

# *Global Vision of the Energy Transition*



Energy Transition Forum 2023  
Ecopetrol

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*International Energy Agency Global Innovation Network*

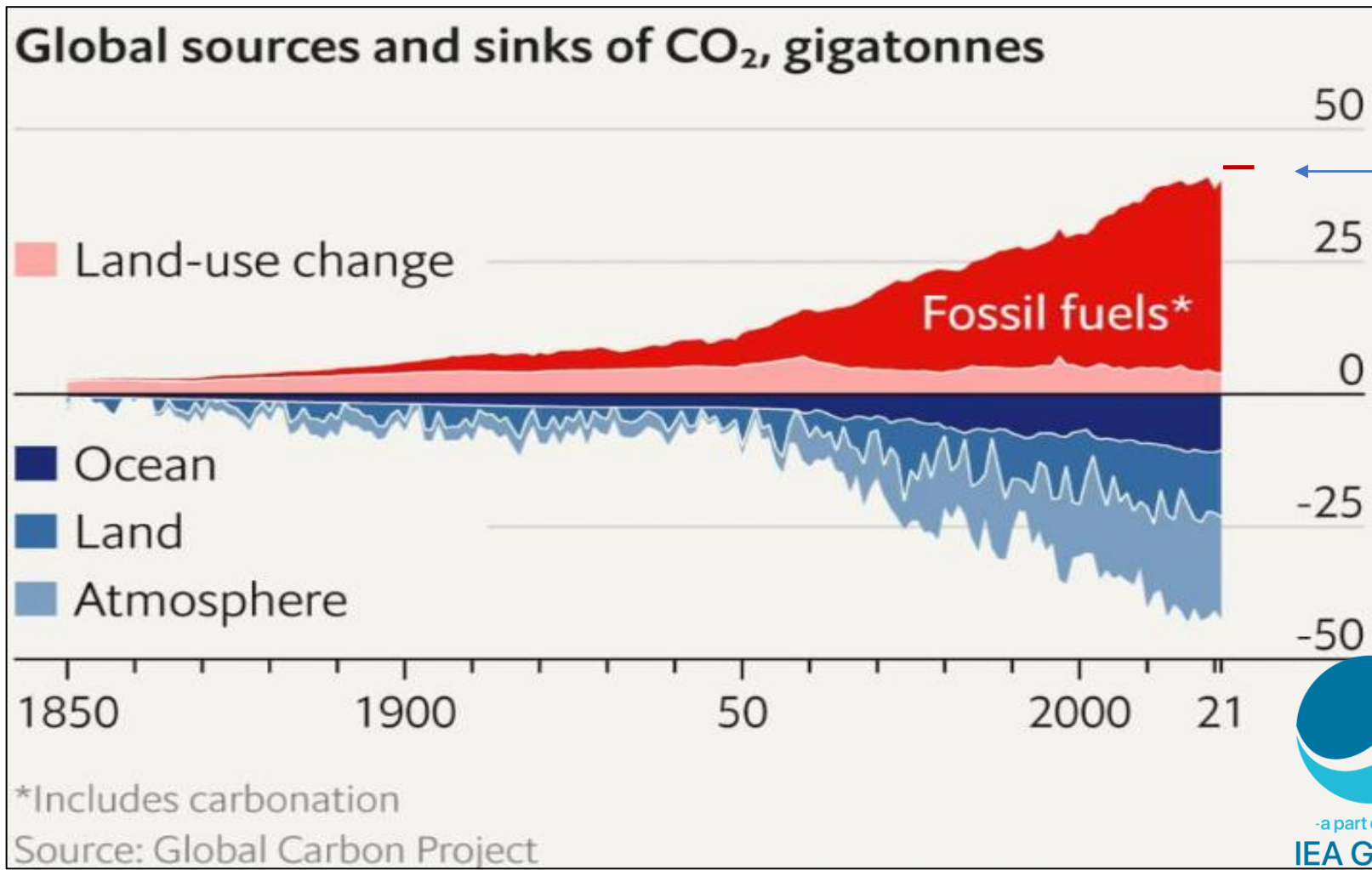


Technology Collaboration Programme

by **iea**

# Urgency: 2022 Marked the highest accumulate CO2 emissions to date

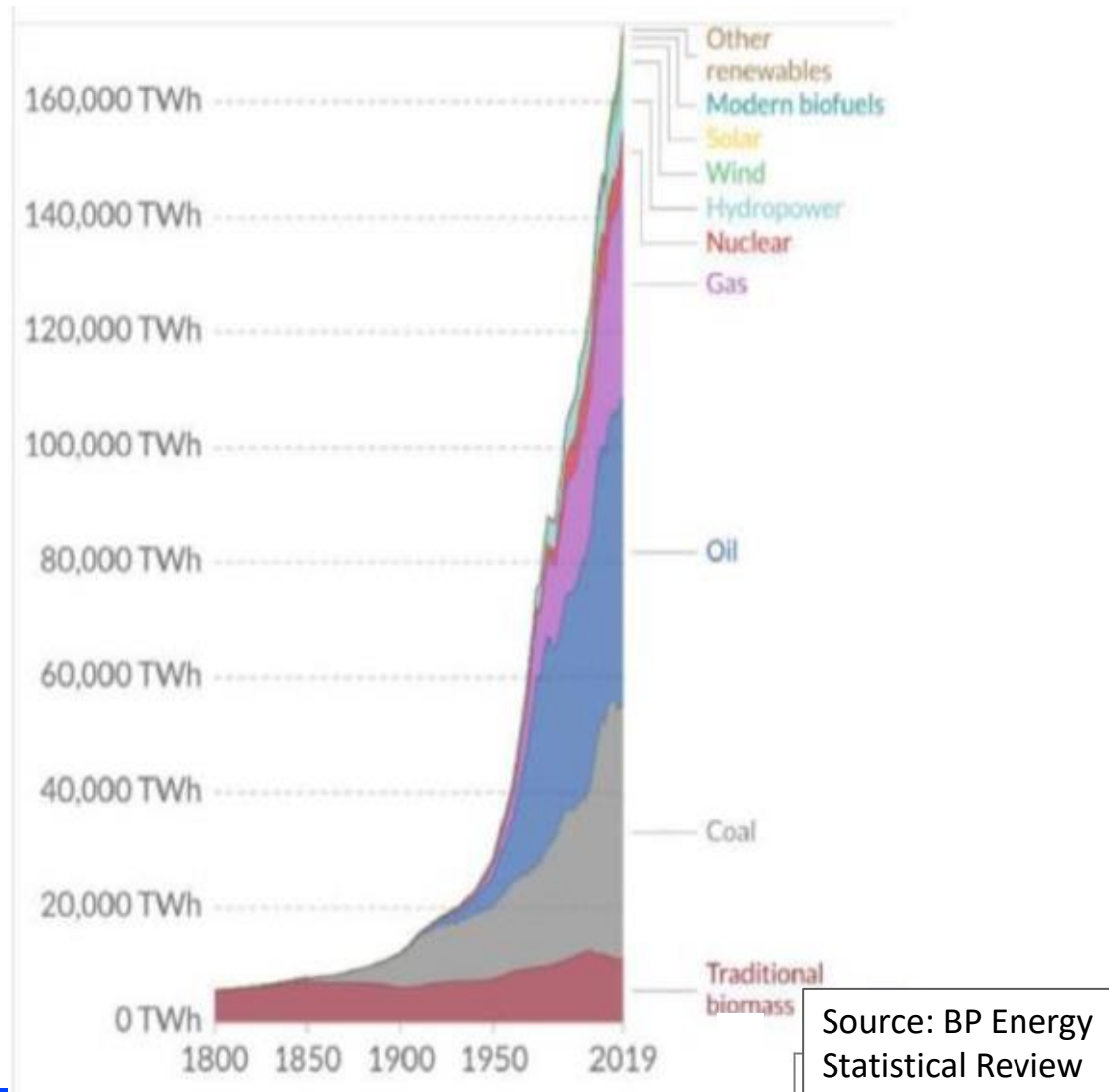
## Acceleration of technology is on a highly critical path!



2022 historic peak in CO2 emissions



The last century has witnessed massive energy growth, with multiple transitions from biomass to solids, to hydrocarbons



An electron based energy system has long been on the agenda, but has still to emerge overall



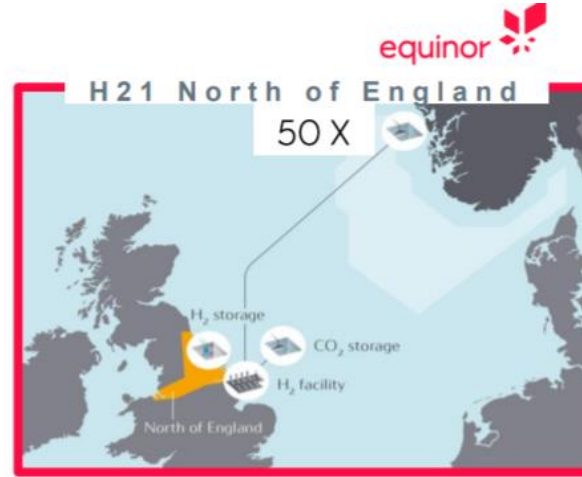
**24 March 1977: President Carter:**  
US Federal Solar Energy Research Institute, Golden Colorado  
*«improve the ways to harness and use the energy from the sun»*

# Replacing Natural Gas in Europe – what does it take?

## Understanding the Challenge

Natural Gas currently provides Europe with more than 1500 TWh of flexible energy.

**What is 1500 TWh?**



Benchmarks:

- Global car fleet: 1,45 bill.
- Global EV-fleet, 14,5 mill.

Vehicle

20 000 000 000 X



Battery park

11 600 000 X



Hydro

200 X



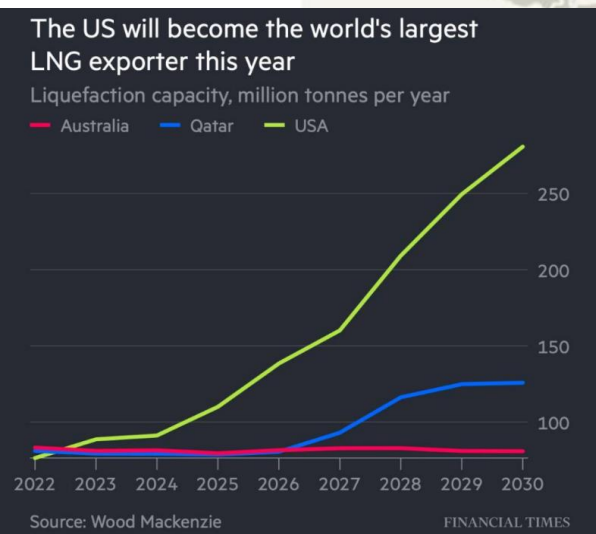
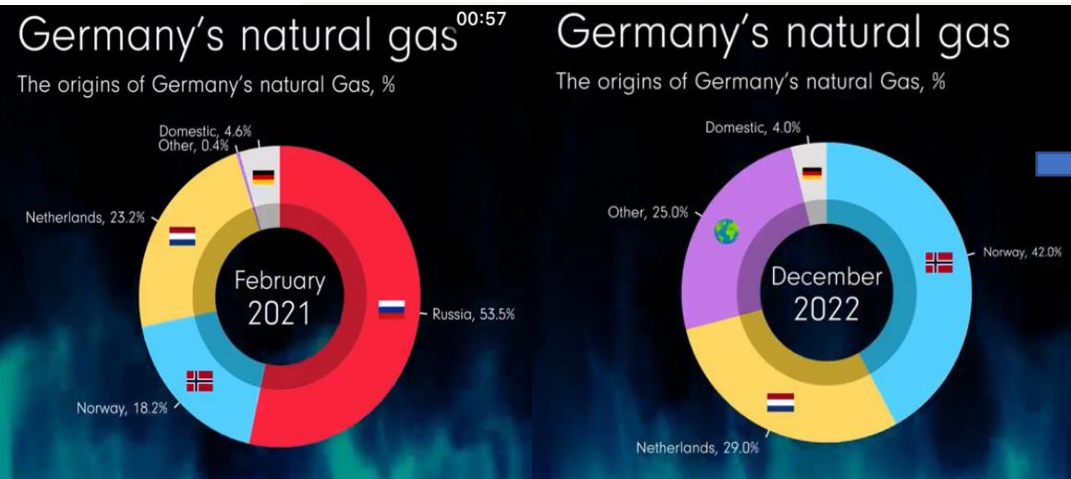
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Source: Equinor



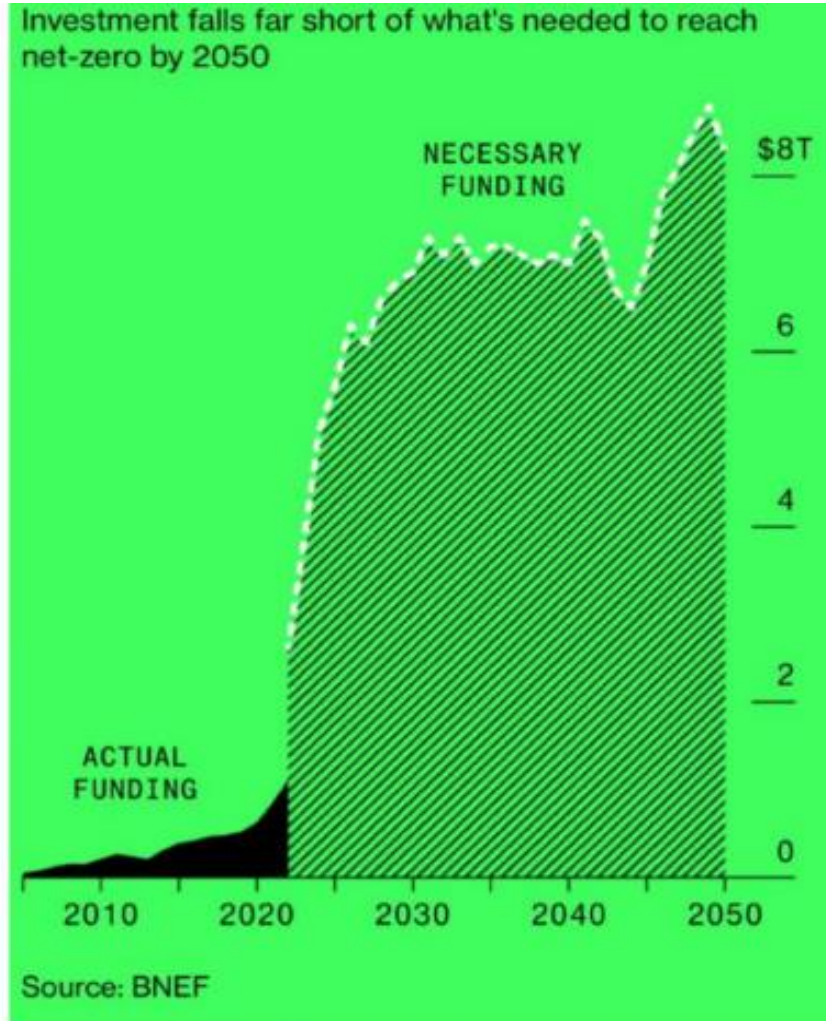
# Extended role of non-Russian gas in a post Ukraine context



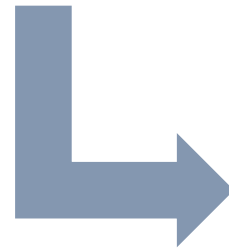
Source map:  
The Economist



# Climate funding gap remains huge



Today's market designs and policy frameworks do not bring the required investments in clean technology for a just transition.



Acceleration mechanisms:

- Early Market Ecosystems & Value Chains
- Early Mover Alliances

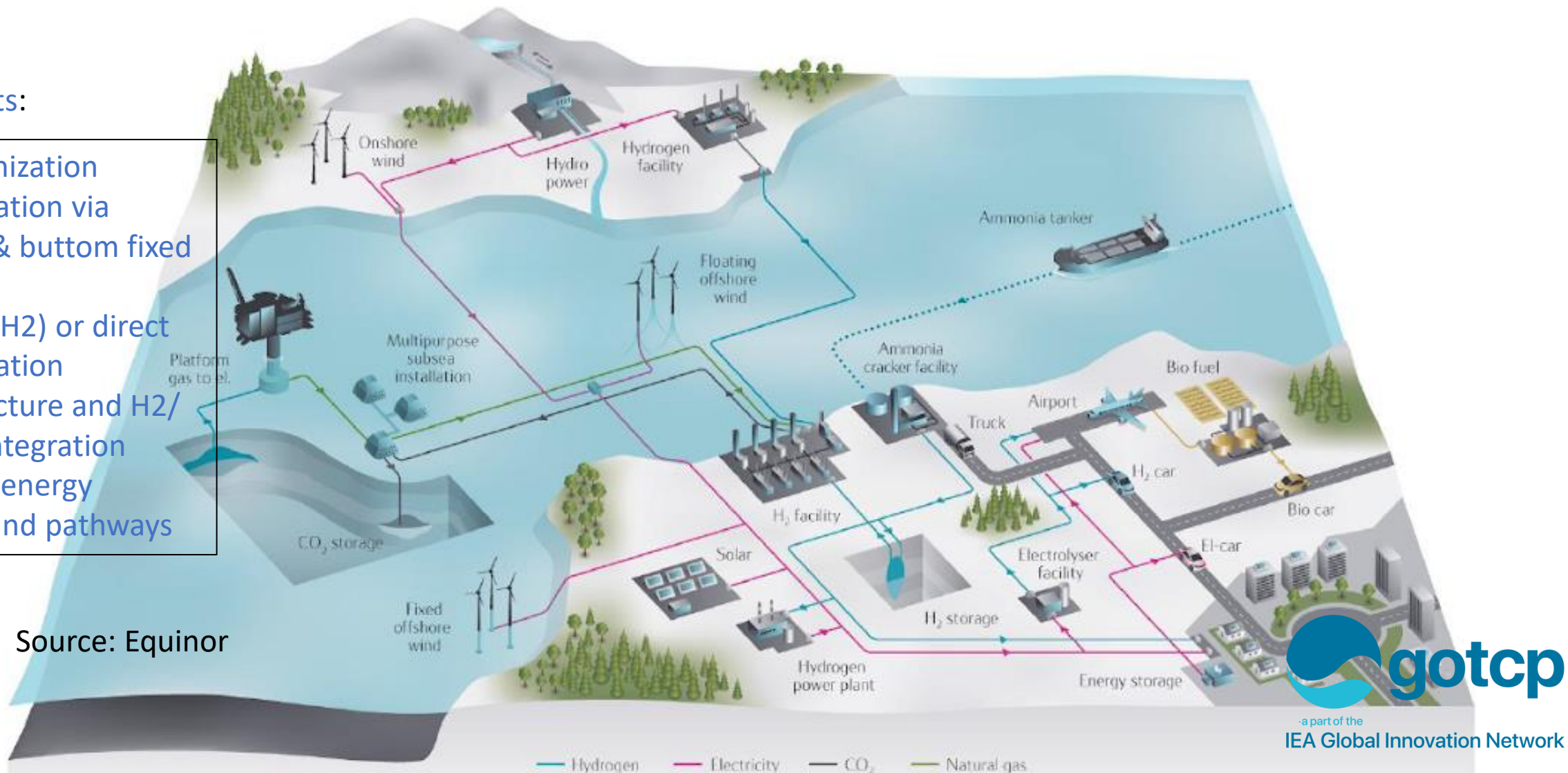




# Just Technology Scale up needed in Energy Transition Hubs

## Key elements:

- Decarbonization
- Electrification via floating & bottom fixed wind
- Indirect (H<sub>2</sub>) or direct electrification
- Infrastructure and H<sub>2</sub>/energy integration
- National energy choices and pathways



# NW Europe: a Vision of Enhanced Energy Security for Transitional Growth

## 1st q 2023 collaborations initiated

### MoU-on nat. gas and H2 supply:

Equinor's CEO and President Anders Opedal  
 RWE's CEO Dr. Markus Krebber  
 in the presence of  
 Norway's PM Jonas Gahr Støre, and  
 Germany's Vice Chancellor Robert Habeck



Nato-EU-Norway-GER energy  
 infrastructure safety collaboration:



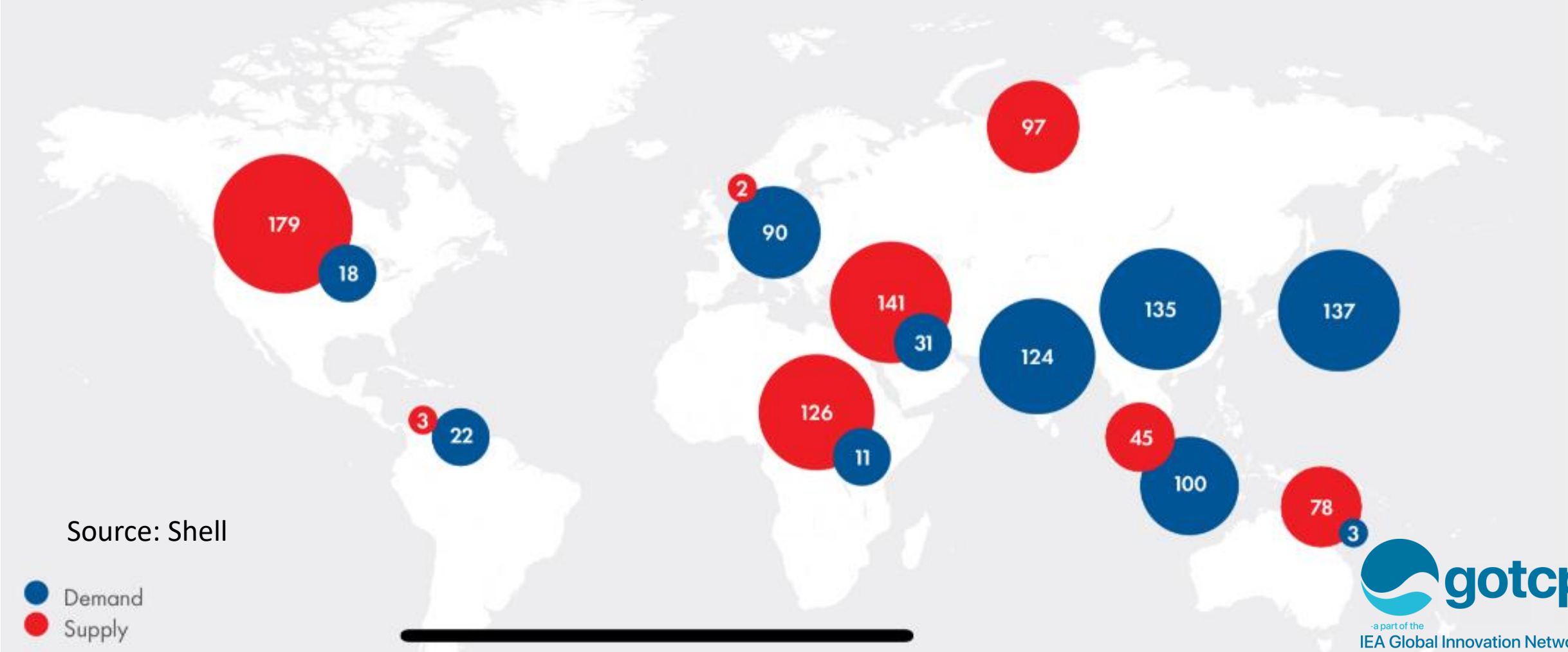
The EU Commission President Ursula von der Leyen,  
 Nato Secretary General Jens Stoltenberg &  
 Norway's PM Jonas Gahr Støre on the Troll platform,  
 Norwegian Continental Shelf





# Synchronizing supply & demand requires major trade hubs

Estimated LNG trade volumes in 2040, million tonnes

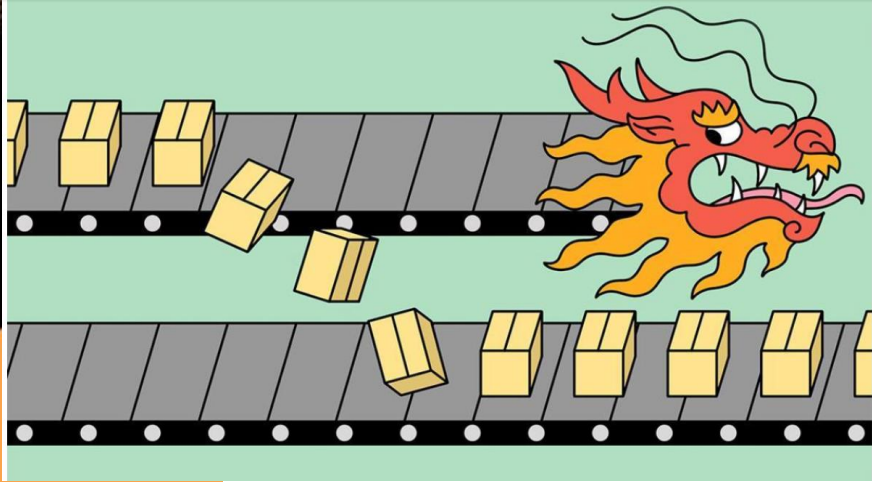


# Geopolitical rivalry challenges global value chains

Access to rear earth oxides and critical components



Exit China by global tech. suppliers





# GOT: 20+ global events on 4 continents to date

Transitional ..... Upstream oil and gas.....



Energy Transition Summit 2022  
Energy Transition Summits | May 3, 2022 | Kristiansand, Norway



Energy Transition Summit 2021  
Energy Transition Summits | October 28, 2021 | Stavanger, Norway



14th meeting of the GOT Executive Committee  
Hydrocarbon Renewable Nexus | July 8, 2019 | Washington D.C.



Offshore Mature Fields  
Brownfield Technologies | June 13, 2016 | London



Next Ten Years of Subsea and Deepwater Technology  
Greenfield Technologies | March 8, 2016 | Rio



Addressing Environmental Risks associated with Shale Gas and Oil through Worldwide R & D Workshop  
Greenfield Technologies | October 27, 2015 | Washington DC



Offshore Safety & Technology Innovation  
Greenfield Technologies | October 23, 2014 | Washington DC



Global Technology Exchange & GOT Task Area Work Sessions  
Scoping topics across workstreams | April 8, 2014 | Florence, Italy



The role of the renewable and hydrocarbon nexus in accelerating the energy transition  
Hydrocarbon Renewable Nexus | October 11, 2018 | Brussels



Nexus of Oil & Gas and Renewables in the Energy Future  
Hydrocarbon Renewable Nexus | September 27, 2017 | Golden, CO



Offshore Mature Fields – Extended Life and IOR  
Brownfield Technologies | June 8, 2017 | Trondheim, Norway



Peer Review of GOT Sponsored Studies of Offshore Greenfield and Shale Gas/Oil Technologies by Rystad Energy  
Greenfield Technologies | October 1, 2015 | Houston, Texas



GOT reframing:  
Transformative Technologies  
in  
Energy Transition Hubs, ETH



The Offshore Arctic under Lower Oil Prices  
Greenfield Technologies | January 25, 2017 | Tromsø, Norway



Competitiveness of Deepwater Technology  
Greenfield Technologies | October 27, 2016 | Rio de Janeiro, Brazil



Unconventional Resource Development Enhanced Recovery and Environmental Stewardship  
Unconventional Oil & Gas | October 12, 2016 | Austin

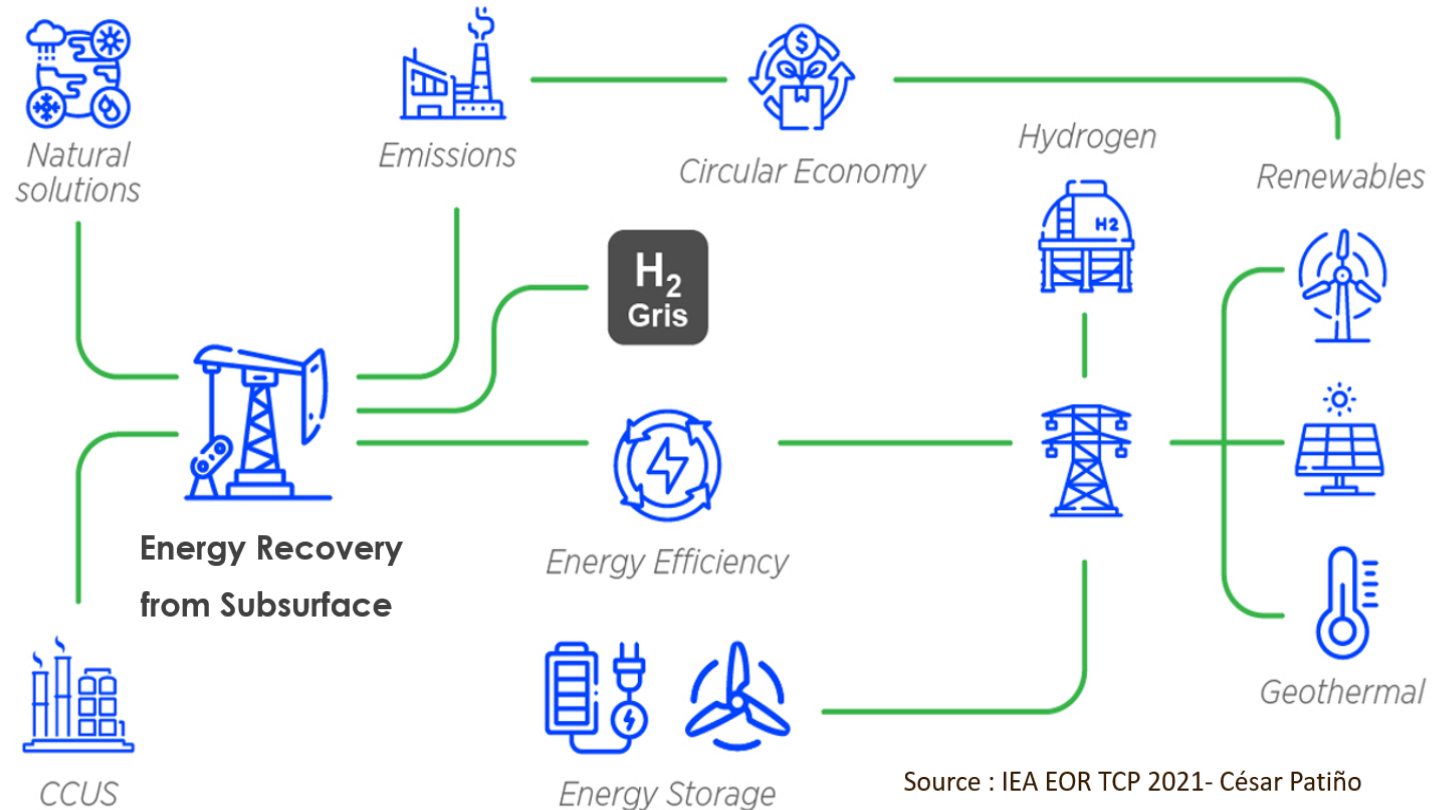


The role of the renewable and hydrocarbon nexus in accelerating energy transition  
Hydrocarbon Renewable Nexus | October 27, 2015 | Brussels, Belgium





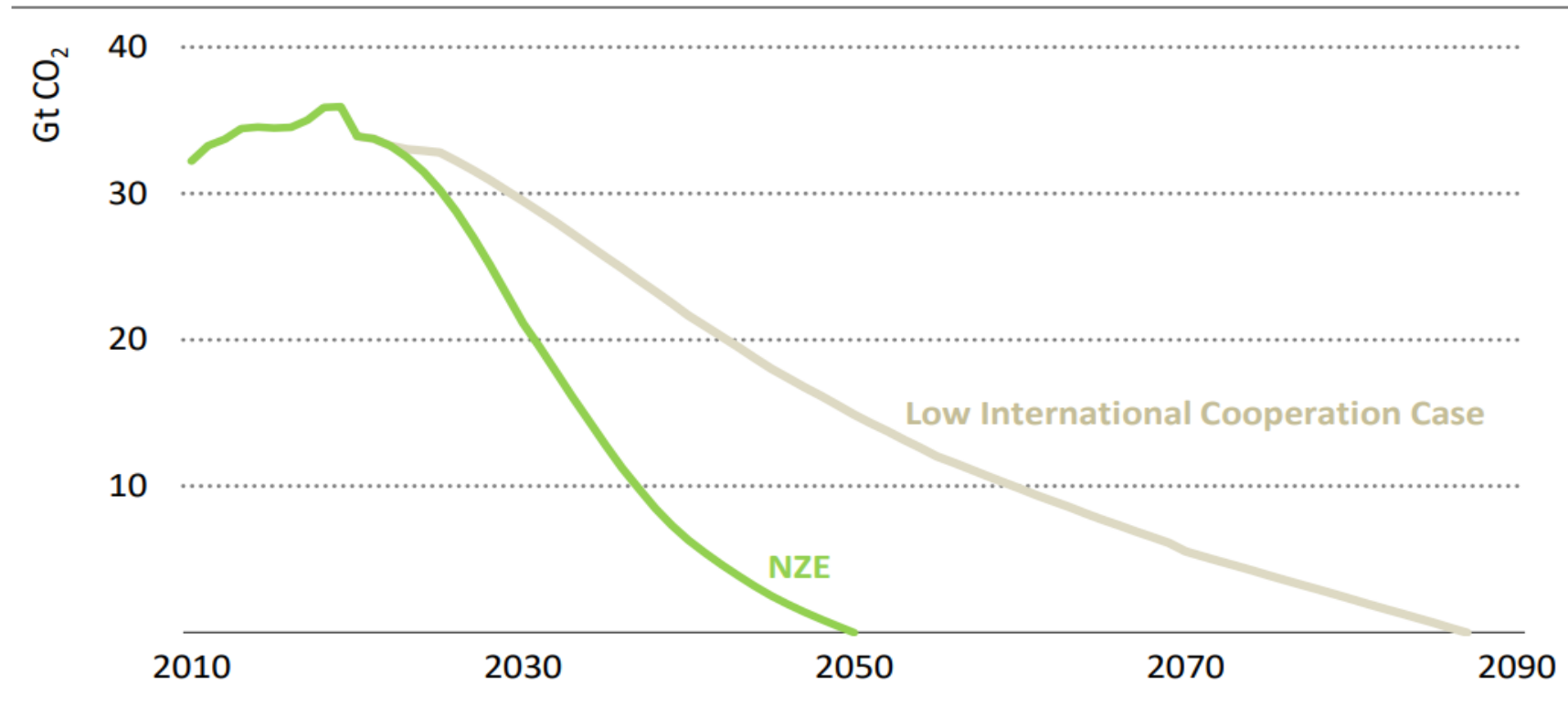
# Collaboration with IEA EOR TCP led by Ecopetrol



Source : IEA EOR TCP 2021- César Patiño

# Transition to global sustainability and security starts with collaboration

**Global energy-related CO<sub>2</sub> emissions in the net zero pathway and Low International Co-operation Case**



Note: Gt = gigatonnes.



Source: IEA 2021, *Net Zero by 2050: A Roadmap for the Global Energy Sector*, <https://www.iea.org/reports/net-zero-by-2050>. License CC BY 4.0



Thank you

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