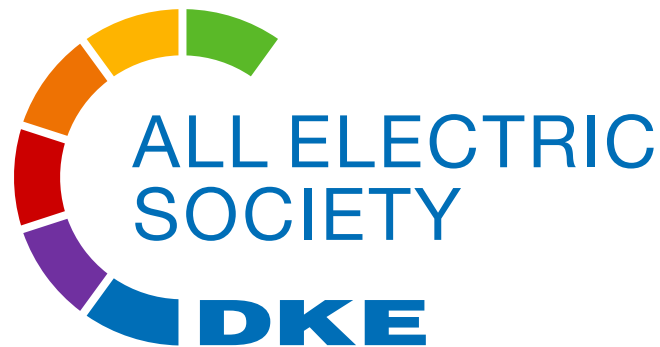


DS Elektrodag - Fremtidssikret Elnet

All-Electric Society



Johannes Stein

Nordhavn, 31th of January, 2024



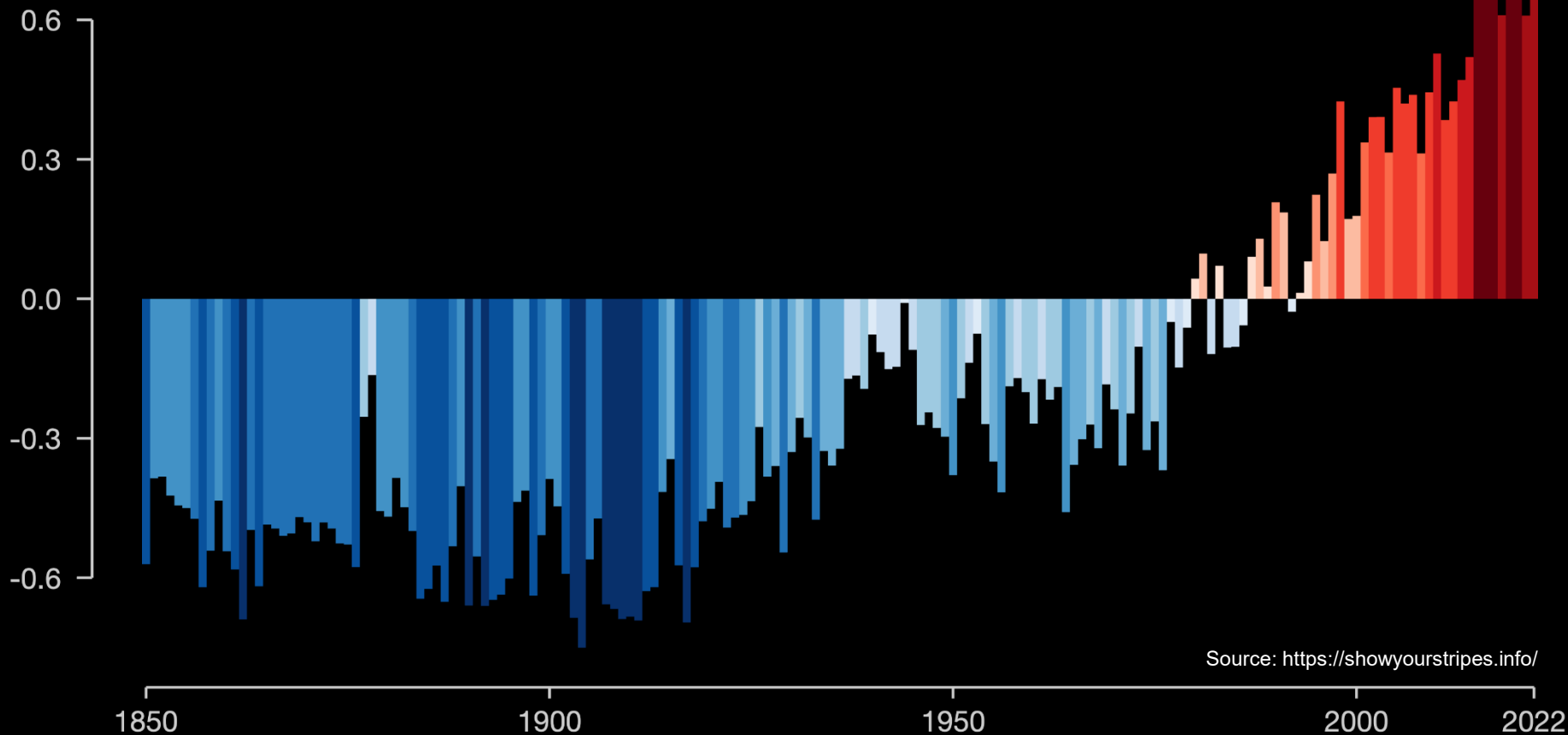
United Nations Sustainable Development Goals (SDGs)



Source: Umweltbundesamt, UN Communication Material

Global temperature change

Relative to average of 1971-2000 [°C]



Source: <https://showyourstripes.info/>



**“The difference
between 2 and 4
degrees is human
civilization.
It is as simple as that.”**

Prof. Dr. Dr. h.c. Hans Joachim Schellnhuber, CBE
Director Emeritus of the Potsdam Institute of Climate Impact Research (PIK)

Source: stock.adobe.com – Murattellioglu

The Challenge: Climate change and energy transition

- Climate change and the resulting transitions are one of the greatest challenges for our society, the economy and the quality of life of every single person.
- The EU's Green Deal and the UN's Sustainable Development Goals (SDGs) have set ambitious goals that require massive change processes.

The Energy Challenge



- The world needs more and more energy so that the growing population can live in prosperity and security.
- On the other hand, we must reduce CO₂ emissions in order to survive.
- The quest for clean energy will create a huge economic and technological boost - unlimited clean energy will be the next driver of the global economy.

The All-Electric Society



The All-Electric Society envisions a world in which renewable electrical energy is economically accessible for everybody as the primary form of energy, sustainably powering the growth of our society.

Definition of the All-Electric and Connected Society (by IEC SMB/ahG 95)



- With a human-centric approach, AECS strives to create sustainable, resilient, and economically vibrant living conditions for everyone.
- AECS achieves this goal by leveraging **intelligent and green electrical energy**, cutting-edge communication, and **digital technologies** to create a **decarbonised environment**.
- By doing so, it not only **protects the planet** but also provides citizens with the resources and infrastructure needed to lead **healthy, safe, secure, and meaningful lives**.

Utopia?



Source: stock.adobe.com HQQUALITY

Vision!



Unlimited availability



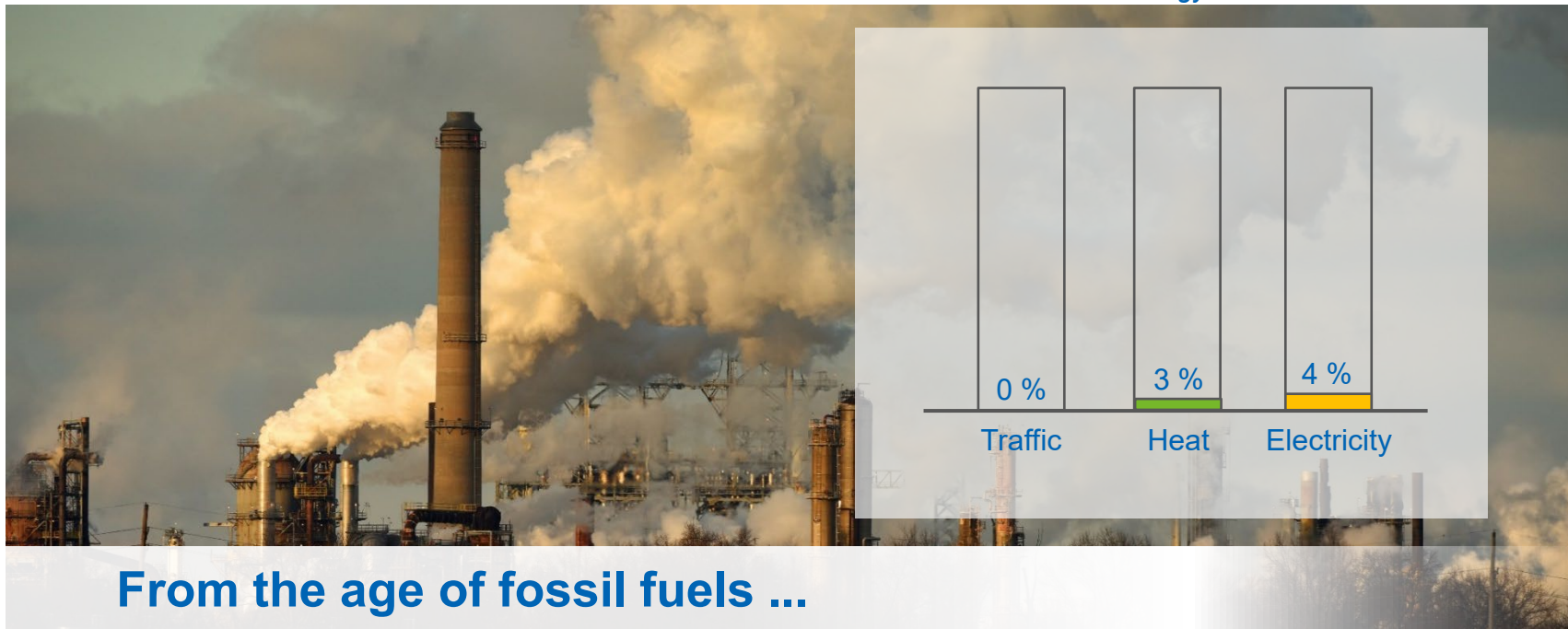
Economically producible



Storable and transportable

The Paradigm Shift – Energy in the 21st Century

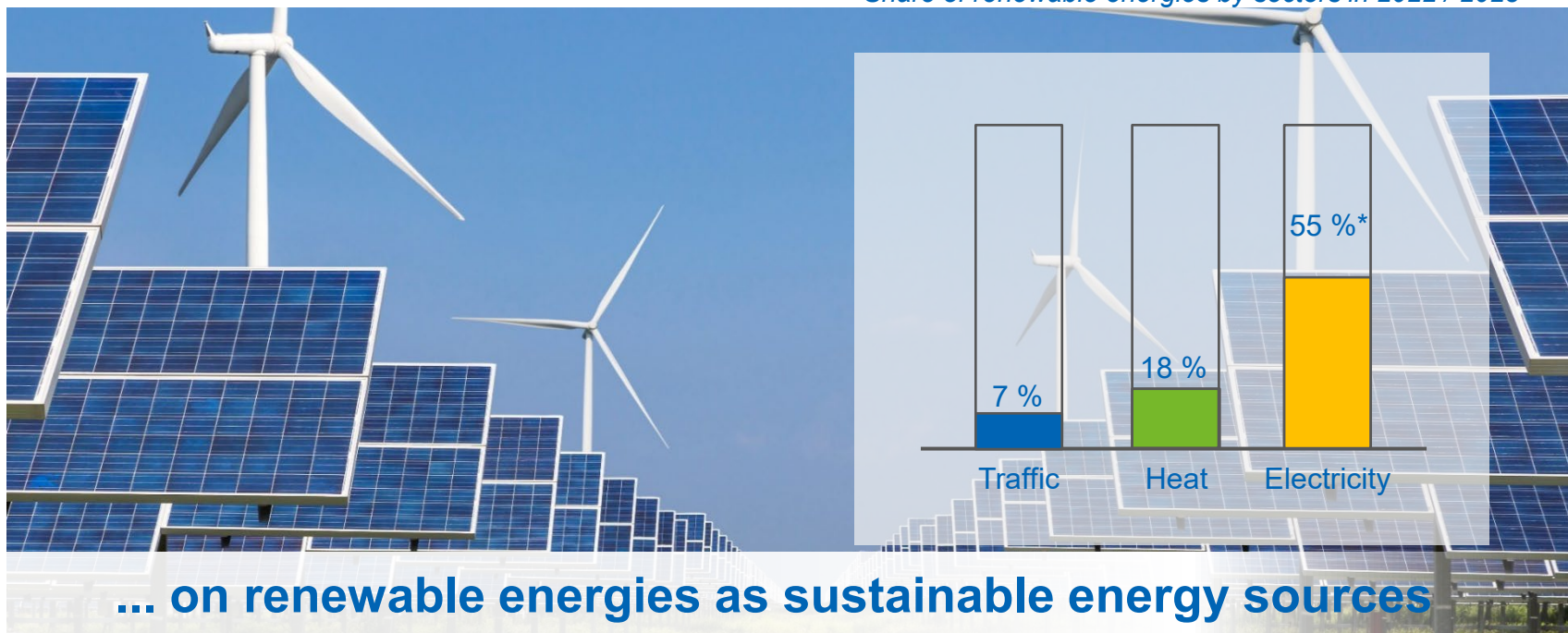
Share of renewable energy in the sectors in 1990



Source: Adobe Stock R. Gino Santa Maria, in Anlehnung an Umweltbundesamt (2022)

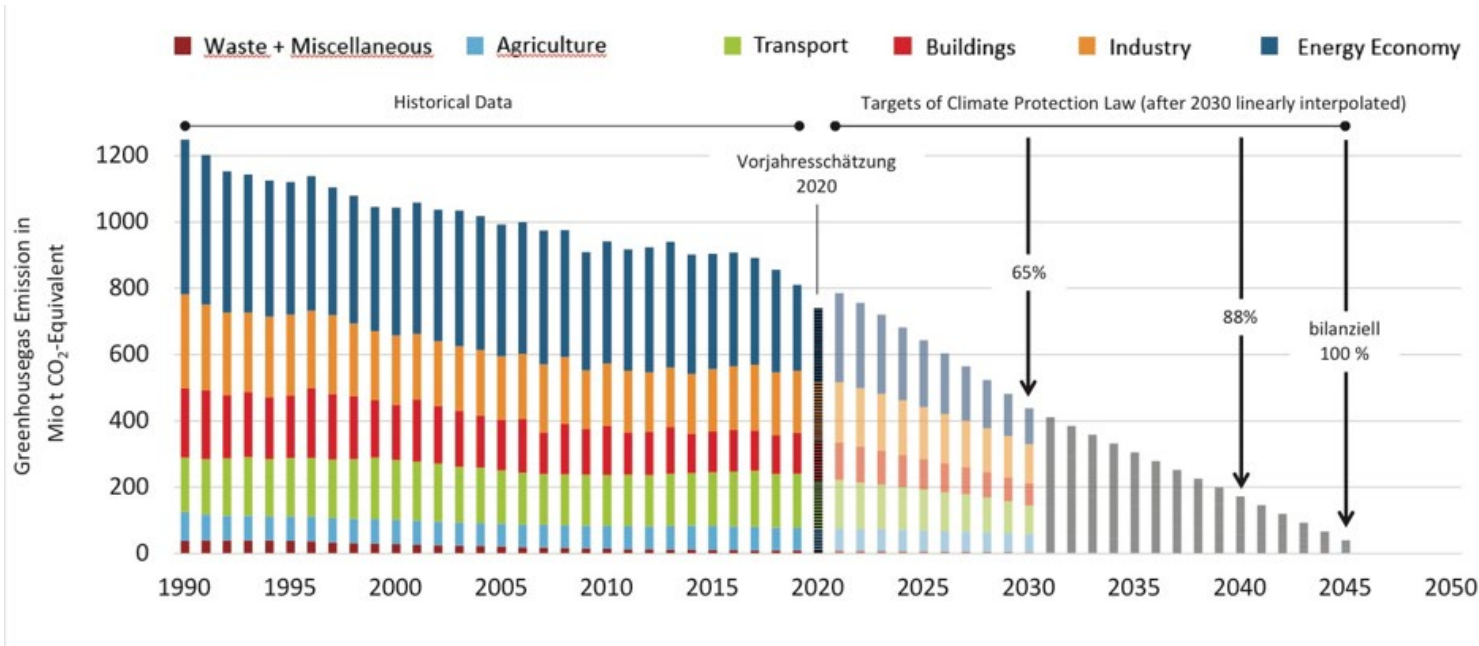
The Paradigm Shift – Energy in the 21st Century

*Share of renewable energies by sectors in 2022 / 2023**



Source: Adobe Stock Soonthorn, based on German Federal Environment Agency (2022)

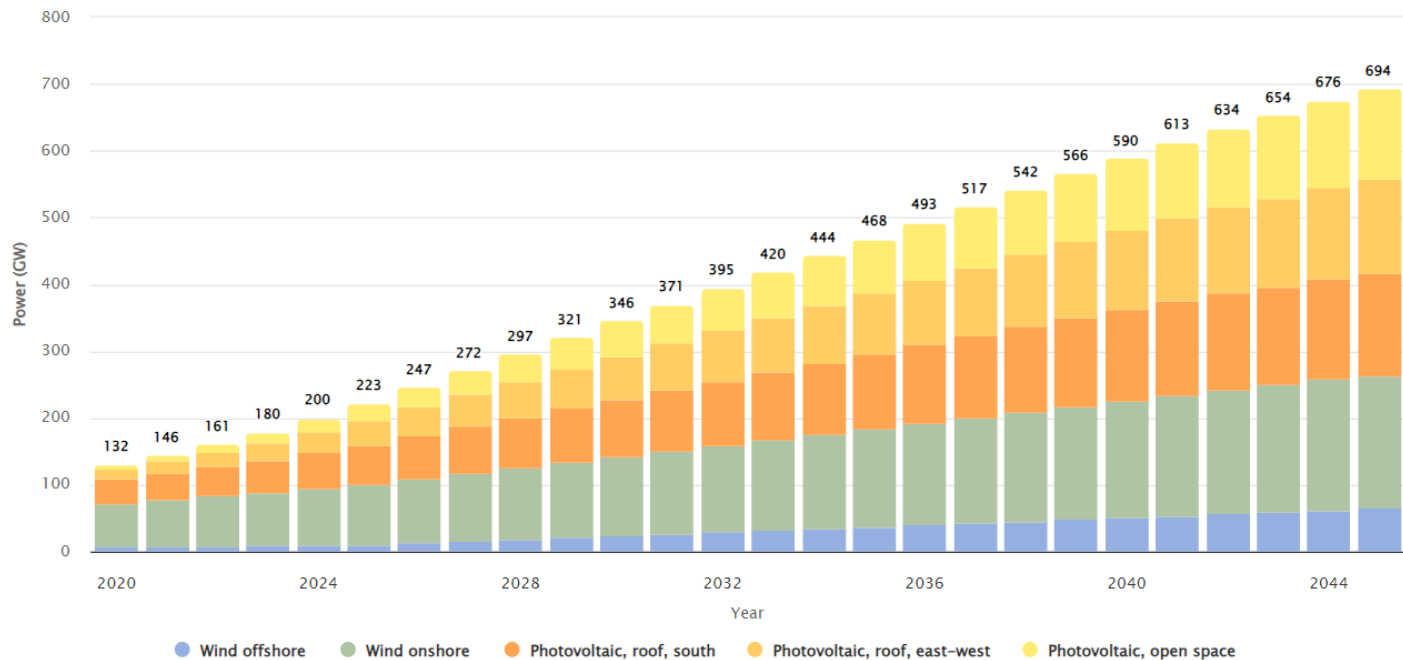
Historical data and reduction targets for German greenhouse gas emissions



VDE VDE Association for Electrical, Electronic & Information Technologies :
Whitepaper on the hydrogen economy, Frankfurt am Main (October 2022)
Here cited: Fraunhofer ISE, Ulf Groos; German Environmental Agency

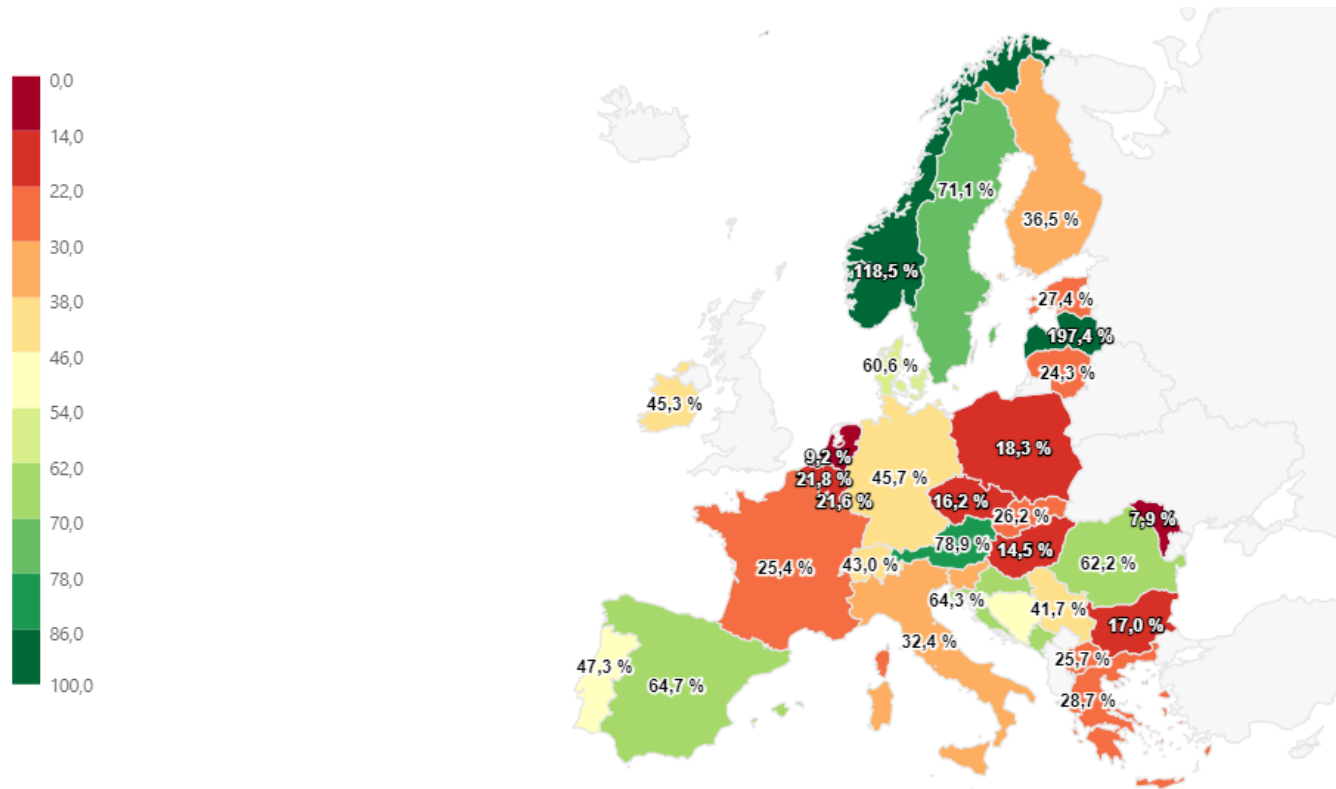
Installed capacity of variable renewables for electricity generation in Germany

scenario reference Fraunhofer ISE Study 2021



Energy-Charts.info - last update: 13.11.2021, 21:17 MEZ

Renewable share of electricity load in week 14/2023

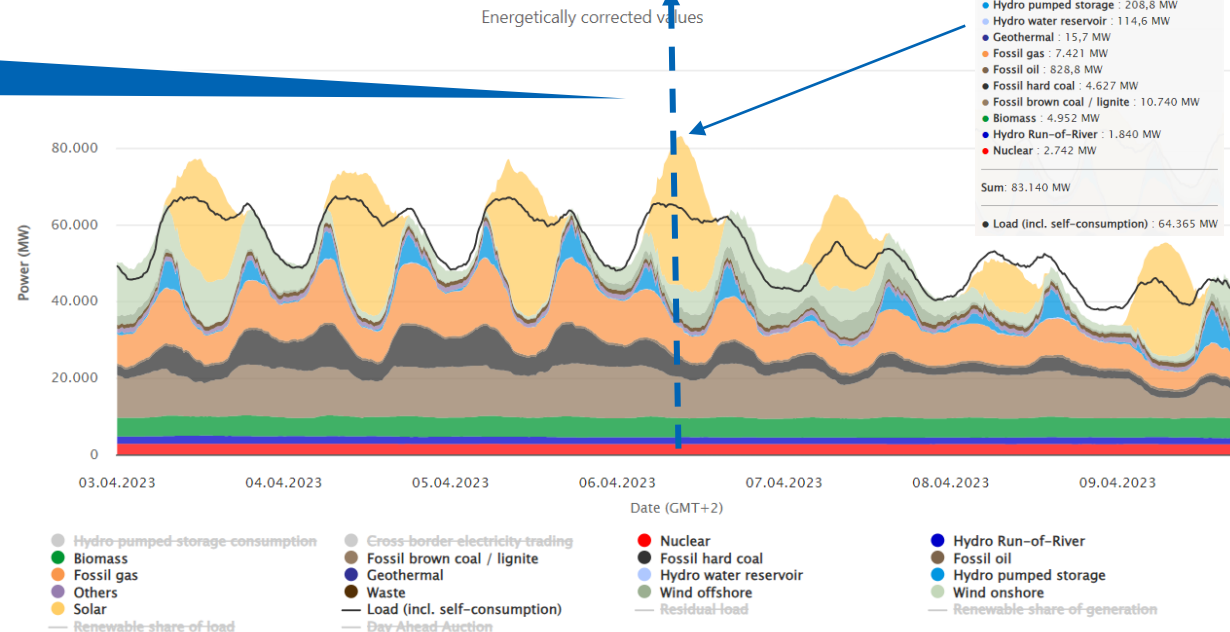


Energy-Charts.info; Last Update: 07.01.2024, 23:55 MEZ

Electricity Generation and consumption in Germany in Week 14 / 2023 (Eastern)

... expected solar power generation on a comparable day in 2030 with Solar 120.000 MW, if the expansion targets are met.
→ possibilities for new electrified applications and Power-to-X (Hydrogen et al.)

Total net electricity generation in Germany in week 14 2023



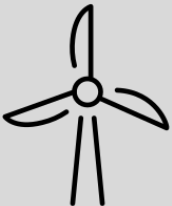






Energy-Charts.info - last update: 26.01.2024, 17:33 MEZ

<https://www.energy-charts.info/> / Vadopted from DE VDE Association for Electrical, Electronic & Information Technologies: Whitepaper on the hydrogen economy, - Frankfurt am Main (October 2022). Here cited: Fraunhofer ISE, University Ulm, Prof. Werner Tillmetz,

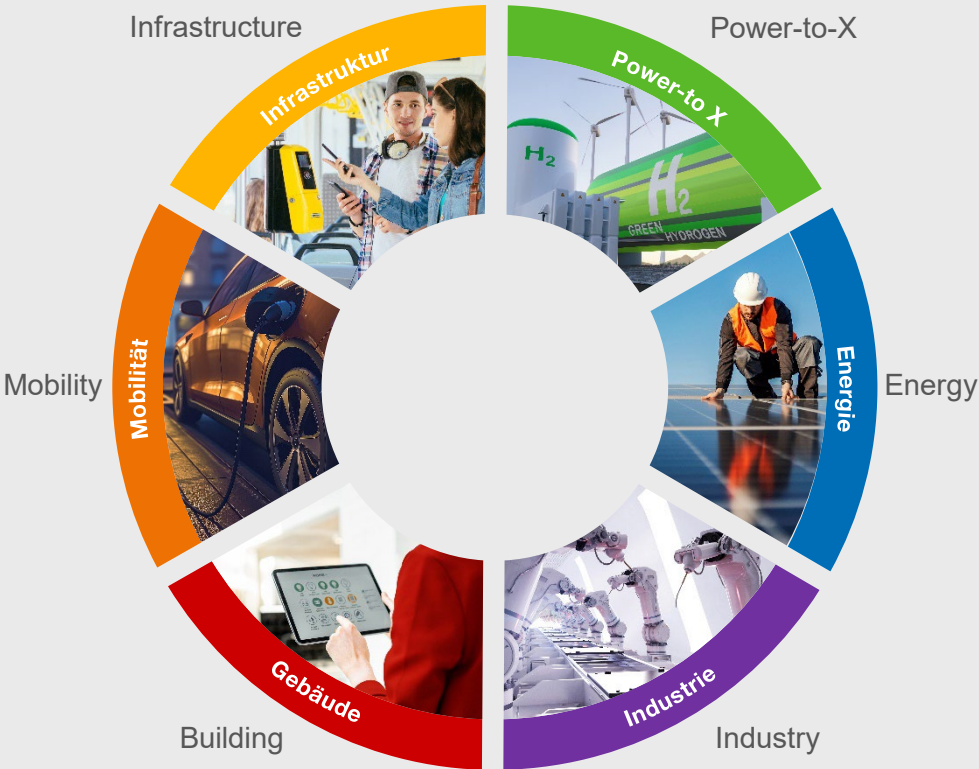


**Applications with fossil fuels are being electrified –
examples of electric vehicles or heat pumps**

Comparison of the supply capacity of a wind turbine for different drive technologies - The electric vehicle with battery is the most efficient

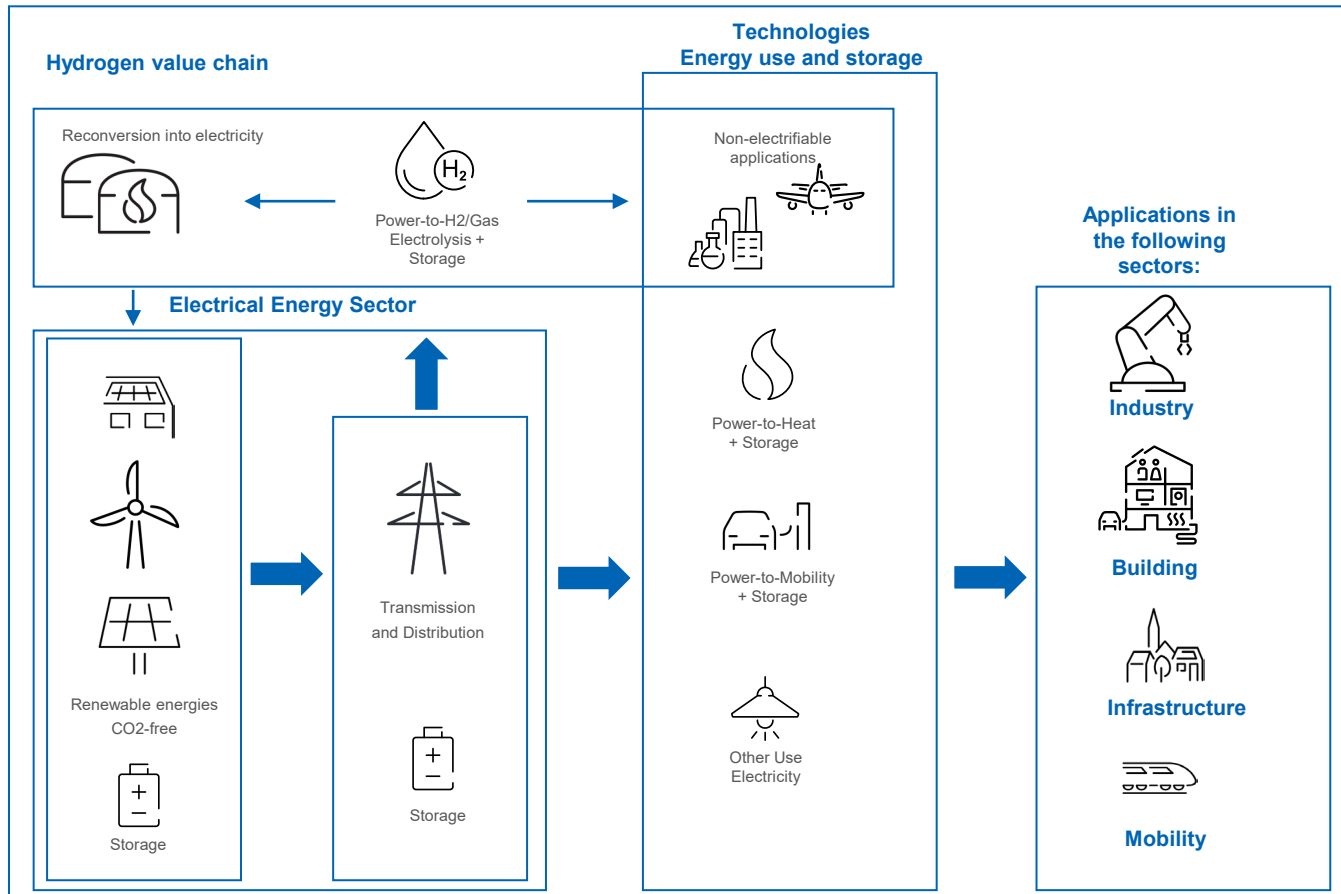
Energy source	Energy carrier	Drive system	Locally emission-free	a 3 MW wind turbine supplies ...
 e.g. Wind turbine 3 MW, 2.000 h per year	Electrical power	 BEV	✓	 1.600 cars
	H ₂	 FCEV	✓	 600 cars
	eFuels	 ICE	✗	 250 cars

Source: VDE Study Powertrain portfolio of the future

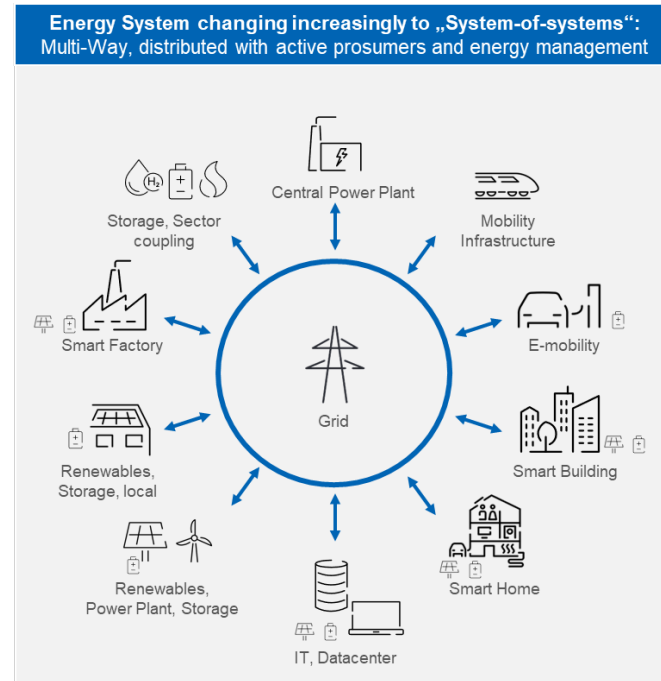
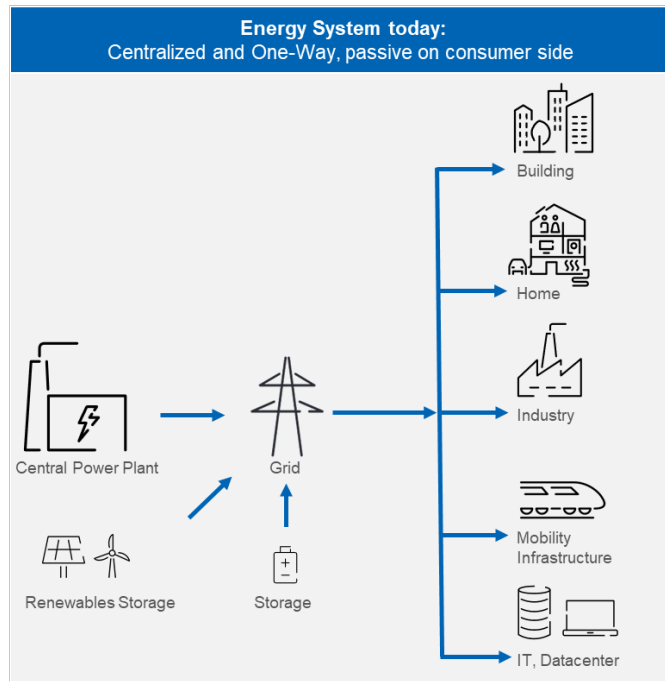


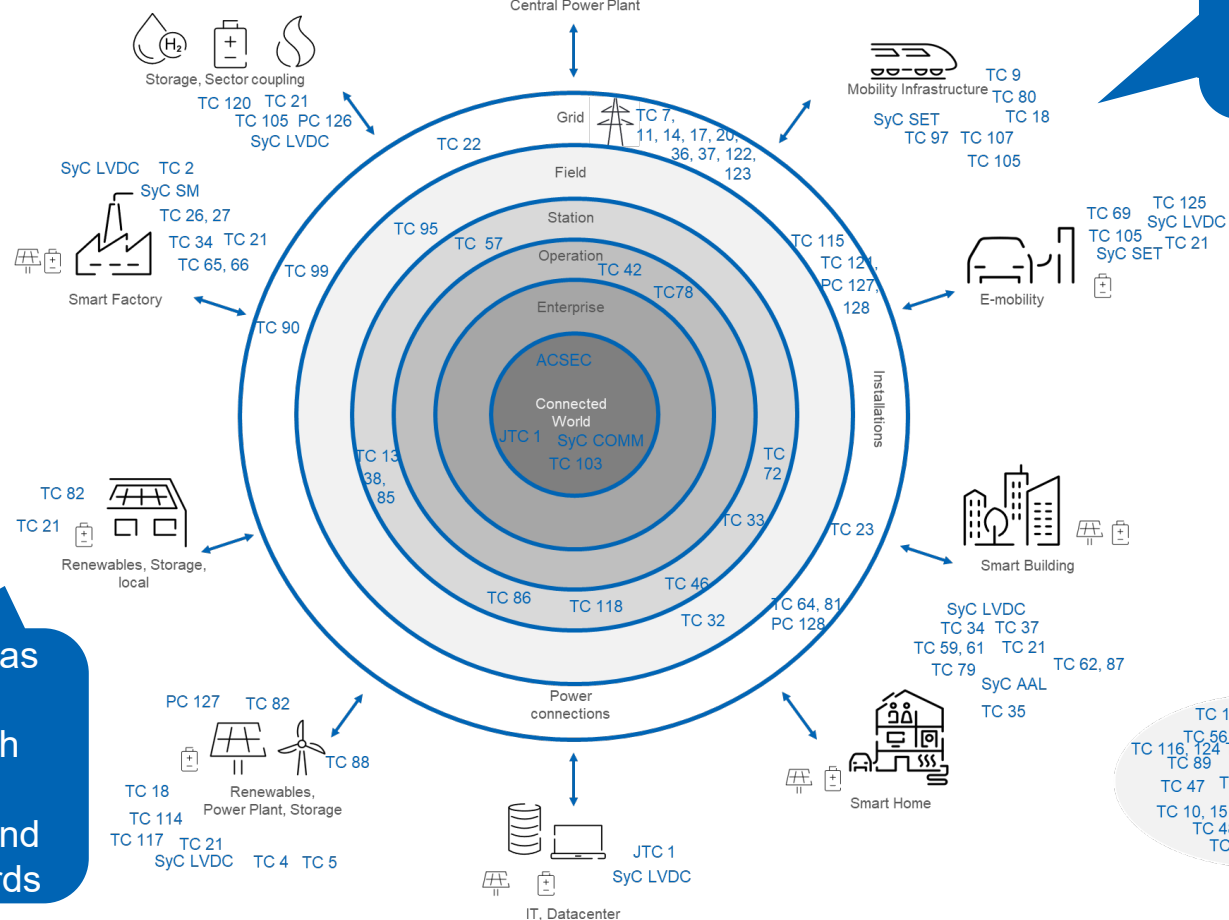
Sector coupling will be the key of the All-Electric Society

- Energy efficiency
- Balancing of generation and consumption
- Flexibility in consumption thanks to energy storage and consumers



From today's linear value chain in the energy system to a network with various possible interactions (IEC SMB/ahG 95)





Might be used as well to map use cases with prototype architectures and related standards

87 **Basic or fundamental electro-technological technologies**

TC 112, 113
TC 56 TC 96 TC 100
TC 116 TC 124 TC 68 TC 89 TC 44 TC 108, 110, 119 TC 101
TC 47 TC 1, 25, 104 TC 94
TC 10, 15 TC 31 TC 51, 55, 56
TC 48, 49 TC 29 TC 70, 76
TC 23 TC 89, 91 TC 96



Electrification

Connectivity

Automation

Vision

A sustainable development of society and economy with a complete decarbonization of our society by covering all our energy needs from 100% renewable energy sources.

Strategy

Technology – especially electrical engineering and information technology – is the decisive key to realizing the vision.

Technology Areas

Renewable energy sources

Electrification → higher demand for electrical energy and power

Balancing of energy supply and demand

Sector coupling

Digitalization and Automation

The All-Electric and Connected Society in Standardization

- A lot of what is already available in standardization, has been well thought out and can be used for the concept of the all-electric and connected society.
- But sector coupling, electrification and automation are creating new as well as increasingly converging technologies that require standardization under the well-known premises of safety, efficiency, sustainability, functionality, and interoperability.
- Standardization can effectively support policy objectives such as the energy transition, decarbonization, and digitalization, as well as the opening up of the global market.

IEC Strategic Plan
Theme 1:
**Enabling a
digital and all-
electric society**

White Papers,
Report, existing
activities

SMB adhoc group
95 *All-Electric and
Connected
Society*

SMB/Strategic
Group 14 *All-
Electric and
Connected
Society*

DKE

Creation of Strategy Group 14 “All-Electric and Connected Society (AECS)” with Danish participation



- SG 14 was established further to SMB Decision 177/5 in June 2023
- The scope of the SG 14 is such as the provision of guidance and the understanding of the AECS to the IEC community
- Kick-off: 24th and 25th of January 2024 in Frankfurt, Germany
(due to change of IEC GM into virtual meetings)

DKE commits itself to the vision of the All-Electric Society



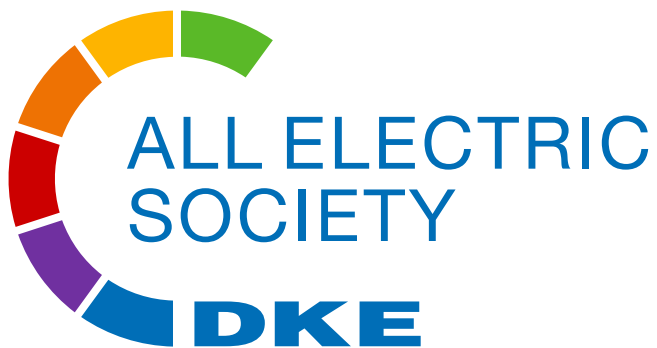
... in the interests of the future of our society ...
... in close consultation with its stakeholders from industry, the public, associations and politics ...

- Standardization has to create the architectural framework for the All-Electric Society.
- Standardization has to drive forward the networking of interest groups worldwide for the standardization of a sustainable energy system.
- Standardization has to create the organizational framework and proactively exploits the opportunities of digitalization.

<https://www.dke.de/en/commitment-2030>



**Realizing the vision of the
All-Electric Society
is a global challenge and
we can only succeed together.**



Thank you
for your attention!

We are building the e-dialistic future.
Please join us.



Your contact:

Johannes Stein

Senior Principal Expert

Horizontal Topic Development

Phone +49 69 6308-252

johannes.stein@vde.com

DKE