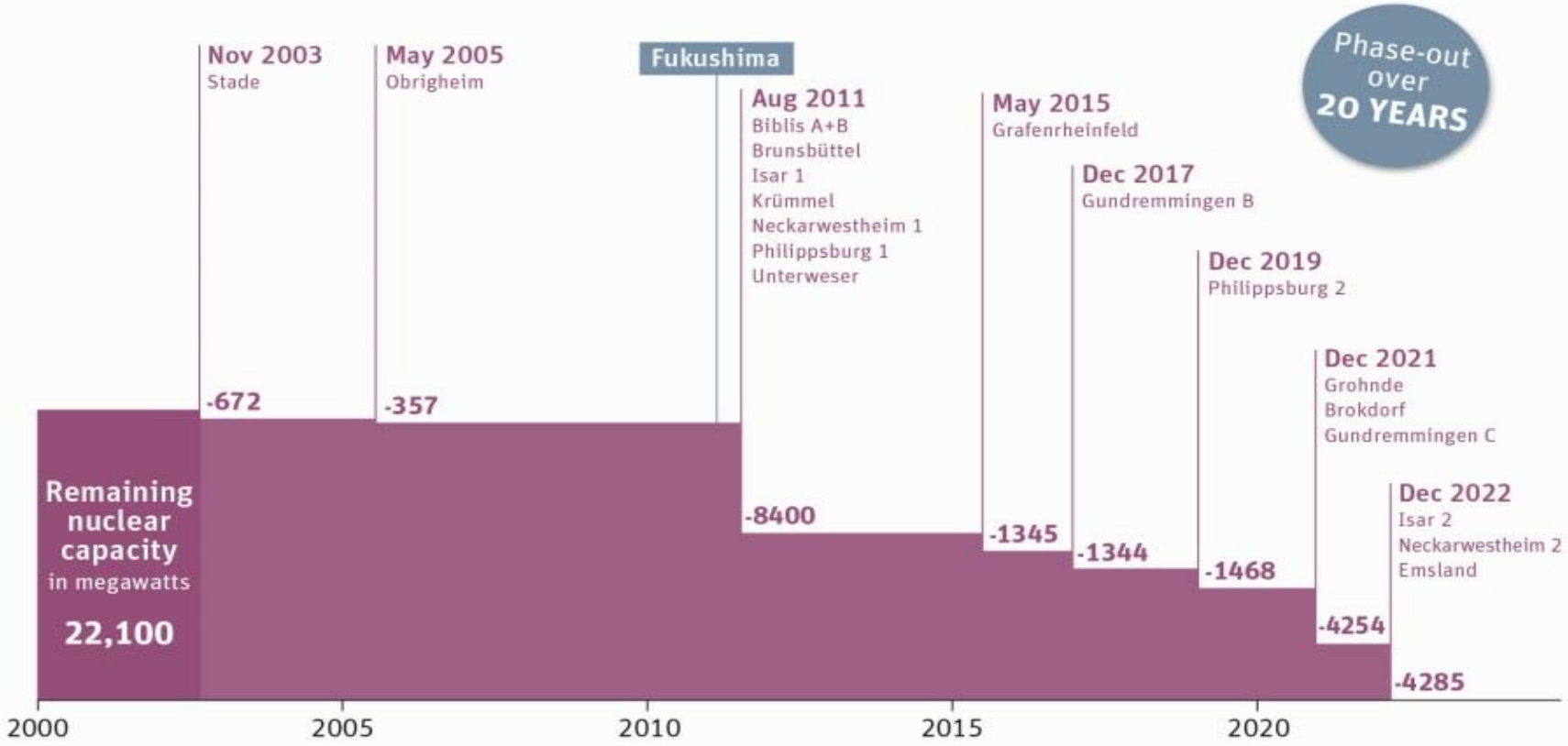
Germany is gradually shutting down all nuclear power plants

Declining nuclear energy installed capacity in Germany, 2000–2022

Source: Institute of Applied Ecology, BMJ, own calculations



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Policies & Instruments: Emissions Trading

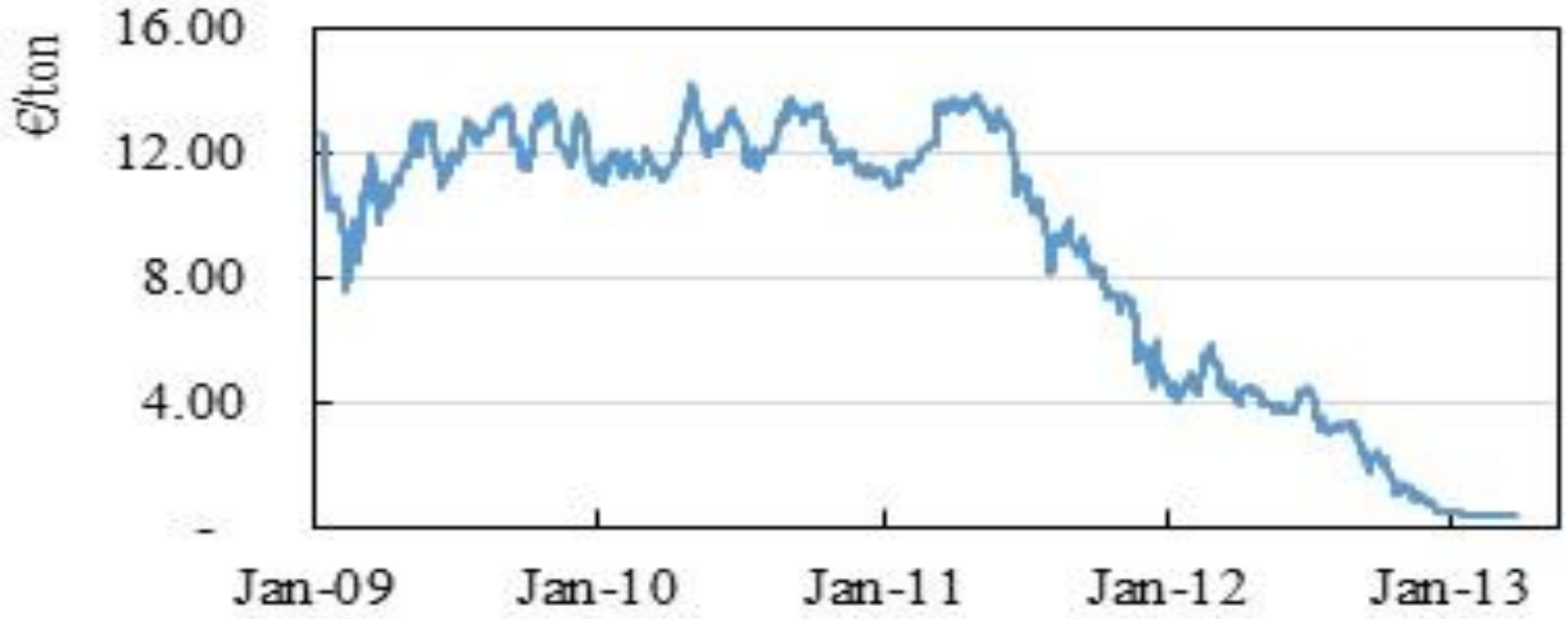

Figure 1. ICE CER Futures - Emissions CER Index

Source: IntercontinentalExchange, Inc.

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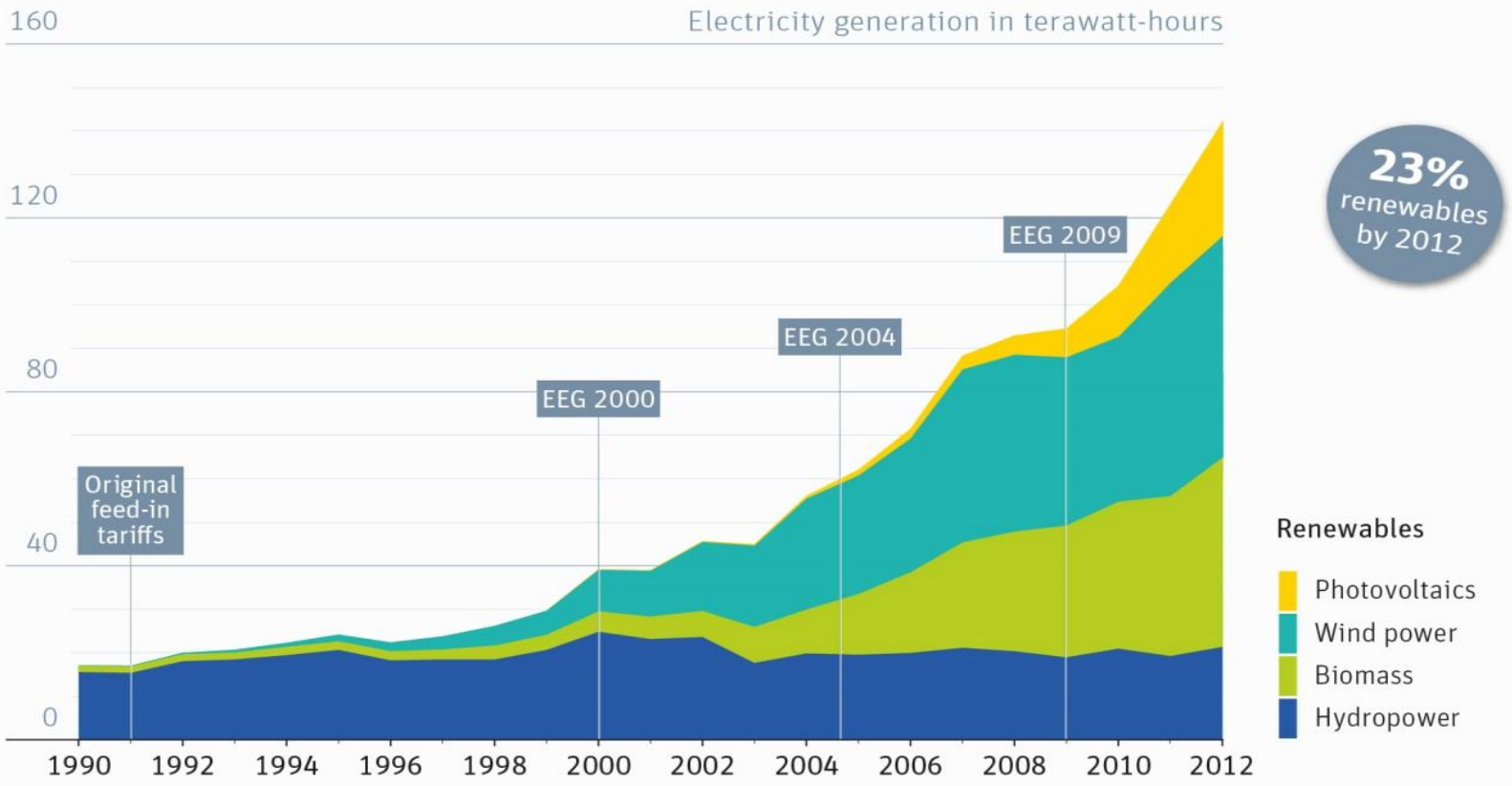
Feed-in tariffs grow renewables

Renewable electricity generation in Germany, 1990–2012

Source: BMU



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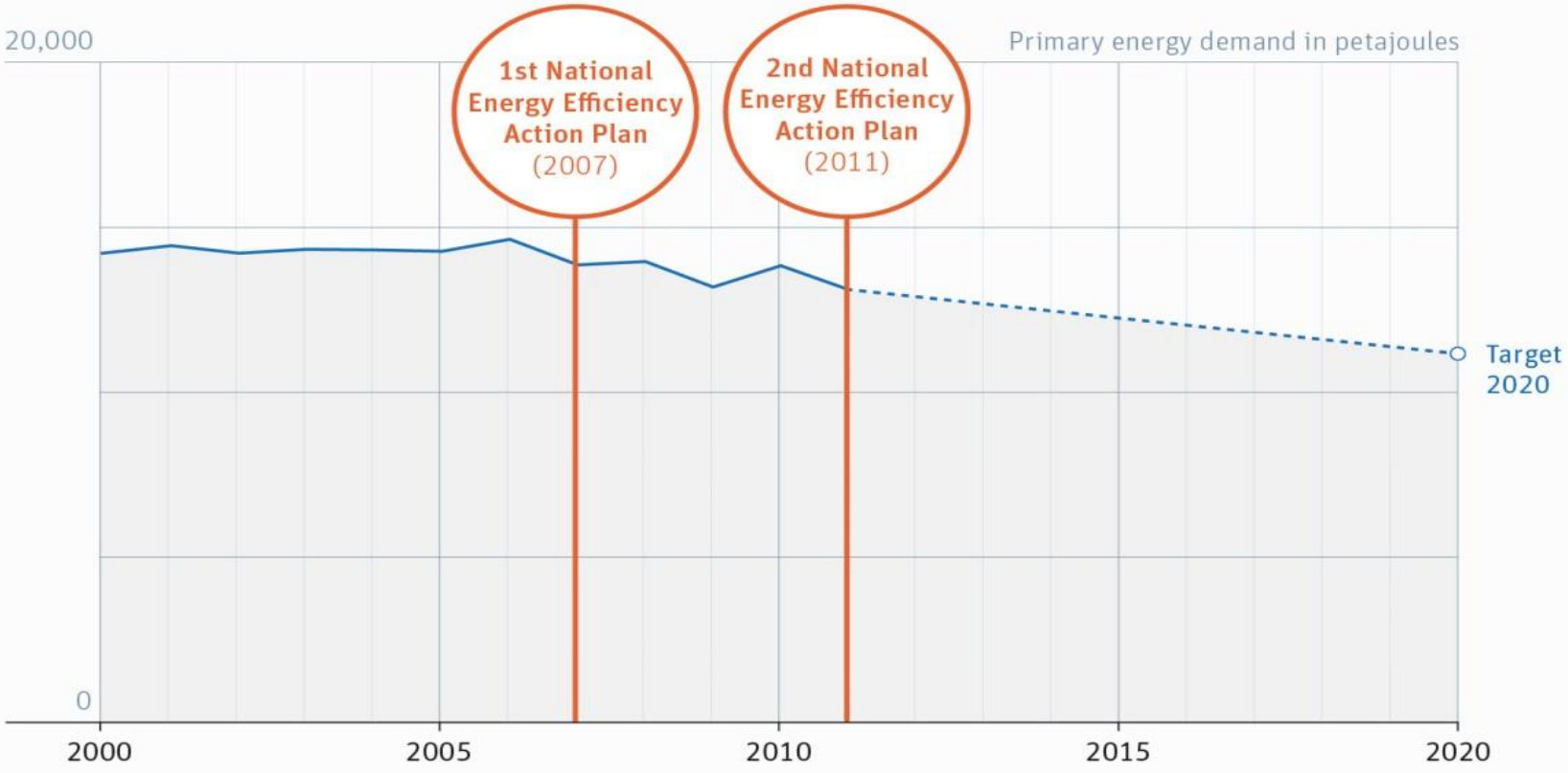
Germany's plan: drive down energy demand

Primary energy demand in Germany, 2000–2020

Source: AGEB, BMWi



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3. *the impacts*

Busted Myths | Changed Paradigms

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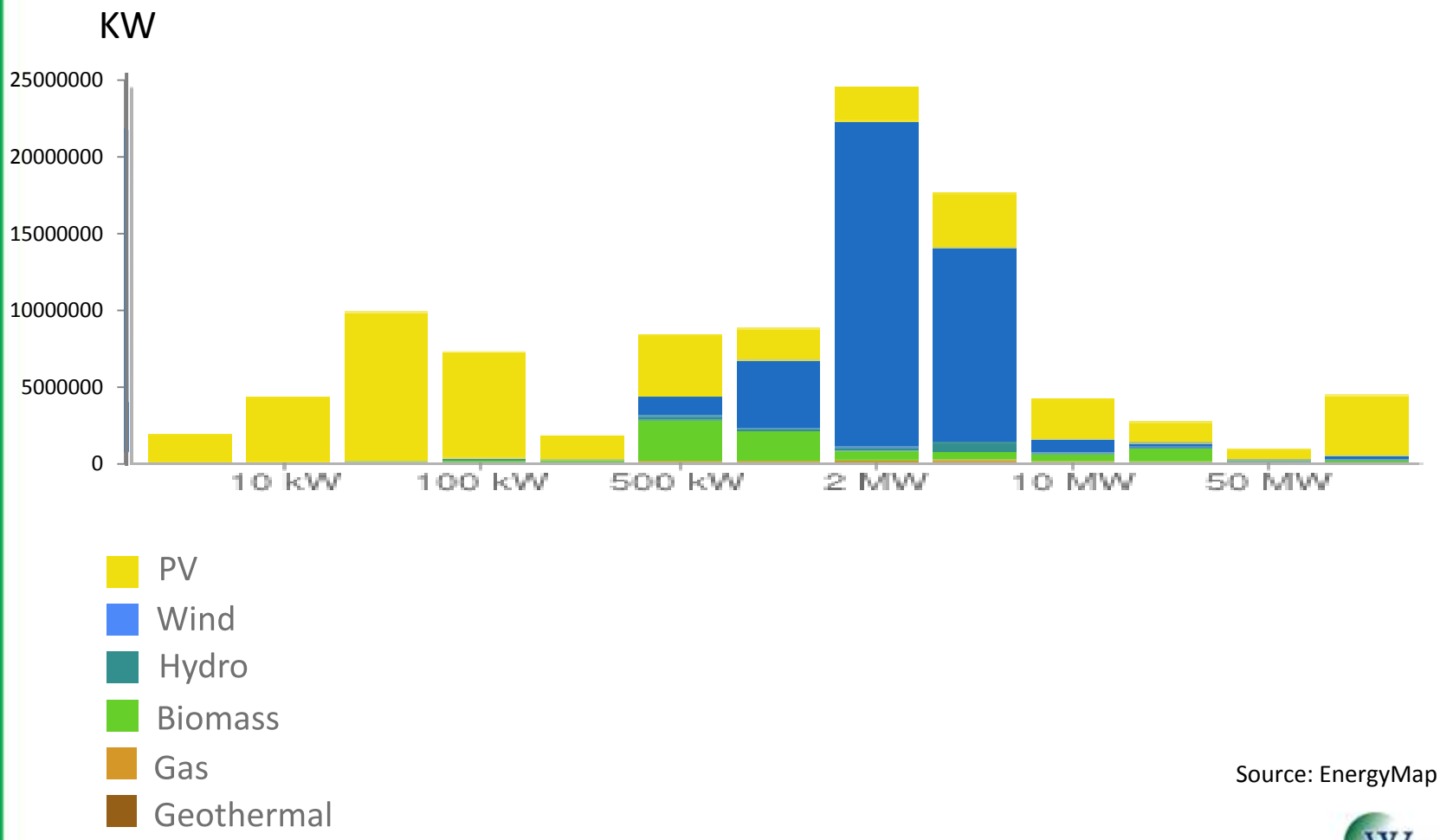
Centralized vs. Distributed Power 1990 - 2014



Source: EnergyMap

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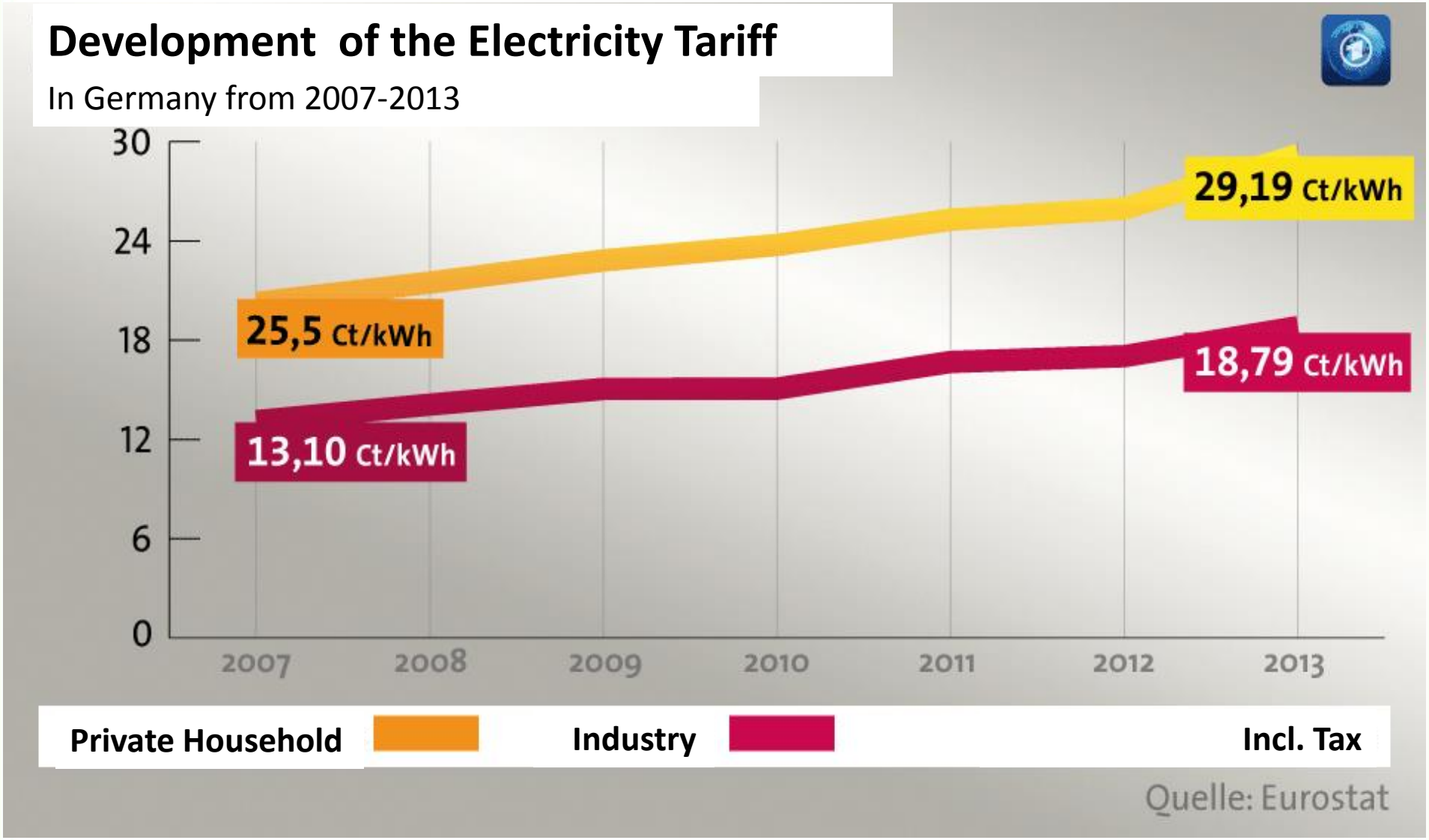
Electricity Tariff Trends



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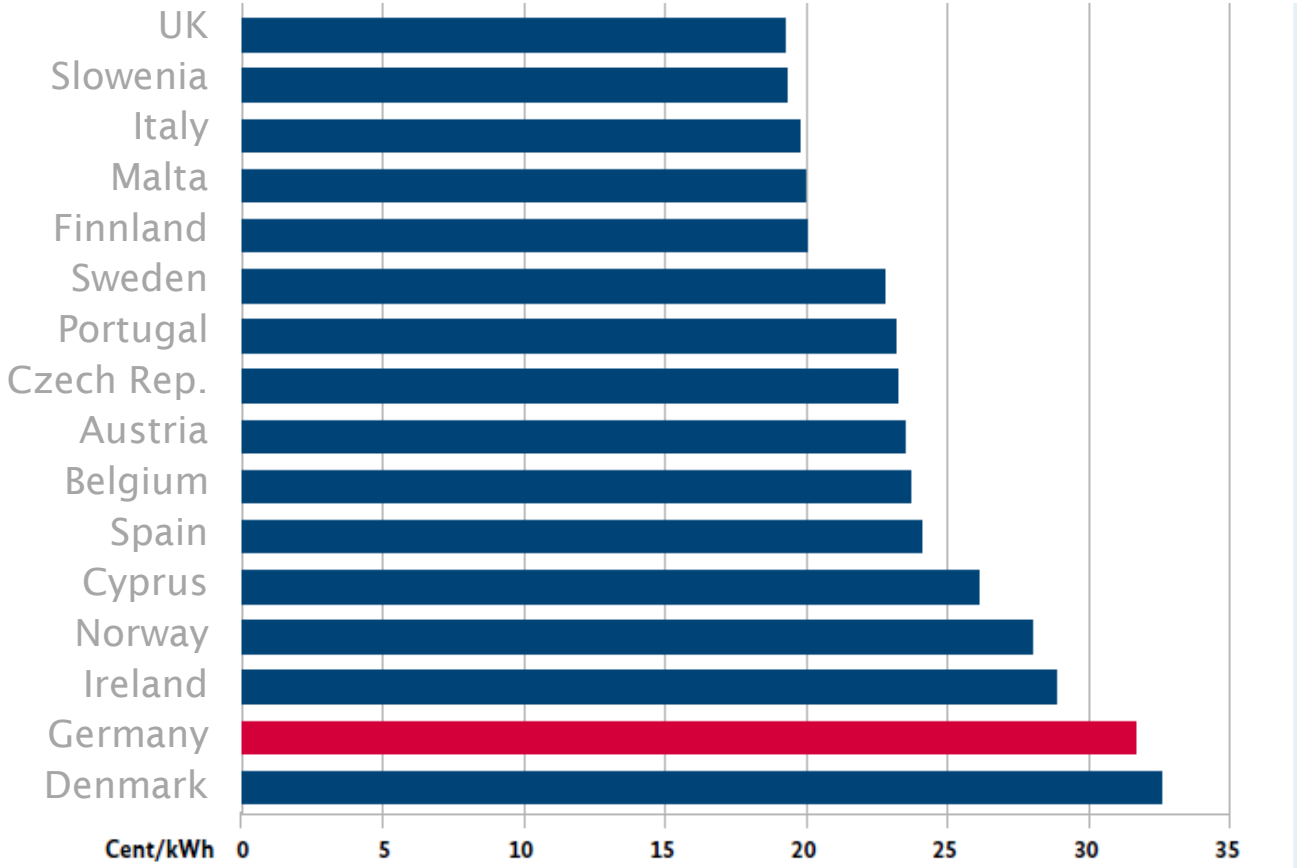
Germany to other EU Countries

Internation Eletricity Tariffs Comparisment of private Households 2013 of an anual Usage of 1000 to 2500kwH



Quelle: Eurostat

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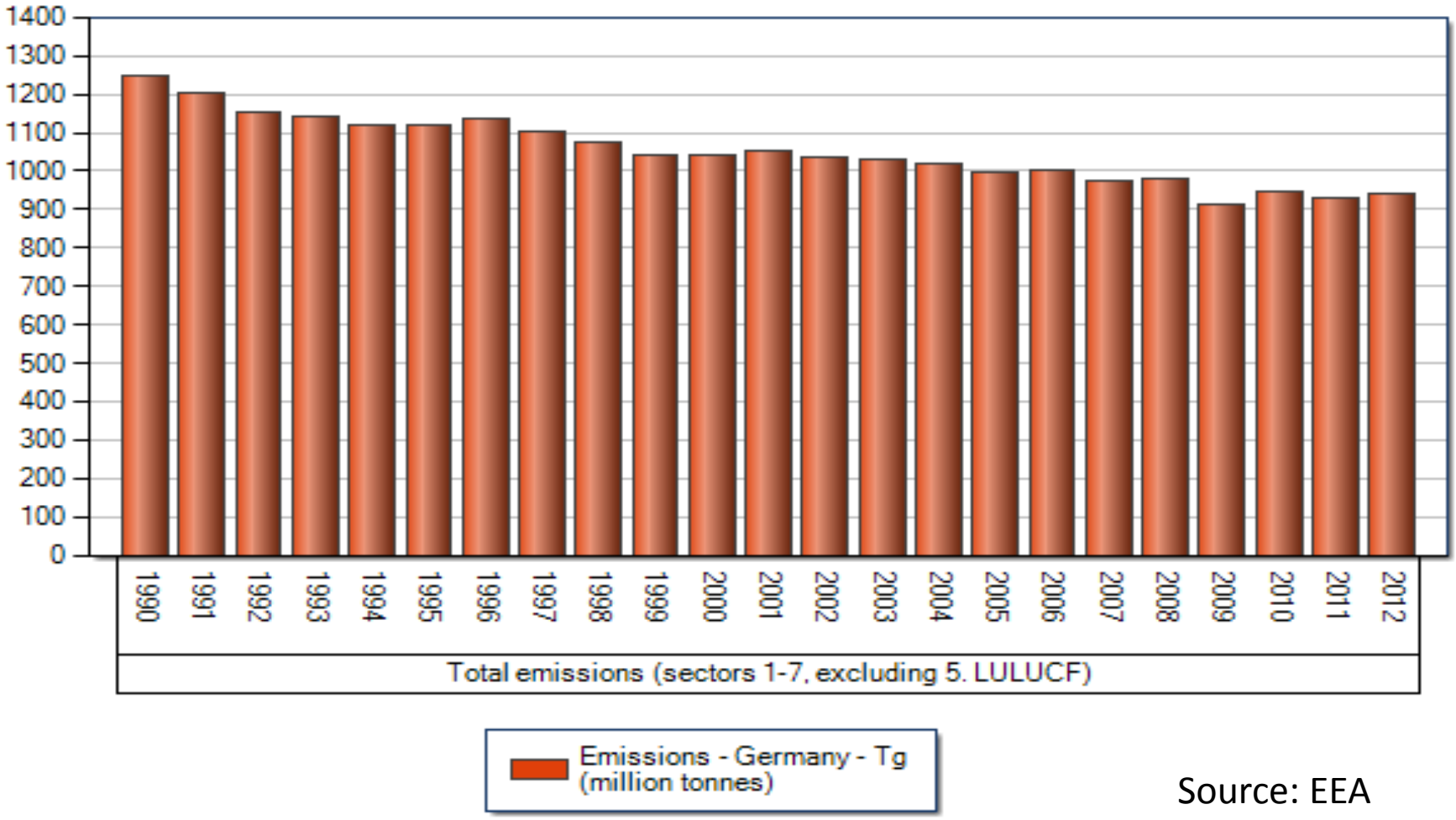
GHG Emissions, Electricity Sector



Source: EEA

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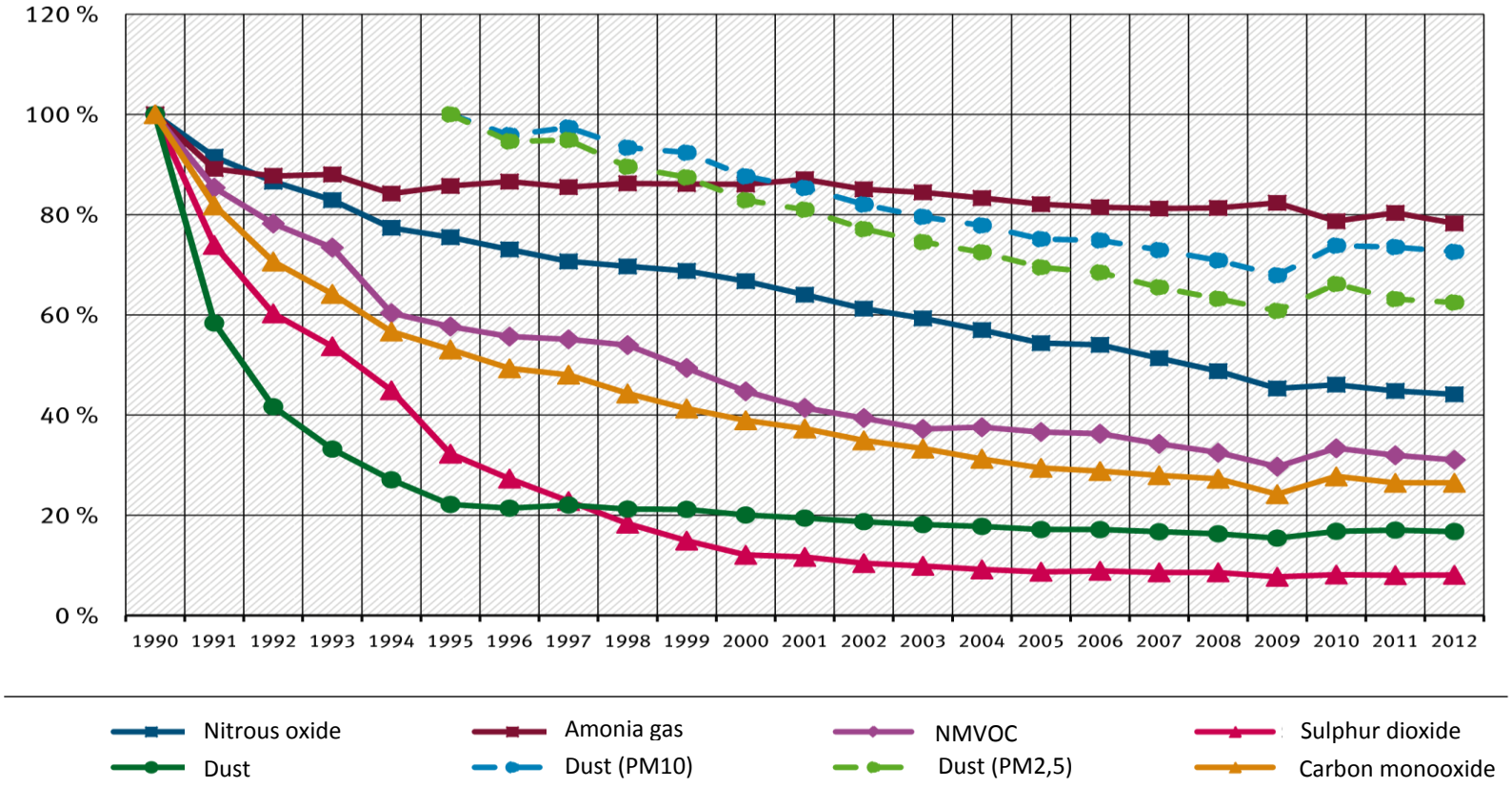
Air & Water quality

Emissions of certain atmospheric pollutants



Quelle: Umweltbundesamt, Nationale Trendtabellen für die deutsche Berichterstattung atmosphärischer Emissionen seit 1990, Emissionsentwicklung 1990 bis 2012 (Stand 15.04.2014)

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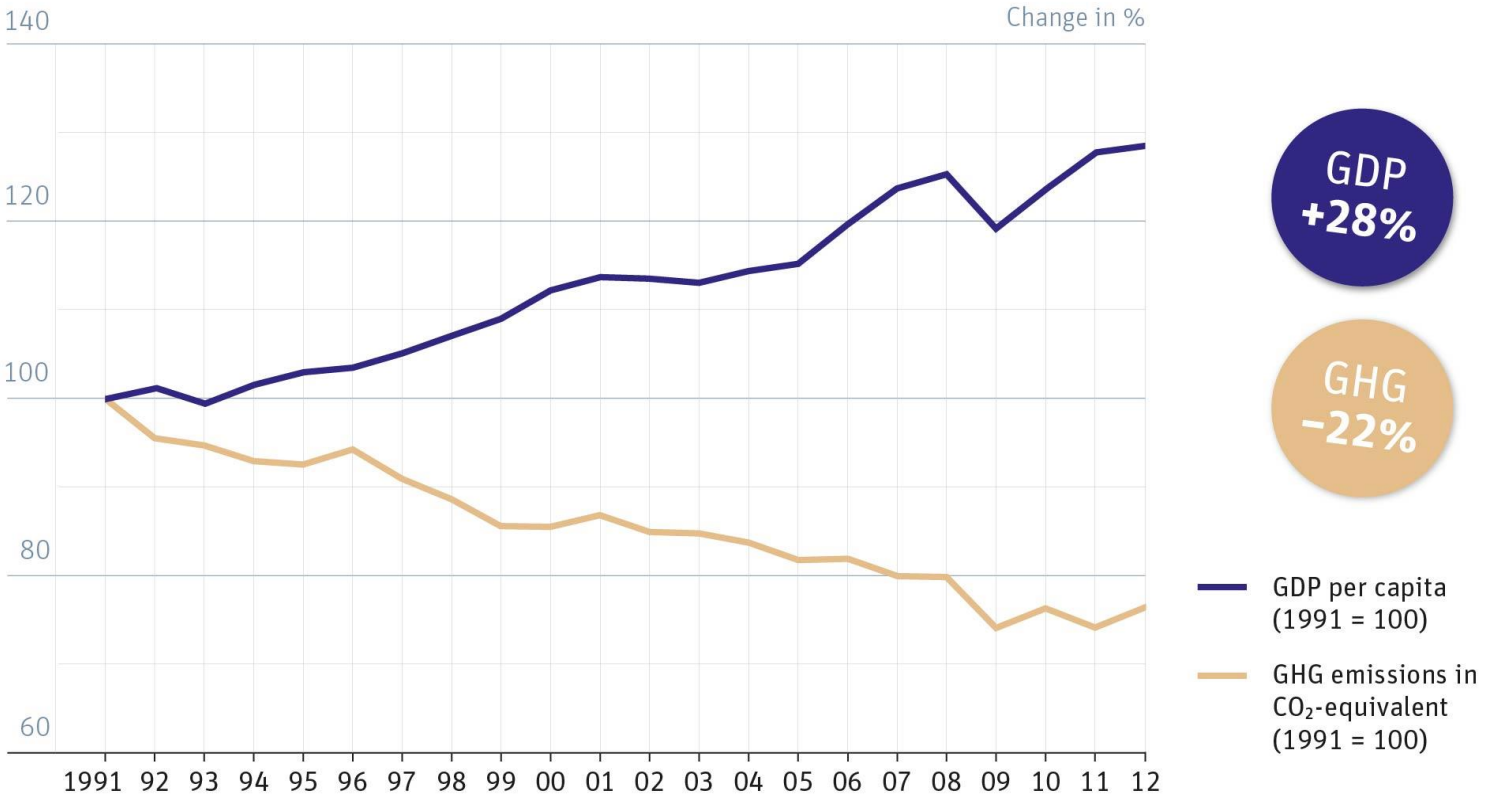
Germany: growing economy, declining emissions

Change of Gross Domestic Product (GDP) and Greenhouse Gas (GHG) emissions in Germany, 1991–2012

Source: BMU, BMWi, Destatis



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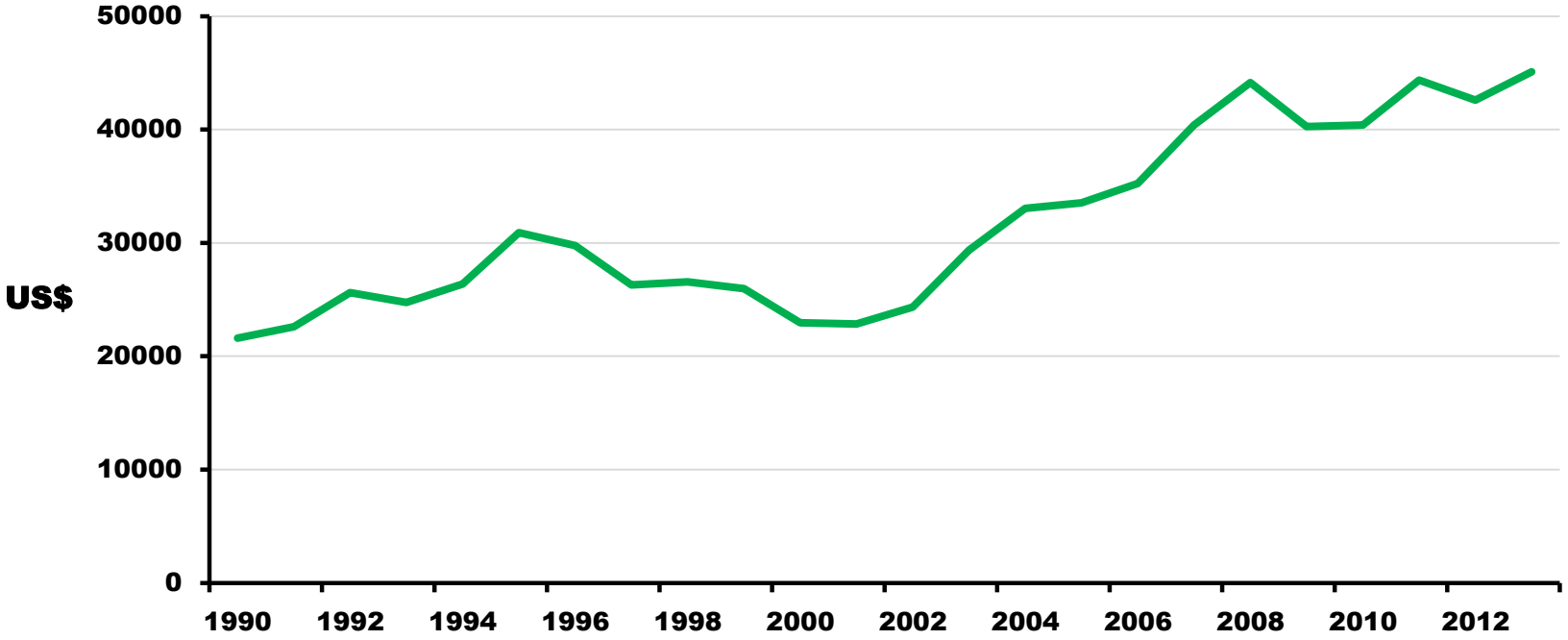
GDP per Capita



Source: Worldbank

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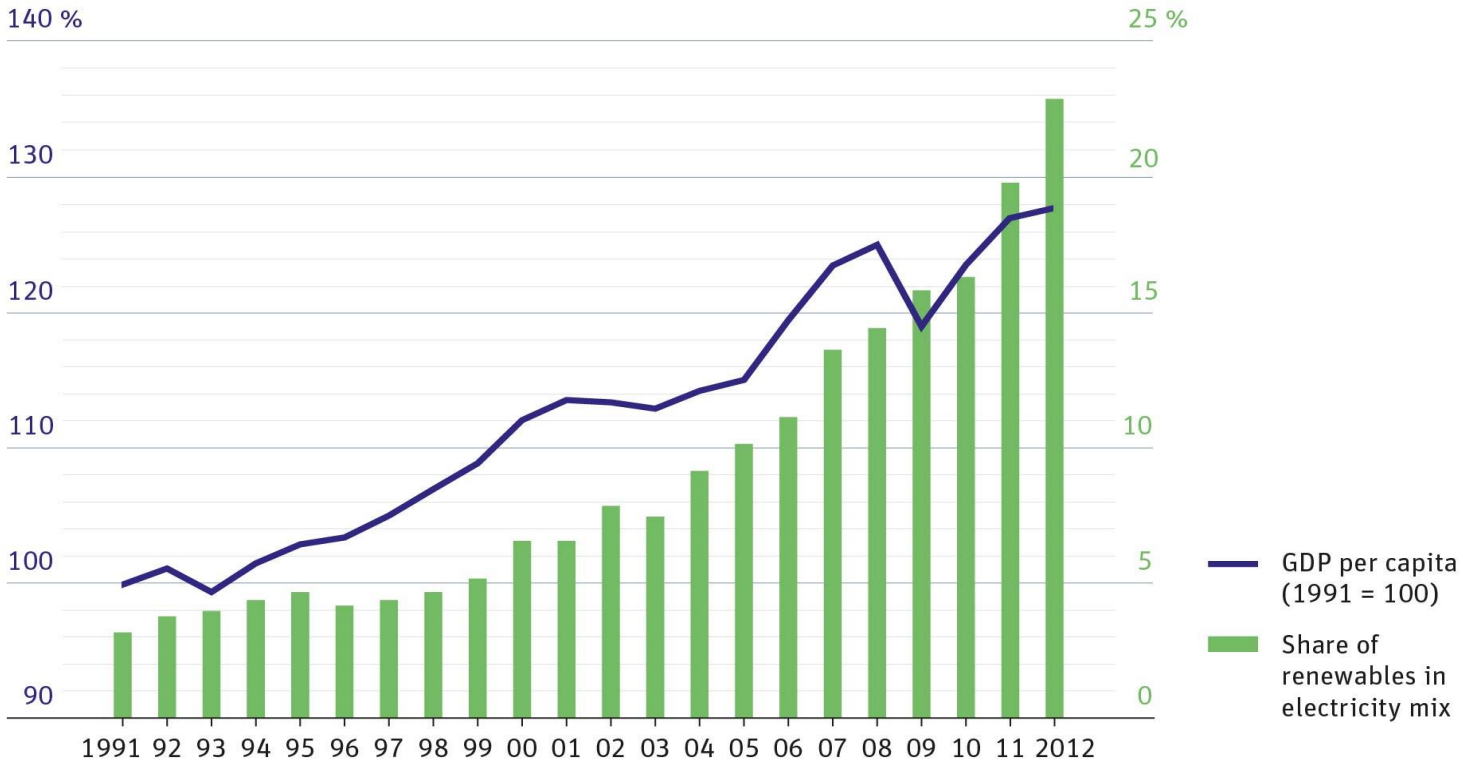
Renewables help make economy healthy

Gross Domestic Product and share of renewables in power generation from 1991–2012, Germany

Source: BMWI, AG Energiebilanzen, Destatis



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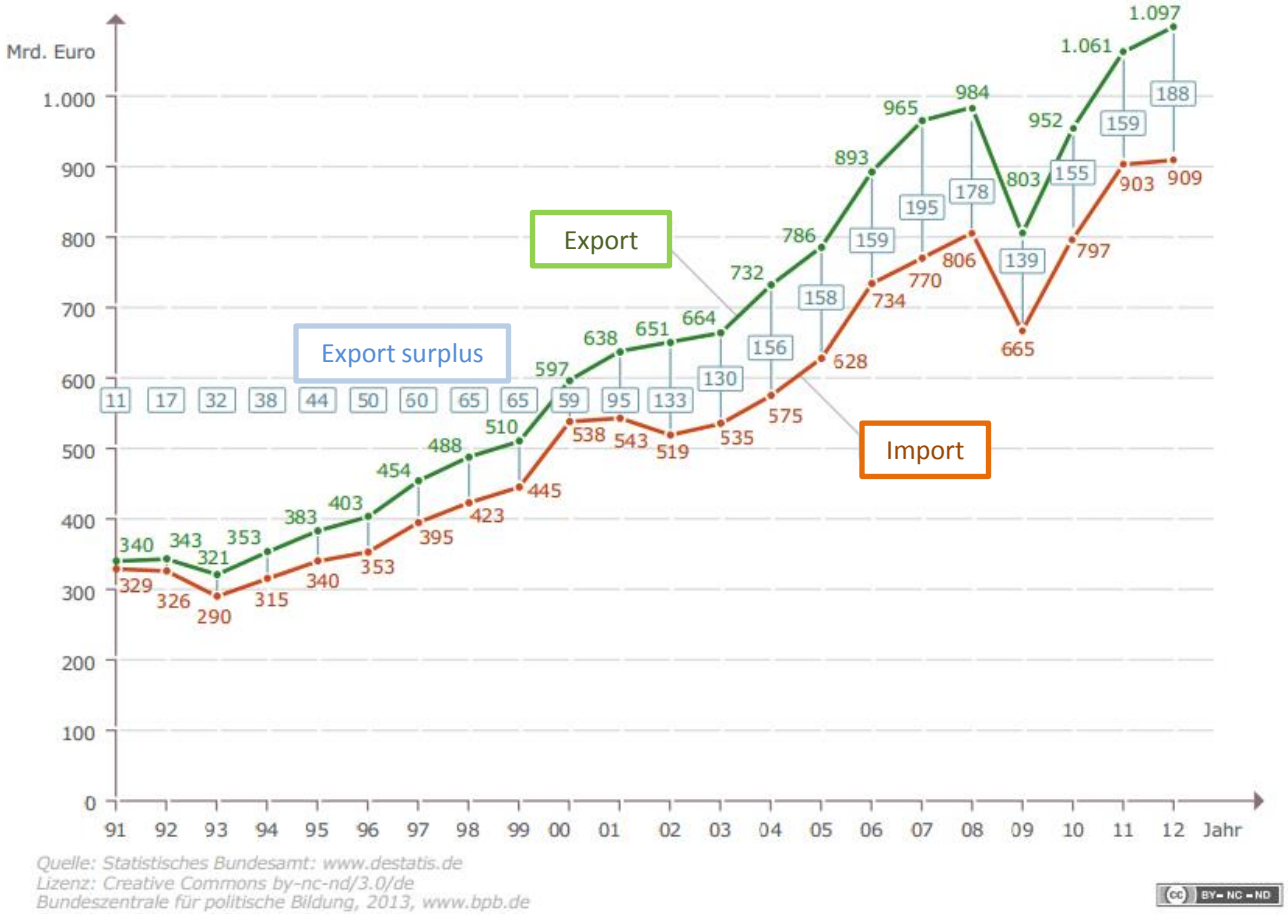
Development of External Trade

Import, Export and Export surplus, 1991-2012



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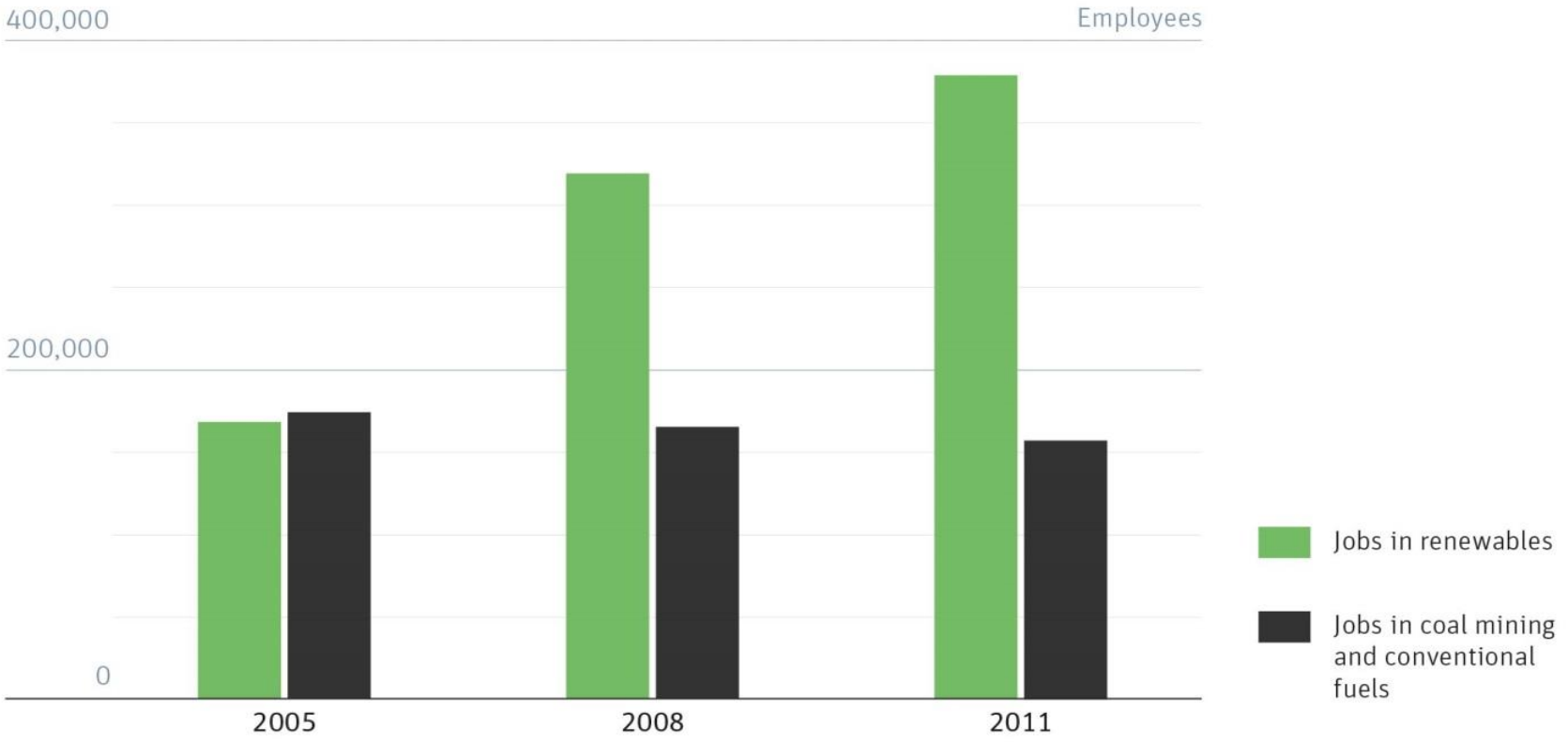
Renewables create more jobs than conventional energy does

Employment in Germany in renewable and conventional energy sectors, 2005–2011

Source: BMU, BMWI



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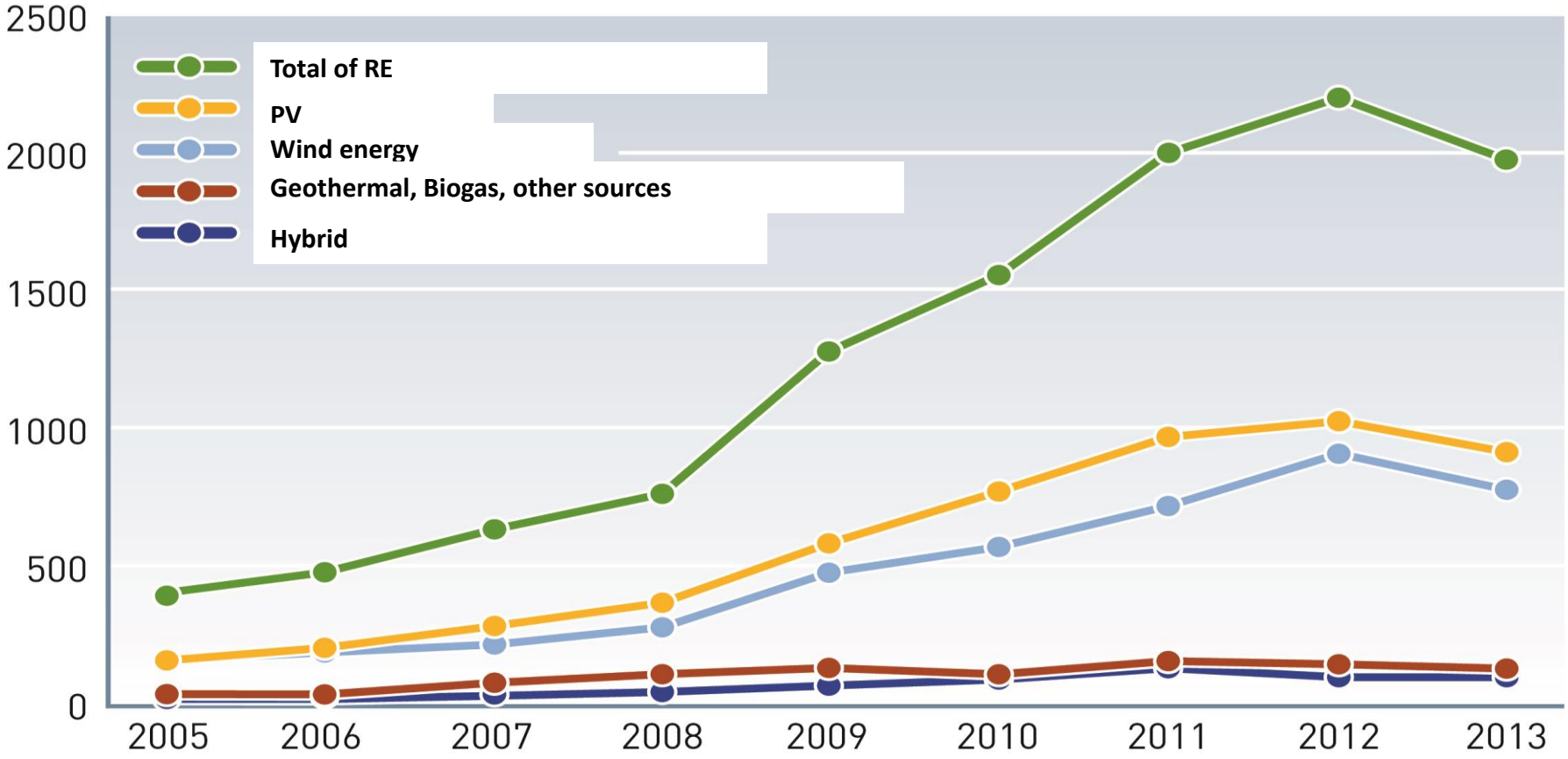
Numbers of patent application in renewable Energy sector in Germany 2005-2013



Quelle: DPMA; Stand: 06/2014

www.unendlich-viel-energie.de

Agentur für Erneuerbare Energien

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Impacts Yet to Come

- Likely “real” electricity price development
- Job prognoses

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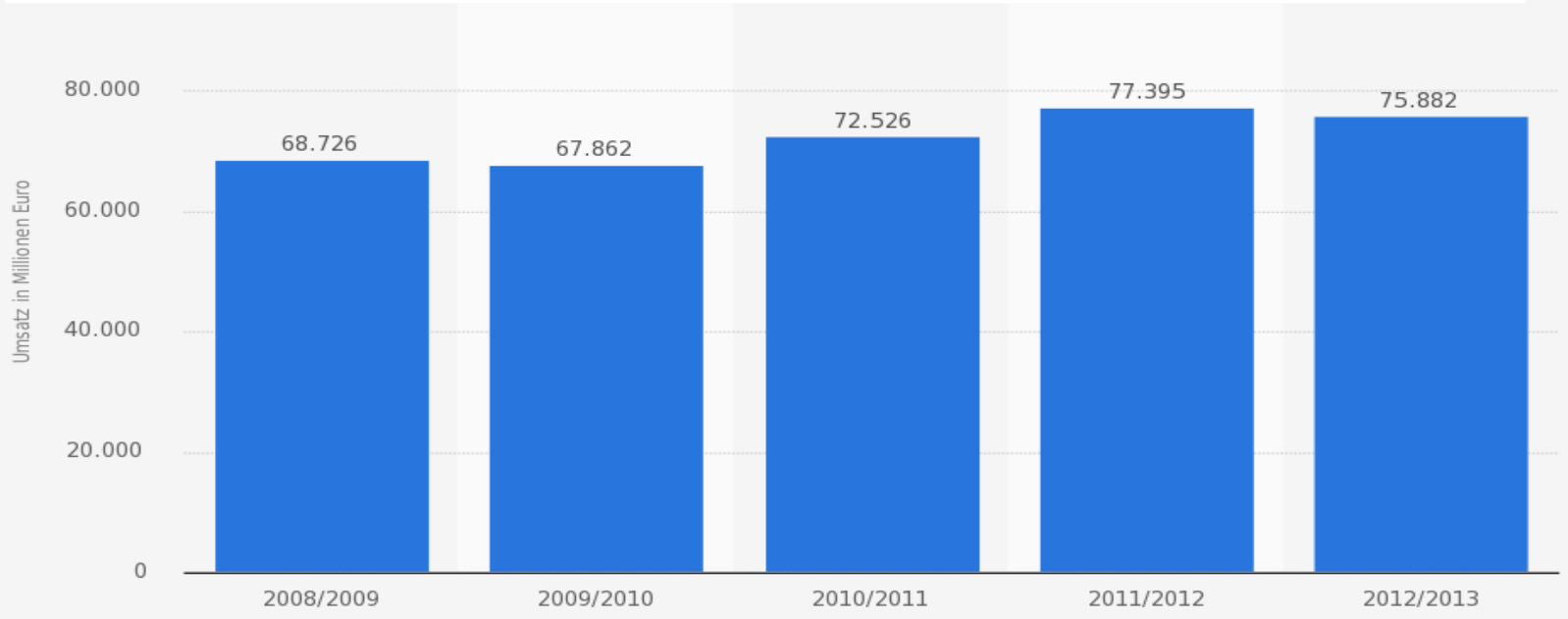
SIEMENS

Revenue of Siemens AG of 2008/2009 till 2012/2013 in Million Euro



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Weitere Informationen:
Weltweit

statista

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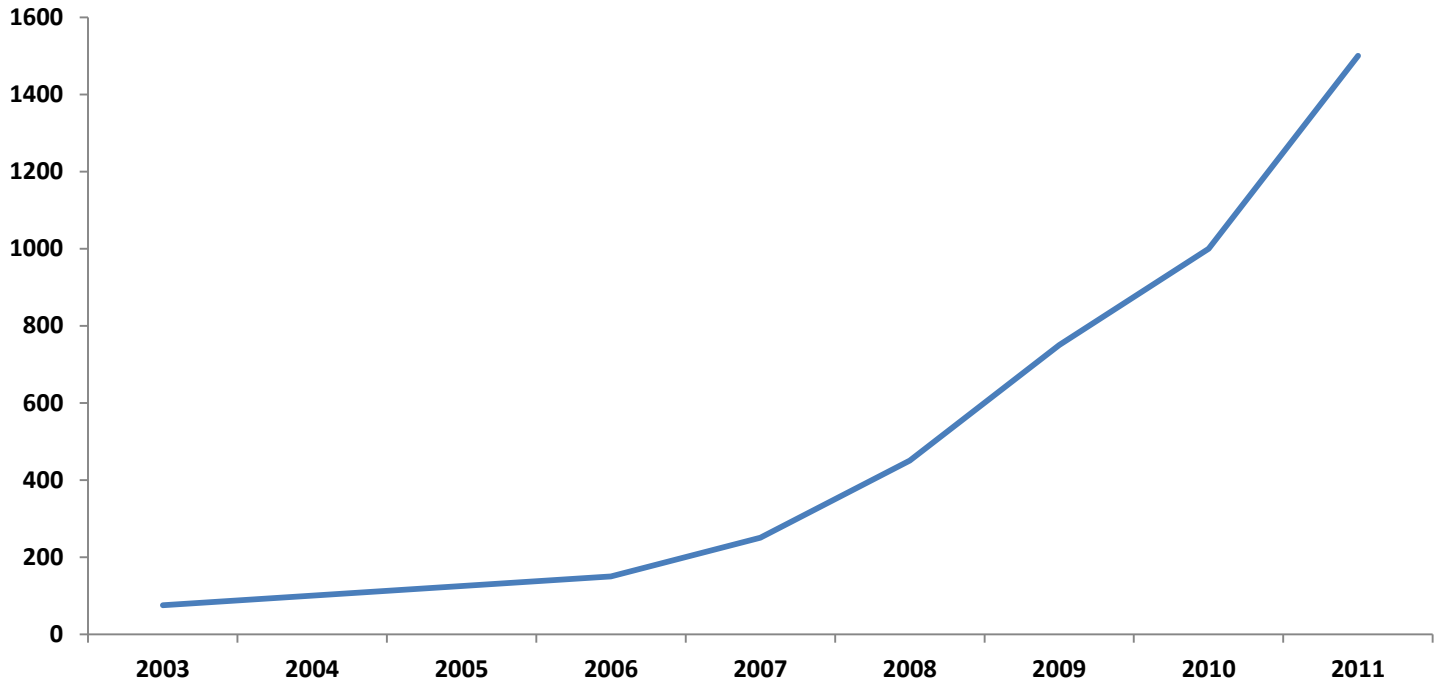
Die Energie ist da

Employees



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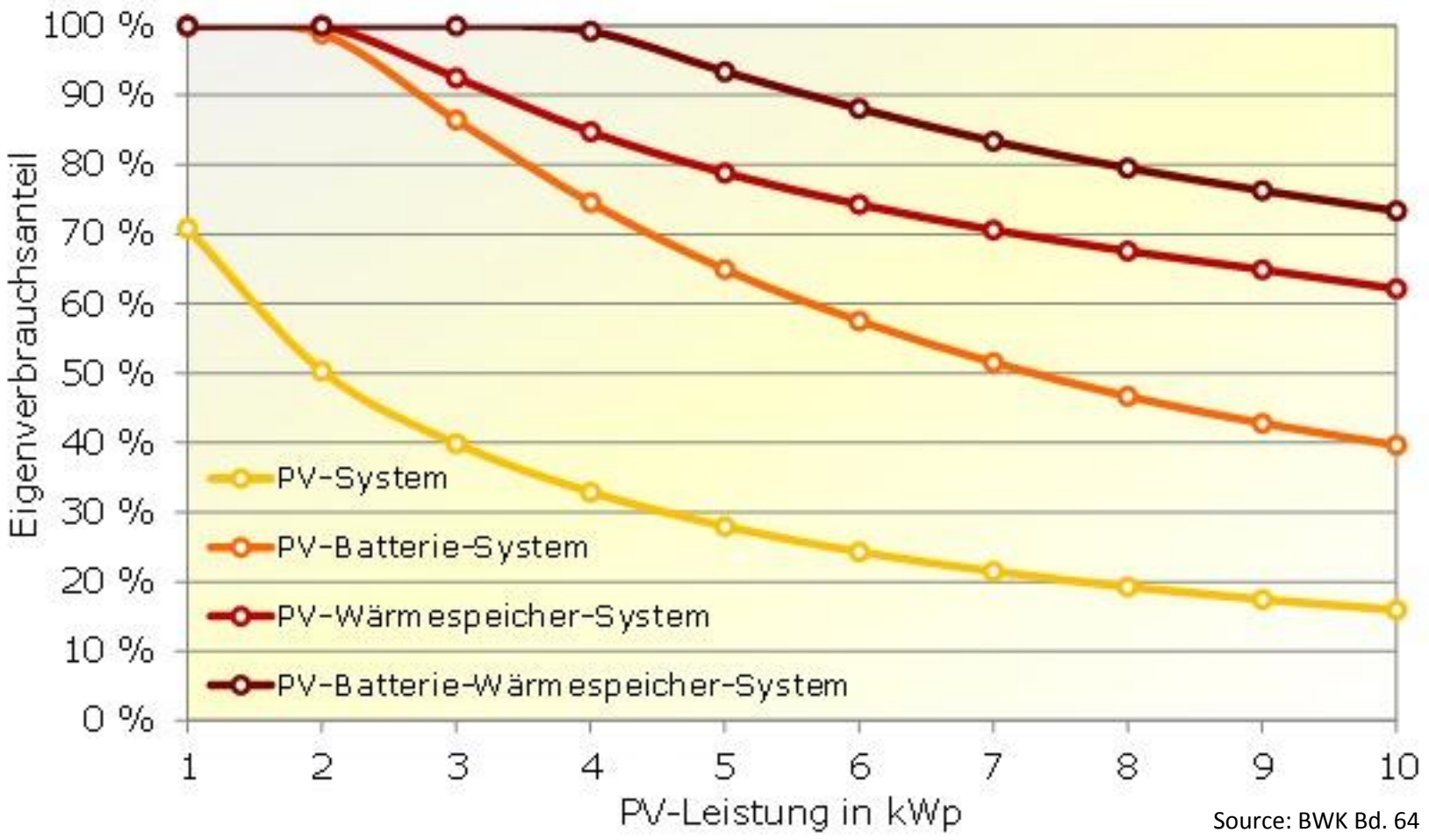
Founded 1988

Revenue:

- 2011: 122 Mio Euro
- 2012: 200 Mio Euro
- 2013: 234 Mio. Euro

Privat Sector



Source: BWK Bd. 64

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Case study

Photovoltaikanlage in Berlin-Zehlendorf	by 0%	by 20%	by 40% own consumption
Lifetime Income of FiT	14.710€	11.776€	8.822€
Lifetime Savings through own consumption	0€	8.973€	17.920€
Overall Lifetime income (a year)	14.710€ (712€)	20.749€ (1.004€)	26.743€ (1.294€)
Lifetime cost	12.562€		
Lifetime Surplus (a year)	2.148€ (104€)	8.186€ (396€)	14.180€ (686€)
Rate of Return	2,26% p.a.	6,77% p.a.	10,29% p.a.

Source: PVSolarstrom

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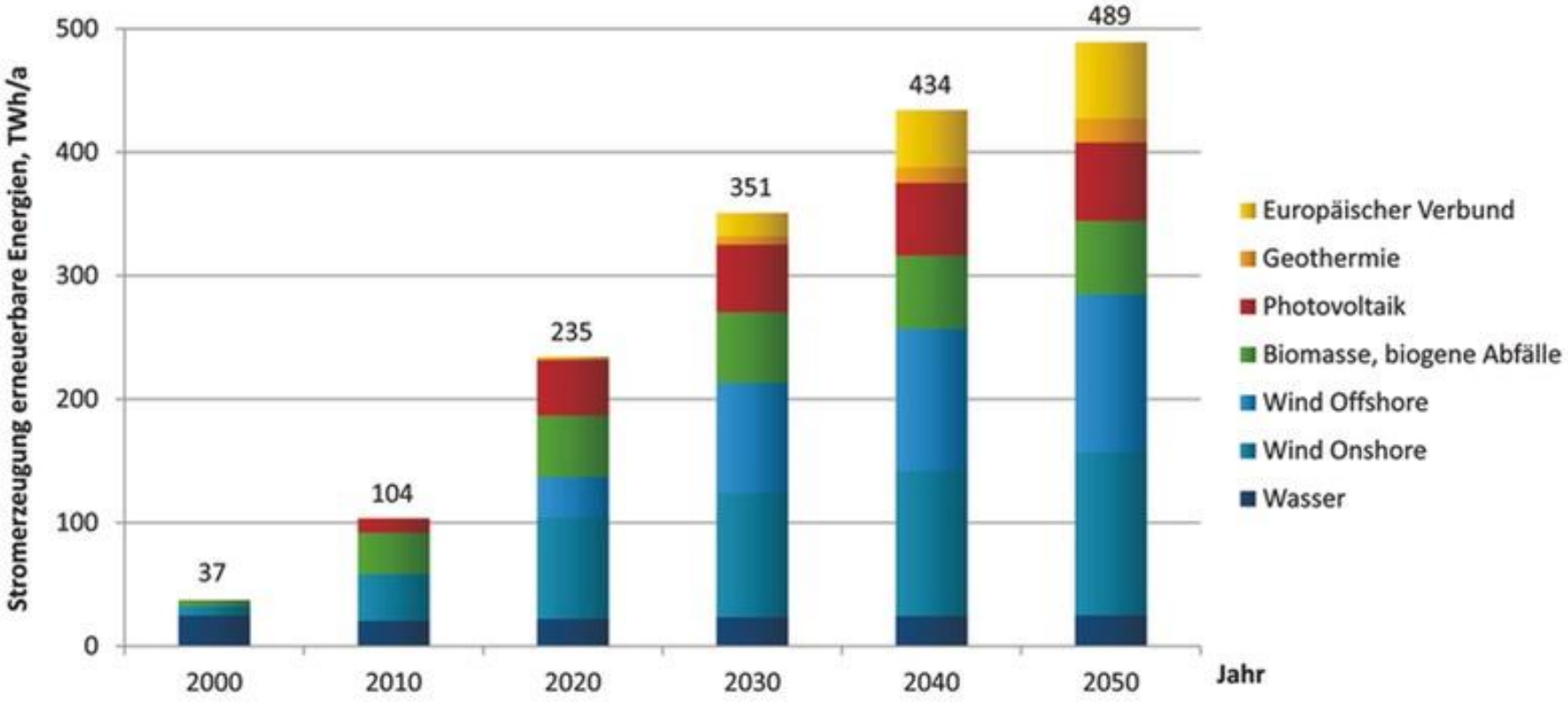
Forecast of electricity landscape



Source: ET

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4. *the lessons*

Key Take-Aways

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- Energy transition globally a necessity
- Energiewende produced enormous environmental, economic & social benefits
- Paradigm change is underway
- Winners and losers; policy-makers need to set market framework; corporations decide how to play
- Corporations are increasingly seeing opps, but need supporting policies
- Political and private sector decision-making should go hand in hand: stakeholder dialogues
- Integrated assessments/roadmaps: Technical, socio-economic, financial, political analysis necessary

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the future

New Challenges | New Ideas

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Technology/Market Challenges

- The future grid
  How does it look like and what are the necessary investments?
  Who runs the grid/back-up in a distributed system?
- The need for storage
  What is are the right support systems for technical options?
- More research needed on DSM
- New Business model needed
  How to create the right market incentives and support sustainable energy business models?

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Ideas

Portfolio of policies which provides ambitious and continuously updated goals and keep being reliable.

These includes financial bonuses or rebates and reformation about legislation.

For example: bill the building instead of the builder

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Impact of insolvent Solarbranche

	Investment (incl Export)	Maintenance and Service	Preparation of Fuel	Total Employment 2013	Total Employment 2012
Wind onshore	100.800	18.200		**119.000**	104.000
Wind offshore	17.500	1.300		**18.800**	17.800
Photovoltaik	45.100	10.900		**56.000**	100.300
Solarthermie	10.100	1.300		**11.400**	12.200
Solarthermal Power	1.100			**1.100**	1.400
Hybrid	8.300	4.800		**13.100**	12.900
Geothermie	14.600	2.700		**17.300**	16.400
Biogas	17.200	11.800	20.200	**49.200**	50.400
Biomass	16.100	12.500	23.000	**51.600**	51.700
Biofuel	6.000	8.600	8.400	**25.600**	25.400
Sum	230.800	63.500	68.800	**363.100**	392.500
public funded Research/Administration				**8.300**	7.300
Sum				**371.400**	399.800

Source: Ec Pocketbook

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