



Panel: Climate Change

Transforming Climate and Energy

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1 The threat is here and now!

Oceans are warming at the same rate as if **five** Hiroshima bombs were dropped in every second



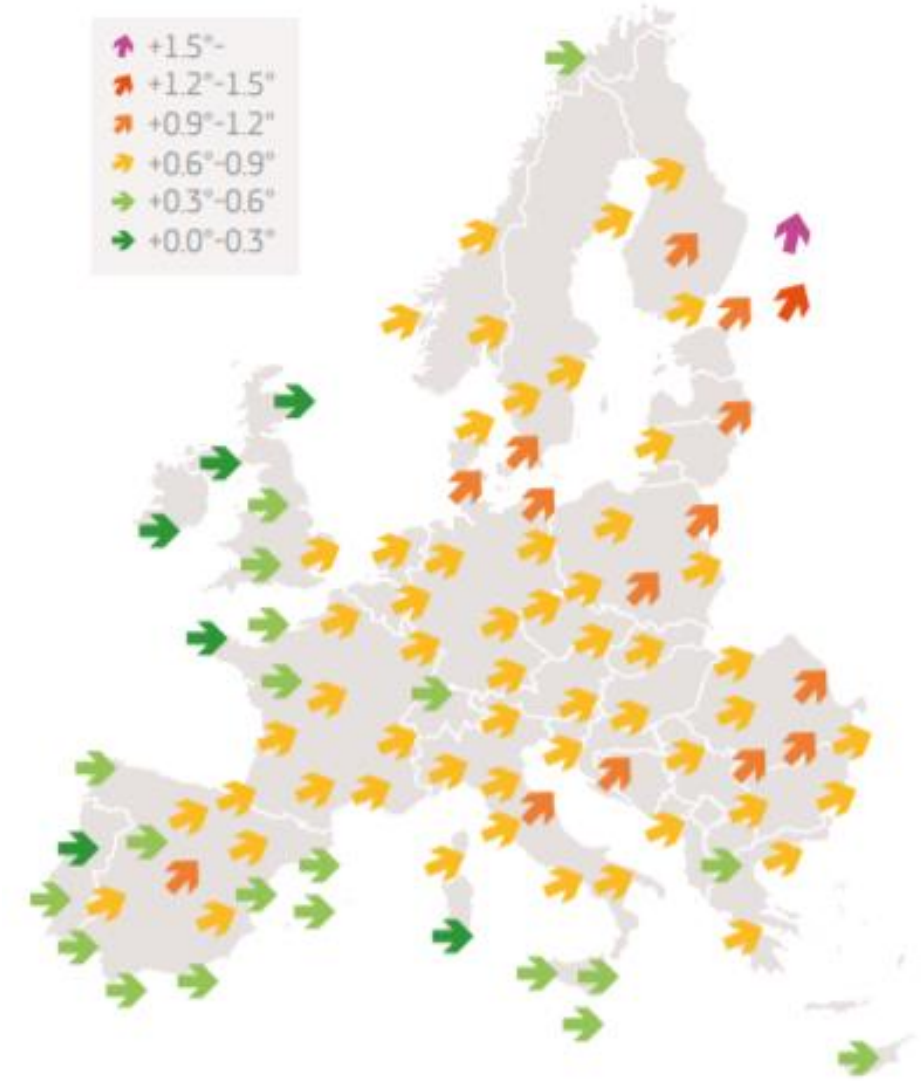
By **Ivana Kottasová**, CNN

Updated 1938 GMT (0338 HKT) **January 13, 2020**



“the average heating across that 150-year period was equivalent to about 1.5 Hiroshima-size atomic bombs per second. But the heating has accelerated over that time as carbon emissions have risen, and was now the equivalent of between three and six atomic bombs per second”

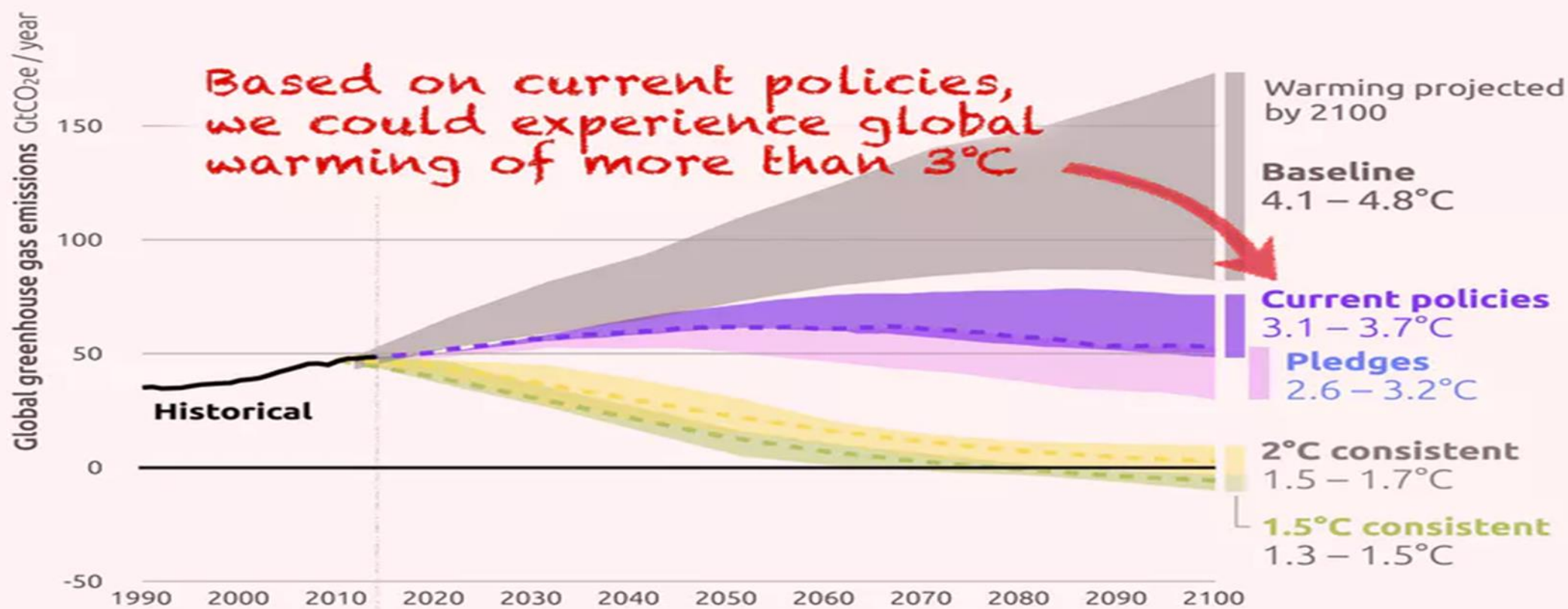
European cities are already on average 1°C warmer than in the 20th century



Source: European Data Journalism Network

Global warming projections for 2100

Emissions and expected warming based on pledges and current policies

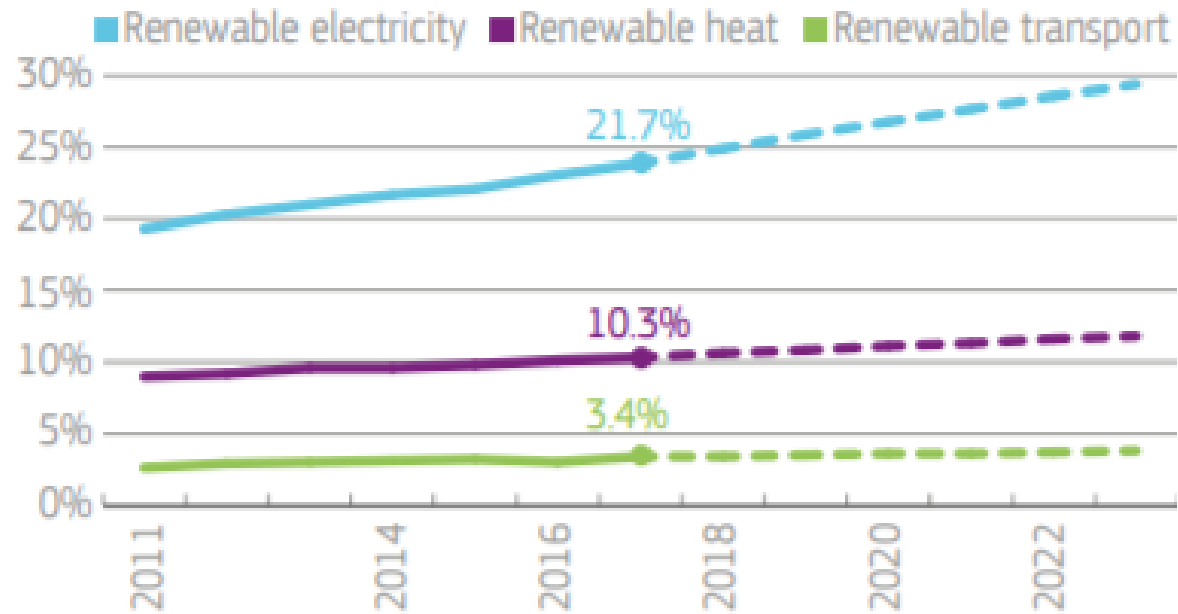


Source: Climate Action Tracker



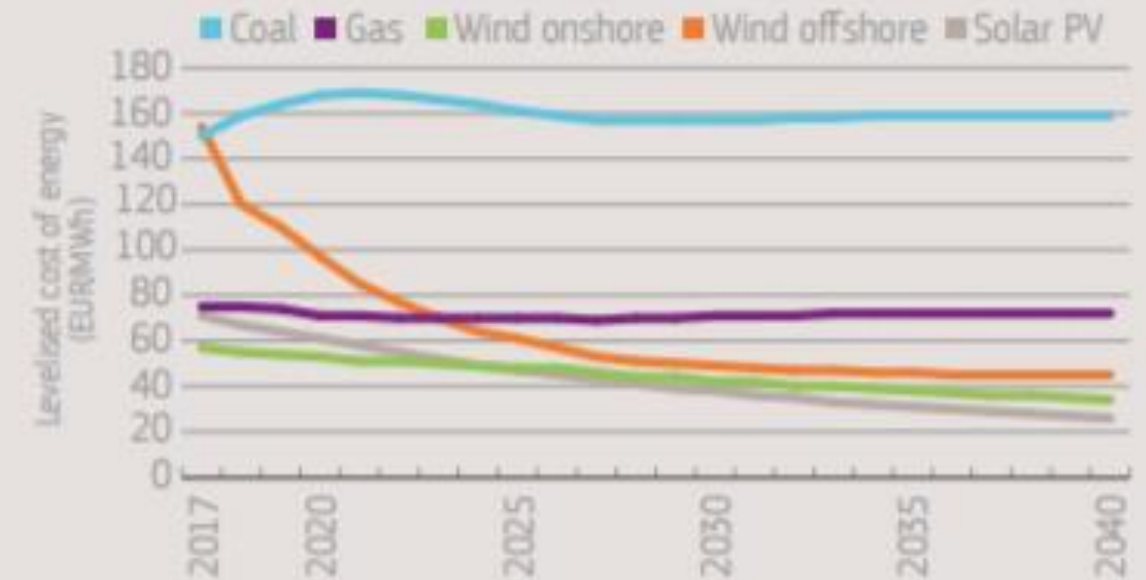
2 Fastest growing renewables!

Share of renewable energy by sector, worldwide, 2011 - 2023



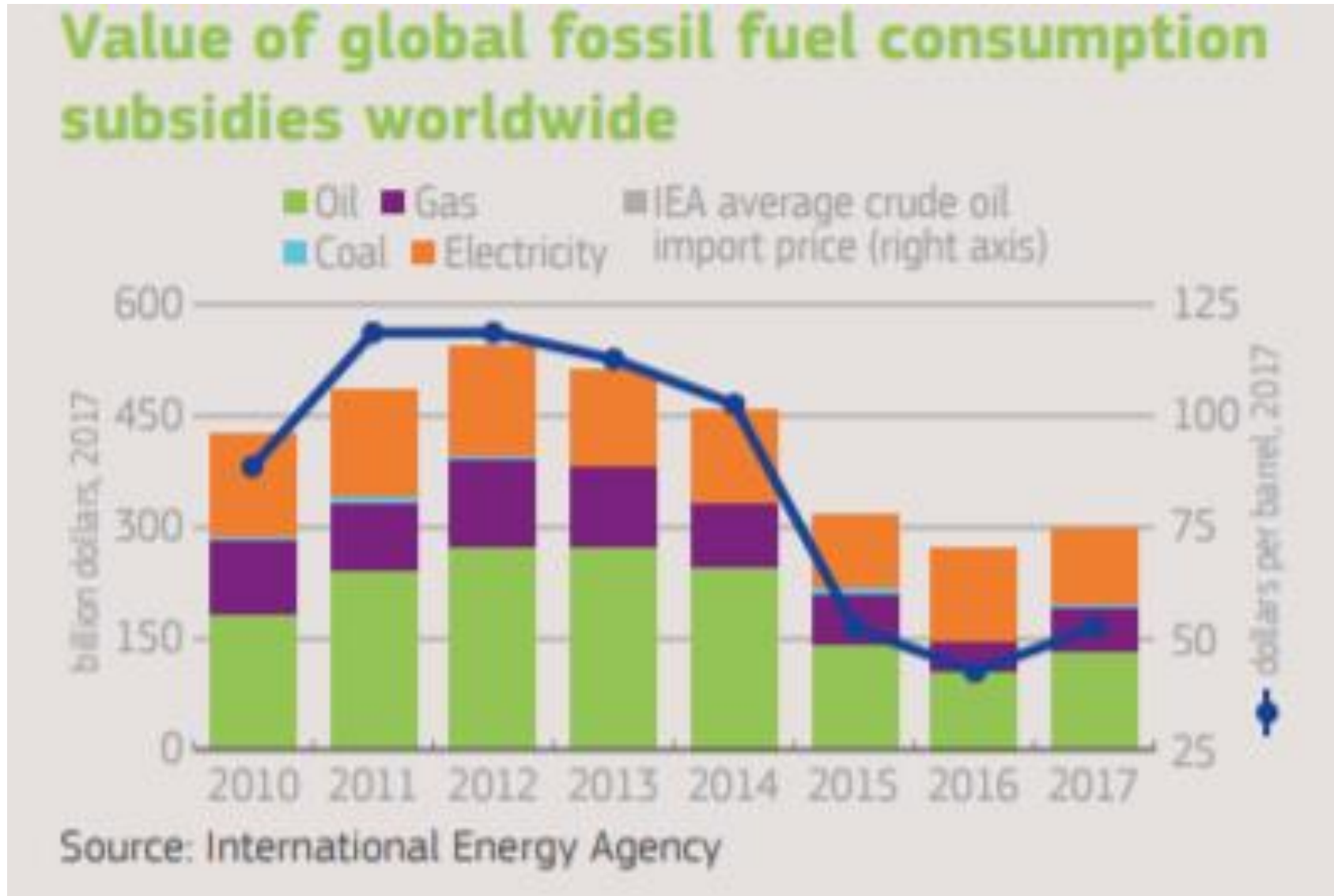
Source: International Energy Agency, Organisation for Economic Cooperation and Development

Renewables now cheaper than fossil fuel in Germany



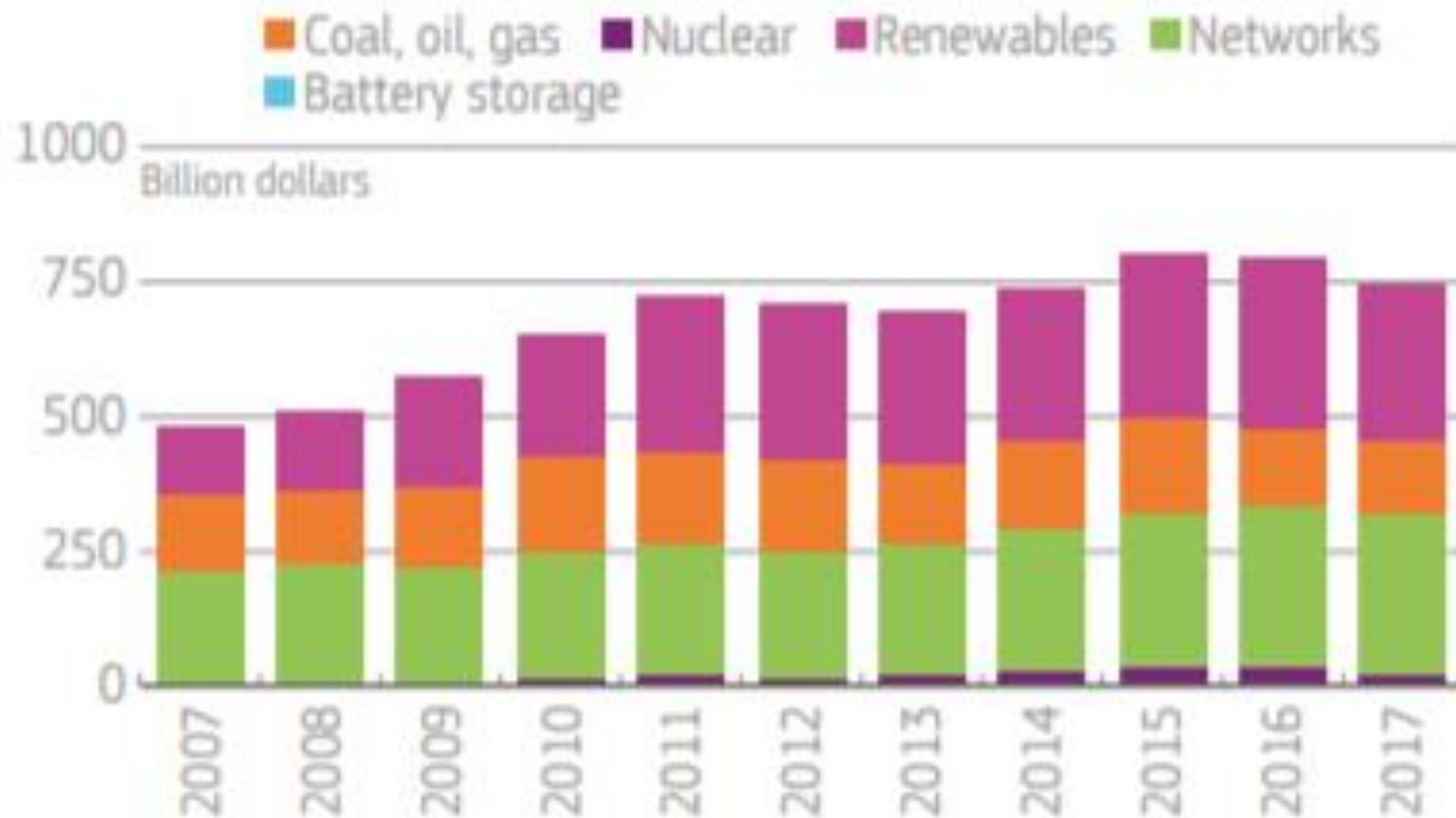
Source: Joint Research Centre, based on Bloomberg New Energy Finance

Still, fossil fuels continue to dominate...



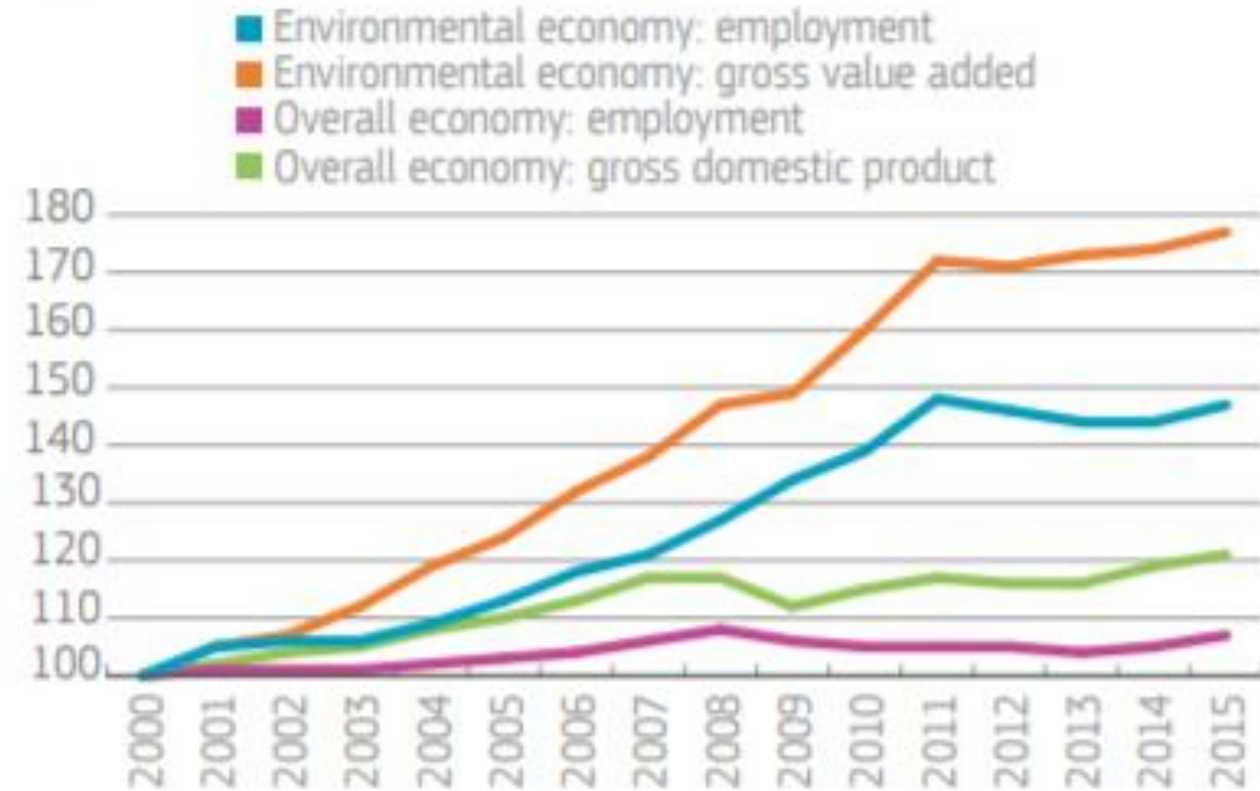
3 Shift of financial markets!

Clean energy investments have largely overtaken fossil fuels



4 Environmental economy is growing fast

Environmental economy growing faster than overall economy

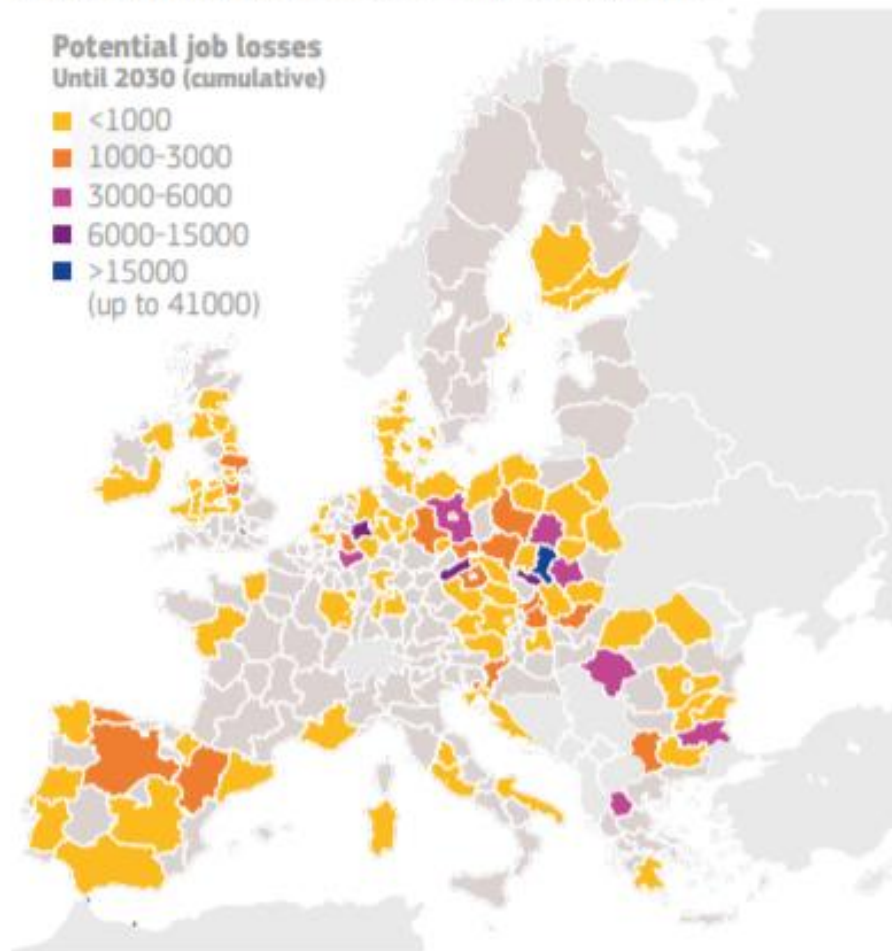


Source: Eurostat, European Commission

...but benefits are spreading unevenly

Carbon-intensive regions are most at risk

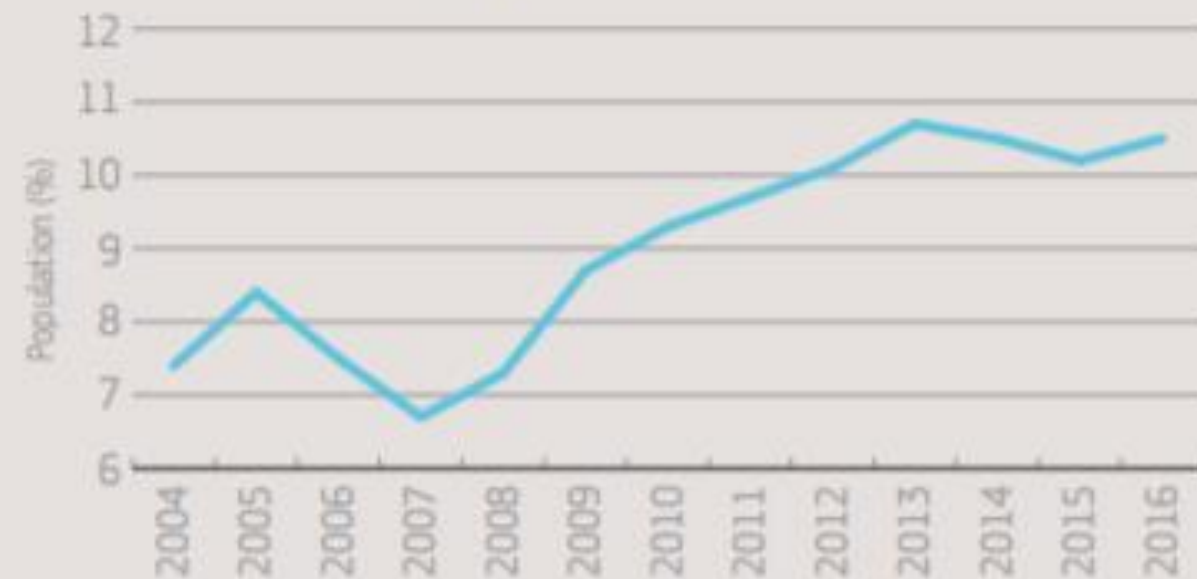
In 2015, there were 237,000 direct jobs in coal and lignite mining and power-plants – the majority of them in just a few regions. By 2030, it is estimated that around 160,000 of these may be lost.³⁶



Source: Joint Research Centre

More Europeans unable to pay their utility bills in recent years

Share of population facing arrears on utility bills, 2004 - 2016

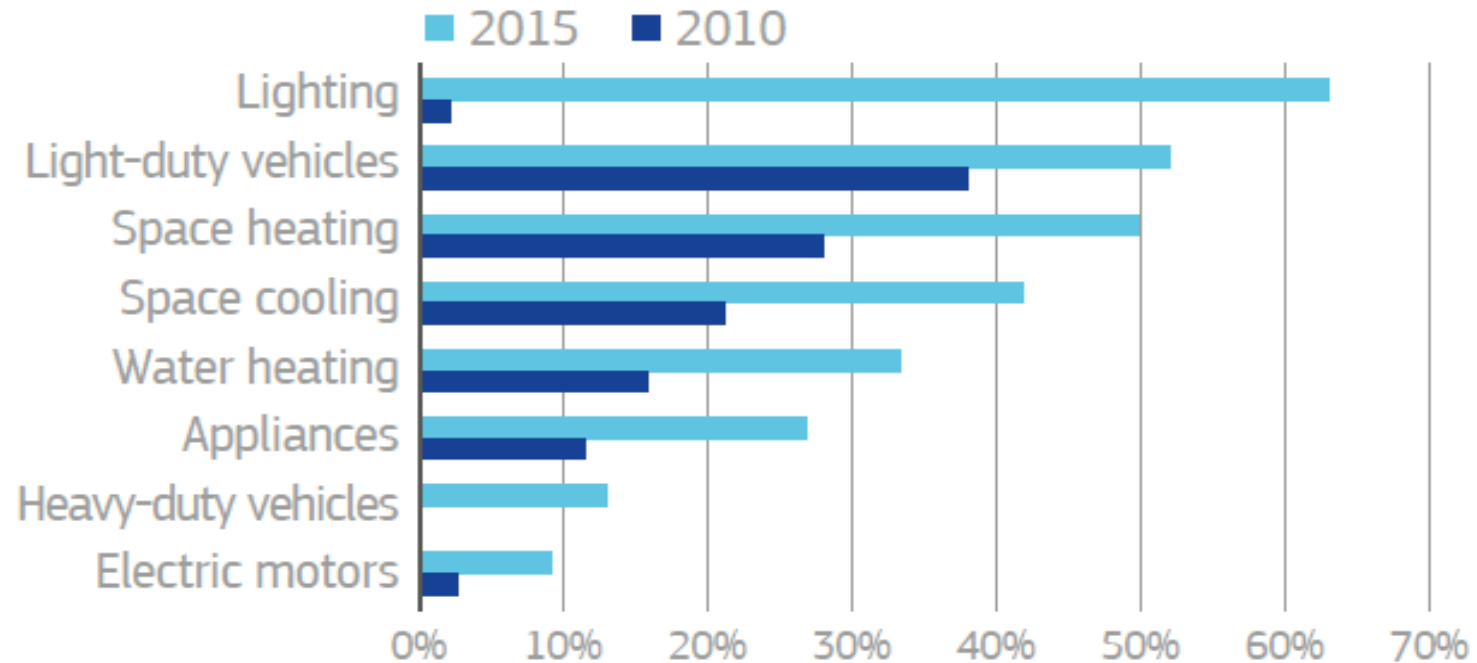


Source: Eurostat, Energy poverty indicator

5 Energy demand transformation

A third of the world's energy consumption now covered by mandatory standards

Share of global end-use energy consumption covered by mandatory energy efficiency policies, 2000 and 2015

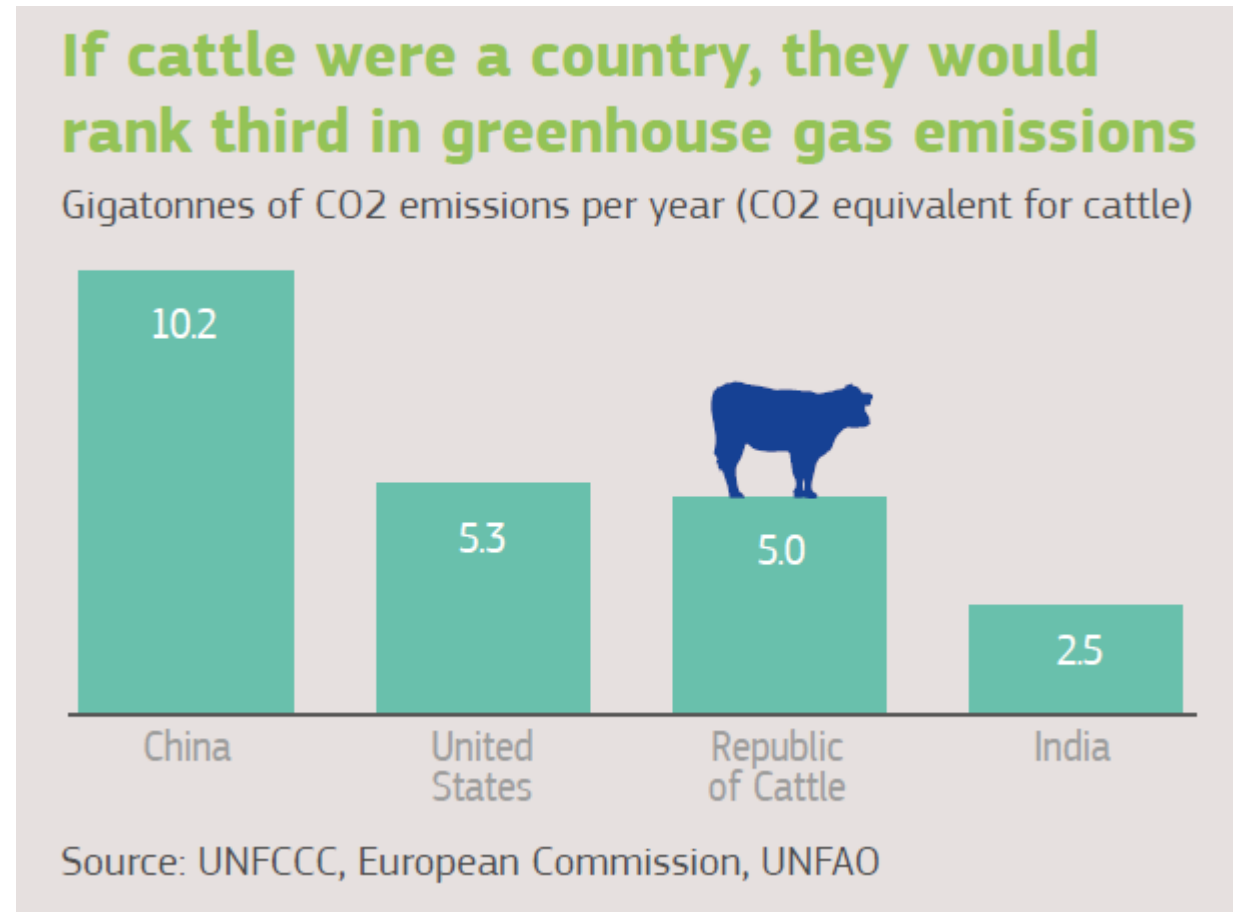


Source: International Energy Agency

...but technological progress will not relieve consumers from their responsibility to make sustainable choices (responsible consumerism)

The relationship between consumer behavior and energy efficiency and cost is complex and can even be inversely proportionate

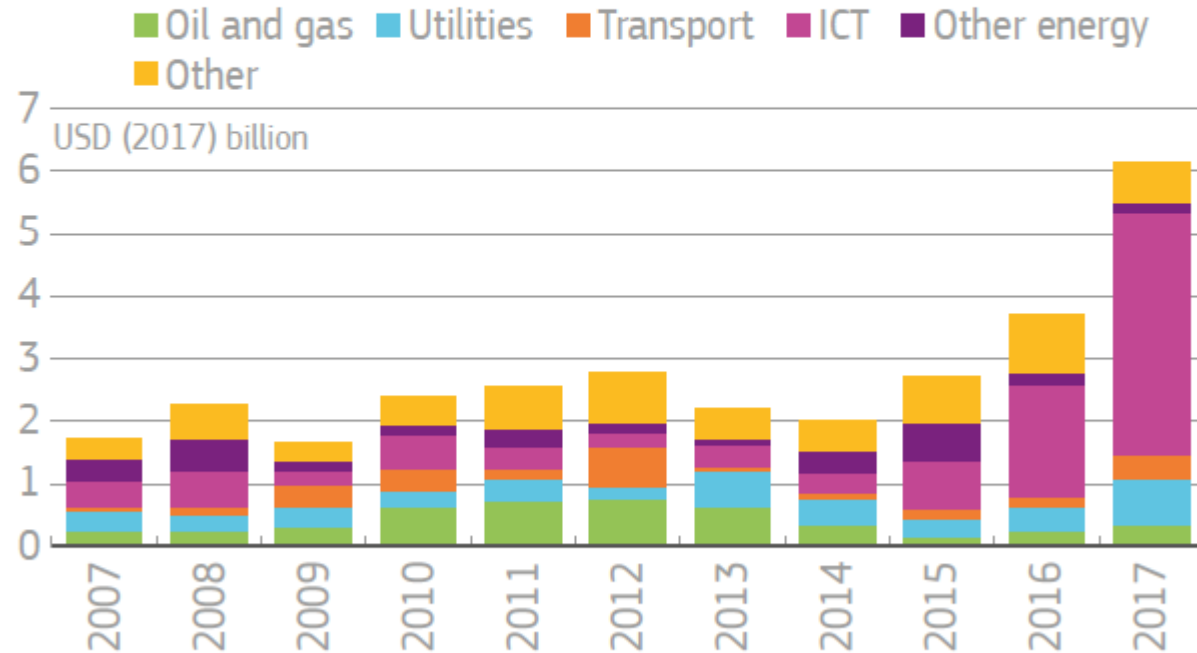
Even as some parts of the population are reducing consumption, the global population is growing fast and will require greater shifts in how society consumes



6 World of digital energy

IT companies ramping up energy investments

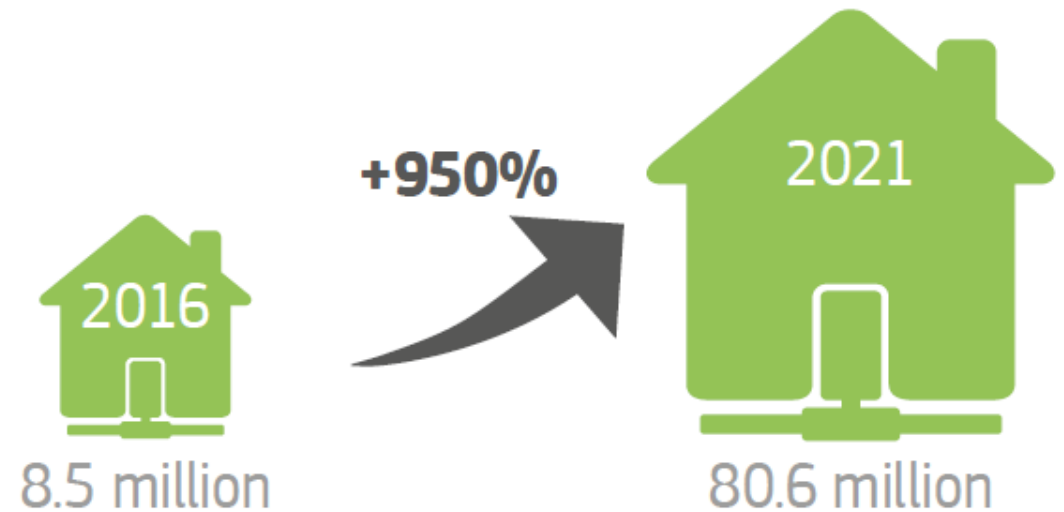
Corporate investments in new energy technology companies, by sector of investing company



Source: International Energy Agency, World Energy Investment 2018

The number of smart homes in the EU is expected to increase tenfold by 2021

Smart homes* in the European Union



*Homes which use digitally controlled lighting, heating, ventilation, air conditioning, security, as well as home appliances

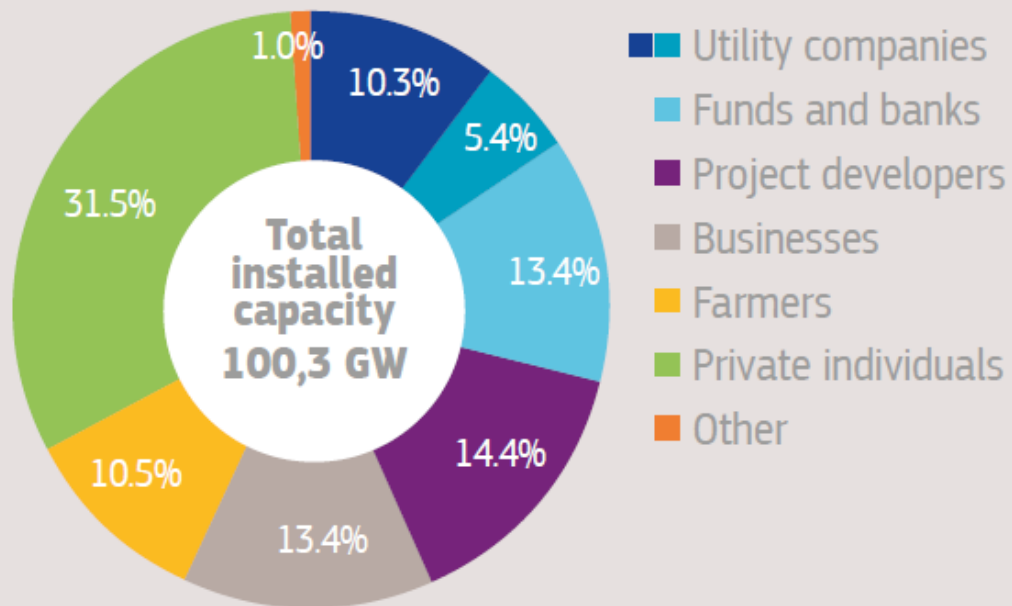
Source: European Commission

7 Electrification, renewables and digitalisation are giving rise to a new generation of small producers

German citizens own roughly one third of the country's renewable electricity capacity

Farmers own another 10.5% while the four dominant utility companies (when considering coal, gas and nuclear markets) – i.e. RWE, Eon, Vattenfall Germany, EnBW, only own 5.4% of renewable production.

Share of renewable energy production by type of owner (2016)



Source: German Agency for Renewable Energy (2018)

The operators and regulators not yet ready for a decentralised power system

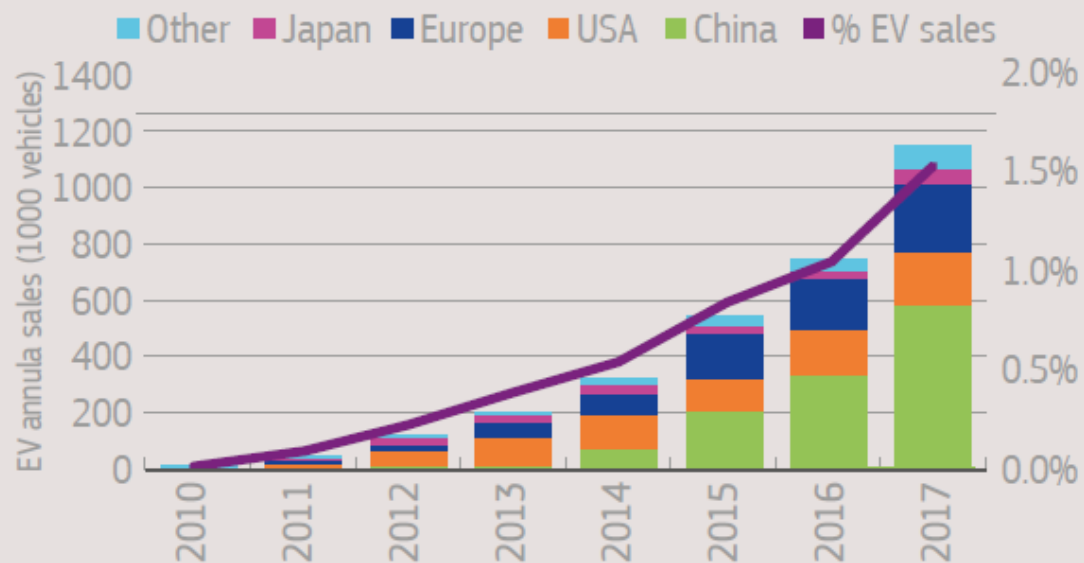
A new role for BLOCKCHAIN??

- Secure and transparent transaction environment for independent energy trading platforms.
- More than 265 million euro (2017) for blockchain technology applications in the energy sector

8 As energy demand surges in Asia, it is also driving innovation

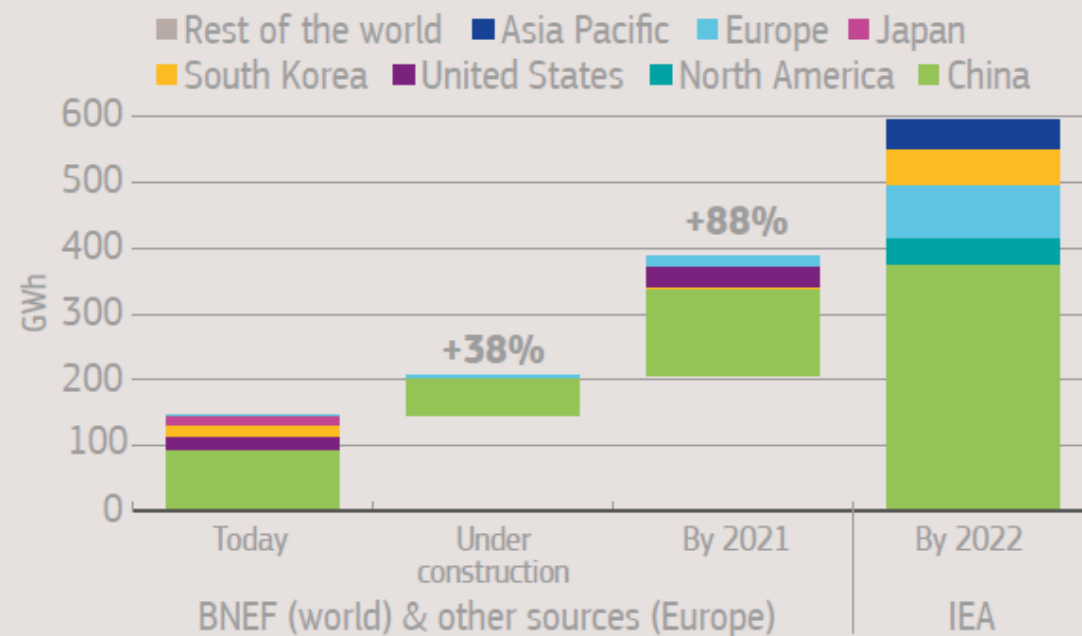
Half of the world's electric vehicle sales in China

Annual sales of electric vehicles.



Source: Joint Research Centre, Bloomberg New Energy Finance

China set to dominate global battery cell production










Source: Joint Research Centre (Compilation from various sources)












Less than 15 years to take over the solar photovoltaic sector

Top 10 manufacturers of solar panels/cells, 2004 to 2018


Production 2001

- 1  Sharp
- 2  Kyocera
- 3  Shell solar
- 4   BP solar
- 5  Astropower
- 6  Sanyo
- 7  Isofoton
- 8  RWE Solar
- 9  Mitsubishi
- 9  Photowatt

Production 2004

- 1  Sharp
- 2  Kyocera
- 3   BP solar
- 4  Q-Cells
- 5  Mistubishi
- 6  Shell Solar
- 7  Sanyo
- 8  Schott Solar
- 9  Isofoton
- 10  Motech

Production 2009

- 1  First Solar
- 2  Suntech
- 3  Sharp
- 4  Q-Cells
- 5  Yingli
- 6  JA Solar
- 7  Kyocera
- 8  Trina Solar
- 9   SunPower
- 10  Gintech

Production 2010

- 1  Suntech
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- 3  Yingli Solar
- 4  JA Solar
- 5  Sharp
- 6  Q-Cells
- 7  Gintech
- 8  Motech
- 9  Trina Solar
- 10  Kyocera

Production 2017-2018

- 1  Jinko Solar
- 2  Trina Solar
- 3  Canadian Solar
- 4  JA Solar
- 5  Hanwha Q Cells
- 6  GCL-SI
- 7  LONGi Solar
- 8  Risen Energy
- 9  Shunfeng
- 10  Yingli Green

In 2018

8 out of 10 Global manufacturers did not exist in 2010

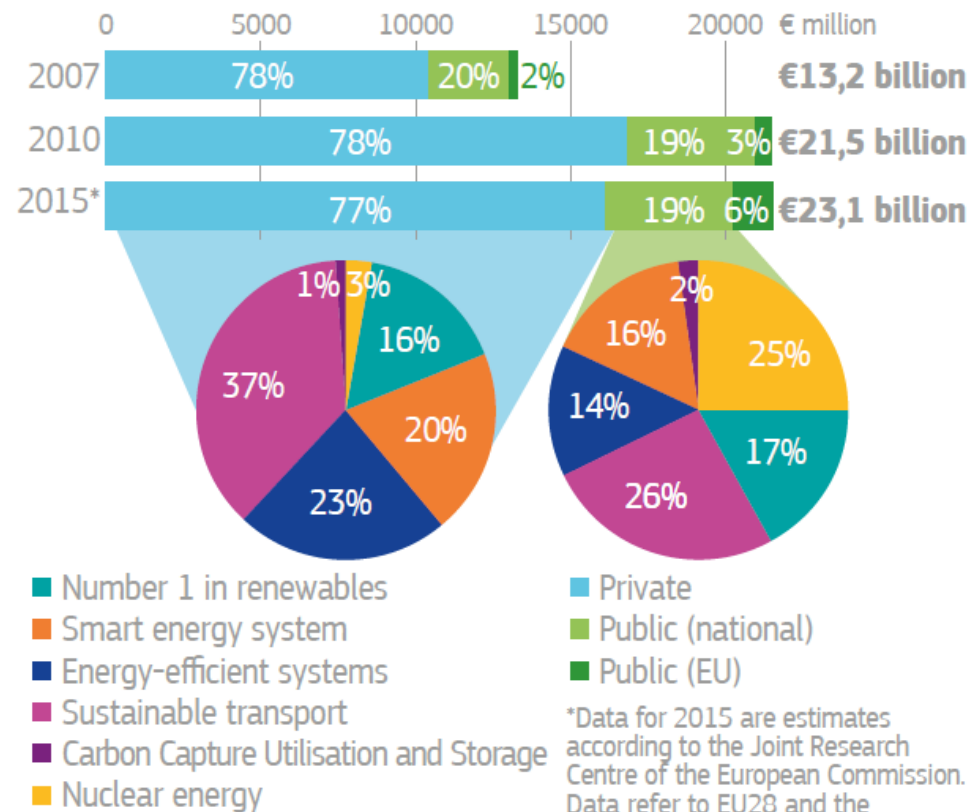
7 out of 10 Global manufacturers are Chinese companies

No  'Global' manufacturer of Solar Cells

Sources: Luxembourg Ministry of the Economy, Photon International, Joint Research Centre, PV-Tech.org

9 Innovation is gradually delivering on the promising technologies

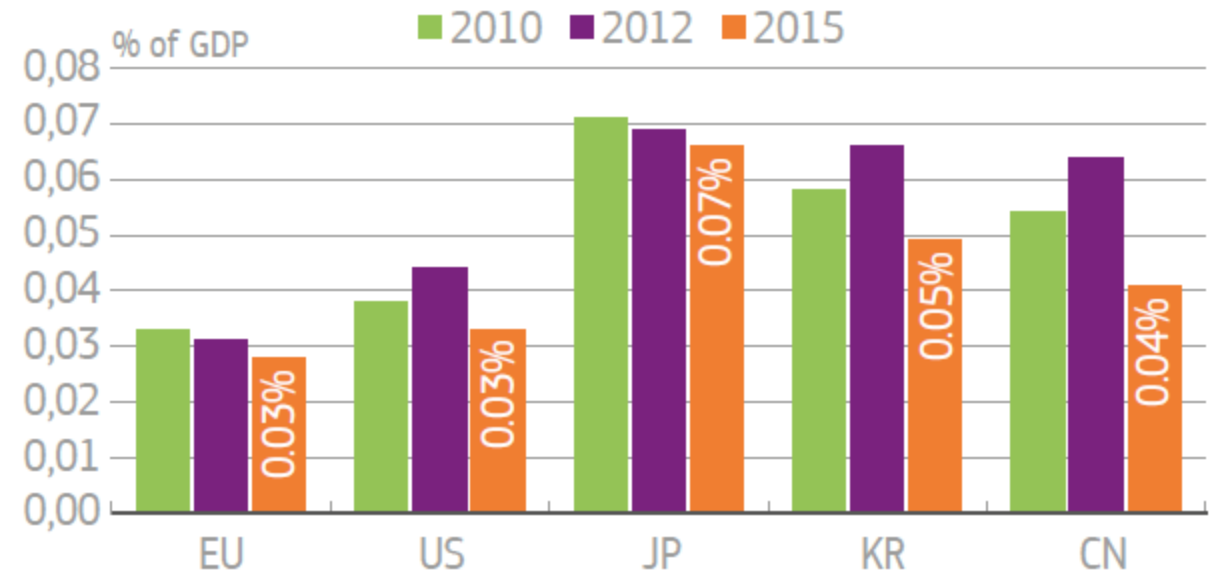
Private research spending on the up in Europe



*Data for 2015 are estimates according to the Joint Research Centre of the European Commission. Data refer to EU28 and the associated countries participating in the SET-Plan (CH, TK, NO, IS).

Source: Joint Research Centre

But the EU ranks last among major economies in terms of R&I investments as a share of GDP



Source: Joint Research Centre