



Biofuels in the energy transition

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The IEA works around the world to support an accelerated clean energy transition that is

enabled by real-world SOLUTIONS

supported by ANALYSIS

and built on DATA

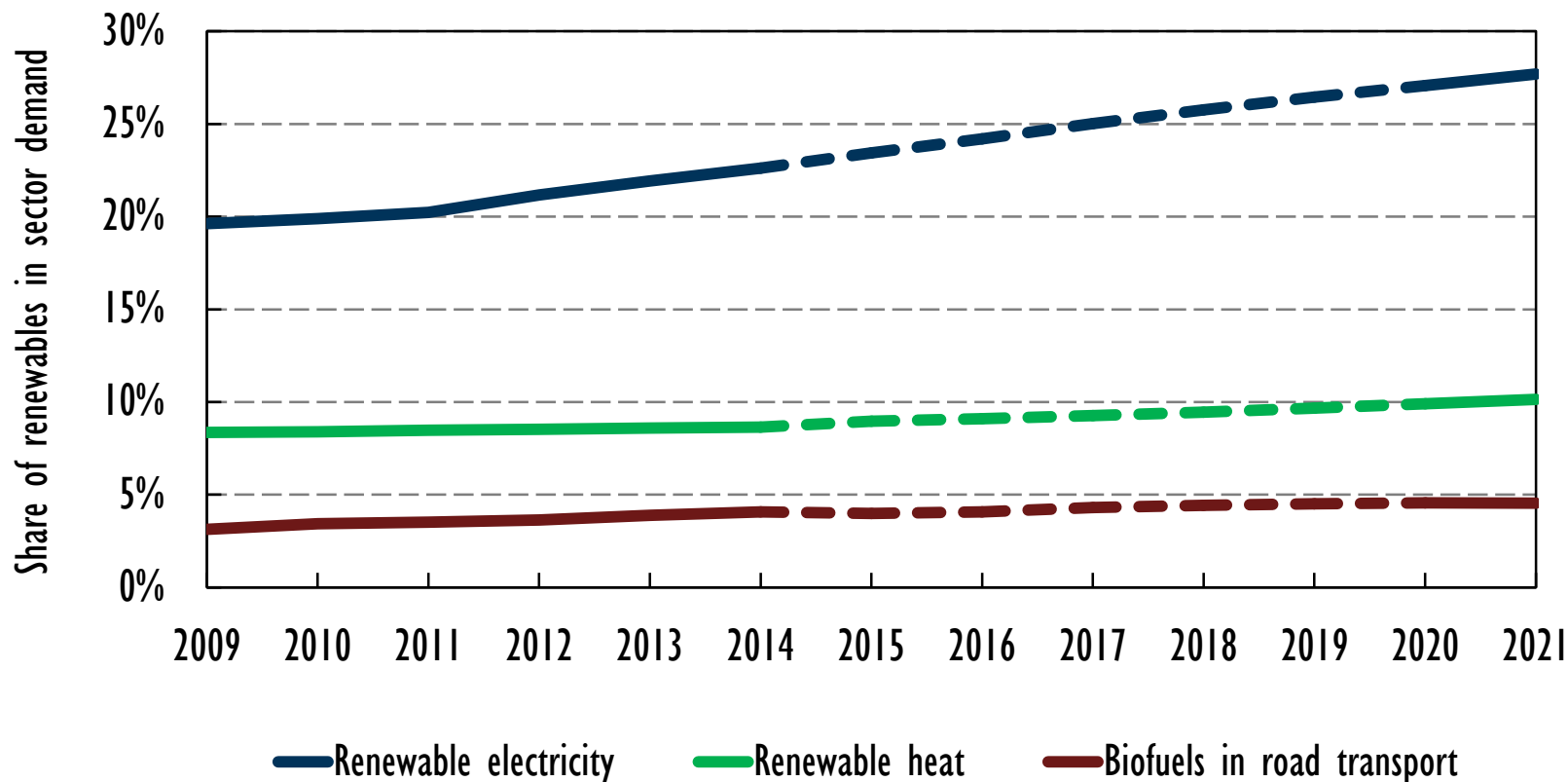
Overview:



- **Medium-Term Renewable Energy Market Report 2016 (MTRMR 2016):**
 - Share of renewables in the power, heat and transport sectors.
 - Conventional biofuels medium term forecast
 - Advanced biofuels medium term forecast
 - Cellulosic ethanol cost reduction potential
 - Prospects for biofuels in aviation
- **Content from Energy Technology Perspectives 2016 (ETP 2016) - What role for biofuels within the IEA's 2 degrees scenario (2DS)?**
 - Geographical trends – decarbonising transport in OECD and non-OECD countries
 - Fuels shares in passenger and freight transport within the 2DS
 - Urban and non-urban transport and role of biofuels in the 2DS.

Renewables dominate electricity growth but less progress in heat & transport

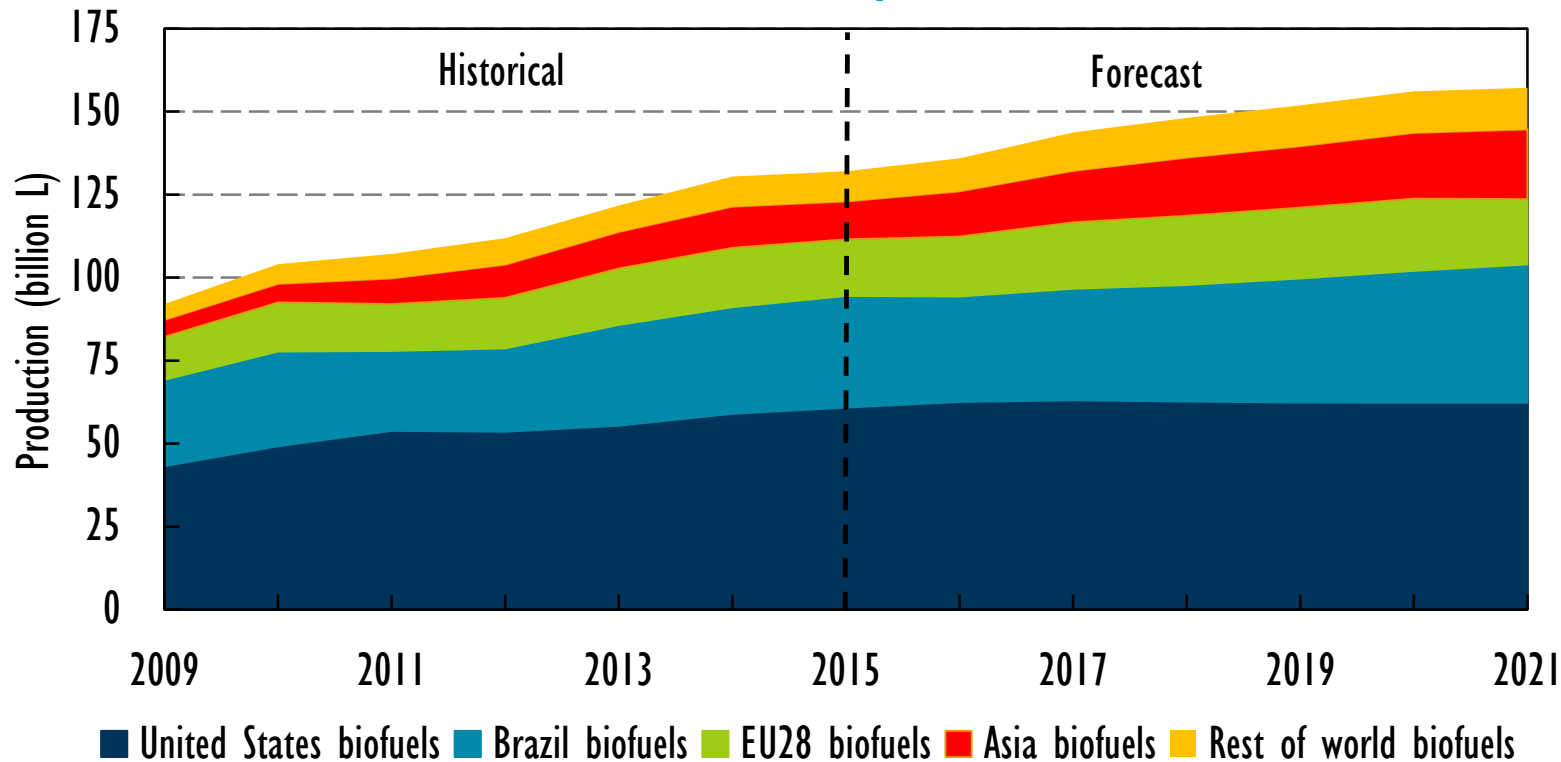
Share of renewables in electricity, heat and transport sectors



The share of renewables rises in all sectors. However, persistent challenges in heat & transport mean lower shares are achieved than for electricity.

Global conventional biofuels production increased modestly during 2015

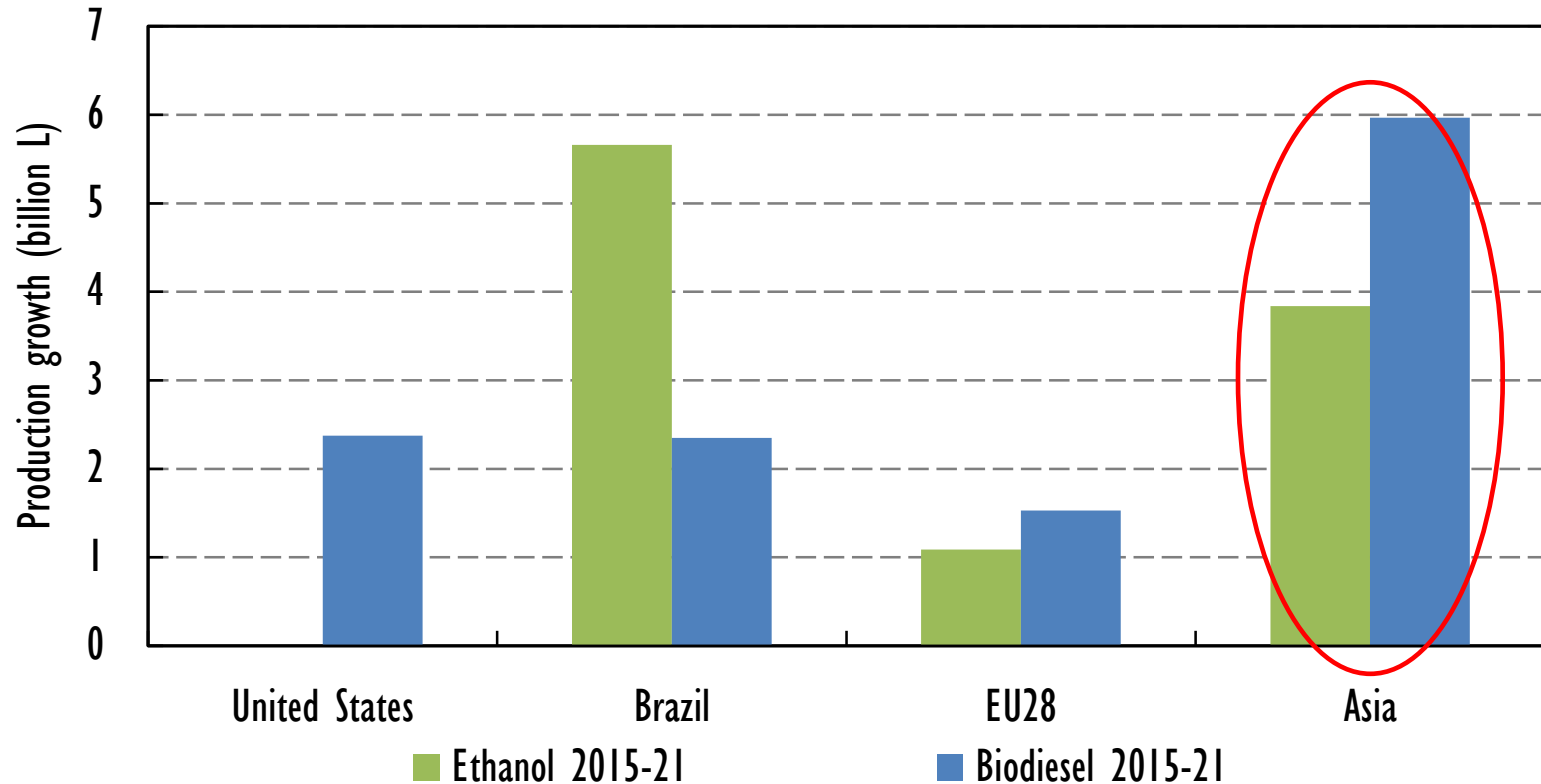
World conventional biofuel production, 2009-21



Conventional biofuels industry expansion has slowed from previous levels, however strengthened mandate requirements in key markets improve the medium-term outlook.

Asia poised to head medium-term conventional biofuels market growth

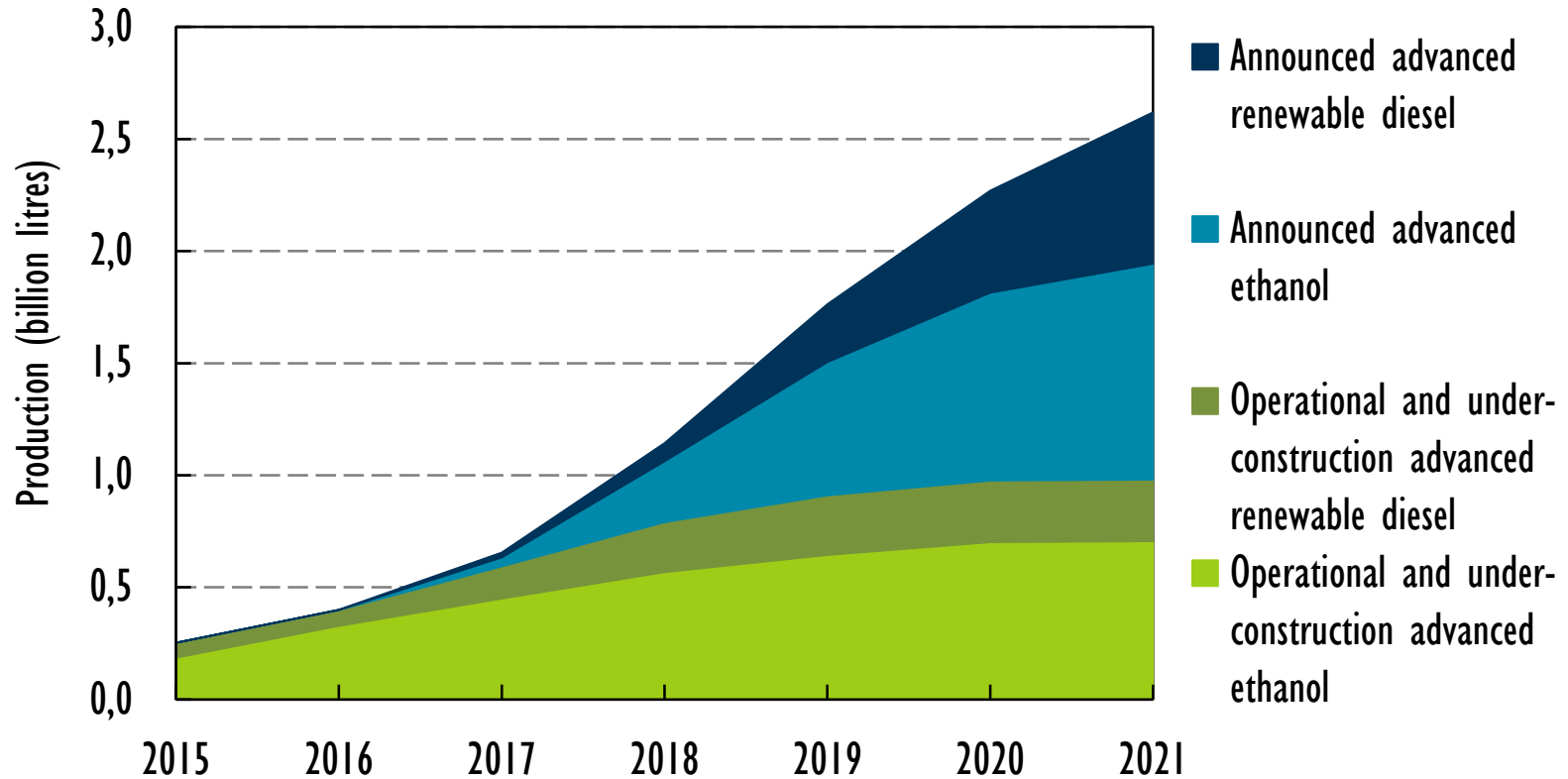
Conventional biofuels production growth in selected countries / regions, 2015-21



Security of supply considerations have resulted in strengthened policies in Thailand and India (Ethanol), and Indonesia and Malaysia (biodiesel), boosting production growth.

Advanced biofuels anticipated to scale up from current production levels

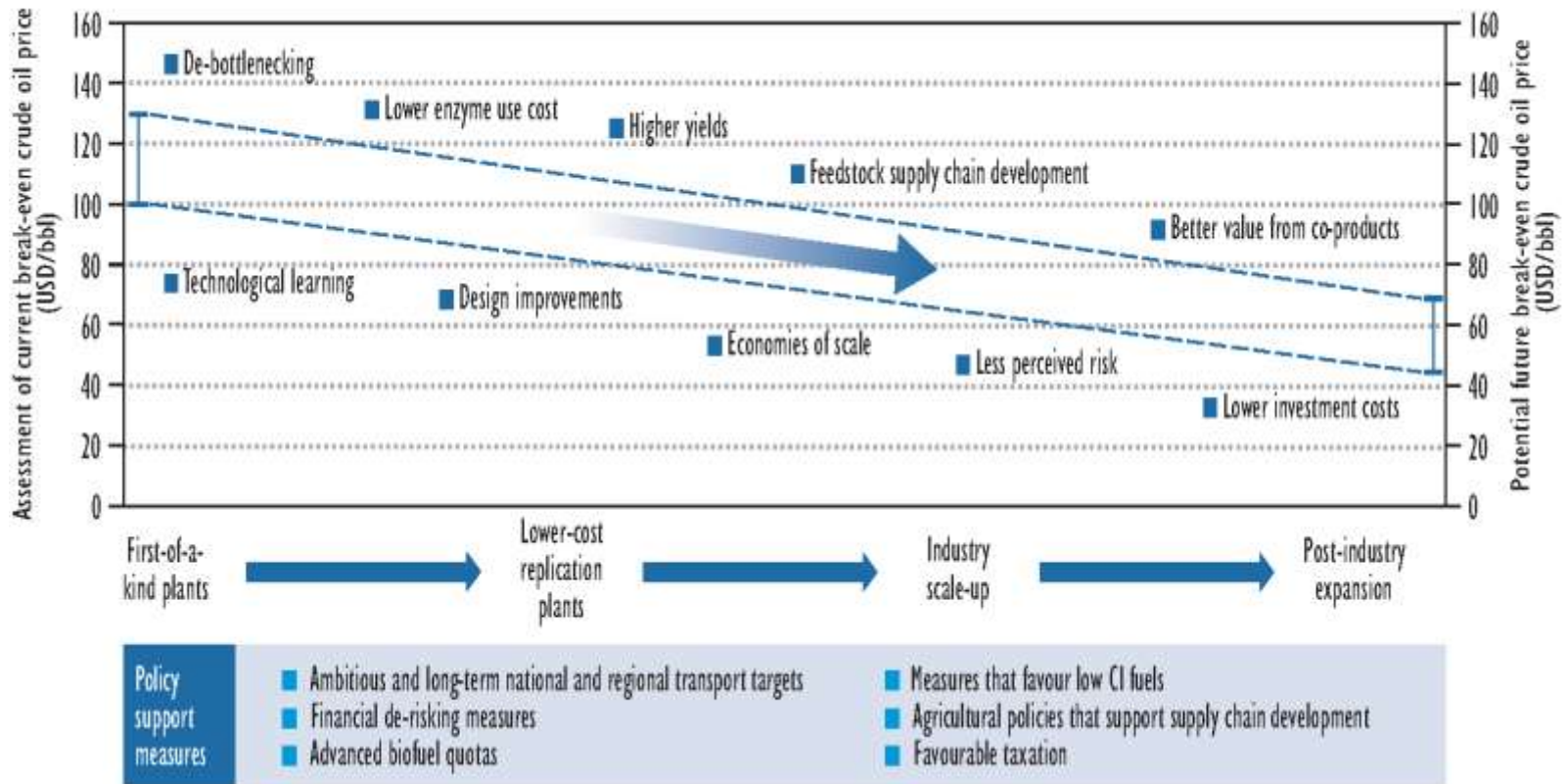
Advanced biofuels production forecast, 2015-21



Advanced biofuels are needed in the longer term to sustainably reduce the overall carbon footprint of the transport sector, but the industry remains in an early stage of development.

Significant cost reduction potential identified for cellulosic ethanol

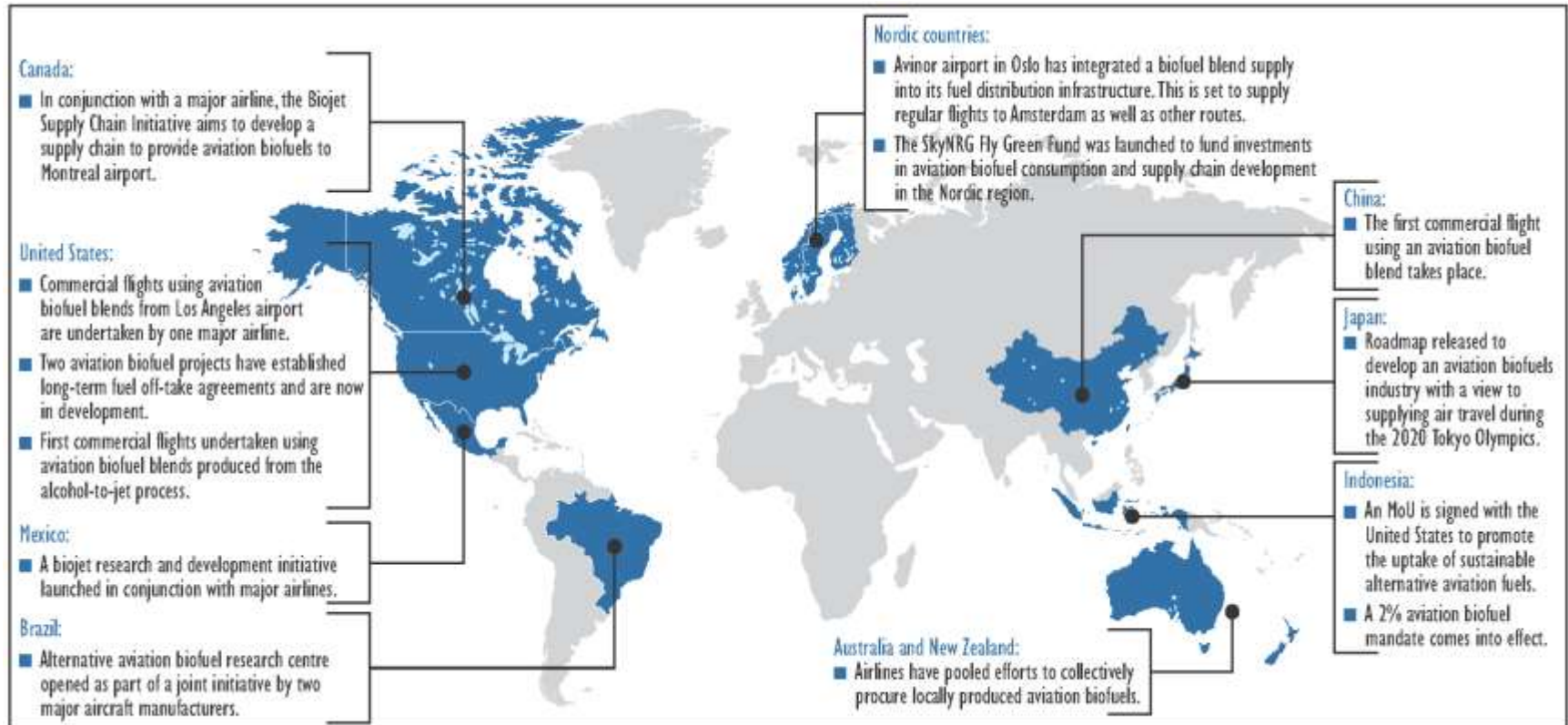
Cellulosic ethanol cost reduction potential



Industry expansion is anticipated to facilitate improved competitiveness of cellulosic ethanol, but more widespread policy support is needed to enable cost reduction potential.

Biofuels are essential to the aviation industry's decarbonisation plans

Global aviation biofuel developments over 2015-16



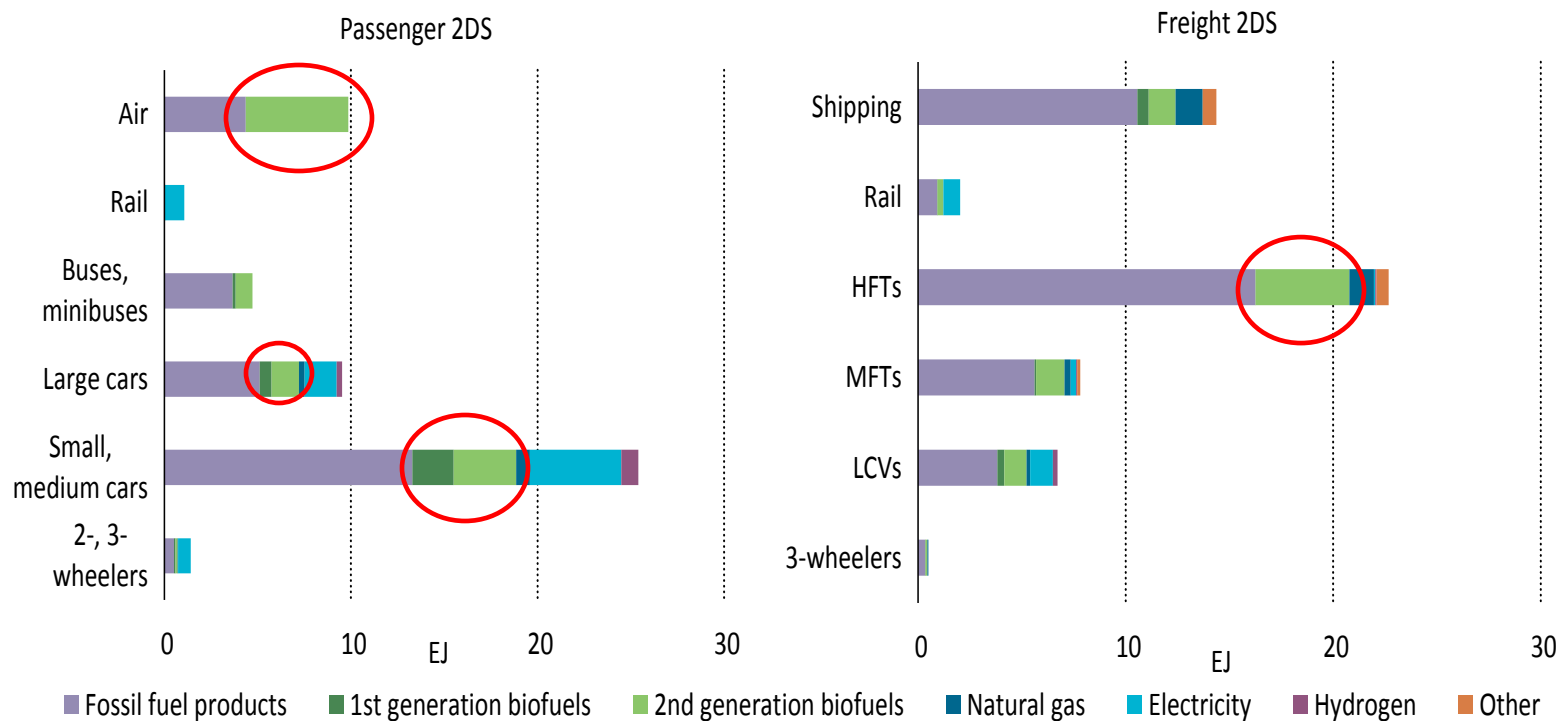
This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.

Worldwide aviation biofuels activity is evident, and uptake can grow further with regional supply chain development and actions to reduce cost premiums over conventional jet fuels.

Biofuels have a role to play across both passenger and freight transport

ETP
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Fuel shares in 2050 for passenger and freight modes by scenario

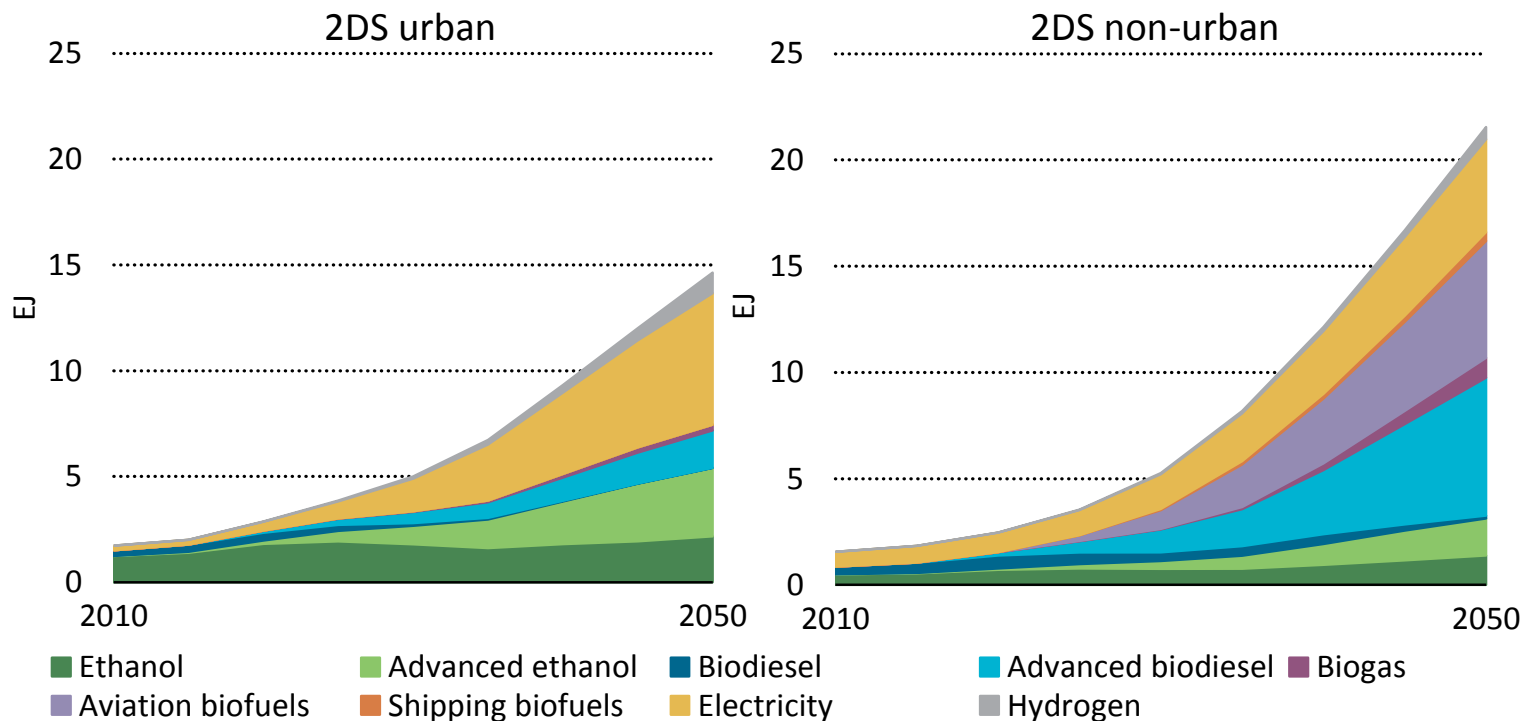


Conventional, and to a greater extent advanced, biofuels make key contributions within the 2DS by 2050. Especially in aviation and heavy duty road freight transport.

Commercialisation of a range of advanced biofuels needed by the 2DS

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Urban and non-urban contribution of fossil fuels alternatives within the 2DS



Electrified transport is crucial for urban transportation in 2050 within the 2DS, while non-urban mobility requires a range of biofuel solutions.

Conclusions



- **Conventional biofuels production has slowed, but strengthened mandates in key markets should underpin medium-term growth.**
- **Security of supply considerations mean Asia will lead conventional biofuels growth over 2015-21.**
- **Advanced biofuels production scale-up by 2021 can be achieved via increased output from current plants & delivery of announced projects.**
- **Clear long-term demand signals have resulted in promising developments for aviation biofuels in a diverse number of countries.**
- **Both conventional and advanced biofuels have a role to play in the IEAs 2DS for the transport sector.**