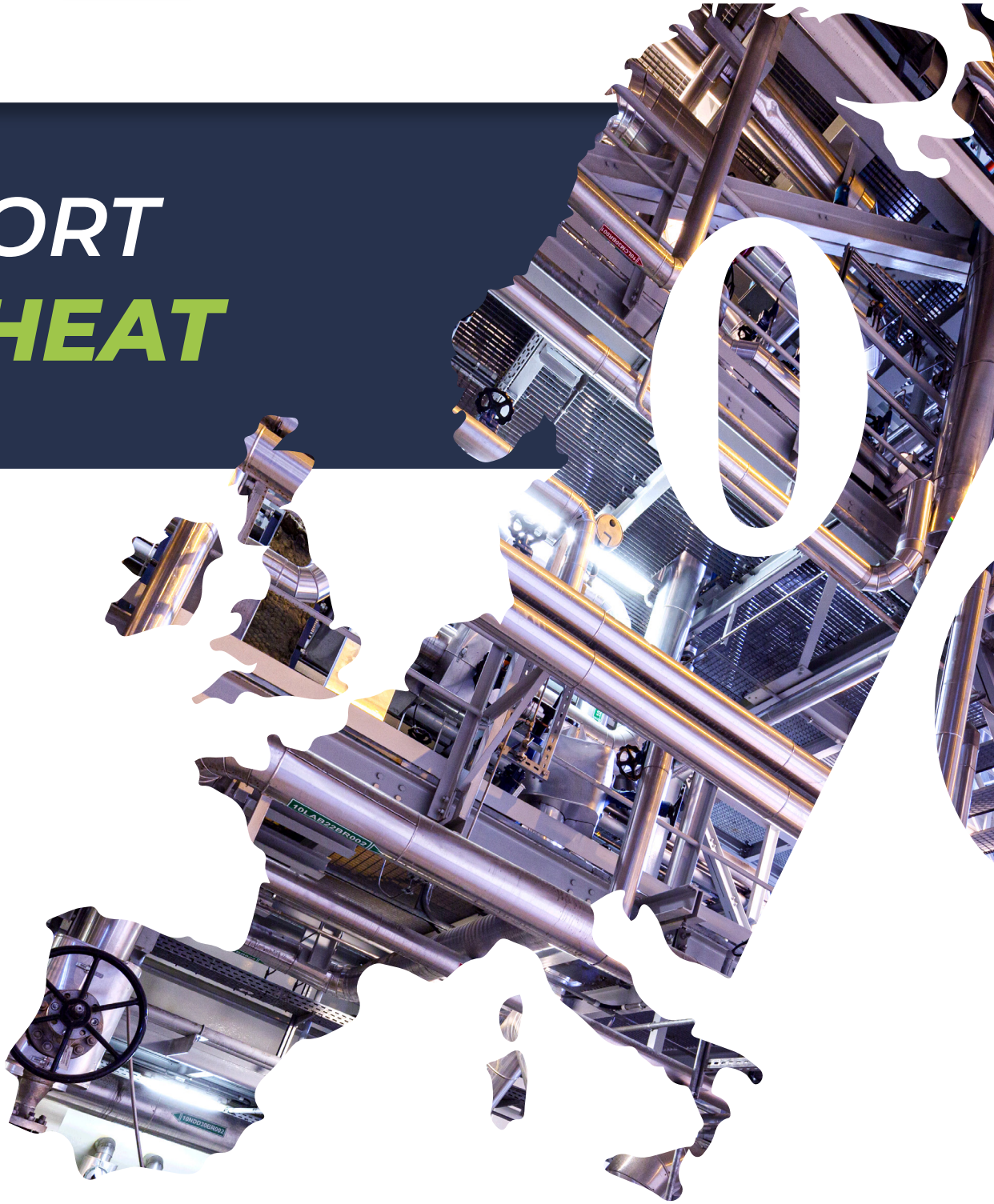
BIOENERGY EUROPE

STATISTICAL REPORT 2021

REPORT BIOHEAT



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-28 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-28 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

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 EN*plus*®
+ 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
+ 300 pages

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

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 / 2020
+ Bioenergy Europe publishes 7 focussed reports published throughout the year

2021

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 a support to advocacy at 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.

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 7 active working groups:

- Agrobiomass & Energy Crops;
- Biopower & CHP;
- Competitiveness;
- Domestic Heating;
- Sustainability;
- Pellets;
- Wood Chips.

Certification Schemes

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

Networks

Bioenergy Europe is the umbrella organisation of both the **European Pellet Council (EPC) and the International Biomass Torrefaction Council (IBTC).** These networks have been created thanks to the dynamics of Bioenergy Europe members. Today, these networks bring 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 18 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 ENplus® quality certification.

Launched in 2012, **the International Biomass Torrefaction Council (IBTC),** aims to build the first platform for companies that have common interests in the development of torrefied Biomass markets. Currently, the IBTC initiative is supported by more than 23 companies worldwide.

IBTC's objective is to promote the use of torrefied biomass as an energy carrier and to assist the development of the torrefaction industry. In this respect, IBTC's key activities are to undertake studies or projects, and to commonly voice its members' concerns to third parties to help to overcome barriers of market deployment.

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 4000 indirect members, including companies and research centres.

Associations

Academia

*Members as of September 2021.

Companies

ENHANCED VISIBILITY & SPONSORSHIP OPPORTUNITIES

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(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.

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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 .

*Bioenergy Europe Members receive a 50% discount on this sponsorship package

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- CHP (2.5 - 20 MWe; 10 - 80 MW heat)
- Thermal oil boiler units (10 - 50 MW)
- Fuel handling equipment and systems
- Ash removal equipment and systems
- Flue gas cleaning equipment and systems
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Forest Investment, Lithuania ›

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Européenne de Biomasse's edb-HPCI® technology is now an industrial reality: the **FICA-HPCI** plant started the **HPCI Green Pellet®** production. (125 kt, Reims, France)

www.ebiomass.eu

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HPCI Green Pellet®

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- Highly stable, water-resistant, low dust, no CO
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- Limited supply chain and conversion costs

SURE

SUSTAINABLE RESOURCES
Verification Scheme GmbH

SURE enables all economic operators along the supply chain, from biomass producers to biomass and biogas plants, to prove sustainable use of biomass in electricity and heat production

SUSTAINABLE RESOURCES Verification Scheme (SURE) is a voluntary certification scheme that aims at ensuring the sustainable and responsible use of biomass within the energy sector. SURE's set of criteria is in accordance with the principles of the European Energy Directive (RED II) and enables all economic operators within the bioenergy sector to demonstrate compliance with RED II requirements*.

Interested to learn more? Visit our website:
www.sure-system.eu
* after recognition by the European Commission

COMPTE·R
BIOMASS SOLUTIONS

For more than 130 years, COMPTE.R, designer and manufacturer of biomass boilers, specialist in wood energy, has been innovating and inventing solutions for the use of renewable energy. Committed to sustainable development, the French company has developed into an industrial group of international scope.

Today, the COMPTE.R group includes 5 production sites and nearly 3,000 installations in service throughout the world. Its activities are based on 4 subsidiaries and 2 representative offices in Europe and North America, with more than 350 employees sharing the same requirements.

www.compte-r.com/

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 2019, with most of it coming from heating (cooling represented 0,5% of the residential H&C demand and 3,6% of the industrial H&C demand). Heat is the main contributor to air pollution and is responsible for 34% greenhouse gases (GHG) emissions. Furthermore, the installed stock often surpasses its technical lifetime (ca 20-30years) and without taking concrete measures, several old and inefficient appliances will still be operating and polluting in 2050, threatening the achievement of the carbon neutrality objective. For these reasons, in the Renovation Wave Strategy, the European Commission recognised H&C as an essential sector for the decarbonisation of Europe's building stock.[1]

This clearly shows the relevance of heating and how it should be one of the main targets in the EU's decarbonisation efforts for 2030 and 2050. The table below shows that H&C represents almost 50% of the final energy consumed in the EU27. It should further be noted that the figures in Table 1 do not include the electricity used for H&C.

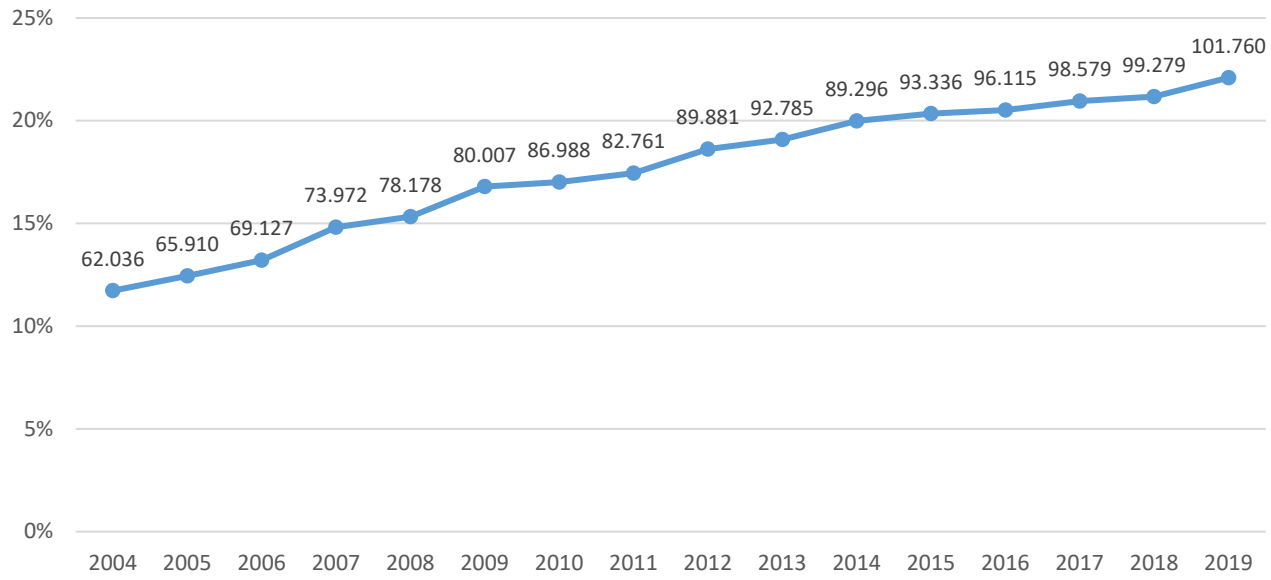
[1] Renovation Wave Strategy, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757&uri=CELEX:52020DC0662

Table 1: HNC Consumption and total Final energy consumption in EU27 Member States and UK in 2018* [ktoe]

	Total final energy consumption	HNC energy consumption	% of the HNC sector in the final energy consumption
EU27	935.607	460.529	**49%**
Growth rate (2018-2019)	-0,54%	-1,76%	-0,4%
EU27+UK	1.057.522	516.518	**49%**
Growth rate (2018-2019)	-0,59%	-1,67%	-0,5%
AT	26.216	14.079	**53%**
BE	32.553	18.291	56%
BG	9.699	3.955	**41%**
CY	1.428	525	37%
CZ	24.200	13.863	**57%**
DE	200.641	108.695	54%
DK	13.565	7.362	**54%**
EE	2.827	1.528	54%
EL	15.405	5.060	**33%**
ES	81.513	29.363	36%
FI	24.674	14.027	**57%**
FR	126.376	61.044	48%
HR	6.726	3.194	**47%**
HU	17.972	10.018	56%
IE	11.297	4.762	**42%**
IT	114.260	53.979	48%
LT	5.456	2.518	**46%**
LU	3.767	1.107	29%
LV	3.928	2.363	**60%**
MT	548	81	15%
NL	44.683	26.218	**59%**
PL	69.135	36.377	53%
PT	16.955	6.289	**38%**
RO	23.713	13.582	57%
SE	31.342	14.765	**47%**
SI	4.861	1.824	38%
SK	10.248	6.232	**61%**
UK	121.914	55.998	46%

* 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.
Source: Eurostat, SHARES 2019

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



* Calculated in accordance with the methodology established in Directive 2009/28/EC and Regulation (EC) No 1099/2008.
Source: Eurostat, SHARES 2019

Figures from recent years show that the deployment of renewables is much slower in the heat sector than in the electricity one. On average, the increase has been 0,69 percentage points (pp) each year between 2004 and 2019 compared to 1,17 pp in power generation. Even though the relative increase is higher in the electricity sector, in absolute terms, the increase might be higher in the H&C sector (depending on the year). In 2019, the renewable heat production was more significant in absolute terms (101.760 ktoe) than that of renewable electricity (84.633 ktoe). With the recast of the Renewable Energy Directive (RED II), which sets the legislative framework for renewables for the period 2021-2030, an indicative target has been set at an annual increase of 1,3 pp of renewables in the final heat consumption, with the possibility to include a maximum of 40% waste heat. When deducting the share of waste heat, the renewable heat target decreases to 0,78 pp – almost equal to the business-as-usual scenario.

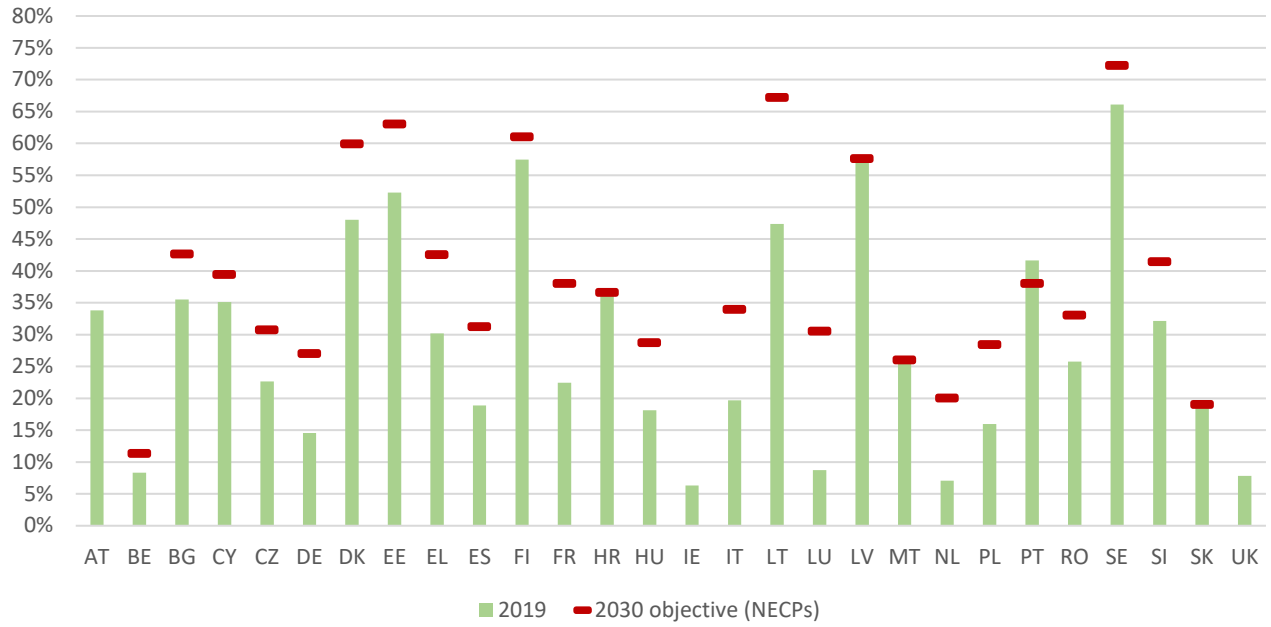
In 2021, the European Commission published a proposal for the revision of the RED II making the renewable heat target mandatory at national level, but lowering the requirement to 1.1 pp, which corresponds to the average annual increase of renewables in heating and cooling as forecasted in the EU member states' Integrated National Energy and Climate Plans.[2] Despite this low ambition, the attempt to address the heating and cooling sector is a step in the right direction.

In this context, long-term strategies to decarbonize the building sector by increasing the share of renewable heat solutions and boosting investments in research and innovation (R&I) will be needed, i.e. for high temperature requirements in the industrial sector or for biomass fuels diversification.

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.

[2] Regulation on the governance on the Energy Union
https://eur-lex.europa.eu/legal-content/EN/TXT/?toc=OJ:L:2018:328:TOC&uri=uriserv:OJ.L_.2018.328.01.0001.01.ENG

Figure 2 Renewable energy share in the H&C sector in 2019 and 2030 Member States´ objectives (in %)



Sources: SHARES 2019, NECPs

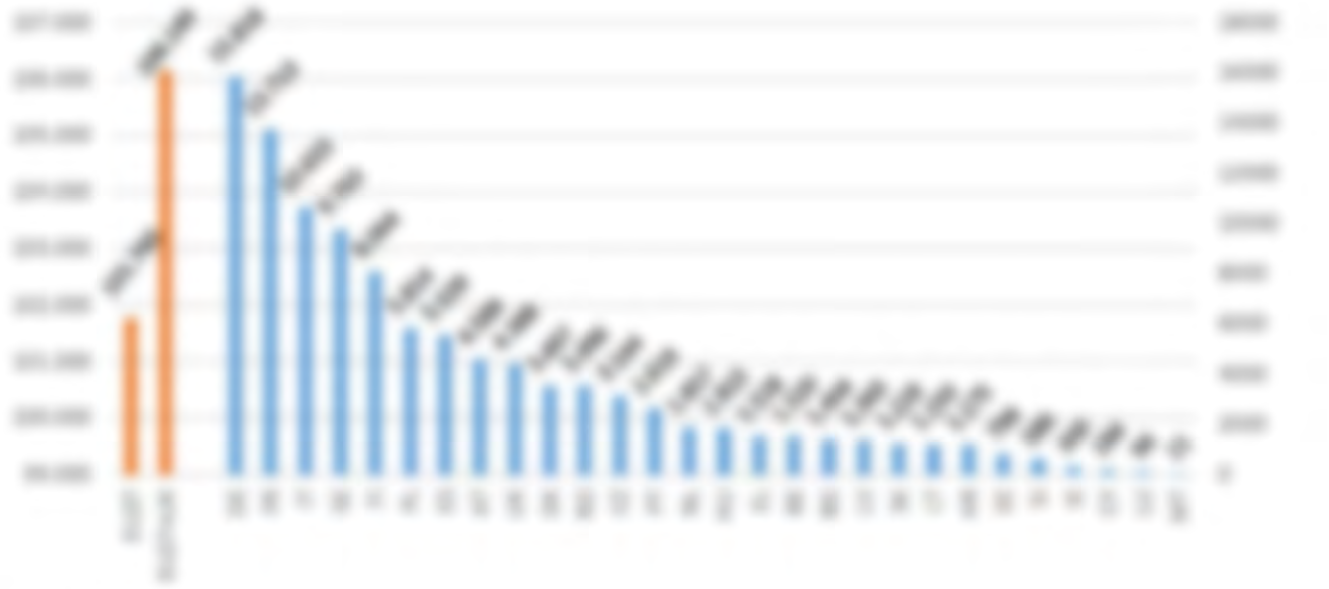
Although Member States have developed their Integrated National Energy and Climate Plans (NECPs)[3], to reach the 2030 targets and effectively move towards a 100% renewable heating and cooling future, more ambition is needed in the presented plans. In this context, the recently published Fit For 55 Package represent a unique opportunity to refocus the EU's efforts on H&C. This must be done by establishing a clear strategy to phase out fossil heating by retrofitting old appliances and replacing them with more efficient and modern renewable ones.

The current renewable H&C objectives proposed by Member States in their NECPs are rather ambitious for some EU countries specially Spain, France, Italy, Lithuania, Luxemburg, or The Netherlands. However, a large group or countries are very close to fulfiling their targets and three of them, Portugal, Latvia, and Slovakia, have already achieved them. With the data available, the average target for the RES share in H&C sector for 2030 is 40% in comparison with the current share of 22,1%.

The countries that forecast a higher share of renewable heat in 2030 are Sweden (72%), Lithuania (67%), Estonia (63%) and Finland (61%), all aiming to a threshold higher than 60%. On the contrary, in Belgium (11%) or in Slovakia (19%), the share or RES in H&C sector in 2030 will remain below 20%. Countries where the contribution of RES in the H&C sector (in %) will present a significant increase are Lithuania (from 47% to 67%), France (from 22% to 38%) and Italy (from 20% to 34%). On the other hand, Portugal and Croatia foresee a lower share of RES in the H&C sector in 2030 of what they currently have. Without making considerable efforts to increase the share of renewable heat, Member States will fail to meet their climate commitments in the long term.

[3] 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.

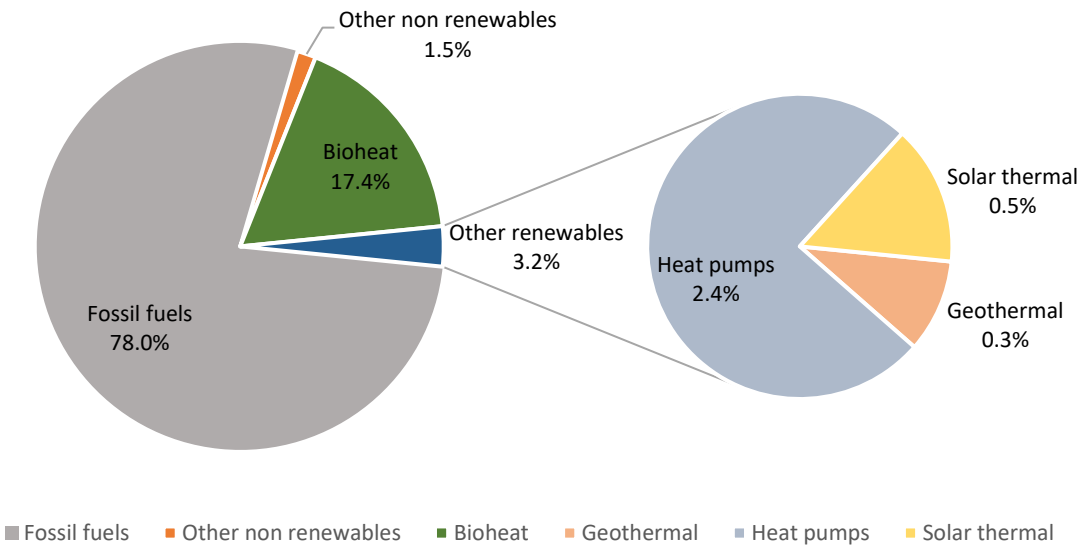
Figure 3 Renewable energy consumption in the HBC sector in the EU27 Member States and UK in 2019 (in ktoe)



Source: SHAPES 2019

Germany and France are the two main energy users in Europe, with 18Mtoe and 14 Mtoe each and a share of 18% in the HBC sector of 15% and 12%. On top of this, they are also the countries where biomass is contributing the most to the renewable heat, with 87% and 76% respectively.

Figure 4 Contribution of the different energy sources in heating and cooling in EU27 in 2019* (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 2019, Bioenergy Europe's calculation

With a share of only 22% of renewables in the heating sector, most of the heat is still being produced by fossil fuels in Europe. To fill 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 bioenergy.

85% of the renewable heat, used within the EU in 2019 was in the form of bioheat, that reached 86.219 ktoe. The related greenhouse gas (GHG) savings were estimated to be around 160 $MtCO_{2eq}$, representing more than the current annual emissions of Belgium and Slovakia together. These critical shares show how bioenergy, and especially solid biomass, is a key driver towards meeting the renewable energy targets in the heating sector. The biomass market is having a stable growth during the years, and the renewable heat scenario is diversifying with heat pumps showing the greatest increase and becoming the second source of renewable heat after bioenergy.

Table 2 Total HSC consumption and contribution of renewables in EU27 Member States and UK in 2019* (in ktoe)

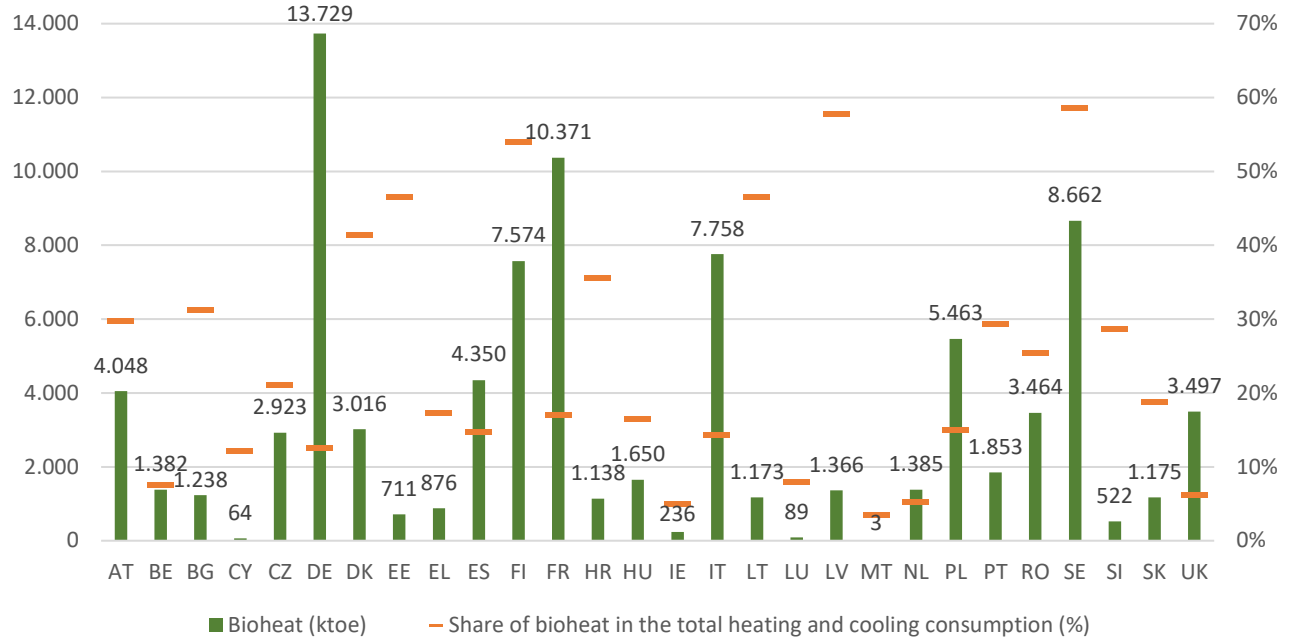
	Total	Renewables	Share of Renewable heat	Biofuel	% of biofuel in the renewable heat
EU27	440 520	101 760	23%	86 219	85%
Growth rate (2018-2019)	-1,8%	2,5%	4,3%	1,9%	-0,6%
EU27-UK	516 518	106 149	21%	89 716	85%
Growth rate (2018-2019)	-1,7%	2,5%	4,3%	1,9%	-0,6%
AT	13 179	6 589	50%	6 048	92%
BE	18 291	1 520	8%	1 362	91%
BG	3 955	1 404	36%	1 236	88%
CY	525	164	31%	64	39%
CZ	13 865	3 144	23%	2 923	93%
DE	108 490	15 458	14%	13 729	87%
DK	7 282	3 497	48%	3 016	86%
EE	1 528	766	52%	711	89%
EL	5 060	1 528	30%	876	57%
ES	29 363	5 169	18%	4 350	78%
FI	16 027	8 064	57%	7 574	94%
FR	41 044	13 713	33%	10 371	76%
HR	3 194	1 175	37%	1 136	97%
HU	10 018	1 815	18%	1 650	91%
IE	4 742	300	6%	236	79%
IT	53 979	10 433	20%	7 758	74%
LT	2 518	1 190	47%	1 173	98%
LU	1 107	96	9%	89	92%
LV	2 963	1 965	58%	1 966	100%
MT	81	21	26%	3	14%
NL	35 218	1 857	7%	1 385	75%
PL	36 377	5 814	16%	5 463	94%
PT	6 389	3 619	42%	1 853	71%
RO	13 582	3 496	26%	3 464	99%
SE	14 765	9 763	66%	8 662	89%
SI	1 824	586	32%	522	89%
SK	6 232	1 228	20%	1 175	96%
UK	55 998	4 368	8%	3 497	80%

* Calculated in accordance to 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 2019

The overall EU share of renewable heat demonstrates strong disparities between Member States. Countries such as Estonia, Finland, Latvia, and Sweden have already achieved very high shares of renewable heat (close to or over 50% of the total). Other countries are lagging far behind, with shares of renewable heat below 10% in five of them (Belgium, Ireland, Luxembourg, The Netherlands, and UK) and below 20% in more than half of the EU27. This proves that concrete and coherent measures based on all renewable heating solutions must be urgently implemented. The majority of the renewable heat produced in Europe is biofuel and there are many countries which rely almost exclusively on biomass as

a solution to decarbonize the heating sector; this is the case, among others, of Poland, Romania, and Lithuania. The countries with the highest values of renewable heat consumption are Italy (11Mtoe and 73%), Sweden (10Mtoe and 89%), Finland (8Mtoe and 94%), Poland (6Mtoe and 94%) and Spain (6Mtoe and 79%).

Figure 5 Total bioheat consumption (in ktoe) and share of bioheat in the total H&C consumption in the EU27 Member States and UK in 2019 (in %)



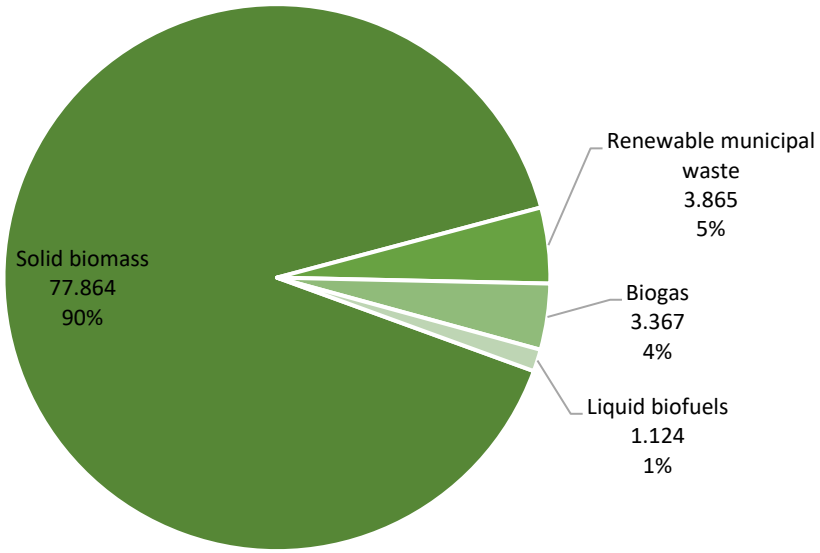
Source: Eurostat

At EU level, the only carbon price mechanism in place is the EU Emission Trading System (EU ETS) that covers installations above 20 MW, however, the majority of the heat consumption in the EU 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. The graph above clearly stresses that those Member States with a high share of bioheat are either countries with an 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 several factors to be considered to explain this situation, among that of widespread rural communities, logistical issues, as well as geographical conditions.

Fostering the decarbonisation of the H&C sector, by ways of introducing a price on carbon has been proven to be an effective tool. The Social Climate Fund presented in the framework of the Fit for 55 Package must be used effectively to promote higher efficiency whilst reducing air pollutions and emissions: this can be done smoothly 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 such as the Renewable Energy Directive (RED II), the Energy Efficiency Directive (EED) and the Energy Performance of Building Directive (EPBD). These directives are strictly interconnected and mutually reinforcing.

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, a strategy to phase out fossil fuels must be urgently put in place.

Figure 6 Type of biomass used for bioheat in EU27 in 2019 (in ktoe, %)



Source: Eurostat

Solid biomass is by far the main feedstock (90%) for bioheat production and inversely bioheat is the main final usage of solid biomass, as 85% of the solid biomass is used for bioheat production (the rest being mainly used for bioelectricity – Cf. Bioelectricity Report). For environmental and economic reasons, the woody biomass used for bioheat production is mostly sourced from by-products of forest management operations and subproducts from the wood industry (Cf. Biomass Supply Report).

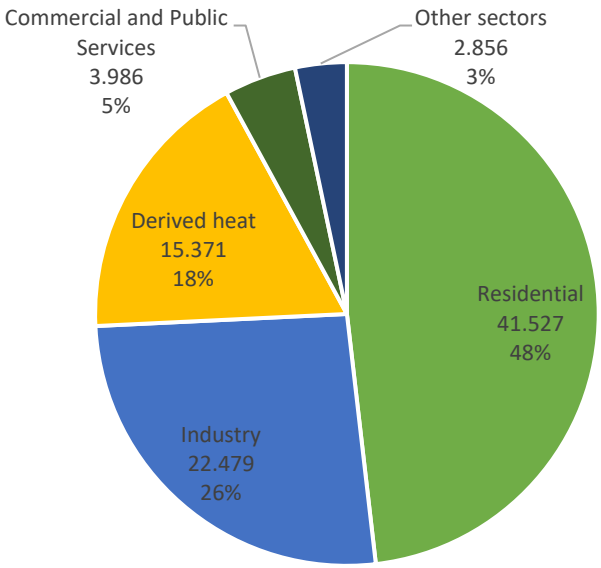
Table 3 Biomass used for heat by fuel and sector in EU27 in 2019 (in ktoe)

	Solid biomass	Renewable municipal waste	Biogas	Liquid biofuels	Total
Industrial sector	20.771	819	484	405	22.479
Residential sector	41.192	0	312	23	41.527
Derived heat	11.384	2.892	966	129	15.371
Commercial & services sectors	2.931	153	769	133	3.986
Other sectors	1.585	0	837	434	2.856
Total	77.864	3.865	3.367	1.124	86.219

Source: Eurostat

'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 (837 ktoe). The derived heat sector (district heating and CHP) is the one using most of the renewable municipal waste for heat.

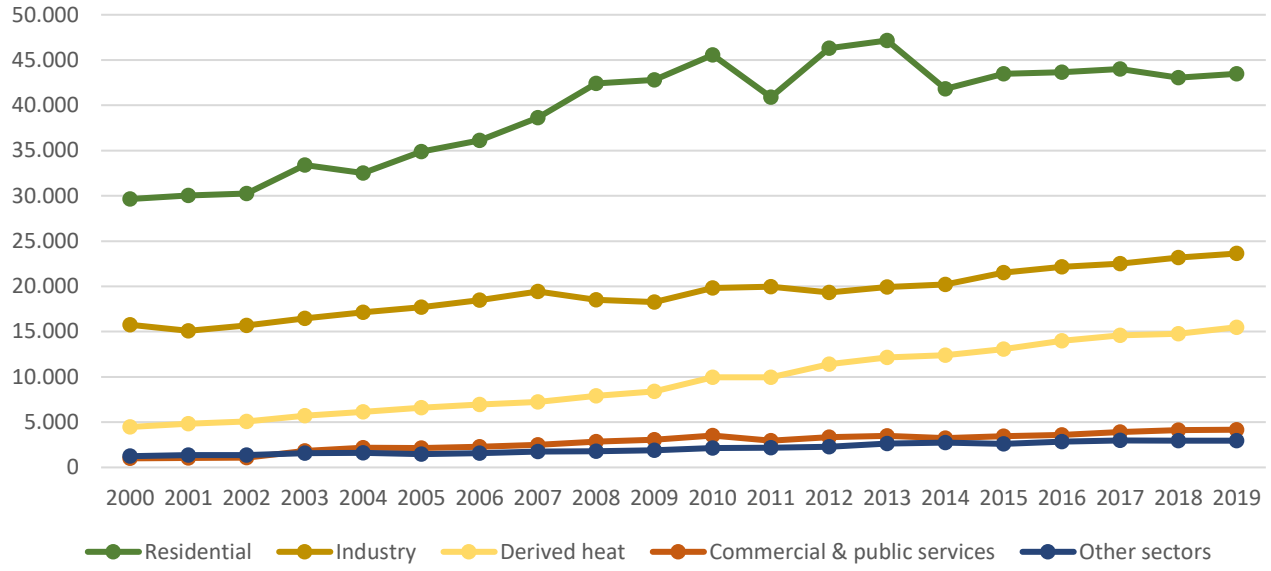
Figure 7 Total bioheat consumption in the different sectors in EU27 in 2019 (in ktoe, %)



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 (41.527 ktoe). This figure includes only the biomass that is directly used for households' heat production, excluding heat supplied through district heating. In 2019, 22.479 ktoe of biomass was consumed as heat in industry and 15.371 ktoe as derived heat (mostly being district heating). This significant share of bioheat consumed by the residential and service sector (schools, hospitals, hotels) shows that there is a great number of small and medium installations producing bioheat in Europe.

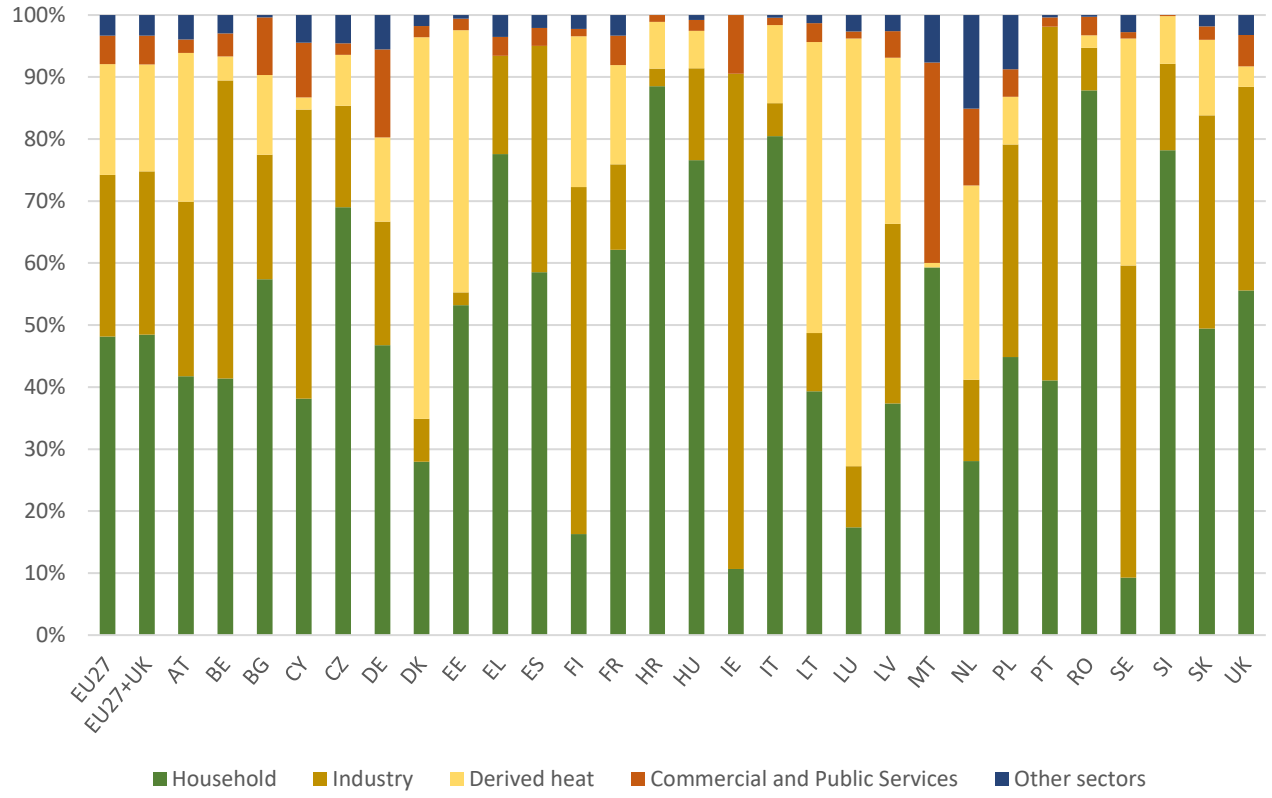
Figure 8 Evolution of the final consumption of bioheat by sector in EU27 (in ktoe)



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

As mentioned previously, the consumption of bioheat is steadily growing in all sectors, on average by 3% annually since 2000. The biggest growth can be observed in the industrial and derived heat segments. The fluctuation in the residential sector can be explained by the mildness of winters and the volatility of fuel prices. The total bioheat consumption has increased by 72% from 2000 to 2019, from which +47% in the residential sector, +50% in the industry, +247% in the derived heat, +315% in the commercial & public services sector. This shows that different sectors (households, industries, district heating etc.) are increasingly relying on biomass as a stable and reliable fuel.

Figure 9 Importance of the different sectors in the total bioheat consumption in EU27 Member States and UK in 2019 (in %)



Source: Eurostat

Bioheat deployment strongly differs between Member States. The residential sector remains the predominant sector for bioheat consumption in most of EU countries, even though the industrial and derived heat sectors are growing too. The consumption of bioheat in the industry sector has a high importance for countries such as Ireland, Slovakia, Portugal, Cyprus, Belgium and Sweden. The countries with the biggest share of bioheat consumption in district heating are Denmark, Lithuania, Luxemburg, Estonia, and Sweden with shares higher than 37%. In contrast, bioheat district heating is less present in Mediterranean countries such as Greece, Spain and Portugal, where district heating networks are generally less used. The use of bioheat in the service sector (schools, hospitals, hotels) is rather limited in most countries, but with a promising upward trend (see Table 4). Only Malta, Germany and Netherlands have more than 10% share.

Table 4: Total biofuel consumption by sector in EU27 Member States and UK in 2018 (in ktoe)

	Total	Household	Industry	Derived heat	Commercial and Public Services	Other sectors
EU27	64.214	41.527	10.479	10.371	1.966	1.872
Growth rate (2018-2015)	1,9%	0,9%	2,0%	5,0%	0,7%	0,8%
EU27+UK	69.714	43.470	10.628	11.486	4.164	1.968
Growth rate (2018-2015)	1,9%	1,0%	2,0%	5,0%	0,7%	0,8%
AT	4.048	1.691	1.139	970	80	160
BE	1.362	572	664	54	52	41
BG	1.238	711	248	228	110	5
CY	64	24	30	1	6	3
CZ	2.923	2.027	479	240	54	120
DE	15.729	6.421	2.705	1.861	1.953	758
DK	3.016	844	208	1.856	53	54
EE	711	378	15	301	13	4
EL	875	680	139	0	27	31
ES	4.350	2.547	1.586	0	126	90
FI	7.574	1.233	4.240	1.841	90	168
FR	10.371	6.446	1.425	1.662	491	946
HR	1.138	1.058	32	80	12	0
HU	1.450	1.264	245	100	29	13
IE	296	25	168	0	22	9
IT	7.758	6.243	411	679	91	34
LT	1.173	461	110	551	36	15
LU	89	15	9	61	1	2
LV	1.366	510	395	367	58	36
MT	3	2	0	0	1	0
NL	1.365	369	181	434	171	209
PL	5.463	3.451	1.471	421	242	477
PT	1.853	761	1.057	0	26	7
RO	3.464	3.043	236	71	104	9
SE	8.662	804	4.357	3.171	90	236
SI	522	408	73	40	1	0
SK	1.175	581	404	143	35	22
UK	5.497	1.943	1.149	115	178	112

Source: Eurostat

Figure 19 Heat production footprint in EU27 Member States and UK in 2019 [in gCO2eq/kWh]

Note: The carbon footprint contribution of each fuel input is calculated for households, district heating and commercial & public sector. Based on the availability of data, only electricity for heating & cooling is calculated for households only.
Source: Eurostat, IRENA, GHK/Defra/Emission Factors for the Member States of the European Union – Version 2017, Greenhouse gas emission intensity of electricity generation in Europe, Bioenergy Europe's calculation

AXIS Tech

EXPERT COMMENT

Before becoming a member of Bioenergy Europe at the end of 2020, we were already analyzing new market prospects and possible changes in the energy sector considering changes related to the Carbon Neutral movement, prospers in the agricultural sector, pandemic, and new technologies of biomass consumption. This year, the European Commission published a proposal for the revision of the RED II making the renewable heat target mandatory at all European countries' national levels.

As you will find in Bioenergy Europe Bioheat Statistical Report. the consumption of bioheat is steadily growing in all sectors, on average by 3% annually since 2000. Wood-related industries have a significant share (>41%) contributed to the total energy consumption from biomass. Nevertheless, this statistical report shows that a share of only 20,6% is renewables in the heating sector, most of the heat is still being produced by fossil fuels in Europe. In upcoming years, we must enable solutions to shrink the “renewable heat gap” as little as we can and increase the efficiency of energy, reduce emissions making the world a cleaner place for our and future generations.

AXIS Tech

The biomass energy sector must provide the best possible products and services to clients, undertake the renovation and modernization of production facilities, implement new production management systems, and invest in research and development of new technologies in order to improve our understanding of biomass waste incineration complexities, as well as of carbon-neutral solutions.

We, as one of the leading biomass energy solutions companies in Baltic states, are committed to providing both innovative and time-tested solutions to a challenging market that focuses on clean energy production and its optimization using local biomass and a variety of agricultural wastes. Our team is ready to solve problems that may arise during the transition to the world of new energy.

Aleksas Jazdauskas

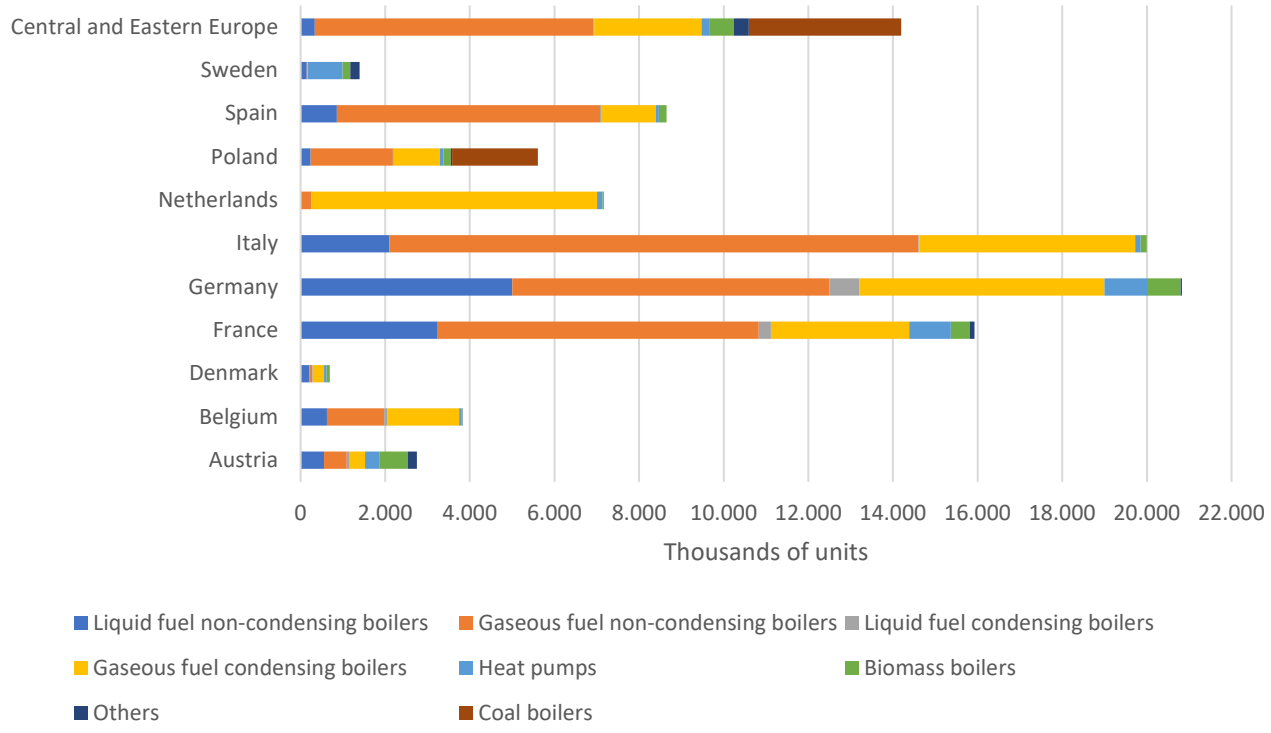
Head of AXIS Tech R&D department

2. The residential sector

In 2019, the residential sector represented 18% of the total heat consumed in the EU27 and only 27% of the households' heat consumption came from renewables, mainly bioenergy (84%). There is still a significant amount of the total heat consumed for H&C in the residential sector, around 136.000 ktoe, from non-renewable sources (mainly gas which is also part of the non-renewable share of the power sector).

Around 60% of heating appliances are old and inefficient, with an average age of about 25 years. According to current labelling standards, they would fall into classes C, D or even lower. 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 Division by fuel input installations of individual appliances in the residential sector for some EU27 Member States in 2017 (thousands of units)



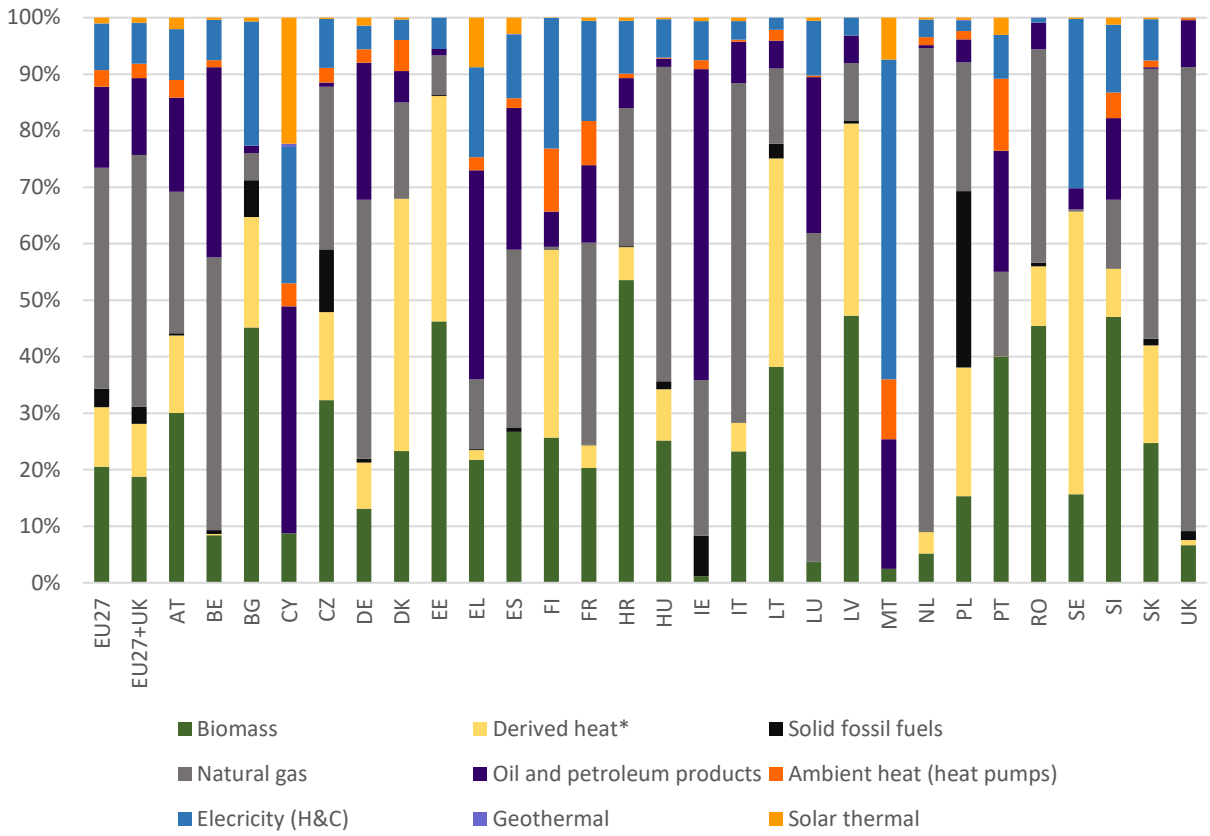
Note: Only individual heating systems with capacities below 400kw in different regions and countries of Europe in 2017 are represented, concerning mainly commercial and other buildings.
Source: European Heating Industry, Heat market report 2020

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 in exchange for the same heat production as their older counterparts. So, their retrofit will deliver significant energy savings and substantial emissions reduction

with a positive impact on air quality; if combined with the use of high-quality certified fuel, GHG emissions can be drastically reduced.

In 2019, bioenergy used in the residential sector in the EU27 was 99,2% based on solid biomass, the remaining was mainly biogas (renewable municipal waste and liquid biofuels together accounted for 0,7%).

Figure 12 Shares of energy used for heating and cooling in the residential sector by EU27 Member States and UK in 2019 (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

In 2019, cooling in the European residential sector was produced only with electricity and it represented around 6,3% of the electricity used for H&C, thus accounting for 0,5% of the total residential H&C energy consumption. It is important to remember that for the final energy consumption in the power sector, a primary energy source (most likely non-renewable) was required to produce it. Thus, it represents a greater amount of energy than the amount finally presented (e.g. Table 5).

Space heating represented the largest part (77,3%) of the residential H&C consumption in EU27 in 2019 (equivalent to 63,5% of total residential energy consumption) followed by water heating that accounted for 18,8% (14,8% when considering total residential energy consumption).

Despite the important share of bioheat used in the residential sector, this segment is still dominated by fossil fuels, producing more than 73,2% of the heat for households in the EU27 in 2019. Additionally, to the promotion of bioheat

for decarbonising the sector, it is also important to replace the existing stock of old and inefficient biomass installations with highly efficient nearly-zero emission modern biomass systems. This will not only increase the resource efficiency but also improve air quality. For example, the number of fine particles emitted by an old open fire is equivalent to the emissions of approximately 278 modern appliances such as pellet stoves (Cf. factsheet '*Slashing emissions from Residential Wood Heating*'). Therefore, to accelerate the deployment of modern biomass heating installations, increasing awareness at local level, and establishing financial support schemes for renewable energy sources is essential.

Furthermore, the biomass is either directly used in the residential sector for heating or indirectly as part of the derived heat delivered to households. In the EU27, biomass in the residential sector (directly used at the housing scale) accounted for 20,0% of the energy consumption for H&C in 2019. In addition, one quarter (Cf. section 4) of the 10,6% of derived heat, gives a total of 22,7% of biomass used for heat in the residential sector.

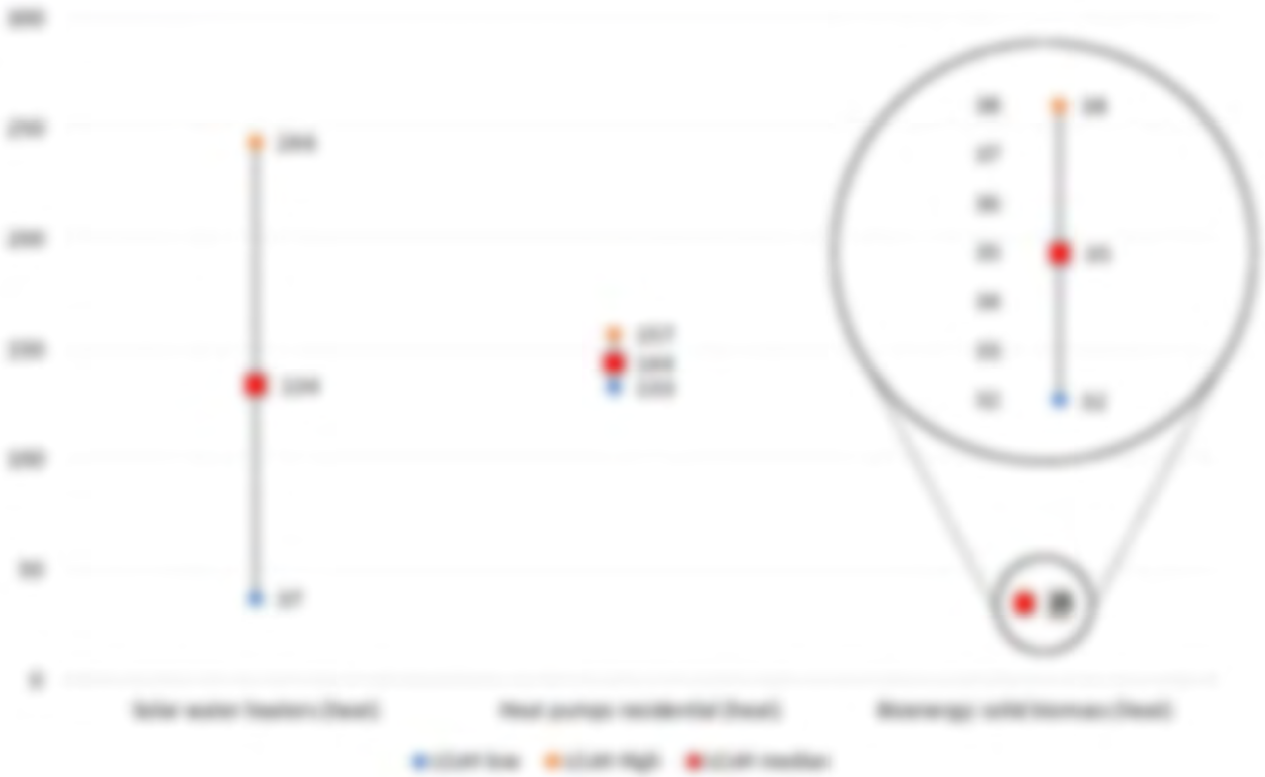
By adding up the direct and the indirect (the share of derived heat from biomass) contribution of biomass in the residential sector, Slovenia, Latvia, Croatia, Estonia and Bulgaria together account for more than 50% of the energy used for residential space and water heating.

Table 5 Final energy consumption for HBC in the residential sector by fuel in EU27 Member States and UK in 2019 (in ktoe)

	Total	Solid fossil fuels	Natural gas	Oil and petroleum products	Derived heat	Electricity (HBC)	Biomass	Geothermal	Solar thermal	Ambient heat (heat pumps)
EU27	222.151	6.613	79.038	18.994	21.919	16.695	45.527	82	2.007	5.861
Growth rate (2018-2019)	-1,2%	-16,9%	-1,7%	1,8%	1,3%	1,3%	3,9%	1,8%	1,3%	11,4%
EU27+UK	231.918	7.049	103.023	20.413	21.588	16.695	49.478	82	2.084	5.861
Growth rate (2018-2019)	-1,1%	-16,3%	-0,6%	1,7%	0,3%	n.a.	3,9%	1,8%	1,3%	11,4%
AT	5.623	19	1.410	907	772	539	1.895	0	113	179
BE	6.799	41	3.279	2.290	16	484	572	0	26	80
BG	3.570	102	76	20	808	346	711	0	11	0
CY	277	0	0	111	0	67	24	2	62	11
CZ	6.236	690	1.795	45	971	541	2.017	0	14	162
DE	46.875	345	22.380	11.877	3.967	2.013	6.421	25	698	1.149
DK	3.621	0	616	203	1.617	132	844	0	12	197
EE	819	1	58	9	327	45	378	0	0	0
ES	9.118	6	384	1.214	53	496	680	0	274	72
FI	9.540	65	3.039	1.398	0	1.077	2.547	11	276	158
FR	4.796	0	27	299	1.592	1.107	1.259	0	2	506
HR	31.759	24	11.363	4.345	1.287	5.644	6.446	0	171	2.477
HU	1.860	3	459	101	110	175	1.008	0	11	14
IRL	5.020	71	1.793	74	455	342	1.263	0	13	9
IS	2.147	155	590	1.181	0	148	25	0	14	34
IT	26.648	0	16.127	1.976	1.362	876	6.243	1	169	96
LT	1.258	32	161	59	446	26	461	0	0	23
LU	423	0	246	117	0	41	15	0	2	1
LV	1.080	5	111	53	367	34	510	0	0	0
MT	69	0	0	16	0	39	2	0	5	7
NL	7.535	1	6.454	36	289	236	389	0	23	108
PL	11.964	4.979	3.639	649	1.630	295	1.451	19	66	237
PT	1.903	0	285	408	1	148	761	0	58	242
RO	6.450	41	2.530	815	704	56	1.043	4	0	0
SE	5.191	0	20	191	2.567	1.538	804	0	11	0
SI	858	0	106	125	74	104	408	0	11	40
SK	2.345	28	1.120	7	404	171	581	0	7	28
UK	21.218	416	23.985	2.418	209	n.a.	1.943	0	36	105

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

Figure 13 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 from bioenergy showed the lowest average valued (35 €/MWh) and the narrowest widespan (± 36 /MWh) when compared to heat pump and solar water heater installations. 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 technologies for heat production. Installation and purchase costs of technology are spread along the lifetime of the equipment and for the same period also the cost of fuel input.

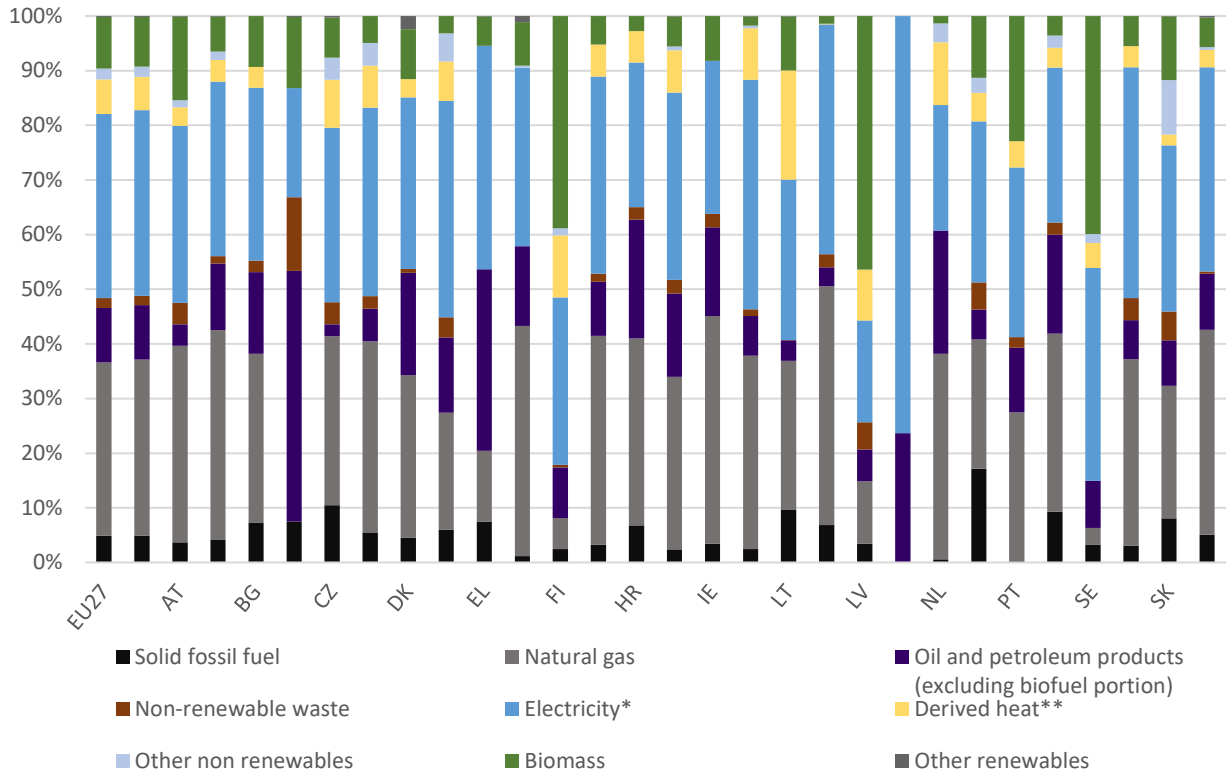
It is clear that the majority of individual installations across Europe remain dependent on fossil fuels for their operation. All coal-fired installations are located in Central and Eastern Europe and particularly in Poland. By 2030, eight EU countries (Italy, France, Ireland, Portugal, the Netherlands, Denmark, Finland, and Spain) have set themselves the target of becoming completely coal-free.

It should be noted that Sweden and Denmark have a small volume of individual heating installations as they have extended district heating networks with very high percentages of bioenergy (see Figure 17 in section 4).

3. The industrial sector

Industry in 2019 represented 21,9% of the final energy consumption in the EU27, excluding electricity consumption. Only 14,2% of industrial energy consumption came from renewables, almost entirely bioenergy (99,9%). Meaning that there is around 135.000 ktoe from non-renewable sources to be replaced (plus the non-renewable part of the electricity used). Therefore, it is substantial to put effort to decarbonise the European industry and hence to promote bioenergy as it shows to be one of the best solutions for this sector.

Figure 14 Division by fuel of the final energy consumption in industry in EU27 Members States and UK in 2019 (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 11 and Table 6 are not just focusing on heat but on the total energy consumption within industries in 2019. However, H&C production represents most of the final energy consumption. Indeed, in 2015 in EU28, according to Heat RoadMap[4], around 80% of the final energy consumption in industry was dedicated to H&C (mainly heat for process – 81% of H&C consumption). Figure 10 and Table 6 illustrate the significant share of fossil fuels compared with renewables in all countries, with the exception of Latvia, Finland, and Sweden. Bioenergy is clearly the main renewable energy source used in industries in 2019, even when considering the renewable electricity with the EU27 average share – 34,7% (Cf. our

[4] 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

bioelectricity report). Bioenergy (including bioelectricity with the EU27 average share – 5,3%) accounted for 10,5% of the final energy consumption in industry in 2019 in the EU27, while the second renewable energy source was electricity from wind, which reached 4,3%. Biomass is key to decarbonise the industry due to its technical characteristics, its competitiveness and reliability.

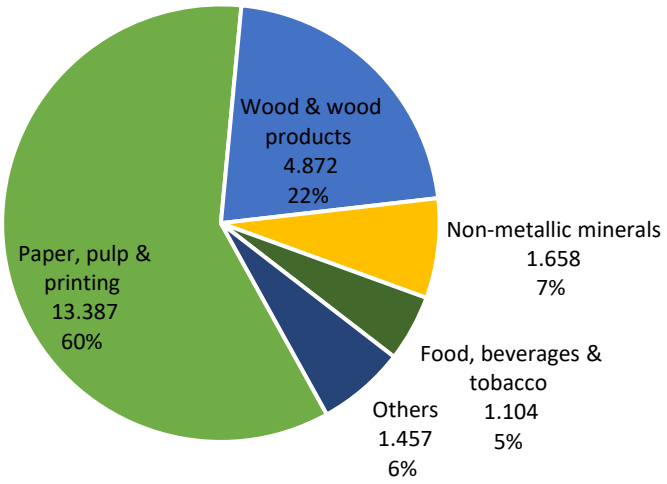
The biomass used for energy consumed in the industry sector is mainly based on solid biomass (92,4%), followed by renewable municipal waste (3,6%) and biogas (2,2%), liquid biofuels account for 1,8%.

Table 6 Final energy consumption in industry by fuel EU27 Members States and UK in 2019 (in ktoe)

	Total	Solid fossil fuel	Natural gas	Oil and petroleum products	Non-renewable waste	Electricity[a]	Derived heat[b,c]	Other non-renewables	Biomass	Other renewables
EU27	236.216	11.676	75.575	19.757	4.351	80.232	15.074	4.761	22.478	344
Growth rate (2018-2019)	1,4%	-7,8%	-1,2%	-4,3%	4,1%	-1,3%	0,1%	4,0%	2,0%	5,7%
EU27+UK	259.337	12.755	83.492	20.884	4.441	88.097	15.707	4.894	23.628	430
Growth rate (2018-2019)	-1,7%	-7,8%	-1,1%	-4,9%	4,0%	-1,4%	-0,1%	-7,2%	2,0%	6,6%
AT	7.433	272	2.675	292	291	2.409	252	96	1.138	7
BE	10.333	436	3.953	1.262	136	3.296	415	213	664	9
BG	3.673	196	825	299	57	845	102	0	248	0
CY	229	17	0	105	31	46	0	0	30	0
CZ	9.549	664	3.029	142	264	2.091	576	266	479	18
DE	55.712	3.074	19.476	3.332	1.274	16.213	4.280	2.317	1.705	11
DK	3.277	103	677	426	16	715	76	0	206	55
EE	453	28	99	64	17	183	33	24	11	0
EL	2.588	194	334	860	0	1.058	0	0	139	2
ES	19.969	234	8.414	2.909	0	6.128	0	73	1.586	224
FI	10.906	271	620	1.836	46	3.344	1.239	137	4.240	0
FR	27.515	918	10.502	2.734	390	9.910	1.422	0	1.425	1
HR	1.172	80	401	255	27	311	67	0	32	0
HU	4.457	108	1.405	680	112	1.529	345	31	245	2
IE	2.292	79	901	272	57	642	0	0	188	0
IT	24.191	595	8.541	1.756	284	10.149	2.274	109	411	13
LT	1.111	107	304	42	1	336	221	0	100	1
LU	918	42	270	21	15	260	1	0	9	0
LV	853	29	97	50	40	108	79	0	395	0
MT	55	0	0	13	0	42	0	0	0	0
NL	10.369	79	5.026	3.016	0	3.071	1.135	460	181	0
PL	16.534	1.839	3.910	906	815	4.873	867	451	1.871	0
PT	4.618	11	1.258	547	87	1.436	222	0	1.057	0
RO	6.661	619	2.179	1.203	150	1.867	243	148	236	1
SE	10.922	350	339	941	0	6.254	502	179	4.357	0
SI	1.322	40	452	95	53	558	51	0	73	0
SK	3.404	280	839	289	183	1.053	68	345	404	1
UK	21.119	1.079	7.917	2.167	89	7.888	673	103	1.149	54

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

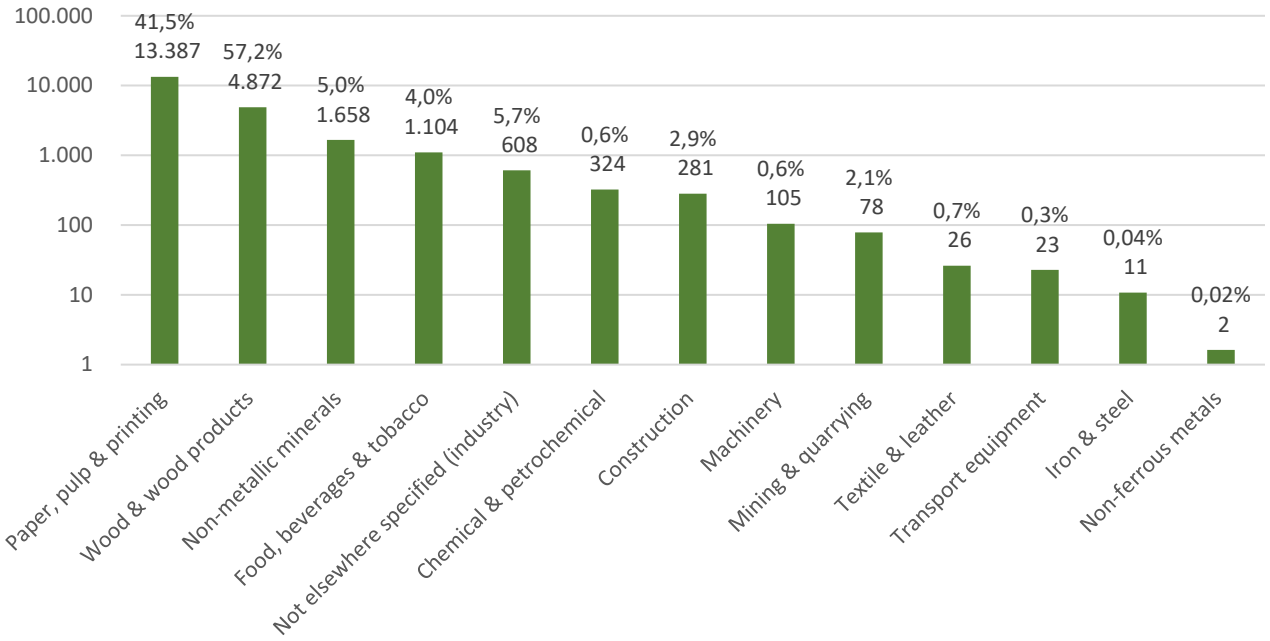
Figure 15 Share of biomass usage in the different industries in EU27 in 2019 (in ktoe - %)



Source: Eurostat

The paper, pulp, and print, as well as the wood and wood product industries combined used 82% of the biomass for energy consumption in 2019. As they are dealing with biomass product, namely wood, for their main activity, it seems logical that they use the residues for energy valorization. The non-metallic minerals, including glass, ceramic, cement, and other building material industries, are the third industrial sector users of biomass. It is the only industrial sector in the top 3 of industrial biomass users, which does not deal with biomass or organic residues in its main activity.

Figure 16 Biomass contribution* for final energy consumption in the different industry sectors in EU27 in 2019 (in ktoe and % of the total final energy consumption – logarithmic scale)

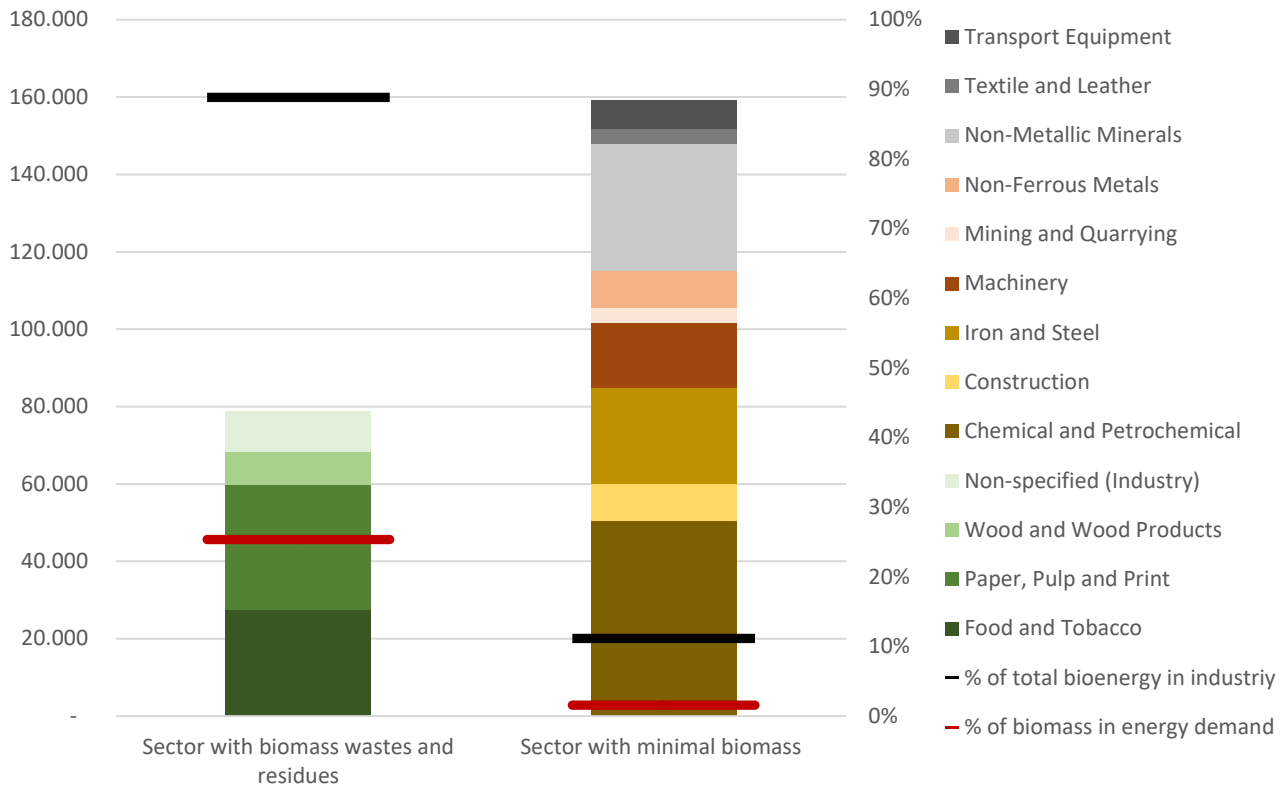


* Not counting the part of electricity or district heating consumed by the industry that has been produced by biomass
Source: Eurostat

In 2019, biomass contributed a significant share (>41%) of the total energy consumption in the paper, pulp and print industries as well as the wood and wood product ones. This important share shows that wood-related industries and bioenergy work very well together. The symbiosis of industrial processes, such as a sawmill or a pulp mill combined with bioenergy production, can increase resource efficiency, because residues are being used instead of ending up as waste. How this industrial symbiosis exactly 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. The non-metallic minerals industry is the third on the podium, where biomass represented 7% of its total energy consumption in 2019.

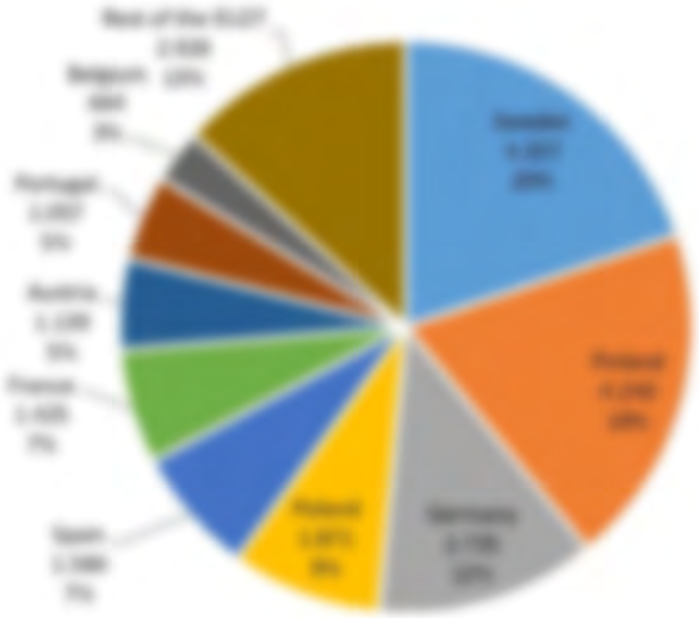
As illustrated in Figure 13, in 2019, 89% of the biomass used in EU27 Member States industries was consumed by those sectors that deal with biomass within their main activity. This is reflected in the following figures, as bioenergy represented 25,4% of the total energy demand from this group of industries. On the other hand, bioenergy represented just 1,6% of the total energy demand in comparison to the rest of the industries using just 11,2% of the bioenergy for industries. However, for those industrial activities often requiring high temperatures to process heat, bioenergy is one of the few solutions to decarbonise this segment of the economy. This clearly signifies those strong efforts as well as vital changes that are necessary in the industrial sectors to ensure that the (bio-based) fuel and the process are compatible, reliable and affordable, especially since there is no (or minimal) biomass usage.

Figure 17 Energy demand by industry and share of bioenergy for sectors dealing with biomass wastes and residues and for other sectors in EU27 in 2019 (ktoe and %)



Source: Eurostat

Figure 18 Country repartition of the biomass used in industries within EU27 in 2019 (in Mtoe and %)



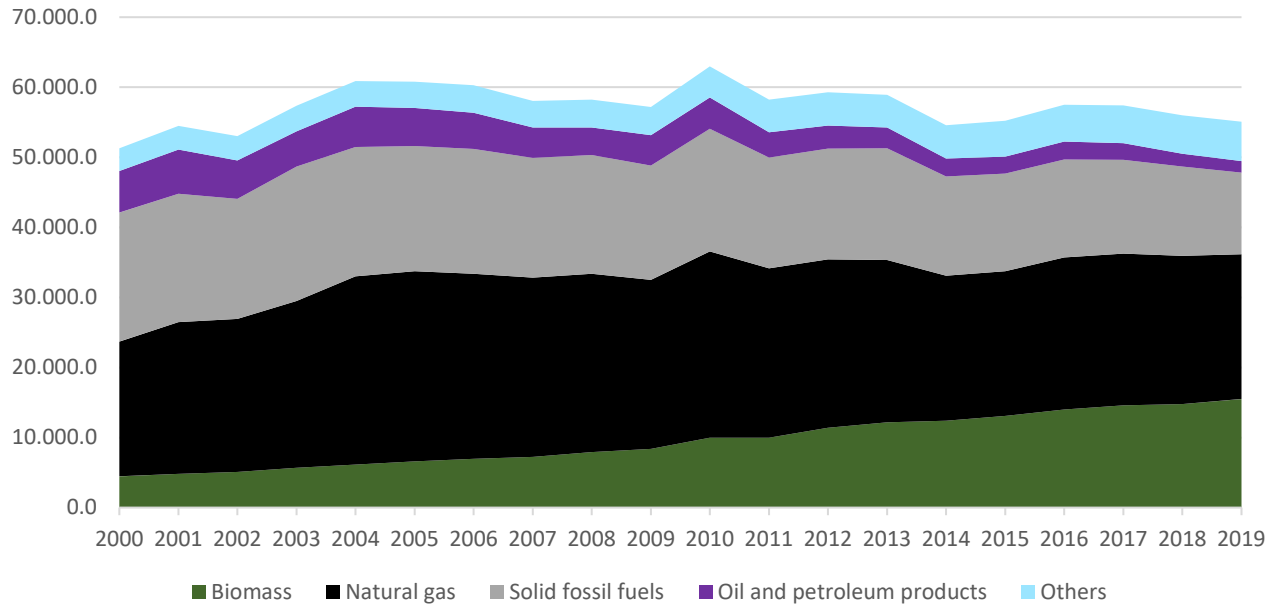
Source: Eurostat

Sweden, Finland, and Germany use a combined total of 1/3 of the entirety of biomass in industries from within the EU27 biomass. 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 the 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 then auto-produced and therefore directly auto-consumed is not included in derived heat but is instead included in the relevant final consumption sector. The derived heat is mainly used for the residential sector (21.319 ktoe), followed by the industrial sector (15.074 ktoe) and the commercial and services sector (9.470 ktoe). The rest is distributed among other sectors, partly for the internal use for the heat production as well as distribution losses.

Figure 19 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

Most of the district heating plants still rely on fossil fuels. In the last few decades, the use of solid fossil fuels as well as oil and petroleum products has decreased, while for natural gas the usage has remained quite stable. In 2019, renewables represented 27,6% of the energy used for derived heat production and 96,5% of it was bioenergy. The share of renewables is increasing, mainly biomass for derived heat – it has multiplied by more than 3 since 2000.

This trend has the potential to change in the future. The recast of the Renewable Energy Directive incentivises the use of efficient and renewable district heating solutions as it gives consumers the right to disconnect from inefficient district heating networks to enable the production of their own renewable heat. This provision not only incentivises individual consumers to produce their own renewable heat, but also pushes the district heating operators to switch to renewable fuels to prevent consumers from disconnecting.

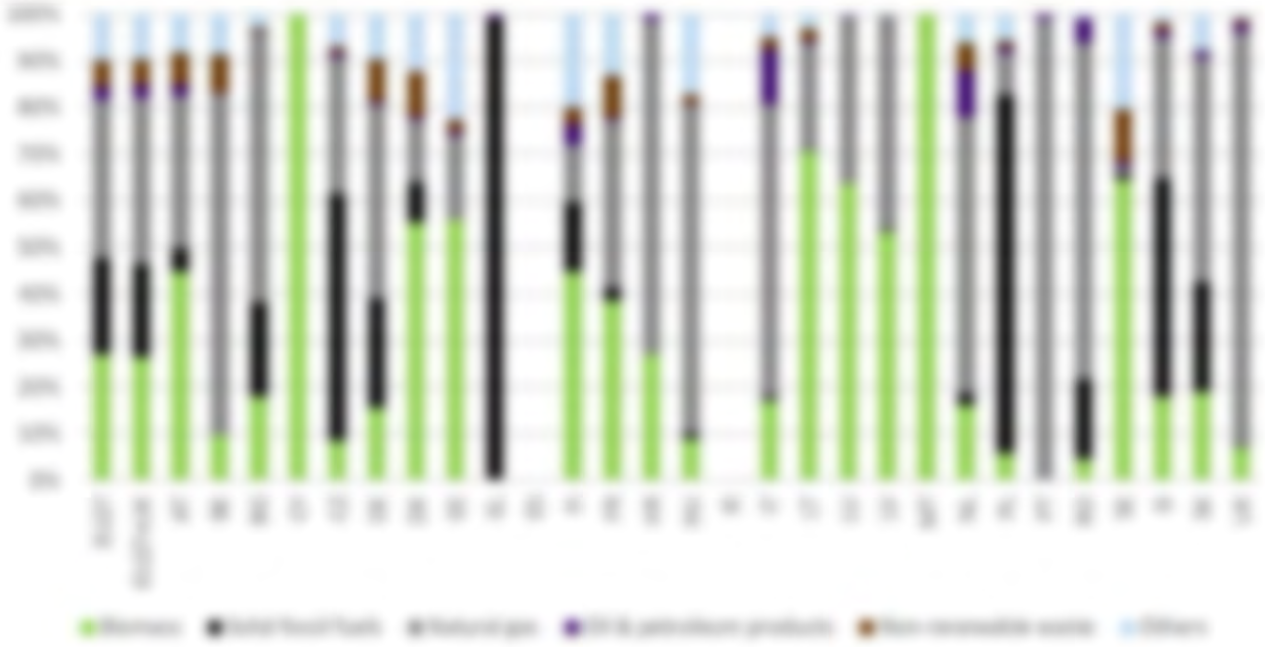
In order to foster the transition from fossil fuels to biomass, the 'polluter pays principle' should either be strengthened or introduced within the heat sector so that heat from fossil fuel production is gradually phased out.

Table 7 Derived heat production by fuel in EU27 in 2019 (in ktoe)

Heat from	Total Gross Heat Production	Growth Rate (2017-2018)	CHP	Heat Only
All Fuels	53.499	-1,7%	38.870	14.629
Solid Fossil Fuels	11.639	-6,4%	9.248	2.392
Natural Gas	19.272	-2,3%	13.960	5.312
Oil and Petroleum Products	1.633	10,5%	1.078	555
Non-Renewable Waste	3.095	5,3%	2.522	573
Manufactured Gases	880	-1,8%	772	107
Peat and Peat Products	727	-4,2%	529	198
Oil Shale and Oil Sands	47	13,8%	47	0
Nuclear Heat	95	-5,4%	95	0
Electricity	58	35,3%	8	51
All Renewables	16.053	5,0%	10.307	6.029
Solid Biomass	11.384	4,6%	7.140	4.244
Liquid Biofuels	129	-0,1%	71	58
Biogas	966	12,3%	624	624
Renewable Municipal Waste	2.892	4,4%	2.362	511
Geothermal	309	9,3%	0	309
Solar Thermal	57	5,2%	0	57
Ambient Heat (Heat Pumps)	317	2,6%	91	226

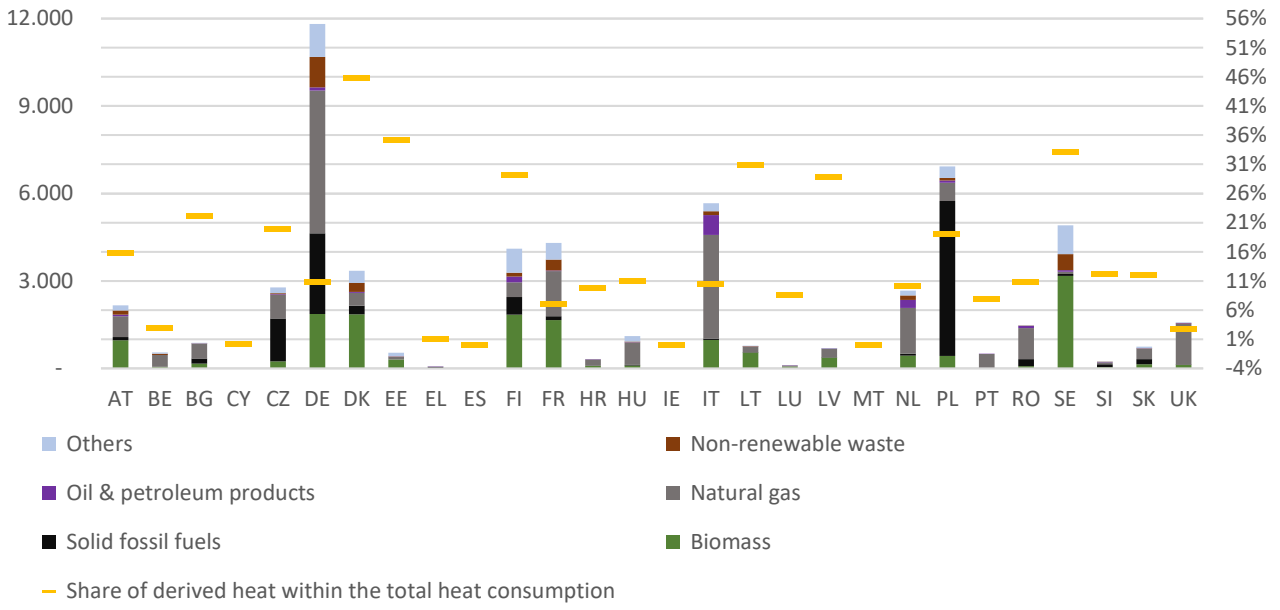
Note: Fuels mean the final derived heat producer from these fuels and not the fuel input for heat production.
Source: Eurostat

Figure 20 Division per fuel of the derived heat production in the EU27 Member States and UK in 2019 (in %)



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

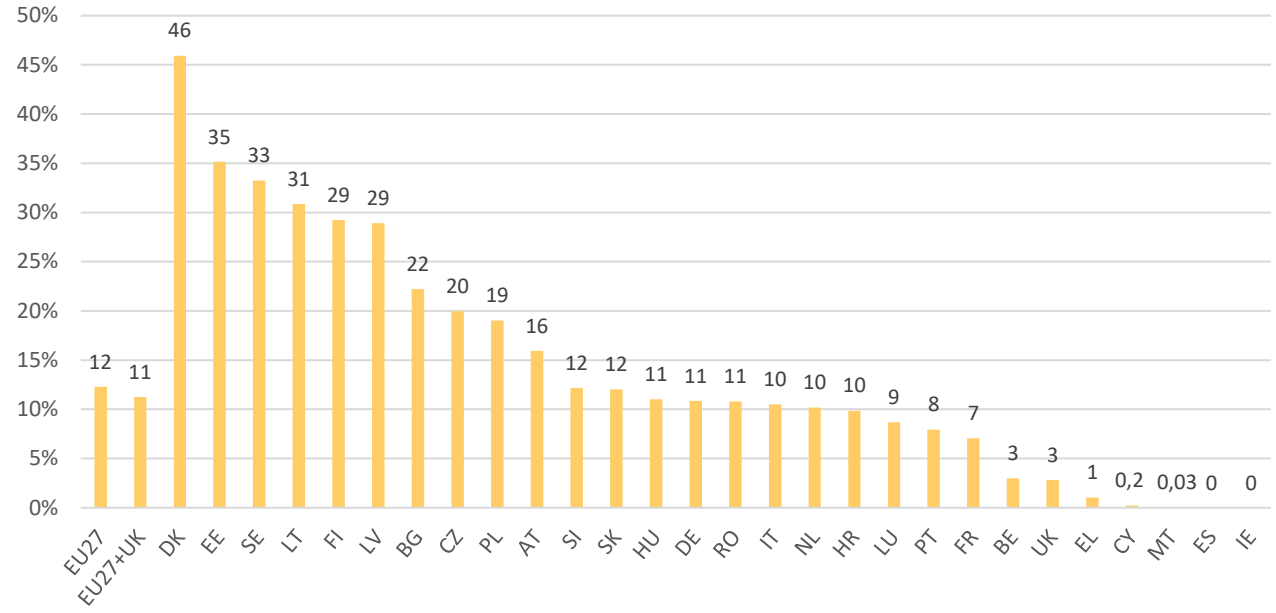
Figure 21 Derived heat production by fuel (in ktoe) and share of derived heat within the total heat consumption in the EU27 Member States and UK in 2019 (in %)



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.
Source: Eurostat

The share of derived heat within the total heat consumption might be underestimated here, since it is the final heat that is accounted for. Whilst for the rest of the sectors, it is the final consumption of the fuels for heat production that is measured and not the useful heat produced. Germany, Poland, and Italy are the main users of derived heat in absolute terms, and in those countries, fossil fuels represented most of the energy in 2019. In Poland, 76,8% of the derived heat was still produced from coal while bioenergy accounted for only 6,1%. Biomass could therefore have a significant role to play to retrofit those installations using coal in Poland but also in Germany, Finland, or the Czech Republic. That would be a significant improvement in terms of GHG Emissions reduction, among other advantages.

Figure 22 Share of derived heat within the total heat consumption in the EU27 Member States and UK in 2019 (in %)



Source: Eurostat

Looking at the importance of derived heat within the total heat consumption (Table 9), Denmark, Estonia and Sweden rank first followed by Lithuania. Lithuania is the country using the biggest amount of bioenergy in the derived heat production, namely 73%.

Table 8 Gross production of derived heat by type of fuels in EU27 Member States and UK in 2019 (in ktoe)

	Total derived heat	Solid fossil fuels	Natural gas	Oil & petroleum products	Non-renewable waste	Biomass	Others	Total heat consumption
EU27	94.994	11.638	16.272	1.633	3.096	51.577	1.185	440.120
Growth rate (2018-2019)	-1,3%	-8,4%	-2,1%	-10,1%	5,3%	5,0%	2,0%	-1,8%
EU27+UK	98.172	11.642	20.671	1.818	3.110	51.686	1.639	474.178
Growth rate (2018-2019)	-1,3%	-8,4%	-2,4%	-10,4%	5,2%	5,0%	2,0%	-1,7%
AT	2.164	107	708	56	145	970	177	13.579
BE	546	0	401	0	45	54	40	18.291
BG	879	178	511	1	5	159	25	9.955
CY	1	0	0	0	0	1	0	525
CZ	2.774	1.469	811	28	85	240	160	13.883
DE	11.814	2.768	4.905	111	1.040	1.861	1.130	106.695
DK	3.345	290	447	26	314	1.856	412	7.282
EE	537	0	97	5	13	301	121	1.538
EL	58	52	0	0	0	0	0	5.060
ES	0	0	0	0	0	0	0	29.303
FI	4.102	609	507	189	138	1.841	817	14.027
FR	4.299	123	1.549	21	863	1.462	561	61.044
HR	315	0	225	4	0	86	0	3.194
HU	1.105	15	778	2	21	100	190	10.018
IE	0	0	0	0	0	0	0	4.762
IT	5.667	45	3.549	662	140	979	272	53.679
LT	777	1	178	4	19	551	23	2.518
LU	96	0	35	0	0	61	0	1.107
LV	663	2	313	1	0	347	0	2.953
MT	0	0	0	0	0	0	0	81
NL	2.665	65	3.578	271	155	434	160	26.218
PL	6.924	5.330	623	78	88	421	995	36.377
PT	500	0	495	5	0	0	0	6.399
RO	1.468	252	1.057	77	0	71	10	13.582
SE	4.908	62	77	58	547	3.171	993	14.760
SI	222	104	67	3	4	40	4	1.824
SK	748	177	360	9	3	149	57	6.232
UK	3.178	3	1.403	36	15	115	15	33.998

Note 1: Late, heat: 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 A Gross Production of derived biofuel by type of biomass in EU27 Member States and UK in 2019 (in ktoe)

	Total biomass	Solid biomass	Biogas	Renewable waste	Liquid biofuels	Share of derived heat produced from biomass
EU27	74 371	71 384	964	2 862	126	27%
Growth rate (2018-2019)	5,3%	4,8%	12,1%	4,8%	-0,1%	6,4%
EU27+UK	74 436	71 434	964	2 907	129	27%
Growth rate (2018-2019)	5,3%	4,8%	12,1%	4,5%	-0,1%	6,4%
AT	970	893	4	73	0	40%
BE	54	8	13	31	2	10%
BG	239	233	5	3	0	18%
CY	1	0	1	0	0	100%
CZ	240	183	17	39	0	9%
DE	1.861	593	893	371	4	10%
DK	1.834	1.420	49	364	3	33%
EE	901	887	2	13	0	54%
EL	0	0	0	0	0	0%
ES	0	0	0	0	0	0%
FI	3.841	3.641	23	177	0	45%
FR	1.462	1.213	77	172	0	39%
HR	86	74	12	0	0	27%
HU	100	84	3	13	0	9%
IE	0	0	0	0	0	0%
IT	679	117	274	132	56	17%
LT	551	537	2	11	0	71%
LU	61	59	1	0	0	64%
LV	367	347	19	0	0	54%
MT	0	0	0	0	0	100%
NL	434	250	9	175	0	16%
PL	421	360	24	17	0	6%
PT	0	0	0	0	0	0%
RO	71	66	1	0	0	5%
SE	3.171	2.519	11	560	81	65%
SI	40	35	4	0	0	18%
SK	143	126	16	2	0	19%
UK	131	109	0	23	0	7%

Source Eurostat

5. Annexes

Table 10 Country Codes

EU28	European Union - 28 countries (2013-2020)
EU27	European Union - 27 countries (from 2020)
AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
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	Slovak Republic
UK	United Kingdom

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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