International Energy Agency

Bioenergy in the Net Zero Roadmap

Jeremy Moorhouse

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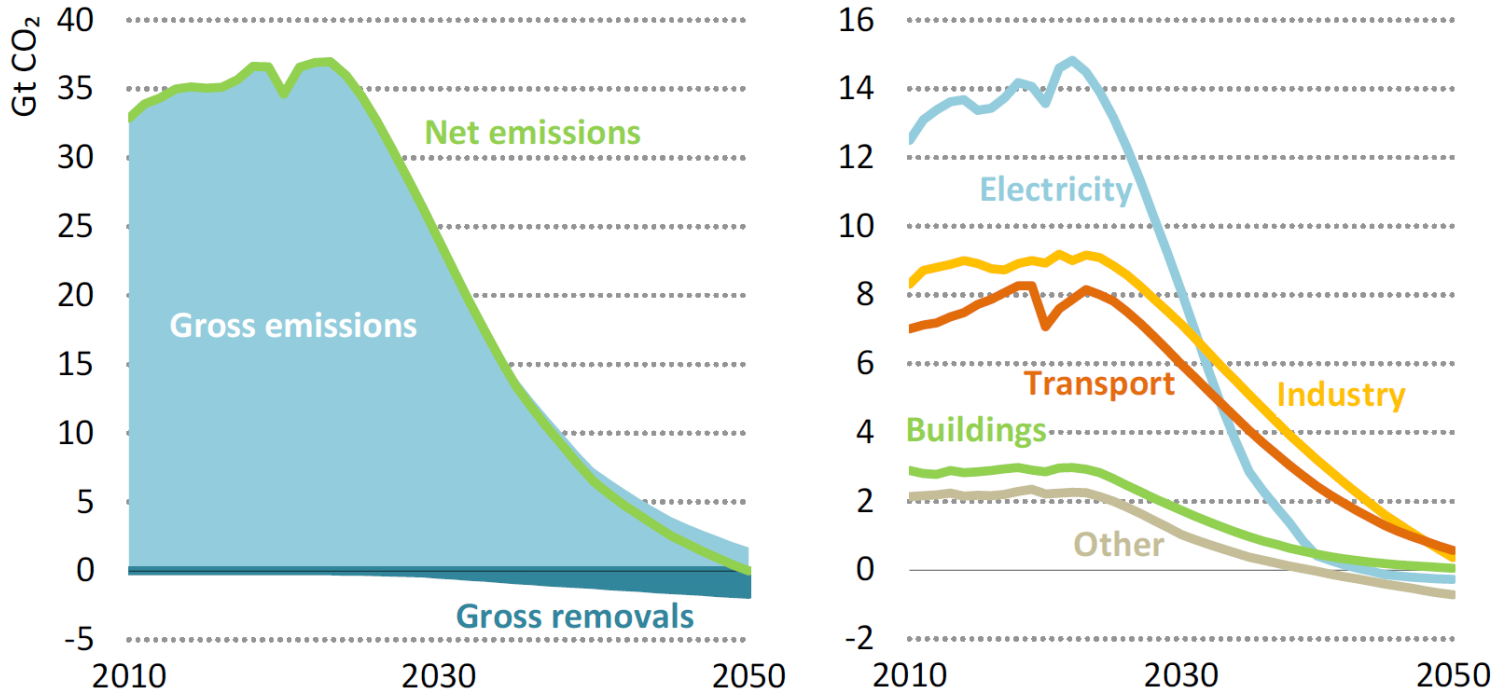
Emissions trends to 2050

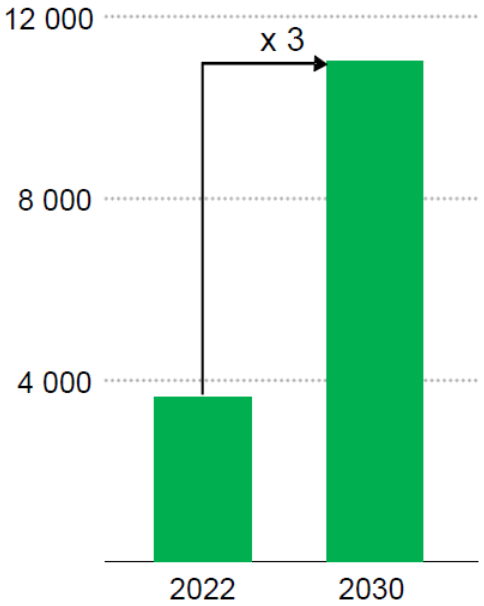
Energy sector gross emissions and removals, total net CO_2 emissions, and net emissions by sector in the NZE Scenario, 2010-2050



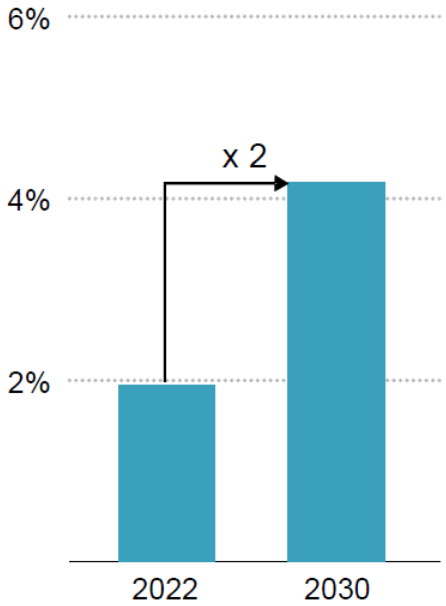
Energy sector CO_2 emissions are reduced 65% by 2035 and reach net zero by 2050, with residual emissions of 1.7 Gt balanced by atmospheric removals of the same magnitude

We have the tools to go much faster

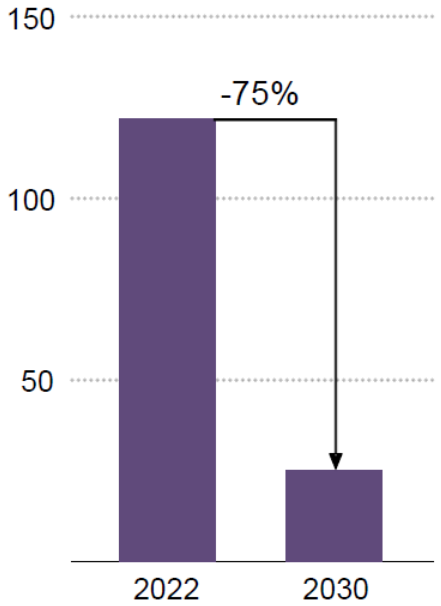
Renewables installed capacity (GW)



Annual energy intensity improvement



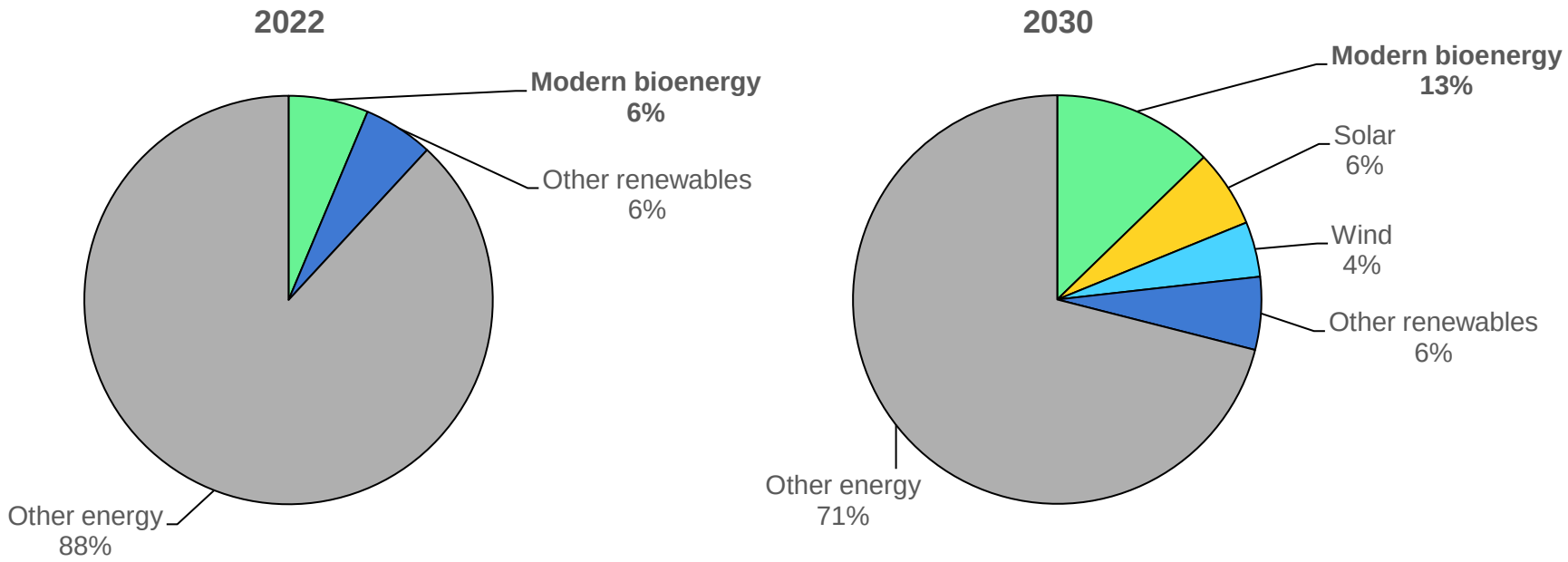
Methane emissions from fossil fuel operations (Mt)



Energy-related greenhouse gas emissions peak by 2025 and decline by nearly 40% from today to 2030. Proven solutions available today deliver over 80% of what is needed this decade.

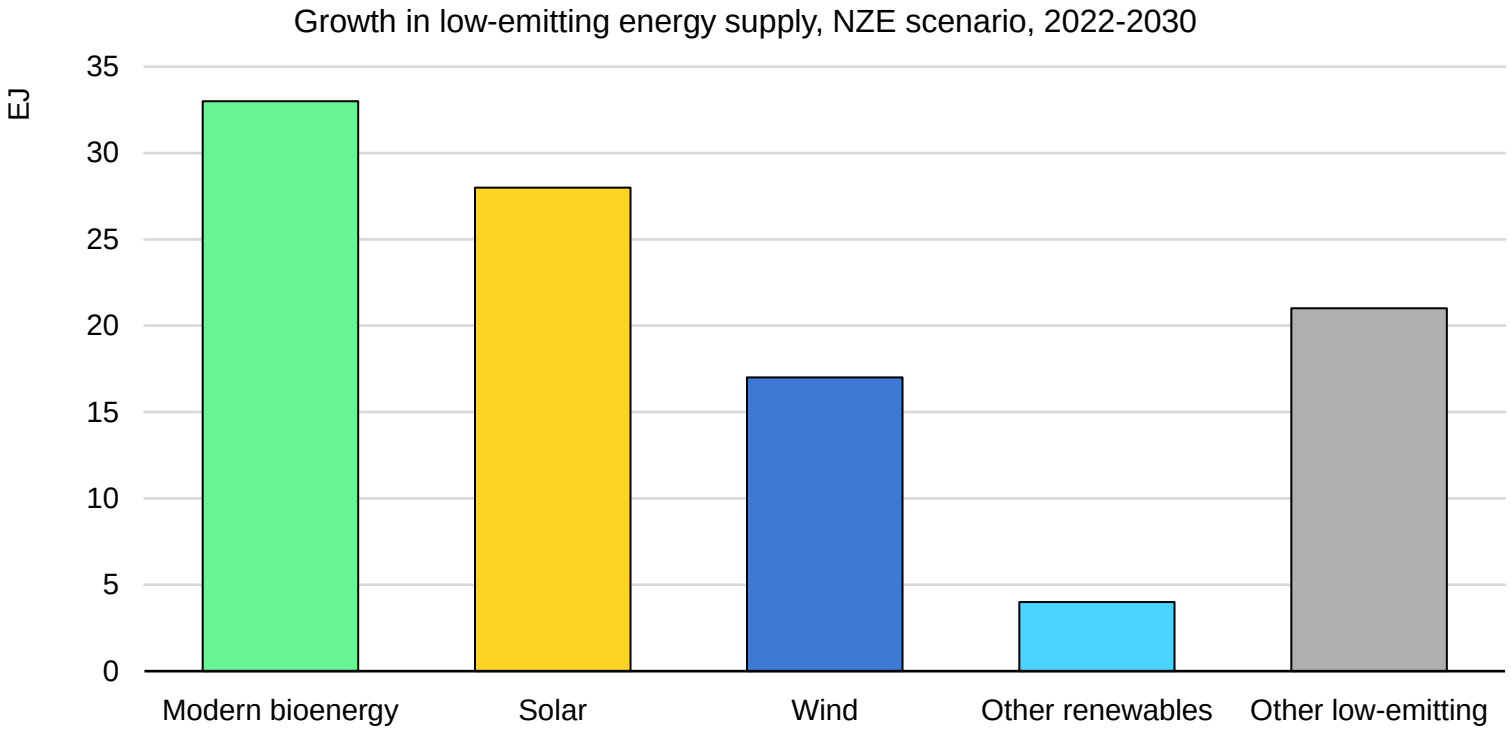
Modern bioenergy is the giant of renewable energy

Share of total energy supply, NZE scenario, 2022-2030



Modern, sustainable bioenergy accounts for more than half of all renewable energy supply today. In the net zero scenario it expands in all sectors thanks to its compatibility with existing infrastructure and global availability.

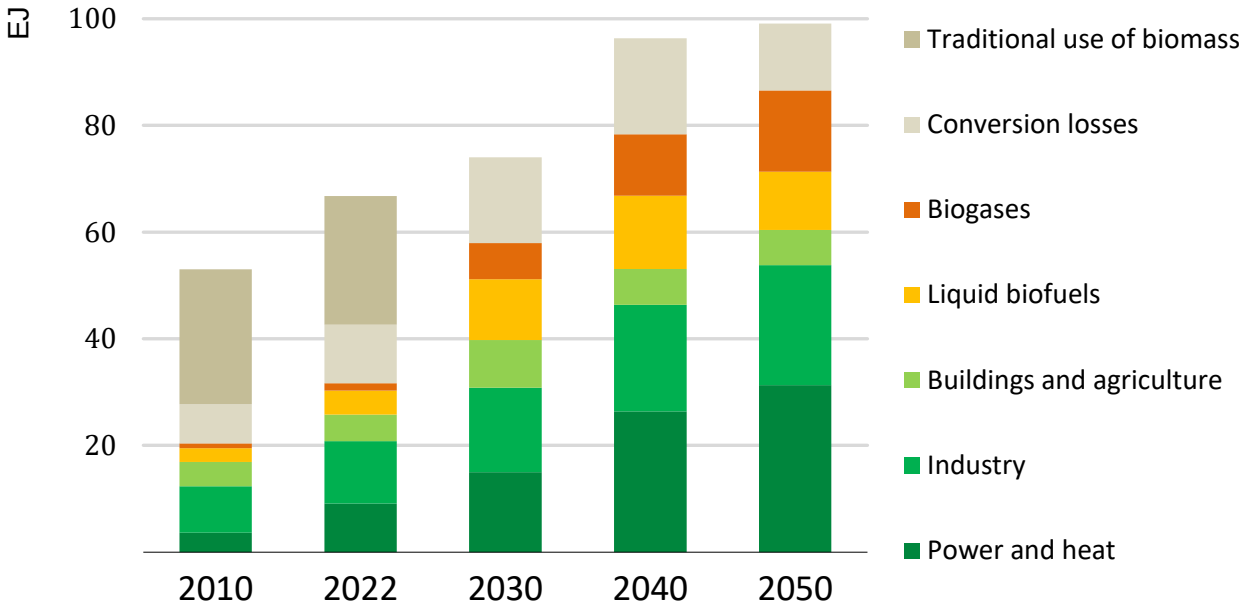
Bioenergy is the largest source of new, low-emitting energy supply



Modern bioenergy is the single largest source of new, low-emitting energy supply in the net zero scenario to 2030. Total supply nearly doubles, with growth in liquid, solid and gaseous supplies.

It plays an important role in all sectors

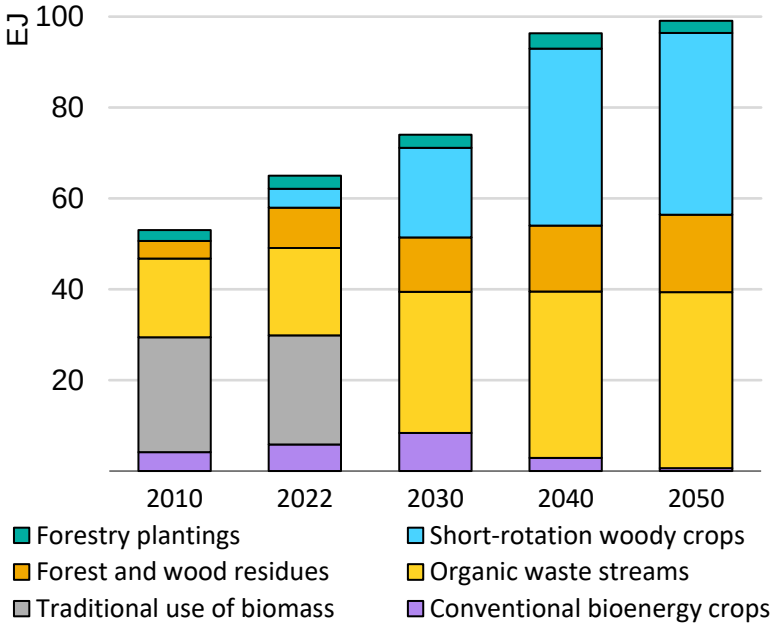
Primary bioenergy use by sector and economic grouping in the NZE Scenario, 2010-2050.

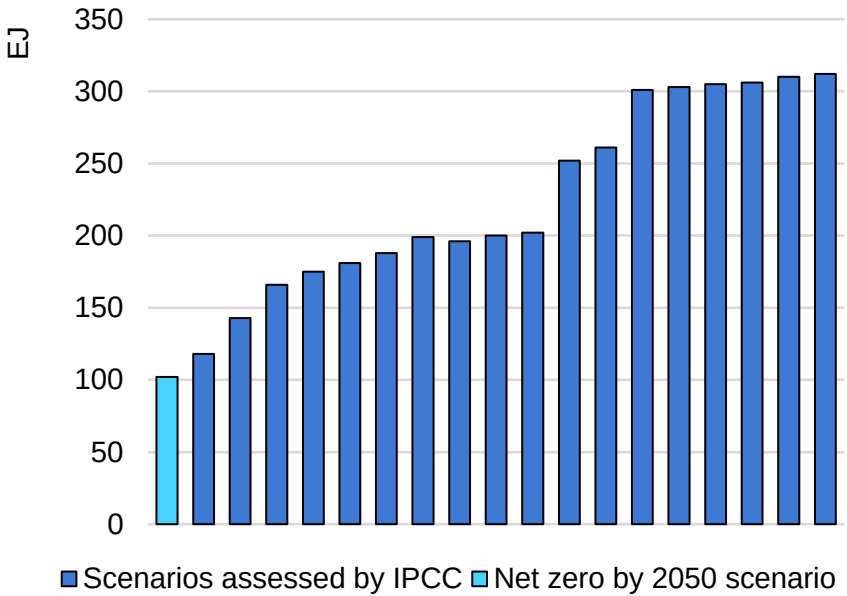


Modern bioenergy use nearly triples to 2050, meeting almost 20% of total energy needs and becoming the second largest source of energy supply. Global demand in 2050 is within the assessed sustainable potential.

There are enough sustainable supplies

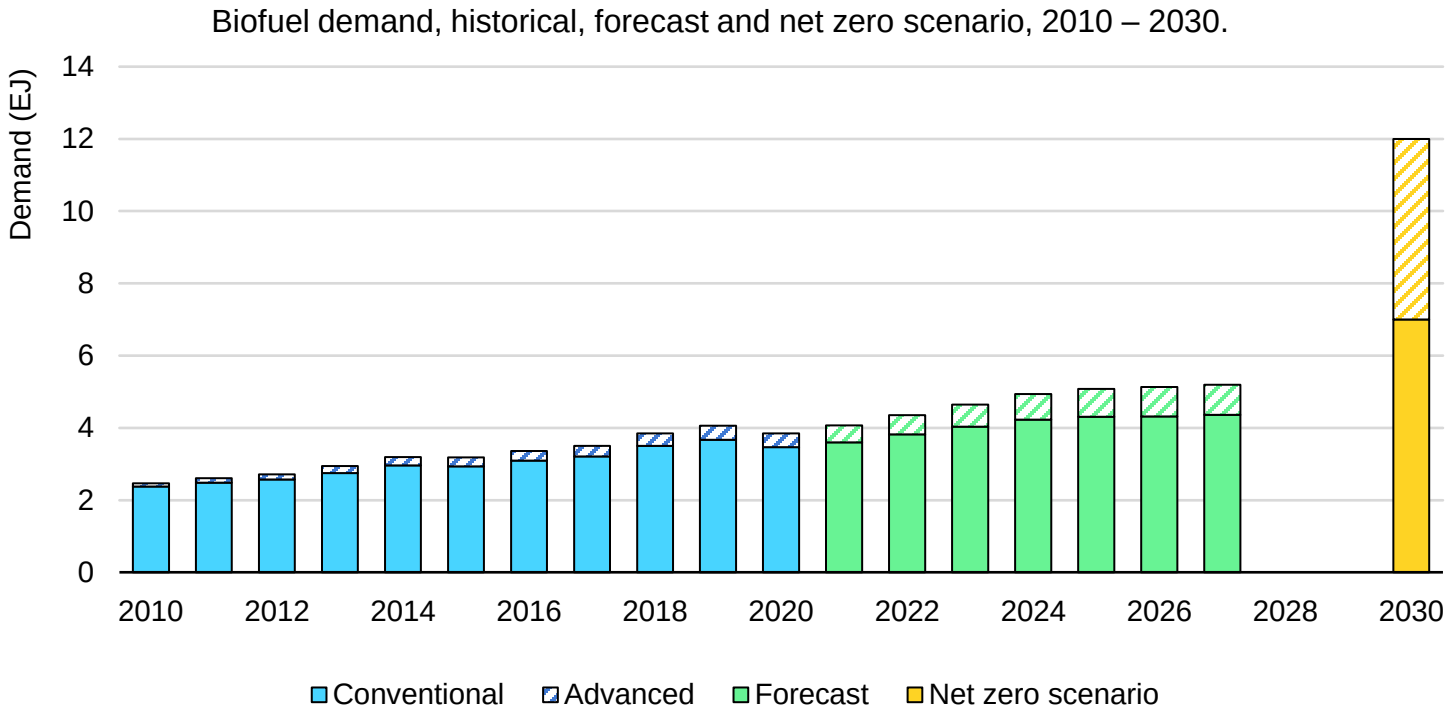
Primary bioenergy use by sector and economic grouping in the NZE Scenario, 2010-2050.





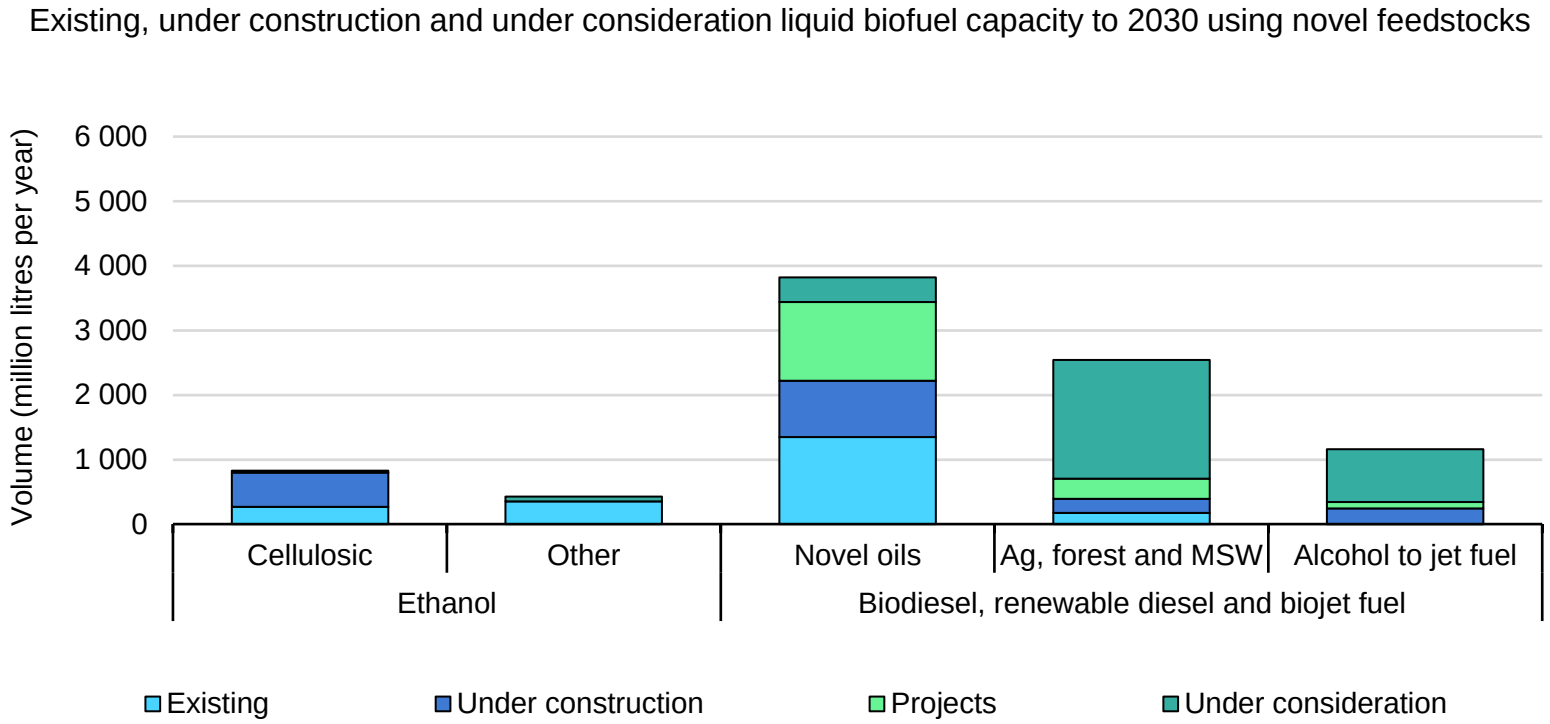
By 2050 there is no overall increase in cropland use for bioenergy production and no encroachment on forested lands from current levels.

Bioenergy is not on track…



The United States, Brazil, Indonesia, India and Canada drive 80% of new biofuels demand to 2027. Achieving net zero requires stronger demand policies, diversifying supply chains and expanding advanced fuels.

…however, trends consistent with net zero are emerging



All major biofuel demand and production centres have policies, programmes and funding efforts to expand and diversify feedstock supply. New projects may account for near 20% of new biofuel supply.

Overcoming barriers

- **Identifying and developing markets with high potential for biofuels production**
  - Enhancing measurement and monitoring
  - Assessing mixed technology development pathways
  - Developing regional-specific policy packages learning from existing experiences
- **Expanding access to feedstocks**
- **Accelerating technology deployment to commercialize advanced biofuels**
- **Seeking consensus on performance-based sustainability assessments and frameworks**
- **Enhancing international collaboration efforts**