Biomethane in Europe

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IMPRESSUM

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Abstract

The European Commission wants to end Europe's dependence on Russian fossil fuels through the latest resolutions (REPowerEU). This is to be achieved, among other things, through increased production of biomethane. The previous, already very ambitious target of 17 billion cubic metres in 2030 (Fit for 55) is to be practically doubled to 35 billion cubic metres of biomethane per year. Without question, the sustainably available renewable raw material potentials must be used to replace fossil energy sources. This applies in particular to waste and residual materials such as liquid manure or biowaste. However, this study by ifeu, financed by the European Climate Foundation (ECF), questions whether these are sufficient to achieve the set target by 2030. Rather, if this target is adhered to, there is a risk that large shares will have to be contributed via cultivated biomass (especially maize), this would translate to about 5% of the arable land in the European Union. This would be associated with considerable negative consequences due to the land requirements and with marginal greenhouse gas savings.

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1 Introduction

The European Commission published the "REPowerEU" plan on 8 March 2022 with the objective to phase out the European dependency on Russian fossil fuel resources and to increase the resilience of the EU-wide energy system based on two pillars:

1. Diversifying gas supplies, via higher Liquefied Natural Gas (LNG) and pipeline imports from non-Russian suppliers,
2. and larger volumes of biomethane and renewable hydrogen production and imports.[1]

Regarding biomethane the earlier target of 17 billion cubic metres (bcm) set by the EU executive in its Fit for 55 Communication is doubled to 35 bcm of biomethane per year by 2030. This would mean a tenfold increase in production across the EU by 2030.

There is no doubt that the sustainably available renewable raw material potentials should be used to replace fossil fuels. This is all the more true when these pose not only a climate threat but also a geopolitical risk. Nevertheless, such ambitious targets need to be questioned as to what extent they are actually feasible or what adverse consequences may be tied to them. For this reason, this paper discusses the following questions:

- How would the 35 bcm in 2030 be produced following existing trends?
- What would the life-cycle emissions of 35 bcm biomethane in 2030 be? (GHG impact compared to natural gas?)
- How much biomethane can realistically be sustainably produced in the European Union? In which countries?
- How much land would be required for the production of 35bcm of biomethane, assuming production happens largely via feed & food stocks
- What are the policy take aways at EU and national level?

Within the subsequent chapters these questions are explored.

Remark:
All figures related to biomethane are given in billion cubicmeter (bcm) natural gas equivalent, applying as conversion base : 1 bcm = **10.467** TWh or 1 TWh = **0.09554** bcm

[1] https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511

2 Biomethane in the EU – existing trends and potentials

2.1 What is biomethane?

Biomethane is a form of methane that, unlike natural gas, is produced from biomass. The most common production route is the "upgrading" of biogas. Biogas is produced by the decomposition of organic matter (crops, agricultural waste, manure, biowaste etc.). These substrates are put into a biogas plant under exclusion of oxygen (anaerobic digestion). With the help of a series of bacteria, the organic material is decomposed, releasing a mixture of gases. Depending on the type of organic material, it consists of 45 – 85 % methane (CH_4) and 25 – 50 % carbon dioxide (CO_2). Various techniques are available for upgrading to biomethane. The processes are state of the art and efficient: up to 97 % of the methane in biogas can be recovered in natural gas quality.

Thermal gasification of solid biomass followed by methanation is an alternative way to produce biomethane. This pathway is not yet commercially available and exists currently only on demonstration scale (Alberici et al. 2021).

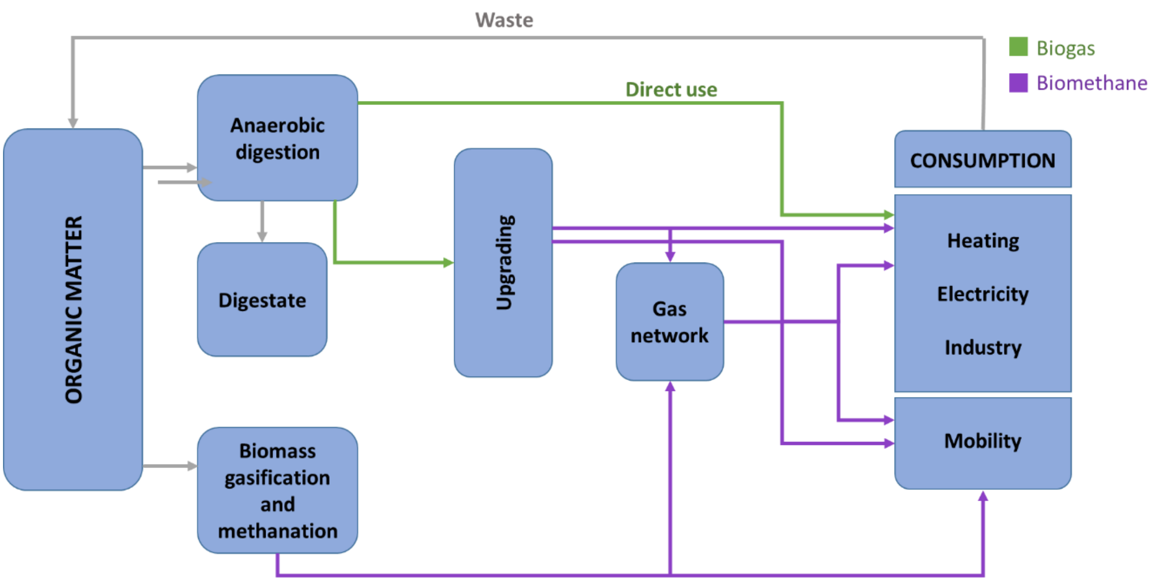


Figure 1: Biogas and biomethane production pathways; source (IEA 2020), illustration by ifeu

2.2 Status quo of biogas and biomethane production in Europe

Total production in Europe

According to the European Biogas Association (EBA) there are around 20,000 biogas plants operating in Europe in 2020. Around 1,000 of them upgrade and inject biomethane into the natural gas grid. The combined biogas and biomethane production was approx. 18 bcm (natural gas equivalent), of which 83 % was directly used to produce local power or heat. Only 3 bcm have been upgraded to biomethane (European Biogas Association 2022a).

During the last decade biogas and biomethane production in the EU has increased due to the promotion of renewable energy policies. The development of biomethane production is shown in Figure 2. Unlike the continuous growth of biomethane production, the increment in biogas stagnated between 2015 and 2019 around 15 bcm. A stronger increase was only seen again in 2020.

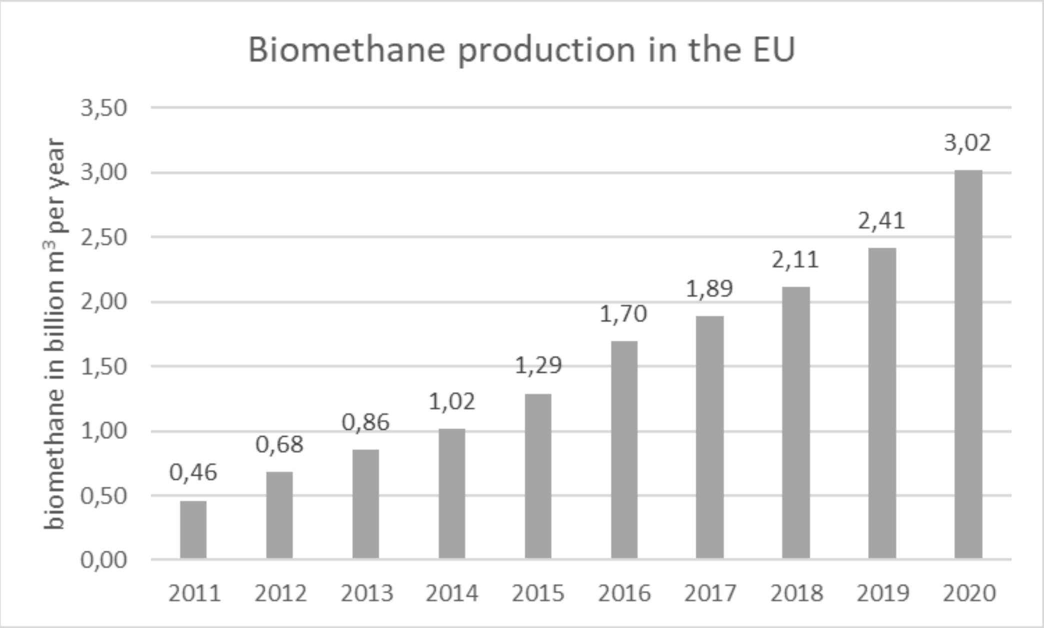


Figure 2: Biomethane production in Europe from 2011 until 2020; source (European Biogas Association 2022a), illustration by ifeu

Production by country

The biggest biogas and biomethane producer in Europe is Germany (see Figure 3 and Figure 4). If the UK is included, it follows in second place. Italy and France are the next largest biogas producers but are more in the middle of the producers in terms of biomethane. The Czech Republic, Poland, Belgium and Spain are also relevant biogas producers, but have almost no biomethane production. In contrast, biomethane production is disproportionately high in the Netherlands, Denmark and Sweden. In Sweden, about 60 % of the biogas produced is upgraded to biomethane.

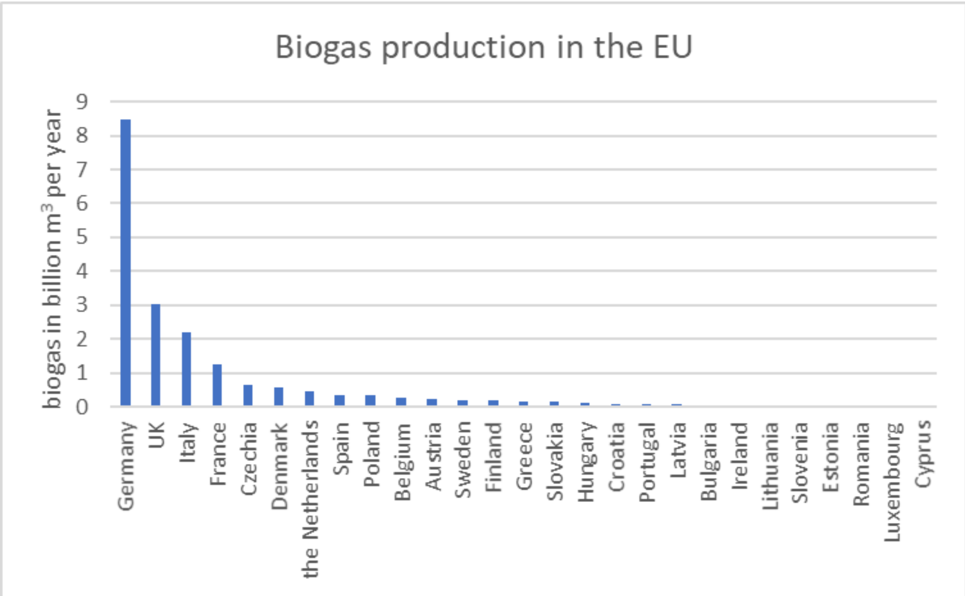


Figure 3: Biogas production in European countries, in 2020; source: (EUROSTAT); illustration by ifeu

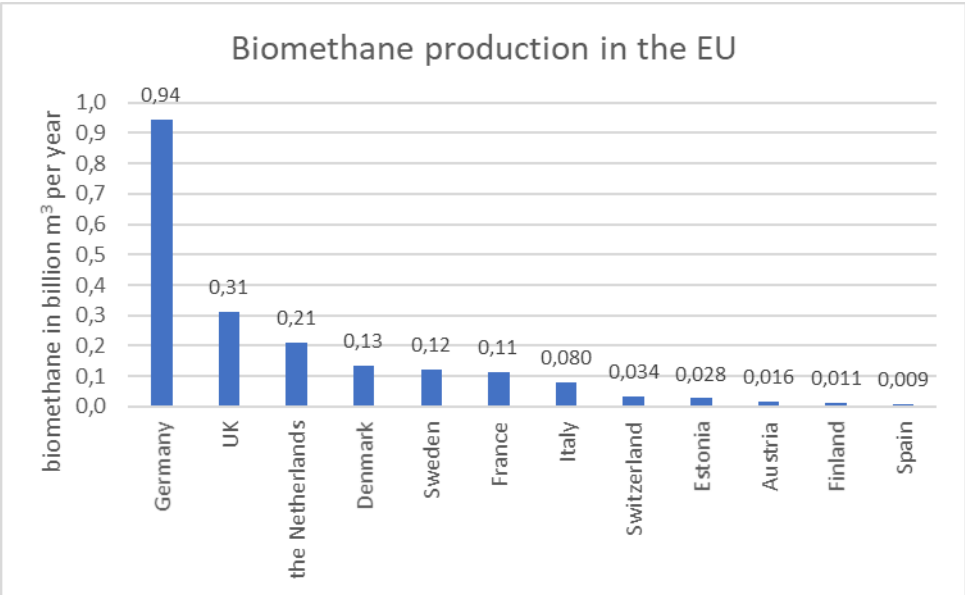


Figure 4: Biomethane production in European countries, in 2018; source: (REGATRACE 2020); illustration by ifeu

Applied feedstocks

The composition of the substrates of biogas plants differs significantly among European countries. While the production of sewage and landfill gas has reached a plateau since more than ten years, agricultural material (crops and manure) and biowaste (municipal and industrial) constituted the overall increase in biogas production since 2005. In Germany – the largest producer of biogas – the use of energy crops (silage maize, etc.) developed to be the most relevant feedstock, due to high biogas yields and favourable support schemes. With reference to mass input crops cover slightly more than 50 % of the feedstock in German biogas plants. With reference to energy output 78 % are attributed to crops (Daniel-Gromke et al. 2017). Also, in Austria, Italy and Poland biogas production is based on crops by rather high shares. The utilisation of agricultural residues such as manure is particularly important in countries like Denmark, France, and also Italy and Germany. In Belgium the use of industrial organic waste from the food and beverage industry is most relevant, while in Estonia, Poland and Sweden still sewage sludge dominates the biogas market (European Biogas Association 2022a).

Based on data from the (European Biogas Association 2022b) and various evaluations, e.g. (Wouters et al. 2020), it can be seen that the largest feedstock contribution for biogas production in Europe, at around 42 %, is based on crops (see Figure 5).

The second most important substrate in terms of quantity - agricultural waste, i.e. predominantly slurry - has a significantly lower gas formation rate. It therefore contributes less than 24 % to the total biogas.

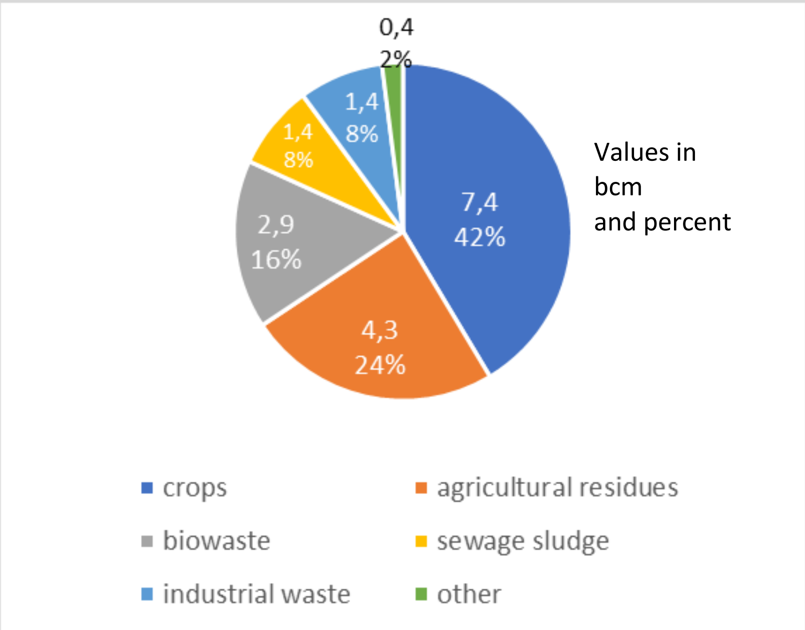


Figure 5: Feedstocks applied for biogas production in the EU; source: (Wouters et al. 2020); illustration by ifeu

2.3 Potentials for biomethane production in the EU

What is needed to meet the target?

Starting with 18 bcm biogas in total and 3 bcm biomethane in Europe by today, the question is: would the target of 35 bcm biomethane sustainably produced be realistic? It has been shown in the previous chapter that biomethane production in the EU is increasing rapidly. However, to reach the target, a significant acceleration of the growth is needed, as Figure 6 shows.

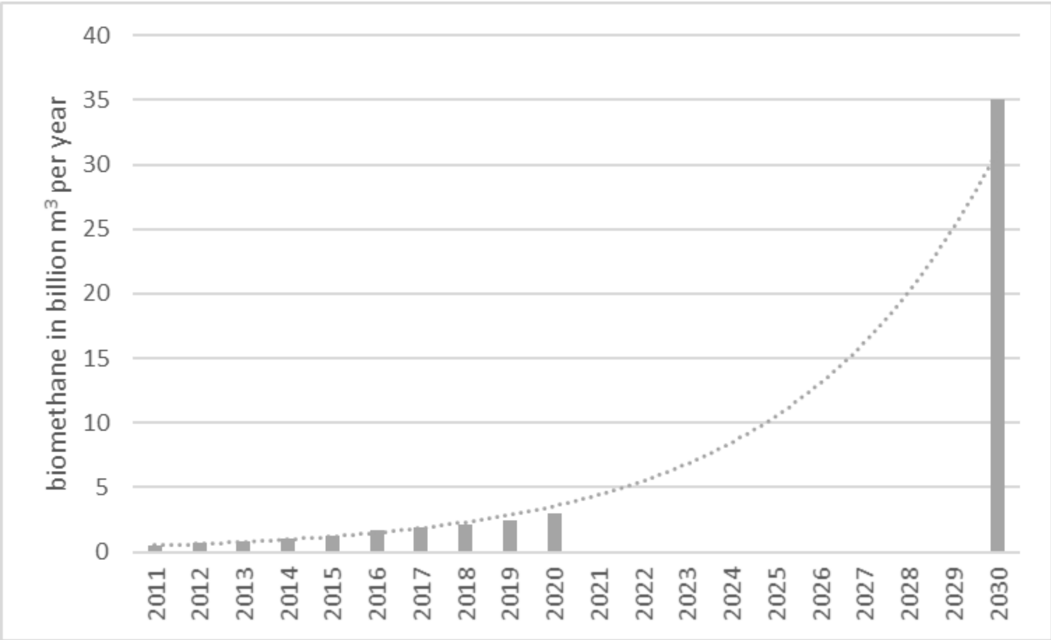


Figure 6: Development of biomethane production in the EU to date and the necessary development up to the target in 2030; (European Biogas Association 2022a), illustration by ifeu

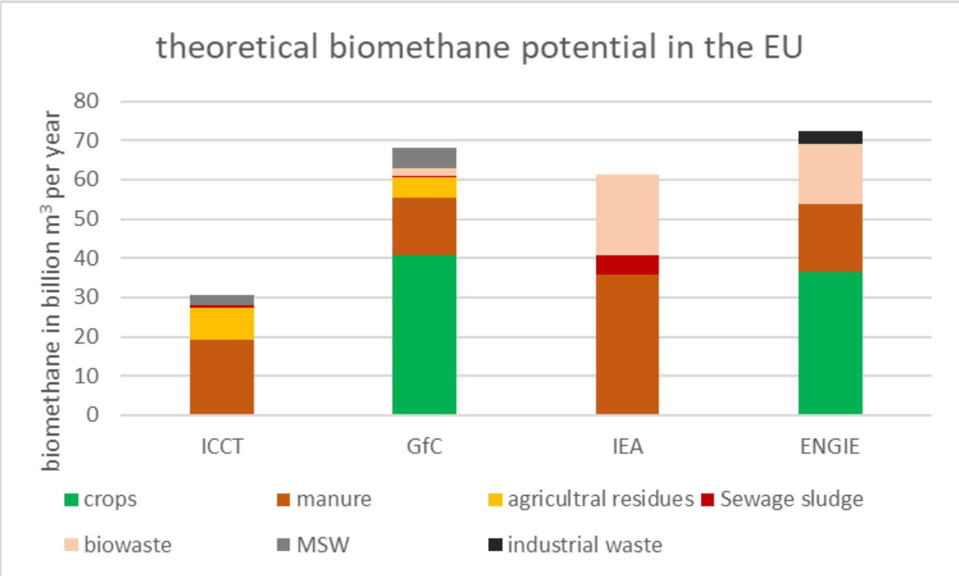
Answers within literature

There is a large number of studies assessing the potential of biogas and biomethane production in Europe. The European Commission published the 'A Clean Planet for all' Communication setting out the Commission's vision to become climate neutral by 2050. We analysed the work of

- The International Council on Clean Transportation (ICCT 2021) and (Searle et al. 2018)
- The Joint Research Center (JRC) (Scarlat et al. 2018a) (Scarlat et al. 2018b)
- REGATRACE (Decorte et al. 2020)
- EBA (European Biogas Association 2022a)
- Gas for Climate (GfC) (Alberici et al. 2021)
- International Energy Agency: Outlook for biogas and biomethane (IEA 2020)
- ENGIE (Birman et al. 2021)
- (Winquist et al. 2021)
- CE Delft on behalf of the European Commission (Kampmann et al. 2016) (Zhou et al. 2021)

The majority of studies consider a time horizon until 2050 or the so-called technical potential and thus the maximum that is theoretically available. MSW: municipal solid waste

Figure 7 gives a summary of selected studies. While the study by GfC (Alberici et al. 2021) and ENGIE (Birman et al. 2021) enclose crop-based potentials[1], ICCT and IEA just refer to wastes and residues. Leaving the crops aside, the ICCT, GfC and ENGIE results are not too far apart, ranging from 30 to 36 bcm. The IEA study comes to an overall result for the biogas potential based on manure and waste that is twice as high as the other three studies. The reason for the differences lies in the respective different approaches: for example, IEA calculates the biogas production from manure based on the total livestock kept in Europe. In contrast, the ICCT, for example, assumes that only livestock kept indoors is available for manure utilisation. Including further deductions, the ICCT's calculation therefore results in a potential of 50 % compared to the theoretical maximum value of IEA.



MSW: municipal solid waste

Figure 7: Summary of selected studies results concerning the biomethane potentials in the EU by feedstock. Unit: bcm; source: (Alberici et al. 2021) and the respective study; illustration by ifeu

At this point it must be emphasized that the estimates of theoretical potentials say nothing about the potentials that can actually be realized. Restrictions in terms of technical implementation within the time scale, economic issues and sustainability must be considered.

Realistic biomethane potentials from waste and residues

We consider the ICCT estimation as a kind of "best case" scenario. This means: 30.6 bcm of biomethane can be provided by waste and residues. This scenario still describes a theoretical potential. In order to derive a "realistic and sustainable case" scenario, we consider:

- The restricted timeline that remains until 2030 to install the technical capacities and to mobilize the feedstock.

[1] In both cases the studies state to refer to cover or sequential crops which are grown between the regular seasons. The studies assume that 100 % of the arable land in Europe can be covered by these crops, presuming a yield on average around 5 tonnes of dry matter per hectare and a complete use for biomethane production.

- That most existing biogas plants are small scale and decentralized in the agricultural area; this is even more important since the majority of feedstock (manure and agricultural residues) has to be collected in the agricultural area too.
- That biomethane production is much more demanding than just biogas production in terms of plant scale, centralized location and connection to the general gas grid.
- That agricultural residues (mostly straw) are also requested by other converters such as bioethanol plants for advanced biofuel.

Based on these considerations we estimate the realistic biogas potential to be available in 2030 by

- 50 % of the potential for manure
- 50 % of the potential for agricultural residues
- 100 % of the potential for sewage sludge and municipal solid waste (MSW)

With reference to the ICCT estimation. **This results in an overall "realistic and sustainable case" of approximately 17 bcm biomethane in 2030.**

2.4 Intermediate crops – the better solution?

A number of the analysed studies emphasize intermediate crops[1] as another feedstock with high potential for biomethane production. According to the RED II (Article 2 (40)) this type of crops is presumed not to take up additional land with its cultivation. However, the definition by the RED II supposes that this property needs to be proven by case.

The estimated potentials for intermediate or sequential crops reach up to 40 bcm (Alberici et al. 2021) (Birman et al. 2021) as already shown in MSW: municipal solid waste

Figure 7. It is to be welcomed that in agriculture intermediate crops are planted, especially for reasons of diversification, soil protection and soil improvement. This is an essential part of good agricultural practice, especially in advance of crops that otherwise lead to long periods of uncovered ground (e.g. maize). However, it is questioned at this point whether this biomass should be used to produce biogas in its entirety or even predominantly.

(Searle et al. 2018) analysed this option and concluded that across the EU cover cropping is rarely applied (less than 3 % of the area). They assume that the reason is that cover crops are generally low-yielding. As a subordinated culture, it is grown in short rotation cycle and – self-evidently – outside or at the margin of the growing season. Mostly the biomass is ploughed into the soil to improve the organic matter. If harvested, it is mostly used as animal feed. Intermediate crops with actually high yields need nutrients and water. Thus, they are hard to distinguish from major crops.

The analysed estimations concerning the potential build on the assumption that intermediate crops yield around 5 tonnes of dry matter per hectare all through European arable land. The authors of this study share the doubts of (Searle et al. 2018) and therefore do not include intermediate crops in the estimation of realistic potentials.

[1] Also named as catch crops, cover crops or sequential crops in the different studies.

2.5 Scenarios to fulfil the 35 bcm target

Against the background of the different estimates of the availability of waste and residual materials, two scenarios are considered for further analysis. One case represents a particularly optimistic situation with high availability, so to speak as the "theoretical best case". The remaining amount to meet the 35 bcm target is contributed by biomethane based on maize. In the "realistic case" with lower availability of waste and residual materials, this remaining amount is correspondingly higher. Thus, in order to fulfil the target of 35 bcm in 2030 there is need of biomethane from crops amounting to:

- 4.4 bcm for the “theoretically best case” scenario
- 18 bcm for the “realistic case” scenario

Important remark: “Realistic” does not include the presumption that the production of 35 bcm biomethane in 2030 is considered as realistic (see Figure 6). The term realistic in this case just refers to a realistic composition of feedstock in the case that 35 bcm biomethane should be produced in 2030.

Table 1: Composition of feedstock for the two scenarios

	Theoretical best case scenario		Realistic case scenario	
	bcm	PJ	bcm	PJ
Manure	19.3	738	9.7	369
Agricultural residues (straw)	8.2	313	4.1	157
Biowaste	2.5	97	2.5	97
Sewage sludge	0.6	22	0.6	22
Maize	4.4	167	18.1	692
Sum	35.0	1,337	35.0	1,337

Source: calculations by ifeu, based on (ICCT 2021)

3 Land required to cover the REPowerEU plan for biomethane

According to the scenarios defined above following quantities of land is required to cover the REPowerEU plan for bio-methane:

- "Theoretically best case": 1.27 million hectares
- "realistic case": 5.29 million hectares

These estimations are based on data taken from BioGrace, which provides a yield factor of 131 GJ biomethane per hectare and year (equals 3,430 m^3 per hectare and year), taken silage maize as feedstock.

What do these figures mean?

- The arable land in the EU amounts to 105 million ha. The area needed for biogas from maize in a realistic case would therefore take up **5 % of the total arable land in the EU**.
- On 5.29 million hectares – the area needed for the realistic case – following harvests would be gained per year:
  - Wheat: 27.5 million tonnes, corresponding to **20 % of the European wheat production** and to **83 % of the Ukrainian wheat production** (in 2021)
  - Rapeseed: 16.4 million tonnes corresponding to **108 % of the European rapeseed production.**

However, the occupation of land by energy crops can also be considered from another angle. Namely, the lost benefit of carbon storage on the land. Using the example of biofuels in Germany, (Fehrenbach & Bürck 2022) have already shown that instead of cultivating energy crops and thus replacing fossil fuels, the climate balance is more advantageous to forego this and leave the area to be covered with carbon-rich natural vegetation. This is because the latter is the foregone benefit of biofuel cultivation and is therefore included in the calculation of the GHG balance as carbon opportunity costs.

With an average annual increment of about 2 t carbon per hectare (equals 7.33 t CO_2e) for the initial phase of a temperate-continental forest in Europe, an annual storage capacity of about **39 million tonnes CO_2** would be possible on 5.29 million hectares. This value will be discussed again at the end of the following chapter.

4 Life-cycle GHG emissions of biomethane compared to natural gas

The GHG intensity of biomethane is strongly depending on feedstock and technical conditions. Emission factors can be taken from the Annex V and VI of the RED II, which are transparently documented in the GHG-calculation tool BioGrace II.[1]

(Zhou et al. 2021) also worked out life-cycle GHG emissions of biomethane and hydrogen pathways in the European Union. They applied the GREET model (Argonne National Laboratory 2020) and they disclose the large ranges given by the possible variations of the pathways. One point of importance is the grade of avoided gas leakage during the fermentation and upgrading process as well as from digestate storage. Another crucial point is the credit that can be given to the fermentation of manure. The reason therefore is that considerable methane emissions are released by storing and spreading non-fermented manure, which can be avoided by fermentation.

The GHG intensity of EU natural gas is 67 g CO_2e/MJ with reference to (Giuntoli et al. 2017) and (Prussi et al. 2020).

Table 2 gives an overview on the GHG intensity of the respective biomethane pathways as applied by ICCT and BioGrace. Since there are no data available for biogas from straw in usual data bases we refer to the BioEm study (Fehrenbach et al. 2016). The following emission factors are selected for the calculations: the data from ICCT for manure, sewage sludge and maize. For complementing we adopt the factor from BioGrace for biowaste (applying the same one for municipal solid waste).

The choice of the ICCT value for manure is based on the comprehensive derivation of this value in the corresponding study. As far as maize is concerned, the ICCT value is also considered appropriate here because it also takes land use change into account to a moderate degree. In addition, the value of 35 g CO2e/MJ from BioGrace represents a best practice situation that cannot be assumed to be representative for an overall view within the EU.

[1] https://biograce.net/biograce2/img/files/BioGrace-II_GHG_calculation_tool_-_Version_4a.zip

Table 2: GHG intensity of the pathways

	GHG intensity in g CO_2e/MJ biomethane			
	BioGrace	**ICCT**	**BioEm**	**Selected factor**
Manure	-96.1 - +12.1	-30		-30
Agricultural residues (straw)			10	10
Biowaste	19.2			19.2
Sewage sludge		-69		-69
Maize	35	42 (+ 21 for LUC)		63
Natural gas		67		67

Source: www.BioGrace.net; (Zhou et al. 2021) ; (Fehrenbach et al. 2016)

Figure 8 gives the estimated GHG emissions from the production of 35 bcm biomethane along with the two scenarios:

- Theoretical best case scenario: **- 8.1** million tonnes of CO_2e, minus means, there is an overall avoidance of GHG emissions due to the high quantity of manure fermentation
- Realistic case scenario: **+ 34.5** million tonnes of CO_2e, which is dominated by the emissions from biomethane production from maize.

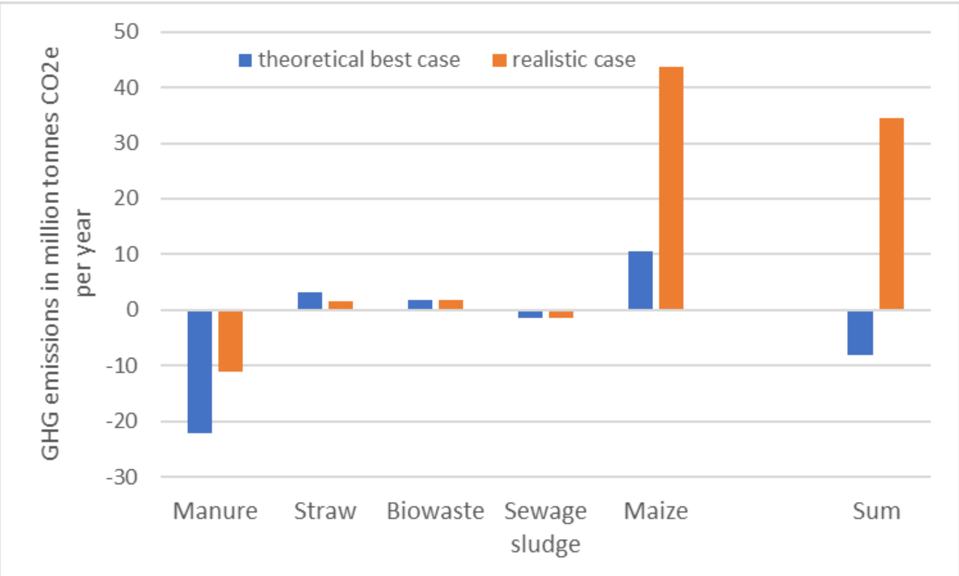


Figure 8: GHG emissions from the production of 35 bcm biomethane; source and illustration by ifeu

35 bcm of natural gas mean 89.6 million tonnes of CO_2e emission. Substituting these quantities of natural gas by the realistic case scenario would lead to a net saving of 55.1 million tonnes of CO_2e emission.

For the realistic case, Figure 9 shows the contribution of the single feedstocks to the net GHG emissions from the production of 35 bcm biomethane compared to the substituted natural gas. It discloses clearly that the predominant saving is due to the share of manure (36 million tonnes of CO_2e). Whereas the large biomethane amount from maize (18.1 bcm) just leads to a comparatively small saving (2.8 million tonnes of CO_2e).

Conclusion: biomethane from silage maize is highly inefficient in terms of GHG saving.

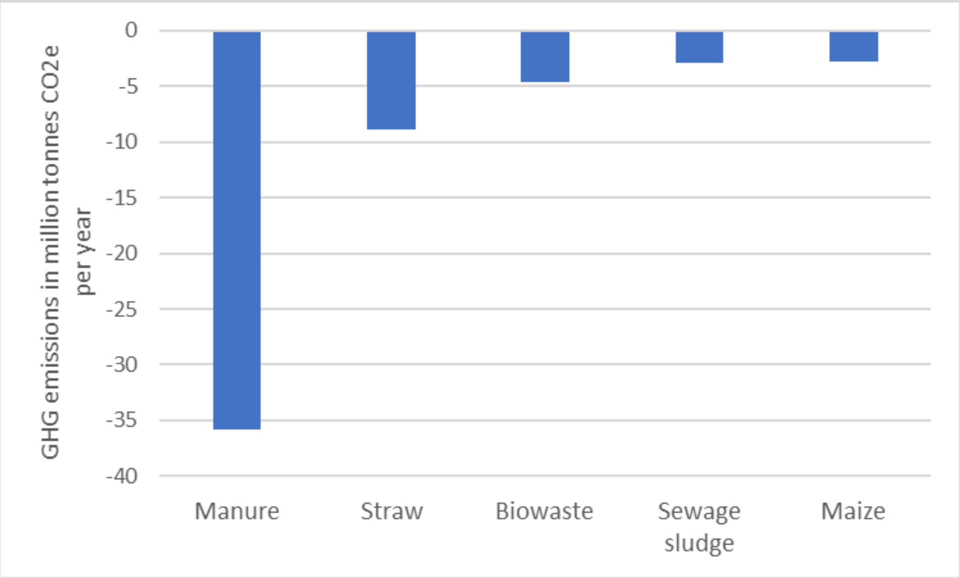


Figure 9: Contribution of the single feedstocks to the net GHG emissions from the production of 35 bcm biomethane compared to the substituted natural gas for the realistic scenario; source and illustration by ifeu

As mentioned at the end of the previous chapter, carbon opportunity costs should also be included in this context. These were calculated as 39 million tons CO_2 per year. Thus, this forgone climate benefit is more than ten times higher than the saving by substituting fossil natural by maize-based biomethane.

5 Economic and further aspects

Within this short study, a comparison of costs is given at a very rough level. Cost factors describing the near future development are typically extremely vague and speculative. This is all the more true in view of the current situation: while the wholesale price of natural gas was relatively stable around EUR 20 per MWh until autumn 2021, prices rose in some cases to as much as EUR 140/MWh by the end of 2021 (majorly due to Gazprom's lack of supply in the spot market). Afterwards, the price fell again before rising to as much as EUR 350 following the Russian Federation's invasion of Ukraine. The further course of market prices is completely uncertain and depends on how other suppliers (e.g. USA, Qatar) are called upon to replace Russian gas on the European market.

For the comparison of biomethane with natural gas, another difficulty is that market prices (including profit margins) are compared with production costs. (Wouters et al. 2020) estimate the costs for biomethane production through anaerobic digestion currently within a range from 50 EUR/MWh to 90 EUR/MWh. The main determinants are feedstock and plant scale.

Compared with "normal" wholesale prices of natural gas, biomethane prices would be twofold to over fourfold. Compared with the "irrational" prices under the given war conditions biomethane appears to be an acceptable economic alternative.

Gasification – an additional solution?

Withinthis short study, producing biogas via the gasification of solid biomass such as wood is not considered as an option with relevant potential within the horizon until 2030. Without a doubt, there is some potential to produce biogenic fuels in this way. However, the following factors clearly limit this potential:

- The state of implementation is still very low, as stated in chapter 2.1. According to (Alberici et al. 2021), biomass gasification with biomethane synthesis is not yet commercially available. It only exists at demonstration scale by ENGIE in France.[1]
- (Wouters et al. 2020) estimate the costs for biomethane production through gasification within a range from 90 EUR/MWh to 100 EUR/MWh.
- Some studies figure out potentials of 30 bcm biomethane and more by gasification (Alberici et al. 2021) (BIRMAN et al. 2021), assuming there is sufficient feedstock based on wood. However, we already see limitations in this availability, on the one hand because the pressure of use on the raw material wood is already very high and leads to scarcity in some countries. The potential of wood is already claimed by different use options and thus multiple, e.g. energy wood for biomass CHPs or increasing the use of wood as a building material.

[1] The GAYA project plans to produce 0.02 bcm biomethane from 2026
https://www.engie.com/en/news/gaya-energy-waste-gas-renewable

- It should also be noted that the net climate change benefits of wood energy use are controversial. Increased wood extraction reduces the carbon sink capacity of the forest (Soimakallio et al. 2022), (Fehrenbach et al. 2021).
- From the utilisation side, the production of biomethane appears to make considerably more sense than liquid fuels via the wood gasification route. Finally, the power-to-liquids and drop-in liquid fuels produced from gasification may be more economical and have a greater potential market share than gaseous fuels.

We agree with the findings of (Searle et al. 2018) that gasification to gain biomethane can be economical with moderate policy incentives once commercialized. However, the actual implementation of this pathway on a significant scale is very questionable.

6 Policy take aways at EU and national level

The following key statements and recommendations can be derived from the preceding analyses:

- There is relevant potential in residues and waste in the EU. Their utilisation via biogas and biomethane production is appropriate and recommendable in many respects. This applies first and foremost to the fermentation of slurry and manure, as methane emissions can also be avoided in this way. Furthermore, the expansion of biowaste fermentation and the digestion of sewage sludge are sensible measures. However, they contribute rather little to the overall potential.
- A realistic EU-wide potential for biomethane based on waste and residual materials is estimated at approx. 17 bcm. It is considered
  - that this means a ramp-up of 5 to 6 times the current production within the remaining seven and a half years.
  - that the livestock farms, where the majority of the feedstock is produced, are distributed in rural areas and are often too small for a biogas plant with biomethane processing.
  - that in many cases direct use of biogas for electricity is the economically more attractive path for potential plant operators.
- In order to achieve the 35 bcm biomethane target, the residues available for biogas production will therefore not be sufficient and a considerable amount of crop based-biomass would have to be used. This would have considerable disadvantages in many respects:
  - In a realistic scenario around 5 to 6 million hectares of arable would be required. This equals to 5 % of the complete arable land and 20 % of the land used for wheat cultivation in the EU27. It would be more than the area that is used in the Ukraine for rapeseed production. Occupying land for biomethane production would thus lower the land availability for food production significantly.
  - The GHG saving from biomethane based on silage maize is much lower than the GHG saving based on manure. A limitation to 17 bcm biomethane from residues already fulfils almost as much in the context of calculating GHG savings as a doubling to 35 bcm using maize biomethane. In other words, 18 bcm of maize biomethane is virtually dispensable for climate protection.
  - On the contrary, the opposite is the case when the carbon opportunity costs are taken into account: foregoing the cultivation of maize for biogas in favour of the growth of a carbon-rich natural forest would contribute far more to climate protection than replacing natural gas with biomethane produced on the same area.

The core problem of the "REPowerEU" plan is thus that it sets excessively high quantity targets without setting further conditions. We therefore recommend to the European Commission:

- To revise the biomethane target in the "REPowerEU" plan, in order to avoid the sigificant negative impacts from crop-based biogas. This can be done either by severely restricting the share of crop-based biomethane or excluding it from eligibility for this target altogether.
- To create coherence with the RED II. In this legal standard, the eligibility of crop-based biofuels is clearly restricted (for good reasons) and the use of wastes and residues is clearly prioritised. Thus, the REPowerEU plan in a way represents a leakage option versus the RED II regulation. This should be prevented by all means.

We recommend national Governments:

- To take all possible measures to exploit the actual **sustainable** potential of biomethane. This refers primarily to the fermentation of manure and slurry as well as the complete collection of biowaste and its use for biogas production. Likewise, wastewater should be treated nationwide and sewage sludge should be utilised for biogas production.
- To avoid any incentives for further cultivation of biomass for biogas production. This includes that when implementing RED II in national legislation, the capping rule for biofuel from food and feed crops must also be regarded for biogas.
- This does not apply to designated catch crops as long as it is ensured that their harvest does not conflict with other uses (e.g. humus formation, animal feed). Therefore, before catch crops are funded for biogas production, technical criteria and conditions for such funding should be in place.
- To create or promote infrastructure so that the biogas produced in rural areas can also be processed and fed into the gas grid. However, it must also be weighed up in which cases this is not appropriate and direct use of the biogas to generate electricity is the better option. The “REPowerEU" plan shall not lead to suboptimal paths being taken to fulfill a mere quantitative target.

Overall, the study resumes that biomethane production will only be able to play a minor role in replacing Russian gas. While sustainable potentials shall be exploited, the main effort should be put on more effective measures such as electrification, energy savings and efficiency increase to reduce gas demand.

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