BIOENERGY EUROPE STATISTICAL REPORT 2023

REPORT BIOHEAT

Bioenergy
EUROPE

Bioenergy Europe

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ABOUT
THE STATISTICAL REPORT

Every year since its debut release in 2007, Bioenergy Europe's Statistical Report has provided an in-depth overview of the bioenergy sector in the EU-27 Member States.

Bioenergy Europe's Statistical Report has been enriched each year with new figures and information, collecting unique data on the developments of the European bioenergy market from a growing number of international contributors.

Bioenergy Europe develops detailed reports that aid industry leaders, decision makers, investors and all bioenergy professionals to understand the situation of bioenergy in Europe.

With more than 150 graphs and figures, readers of Bioenergy Europe´s Statistical Report can get accurate and up-to-date information on the EU-27 energy system such as the final energy consumption of biomass for heat and electricity, the number of biogas plants in Europe, the consumption and trade of pellets, the production capacity of biofuels and other key information to help break down and clarify the complexity of a sector in constant evolution.

In 2017, the Report was rewarded by the European Association Awards for being the 'best Provision of Industry Information and Intelligence', a recognition after a decade of collective work.

THE EUROPEAN ASSOCIATION AWARDS 2017

ABOUT
BIOENERGY EUROPE

A bit of history

Bioenergy Europe is the voice of European bioenergy.

It aims to develop a sustainable bioenergy market based on fair business conditions. Founded in 1990, Bioenergy Europe is a non-profit, Brussels-based international organisation bringing together more than 40 associations and 90 companies, as well as academia and research institutes from across Europe.

Our vision

Bioenergy Europe will be the leading player in ensuring that sustainable bioenergy is a key pillar in delivering a carbon neutral Europe.

Our mission

Bioenergy Europe facilitates the development of a sustainable, strong, and competitive bioenergy sector through:

- Promotion towards European policymakers and stakeholders for awareness, acceptance, and reputation of bioenergy.
- Promote the development of consistent, realistic, and sustainable bioenergy scenarios in the heat, electricity, and transport sectors.
- Pro-active proposals to develop more favourable European legislation.
- Market intelligence to support decision making.
- Services to members, including support to advocacy at a national level.
- Tools, including certification schemes, to sustain market growth and credibility.
- Industry collaboration throughout the entire supply chain.
- Promotion of efficient and innovative technologies within the bioeconomy.

2007
First Statistical Report published

2009
+ analysis on the National Renewable Energy Action Plan
+ (108 pages)

2010
89 pages

2011
+ pellet chapter
+ (108 pages)

2012
+ statistics on ENplus®
+ 2700 downloads
+ (124 pages)

2013
+ socio-economic indicators
+ 2600 downloads

2014
+ EPC European Wood Pellet
+ Overview + expert's view
+ 3000 downloads
+ 158 pages

2015
+ statistics on wood chip consumption
+ 200 page report on bioenergy support scheme in Europe
+ key findings report
+ 3500 downloads

2016
+ chapter on environmental impact of bioenergy
+ projections on bioheat & bioelectricity
+ awarded as 'the Best Provision of Industry Information & Intelligence'by the European Association Award
+ 4000 downloads

2017
+ updated information on bioelectricity / bioheat market & support schemes in all EU28 Member States
+ a seperate report on ENplus®

2018
+ report available to the public, free of charge
+ emphasis on providing transparent data & sharing knowledge to support private & public initiatives to promote bioenergy
+ 300 pages

2019
+ Bioenergy Europe publishes 7 focussed reports published throughout the year

2023

OUR

ACTIVITIES

Bioenergy Europe carries a wide range of activities aimed at supporting its members on the latest EU and national policy developments. Bioenergy Europe works to voice their concerns to EU and other authorities, including, advocacy activities in key policy areas as well as the organisation of dedicated working groups.

Working Groups

Bioenergy Europe's working groups act as a platform for members to discuss common issues and exchange information on the state of play of bioenergy.

There are currently 8 active working groups:

- Agro-biomass;
- Competitiveness;
- Domestic Heating;
- Pellets;
- Sustainability;
- Wood Supply;
- Carbon Dioxide Removals;
- Task Force National Advocacy.

Certification Schemes

Thanks to the experience and authority acquired over the last 20 years, Bioenergy Europe has successfully established two international certification schemes to guarantee high quality standard for fuels, namely, EN*plus*®, as well as the latest edition in the certification for sustainable bioenergy: SURE.

Network

Bioenergy Europe is the umbrella organisation of the European Pellet Council (EPC). This network has been created thanks to the dynamics of Bioenergy Europe members. Today, this network brings together bioenergy experts and company representatives from all over Europe and beyond.

The European Pellet Council (EPC), founded in 2010, represents the interests of the European wood pellet sector. Its members are national pellet associations or related organisations from over 17 countries.

EPC is a platform for the pellet sector to discuss issues relating to the transition from a niche product to a major energy commodity. Issues include the standardisation and certification of pellet quality, safety, security of supply, education and training, and the quality of pellet-using devices. EPC manages the EN*plus*® quality certification.

EN plus ®

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EUROPEAN PELLET COUNCIL

A NETWORK OF BIOENERGY EUROPE

For further information on Bioenergy Europe's Networks & Certification Schemes visit www.bioenergyeurope.org

OUR

MEMBERS*

As the common voice of the bioenergy sector, Bioenergy Europe, aims to develop a sustainable bioenergy market based on fair business conditions and does so by bringing together national associations and companies from all over Europe – thus representing more than 5000 indirect members, including companies and research centres.

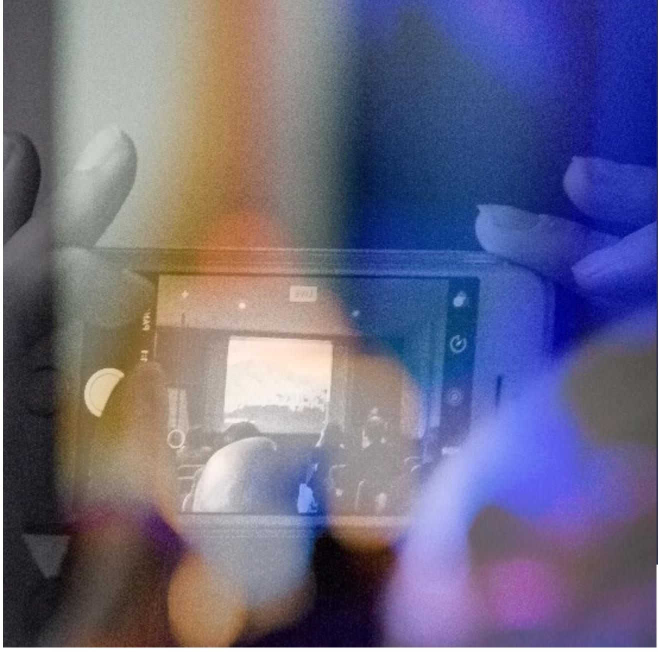
Associations

Academia

Companies

*Members as of September 2023.

ENHANCED VISIBILITY & SPONSORSHIP OPPORTUNITIES



Enhanced Visibility

(Exclusive to Bioenergy Europe Members)

This opportunity entails a free of charge promotion for Bioenergy Europe members only. This offer includes the chance to display your organisation's logo as well as a featured 100-word description, placed in 1 of the 7 annual statistical reports of your choice.

This enhanced visibility opportunity is limited and interested members are required to contact the team via info@bioenergyeurope.org

You can find further information about this opportunity on the Bioenergy Europe website.

Sponsorship

Bioenergy Europe offers a sponsorship opportunity for the Statistical Report where you will have the opportunity to have the highest level of visibility. In addition to having full page adverts in all 7 statistical reports, you will also have your logos placed on publications, policy briefs, and enjoy content-driven tweets, as well as Linkedin posts, amongst a variety of additional advantages.

You can find more information in regard to the sponsorship on our website
or get in touch with our Team at info@bioenergyeurope.org

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Learn more here: https://sure-system.org/en/

enSURE compliance with RED II sustainability requirements.

SUSTAINABLE RESOURCES Verification Scheme is a worldwide certification scheme to ensure sustainable use of biomass and biogas for the production of electricity or heating and cooling in compliance with the REDII criteria.

SURE provides a solution to all economic operators within the bioenergy sector: agricultural and forest biomass producers, producers of biomass fuel from waste and residues, pellet producers, logistic operators, biomass fuel traders, biomass and biogas plants.

SURE offers certification solutions applicable to economic operators in all stages of the supply chain wishing to demonstrate their compliance with RED II criteria, so there's no need for other 'sustainability' certifications.

1. Heat and Renewable Heat Demand in Europe

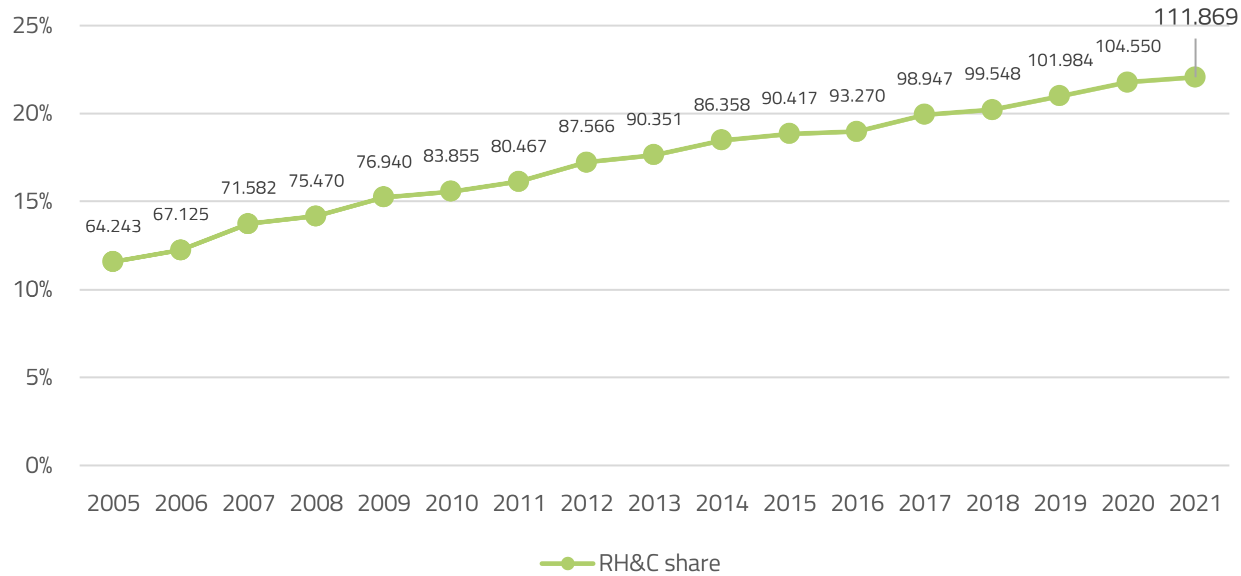
Heating and cooling (H&C) represented nearly half of the final energy consumption in the EU27 in 2021. As such, the decarbonisation of the heating sector is crucial for a successful transition to a carbon-neutral energy system by 2050.

Table 1 H&C Consumption and total final energy consumption in EU27 Member States in 2021 (ktoe)

	Total final energy consumption	H&C consumption	% of the H&C sector in the final energy consumption
EU27	[illegible]	[illegible]	46%
Growth rate 2020-2021	[illegible]	[illegible]	[illegible]
AT	26,357	12,880	49%
BE	33,182	17,654	53%
BG	10,247	4,751	47%
CY	1,581	519	33%
CZ	25,449	13,412	53%
DE	199,442	104,536	52%
DK	13,735	6,966	51%
EE	2,761	1,271	46%
EL	14,854	5,154	34%
ES	78,608	28,663	36%
FI	24,738	13,658	55%
FR	136,355	58,423	43%
HR	6,888	3,322	48%
HU	18,848	10,313	55%
IE	11,017	4,766	43%
IT	113,207	52,792	47%
LT	5,662	2,558	45%
LU	3,445	1,124	33%
LV	3,980	2,324	58%
MT	533	93	17%
NL	43,333	24,929	58%
PL	74,177	38,285	52%
PT	15,755	6,234	40%
RO	25,280	14,441	57%
SE	32,157	14,278	44%
SI	4,768	1,811	38%
SK	10,342	5,526	53%

*Calculated in accordance with the methodology established in Directive 2009/28/EC and Regulation (EC) No 1099/2008. Total heat includes all elements of 'gross final consumption of energy' for other purposes than electricity and transport. It should be noted that the figures in Table 1 do not include the electricity used for H&C, which share is expected to increase.
Source: Eurostat, SHARES 2021

Figure 1 Evolution of renewables in H&C sector* in EU27 (ktoe, %)



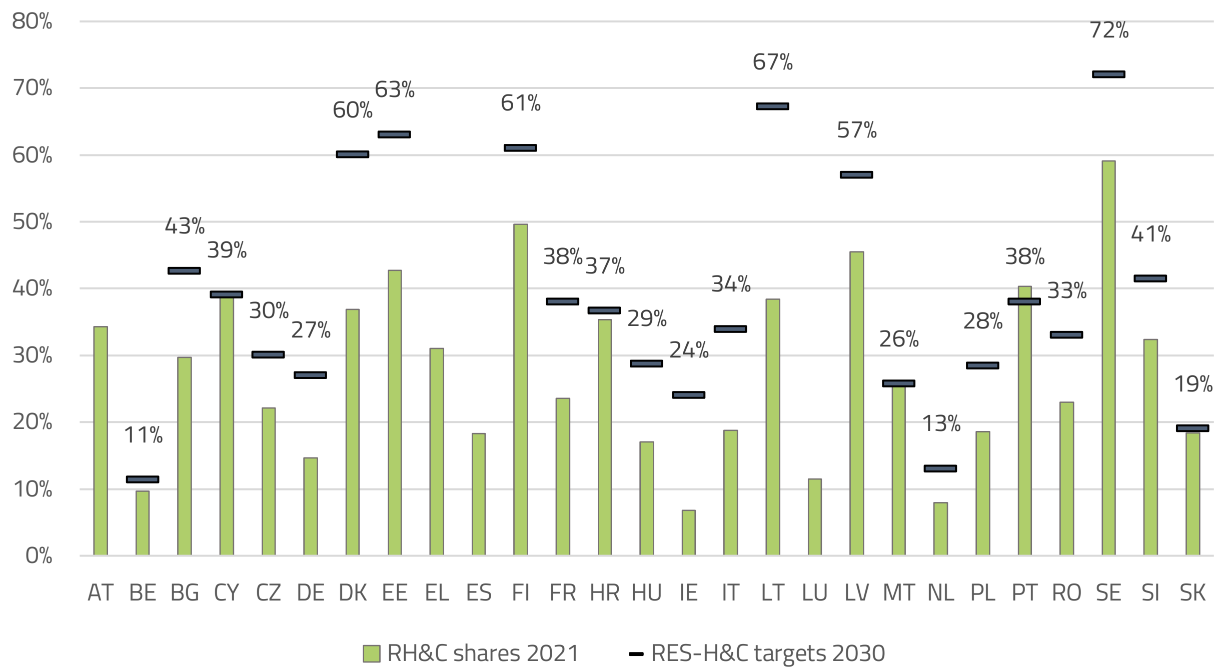
* Calculated in accordance with the methodology established in Directive 2009/28/EC and Regulation (EC) No 1099/2008.
Source: Eurostat, SHARES 2021

However, the process of replacing fossil fuels with renewable energy sources and other zero-carbon solutions in this sector has so far been slower than in electricity generation, as renewables currently represents only 22% of heat consumption. Heating and cooling, unlike electricity generation, demand a consistent energy supply. Integrating variable renewables into these sectors presents challenges, but biomass emerges as a solution due to its capacity for continuous heat provision. However, policy emphasis has historically favored decarbonizing electricity, sidelining heating and cooling. Renewable heating and cooling initiatives suffer from this policy imbalance. The lack of tailored incentives and regulatory support curtails innovation and market growth. This impediment perpetuates a cycle, stymying advancements in technology and scalability. Addressing this requires a policy shift. Redirecting attention towards renewable heating and cooling is paramount. Tailored incentives, subsidies, and regulations should be established to foster innovation and encourage market players. In the drive toward sustainability, recognizing the significance of renewable heating and cooling is vital. Rectifying the policy asymmetry between electricity generation and thermal applications will spark progress and ultimately reduce emissions from heating and cooling systems. On average, the increase of RHC has been 0,62 percentage points (pp) each year between 2004 and 2020 compared to 1,29 pp in power generation. Although the relative increase is higher in the electricity sector, since the H&C sector is larger than the electricity one, the increase in absolute terms might be higher in H&C (depending on the year). In 2021 for example, renewable heat consumption reached its highest value to date (111.869 ktoe) exceeding that of renewable electricity (93.293 ktoe) in absolute terms. With the revision of the Renewable Energy Directive (RED II), which sets the legislative framework for renewables for the period 2021-2030, a mandatory target has been set at an annual increase of 1,1 pp of renewables in the final heat consumption, with the possibility to top this up to 1,3 pp. The 1,1 pp requirement corresponds to the average annual increase of renewables in heating and cooling as forecasted in the EU member states' Integrated

National Energy and Climate Plans[1] (NCEPs). These plans outline strategies, targets, and initiatives aimed at reducing greenhouse gas emissions, promoting renewable energy sources, and enhancing energy efficiency. The publication years of these plans vary by country, reflecting the individual timelines and priorities of each nation. These plans are not static documents; they are subject to revision and updates in response to changing circumstances, advancements in technology, and evolving global commitments. This iterative approach allows member states to fine-tune their strategies and adapt to new challenges as they arise. The new proposal also introduces a list of indicative measures to achieve this higher target including the replace of old heating systems with new renewable appliances, the training of renewable heat professionals and the proposal of establishing "heat purchase agreement". In this context, long-term strategies to decarbonize the heating sector by increasing the share of renewable heat solutions and boost investments in research and innovation (R&I) will be needed.

To reach the objectives presented in the Fit for 55 Package it is essential to act now and put the H&C sector at the centre of EU's decarbonisation strategy. This is a key opportunity to take concrete actions to ensure climate neutrality by 2050 and retrofitting old heating installations with modern renewable ones can strongly increase energy efficiency, reduce emissions, and address air pollution. To achieve this goal a renewed focus on renewable heat sources such as bioenergy and a comprehensive approach will be needed.

Figure 2 Renewable energy share in the H&C sector in 2021 and 2030 Member States´* objectives (in %)



Sources: SHARES 2021, NECPs

*No dedicated RES H&C targets for Austria, Spain and Luxembourg.

[1] Regulation on the governance on the Energy Union [EUR-Lex - 32018R1999 - EN - EUR-Lex (europa.eu)]

Although Member States have developed their Integrated National Energy and Climate Plans (NECPs)[2], to reach the 2030 targets and effectively move towards a 100% renewable heating and cooling future, the above chart clearly showcases that more ambition is needed in the current context. In order to achieve this, it will be essential to establish a clear strategy to phase out fossil heating by retrofitting old appliances and replacing them with more efficient renewable modern ones, while also creating economic incentives for people to switch from fossil fuels to renewable energy. The changes that the Fit for 55 (FF55) Package will implement through the revision of the Renewable Energy Directive (REDIII), the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD) provide a unique opportunity to refocus the EU's efforts towards the heating sector.

In terms of ambition, the current renewable H&C objectives for 2030 submitted by Member States in their NECPs is quite varied across the European Union. Member States such as Sweden, Estonia, Lithuania, France, Italy, Romania and the Denmark have very ambitious goals of more than 10 pp increases for their respective share of renewables in H&C, while several countries set goals to which they are very close to fulfilling, and three of them, Cyprus, Malta and Portugal, have already achieved them. Based on the data available, the average target for the RES share in H&C sector for 2030 is 38,69% compared with the current share of 27,77%.

The countries with the highest share of renewable heat in 2021 were Sweden (59%), Denmark (51%), Finland (50%), Latvia (45%), Estonia (43%), and Portugal (40%). It is noticeable that most of the Nordic and Baltic countries which lead in the shares of renewable heating rely on a large share of bioheat to decarbonize their H&C sector. The countries with the least developed renewable H&C sectors are Ireland (7%), the Netherlands (8%) and Belgium (10%). According to the NCEPs RES-H&C targets, the shares in this sector in 2030 will remain below 25%. Despite all of this, it is very important to highlight that the overwhelming majority of renewable heat in these 3 countries comes from biomass (77% for Ireland, 88% for Belgium and 74% for the Netherlands), and that these figures would be close to zero if biomass' contribution was removed from the equation.

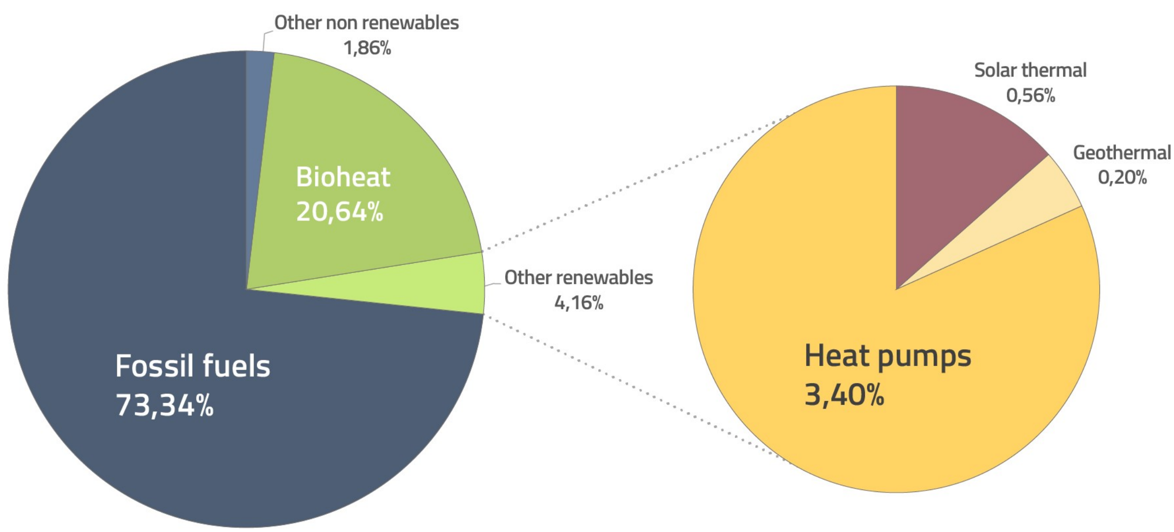
[2] NECPs are 10-years National Energy and Climate Plans detailing national decarbonization trajectories and describing the foreseen energy–climate measures and policies to be implemented over this period to reach the proposed target.

Figure 3 Renewable energy consumption in the H&C sector in the EU27 Member States in 2021 (in ktoe)

Source: SHARES 2021

In 2021, the total renewable energy consumption in the H&C sector in the European Union amounted to 111,869 ktoe. Despite their relatively small shares of RES in the H&C sector, Germany (15%) and France (24%) due to their size are still the two biggest users of renewable energy sources (RES) in the H&C sector in Europe, with almost 18 Mtoe and 16 Mtoe respectively. Although the Baltic countries of Latvia, Lithuania, and Estonia have a large share of renewables in their H&C sector, they only make up a small share of the energy usage in the EU, between 1 and 0,5 Mtoe. The relative strength of low population density countries (FI 50%, SE 59%, LV 43%, EE 43%) in deploying more renewables in comparison with the highest density EU countries (MT 26%, NL 8%, BE 10%, LU 11%) highlights the important role that bioenergy can play especially in rural areas. Generally speaking, low population density countries often have larger land areas with abundant access to renewable resources such as biomass, wind, and solar energy, allowing for a better development of those solutions. Furthermore, in certain low population density countries, district heating systems are more viable and developed, due to the availability of space and resources. These systems can effectively utilize biomass and other renewables to provide heating to entire communities at once and drastically increase the country's RH&C share.

Figure 4 Contribution of the different energy sources in heating and cooling in EU27 in 2021* (in %)



Note: Other non-renewables are mainly non-renewable waste.

*Article 5 of Directive 2009/28/EC establishes the guidelines for Member States on calculating renewable energy from heat pumps from different heat pump technologies. Only renewable energy from heat pumps with a Seasonal Performance Factor (SPF) greater than 2.5 should be considered towards the target.

Source: Eurostat, SHARES 2021, Bioenergy Europe's calculation

With a share of only 25% of renewables in the heating sector, more than 70% of the heat is still being produced by fossil fuels in Europe. To tackle this "renewable heat gap", all renewable solutions must increase their capacity in the coming years. The EU and Member States should now focus on this sector and put in place the right framework to increase overall RES penetration and accelerate the deployment of new and efficient renewable heat solutions, such as sustainable bioenergy. Social and economic incentives should be introduced or strengthened to make biomass and other renewable solutions more competitive. Additionally, investing in training and programs for installers emerges as a pivotal need to propel the growth of renewable heat in the EU. Indeed, facilitating safe, efficient, and compliant installations is key in driving the increased adoption of an energy source. Such investments not only align with sustainability objectives but also galvanize the EU's journey towards a greener, more energy-diverse future.

The ongoing crisis in gas supply and ever-increasing prices of fossil sources is an opportunity to boost renewables' deployment. Some proposed alternatives to gas like LNG are not 2050 compatible and are just paving the way for future new energy (geopolitical) crisis while locking-in investments for fossil energy. Electrification could be part of the solution to decarbonise the heating sector, but taking into consideration several other parameters (competition due to increasing demand for electricity across many different sectors, high cost for additional installed capacity after a certain point, etc) will certainly not be the only one to solve our energy challenge.

Within the EU in 2021, 83% of the renewable heat is used in the form of bioheat, and reached 93.114 ktoe of absolute consumption. The related greenhouse gas (GHG) savings were estimated to be around 162 $MtCO_2eq$, representing nearly the total current annual emission of the Netherlands. These critical shares once again highlight how sustainable bioenergy, and especially solid biomass, is a key driver towards meeting the renewable energy targets in the heating sector. The bioenergy market has continued to experience stable growth for the past decades, and new renewable heat scenarios show an increasingly diverse market/heating supply. Heat pumps have been growing quick and are now the second largest renewable heat solution after bioheat. A mix of renewables will be needed in order to phase out fossil fuels completely in the future and the H&C is a perfect example of how end-users, either industries or residential consumers will have different renewable options to choose from, depending on their needs and locations.

The bioheat consumption increased in several countries between 2020 and 2021, even though the percentage of bioheat out of the total renewables reduced slightly due the higher penetration of other RES technologies in the market. Germany showed the biggest increase from last year, growing from 13.484 ktoe of bioheat in 2020 to 14.571 ktoe in 2021, followed by France (from 9.891 to 10.921 ktoe).

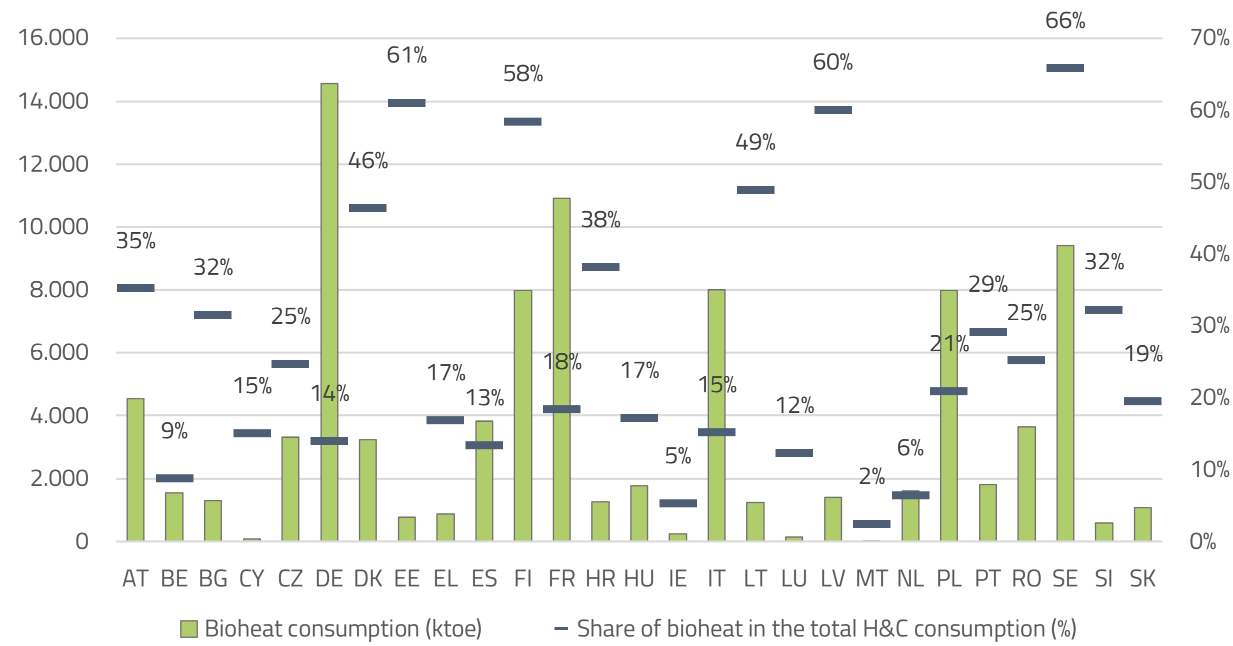
Table 2 Total H&C consumption and contribution of renewables in EU27 Member States in 2021 (in ktoe)

	Total	Renewables	Share of renewable heat	Bioheat	% of bioheat in RH&C
EU27	451.084	111.869	25%	93.114	83%
Growth rate 2020-2021	-0,4%	7,0%	8%	6,4%	-2%
AT	12.880	5.166	40%	4.533	88%
BE	17.654	1.755	10%	1.537	88%
BG	4.151	1.505	36%	1.309	87%
CY	519	204	39%	78	38%
CZ	13.412	3.601	27%	3.312	92%
DE	104.536	16.978	16%	14.571	86%
DK	6.966	3.738	54%	3.228	86%
EE	1.271	775	61%	775	100%
EL	5.154	1.616	31%	868	54%
ES	28.663	5.241	18%	3.831	73%
FI	13.658	8.839	65%	7.976	90%
FR	59.423	15.037	25%	10.921	73%
HR	3.322	1.306	39%	1.268	97%
HU	10.313	1.954	19%	1.773	91%
IE	4.766	326	7%	251	77%
IT	52.762	10.896	21%	8.010	74%
LT	2.558	1.314	51%	1.250	95%
LU	1.124	146	13%	138	94%
LV	2.324	1.396	60%	1.394	100%
MT	93	24	26%	2	9%
NL	24.829	2.165	9%	1.600	74%
PL	38.285	8.436	22%	7.972	94%
PT	6.234	2.675	43%	1.813	68%
RO	14.447	3.661	25%	3.645	100%
SE	14.278	11.273	79%	9.399	83%
SI	1.811	664	37%	584	88%
SK	5.526	1.159	21%	1.077	93%

Calculated in accordance with the methodology established in Directive 2009/28/EC and Regulation (EC) No 1099/2008. Total includes all elements of 'gross final consumption of energy' for other purposes than electricity and transport.
Source: Eurostat, SHARES 2021

Table 2 clearly illustrates the strong disparities between Member States in terms of renewable heat shares in their energy mix. Denmark, Estonia, Finland, Latvia, Lithuania and Sweden have already achieved very high shares of renewable heat (over 50% of the total) while other countries are lagging far behind, with shares below 10% in two of them, namely Ireland and the Netherlands. 83% of all the renewable heat produced in Europe is bioheat and there are many countries which rely almost exclusively on biomass as a sustainable fuel to decarbonize the heating sector; this is the case for Romania, Croatia, Latvia, and Poland who are all at least 95% reliant on bioheat for their share of renewables. The countries with the highest values of renewable heat consumption in absolute terms are Germany, France, Italy and Sweden.

Figure 5 Total bioheat consumption (in ktoe) and share of bioheat in the total heat consumption in the EU27 Member States in 2021 (in %)



Source: Eurostat

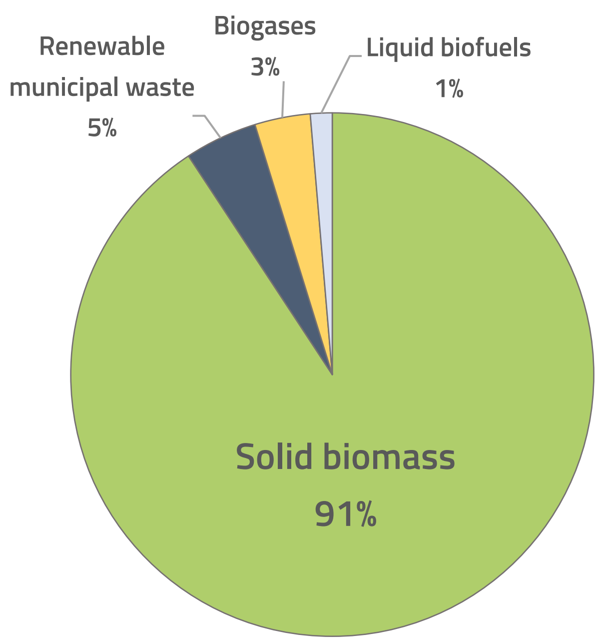
At EU level, the EU Emission Trading System (EU ETS) covers installations above 20 MW. However, only 30% of the buildings are affected by the system and the majority of the heat consumption in the EU - approximately 132 million of small systems - happens in installations well below this threshold. In most of the Member States there is no additional measure to counterbalance fossil fuels externalities in the heating sector. In December 2022, the European Parliament and the Council of the EU agreed to establish a new ETS for emissions from fuels used in buildings, road transport and certain industrial sectors not already covered by the existing EU ETS. The ETS II will complement Member States' efforts to reduce emissions in line with national targets under the "Effort Sharing Regulation" (Regulation (EU) 2018/842). It will be separate from the existing EU ETS for emissions from electricity and heat generation, industrial production, maritime transport and commercial aviation in the bloc. The EU ETS II will however only become operational from 2027 earliest, while high energy prices later this decade may even postpone the start until 2028. The graph above clearly stresses that the Member States with a high share of bioheat are either countries with a well-established district heating market (installations above 20 MW falling under the EU ETS) or countries that have introduced carbon taxes (Sweden, Finland, Germany…). However, there are also several factors to be considered to explain this situation, among which widespread rural communities, logistic issues, and geographical conditions.

Fostering the decarbonisation of the H&C sector, by ways of introducing a price on carbon and banning or restricting support for fossil fuels has been proven to be an effective tool. The Social Climate Fund presented in the framework of the Fit for 55 Package will provides Member States with financial resources to support vulnerable citizens and micro-enterprises in investing in energy efficiency measures promoting higher efficiency whilst reducing air pollutions and emissions: this can be smoothly done by replacing old heating systems with new renewable ones. Bioheat can be a key enabler of this change, if the EU policy framework seize this opportunity and provide an integrated revision of key legislative files

In addition, it should be noted that the direct and indirect subsidies on fossil fuels (gas, heating oil or coal) are creating unfair competition for renewable energy sources and are hampering their uptake. In order to reach a carbon neutral 2050 economy, an immediate stop to subsidies and a clear exit strategy to phase out fossil energy must be urgently put in place.

The supply of gas is still problematic, with unprecedent price peaks that are putting our economy in great danger Although bioenergy has also experienced some price volatility, it can also play a key role in providing more energy security and affordable options also for vulnerable consumers because biomass can be sold in much smaller batches than fossil fuels allowing for a consumer to buy a 15 kg bag of pellets instead of needing to get a delivery of 1,000 litres of fuel oil. Provided the bioenergy sector is accompanied by an adequate policy framework and proper support, it can grow at a steady price with a stable price all while remaining sustainable.

Figure 6 Type of biomass used for bioheat in EU27 in 2021 (in ktoe, %)



Source: Eurostat

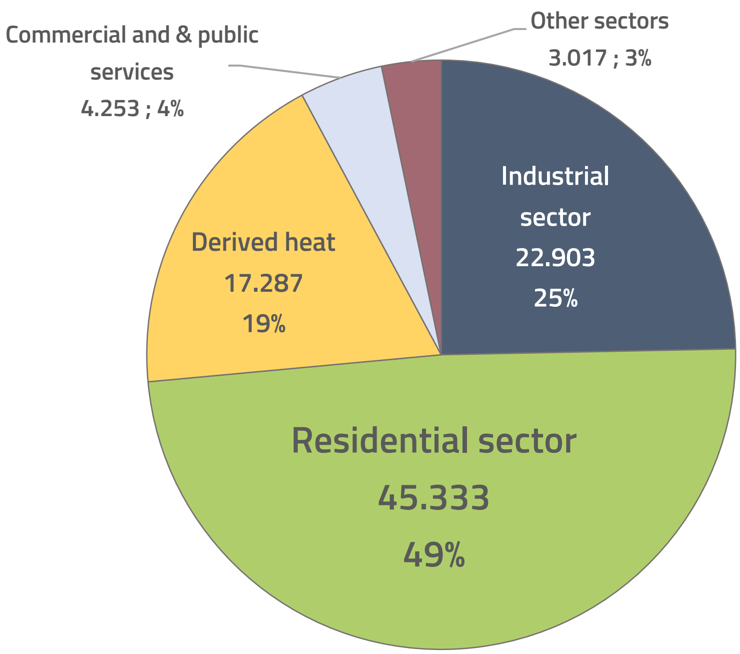
When it comes to the types of feedstocks involved in bioheat production, as of 2021 solid biomass remains by far the main feedstock (91%) for bioheat production and inversely bioheat is the main final usage of solid biomass (the rest being mainly used for bioelectricity – Please see the Bioelectricity Report). Most of the woody biomass used for bioheat production is sourced from by-products from forest management operations and from the wood industry, that would have otherwise gone to waste; their use in bioheat applications provides both environmental and economic benefits (Please see the Biomass Supply Report).

Table 3 Biomass used for heat by fuel and sector in EU27 in 2021 (in ktoe)

	Solid biomass	Renewable municipal waste	Biogases	Liquid biofuels	Blended biogasoline	Pure biodiesels	Blended biodiesels	Other liquid biofuels
Industrial	21 120	831	508	443	3	23	305	112
Residential	45 047	0	238	48	11	5	30	2
Derived heat	13 140	3 129	863	155	N.A.	1	N.A.	155
Commercial and & services	3 189	204	741	119	4	10	73	32
Others	1 698	0	838	482	21	39	548	41
Total	84 194	4 164	3 187	1 248	39	78	957	341

Note: 'Other sectors' in Table 3 include agriculture, fishing and industries not elsewhere specified, the biogas for this category is mainly used (as well as produced) in the agricultural sector (888 ktoe). The derived heat sector (district heating and CHP) is the one using most of the renewable municipal waste for heat. Certain types of biomasses recorded zero consumption and were therefore removed from the table (Pure biogasoline, Pure bio jet kerosene and blended bio jet kerosene).
Source: Eurostat

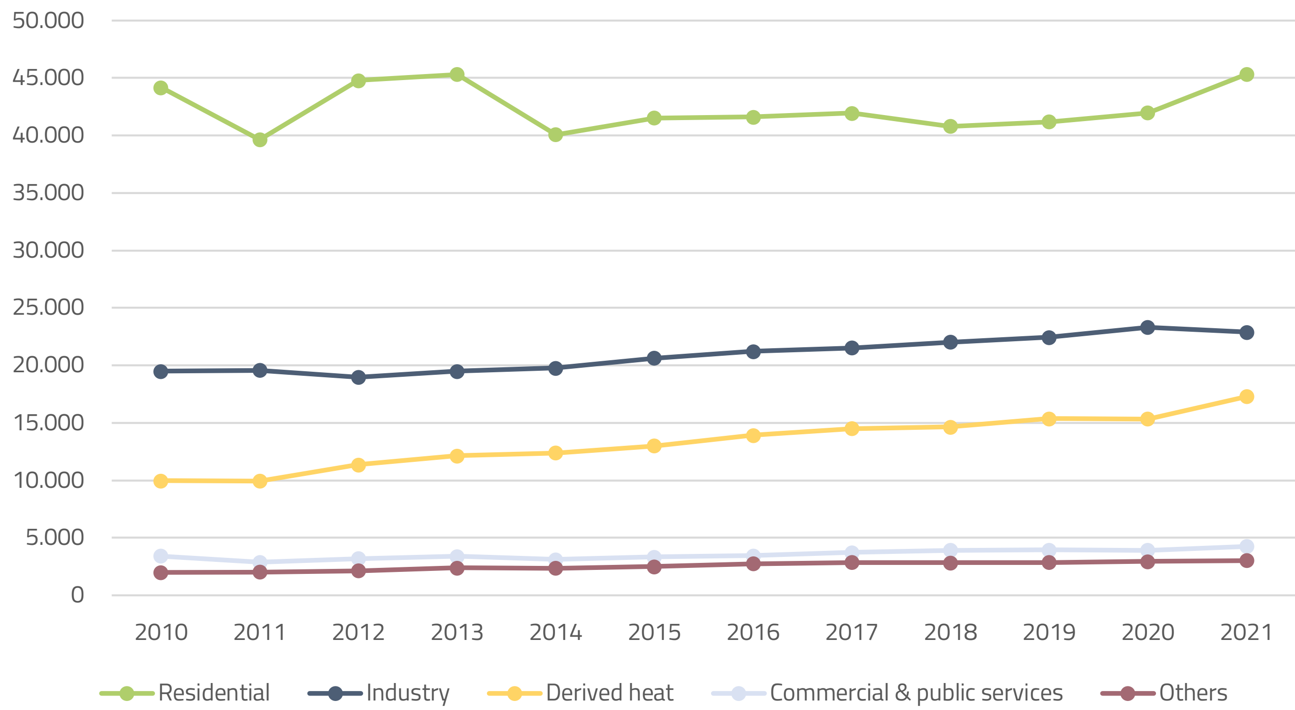
Figure 7 Total bioheat consumption in the different sectors in EU27 in 2021 (in ktoe, %)



Note: Other sectors include agriculture, fishing and not elsewhere specified
Source: Eurostat

In the EU27, the most relevant market for bioheat is the residential sector (45.333 ktoe). This figure includes only the biomass that is directly used for households' heat production, excluding heat supplied through district heating. In 2021, 22.903 ktoe of biomass were consumed as heat in industry and 17.287 ktoe as derived heat (mostly being district heating). From 2020 to 2021 the use of bioheat in the residential sector increased but slightly decreased in the industrial sector which is likely in part due to the COVID-19 pandemic. Commercial and public services together with other sectors (such as agriculture and fishing) only amounted to a total of 7% of the total bioheat consumption in EU27 in 2021.

Figure 8 Evolution of the final consumption of bioheat by sector in EU27 (in ktoe)



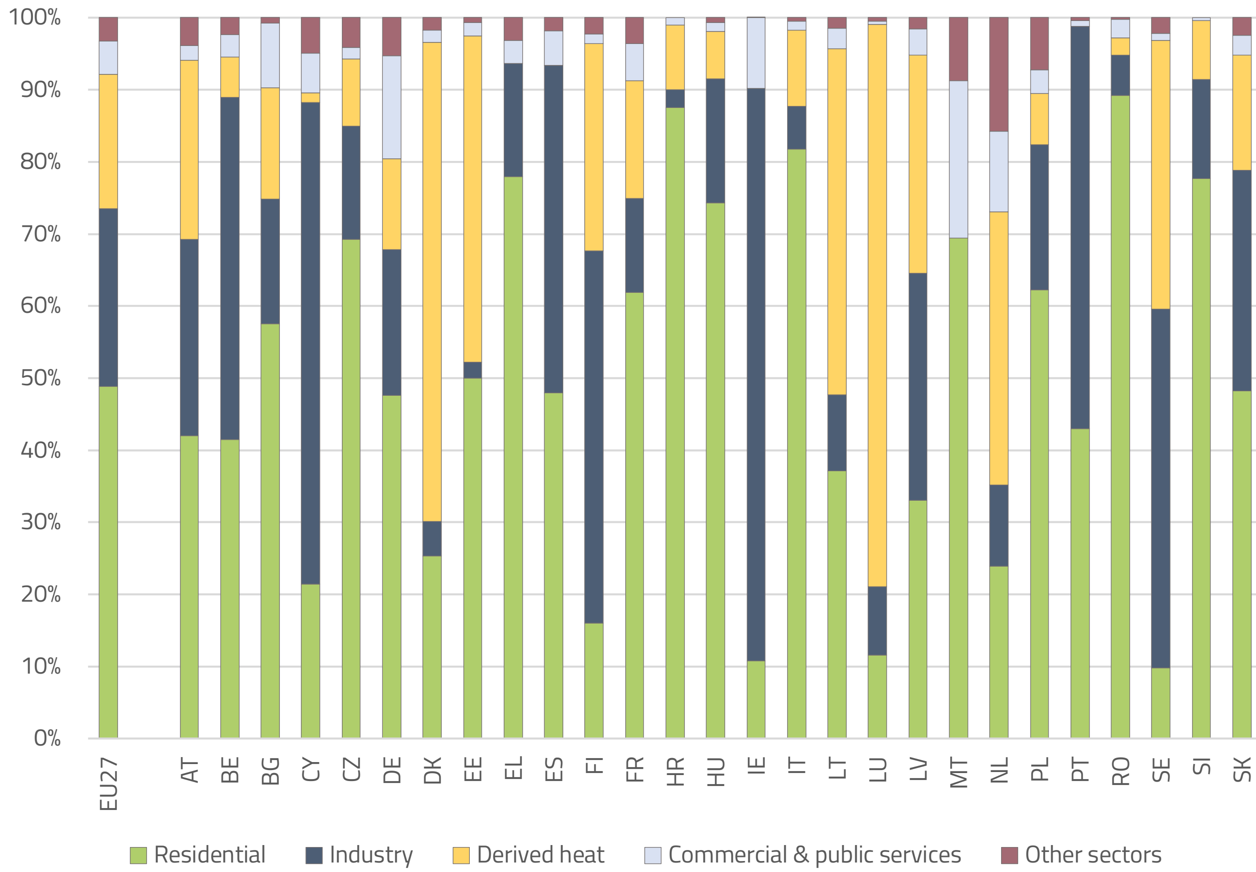
Note: Other sectors includes agriculture, fishing and not elsewhere specified

Source: Eurostat

The consumption of bioheat has grown on average by 3,45% annually in all sectors since 2000. The biggest growth can be observed in the residential and derived heat segments. The industrial sector experienced a noticeable decline in the utilization of bioenergy for heat between 2020 and 2021. This decline can be attributed to a confluence of factors, each contributing to the shift in energy consumption patterns. Notably, the ongoing global impact of the COVID-19 pandemic played a significant role in dampening economic activity across various industries. As governments implemented lockdowns and restrictions to curb the spread of the virus, many industrial processes scaled back or temporarily ceased operations, resulting in a reduced demand for energy, including bioenergy. Moreover, the relatively subdued prices of fossil fuels during the pandemic period presented a compelling alternative for industrial players seeking cost-effective energy sources. The diminished costs of conventional fossil fuels made them a more economically attractive option compared to renewable biofuels, prompting some industrial facilities to opt for fossil fuel-based solutions to meet their energy needs.

The total bioheat consumption has increased by 76% from 2000 to 2021. The increases in each sector have respectively been +50% in the residential sector, +48% in the industry, +255% in the derived heat and +317% in the commercial & public services sector. Despite the challenges created by the COVID-19 crisis, the chart clearly illustrates that the demand for bioheat from different sectors (households, industries, district heating etc.) is still increasing, with biomass being perceived as a stable and reliable fuel.

Figure 9 Importance of the different sectors in the total bioheat consumption in EU27 Member States in 2021 (in %)



Source: Eurostat

Bioheat usage differs still widely between Member States, but the residential sector remains the predominant sector for bioheat consumption in most countries. This is verified countries like Austria, Bulgaria, Czechia, Germany, Estonia, Greece, Spain, France, Croatia, Hungary, Italy, Malta, Poland, Romania, Slovenia and Slovakia. Despite this, the industrial and derived heat sectors are also experiencing substantial growth in absolute terms. When it comes to relatives, the share of bioheat in the industrial sector is bigger in Ireland (79%), Cyprus (68%), Portugal (57%), Sweden (50%), and Belgium (48%). The countries with the biggest share of bioheat consumption in district heating are Luxemburg (78%), Denmark (65%), Lithuania (45%), Estonia (45%), and Sweden (36%). In contrast, bioheat share in district heating is less present in Mediterranean countries such as Greece, Spain and Portugal, where warmer climates generally lead to a decrease in the use of district heating networks. The use of bioheat in the service sector (schools, hospitals, hotels) is rather limited in most countries, but has a high growth rate (see Table 4).

Table 4: Total bioheat consumption by sector in EU27 Member States in 2021 (in ktoe)

	Total	Residential	Industry	Derived heat	Commercial & public services	Other sectors
EU27	92.763	45.333	22.903	17.287	4.253	3.017
Growth rate 2020-2021	6,1%	8,0%	-2%	12,7%	8,3%	3%
AT	4.521	1.901	1.230	1.121	94	175
BE	1.507	625	716	84	48	35
BG	1.304	751	225	202	116	10
CY	68	15	46	1	4	3
CZ	3.312	2.292	520	308	54	137
DE	14.458	6.886	2.916	1.829	2.064	762
DK	3.228	817	155	2.146	53	57
EE	775	388	17	351	14	6
EL	828	646	130	0	26	26
ES	3.821	1.832	1.735	0	184	70
FI	7.976	1.280	4.115	2.292	111	178
FR	10.821	6.759	1.423	1.781	563	395
HR	1.259	1.102	32	113	13	0
HU	1.773	1.318	306	116	23	11
IE	251	27	199	0	25	0
IT	7.954	6.501	475	839	101	38
LT	1.246	462	132	599	36	18
LU	138	16	13	107	1	1
LV	1.392	460	439	421	50	22
MT	2	2	0	0	0	0
NL	1.593	380	181	603	178	251
PL	7.972	4.962	1.607	561	263	579
PT	1.788	768	999	0	14	7
RO	3.645	3.252	202	90	94	7
SE	9.399	919	4.882	3.501	96	201
SI	584	453	80	48	2	0
SK	1.076	519	329	172	30	27

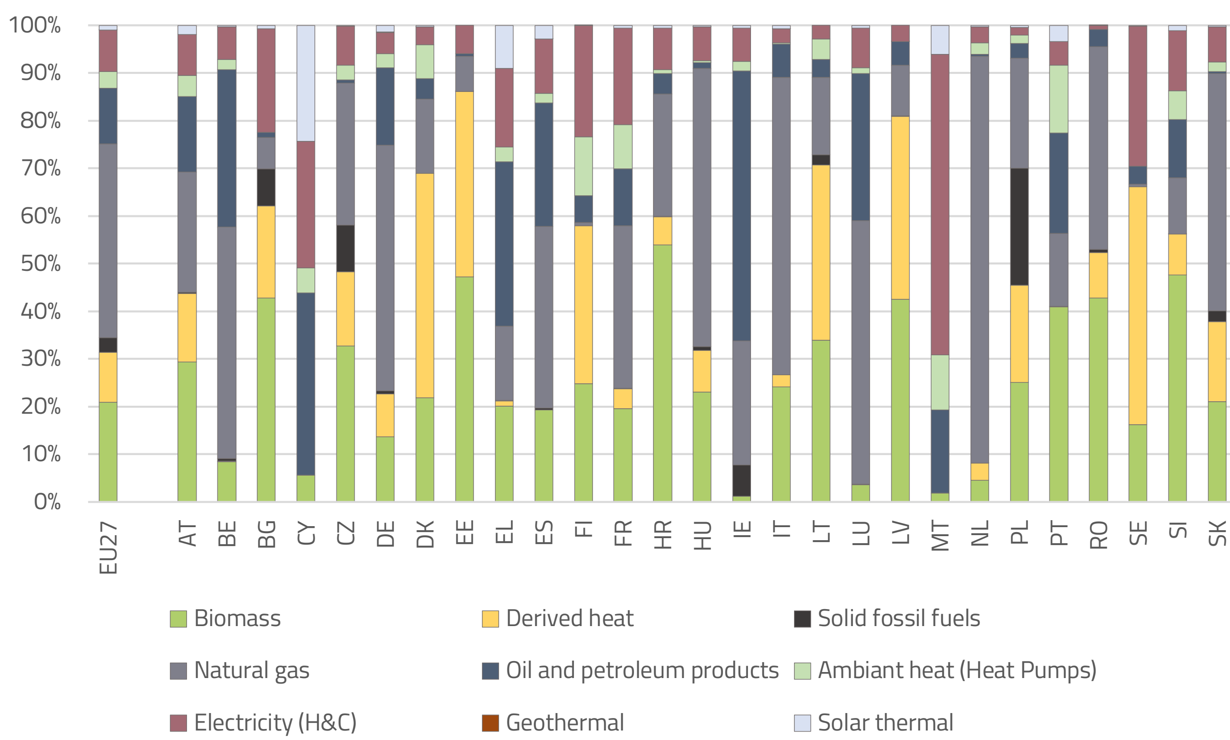
Source: Eurostat

2. The Residential Sector

The building sector accounts for more than 40% of the energy consumption and 36% of the greenhouse gas emissions in the EU, with heating representing the largest share of energy consumed, far ahead of electricity. 75% of the final energy consumed by EU households in 2021 was for heating their homes, with renewables accounting for more than a quarter of EU households space heating consumption. There is still a significant amount of the total heat consumed for H&C in the residential sector, from non-renewable sources, mainly fossil gas.

Individual biomass heating systems can be an important part of the solution, offering affordable and sustainable options, especially in rural and remote areas. Long-term strategies to decarbonise the building sector are needed, not only to foster a switch from fossil to renewable energy, but to also to promote the replacement of old biomass appliances with modern, more efficient ones. Indeed, modern bioheat installations use less fuel to produce the same heat output as their older counterparts. So, retrofitting those old inefficient installations will deliver significant energy savings and substantial emissions reduction which will have a positive impact on air quality; if combined with the use of high-quality certified fuel, particulate matter emissions can be drastically reduced.

Figure 10 Shares of energy used for heating and cooling in the residential sector by EU27 Member States in 2021 (in %)



* the "derived heat "category includes also DH produced from biomass

Note: Ambient heat is the energy in form of heat captured by heat pumps, the electricity used to fuel the heat pumps is included under "Electricity (for H&C)". UK value for "Electricity (for H&C)" is "N.A." and thus in the graph is considered with zero (0).

Source: Eurostat

About 65% of 103 million heaters in the European buildings are old and would fall in class 'C' or 'D' of the energy scale (inefficient and old appliances with an average age of about 25 years), and they are replaced at a low 4% annual rate. Given the risk of replacing old heating systems with similarly inefficient ones when they break, their planned replacement with highly efficient and renewable alternatives is crucial before 2030. According to the Commission's impact assessment for the 2030 Climate Target Plan, the residential sector would experience the highest reduction in fossil energy demand in heating and cooling. To ensure the new 2030 climate target of 55% is achieved, CO_2 emissions from buildings will need to be reduced by 60% by 2030 (compared to 2015 levels), thus requiring immediate action.

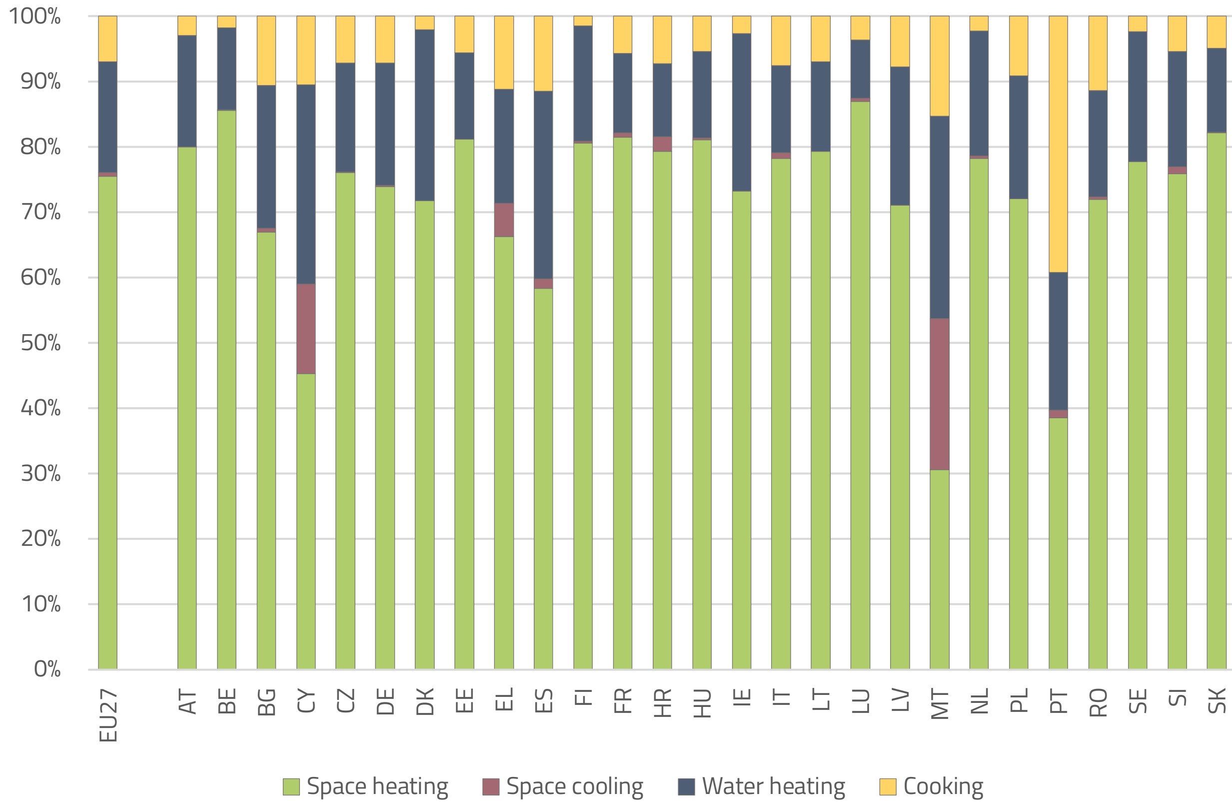
Figure 11 Installed stock of heaters in some EU Member States and UK in 2020 (thousands of units)

* Bulgaria, Czech Republic, Hungary, Romania and Slovakia
Source: European Heating Industry, Heat market report 2021

European Heating Industry Market Report 2021

See Bioenergy Europe Position Paper Heating decarbonisation – A synergic approach

Figure 12 Energy used for different types of heating in households in EU27 Member States in 2021



Source: Eurostat
Note: Data is in TERAJOULES.

In the EU, the main use of energy by households is for heating their homes, only 6 (BG, CY, EL, ES, MT, and PT) out of 27 Member States using less than 70% of their energy on space heating. These countries have milder climates than many other EU countries, which results in lower heat demand. 4 out of 27 EU Member States source more than 60 % of the energy needed for heating their homes from renewable energies. These are Estonia, Lithuania, Denmark, and Bulgaria. The EU Member States where the proportion of fossil gas used for space heating is the highest are Hungary, the Netherlands and Italy. Three Member states mainly use petroleum products for space heating: Cyprus, Ireland and Greece. Only one Member State (Poland) still uses major amounts of solid fossil fuels for space heating (24,52%)[5]. Finally, two Member States mostly rely on derived heat, Sweden and Denmark. Space cooling has by far the lowest percentage across EU27, and some countries not using any energy for cooling at all further reducing the EU average. The second lowest heating and cooling use is energy for cooking, with the only outlier being Portugal (where 39% of the energy consumed in households is directed towards cooking).

[5] Eurostat, 2021. Energy consumption in households by type of end-use

Table 8 Final energy consumption for H&C in the residential sector by fuel in EU27 Member States in 2021 (in ktoe)

	Total	Solid fossil fuels	Natural gas	Oil and petroleum products	Derived heat	Electricity (H&C)	Biomass	Geothermal	Solar thermal	Ambient heat (heat pumps)
EU27	215,352	3,488	87,710	24,984	22,600	18,863	45,847	63	2,132	7,835
Growth rate 2020-2021	6.3%	-3.0%	11.0%	-18.6%	11.2%	14.0%	7.3%	64.2%	6.2%	26.6%
AT	6,478	15	1,634	1,027	931	561	1,901	0	123	287
BE	7,409	35	3,599	2,448	15	507	824	0	24	734
BG	1,756	138	113	21	339	381	751	0	12	0
CY	262	0	0	100	0	70	15	0	84	14
CZ	7,006	685	2,082	48	1,091	573	2,252	0	75	216
DE	48,933	548	25,128	7,904	4,382	2,177	6,843	38	655	1,398
DK	3,726	0	579	158	1,703	138	817	0	12	306
EE	822	1	60	5	320	48	388	0	0	0
EL	3,208	3	499	1,107	36	527	844	0	251	99
ES	9,522	38	3,635	2,484	0	1,080	1,852	0	278	155
FI	5,106	0	32	284	1,693	1,164	1,269	0	5	632
FR	34,844	26	11,821	6,157	1,486	7,031	6,759	0	184	3,331
HR	2,047	2	524	89	123	179	1,102	0	12	16
HU	5,711	43	3,329	74	501	410	1,318	0	15	20
IE	2,285	151	584	1,255	0	183	27	0	14	65
IT	27,508	0	16,838	1,878	710	795	6,501	1	189	96
LT	1,363	30	225	52	551	35	462	0	0	58
LU	435	0	241	134	0	38	16	0	0	6
LV	1,084	1	115	53	416	37	460	0	0	0
MT	83	0	0	15	0	53	2	0	5	10
NL	8,448	0	7,206	36	314	230	380	0	22	233
PL	19,820	4,057	4,566	823	4,080	554	4,962	21	80	540
PT	1,673	0	288	394	1	93	768	0	63	208
RO	7,602	44	3,238	273	737	82	3,252	0	0	0
SE	5,488	0	28	202	2,744	1,616	887	0	10	0
SI	953	0	112	117	82	120	433	0	10	98
SK	2,409	54	1,228	9	475	182	519	0	8	51

Note: The residential H&C consumption includes the space heating, the space cooling and water heating.
Source: Eurostat

Figure 12 Levelised cost of heat in residential sector for three different technologies for EU27 Member States and UK in 2018 (in €/MWh)

Note: Levelised Cost of Heat (LCoH) is calculated as a full price of heat including the cost of fuel input and the lifetime of the equipment.
Source: Eurobserver

In 2018, the levelized cost of heat (LCoH) from bioenergy showed the lowest average value (35 €/MWh) and the narrowest widespan (± 3€/MWh) when compared to heat pump and solar water heaters. It's however important to note that the diversity in solid biomass fuels makes it difficult to regroup them in a single category, given the high price difference between wood chips or logs and bagged pellets for the residential use.

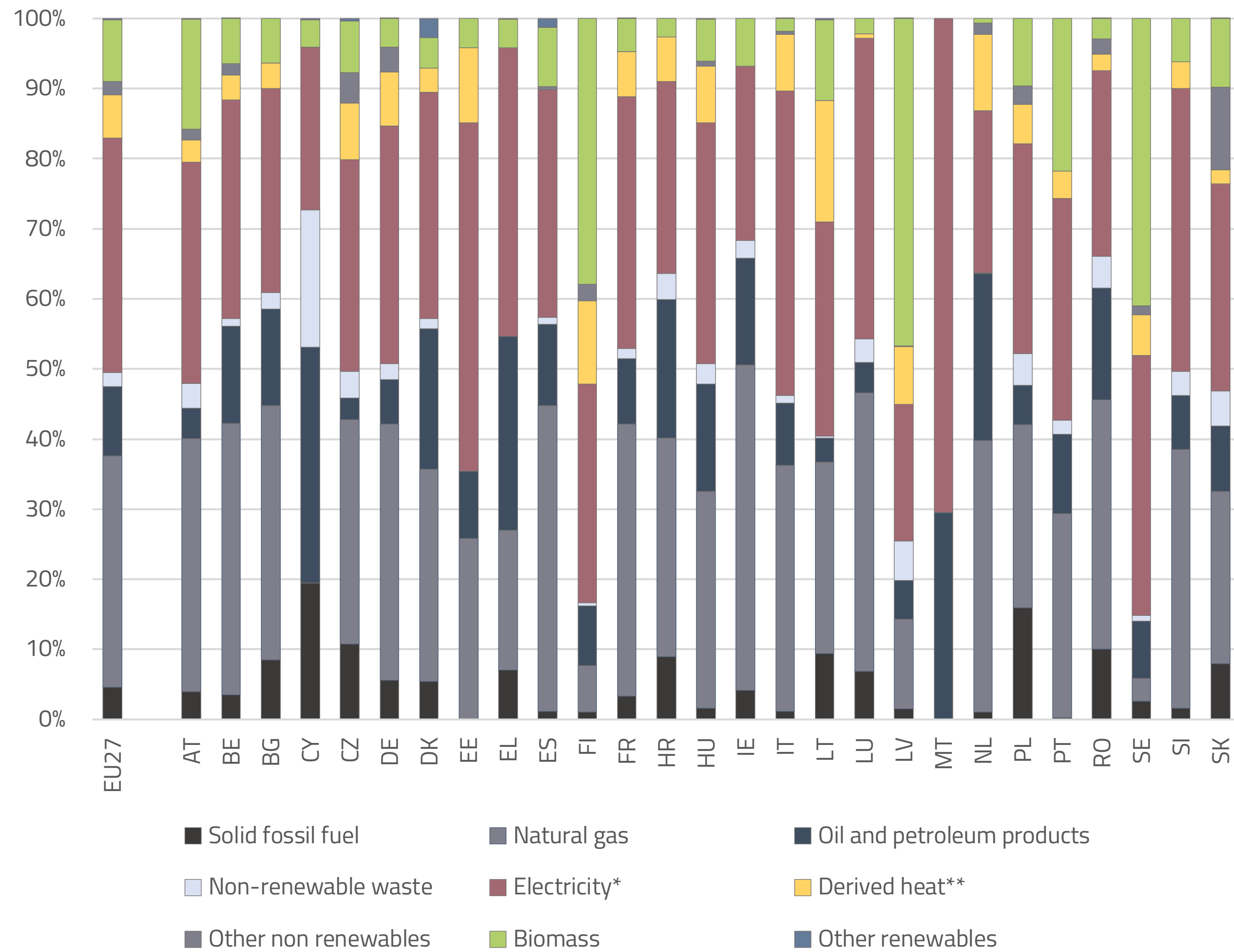
Due to the methodology used for the calculation, incorporating the lifetime of the technology employed on top of the cost of fuel input, provides a fair comparison among these three different solutions. Installation and purchase costs are spread along the lifetime of the equipment and for the same period also the cost of fuel input.

3. The Industrial Sector

In 2021, the Covid-19 pandemic continued having a profound impact on energy consumption in the European Union. The transport sector was still the most affected due to restrictions on mobility, followed by a decline in industrial activity. Despite this, there was still some rebounding and the final energy consumption in industry increased by 3,1% from previous year.

Because of the COVID-19 crisis, final energy consumption from fossil fuels in industry did increase by small margins in 2021, while renewables saw a small decline. Biomass used in industry decreased from 23.313 ktoe in 2020 to 21.120 ktoe in 2021. In the end, only 8,85% of the industrial energy consumption came from renewables, almost entirely coming from bioenergy (99%).

Figure 13 Division by fuel of the final energy consumption in industry in EU27 Members States in 2021 (in %)



* Part of the electricity consumed by the industry is used for H&C purposes, also part of this electricity has been produced from biomass.

** Part of the derived heat has been produced from biomass.

Source: Eurostat

Figure 14 and Table 6 focus on the total energy consumption within industries in 2021, with around 80% being dedicated to H&C[6]. They also illustrate the significant share of fossil fuels compared with renewables in all countries, except for Latvia, Finland, and Sweden. Bioenergy is clearly the main renewable energy source used in industries in 2020, accounting for 8,85% of the final energy consumption in the sector. This shows the key role that bioenergy plays in the decarbonisation of the industry due to the technical characteristics, its competitiveness and reliability.

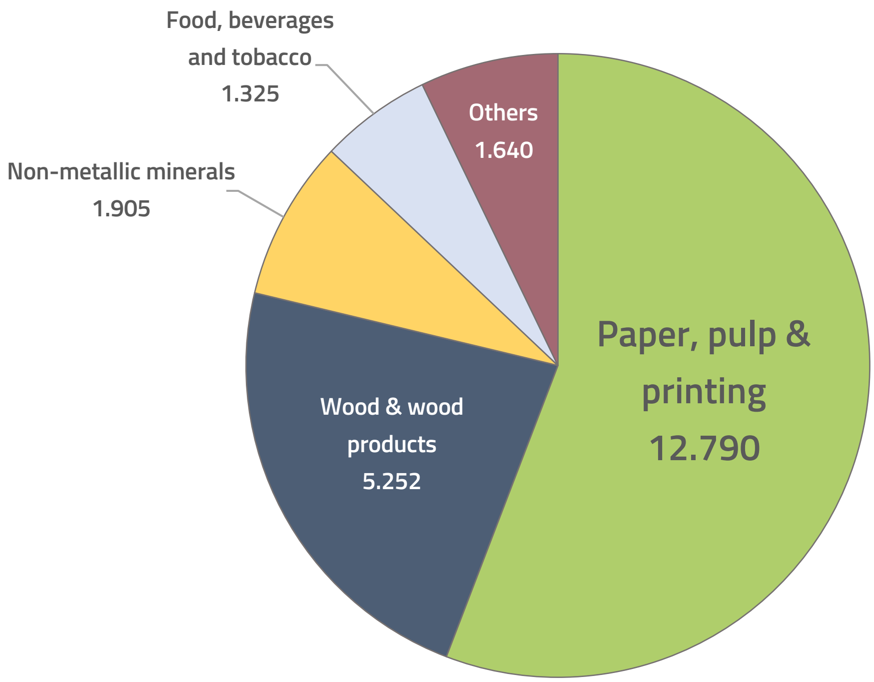
[6] Heat roadmap Europe: https://vbn.aau.dk/ws/portalfiles/portal/288075507/Heat_Roadmap_Europe_4_Quantifying_the_Impact_of_Low_Carbon_Heating_and_Cooling_Roadmaps.pdf

Table 8 Final energy consumption in industry by fuel EU27 Members States in 2021 (in ktoe)

	Total	Solid fossil fuel	Natural gas	Oil and petroleum products	Non-renewable waste	Electricity*	Derived heat**	Other non-renewables	Biomass	Other renewables
EU27	238.465	11.059	78.575	23.571	4.719	79.831	14.813	4.378	21.120	399
Growth rate 2020-2021	3.1%	3.2%	6.3%	0.9%	-0.6%	4.3%	0.6%	9.4%	-9.4%	6.5%
AT	7.564	303	2.731	324	269	2.385	245	112	1.188	8
BE	10.538	369	4.081	1.460	119	3.288	367	180	670	3
BG	2.868	243	1.041	397	68	833	104	0	183	0
CY	206	43	0	69	43	48	0	0	8	0
CZ	6.988	754	2.233	217	265	2.113	563	304	515	24
DE	55.189	3.064	20.173	3.541	1.230	18.724	4.234	1.971	2.243	12
DK	2.423	129	729	480	35	776	84	0	103	66
EE	383	0	99	37	0	190	41	0	16	0
EL	2.543	179	507	700	0	1.044	0	0	104	2
ES	20.090	231	8.761	2.331	207	6.521	0	90	1.691	258
FI	10.513	115	689	899	51	3.276	1.251	248	3.984	0
FR	26.884	905	10.456	2.523	387	9.693	1.736	0	1.281	2
HR	1.191	107	372	235	45	326	76	0	32	0
HU	4.710	75	1.437	722	138	1.616	381	35	281	5
IE	2.148	89	996	329	54	533	0	0	146	0
IT	25.258	302	8.863	2.225	286	10.912	2.042	98	439	12
LT	1.105	104	301	38	3	338	191	0	127	2
LU	609	42	242	26	21	261	4	0	13	0
LV	855	13	109	48	47	167	70	1	399	0
MT	60	0	0	18	0	43	0	0	0	0
NL	13.135	142	5.081	3.143	3	3.043	1.426	219	81	0
PL	16.212	2.581	4.243	906	741	4.862	919	430	1.554	0
PT	4.512	10	1.314	512	89	1.430	175	0	981	0
RO	6.854	687	2.443	1.088	316	1.815	157	150	198	1
SE	10.876	284	352	892	90	4.034	629	139	4.456	0
SI	1.294	21	477	100	45	521	50	0	80	0
SK	3.382	269	832	215	171	998	68	430	329	2

Note: 'other renewables' includes solar thermal, geothermal, and ambient heat. Source: Eurostat

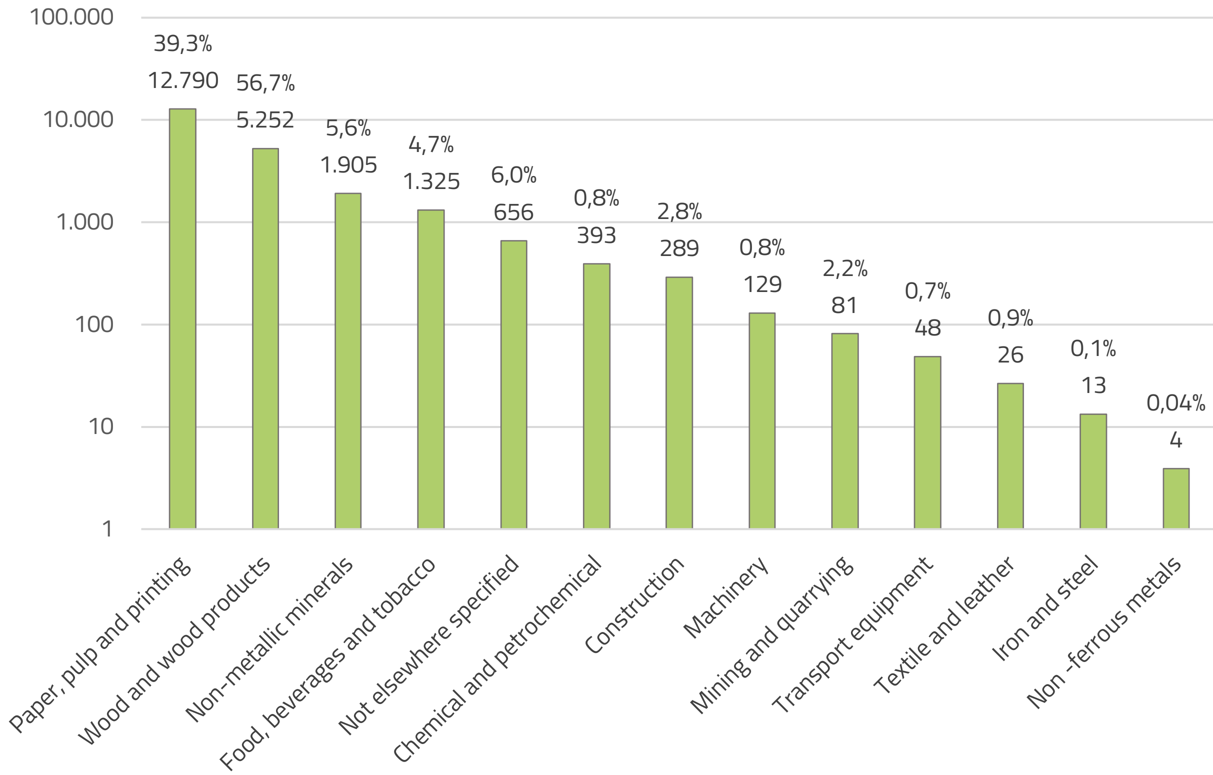
Figure 14 Share of biomass usage in the different industries in EU27 in 2021 (in ktoe - %)



Source: Eurostat

The paper, pulp. and print, as well as the wood and wood product industries combined used 79% of the biomass for energy consumption in 2021. As they are mainly dealing with raw materials made from biomass, namely wood, in their daily operations, it is logical that they valorise the residues for energy production. The non-metallic minerals, including glass, ceramic, cement, and other building material industries, are the third largest industrial sector user of biomass. It is the only industrial sector in the top 3 industrial biomass users that does not deal with biomass or organic residues in its main activity.

Figure 15 Biomass contribution for final energy consumption in the different industry sectors in EU27 in 2021 (in ktoe and % of the total final energy consumption – logarithmic scale)

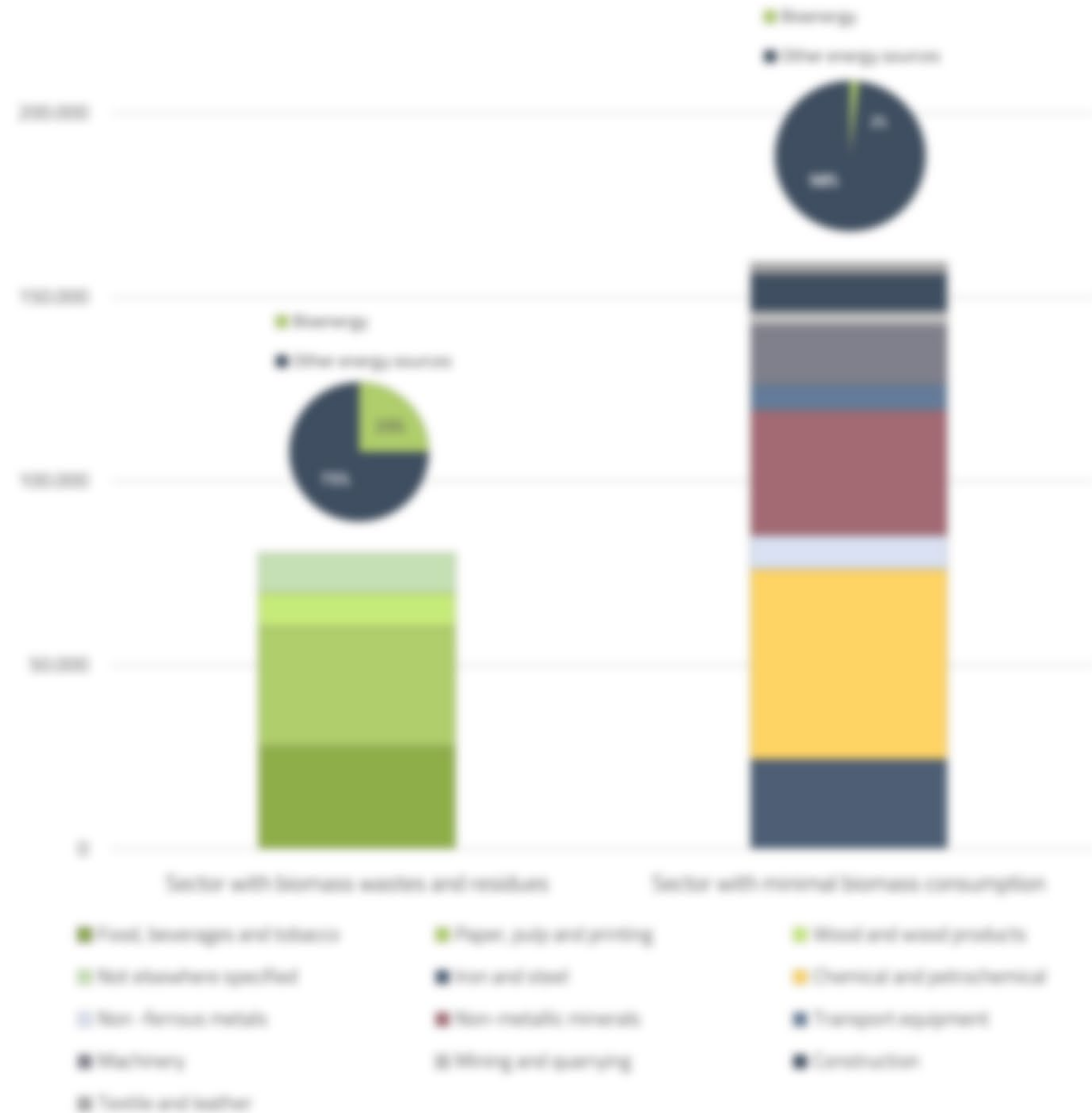


Source: Eurostat

In 2021, biomass contributed a significant share (39,3%) of the total energy consumption in the paper, pulp and printing industries as well as the wood and wood product industries (56,7%). This large share, while slightly lower than last year, continues to show that there are many synergies between wood-related industries and bioenergy and that they work very well together. The symbiosis of industrial processes, such as a sawmill or a pulp mill combined with bioenergy production, works towards an increased resource efficiency since residues are valorised and used instead of ending up as waste. How exactly this industrial symbiosis looks like depends on the local needs and circumstances of each site and should therefore not be influenced by rigid implementation of the cascading principle in legislation.

As illustrated in Figure 16, in 2021, industries that deal with biomass as their main activity, required on average half the energy than the transport, ferrous, non-ferrous, non-metallic minerals, construction and chemical sectors combined, mostly due to the sizes of those industries. This is reflected in the following figures, as bioenergy represented 25% of the total energy demand from the food, beverages, tobacco, wood products as well as paper, pulp and printing. On the other hand, for energy intensive sectors, bioenergy represented just 1,8% of the total energy demand in comparison to the rest of the industries using just 11,8% of the bioenergy for industries. Nevertheless, for those industrial activities often requiring high temperatures for their processes, bioenergy is one of the few solutions available to decarbonise this segment of the economy.

Figure 16 Energy demand by industry and share of bioenergy for sectors dealing with biomass wastes and residues and for other sectors in EU27 in 2021 (ktoe)



Source: Eurostat

Figure 17 Country repartition of the biomass used in industries within EU27 in 2021 (in ktoe and %)

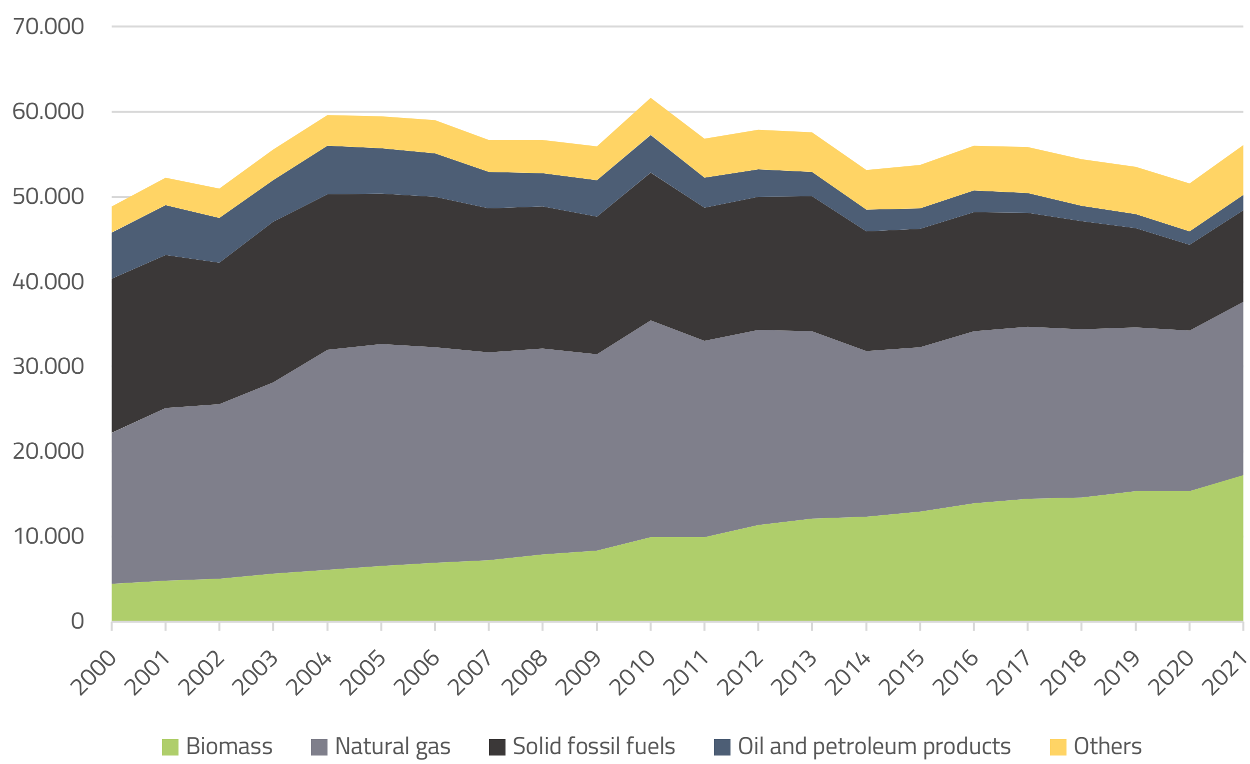
Source: Eurostat

Sweden, Finland, and Germany combined use over half (52%) of all the biomass used in industries within the EU27. This is mainly due to these countries being among the top producers of both pulp & paper as well as wood products in the EU.

4. The Derived Heat

Derived heat is heat that is distributed to the final consumer through a grid (in other words, district heating). It can be produced from Combined Heat and Power (CHP) or heat-only plants. The heat that is self-produced and directly consumed on-site is not included in derived heat but is instead accounted for in the relevant final consumption of the sector. Figure 19 shows the steady growth of production for derived heat using biomass from 4.469 ktoe in 2000 up to 17.287 ktoe in 2021). Despite this substantial increase, nearly quadrupling over two decades, fossil fuels in 2021 were still the most prevalent source for derived heat production. The largest sources was natural gas (20.353 ktoe), followed by solid fossil fuels (10.773 ktoe) and finally oil and petroleum products (1.784) which only play a minor role.

Figure 18 Evolution of derived heat production by fuel in EU27 (ktoe)



Note: Fuels mean the final derived heat produced from those fuels and not the fuel input for heat production.
Source: Eurostat

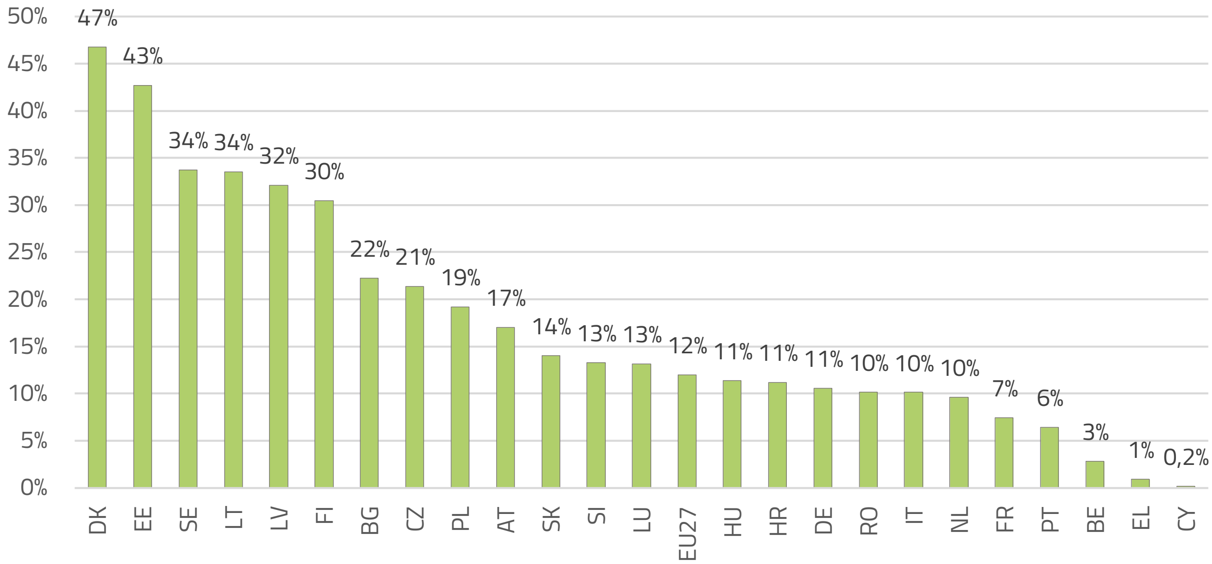
Although most of the district heating plants still rely on fossil fuels, there have been some changes in the energy mix. In the last few decades, the use of solid fossil fuels as well as oil and petroleum products has decreased, but the use of natural gas has remained quite stable. In 2021, renewables represented 32% of the energy used for derived heat production and 94,27% of it was bioenergy. The share of renewables for derived heat is still increasing, mainly driven by biomass. Given the changes in the revised Renewable Energy Directive which incentivises the use of efficient and renewable district heating solutions by giving consumers the right to disconnect from inefficient district heating networks to instead produce their own renewable heat, this trend could accelerate. This provision not only encourage individual consumers to produce their own renewable heat, but also pushes the district heating operators to switch to renewable sources to prevent consumers from disconnecting. There is also a new indicative target of 2.1pp average increase of renewables in districts set a promising path for further deployment of renewable heat solutions in this context.

Table 7 Derived heat production by fuel in EU27 in 2021 (in ktoe)

	Total gross heat production	Growth rate 2020-2021	CHP	Heat only
All fuels	**56.038**	**9%**	**50.763**	**23.614**
Solid fossil fuels	10.773	7%	8.254	2.519
Natural gas	20.353	8%	14.406	5.947
Oil and petroleum products	1.784	13%	1.152	632
Non-Renewable waste	3.315	7%	2.659	656
Manufactured gases	769	-2%	697	73
Peat and peat products	459	-20%	303	156
Oil shale and oil sands	47	43%	47	0
Nuclear heat	93	6%	48	45
Electricity	111	7%	11	100
All renewables	**18.338**	**12%**	**11.596**	**6.742**
Solid biomass	13.143	17%	7.992	5.147
Liquid biofuels	155	67%	70	85
Biogas	863	-14%	839	24
Renewable municipal waste	3.129	6%	2.584	545
Geothermal	336	7%	0	336
Solar thermal	59	-12%	0	59
Ambient heat (heat pumps)	656	13%	111	545

Note: Fuels mean the final derived heat produced from those fuels and not the fuel input for heat production.
Source: Eurostat

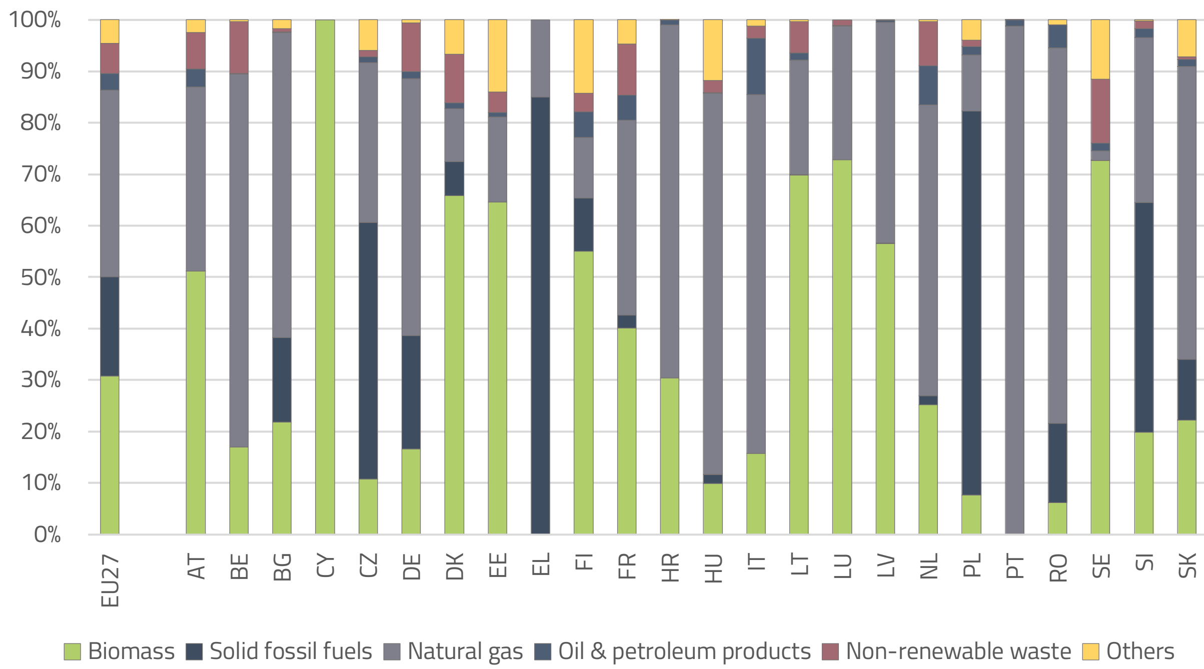
Figure 19 Share of derived heat within the total heat consumption in the EU27 Member States* in 2021 (in %)



*No data available for ES/IE/MT

Source: Eurostat

Figure 20 Division per fuel of the derived heat production in the EU27 Member States* in 2021 (in %)

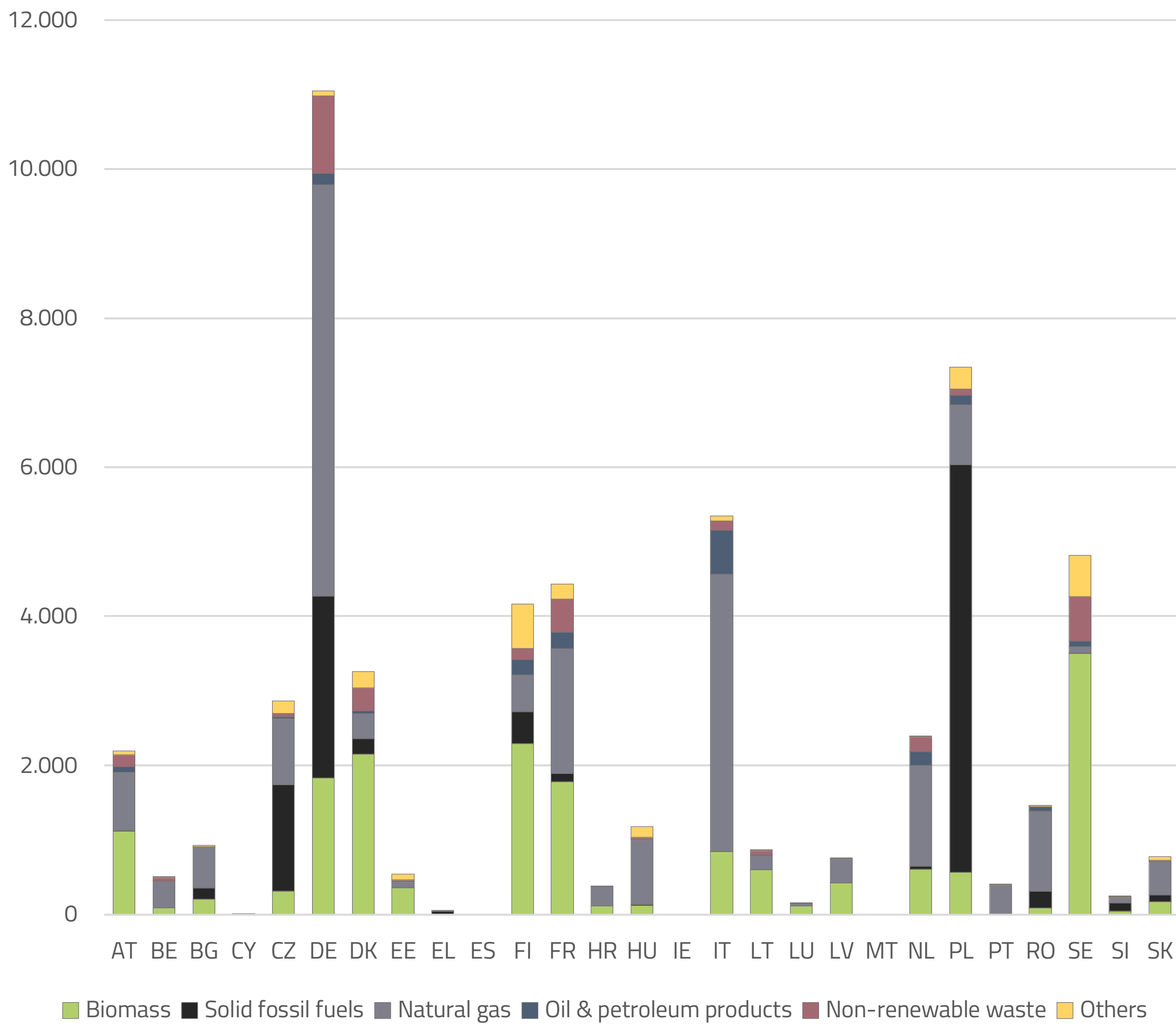


Note: when referring to fuels it is related to the final derived heat produced from those fuels and not the fuel input for heat production.

*No data available for ES/IE/MT

Source: Eurostat

Figure 21 Derived heat production by fuel (in ktoe) in the EU27 Member States in 2021



Note: when referring to fuels it is related to the final derived heat produced from those fuels and not the fuel input for heat production.
Source: Eurostat

Germany, Poland, and Italy are the largest users of derived heat in absolute terms. However, in all those countries, derived heat is predominantly produced from fossil fuels, mainly natural gas in the case of Germany and Italy and mainly coal in Poland. Although on average, biomass in the EU27 is only responsible for 31% of the derived heat production; but in nine countries (Lithuania, Austria, Cyprus, Estonia, Estonia, Luxembourg, Denmark, Finland and Sweden), it contributes more than 50% (see Table 9).

Table 8 Gross production of derived heat by type of fuels in EU27 Member States in 2021 (in ktoe)

	Total derived heat	Solid fossil fuels	Natural gas	Oil & petroleum products	Non-renewable waste	Biomass	Others
EU27	**56.038**	**10.773**	**20.353**	**1.764**	**3.315**	**17.287**	**2.526**
Growth rate 2020-2021	8.7%	6.9%	7.7%	12.8%	6.8%	12.7%	-0.5%
AT	2.152	2	783	78	154	1.121	54
BE	495	0	359	1	50	84	2
BG	925	151	549	2	5	202	16
CY	1	0	0	0	0	1	0
CZ	2.863	1.427	891	30	36	308	171
DE	11.048	2.439	5.526	149	1.038	1.829	66
DK	3.256	212	339	35	308	2.146	216
EE	543	0	90	4	22	351	76
EL	47	40	7	0	0	0	0
ES	0	0	0	0	0	0	0
FI	4.161	428	493	207	150	2.292	591
FR	4.435	107	1.681	217	439	1.781	209
HR	371	0	255	3	0	113	0
HU	1.174	21	871	1	27	116	138
IE	0	0	0	0	0	0	0
IT	5.344	0	3.730	582	129	839	64
LT	858	1	192	11	52	599	3
LU	148	0	38	0	2	107	0
LV	746	1	321	2	0	421	1
MT	0	0	0	0	0	0	0
NL	2.396	41	1.357	180	206	603	8
PL	7.340	5.476	802	124	88	561	289
PT	398	0	393	5	0	0	0
RO	1.463	226	1.067	66	0	90	14
SE	4.818	3	89	71	600	3.501	553
SI	241	107	77	4	4	48	1
SK	775	91	442	10	4	172	56

Note: Fuels mean the final derived heat produced from those fuels and not the fuel input for heat production.
'Other sources' includes electricity, ambient heat, geothermal, solar thermal, manufactured gas, nuclear heat, oil shale and oil sands, and peat and peat products.
Source: Eurostat

Table 8 Gross production of derived bioheat by type of biomass in EU27 Member States in 2021 (in ktoe)

	Total biomass	Solid biomass	Biogas	Renewable waste	Liquid biofuels	Share of derived heat produced from biomass
EU27	17.287	13.142	863	3.129	155	31%
Growth rate 2020-2021	13%	17%	-14%	5%	63%	1%
AT	1.121	1.029	5	87	0	51%
BE	84	21	21	41	0	17%
BG	202	198	4	0	0	22%
CY	1	0	1	0	0	100%
CZ	308	251	18	40	0	11%
DE	1.829	662	260	904	4	17%
DK	2.146	1.717	49	377	4	66%
EE	351	335	2	14	0	65%
EL	0	0	0	0	0	0%
ES	0	0	0	0	0	N.A
FI	2.292	2.080	21	190	1	55%
FR	1.781	1.295	86	400	0	40%
HR	113	96	17	0	0	30%
HU	116	94	3	19	0	10%
IE	0	0	0	0	0	N.A
IT	835	385	291	123	41	16%
LT	599	562	2	35	0	70%
LU	107	104	3	1	0	73%
LV	421	402	20	0	0	58%
MT	0	0	0	0	0	N.A
NL	603	386	7	210	0	25%
PL	561	500	23	38	0	8%
PT	0	0	0	0	0	0%
RO	90	85	5	0	0	6%
SE	3.501	2.743	5	648	105	73%
SI	48	44	4	0	0	20%
SK	172	152	18	2	0	22%

Source: Eurostat

5. Annexes

Table 10 Country Codes

EU27	European Union (27 members)
AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czechia
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia

Table 11 Symbols and abbreviations

Symbol	Meaning
,	Decimal separator
.	Thousand
N.A.	Data not available

Table 12 Decimal prefixes

10^{1}	**Deca (da)**	10^{-1}	**Deci (d)**
10^{2}	**Hecto (h)**	10^{-2}	**Centi (c)**
10^{3}	**Kilo (k)**	10^{-3}	**Milli (m)**
10^{6}	**Mega (M)**	10^{-6}	**Micro (μ)**
10^{9}	**Giga (G)**	10^{-9}	**Nano (n)**
10^{12}	**Tera (T)**	10^{-12}	**Pico (p)**
10^{15}	**Peta (P)**	10^{-15}	**Femto (f)**
10^{18}	**Exa (E)**	10^{-18}	**Atto (a)**

Table 13 General conversion factor for energy

to from	1 MJ	1kWh	1 kg oe	Mcal
1 MJ	1	0,278	0,024	0,239
1 kWh	3,6	1	0,086	0,86
1 kg oe	41,868	11,63	1	10
1 Mcal	4,187	1,163	0,1	1

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