ENERGIGAS SVERIGE

Biomethane in Sweden – market overview and policies

Linus Klackenberg, Swedish Gas Association

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Preface

The aim of this document is to give an overview of the Swedish biomethane/biogas market. It describes some statistics of the use and production of biogas and biomethane as well as the main policies and drivers for biogas and biomethane in Sweden. We also briefly describe how the green gas concept and the sustainability criteria scheme is working and possibilities for cross border trade.

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Content

Energy gases in Sweden

In Sweden only about 3 % of the total energy supply of 507 TWh is energy gases (Figure 1), which is rather low compared to many other countries in EU. Of the total energy use (354 TWh) about 3 % is energy gases, mainly used in industry.

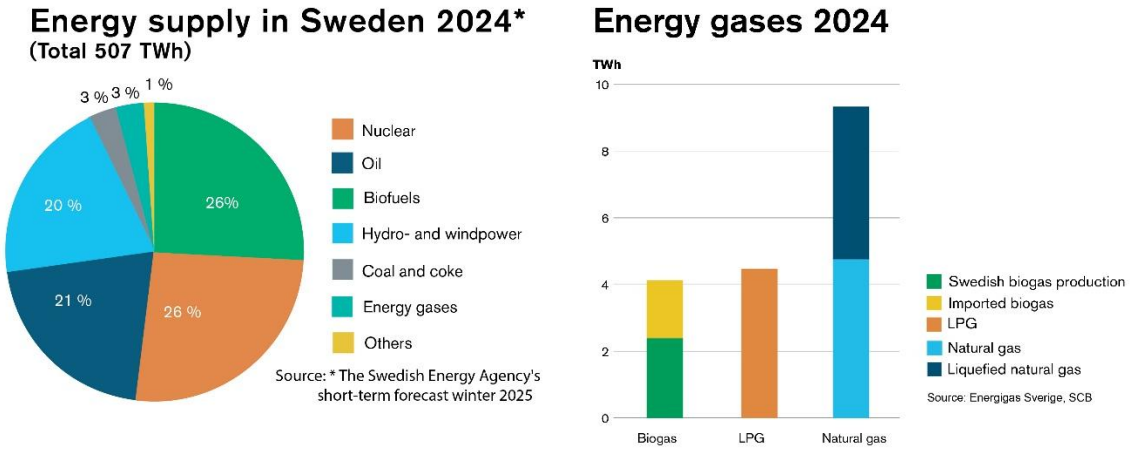

Figure 1 Total energy supply and deliveries of energy gases in Sweden 2024. Source: Swedish Energy Agency, Swedish Gas Association and SCB.

The use of energy gases dropped from 20.4 TWh 2021 to 16.2 TWh 2022 – mainly explained by the high energy prices following the Russian war on Ukraine. In 2024 use of energy gases increased to 17,9 TWh 2024. The share of renewable gases 2024 (biogas/biomethane) was 23 % (4.1 TWh) and the share of fossil gases was 77 % (13,8 TWh natural gas, LPG and LNG).

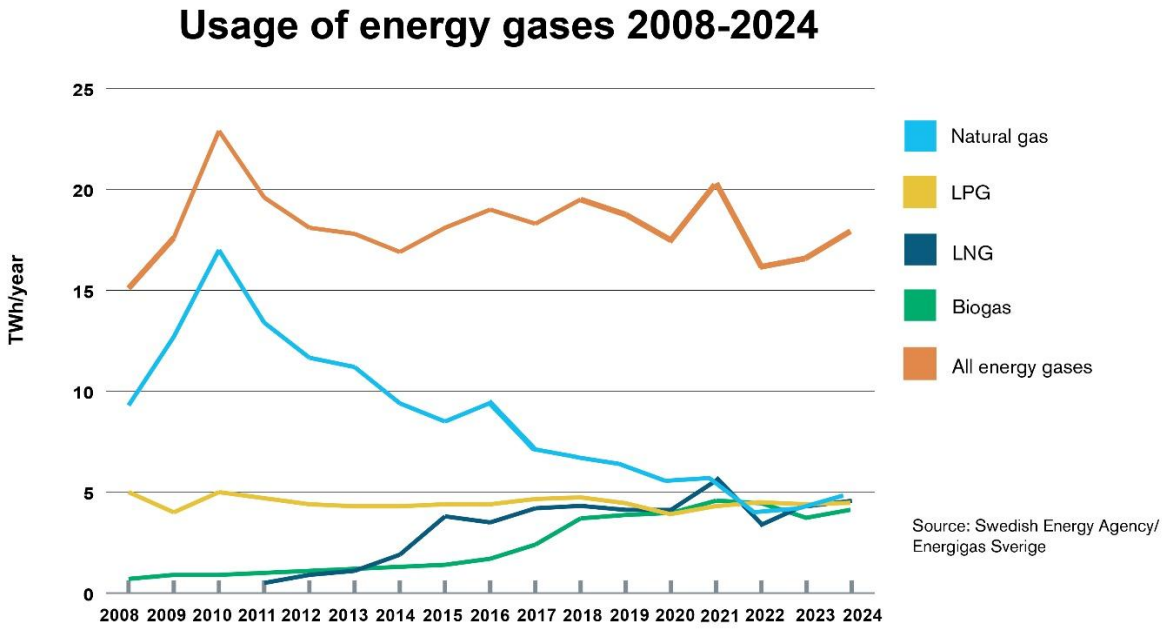

Figure 2 Total use of different energy gases (except hydrogen) in Sweden 2008-2024, TWh per year. Source: Swedish Energy Agency and Swedish Gas Association.

Natural gas is mainly used in heavy and small industry (73 %), as shown in Figure 3. In 2021 the share used in industry was 85 %, but due to the high energy prices the natural gas use decreased in 2022 and 2023 - particularly in industry.

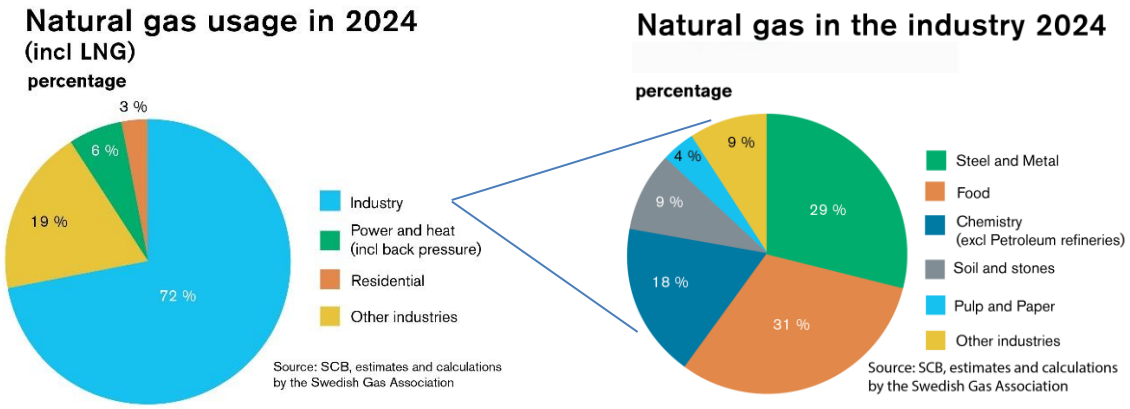

Figure 3 Distribution of total natural gas use and natural gas use in industry in Sweden 2023. Source: SCB.

Thel use of energy gases has been fluctuating around 17-20 TWh per year since 2012 as shown in Figure 4. The use of LPG has been rather stable around 4-4.5 TWh, while the use of compressed natural gas via the gas grid has decreased substantially. Instead, the use of LNG and the use of biogas/biomethane have increased.

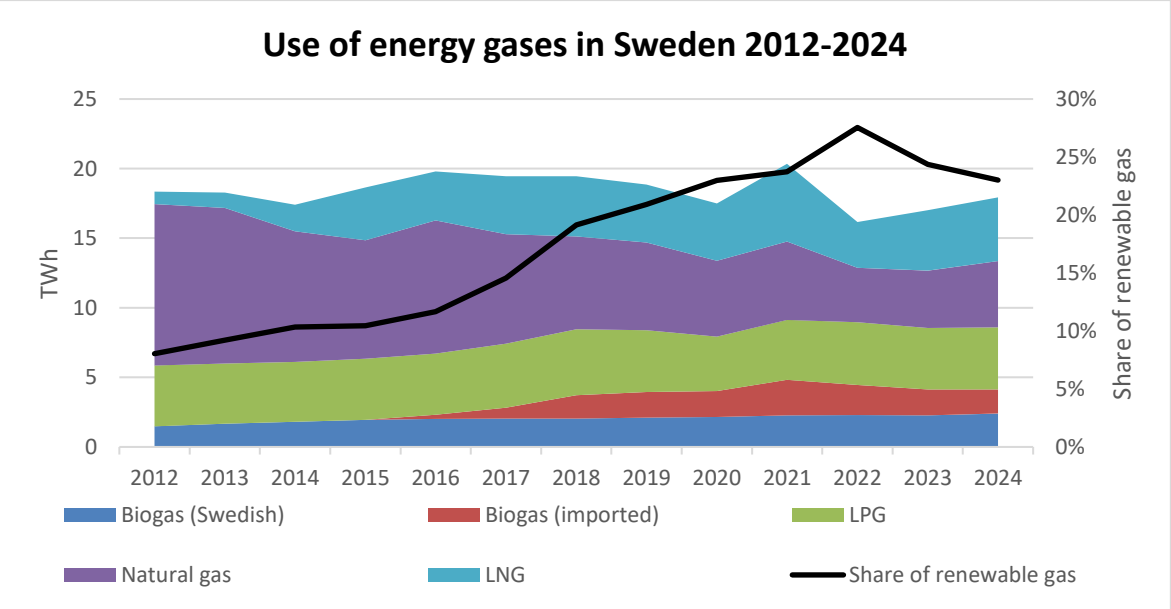

Figure 4 The total use of different energy gases, including as raw material, and the total share of renewable gases in Sweden 2012-2024. Hydrogen is not included except indirectly as about 2/3 of the hydrogen is produced from natural gas. Source: Swedish Energy Agency and Swedish Gas Association.

The share of renewable energy in total energy use in Sweden is 68% (2023) and for transport the renewable share is 34 % (2023), as calculated according to the renewable energy directive (REDII) methodology[1]. The total use of biofuels for transport increased annually for many years until 2023

[1] Source: Swedish Energy Agency, Energiläget i siffror

due to a reduction quota obligation for diesel and gasoline and tax exemption for biogas/biomethane and high blends of liquid biofuels. In 2024 the share of biofuels in road transport (energy share) dropped from 27 % to 13 %[2] due to a drastic decrease in the reduction quota obligation and tax cuts on fossil diesel and gasoline. The total use of methane for transport (CNG/CBG and LNG/LBG) was 2,1 TWh 2024. The average biomethane share was 96 % for CNG/CBG and 73 % for LNG/LBG.[3]

Limited gas grid infrastructure gives a developed off-grid market

The Swedish biomethane market is largely off grid with several small local and regional grids or stand-alone biomethane plants and filling stations. A large part of the biomethane in Sweden is transported on the road as compressed gas (200/260 bars) and to an increasing extent as liquefied gas (LBG).

The gas pipeline infrastructure is limited to the south-western part of Sweden where the transmission network is connected to European gas network via exit Dragör (connection with Denmark). There is also a regional gas network in Stockholm, fuelled with locally injected biogas and shipped LNG/LBG. See Figure 5.

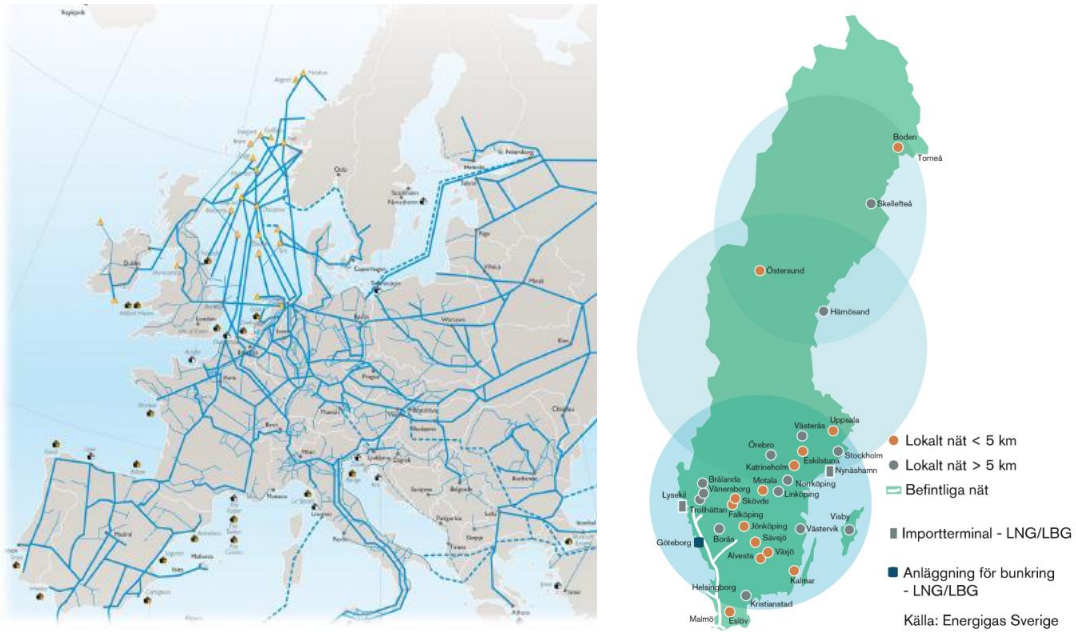

Figure 5 Gas pipeline infrastructure is limited to south-western Sweden and small local gas grids (map from 2020). There are two existing LNG import terminals and a couple of more planned. There are also four LBG plants.

Production of biogas/biomethane

There were 330 biogas plants producing in total 2.4 TWh of biogas/biomethane 2024. The number of plants has increased with 34 smaller farm plants with local electricity and heat production since 2023. The biogas and biomethane production increased by 6 % from 2023 to 2024 to totally 2 395

[2] Source: Drivkraft Sverige/Infostat, Andel förnybar energi - Drivkraft Sverige
[3] Source: SCB, Statistik om fordonsgas - Energigas Sverige

GWh. Most of the biogas and biomethane (52 %) is produced in 32 co-digestion plants and in 131 wastewater treatment plants (30 %) as shown in Figure 6.

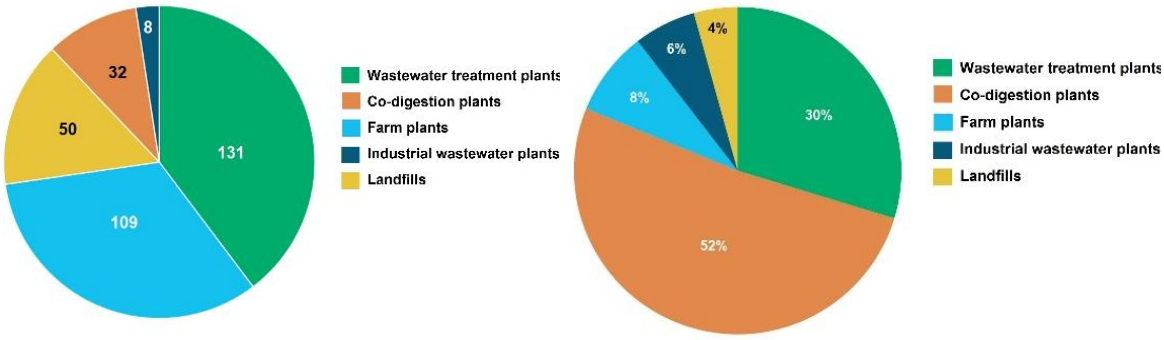

Figure 6 Number of biogas/biomethane plants (left) and share of biogas/biomethane production for different plant types (right) in Sweden 2024.
Source: Swedish Energy Agency/Swedish Gas Association.

Biogas and biomethane is mainly produced by various organic wastes and residues, such as sewage sludge, organic household waste (food waste), manure, waste from food industries and slaughterhouses (Figure 7).

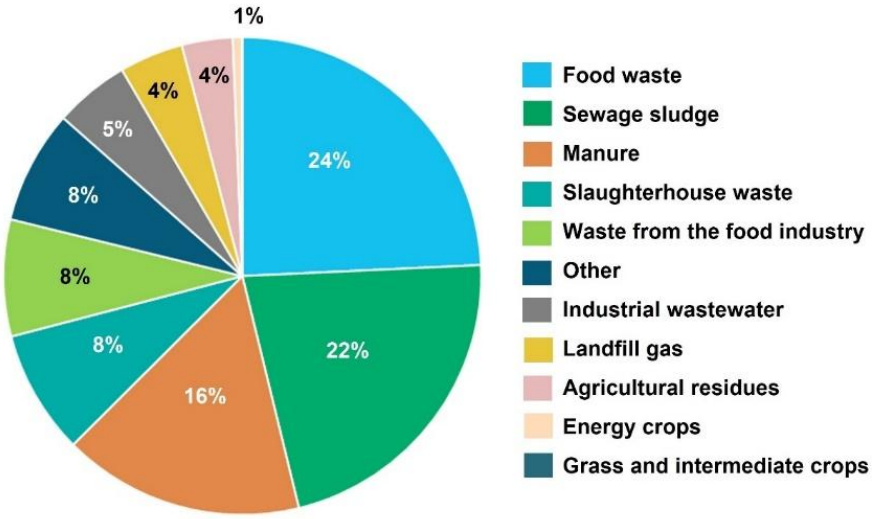

Figure 7 Share of the biogas and biomethane production from different substrates (raw materials) in Sweden 2024, calculated from the amount of used substrates and estimated biogas yields.

The share of biogas that is upgraded to biomethane has increased steadily over the last 10 years, whereas the use for heating has decreased. In 2024 68 % of the produced biogas was upgraded to biomethane (Figure 8), of which most (more than 90 %) is used for transport.

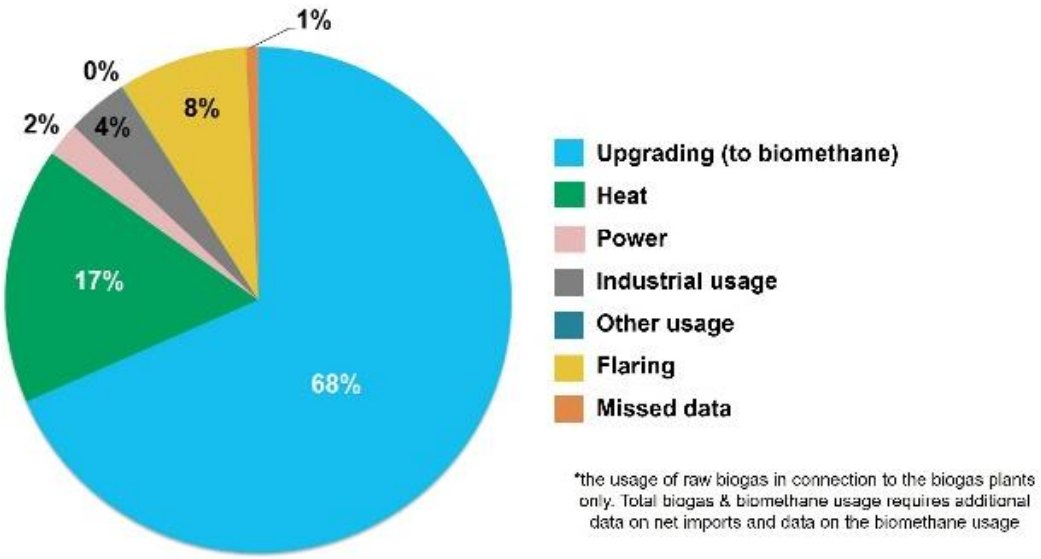

Figure 8 Usage of produced biogas at Swedish biogas plants 2024. Source: Swedish Energy Agency/Swedish Gas Association.

There were 71 biomethane upgrading units producing about 1.6 TWh biomethane 2024[4]. About 0.55 TWh of this is injected to the south-western gas grid (connected to the European gas grid) and in the regional Stockholm gas grid. The rest is used locally or trucked to filling stations.

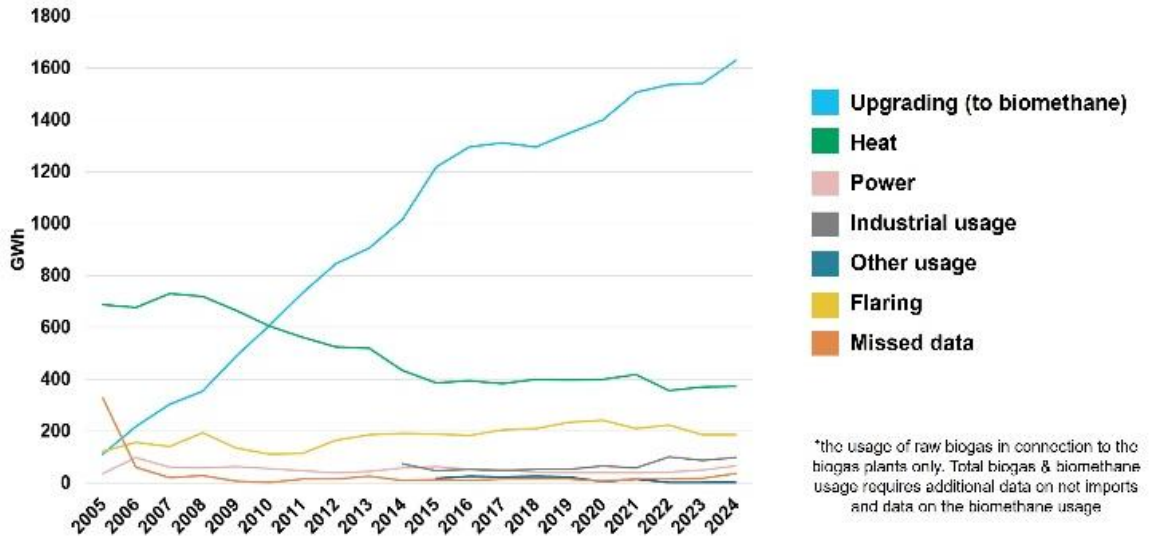

Figure 9 Usage of produced biogas at Swedish biogas plants 2005-2024. Source: Swedish Energy Agency/Swedish Gas Association.

A rapidly increasing share of the biogas is liquified to LBG (Liquified Biogas). In 2024 there were six LBG plants producing 253 GWh[5], an increase by 41 % since 2023 (Figure 10). Most of the planned new biogas production capacities are LBG plants, and a large part of new production will be manure based.

[4] Note that this is part of the total biogas production 2.4 TWh.
[5] Part of the 1.6 TWh biomethane produced.

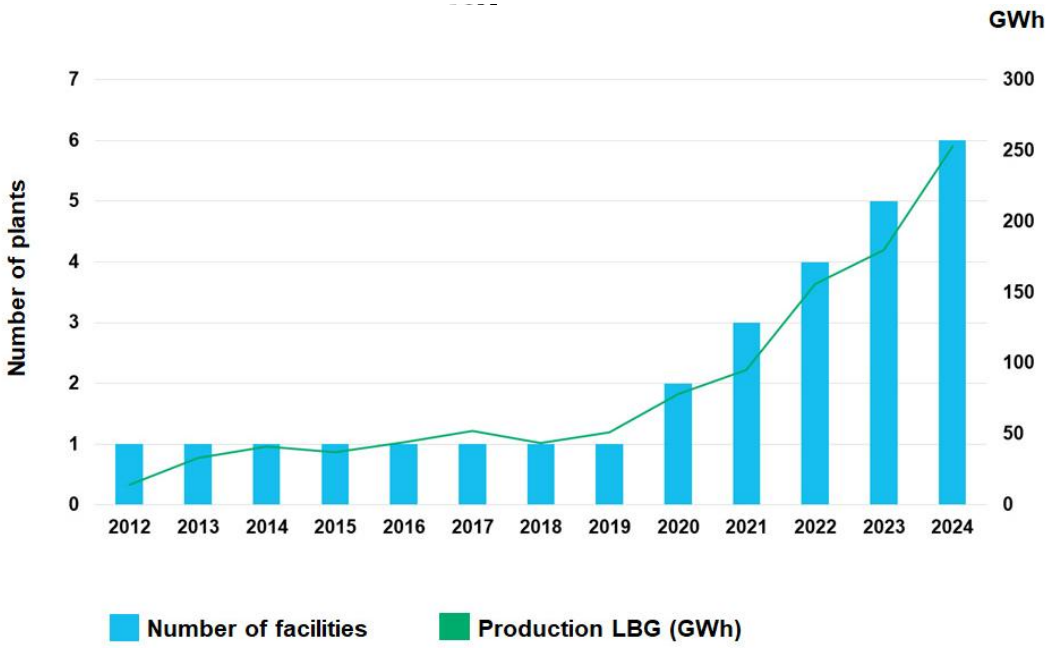

Figure 10 Production of LBG (GWh) and number of LBG plants in Sweden 2012-2024. Source: Swedish Energy Agency/Swedish Gas Association.

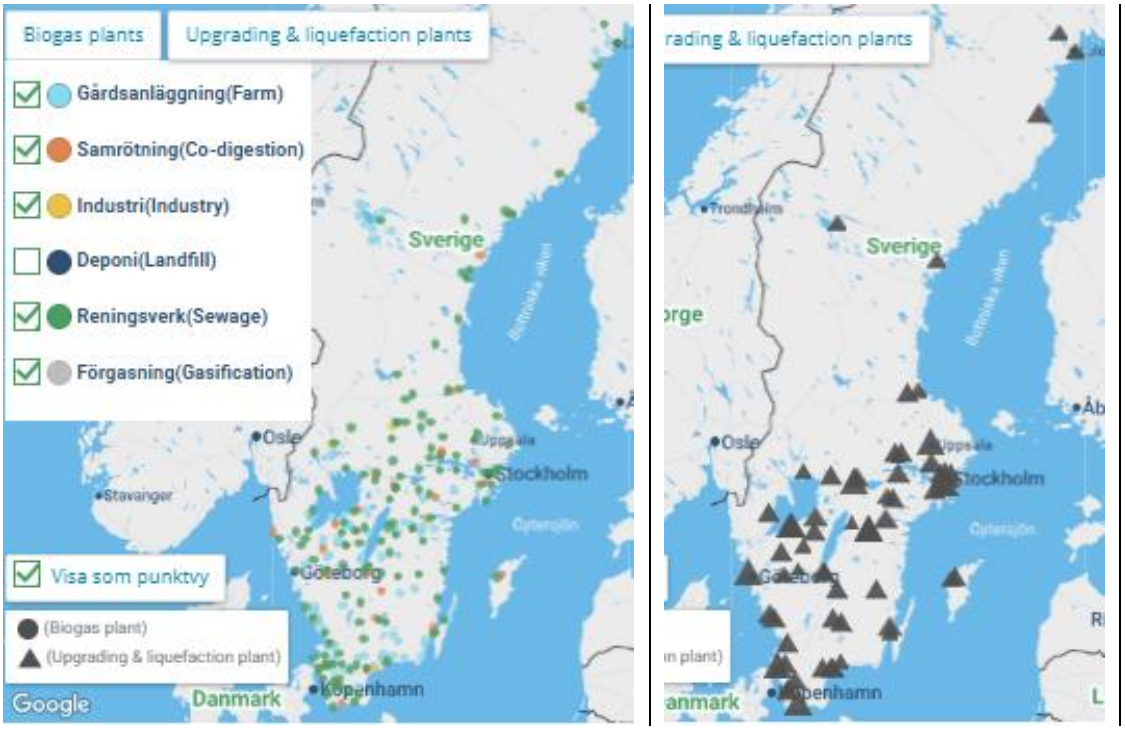

Figure 11 Map of biogas plants and biomethane upgrading units in Sweden. Source: [Karta biogasanläggningar - Energigas Sverige]

Total use of biomethane and biogas including net imports

The total biogas and biomethane use in Sweden 2024, including net imports of biomethane and LBG, was 4.1 TWh. It is at the same level as 2023, but 14 % lower than the top year 2021 (Figure 12). Between 2015 and 2024 the total biogas and biomethane use have increased by 113% while the production has increased by 24 %.

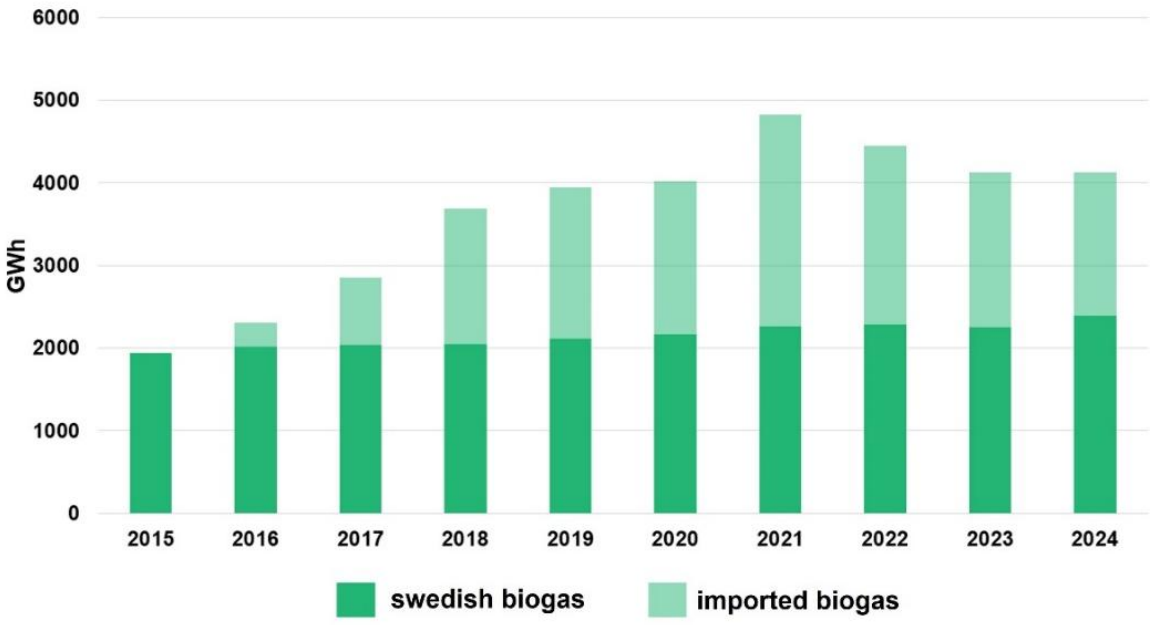

Figure 12 Total biogas and biomethane use (GWh) in Sweden 2015-2024 (production + net imports of biogas and biomethane).

The import of biomethane through the gas grid has increased rapidly since 2015 from about 0.2 TWh 2016 to 2.5 TWh 2021. Since 2022 the biomethane imports via the gas grid has decreased annually down to 1.2 TWh 2024 (Figure 13). The imported biomethane via the gas grid was all Dannish biomethane 2024. Most of the import is used for substituting natural gas in industry and heating. The export is still small but is growing.

The decrease in biomethane imports 2022-2024 is explained by decreased biomethane demand in industry and CHP due to the high gas prices that followed by the Russian invasion of Ukraine early in 2022. Just as the gas prices and gas demand had stabilised, the tax exemption on biogas and biomethane was revoked early 2023 due to a ruling in the EU Tribunal, which further decreased biomethane demand at the gas grids. Since the tax exemption came back into force late in 2024 after a new state aid approval by the Commission, the biomethane demand is now growing again. It is shown e.g. by the increase of the biomethane share in the southwestern gas grid from 26 % 2024 to 37 % Q1-Q2 2025.[6]

At the same time, despite the high gas prices in 2022 and the revoked tax exemption in 2023-2024, the net imports of liquified biogas (LBG) has increased from 64 GWh 2021 to 0.5 TWh in 2024 (Figure 13) following a strong demand for LBG mainly in heavy transports and industry.

[6] Nordion Energi/Swedegas, Gasbarometern

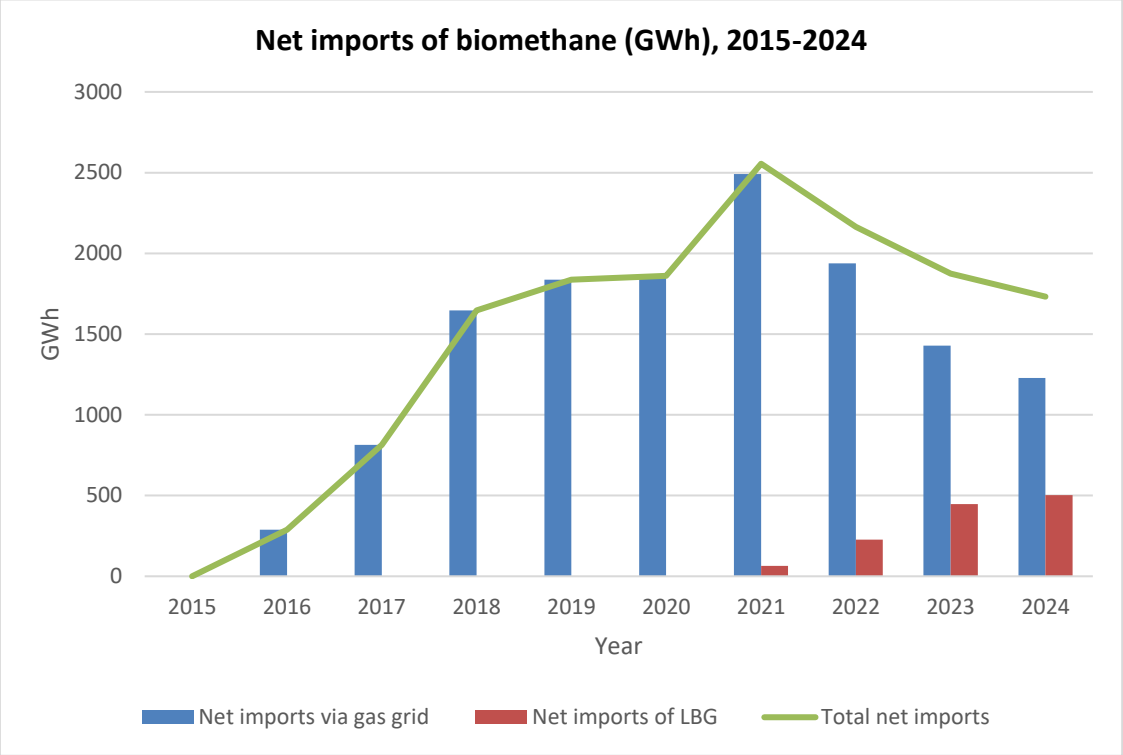

Figure 13 Net imports of biogas/biomethane in Sweden 2015-2024.

Biomethane production potential and planned new capacity

Significant new biomethane production underway

Major investments are currently being made in large-scale biomethane production in Sweden, after a long period of slow development. In 2025, several large LBG (liquefied biogas) plants will come online, and more large-scale biomethane facilities are under construction. By 2028, planned projects could increase biomethane production by 2.7 TWh per year, more than doubling the 2024 production level (Figure 14). Most of the planned new biomethane production will be LBG production, largely from manure. In addition, new liquefaction capacity is underway at existing biomethane plants or in connection to the gas grid is (Figure 15). New biomethane projects are regularly announced, suggesting this estimate continuously grow.

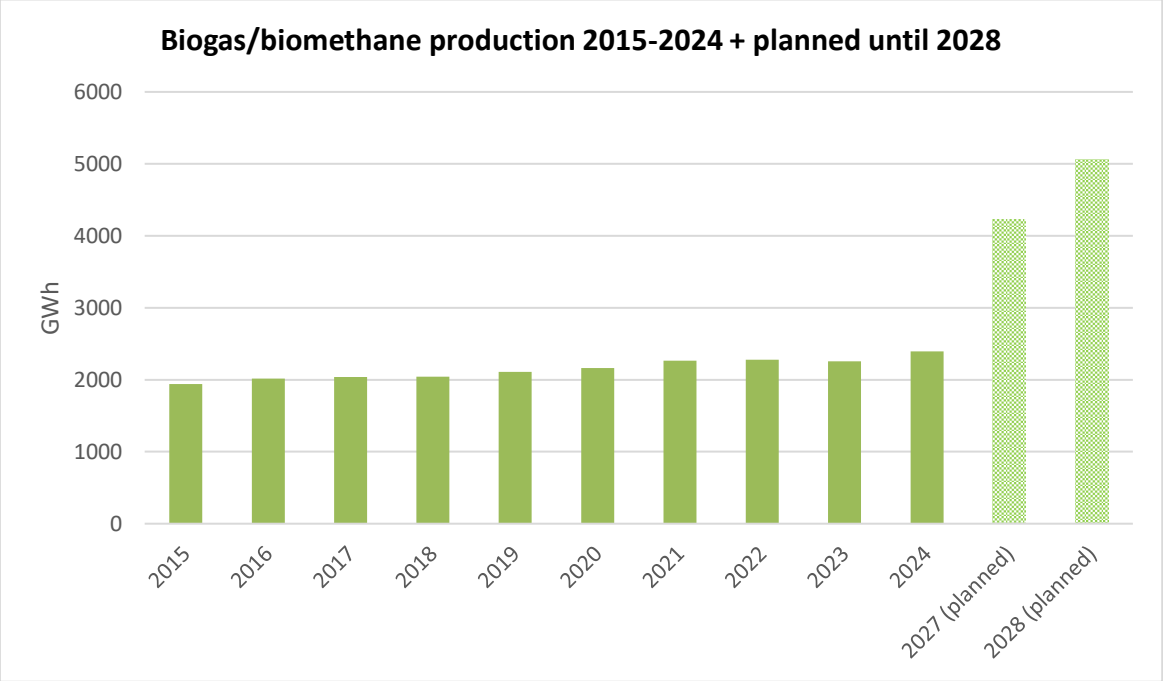

Figure 14 Biogas/biomethane production 2015-2024 and planned new production until 2028.

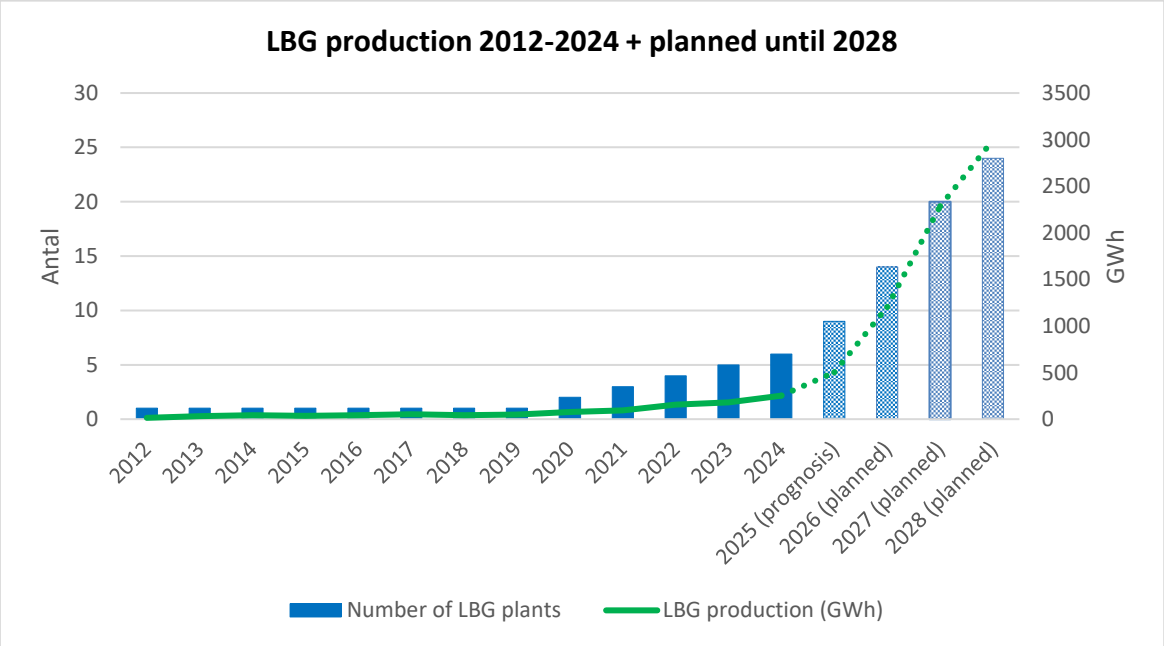

Figure 15 Number of LBG plants and LBG production in Sweden 2012-2024 and planned new LBG production until 2028. Includes new liquefaction capacity using existing biomethane production.

Potential to multiply biomethane production in Sweden

Studies, with somewhat varying time frame and scope of substrates included, show that Sweden could produce at least 30 TWh and possibly up to 60 TWh of biomethane (Figure 16).

- Production could double simply by digesting **more of the existing substrates**.

- Even greater potential lies in digesting currently unused materials from agriculture such as straw, ley crops, cover crops, and other sustainable **agricultural biomass**, as well as park and garden waste.
- The largest potential for biomethane production in Sweden comes from **forestry and wood industry residues**, such as tops and branches and wood waste. This requires new technologies like biomass gasification. The technology has been demonstrated in Sweden, but there is still no commercial gasification plant producing biomethane in the country.
- In addition, there is significant potential to boost biomethane output by producing e-methane at existing and new biomethane plants through so-called **methanation** of carbon dioxide. Methanation involves adding hydrogen to the process, converting the CO_2 that would otherwise be removed during upgrading into more methane. This can increase biomethane/e-methane production at a plant by 60-70 % without additional substrates and the overall potential of 30-50 % if implemented widely. Commercial methanation plants are not yet operating in Sweden, but demonstrations are underway, and there are now commercial plants in countries such as Denmark.

You can read more about how Swedish biomethane production can grow at **Industrins biogaskommission**.

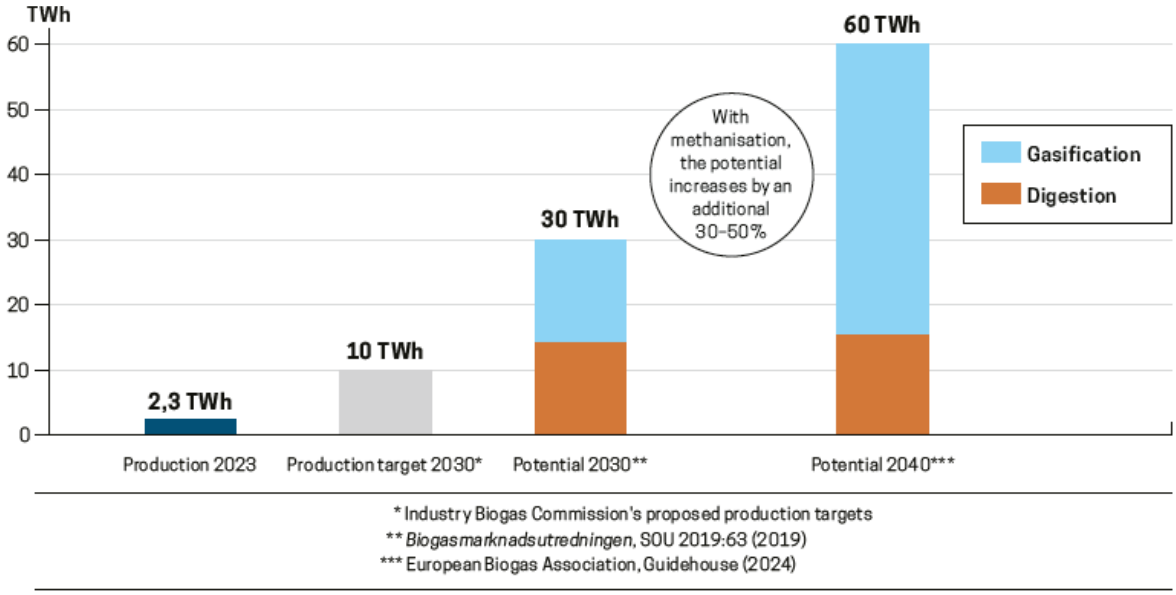

Figure 16 Todays biogas/biomethane production compared to the proposed national biogas/biomethane production target 2030, estimations on potential production according to two studies for 2030 and 2040 respectively (with different system boundaries). Orange = digestion, blue = gasification. With methanation of CO_2 at many of the biomethane plants the potential can increase by 30-50 %. Source: Industrins biogaskommission.

Biomethane in transport

Most of the produced biogas (68 %) is upgraded and mainly used for road transport. The market for biomethane as transportation fuel is now rather developed in Sweden. The use of methane as CNG/CBG in transport increased rapidly up to 2014 but has since then stabilized at around 1.5 TWh the last years (Figure 17). The biomethane share has continued to be high at 95-97% the last 5 years.

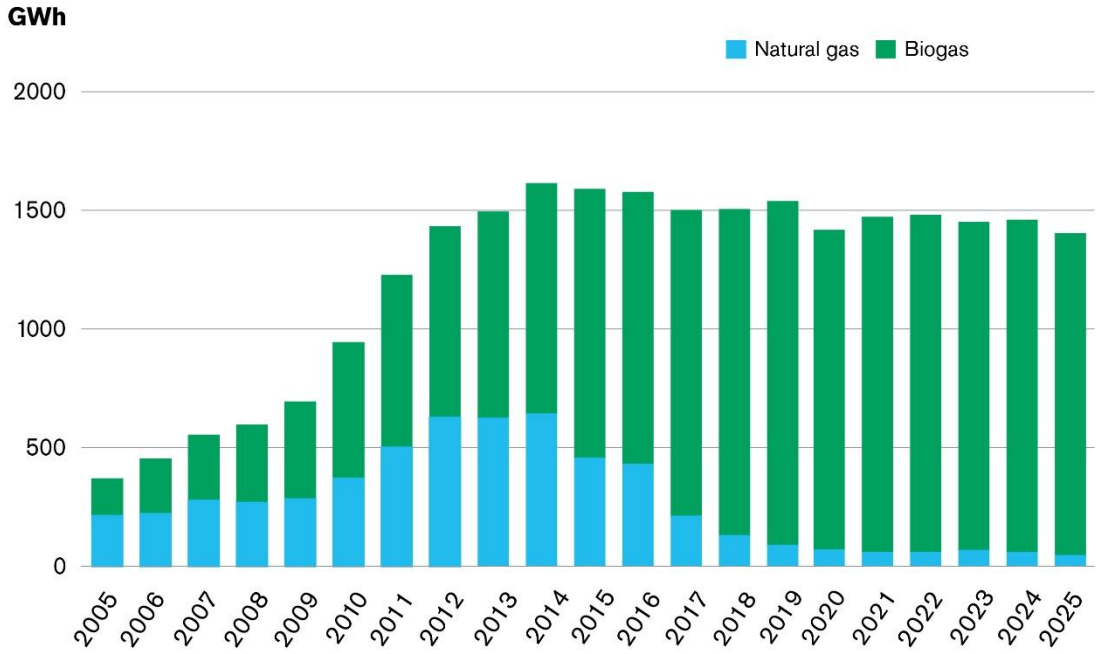

Figure 17 Sold volumes of CNG/CBG for road transport in Sweden 2005-2025. Source: SCB.

The total number of gas vehicles was 43,556 by the end of 2025. The number of buses (2,220), passenger cars (31,396) and light duty vehicles (6,418) has declined for the last years, while the number of heavy trucks (3,522) has increased (Figure 18).

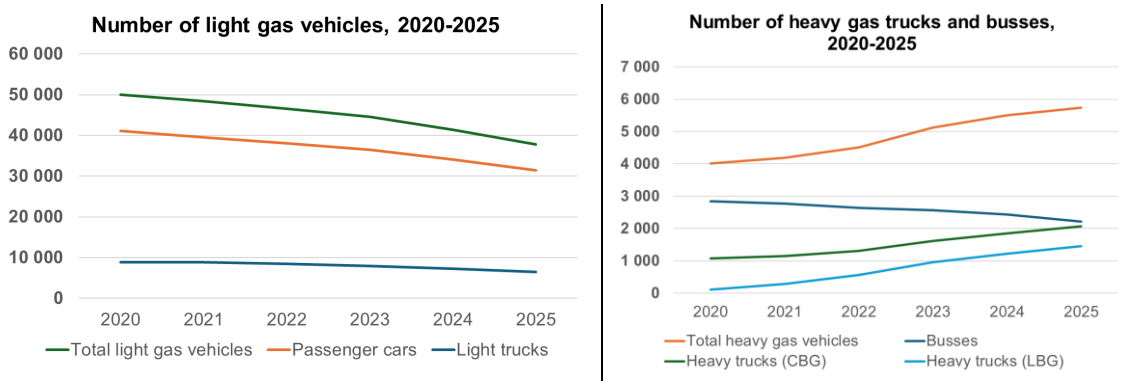

Figure 18 Number gas vehicles in Sweden 2015-2025. Source: SCB, Transport Analysis and Swedish Gas Association.

At the end of 2025 there were 240 public filling stations for CNG/CBG and LNG/LBG, in addition to 57 non-public stations dedicated to certain vehicle fleets, including busses. The number of filling stations for LNG/LBG has increased rapidly the last couple of years, to around 40 at the end of 2025. (Figure 19).

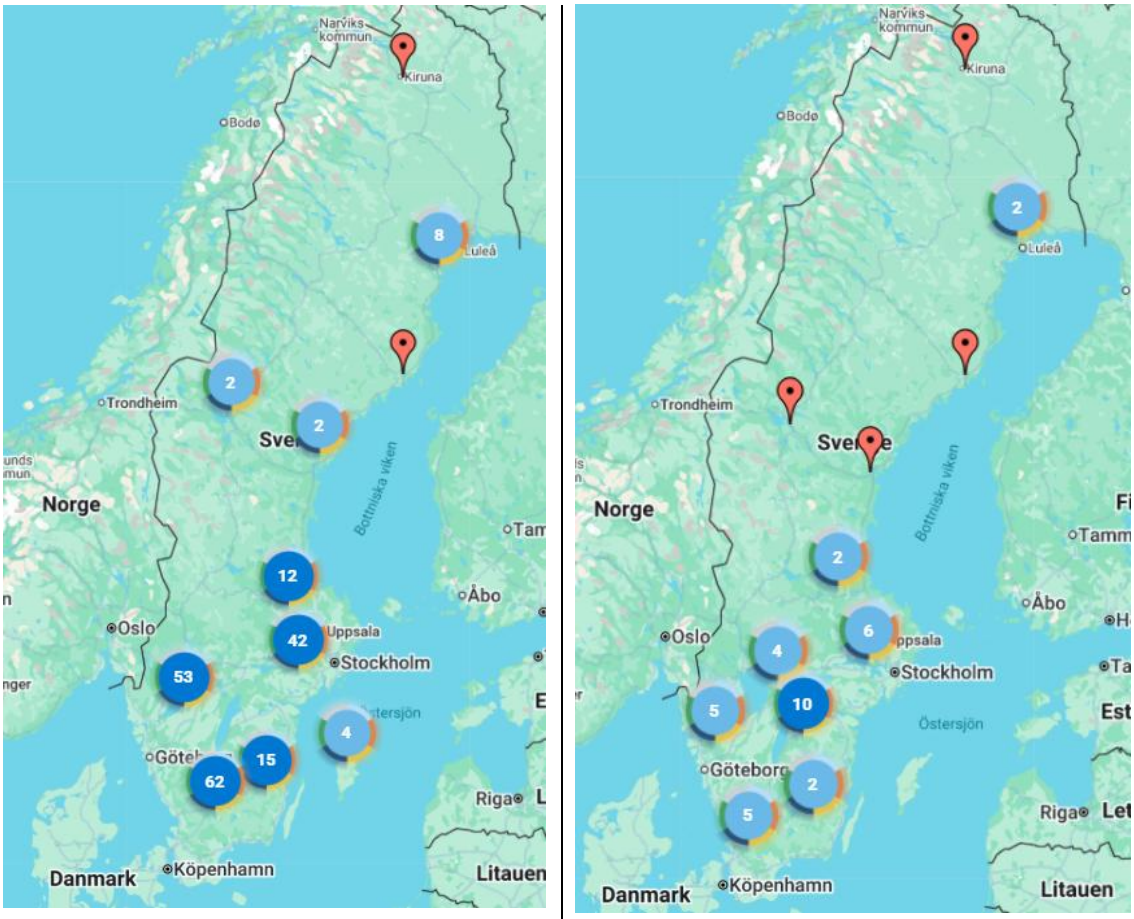

Figure 19 Map of CNG/CBG filling stations (to the left) and LNG/LBG (to the right) end of 2025.

The market for liquified biomethane (LBG) is increasing rapidly

The interest for liquified biomethane (LBG) is large and the market is growing, especially for use in long-distance heavy trucks. As shown in Figure 18 above the number of LNG/LBG heavy-duty vehicles are increasing in Sweden. The sold volumes of LNG/LBG are also increasing and were 717 GWh in 2025 (Figure 20). The share of LBG was 77 % as an average in 2025.

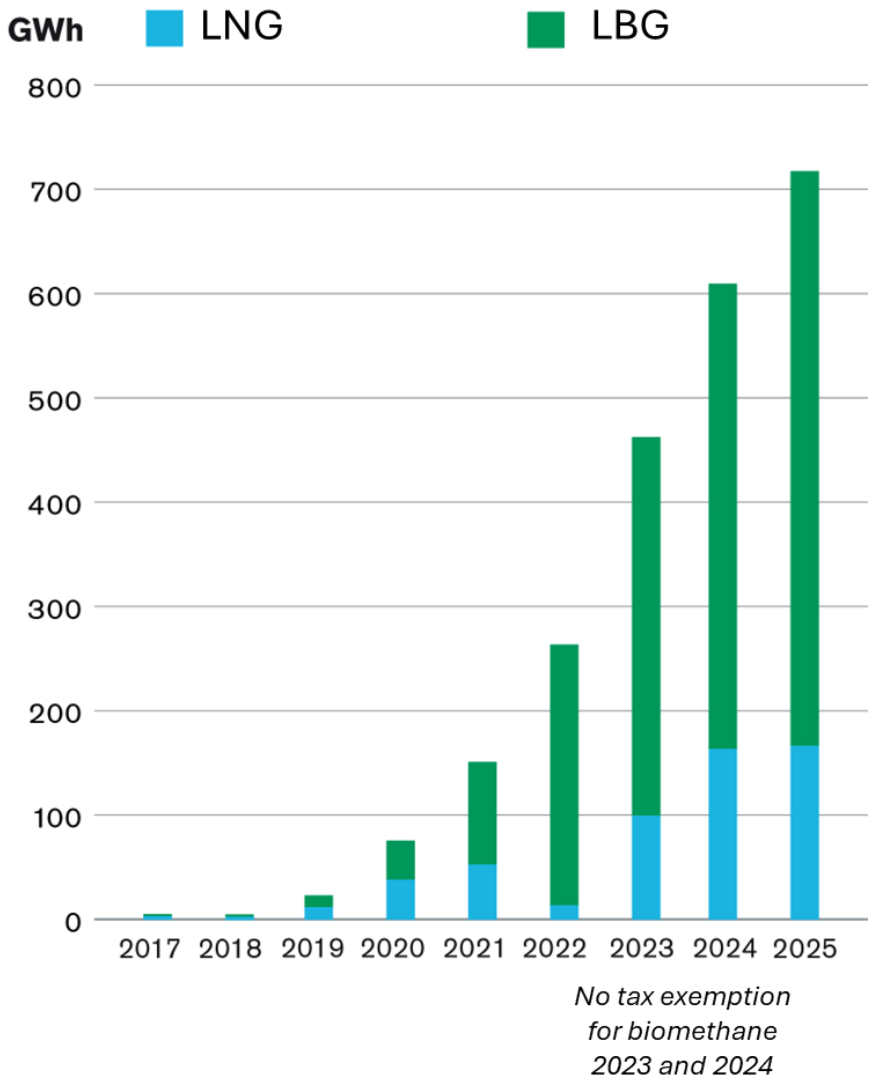

Figure 20 Sold volumes of LNG/LBG for road transport in Sweden 2017-2025. Source: SCB.

Besides the HDV sector there is also an increasing demand for LBG in off-grid industries substituting their LNG use. There is also a growing interest for LBG in the maritime sector with a potentially large market ahead as many new ships in the last couple of years are LNG/LNG-ready ships. The LBG share is still small but growing, and is expected to grow more in the coming years as economic drivers in terms of new policy instruments such as EU ETS and FuelEU Maritime are phased in. The total use of LBG was 755 GWh in 2024, of which about 445 GWh in transport and 310 GWh in industry.

Use of gas and biomethane in different sectors and potential future biomethane demand

As shown in Figure 21 below, the use for heat and power and for housing is very low in Sweden compared to many other countries (around 10 % of the total gas use), but the share of renewable gas is high (40-60 %). The gas use is expected to be limited also in the future in these sectors, but the share of renewable gas is expected to grow the coming years as the tax exemption is back since late 2024 and with increasing EU ETS CO_2 prices. Only about 12 % of the gas is used for

road transport, but this is the sector with the highest biomethane share (almost 90 % in total 2024). Since the demand for especially LBG in heavy transport is growing rapidly, the gas use in transport sector is expected to grow substantially, even though use in light vehicles likely will continue to decrease.

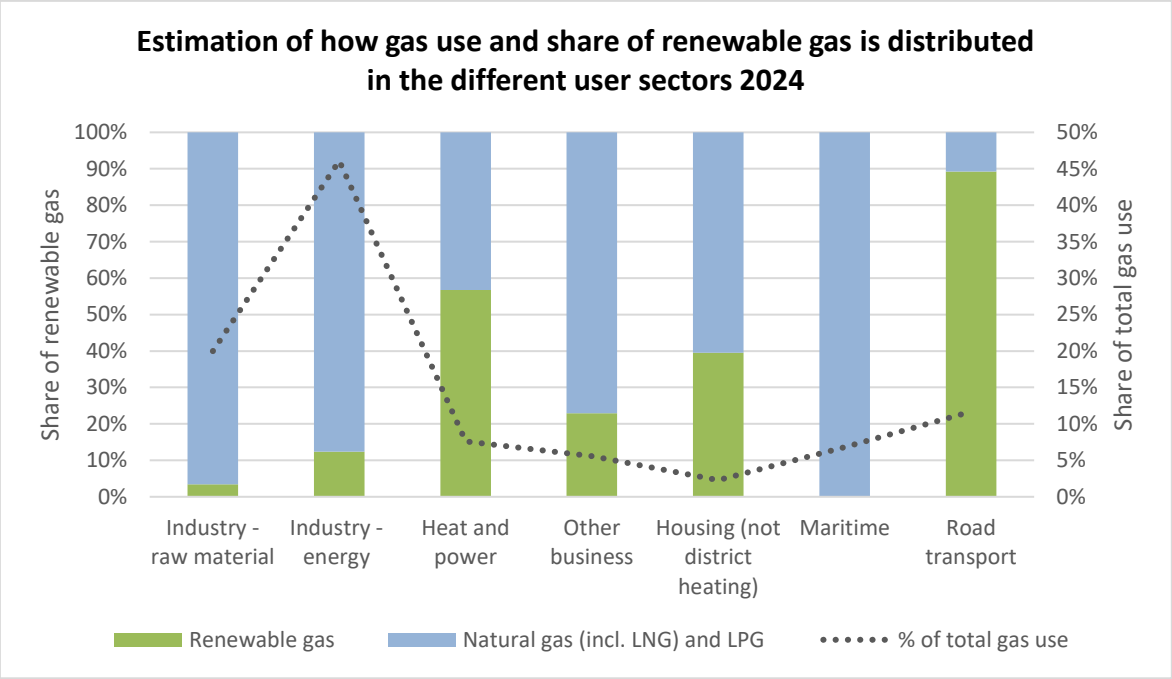

Figure 21 Share of total gas use and share of renewable gas per user sector in Sweden 2024. Includes methane (natural gas, LNG, biogas/biomethane) and LPG (incl. bio-LPG). Source: estimation by Energigas Sverige.

In Sweden, instead most of the gas is used by the industry. About 66 % of the total gas used in Sweden is used in industry, of which 20 % as raw material e.g. in the chemical industry and the rest for energy purposes in industrial processes. In industry, due to so far insufficient policy instruments, the renewable share is still low. Thus, one of the largest potential markets for biomethane ahead in Sweden is the industry, where the existing gas use is the highest and with low biomethane share. Another potential large market for biomethane and e-methane is the maritime sector. Here the gas use is still rather low (around 7 %) but LNG use in shipping is now growing fast as EU climate policies are now targeting also shipping. The LNG use in shipping is expected to grow the coming years as many newly ordered LNG-ships are put into operation. Gradually, the LNG will be replaced by LBG and e-methane as the reduction quotas in FuelEU Maritime increases and the CO_2 prices within EU ETS (which now includes the maritime sector).

Long-term energy and climate policy

The climate act sets long-term ambitious GHG targets for 2030 and 2045

Ambitious energy and climate goals push for increased renewable energy. Since 2017 there is a climate law and ambitious long-term climate and energy goals:

- Zero net GHG emissions by 2045 at the latest (from 2045 negative emissions). GHG emissions from activities in Sweden shall be at least 85 % lower in 2045 compared to 1990. The remaining reductions down to zero can be achieved through supplementary measures.

- 100 % fossil-free electricity production 2040[7]
- 63 % GHG emission reduction in non-EU ETS sector in 2030 and 75 % 2040 compared to 1990
- 70 % GHG emission reduction in domestic transport (excl. aviation) 2030 compared to 2010

The government is according to the law committed to present a climate policy plan every 4 years. The first was presented late 2019, and the new government from October 2022 presented their climate policy plan in December 2023. Further, a climate policy council shall continuously analyse the current climate policies and make recommendations. The climate policy council presented their first annual report 2019, which indicated that policies are not enough to reach the goals. The three latest reports (in 2024, 2025 and 2026) were very critical to the current climate policy and that the new government´s climate action plan is inadequate and insufficient for reaching the climate goals. With current policy it is unlikely that either EU or national climate targets will be reached.

Roadmaps and visions in the gas industry

No national biogas strategy adopted

There are so far no official strategy or goals for biomethane or energy gases in Sweden. The gas industry formulated a proposal for a biogas strategy already in 2018 which was not taken up by politicians. However, in 2018 the Government appointed a broad biogas market inquiry which presented their report in December 2019, see below.

The Swedish gas industry´s roadmap for fossil free energy gases

In 2020 the Swedish gas industry through the Swedish Gas Association published a roadmap on how to achieve fossil free energy gases by 2045, within the governmental initiative Fossilfritt Sverige. A new upgraded version of the roadmap was published in September 2024 Gasbranschens uppgraderade färdplan för fossilfri konkurrenskraft - Energigas Sverige.

The upgraded roadmap estimates the demand for fossil-free gases (including hydrogen, methane, LPG, syngas) in various sectors by 2030 as show in Table 1 below.

Table 1 Total estimated demand for fossil-free gas in Sweden 2030 is 50 TWh. The goal of the gas industry is to meet the estimated demand of fossil-free gases. Source: Gasbranschens uppgraderade färdplan för fossilfri konkurrenskraft - Energigas Sverige.

User sector	Demand for fossil-free gas 2030
Industry	10 TWh biogases
	30 TWh fossil-free hydrogen
Road transport	10,000 biomethane trucks – 5 TWh biomethane
	3,000 hydrogen trucks – 1 TWh hydrogen (2035)
Shipping	3 TWh biomethane and e-methane
Heat and Power	1 TWh biogas/biomethane

[7] The former agreement was 100% renewable electricity, but was 2023 changed by parliament to fossil free electricity

The roadmap also sets targets for the Swedish gas market up to 2030 and 2035 and includes 30 policy recommendations and 11 industry undertakings. The vision and targets are summarized below.

Gas industry´s joint vision:

- Gas for a robust, circular and **completely** fossil-free society

Target for gas use

- 2035: All energy gases used in Sweden will be completely fossil-free

Targets for production

- 2030: 10 TWh biomethane and 33 TWh fossil-free hydrogen is produced in Sweden 2030
- 2035: 20 TWh biomethane and other biogases is produced in Sweden 2035

Target for developed infrastructure

- 2030: 100 % biomethane in all gas grids
- 2030: 1 000 km hydrogen grids

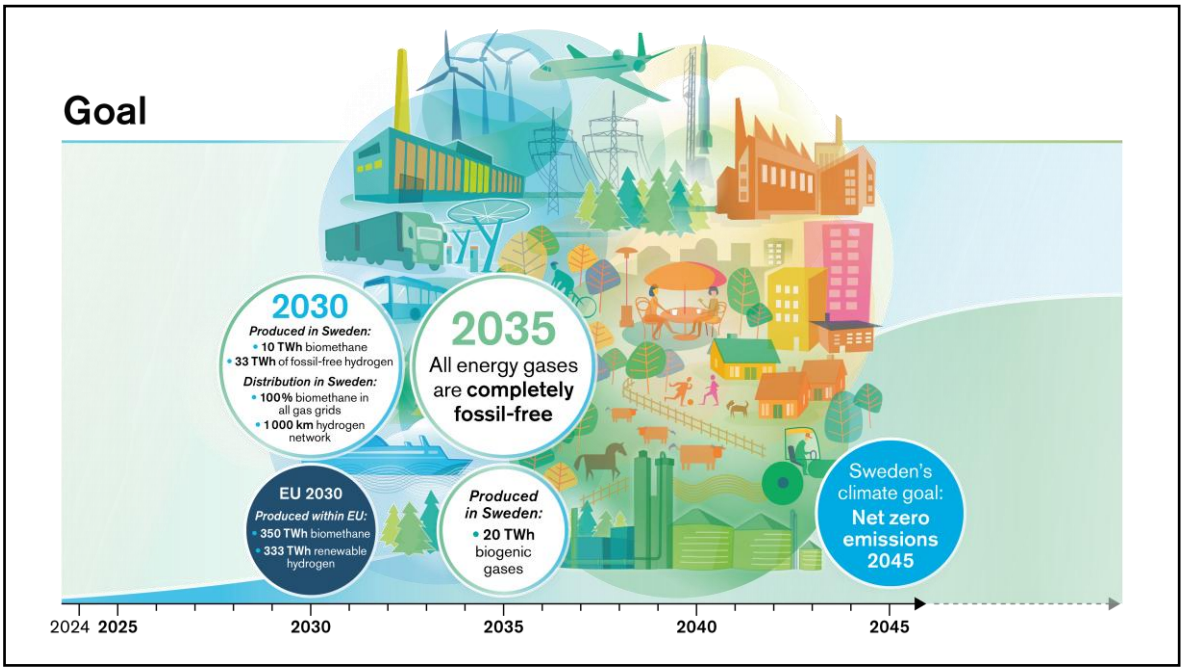

Figure 22 Summary of the targets to 2030/2035 of the gas industry´s roadmap for fossil-free competitiveness launched in September 2024. Source: Färdplan gasbranschen - Energigas Sverige.

The Biogas market inquiry suggested policies for increased biogas production

In December 2019 a Government-appointed broad biogas market inquiry Mer biogas! För ett hållbart Sverige SOU 2019:63 presented their report with descriptions of the biogas market, its environmental and social benefits, potential and policy recommendations. It suggested several policy measures, including that the tax exemption for biogas and biomethane is complemented by a new long-term production support scheme with additional production premiums for manure-based biogas, upgraded biogas (biomethane) and liquified biogas (LBG). It also suggested another (auction based) production support scheme for biogenic gases produced from lignocellulose and that the parliament should adopt a national biogas/biomethane production target of 10 TWh by 2030.

Policy development after the Biogas market inquiry

Since the Biogas market inquiry report several policy measures have been realized:, the suggested biogas/biomethane production support scheme has been implemented, investment support for biomethane solutions including vehicles and filling stations have been prolonged, and continued exemption from CO_2 and energy tax for biogas/biomethane and bio-LPG was approved by the EU Commission until 2030 (the tax exemption was temporarily revoked from March 2023 to late 2024 due to a ruling in the EU Tribunal – see below).

From November 2022 the purchase bonus for new electric, hydrogen and gas cars of the rather new bonus-malus scheme for passenger cars and light vehicles was removed by the new Government. The purchase bonus for gas HDVs was also suggested to be revoked due to new EU state aid rules but could in the end be prolonged with some adjustments and is still effective for gas HDVs.

There is still no national biogas/biomethane target adopted. To increase domestic biofuel production from ligno-cellulosic residues the Government-appointed Bioeconomy inquiry in March 2023 proposed a new long-term auction-based production support scheme. It would be in the form of “contracts for difference” for large scale (> 0.5 TWh/year) production of liquid biofuels and other intermediate products of certain quality. It is limited to “advanced” biomass feedstocks listed in REDII Annex IX or biogenic CO_2 and renewable electricity and the use of new technology but not limited to a certain end product or end use. If implemented it could include e.g. gaseous fuels from biomass gasification such as biomethane. However, no action on this proposal has been communicated by the Government so far.

Regulatory framework, support systems and drivers for biomethane market

In Sweden general economic incentives in terms of high CO_2 and energy tax on fossil fuels and tax exemption for renewables have been the main drivers for decarbonising since the 1990’s. Tax exemption has been the main driver also for biogas and biomethane, but has in recent years been complemented by productions support, investment support and increasing prices in the EU emission trading scheme (EU ETS). Since the taxes have been highest in the transportation sector, most of the biomethane has been used for road transport, but also to some extent for heating (district heating or process heat). In other sectors, such as industry with high natural gas use, the tax advantage for renewables has been generally much lower. The last years the biomethane demand in industry has increased and biomethane has become more competitive in parts of the industry due to increased tax on natural gas for heating and increasing CO_2 prices within ETS.

The gas use in general as well as the biomethane use and imports dropped significantly in 2022 due to the high energy prices caused by the Russian war on Ukraine. Since the abrupt change in tax on biogas and biomethane use in March 2023 (from full exemption of energy and CO_2 tax to be fully taxed as natural gas and LPG) both production and biomethane demand has been under high pressure with decreased competitiveness (see * below). This has now changed as tax exemption is back into force since late 2024.

The biogas/biomethane production has increased steadily since 2005 mainly driven by investments by municipalities and regions in biomethane driven public transport (buses) and new biomethane plants for recycling of biowaste (co-digestion plants). Biogas production has occurred for several decades in many sewage plants but since 2005 the share of biomethane upgrading has increased. There have been several investment support programmes that have facilitated this development. In the recent years, a large part of new production is run by private companies mainly focusing on agricultural and industrial organic waste and residues such as manure and waste from food

industry and slaughterhouses. It is also in the private sector where most of the additional production capacity investments are foreseen in the future – and mainly as LBG.

An ongoing Governmental inquiry will present its findings about policies to reach the targets in ESR-sectors and that are in line with overall EU targets in May 2026. Focus is on road transport and how to reach climate targets with limited effect on fuel prices, households or companies. Among others, it will propose how the reduction quota for gasoline and diesel should be developed and whether gas should be included.

Existing national policies and drivers

Fiscal incentives – CO_2 and energy tax exemption*

- Transportation:
  Exemption from CO_2 and energy tax for biomethane as transportation fuel is approved by the EU Commission until the end of 2030. Natural gas for transportation is exempted from energy tax and only pay CO_2 tax. The CO_2-tax rate 2026 corresponds to 3256 SEK/1000 Nm^3 (~29 €/MWh). The value of the biomethane tax exemption can be estimated with the corresponding tax for petrol or diesel. The CO_2-tax for petrol 1st Jan 2026 is 3.27 SEK/litre (~33 €/MWh) and the energy tax is 1.52 SEK/litre (~15 €/MWh). The CO_2-tax for diesel 1st Jan 2026 is 1150 SEK/m3 (~11 €/MWh) and the energy tax is 2811 SEK/m3 (~26 €/MWh).

- Heating fuel (including industrial use):
  Exemption from CO_2 and energy tax for biogas or biomethane for heating (including industrial use) is approved by the Commission until end of 2030[8]. Corresponding tax 2026 on natural gas is 4524 SEK/1000 Nm^3 (~40 €/MWh), broken down by energy tax: 1268 SEK/Nm^3 and carbon tax: 3256 SEK/Nm^3. The former partial exemption from energy tax for fossil fuels used in the manufacturing process in industrial activity (for other purposes than use in motor vehicles) was phased out in July 2021. For industrial activities included in the EU ETS, is exempted from 100 percent of the CO_2 tax.

- Heat or CHP plants:
  Exemption from CO_2 and energy tax for biogas or biomethane when used in heat or combined heat and power plants. Natural gas, and other fossil fuels, for such use within the EU ETS, are exempted from 100 percent of the CO_2 tax from 1 January 2023.

* The state aid approval for the Swedish tax exemption 2021-2030 for biogas and bio-LPG for transport or heating was revoked by an EU General Court ruling (Landwärme vs Commission Case T-626/20) in 21st of December 2022. The Swedish Tax authorities announced that no tax exemption was granted from 7th March 2023 and onwards. After re-opening the state aid approval process the Commission conducted a more comprehensive investigation before a new state aid approval was given late 2024. Tax exemption on biogas and bio-LPG is applied again since 29th of November 2024.

[8] Also bio-LPG is exempted from CO_2 and energy tax until end of 2030

Production support/premium

Production support scheme for biogas and biomethane from 1 July 2022.

The support scheme consists of three premiums, which are additional:

- Max 0.40 SEK/kWh (~35 €/MWh) support for biogas produced from manure[9].
- Max 0.30 SEK/kWh for biogas upgraded to biomethane.
- Max 0.15 SEK/kWh additional for biomethane that is liquified to LBG[10].

The scheme is administered by the Swedish Energy Agency and support is given to the raw biogas producer based on continuous yearly applications. There is no guaranteed support or period based on contracts etc, but the aim is long-term support of about 10 years. The production support can be combined with other support such as investment support or tax exemption but is subject to annual overcompensation assessment.

Biomethane and LBG premium are restricted to biomethane produced from RED Annex IX feedstocks (except landfill gas). Eligible also for biomethane produced with other technologies than anaerobic digestion such as biomass gasification. Only eligible for plants producing up to 50 000 tonnes biogas/biomethane/LBG per year and due to EU state aid rules (GBER) a maximum 300 MSEK of accumulated production support per project and undertaking can be granted over time. The support is since 2023 eligible for any final use.

Investment support

- Local climate investment programme (Klimatklivet):
  Investment support (up to approx. 45-65 % of investment cost and max 300 MSEK) for all types of investments or measures that leads to high GHG emission reductions, 2015-2030. The budget for 2026 is 4.5 billion SEK/year (~0.41 billion €). A significant part of the investment support so far has been granted to biomethane investments (biogas/biomethane plants, CBG/LBG filling stations, etc.) but also other measures such as EV charging infrastructure.

Economic incentives and other regulations for low emission road transport, including biomethane

- Climate purchase premium for HDVs, including gas vehicles, of up to 20 % of purchase cost. The bonus is granted by the Swedish Energy Agency.
- Legislation for environmental zones in cities from 1st of January 2020. Cities can put up restriction zones for polluting (noise and emissions) vehicles in three different restriction levels. Only Euro 6 gas vehicles (NGVs), hydrogen and all-electric vehicles are allowed in all three zones. On the heavy-duty side, Euro VI plug-in hybrid electric vehicles (PHEVs) are also allowed. So far not widely used.

[9] This support has been available since 2015 by the Swedish Board of Agriculture but is since 1 January 2024 part of the biogas support scheme at Swedish Energy Agency

[10] The new production support scheme has replaced a temporary and more limited biomethane production support in place from October 2018 until end of 2021.

ENERGIGAS SVERIGE

Other policies and regulations with positive effect on the biomethane market

- Environmental information about all transportation fuels must be displayed at the filling station, including origin and CO_2 reduction from 1st Oct 2021.
- Municipalities must provide systems for separation and collection of organic waste from households from 2024. The national goal of collection and recycling of nutrients and with energy recovery (digestion) from 40 % of all organic waste from households, commercial kitchens, grocery stores and restaurants was reached. The new national goal is 75 % nutrient and energy recovery (digestion) by 2023, which was not reached.

Economic drivers via EU support schemes increasingly important for biomethane demand

A revised EU emission trading scheme

The revised EU ETS provide an increased push for biomethane and other renewables in large industries and heat and power production, as well as in shipping. Among the main changes that will increase the push for biomethane are the phase out of the free allocation of allowances, the increased emission reduction targets (no CO_2 emissions is allowed within ETS from 2039), and the gradual inclusion of shipping from 2024 and full inclusion from 2026.

The new ETS2

The new separate emission trading scheme covers emissions from most sectors not covered by EU ETS1, the so called ESR-sectors, for instance small industry, transport and housing. In Sweden also agriculture and forestry are opted in. When the emission trading starts from 2027 (or from 2028 if the proposed postponement with one year is adopted) the cost for fossil fuels will increase – increasing the competitiveness for renewable fuels such as biomethane. ETS2 will likely be on top of other national policy instruments like tax exemption or reduction quotas.

Upcoming drivers for shipping with new EU policies

International environmental legislation (sulphur and nitrogen oxide limits) together with some national environmental-differentiated port fees have provided some push for more LNG ships. However, until recently there has been no real economic incentives for renewable fuels in shipping. Two important EU-policies are now coming into force that will become an increasing driver for biomethane in maritime sector: the new EU wide reduction quota system for shipping with increasing quotas effective from 2026 (FuelEU Maritime) and the full inclusion of shipping in the emission trading scheme (EU ETS) from 2026.

An adopted revised Energy Tax Directive (ETD) would incentivise renewable fuels over fossil fuels

The revision of the ETD from 2003 has been going on for many years now. After intense negotiations to reach an agreement under 2024-2025 an agreement now seem far away. The proposal includes tax levels for more energy types and fuels and most importantly to set new differentiated minimum tax levels on energy and fuels. Sustainable advanced biofuels (such as RED Annex IX based biomethane) and RFNBOs (such as hydrogen and e-methane) will get low minimum tax level while fossil fuels such as diesel and natural gas will get a higher. If adopted, there will be substantial tax incentives for renewable energy and fuels (at least for sustainable fuels other than from food and feed crops), without the need for state aid.

EU CO_2 standards for new road vehicles negatively affect biomethane in transport

The EU policy clearly aims to replace vehicles with internal combustion engine with “zero-emission vehicles” (= electricity and hydrogen vehicles). This will negatively affect the development for biomethane in road transport. Particularly the EU CO_2 standard regulation for light road vehicles, which only allow sales of zero-emission cars from 2035, already lead to declining market for gas cars. The CO_2 standard regulation for heavy road vehicles is similar but slower and less strict

(90 % of new sales 2040 must be zero-emission vehicles), still allowing a long-term growing market for LBG trucks. The CO2 standards will be revised within the next few years.

Some policy barriers for further development

- The investment conditions for biomethane production are now rather good and new investment projects are presented continuously. However, the long-term policy conditions have been and are still too uncertain for biomethane production to take the next step.
- The biomethane production support is subject to annual Governmental budgets, and its political certainty is not guaranteed long term. Implementing a biomethane strategy and setting a target for biomethane would decrease the political uncertainty and further strengthen the investor confidence.
- To realize the large biomethane potential from forest residues and wood waste or e-methane production another type of production support scheme is required, such as the CfD suggested by the Bioeconomy inquiry in March 2023 for investments in large scale biomethane plants or e-methane and production of liquid biofuels.
- The so important 10-year EU Commission approval of the tax exemption for biomethane from 2021 gave more long-term confidence and trust in the market. The sudden revoke of the tax exemption during most of 2023 and 2024 leading to full energy and CO_2 tax for biogas and biomethane use was detrimental to the market and for investments. Especially for the very promising and quickly increasing LBG-market for heavy duty vehicles. Hopefully, the market can now quickly restore again.
- Acknowledgment of market instruments and mass balance principles for trade and compliance to various policies such as ETS, taxation, RED sustainability criteria and GHG-accounting schemes are crucial for efficient market development. It is still not fully recognised in all important schemes or accounting programmes, and the uncertainty and different rules hamper the market and increase costs. For instance, mass balanced biomethane from the grid liquified outside Sweden and imported to Sweden as LBG are currently refused tax exemption, which is problematic for the growing market for LBG in heavy road transport.
- The lack of a biomethane registry/Guarantees of Origin (GO) system in Sweden is an increasing problem – particularly for cross border trade. However, according to proposed regulations in 2025 (still not adopted November 2025) a new GO system for gas in line with Article 19 of RED will be in place from 1 January 2026, managed by the Swedish Energy Agency.
- There are a couple of taxation rules that are disadvantageous for biomethane, for instance that taxation now is based on volume instead of energy content. This will be changed from 1 July 2026.
- Potential lack of local biomethane demand (for instance with decreasing demand in cars and public transportation) in a country with limited gas grid infrastructure will be a challenge for many biomethane producers. Liquefaction to LBG will be key to reach potential large gas users in industry, long haul heavy road transport or maritime transport in the future.
- Even with the tax exemption back into force, the competitiveness for CBG and LBG in transport has decreased due to reduced reduction quota and taxes on gasoline and diesel.
- The economic incentives for biomethane use in some industrial sectors are too week for biomethane to be competitive to fossil fuels. Particularly for use in the iron and steel sector and for use as raw material in the chemistry industry since exemption from energy and CO_2 taxes are not effective in these sectors and/or they are not included in

the ETS. This issue and the large demand for biomethane as raw material in the industry is highlighted in a report from **Industrins biogaskommission** in March 2025, which also includes policy recommendations.

Regulation on sustainability criteria, mass balancing in gas grids, cross border trade and tracking systems

Green gas concept allows for mass balancing in gas grids for tax purposes

There is no biomethane registry or independent certification system currently in place in Sweden[11], but mass balancing is possible for biomethane in gas grids since 2011 in the taxation regulation (called green gas concept) as well as in the sustainability criteria scheme. The Tax Authority, however, has the possibility to request full documentation from all taxable companies using the green gas concept. All companies are using in-house accounting to make sure that they inject (or that it is injected for their account) as much biomethane as they take out and put into market for energy purposes. Some companies use third party auditing for this.

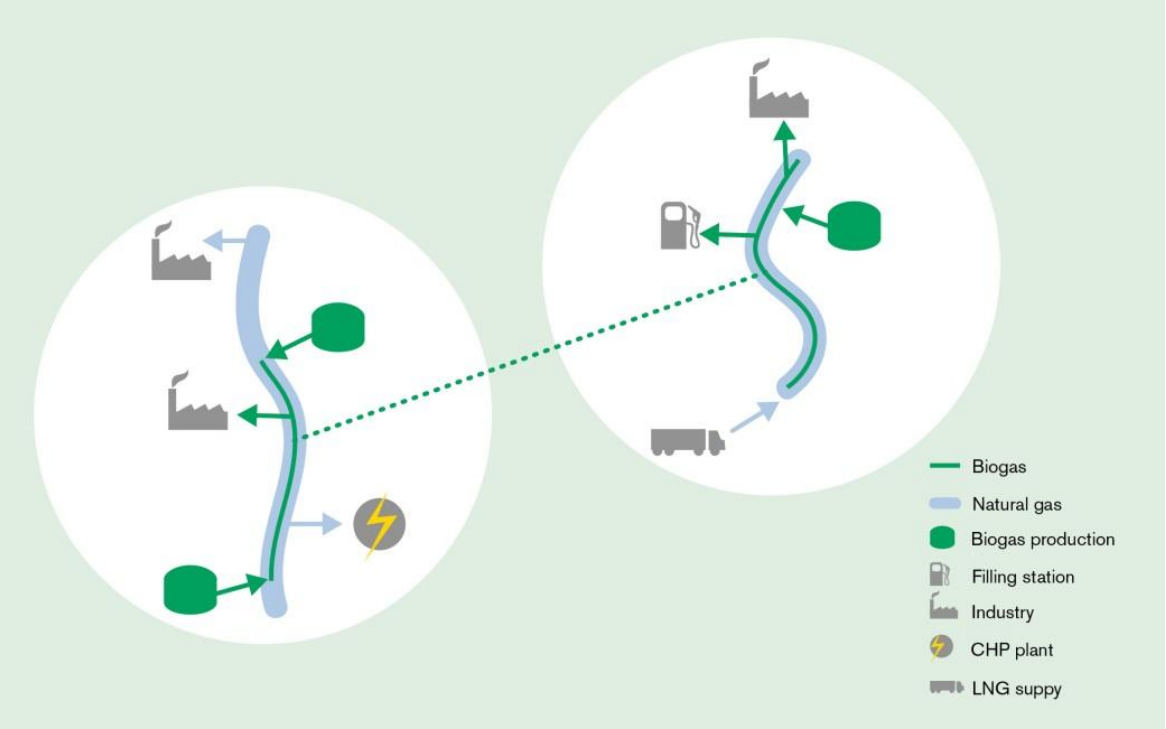

Figure 23 The green gas concept in Sweden. 100 % biomethane can be purchased and claimed as biomethane from the gas network or local gas grids through the mass balance principle and is eligible for exemption of energy and CO_2 tax.* Full in-house documentation and a purchasing contract between the user and the supplier is required.

In the Act (1994:1776) on energy taxes[12] the green gas concept was introduced in 2011, which means that biomethane users connected to the gas grid or in a local grid can buy and claim any share of biomethane even though it is a physical mix of natural gas and biomethane. Biomethane

[11] A GO system for gas will be in place from 2026. However, unclear if and thus when it may be part of/valid as verification documentation of biomethane purchase in policies such as tax exemption, ETS etc. Probably it will rather be UDB registrations that will affect biomethane verification in various regulations ahead.
[12] Lagen (1994:1776) om skatt på energi (Chapter 2, 2 a §)

from gas grids is eligible to full energy tax and CO_2 tax exemption. The biomethane content shall be decided by the purchasing contracts between the user and the supplier, and the supplier must assure that the same amount has been injected to the grid. If the biomethane is bought in another country, and transported to Sweden from Denmark through the grid, transmission capacity from the injection point must thus be booked.

The green gas concept is in principle applicable for both imported and domestic biomethane and is possible also between gas grids in Sweden that is not physically connected.

However, it does not apply (at least not fully) for biomethane withdrawn from the gas grid outside of Sweden and then trucked/shipped to Sweden e.g. as LBG.

No mass balancing or "green gas principle" applies for off-grid biomethane such as LBG/LNG for taxation.

"Green gas concept" since 2022 also possible within EU ETS

Following a revision of the EU ETS regulation, from 1st of January 2022 emission allowances are no longer required for biomethane purchased from gas grids and the biomethane share is decided based on purchase records, proof of sustainability and records from a biomethane registry/Guarantees of Origin (if available). Until a biomethane registry/Guarantees of Origin for biomethane is implemented in Sweden other proofs are accepted, including cancelling of a certificate/GO for export to Sweden in the exporting country´s registry.

No mass balancing applies for off grid biomethane such as LBG/LNG in EU ETS.

In ETS2 mass balancing according to RED-rules are allowed also for off-grid. How this will be implemented in practice when co-distributing e.g. LBG with LNG is a bit unclear.

RED sustainability criteria

The national sustainability criteria scheme is regulated by the Sustainability Act (2010:598)[13] and is supervised by the Swedish Energy Agency. All suppliers of biofuels (including biomethane aimed for transport) eligible for taxation must apply for a Sustainability Decision (Hållbarhetsbesked) by the Swedish Energy Agency. From 1st July 2021 the sustainability criteria apply also to other energy purposes than transport (electricity, heating and cooling), including all biogas and biomethane used in installations > 2 MW. The already existing national RED sustainability criteria scheme continues with the same set up but now extended to all biomass fuels. The sustainability criteria regulation is updated to comply with REDIII from 1st of July 2025 – e.g expanded to RFNBO (renewable fuels of non-biological origin) and RCF (recycled carbon fuels). Registration of all transactions of liquid and gaseous sustainable biomass fuels, RFNBO and RCF in the Union database (UDB) will be mandatory when the EC delegated regulation on UDB is adopted.

To be eligible for tax exemption or to be counted for in other support systems, such as the GHG reduction obligation for gasoline and diesel or EU ETS, all biomass fuels, RFNBO or RCF must meet the sustainability criteria, which is proven by a valid Sustainability Decision.

To get a Sustainability Decision, the supplier must set up a control system covering the whole production and supply chain with routines – including agreements with sub-suppliers, regularly sampling and auditing, and a mass balance system – that assures that biofuels supplied meet the sustainability criteria. A statement from an independent auditor assuring that the control system fulfils the requirements must be sent to the Swedish Energy Agency, together with the application. The supplier must in April every year report to the Swedish Energy Agency the amounts of sustainable fuels delivered and their sustainability characteristics. The Sustainability Decision is

[13] Lag (2010:598) om hållbarhetskriterier för biodrivmedel och flytande biobränslen (hållbarhetslagen)

reviewed every second year or so by the Swedish Energy Agency, based on independent auditing of the control system including samples of actual biofuels consignments delivered. All suppliers (or users if used for other energy purposes than transport) of biofuels must have a sustainability decision, but an alternative to show that all requirements in the national regulations are met is to refer to certification by a Voluntary scheme (VS) approved by EC. Biofuels covered by certification from a VS is always compliant with the sustainability criteria in Sweden.

For biomethane export (which so far is limited) Swedish producers normally use voluntary scheme certifications. For imports voluntary scheme certificates are usually used to prove compliance in Sweden, but it is not necessary if the supplier´s control system have sufficient routines that can assure RED compliance through the whole production chain and if this was described to the Swedish Energy Agency in the Sustainability Decision application.

Mass balancing in the gas grids and cross border
Just like the green gas concept in the tax regulation mass balancing is recognised within the Swedish national gas networks and local grids, based on purchasing contracts and proofs of injection of the same amount of biomethane into the grids.

Biomethane registry / Guarantees of Origin for gas / Union Database

Until the beginning of 2026 no national biomethane registry or centralized system for register and tracking biomethane has been in place in Sweden. However, from February 2026 a national Guarantees of Origin (GO) system extended to renewable gases is in place[14]. When the system become connected to AIB (Association of Issuing Bodies) gas GO rules and hub, cross-border transfer of gas GOs to/from the Swedish GO register will be possible. Probably sometime in the second half of 2026. So far, the gas GO will be voluntary, but with implementation of the Gas Directive, cancellation of gas GO will be mandatory for gas suppliers for disclosure of renewable gases to final customers. These disclosure rules for gas are still to be developed by the Swedish Energy Markets Inspectorate (Ei) and will most likely be restricted to the regulated gas grids.

However, it is unlikely that GOs will be a valid means of biomethane purchase verification in policies such as tax exemption, ETS etc. When the Union Database (UDB) is fully operational UDB registrations will most likely be the main tracking and verification system for biomethane in various regulations ahead.

[14] Ursprungsgarantier, The Swedish Energy Agency