

Role of Bioenergy in Clean Energy Transitions

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Global role of bioenergy in the coming decades to combat climate change

9 November 2021

Unprecedented policy momentum

- Covid-19 crisis had unprecedented impact on global energy system, including bioenergy
- Four grounds of optimism towards clean energy transitions, despite all present difficulties:
 - Net zero pledges by many countries and companies
 - New 2030 emission cut targets by US, EU
 - Largest stimulus packages in economic history
 - COP26 Global Methane Pledge





CO_2 emissions in World Energy Outlook scenarios from 2000-2050 and the corresponding rise in global temperatures in 2100



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Targets alone are not enough



Change in global CO2 emissions by fuel, 1990-2021

After the largest ever decline due to the Covid-19 crisis, global CO2 emissions are set to increase by nearly 5% in 2021, approaching the 2019 peak, as demand for coal, oil & gas rebounds with the economy

Set near-term milestones to get on track for long-term targets



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Prepare for the next phase of the transition by boosting innovation



Unlocking the next generation of low-carbon technologies requires more clean energy R&D and \$90 billion in demonstrations by 2030; without greater international co-operation, global CO₂ will not fall to net-zero by 2050.

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Total bioenergy supply in the NZE 25% Traditional use of biomass 100 \square Conversion losses 20% 80 Biogases \bigcirc 0 Liquid biofuels 15% 60 Modern solid bioenergy 0 Buildings and agriculture 10% 40 Industry Electricity 5% 20 ... \circ Modern bioenergy share in TES (right axis) 2010 2020 2030 2040 2050

Bioenergy to play a major role in various forms

Modern bioenergy use rises to 100 EJ in 2050, meeting almost 20% of total energy needs and becoming the second largest source of energy supply. Global demand in 2050 is well below the assessed sustainable potential.

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Advanced biofuels are necessary for net zero



Advanced liquid biofuel production expands rapidly over the next decade in the Net Zero scenario growing from less than 1% of total biofuel supply in 2020, to almost 45% in 2030 and 90% in 2050

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Bioenergy and CCUS can lead to negative emissions



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- Reaching net-zero emissions globally by 2050 is a critical and formidable goal, requiring an unprecedented transformation of how energy is produced, transported and used
- The pathway to net-zero hinges on immediate and massive deployment of all available clean and efficient energy technologies, as well as boosting clean energy innovation
- Low-emissions fuels in the form of liquid biofuels, biomethane, hydrogen-based fuels help to decarbonise sectors where direct electrification is challenging
- In an energy mix dominated by renewables, sustainable bioenergy features prominently in flexible electricity generation, industry and transport, and is increasingly used in connection with CCUS
- Urgent, strong and credible policy actions from governments, underpinned by much greater international cooperation, are needed to attract investment at scale and foster required innovation