Fundación Naturgy

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Energy Prospectives

La transición energética en la Unión Europea: una visión geoestratégica

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My Background

Degree in Physics
solid state physics

National politics
MP, Minister of Education, Minister of Finance

Diplomacy
Latvia's accession to the EU

European politics
Commissioner for Energy; for Development

Energy regulation
Chairman of the BoA of ACER

PART 1

A New World Emerging

Energy transformation

Six dynamic forces of change are driving the rapid growth of renewables.

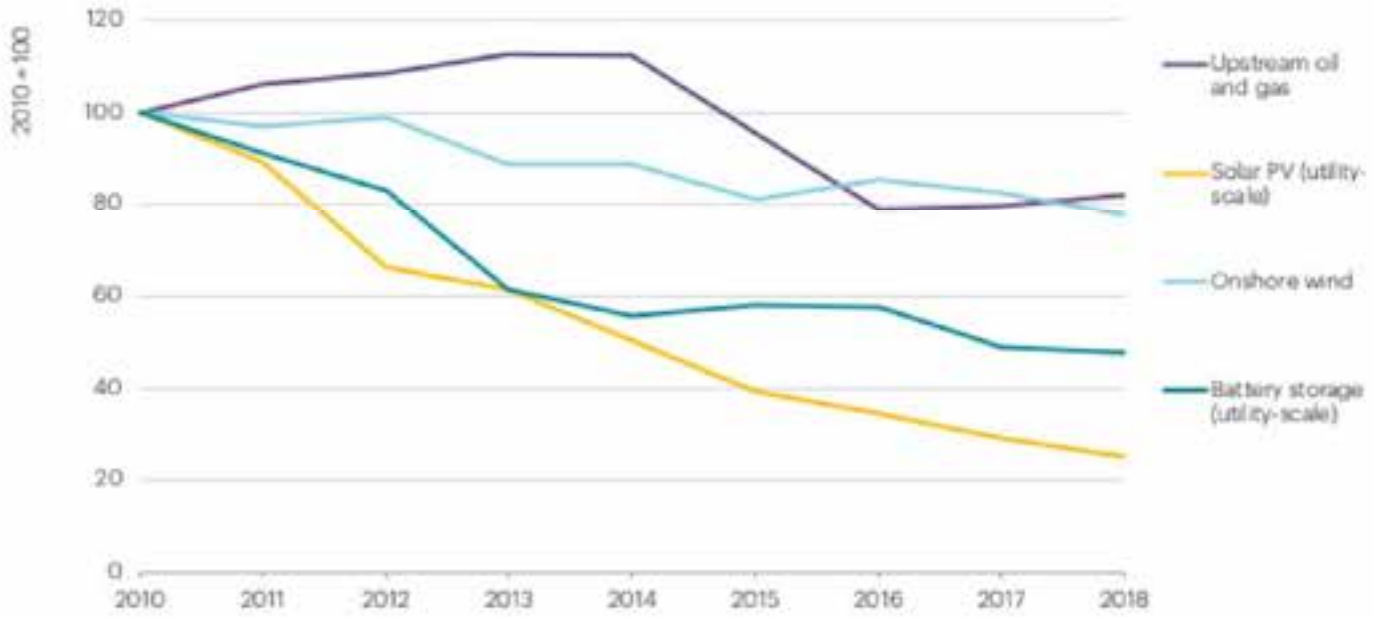
The trajectory of the energy transformation:

- Will progress at different speeds in each country and in each sector,
- Political choices will make a difference.

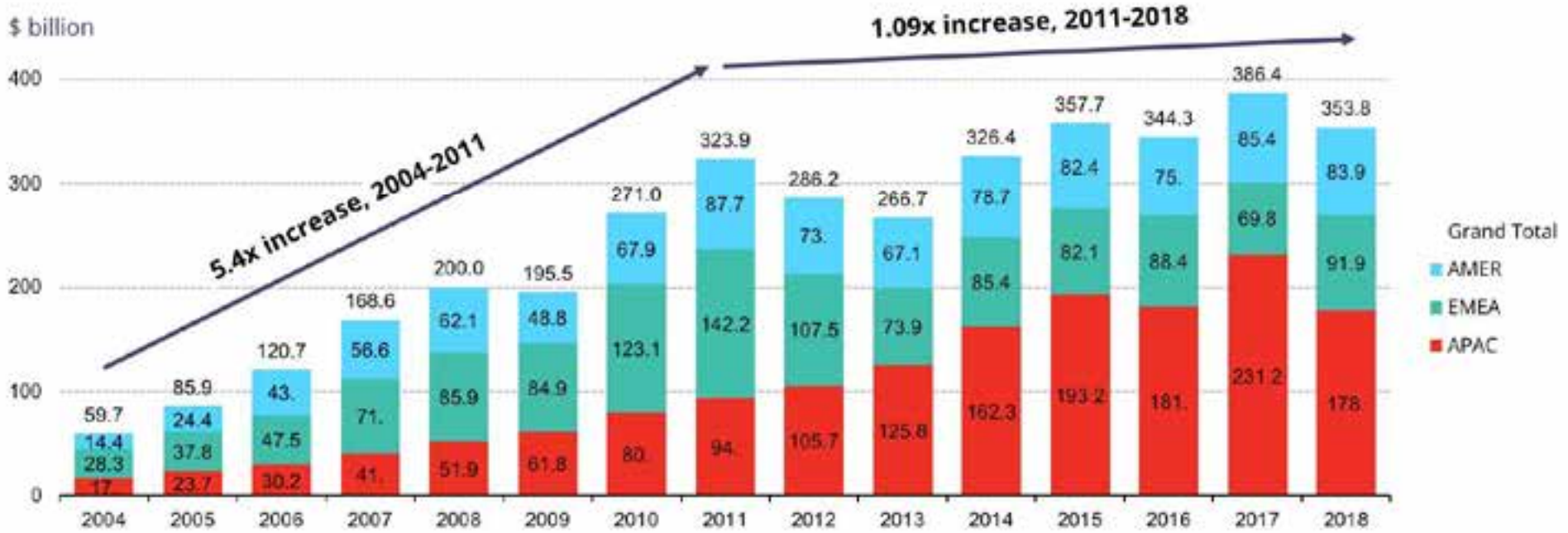
Three characteristics underpin the transition:

- energy efficiency,
- growth of renewables,
- electrification.

Change in capital costs of selected fuels and energy technologies



Global clean energy investment



Source: BloombergNEF

Power Shifts

New energy leaders

Countries that take advantage of new RE technologies can enhance their global influence and become new energy leaders.

- Countries with high RE technical potential
- Mineral-rich countries
- Leaders in technological innovation

New actors

Renewables tend to decentralize and democratize energy systems; the energy transformation will therefore lead to a diffusion of power.

The role of the centralized state in new energy systems may change. New energy actors will emerge.

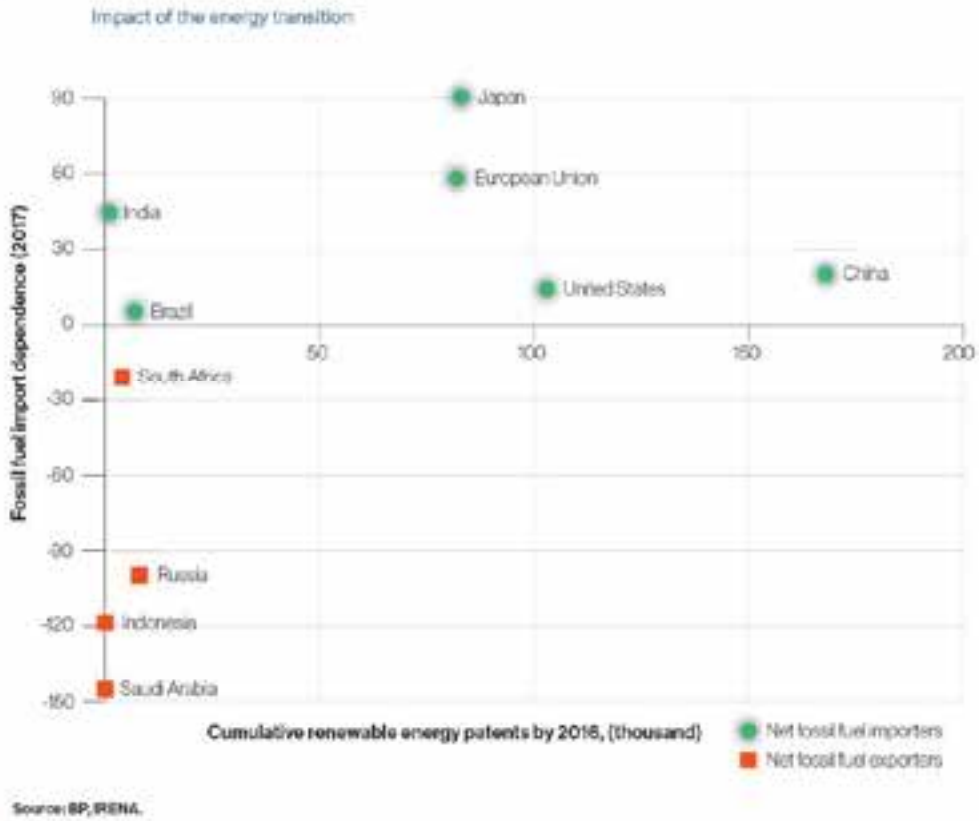
- Citizens
- Cities
- Corporations

Power Shifts
Repositioning of states

The global transition to RE could transform global power relations in the same way that the transition from biomass to fossil fuels did two centuries ago.

The energy transformation will alter the power and influence of some states and regions.

The repositioning of states depends on:
- changes in fossil fuel trade flows,
- commercial race to become a leader in RE technology.



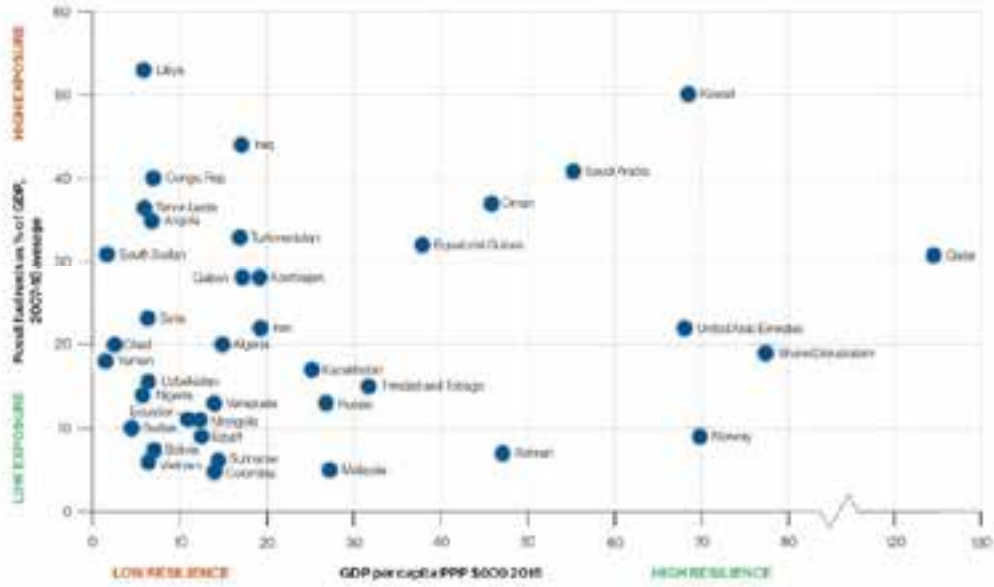
Power Shifts

The vulnerability of fossil fuel exporters

Major fossil fuel exporters are likely to see a decline in their global reach and influence, unless they diversify their economies and prepare for a new energy era.

Fossil fuel exporters' preparedness for the energy transition. Four groups of countries:

- Highly exposed, low resilience,
- Highly exposed, highly resilient,
- Moderately exposed, moderately resilient,
- Relatively low exposure.



Note: The chart includes countries in which fossil fuel rents account for more than 5% of GDP.

Source: IMF World economic outlook database April 2018, World Bank.

New relations between states

Rethinking energy statecraft

Energy resources will lose their potency as geopolitical instruments.

Reliance on electricity, biofuels and other critical materials for RE technologies will become more significant.

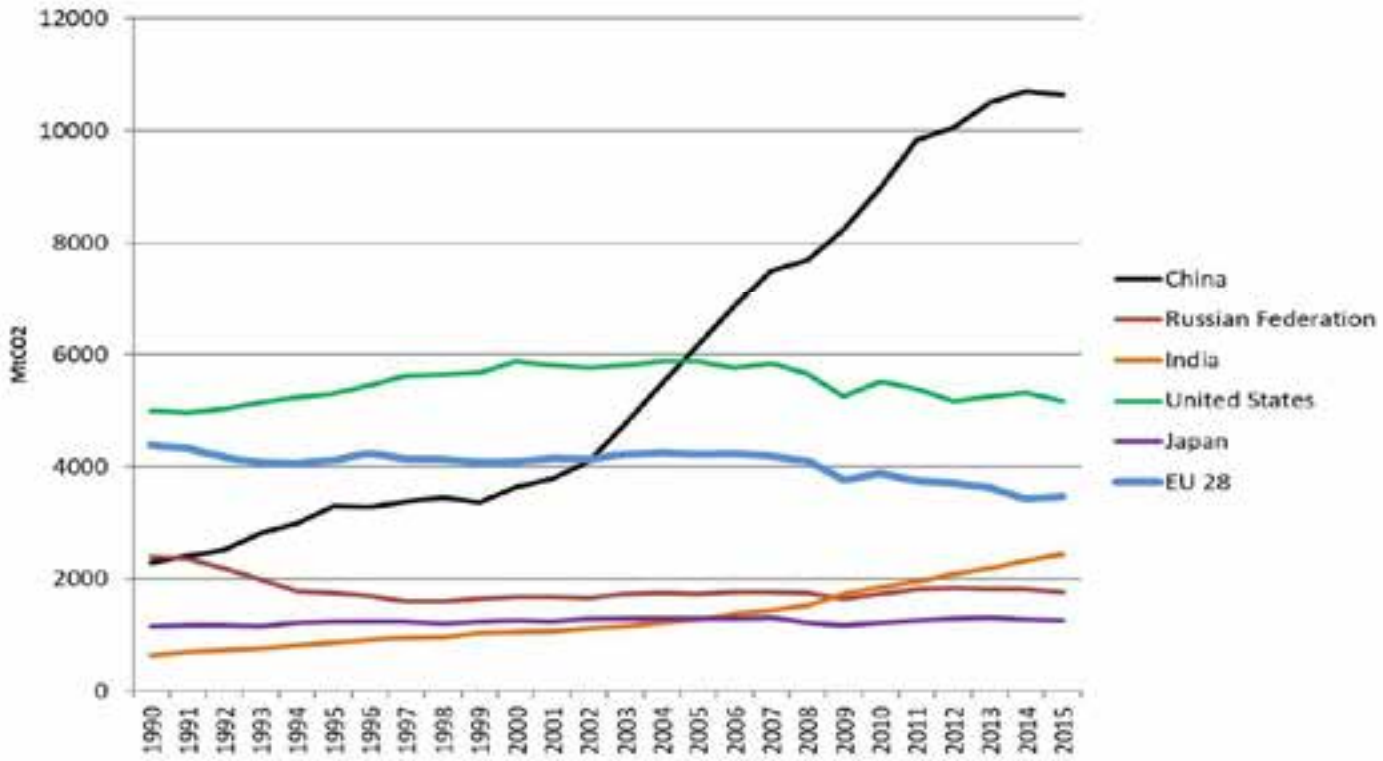
These new forms of dependence are unlikely to attain the geostrategic importance of oil and gas.

- Electricity trading tends to be more reciprocal than trade in oil and gas.
- Trade in biofuels is unlikely to be used as a geopolitical weapon due to market characteristics.
- Most of the 17 rare earth minerals are not geologically rare. They are abundant and widely distributed, though they are expensive and polluting to mine and produce.

Trends in “heavyweights”

Saudi Arabia	No fundamental change in oil policy; increased role of gas in energy mix; very small part of renewables
United States	Continuation of “shale revolution”; LNG exports; increased role of gas in the energy mix on the expense of coal; continuation of the growth of renewables
China	Decreasing role of coal in energy mix; strong growth of renewables
Russia	No fundamental change in oil&gas policies; new export pipelines; energy mix continues to be based on natural gas
India	Strong growth of coal use in the energy mix; interest on increasing role of gas and renewables

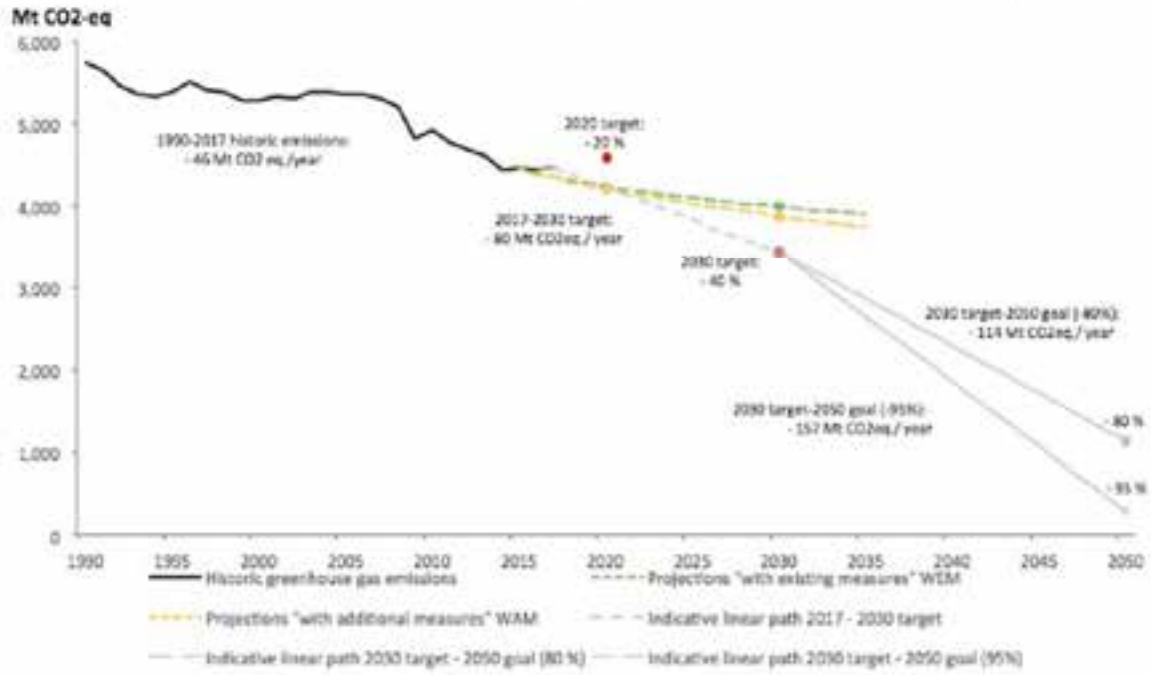
CO2 emissions 1990-2015



PART 2

Clean energy for all the Europeans

EU emissions 1990-2050

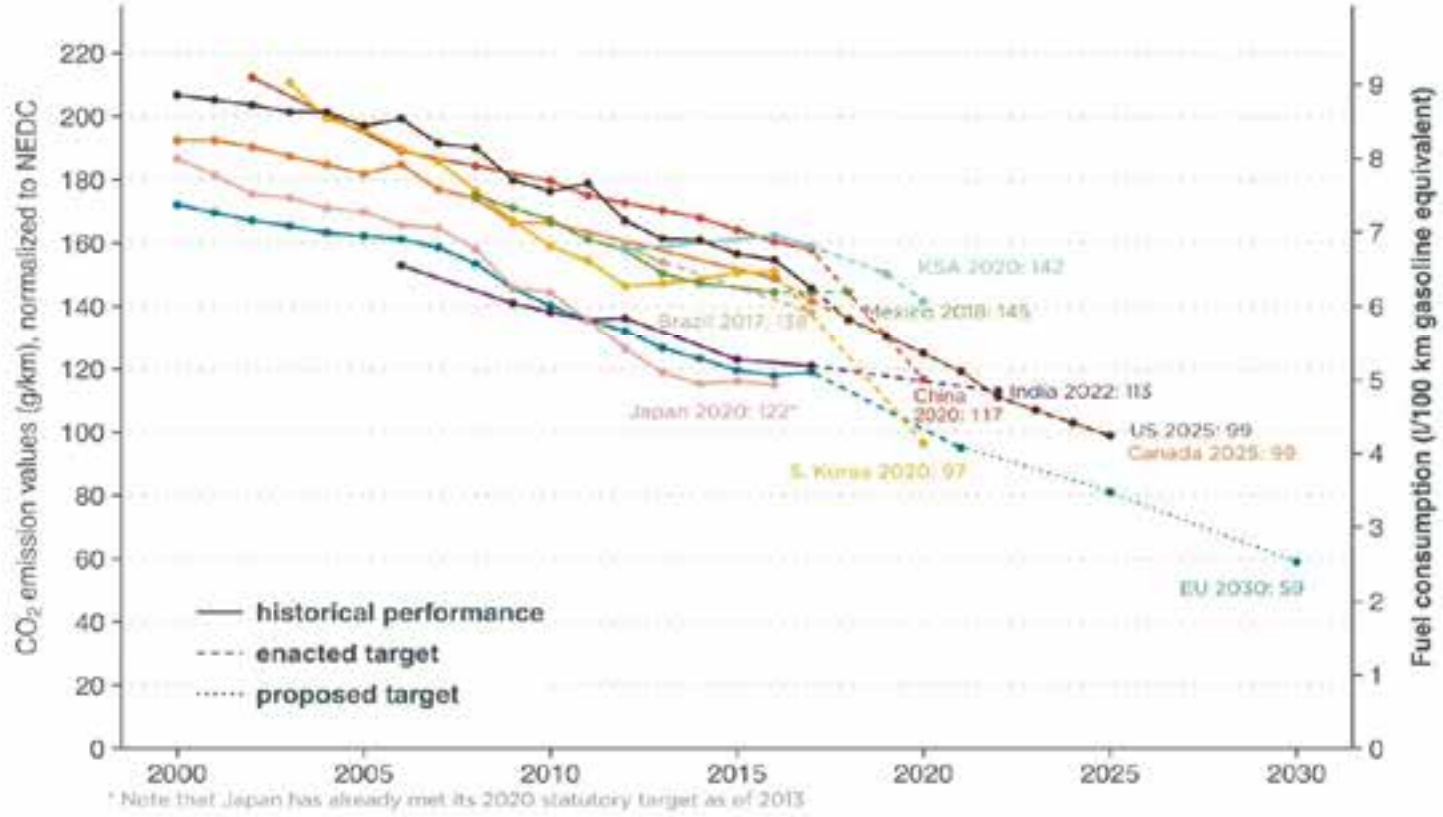


EU greenhouse gas emissions by sector, 1990-2030

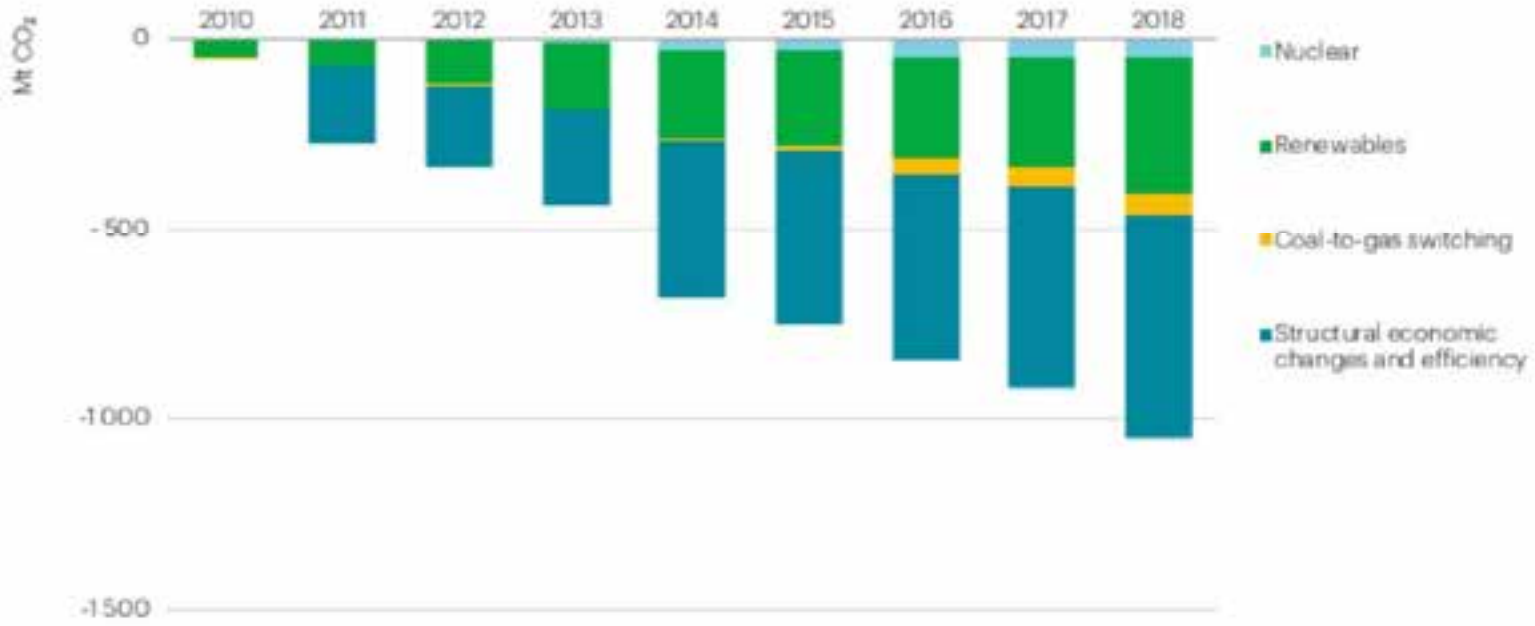
(2030 projections "with existing measures")

	(in Million tonnes of CO_2 equivalent)				Percentage variations since 1990		
	1990	2005	2017	2030	2005	2017	2030
Energy supply	1869	1713	1276	1053	92	68	56
Energy use in Manufacturing	841	636	483	459	76	57	55
Industrial processes and product use	517	466	379	340	90	73	66
Transport	787	976	946	887	124	120	113
Other energy use	854	794	663	555	93	78	65
Agriculture	542	434	432	432	80	80	80
Waste	236	200	136	99	85	58	42
International aviation	69	131	150	164	190	217	238
Total	**5715**	**5350**	**4465**	**3989**	**94**	**78**	**70**

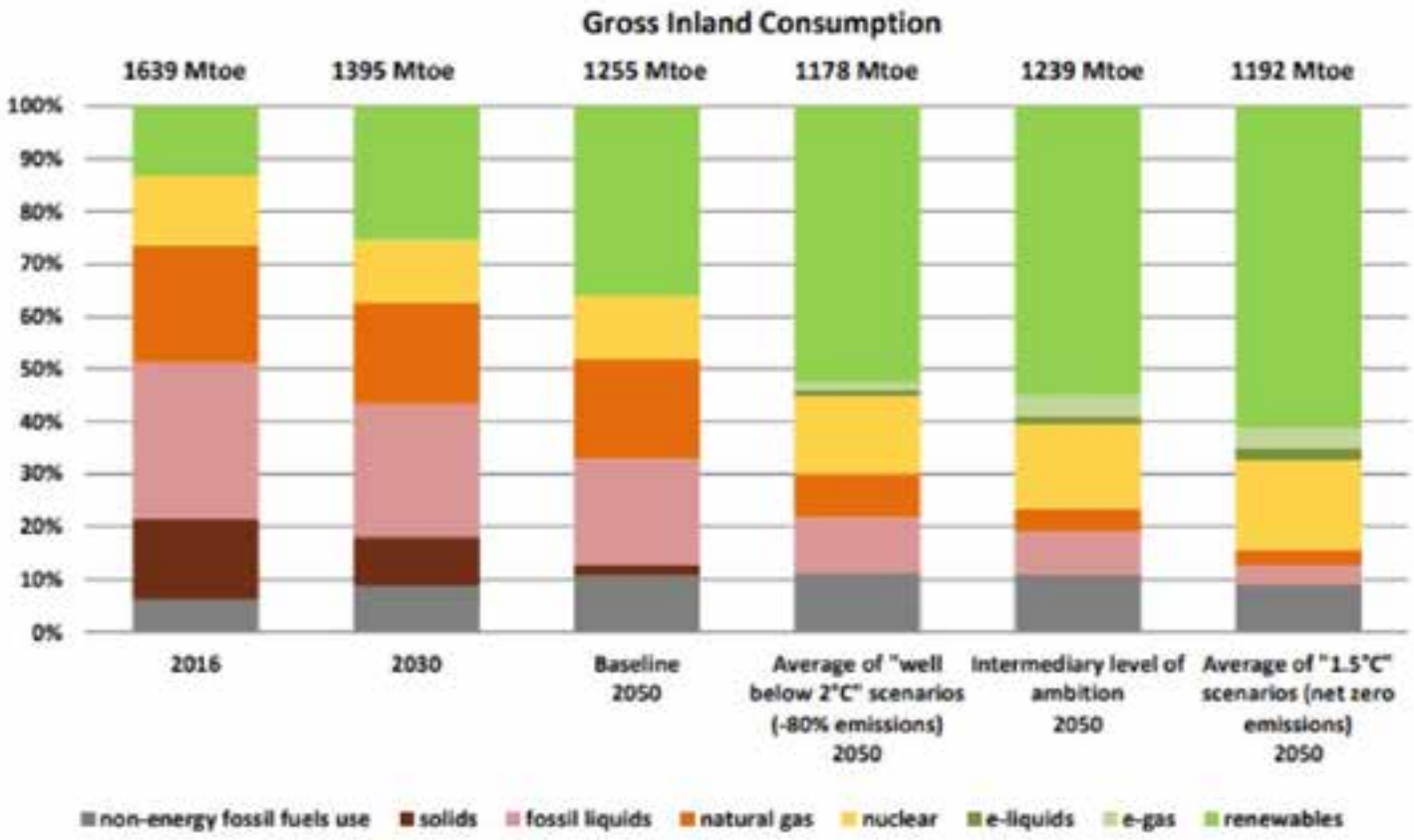
EU CO_2 standards for new passenger cars



Breakdown of cumulative emissions reductions in the European Union versus the baseline projection since 2010

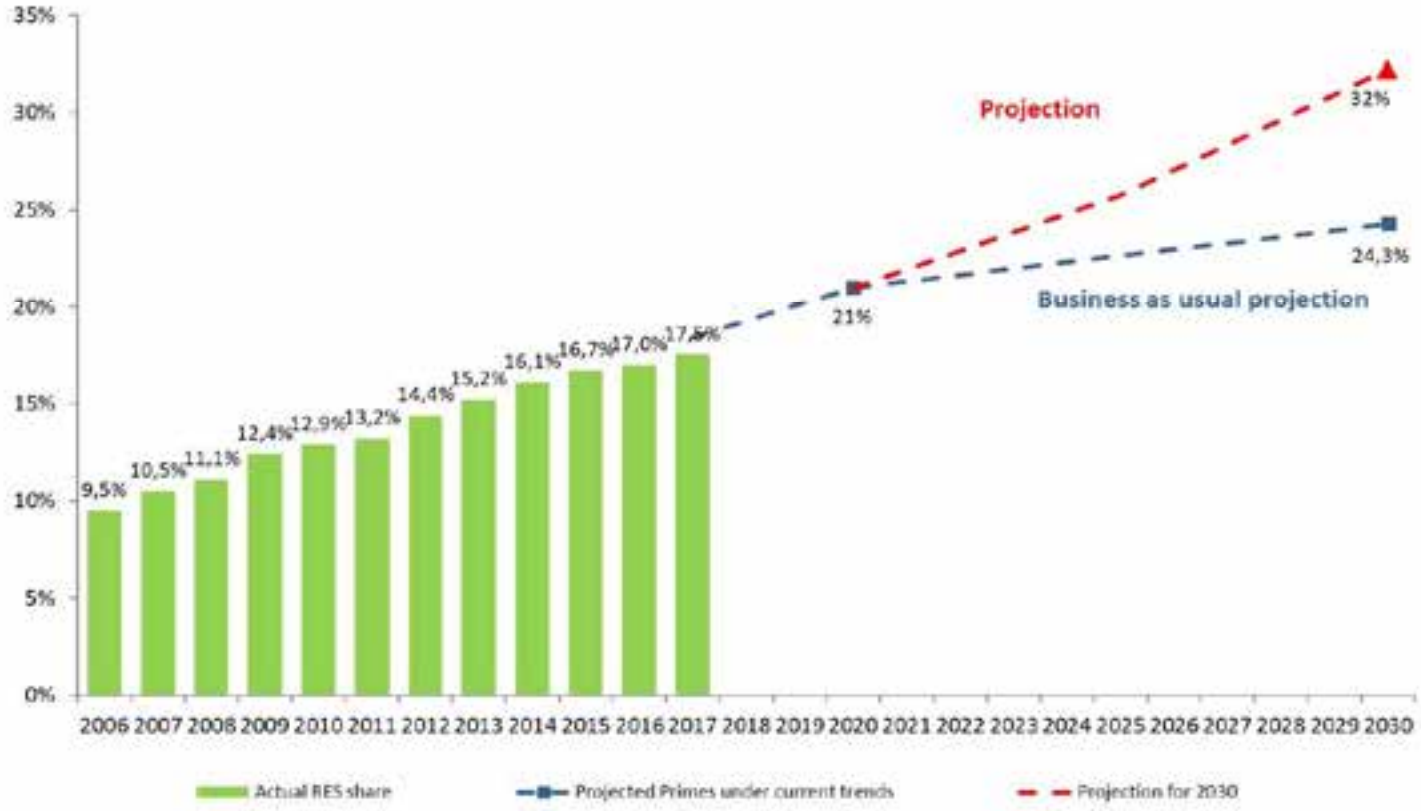


Fuel mix in Gross Inland Consumption

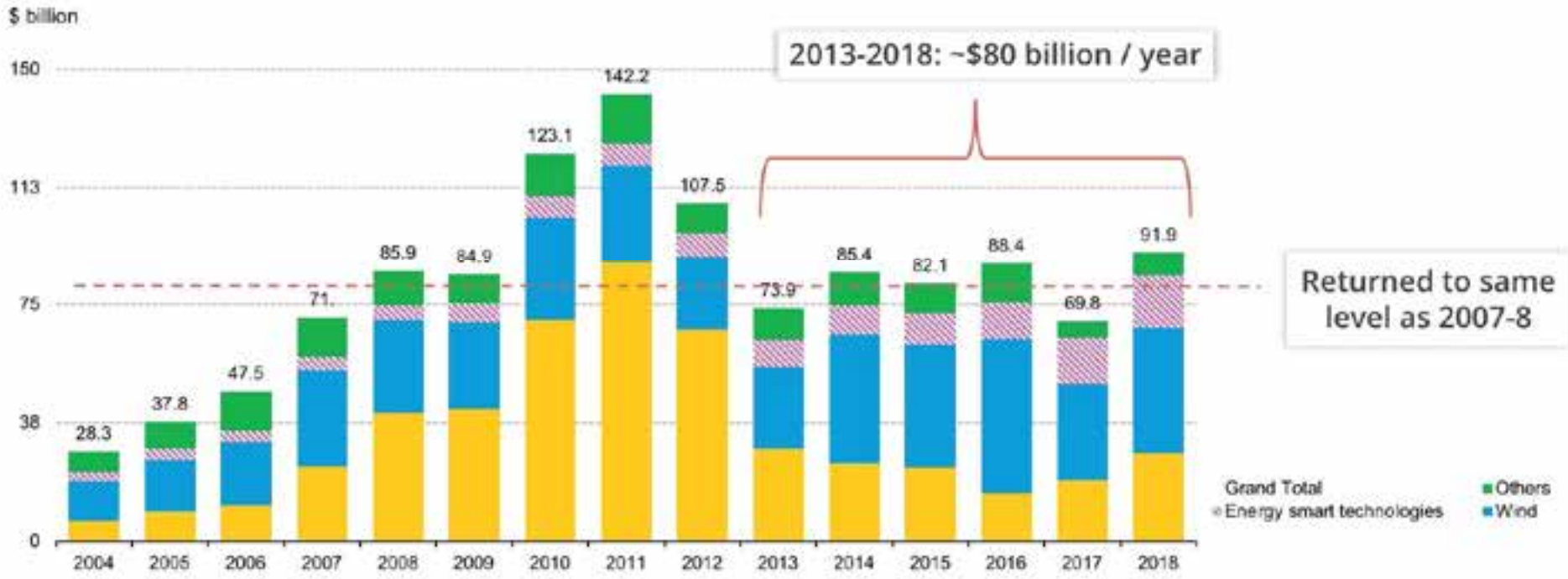


Energy efficiency

RES development

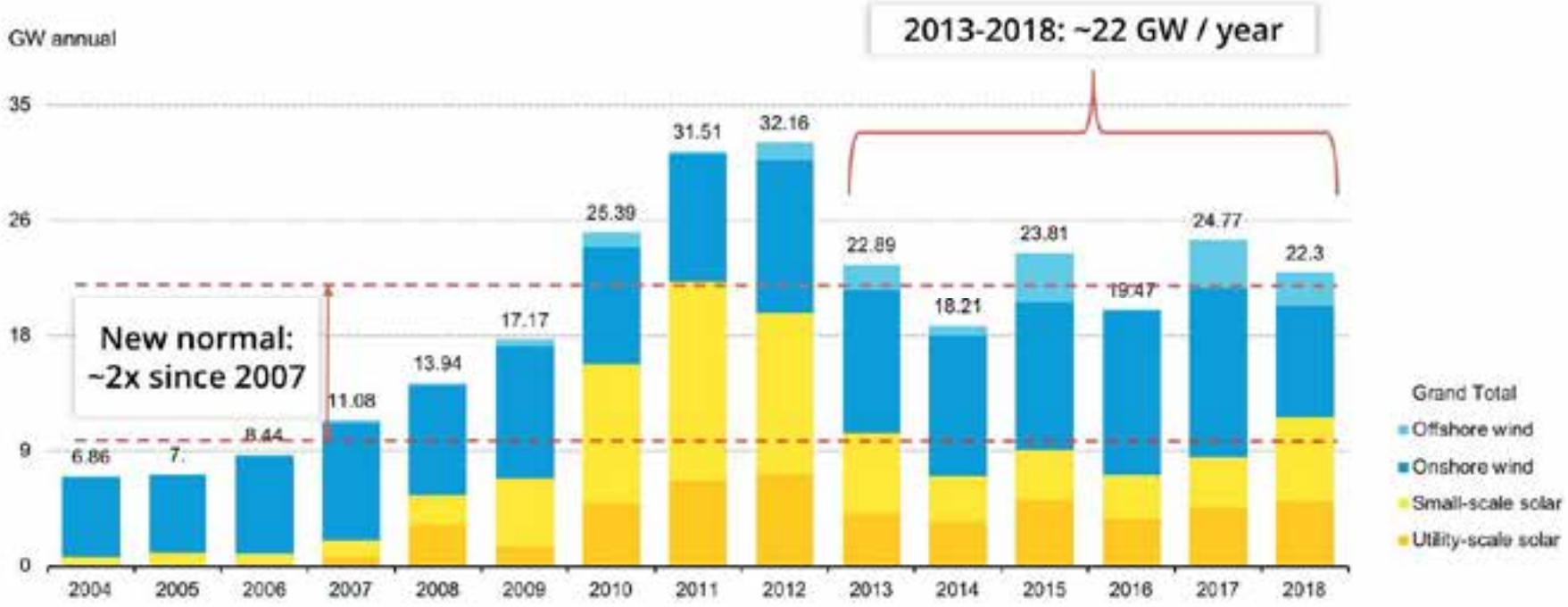


European clean energy investment



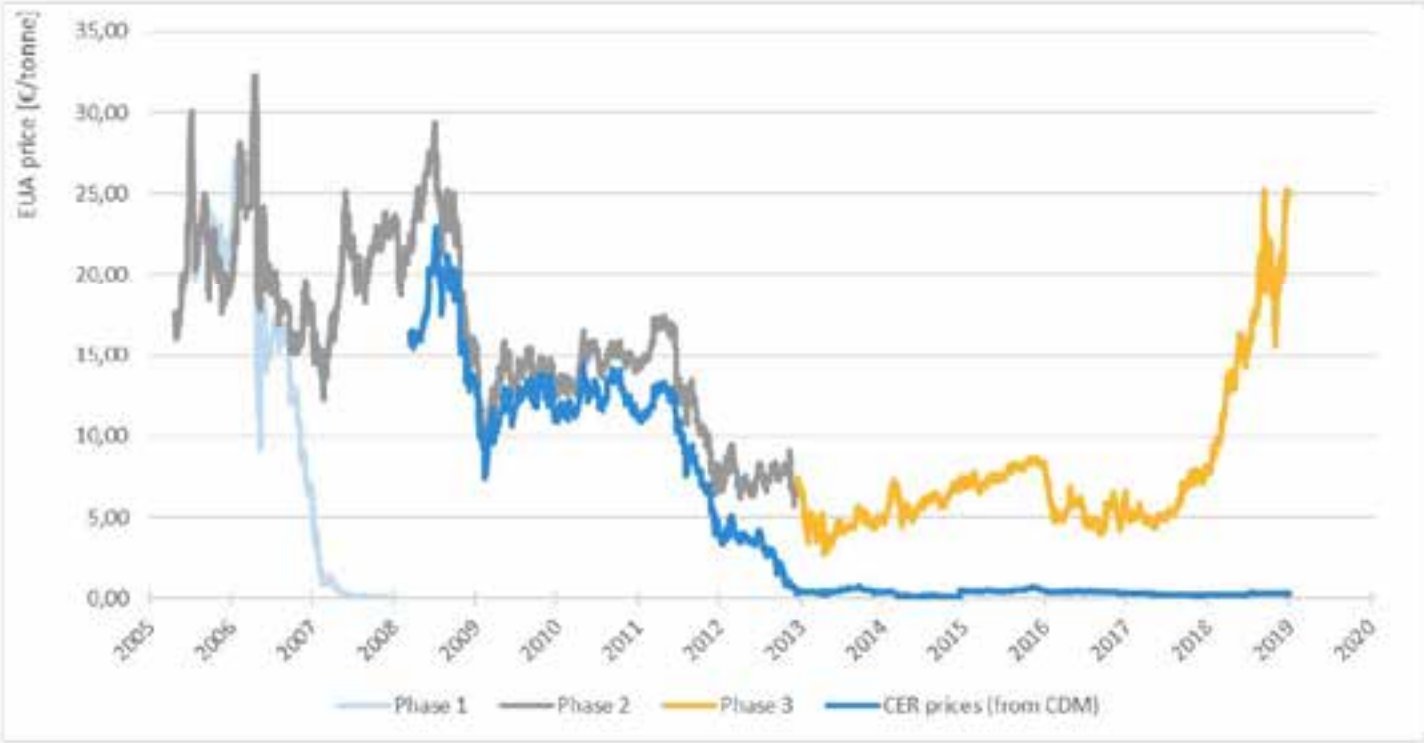
Source: BloombergNEF

European clean energy installations (annual)

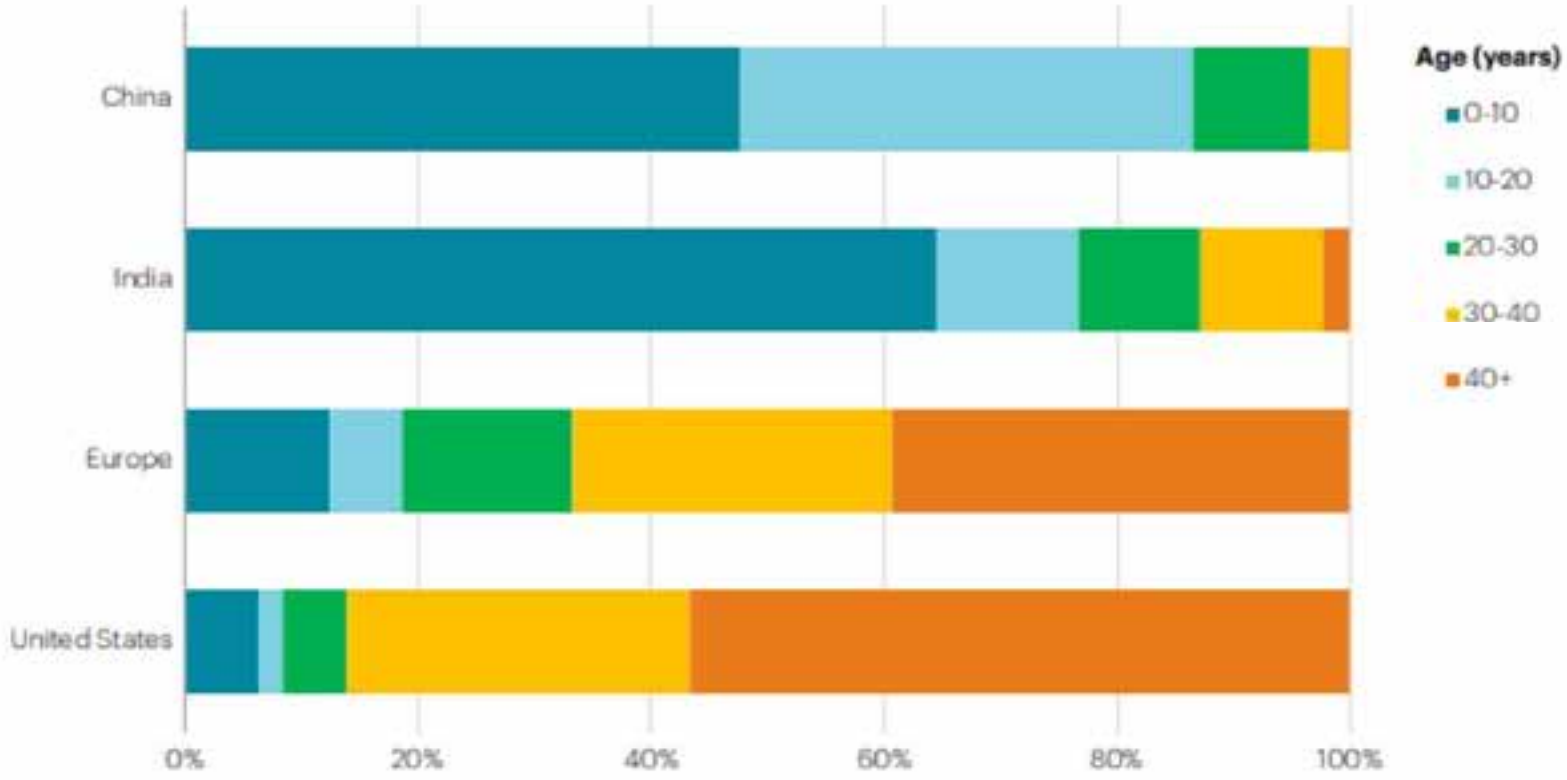


Source: BloombergNEF

EU ETS

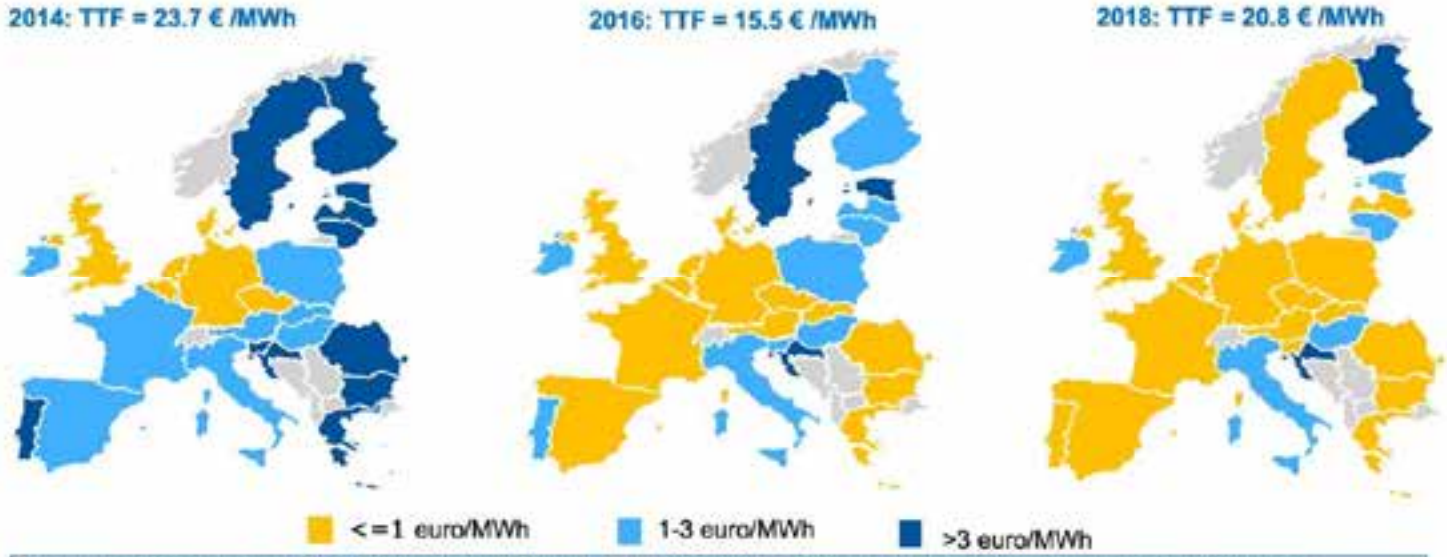

EUA price [€/tonne]
35,00
30,00
25,00
20,00
15,00
10,00
5,00
0,00
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Phase 1
Phase 2
Phase 3
CER prices (from CDM)

Share of coal-fired plants in selected countries/regions by age



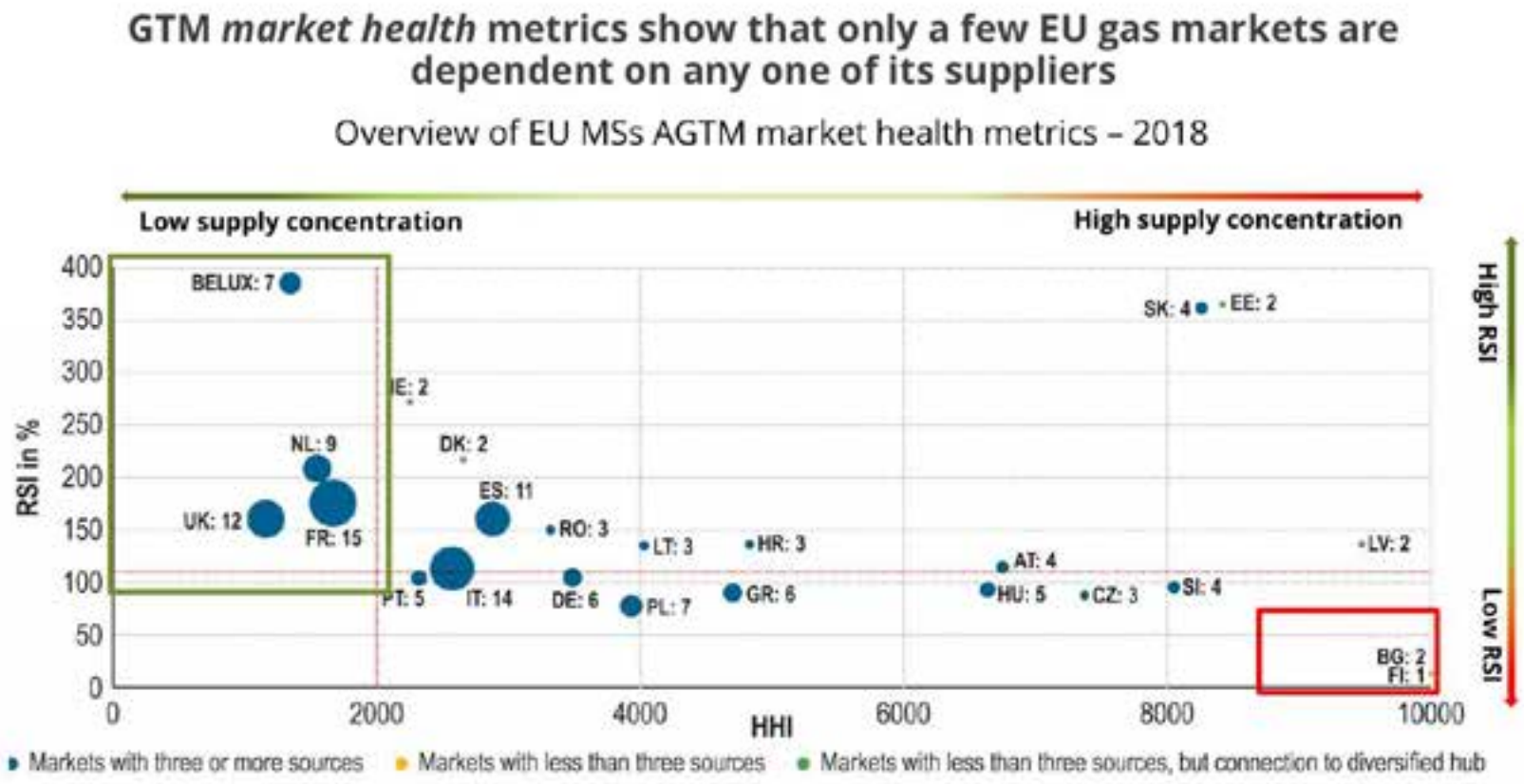
Supply sourcing costs* convergence is stabilising. In some regions convergence has been reached

Calculated gas supply sourcing cost* compared to TTF - estimates



- Declining differentials across MSs suggest that most regions are benefiting from more robust supply-side competition
- Sourcing via hubs is generally more competitive. Non-hub indexed LTCs are more exposed to non-gas fundamentals
- LNG setting price in many markets, whereas major "pipe" producers are retaining market share by lowering margins and indexing prices to hubs' prices

Gas target model metrics



Sources: ACER calculations based on GTM metrics, ENTSOG data, Eurostat data and Frontier Economics GTM assessment.

A flexible European Electricity Market

Boost wholesale market flexibility and provide clear price signals to facilitate the continuing penetration of renewable energies and ensure investments

Enable active consumer participation and ensure that consumers are protected and benefit from progress in energy technologies

Promote regional cooperation and provide a true European dimension to security of supply

Germany's "Klimaschutzprogramm 2030"

Goals
(55% less GHG emissions; 65% RES in power; 10million e-cars)

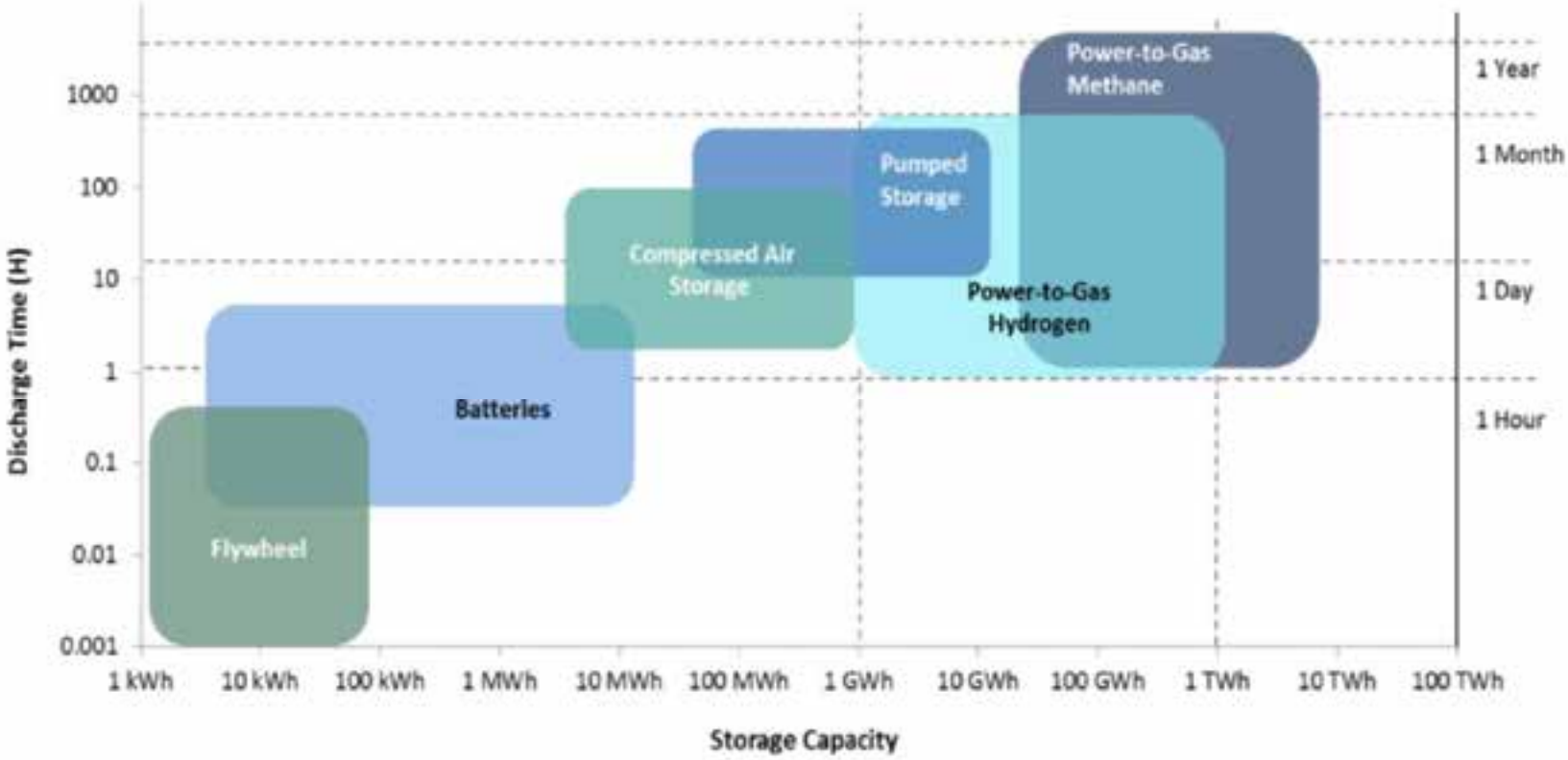
Public investments
(rail) and **incentives** (e-cars; buildings)

Regulation
(out of coal 2038; no new oil heating 2026; decrease of electricity levies)

CO_2 price transport and heat
(10-35 EUR/t; German emission trading)

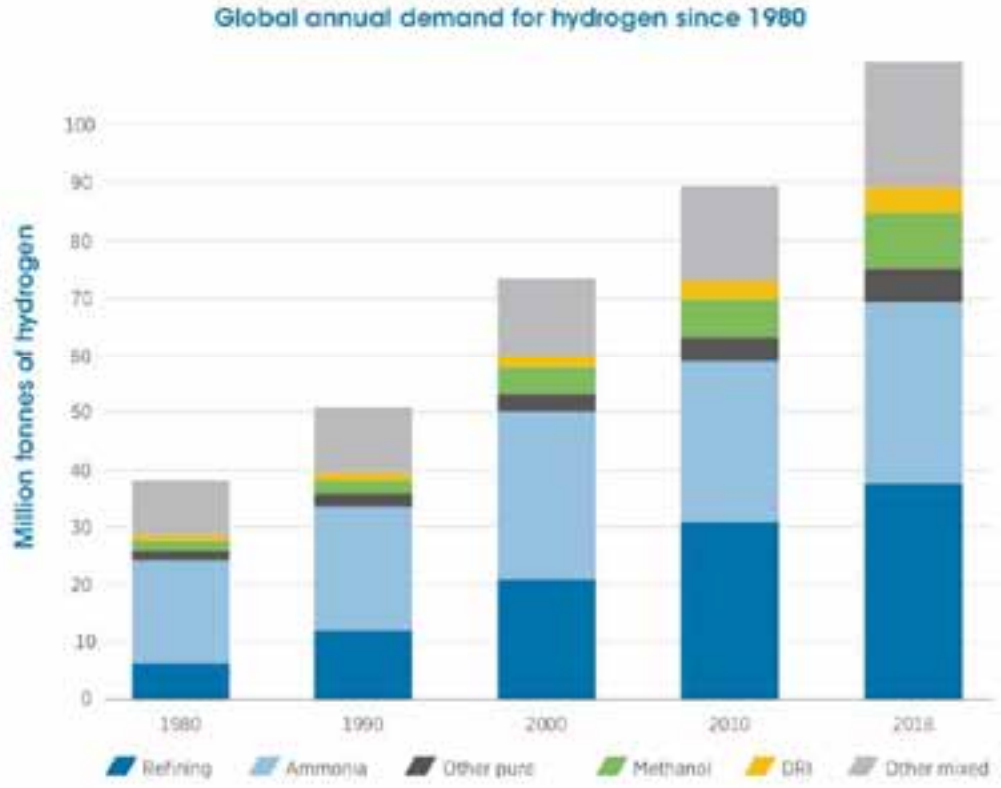
Fairness of transition
(support for commuters)

Comparing the monthly consumption of electricity and gas in the European Union



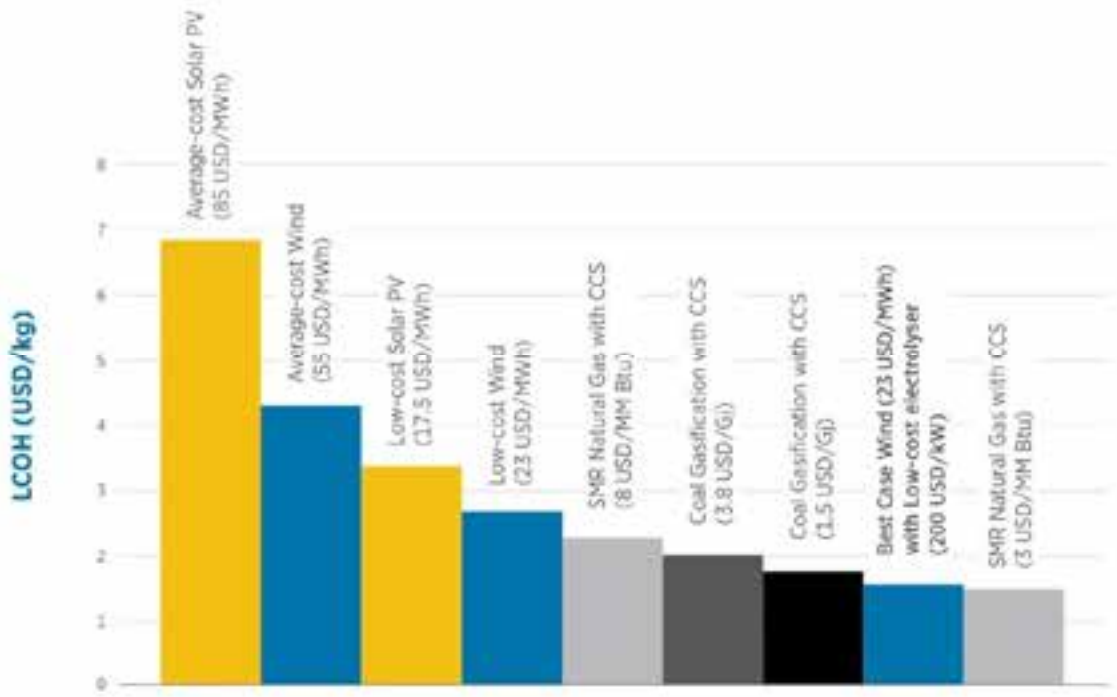
Source: European Commission (2017), Energy storage – the role of electricity.

Hydrogen use trends, 1980 to 2018



Source: IEA, 2019

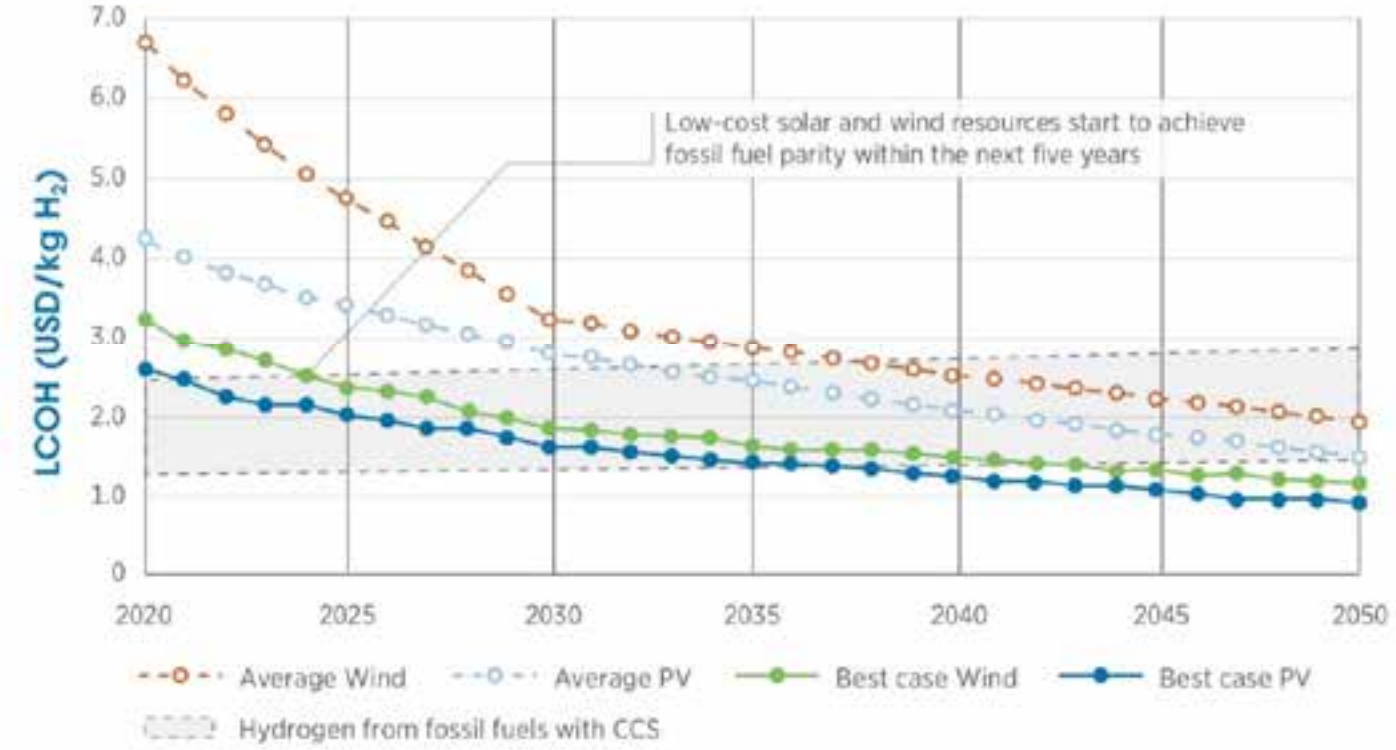
Costs of producing hydrogen from renewables and fossil fuels today



Notes: Electrolyser capex: USD 840/kW; Efficiency: 65%; Electrolyser load factor equals to either solar or wind reference capacity factors. For sake of simplicity, all reference capacity factors are set at 48% for wind farms and 26% for solar PV systems.

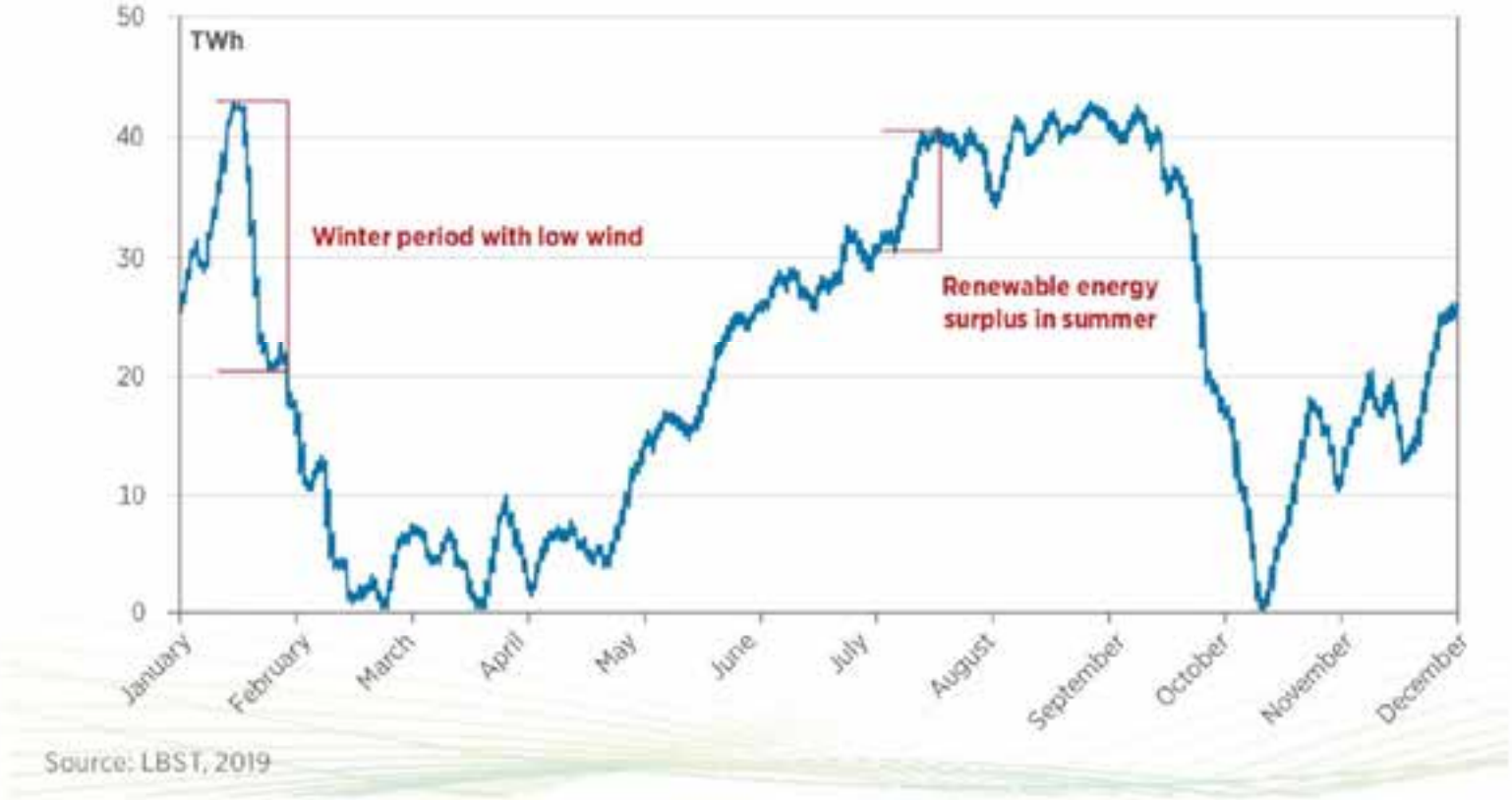
Source: IRENA analysis

Hydrogen production costs from solar and wind vs. fossil fuels



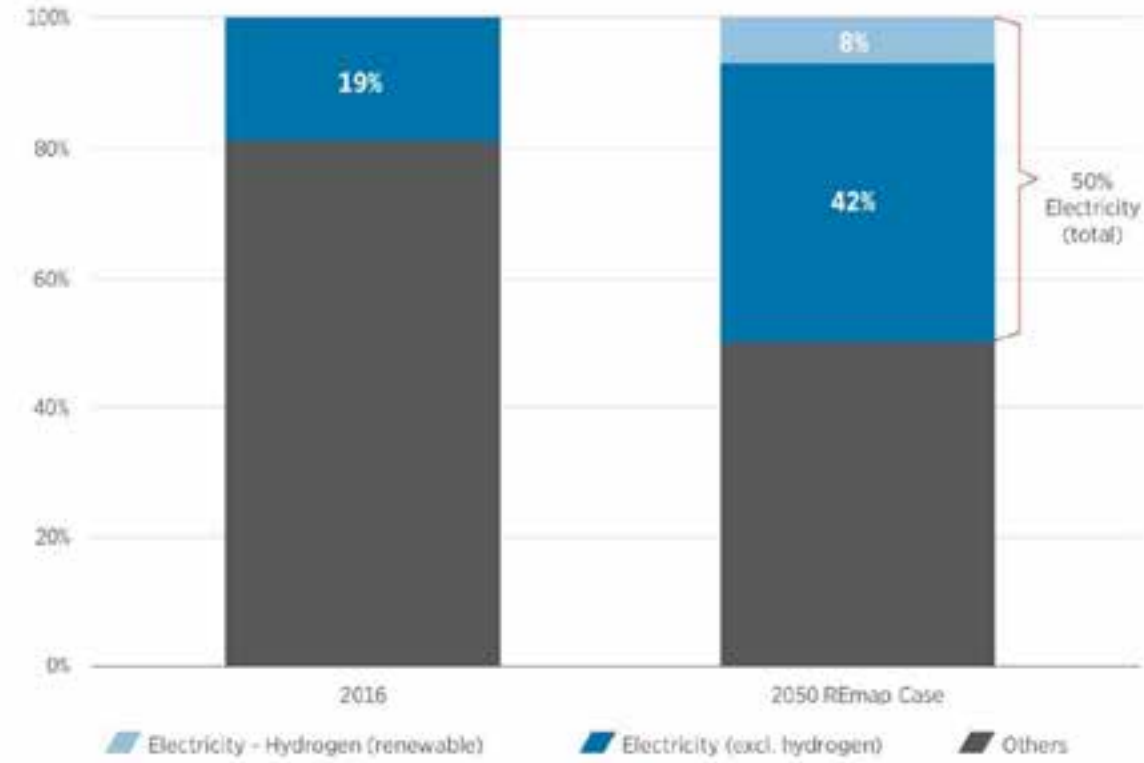
Note: Remaining CO_2 emissions are from fossil fuel hydrogen production with CCS.

Hydrogen storage profile in 2050



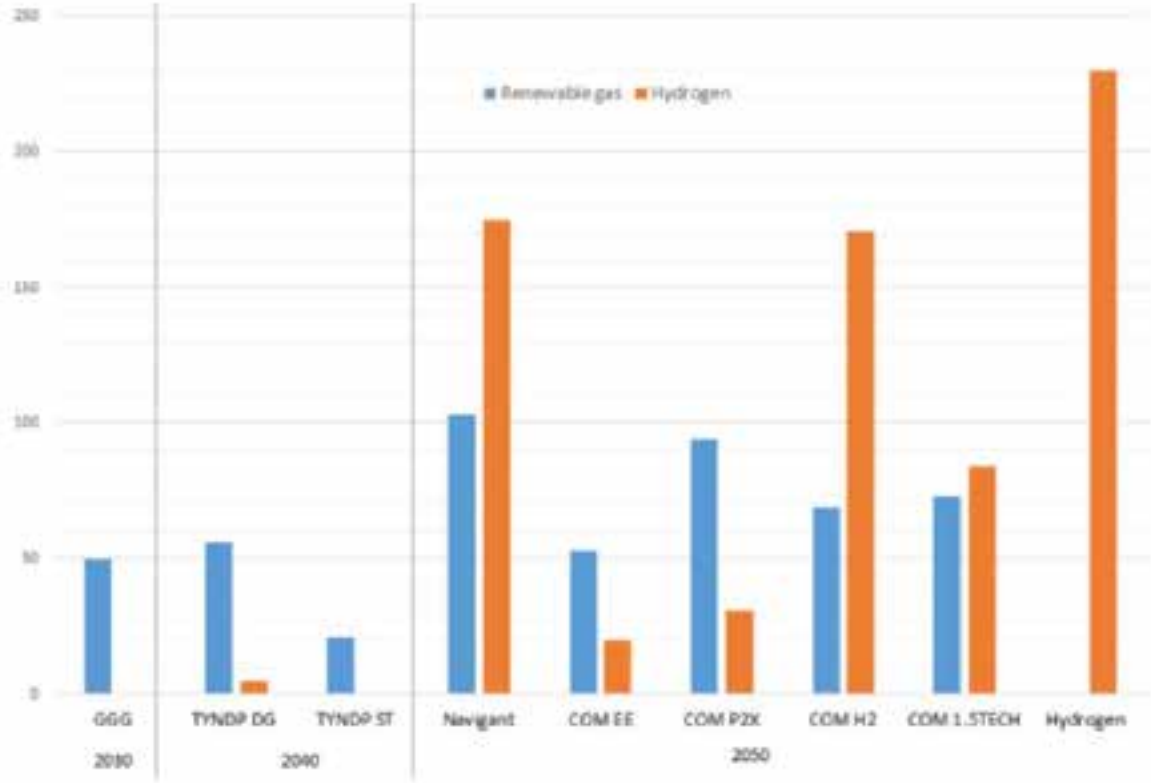
Source: LBST, 2019

Electricity in total energy consumption (EJ/yr)



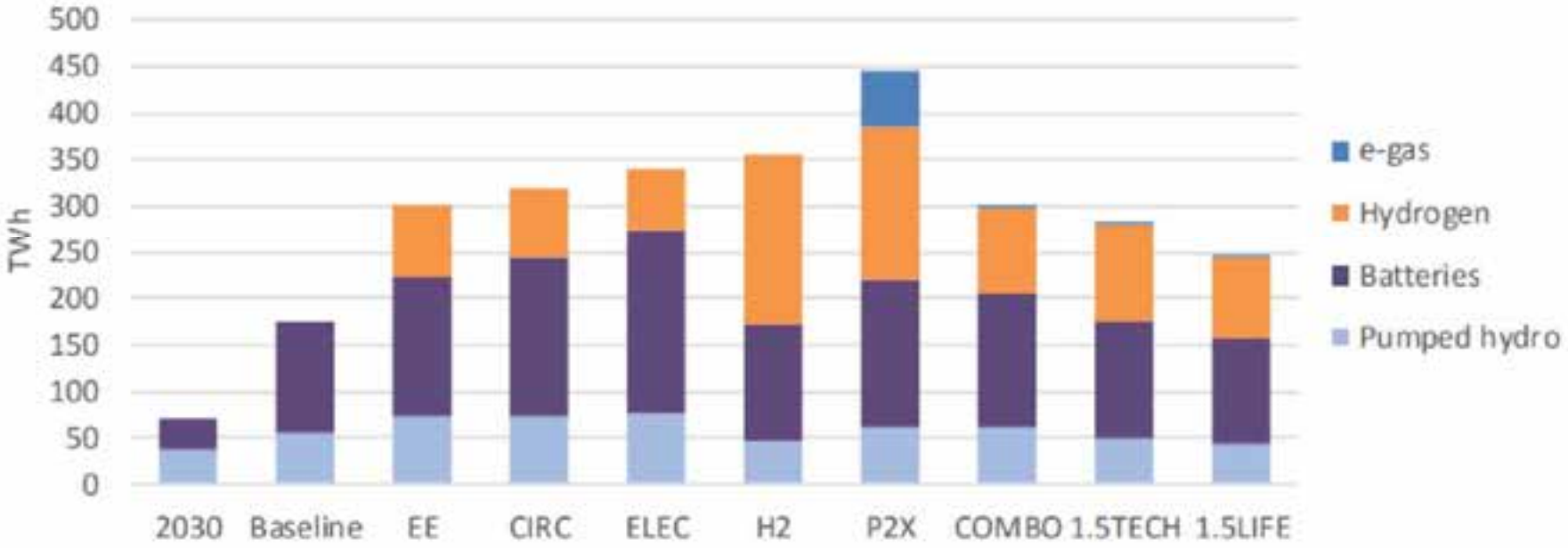
Source: IRENA, 2019a

Production projections for renewable gas and hydrogen (bcm)



Source: GGG (2014); TYNDP (2018); Navigant (2019); European Commission (2018); Hydrogen (2019).

Storage in 2050



Source: PRIMES.

Three Pillar Strategy

Strong electrification on the basis of RES

Greening of molecules and low carbon molecules

Sector Coupling / integration (P2X, grids, dem and side)

Principles for effective transition

Competitive markets deliver efficient outcomes

Energy markets need clear and well-designed rules

Participants in the energy markets must have the right incentives - to operate efficiently in the short term; to invest adequately in the mid- and long-term; to internalise environmental costs; to innovate

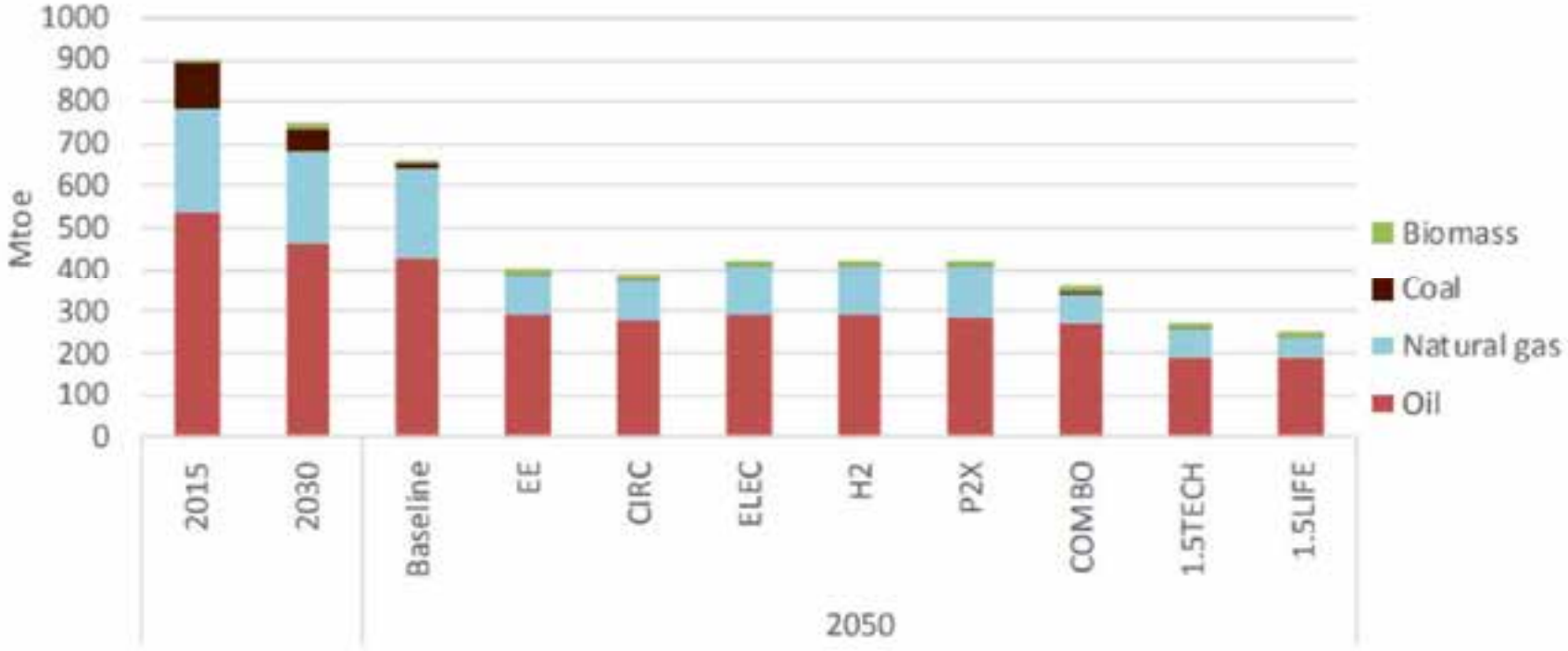
New Commission - new ambitions

Europe's carbon neutrality by 2050

European Green Deal

Carbon Border Tax (Border Carbon Adjustments)

Energy imports



Source: Eurostat (2015), PRIMES.

PART 3

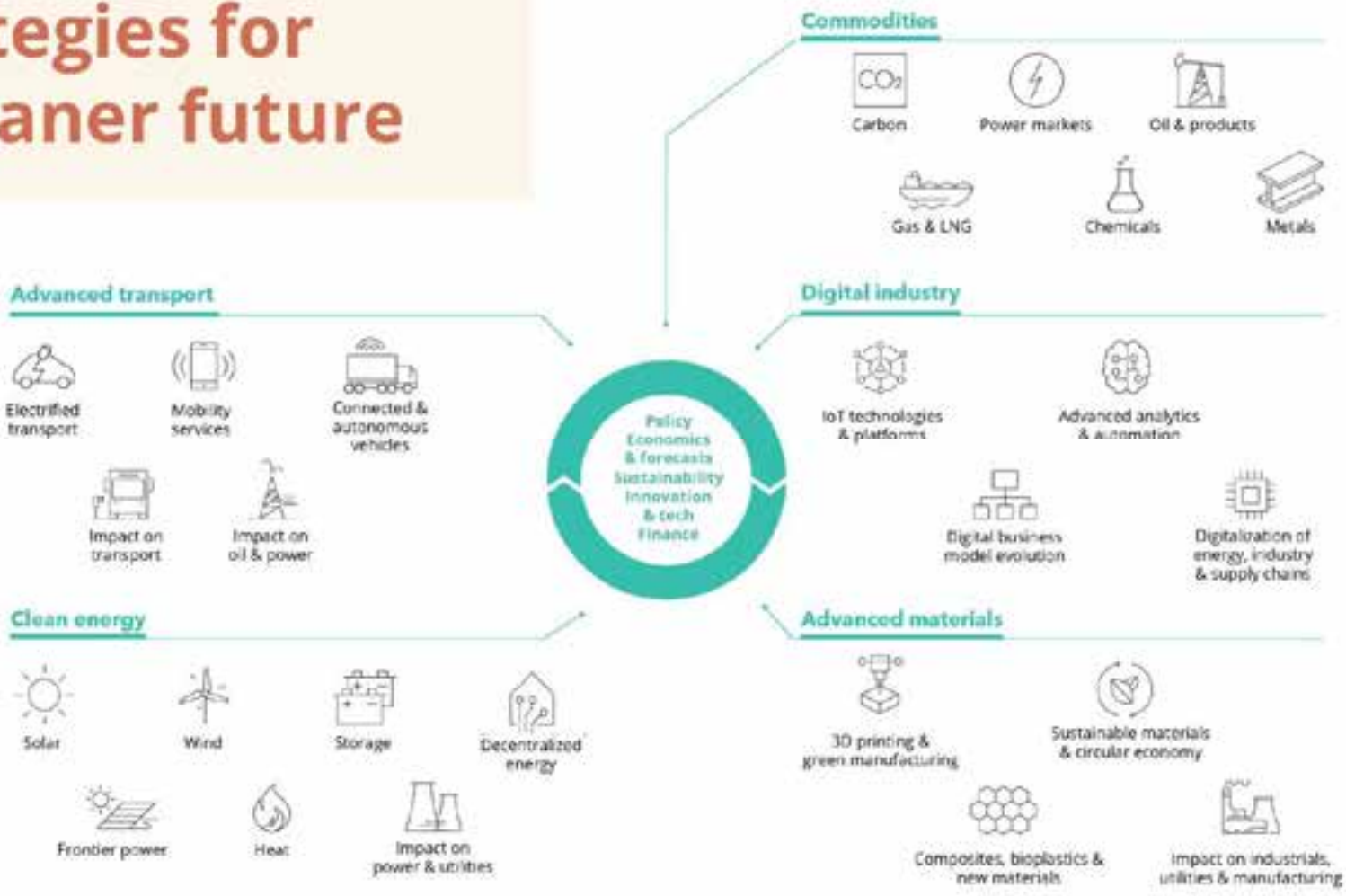
It may get worse before it gets better, but it will get better

I have an impossibility theorem that says that **democracy**, **national sovereignty** and **global economic integration** are mutually incompatible; we can combine any two of the three, but never have all three simultaneously and in full.

Dani Rodrick

"Recasting the globalisation narrative"

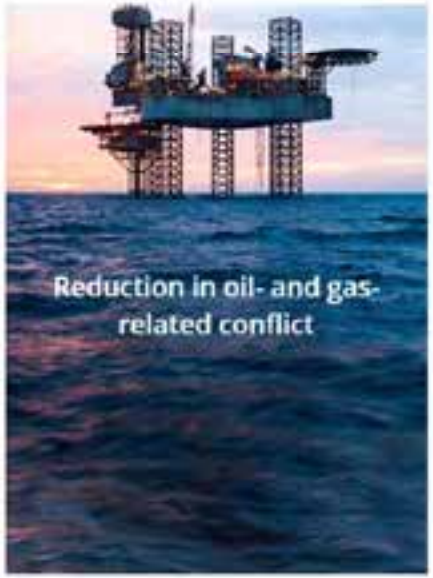
Strategies for a cleaner future

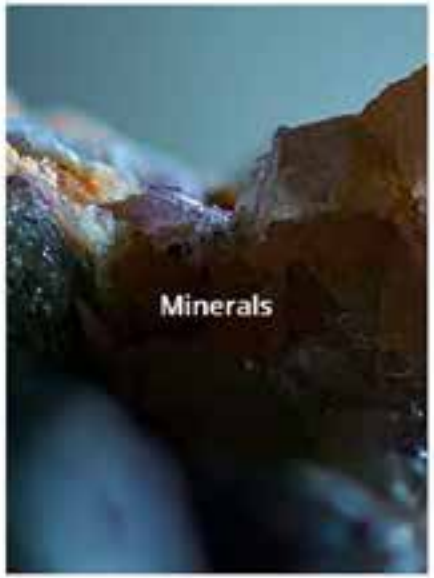


Energy and conflict

The pivot to renewables will reduce the incidence of certain kinds of conflict, and alleviate competition for important natural resources, notably oil, gas, water, and food.

Cybersecurity, technology dominance and access to important minerals may generate tensions.





Challenges

Countries must prepare for the changes ahead and develop strategies to enhance the prospects of a smooth transition.

Fossil fuel-exporting countries may face instability if they do not diversify their economies and prepare for a new energy age;

A rapid shift away from fossil fuels could create a financial shock with significant consequences for the global economy;

Workers and communities who depend on fossil fuels may be hit adversely;

Risks may emerge with regard to cybersecurity and new dependencies on certain minerals.

Opportunities

Overall the benefits of the global energy transformation outweigh the challenges. It will:

- Strengthen the energy security and energy independence of most countries;
- Promote prosperity and job creation;
- Improve food and water security;
- Enhance sustainability and equity;
- Allow some states to leapfrog technologies based on fossil fuels;
- Reduce the number of energy-related conflicts.

Opportunities outweigh risks