Distilling critical energy transition features in net-zero scenarios

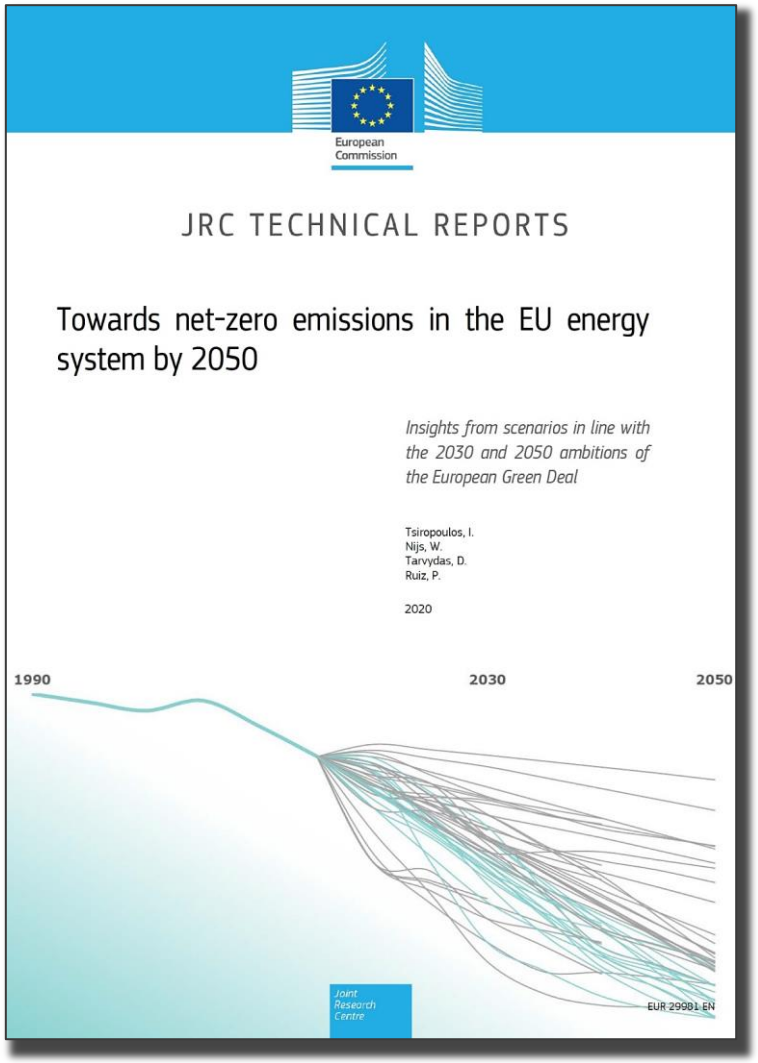
Setting the scene for discussion

Wouter Nijs

JRC.C7, Knowledge for the Energy Union

IRENA LTES Forum, 10 June 2021

Q1. How can scenarios be used to build consensus?



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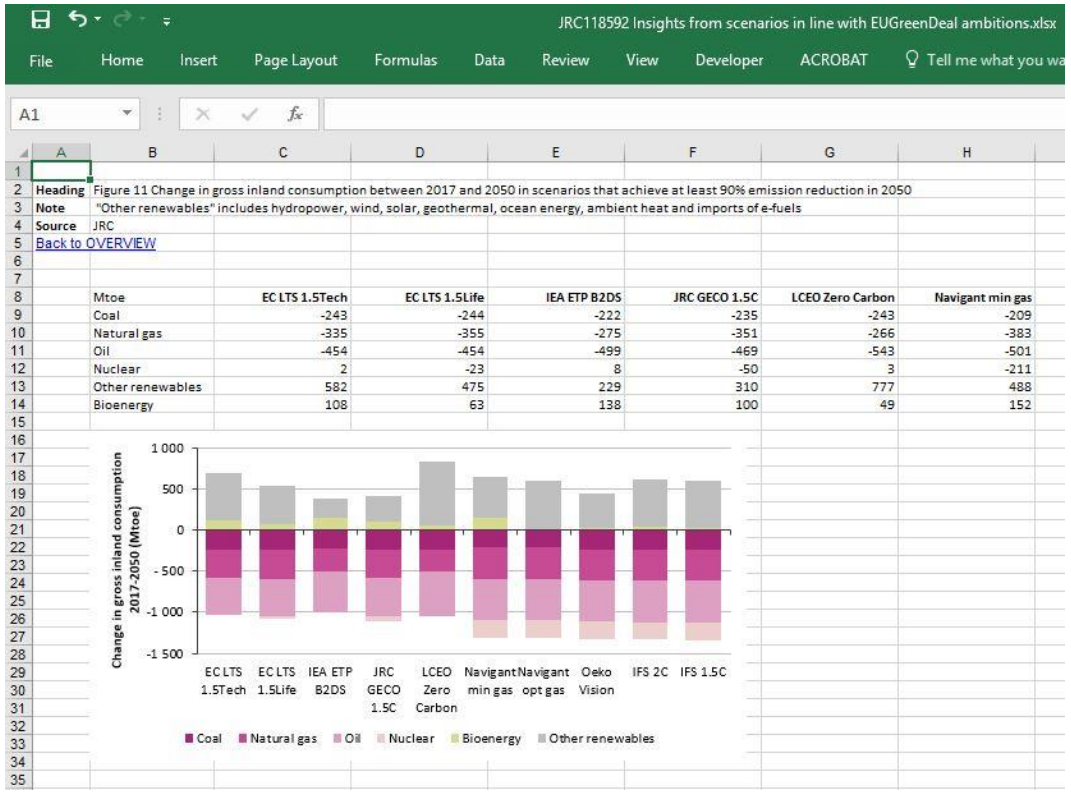

Data behind the graphs, Towards net-zero emissions in the EU energy system by 2050, JRC118592, licensed under CC BY 4.0., © European Union, 1995-2020.

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Q1. How can scenarios be used to build consensus?

Purposes of scenario building	Purposes of scenario comparison
• Provide an analysis of expected impacts of new policies *(Outlooks, policy scenarios)* • Identify pathways to a normative, preferable future *(Road mapping, backcasting)* • Enable decision making under uncertainty *(Narrative-led and plausibility-based)*	• Improve comparability of indicators, narratives and values • Identify commonalities and trade-offs for decision-makers • Explore a range of scenario results from different frameworks

Definitions taken from WEC (2019)

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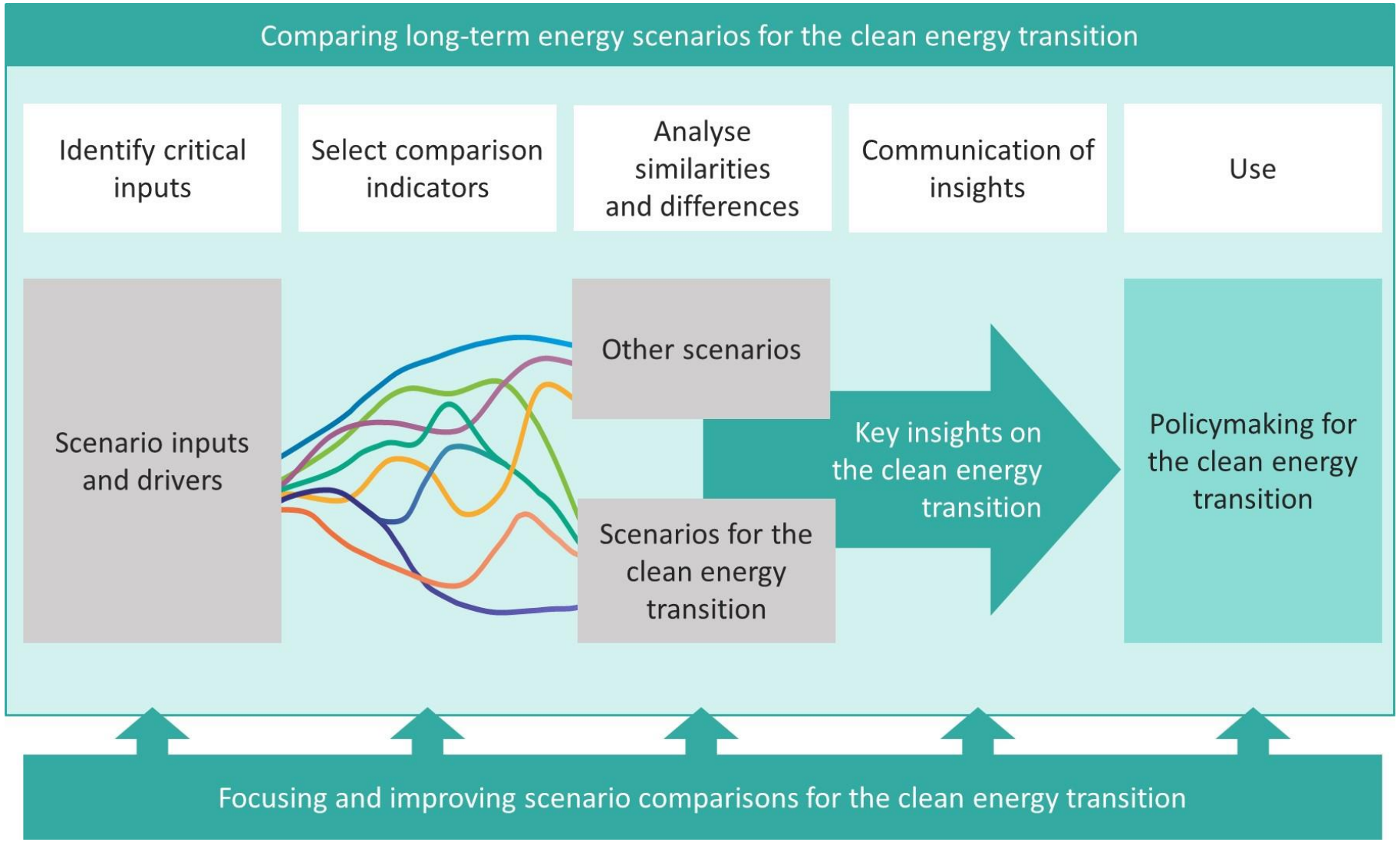

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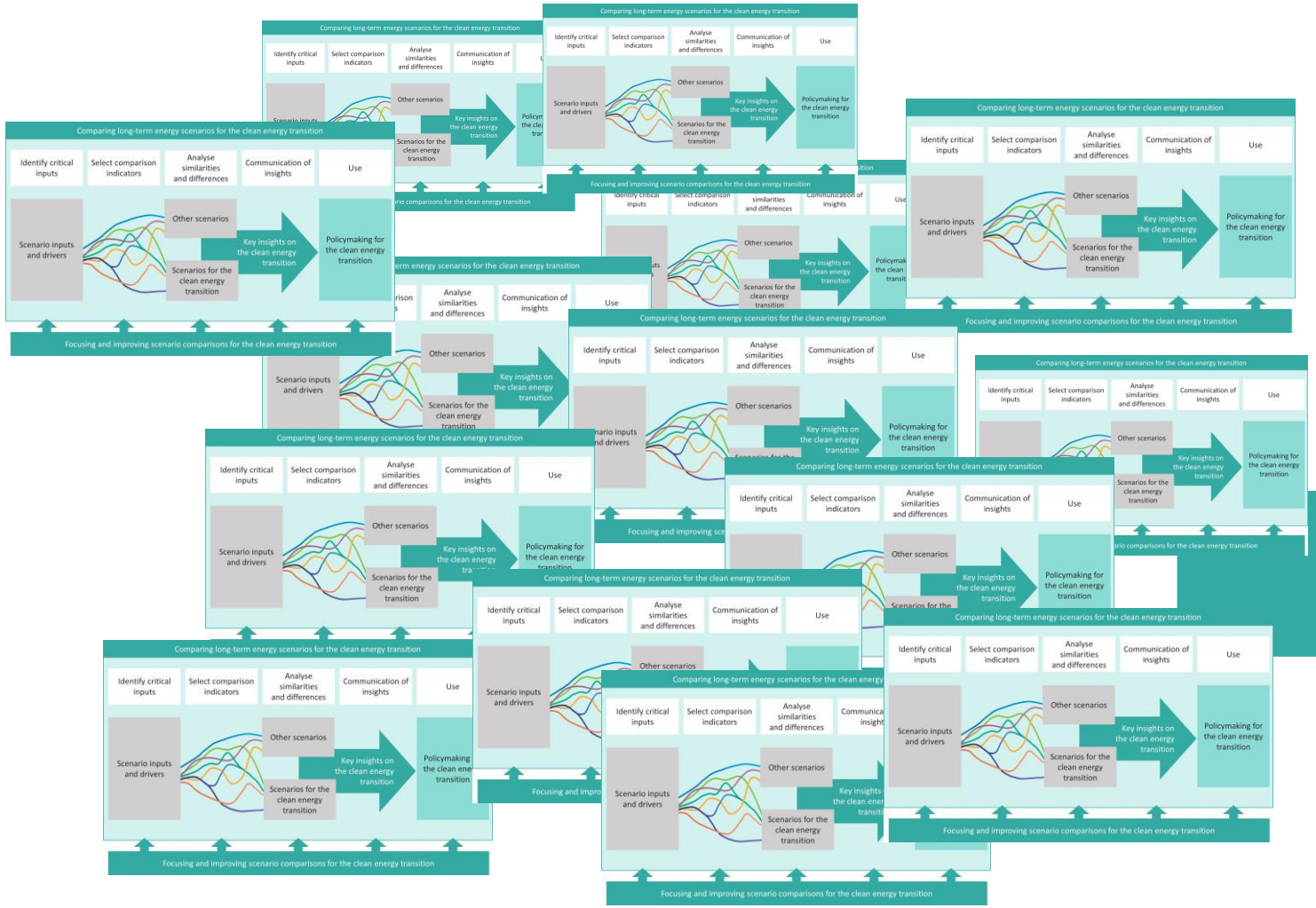

Upcoming report on benchmarking of 14 scenario comparison studies for the clean energy transition

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Q2. Critical energy technologies

- Massive electrification of end uses
- High shares of variable renewable energy in power generation
- An unprecedented scale-up of disruptive technologies
  - New technology mix in transport, led by electric vehicles
  - Low carbon heating systems in buildings
  - Hydrogen and derived fuels becoming a main energy commodity, strongly impacting the growth of wind and solar
- The use of 'negative emissions technologies' (NETs), also referred to as Carbon Dioxide Removal (CDR) to offset remaining emissions

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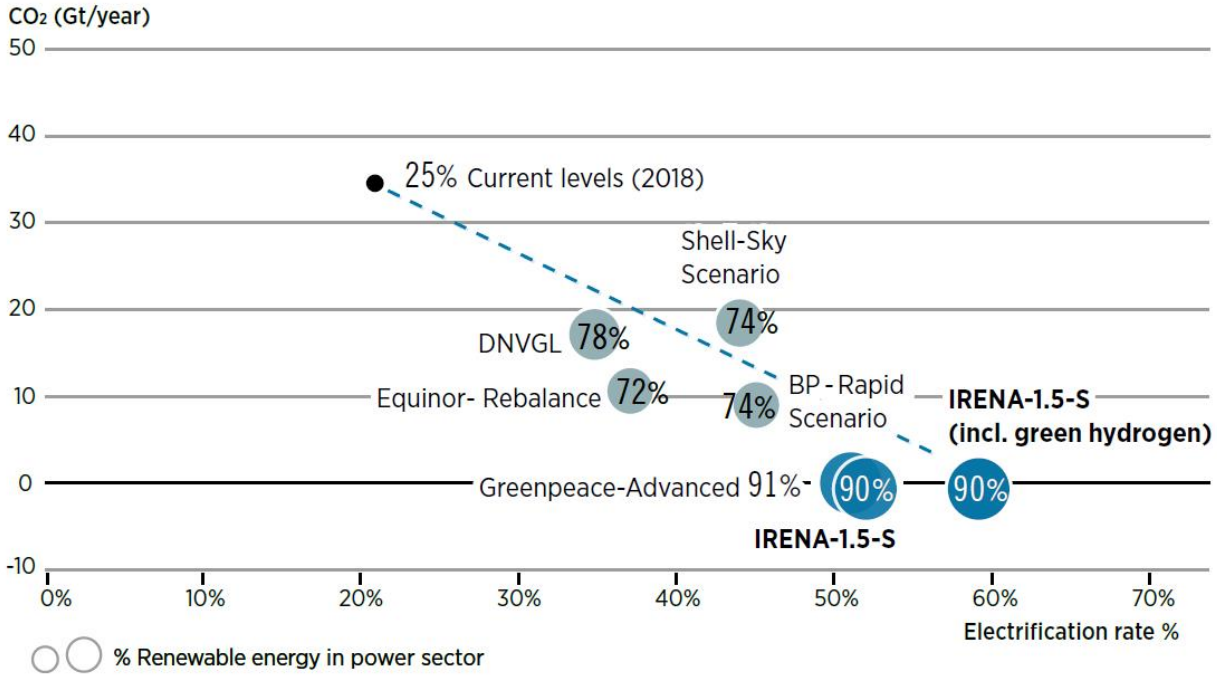
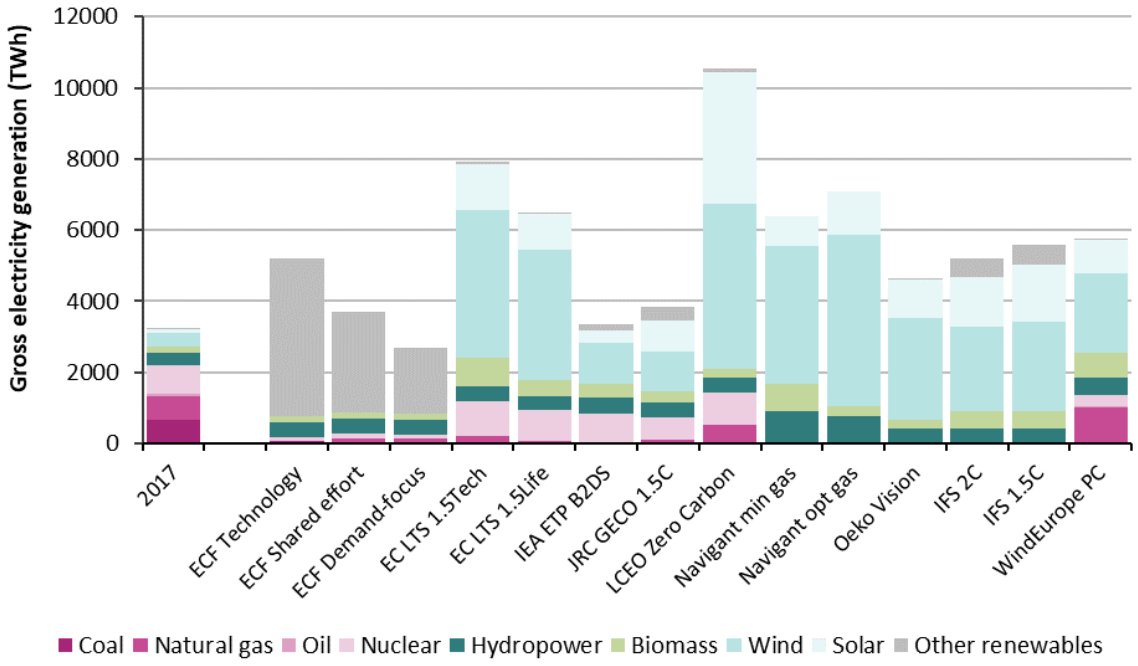
Q2. Critical energy technologies





Preview of IRENA (2021), World Energy Transitions Outlook: 1.5 °C Pathway, International Renewable Energy Agency, Abu Dhabi.

Tsiropoulos I., Nijs W., Tarvydas D., Ruiz Castello P., Towards net-zero emissions in the EU energy system by 2050 - JRC118592.

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Q2. Critical socio-economic transition features

- The increasing complexity of the energy system
- A fast phase-out of fossil fuels requiring a speedy regulatory response
- The necessity to enable investments and deep structural transformations through an integrated planning approach with room for continuous social dialogue.
- The necessity for long-term scenarios and policies to focus also on the near future up to 2030.

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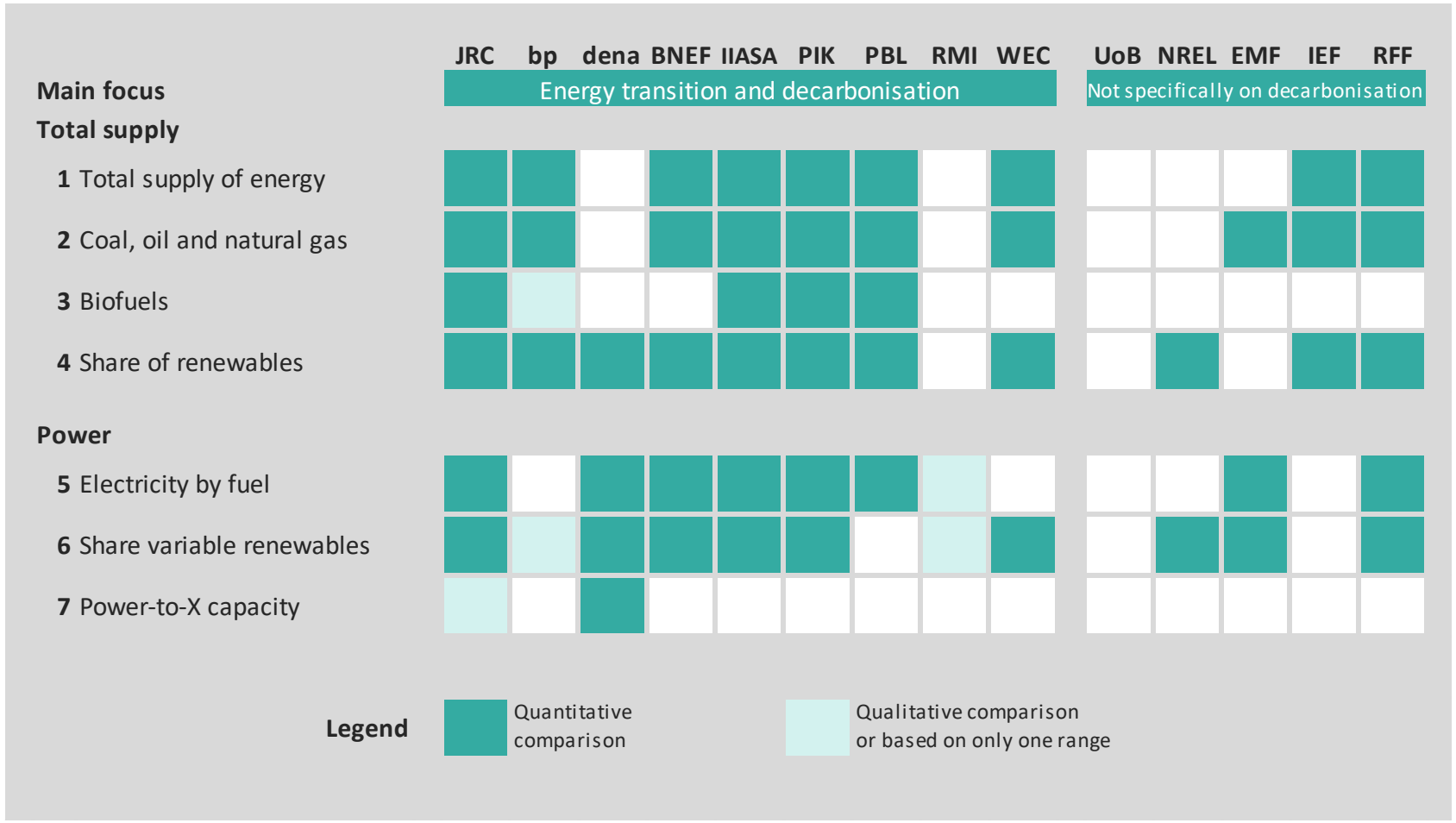
Q3. Improving scenario development tools



SUPPLY

POWER

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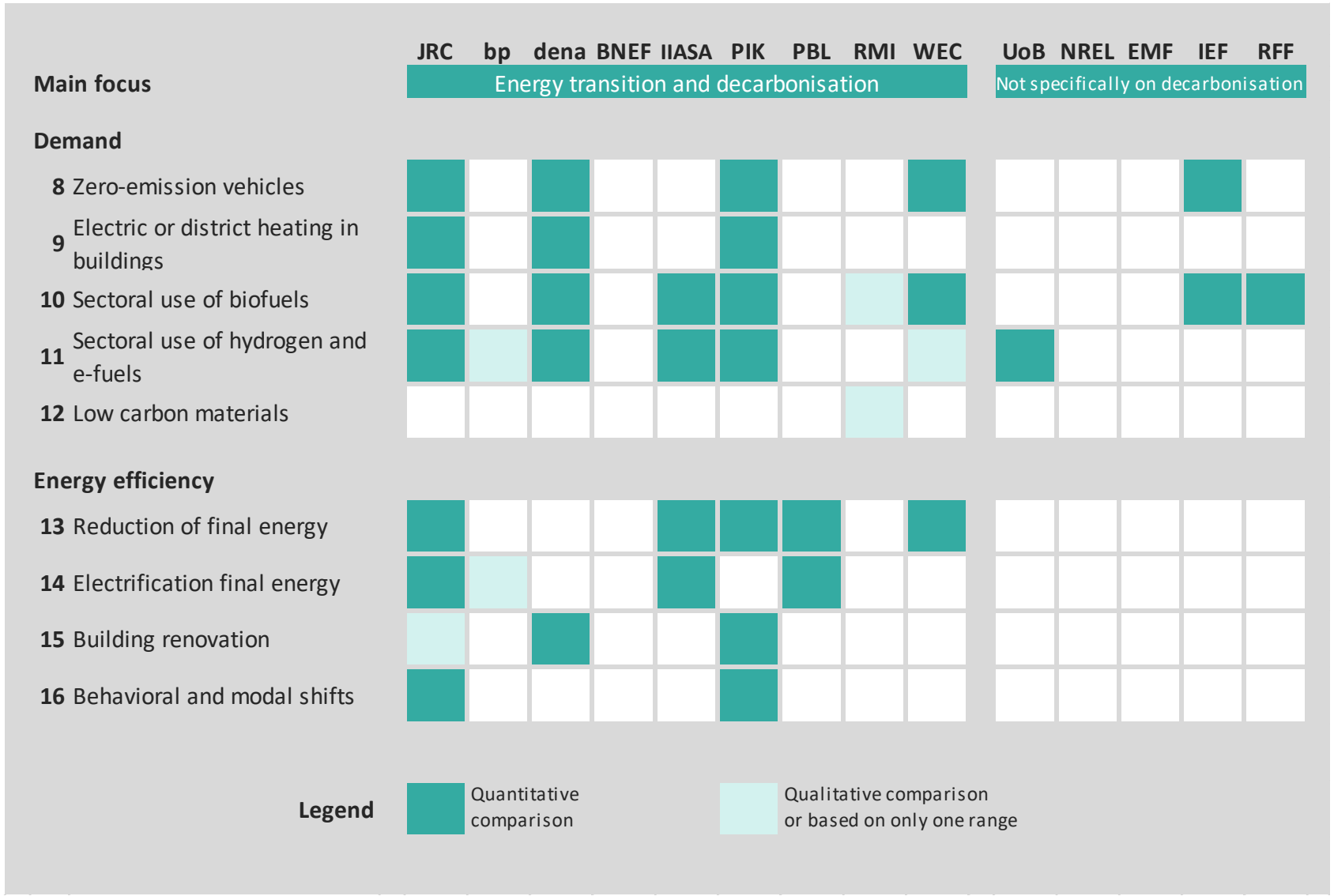
Q3. Improving scenario development tools



DEMAND

EE

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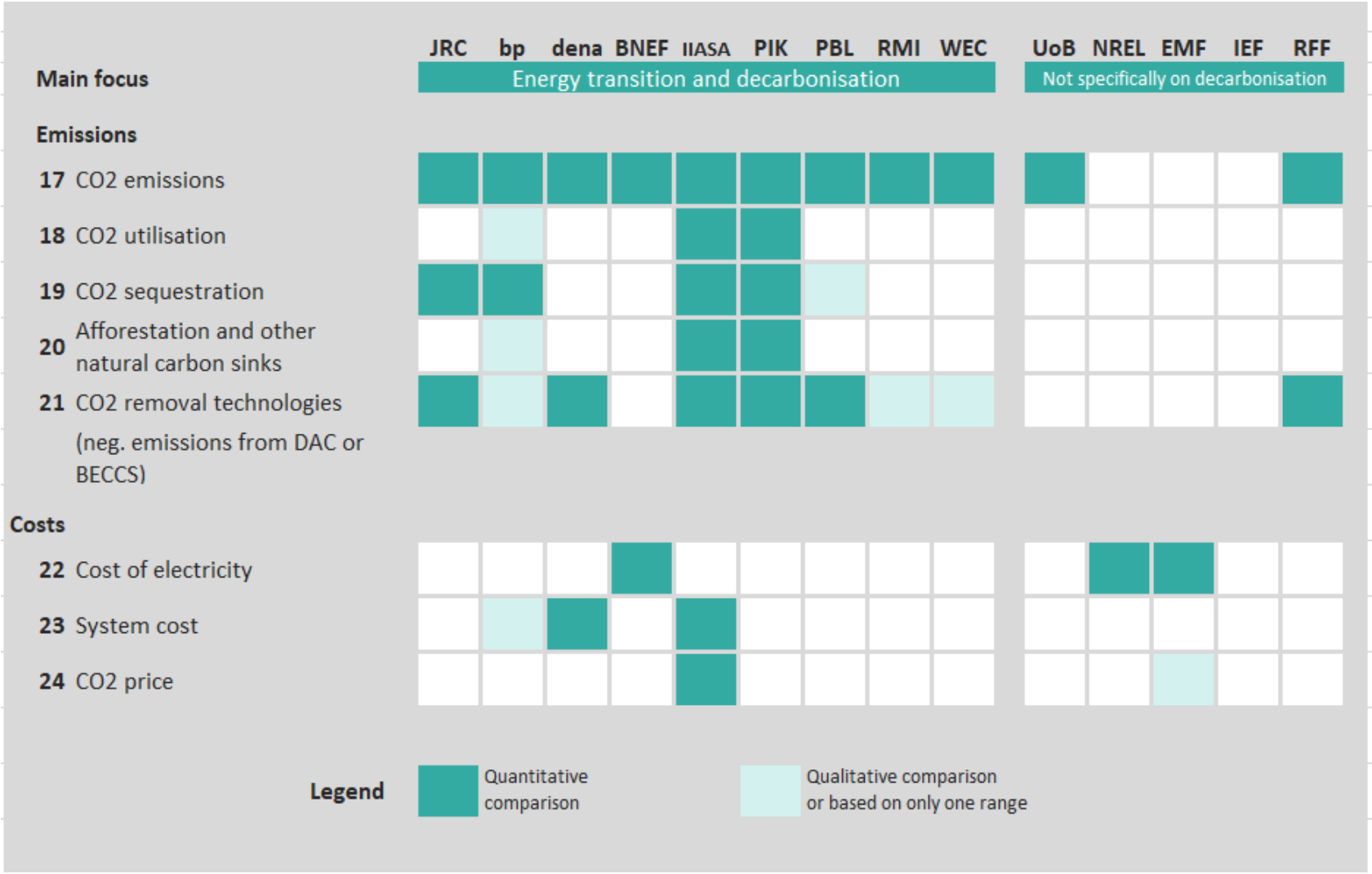
Q3. Improving scenario development tools



EMISSIONS

COST

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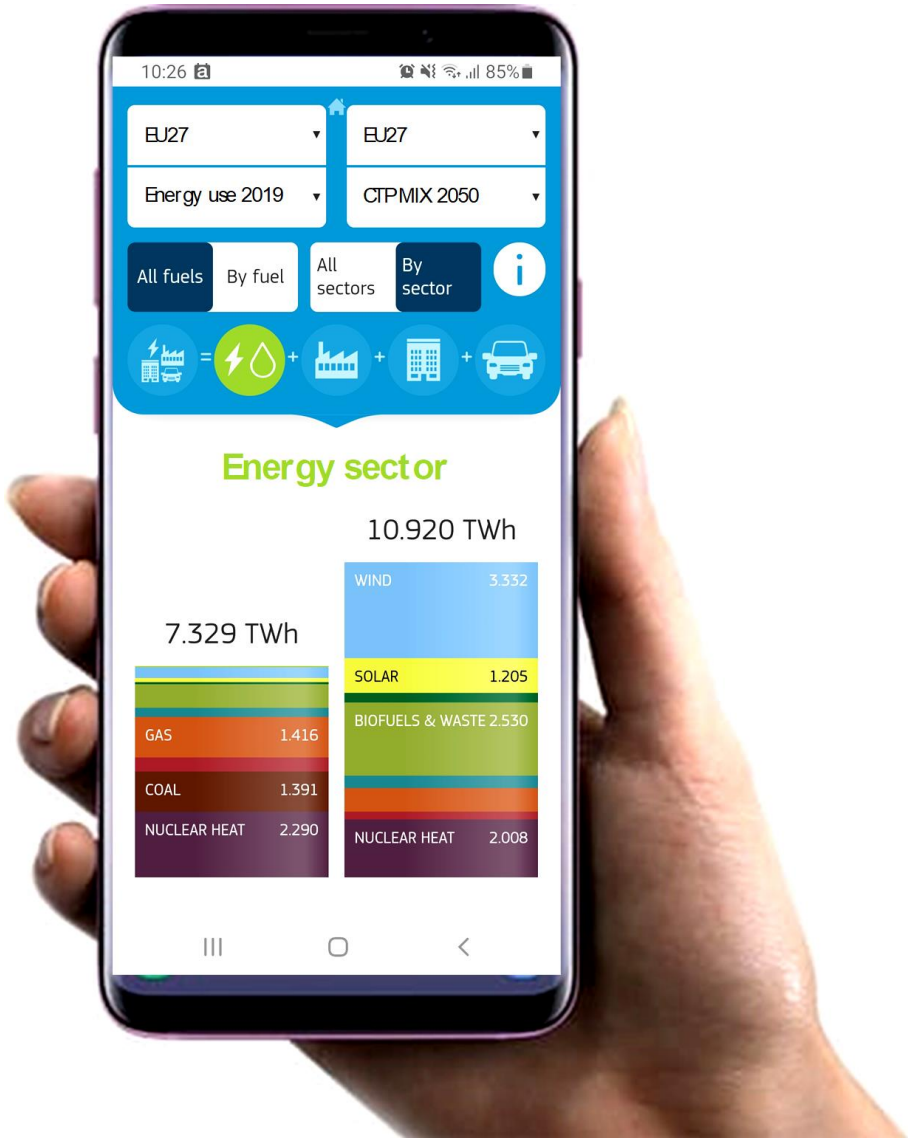
Q3. Improving scenario development tools

Supply indicators	Demand indicators	Cost and emissions indicators
• Biofuel feedstock • Power-to-x capacity • Material flow needs	• Zero-emission vehicles • Electrification of final energy • Heating systems of buildings • Consumer behaviour	• CO2 reuse or sequestration • Afforestation or other natural carbon sinks • Investment cost and finance gaps

Limits of what is possible	How technology options are traded off against each other
• How fast sectors can grow ? • How much can be electrified ? • How easy climate-neutral fuels can be supplied ? • What role consumers can play in technology uptake ? • How much natural carbon sinks can contribute and what impact carbon budgets have ? • What are the limits of financing ?	• Electrification versus the use of green hydrogen or derived fuels • Natural gas with CCS versus upscaling renewables and electricity storage • Public transport versus private electric vehicles

Q3. Improving scenario development tools



- Upcoming JRC interactive tool
- Visualise energy scenarios to create awareness and to inform about the European Green Deal
- Mobile first
- Compare scenarios, countries and changes over time

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Keep in touch

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Thank you

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