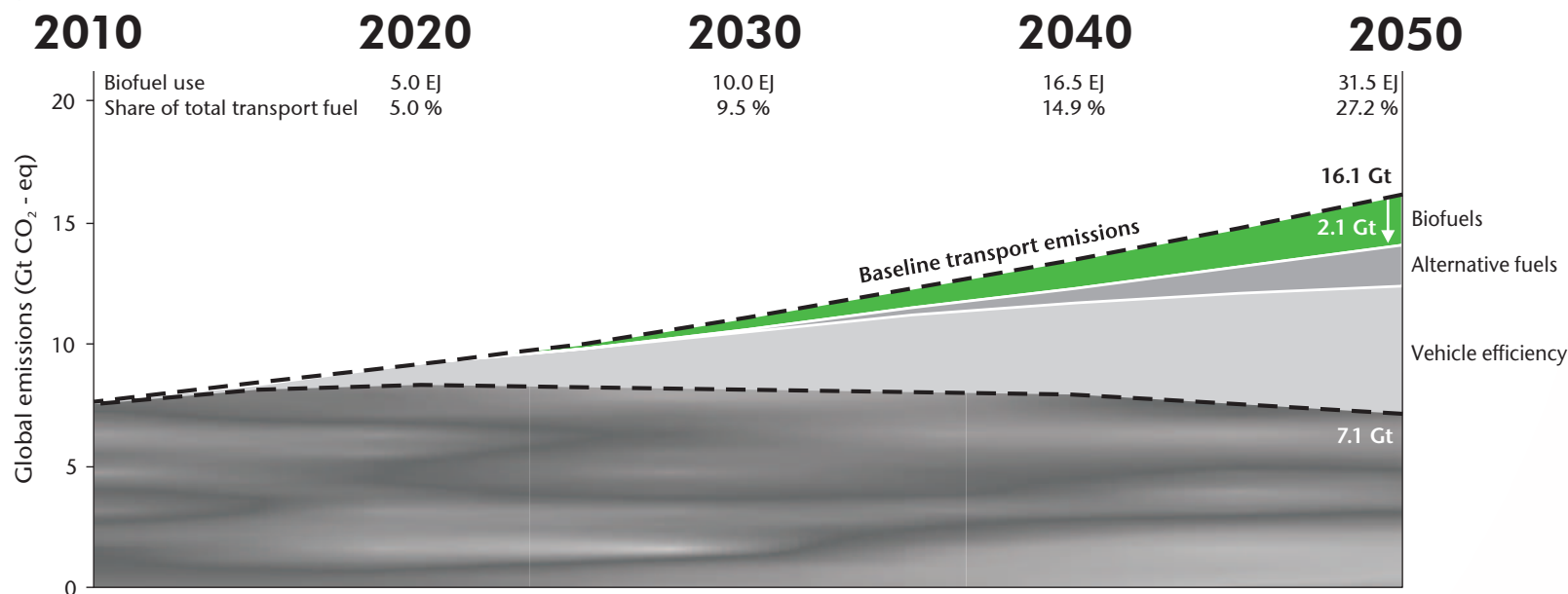


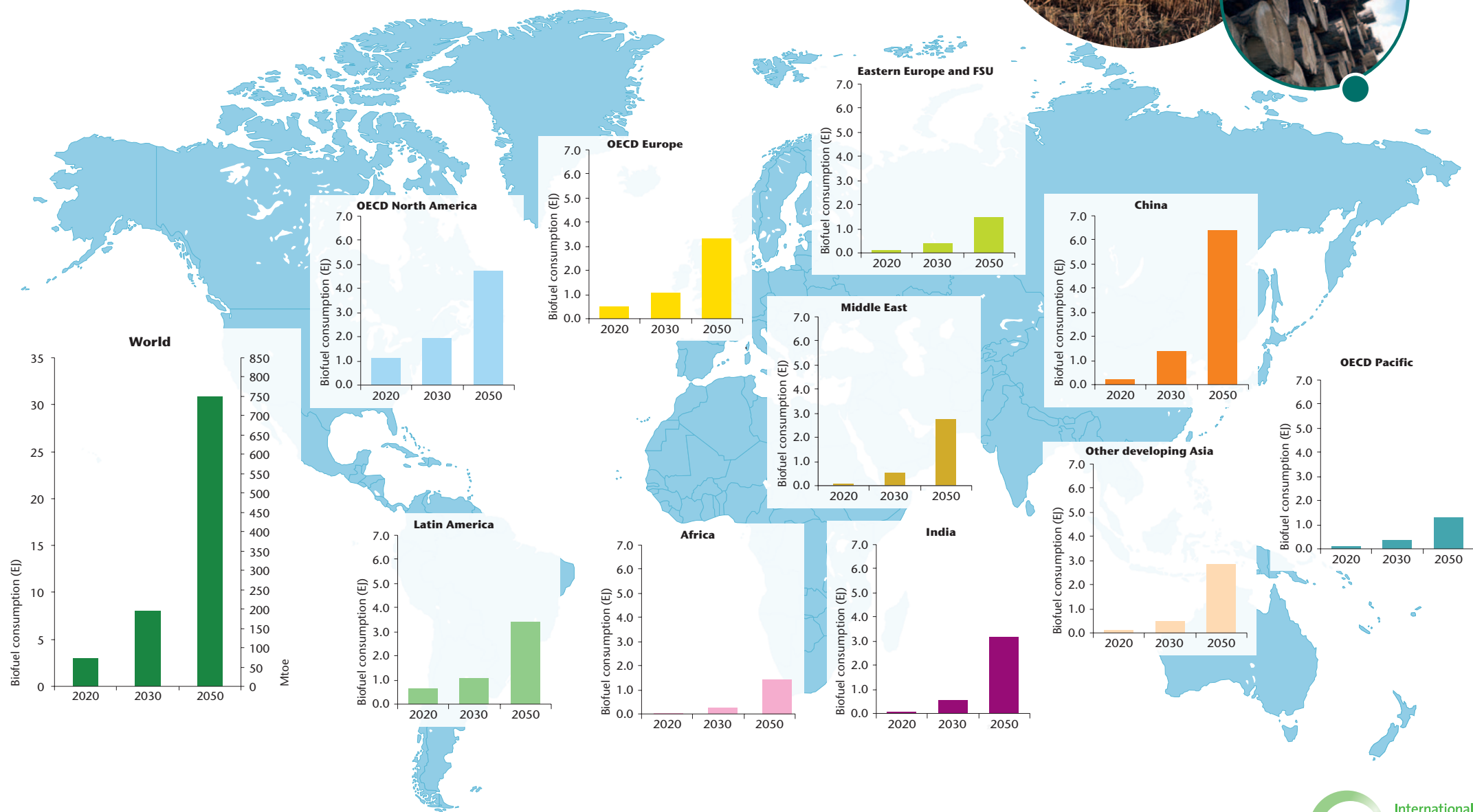
Biofuels contribution to emission reductions in the transport sector



Key findings

- ▶ By 2050 biofuels provide 27% of total transport fuel, and avoid around 2.1 Gt CO₂ emissions per year when produced sustainably.
- ▶ To meet this vision, the most cost and GHG efficient biofuels will be needed including considerable amounts of advanced biofuels.
- ▶ Commercial deployment of advanced biofuels will require further substantial research, development and demonstration, as well as deployment investment.
- ▶ Support policies should incentivise the most efficient biofuels in terms of overall green-house gas performance, and be backed by a strong policy framework which ensures that food-security and biodiversity are not compromised and that social impacts are positive.
- ▶ This roadmap requires around 65 EJ of biofuel feedstock in 2050, occupying around 100 Mha. With a sound policy framework in place, it should be possible to source the required biomass from residues and wastes, along with sustainably grown energy crops.
- ▶ Trade in biomass and biofuels will become increasingly important to supply biomass from biomass-rich regions to areas with high production and/or consumption levels and can help trigger investments in certain regions.
- ▶ Increasing scale and efficiency improvements will reduce biofuel production costs. The competitive position of biofuels will depend on a number of factors. Most biofuels are competitive by 2030, except when their production costs are strongly coupled to oil prices. In the longer term, the marginal savings or costs of deploying biofuels are a very small percentage of overall fuel costs.

Global map of biofuel consumption

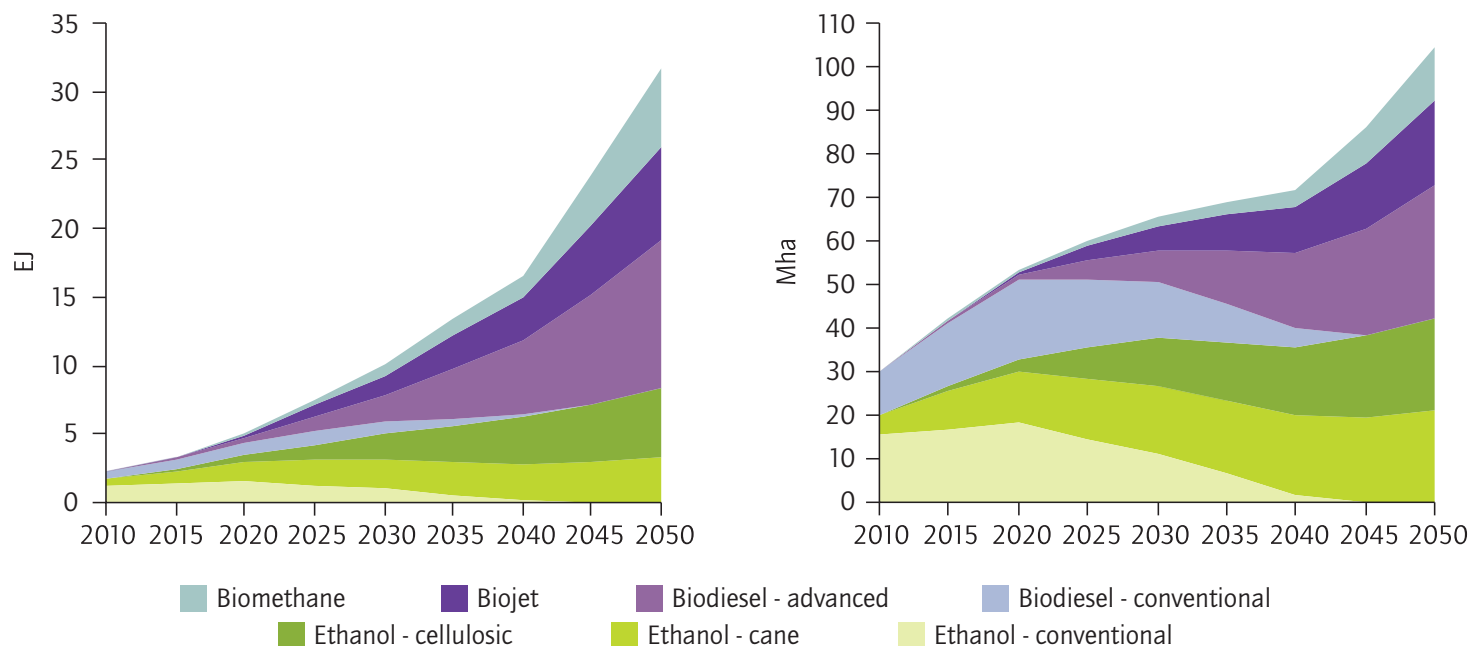


Key actions over the next 10 years

This roadmap suggests following key actions should be undertaken over the next few years:

- Create a stable, long-term policy framework for biofuels to increase investor confidence and allow for the sustainable expansion of biofuel production.
- Ensure sustained funding and support mechanisms for promising advanced biofuel technologies to reach commercial production within the next 10 years.
- Introduce mandatory sustainability requirements based on internationally aligned certification schemes in order to reduce land use change and ensure biofuels' sustainability.
- Link financial support schemes to the sustainable performance of biofuels to ensure >50% lifecycle GHG emission savings for all biofuels.
- Incentivise use of residues and wastes as biofuel feedstock.
- Increase research efforts on feedstocks and land availability mapping to identify the most promising feedstock types and locations for future scale-up.
- Reduce and eventually abolish tariffs and other trade barriers to enhance sustainable biomass and biofuel trade.
- Support international collaboration on capacity building and technology transfer to promote the adoption of sustainable biofuel production globally.

Demand for biofuels (left) and resulting land demand (right)



To meet the feedstock demand required in this roadmap, around 100 Mha of land (mainly pasture and unused land) are needed. In addition, around 1 billion tons of residues and waste biomass is needed, mainly for advanced biofuel production. If more residues were used, land demand could be reduced significantly.

- A sound policy framework is needed, including internationally aligned certification schemes, to promote the use of residues and wastes, along with sustainable production of energy crops and avoid competition for land and feedstocks with growing food demand and fibre production.
- Enhanced biomass and biofuel trade will play a crucial role to supply biomass and/or biofuels from biomass-rich regions to areas with high production and/or consumption levels.

Production costs (USD/litre gasoline equivalent)

	2010	2020	2030	2040	2050
<i>Petroleum gasoline</i>	0.54	0.72	0.82	0.83	0.85
<i>Ethanol - conventional</i>	0.70 - 0.75	0.70 - 0.80	0.65 - 0.85	0.65 - 0.85	0.65 - 0.85
<i>Ethanol - cane</i>	0.60 - 0.70	0.60 - 0.70	0.60 - 0.70	0.60 - 0.70	0.60 - 0.75
<i>Ethanol - cellulosic</i>	1.05 - 1.15	0.90 - 1.05	0.80 - 0.95	0.80 - 0.90	0.75 - 0.90
<i>Biodiesel - conventional</i>	0.95 - 1.05	0.95 - 1.10	0.95 - 1.15	0.95 - 1.15	0.95 - 1.15
<i>Biodiesel - advanced (BtL)</i>	1.05 - 1.15	0.90 - 1.05	0.80 - 1.00	0.75 - 0.90	0.75 - 0.85
<i>bio-synthetic gas</i>	0.90 - 1.05	0.85 - 0.95	0.75 - 0.90	0.70 - 0.85	0.65 - 0.80

Note: Costs reflect global averages. Ranges result from the strength of correlation between oil price and feedstock costs and capital costs. Lower production costs result from a weak correlation, whereas higher costs result from a stronger impact of oil prices on feedstocks (20% impact) and capital costs.

Biofuels for transport roadmap milestones

2010

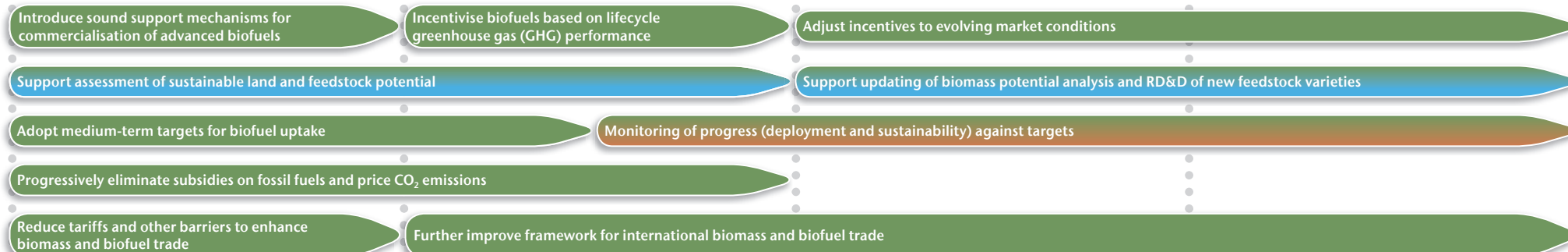
2020

2030

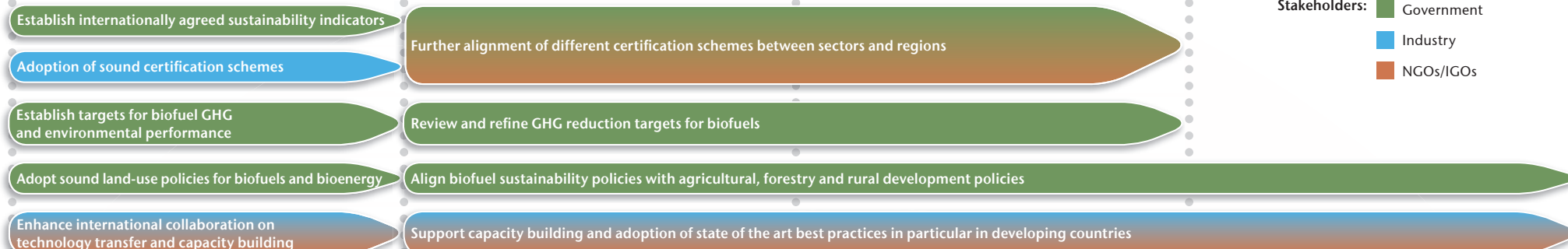
2040

2050

Regulatory framework and support schemes



Sustainability framework



Stakeholders:

- Government
- Industry
- NGOs/IGOs

Technology and RD&D

