

EU towards 2050 and the energy security concerns

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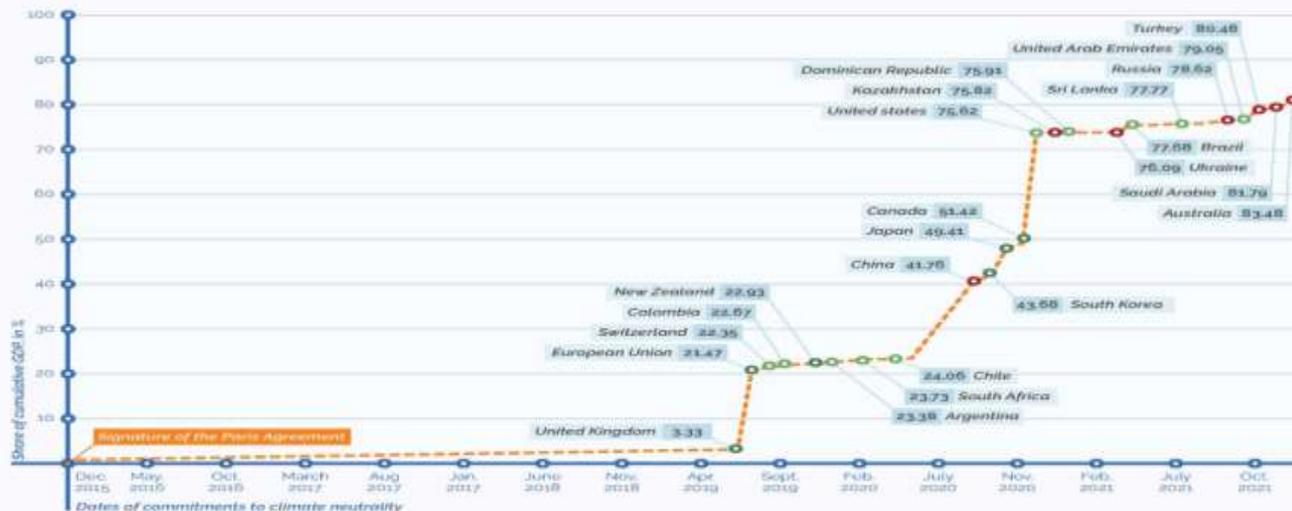
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WHAT HAPPENED SINCE WE MET LAST YEAR

- **COVID:** pandemic not over, but economies recovering strongly, wiping out all CO2 emission reductions achieved in 2020
- **Energy price spikes:**
 - ↳ Good for renewables, thus for decarbonization?
 - ↳ A threat for energy security, signaling the need to keep fossil fuel industry alive?
 - ➔ Need to reinforce ability to face energy crises
- **Fit For 55 Package to implement EU Green Deal:** a comprehensive set of directives and regulations to reduce CO2 emissions by 55% by 2030 and get on track toward carbon neutrality. First train issued in July, second train on 14 December
- **COP26:** net zero commitments now the norm, no more financing of coal, agreement to tackle methane emissions, ... but not enough to reach Paris Agreement objectives

CARBON NEUTRALITY SPREADING THROUGHOUT THE WORLD

After the EU committed to achieve climate neutrality by 2050, the world's largest economies have followed suit.



- Decisions to "achieve climate neutrality by 2050" enshrined in law.
- Decisions to "achieve climate neutrality by 2050" announced.
- Decisions to "achieve climate or carbon neutrality" by 2060 at the latest" announced.

2. Climate neutrality aims to reduce all greenhouse gases (GHGs), while carbon neutrality only aims to reduce carbon dioxide (CO₂) emissions.

Source: Jacques Delors Institute, based on 2021 forecast data from the International Monetary Fund (IMF) and the Climate Watch Net-Zero Tracker (last accessed October 18, 2021).

Note: This graph lists the commitments of the world's 50 largest economies. More countries outside of this ranking have adopted climate neutrality goals. The list can be viewed [here](#).

All of the largest economies that aim for climate or carbon neutrality by 2050-2060 account for more than **80% of global GDP!** By delivering on their commitments together, they have what it takes to stabilise the climate.

EU GREEN DEAL DRIVES CARBON NEUTRALITY

FIT FOR 55 PACKAGE IS THE IMPLEMENTATION INSTRUMENT

Interim target for 2030: -55%
In Climate Law to reach carbon neutrality in 2050



The most important endeavor since the creation of the Single Market: articulating **climate, innovation and social justice**

Beyond energy:

An industrial strategy to innovate and to develop new technologies while creating new markets.

Making Europe a leader in low carbon technologies.
Hydrogen Alliance

CBAM to prevent carbon leakages

Beyond Europe:

Green Agenda for Western Balkans

New Agenda for Mediterranean

New strategy on international energy engagement being prepared by EC

WHAT IS ENERGY SECURITY?

- A polyseme (a concept widely used, but no consensus on its meaning or precise definition)
- According to the IEA (which was created in 1974 to address the first serious security concerns following the first Arab oil embargo): the uninterrupted availability of energy sources at an affordable price, irrespective of economic or political instability
- This definition of long-term security of energy supply has increasingly been complemented recently, due to the rapidly increasing RE penetration, with concepts specific to the electricity system: power system reliability and grid stability
- Typical energy security indicators include:
 - ❖ Self sufficiency (or the opposite, degree of import dependency)-- overall and by fuel
 - ❖ Number of external suppliers, and market share of dominant supplier
 - ❖ Primary energy mix
 - ❖ Etc.....

ENERGY SECURITY: FROM SELF SUFFICIENCY TO COOPERATION AND MARKET INTEGRATION



ENERGY SECURITY AND DECARBONIZATION

CONVERGENCE OR DIVERGENCE?

- Paris Agreement and other climate commitments require massive RE scale-up and increased electrification
- RE are usually national energy sources, so increasing the RE penetration results in a higher level of self-sufficiency. But is autarchy synonymous to energy security?
- Moreover, production of Variable Renewable Energy (VRE) is difficult to control, more decentralized and not always available when and where needed=> threat to power system reliability and to energy security
- To cope with a high RE penetration, power systems need flexibility, and regional electricity market integration is a good way to deliver that flexibility without hurting the other objectives of security and affordability

REGIONAL ENERGY MARKET INTEGRATION BENEFITS

INCLUDE ENHANCED ENERGY SECURITY AND RES SCALE-UP SUPPORT

- Enhanced energy security???? (depends on definition)
- Increased power system flexibility and reliability
- Smoothing of load duration curve
- Optimized use of infrastructure and more efficient dispatch of power plants=> lower cost of supply
- Economies-of-scale on generating plants serving multiple markets
- Reduced CO2 emissions

=> Increased exchanges across borders

Might be the best solution to reconcile different objectives— for a secure low-carbon energy supply at least cost. Possible threat to energy security?

EURO-MEDITERRANEAN ENERGY MARKET INTEGRATION FACILITATES DECARBONIZATION...

Countries of the southern and eastern Mediterranean shores are rich in carbon-free energy resources and creating an integrated Euro-Mediterranean market would increase power system flexibility, thus supporting renewable energy scale-up

Key highlights of EU Green Deal are the need to increase cross-border trade and regional cooperation, to better share clean energy sources and to interconnect energy systems.



In the next software update, here the stats will be shown for the selected area

Delete and start drawing a new one

.... AND INCREASES ENERGY SECURITY BOTH FOR EUROPE AND SOUTHERN/EASTERN MED SHORE

MEDITERRANEAN INTEGRATION REQUIRES INFRA (HARDWARE)... ... AND MORE (SOFTWARE)

- ❑ Hardware: interconnectors (CEF)
 - Morocco-Spain already connected
 - Turkey connected to Greece and Bulgaria
 - Several projects, but slow moving:
 - Tunisia-Italy (ELMED PIC, TuNur)
 - Algeria-Spain and Algeria-Italy
 - Israel-Cyprus-Crete (PIC)
 - Egypt-Cyprus-Crete (PIC)



- ❑ Gas transport infrastructure underutilised, could be used for hydrogen (or blend)
 - MEG no longer used to export Algerian gas (can be used for green hydrogen?)
 - Medgaz ????
 - Trans-Med declining use trend to persist
 - Average utilisation of LNG terminals < 25%



- ❑ More
 - Sector Coupling, optimize across energy forms
 - Some harmonization of market design and convergence in market operations
 - Cooperation between national TSOs (and between gas and electricity SO) and National Regulatory Authorities ... and political will to work together

... in summary, think whole energy system and regionally/globally

Thank you

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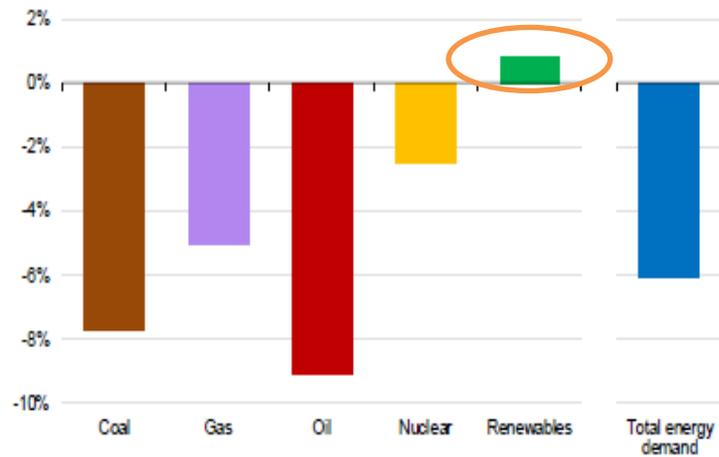
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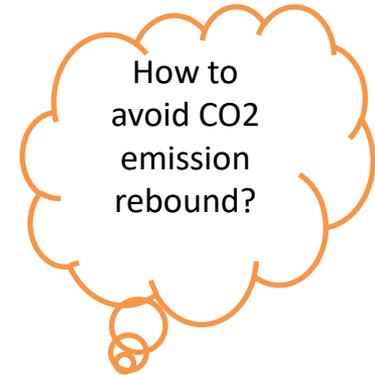
Back-up Slides

COVID-19 pandemic resulted in the largest ever annual fall in CO2 emissions

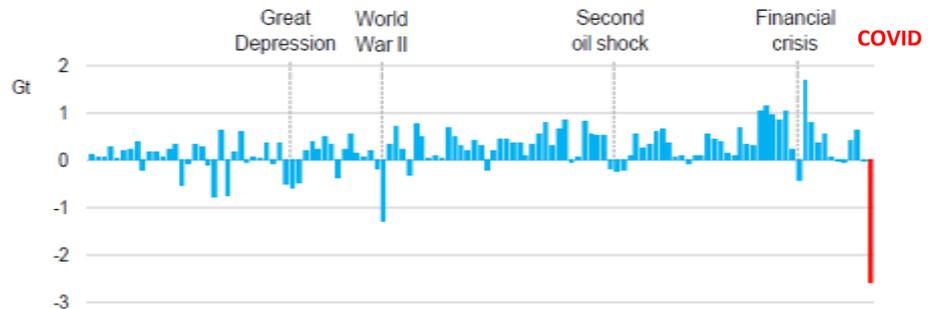
Projected change in primary energy demand by fuel in 2020 relative to 2019



Source IEA Global Energy Review 2020



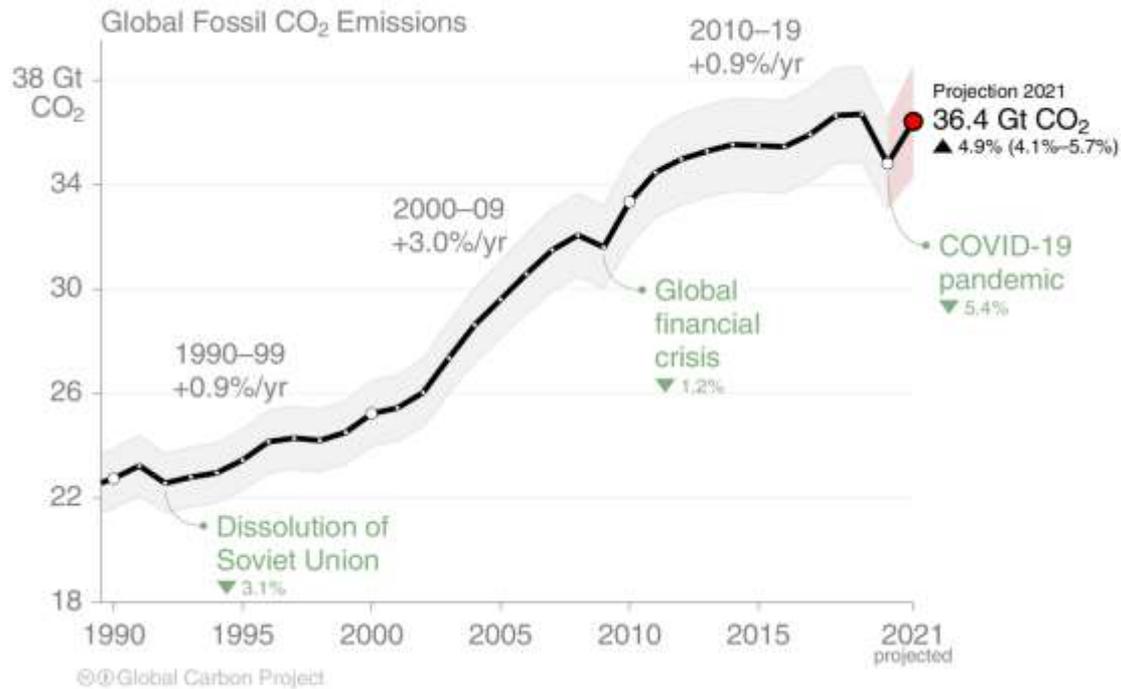
Annual Change in energy-related CO2 emissions, 1900-2020



Global Fossil CO₂ Emissions

Global fossil CO₂ emissions: 34.8 ± 2 GtCO₂ in 2020, 53% over 1990

- Projection for 2021: 36.4 ± 2 GtCO₂, 4.9% [4.1%–5.7%] higher than 2020



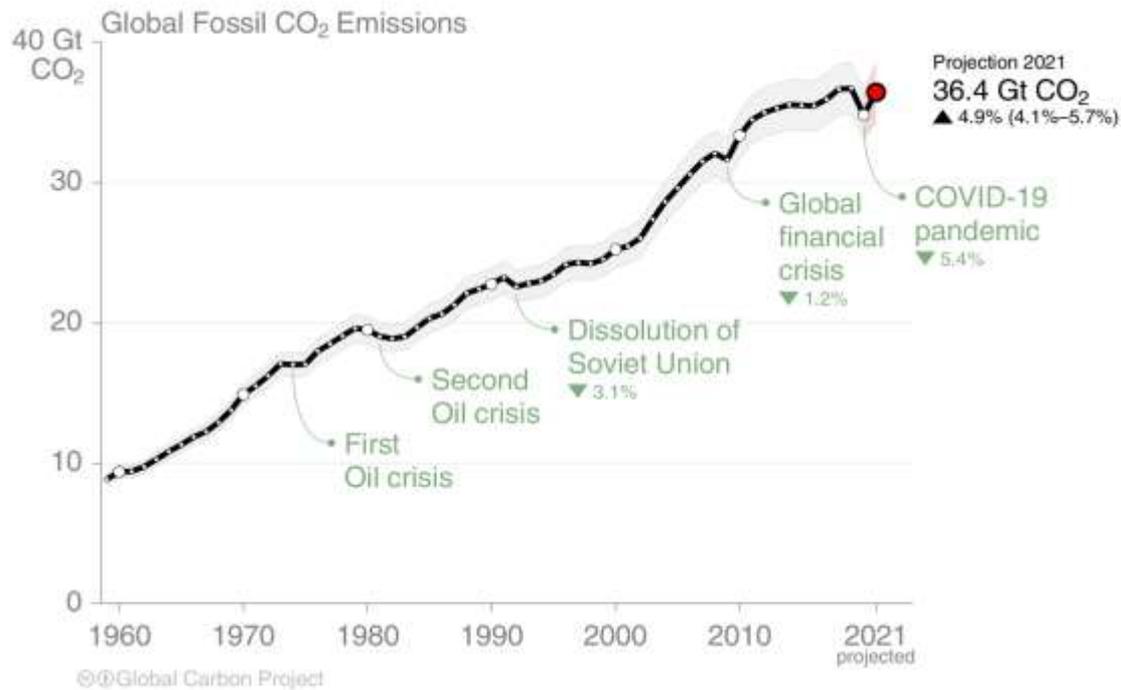
Uncertainty is ±5% for one standard deviation (IPCC “likely” range)

The 2021 projection is based on preliminary data and modelling.

Source: [Friedlingstein et al 2021](#); [Global Carbon Project 2021](#)

Global Fossil CO₂ Emissions

Global fossil CO₂ emissions have risen steadily over the last decades. Emissions in 2021 are set to rebound towards their pre-COVID-19 levels after an unprecedented drop in 2020.



The 2021 projection is based on preliminary data and modelling.

Source: [Friedlingstein et al 2021](#); [Global Carbon Project 2021](#)

POWER SYSTEM FLEXIBILITY

THE PROBLEM AND THE SOLUTIONS

Dispatchable
power plants

Demand side
Response

Energy storage
facilities

Interconnection
with adjacent
markets

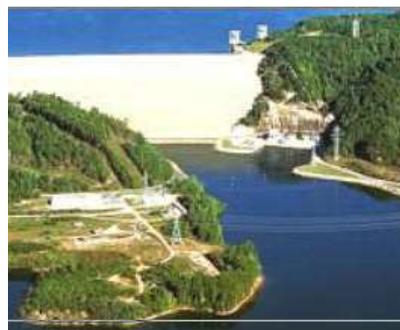


Gas-fired
power plant



Industrial

residential



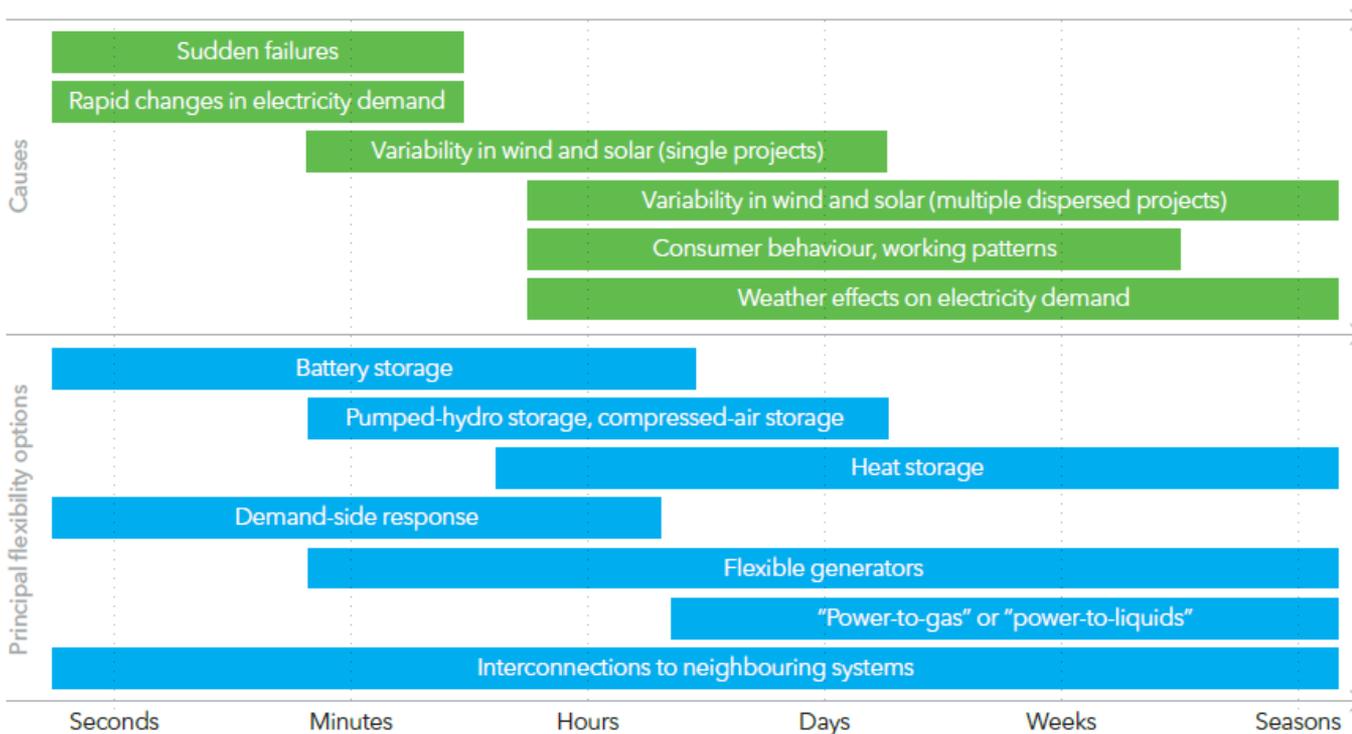
Pumped hydro
facility



Scandinavian
interconnections

Numerous definitions but flexibility can generally be defined as the ability of the power system to cope with sudden and unexpected changes in demand/supply

Flexibility issues by timescale



Sector coupling, also a source of flexibility (DSR, storage)

- Concept initiated with the coupling of the transport sector with the power sector: use electric vehicles (EV) as batteries and let power flow from EV to the grid (V2G)– since cars are parked 95% of the time
- Massive electrification of end-use sectors create new loads high in capacity but low in energy, if not properly managed. But if end-use sectors are coupled with each other and with power sector, DSR potential and storage solutions are increased
- Coupling electricity and gas (incl green gas and hydrogen) sectors is also a source of flexibility