

Water & Energy in Europe



United Nations
Educational, Scientific and
Cultural Organization

• UNEVOC

• International Centre
• for Technical and Vocational
• Education and Training

Jens Liebe
Senior Programme Expert
UNESCO-UNEVOC
International Centre

Energy



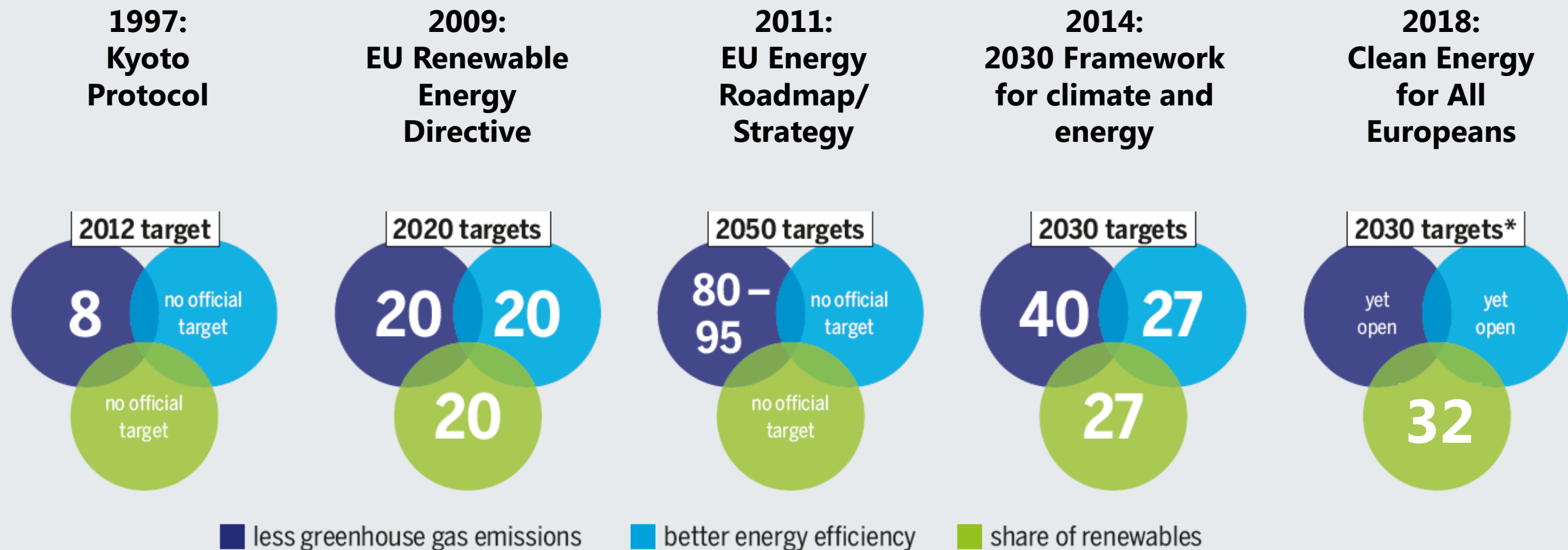
Main trends in Europe

Decarbonization & Climate Goals, **Increase of renewables**

- Renewables overtook nuclear: No. 1 power source since 2014
- Almost 90% of new power in Europe in 2016 from renewable sources
- Wind, solar & biomass overtook coal as the EU's second largest form of power capacity in 2017



Some European Energy Policies



Targets compared to 1990 levels. All data recalculated for EU28 *Clean energy package targets projected by the European Commission's REmap analysis, February 2018



Status of water resources

- On average **relatively abundant, availability differs**
- Demand projected to increase by up to 16% by 2030
- Effects of climate change will affect water supply
- Use efficiency and pollution are a concern

Some European Water Policies

EU Water Framework Directive

- integrated and coordinated “systems” approach to water management based on the concept of river basin planning
- **main objective: all waters to reach good or high ecological status**
- No prescriptive targets (except for no deterioration)
- *River basin management plans*

EU Drinking Water Directive

- **Ensure safe drinking water for all**
- better deal with risks to water supply, engage with polluters
- reduce water losses & energy consumption
- *Water Safety Plans (WHO standards)*

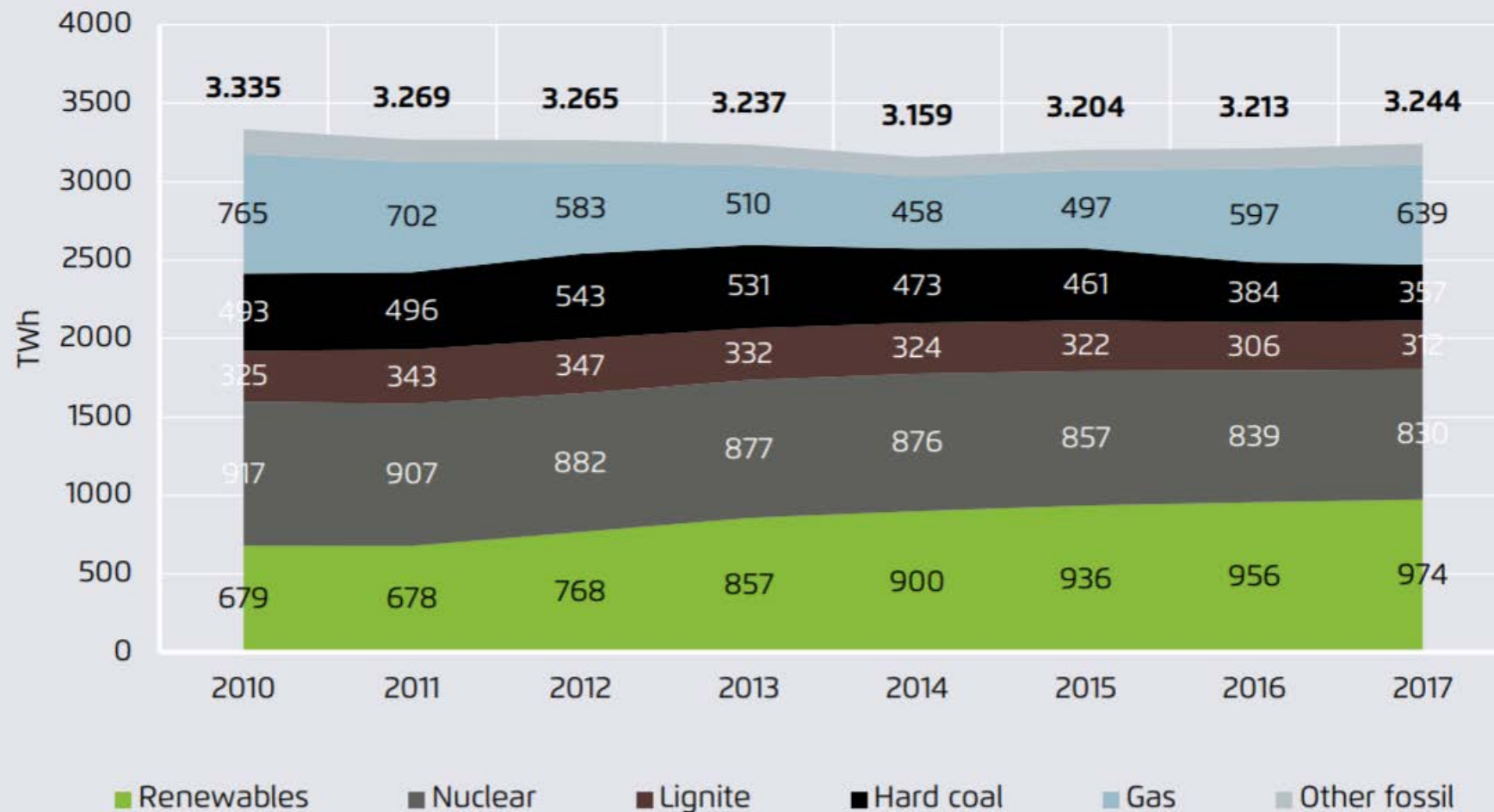
Nitrates Directive

- Reduce nitrate pollution

Nexus Example: Energy transition

EU electricity generation, by fuel type

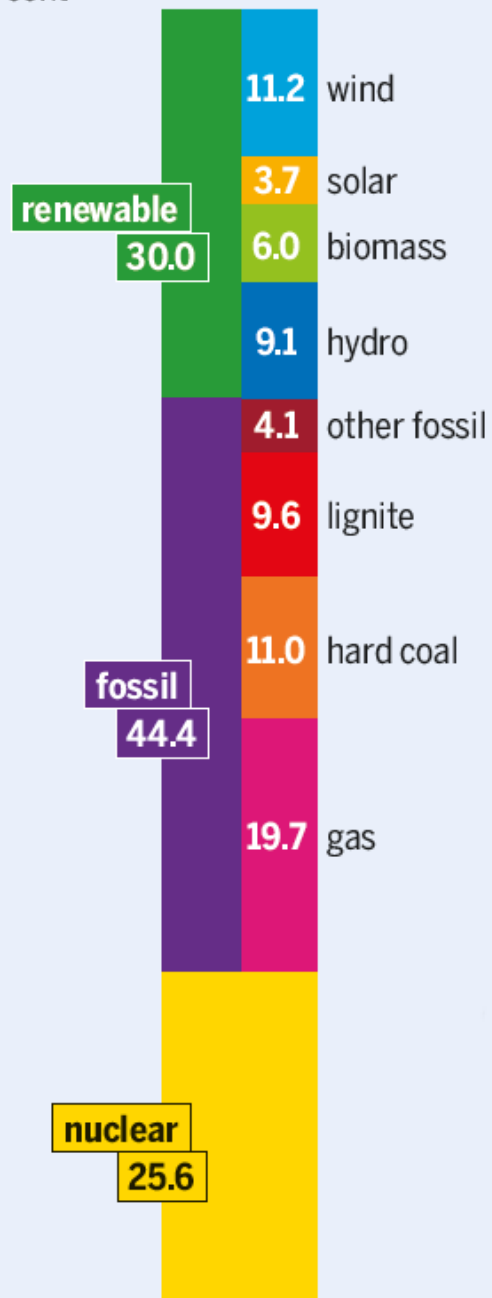
Figure 2



EUROSTAT data to 2015, 2016 and 2017 are own calculations

(Source: [EU power sector in 2017](#))

EU electricity generation mix, 2017, percent



Water consumption of energy production

Europe-wide

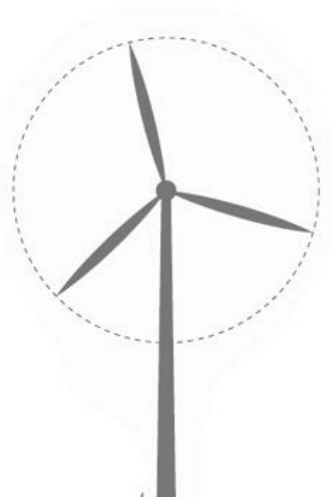
44% of water use: conventional power production (fossil, nuclear) for cooling

24% agriculture

21% households

11% industry

(Source: [EU 2017](#))

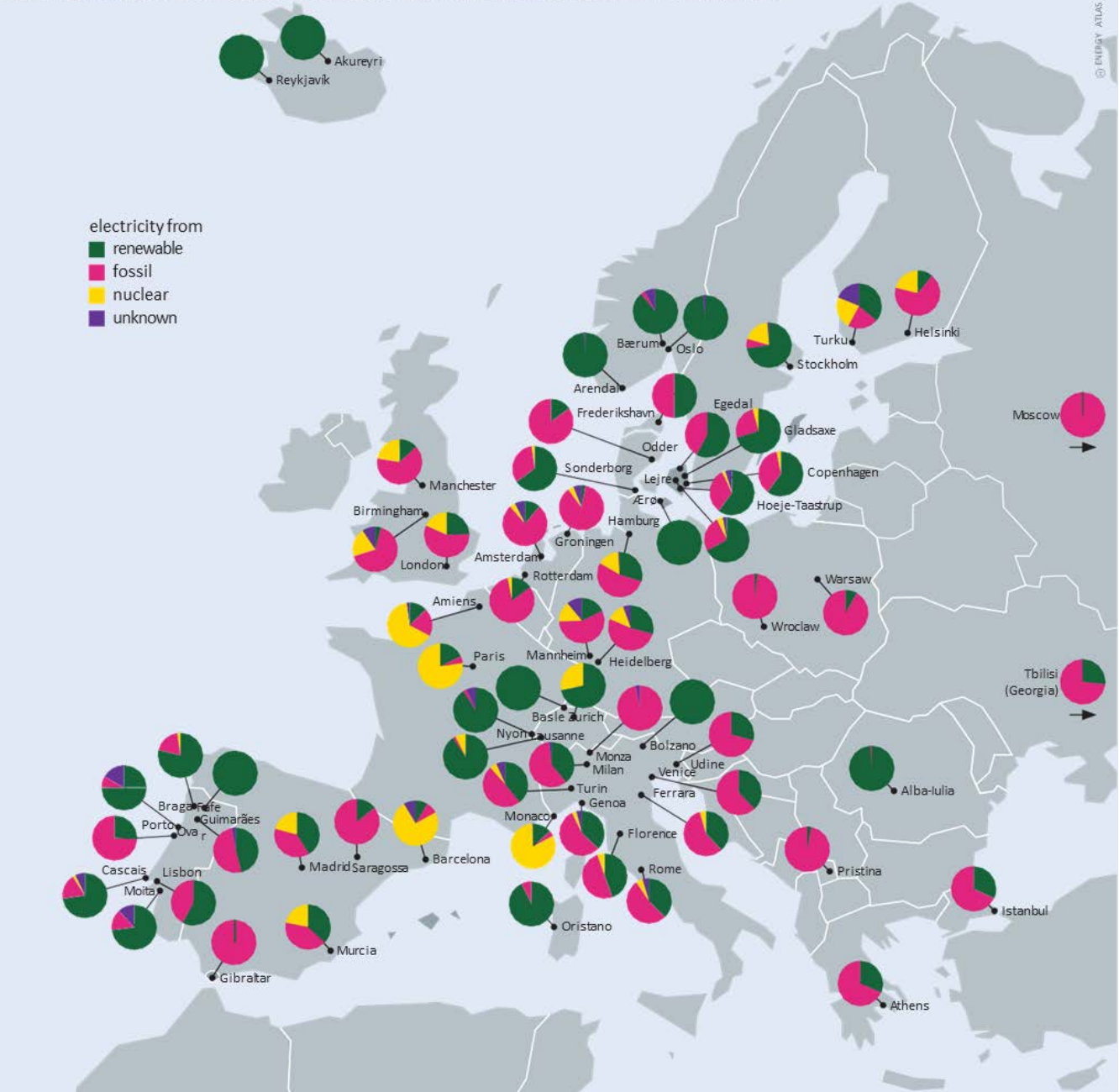


Windpower consumes barely any water.

Water saving of European wind turbines built so far equates to water use of 22 million European household.

(Source: [Windkraft Journal](#))

THE RACE FOR RENEWABLES – SOME HAVE FINISHED, OTHERS STILL HAVE TO START
City-wide power consumption by generation source, all reporting European cities as from 2015–2017, shares



Renewables growth is uneven

In 2017:

- Wind +19%** (2/3 in Germany and UK)
- Solar +8%**
- Biomass +3%**
- Hydro -16%**

Western Europe is phasing out coal, but Eastern Europe is sticking to it

Hydro potential is largely tapped (capacity for hydroelectric production increased by 44 % between 1990 and 2014)

Overall energy consumption still rising slightly (0.7%): Increasing efficiency compensated by more use

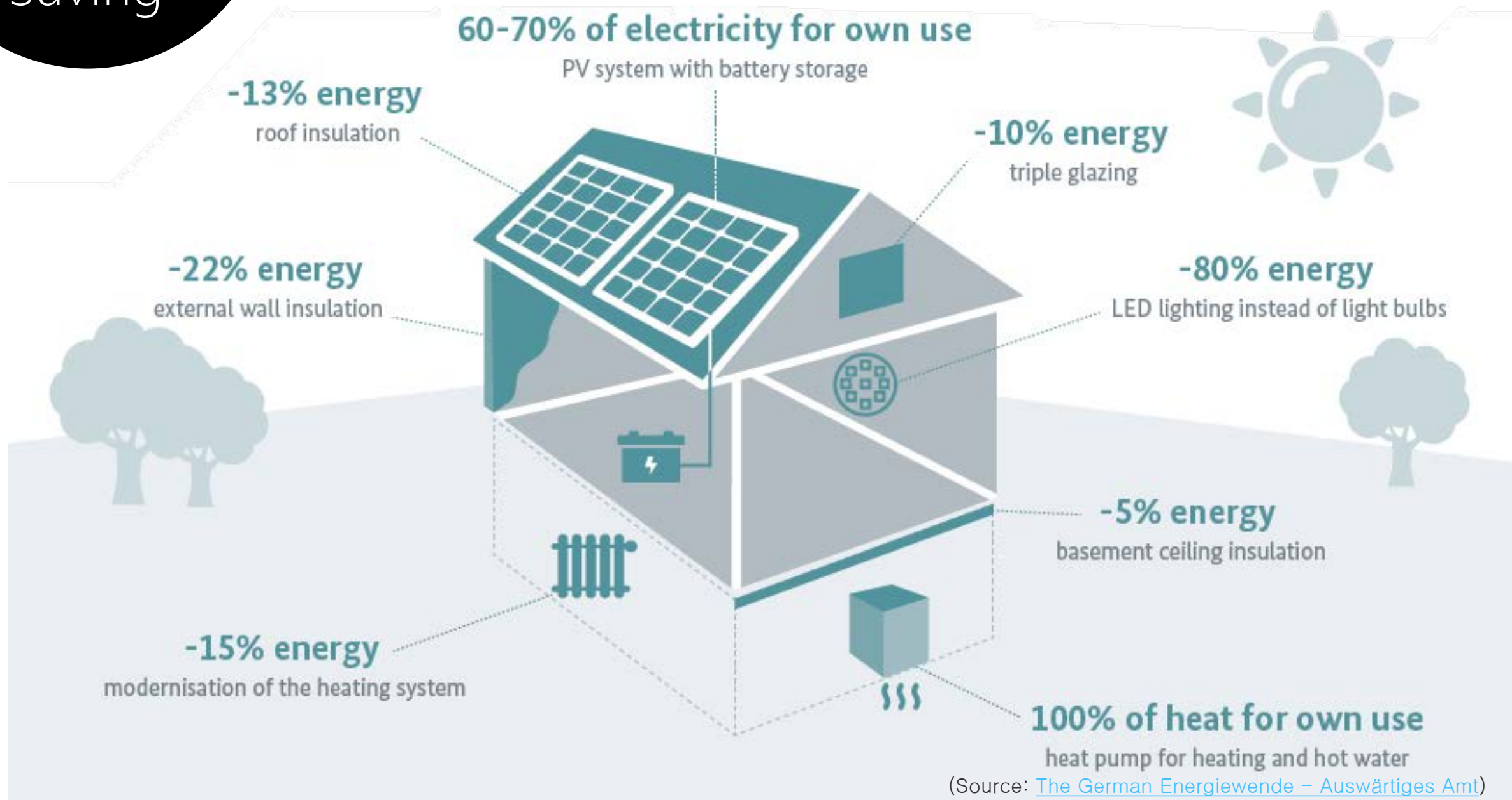
CO₂ emissions in the power sector stable, but rose economy-wide

(Source: [Energy Atlas 2018](#))

(Source: [The European Power Sector in 2017](#))

Energy Saving

Energy production is only one part of the equation...



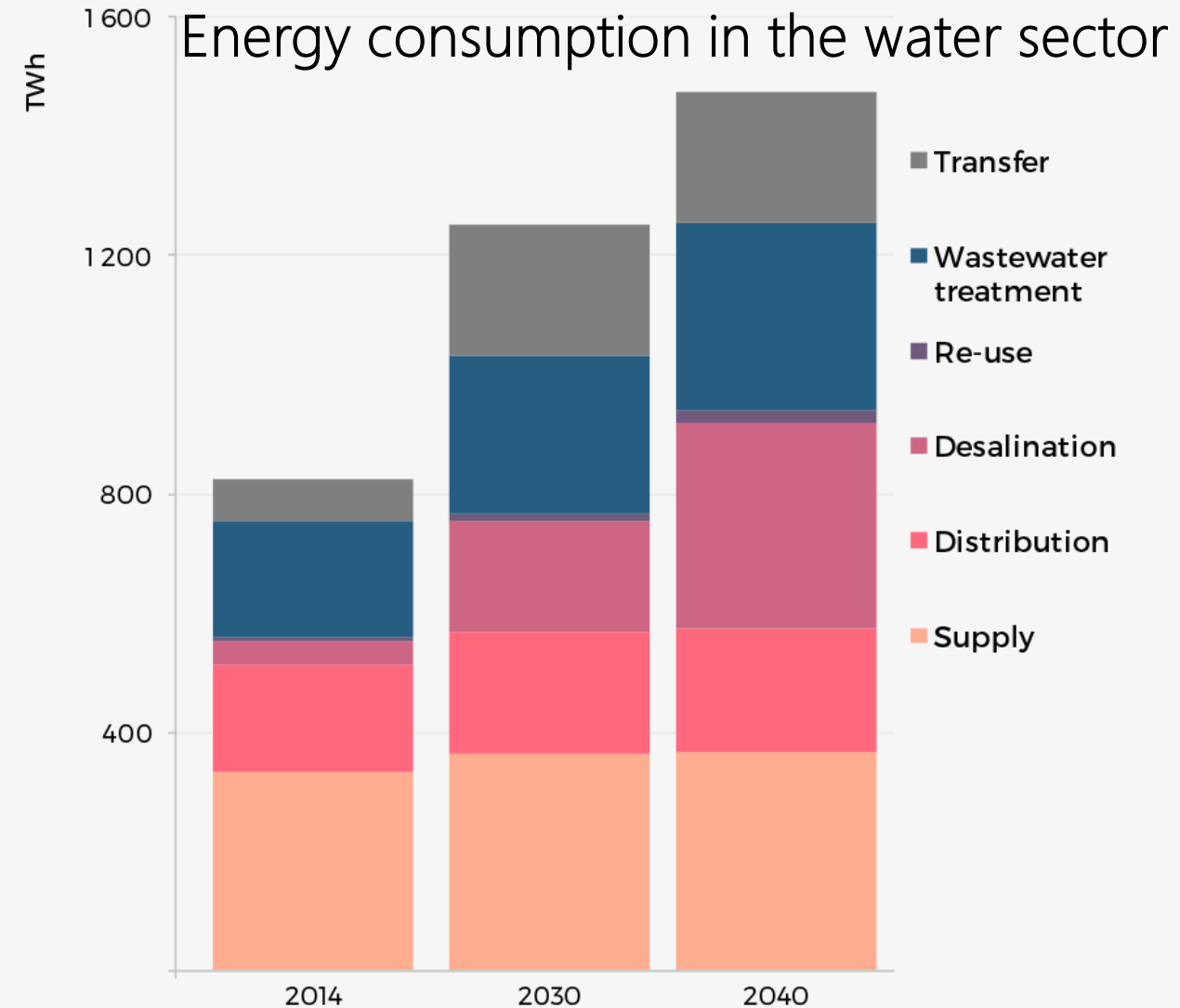
Nexus example:

6 CLEAN WATER
AND SANITATION



Drinking Water Loss Reduction

Leakage rates in water supply:
7% to 50% or more



(Source: World Energy Outlook 2016, [IEA](#), modified)

Nexus Example: Drinking Water Loss Reduction

Non-Revenue Water

Country	Year	Value
Belgium	2015	21%
Denmark	2015	7%
Bulgaria	2016	61%
Poland	2015	17%
Ethiopia	2016	29%
Ghana	2009	52%
Kenya	2017	41%
South Africa	2017	34%

(Source: [IBNET](#))

Four principal methods

- Pressure management
- Active leak control
- Speed and quality of repairs
- Infrastructure management

Example Germany

Since 1990, water and wastewater utilities have invested more than €110 billion in infrastructure.

530,000 km water supply network

540,000km sewage network

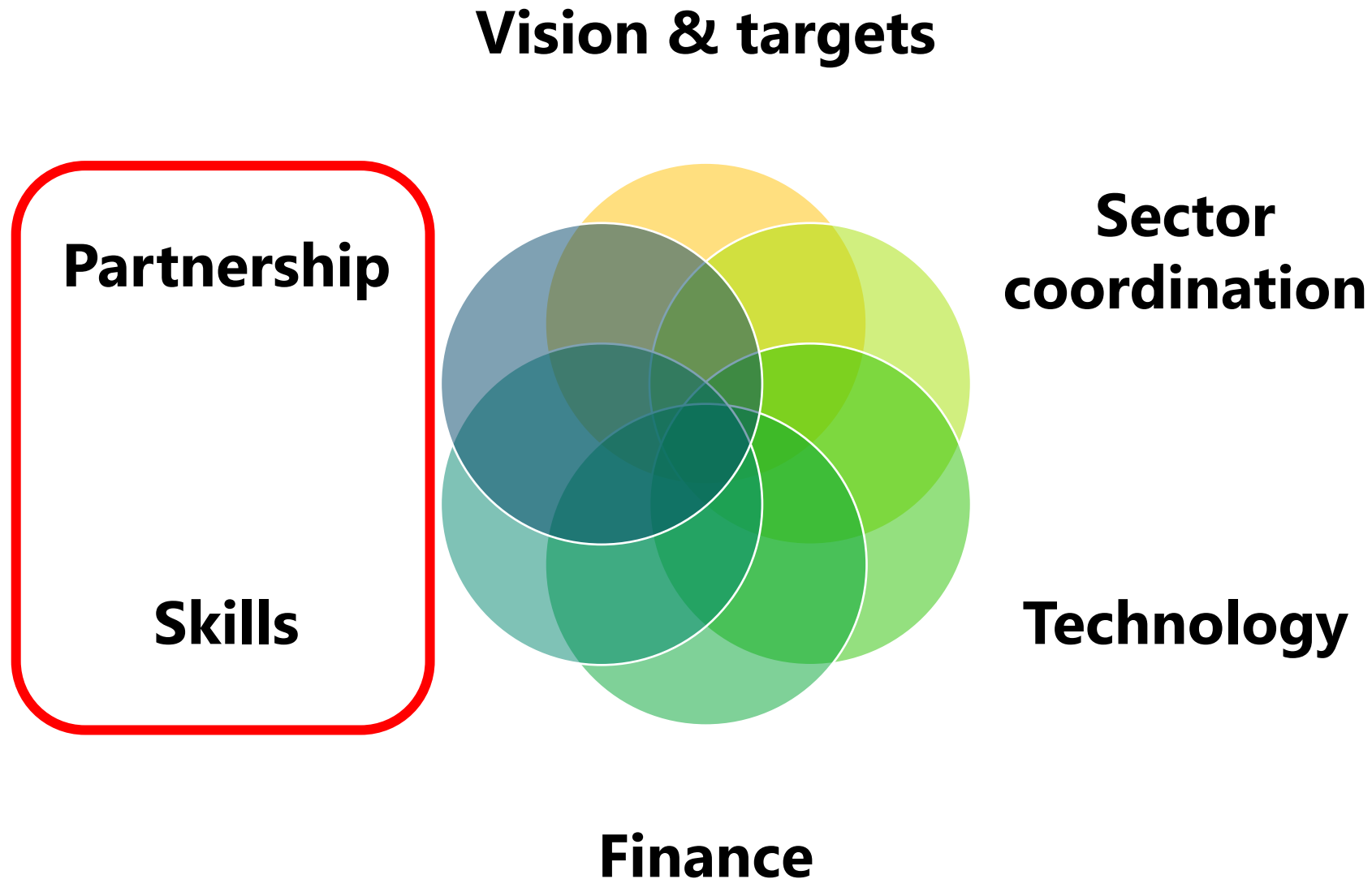
close to 10,000 water treatment plants

Water loss in supply networks currently stand at approximately 6.5% - among the lowest in Europe.

Internationally

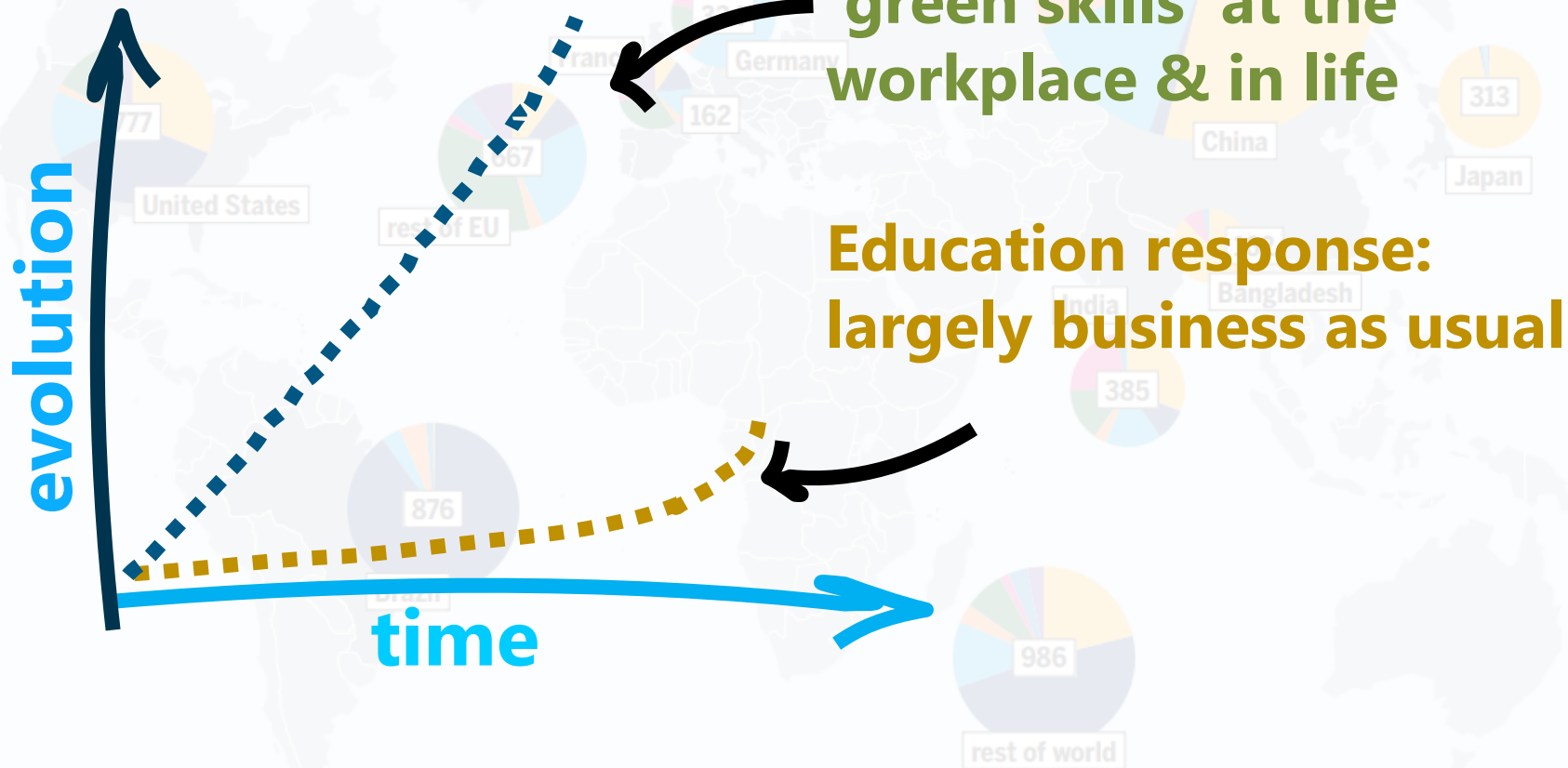
Strong support through national and international water agencies, development banks, partnerships

Crucial needs in addressing water & energy related sustainable development





solar photovoltaic
liquid biofuels
wind power
solar heating/cooling
solid biomass
biogas
hydropower
geothermal



Jobs & Skills

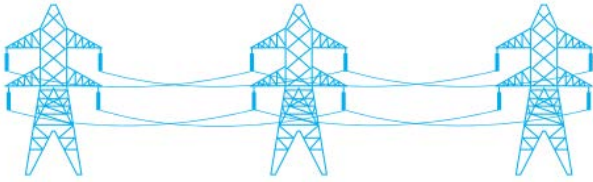
Renewables have created 8.3 million jobs worldwide so far, and more than **1.1 million in the EU**

Water services sector is a significant provider of employment in the EU:

- 9,000 small- and medium-sized enterprises (SME)
- **600,000 direct jobs in water utilities alone**
(EC, 2012)

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Massive investments require new skills



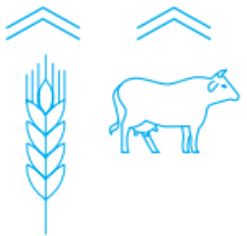
In 2016, over **160 GW of renewables capacity** was built around the world accounting for **\$280 billion investment, double what fossil fuels received.**



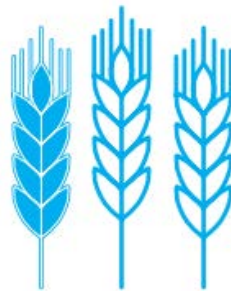
Annual investment in energy storage in emerging markets was 2.5 billion in 2016 and is expected to reach **\$23 billion** in 2025.



Green buildings investment was **\$388 billion** in 2015, and green buildings are at least a 3.4 trillion opportunity through 2025.



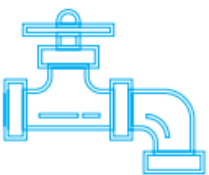
Food demand is expected to increase **20%** over the next 15 years, driven by the developing world. This will require increasing food production **70%.**



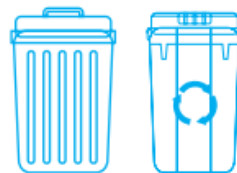
Over **one third** of all food that is grown is wasted.



The next decade will see **trillions** invested in road, rail, port and airport infrastructure; the Asia-Pacific region alone presents an **\$8 trillion** investment opportunity.



Investment in urban water infrastructure could exceed **\$13 trillion to 2030.**



Waste recovery and recycling markets were around **\$265 billion** in global revenue in 2016.

Network cooperation

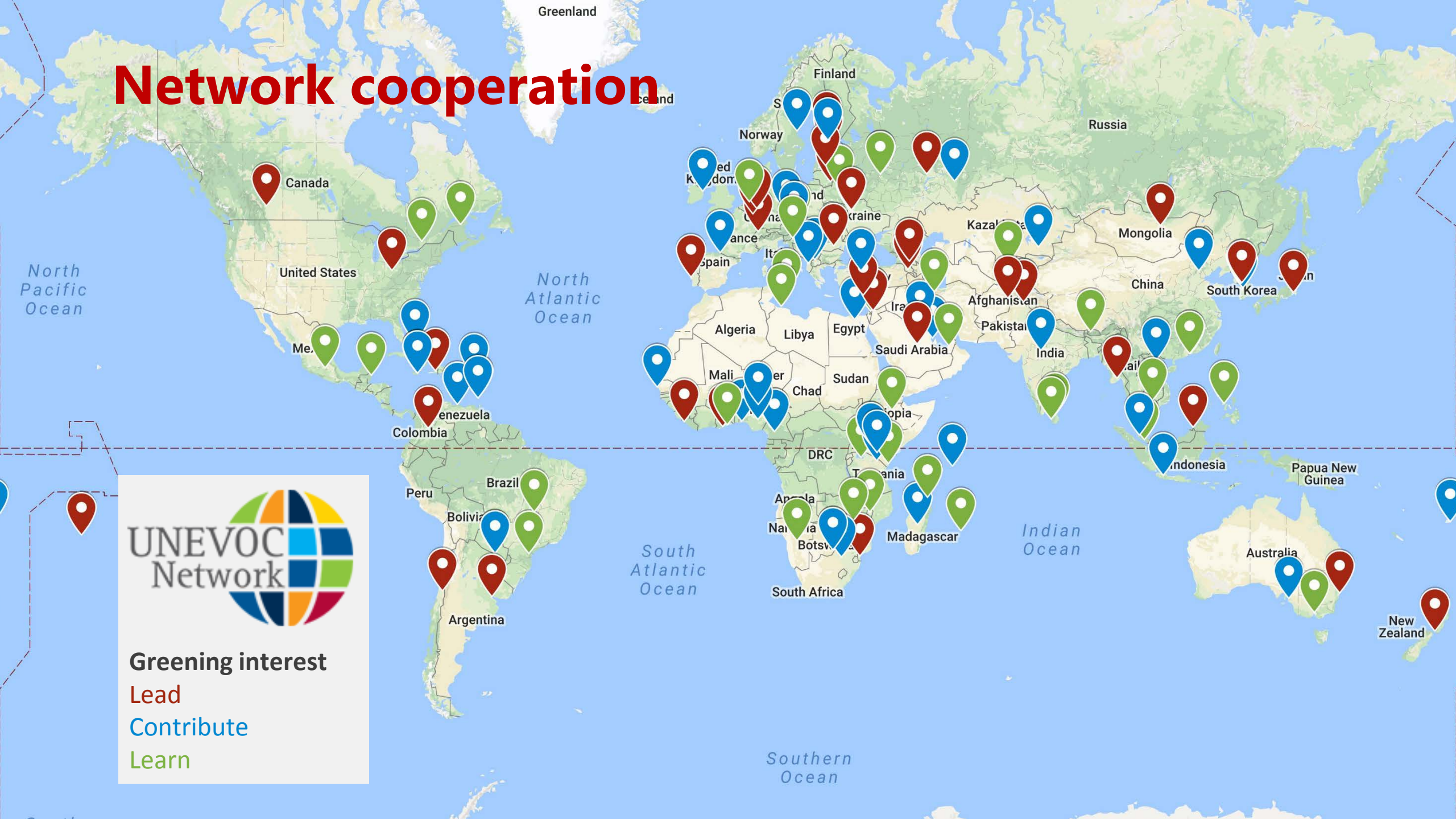


Greening interest

Lead

Contribute

Learn



Greening Technical and Vocational

Education and Training

A practical guide for institutions

www.unevoc.unesco.org/greening

Greening TVET: A Practical Guide for institutions in implementing ESD

An **incremental and systematic process** of supporting education and training systems towards greening societies and economies in an **ecologically-sound, participatory and sustainable** manner.

Five major approaches to apply sustainability in TVET institutions



Greening the Campus

Managing campus to reduce the carbon footprint of the campus by deploying proper resources and sustainable principle.



Greening the Curriculum and Training

Integrating “sustainability” in the curriculum and training both emerging and existing



Greening Research

Applying sustainability in research philosophies, content, ethos and standards.



Greening the institutional culture

Promoting green values and attitudes in all aspects of the institution culture.



Greening the workplace and community

Engaging enterprises and the wider community

Key messages

- *Renewable energy, increasing efficiency, reducing losses:*
Develop a vision with clear targets for sustainable water and energy development & communicate it well
- **Sustainable development comes from within! Develop skills and education along with technology**
- **Engage in partnerships & collaborations to learn and share**