



# GAS FOR CLIMATE

## A path to 2050

### Action Plan 2030

How gas can help to achieve the Paris Agreement target in an affordable way



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TERÉGA



## Gas for Climate: how to scale up renewable gas in Europe

The Paris Agreement goal to limit global temperature increase to well below two degrees requires deep decarbonisation. This can only be achieved through long-term energy system planning starting today and shared determination of all involved in the energy system. Gas for Climate is committed to achieve a net zero emissions EU energy system by 2050 and is convinced that this can be achieved by a smart combination of renewable electricity and renewable gas.

Gas for Climate is a group of seven leading European gas transport companies (Enagás, Fluxys, Gasunie, GRTgaz, Open Grid Europe, Snam and Teréga) and two biomethane industry associations, European Biogas Association and Consorzio Italiano Biogas. The group embraces deep decarbonisation by 2050 and highlights the valuable role that renewable and low carbon gas can play in this, alongside increasing quantities of renewable electricity.

In February 2018, Gas for Climate published a study by Ecofys, a Navigant company, that analysed the future role of renewable gas in the EU energy system. The Ecofys study showed that, using conservative assumptions, it is possible to scale up renewable gas production within the EU to 122 billion cubic metres (bcm) by 2050, utilising both hydrogen and biomethane. This renewable gas can be transported, stored and distributed in existing gas infrastructure and the synergies offered by renewable electricity and renewable gas allow the EU to achieve a net zero carbon energy system by 2050, while saving €138 billion annually compared to a scenario without any gas.

To achieve a net zero carbon EU energy system by 2050 in a cost-effective way we believe that renewable gas production within the EU needs to scale up. This requires action by many different stakeholders, starting today. Gas for Climate members, both biomethane producers and Transmission System Operators (TSOs), are committed to support decarbonisation by facilitating a scale up of production and ensuring the infrastructure to store and transport renewable gas is ready. Gas for Climate also sees the need for an improvement of renewable gas business cases

*“ We are committed to achieve net zero greenhouse gas emissions in the EU by 2050 to meet the Paris Agreement target. Renewable gas used in existing gas infrastructure can play an important role in this. ”*

*The CEOs of Gas for Climate members*

with lower production costs. Gas for Climate consortium members already act upon this by promising demonstration projects in the area of renewable gas and by scaling up biomethane production across Europe.

### Needs to achieve a net zero carbon EU energy system



**Production** – increase of renewable gas production requires an improvement of business cases, scale-up of the market, increased societal acceptance of sustainable renewable gas and further development of technologies.



**Transport & trade** – transport and trade of renewable gas needs to be further developed and tested to become 'common practice'. Regulation plays a key role in enabling transport and trade of renewable gas. A European Register for Green gas, among others, will be required to ensure flourishing renewable gas cross-border trades.



**Use** – renewable gas delivers significant value to society, especially in the heating of existing buildings and production of electricity at times of peak demand. Gas is also needed for some industrial (high temperature and feedstock) processes than cannot be replaced by electricity for physics or economic reasons. Renewable gas can also be used to decarbonise transport, in particular we foresee a role in (heavy) transport.

This Action Plan describes what Gas for Climate member organisations are already doing to facilitate the scaling up of renewable gas, what their ambitions related to renewable gas are out to 2030 and what is needed to enable action. This Action Plan will be further refined and updated in 2019 following additional insights and analysis into the future role of gas in a decarbonised system.

# Unlocking the potential of renewable gas in Europe

Renewable and low carbon gases have a valuable role to play in a future decarbonised EU energy system. These gases include biomethane, green hydrogen, power to methane, blue hydrogen and natural gas combined with Carbon Capture and Storage (CCS). All of these gases can be stored, transported and distributed using the existing gas infrastructure for an integrative sector coupling approach.

The February 2018 Gas for Climate study focused on renewable gas used mainly for heating buildings, producing electricity at times of peak demand but also in some industrial processes and heavy road transport. Following the study scope, this Action Plan only covers biomethane, green hydrogen and power to methane for electricity, buildings heating, heavy road transport and heat & feedstock for industry.

In 2019 the Gas for Climate Consortium will assess the potential of low carbon gas in the EU and the societal value of using this gas in various sectors of the energy system. Subsequently, this Action Plan will be updated with recommendations for low-carbon gas i.e. blue hydrogen or natural gas with CCS.

**Biomethane** is renewable methane gas produced from biomass. Gas for Climate advocates the use of sustainable biomass leading to positive externalities rather than negative sustainability impacts.

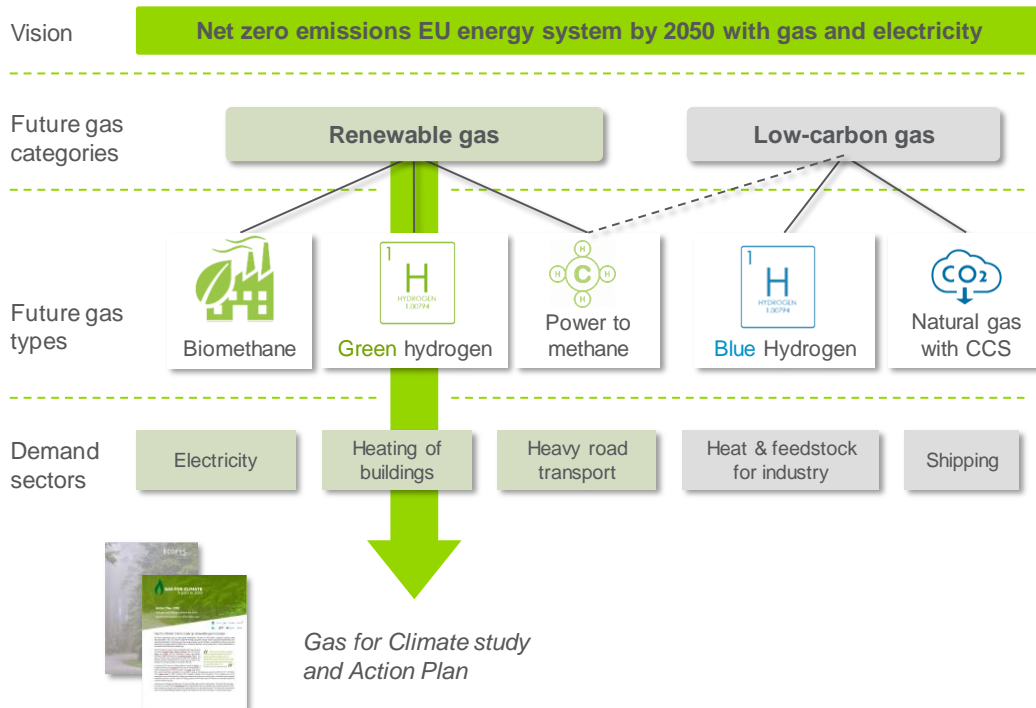
**Green hydrogen** is renewable hydrogen gas produced from renewable electricity.

**Power to methane**, also called synthetic methane, is methane gas produced from hydrogen and carbon dioxide.

**Blue hydrogen** is low carbon hydrogen gas produced for example from natural gas with pre-combustion Carbon Capture technology

**Natural gas with CCS** is low carbon methane gas because carbon capture and storage is applied.

## Scope of this Action plan



**The focus of this Action Plan is on biomethane, green hydrogen and power to methane for electricity, building heating, heavy road transport and heat & feedstock for industry. This focus can be expanded based on additional Gas for Climate analysis.**



# Scaling up renewable gas is happening today

To achieve a net zero carbon EU energy system by 2050 in a cost-effective way we believe that renewable gas production within the EU needs to scale up. Action today is required to make this vision a reality. The Gas for Climate consortium members are already undertaking various actions to make this vision a reality.



**Jupiter 1000** (France), a 1MWe power to gas project, is the first industrial demonstration of an electrolysis and methanation process using CO<sub>2</sub> captured with a CCS technology. Green hydrogen will be produced using two electrolyzers involving different technologies, from 100% renewable energy. **GRTgaz** is the project manager and **Teréga** a partner.

## HYOFFWIND

**Hyoffwind** in Belgium is one of the first power to gas projects of industrial-scale. **Fluxys** is one of the partners in the project. Even though the project is still in feasibility phase, the aim is to build a power-to-gas installation that can convert several megawatts of electricity into green hydrogen which can be marketed as carbon-free fuel or feedstock.

## Supercritical Water Gasification (SCW)

The **SCW** project in the Netherlands uses supercritical water gasification to convert wet biomass into sustainable energy and reusable raw materials. It is a multi-feedstock technology that can process multiple types of biomass. Additionally, the gas is produced at high pressure negating the high costs of compression. **Gasunie** is part of the team building this project.



The **Ambigo** project in the Netherlands aims to make efficient biomass gasification applicable on an industrial scale. The installation looks at various biomass to biomethane gasification technologies, and can process different types of sustainable biomass. In addition, research is being carried out into the processing of residues that are still being burned at low yields in waste incinerators. **Gasunie** is one of the project partners.

The **FenHYx** project by **GRTgaz** in partnership with other international stakeholders will be located in **France**; it aims to define the technical, economic and regulatory conditions for injecting hydrogen into the high pressure gas infrastructure to accelerate the adaptation of the European gas network to hydrogen and contribute to the emergence of the hydrogen sector. FenHYx will be an industrial platform reproducing all the components of a high pressure gas network: trials at different pressures and concentrations of hydrogen and methane, will be used to test on grid and industry user's equipment, assess and certify innovative processes for transporting hydrogen and to facilitate innovations in equipment

## HYREADY

The Europe-wide **HYREADY** project aims to test the injection of various percentages (2, 5, 10, 20 and 30%) of hydrogen on gas transport and distribution networks. It also aims to provide engineering guidelines for gas TSOs and DSOs to support them in preparing their networks to be able to transport a mix of methane with hydrogen. **GRTgaz**, **Enagás**, **SNAM** and **Teréga** from the GfC consortium are all involved in the project.

**Amprion** and **OGE** have joint forces to develop a power to gas project at an industrial scale of between 50 MW to 100 MW. Potential sites are currently being identified in Germany. The purpose of this initiative is to demonstrate and test the potential to couple power and gas grids on the highest system level and to offer the option long-term for system integration by storing and transporting renewable energy also via gas infrastructure. Today's largest power to gas plant in Germany has a maximum installed capacity of around 6 MW.



Italian farmers and biogas producers united in the **Consorzio Italiano Biogas** developed an innovative approach to produce sustainable biogas from winter crops. This **Biogasdoneright** concept increases the agricultural productivity of existing farmland without negative environmental impacts and no direct or indirect land use change effects. Biogasdoneright leads to co-benefits such as decreased soil erosion risk, increased on-farm biodiversity and a potential increase of soil carbon content by leaving more agricultural residues on the land. It is likely to result in negative carbon emissions.



**H2Gas** will boost the development of renewable hydrogen production and use. This project also aims to integrate renewable hydrogen, from power-to-gas technology, in the gas distribution and transport networks. **Enagás** is partner of the project.



The **RenovaGas** pilot in Spain developed a power to gas facility using renewable energy and methanation with CO<sub>2</sub> from Biogas. The gas obtained is totally renewable and high quality, enabling it to be injected directly into the Spanish gas network. **Enagás** was one of the partners in the project.

**Snam** has acquired 70% of IES Biogas, a leading Italian company in the design, construction and management of biogas and biomethane production plants in order to boost the development of biomethane production

## What Gas for Climate members want to achieve by 2030

Increasing renewable gas production in Europe to more than 120 billion cubic metres by 2050 requires action today. Gas for Climate members, both biomethane producers and TSOs, are committed to support decarbonisation by facilitating a scale up of production and ensuring the infrastructure to store and transport renewable gas is ready. Gas for Climate also sees the need for an improvement of renewable gas business cases with lower production costs. The overview below shows the specific 2030 ambitions for each Gas for Climate member organisation. According to the ENTSOG Ten Year Network Development plan (2018), the amount of renewable gas in Europe can reach a quantity of 255 TWh (~25 bcm) by 2030 in the six EU Member States in which Gas for Climate consortium members are based (Belgium, France, Germany, Italy, Netherlands and Spain)<sup>1</sup> As a consortium we are committed to support the achievement of that goal.

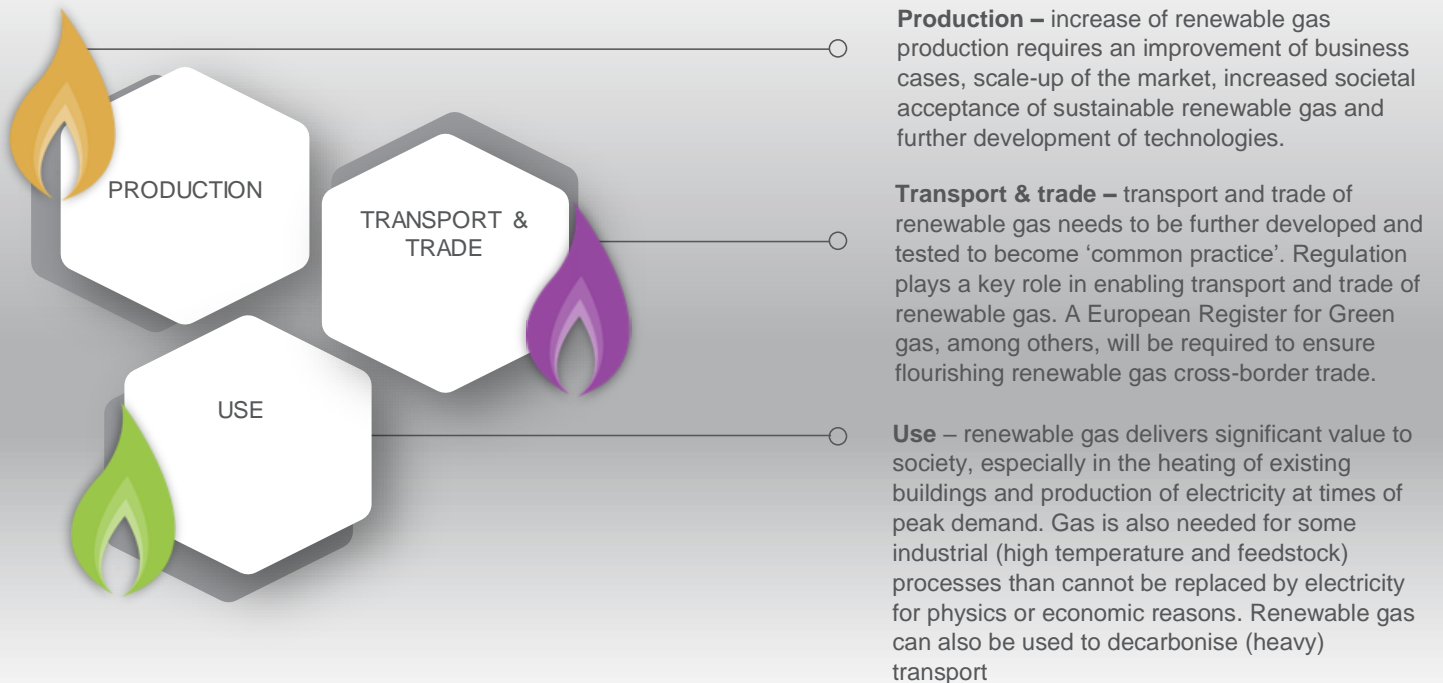
The overview below shows the 2030 ambitions for each Gas for Climate member organisation.



<sup>1</sup> This number is based represent the most ambitious renewable gas forecast as included in the ENTSOG Ten Year Network Development plan scenario's

## At least 120 bcm renewable gas by 2050 – how to get there

The market for renewable gas is currently driven by the efforts of first movers. Achieving more than 120bcm or around 1200 TWh renewable gas by 2050 within the context of full decarbonisation at the lowest possible costs requires actions throughout the full renewable gas value chain. Necessary actions are described below, being grouped in actions focusing on the production, transport & trade and use of renewable gas.



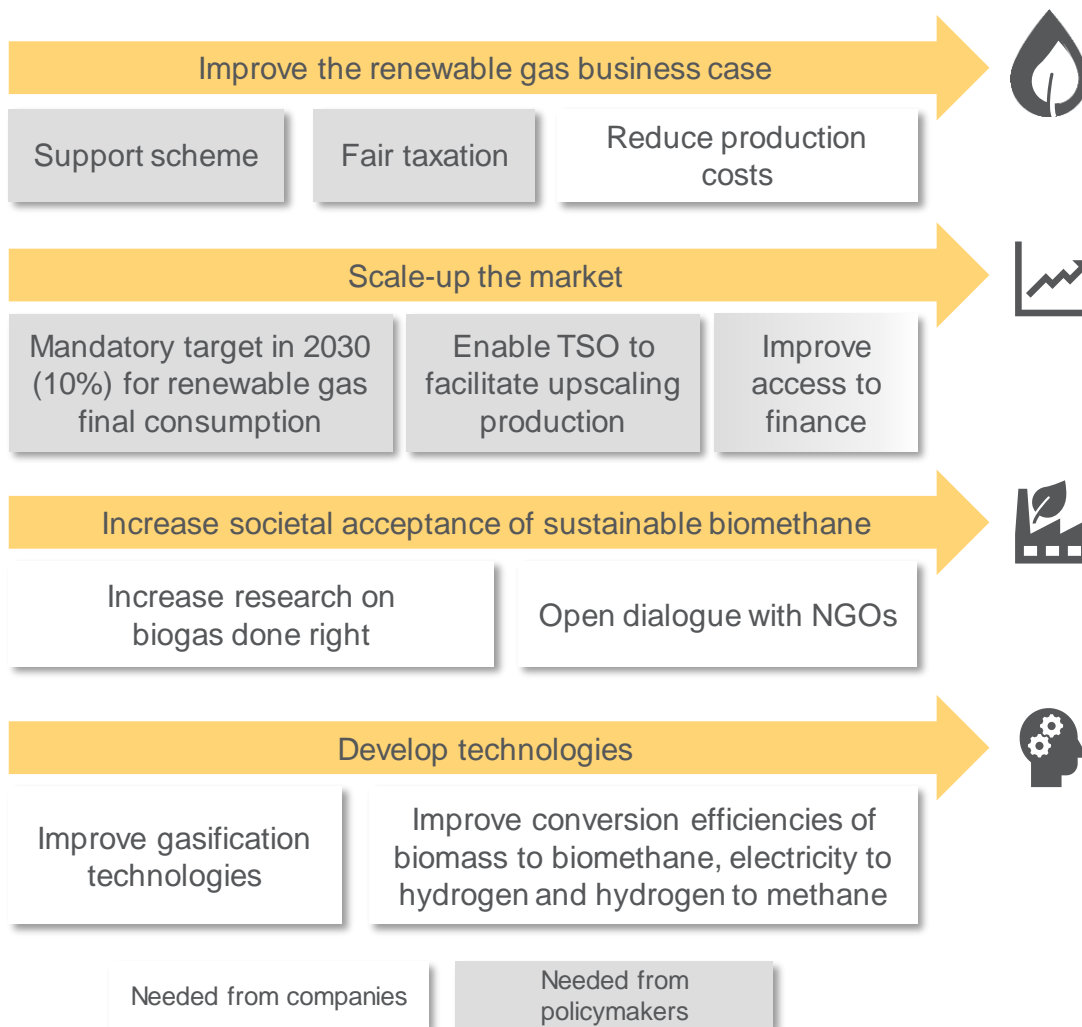


**Increased production of renewable gas is needed to reach our 2050 vision. This requires an improvement of the business case, scale-up of the market, increased societal acceptance of renewable gas, further development of technologies.**

Part of these needs can be covered by companies. Gas for Climate member organisations are already facilitating production by implementing pilot projects and are committed to further facilitating the scaling up of production. Biomethane producers are committed to reducing production costs and steering biomethane production towards using the most sustainable types of biomass. One example is the Biogasdone right concept, which is an innovative approach to produce sustainable biogas from cover crops without increasing the use of synthetic fertilizers, using strip tillage and feeding soil nutrients back to the field by precision-fertilization of biogas digestate. Biogasdone right increases the agricultural productivity of existing farmland without negative environmental impacts and no direct or indirect land use change effects. It has proven positive impacts on soil quality and reduced use of chemical fertilizer. It can also generate negative carbon emissions through increased organic carbon in soils.

However, a successful scale-up of renewable gas production also requires policy support, such as the introduction of a 10% target for renewable gas by 2030

#### **Requirements for ramping up renewable gas production, and how companies (TSOs, producers, equipment suppliers) and policy makers can contribute**





## What companies can do to increase renewable gas production

WHAT	WHO	WHEN
Biomethane producers involved in Gas for Climate are committed to significantly reduce biomethane production costs. A cost reduction of at least 20% in 2030 compared to 2018 biomethane production cost levels should be feasible.	Biomethane producers, technology providers	2018-2030
Electrolysis system costs to produce hydrogen from electricity are expensive today. Yet it is possible to significantly reduce costs by increasing the efficiency of electrolysis and decreasing financing costs by derisking strategies.	Technology providers	2018-2030
Improve gasification technologies including enabling feedstock flexibility (quality, consistency, dryness) and post-production gas treatment (particulate and tar removal, enrichment for grid injection).	Technology providers, renewable gas producers	2018-2030
Improve conversion efficiencies of biomass to biomethane, electricity to hydrogen and hydrogen to methane	Technology providers, renewable gas producers	Up to 2025
Increase research on biogas done right. Biogasdone right not only holds the promise of scaling up sustainable biomethane production, the concept can also generate additional benefits such as increased rural employment, security of energy supply and more sustainable agricultural production. Today, Biogasdone right is mainly applied in Italy and tested in France. For the concept to be rolled-out throughout the EU, cultivation trials are needed in various Member States. Farmers and biogas producers can take the lead, assisted by agricultural institutes and universities.	Farmers, biomethane producers, agricultural institutes and universities	Up to 2025

## How policy can help to increase renewable gas production

WHAT	WHO	WHEN	HOW
<b>Introduce a mandatory target with at least 10% renewable gas final consumption by 2030, with specific national targets to be decided upon based on the national availability of agricultural and forestry biomass. Achieving the target will count towards the 32% target for renewable energy as laid down in the REDII directive.</b>	EU	2018-2022	<ul style="list-style-type: none"> <li>To be included in the upcoming EU gas market update</li> </ul>



<b>CAPEX support</b> for innovative renewable gas production technologies	EU	2018-2022	<ul style="list-style-type: none"> <li>• Support schemes made available also for projects with relatively limited capital expenditure</li> <li>• Finance gasification plants from the EU Innovation Fund</li> <li>• Support for innovative gasification demonstration projects from Horizon Europe</li> </ul>
<b>Recognise the roles which TSOs can play to facilitate and scale up renewable gas production</b>	EU	2018-2022	<ul style="list-style-type: none"> <li>• The EC should clarify the role that TSOs can play to support the development of renewable gas</li> </ul>
<b>Fair support for renewable gas.</b> Ensure that the benefits of renewable gas as dispatchable renewable energy are considered in national incentive schemes in a harmonised way	National policy with EU coordination	up to 2025	<ul style="list-style-type: none"> <li>• Introduce EU harmonised rules for auctioning renewable energy subsidies</li> <li>• Modify the calculation of tariff-based support for renewables to focus not just on lowest possible production costs but to also consider the highest possible benefit to the overall energy system</li> <li>• Enable grid connection and tariff discounts for green gas injections into the transmission network</li> </ul>
<b>Use renewable gas support schemes to drive down production costs</b>	National policy with EU coordination	up to 2025	<ul style="list-style-type: none"> <li>• Design national support schemes (auctions) in such way that the renewable gas sector is enabled and incentivised to reduce production costs. Build on best practice in offshore wind</li> </ul>
<b>Fair taxation</b> <ol style="list-style-type: none"> <li>1. Avoid double taxation of green hydrogen. Today, energy tax is charged over electricity, also when used to produce hydrogen. Hydrogen as a product is yet again charged with energy tax</li> <li>2. Differentiate energy tax on biomethane from natural gas</li> </ol>	National policy with EU coordination	2025-2030	<ul style="list-style-type: none"> <li>• National energy tax law, to open the possibilities for rebates/exemptions to produce green hydrogen and biomethane</li> </ul>
Use the EU carbon farming initiative to support <b>Biogasdoneright</b> implementation	EU	2018-2020	<ul style="list-style-type: none"> <li>• The Common Agricultural Policy should recognise Biogasdoneright under the new result-based policy design rewarding farmers directly for tonnes of CO<sub>2</sub> removed from the atmosphere by cultivating biomethane feedstock in addition to food crops (Carbon Farming)</li> </ul>

### Offshore wind support scheme leading to large production cost reductions

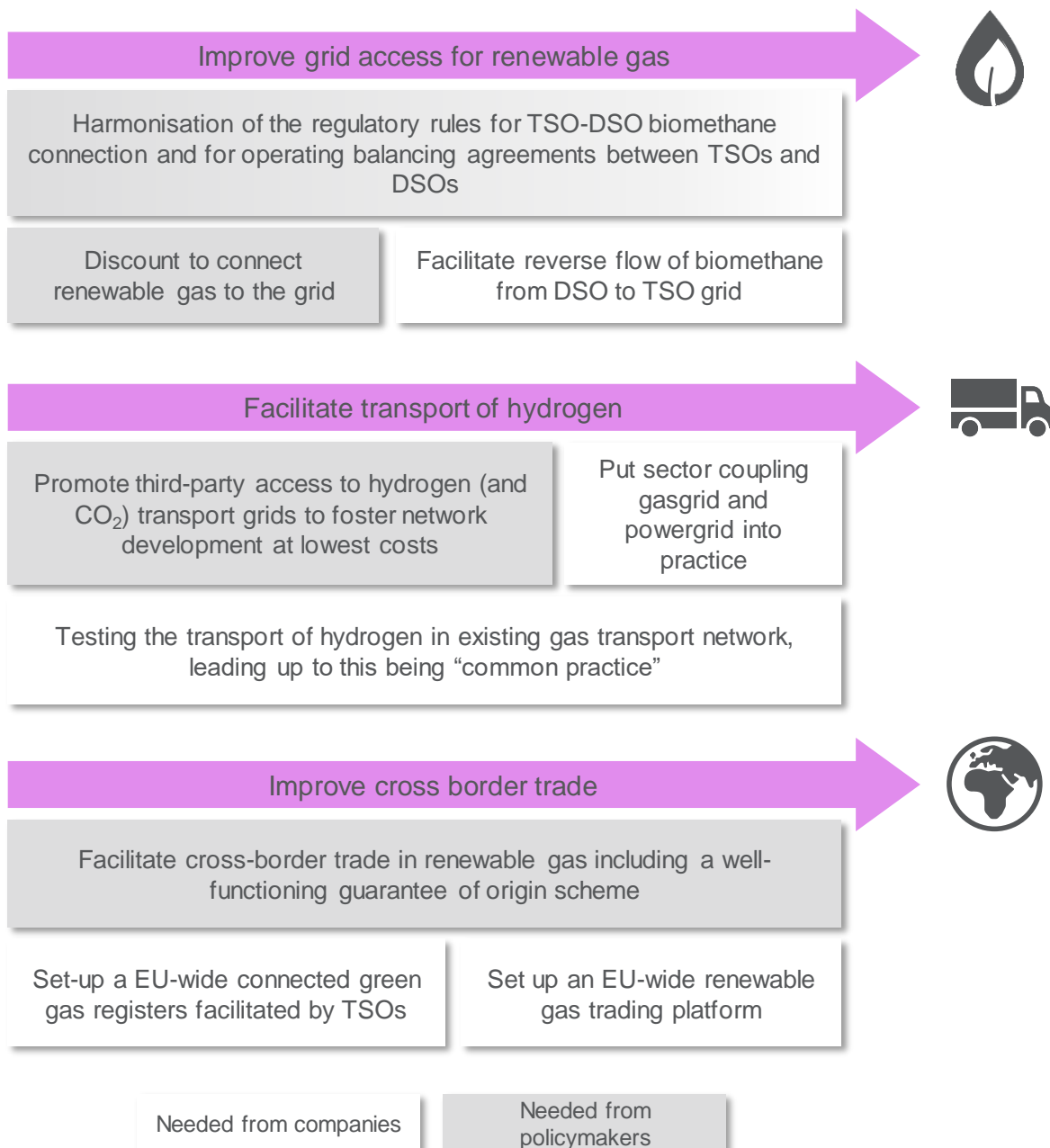
An ongoing series of five tenders for large offshore wind farms in The Netherlands has proven successful in driving down the costs by a factor of more than two between 2013 and today. Achieving the same success for renewable gas production would require: Offering a guaranteed market volume during a series of years, gradually driving up the scale of the projects, removing upfront risks including permitting risk, and defining a clear role for the TSO, in combination with a commitment from the supply side to reduce costs substantially over the course of the scheme. In the case of offshore wind, the supply side (wind developers) committed to a 40% cost reduction, which has already been exceeded in the first of the five rounds.



**Renewable gas needs to be transported, stored and traded. Gas for Climate sees a clear need for improved grid access for renewable gas, improved cross border trade of all forms of renewable gas and facilitated transport of hydrogen and the tight coupling of gas and electricity in various demand sectors.**

Part of the required actions to achieve a well organised transport and trade of renewable gases are to be taken by companies. Gas for Climate member organisations have already set up pilot projects to test and improve the transport and trade of renewable gas. However, a successful scale-up of renewable gas transport and trade also requires policy support.

**Requirements to enable transport and trade of renewable gas, and how companies (TSOs, producers, equipment suppliers) and policy makers can contribute**



## What companies can do to enable renewable gas transport and trade

WHAT	WHO	WHEN
Testing the transport of hydrogen in existing gas transport networks, leading up to this being 'common practice'	TSOs	2018-2022
Enabling 'reverse flow' injection of renewable gas in existing gas transport networks leading up to this being 'common practice'. Regular communication on (new) renewable gas capacity coming online	DSOs/TSOs	2018-2022
Harmonisation of the national registers and setting up an EU-wide connected green gas register facilitated by TSOs to enable cross-border trade.	TSOs, other companies	2018-2022
Set up an EU-wide harmonised renewable gas trading platform	Companies	up to 2025
Gas and electricity grid operators to set up hydrogen and power to methane pilot projects	TSOs, other companies	Up to 2025

## How policy can help to enable renewable gas transport and trade

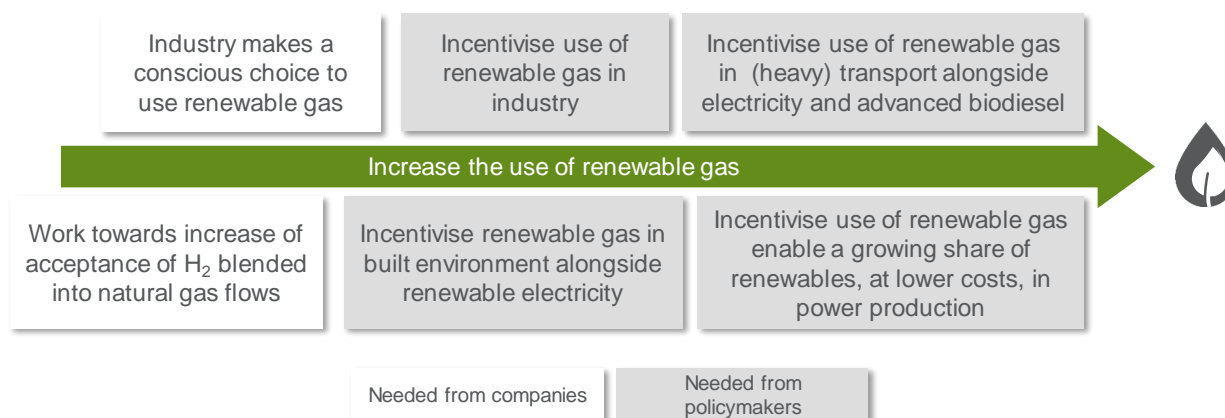
WHAT	WHO	WHEN	HOW
<b>Harmonisation of the rules and guidelines</b> for TSO-DSO renewable gas connection and in governing balancing agreements between TSO and DSOs	EU	2018-2022	Upcoming EU gas market update <ul style="list-style-type: none"> <li>injection in DSO grid should be counted as gas made available at a virtual trading point (at TSO level) to improve renewable gas tradability</li> <li>DSO and TSO technical guidelines and gas quality specifications should be harmonised.</li> </ul>
<b>Promote Third Party Access</b> to hydrogen and CO <sub>2</sub> transport grids to unlock and foster the development of CCU/S and hydrogen across Europe	EU	2018-2022	Upcoming EU gas market update
Facilitate <b>cross-border trade</b> of renewable gas including a well-functioning guarantee of origin scheme	EC and Member States	2018-2022	EC recognition of renewable gas certificate trading schemes to enable proof of origin and proof of sustainability by an EU harmonised certification scheme  Upcoming EU gas market update

Recognise the role of the gas transport infrastructure in terms of capacity and flexibility it provides for the energy system, in particular for the integration of renewable sources	EC	2018-2022	<p>To be included in the upcoming EU gas market update</p> <p>To develop an energy-wide tariff scheme reflecting the contribution of the gas system flexibility to the balancing and resilience of the European energy system</p>
Increase the <b>coupling</b> between the gas and electricity grids as well as fostering sector coupling. Sector coupling means creating interlinkages between the electricity, heating and transport sectors through infrastructure and energy carriers. Sector coupling can facilitate a greater share of variable renewable energy in the energy system while allowing dispatchable energy to provide flexibility in all three sectors in the most efficient way.	EU	2018-2030	<p>Foster interlinked Network Development Plans by the gas and electricity sectors</p> <p>European legislation should value the synergies between sectors (e.g. taking into account positive externalities for the agricultural sector of green gas project through the CBA for PCI)</p> <p>Enabling the conversion of green gas and green electricity certificates through P2G and G2P</p>



Various energy-using sectors can stimulate demand for renewable gas. Companies can decide to use renewable gas and policy makers can incentivise sectors to use renewable gas.

**Requirements to ramp up renewable gas use, and how companies (TSOs, producers, equipment suppliers) and policy makers can contribute**



## What companies can do to increase the use of renewable gas

WHAT	WHO	WHEN	HOW
Industry makes a conscious choice to use renewable gas. We see ever more companies taking responsibility in the fight against climate change. Over 400 large international companies have pledged to reduce their company-emissions in line with required reductions to meet the Paris Agreement target. Within the EU, the more stringent EU ETS after 2020 is likely to trigger increased investments in low carbon production technologies and industrial energy efficiency.	Companies	Up to 2030	<ul style="list-style-type: none"> <li>EU ETS-installations opting to use renewable gas for process heat</li> <li>Companies setting science-based climate targets</li> </ul>
Work towards increase of acceptance of hydrogen blended into natural gas flows	TSOs, DSOs, hydrogen producers	Up to 2025	



## How policy can help to increase the use of renewable gas

WHAT	WHO	WHEN	HOW
<p><b>Support the use of renewable gas in transport to help to decarbonise of the transport sector.</b> Currently, gas does not play a large role in transport. A fully decarbonised transport system requires large quantities of renewable or low carbon fuels. Electric mobility alone is unlikely to be able to decarbonise the entire transport sector. Sustainable biofuel and renewable gas have a role to play as well. Stimulating vehicle fuel efficiency should go hand in hand with a faster increase in the share of renewables in transport. Also, consumer access to electric vehicles as well as vehicles that run on renewable gas should be improved.</p>	EU	2019-2030	<p>EU Clean Mobility Package II, Clean Mobility Package III and REDII</p> <ul style="list-style-type: none"> <li>• Incentivising vehicle manufactures to supply more vehicles running on (bio)methane by introduction of a full life-cycle assessment CO<sub>2</sub> methodology vs. existing tailpipe approach.</li> <li>• Introduction of a CO<sub>2</sub> correction factor (CCF) in the EU regulations for CO<sub>2</sub> standards for light duty vehicles and heavy-duty vehicles. The CCF ensures that CO<sub>2</sub> savings from using renewable gas are taken into account when assessing carbon benefits of vehicles.</li> <li>• Raising the 2030 renewable transport fuels target of as included in the REDII Directive from the current 14% to at least 20% during the 2023 revision of the Directive.</li> </ul> <p>Recognise (in RED II, Annex IX) cover cropping as an advanced form of biogas/biofuel feedstock production, not leading to unwanted land use impacts.</p>
<p><b>Assume a strict technical neutrality in incentivising the use of renewables in the built environment</b></p>	EU	2025-2030	<p>Evaluation of the Energy Efficiency Directive</p>
<p><b>Support the design of a market system which enables the discovery of the societal costs and benefits of all renewables</b> (incl. those associated with intermittency)</p>	EU	2018-2020	<p>Evaluation of Directive and Regulation of Internal Electricity Market (recast).</p> <p>Commission original proposal appear to be more “market oriented” than other</p>

A large scale-up of renewable gas in Europe is possible yet requires going beyond 'business as usual'. Companies must step up efforts to improve renewable gas business cases, facilitate its trade and transport and be willing to start using it to produce heat, power and fuel. Policy makers can use the upcoming EU gas market update to support the transition towards renewable gas.

The Gas for Climate consortium hopes that this Action Plan will contribute to the development of renewable gas as a valuable element in the net-zero emission European energy system of the future. We welcome your feedback and look forward to further discussion and collaboration with companies and policy makers. Please contact us via our website [www.gasforclimate.org](http://www.gasforclimate.org) or via [info@gasforclimate.org](mailto:info@gasforclimate.org).



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