

# Bioenergy in Austria

A factor creating added value

klimaaktiv



Poster inside:  
AUSTRIAN  
BIOENERGY MAP!



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**Central European  
Biomass Conference**

January 2020, Graz, Austria

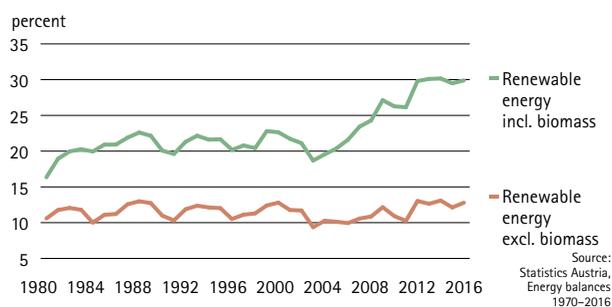


MIT UNTERSTÜTZUNG VOM  
**BUNDEMINISTERIUM  
FÜR NACHHALTIGKEIT  
UND TOURISMUS**

# The impact of biomass ...

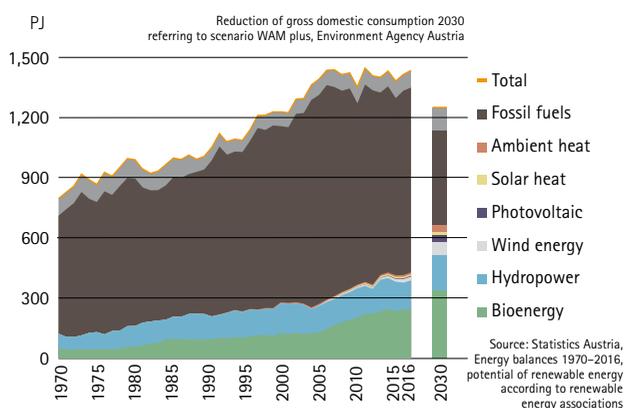
Over the past few years, the bioenergy sector has become a mainstay of Austria's energy accommodation. Biomass provides a substantial contribution to Austria's transition towards a sustainable and climate-friendly energy system, creating domestic added value as well as employment and spending power. Austrian enterprises and research institutions ensure that our bioenergy technologies occupy top positions in the domestic and international markets.

## Share of renewable energy of gross domestic energy consumption in Austria



Without bioenergy, the share of renewable energy has amounted to only 10 to 13 percent of the total energy consumption for years.

## Development of gross domestic energy consumption 1970 to 2016 and potential for 2030



Until now, among renewable energies only bioenergy and hydropower make a substantial contribution to covering energy consumption.

## The biggest domestic energy source

Biomass is by far the most important domestic energy source. In 2016, 44 percent of the total domestic energy volume were provided by biomass, followed by hydropower which provided 27 percent. Biomass is Austria's most relevant renewable energy source, accounting for 57 percent of the total amount. Once again, hydropower occupies the second rank, accounting for 33 percent.

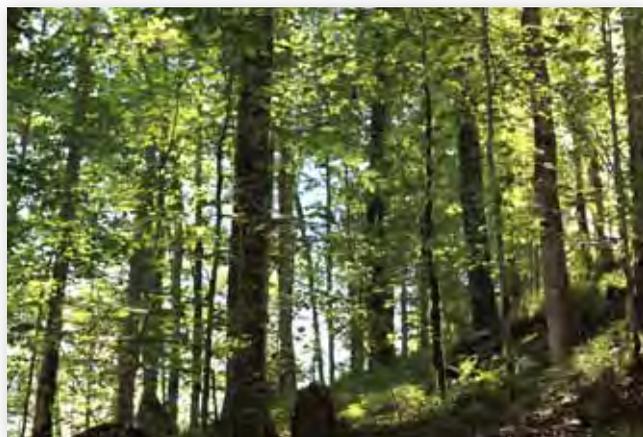
## 2020 goals: not without bioenergy

Between the years 1990 and 2016, the share of bioenergy of the total energy consumption in Austria has evolved from 9 to 17 percent even though Austrian energy consumption increased by 36 percent during that period. This was possible because the total use of biomass now amounts to more than 2.5 times the volume of the year 1990.

According to European Union requirements, Austria is bound to attain a share of 34 percent of renewable energy in its total energy mix by the year 2020. The current share amounts to 33.5 percent. Without bioenergy however, it would drop down to about 15 percent at most. It is therefore obvious that without bioenergy the exit from nuclear power and fossil fuels is not feasible.

## Forests: main source of raw material

The most important source of raw material for the biomass sector are our forests. In 2016, they provided 79 percent of Austria's biomass volume; the rest came from the agricultural and the waste sectors. If its potential is consistently made available, Austria's use of biomass could increase by a further 39 percent by the year 2030. More than half of this potential for development is associated with the agricultural and the waste sector; the remaining share is related to the forestry sector. If a reduction of energy use, as aimed for by the EU, is achieved, the bioenergy sector could cover about a third of the domestic energy demand.



Forests are currently Austria's most important raw-material supplier for bioenergy.



More than half of the future development potential of biomass is accounted for by the agricultural and the waste sectors.

# ... for our energy system

## Heat market dominant

Traditionally, biomass in Austria is used for heat production. In 2016, heating consumed 81 percent of the bioenergy production, followed by biofuel with a share of 11 percent and green electricity from biomass and biogas with a share of 8 percent. Around 78 percent of biomass heat are used in single combustion systems, the remaining 22 percent are used for district heating which showed the highest increase, its production having more than tripled since 2005.

Biomass holds a share of over 30 percent of the total heat energy mix. For the heating of dwellings in Austria, it is by far the most popular source of energy with a share of 40 percent of the total energy use. Nearly 670 000 Austrian households use primarily wood-burning heating devices to keep their living spaces warm. A distribution grid of over 2 100 biomass district heating stations makes sure that large parts of Austria are provided with climate-friendly heating.

## Energy for mobility: a challenge

With a share of 5.6 percent, biomass is the most noteworthy renewable energy source in the transport sector. The energy consumption of electric vehicles only accounts for 2.7 percent. In addition to further development of renewable energy sources, new mobility concepts fostering the public transport sector as well as systems with reduced fuel consumption are vital to contain carbon emission levels from the combustion of fossil fuels.

## Green power, whatever the weather

The contribution of biomass to the generation of electricity exceeds that of photovoltaic by four times. Wood cogeneration technology is on the rise in Austria as well as in Germany. It allows for high efficiency regarding small-scale power generation. Biomass combined heat and power plants are capable of generating electricity around-the-clock and thus to make an important contribution to electricity base load accommodation.

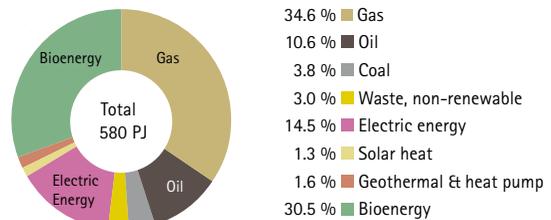
## Outlook

Future prospects by the year 2050 envision increased use of biomass in the fields of electricity generation, high-temperature processes in industrial heat generation and in the transport sector. Regarding the latter biofuels could gain in importance mostly in the field of aviation.



More than 80 percent of Austria's bioenergy is used for the generation of heat.

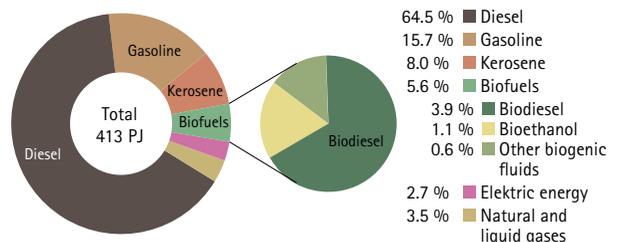
### Final energy consumption, heating, 2016



Source: Statistics Austria, Energy balance 2016, Useful energy analysis 2016

For heating, biomass is Austria's second most important energy source after natural gas.

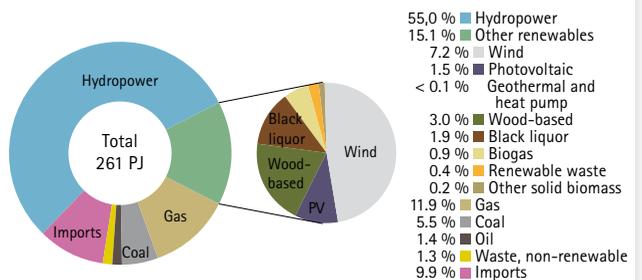
### Final energy consumption, transport, 2016



Source: Statistics Austria, Energy balance 2016, Useful energy analysis 2016

For transportation it is most difficult to replace fossil fuels – biomass covers more than 5 percent of the total consumption.

### Electricity generation, 2016



Source: Statistics Austria, Energy balance 2016

Biomass covers 6.4 percent of electricity generation, almost as much as wind power and four times more than photovoltaic.



The production of district heating based on biomass has more than tripled over the last ten years.

# Regional effects of bioenergy

## Case study: the region of Hartberg

A study by the Austrian Energy Agency on behalf of the Climate and Energy Fund has closely examined the practical effects of biomass use in the Climate and Energy Model Region (KEM) Hartberg in eastern Styria. Said region includes the following communities: Hartberg town, Hartberg surroundings, Greinbach and St. Johann in der Haide. 38 percent of that area are covered by forests. The harvest of timber could still be increased by about 50 percent. Overall 12 600 people are living in the region. Their combined consumption of heat energy amounts to approximately 720 terajoule (TJ) per year. 53 percent of heat energy consumption in the region are covered by fossil energy sources, mainly heating oil. The remaining 47 percent are covered by bioenergy sources.

## An example for other regions

The presumptions for the calculation of added value and employment effects in this case study were chosen in a way that makes them easily transferable. Hence the Climate and Energy Model Region Hartberg gives a replicable example for many other regions in Austria. The insights gathered from this project should help persons in charge in other regions opt for investments in domestic renewable energy sources.

## Employment in the chain of custody

In contrast to fossil fuels, regarding the use of bioenergy the whole chain of custody – from forest management practices all the way to the stove or boiler – usually generates domestic employment. An example: To transfer one TJ of wood (= 114 solid cubic metres) from the forest to a domestic household – passing several intermediate steps as well as a small district heating system – approximately 168 regional working hours are needed. In detail, these include:

- 16 man hours of forest management and silvicultural measures
- 52 man hours of felling and forwarding to the forest road
- 16 man hours for wood transportation
- 17 man hours for the production of wood chips and the transportation to the district heating plant
- 50 man hours of operation and maintenance of the district heating plant
- 17 man hours for administrative tasks.

For one TJ of firewood to be burned in a logwood boiler, 143 direct regional working hours are necessary; 192 man hours are needed for a tile stove. The operation of an oil heating system secures about 21 direct regional working hours per TJ, the use of a gas heating system only ten.

## 1 TJ of bioenergy creates 168 regional man hours along the chain of custody

Silvicultural measures: 16 h



Felling and forwarding: 52 h



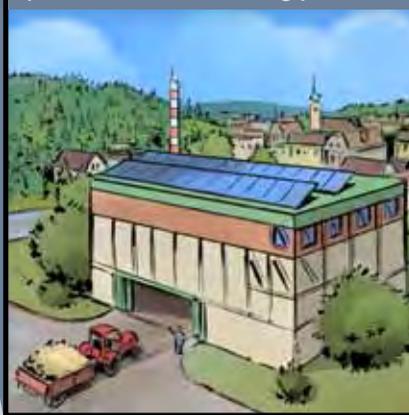
Wood transportation: 16 h



Administrative tasks: 17 h



Operation of district heating plant: 50 h



Production & transport of chips: 17 h



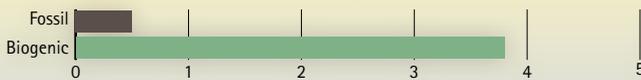
## Seven times more jobs with biomass

Even though 53 percent of heat energy consumption in the KEM Hartberg are covered by fossil energy sources, the fossil system only provides 4.2 regional full-time equivalents (FTE). The biogenic system secures 31 full-time jobs. The direct regional creation of value through maintenance, operation and fuel supply in a biogenic system amounts to 3.8 million Euro per year; fossil plants create only 0.5 million Euro. The money drain from the region is about 0.9 million Euro in a biogenic system, but 7.2 million Euro if a fossil system is used. Carbon emissions in Hartberg caused by bioenergy amount to 800 tons per year. Heating systems using fuel oil emit 31 100 tons every year.

## Scenario with 100 percent bioenergy

A best and a worst case scenario regarding the use of biomass for heating in the Hartberg region was evaluated. In the first scenario (100 percent use of biomass), the yearly maintenance and fuel supply would secure 61 jobs, whereas the other scenario (100 percent fossil fuels) would only retain 8.5 jobs. Maintenance and operation of biomass heating systems could generate 6.5 million Euro of regional added value opposed to 1.1 million Euro in the fossil scenario. Annual money drain from the region drops from 15.1 million Euro in the fossil scenario to 1.6 million Euro in the biogenic case. Carbon emissions would add up to 58 500 tons in the fossil setting and to only 1 600 tons in the bioenergy scenario.

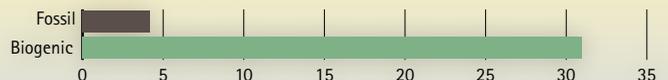
### Regional added value (service, operation) in million Euros



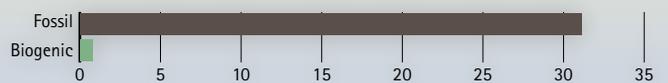
### Cash drain in million Euro



### Direct regional employment (FTE), service and operation



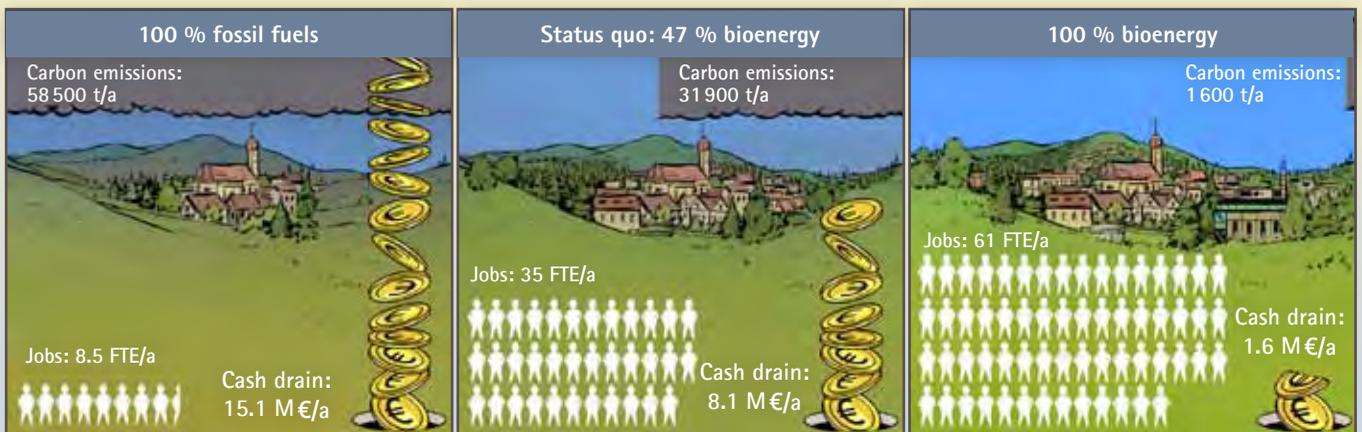
### Carbon emissions (1 000 tonnes per year)



Source: AEA, ÖBMV

Effects of bioenergy and fossil energy for space heating in the Climate and Energy Model Region Hartberg; energy mix contains 47 percent of biomass.

## Regional effects of heat allocation in the Climate and Energy Model Region Hartberg



The Climate and Energy Model Region Hartberg in eastern Styria consists of four towns with a total of 12 600 inhabitants.



The KEM Hartberg can serve as a prime example for many other regions in Austria.

# National effects of bioenergy

## 22 250 jobs in Austria

Thanks to the use of renewable energy sources, approximately 41 600 full-time jobs are secured in Austria, 22 250 of them are associated with the biomass sector. A large share of the jobs in the field of bioenergy is related to the operation of facilities processing solid biomass. Among the renewable energy branch almost every second full-time job deals with the use of solid biomass. Generating 38 percent of the total turnover in the field of renewable energy sources, biomass is the sector's biggest contributor with 2.8 billion Euro. The bigger part of this turnover – almost 1.5 billion Euro – comes from the provision of combustible material (logwood, wood chips, wood pellets or saw-mill by-products).

## Boilers and stoves made in Austria

In the year 2017, 5 118 pellet boilers, 2 750 wood log boilers, 2 312 wood chip boilers and 775 combined firewood and pellet boilers were sold on the Austrian market. Furthermore 1 672 pellet stoves, 6 677 cooking stoves and 7 235 wood log stoves were sold on the domestic market. The total turnover of Austrian biomass boiler producers (769 million Euro) as well as of domestic stove manufacturers (94 million Euro) amounted to 863 billion Euro in the year 2017. This resulted in a total number of 3 600 jobs in Austria.

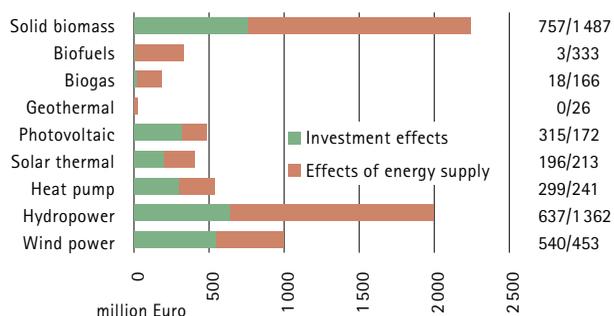
## Hot on the international market

Austrian producers of biomass boilers sell about 80 percent of their products abroad. In Germany for instance two out of three installed biomass boilers are of Austrian origin. The most important export markets for Austrian biomass boilers are Germany, France, Italy and Spain. Promising market places are Great Britain and the US. Technologies for the use of bioenergy have a long tradition in Austria, which has resulted in market leadership, patents and research skills. In most cases, components for biomass boilers are either produced by the manufacturers themselves or by other domestic enterprises. Austrian companies not only produce the boilers, but also compatible components such as buffer tanks as well as extractor and storage systems.

## The boiler branch is challenged

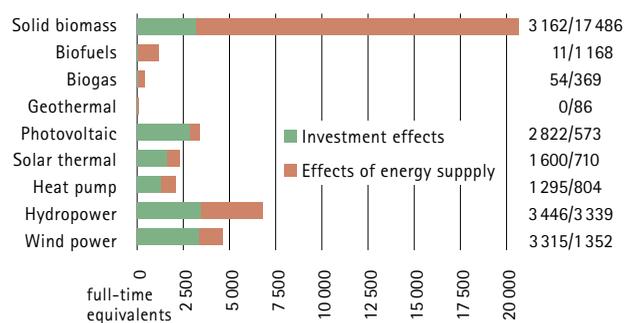
Several warm winters in a row plus the drop in the prices for crude oil led to a dramatic decline in the sales of biomass boilers in Austria since 2013. 2017 was the first year that the sales of biomass boilers went up again by 6.6 percent. The restocking of the oil tanks with cheap heating oil has slowed down the exchange rate of out-dated oil boilers considerably. The ongoing aid programme for oil boilers from the Austrian mineral oil industry is a further burden, which is endangering jobs in the domestic bioenergy sector.

### Primary sales from technologies for the use of renewable energies 2016



In the year 2016, technologies for the use of biomass as an energy source generated a turnover of nearly 2.8 billion Euro.

### Primary employment from technologies for the use of renewable energies 2016



Biomass fosters employment in the region – in 2016, that accounted for 22 250 full-time jobs.



A big part of the effect on the turnover created by renewable energies is accounted for by the allocation of solid biomass fuels.



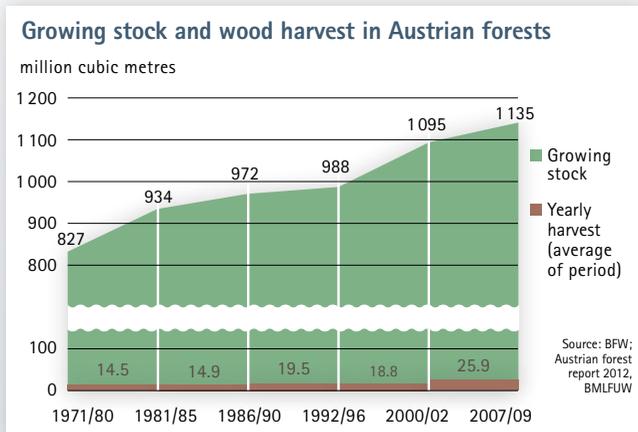
Austrian producers of biomass boilers and stoves provide more than 3 600 domestic jobs.

## Wood stock at a record high

Growing stock in domestic forests has been on the rise throughout the past few decades and has reached a record high of 1.135 billion solid cubic metres according to the Austrian Forest Inventory. Especially in small-scale private forests (which cover more than 50 percent of the total forest area) the harvest of wood is still significantly lower than the increment. The latest National Forest Inventory showed a backlog of tending activities and stated reserves for thinning measures of 90 million solid cubic metres – 15 million more than ten years ago.

## New chances for forest owners

More than 300 000 persons in Austria generate income from forest management. Until a few years ago, forest owners couldn't sell industrial roundwood or wood chips in a cost-covering way. Hence the first thinning measures were often omitted, even though they belong to the most important forest management practices. Only trees that are provided sufficient growing space can develop into strong, stable and valuable individuals. Forest management practices also help in achieving a good nutrient balance and microclimate and they foster soil organisms as well. Due to increased demand by the bioenergy sector, thinning measures are more common nowadays. Thus more wood is available on the market.



Despite an increased wood harvest, growing stock in Austrian forests has risen significantly over the past decades.



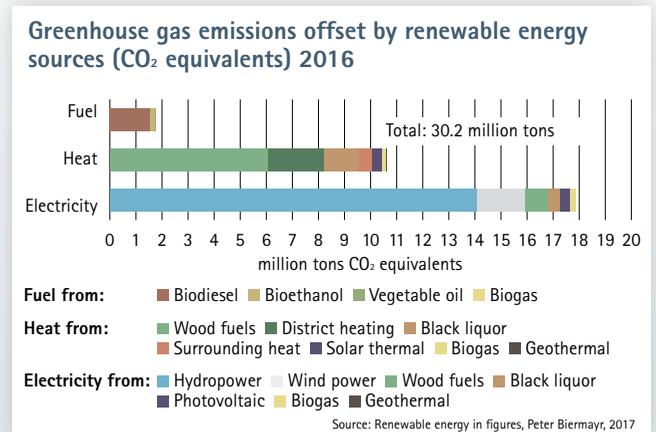
Wood fuel products are often by-products of harvesting as well as of the processing of stem wood.

## Energy wood stabilises the market

Forest owners will continue to earn their principal income with more valuable products like saw logs, but the continuous and reliable demand for energy wood which is independent from the timber market helps to stabilise the roundwood prices. As a consequence of the energetic use of raw timber, the volume of beetle-infested wood is declining because damaged wood is chopped before the beetles are fully developed. This protects the growing stock of the Austrian forest owners from massive loss in value.

## Bioenergy: protecting the climate

In 2016, the use of renewable energy reduced the carbon emissions in Austria by more than 30 million tons. The utilisation of bioenergy alone accounted for nearly 13 million tons. Besides the beneficial effects for the climate, the Austrian economy is able to save millions of Euros in the field of carbon emission trading. In the bioenergy sector, the biggest part of the carbon emissions offset, with a share of 47 percent, comes from wooden biomass used for heat generation. Replacement of oil heating systems by modern biomass boilers has led to a decrease of carbon emissions by almost 40 percent since 1990 in the space heating sector. The transport sector on the other hand has experienced an increase of over 66 percent.



Through the use of renewable energies, Austria saves the emission of over 30 million tons of CO<sub>2</sub>, 13 million tons are offset by bioenergy.



As a result of the utilisation of energy wood, formerly neglected first thinning measures are now cost-covered.



Visit us at the next

# Central European Biomass Conference

January 2020, Graz, Austria

fuels

heat & CHP

liquids

pellets

biogas



With over 1000 participants from 50 nations the Central European Biomass Conference (CEBC) is the most important bioenergy event in Central Europe. The conference, which takes place every three years in Graz, provides an overview of the political, economic and technological developments in the field of bioenergy use in Europe. Excursions to biomass projects and the industry forum bridge the gap between theory and practice. Workshops, the Matchmaking Event and B2B meetings make the conference an excellent platform for networking. The CEBC takes place simultaneously with the home builder trade fair for 40000 visitors with a focus on energy technologies.

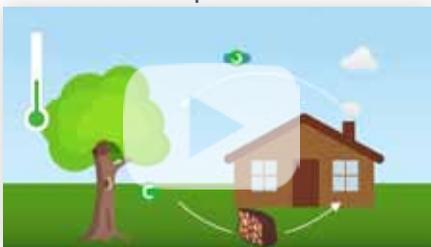
The organisers, the Austrian Biomass Association, the Styrian Chamber for Agriculture and Forestry and the Bioenergy 2020+ GmbH are looking forward to welcoming you at the 6<sup>th</sup> Central European Biomass Conference in Graz in January 2020.

More information: [www.cebc.at](http://www.cebc.at)

## Bioenergy clips

 [www.youtube.com/user/waermeausholz](http://www.youtube.com/user/waermeausholz)

Forest and climate protection



Heating with wood adds value to the region



The Power of wood – cascade use



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