

Sustainable Bioenergy for the Energy Transition

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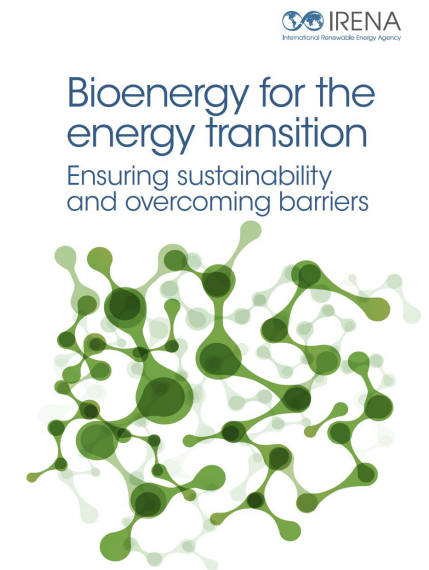
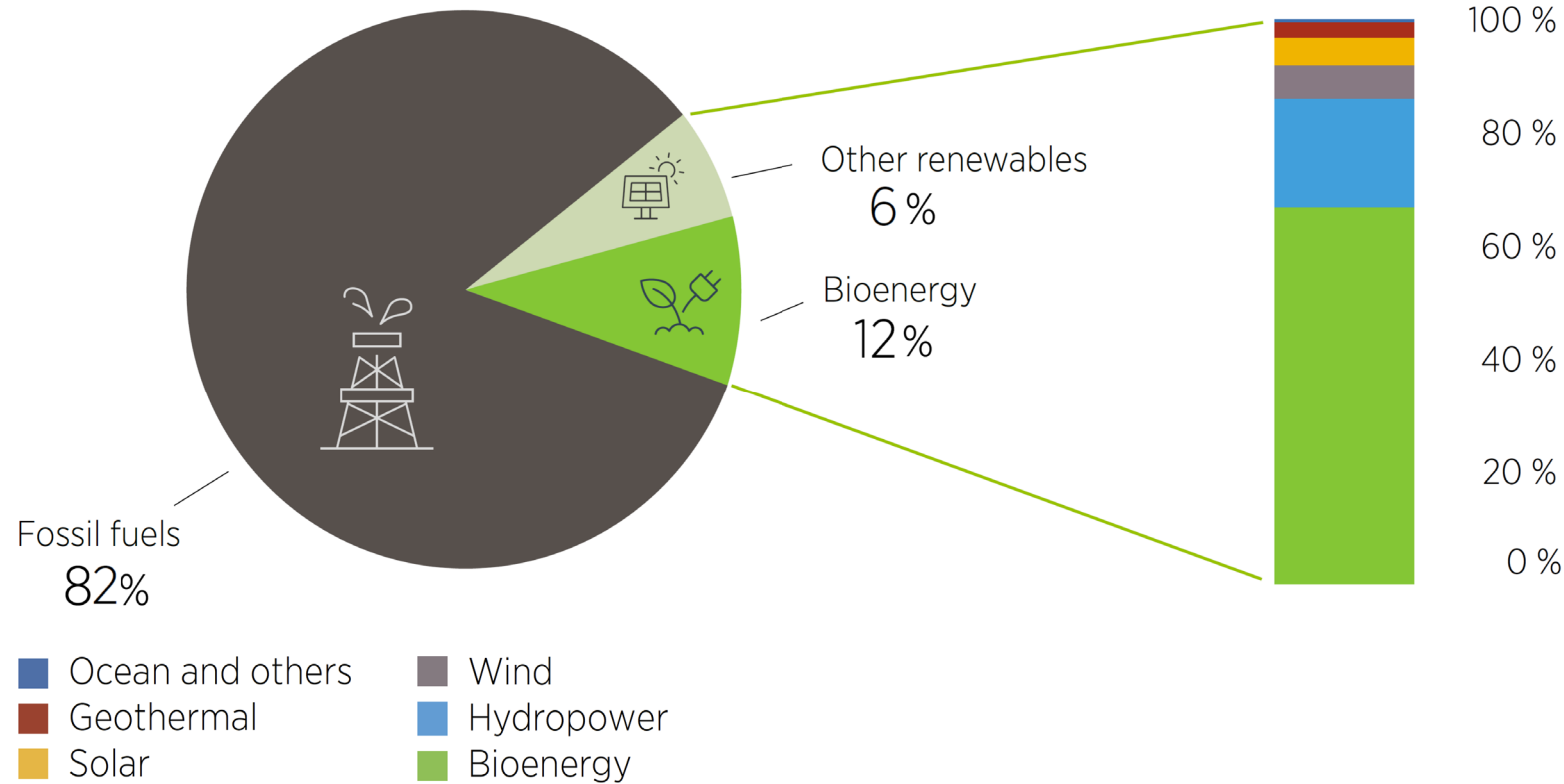
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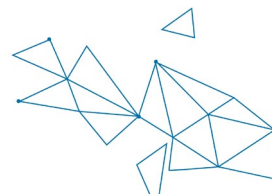
Bioenergy contributes the largest share of renewable energy consumption

Share of bioenergy and other renewables in global total final energy consumption, 2019

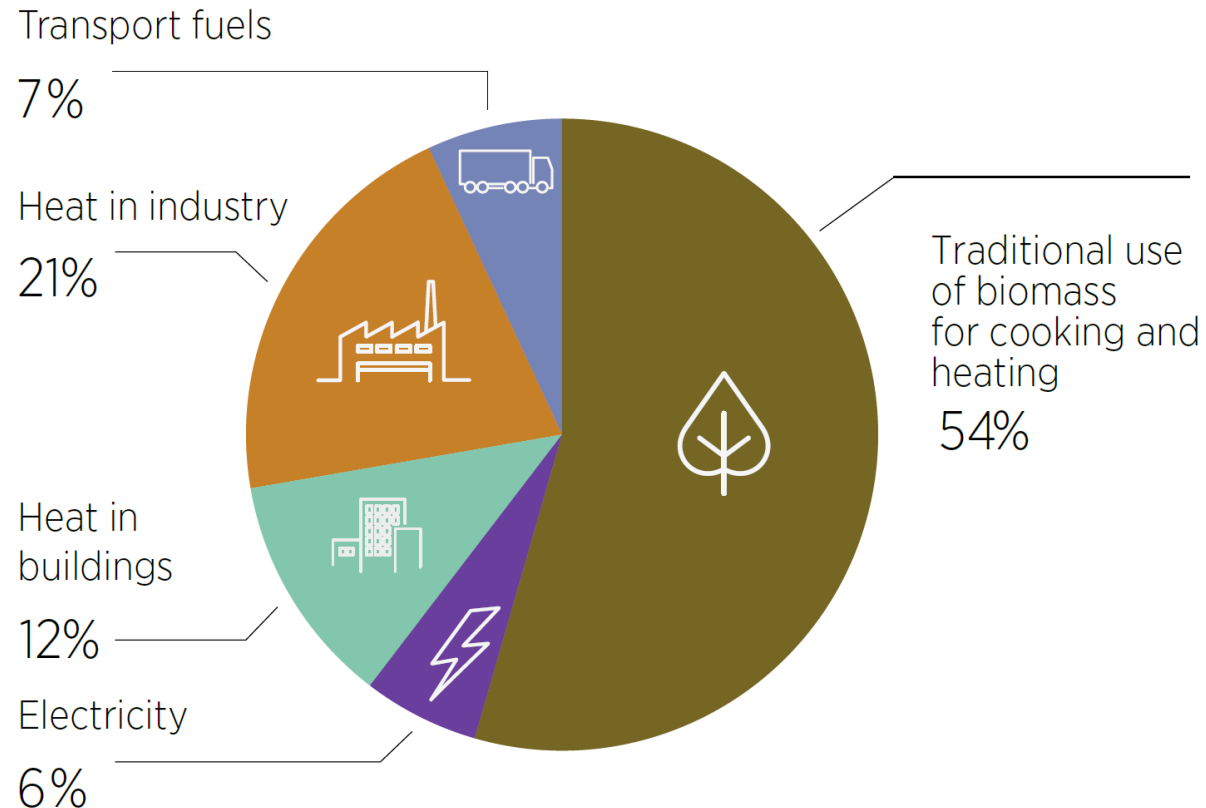


Source: IEA, IRENA

Bioenergy provided around 12% of global energy demand in 2019.

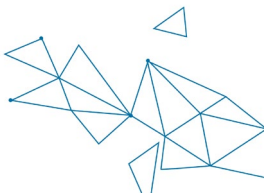


Share of global bioenergy consumption by end use, 2020



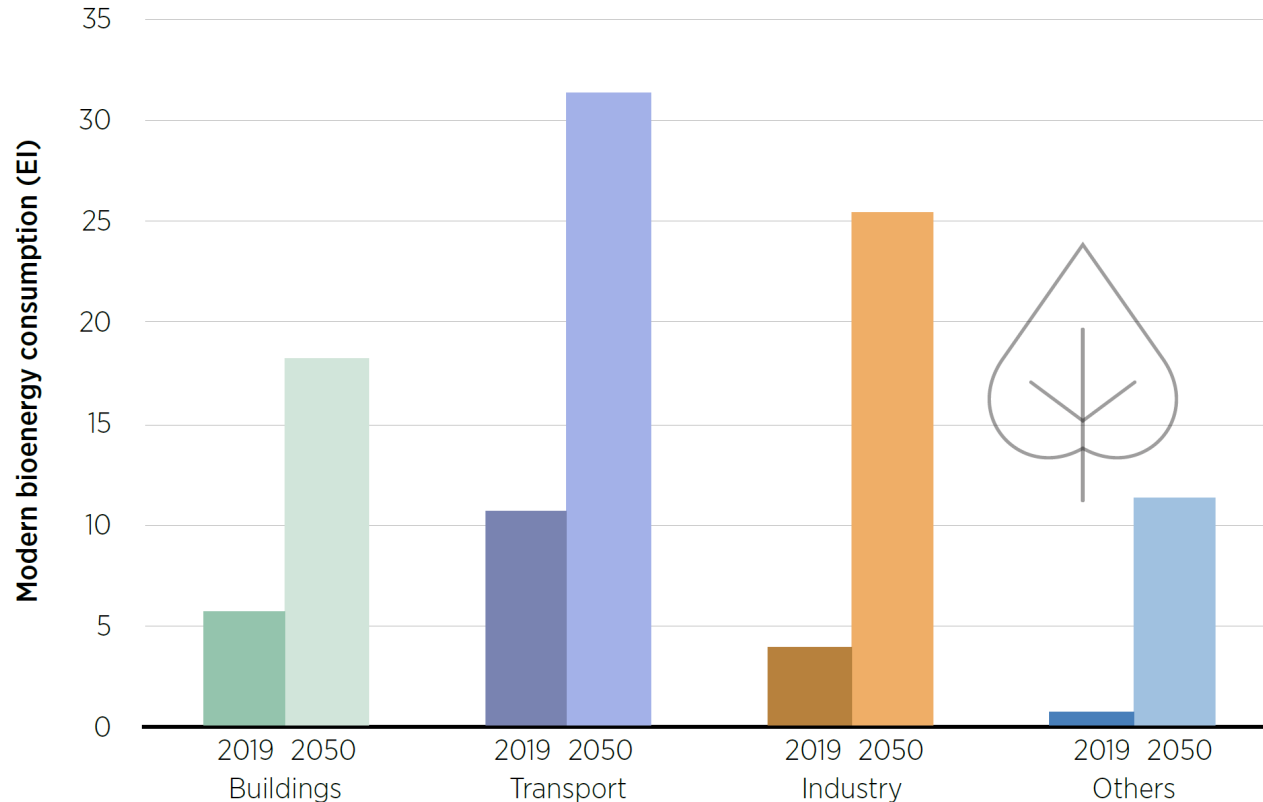
Source: IRENA, IEA

In 2020, more than 80% of bioenergy is used for cooking and heating in buildings and industry, providing 20% of total heat consumption.



Modern bioenergy plays an important role in the global energy transition

Modern bioenergy consumption in 2019 and 2050 in IRENA's 1.5°C Scenario, by sector

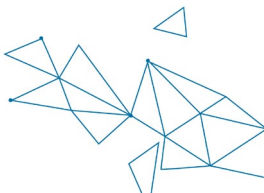


Modern bioenergy can support the decarbonisation of all sectors.

By 2050, it could provide 20% of total energy use in industry and is one of few renewable options for aviation.

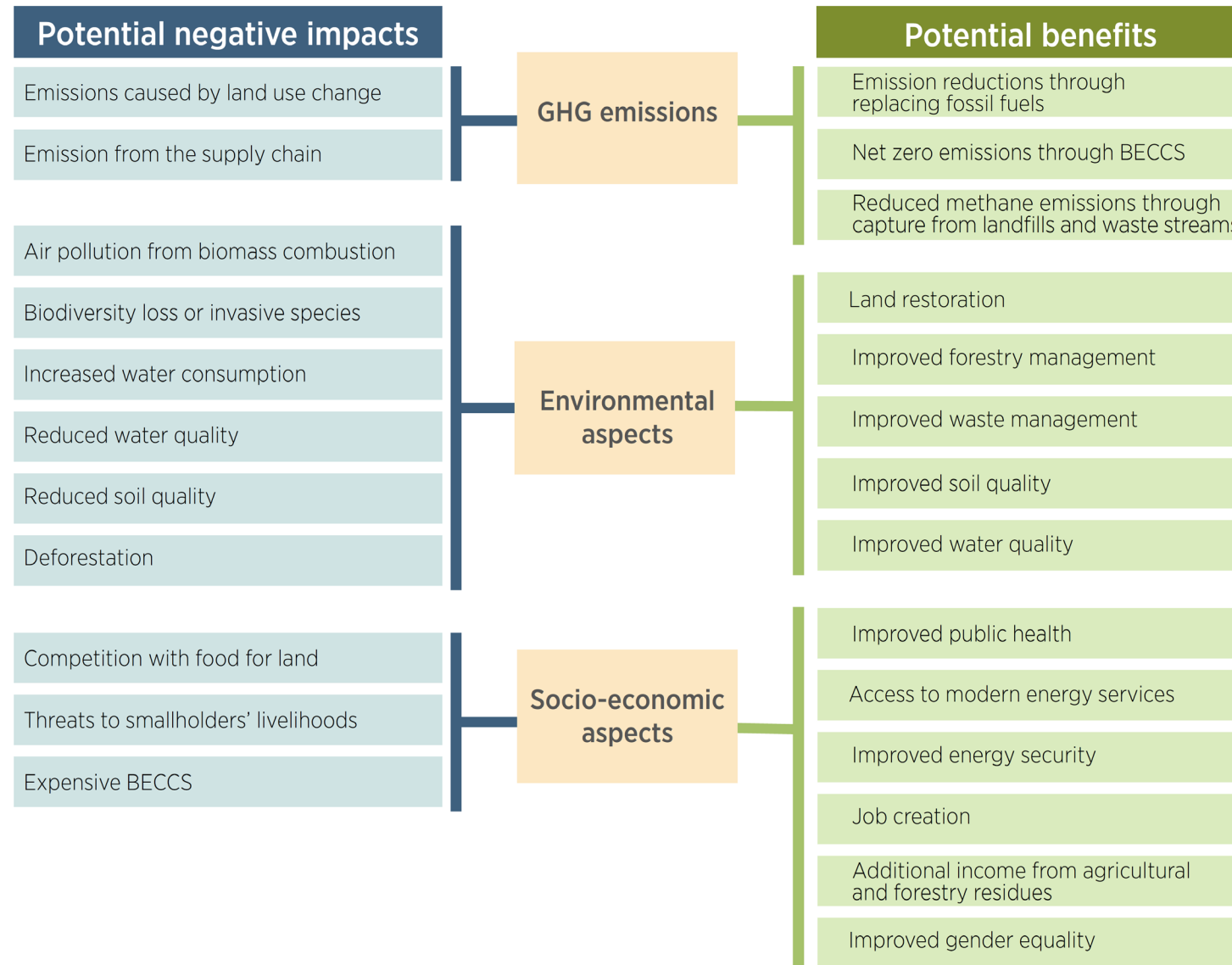
Note: "Others" includes bioenergy for non-energy use and as chemical feedstock; EJ = exajoule.

Source: IRENA



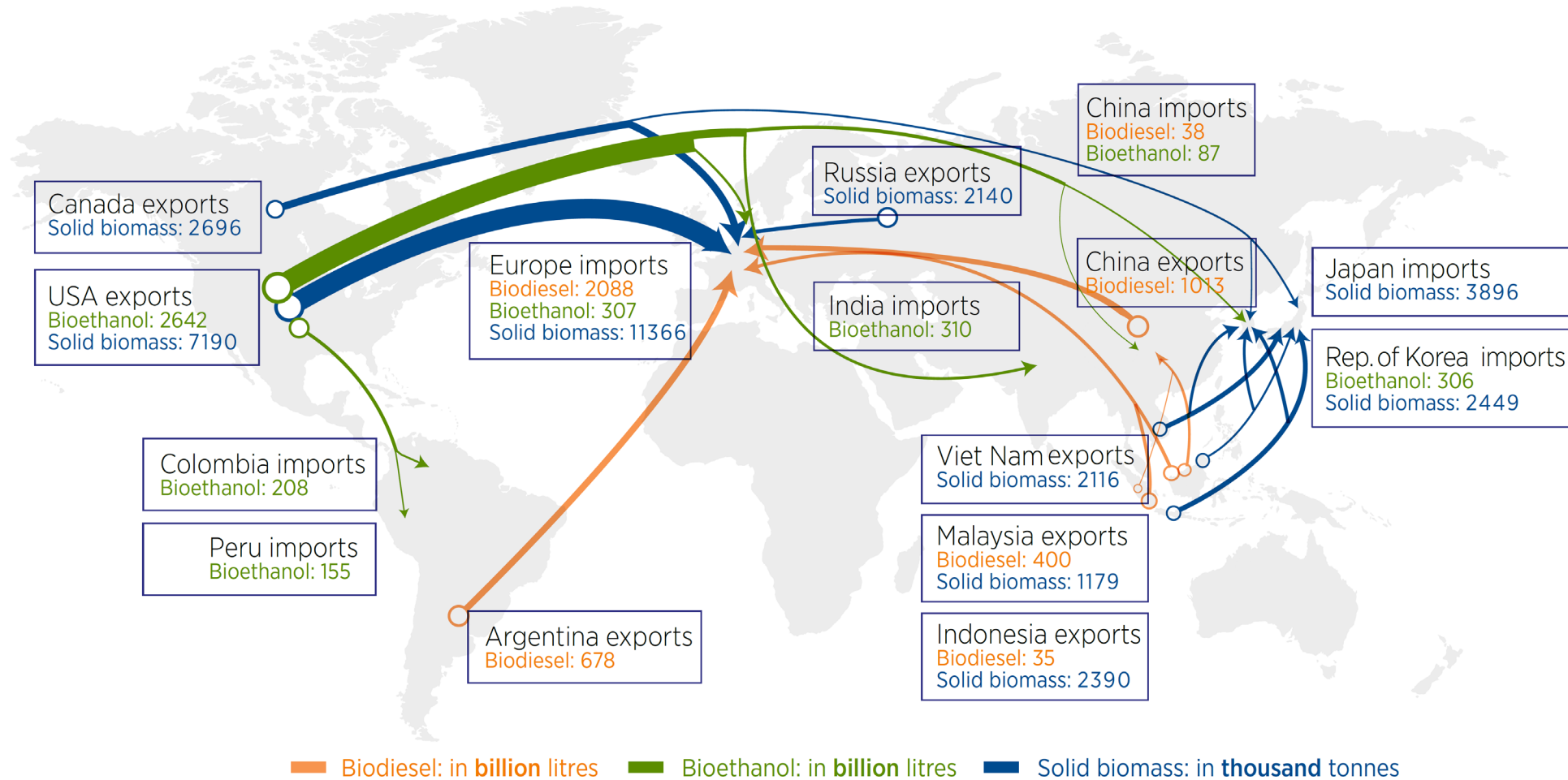
Bioenergy sustainability is a complex topic

Potential aspects related to bioenergy sustainability



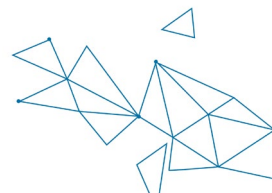
Wood pellets, biodiesel and bioethanol are major bioenergy commodities

Global bioenergy trade in major markets, 2020

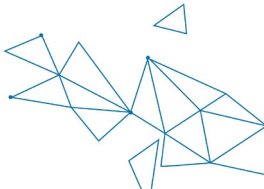
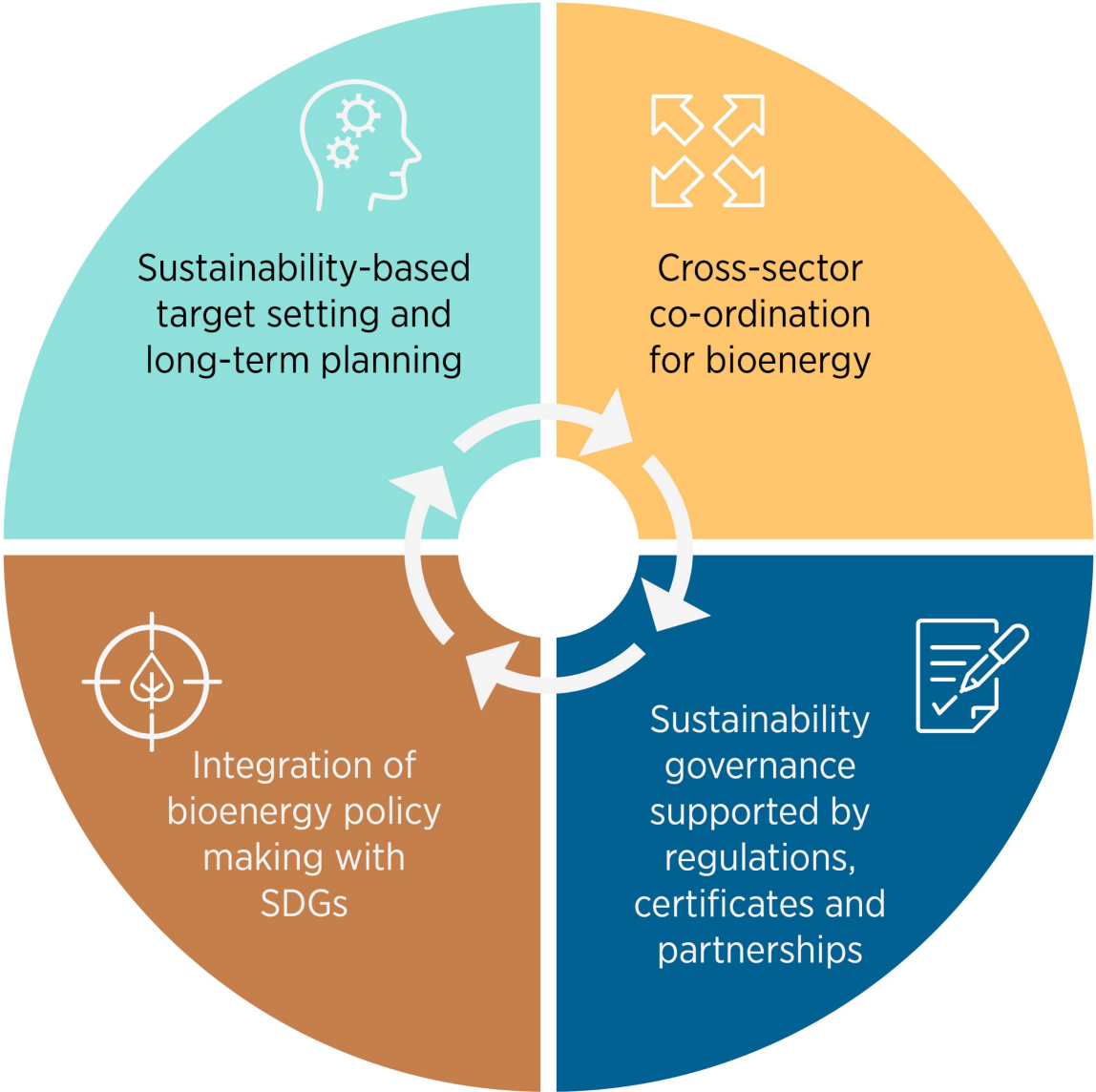


Note: The figure does not include all bioenergy trade due to limited data. Other international trade of bioenergy may exist but is not shown in this figure.

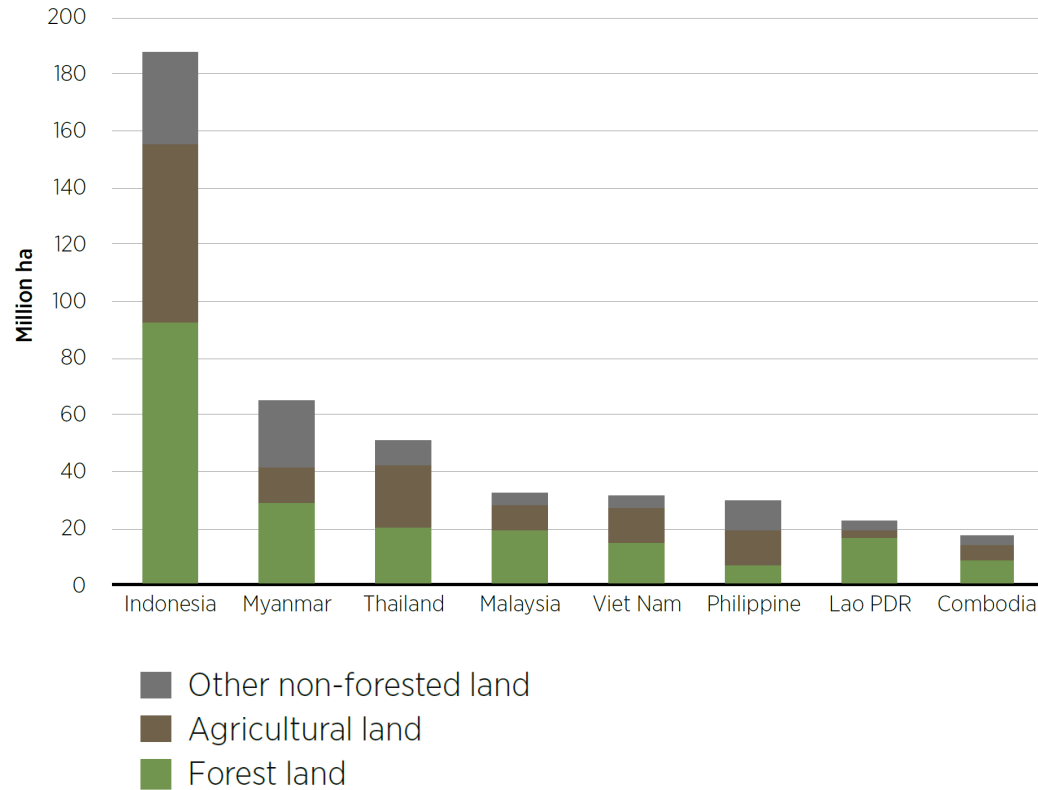
Source: IRENA analysis based on Argus, Japanese Forestry Agency, UNComtrade, and USDA



A comprehensive policy framework is necessary to ensure sustainability

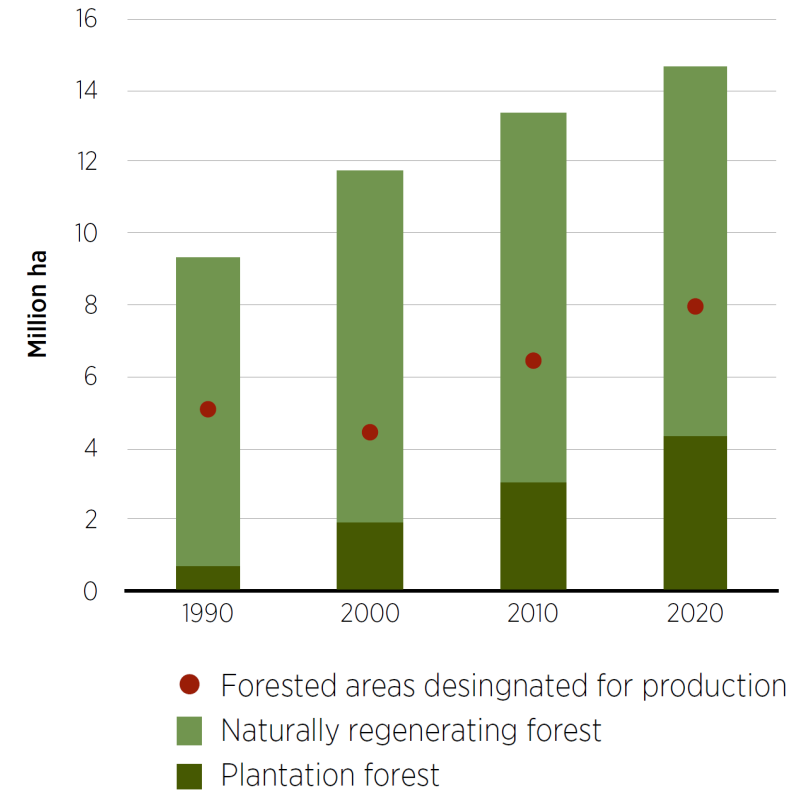


An overview of land use in some Southeast Asian countries



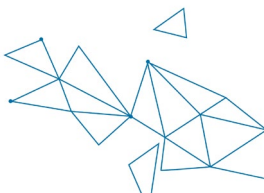
Source: FAO

Changes in forested areas in Viet Nam in 1990-2020

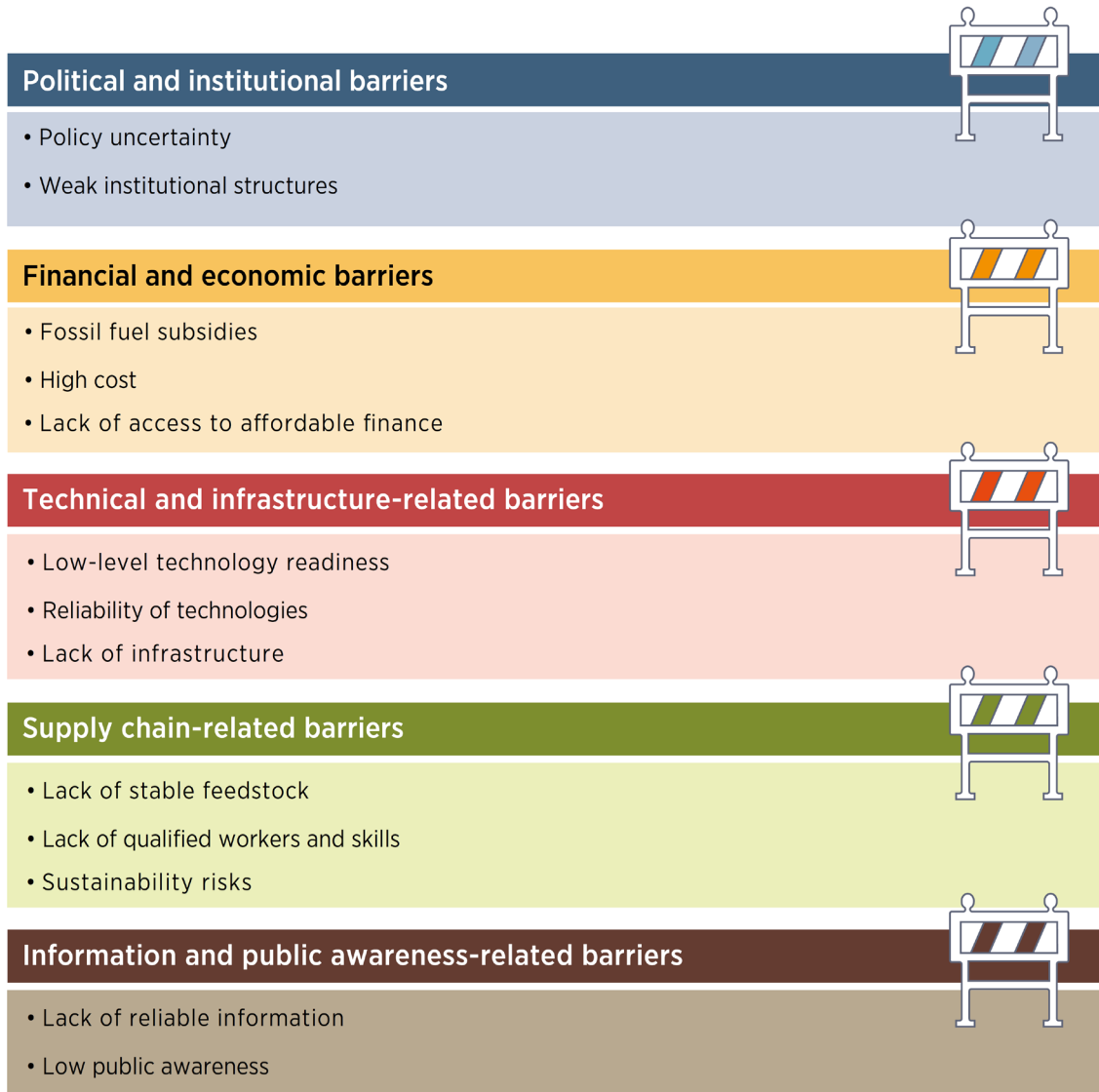


Source: FAO

The agriculture and forestry sectors of Southeast Asia can generate a considerable volume of residues and waste.

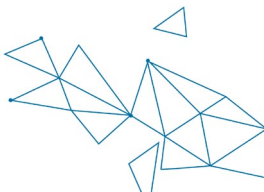


Policies and regulations are needed to tackle cross-cutting barriers



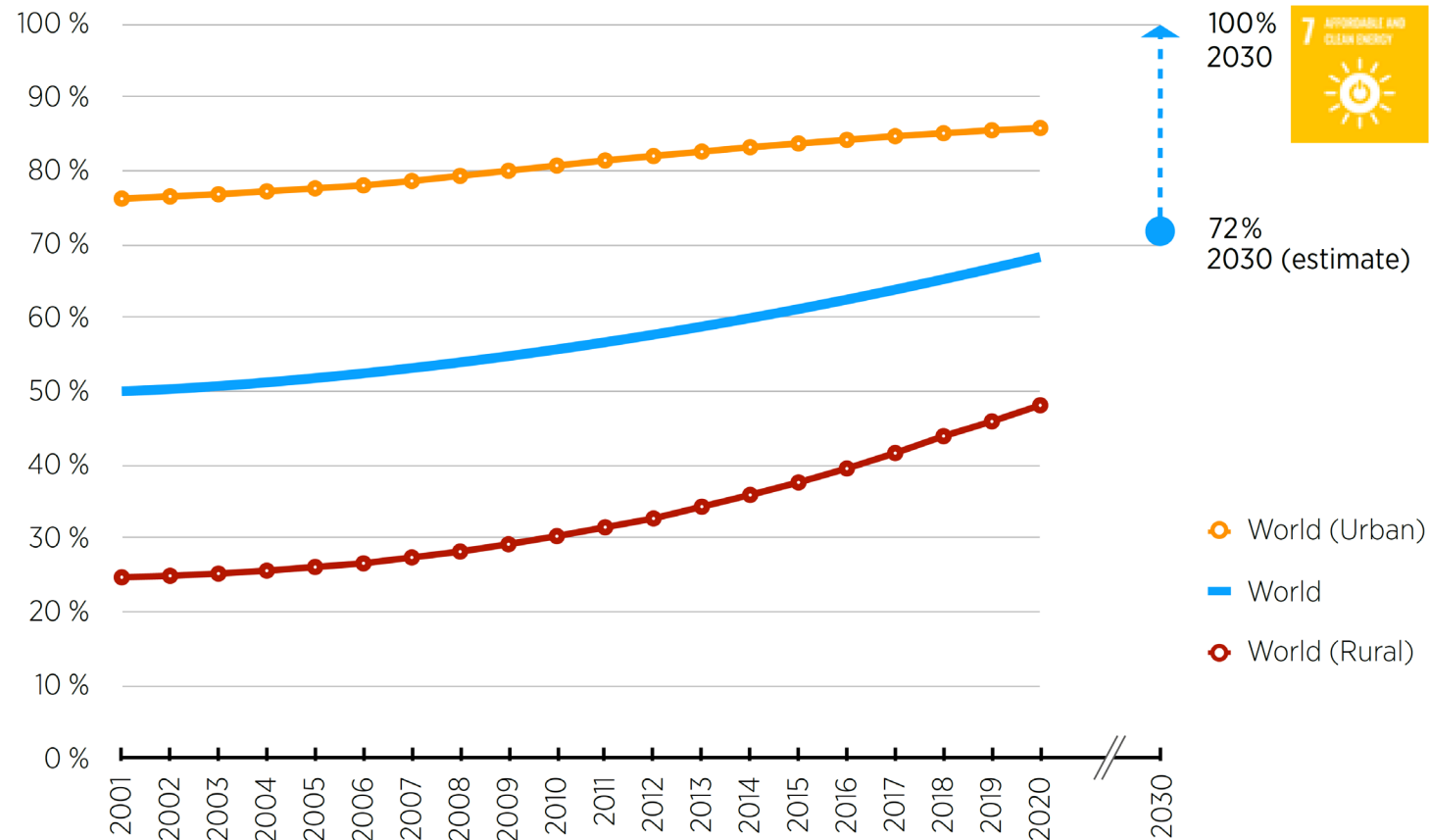
Policy uncertainty has been a main barrier to developing renewables, including bioenergy, due to the lack of long-term policy commitments and targets.

Weak supply chains are another major barrier for large-scale bioenergy projects. They also can be a reason for high production costs



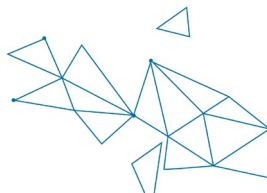
Modern bioenergy solutions can narrow the global gap of clean cooking

Global clean cooking access rates from 2001 to 2020 and forecast to 2030

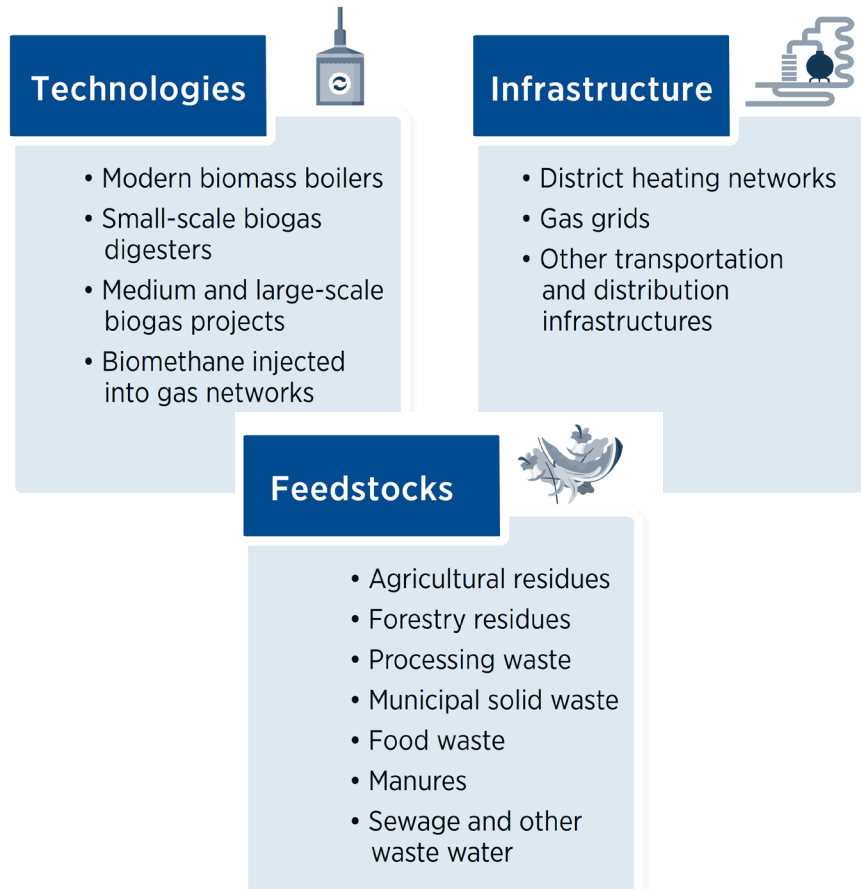


Source: IRENA, WHO

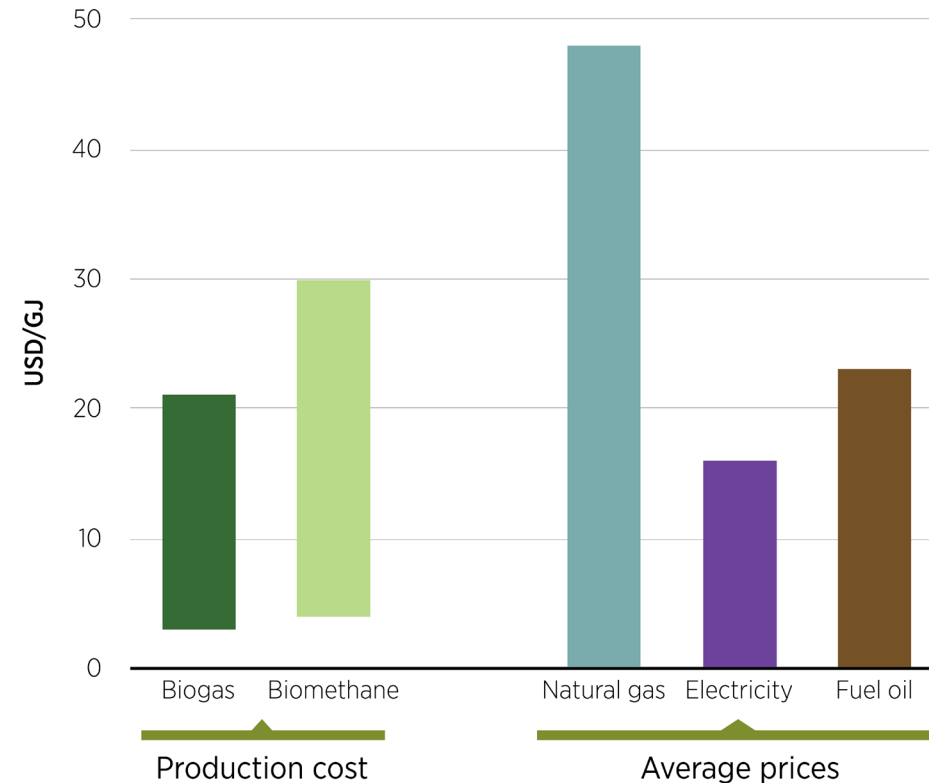
Biogas digesters have played a significant role in helping people transition from inefficient biomass to clean cooking solutions, with successful examples in China, India, Nepal and Viet Nam.



Major pathways for modern bioenergy use in buildings

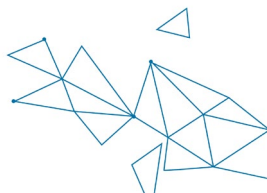


Biogas and biomethane production cost and average prices of natural gas, electricity and fuel oil for residential consumers in OECD countries, 2018



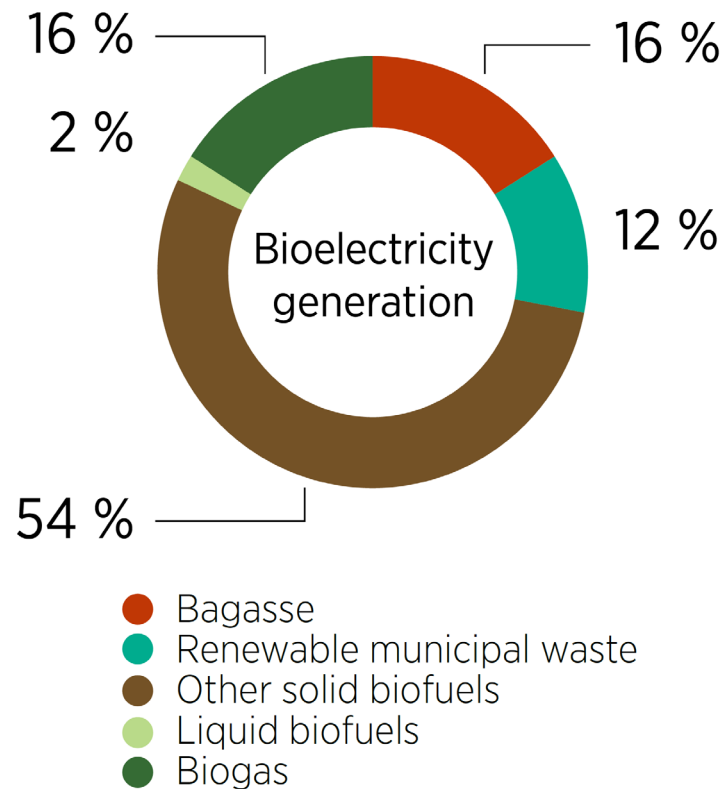
Source: IRENA, IEA, REN21

Biogas and biomethane-based heat can be competitive with fossil fuel options if low-cost feedstocks (*e.g.*, residues and waste) are available.



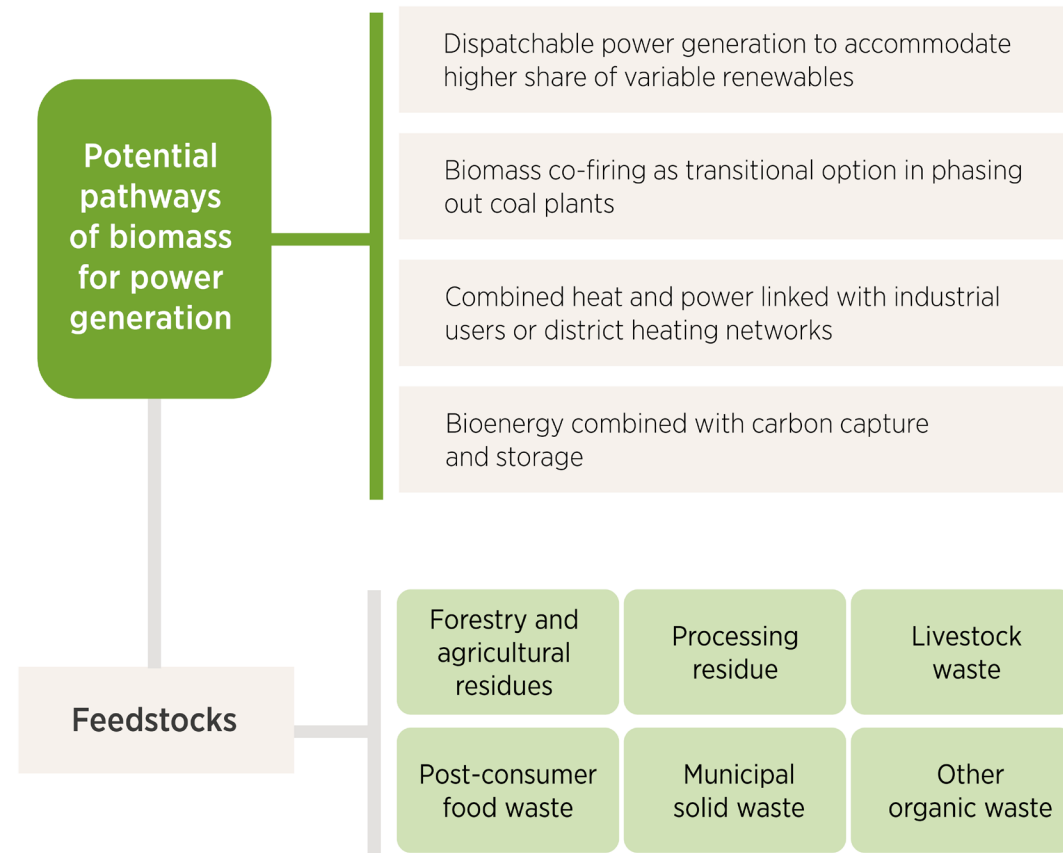
Bioenergy-based power generation must deliver multiple benefits

Share of biomass feedstock in total bioelectricity, 2020



Source: IRENA, IEA

Conditions that bioenergy power generation projects need to meet to ensure prioritised use of limited biomass feedstock



Bioelectricity projects should be limited to those using low-cost residues and waste, provide dispatchable electricity, combined with heat or BECCS, or some co-firing plants.



Potential opportunities of bioenergy for industrial decarbonisation



Biomass to provide heat for industry

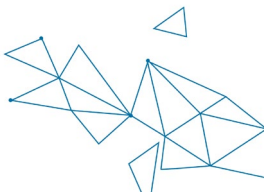
- MSW to provide heat for cement industry
- Biomass heat for biomass-based industries, including pulp and paper, sugar, food and wood production
- Bioenergy heat for other industrial processes



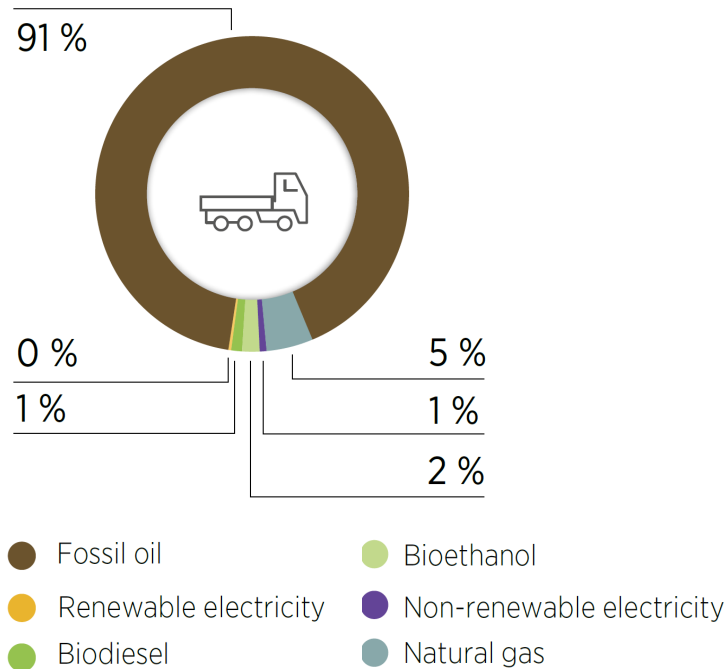
Biomass as a feedstock for chemical and petrochemical industry

- Biomass-based plastic
- Biomethanol production
- Other high-value chemicals based on biomass-feedstocks

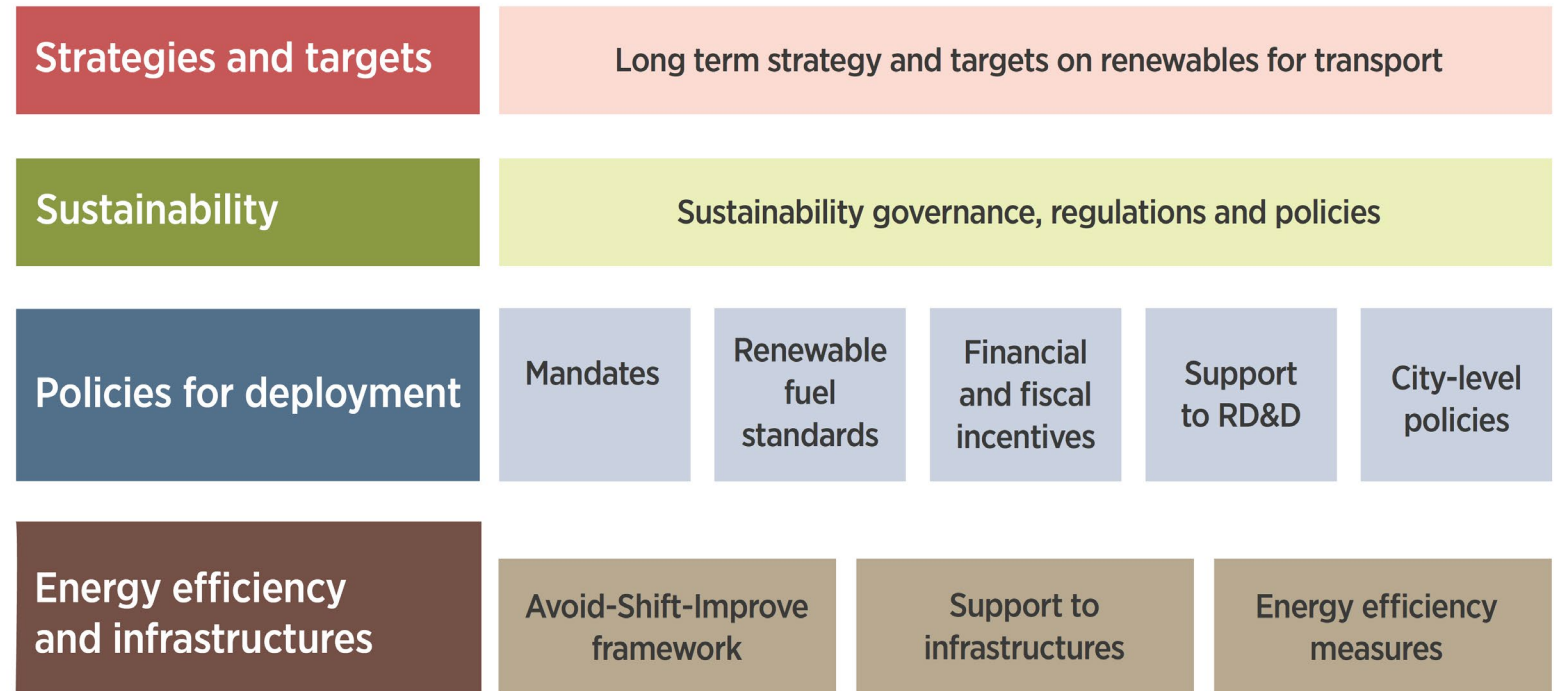
Bioplastic will increase from less than 1% in 2020, to around 20% of global plastic production by 2050 in the 1.5°C Scenario.



Total energy demand in transport, by fuel, 2020

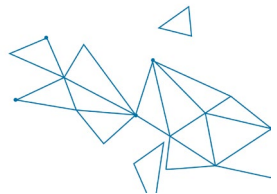


Overall policy framework for deployment of renewables in transport



Source: IEA, REN21

Bioenergy's role in the decarbonisation of transport will need to be co-ordinated with other options such as electric vehicles, green hydrogen or green ammonia.





THANK YOU