International Energy Agency

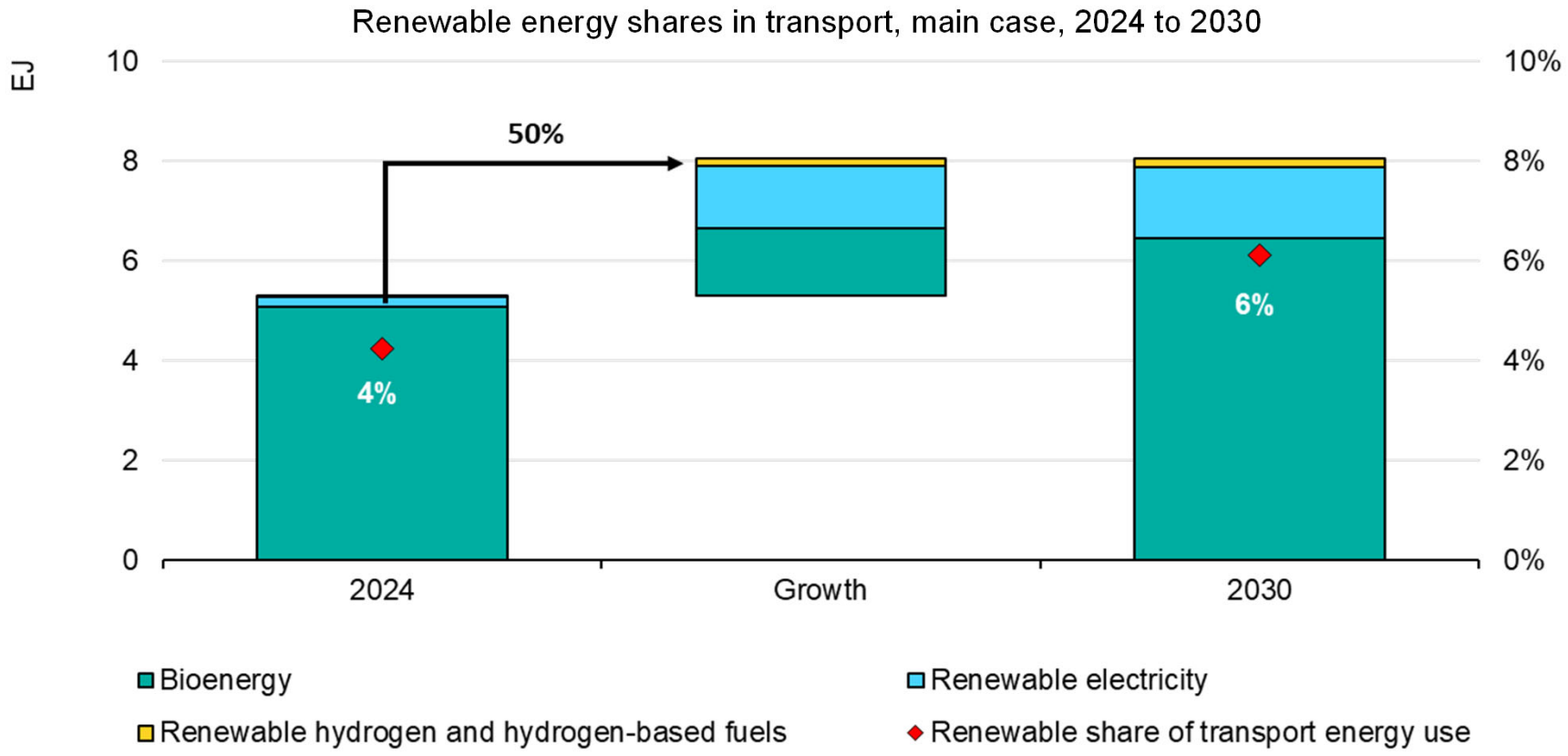
Global trends in marine biofuel production and supply

What is needed to align with the Belem Sustainable Fuels 4x pledge?

Dr. Paolo Frankl, Head of the Renewable Energy Division

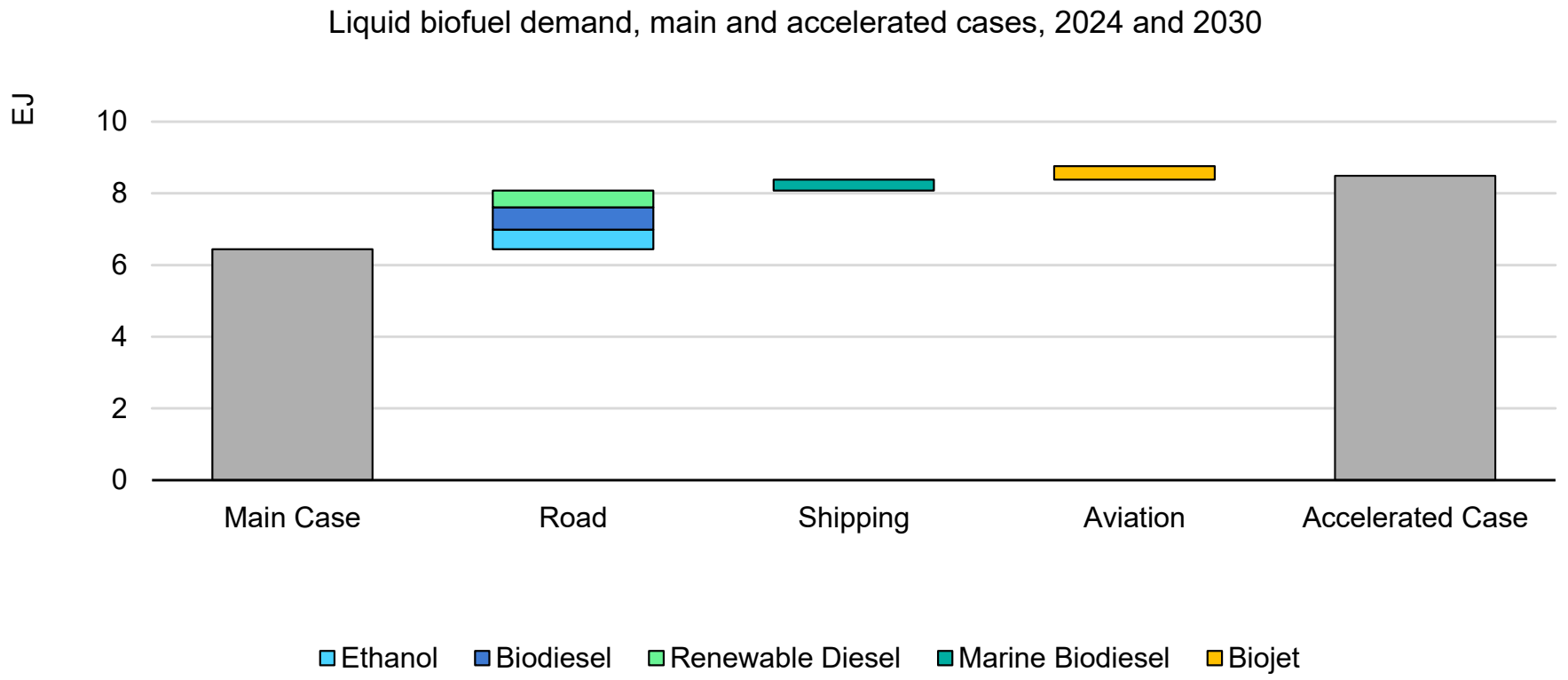
IMO Technical Seminar on Marine Biofuels London, the United Kingdom, 12 February 2026

Renewable transport growth driven by electricity and liquid biofuels



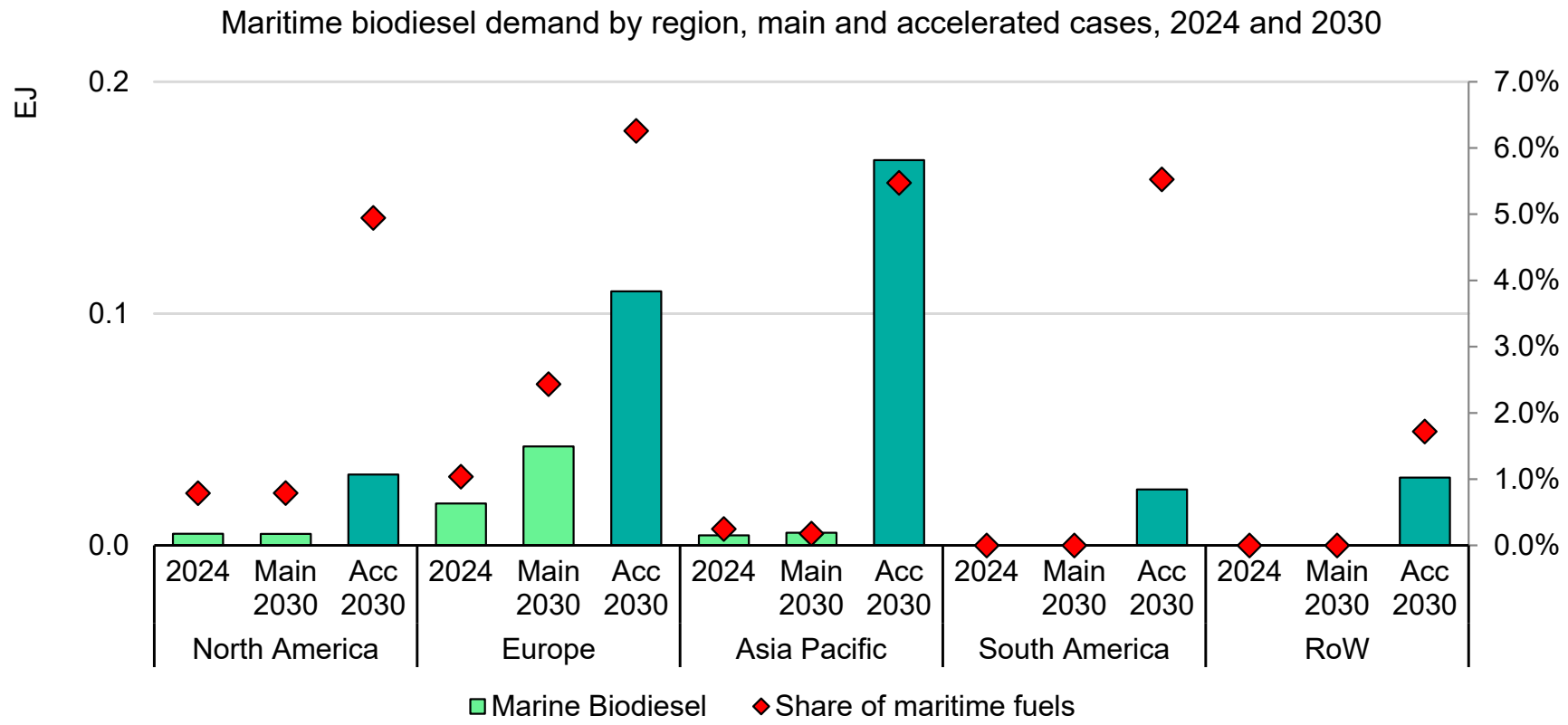
Much of this growth is supported by policies including targets, mandates, and performance-based emission reduction targets across all forms of transport.

Further acceleration of biofuels if announced policies implemented



Biofuel growth is strong in road transport but is gaining momentum in maritime and aviation transport – making up almost 10% of liquid biofuel growth by 2030 in an accelerated case.

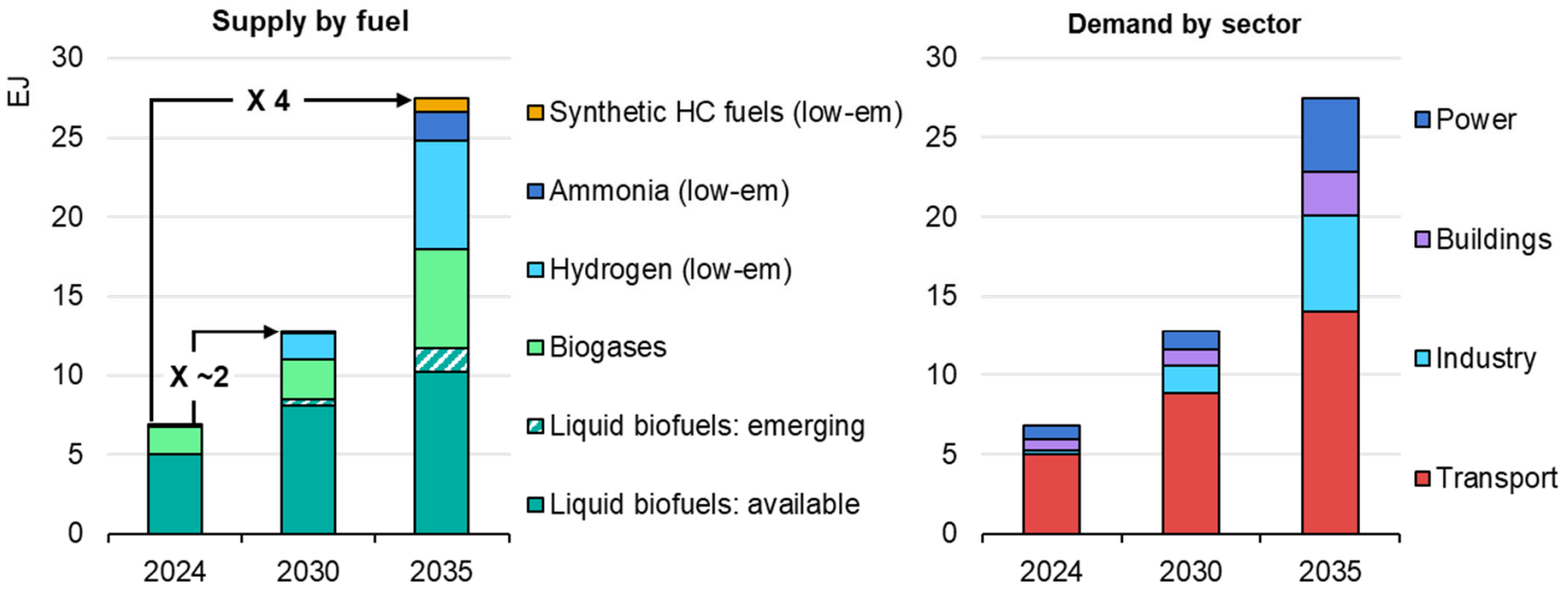
Marine biofuels requires further policy support



In the accelerated case marine biodiesel demand climbs to nearly 0.4 EJ (11 billion litres) – accounting for nearly 5% of total maritime fuel demand by 2030.

Sustainable fuels quadruple globally if announced policies are implemented

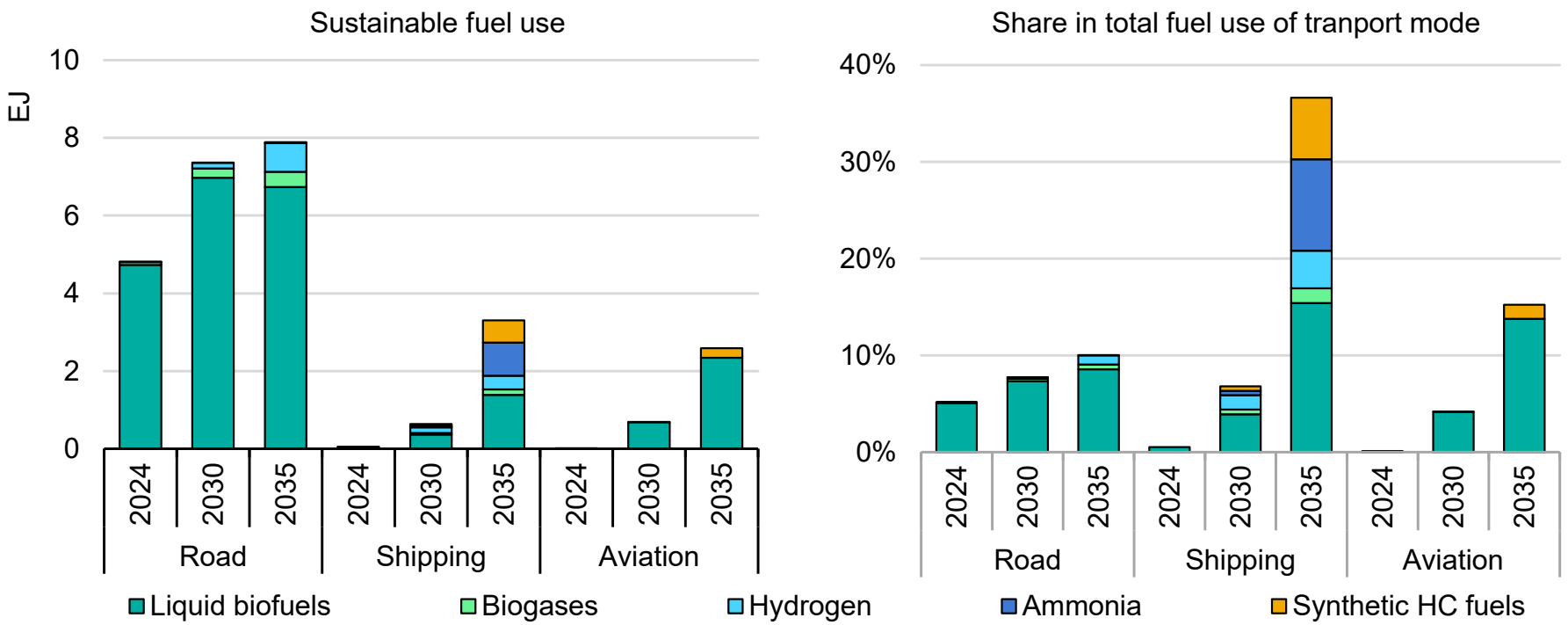
Sustainable fuel supply and demand in the accelerated case, 2024 to 2035



Depending on the country and regional circumstances, the sustainable fuels mix and shares can be very different from global averages.

They continue to be important in transport's energy transition

Sustainable liquid and gaseous fuel use by fuel type for selected transport modes in the accelerated case, 2024 to 2035



By 2035 sustainable fuels in transport nearly triples. In hard to electrify sectors such as shipping and aviation they make up significant shares of total fuel use by 2035.

Sustainability criteria a key priority action

A **fourfold growth in a decade is ambitious but achievable**, if announced policies are consistently and fully implemented and market barriers are removed. Priorities are:

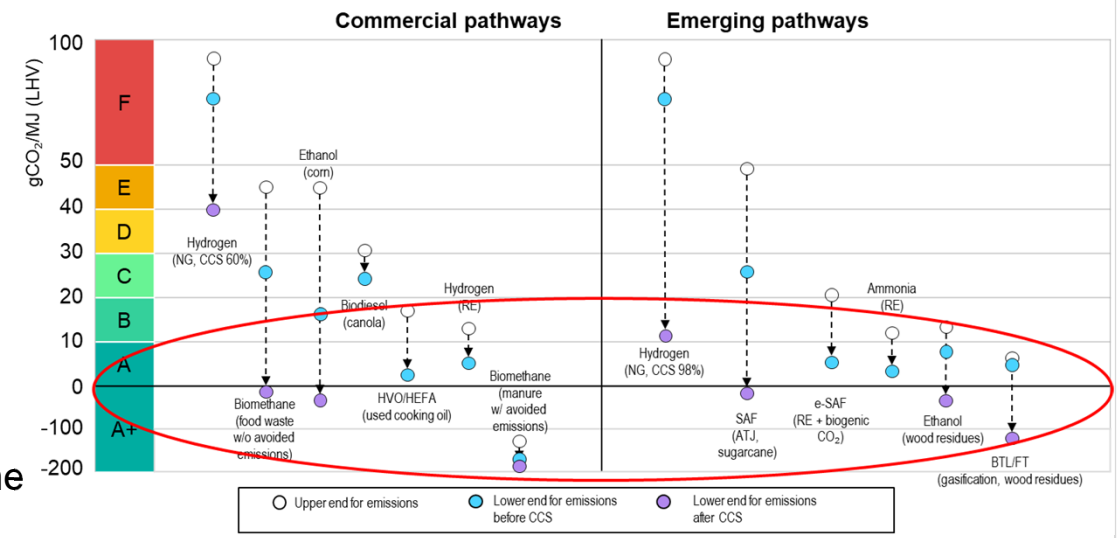
1. **Establish roadmaps, targets and support policies** to create long-term visibility for market development
2. **Increase demand and supply of sustainable fuels** to reduce revenue risk, unlock private investment and drive continuous improvements in GHG performance
3. **Work towards common sustainability criteria** to ensure a level playing field, avoid double counting and guarantee data transparency and verifiability to build integrity into reporting.
4. **Support innovation to narrow cost gaps** and accelerate the scale-up of pathways with high GHG emissions-reduction potential.
5. **Develop supply chains and foster trade** to match regional production strengths with global demand, and to help EMDEs to participate in global supply chains.
6. **Make financing more accessible** to ensure projects receive final investment decisions, especially in the EMDEs.

With well-designed policies, most fuels can reach very low emissions

A **tiered labelling system** allows:

- Consistent **comparability** across fuels and existing schemes
- Defining **minimum emission reductions** compared to fossil fuels
- Recognising and rewarding **better performance** beyond threshold
- Measuring and fostering **continuous improvement** over time
- Using a **portfolio of low(er)-GHG fuels** in the early phase of the transition

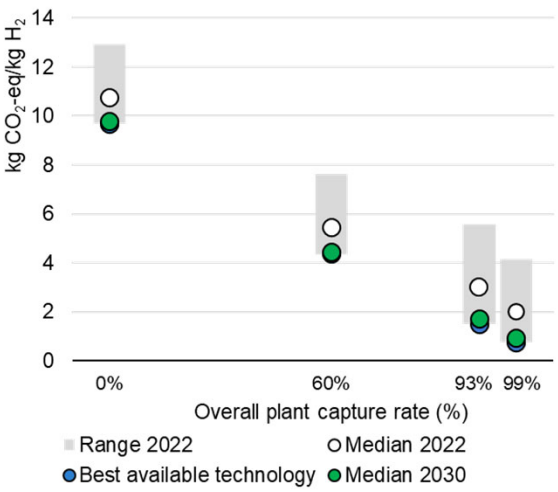
Example of a quantitative GHG intensity labelling system for selected sustainable fuel pathways at the point of delivery



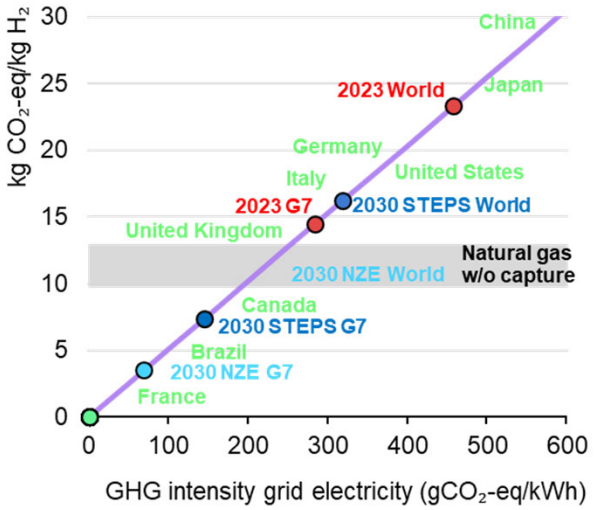
Most fuel pathways have potential to achieve low GHG emissions overtime

GHG emission ranges for the main sustainable fuel pathways

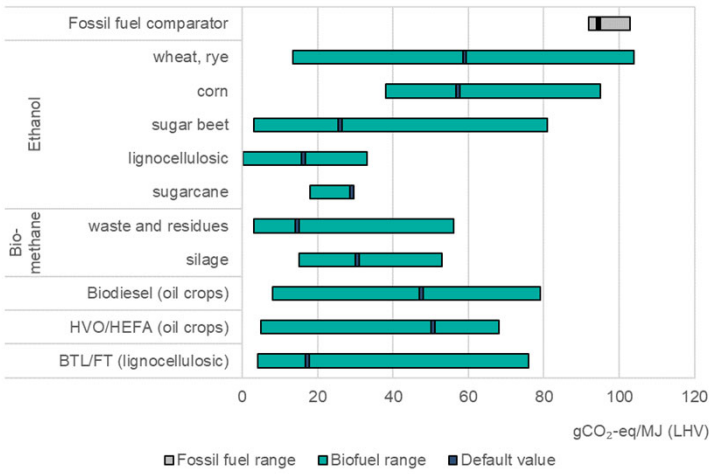
Hydrogen from fossil fuels with CCUS



Hydrogen from electrolysis



Selected biofuel pathways



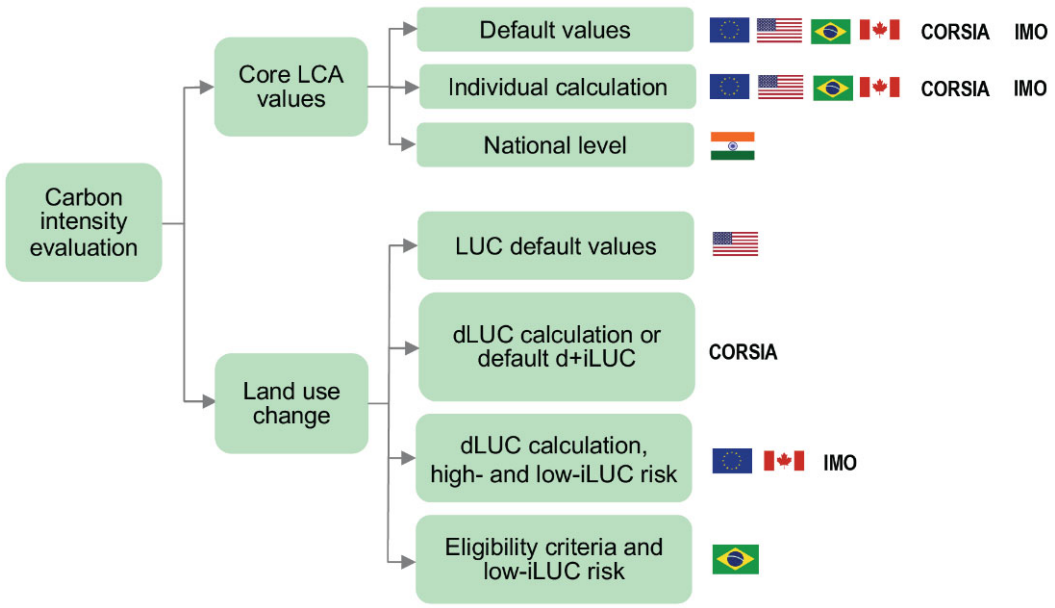
Several measures can be applied to improve GHG performance of fuels, but incentives are required to cover extra costs.

Current regulations have some commonalities but also important differences

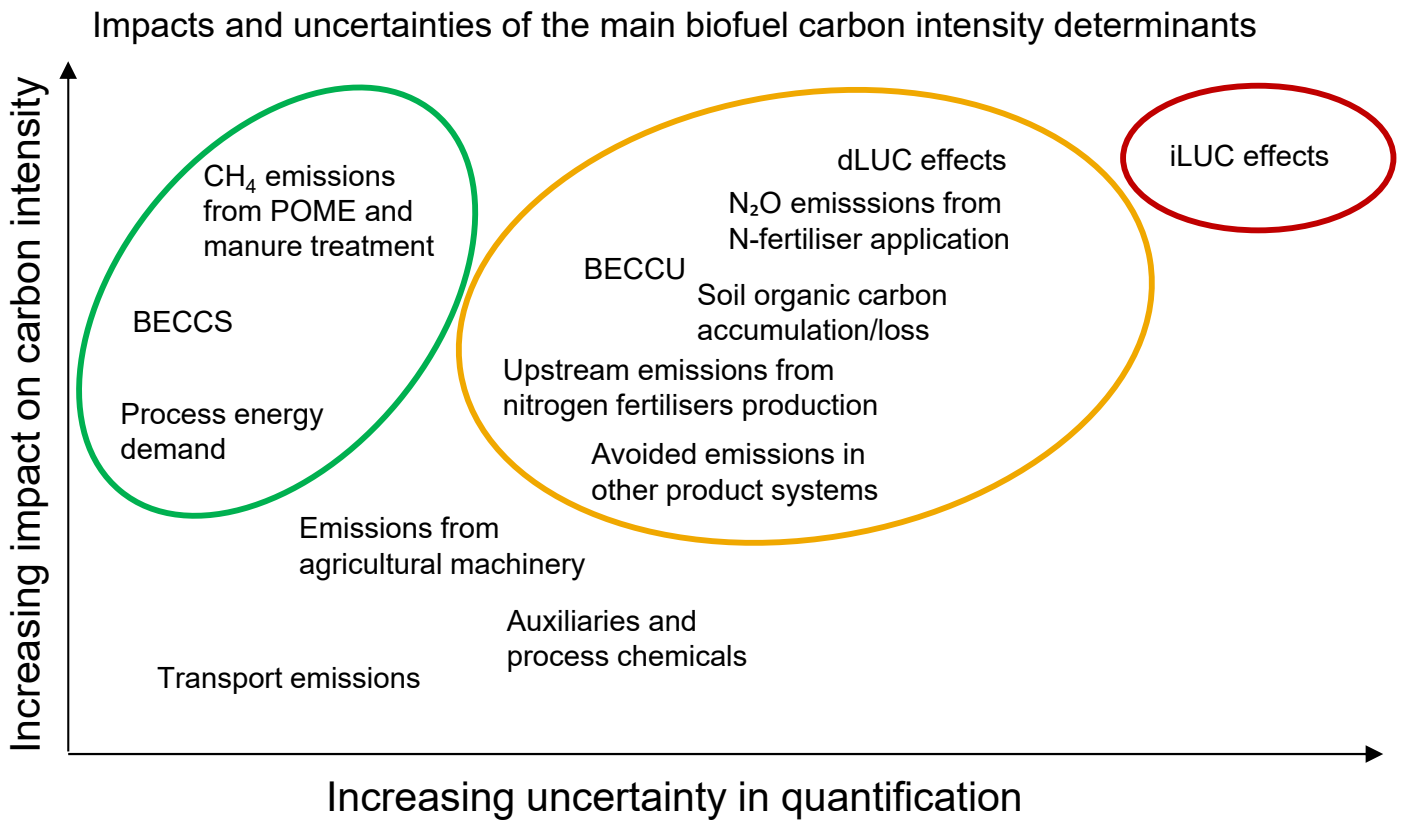
Biofuels

- GHG accounting is handled **similarly** across main biofuel policy frameworks, with the **exception of LUC**.
- GHG intensities can vary widely, but methodologies are **robust** and causes **well understood:**
  - regional differences
  - methodological choices
  - data input quality and representativeness
- LUC impacts a **major source of disagreement** across frameworks.

Carbon accounting approaches in the main biofuel policy frameworks



Tailored approaches needed to optimise high impact emission drivers

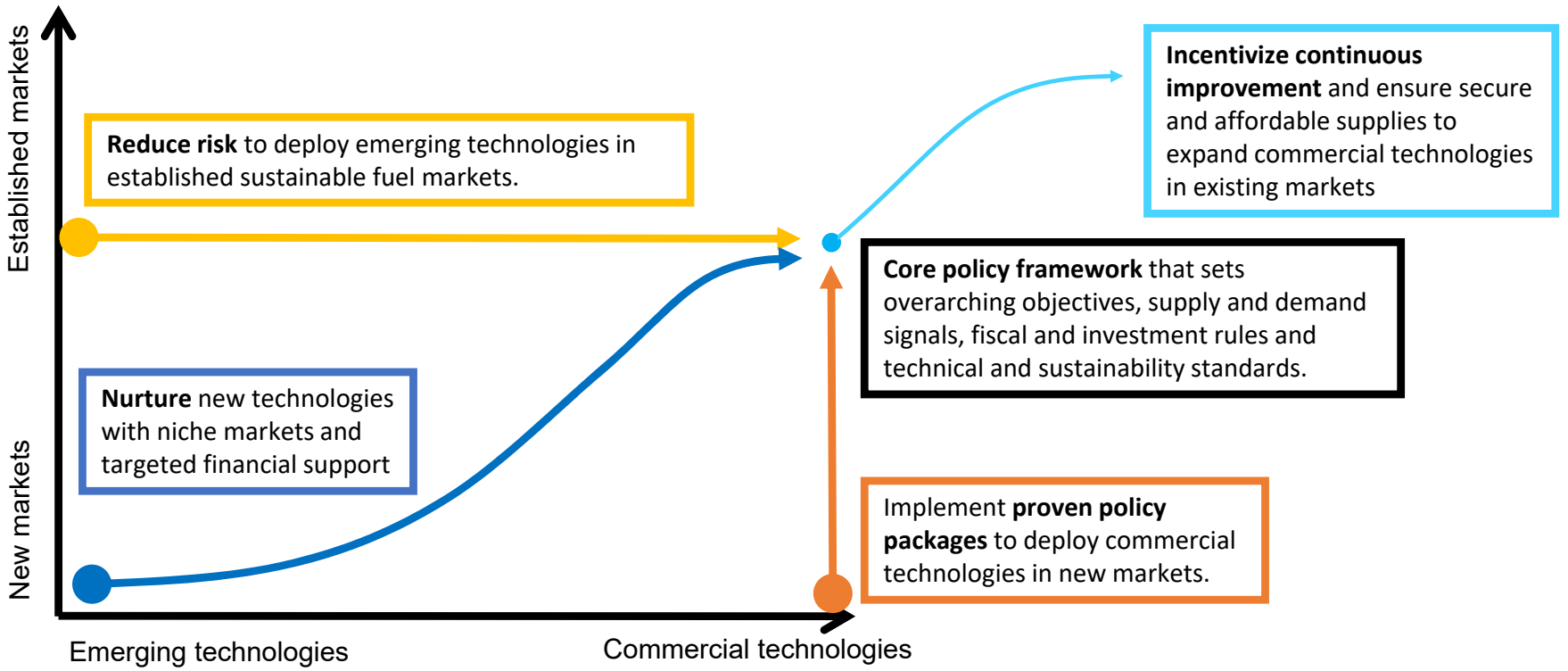


Green determinants are ”low-hanging fruits” for GHG reductions. Yellow can be tackled, but require additional verification efforts. ILUC cannot be measured or verified (only modelled) and need to be agreed on a policy level.

Additional policies needed to address system aspects in the transition

	Short-term	Long-term
Biofuel iLUC	Address ILUC with risk-based approaches (dLUC should be included).	Enforce direct land-use change policies globally.
Hydrogen Indirect system impacts	Careful application of additionality and temporal/spatial correlation requirements.	All power systems will be net zero.
H2Based Fuels Source of CO_2 and allocation of emission benefits	Case-by-case allowance of using 'waste' fossil CO_2 from existing industrial processes. Mutually agreed allocation of emissions benefits between the original CO_2 emitter and fuel producer, possibly in proportion to relevant investments. Important to avoid double crediting.	No fossil CO_2 allowed.

Integrated policies needed to expand sustainable fuels



A core policy framework underpins sustainable fuel deployment, but targeted measures are needed depending on technology readiness and market maturity. Nearly a century of global experience offers a solid foundation to build on.

The IEA recommends 6 priority actions

A **fourfold growth in a decade is ambitious but achievable**, if announced policies are consistently and fully implemented and market barriers are removed. Priorities are:

1. **Establish roadmaps, targets and support policies** to create long-term visibility for market development

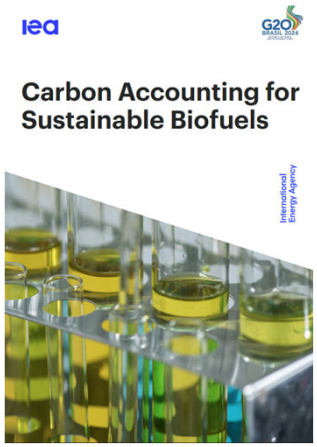
2. **Increase demand and supply of sustainable fuels** to reduce revenue risk, unlock private investment and drive continuous improvements in GHG performance

3. **Work towards common sustainability criteria** to ensure a level playing field, avoid double counting and guarantee data transparency and verifiability to build integrity into reporting.

4. **Support innovation to narrow cost gaps** and accelerate the scale-up of pathways with high GHG emissions-reduction potential.

5. **Develop supply chains and foster trade** to match regional production strengths with global demand, and to help EMDEs to participate in global supply chains.

6. **Make financing more accessible** to ensure projects receive final investment decisions, especially in the EMDEs.


Carbon Accounting for Sustainable Biofuels
International Energy Agency


Towards Common Criteria for Sustainable Fuels
International Energy Agency


Delivering Sustainable Fuels
Pathways to 2035
International Energy Agency