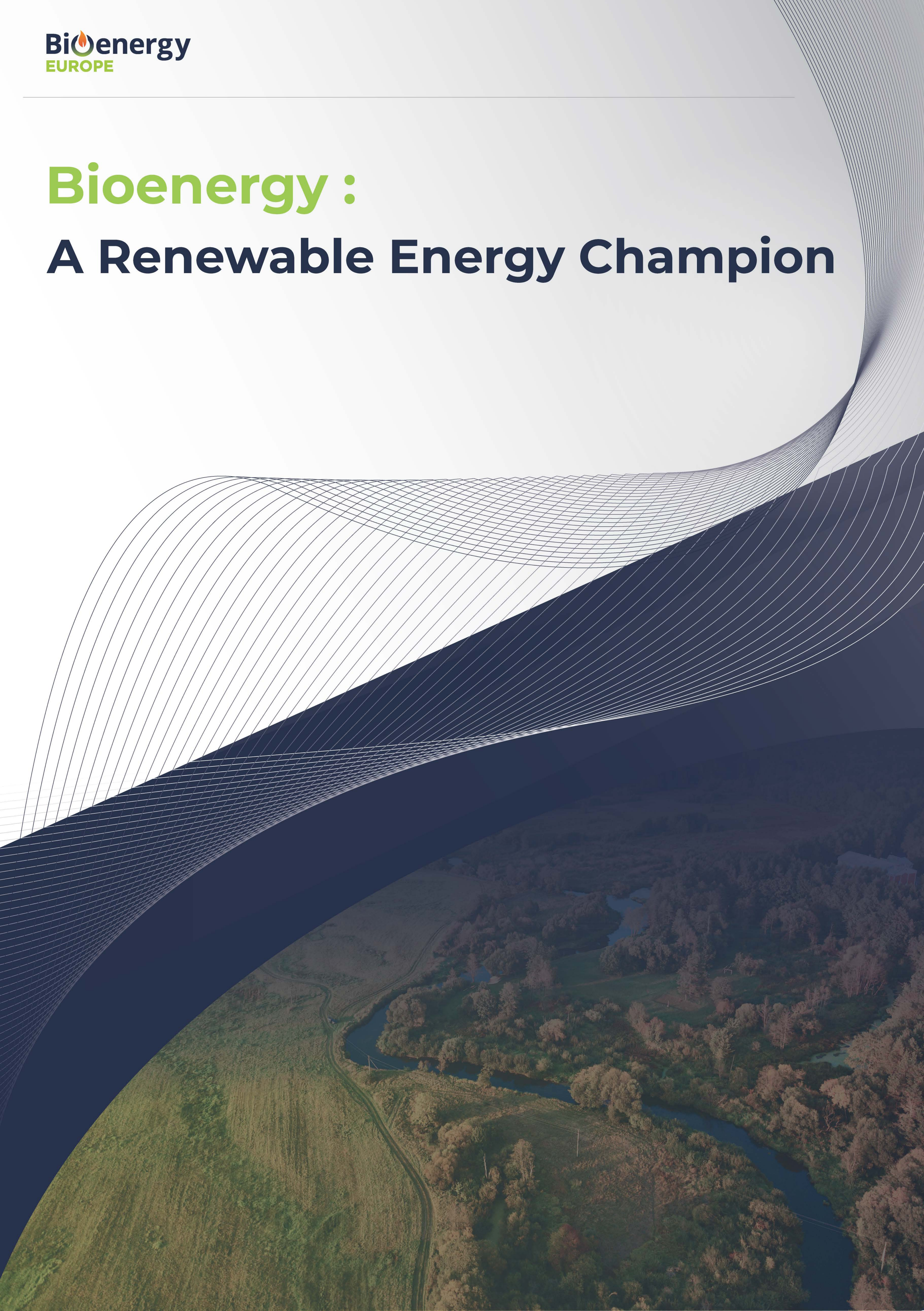
Bioenergy EUROPE

Bioenergy :

A Renewable Energy Champion



Championing Renewable Energy

Bioenergy has great potential in Europe and can become the #1 fuel to decarbonise a significant part of our remaining heat, electricity, and transport demand by 2050.

Bioenergy is a proud contributor to Europe's excellence and is a committed champion in emission reduction, sustainable forest management, and air quality improvements while contributing to a green European economy.

Climate Champion

Bioenergy is carbon neutral: Europe needs this renewable energy source to fight climate change and reduce emissions.

Sustainability Champion

Bioenergy helps sustainable forest management: using biomass for energy ensures that European forests keep growing.

European Champion

Bioenergy supports local economies: it provides a lifeline for people and rural workers across Europe while preserving the EU's energy autonomy.

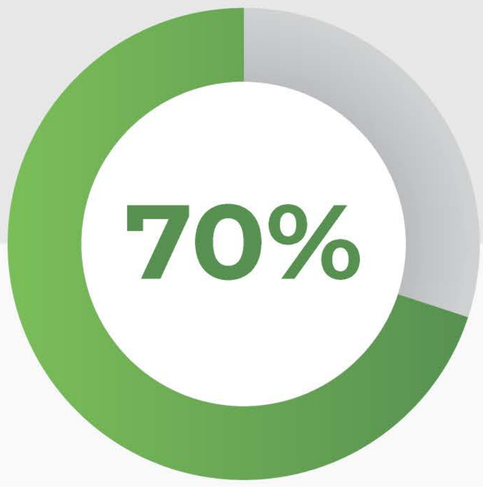
Innovation Champion

Bioenergy provides alternatives to old polluting technologies: ultra-low emission equipment helps decarbonise our heat demand and improve air quality.

Bioenergy Explained

Where does bioenergy come from?

3 main sources of biomass:



Woody Biomass

from by-products such as bark, saw dust, and wood chips coming from wood industries and forest management operations

Agricultural Biomass

from agricultural crops, residues, and dedicated energy crops

Waste Biomass

from municipal, agricultural, and wood waste

Where is bioenergy used?

Bioenergy is mainly used for heating purposes:

- **Heating: 70%**
- **Electricity: 15%**
- **Transport Fuel: 15%**

Bioenergy is heating 66 million European households!

DID YOU KNOW?

Bioenergy is already widely used by the wood, paper, and food industries. Other sectors could benefit from the use of bioenergy in their process or space heating.

How is biomass converted into heat?

Building heating from biomass can be produced through:

Individual Biomass Stoves

used as local space heaters

Individual Biomass Boilers

to provide hot water and space heating for a whole house

District Heating

to provide heat to different buildings from a central production site

#1 Source of Renewable Energy

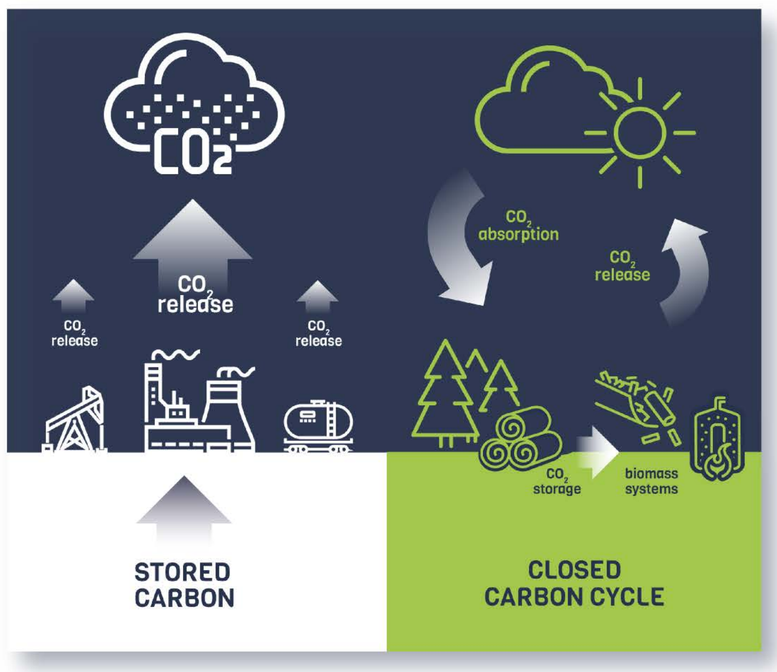
Bioenergy is the main renewable energy source used in Europe, representing 57% of the renewable energy consumed in the EU.

Climate Champion

Bioenergy is carbon neutral:
Europe needs this renewable energy source to fight climate change and reduce emissions.

Bioenergy is part of the natural carbon cycle

Transforming biomass into energy does not increase the levels of CO_2 in the atmosphere. The same amount of carbon emitted when bioenergy is generated was previously taken from the atmosphere as crops and trees were grown.



Using biomass to produce heat and electricity saves CO_2 not once, but several times

First CO_2 is taken up from the atmosphere via photosynthesis and accumulates in above/below ground biomass, creating a carbon sink. Then wood materials substitute fossil materials (cement, steel, etc.), storing carbon for decades in wood houses for examples.

Cutting Emissions

In 2018, bioenergy use alone saved around 7% of the overall greenhouse gas emissions in the EU (that is, the average annual emissions of a country like Spain).

Bioenergy helps forest management – which in turn contributes to climate mitigation

- Managing forests helps mitigate the consequences of global warming (including wildfires, storms, droughts, and insect outbreaks).
- Productive forests mean young trees are continuously planted, while mature trees that are capturing less and less carbon are feeding the bioeconomy to substitute fossil-based materials like steel or cement.
- Sustainable forestry increases the carbon stock potential of forests thanks to careful site preparation and overall better management.

Carbon stored in European forests increased by 23% between 1990 and 2020

Bioenergy is the perfect match for carbon capture and storage technologies

- Combining energy production from biomass with CO_2 Capture and Storage brings a net removal of CO_2 from the atmosphere.
- Carbon captured from biomass energy conversion can be recycled via chemical or biological processes to form synthetic fuels, useful chemical compounds and polymers, and sustainable construction materials.

Healthier soils: zoom-in on Biochar

Heating biomass in the absence of oxygen can produce biochar - a fine-grained, highly porous charcoal that helps soils retain nutrients and water. Healthier soils mean more biodiversity, less use of water and chemicals, and better food security. Also, biochar can hold carbon in soil for hundreds to thousands of years, being a simple yet efficient way to reduce carbon emissions and combat climate change.

Sustainability Champion

Bioenergy helps sustainable forest management:
using biomass for energy ensures that European forests keep growing.

Sustainable Forest: Bioenergy depends on healthy forests and helps their sustainable management.

The bioenergy sector works with the wood industry and forest owners to ensure that European forests maintain their biodiversity, vitality, and regeneration capacity.

How Bioenergy helps Sustainable Forest Management

Creating a market for forest residues

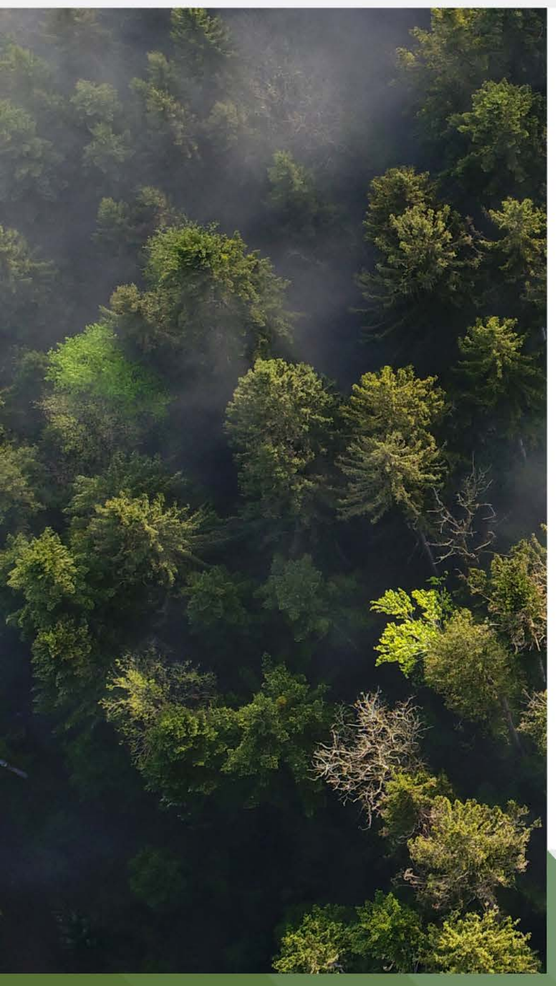
Bioenergy uses forest residues – like tops and branches – that cannot be used for materials. This creates a market for residues that would otherwise be left on the forest floor, decay as CO_2, and be a potential fire hazard.

Financing forest management

Bioenergy helps finance costly management operations such as early thinning, that prevent the development of pests and diseases, while improving the quality of remaining trees. This also makes our forests more resilient and contributes to biodiversity.

Promoting a win-win biodiversity pathway

The bioenergy sector/industry collects woody debris and uses them (within the limits of locally recommended thresholds) to generate energy. This reduces CO_2 emissions without damaging forest ecosystems.



Sustainable Agriculture: Biomass from sustainable agriculture is an important energy source but its potential remains largely untapped.

- Using agricultural residues (from orchard prunings for example) for energy production is a sustainable solution to prevent farmers from burning those residues and creating waste and air pollution.
- The positive contribution to the environment provided by perennial energy crops (such as miscanthus, poplar and willow) helps to improve water quality, enhance biodiversity, prevent erosion, and mitigate climate change.

PIONEERING SUSTAINABILITY

Maximising the environmental benefits of bioenergy with strong sustainability criteria:

Bioenergy is the only (renewable) energy source with mandatory sustainability criteria: in case it does not comply with these criteria, it cannot count towards the renewable energy targets and has no access to any public funding.

Bioenergy promotes a circular economy:

- The use of waste and by-products from the forest-based and agricultural sectors fosters circularity in industrial processes and helps to avoid pollution.
- We use forest residues, lower quality wood from industry, and agricultural waste and by-products that would otherwise be decaying and would emit CO_2 anyway.

European Champion

Bioenergy supports local economies: it provides a lifeline for people and rural workers across Europe while preserving the EU's energy autonomy.

Bioenergy is a key pillar of the European economy:

700,000
Direct & Indirect Jobs

50,000
Businesses

€57.6 billion
Annual Turnover

Bioenergy is a lifeline for people across Europe, especially in rural areas:

- Agrobiomass can provide European farmers with an additional source of income. It can also help rural cohesion, with some farmers supplying villages with energy.
- Bioenergy diversifies incomes in the forestry sector, providing a market that uses residues and low-value wood.
- Bioenergy can help address energy poverty, as most biomass has a cost below 5 Euros per gigajoule, compared to above 10 Euros per gigajoule for crude oil.

DID YOU KNOW?

Bioenergy creates almost as many jobs as all other renewable energy sectors combined.

How Bioenergy supports Europe's strategic autonomy

#1 Renewable Energy

57%
of total renewable energy sources consumed in the EU

Local Suppliers

74%
of bioenergy equipment suppliers based in europe

Self-Sufficient

96.5%
Biomass comes mainly from the EU

- **Fuelling Europe:** Bioenergy is the only renewable energy source that can fuel three sectors: electricity, heating, and transport.
- **Reducing reliance on fossil fuels imports:** In 2017, solid biomass consumption in the EU helped save EUR 40bn worth of fossil fuel imports. Every year, the EU is also able to do without 8bn litres of imported oil thanks to wood pellets.
- **Building resilience:** As a leader in technological development, manufacturing and fuel production processes, bioenergy makes Europe resilient to global value chain disruptions.

Innovation Champion

Bioenergy provides alternatives to old polluting technologies: ultra-low emission equipment helps decarbonise our heat demand and improve air quality.

Improving air quality and reducing pollution with cutting-edge technologies:

- Air pollution is the single largest environmental health risk in Europe. The quality of the air we breathe, and the comfort of heating is becoming more and more important. The bioenergy industry is committed to provide and use low-emission, efficient technologies. **For example, pellet appliances pollute 2-300 times less than an open fire.**

The power-generating pellet boiler

- A new generation of wood boilers with near to zero emissions are currently being launched on the market. They have no measurable emissions of particulates. By encouraging this switch, we are committed to decarbonise our economy and reduce harmful pollutants.

Providing high-quality, safe fuel that end consumers can trust:

Fuel quality standards and certification schemes for biomass are essential to guarantee the lowest levels of air emissions.

In Focus: Certification Schemes

Certification schemes like EN*plus*® ensure that wood pellets meet a variety of technical specifications, including density, ash and moisture content, calorific values, and mechanical durability.

Biomass is versatile, making bioenergy the perfect match for other innovative technologies:

- Bioenergy can be used for micro co-generation, which produces both heat and electricity for a household.
- Carbon neutral bioenergy technologies are available for industrial use, including for high temperature process heat and industrial Combined Heat and Power.
- Combining energy production from biomass with CO_2 capture and storage or biochar brings a net removal of CO_2 from the atmosphere.

LOOKING FORWARD

In the future, many fossil-based chemical products will be produced in biorefineries, generating bioenergy from their by-products.