Technical & Commercial Conference

Energy Transition Strategy

No Gas, No Transition - How to Stay on the Path

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150+
major LNG transactions

50+
lawyers focused on LNG

$750+ billion
negotiated in LNG sales agreements

85+
LNG vessels chartered (~20% of world fleet)

60+
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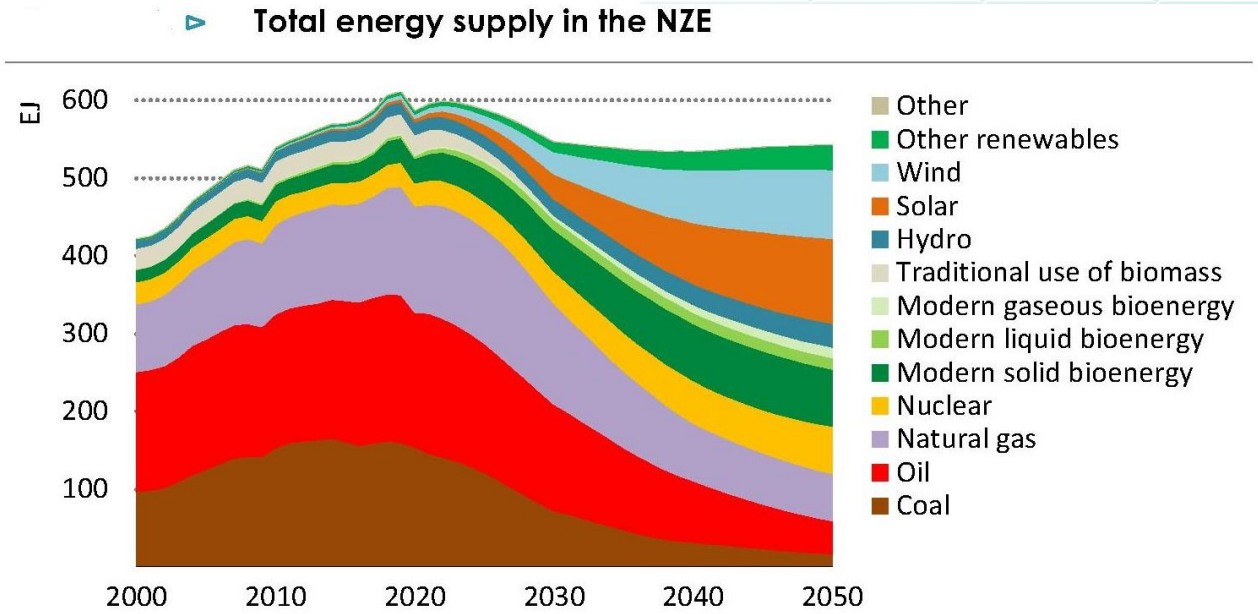
major FSRU projects

"Highly regarded for its deep roots advising clients involved in the oil and gas industries. Represents developers and producers on major downstream assets ranging from LNG processing facilities to oil and petrochemical processing plants."

Chambers Global Projects: Oil & Gas and LNG - USA 2022

Rapid Decarbonization Realities

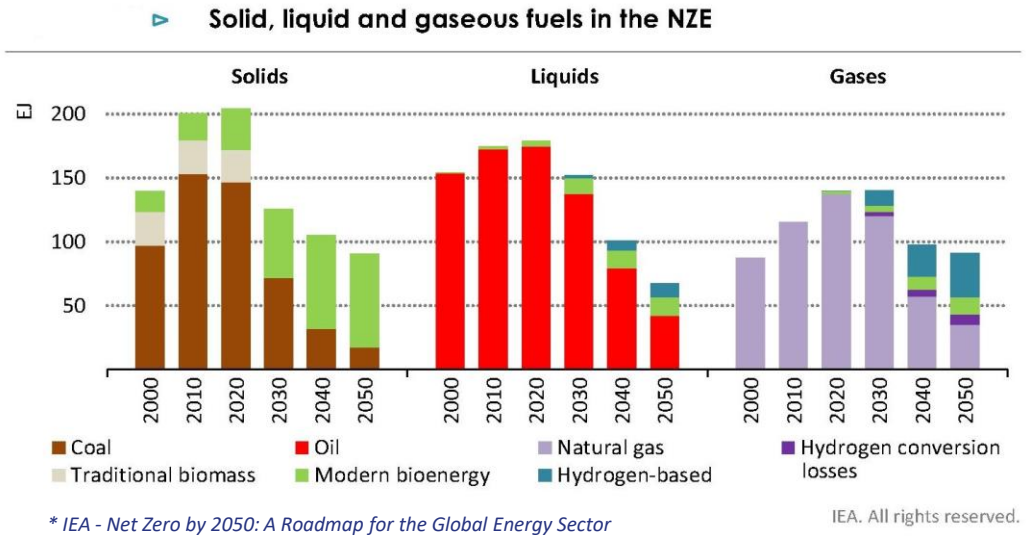
- The 2050 Dilemma – trade-offs
- Path to 2030 will make a huge impact on 2050
  - Timeline for large-scale energy projects for 2030 is now
  - Limits on governmental support
- Need for a pragmatic approach to rapid decarbonization that will support
  - long-term decarbonization
  - low-cost, reliable, abundant energy across geographies
- 2050 net-zero / 1.5 °C scenarios
  - IEA Stated Policies Scenario (**STEPS**) – huge gap
  - IEA Announced Pledge Cases Scenario (**APS**) – significant gap
  - IEA Net-Zero Emissions by 2050 Scenario (**NZE**)*
  - Intergovernmental Panel on Climate Change (**IPCC**) Special Report on Global Warming of 1.5 °C Scenarios



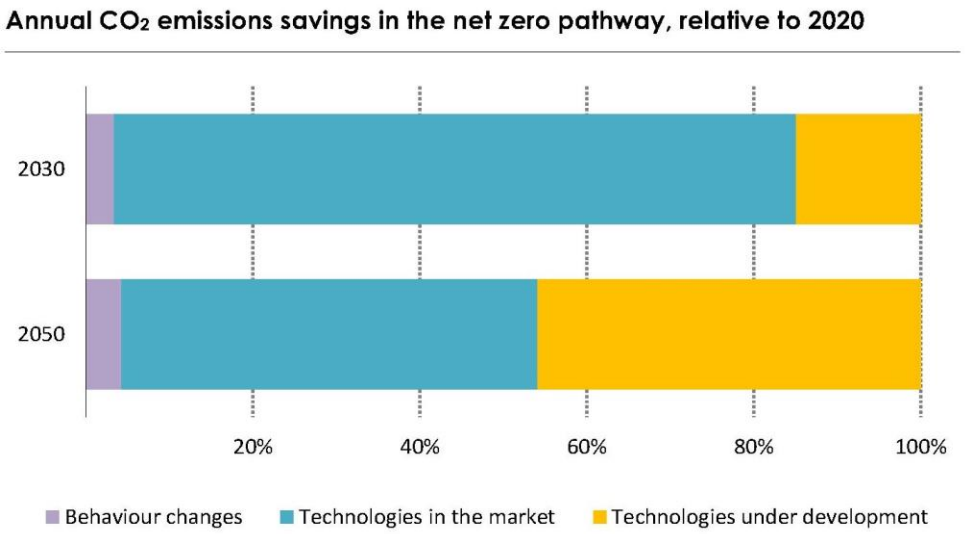
Renewables and nuclear power displace most fossil fuel use in the NZE, and the share of fossil fuels falls from 80% in 2020 to just over 20% in 2050

** IEA - Net Zero by 2050: A Roadmap for the Global Energy Sector*

Rapid Decarbonization Scenario Assumptions



** IEA - Net Zero by 2050: A Roadmap for the Global Energy Sector*



** IEA - Net Zero by 2050: A Roadmap for the Global Energy Sector*

IEA NZE 2050 – Key Assumptions for Oil & Gas

- "[N]o fossil fuel exploration is required and no new oil and natural gas fields are required beyond those that have already been approved for development. No new coal mines or mine extensions are required either."
- "An orderly transition across the energy sector. This includes ensuring the security of fuel and electricity supplies at all times, minimizing stranded assets where possible and aiming to avoid volatility in energy markets."

But also – H2 and CCUS play a large role

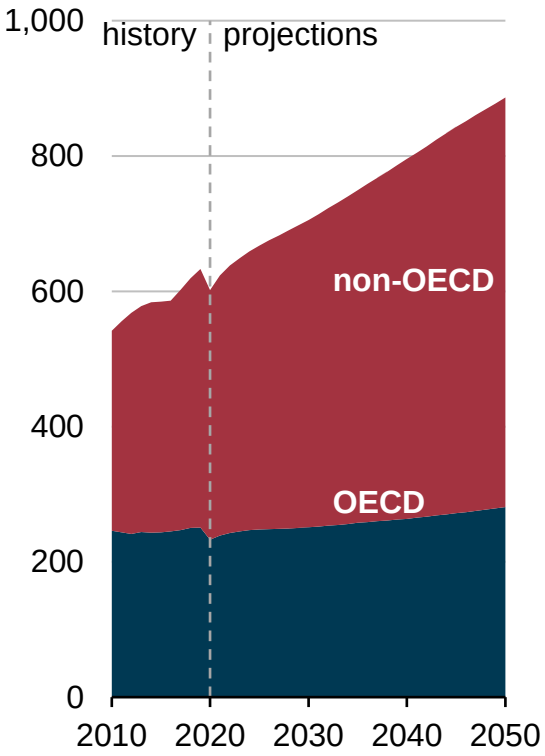
- NZE 2050 – Around half of fossil fuel use in 2050 is in plants equipped with CCUS
- NZE 2050 – Around 925 bcm of natural gas is converted to hydrogen with CCUS
- IPCC 1.5 °C Scenarios – higher CCUS and lower H2 but still significant

Dependency on new technology is high – not just in renewables, batteries and DAC

Natural Gas – Indispensable for the Future

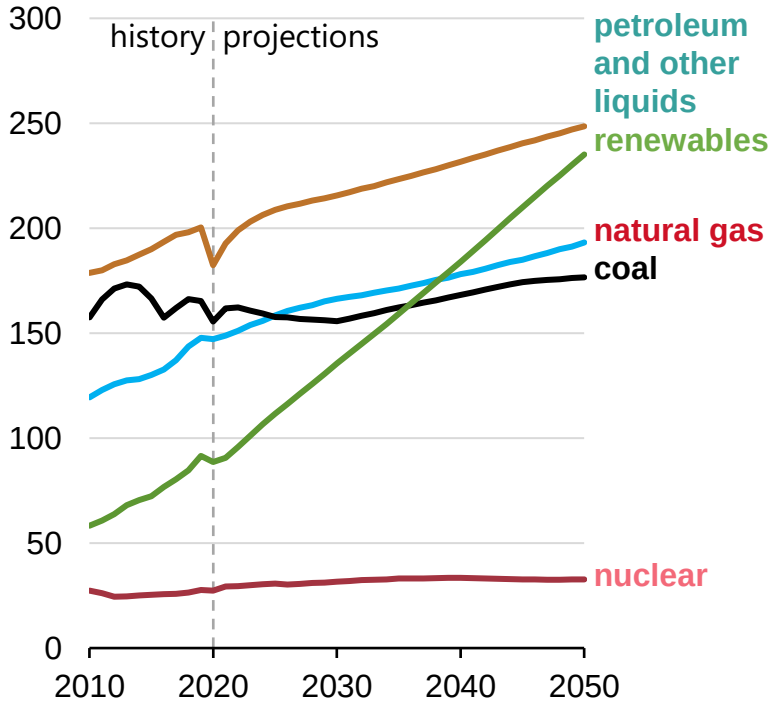
World energy consumption*

quadrillion British thermal units



Primary energy consumption by energy source, world*

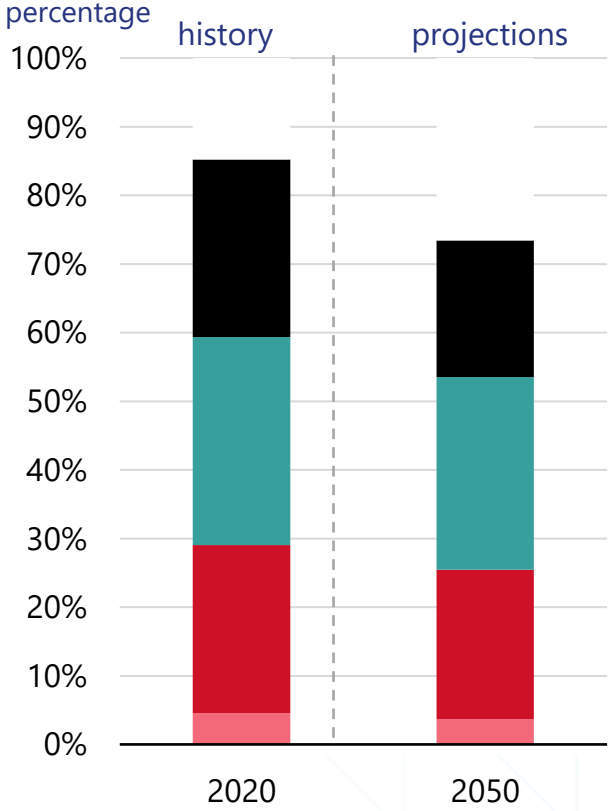
quadrillion British thermal units



** IEA International Energy Outlook 2021 (IEO2021)*

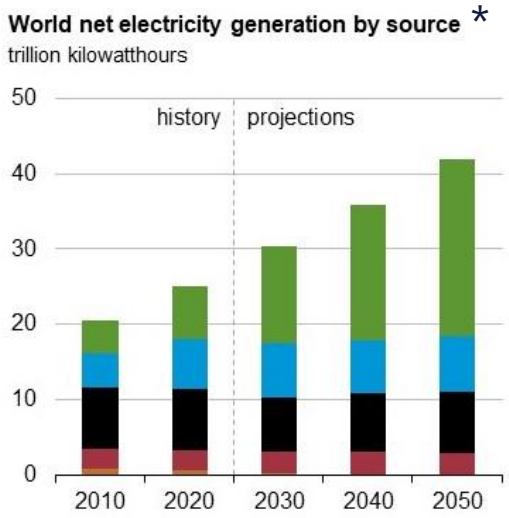
Share of primary energy consumption by source, world*

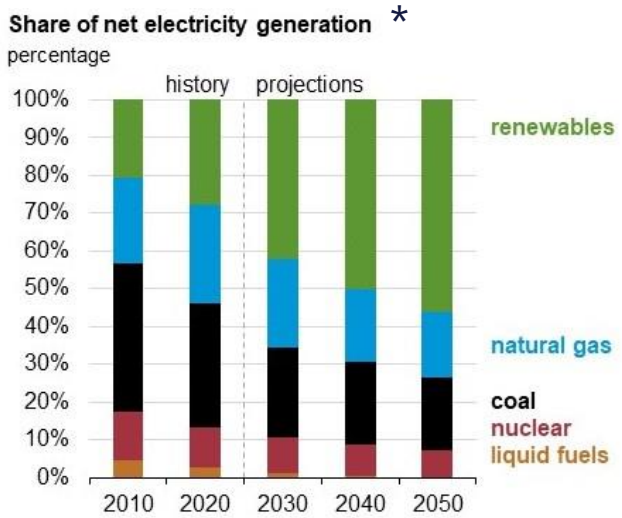
percentage

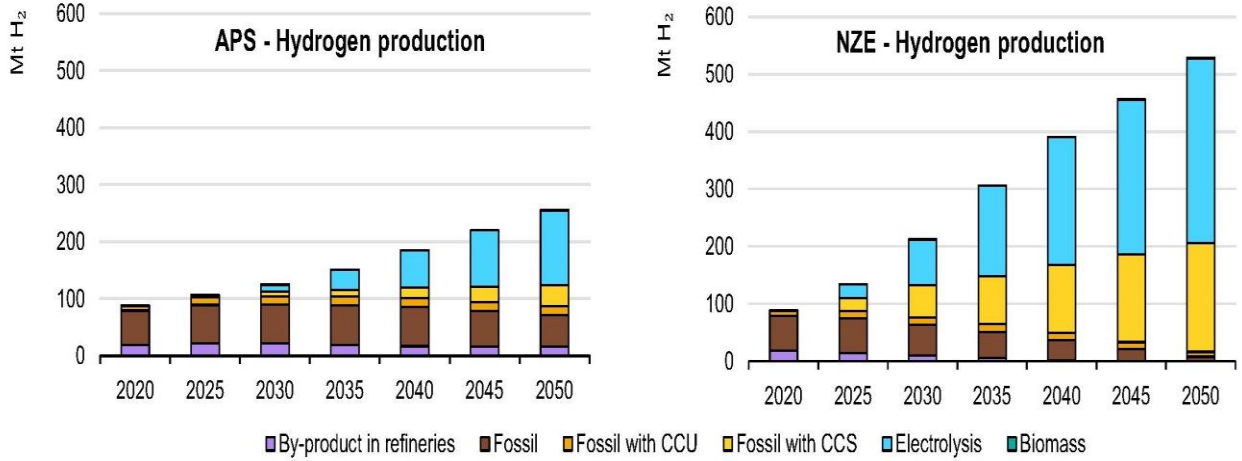


- 2022 takeaway – the world needs natural gas to support energy security
- 2030 takeaway – consumption of energy in all forms but coal will grow
- 2030 takeaway – renewable energy is growing quickly, but not quickly enough to meet 2030 goals
- 2050 takeaway – natural gas remains critical to global energy supply, to support economic growth and energy security and to prevent energy poverty, especially outside the OECD countries

Scale, Cost, and Drivers for Renewables and H2







** IEA International Energy Outlook 2021 (IEO2021)*

- Substantial natural gas required for renewable growth
  - Intermittent power requires a balancing agent – batteries, conversion to hydrogen, or additional non-intermittent generation
  - Batteries have their own cost, scale and timing limitations
  - Batteries + renewables are not a 100% decarbonizing solution
  - H2 production requires natural gas and CCS in APS, NZE, and IPCC 1.5 °C Scenarios
- Bioenergy with carbon capture and storage (BECCS) are another source CO2 abatement and will include H2 production from pyrolysis of natural gas or RNG

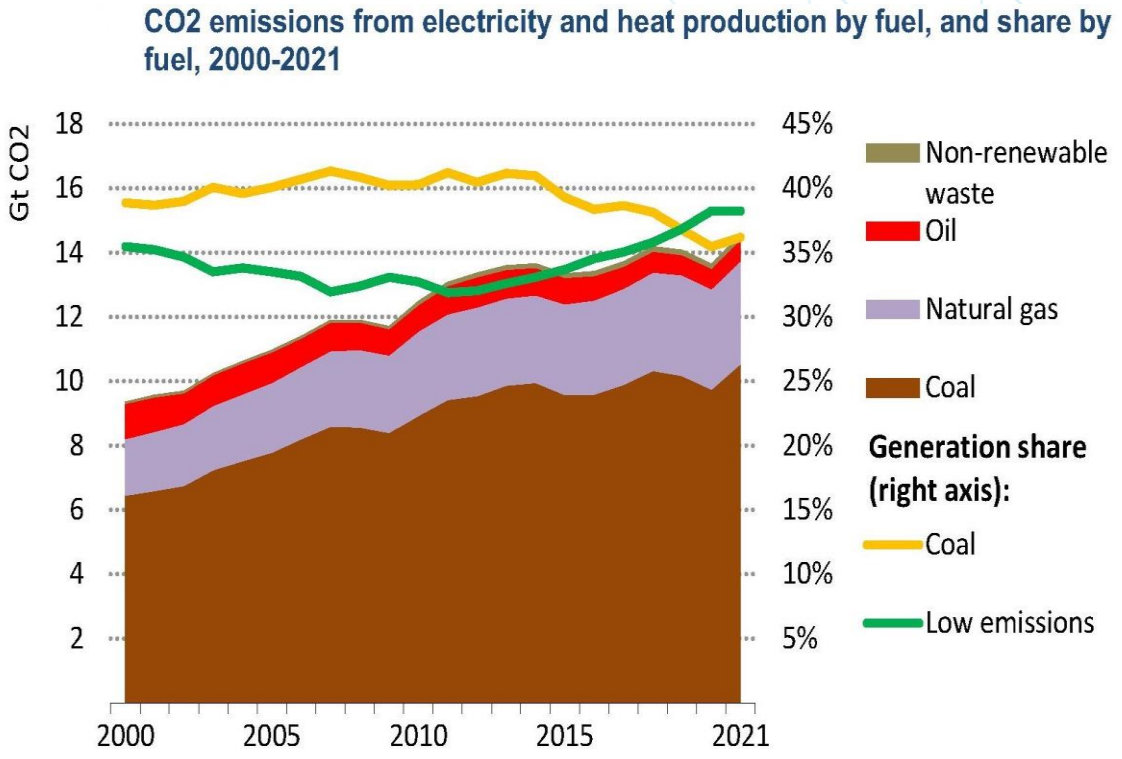
A Pragmatic Way Forward

Support decarbonization and search for low-carbon solutions

- Capable of being deployed rapidly and in the near-future (*i.e.*, push for 2030)
- Based on existing technology or almost-ready technology
- Scalable and affordable (or will rapidly become affordable)
- Minimize stranded assets
- Adaptable to different geographies
- Allow for continued low-cost, reliable, abundant energy

Natural gas is an important for energy security and broad-based economic security, especially outside the OECD

Natural gas supports a low carbon future – replaces coal, produces low-carbon/no carbon hydrogen, supports the growth of renewables, and does not require mass energy austerity



** IEA Global Energy Review: CO2 Emissions in 2021*

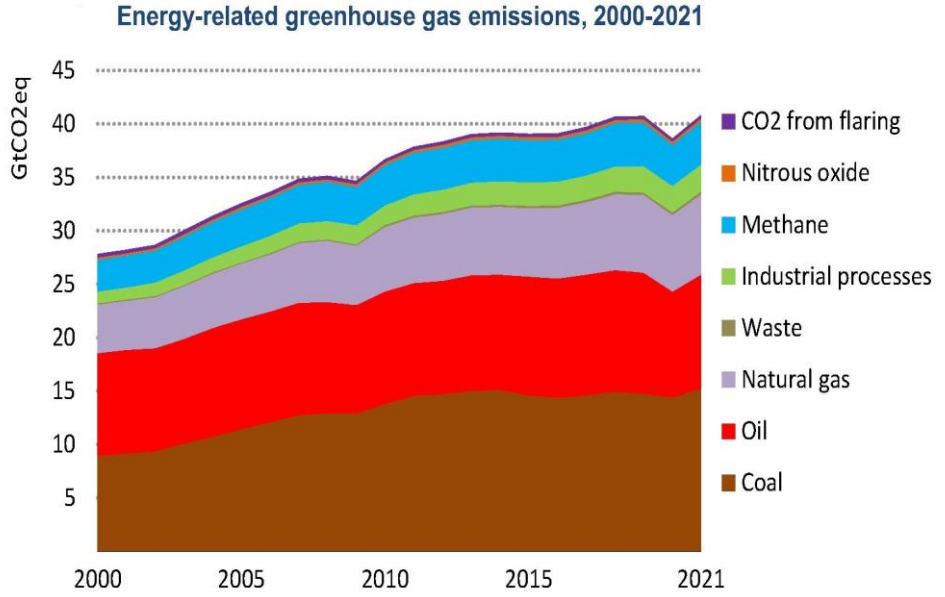
A Pragmatic Way Forward (2)

Natural gas has natural advantages that should not be wasted

- Both electricity and hydrogen have significant transmission and storage challenges
- Enormous cost of replacing natural gas rapidly with electricity and batteries or other energy storage solutions – will not be done by 2030
- Existing gas and transportation assets wasted
- Production can grow rapidly, especially with LNG

But…emissions from Natural Gas production and consumption must be abated

- Methane leaks and flaring must be addressed
- CCS and emissions capture must be rapidly implemented across the gas value chain
- RNG must become a larger share of natural gas
- Low-carbon H2 production from gas, with CCS should be accelerated



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