



# CONTRIBUTION GREENGASGRIDS PROJECT TO DEVELOPMENT IN BIOMETHANE MARKETS

FINAL REPORT GREENGASGRIDS PROJECT



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GREEN  
GAS  
GRIDS

## Authors

Matté Brijder (Netherlands Enterprise Agency - RVO)  
Mathieu Dumont (Netherlands Enterprise Agency - RVO)  
Axel Blume (German Energy Agency - dena)

## Coordinator

German Energy Agency (dena)

## Contact

Deutsche Energie-Agentur GmbH (dena)  
Axel Blume  
Regenerative Energien  
Chausseestr. 128 a  
10115 Berlin  
Tel: +49 (0)30 72 61 65 - 824  
Fax: +49 (0)30 72 61 65 - 600  
info@dena.de

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# FINAL REPORT GREENGASGRIDS

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Webpage: [www.greengasgrids.eu](http://www.greengasgrids.eu)



# PARTNERS GREEN GAS GRIDS



German Energy Agency - dena (Germany)



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Natural & bio Gas Vehicle Association - NGVA

# EXECUTIVE SUMMARY

The Green Gas Grids (GreenGasGrids) project aimed at establishing an exchange between the partner countries in order to boost the biomethane market development and enhance knowledge in a pan-European perspective. The project was funded by the Intelligent Energy for Europe (IEE) programme. The countries that took part were divided into two groups: countries where biomethane is at an early stage of development (starter countries), and countries where biomethane is already produced and a market for it exists (forerunner countries). The group of starter countries comprised the UK, Italy, Croatia, Hungary, Poland and Slovakia. Forerunner countries were Germany, France, Austria and the Netherlands. Switzerland and Sweden joined the consortium as observers.

## Knowledge exchange

The GreenGasGrids project helped to create a strong international network in which knowledge was actively exchanged and consideration was given to the development of knowledge. In the context of knowledge exchange, particular attention was paid to writing reports that give an overview of the state of development in the various participating countries. These reports incorporate knowledge resources and provide an overview of incentive frameworks and gas quality demands, etc. Brochures have also been produced to provide information to stakeholders in the various countries, to support the development of a biomethane market. In this, a distinction was made between policymakers and potential investors and promoters. Furthermore, fifteen fact sheets were created. These describe best practices – primarily pilot projects that incorporate lessons learned from the forerunner countries. These make the insights gained into the technical developments and opportunities in the various countries involved available to everyone. All documents can be downloaded from the programme's website: [www.greengasgrids.eu](http://www.greengasgrids.eu).

## Seeing and feeling is believing

Under this motto, two study tours were organised within the context of the project. The first study tour, to Austria and Bavaria (Germany), took place in June 2012. During the morning participants heard presentations from several countries and companies. The material ranged from general information to company-specific information. This was followed in the afternoon with a plant visit, after which the tour continued to the next location. Interest in the study tour exceeded expectations. This great success was the reason why the Netherlands took the initiative to organise a second study tour, in June 2013. This second tour was organised by the Netherlands Enterprise Agency in collaboration with the Dutch (bio)gas industry. This four-day tour followed the same format as the earlier one, with presentations in the morning and visits to sites in the afternoons. Like its forerunner, this tour filled a great need and was extremely well received by the participants. A significant success of the tours was the establishment of contacts between tour participants and companies, including participants from countries that were not represented in the GreenGasGrids project itself, such as Spain, Portugal, Estonia and Latvia.

The tours, however, were not the only important points of contact to be initiated by and come out of the GreenGasGrids project. Another example was the GreenGasGrids info days, in which each participating country organised two or more national information days. During these days, knowledge was actively disseminated to national stakeholders, including initiators, grid operators, ministries and businesses. These information sessions were generally well attended.

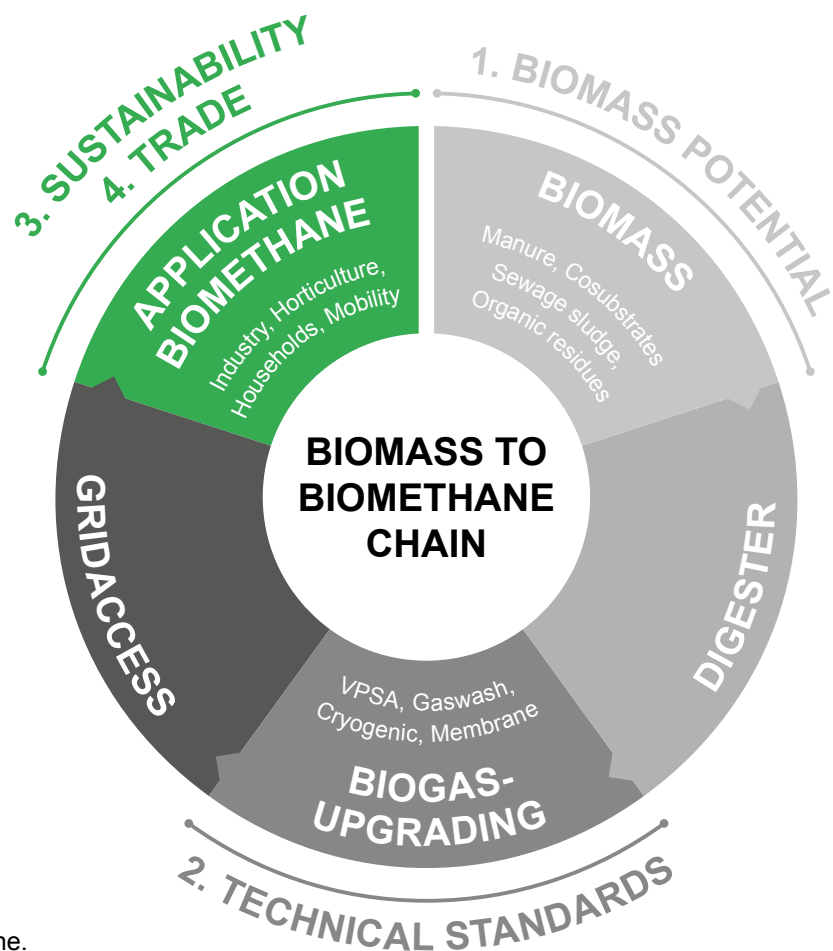
By giving a good outline of the opportunities, processes and solutions for the development of a biomethane market, the forerunner countries contributed to the success of the various national information days.

The exchange of knowledge was not limited to the GreenGasGrids project itself. Contact was also made with other EU-supported projects through, for example, the national information days. These contacts enhanced the international network even further, something that was reflected in the organisation of a joint final workshop of three EU projects – GreenGasGrids, BioMaster and Urban Biogas – on 11 March, 2014, in Brussels.

Finally, a further benefit to come from the project involves moves towards creating an EU market for biomethane. Thanks in part to the GreenGasGrids project, the development of a market for biomethane was accelerated in a number of countries. In the UK, France and Italy, for example, an incentive framework has been developed. This should lead to the biomethane market in these countries getting off to a strong start.

### Generating knowledge

In addition to knowledge exchange, the GreenGasGrids project also focused on generating knowledge. In this context, the activities of the project focused on four main themes addressed in the biomass to biomethane development chain:



- Availability of biomass and the potential for biomethane;
- Sustainability;
- Gas quality;
- Cross-border trade in biomethane.

The groups' work culminated in the writing of four discussion papers on the four themes. Internet consultation and newsletters produced by the work groups were used to draw input from a broad support group, including people and organisations not involved in the project or biomethane activities before. At the final workshop, in March 2014, in Brussels, the four discussion papers were one of the main topics on the agenda.

An important achievement of the project has been the start made to establishing an international standard for biomethane trading. To this end, the GreenGasGrids project took the initiative to organise a workshop for all the relevant biomethane certifying bodies within the EU. At this conference, in September 2013, in Vienna, the issuing bodies were able to raise and put their points on the wider standardisation agenda. At the end of the workshop all issuing bodies signed a Letter of Intent to develop the framework conditions for an international standard for biomethane trading.

By bringing these parties together, the first important steps have been taken towards harmonising biomethane trading requirements and conditions. A further rollout of an EU trading system for biomethane certificates will only be possible if there is extensive harmonisation. In this regard, the GreenGasGrids project has contributed significantly to the development of this harmonised trading system, particularly through the efforts of NGVA (Natural & bio Gas Vehicle Association), whose input to CEN's TC 408 contributed to the development of common gas quality standards.

### European Biomethane Roadmap

The GreenGasGrids project has reviewed the present market status and has thoroughly looked at the obstacles hindering the broader production and application of biomethane. The Roadmap indicates, that - if the necessary actions will be taken - the level of biomethane production could reach 18-20 million m<sup>3</sup>, about 3% of the European natural gas consumption by 2030 and biomethane could provide min. 10% of total gaseous vehicle fuel consumption. Whether this role of biomethane would be reached is not a technical or raw material availability question – this is essentially the question of willingness, determination and consequent support by the political decision makers.

The key pre-conditions of realising the full biomethane potential are:

- the national renewable energy support/incentive schemes should treat the “green gas” (biomethane) equally with “green electricity”;
- the National Renewable Action Plans should be extended with a specific biomethane section to quantify the targets and determine the needed measures for achieving them;
- imported biomethane (if properly certified) should receive equal treatment (same support/incentives) with domestic production;
- national/domestic biomethane registries should be established in every biomethane producing country;
- the national/domestic biomethane registries should develop a Europe-wide cooperation aimed at coordination and harmonisation of their activities;
- the European natural gas network should be declared as a single, closed mass-balance unit.

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# INTRODUCTION

## Biomethane

Biomethane is methane sourced from renewable biomass such as organic waste, sewage, agricultural residues, energy crops or woody biomass. In each case it offers a climate friendly way of substituting fossil natural gas and is a flexible energy carrier for fuel, electricity and heat applications, moreover, material use for biomethane offers additional possibilities. Throughout Europe there are in total almost 250 biomethane plants in operation, a fact that clearly shows: biogas upgrading technology is mature and proven, thus technology is no longer to be regarded as a restricting factor. Biomethane offers tremendous potential when it is produced and injected into the natural gas grid. The existing natural gas infrastructure can be used for transporting the biomethane to its final consumer, where due to its flexibility in utilization, biomethane can make a contribution to reducing greenhouse gases (GHG) in all three sectors - electricity, heat and transport.

## Objectives of the GreenGasGrids project

GreenGasGrids aimed to substantially support increasing biomethane's contribution to the renewable energy targets of 20% and share in transportation up to 10% in 2020. The project's objective was to measurably increase the production and use of biomethane for transport, heat and electricity by addressing the most hindering barriers to biomethane deployment in the EU, both in forerunner and starter countries. To do so the project's consortium consisted of 13 European partners, including national energy agencies, scientific institutions as well as industry associations involved in biomethane, natural gas, and renewable energy.

To achieve this goal the project followed four main targets:

- **Know-how transfer from forerunner to starter countries with regard to biomethane market development:**
  - Provide hands-on experience and information to starter countries
  - Develop national roadmaps to address country-specific setting and barriers
  - Arrange business match-making
  - Develop business models for biomethane projects
- **Tackling market barriers/open issues on the EU-level:**
  - Address main issues for biomethane markets: trade, technical standards, legislative aspects, sustainability
  - Build on existing initiatives and provide added value to their outcomes
- **Address EU level legislative support**
  - Develop an EU Roadmap for biomethane
- **Combine expertise**
  - Involved stakeholders in policy and industry so far working on the issue separately closely connected in network

Another goal of the action was to increase awareness for the advantages of biomethane production.

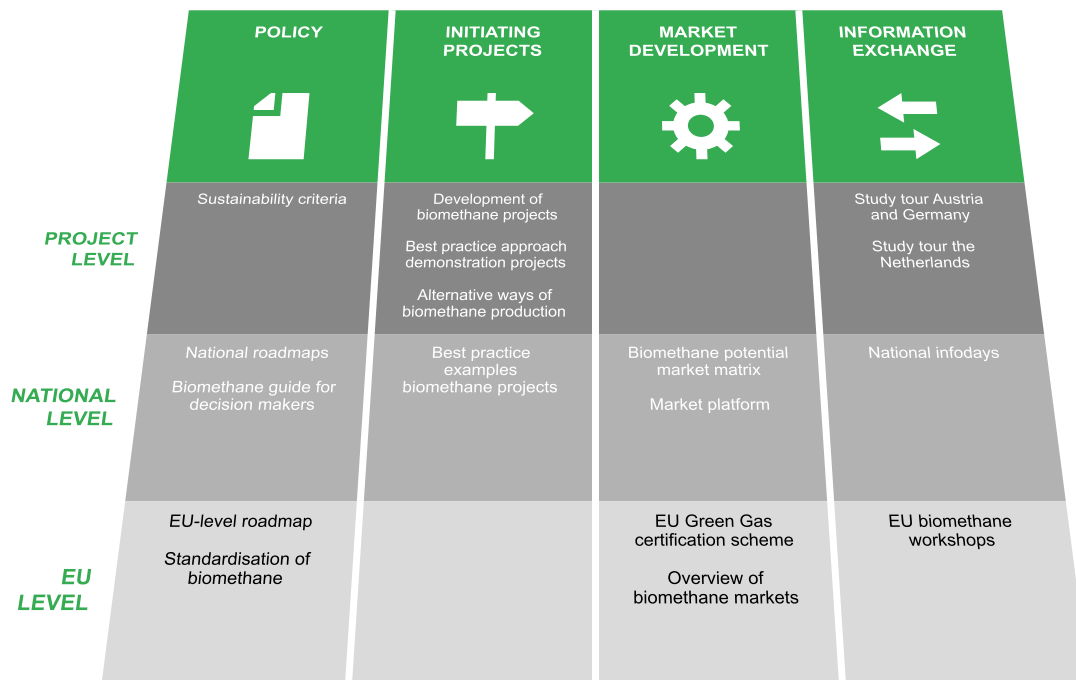
The abovementioned targets and goals have resulted in several products like papers, guidelines and reports created by the GreenGasGrids project partners and are described from page 12. These results will contribute to the further development of the national and European biomethane market. The project's objective was to measurably increase the production and use of biomethane for transport, heat and electricity by addressing the most hindering barriers to biomethane deployment. From page 26 the success stories are presenting a selection of four achievements made on a concrete regional level which have been results and impacts of the work done in the GreenGasGrids project. A number of partners have reported separately about their achievements. These reports are included the annex.

# CONTRIBUTION GREEN GAS GRIDS PROJECT TO DEVELOPMENT IN BIOMETHANE MARKETS

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The state of development of biomethane can be projected on project level, national level or even on EU-level. An overview of all the results of the GreenGasGrids project on the different levels of activity is shown in the figure and the results are presented in more detail.

*Contributions GreenGasGrids project to development in biomethane markets.*



# POLICY

## Project level

### *Discussion paper sustainability criteria and greening the biomethane production chain*

A successful European biomethane market relies on the provision of an environment in which production is sustainable, in environmental, social and economic terms. Sustainability measures are put in place to ensure that biomethane production is sustainable across the entire production and use lifecycle. Biomethane can be produced from anaerobic digestion using a range of feedstock. It is an extremely flexible form of renewable energy, which can be used in an efficient and versatile way. Like natural gas it can be used for transportation, heat and the generation of electricity, or it can also be injected into national gas grids. However, this flexibility also means its environmental impact may vary significantly.

The work carried out in the GreenGasGrid project has resulted in a discussion paper on sustainability criteria. This paper focused on assessing the sustainability criteria in place within the European Union and within individual Member States for the production of biomethane, the interaction of the two, and how application of best practice methods can ensure that the sustainability targets set for biomethane production are met. There may be several critical changes over the next year, which will have a direct impact on the thresholds associated with biomethane production. For this reason it is vital that best practice techniques are adhered to, thereby ensuring that biomethane production on project level takes place sustainably, both environmentally and economically.

The level of greenhouse gas (GHG) emissions emitted during the biomethane production process can vary significantly depending on a number of process factors. When comparing the results from the studies reviewed to the best and worst practice cases examined earlier, it is clear that the results produced from industry are in line with the best practice scenarios. In contrast, the academic studies indicate that GHG emissions are more consistent with worst practice scenarios. This is a reassuring sign that industry is responding to the obligations set in place by the EU through the RED Sustainability Requirements. It is clear, however, that those emissions from biomethane production could be improved further by implementing further best practice techniques.

## National Level

### *National roadmaps*

The purpose of the national biomethane roadmaps is, to briefly describe the necessary tasks to be fulfilled – starting with the characterisation of the current situation – in the process which is regarded as crucial for the further development of the biomethane sector in the respective European countries. Feedstocks are needed for the production of biomethane but questions like usability, availability and sustainability are growing in importance. A few aspects are commonly important like the role of the public bodies and organisations related to regulatory issues. Technical standards have to be implemented as well as support measures in order to establish a grown market in the future. National targets are set EU wide and act as the most important driver for future development. Nevertheless in practice, it appears that success is only guaranteed, if the entire chain is organised. The real innovation lies in the degree of organisation, and the technical innovations themselves. That is not easy because many biogas producers come from a completely different background (waste treatment, farmers, water treatment or industry), have different interests and speak a different language. Success can only be achieved if every stakeholder commits himself to the goal of putting biomethane on the market as a good, available, sustainable and practical product.

### *Biomethane guide for decision makers*

The Biomethane Guide for Decision Makers is intended as a source of quick reference for municipal, regional and even national level decision makers and authorities with influence over policies. This guide describes the benefits offered by biomethane and the ongoing policy schemes in EU countries supporting the development of biomethane. This guide also provides a framework to analyse the current state of biomethane development within regions and a devise and strategy to identify the weak areas within development of biomethane industry. The framework is meant to encourage a deeper understanding in biomethane production and utilisation and initiate a proactive role in aligning the policies for further development.

### **The guide is divided in 5 sections:**

- **Section I: Biomethane as a high value renewable energy source**

This section helps in generating the basic understanding of biomethane and discusses the underlying importance of biomethane as a renewable natural gas substitute. The section also describes the available potential in terms of production of biomethane and the extent of climate benefits which are derived from biomethane utilisation.

- **Section II: Biomethane as an integrated energy solution**

This section is intended for decision makers to become aware of the linkage between the key EU (European Union) level policy drivers and biomethane production and utilisation. It also highlights the role biomethane can play by integrating within the existing natural gas infrastructure and fulfilling the renewable energy targets.

- **Section III; Best practice along the value chain**

This section describes the value chain of biomethane to natural gas grid injection. It covers:

- Biogas production and feedstock
- Gas upgrading technology and emission control
- Grid injection, biomethane trade and utilisation

- **Section IV: Support policies in Member States**

This section provides information on the regulatory framework as established in EU countries. It further describes the financial instruments which are being encouraged within EU countries for the promotion of biomethane.

- **Section V: Assess your biomethane strategy**

This section describes a framework that shall help decision makers to create a strategy for national biomethane development. The framework is a set of questionnaire which acts as a guide to identify weak issues within biomethane development strategy. Identification leads to aligning the policies to address the weak issues and promote the growth of biomethane industry. Assessment of the system functions will lead to the emergence of a functional pattern that highlights the strengths and weaknesses of current biomethane strategy.

## EU-level

### *EU-level biomethane Roadmap*

The main purpose of the EU-level Roadmap is to draw attention European wide to the unique possibilities offered by upgrading biogas to biomethane and to elaborate the key conditions for dynamic growth of this industry. Historically the biogas industry viewed „green” electricity as its main deliverable, while the support systems in nearly all European countries gave preference to local production of electricity instead of upgrading biogas to biomethane. This Roadmap shows the ways how this situation could be reversed, resulting in substantial increase in production and use of biomethane.

While preparing the Roadmap all renewable energy related European Union policy issues (such as environmental and climate protection, sustainability, ILUC, clean fuels for transportation, etc.) have been reviewed.

The conclusion of the analysis is that promoting the production and usage of biomethane is in full harmony with the short-, medium- and long term energy and climate policies of the EU.

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The EU-level Roadmap addresses all the above issues along with other questions relevant to the development of the European biomethane industry.

### *Standardisation of biomethane – as a vehicle fuel and for injection into the natural gas grid*

All of the biomethane producing countries developed national standards for injection (plus some more countries not injecting biomethane yet). However, all of them use different parameters and/or concentrations of compounds (other than methane) with large variations up to a factor of 100 (i.e. for mandated oxygen levels). In recent years, two EU funded projects have tried to develop common standards for injection.

During the FP6 project Biogasmax a proposal was developed which wanted to find a compromise between stringent parameters created by the national DSOs (Distribution System Operators) and parameters that could be achieved at reasonable costs and process energy consumption.

Another approach was made by Marcogaz, a technical association of the gas industry. They came close to an excellent solution but the final proposal could not find common ground and was abandoned. Nevertheless, as part of the work the CEN working group reached out the European Commission for assistance, which together with other efforts made the EU aware of the lack of biomethane standardisation, resulting in the issuing in 2010 of mandate M/475, “Mandate to CEN for standards for biomethane for use in transport and injection in natural gas pipelines”, the starting point for the current standardization work on biomethane within CEN (Comité Européen de Normalisation).

The intention of mandate 475 was to allow one standard for each application, with the natural division being that CEN/TC 234 “Gas infrastructure” dealt with injection, while CEN/TC019 “Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin” would take charge of the fuel standard. However, this was opposed by many natural gas grid operators, which delayed the start of the work a full year. The compromise was to make a joint technical committee, an independent project committee with its work limited to the one of the mandate: CEN/TC408: “Project Committee – Biomethane for use in transport and injection in natural gas pipelines”. Both TC234 and TC019 were allowed to nominate experts and liaise with TC408.

GreenGasGrids was represented in CEN TC408 through two of the consortium partners, i.e. EBA (European Biogas Association) and NGVA (Natural & bio Gas Vehicle Association) Europe. Both partners represent the voice of the practice. EBA stands for the needs of biogas and upgrading plant operators as well as of the plant providers. NGVA is the voice of the engine manufacturers that are in part also directly involved in CEN (Scania, Volkswagen). During the project the group continuously followed CEN activities and works to complement them in its discussion papers and final results respectively. To establish communication with related initiatives, EBA liaised with groups such as IEA Task 37, CEN, the Association of Issuing Bodies (AIB), Marcogaz, Eurogas and ENTSOG. Representatives of these institutions/initiatives participated in activities and in experts’ workshops. This has resulted in a report about standardisation of biomethane and a fruitful collaboration with the CEN/TC408 group.



# INITIATING PROJECTS

## Project level

### *Guideline for development of biomethane feed-in projects*

One of the main goals of the GreenGasGrids project was to encourage and stimulate the production of biomethane. Thus this guideline is intended to support project developers, and it aims in providing ideas for a risk management when planning and implementing biomethane feed-in projects. The guideline is divided in three categories that address management, technical and financial aspects.

The list of topics does not claim to be exhaustive. However, it covers relevant issues and questions a project developer has to deal with during the development and planning process for the purpose of project risk assessment and developing a risk mitigation strategy. In the awareness that there are wide differences regarding the existing national legal framework, regulations and permit requirements, the guidelines are framed in general terms and set out as recommendations. However, the principles of an energy efficient, sustainable and economically well managed project implementation remain applicable everywhere. The report also includes a comprehensive list of sources for more information: from other countries, from other projects and also in different languages.

### *Biomethane demonstration projects – best practice approach*

Given the experiences of the development of biomethane projects in forerunner countries, the GreenGasGrids project has summarised the practical aspects for the development of bio-methane projects which especially arise when starting the very first project in a country – a bio-methane demonstration project. This was done by looking at the Austrian situation. However a specific Austrian perspective was avoided as much as possible and most of the results are in the other countries in effect the same as in Austria. The report was compiled through conducting structured interviews with project developers, project operators and plant constructors.

A demonstration project often faces hurdles such as the following:

- Few experience in relation to the intended implementation of new technology;
- Low data availability in case of usage of unusual substrate compositions (mixtures);
- Undeveloped legal framework;
- Unknown licensing procedures;
- Poor established service network of technology providers;
- Inexperienced operators;
- Refusal of injection by gas grid operators/gas storage facility operators;
- Missing acceptance by regulatory authorities in relation to incentive schemes.

Despite these barriers and obstacles, the demonstration project is of great importance since the technology will be represented a certain time only by this project and therefore it influences the reputation of the technology greatly. Therefore, a best-practice approach, meaning thoughtful planning and implementing, is essential to pave the way for further diffusion of bio-methane technology. Financial support on regional, national or EU level can ease the process and overcome some financial hurdles.

### *Alternative ways of biomethane production – SWOT analysis*

Conventionally, biomethane results from the anaerobic digestion of organic matter such as manure, bio-waste or energy crops. Apart from this production way, biomethane can be obtained from other alternative processes that work under different circumstances and with different sources:

- the production of Synthetic Natural Gas from biomass (BioSNG) from woody biomass by thermo-chemical conversion, and
- the Power to BioGas process on the basis of biological methanisation of renewable hydrogen and carbon dioxide.

In the Green Gas Grids project the SWOT analysis has been chosen to serve as an initial assessment of technical and economic risks for biomethane production technologies. The analysis aims to identify internal strengths and weaknesses of the production pathways BioSNG production and Power to BioGas as well as examining the external opportunities and threats which can endanger the feasibility of a biomethane project.

Concerning stage of development, it can be stated that biomethane from anaerobic digestion (AD) is the most developed pathway. Compared to that state, Power to BioGas and BioSNG production are regarded to be at demonstration status. The first real industrial scale BioSNG project has just recently been commissioned. One large scale Power to BioGas project is already in the pipeline.

The three pathways have their specific characteristics concerning the appropriate technical and economical scale. BioSNG production is considered to be appropriate for large scale projects due to issues such as availability of substrates and cost degradation effects; Biomethane from AD projects experienced specific production costs benefit from scale-up effects up to a plant size of 2000 Nm<sup>3</sup>/h. Due to the connection of Power to BioGas projects with biogas plants, their scale are expected to be linked to the size of biomethane from AD projects. Under the current economic conditions (e.g. low natural gas price of ca. 24 €/MWh) these renewable gases can only compete with fossil natural gas, if appropriate support mechanisms are available. To sum up, the comparison shows that each biomethane production pathway has its specific strengths. Due to the flexibility in production and utilisation biomethane is worth to be considered in a lot more energy concepts.

### **National level**

#### *Factsheets for best practice examples*

The GreenGasGrids projects has developed fifteen factsheets for best practice examples of biomethane feed-in projects in the participating countries, both forerunner and starter countries.

1 project in Croatia: Gradec

3 projects in Austria: Asten, Wiener-Neustadt and Engerwitzdorf

3 projects in Germany: Kißlegg, Ronnenberg and Rhede

1 project in the UK: Poundbury

2 projects in Poland: Świeleno and Skrzatusz

5 projects in the Netherlands: Tirns, Rijsenhout, Well, Dinterloord and Beverwijk

The factsheets describe the basic data, the process, the upgrading technology, financial aspects and business model and lessons learnt.

# MARKET DEVELOPMENT

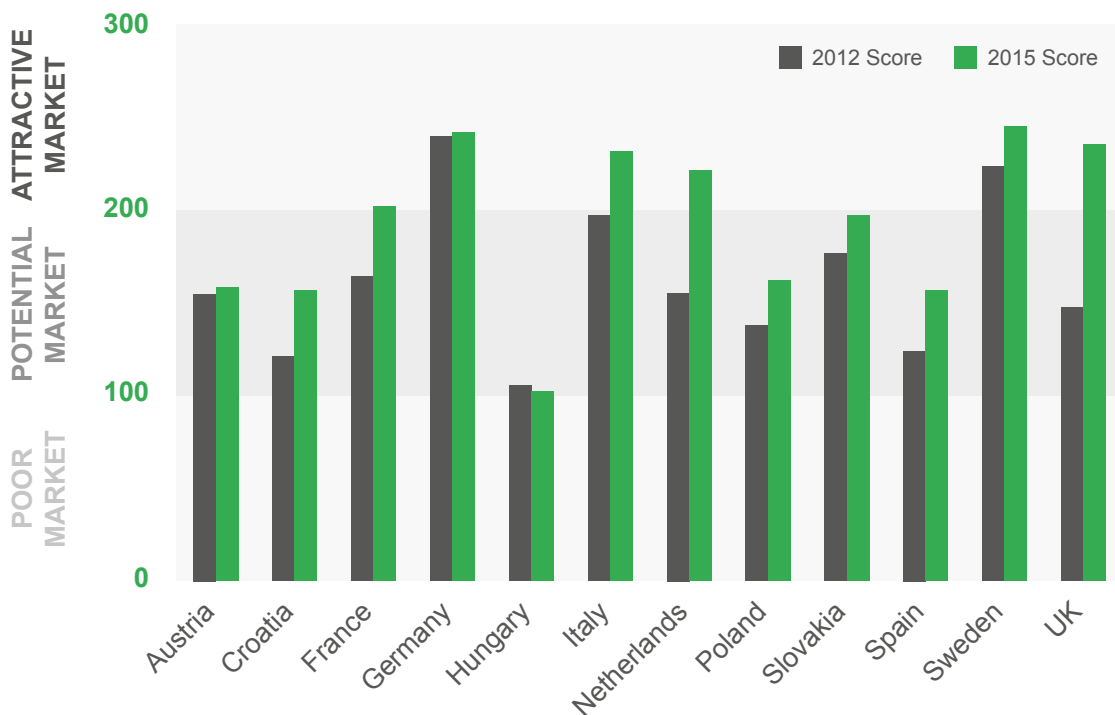
## National level

### National targets for biomethane production – biomethane potential market matrix

The GreenGasGrids project has developed the Biomethane Market Matrix report aimed to assess the following:

- The relative health of the biomethane market in each GreenGasGrid partner country
- The extent of the total biomass resource in these countries
- Whether there are any barriers to the growth of the biomethane market in these countries, and the key developments required to improve growth.

These aims were accomplished through the use of a questionnaire matrix, which was sent to industry, government and academic contacts in each partner country. A scoring system was used to rank the relative health of the biomethane industry in each country. This can help national and EU stakeholders (both policy makers and industry) assess whether this growth is favourable and demonstrate the need to remove barriers to the biomethane industry in order for development to progress.



The Biomethane Market Matrix shows, when looking at the resource potential of each of the GreenGasGrid partner countries, there is a potential for strong growth in biomethane industry over the next 20 years if all resources are utilised. The potential levels of growth in biomethane supply are extremely variable across the EU partner countries. The realisation of these projections are heavily dependent upon the availability of financial incentives for biomethane injection, the size and level of supply chain development in these countries, amongst other factors, further details of this can be found in the report. It is important to note that the Resource Potential methodology, although seen to be the “most suitable” does not take into account the importance of financial incentives and other important restrictions on growth and simply projects the potential for biomethane using all available resources within each member country. Estimating the biomethane potential of each country is critical to future market development, regardless of the methodology employed the potential for growth in this industry amongst the partner countries is strong providing incentives are in place and restrictions minimised.

### *Market platform*

In order to help to develop the market for biomethane in the various countries it is extremely important to have information about all kinds of national aspects. Therefore an online market platform was developed within the GreenGasGrids project to show all information per country on the legal and regulatory framework, the biogas and biomethane market and service and product suppliers. Another feature are the cross-country overviews: showing information about the energy consumption, status quo of the biomethane market (biomethane projects), the biogas potential, the gas quality standards and the subsidy schemes in different countries over Europe.

### **EU-level**

#### *Proposal for an EU Green Gas Certification Scheme*

According to Article 15 of Renewables Directive 2009/28/EC: “Each Member State must be able to guarantee the origin (GO) of electricity, heating and cooling produced from renewable energy sources”. Aim of such certification system is to raise awareness of using renewable energy sources within consumers, to improve knowledge transfer and have a better chance of detecting financial irregularities. To achieve an equivalent harmonised standardisation of biomethane in Europe, size of the market and its main actors must be identified.

Within the GreenGasGrids project the biomethane trade issues were addressed and the objectives were to create a European trade scheme and a proposal for an EU Green Gas Certificate Scheme to have a consistent system for ‘Guaranties of Origin’ (GoO). The activities started with understanding and evaluating the existing renewable energy and biomethane certification schemes. Thereafter the specifically biomethane related issues were analysed and – upon extensive exchange of information and views with different stakeholders – formulated its position and proposals.

To make use of the European biomethane potential it is vital that it can be traded across national borders. Initiated by the GreenGasGrids project, six national biomethane registries have decided to cooperate, and signed a Letter of Intent which lays down the basic understanding about the planned joint activities.

The key areas of collaboration have been:

- to create the most efficient conditions for transfer of information related to biomethane transactions among the national biomethane registries,
- to establish a harmonised methodology by which the complete information pertaining to biomethane ‘Guaranties of Origin’ is transferred between each registry.

The collaborating registries are the Biomethan Register Austria ([www.agcs.at](http://www.agcs.at)), the Danish Energinet.dk ([www.energinet.dk](http://www.energinet.dk)), Gaz Réseau Distribution France ([www.grdf.fr](http://www.grdf.fr)), the German Biogasregister Deutschland ([www.biogasregister.de](http://www.biogasregister.de)), VSG/Federation of the Swiss Gas Industry ([www.erdgas.ch/biogas/clearingstelle](http://www.erdgas.ch/biogas/clearingstelle)) and the British Green Gas Certification Scheme ([www.greengas.org.uk](http://www.greengas.org.uk)). The Letter of Intent is available for download.

#### *Overview of biomethane markets and regulations in GreenGasGrids partner countries*

The market for biomethane varies widely across the European countries. On one hand, there are so called forerunners like Sweden, The Netherlands, Germany, Switzerland and Austria, which have fair experience in biomethane to grid injection technology. The second group of countries still find themselves in information phase, so called starter countries. Countries like Italy, Hungary, Slovakia, Croatia and Poland possess excellent agro-economic conditions for biogas production, but are in the early stage of development of biogas industry.

Country	Biomethane plants	Biomethane plants feeding the grid	Biogas plants total (incl. LFG, sewage, agricult.)	Agricultural	Biowaste (incl. organic MSW)	Sewage	LFG
<b>Austria</b>	<b>10</b>	7	<b>503</b>	approx. 300	55	134	14
<b>Croatia</b>	<b>1</b>	-	<b>12</b>	9	-	2	1
<b>France</b>	<b>3</b>	3	<b>269</b>	40	98	60	71
<b>Germany</b>	<b>140</b>	138	<b>9.200</b>	approx. 7.400	100	1.700	
<b>Hungary</b>	<b>1</b>	-	<b>58</b>	36	-	14	8
<b>Italy</b>	<b>2</b>	-	<b>1.300</b>	approx. 1000	32	60	220
<b>Netherlands</b>	<b>23</b>	23	<b>130</b>				
<b>Poland</b>	-	-	<b>219</b>	30	2	approx. 200	
<b>Slovakia</b>	-	-	<b>57</b>	34	4	10	9
<b>UK</b>	<b>4</b>	4	<b>360</b>	60		100	> 200
<b>Sweden</b>	<b>47</b>	11	<b>242</b>	26	26	135	55
<b>Switzerland</b>	<b>17</b>	15	<b>600</b>	140		460	
<b>TOTAL</b>	<b>247</b>	<b>201</b>	<b>12.950</b>				

The prevailing conditions vary considerably across these nations. The support schemes for biomethane provided by individual government vary strongly – from gas feed-in tariffs in UK and France, feed-in tariffs for CHP in Germany, to mainly market driven developments e.g. in Sweden and Switzerland. Also the feedstock applied for biogas production also varies as primarily energy crops in Germany and predominantly organic waste in Switzerland and Sweden, while the UK is distinguished by an uptake of high ratio of AD from sewage at waste-water treatment plants. These variations occur due to different infrastructure and raw material basis and diverse political framework and goals. Sweden for example does not have an all-spanning gas grid infrastructure, but instead the country focuses on direct applications of biomethane such as biofuel. Germany, on the other hand, focuses on applications in CHP plants, while the Netherlands and UK have established a well-developed heat market for eco-friendly green gas.

Due to all these differences in prevailing conditions, it has so far not been possible to develop a common European market for biomethane. It is therefore necessary to provide transparent and comprehensive information on the respective markets, to develop joint strategies and propositions and to learn from each other through best practice exchanges. The GreenGasGrids project offers an overview on the current state of the biomethane market in forerunner and starter countries. Major issues that are considered to be essential for the success of biomethane production are addressed:

- Status quo - biogas plants and biomethane plants;
- Political targets for biogas and biomethane production;
- Natural gas consumption, suppliers, infrastructure;
- Technical standards for biomethane and natural gas;
- Support schemes for biogas and biomethane;
- Certification.

The overview reveals that each country has adopted a different approach to tackle the challenges and obstacles concerning the exploitation of the national biogas potential in a sustainable and economical way.

# INFORMATION EXCHANGE

## Project level

### *Biomethane study tour Austria and Germany*

From 25 June to 28 June 2012 the 4-day study tour in Germany and Austria took place. The tour was organised within the GreenGasGrids project to present insights on Biomethane upgrading technologies and the operation of plants using these technologies. Through the study tour key actors and stakeholders from starter countries got the opportunity to gather and exchange know-how concerning the application of the technologies, possible legal hurdles and the current market situation. 58 participants from 16 European countries including all partner countries participated. In the course of the tour 4 biomethane plants were visited in Aiterhofen, Kisslegg (Germany), Engerwitzdorf and Asten (Austria). Local stakeholders and project partners presented the upgrading technology, the market situation in Europe as well as economic aspects. In between the tour offered the opportunity for open discussion of these topics among attending experts and interested first movers.

### *Biomethane study tour the Netherlands*

The big interest in the first study tour in 2012 in Austria and Germany motivated the Netherlands to organise a second 4-day biomethane study tour in the Netherlands from 17 June to 20 June 2013. The Dutch study tour attracted 35 participants from 10 different countries. The study tour was a combination of presentations of stakeholders in the Dutch biomethane market together with plant visits. The tour visited 6 biomethane plants in Rijsenhout, Groningen, Ververlaten, Assen, Wijster and Weurt. Additionally, several presentations were held from local stakeholders, project developers, product suppliers and gas grid operators.

## National level

### *National info days*

During the GreenGasGrids project a total of two national biomethane feed-in info days were held in each of the partner countries. The aim of the info days was to bring together national stakeholders of different areas of expertise and to inform them about the opportunities the biomethane production presents. For the forerunner countries (Austria, Germany, France, The Netherlands, United Kingdom) these info days brought the opportunity for business match-making, bringing together stakeholder and discussion of the current and future situation of the national biomethane market. For the starter countries (Croatia, Hungary, Italy, Poland, Slovakia) the info days provided policy makers and decision makers with technical and legislative advice for the implementation of biomethane projects. Further the occasion was used for knowledge transfer from experts of forerunner countries to the stakeholders of the starter countries.

In general, the feedback to the national biomethane feed-in info days was a very positive one. In all of the partner countries the event was well-attended by interested parties, like plant and grid operators, representatives of different federal ministries, regulators, state agencies, biogas project developers or research institutions. Those stakeholders were brought together and within the framework of the event were offered up-to-date information, opportunities of discussion and business contacts of the field.

The main issue picked up during the events was the question of successful and economic integration of biomethane into the existing natural gas market. A number of partner countries presented existing barriers of the current market situation and discussed their meaning for the future development of the technology. The international market and its future progress were of particular interest in the forerunner countries.

For starter countries the main focus was panned on the introduction of the conversion technology and highlighting of national potentials of the technology. In the course of many events it was concluded that assistance from the national government would be needed to establish the technology, e.g. by including the method into the national energy policy. For example during the info day in Hungary it was determined that biomethane injection should be emphasised in the Renewable Energy Roadmap of Hungary being under development. The info day in Slovakia showed that a majority of the questioned stakeholders are for the formation of a National Biogas Association for further coordination and promotion of the technology.

All in all the national biomethane feed-in info days created not only interest in all of the partner countries for the field of technology but also sparked discussions about potentials and feasible utilisation. For some countries the event meant the introduction of biomethane to the national energy mix, for others it served the purpose of connecting with business partners and contemplating the market situation for the years to come. All of them analysed the current barriers and risks of the application. Various plans were made to integrate the technology into the national policy schemes and use the given potentials.

## EU-level

### *EU biomethane workshops*

During the GreenGasGrids project high level EU workshops were organised debating about the various aspects of biomethane production and utilisation. The first workshop in February 2012 in Brussels focused on standardisation and certification of biomethane, sustainability and the biomethane potential in Europe. The second workshop took place in September 2012 in Zagreb dealing with cross border trade and the harmonisation of biomethane registries. In March 2013 in Paris the third workshop dealt with EU development of biomethane: legislation, injection and trends. The fourth workshop took place in September 2013 in Vienna with a focus on gas quality and sustainability of biomethane, the outcome CEN/TC408 working group, specifications of biomethane as vehicle fuel and harmonised recommendations for issuing Biomethane Guarantees of Origin for cross-border trade. During this workshop the attending issuing bodies signed a Letter of Intent for the improvement of framework conditions of cross border biomethane trade.

The fifth workshop was organised in March 2014 in conjunction with two other European projects, BioMaster and Urban Biogas, to present all the main conclusions and outcomes of the GreenGasGrid project.





# FUTURE POLICY FORMATION TOWARDS RESOURCE EFFICIENCY

## Success stories

GreenGasGrids project has created a bright variety of outputs for each country participating. The following success stories present a selection of four achievements made on a concrete regional level which have been results of the work made in GreenGasGrids project.

### 1. UK: Biomethane market development.

United Kingdom begun as a starter country in GreenGasGrids project in 2011 which means it had no biomethane plant feeding in the grid but a huge potential for doing so. In mid 2014 seven plants are in operation and nearly 40 are in the forecasts for the period up to 2016. Total biomethane production forecast for 2015 is 1.8 TWh and is significant. This data shows that UK has become a further European biomethane forerunner country and has revealed its potential. GreenGasGrids project played an important role in this development with the following actions (not exhaustive):

- Know-how exchange from forerunner countries led persuasion of UK Health and Safety Executive to change the specification for O<sub>2</sub> injection into the Distribution Networks from 0.2% to 1%.
- Support in relation to understanding the details of the biomethane regime in other countries which allowed the UK REA to influence the regime in the UK to help ensure that all activities are competitive, with no work restricted to the monopoly Gas Distribution Network. UK REA has shared the reports produced by GreenGasGrids with stakeholders in UK including the UK Government. These have been helpful in building credibility and influencing policies.
- The sharing event required by GreenGasGrids in 2012 Info Day has become an annual event in the UK. UK Biomethane Day 2014 had 300 delegates and 34 exhibitors.

## 2. Italy: GreenGasGrids work led to signing of decree allowing the injection of biomethane into the gas grid.

The Italian government signed in December 2013 a decree finally allowing biomethane injection into the grid and its use as a transport fuel. The decree helps to unleash the biomethane potential in the country that is one of the biggest biogas producers in the world and has a highly developed natural gas network.

GreenGasGrids consortium supported the preparation of this decree with several actions. The project partners advocated strongly for acknowledgment of the great potential biomethane has with regard to the process of implementing the EU's Directive on renewables into national law. GreenGasGrids consortium members NGVA and CIB contributed constantly to the process, pushing for the decree to get passed for example with participating in a working group which focused on the development of biomethane in Italy. Furthermore GreenGasGrids project provided substantial support to the cause. Following the announcement of the Italian authorities, the project partner Italian Biogas Consortium organised a successful workshop in December 2013 with more than 220 attendees. The event delivered highly valuable information regarding the decree's contents and opportunities, available biomethane upgrading technologies, and the opportunities held for gas-powered vehicles.

The potential for biomethane in Italy is huge, especially for biomethane obtained from farms, food processing companies and landfills. According to experts' studies it could amount up to billion cubic meters a year. The CIB estimates that, thanks to biomethane, the new scenario in Italy by 2018 could be the following:

- 1,4-2 billion Euros invested in biomethane plants;
- 500 new gas refuelling stations;
- increase in number of CNG vehicles 70,000 - 90,000 year (1,300,000 by 2018);
- biomethane production 40,000-60,000 Nm<sup>3</sup>/h;
- share of biomethane in the NGV fuel share 20-35%.

## 3. Poland: GreenGasGrids project recommendations led to LoI on new biomethane project.

The GreenGasGrids project enabled continuous know-how transfer from forerunner countries to different Polish stakeholders (biogas plants owners, business, and regulators). The project activities resulted in a broad national level for biomethane information campaign to different target groups. Policy makers were informed about biomethane options: advantages and barriers and due to GreenGasGrids project, the message from business sector was directed to them and discussed as well. Biomethane potential will be in more extent taken into account in renewable regulations, RES national plan updating and energy policy. Biomethane potential is being considered in framework of Poland Energy Policy until 2035.

In a next step all existing biogas plants have been addressed by information regarding biomethane opportunities. Discussions with many of them have been performed. Also many interviews were executed with stakeholders that led to extensive information and opinion exchange. Within GreenGasGrids project a roadmap for biomethane market development in Poland was elaborated and led to intensive cooperation with different stakeholders. The biomethane market potential was deeply discussed in aspects of policy, regulations and technical issues. Two national info days addressed relevant stakeholders and resulted in fruitful discussion and know-how transfer between business sector, politicians and society. KAPE furthermore enabled a series of business to business meetings, established contacts with different institutions and provided detailed information on biomethane.

As a result of these two parts the GreenGasGrids project work led to an increase of inquiries from biogas plant operators and other potential investors who were considering opportunities of biomethane generation. Biogas based heat generation is decreasing over the last years and has become a relevant option for solving many of existing problems in typical cogeneration engines. That is and will be an additional aspect for potential investors. All this led finally to a Lol between KAPE and a Polish company willing to invest in a biogas upgrading plant. This Lol was signed in mid 2014 and is the next step for establishing biomethane as an important module in the framework of future Polish energy system.

#### 4. Cooperation of biogas registries started

To make use of the European biomethane potential it is vital that it can be traded across national borders. It is with that aim that six national biomethane registries have decided to cooperate. Initiated by the GreenGasGrids project, they signed a Letter of Intent which lays down the basic understanding about the planned joint activities.

The key areas of collaboration have been:

- to create the most efficient conditions for transfer of information related to biomethane transactions among the national biomethane registries,
- to establish a harmonised methodology by which the complete information pertaining to biomethane “Guarantees of Origin” is transferred between each registry.

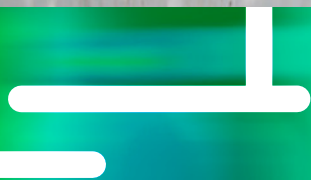
The collaborating registries are the Biomethan Register Austria ([www.agcs.at](http://www.agcs.at)), the Danish Energinet.dk ([www.energinet.dk](http://www.energinet.dk)), Gaz Réseau Distribution France ([www.grdf.fr](http://www.grdf.fr)), the German Biogasregister Deutschland ([www.biogasregister.de](http://www.biogasregister.de)), VSG/Federation of the Swiss Gas Industry ([www.erdgas.ch/biogas/clearingstelle](http://www.erdgas.ch/biogas/clearingstelle)) and the British Green Gas Certification Scheme ([www.greengas.org.uk](http://www.greengas.org.uk)).

The Letter of Intent is available for download.



The purpose of this Letter of Intent is to lay down a common understanding shared between the national biomethane registries regarding their cooperation towards a cross-border trade of biomethane.

1. The signatories to this Letter of Intent (the “Partners”) share the view that a functional system of comprehensive information transfer between the national biomethane registries is essential for facilitating future cross-border biomethane trade within the European gas grid. We believe that biomethane is a unique source of renewable energy, as it is the only renewable resource capable of flexible production, and which can be used in the heating, power and vehicle fuels sector.
2. The foundation of cross-border trade will be the proof of injection of biomethane, or “Guarantee of Origin”, with a standard unit size. The term “Guarantees of Origin” is used to refer to electronic documents which serve as a proof of origin and other qualities for bio-methane but do not have an own, intrinsic (market) value, and cannot be traded independently from the physical product they are connected to. The Guarantees of Origin are distinct from Certificates which can be traded independently from the physical product. This applies even if a pure certificate system is operating in particular European States.
3. Biomethane in the following text will include upgraded biogas and Syngas. Power-to-Gas will be included only if the applied power is generated from renewable sources and the hydrogen is biologically converted to methane.
4. The Partners encourage the establishment of national biomethane registries in every European country. The Lol is open for other registries to join. Partners will actively try to assist the establishment of registries.
5. The Partners agree on the following major areas of collaboration:
  - to create the best possible conditions for transfer of information related to biomethane transactions,
  - to ensure highest possible compatibility between their registration systems,
  - to set the conditions for mutual acceptance of Guarantees of Origin for biomethane.



GREEN  
GAS

# RESULTS AND IMPACTS ACHIEVED

Within the framework of GreenGasGrids project, it was planned to initiate several new biomethane facilities, six in starter countries like Poland, UK and Croatia and four in forerunner countries like Germany, Austria or the Netherlands. Until the end of action, the project consortium succeeded to influence market actors to invest in the erection of eight new biomethane projects in starter countries (two in Slovakia, one in Hungary and five in the United Kingdom) and 16 in forerunner countries (two in France, ten in the Netherlands, one in Austria and three in Germany). These new projects provide the opportunity to feed in an amount of additional biomethane of 317,20 Mega Watt hours (MWh) in starter countries (Planned 300 MWh) and of 811,76 MWh in forerunner countries (Planned 200 MWh) within the next years.

A new biogas plant with upgrading unit and gas injection station costs up to € 12 million. Taking this figure into account, the GreenGasGrids project helped to trigger investments of € 288 million in the countries mentioned above.

The best practice reports and guidelines that were prepared for stakeholders in the different starter countries have been spread via direct contacts, at events and by means of mailings, reaching from 40 up to 1.000 stakeholders per starter country. One of the planned project impacts was the introduction and/or amendment of six norms, national targets, rules for biogas quality and/or sustainability criteria with regard to biomethane. By the end of the project, five regulatory amendments have been realised in the participating countries. It is most likely, that the results and publications of the GreenGasGrids project influence and support improving the framework conditions of biomethane beyond the project's time frame.

In order to transfer know-how on biomethane from within Europe it was and is necessary to publish papers and results prepared in the project in EU key media. The GreenGasGrids project made a good job and published outcomes and results in nine EU key media, double the amount planned initially. From 42 up to 150 persons attended the workshops that were organised by the GreenGasGrids project. Hence, the GreenGasGrids project draws a high interest in biomethane. The project consortium reached a number of two stakeholders (one less than planned) from each partner country and exactly eight key EU level stakeholders attending the workshops.

The Biomethane EU-Roadmap prepared by the GreenGasGrids project was delivered to 98 key stakeholders who attended the final conference. In addition to that, a minimum of five positive responses to the Roadmap from EU level policy makers such as associations have been received. Typical comments were like the following: "Thank you very much for sharing with us this Roadmap. We will definitely take it into consideration for our future work." The common performance indicators have been overachieved: The cumulative investment made by European stakeholders in sustainable energy within 1.5 years after the end of action was more than two times higher than planned (€ 288 million to € 120 million). Furthermore the renewable energy production triggered through the project work in tons of oil equivalent (toe) per year was with 97,073 toe likewise two times higher than planned 43,000 toe. It involves a CO<sub>2</sub> reduction of 180,000 tons CO<sub>2</sub> (75,000 tons CO<sub>2</sub> was predicted).

### Further outcomes and impacts

All EU Member States with relevant biomethane activities and/or potential have been represented in the consortium. With a concerted approach involving public and private stakeholders throughout all project stages GreenGasGrids helped to tackle the most pressing issues bringing together key market actors currently working separately and pushing for solutions to market problems for which ongoing discussions have reached little consensus so far. GreenGasGrids has become a well-known platform for European biomethane actors that distributes biomethane related information, provides scientific publications, and organizes study tours and biomethane events like national info days. The website includes a market platform for all kinds of information regarding European biogas and biomethane markets, legal and regulatory framework as well as a comprehensive overview of service and product suppliers.

The GreenGasGrids Project substantially contributed to the international cooperation among the national biomethane registries (Bioregist project) that signed a Letter of Intent (LoI). With the LoI the involved registries intend to create the framework conditions for a transfer of information among the national biomethane registries. Countries involved in this action are Germany, Austria, Denmark, France, Switzerland and UK.



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# ANNEX 1

## Introduction

A number of partners reported separately about their achievements. These reports are included in this annex. Below, however, is a brief overview of their achievements.

- Poland saw the signing of an initial letter of intent for the establishment of the country's first biogas upgrading project. This was a result of the knowledge exchange activities within the GreenGasGrids project.
- For Germany the project increased the interest in biomethane in general and provided information about rapidly growing European biomethane markets. As a result business opportunities for German biogas and biomethane branch have been revealed. Cross border trade was supported within project and helped to establish basis for European biomethane market.
- Italy has published a decree for feed-in tariff support for biomethane projects.
- The relatively huge potential of the Austrian biomethane market was analysed and the deficiencies for the further extensions of the biomethane sector were identified. The so far missing goals for 2030 are being discussed by the relevant authorities, thus enabling sound input by the biomethane sector stakeholders – including the Austrian Energy Agency.
- In France, the GreenGasGrids project helped bring together key stakeholders, leading to the development of a national biogas strategy.
- Although Switzerland was not a project member, the project did contribute to the country's development of biomethane as an energy source.
- The discussion and lessons learned from the GreenGasGrids project contributed significantly to national discussions in Croatia, where several biogas plant operators are considering developing a biomethane project. The main contribution of the GreenGasGrids project was to spread knowledge from forerunner countries about comprehensive legislation required to make this possible.
- NGVA published a press release to mark the end of the project that included a call for political support to develop a European biomethane market.
- The Netherlands launched a new biomethane roadmap for 2020.
- In Hungary the dissemination of biomethane related information and knowledge was particularly successful.

# POLAND

## 1. Contribution of GreenGasGrids project to the biomethane development

- GreenGasGrids project enabled and enables continuous know-how transfer from forerunner countries: Germany and the Netherlands to different Polish stakeholders (biogas plants owners, business, and regulators).
- The activities resulted broad national level biomethane information campaign to different target groups.
- Policy makers were informed about biomethane options: advantages and barriers and due to the GreenGasGrids project, the message from business sector was directed to them and discussed as well.

## 2. What was the indirect effect of the results of the GreenGasGrids project on the market development in your country?

- The policy makers, after series of one-one meetings (with Ministry of Economy mainly, 2013-2014) are aware of biomethane potential and its development in other countries. Biomethane potential will be in more extent taken into account in renewable regulations, RES national plan updating and energy policy. Biomethane potential is being considered in framework of Poland Energy Policy until 2035 (in preparation at the moment).

## 3. What are the direct effects of the results of the project

- All 44 (2014) agriculture biogas plants have been addressed with information regarding biomethane opportunities. To each plant was provided with Roadmap for Biomethane Market Development in Poland and info about the GreenGasGrids project and its results. Discussions with many of them have been performed. Also many interviews were executed with stakeholders led to Roadmap preparation and information and opinion exchange.
- The Roadmap for Biomethane Market Development led to intensive cooperation with different stakeholders. The biomethane market potential was deeply discussed on aspects of policy, regulations and technical.
- 1st National info day resulted in fruitful discussion and know-how transfer to relevant stakeholders
- The 2nd National event was organised during the biggest RES event – international Fairs “POLEKO” in Poznań (8th October, 2013). This event, as usual, gathered hundreds of companies and thousands of visitors. The GreenGasGrids info day gathered 84 direct participants, representing business sector as well. KAPE permanent stand functioning during the Fairs enabled series of business to business meetings.
- Contacts with different institutions as RES Clusters (e.g. Kielecki Region RES Cluster) and others were established and info on biomethane was delivered and discussed with them.
- The GreenGasGrids project dissemination includes participation with GreenGasGrids presentations in many national conferences, e.g.:
  - “Energy from biomass in practise of 2014” during “ENEX” in Kielce (18-20 March, 2014)
  - Biomaster workshop “Biomethane for Transport”, 5.03.2014

## 4. What development do you expect in your country after the project in the biomethane development in your country which can be related to the project?

- Biogas plant owners and potential investors are considering opportunities of biomethane production.
- Heat generation based on biogas is decreasing over last years. Biomethane production solves many of existing problems using heat from CHPs.

# GERMANY

## 1. What was the top 3 of contribution of the GreenGasGrids project to the biomethane development in your country (or organisation)?

- Constant gathering of market information on all relevant aspects regarding the existing legal and regulatory framework and the natural gas infrastructure by dena and FhG UMSICHT led to a comprehensive data base with up-to-date information for Germany and Europe. Distribution via project channels provided market actors and decision makers with crucial information. The data also was used as a basis for a gap analysis regarding biomethane development, preparing discussion papers on biomethane and the cooperation of biogas registries from different countries. The complete set of data served as a pool for the market overview, the online market platform as well as the best practice report for policy makers and guidelines for market actors.
- To make use of the European biomethane potential it is vital that it can be traded across national borders. A step towards a European biomethane market was made by GreenGasGrids project contributing substantially to the international cooperation among the national biomethane registries that signed a Letter of Intent (LoI) in December 2013. With the LoI the involved registries intend to create the framework conditions for a transfer of information among the national biomethane registries. Countries involved in this action are Germany, Austria, Denmark, France, Switzerland and UK.
- By the means of publications and different kind of events policymakers were provided with information about the potentials and opportunities of biomethane. dena and FhG UMSICHT intensively worked on knowledge exchange between market actors from different countries. These activities supported some German biomethane companies starting or intensifying their business in starter countries like UK and Italy.

## 2. What was the indirect effect of the results of the GreenGasGrids project on the market development in your country (or organisation)?

- The German biomethane market is relatively well developed. GreenGasGrids project's public relations – such as national info days, a well-attended study tour as well as papers and articles disseminated via GreenGasGrids webpage - inspired some German actors to shift their focus from Germany to European biomethane markets.
- dena has extended its European network concerning biomethane and has intensified existing partnerships with stakeholders from all over Europe.
- The LoI between the biomethane registries created a working group that facilitates the information exchange on different issues of biomethane trade and verification processes.

## 3. What are the direct effects of the results of the project in your country

- The European Biomethane Roadmap and other publications within the GreenGasGrids project raised the awareness of German stakeholders that there are a lot of biomethane activities and market opportunities in different European countries.
- Two national info days created an environment for information transfer among market actors as well as making contacts between market actors and relevant authorities. The participants discussed the opportunities and barriers for further biomethane market development.

- The study tour which took place in Germany and Austria in 2012, supported by the dena and FhG UMSICHT, initiated an ongoing know-how exchange/transfer between forerunner and starter countries. New business contacts between stakeholders from starter and forerunner countries were made.
- FhG UMSICHT could provide own research results to the CEN/TC 408 project committee for biomethane for transport and injection into natural gas grid.
- German companies learnt from foreign countries about regulations and framework conditions on the one hand. On the other hand, they collected ideas where and how to realise new biomethane projects.

For all partner countries:

- All EU member states with relevant biomethane activities and/or potential have been represented in the consortium. With a concerted approach involving public and private stakeholders throughout all project stages GreenGasGrids helped to tackle the most pressing issues bringing together key market actors currently working separately and pushing for solutions to market problems for which ongoing discussions have reached little consensus so far. GreenGasGrids has become a well-known platform for European biomethane actors that distributes biomethane related information, provides scientific publications, organises study tours and biomethane events like national info days. The website includes a market platform for all kinds of information regarding European biogas and biomethane markets, legal and regulatory framework as well as a comprehensive overview of service and product suppliers. And, this project established a strong network in the European biomethane field that will be valuable for future information exchange and joint activities.
- The market platform offers the chance to compare the different approaches of how biomethane is handled in the single national markets. The exchange and discussions between actors from different countries deepened market actor's knowledge about foreign markets and regulations. It helped to understand to critically scrutinise the own national market conditions and developments as well as technical concepts e.g. structure of national support schemes, financial support of grid injection station, required gas quality.

#### **4. What development do you expect in your country after the project in the biomethane development in your country which can be related to the project?**

- In the years to come, due to changes of national regulations the German biomethane market will probably see only little growth. Support of GreenGasGrids consortium opened the door for German biomethane branch to other European markets. The project provided information about rapidly growing European biomethane markets and revealed business opportunities for German biogas and biomethane branch.

# AUSTRIA

Achieved results in the GreenGasGrids-Project from the Austrian perspective

- Continuous gathering and updates of relevant technical and commercial data/contents for the biomethane sector. By doing so insights were gained in processes and regulations/provisions in the other participating countries, thus knowledge was transferred in a direct and indirect manner.
- The homepage served as a continuous update of the market information (market platform), which serves - jointly with the technical data - as a sound basis for basic information for potential investors, plant manufacturers and of course for authorities.
- Dissemination of press releases, articles and newsletters plus recognition in the European (project) field. These activities helped (still help) to regain support from the relevant groups – in particular from politicians.
- Because of the two National info days awareness was raised in relation to harmonisation needs in the technical standards- sector as well as in developing markets (niches) for the broader application of biomethane. In addition these info days provided a “platform” for business making processes and the exchange of views among the business sector as well as for establishing contacts between business and the relevant authorities. On top of these opportunities, the social partners could openly discuss the opportunities and the hurdles – mainly the needed subsidies - for further extension of the biomethane sector. The discussions at both info days were moderated by GreenGasGrids representatives.

Because of the integration of external experts - in particular from the research sector - within the framework of the national info days, the latest developments in the biomethane sector could be presented to the audience.

- By the set-up of the “biomethane registry club” based on a LoI (Letter of Intent), an important step was made in relation to the broader application of biomethane. Towards the intended long term goal of implementing a trade certificate system, the GreenGasGrids project served as a strong initial push by developing and subsequently recommending the implementation of Guarantees of Origin (GoOs) in the participating countries as a first step.
- Because of the achieved results in relation to harmonisation needs of technical standards in Europe – mainly in cooperation with the Natural & bio Gas Vehicle Association (NGVA) - a basis was developed which serves as point of origin for a process on European level – with the future involvement of the relevant institutions in Austria. In addition industry – including plant manufacturers in Austria – can provide input in the future process.
- The interviews performed with project promoters, plant operators and financing institutions in relation to best practices of demonstration projects and the subsequent elaboration of the related report, led to deep insights in the process of developing projects, erection and operation of biomethane plants – although some information could not be published because of business secrets. However, these insights help in supporting the broader application of biomethane in Austria.

- The study tour which took place in Austria and Germany, in 2012, organised by the Austrian Energy Agency, led (and still leads) to a know-how exchange/transfer between the forerunners and the newcomers – as intended by the project. Besides plant manufacturers and plant operators provided sound input in the fruitful knowledge exchange process.
- By compiling the reports on the National Info Days, the Austrian Energy Agency could significantly contribute to relevant discussions and the subsequent know-how exchange/transfer.
- The elaboration of the Austrian Roadmap by the Austrian Energy Agency, led to intensive cooperation with the relevant stakeholders, like associations, authorities, project promoters, financing institutions and biomethane operators. The relatively huge potential of the Austrian biomethane market was analysed and the deficiencies for the further extensions of the biomethane sector were identified. The so far missing goals for 2030 are being discussed by the relevant authorities, thus enabling sound input by the biomethane sector stakeholders – including the Austrian Energy Agency.
- In relation to the elaboration of the “European Roadmap”, Austria – as any other participating country – could provide input, thus achieving more negotiation power on European level in comparison to a standalone approach. Besides the “European Roadmap” led to a counter flow of know-how exchange/transfer which could be implemented in the Austrian Roadmap – thus enhancing the chances of fruitful future results.
- The biggest biomethane plant in Austria was completed and put into operation a few months ago. The project promoter visited both of our National Info days and we had several discussions dealing with their business approach.

# FRANCE

## 1. What was the top 3 of contribution of the GreenGasGrids project to the biomethane development in your country (or organisation)

- to enhance the knowledge and the relationship between national partners (ministries, stakeholders, suppliers, grids operators, etc.) through the national working group on injection
- to establish a proposal for a national road map with a huge participation of the TSOs (Transmission System Operators) and DSOs (Distribution System Operators), with the participation of the ministry for Ecology and Energy.
- to start a national study to analyse performances of the first feed-in gas grid units: totally paid by ADEME, this study will take place during 3 years from 2014 to the end of 2016

## 2. What was the indirect effect of the results of the GreenGasGrids project on the market development in your country (or organisation)?

- to show first realisation of biomethane feed-in units as a possible way for the biogas valorisation (short part of the technical day on "Territorial Anaerobic Digestion", organized on May, the 13th in Paris, by ADEME)

## 3. What are the direct effects of the results of the project?

- to realise 2 info-days with a great participation of the national partners (all national partners presents)
- to include biomethane as a possible energy in the national targets for the mix gas in the near future (2020, 2030 and 2050)
- to realise some studies to evaluate the biomethane potential: biomethane from waste water treatment sludge, agriculture and food industries feedstock
- to produce a study about French feedstock (manure, crop residue, food waste, etc.) by 2030 for each region of France.

## 4. What development do you expect in your country after the project in the biomethane development in your country which can be related to the project?

- to do the collection, the synthesis and the dissemination of the technical and economical results of the first feed-in gas grid units
- the French biomethane road map will help to define the ADEME biogas strategy

# SWITZERLAND

In Switzerland – which is kind of a guest country in the project – the work of the WG3, WP3 together with WP2 group lead to a political initiative in the Swiss parliament targeting to allow importation of biomethane into Switzerland under the same conditions (meaning free of CO<sub>2</sub>-tax and mineral oil tax) as the biomethane produced in Switzerland. The Nationalrat (large chamber) has already accepted the on 9/9/2013. The second chamber (Ständerat) will decide this summer:

[http://www.parlament.ch/d/suche/seiten/geschaefte.aspx?gesch\\_id=20114198](http://www.parlament.ch/d/suche/seiten/geschaefte.aspx?gesch_id=20114198).



# CROATIA

## **Contribution of the GreenGasGrids project to the biomethane development in Croatia**

Knowledge dissemination about biomethane production technologies, financial aspects of biomethane production and technical aspects of injection of biomethane into the natural gas grid was covered through workshops and info-days organized during the project. In the scope of GreenGasGrids project detailed evaluation of the potential of biogas production by the year 2020 with regard to the origin of raw materials was carried out. Connections of key stakeholders of biomethane market were realized through workshops and biomethane info-days. The biomethane roadmap for Croatia was developed. It includes biomethane production potential, defining obstacles for development of biomethane market as well as recommendations for their removal.

## **Direct effect of the results of the GreenGasGrids project in Croatia**

In time of project duration a significant increase of number of operational biogas plants was achieved. Also, the increased interest of investors to invest in building of biomethane plants was noticed. EIHP is involved in working group for biofuels in the scope of new legislative framework development by the Ministry of economy.

## **Indirect effect of the results of the GreenGasGrids project in Croatia**

Knowledge dissemination about biomethane production technologies, financial aspects of biomethane production and technical aspects of injection of biomethane into the natural gas grid was accomplished. Know-how from forerunner countries with regard to biomethane market development, policy development, technology uses and their experiences were transferred.

## **Expected development on the biomethane market in Croatia**

Through the GreenGasGrids project all biomethane market participants were informed and have acquired an appropriate level of knowledge required for an active contribution to the development of biomethane market. High-quality and comprehensive legislation is an essential prerequisite for the development of biogas in Croatia. If the new Law on renewable energy sources (which should come into force by the end of the year) is going to provide a system for encouraging the production of biogas, it could be assumed that there will be a realization of the production of biomethane. It is also supported by the legal obligations related to the separation of organic waste from municipal waste but also by the interest of investors for the production of biomethane.

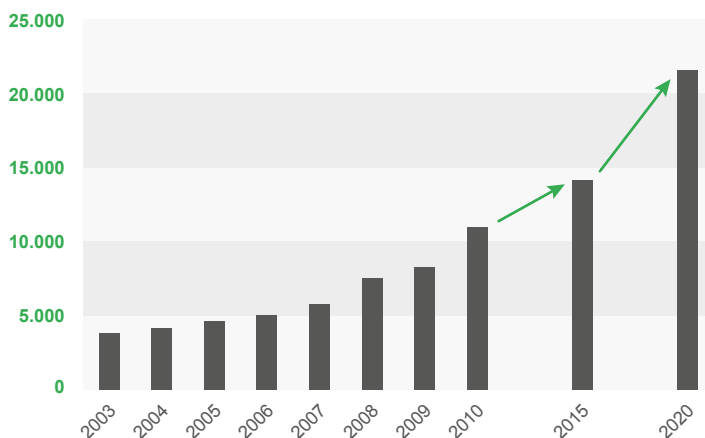
# NGVA

## GreenGasGrids calls for political support to develop European biomethane market

In its three year duration, the project organised several events and published numerous valuable deliverables, providing basis for fruitful discussions among decision makers and market players. All documents highlighting the project research and results can be found in the download section of the GreenGasGrids website.

Recently, a 'Proposal for a European Biomethane Roadmap' has been issued by the initiative. The Roadmap focuses on the unique possibilities offered by upgrading biogas to biomethane and highlights the key conditions for dynamic growth of the biomethane industry. While preparing the Roadmap, all relevant objectives of the European Union related to renewable energy such as environmental and climate protection, sustainability and the need to tackle ILUC (indirect land use change) have been taken into account. The conclusion of the analysis is that promoting the production and usage of biomethane is in full harmony with the short-, medium- and long-term energy and climate policies of the EU.

The project partners reviewed the present market status and thoroughly looked at the obstacles hindering the broader production and application of biomethane. The Roadmap indicates, that - if the necessary actions will be taken - the level of biomethane production could reach 18-20 million m<sup>3</sup>, about 3% of the European natural gas consumption by 2030 and biomethane could provide min. 10% of total gaseous vehicle fuel consumption. Whether this scenario will become a reality is not a technical or raw material availability question, it is essentially the question of willingness, determination and consequent support by the political decision makers.



*Development of the European biogas industry between 2003 and 2010 (Source: EurObserver Biogas Barometers)*

On 11 March 2014, GreenGasGrids furthermore held the European workshop on biomethane – markets, value chains and applications in Brussels, which also marked the final event of the GreenGasGrids. Topics of the workshop were the promotion of biogas production, the upgrading to biomethane for injection into the gas grid and use in vehicles, as well as strategies for overcoming the impasse by bringing the key components of the biomethane chain into a joint initiative. All presentations given by the 13 project partners are available for download here.

# THE NETHERLANDS

The Netherlands is one of the forerunner countries in the project and plays an active role in the implementation and dissemination of biomethane projects across Europe. The Netherlands has extensive knowledge about all aspects of producing and using biomethane. Several Dutch contributions were given to National info days in other partner countries (Croatia (2), Italy (1) and Germany (2)) by presenting the Dutch approach and achievements in developing the national Biomethane market. On top the Dutch approach was also presented in the region of Tartu in Estonia as a contribution to an Info day organised by the IEE-Biomaster project.

During the project three National info days were organised in the Netherlands, which were very well attended with 150 to 250 participants. Embedded in the Dutch National info days was the dissemination of the international developments in the several biomethane markets in Europe.

The key question for the first National Info day in April 2012 was: What is the outlook for the future of Green Gas? Heated discussions, intriguing spoken columns and detailed presentations sharpened the minds of the 155 participants, including producers, policymakers, consultants and grid operators. Subsequently, the audience was invited to help draw up the agenda for the future. Which challenges do we still need to confront? How will we address the issue of any possible differences in the calorific value of different gas flows, for instance? And a particularly important question: How can we ensure a speedy implementation process while at the same time guaranteeing absolute safety? One important conclusion was that all parties will have to unite and commit to the cause.

The purpose of the second National Info day in December 2012 was to inform all visitors about the situation concerning innovative technology for the production of biogas and green gas. Part one of the symposium provided an overview of the current-day technology, which is now already available. Part two dealt with the innovations supported by the top sector policy for gas. In subsequent parallel sessions, attention was paid to the presentation of new projects which enjoy financial support from the top sector for gas.

The third National Info day in December 2013 was dedicated to Innovative Technologies, the latest technological and economic insights into the biogas industry. This day was a clear sign of that green gas development is forging ahead and shows that the green gas potential is as big as ever. Parallel sessions on low-grade biomass streams, digestate valorisation, mobility, fermentation, gasification and infrastructure and application yielded further insight into the technical aspects of the biogas market. With the innovative technologies presented, the green gas market can continue to further develop in 2014 and further. Green gas is indispensable for a transition to a more sustainable Dutch energy economy.

The big interest in the first study tour in 2012 in Austria and Germany motivated NL Agency to organise a second 4-day biomethane study tour in the Netherlands in the summer of 2013. The Dutch study tour attracted 35 participants from 10 different countries. The study tour was a combination of presentations of stakeholders in the Dutch biomethane market together with plant visits. Quote of one of the participants: The tour was very interesting and full of useful information. The site visits were also of great use and intriguing to see. I would say the tour exceeded my expectations in the accommodation and subsistence department; very nice hotels and food during the trip.

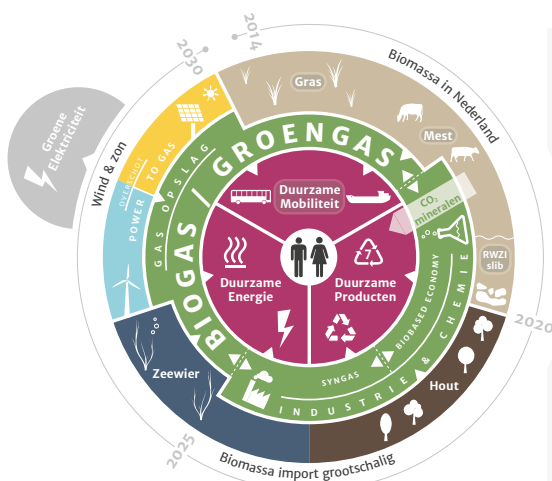
A market platform was developed to provide a comprehensive overview of the European biogas market. This market platform serves as a continuous update of the market information of relevant technical and commercial data/contents for the biogas/biomethane sector. In this way potential investors, plant manufacturers and policy makers gain information in processes, market information and regulations/provisions in all participating countries, thus knowledge is transferred in a direct and indirect way.

According to the project plan Netherlands developed a National roadmap. This roadmap focuses on biomethane production by the technologies of fermentation and gasification. The focus on gasification up to 2020 is mainly focusing of the establishment of a commercial demonstration plant. The take-off of the gasification technology is foreseen from 2020. The National roadmap is officially handed over to main stakeholders in industry and the Ministry of Economic Affairs. (photo)



## Hernieuwbaar gas

De schakel tussen laagwaardige grondstoffen en hoogwaardige toepassingen



### Hoofdpunten Routekaart

Biogas kan in 2020 ca. 5-7% van de duurzame energiedoelstelling realiseren (ca. 15-20 PJ) bruto eindverbruik)

Het potentieel voor biogas uit vergisting is:

- 2020: 1,2 miljard m<sup>3</sup> biogas
- 2030: 3,7 miljard m<sup>3</sup> biogas

### Acties korte termijn

Inzetten op:

- Mest, gras, RWZI-slib
- Level Playing Field voor Mobiliteit
- Innovatieprogramma o.a. (superkritische) vergassing en Power-to-Gas

Versterken van ketenregie: krachtenbundeling van huidige organisaties en voortzetting PPS-aanpak

### Perspectief voor 2030

Belangrijke rol van groen gas in power-to-gas en biobased economy

Bij sterke groei van de biobased economy blijft het biogaspotentieel overeind

GREEN  
GAS  
GRIDS

# THE UNITED KINGDOM

## What are the lessons learned for the so called starter countries from the forerunner countries?

1. Needs political support and an associated renewable support arrangement (e.g. feed in tariff in the UK)
2. Needs the Gas Distribution Network owners to be supportive and to remove any technical barriers that inhibit biomethane (e.g. Oxygen specification)
3. Needs AD developers and biomethane supply chain to work with the Gas Distribution Networks and possibly Gas Suppliers to create a pilot project to help show that Biomethane has no adverse issues regarding gas quality and to build confidence

## What was the top 3 of contribution of the GreenGasGrids project to the biomethane development in your country (or organisation)?

- Support in relation to persuading the UK Health and Safety Executive to change the specification for O<sub>2</sub> injection into the Distribution Networks from 0.2% to 1%
- Support in relation to understanding the details of the Biomethane regime in other countries which allowed the UK REA to influence the regime in the UK to help ensure that all activities are competitive, with no work restricted to the monopoly Gas Distribution Network
- The sharing event required by GreenGasGrids in 2012 “Info Day” has become an annual event in the UK. UK Biomethane Day 2014 had 300 delegates and 34 Exhibitors. See Report on UK Biomethane Day 2014

## What was the indirect effect of the results of the GreenGasGrids project on the market development in your country (or organisation)?

- We have shared the reports produced by GreenGasGrids with stakeholders in UK including the UK Government. These have been helpful in building credibility and influencing policies
- Total biomethane production forecast for 2015 is 1.8 TWh which is around 130,000 tonnes and is significant. GreenGasGrids has played an important role in supporting this market

## What are the direct effects of the results of the project?

- UK Biomethane day, spin off from Biomethane Day in 2012 has become an annual event in the UK. UK Biomethane Day 2014 had 300 delegates and 34 Exhibitors. See Report on UK Biomethane Day 2014
- UK REA has made very good contacts in the GreenGasGrids group
  - This includes contacts in Germany for projects to create capacity in the gas grid by compressing from one pressure tier to a higher pressure tier
  - Such projects now underway in the UK
- Knowledge sharing has been very useful, including Study Tour to Netherlands
- UK REAL Green Gas Certificate Scheme has benefited from working with other similar schemes
- Information sharing in relation on to Sustainability and Technical Standards has been helpful

**What development do you expect in your country after the project in the biomethane development in your country which can be related to the project?**

- UK Biomethane Day 2015
- Ongoing work in relation to Sustainability
- Being able to show to UK Government that the biomethane market is growing in France and Netherlands is helpful
- Implementation of “compression projects” to create capacity
- Further development of the REAL Green Gas Certificate Scheme with additional crops border co-operation and potential for trading to develop

# HUNGARY

## **What was the top 3 of contribution of the GreenGasGrids project to the biomethane development in your country (or organisation)?**

- The first and only biomethane production plant started its operation at Zalavíz Zrt., a waste water treatment plant at the city of Zalaegerszeg (western Hungary). Because of yet to be established biomethane feed-in regulations, biomethane is utilised to fuel company vehicles.
- A major international workshop with participants from Austria, Hungary, Romania and the European Biogas Association was organised in collaboration with a Hungary-Romania trans-border project. More than 100 stakeholders took part. Some of the lectures were delivered by the GreenGasGrids project partners from forerunner countries.

## **What was the indirect effect of the results of the GreenGasGrids project on the market development in your country (or organisation)?**

- Dissemination of biomethane related information and knowledge was particularly successful.

## **What are the direct effects of the results of the project?**

- Negotiation started about the conditions and regulations concerning biomethane injection into the natural gas grid. Unfortunately, the general political decision making atmosphere is not favourable for biomethane and for renewable energy in general and this created difficulties in establishing progress in related legislation and regulations. Lack of confidence dominates the market since a state guaranteed feed-in system was suspended by the government in 2010.

## **What development do you expect in your country after the project in the biomethane development in your country which can be related to the project?**

- A strong collaboration with the European Biogas Association (EBA) will be maintained through the Hungarian Biogas Association, a founding member of EBA. This way contact and continuous information exchange will be sustained with the GreenGasGrids project partners in the future and best practices will be implemented in Hungary. Discussions with several partners from GreenGasGrids participant countries are underway on submitting joint proposals in Horizon2020 calls concerning technical aspects of biogas and biomethane.



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