



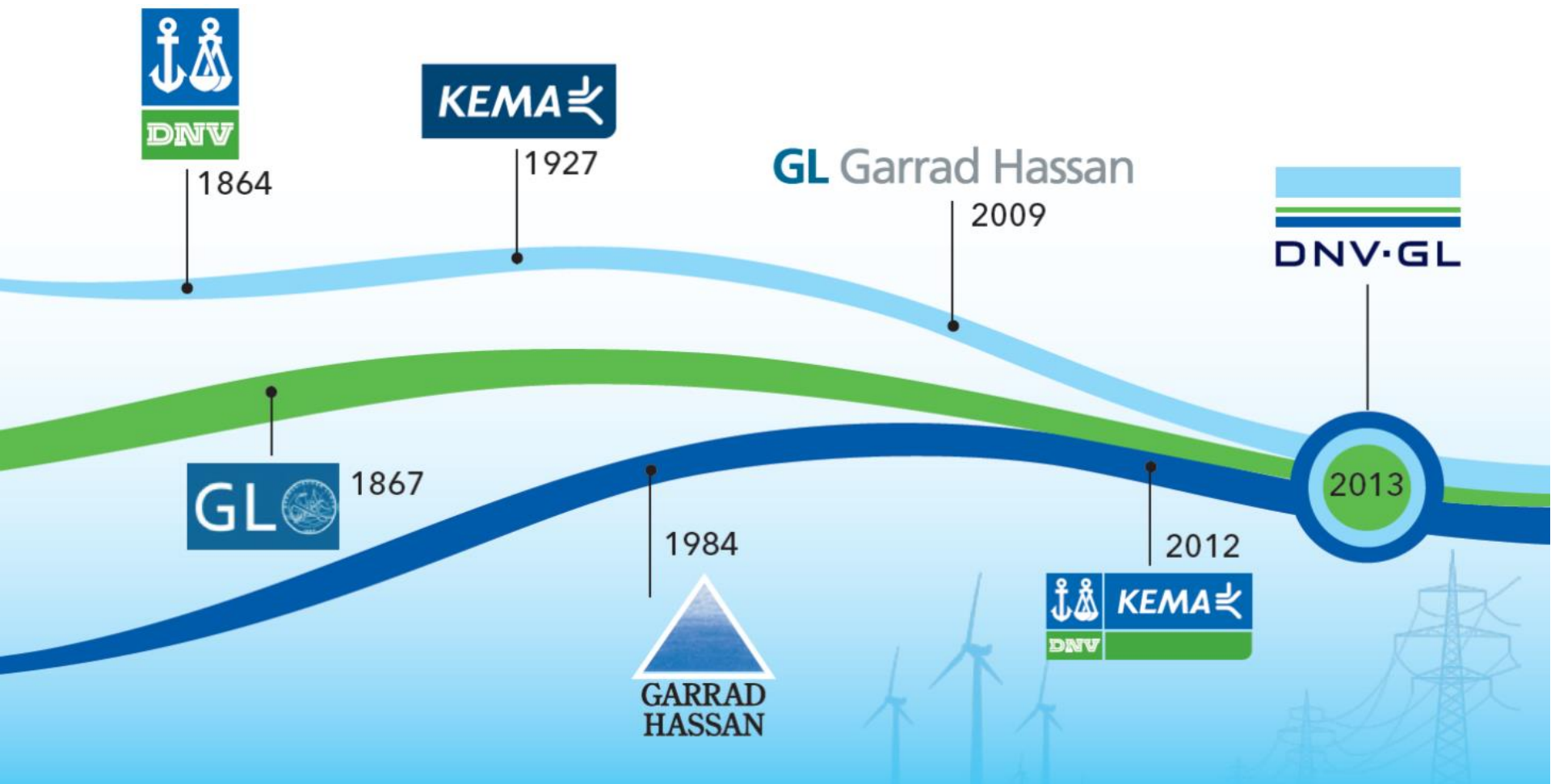
IV CONGRESO **SMART GRIDS**

Madrid 23 Noviembre 2017

“3D: DIGITALIZACIÓN, DESCENTRALIZACIÓN Y DESCARBONIZACIÓN

Santiago Blanco
Director General
DNV GL

DNV GL, +2.300 ENERGY EXPERTS



3D: THE NEW PARADIGM OF THE ENERGY SYSTEM



DECARBONIZED



DECENTRALIZED



DIGITAL



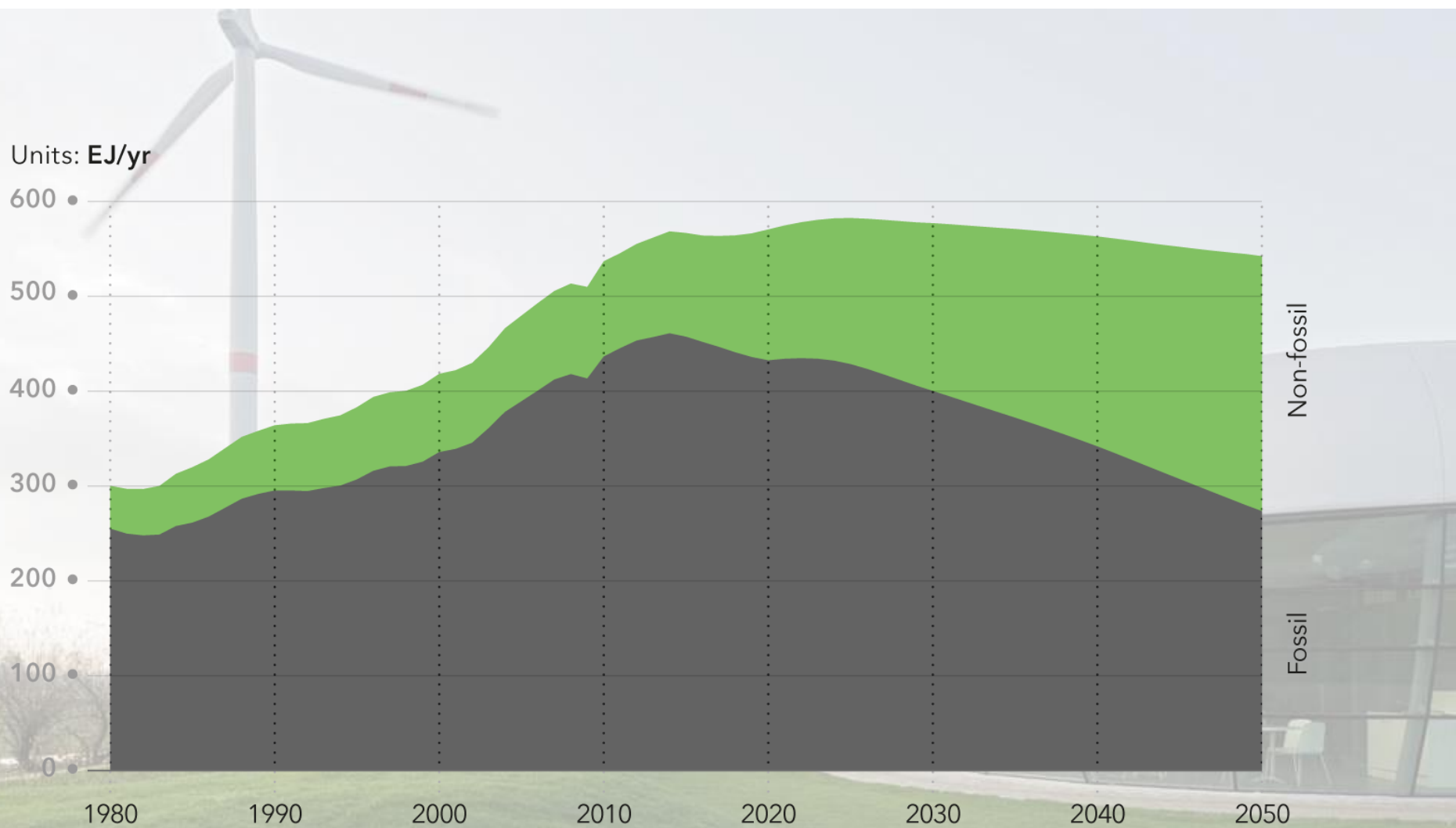
A global and regional forecast of the Energy Transition to 2050

<https://eto.dnvgl.com/2017/>

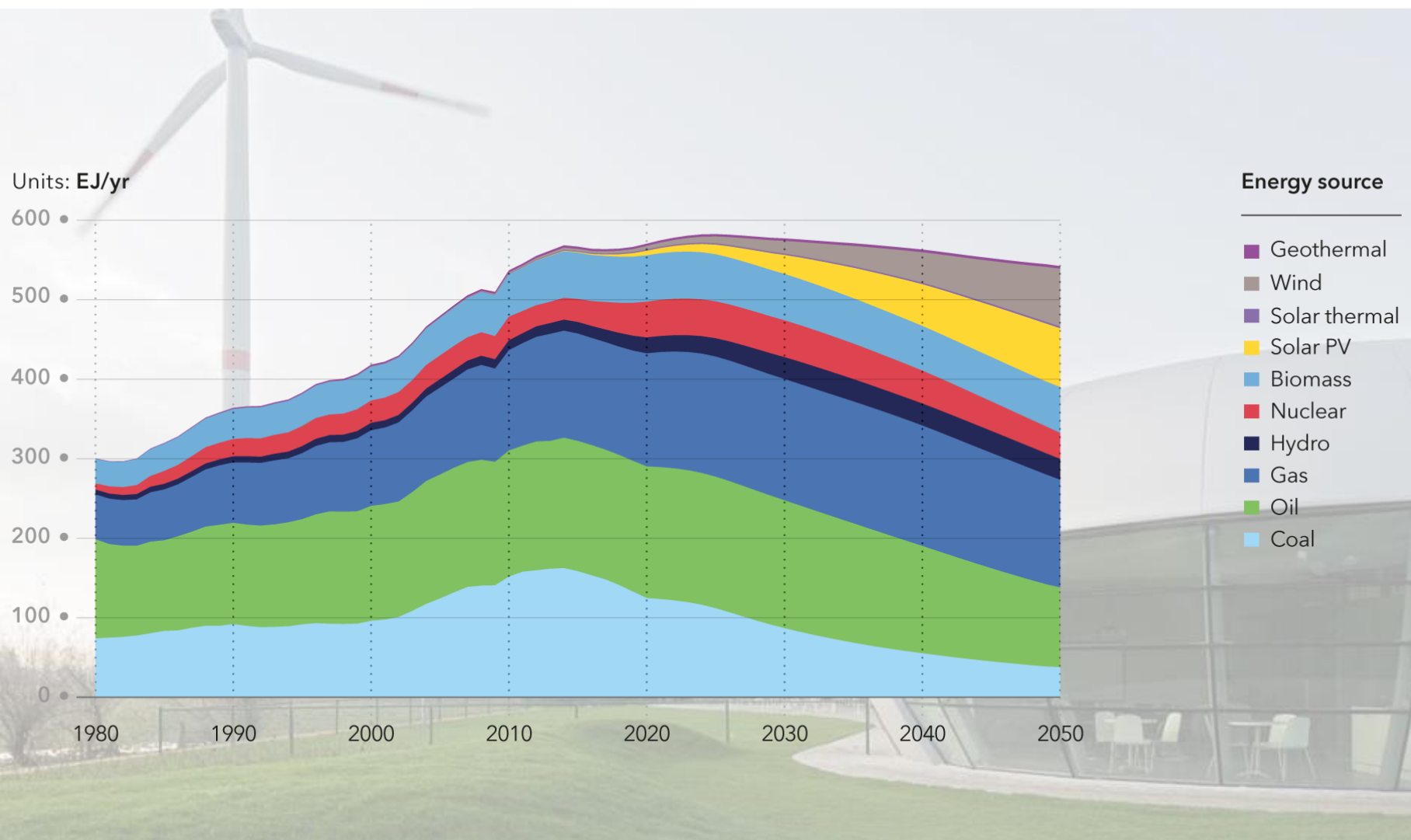


DECARBONIZED

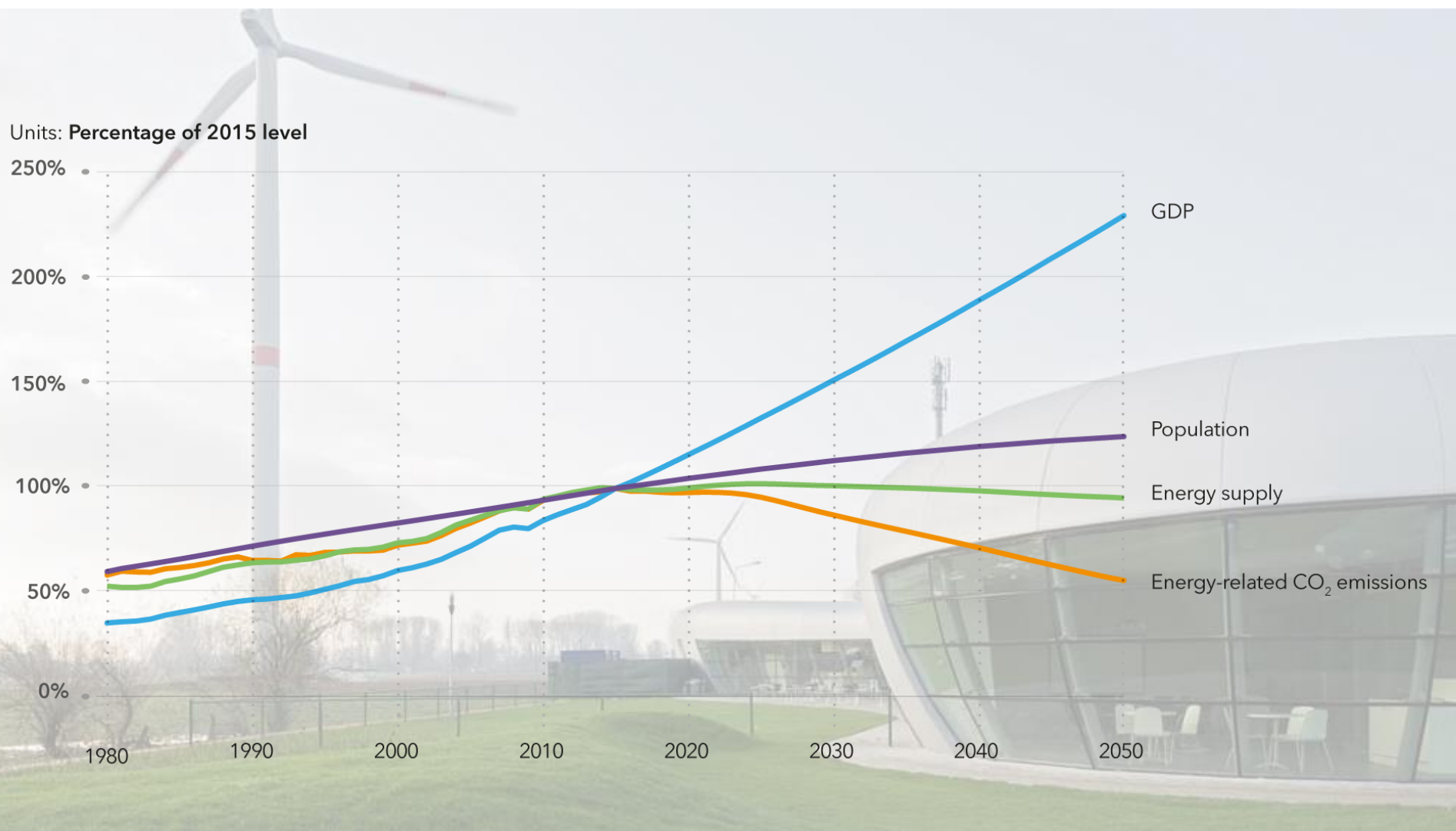
ETO: FORECAST WORLD ENERGY SUPPLY



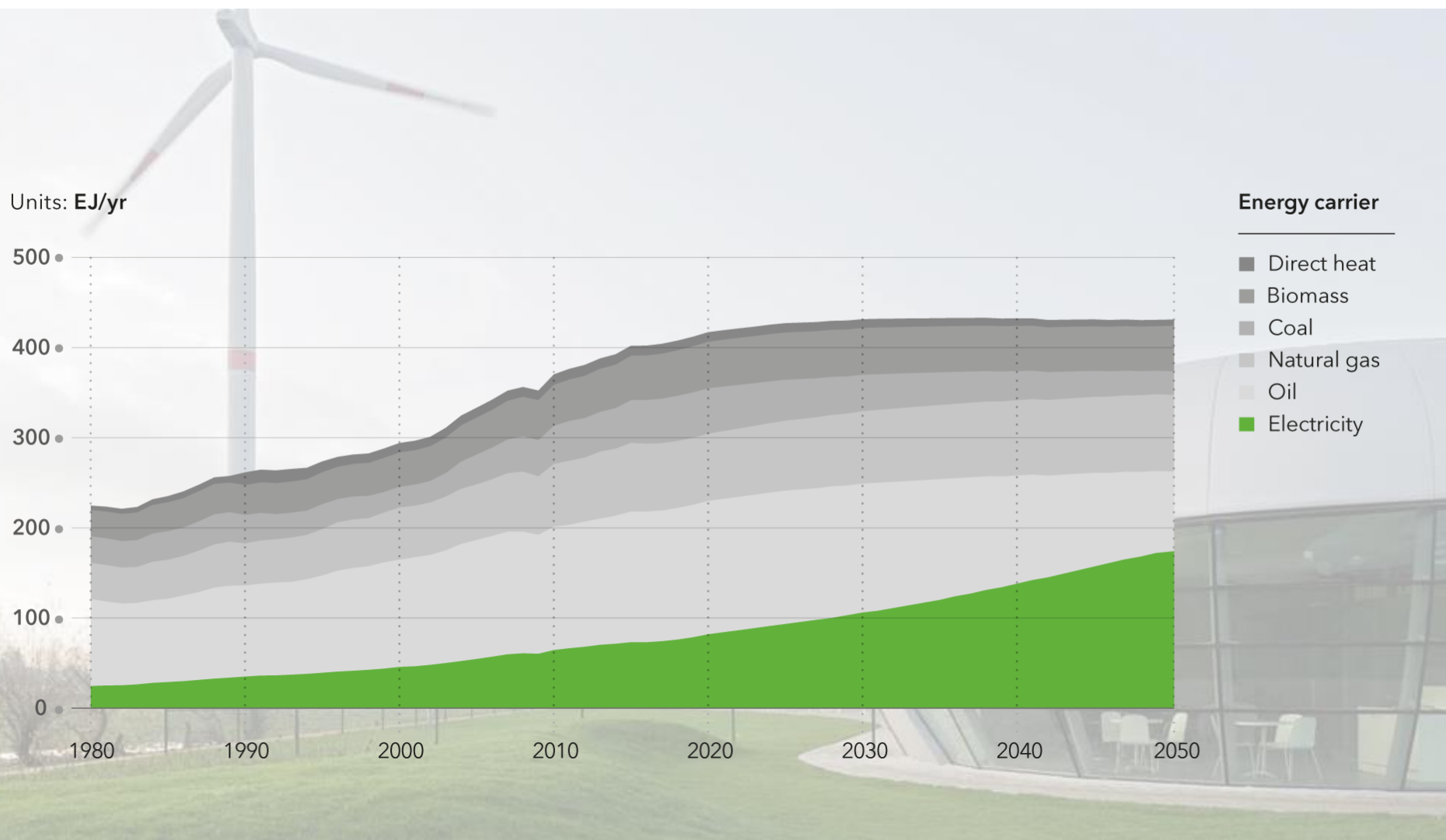
ETO: FORECAST WORLD ENERGY SUPPLY



ETO: ECONOMIC GROWTH VS. ENERGY EFFICIENCY GROWTH



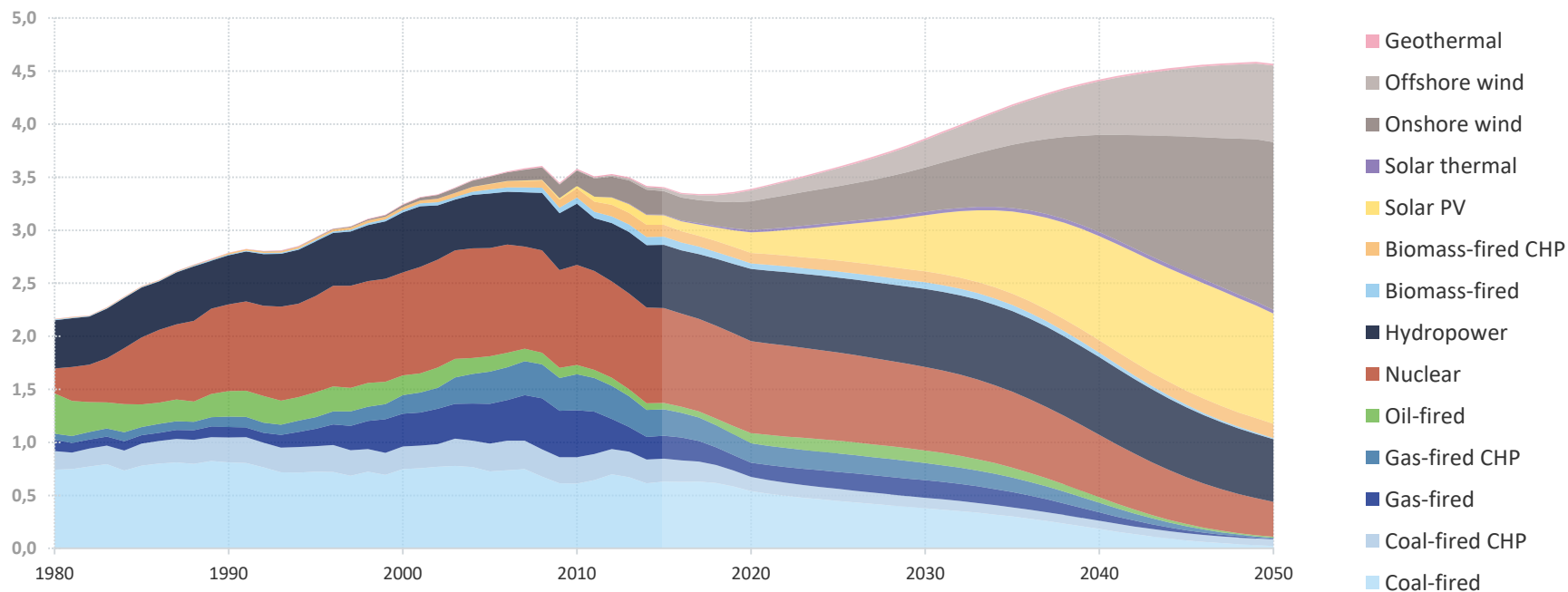
ETO: WORLD FINAL ENERGY DEMAND BY ENERGY CARRIER



ETO: WORLD FINAL ENERGY DEMAND BY ENERGY CARRIER

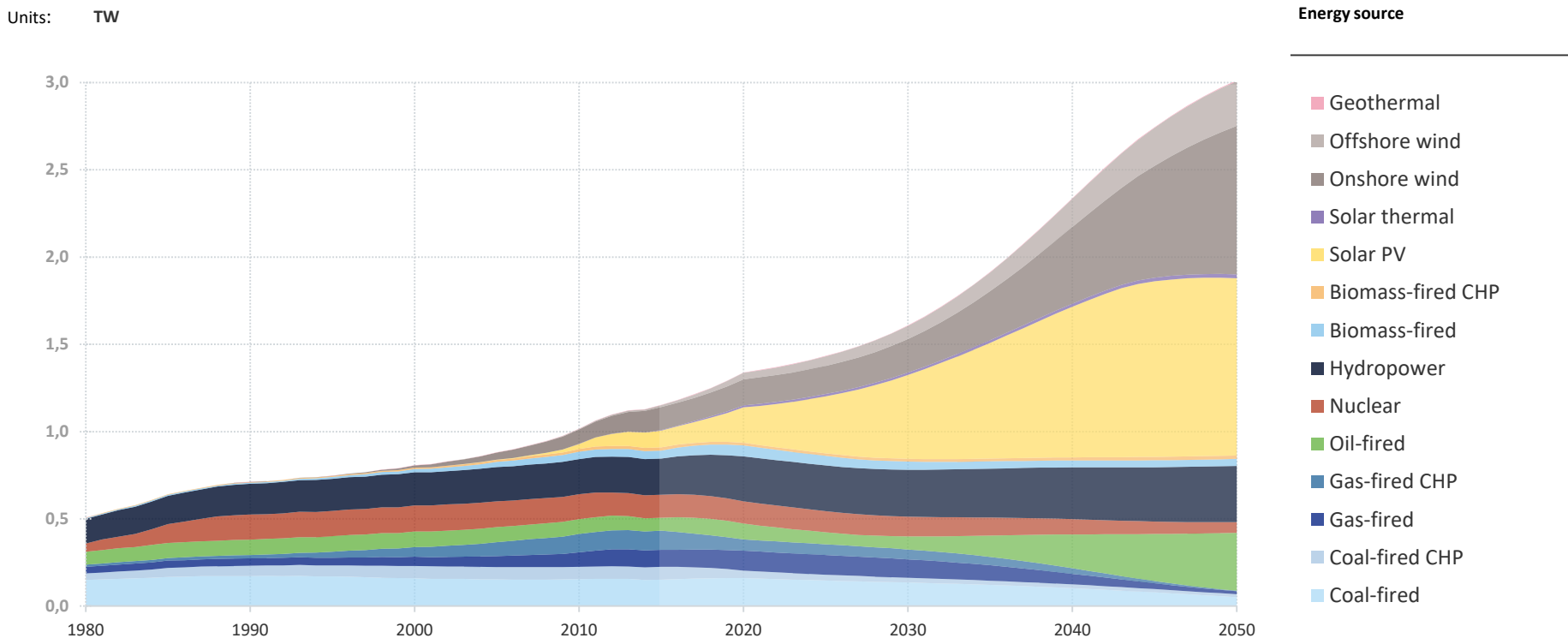
EUR ELECTRICITY GENERATION BY ENERGY SOURCE

Units: PWh/yr



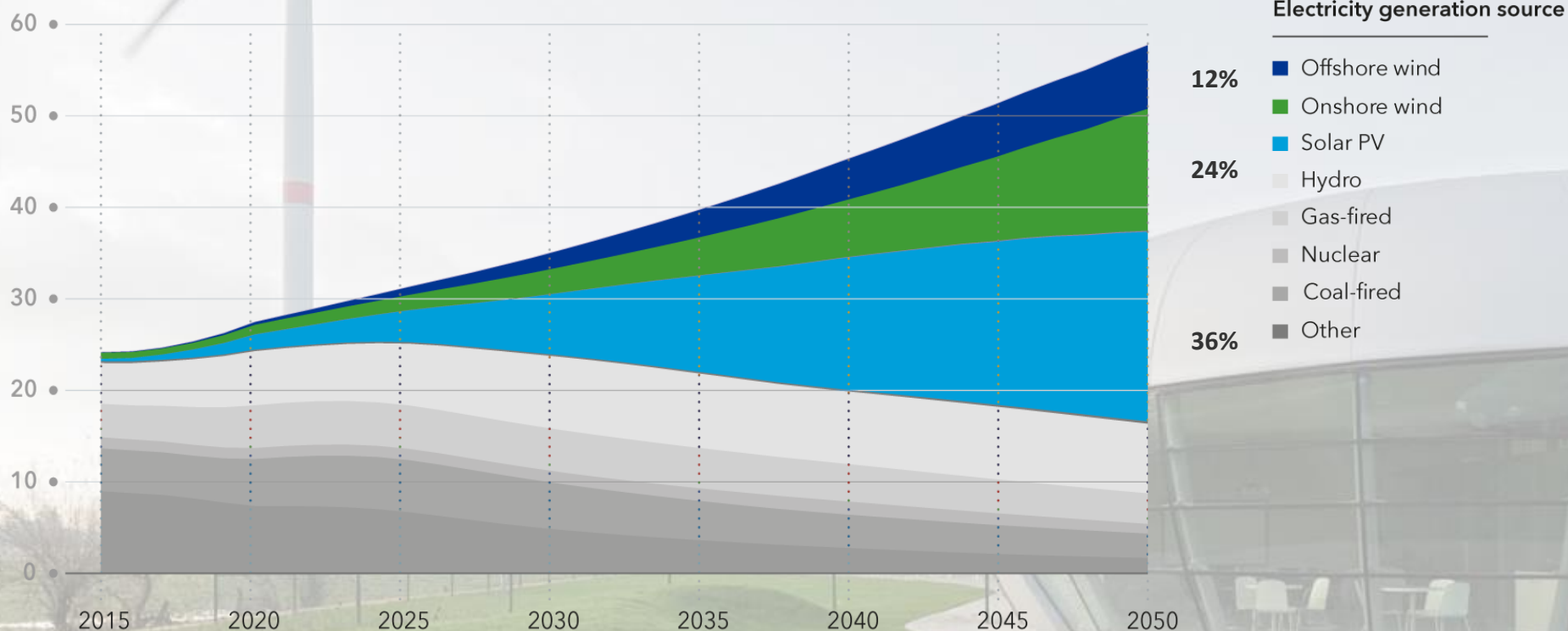
ETO: WORLD FINAL ENERGY DEMAND BY ENERGY CARRIER

EUR ELECTRICITY CAPACITY BY ENERGY SOURCE

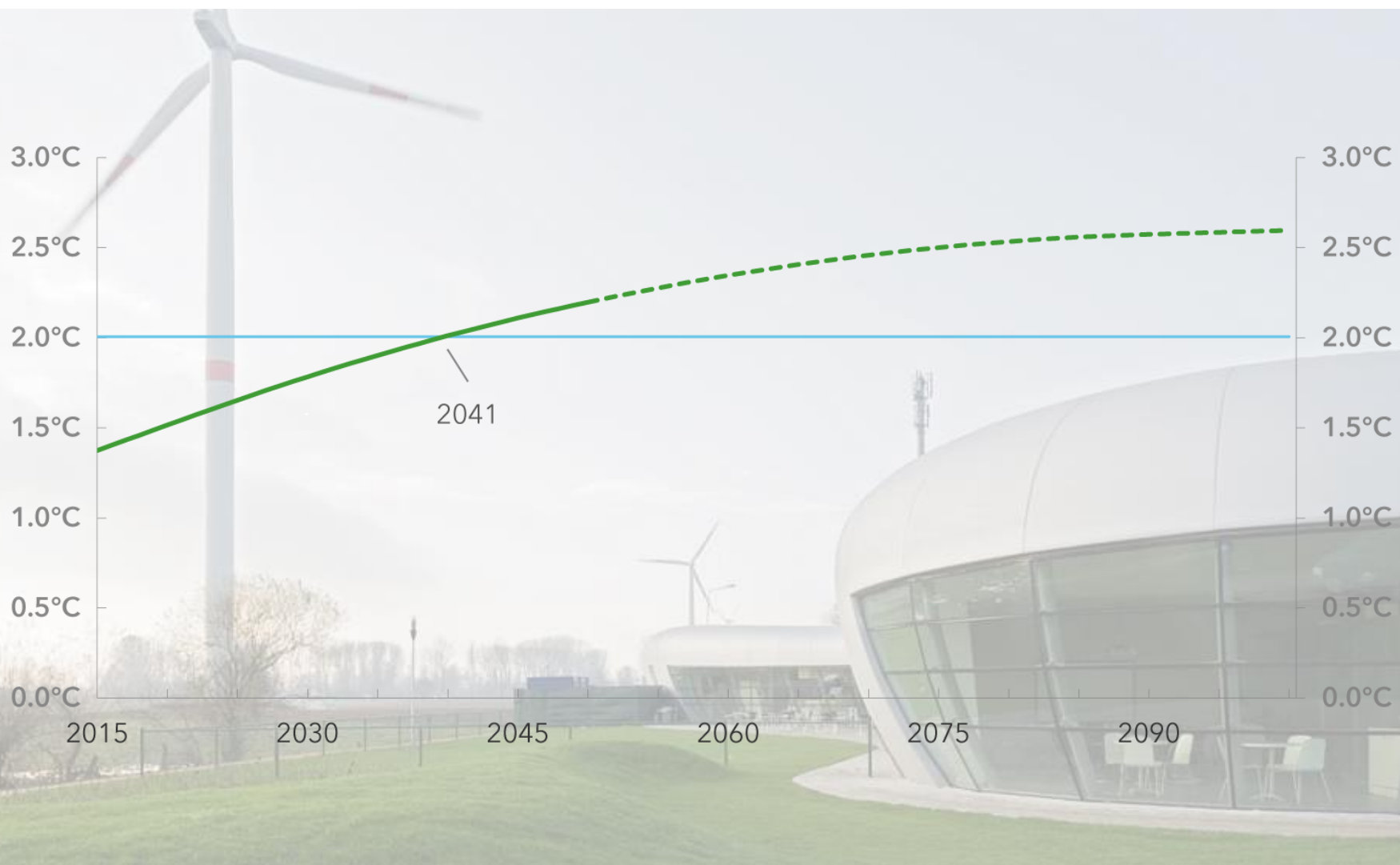


ETO: GROWTH OF SOLAR PV AND WIND BY 2050

Units: PWh/yr

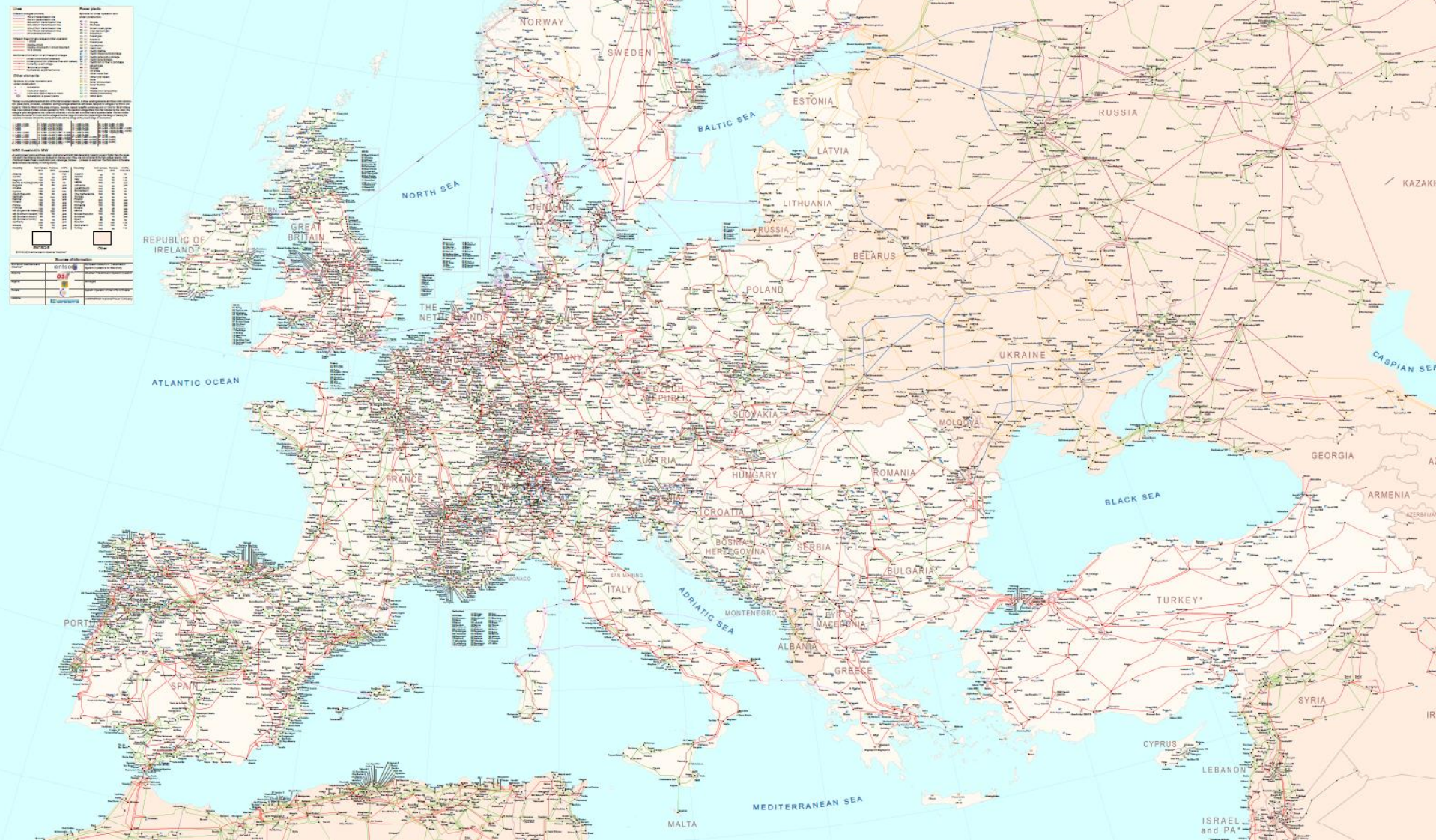


ETO: GLOBAL WARMING AND CARBON BUDGET



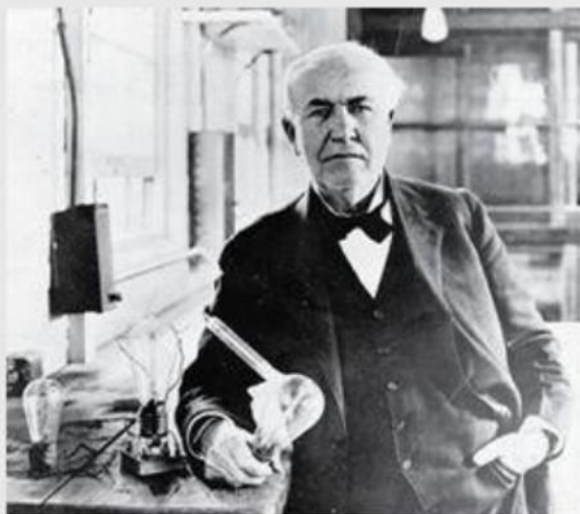
A large, horizontal battery with a metallic blue finish. Inside the battery, a solar panel is visible, reflecting a bright sun. A yellow minus sign is on the left end of the battery, and a yellow plus sign is on the right end. The battery is set against a background of a blue sky with clouds and a reflection on a glossy surface below it.

DECENTRALIZED

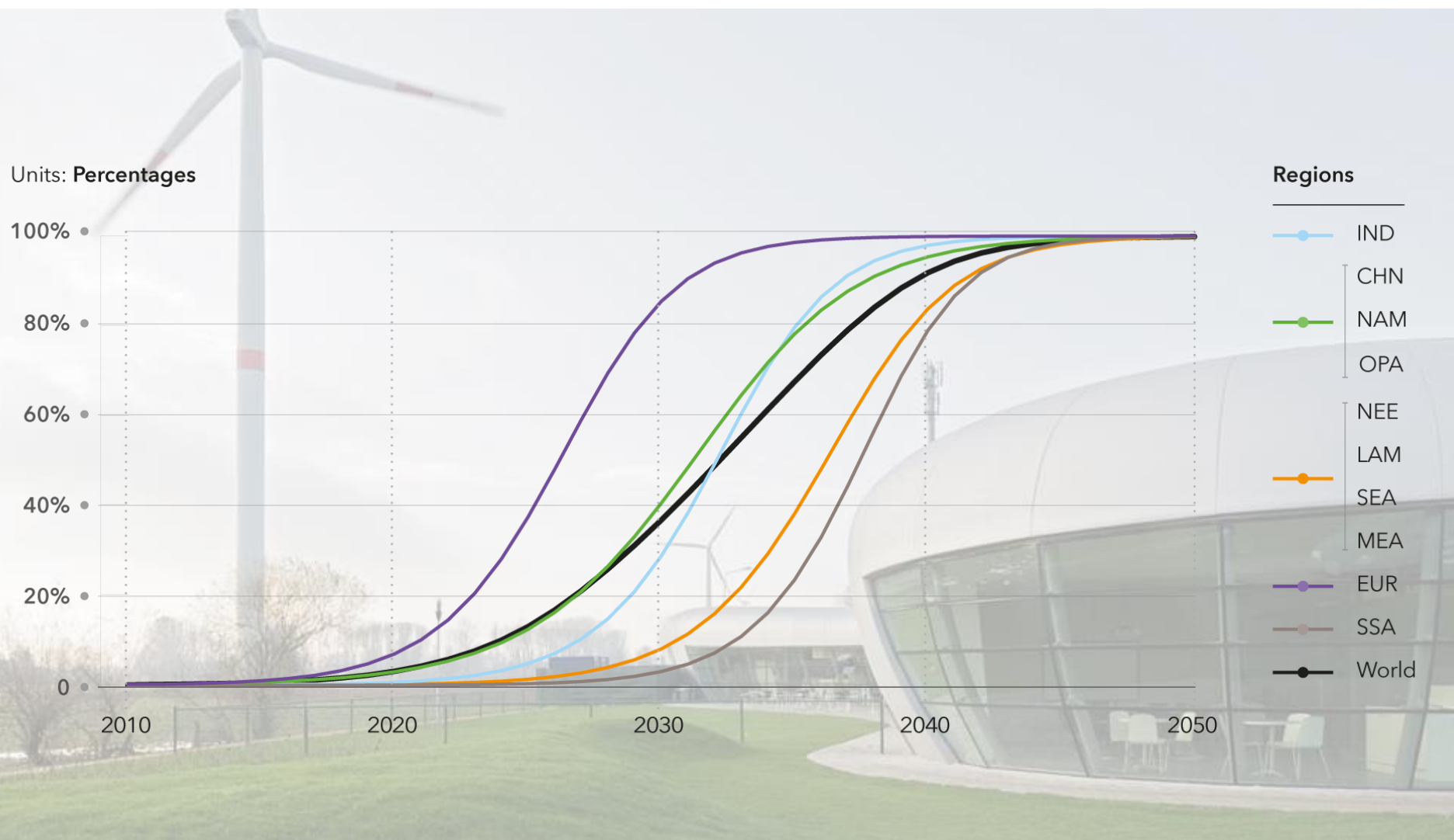


EDISON vs BELL

- If Alexander Graham Bell were somehow transported to the 21st century, he would not begin to recognize the components of modern telephony – cell phones, texting, cell towers, PDAs, etc. –
- Thomas Edison, one of the grid's key early architects, would be **totally familiar with the grid!**

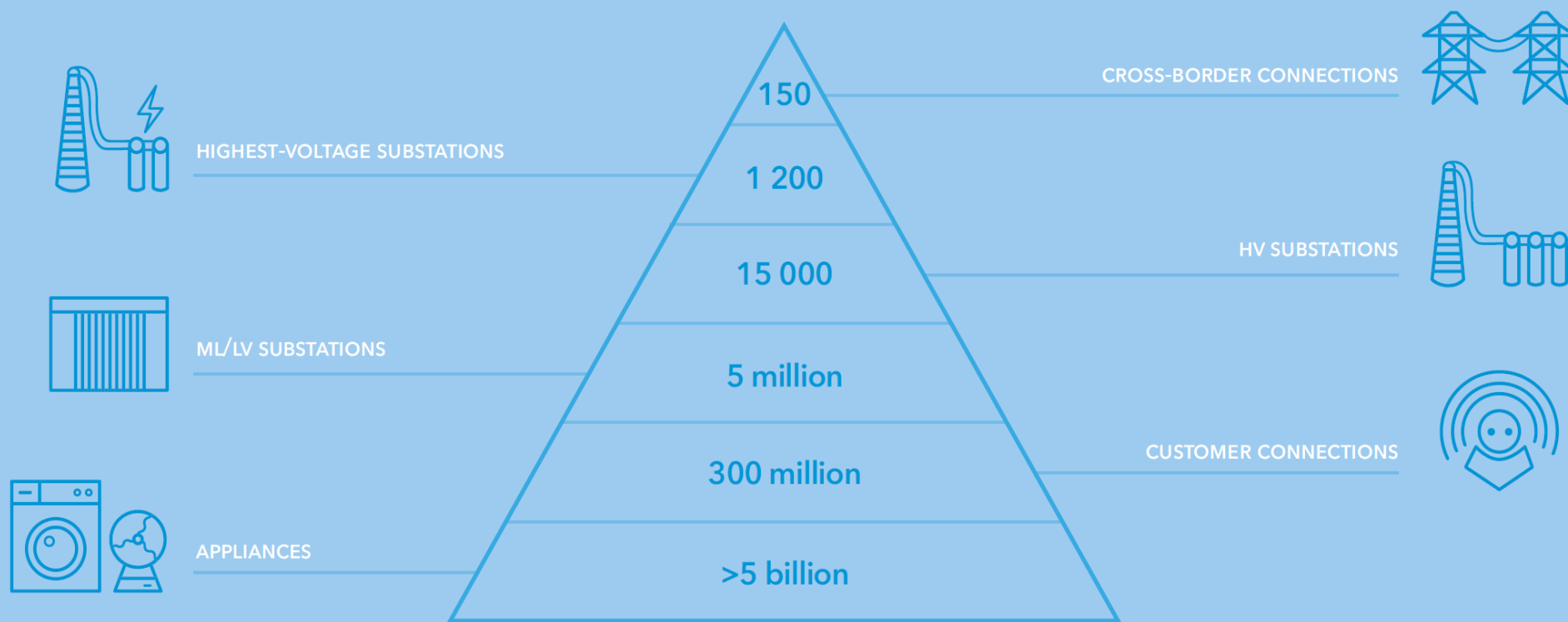


ETO: MARKET SHARE OF ELECTRIC VEHICLES IN NEW SALES



BILLIONS OF NODES INTERACTING

TRANSMISSION AND DISTRIBUTION SYSTEM ELEMENTS IN EUROPE (FIGURE 4-10)



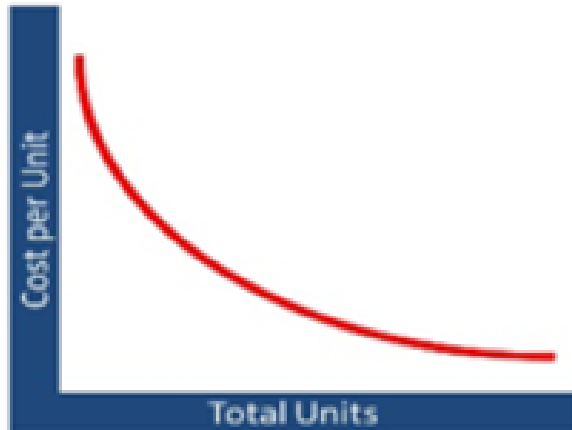
Source: DNV GL

THE CUSTOMER WILL BE THE CENTER

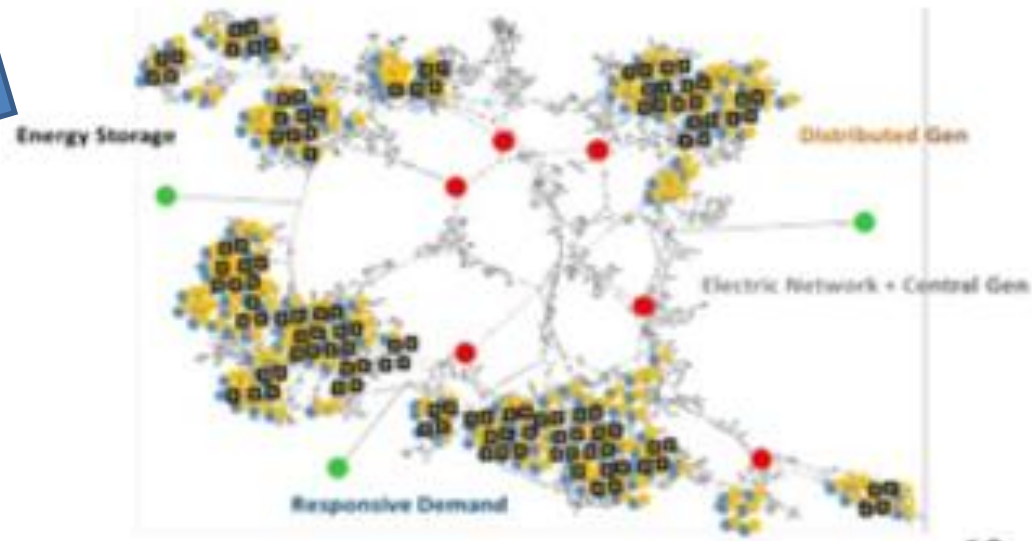


NETWORK DYNAMICS WILL GENERATE COMPETITIVE ADVANTAGES

ECONOMY OF SCALE



NETWORK ECONOMIES



NETWORK DYNAMICS WILL GENERATE COMPETITIVE ADVANTAGES



DISRUPTION IS EVERYWHERE



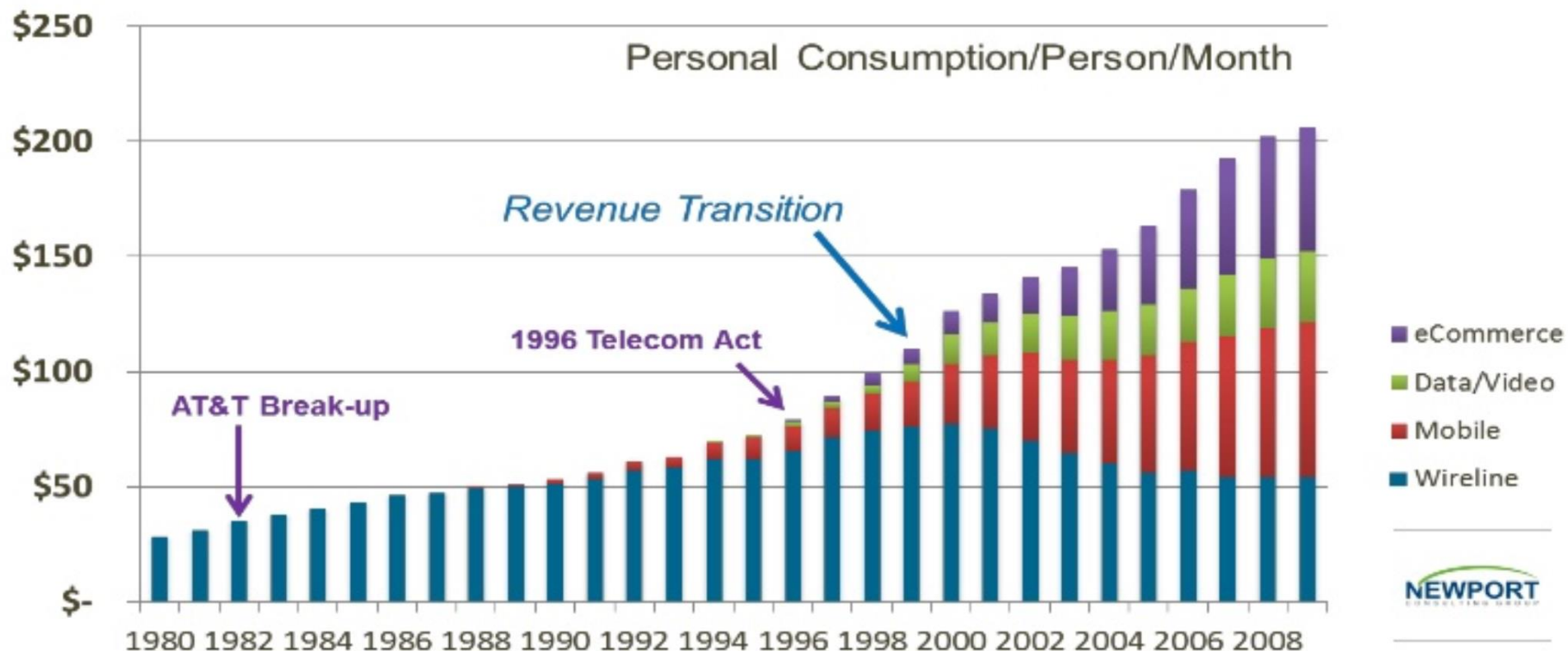
PHYSICAL AND VIRTUAL DISTRIBUTED ENERGY RESOURCES



WE WILL PAY FOR SERVICES, NOT FOR RESOURCES ANYORE



WE WILL PAY FOR SERVICES, NOT FOR RESOURCES ANYORE



Sources: FCC, Industry Analysis and Technology Division Wireline Competition Bureau, Sept. 2010
US Census Bureau Retail eCommerce Revenue data used to estimate per adult monthly spend



DIGITAL

THE RISE OF DIGITALIZATION

TODAY

Devices are generating 277 times as much data as people

30 million new devices are connected every week

Only 25% of companies report having a strategy for digital transformation

THE RISE OF DIGITALIZATION

THE FUTURE

78% of all computing will be done in the cloud (2018)

**40% of all businesses will be disrupted by a digital issue
(2019)**

**Connected systems will each generate 5TB of data per
day (2020)**

There will be 50 billion connected devices (2020)

Source: Cisco

THAT MIGHT CREATE NEW BUSINESS CASES



WINTER PACKAGE: ART. 51 TASKS OF THE EU DSO


- Coordinated operation and planning of transmission and distribution networks;
- Integration of renewable energy resources, distributed generation and other resources embedded in the distribution network such as energy storage;
- Development of demand response;
- Digitalisation of distribution networks including deployment of smart grids and intelligent metering systems;
- Data management, cyber security and data protection;

NEW YORK PSC: DISTRIBUTED SYSTEM PLATFORMS

“Distributed energy resources will become integral tools in the planning, management, and operation of the electric system. The system values of distributed resources will be monetized in a market, placing DERs on a competitive par with centralized options.”

“New York’s utilities have a new role: to develop and operate the platform needed to empower customers and enable distributed energy markets or distributed system platforms (DSPs)”

**Reforming the Energy Vision (REV), First Major Order,
New York Public Service Commission (PSC), 25-2-2015**



*“IF YOU ARE NOT PART OF THE
SOLUTION,
YOU ARE PART OF THE
PROBLEM”*

African Proverb



III CONGRESO **SMART GRIDS** Madrid 18-19 Octubre 2016

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