8th Annual EPRI-IEA Workshop

Challenges in Decarbonisation: Building a Resilient Net-Zero Future

Day 2 Keynote

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Reimagining the Future Energy System

Decarbonisation

~10-15 years

Accelerate economy-wide, low-carbon solutions

- Electric sector decarbonization
- Transmission and grid flexibility: storage, demand, EVs
- Efficient electrification

~15-30 years

Achieve a net-zero clean energy system

- Ubiquitous clean electricity: renewables, advanced nuclear, CCUS
- Negative-emission technologies
- Low-carbon resources: hydrogen and related, low-carbon fuels, biofuels, and biogas

Transformation

Drive affordability of a clean and resilient energy system through digital transformation

- Power system modernization: pervasive sensors, monitoring, advanced analytics using AI
- Upgraded and expanded communications infrastructure and control systems

Resiliency

~10-15 years

Mitigate climate impacts and cyber/physical risks

- System and asset hardening
- Improved response
- Faster recovery
- Cybersecurity

~15-30 years

Future proof energy system design basis

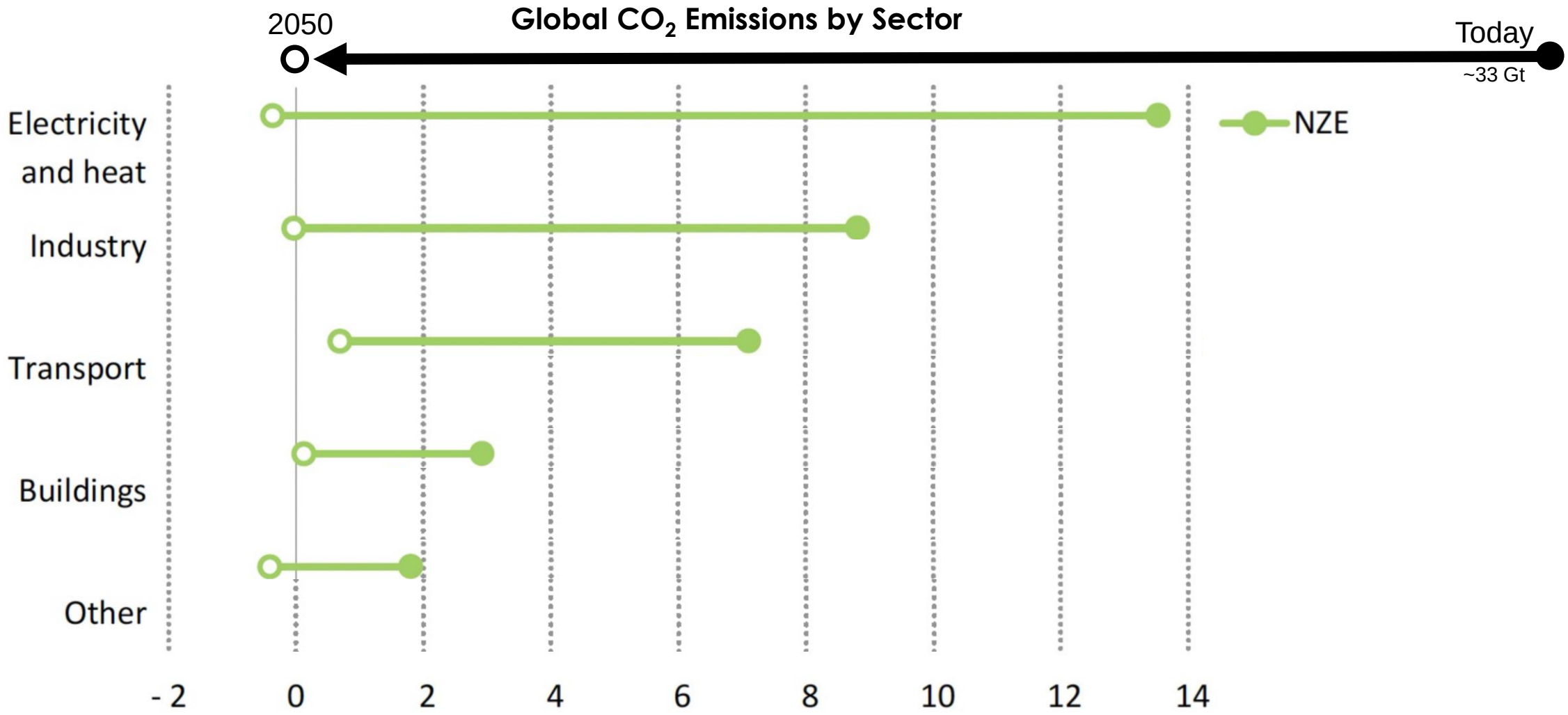
- Resilient power system design
- Advanced asset design and strategic undergrounding
- Smart integration of energy carriers

Making Energy More

Clean | **Affordable** | **Reliable**

DECARBONISATION

Across the Economy
many technologies needed



Reference: Adapted from IEA World Energy Outlook 2021

Decarbonisation Pathways Enabled by Innovation

Decarbonisation

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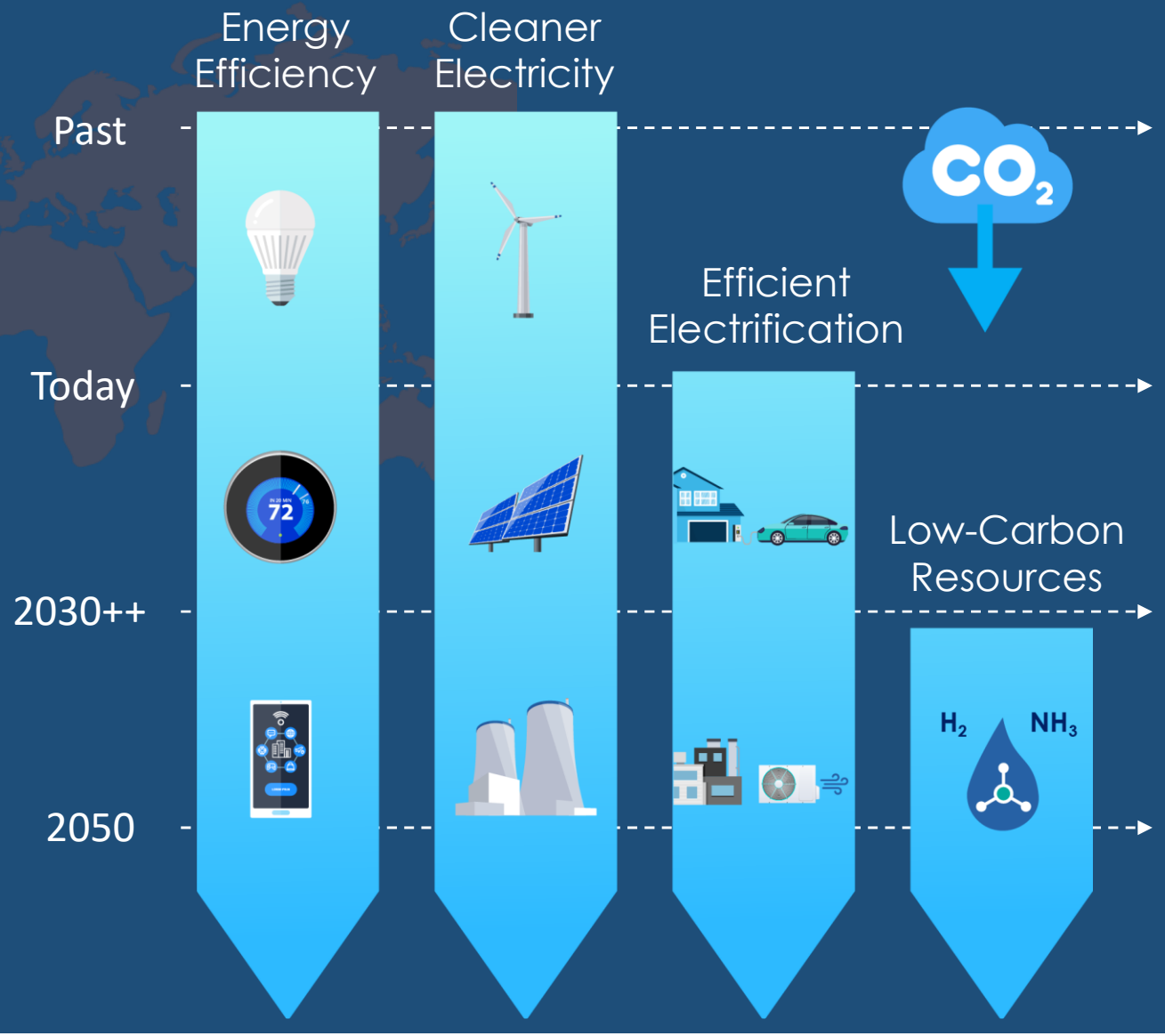
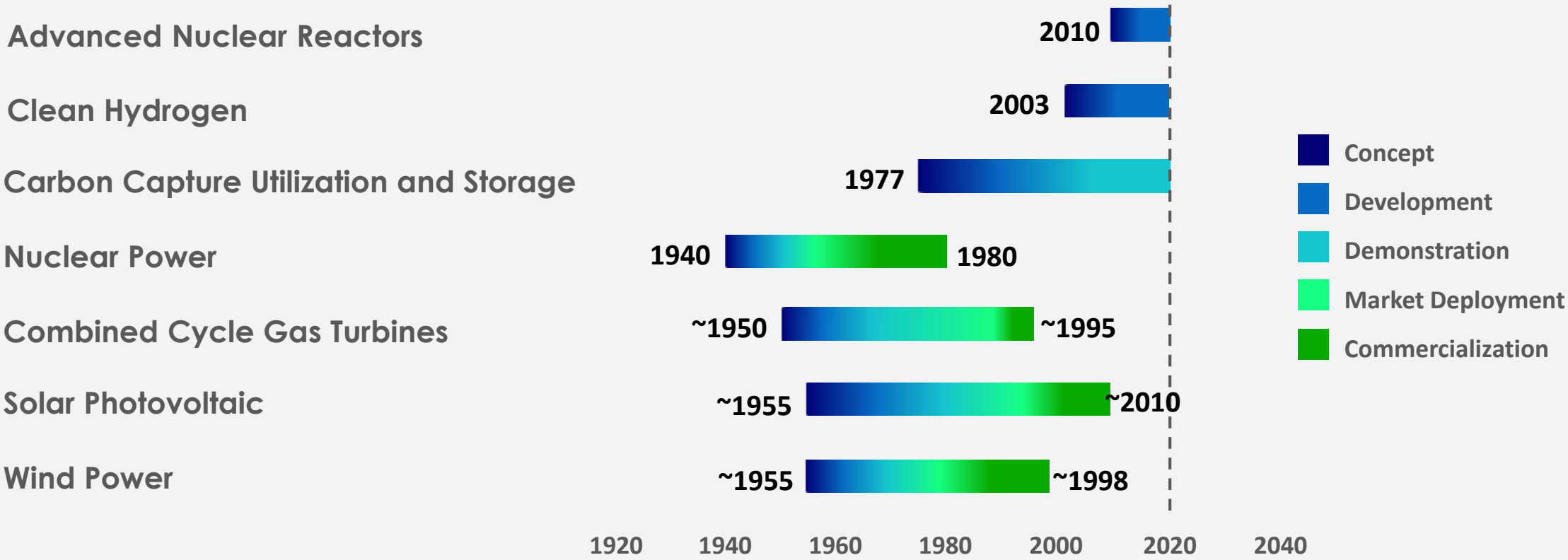


TECHNOLOGY

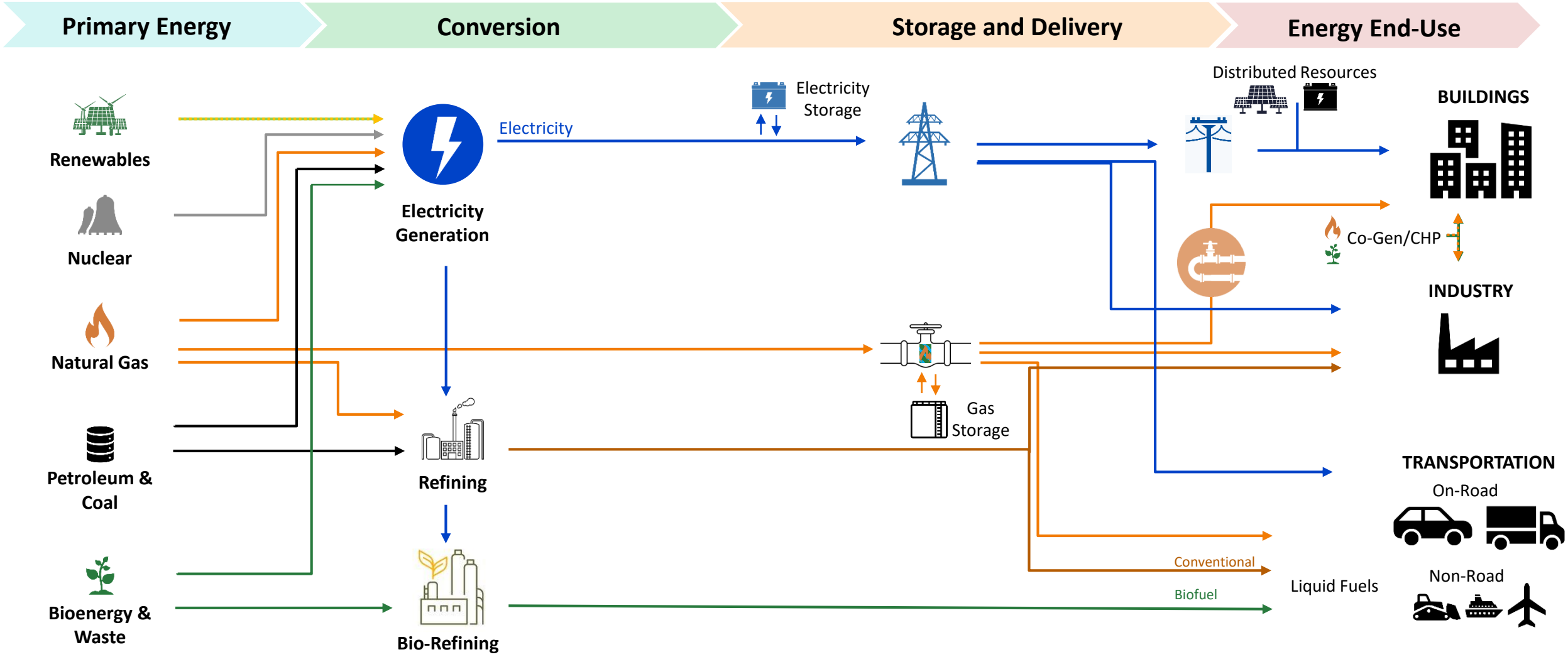
Decades of Effort
from concept to commercialization



Notional timelines

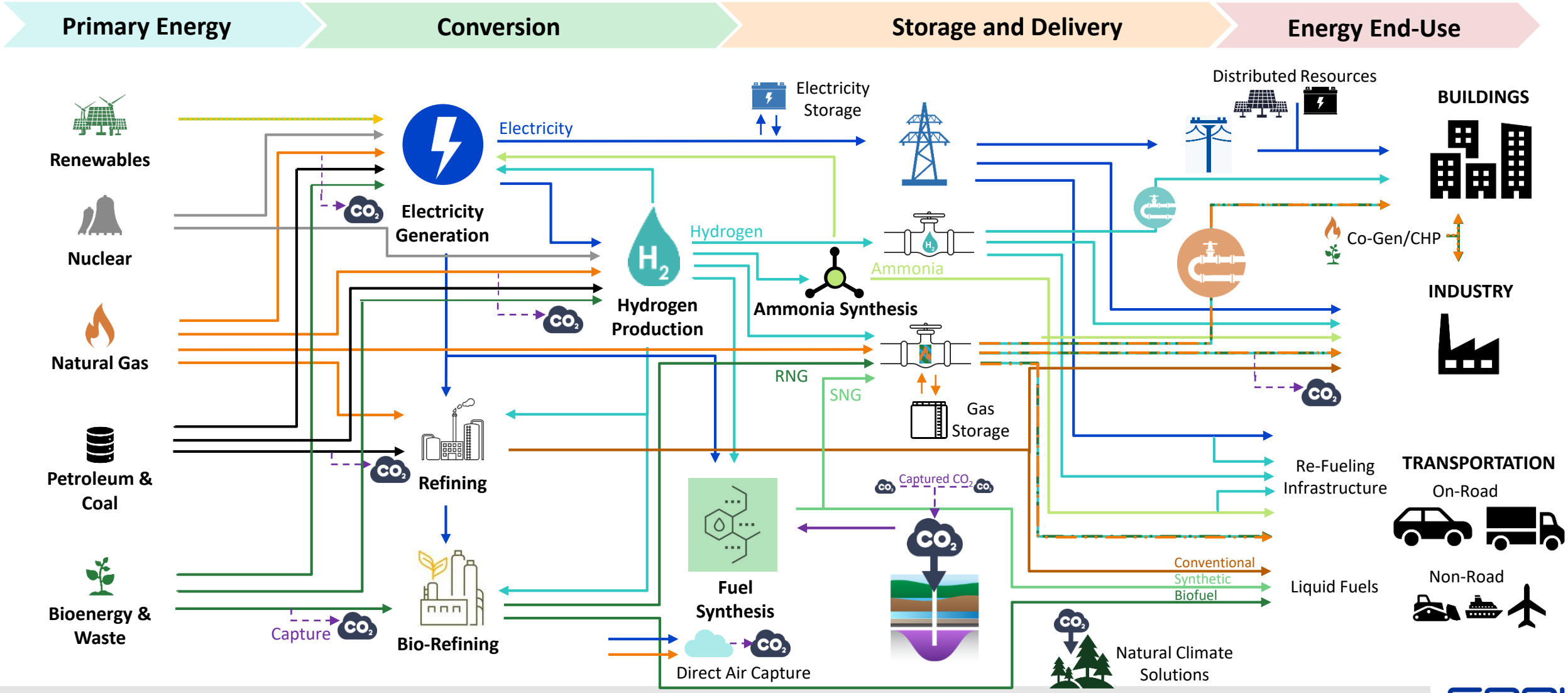
TECHNOLOGY+++

Energy System won't be as 'simple' as today



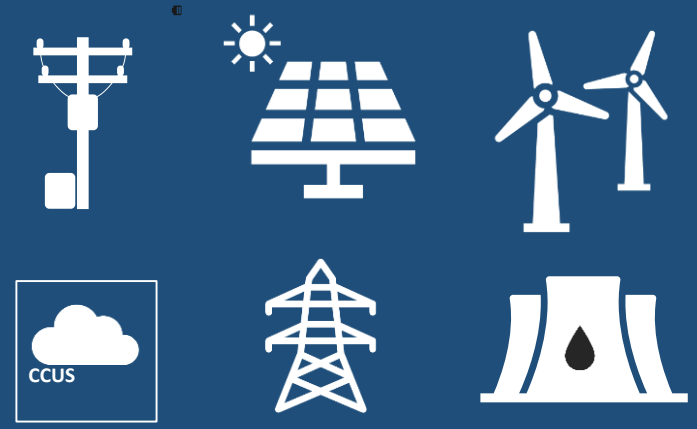
COMPLEXITY

New Resources and Players
how will they fit and transition?



Low-Carbon Fuels Pathway from the Electric Sector

LOW-CARBON GENERATION, TRANSMISSION & DISTRIBUTION



→ **Direct Electrification** →

→ **Indirect Electrification** → **Low-Carbon Fuels***

- **Hydrogen**
- **Ammonia**
- **Synthetic Hydrocarbons**

**Representative of one of several pathways*

DECADES OF CHANGE

WHAT DOES 2050 LOOK LIKE?

What are the technologies to address economy-wide decarbonisation?

What are the strategies and approaches to drive value across the economy?

What are the barriers to overcome and who are the key stakeholders for collaboration?