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REPORT

Work package: WP05
Biogas injection into the natural gas pipeline grid; framework; conditions, methods, barriers and demand for regulation

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Deliverable: D15
A catalogue of the most important mental barriers of the natural gas grid operators and gas companies related to the biogas injection and a proposal list for minimizing such barriers

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REDUBAR
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Table of Contents

Table of Figures

1. Introduction

Deliverable D15 of the REDUBAR project comprises a catalogue of the most important mental barriers of the natural gas grid operators and gas companies related to biogas injection. The results of the prepared questionnaire “Input of biogas into the natural gas grid” (see annex) have been the input for this catalogue. In the following report we will show how open different countries are concerning the input of biogas into the natural gas grid. How much the different companies know about the costs and problems that this entails and which general opinion they have on this subject.

The main intention of the questionnaire is to identify the barriers. From this, a concept should be provided by solutions, so that these barriers can be overcome by specific political measures.

The questionnaire has been sent via e-mail to target groups of the countries which are involved in this project. These include Germany, Poland, Greece, Hungary, Netherlands, Czech Republic, Italy and Lithuania. The main results of the anonymous questionnaire have been collected in this catalogue. Most of the participants are gas companies.

Unfortunately, we have only received few responses and we have not received a response from Italy. The reason for this could be reluctance (a mental barrier) to this subject.

The questionnaire includes five questions. We will show the evaluation in different diagrams. The fourth question was an "open question" where the participants are able to write their own positions and opinions.

The results of the questionnaire survey are summarized in chapter *<Responses>* of this report. The catalogue is structured in the participating countries of the REDUBAR project.

2. Analysis

2.1. General aspects

To ensure that the evaluation occurs in the correct relation, the first diagram shows the number of the gas providers in the respective countries.

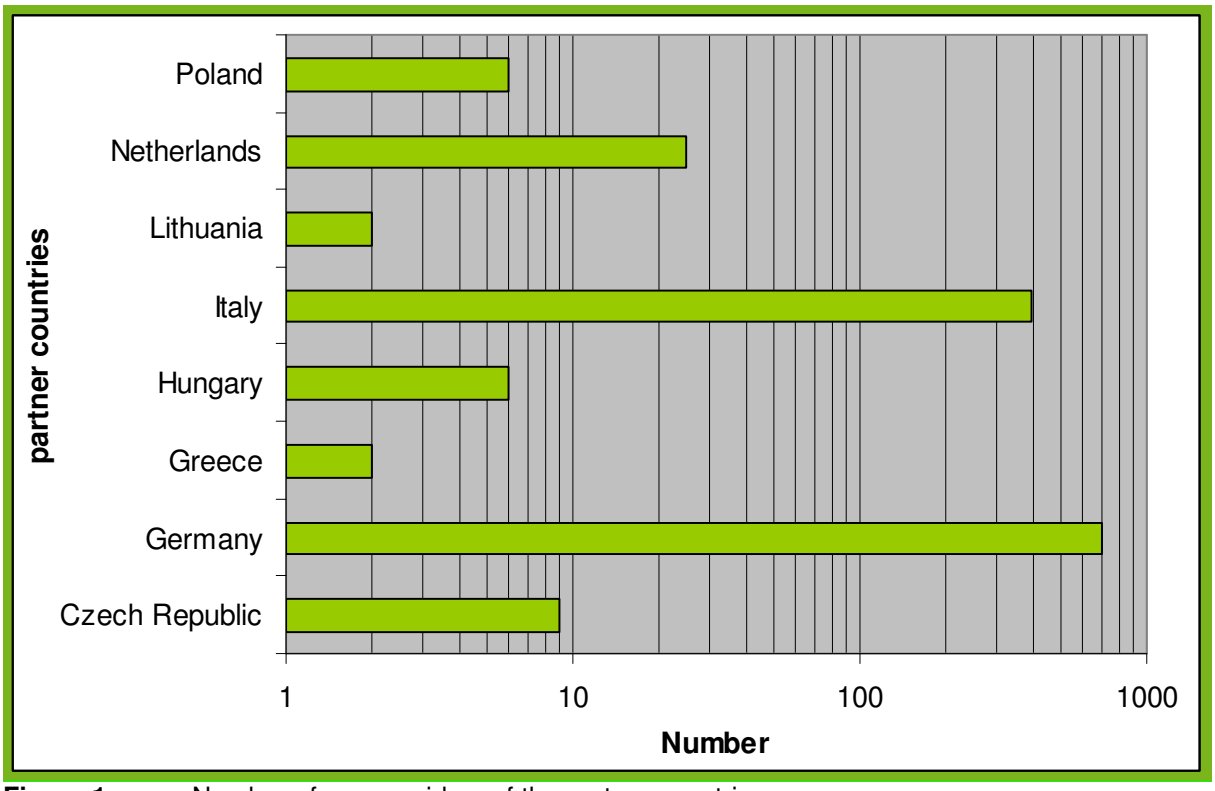

Figure 1: Number of gas providers of the partner countries

Germany has roughly 700 gas providers the most providers per country in this project consortium. Italy is second largest with 397. Netherlands follows with 25, Czech Republic with 9 and Hungary with 6 gas providers. Poland has 6 while Greece and Lithuania have the least with 2.

The very high number of gas supplier in Germany is based on the structure of the public natural gas grid. Here you find some big gas suppliers. They distribute the natural gas in Germany to small (local) gas supplier. These local gas suppliers such as public services sell the natural gas to the end customer.

In today’s age of internet and e-mail it is easy to send a high number of questionnaires to gas suppliers and gas companies. But this is also the reason why companies protect their networks as well as their employees from these e-mails.

As a result, it is more efficient to concentrate the actions to a small representative group of gas companies.

The following figure shows the number of participants contacted and the number of completed questionnaires (replies).

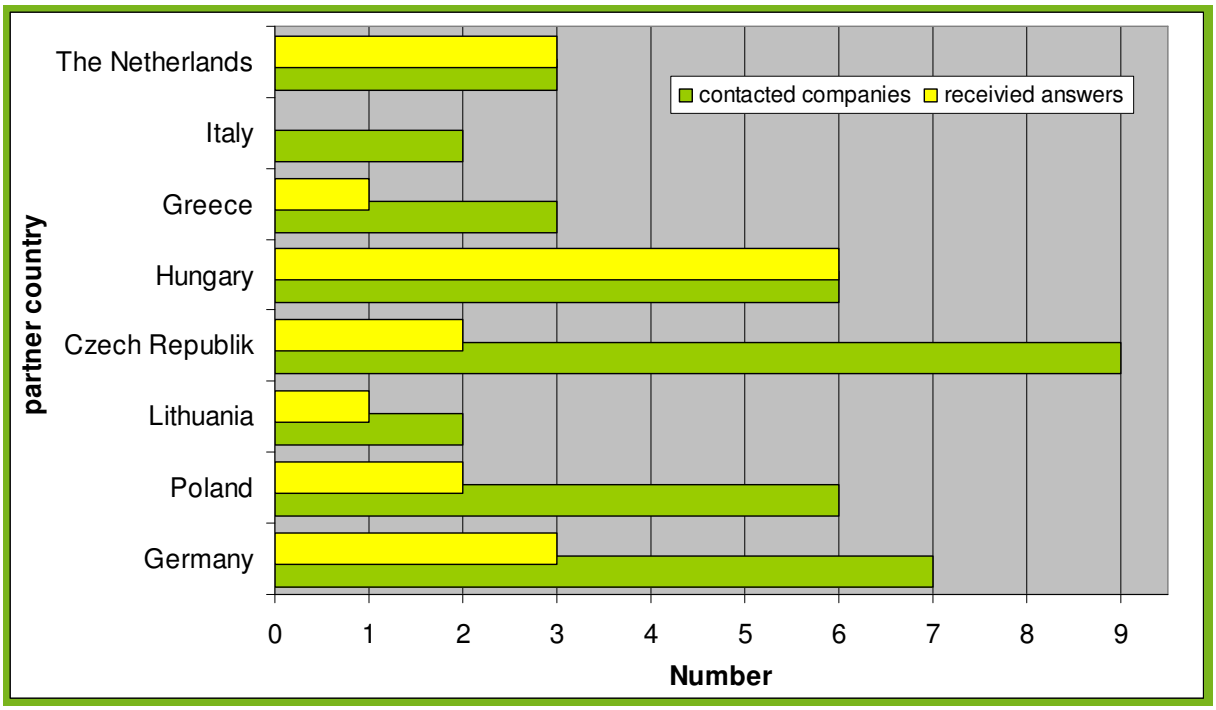

Figure 2: Comparison of contacted gas companies and suppliers to received answers

A total of 38 companies were contacted by the project partners. We received 18 responses (see following figure).

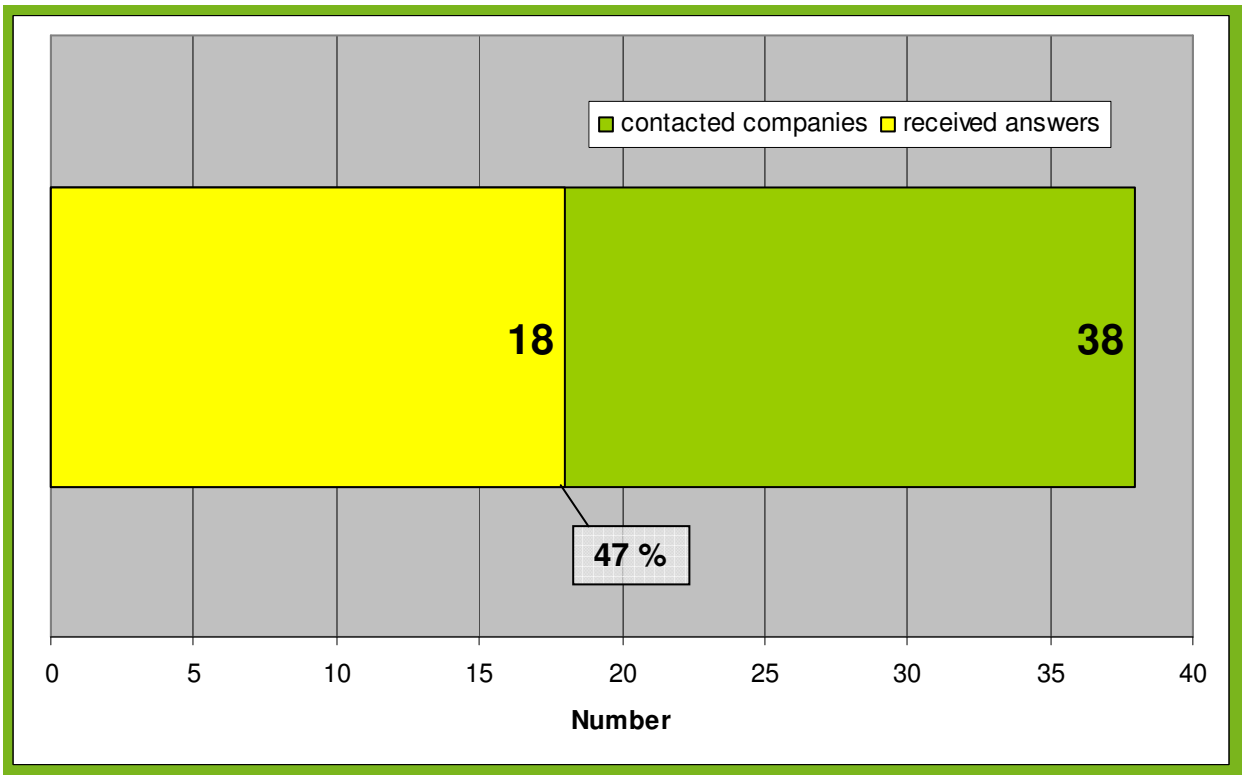

Figure 3: Feedback from questionnaire survey

Less than 50 percent of contacted gas companies and supplier answered our questionnaire survey. This fact shows one important mental barrier - It is a reservation to publish information outside the company. Other reasons include lack of stability and the anxiety of economical disadvantages. Every company or organisation is interested in receiving more information from outside but only a smaller portion of them publish their own information to outside.

For this deliverable, participants from all target groups are asked. These target groups are:

1. Gas companies, like natural gas grid owners, operators and gas suppliers
2. Nationally organized and trans-national acting branch decision makers, representing a lot of entities in their country
3. Policy decision-makers in the participating countries and EU-wide
4. Environmental organisations, biogas producers, agricultural companies
5. Professional disseminators and multipliers such as energy agencies
6. Users from diverse branches (agriculture, gas industry, energy industry)

But the main focus is fixed on target group 1, gas companies and gas grid operators (see title of this deliverable, too). This fact is shown in the following figure. 11 of 17 filled questionnaires (about 65 %) are filled by gas transport companies.

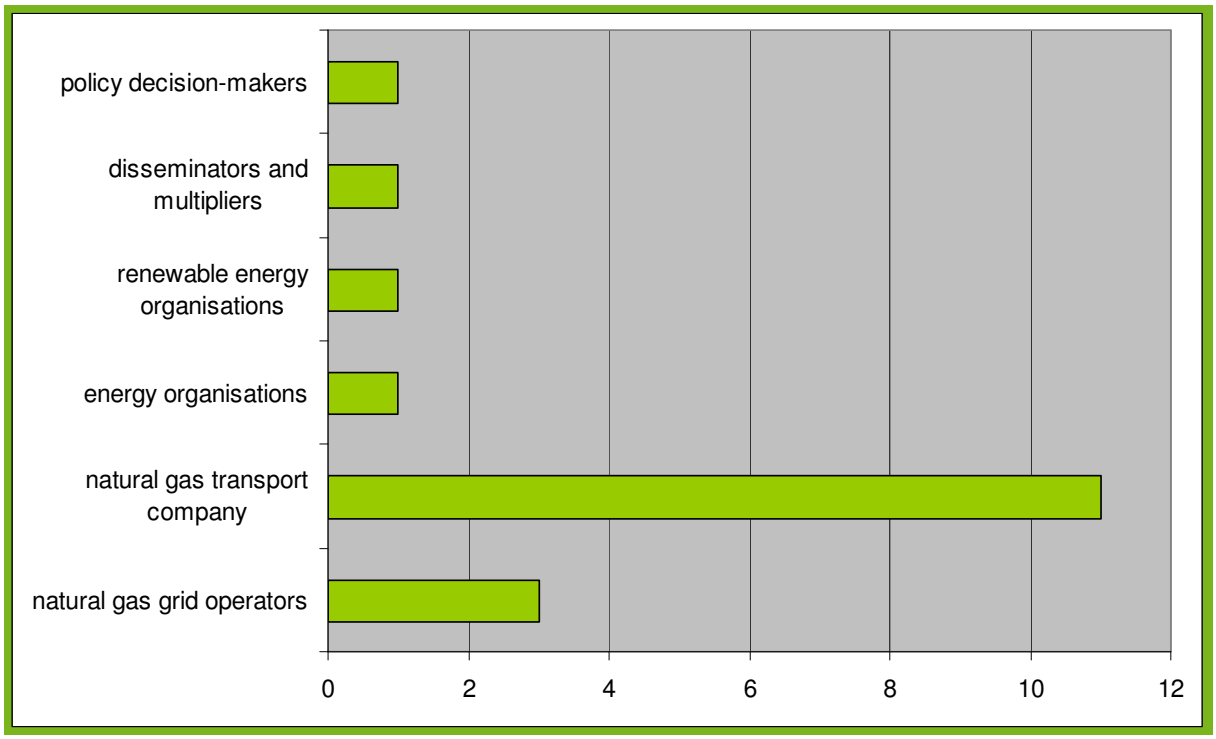

Figure 4: Distribution of feedback from participants of the target groups

2.2. Results of the questionnaire survey

The prepared questionnaire (see annex) includes 5 questions whereby 4 of them are multiple choice questions. Question 3 and 5 combines multiple choice and the open answer format. The participant can fix the reasons for its point of view. In question 5 the respondents find a long list of answers which he can extend or complete.

Question 4 is prepared in an open format. The participants can fill in obstacles and barriers with their own words, without limit.

2.2.1 Question ONE – "How have you informed yourself about the input of biogas into the natural gas grid?"

The following diagram shows an actual status of knowledge of the respondents.

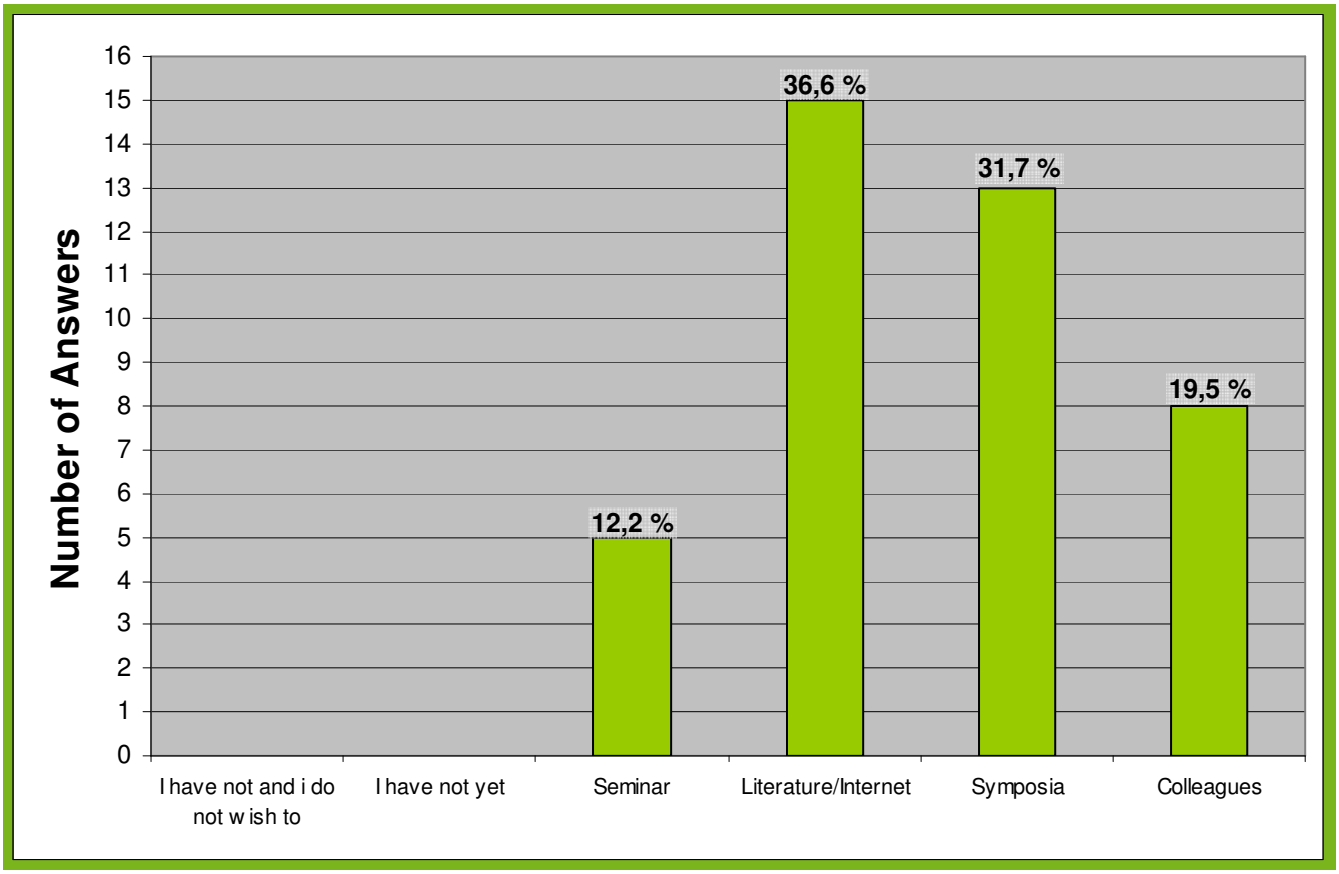

Figure 5: Evaluation of question ONE

It is clear to see that all participants are informed. That's a positive fact. A basis of information exists allowing for discussion and an understanding of the importance of measures for increasing the biogas use, especially for biogas injection into public natural gas grids.

The diagram shows clearly that one third of the participants are informed by self education via Literature and Internet (→ more than 7.000 clicks to our REDUBAR website, that's are more than 42.000 clicks to single pages of the website). More than 40 percent use Seminars (such as workshops designed and planned by DVGW) and Symposia (such as BMK –BioMethan Kuratorium initiated by FEE) to inform them.

2.2.2 Question TWO – "How do you estimate your level of knowledge in regard to the topic?"

The evaluation of question ONE shows that the gas company participants exhibit knowledge. With question TWO the quality of the knowledge should be shown – see the following figure.

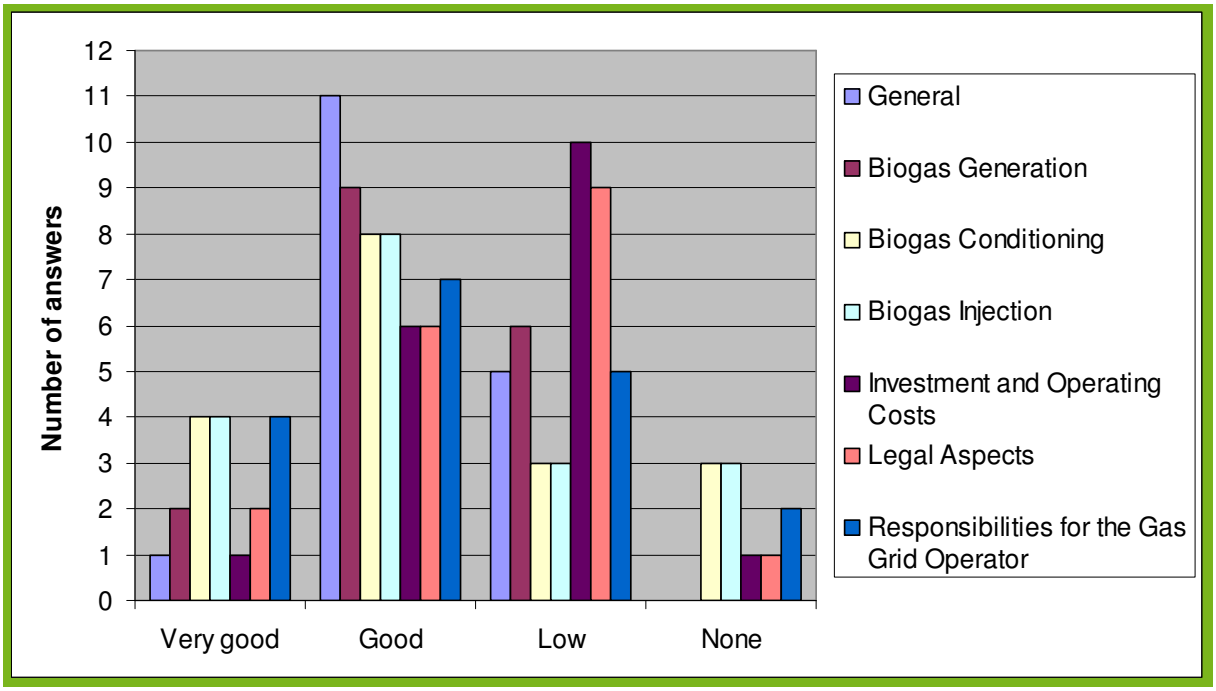

Figure 6: Evaluation of question TWO

The diagram shows that the majority of the participants, about 44 %, have a "Good" knowledge about the general and the separate steps of the supply chain for biogas injection into the natural gas grid. About one third estimates their knowledge as "Low". Less than 10 per cent did not know any information about the steps in the supply chain of biogas use.

For the following evaluation we use the fixed structure of biogas supply chain. Most of the participants have good or very good knowledge about the general biogas system (from biomass to biogas in the gas grid). A similar situation is shown for the "Biogas Generation". More uncertainty could result from not enough detailed information. The interviewed participants have a prevailing "Good" knowledge regarding the chain steps "Biogas Conditioning" and "Biogas injection". Regarding conditioning and injection, there exists a high know how at gas companies for several decades.

Another situation we have on the level of "Legal Aspects" and "Investment and Operating Costs". Biogas injection into natural gas grids is relatively new technology. In general, an ecological mechanism to increase the biogas injection does not exist in every European country. The same problem we find on the level of "Legal Aspects". In Germany we have a comfortable situation. There are ecological mechanisms and a lot of rules, norms and regulations to increase the biogas injection into the gas grid.

If these instruments are partly or completely missing, as they are in other European countries, the biogas market will not increase. The result is a lack of knowledge. The preceding diagram shows this situation. Last but not least, the participants of asked gas companies fix their good knowledge about their responsibilities.

2.2.3 Question THREE – "What is your position on the input of biogas into the natural gas grid?"

This diagram shows the evaluation of the third question:

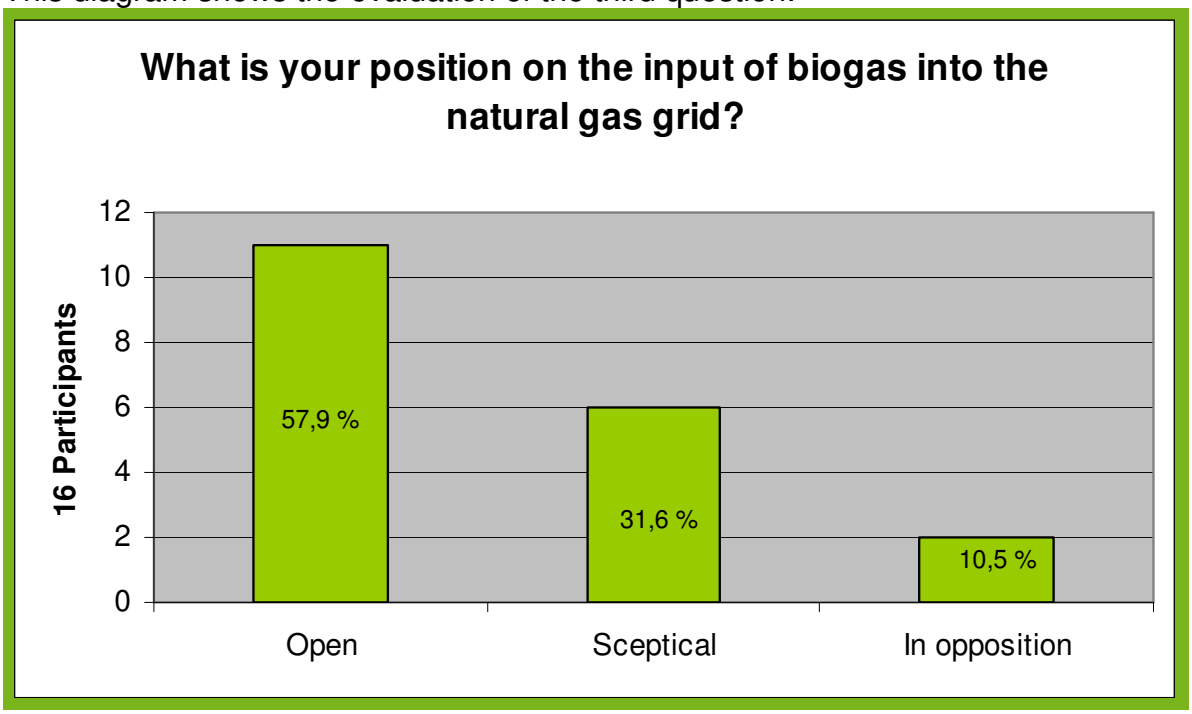

Figure 7: Evaluation of question three

This diagram shows a positive trend for the use of biogas. Because about 60 percent of the asked participants have an open attitude to the biogas use. Two of the Hungarian participants are in opposition because biogas injection is too expensive and there exists no clear condition. About 32 percent of the asked participants are sceptical. Both Czech, two of the Hungarian and one Dutch asked participant see problem with economics, with plant sizes, open technical questions.

The Dutch participant fears too much small biogas suppliers. But this fact will be regulated by economic factors by itself. For small plants biogas injection into the natural gas grid is too expensive → so there is no interest. The experience in Germany shows an economic biogas injection with plant sizes over 250 Nm^3/h.

2.2.4 Question FOUR – "Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?"

Question four was an open question where the participants had the opportunity to write their own opinions and position.

The following are some of the major concerns several different countries have regarding biogas injection. Many countries are concerned about the localized nature of biogas production and the associated costs of establishing a distribution grid for relatively small scale operation. Additionally, there is a lack of regulation and standards for gas properties such as methane content and gas quality. There is also uncertainty with respect to the economics and the costs associated with conditioning, injection, metering and compression. Developed countries such as Germany have problems with the clear distinction of responsibilities between grid operators and those being supplied. Furthermore, there is still debate on which processing technologies are the most effective. An overall lack of technical expertise and knowledge is another reason for many countries being apprehensive towards biogas injection. The Czech Republic is concerned with TSOs (transmission gas grid operator) /DSOs (regional gas grid operator) from partial damage (corrosion) of pipelines as well as unstable calorific value and quality of treated biogas. Finally, some people believe that there may be repercussions to their health as they believe biogas is produced from waste.

The answers summarized in chapter *<Responses>* of this report structured in the participating countries of the REDUBAR project.

2.2.5 Question FIVE – "Which reservations are applicable to you and describe shortly why"

For this question we have given eleven possible barriers. The participants could write in additional barriers. These are summarised in chapter <4. Responses> structured for each participating country.

This following diagram shows the occurrence of the single barriers. Conspicuous are two barriers, D and K. Most of participants see the ratio between costs and benefits too unfavourable (barrier D). The described barrier in question K show an analogue problem – *"Without financial support renewable energies will be not feasible/ survivable"*. The questions E and F describe the financial barriers, too.

Another big barrier is the uncertain quantities (problem of biogas potential in the regions – additionally *"no food for fuel"* problem) and qualities of biogases from different RES. It is shown by barriers A, B and C

At question "I - Unavailability of trained staff" fewest of participants see here the problem for biogas use.

It is clear to see that financial barriers the most important barriers for realising biogas projects. A continuous education and training is very important. The fast changes on

this market produce much lack of knowledge at the concerned persons. But it is the smallest barrier.

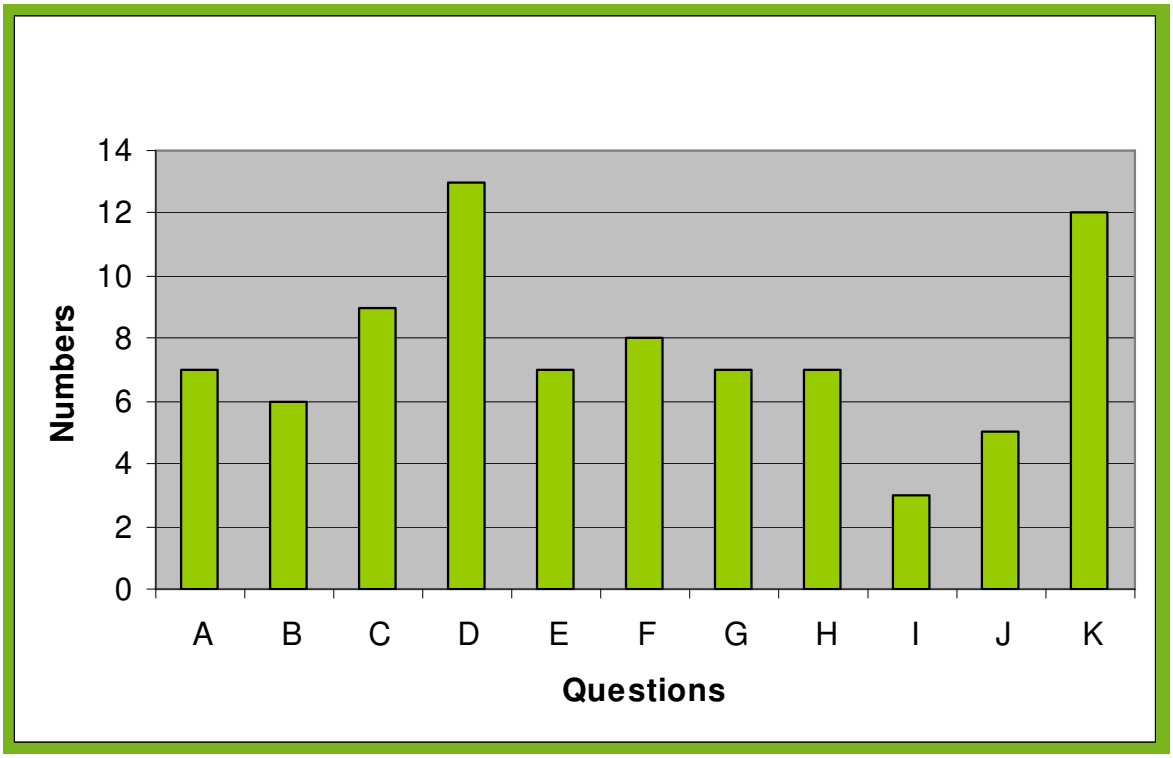

Figure 8: Evaluation of question five

Questions:	
A	Security of supply is dubious due to fluctuating biogas quantities
B	I am unaware of the biogas potential in the region
C	Quality of gas for consumers may be an issue
D	Ratio of costs and benefits is unfavourable
E	Overall cost is difficult to estimate
F	I believe the economic efficiency to be unfavourable
G	It is difficult to visualise the regulatory framework
H	Regulatory framework seems too insecure for me
I	Unavailability of trained staff
J	I don't think renewable energies can provide a solution to the world's energy problems
K	I believe the current hype of renewable energies is made by politicians. Without financial support renewable energies will be not feasible/ survivable

3. Proposal list for minimizing barriers

Based on the results of the answers and diagrams, the financial barrier seems to be the biggest problem. Most of the participants have suggested that the financial background of the government is not given. It will be not possible without financial subsides from the national governments as well as EU funds.

Furthermore, the uncertain quantities and quality of the biogas will be a big point.

The unstable calorific values of biogas, unstable quality as well as unknown contaminations are an issue for the lack of acceptance and interest.

Some of the participants stated that the lack of sufficient knowledge about the technology and law regulations of biogas will be a problem which has to be resolved.

The security of supply and regulatory issues were denoted as further barriers. Additionally, the overall costs are difficult to estimate, the economic efficiency is unfavourable and it is difficult to visualise the regulatory framework.

Half of the questioned companies indicated an open position on the input of biogas into the natural gas grid. The others were either sceptical or in opposition.

Some participants see the expensive process and the long term development as a problem.

Unavailability of trained staff is not seen as an important barrier.

If we take everything into consideration we can come to the conclusion that a proposal for minimizing the barriers should start with financial support from the national governments and the EU for biogas injection.

The following list of proposals shows different recommendations for minimizing or overcoming the described barriers.

Proposal list for minimizing barriers
Renewable energies need, at least for the time being, heavy financial support, until people start believing them to be a solution to the energy crisis of the near future.
Adopt biomethanation as a focus to the EU funded programs as Intelligent Energy Europe, Life, Leader etc. putting special emphasis to modern media to reach the youth, professional associations to reach target groups like farmers or drivers, to governmental, municipal and communal bodies to reach the authorities
Developing the market for RES technologies and equipment Initiating activities to enable the transfer and production in EU countries of the best RES technologies.
Supporting intra-European technology transfer from the in biomethane application higher developed Member States, as Austria, Germany, the Netherlands, Sweden to countries with nil applications and limited technical experience in this field so far primordially in national languages
Creating new research and development (R&D) programs. - Increasing funds for scientific research studies in RES (incl. biogas)
Carry out researches and create adequate norms
Establish a European investment fund for the purposes with favourable conditions for drawing rights
Set up an investigation plan (perhaps European wide for each country) and making decisions for the whole EU.
In order to make the market price of renewable energy (and thus biogas) competitive, financial subsidies of various types and extent are needed in the complete vertical set-up of energetic from production to utilisation.
Organizing the stakeholders in a technological platform but keep care to integrate innovative small and medium sized enterprises
Prepare simple administrative structures for the approval process of biogas plants (fix tasks and responsibilities)
Good communication and promotion to the public. - Setting up a good definition about renewable energy (no food for fuel).
Work out a 'green gas' certification system
Providing checklists for example for developing and controlling projects in national languages
Collect experiences from injection projects (country and EU – level -> revision of the actual regulations)

4. Responses

4.1. GREECE

We have sent three requests to Greece but we get only received one back.

To *question one* they answered that they have informed themselves about the input of biogas into the natural gas grid by Symposia and Literature or Internet.

To *question two* they estimate that their knowledge in regard to the topic is generally very good in Biogas injection and responsibilities for the gas grid operator.

They are well informed in Biogas conditioning, Biogas generation and legal aspects but do not know much about investment and operating costs.

To *question three* they answered that they have a very open position about the injection of biogas into the natural gas grid.

To *question four* "Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?" they have answered:

- The production of biogas is localized, meaning that it will take an extensive grid to make use of it.
- People believe that biogas is a fuel produced from garbage and will thus have an effect on their health.
- The percentage of methane in biogas is less that in natural gas.
- The cost of biogas conditioning and injection to a grid is high.

To *question five* "Which reservations are applicable to you and describe shortly why" they have marked:

- Security of supply is dubious due to fluctuating biogas quantities.
- The main biogas producers of Greece already use most of their produced biogas for co-production of heat and electricity. Other units producing biogas are rather small and the quantities produced are not stable.
- I am unaware of the biogas potential in the region.

- No research has been made at the region measuring already existing or scheduled to be built biogas production units
- Quality of gas for consumers may be an issue.
- There is an issue of acceptance by the public of the use of a fuel produced by garbage or industrial waste.
- Ratio of costs and benefits is unfavourable.
- At the moment selling biogas at the National Natural Gas Grid is less beneficial than using the produced biogas in a generator and selling to the power company.
- Overall cost is difficult to estimate (pipelines, measurements, armatures, etc.)
- The production of biogas is localized and the produced quantities are low.
- I believe the current hype of renewable energies is made by politicians. Without financial support renewable energies will be not feasible/ survivable
- Renewable energies need, at least for the time being, heavy financial support, until people start believing them to be a solution to the energy crisis of the near future.

4.2. THE NETHERLANDS

We have sent three requests to the Netherlands but we get only received one response.

To *question one* they answered that they have informed themselves about the input of biogas into the natural gas grid by Symposia, Seminars and Literature.

To *question two* they would estimate their knowledge as good in general as well as in installation engineering and the legal aspects.

But in regard to investment and operating costs they want to know more.

To *question three* they have an open position about the injection of biogas into the natural gas grid.

But they are also sceptical because they believe that most biogas plants are rather small and grid operators are not keen to have many small suppliers.
There are still a few barriers present that don’t allow biogas injection on a large scale (gas grid capacity, biogas quality, risks for humans, animals and vegetation, liability)

To *question four* "Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?" they have answered:

The small scale of operation and the associated costs are a problem. Grid operators are opposed because of workload increases and there are uncertainties in several aspects like securing gas quality and quantity, how to regulate items, etc. Gas grid operators do not oppose the injection of biogas, but do have additional requirements for the injection of biogas.

In general: unknown makes unloved. Transport companies are responsible for security of supply for the customers in their network. New and unknown components in biogas can possibly form a risk for their network (and the applied materials and components in these networks). Moreover with large-scale injection of biogas a problem can arise in the network configuration. The networks have been designed to transport gas from production points to the net periphery. To build an injection point halfway in the net could have a far-reaching impact to the ability to transport large amounts of gas.

The use of biogas can in my opinion also be considered against the background of the finite nature of the national natural gas and to become independent of foreign (natural) gas suppliers. Renewable energy will not solve the total energy supply problem, but can be a part of the energy supply. It also fits well into the movement to a concrete improvement. Moreover a possibly strategic value must be granted to biogas.

To *question five* "Which reservations are applicable to you and describe shortly why" they have marked:

- I am unaware of the biogas potential in the region.
- Quality of gas for consumers may be an issue.
- This potential problem can be solved with good communication and guarantees.
- Ratio of costs and benefits is unfavourable.
- So far yes
- It is still unclear what the biogas value (in euros) will be. The technology is still in development and unknown costs could arise.
- Overall cost is difficult to estimate (pipelines, measurements, armatures, etc.).
- More data will become available when more plants are installed
- I believe the economic efficiency to be unfavourable.
- Yes, due to small scale. Large scale through gasification is pre-commercial and therefore are expensive
- It is difficult to visualize the regulatory framework.
- It differs between EU member states
- Regulatory framework seems too insecure for me
- I believe the current hype of renewable energies is made by politicians. Without financial support renewable energies will be not feasible/ survivable.
- Support is needed for new technologies. A major risk is the unpredictability of the political field. The development of these techniques and investing in knowledge and infrastructure require a long term vision beyond the time horizon of 4 or at the most 8 years which politicians have in general.

4.3. POLAND

We have sent Poland 6 inquiries from which we have received 2 answers back.

To *question one* they answered that they have informed themselves about the input of biogas into the natural gas grid by Symposia, Seminars Literature as well as self study.

To *question two* they estimate that their knowledge in regard to the topic is generally very good as well as in Biogas injection and responsibilities for the gas grid operator.

They are informed well in Biogas conditioning, Biogas generation and legal aspects but they are not informed regardinginvestment and operating costs.

To *question three* they answered that they have a very open position about the injection of biogas into the natural gas grid.

To *question four* "Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?" they have answered:

- Injection costs,
- lack of law regulations,
- economic factors,
- gas composition.

The main obstacles arising with a lack of standardized technology, purification costs, law regulations to keep quality parameters injection gas define in Ordinance of the Minister of Economy, Labour & Social Policy of 6 April, 2004 on detailed conditions adding entity to gas grids, motion and exploitation this grids.
Gas operators oppose the input of biogas into gas grid probably because of a lack of sufficient knowledge about biogas.

To *question five* "Which reservations are applicable to you and describe shortly why" they have marked:

- Security of supply is dubious due to fluctuating biogas
- Ratio of costs and benefits is unfavourable
- Overall cost is difficult to estimate (pipelines, measurements, armatures, etc.)
- I do not think renewable energies can provide a solution to the world’s energy problems
- I believe the current hype of renewable energies is made by politicians. Without financial support renewable energies will be not feasible/ survivable.

- I do not think renewable energies can provide a solution to the world’s energy problems
- In my opinion renewable energy in first step of development don’t effect decisive on improvement current energetic situation in the world. Long-term development prognosis, on the assumption that renewable energy will increases, can provide a solution to the world’s energy situation.

Development of biogas market in first stage will need large capital outlays, because of that the biogas market will need financial support from the national government and EU founds.

4.4. LITHUANIA

In Lithuania there are a total of only two gas companies. We have contacted both and have received one answer.

To *question one* they answered that they have informed themselves about the input of biogas into the natural gas grid only by colleagues.

To *question two* they estimate that their knowledge in regard to the topic is generally very good as well as in Biogas injection and responsibilities for the gas grid operator.

Their knowledge concerning the topic in general is insufficient including biogas generation, investment and operating costs, legal aspects and responsibilities for the gas grid operator.

They do not know anything about biogas conditioning and injection.

To *question three* they answered that they have a very open position about the injection of biogas into the natural gas grid.

To *question four* "Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?" they have answered:

It is not clear how technically is to inject it to the biogas into the natural gas grid technically…

To *question five* "Which reservations are applicable to you and describe shortly why" they have marked:

- Security of supply is dubious due to fluctuating biogas quantities
- I am unaware of the biogas potential in the region
- Quality of gas for consumers may be an issue
- Overall cost is difficult to estimate (pipelines, measurements, armatures, etc.)
- I believe the economic efficiency to be unfavourable
- It is difficult to visualize the regulatory framework
- Regulatory framework seems too insecure for me
- Unavailability of trained staff

4.5. GERMANY

We contacted more than 25 companies but we only received three responses. All three were gas companies.

To *question one* they answered that they have informed themselves about the input of biogas into the natural gas grid by Symposia and Literature or Internet, seminars as well as colleagues.

To *question two* they estimate that their knowledge in regard to the topic is generally good as well as in installation engineering and responsibilities for the gas grid operator.

All three indicate to having insufficient knowledge of the legal aspects as well as investment and operating costs.

To *question three* they answered that they all have a very open position about the injection of biogas into the natural gas grid.

To *question four* "Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?" they have answered:

- Lack of information regarding proven biogas production and processing plants
- Lack of reliable information about the national promotion of the production and the use of the produced biogas for the production of electricity and heat.
- Hardly economically efficient- pioneer work
- Production technology open
- Operational cost development open
- Biomass material price development open
- Problems particularly in the clear separation of competences between Transport company and biogas producers
- Balancing of bio-natural gas in the gas grid

To *question five* "Which reservations are applicable to you and describe shortly why" they have marked:

- Security of supply is dubious due to fluctuating biogas quantities
- No experience regarding biogas injection available
- I am unaware of the biogas potential in the region
- Ratio of costs and benefits is unfavourable
- Processing and injection of biogas is very expensive
- Overall cost is difficult to estimate (pipelines, measurements, armatures, etc.)
- I believe the economic efficiency to be unfavourable
- Biogas production is expensive due to high prices of substrate
- It is difficult to visualize the regulatory framework
- Taxation of bio/natural gas is not-known
- Unavailability of trained staff
- I do not think renewable energies can provide a solution to the world’s energy problems
- I believe the current hype of renewable energies is made by politicians. Without financial support renewable energies will be not feasible/ survivable

4.6. HUNGARY

In Hungary there are six gas companies. We have contacted all of them and received responses by all.

To *question one* they answered that they have informed themselves about the input of biogas into the natural gas grid by literature/internet and colleagues. None has indicated to gather information's by seminars or symposia.

The following diagram shows the answers of question two:

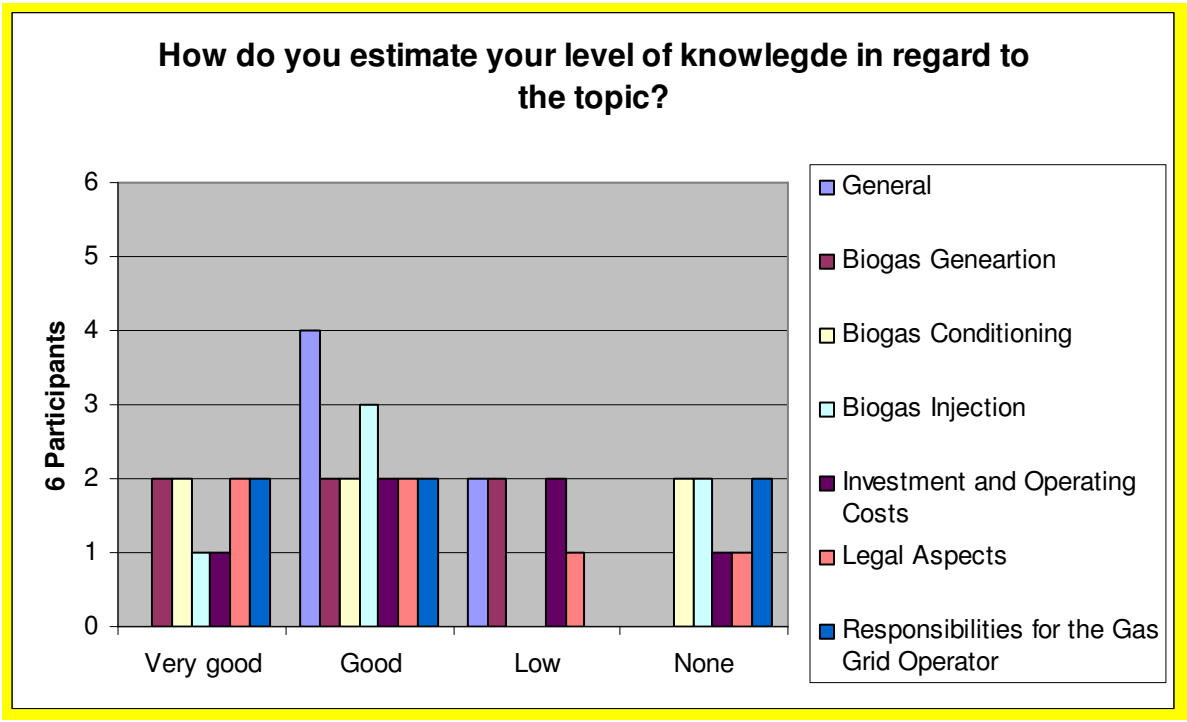

Figure 9: Evaluation of question two of Hungary

The answers to question three are shown in the diagram below.

Two of the six companies have an open position but two are sceptical, because:

- Bio methane is not the favourite one among RES in Hungary and it seems there is no interest in biogas business development.
- Plenty of open questions from technical to economic issues

And the other two declare to be in opposition, because:

- Quality problems and unknown contaminations
- Injection into a transmission system is too expensive

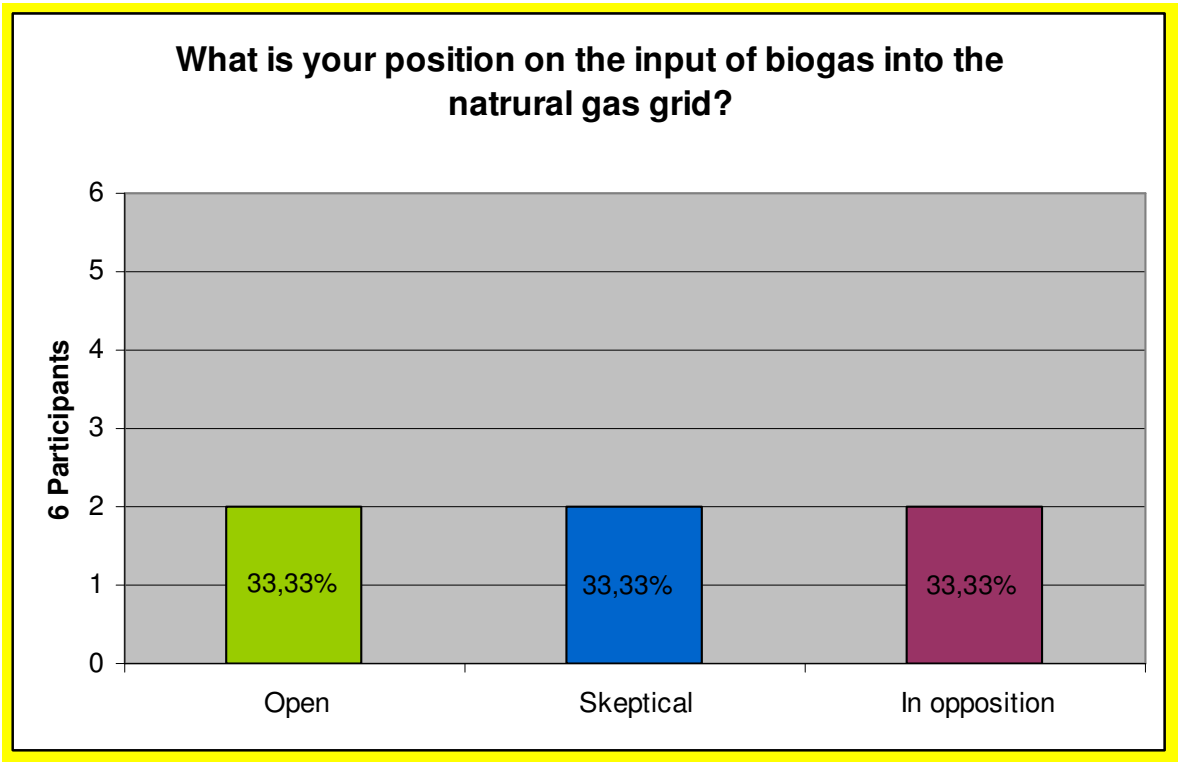

Figure 10: Evaluation of question three of Hungary

To *question four* "Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?" they have answered:

- We see possible problems occurring at customers because of the insecure gas quality.
- Carrying out a connection point with full high level equipments is very complex and expensive work
- As far as I know: no experience, no sufficient regulation and financial background in Hungary
- Green electricity is much more preferred than green gas
- Quality and quantity problems of biometane

To *question five* "Which reservations are applicable to you and describe shortly why" they have marked:

- Security of supply is dubious due to fluctuating biogas quantities
- I am unaware of the biogas potential in the region
- Quality of gas for consumers may be an issue
- Ratio of costs and benefits is unfavourable
- Overall cost is difficult to estimate (pipelines, measurements, armatures, etc.)
- I believe the economic efficiency to be unfavourable

- It is difficult to visualise the regulatory framework
- Regulatory framework seems too insecure for me
- I do not think renewable energies can provide a solution to the world’s energy problems
- I believe the current hype of renewable energies is made by politicians. Without financial support renewable energies will be not feasible/ survivable

4.7. CZECH REPUBLIC

In the Czech Republic there are nine gas companies. Of the requests we received two responses.

To *question one* they answered that they have informed themselves about the input of biogas into the natural gas grid by Symposia, Seminars, Literature and colleagues.

To *question two* they estimate that their knowledge in regard to the topic of installation engineering is very good.

They are informed well concerning investment and operating costs, legal aspects and responsibility for the gas grid operator they are informed well.

To *question three* they answered that they are very sceptical of the injection of biogas into the natural gas grid.

Sceptical, because:

- Biogas purifying, conditioning and compressing is quite expensive process and amounts of biomethane cannot be so huge to take over a significant part of energy supply (in densely populated areas like Mid Europe). Moreover crops produced for energy purposes are competitive to feed crops.
- Cost of conditioning, cost of injection, no subsidy for injected biogas from state authorities or gas companies, no economical feasibility without subsidies

To *question four* "Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?" they have answered:

- Costs of biogas purifying, conditioning, metering and compressing.
- Gas grid operators have fears regarding biomethane quality. Gas grid operators are responsible for gas quality in relation to customers.
- Fear of TSOs/DSOs from a partial damage (corrosion, etc) of pipelines, unstable calorific value of treated biogas, unstable quality of biogas

To question five "Which reservations are applicable to you and describe shortly why" they have marked:

- Quality of gas for consumers may be an issue. (Unstable calorific value of biogas, unstable quality of biogas)
- Ratio of costs and benefits is unfavourable. There are no benefits established for biogas injecting in the Czech Republic
- I believe the economic efficiency to be unfavourable
- Unavailability of trained staff
- I do not think renewable energies can provide a solution to the world’s energy problems
- I believe the current hype of renewable energies is made by politicians. Without financial support renewable energies will be not feasible/ survivable. In relation to present financial and economic crisis the financial resources should not be used for projects which aren’t able to be economically effective without subsidies.

4.8. Italy

The questionnaires were sent to the gas companies but we didn’t get any reply.

Annex:

General questionnaire for preparing deliverable D15

Questionnaire: Input of biogas into the natural gas grid

Please complete the questionnaire in its entirety and send it back to the person who gave it to you. If you are not able or do not wish to answer a question, please cross it out and state the reason. Your data will be treated as confidential, and used only for purposes inside this study. Thank you.

Country: .....

Organization: .....

1. How have you informed yourself about the input of biogas into the natural gas grid?

- ☐ I have not, and I do not wish to
- ☐ I have not yet , because: .....
- ☐ Seminar
- ☐ Literature/ internet
- ☐ Symposia
- ☐ Colleagues

2. How do you estimate your level of knowledge in regard to the topic?

	very good	good	low	none
General	☐	☐	☐	☐
Installation engineering:				
Biogas generation	☐	☐	☐	☐
Biogas conditioning	☐	☐	☐	☐
Biogas injection	☐	☐	☐	☐
Investment and operating costs	☐	☐	☐	☐
Legal aspects	☐	☐	☐	☐
Responsibilities for the gas grid operator	☐	☐	☐	☐

3. What is your position on the input of biogas into the natural gas grid?

- ☐ Open
- ☐ Skeptical, because: .....

  .....

  .....

  .....
- ☐ In oposition, because: .....

  .....

  .....

  .....

4. Where do you see general problems arising with the injection of biogas? Why do many gas grid operators oppose the input of biogas in your opinion?

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5. Which reservations are applicable to you and describe shortly why?

☐ Security of supply is dubious due to fluctuating biogas quantities.....

.....

☐ I am unaware of the biogas potential in the region.....

.....

☐ Quality of gas for consumers may be an issue.....

.....

☐ Ratio of costs and benefits is unfavourable.....

.....

☐ Overall cost is difficult to estimate (pipelines, measurements, armatures, etc.) .....

.....

☐ I believe the economic efficiency to be unfavourable.....

.....

☐ It is difficult to visualize the regulatory framework.....

.....

☐ Regulatory framework seems too insecure for me.....

.....

☐ Unavailability of trained staff.....

.....

☐ I do not think renewable energies can provide a solution to the world's energy problems

.....

☐ I believe the current hype of renewable energies is made by politicians. Without financial support renewable energies will be not feasible/ survivable. .....

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☐ Additional: .....

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