International Energy Agency

Renewable Energy Trends & Outlook
The role of Bioenergy for Decarbonisation

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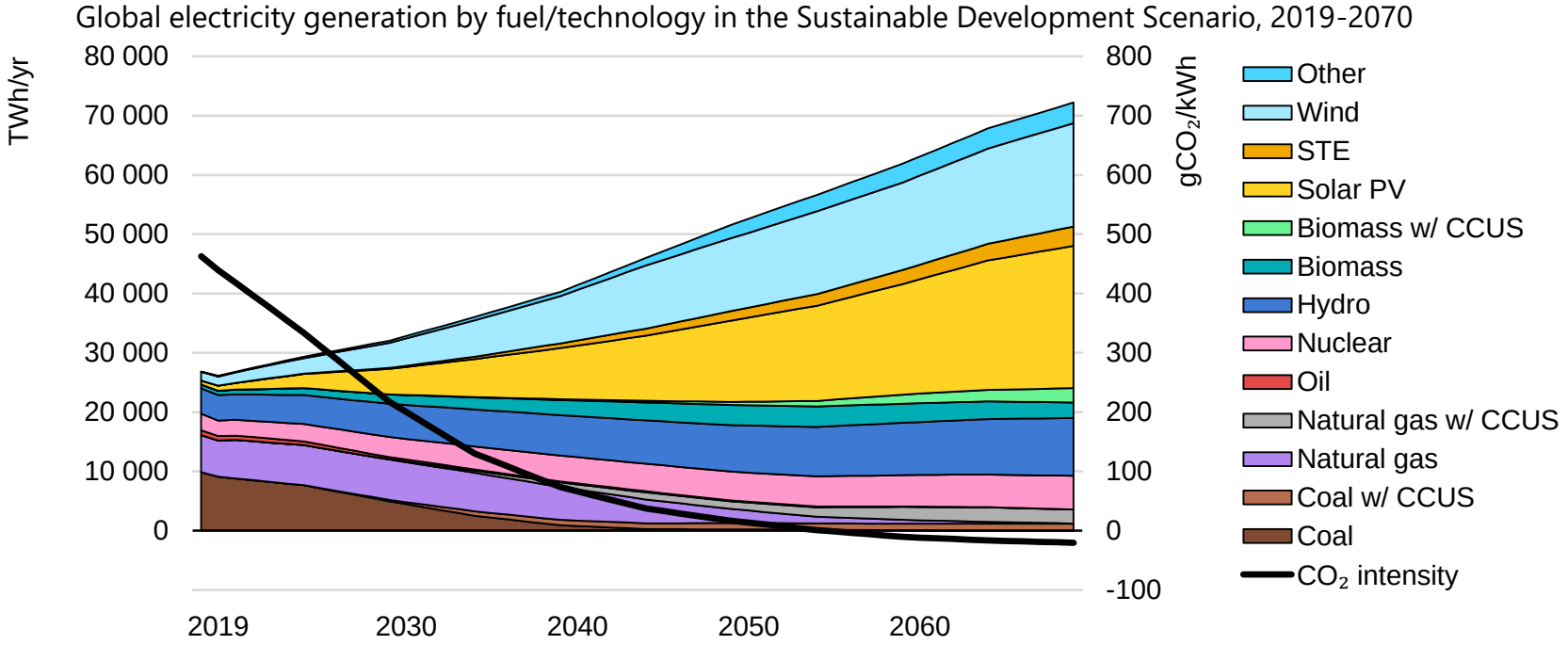
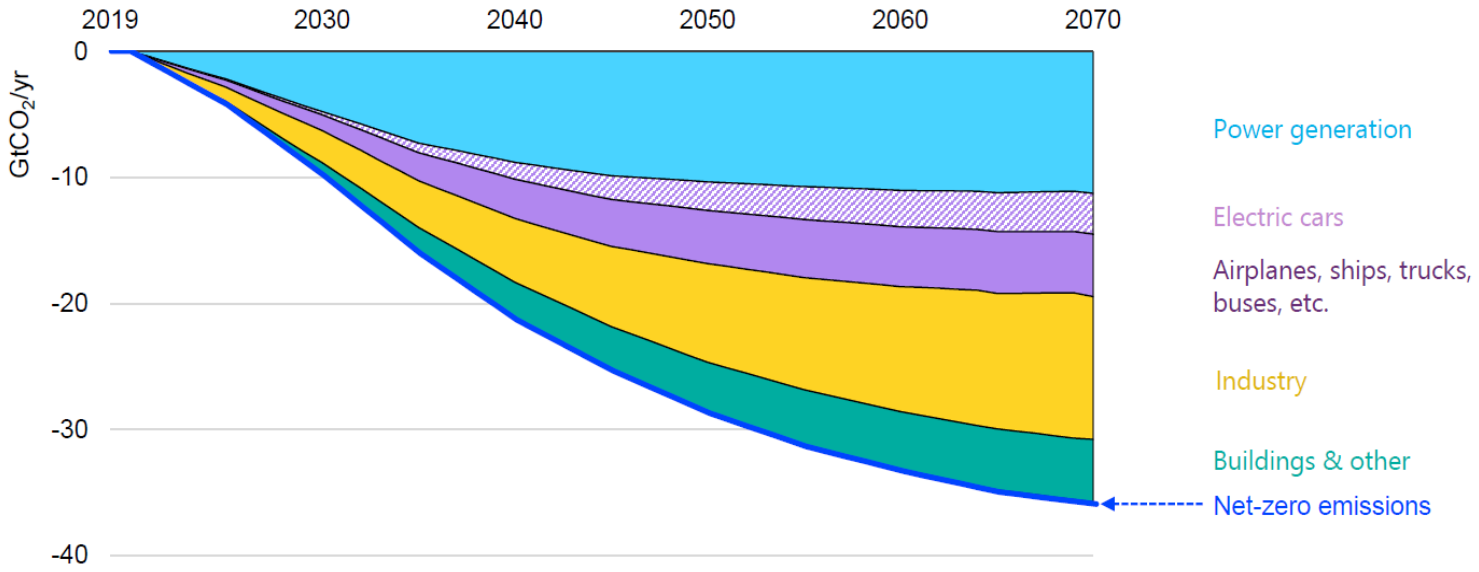
Solar leads renewables to new heights in power systems



Solar becomes the cheapest electricity in most countries, leading the massive deployment of renewable electricity. RE share on total electricity generation surpasses 80% in 2050 and reaches 87% in 2070.

Focusing on the power sector is not enough to reach climate goals

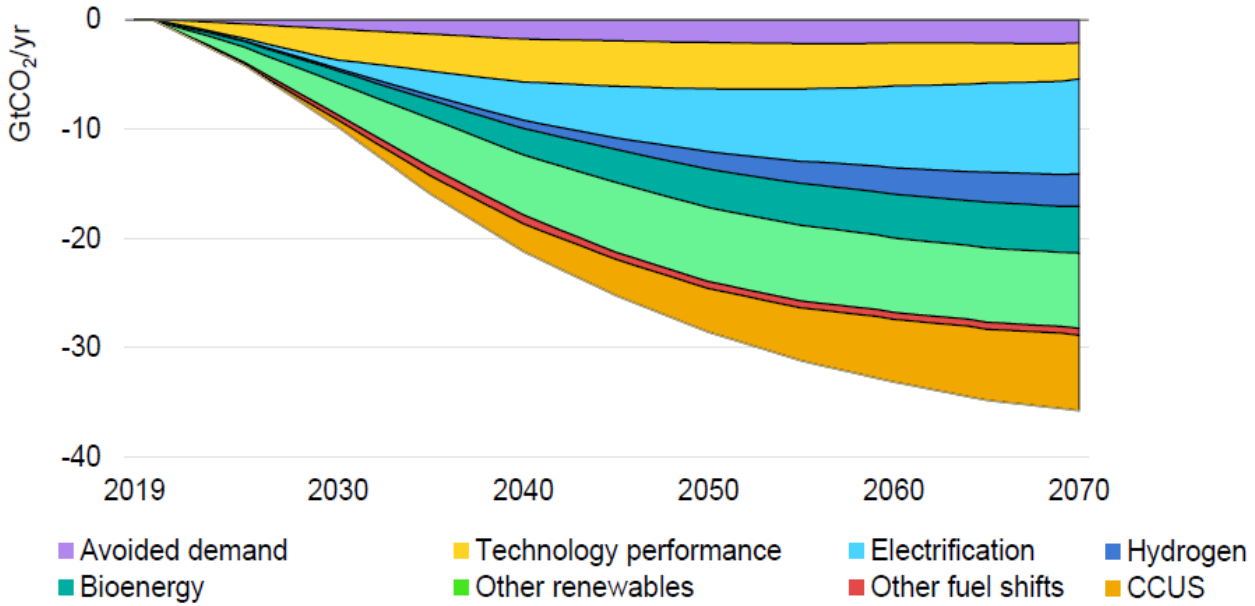
Global CO2 emission reductions in the Sustainable Development Scenario, relative to baseline trends



Clean energy technology progress in the power sector and with electric cars is encouraging, but alone not sufficient to reach climate goas. About half of all CO2 emissions today are from industry, transport & buildings

A large portfolio of clean energy technologies is needed

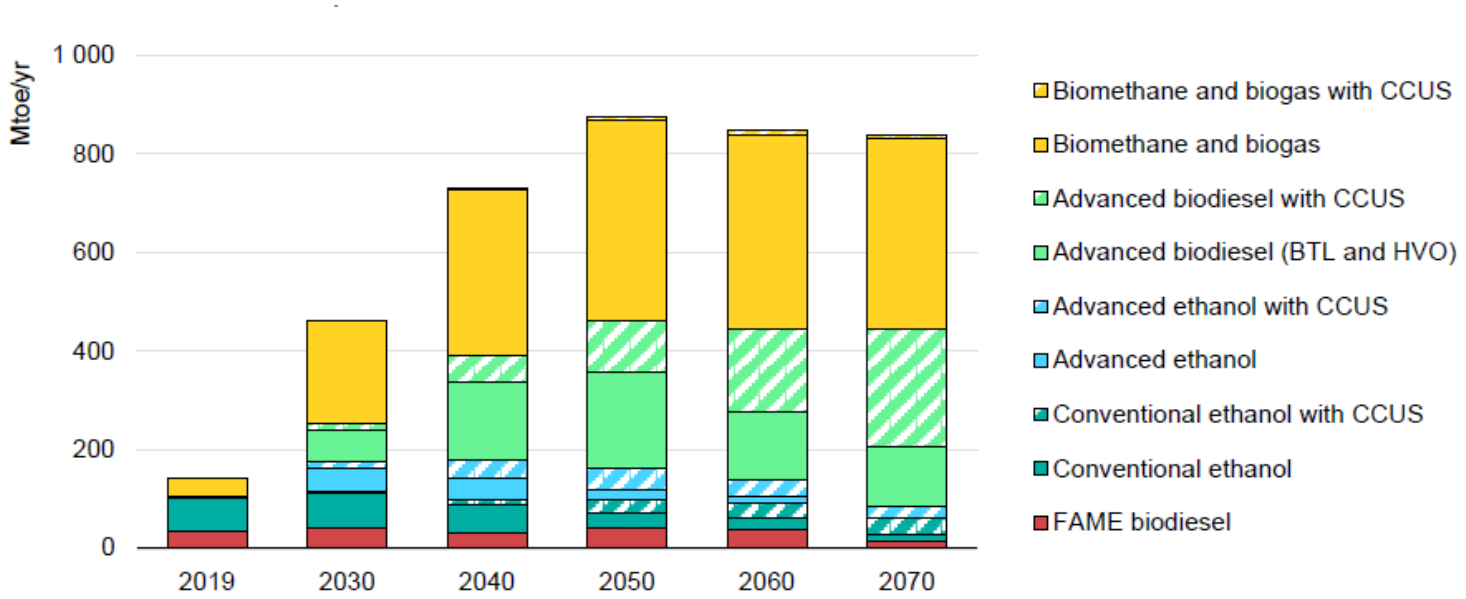
Global annual energy sector CO2 emissions reductions by measure in the SDS relative to the Stated Policies Scenario



The use of modern bioenergy triples from today's levels. It is used to directly replace fossil fuels or to offset emissions indirectly through its combined use with CCUS, accounting for 1/8 of cumulative emission reductions

Biofuels need to ramp up quickly

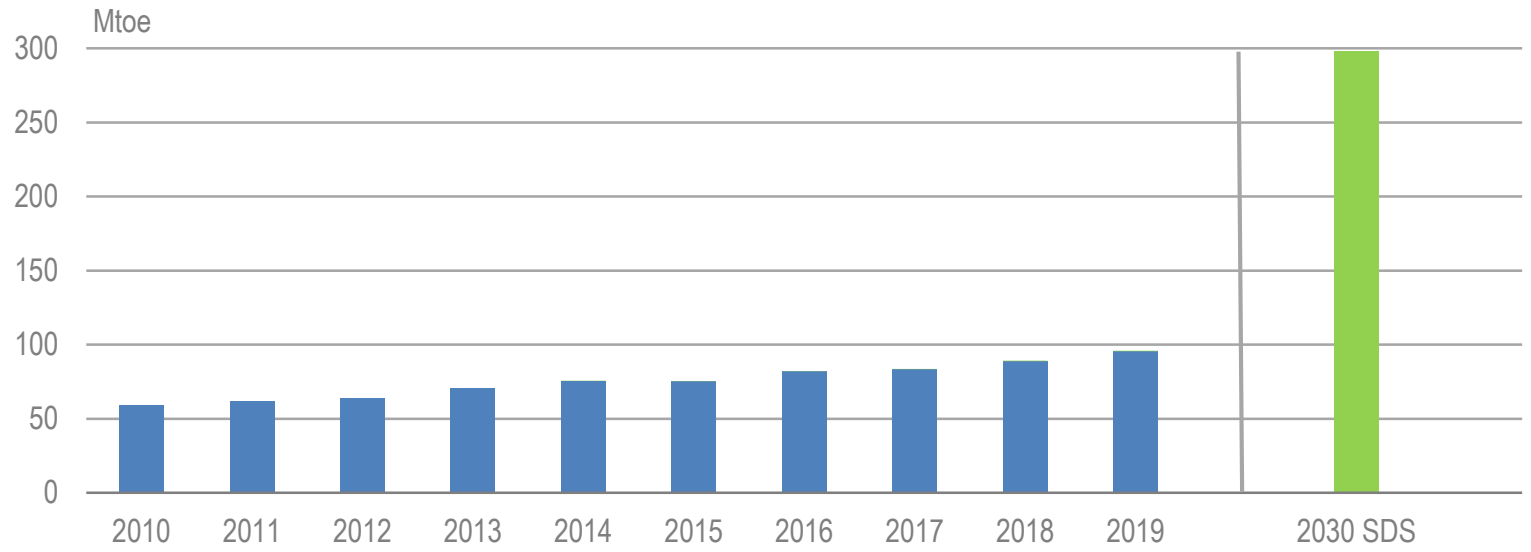
Global biofuels production by technology in the Sustainable Development Scenario



Innovation and large commercial scale demonstration need to accelerate substantially, to ramp up deployment of advanced biofuels and CCUS at the necessary scale in the SDS.

Biofuels are not on track

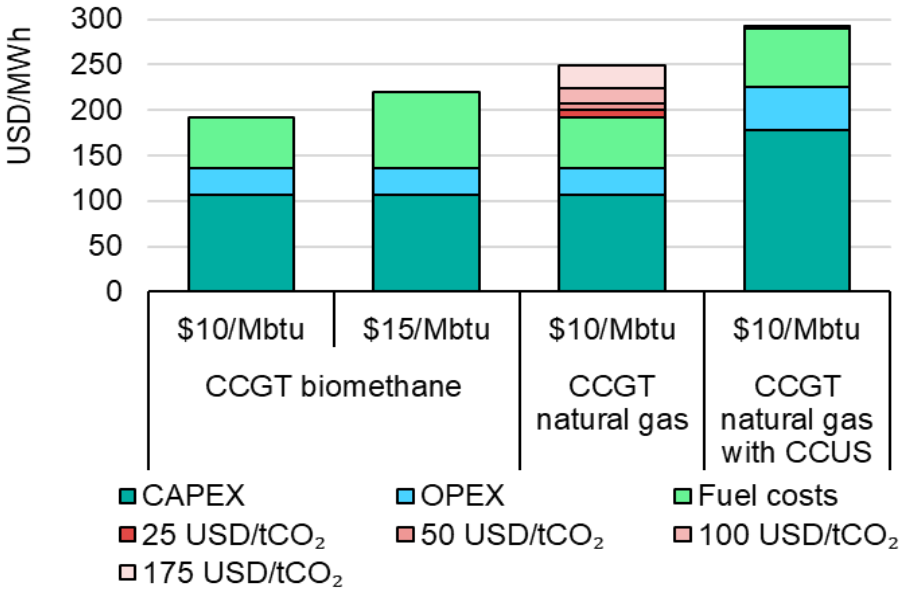
Global biofuel production 2010-2019 compared to consumption in the Sustainable Development Scenario



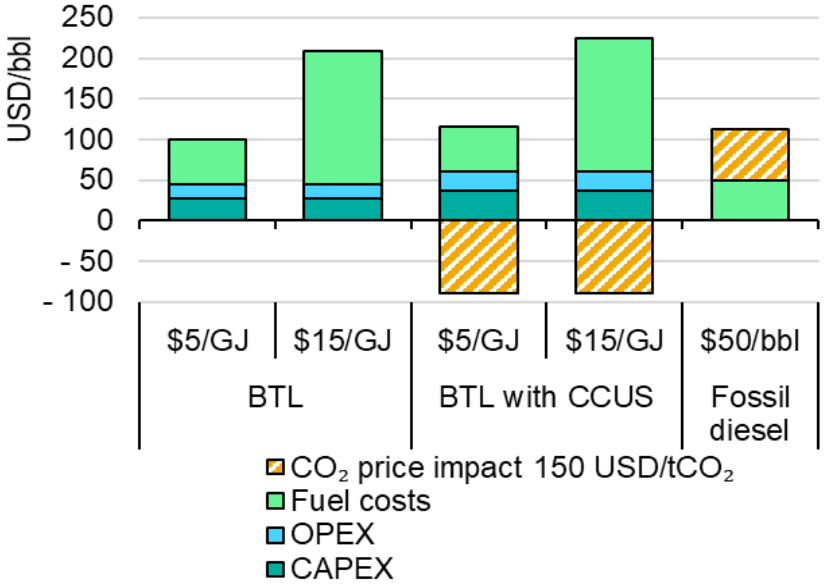
Biofuel deployment must significantly accelerate in this decade to be on track with SDS targets

Cost competitiveness remains an important issue

Levelised costs of bioenergy for power generation, 2050



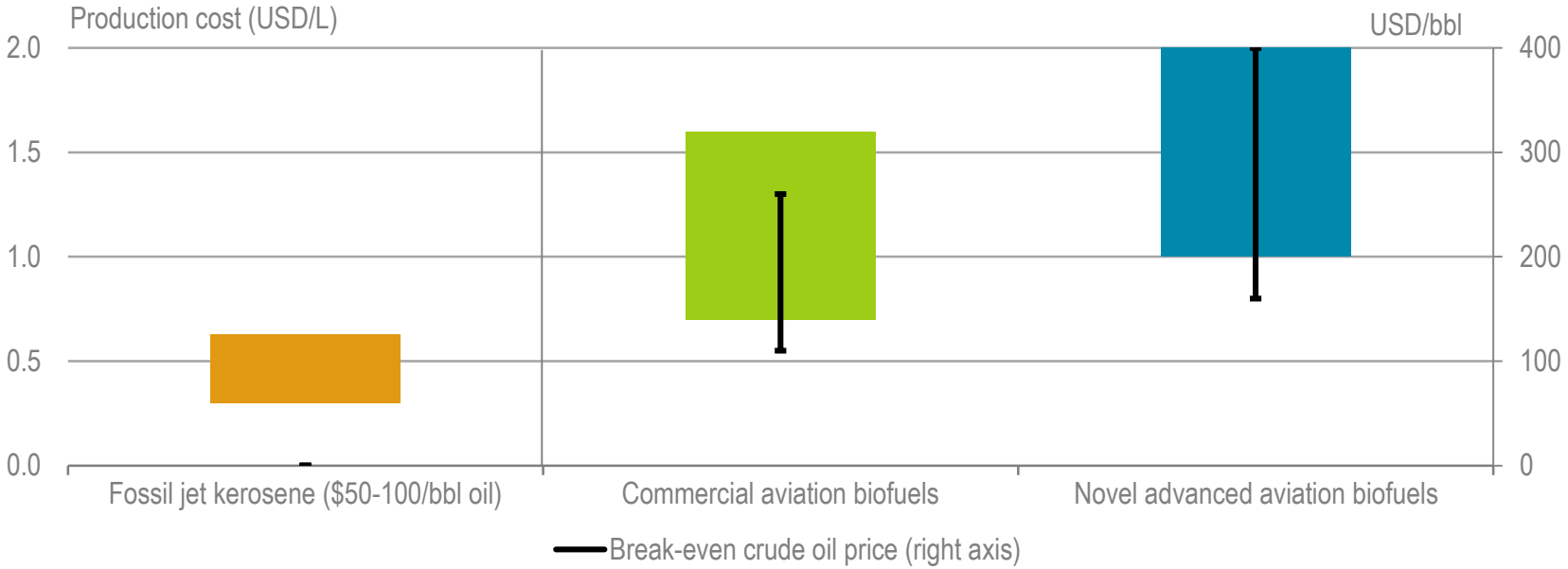
Levelised costs of liquid biofuels, 2050



- The cost-competitiveness of biomass for the production of electricity and biofuels depends on bioenergy feedstock costs, competing fossil energy prices and CO_2 prices.

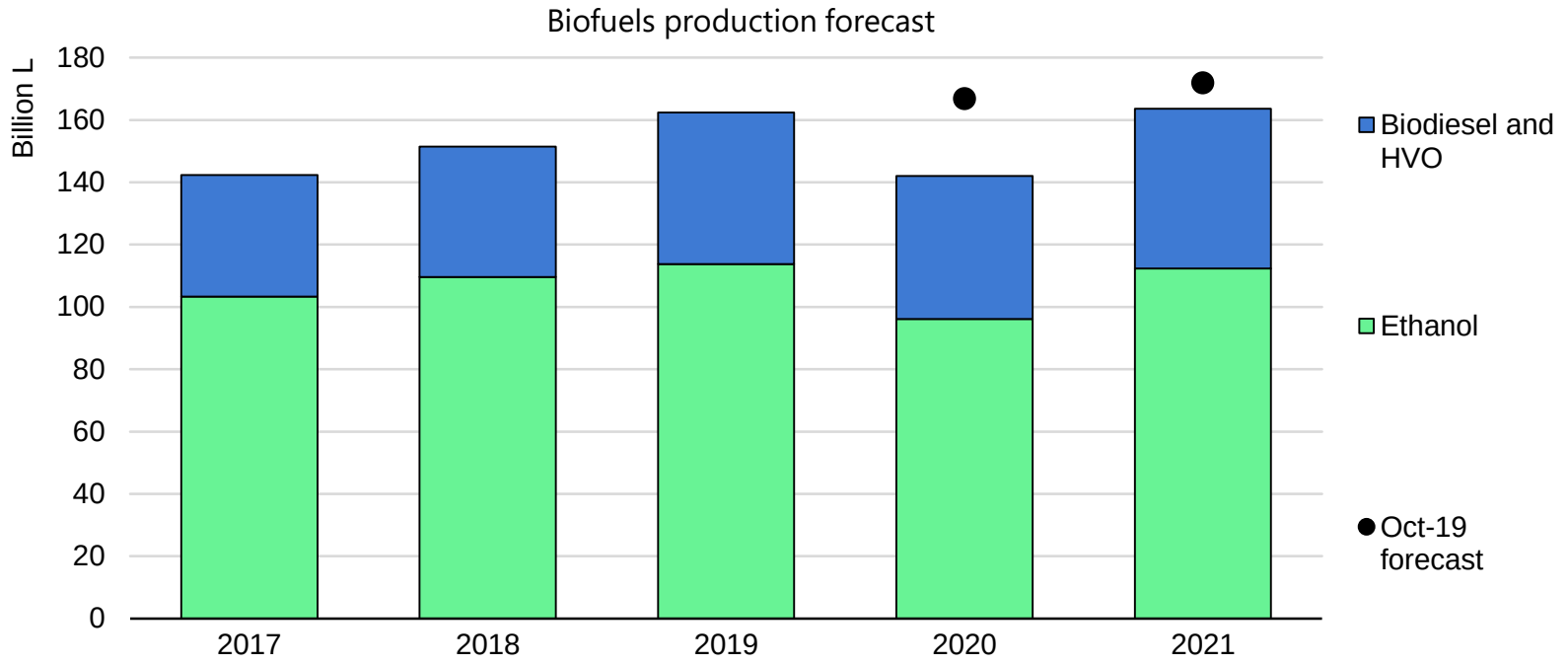
Higher costs that fossil jet fuel remains a key barrier to SAF uptake

Production costs for fossil jet fuel and aviation biofuels with break-even crude oil price



The development of less mature technologies, that can use residue and waste feedstocks, is needed to raise SAF production and reduce costs.

Covid-19: Biofuels production declines for the first time in two decades



Biofuel production in 2020 falls as Covid-19 reduces transport activity, shrinking demand from mandate policies. Low gasoline and diesel prices also challenge the business case for biofuels.

Sustainable recovery opportunities

- IEA Sustainable Recovery Plan carried out in cooperation with the International Monetary Fund, shows implementing the plan can:
  - Boost global economic growth by an average of 1.1 percentage points a year
  - Save or create roughly 9 million jobs a year
  - Make 2019 the definitive peak in global emissions

- One of the most labour-intensive energy industries, already employing globally around 3 million people, bioenergy has the the second-largest number of jobs (15-30) created per million dollars of spending

- Biofuture Platform Five Principles for Post-COVID Bioeconomy Recovery and Acceleration:
  1. Do not backtrack
  2. Consider short-term COVID support for producers
  3. Reassess fossil fuel subsidies
  4. Build Back Better with Bio
  5. Reward sustainability

Concluding remarks

- Renewables primary energy more than quadruples by 2070, reaching almost two thirds of total. Bioenergy triples becoming the second largest supply source
- A large portfolio of innovative technologies are needed to achieve SDS targets
- Effective policy toolkits are needed to foster technologies at different maturity stage. Technology specific measures can be helpful in the early stages.
- Carbon pricing can help, but price levels and distributional effects must be carefully assessed and managed taking into account local contexts.
- Sustainability of bioenergy and other clean energy options must be measured and rewarded. This helps compensating the cost gap with fossil fuels