DOUBLING BIOENERGY USE ESSENTIAL FOR GLOBAL SUSTAINABILITY

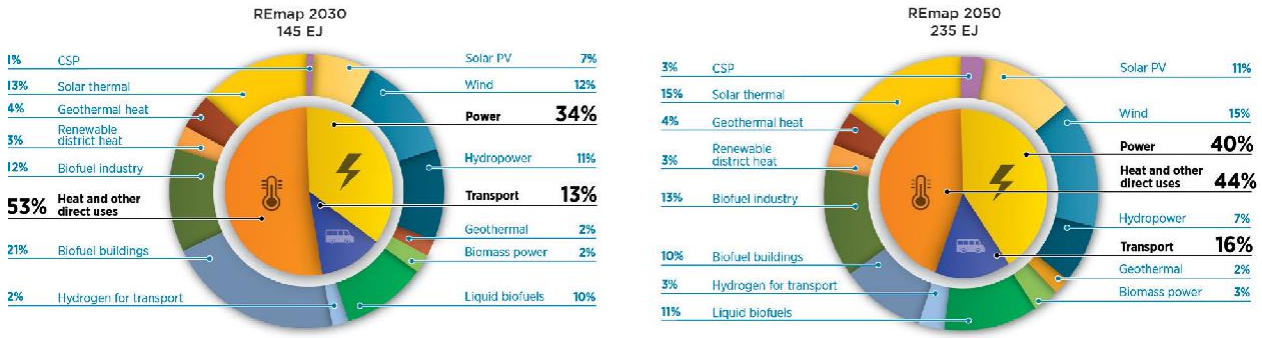
Bioenergy accounts for nearly three-quarters of renewable energy use today and use of modern bioenergy may quadruple by the middle of the century.

Bioenergy will play a key role in realising the decarbonisation potential identified under the REmap case and in facilitating a global energy transition that limits global temperature rise to less than 2°C.[1] If the world doubles its renewables share by 2030, bioenergy will still account for about half of total final renewable energy use and will maintain a similarly high share in 2050. Biomass is a versatile resource that can be converted into energy as heat or power as well as transport fuel, and can take solid, liquid or gaseous forms.

Bioenergy has an important role to play in every sector of the global energy system, and its development goes hand in hand with the broader concept of a bio-based economy that also includes biomaterials. In the power sector, it can provide flexibility to balance expansion of intermittent and seasonal wind and solar resources. For industry, biomass can efficiently supply high-temperature process heat and can be used as a raw material to produce a wide range of valuable chemicals and plastics. In buildings, wood provides fuel for highly efficient district heating systems, space and heating boilers and cook stoves. In transport, together with better fuel efficiency and electrification, biofuels can sharply reduce fossil fuel use; indeed, they are the only current practical alternative to fossil fuels for aviation, marine shipping and heavy freight transport.

Roughly half of today's final renewable energy use of 64 EJ is in traditional bioenergy applications, such as wood and charcoal for cooking and water heating in developing countries. The other half is in clean, efficient, modern applications of bioenergy and other renewables for electric power, industrial process heat, building space conditioning and liquid transport fuels, together accounting for about 32 EJ in 2015. Modern bioenergy applications in 2015 represented 21 EJ of this. Under the REmap case, the use of modern bioenergy triples by 2030, to 62 EJ, while traditional uses sharply decline.

Figure 1: Breakdown of final renewable energy use by sector and technology, 2030 and 2050



[1] The Reference Case is the most likely case based on current and planned policies and expected market developments. TheREmap case is a low-carbon technology pathway that goes beyond the Reference Case for an energy transition to decarbonise the energy system in line with the goal in the Paris Agreement of limiting global temperature rise to less than 2°C above pre-industrial levels with a 66% probability.

Nearly half of renewables in 2030

Based on current plans and policies, bioenergy (including district heating) would account for 48% of final renewable energy use in 2030 and 40% in 2050.

Liquid biofuels use must grow nearly ninefold from 2015 to 2050.

The transport sector, which accounted for only 2% of total final renewable energy use in 2015, accounts for 13% in 2030, and 16% in 2050 under REmap. The share of liquid biofuels and biomethane as a proportion of energy use in the transport sector would grow from 4% in 2015 to 12% in 2030, and 26% in 2050. In absolute terms, this represents fourfold growth, from 129 billion litres in 2015 to approximately 500 billion litres per year by 2030. After 2030, the amount would more than double to 1 120 billion litres per year by 2050. Nearly half of this total amount would comprise advanced liquid biofuels in 2050, which are made from a wider variety of feedstocks than conventional biofuels, but which supply just 1% of biofuels today.

This growth is critical since long-range road freight transport, aviation and shipping have few other alternatives on the horizon. Deployment of other forms of biomass, for replacement of oil and gas feedstock and other industrial applications, needs to grow substantially.

Bioenergy is part of a larger bioeconomy, which includes agriculture, forestry, fisheries and the manufacture of food, paper, wood and agricultural fibre products, biomaterials and bio- based chemicals.

This broader bioeconomy accounts for about USD 2 trillion of annual trade and one-eighth of overall global trade volume today. Policies to promote the bioeconomy may include intensified efforts to map global soils, monitoring of contributions to the Sustainable Development Goals (SDGs), development of skills and knowledge for using bio-based materials in manufacturing and consumer products, biorefinery demonstration projects combining production of energy and higher-value materials, and research on new food systems, sustainable aquaculture and artificial photosynthesis. They may also include specific renewable energy targets, mandates, loan guarantees and financial incentives.

Transition away from traditional biomass is a priority.

Traditionalusesofbioenergyforcookingandheating account for around 5% of total global energy use today and have impacts beyond energy. Nearly one in three humans depends on this form of renewable energy. This energy use causes detrimental socio-economic impacts, including negative effects on human health and the environment. Modern alternatives, such as biogas, can replace traditional biomass. Better statistical data on traditional uses of bioenergy are needed to enable better policy making. Inclusive multi-stakeholder processes can identify areas best suited for bioenergy production, as well as appropriate arrangements for promoting its production and development while avoiding or mitigating possible negative impacts.

Governments have an important role to promote bioenergy with a focus on enabling infrastructure for sustainable biomass supply chains.

Biomass is at the heart of the nexus of energy, food, water and land scarcity, offering the greatest potential for deployment in all three end-use sectors of transport, buildings and industry. In order to reach this potential, while minimising the additional burden on water and land sources, biomass must be sourced in a sustainable, resource-efficient and cost-effective manner.