EUROPEAN COMMISSION

Brussels, 14.12.2010
C(2010)8921final

In the published version of this decision, some information has been omitted, pursuant to articles 24 and 25 of Council Regulation (EC) No 659/1999 of 22 March 1999 laying down detailed rules for the application of Article 93 of the EC Treaty, concerning non-disclosure of information covered by professional secrecy. The omissions are shown thus […].

PUBLIC VERSION

WORKING LANGUAGE

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Subject: State aid N 276/2010 – Sweden
Aid for the project "GoBiGas"

Dear Sir,

1. PROCEDURE

(1) On 15 January 2010, the Swedish authorities pre-notified aid for the project Gothenburg Biomass Gasification (hereinafter: "the GoBiGas project" or "the Project"). The pre-notification was registered on the same day under State aid case number PN 15/2010.

(2) Following a meeting between the relevant Commission service, the Swedish authorities and representatives of the beneficiary on 18 March 2010, the Commission submitted on 25 March 2010 a letter to the Swedish authorities specifying certain aspects which needed to be clarified and/or covered in the forthcoming notification.

(3) On 23 June 2010, the Swedish authorities notified, according to Article 108(3) of the Treaty on the Functioning of the European Union ("TFEU"), the planned aid on the basis of the Community Framework for State aid for research and development and innovation[1] (hereinafter: "the R&D&I Framework"). The notification was registered on the same day under State aid case number N 276/2010.

(4) On 16 July 2010, the Commission requested supplementary information. Following several extensions of the deadline to reply, the Swedish authorities submitted the

[1] OJ C 323, 30.12.2006, p. 1.

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requested information on 23 November 2010, complemented by e-mails of 25 November 2010 and 3 December 2010.

2. DESCRIPTION OF THE MEASURE

2.1. Objective of the aid

(5) Under the proposed measure, the Swedish authorities plan to provide aid for R&D activities relating to the development of a pre-commercial demonstration plant for indirect gasification of low-quality forest raw material into bio-methane. In addition to promoting R&D activities that can serve as guidance for future investment decisions regarding the commercial scale-up of the relevant energy technology by demonstrating the feasibility of producing biogas of sufficiently high quality, the aid would also have a positive impact on environmental protection, security of energy supply and creation of new jobs.

2.2. Legal basis and granting authority

(6) The aid will be provided on the basis of an aid scheme approved by the Commission in August 2008[2]. That scheme aims at promoting energy research in order to create conditions for effective energy markets, secure energy supply and the protection of the environment, health and climate.

(7) The Swedish authorities submitted that the national legal basis under which they intend to grant the aid is the following:

- Regulation (1988:764) on State support for the industry ("*Förordning 1988:764 om statligt stöd till näringslivet*")
- Regulation (2008:761) on State support for research and development and innovation within the energy field ("*Förordning 2008:761 om statligt stöd till forskning och utveckling samt innovation inom energiområdet*")

(8) The granting authority is the Swedish Energy Agency.

2.3. The beneficiary

(9) The beneficiary of the aid is Göteborg Energi AB (hereinafter: "Göteborg Energi"), which is an energy company located in Göteborg, Western Sweden. In 2009, the company had 888 employees and a turnover of SEK 3 580 million (ca. € 386 million). The company is wholly owned by the municipality of Göteborg and provides products in the following areas: electricity trading, electricity transmission, district heating, gas, data and telecommunications, energy services, cooling and ready heat[3].

(10) For the purpose of carrying out the project, a dedicated project company, GoBiGas AB, has been established. That company will carry out the project in the Rya area in Göteborg and will be the owner of the demonstration plant. GoBiGas AB is a private

[2] N 561/2007 – SE – Energy research, development and innovation scheme STEM, OJ C 238, 17.9.2008, p. 2

[3] NACE code D35 – Electricity, gas, steam and air conditioning supply

* Business secret.

limited-liability company which will have 22 employees and which will be owned at […]* % by Göteborg Energi and at […] % by E.ON Gasification Development AB, a subsidiary of E.ON Sverige AB (hereinafter both E.ON Sverige AB and E.ON Gasification Development AB are referred to as E.ON).

(11) The project has an advisory steering committee, which consists of […] members in total ([…] from Göteborg Energi and […] from E.ON). […]

2.4. Description of the Project

(12) The Project consists of developing a pre-commercial demonstration plant with a capacity of 20 MW bio-methane production via indirect gasification of low-quality forest raw material. The overall objectives of the research activities are to verify:

- the efficiency of conversion from biomass to bio-methane and the total energy-efficiency of the process[4];
- product quality;
- environmental performance; and
- fuel flexibility (different kinds of biomass, moister content, etc).

(13) The demonstration plant will consist of three major areas: (i) gasification, (ii) methanation and (iii) utility area. In the gasification area, biomass is transformed into gas, which is purified and methanised in the methanation area. The gasification and methanation areas will be closely linked: by product gas going from the gasification to the methanation and by gas and liquid streams recycled from the methanation to the gasification plant. The different areas are also heat integrated so that heat recovered in one area can be used in the other areas. The gasification and methanation areas are described in the following overview:

[4] One of the main issues to be demonstrated by the Project is the increase in annual operating hours from 7 000 hours with frequent maintenance stops to 8 000 hours with one longer scheduled maintenance stop. If the Project is successful, a commercial scale-up of the technology in a 100 MW plant could be envisaged after the 20 MW plant reaches an acceptable operation level. Should this be the case, no physical assets of the 20 MW plant would however be used for the 100 MW plant.

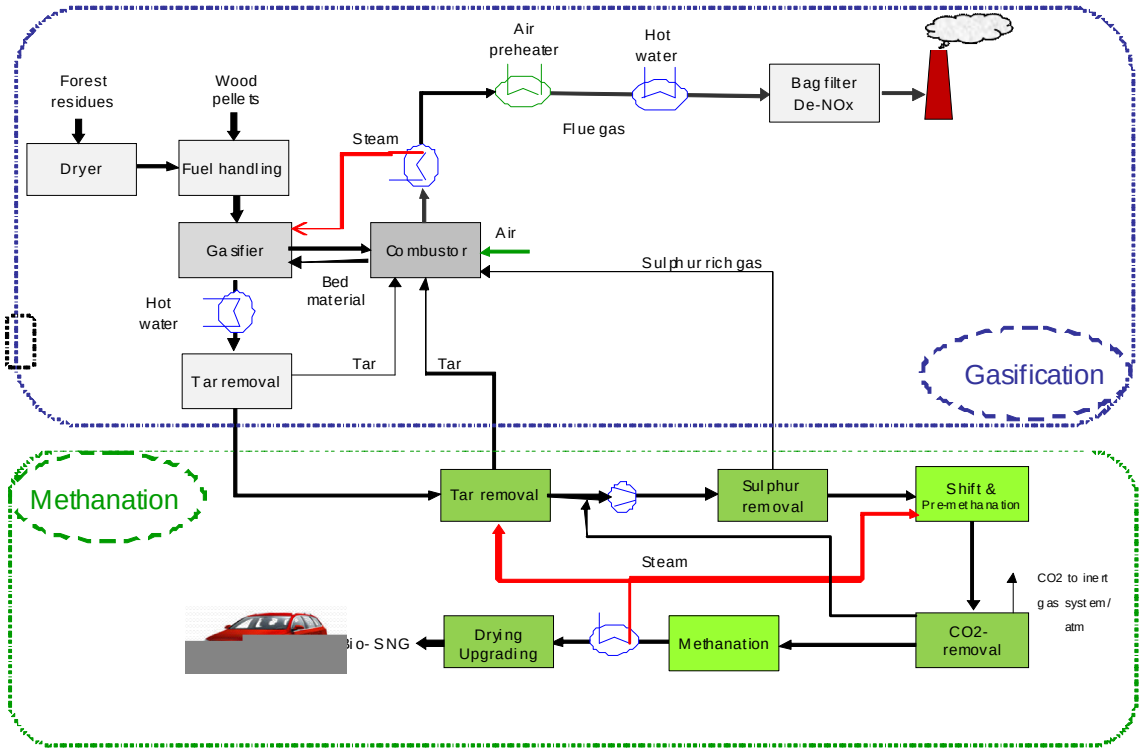

Figure 1: *Overview of gasification and methanation of the Project*

2.4.1. Gasification area

(14) The Project will demonstrate at a pre-commercial scale an indirect biomass gasification technology, which has originally been developed by REPOTEC, in Güssing (Austria). REPOTEC will together with a Finnish engineering company, Metso Power, supply the gasification technology.

(15) During the start-up and initial operation period, wood pellets will be used as input fuel. As soon as a new fuel handling and dryer system has been built, forest residues[5] will be used as input fuel.

(16) Dry fuel is fed to the gasification reactor, where it is converted into gas (hereafter: product gas) and into some unconverted char. […]. The heated bed material from the combustion reactor is recycled to the gasification reactor where it supplies heat to the gasification. The temperature is ca. […] °C in the gasification reactor and ca. […] °C in the combustion reactor.

(17) The product gas is thereafter cooled to ca. […] °C […]. As the gas is cooled […], with an increased risk for the particles to stick to the heat exchanger tubes and cause fouling.

5 The fuel will mainly consist of tree tops and branches and will probably come from the surroundings of Göteborg, the lake Värnen in Sweden or from the Baltic region. This is, according to the Swedish authorities, very different compared to the high quality chipped round wood of fairly uniform size and shape used in Güssing.

(18) The product gas is then filtered in a bag house filter […]. The dust free gas from the filter is fed to a tar removal scrubber, […]. […]. After this scrubber, the gas is fed into the methanation plant.[6]

(19) The flue gas from the combustion reactor is cooled […]. After the coolers, the flue gas is filtered in a bag house filter, […].

2.4.2. Methanation area

(20) The methanation technology that will be used in the Project will be supplied by Haldor Topsøe. Although the main technologies used in the methanation area have been proven independently, the specific combination of technologies that characterises GoBiGas has not been used before.

(21) The first step is tar removal, […]. Thereafter, the product gas is compressed to ca. […] bar and fed to […]. […]. This is done in a […], which is new and unique and for which the design has not been tested in processes being based on forest raw material.

(22) The gas is thereafter washed […]. […]. The cleaned gas is sent to a guard bed […] to remove any traces of sulphur compounds.

(23) The gas is then divided in […] streams, […]. […] when the streams meet again […]. The combined stream is cooled, water is condensed and separated […].

(24) […].

(25) Thereafter, the […] gas is fed to […]. The bio-methane is fed to a local […] natural gas grid. The […] is a novel method to be applied for the Project.

2.4.3. Specific R&D activities

(26) The R&D activities that will be supported by the aid include the following:

- Design and development of the scaled-up demonstration plant. It is not known, for example, how […] will look in larger scale.
- Studies due to the use of forest residues as input fuel. First, studies are needed for the design of the feeding system in order to […]. Second, investigation is needed of the influence of e.g. gasifier temperature, bed material type and exchange/make-up rate in order to cope with ash-melting and bed agglomeration in the gasification and combustion reactors which may occur due to the use of forest residues.
- Analysis of potential problems with […] as well as with […] and […], in order to make the […] suitable for production of commercially viable gas.
- Analysis of problems with […] as well as with […] that can […]. Research is in particular required to find […] or alternative ways of […] so to minimise the environmental impact thereof.

[6] The product gas is used in very different ways in the Güssing plant and in the GoBiGas plant. In Güssing where the gas is used as fuel in a gas engine, it is sufficient to remove the heavy tar compounds, while lighter tars rather are seen as additional fuel than as a problem. Also, a sulphur content of about […] ppm can be tolerated in that application. For the bio-methane production to be proven by the GoBiGas project, however, the gas has to be virtually tar-free and contain a maximum of […] ppm sulphur.

– Determination of the right combination of catalysts and processes used in the methanation.

– A complete removal of sulphur compounds is essential since […]. The […] is also sensitive to […][7]. This will require extensive research in finding the right ways to be able to reach the processes needed for the production.

2.5. Novelty of the knowledge resulting from the Project

(27) Until today, R&D demonstration activities in this field are adapted to production of biofuels[8]. In terms of R&D demonstration activities for production of biogas, the most advanced projects in Europe which have been identified by the Swedish authorities are the following:

– *Bio-SNG*: The project is carried out by the Technical University of Vienna in cooperation with REPOTEC, and makes use of REPOTEC's gasification technology in a pilot of 8 MW (fuel input) in Güssing (Austria). The pilot was constructed in 2000 and has been in operation since 2002. It consists of a gasifier to produce gas for electricity and district heating distributed in the city of Güssing. A very small methanation unit is also located at the plant, but it is according to the Swedish authorities not in operation. The input fuel used in that plant is of better and more consistent quality than in the GoBiGas project. This notwithstanding the gas produced in Güssing is of considerably lower quality than the one that will be produced in GoBiGast, which has to meet the requirements for feed-in to the grid.

– *MILENA*: In 2006, the Energy Research Centre of the Netherlands (ECN) carried out a demonstration project in laboratory scale (0.01 MW) of the technical feasibility within the field of syngas. That project enabled the development of the technologies MILENA (gasification) and OLGA (tar removal). As a result of that project, it could be concluded that the production of bio-methane via gasification/ methanation of biomass functions at laboratory scale. In 2007, ECN launched the construction of a R&D demonstration plant of gasification with a capacity of 10 MW using the MILENA technology, primarily for the production of electricity, but it could also be used as a research installation for substitute natural gas (SNG) production. The demonstrator was put in operation in summer 2008. The next step is to build a 50 MW installation for Bio-SNG production using the same technology. Such a plant could be put in operation in 2016.[9] However, the technologies used in the MILENA project are different[10] from the ones to be used in the GoBiGas project and so is the scale of the demonstration plants.

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7 […].

8 E.g.: Choren and Shell developed a complete *Biomass-to-Liquid* installation producing syngas used for production of biodiesel in Freiburg, Germany, which consists of gasification, purification of synthesis gas, Fisher-Tropsch procedure and upgrading. Forschungszentrum Karlsruhe and the technology company Lurgi have also developed the *Bioliq* process, which consists of production in three-stages (flash pyrolysis, entrained-flow gasification, and synfuel production) of biocarbons of gas motor type.

9 *Production of bio-methane from woody biomass* (ECN-M-09-086), ECN, June 2009 (in particular section 4)

10 The main difference between the technologies is the tar removal technology, which is of relevance for the gasifier upstream, as well as for the gas cleaning, conditioning and methanation downstream (*RD&D needs and recommendations for the commercialisation of the production and use of renewable Substitute Natural Gas from biomass* (ECN-BKM-2009-341), ECN, April 2009, p. 20.).

– *GAYA*: An R&D platform (0.5 MW) for testing gasification technology to produce bio-methane from biomass is also to be developed in France within the scope of the GAYA project[11]. While the GoBiGas project involves scaling-up of technology to a pre-commercial size, the GAYA project aims at developing an innovative method of decentralised bio-methane production based on gasification of lignocellulosic biomass characterised by small-sized, reliable, profitable and highly energy-efficient plants. Moreover, the GAYA project focuses on research concerning evaluation of a biomass supply chain with reference to use of various different types (e.g.: not exclusively based on wood) of biomass for the purpose of bio-methane production with a view of developing a larger flexibility for a better market penetration.

(28) In addition, there are early plans to develop a technology platform using pressurised circulating fluidised bed (CFB) gasification with oxygen/steam, gas purification for production of synthetic gas in Värnamo (Sweden). An alternative which is being discussed would be to instead produce high pressure fuel gas for the "Toop Spool" cycle (a novel high efficiency process for production of renewable electricity). Such a platform may lead to limited production of second generation biofuels, but only in sample size. According to the information submitted by the Swedish authorities regarding this potential project, the technology, the scale and possibly the end-product would be different from the ones of the GoBiGas project.

(29) On that basis, the Swedish authorities argue that the results of the Project would be novel. In particular, completely new knowledge would be developed through the GoBiGas project in the fields of:

– Tar removal technology using […].

– Combined use of the […] as […] and […].

– Carrying out the methanation at a pressure of approximately […] bar (normally pressure from about […] bar and up to […] bar is used).

– Use of methanation processes at conditions which deviate from normal industrial practice, e.g. at lower pressure.

2.6. R&D categories and eligible costs

2.6.1. Eligible costs

(30) According to the Swedish authorities, the total costs for the Project are estimated to amount to SEK […] million (approximately € […] million). Out of the total costs, SEK 978 million (ca. € 105 million) would fall within the definition of experimental development set out by the R&D&I Framework and would, thus, be eligible for aid. The eligible costs can be broken down in the following categories:

[11] The Commission approved aid for the GAYA project by its decision on State aid case N 493/2009, OJ C 213, 6.8.2010, p. 9.).

Cost summary *million SEK*	**Eligible costs**
EXPERIMENTAL DEVELOPMENT	
Personnel	[…]
Instruments and equipment	[…]
Building and land	[…]
Contractual research	[…]
Other operating expenses	[…]
TOTAL	**978**

Figure 2: *Eligible costs for the Project*

(31) According to the Swedish authorities, there will be no commercial use of the demonstration plant subsequent to the Project. This is due to the small scale of the plant which would not make it commercially viable. However, in case conditions have changed and the plant would be in commercial operation after the Project, a claw-back mechanism will be applied, by which any excessive part of the aid will be re-paid to the Swedish authorities. By "excessive aid amount" the Swedish authorities refer to any amount which brings the internal rate of return of the Project to a rate which is higher than its weighted average capital costs at the time when the aid was granted, i.e. in this case […] %. Any such excessive aid amount will be repaid with interest at the reference rate determined by the Swedish Central Bank.

2.7. The aid instrument and intensity

(32) The Swedish authorities intend to provide a direct grant of maximum SEK 222 million (about € 24 million) for the Project. The grant will be disbursed in several instalments scheduled for the following dates: 31.7.2010 (or following the Commission's approval), 31.7.2011. 31.7.2012 and 31.12.2012.

2.8. Duration

(33) The main investment will be made over three financial years, while the duration of the Project is estimated to 10 years.

2.9. Cumulation

(34) According to the Swedish authorities, the aid can not be cumulated with aid from other local, regional, national or Community schemes to cover the same eligible costs.

3. ASSESSMENT

3.1. Existence of aid

(35) According to Article 107(1) of the TFEU, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, insofar as it affects trade between Member States, be incompatible with the internal market.

(36) The notified grant will be provided by the Swedish authorities from the State budget, i.e. it is financed from State resources. The grant is provided exclusively to the beneficiary and by relieving it from R&D costs which should otherwise have been borne by the company, the measure confers an advantage to this company. The beneficiary is active in the gas sector, which is open for competition and trade between Member States. The aid could improve the financial situation and enhance the market position of the beneficiary and thereby distorts or threatens to distort competition and affects trade between the Member States.

(37) Consequently, the notified measures constitute State aid within the meaning of Article 107(1) of the TFEU.

3.2. Legality of aid

(38) The Commission notes that the Swedish authorities have complied with Article 108(3) of the TFEU by notifying the aid measure to the Commission and by not putting the measure into effect before the Commission's authorisation thereof.

3.3. Basis for assessment of compatibility of the aid with the TFEU

(39) According to Article 107(3)(c) of the TFEU, aid may be compatible with the internal market if it facilitates the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest.

(40) The R&D&I Framework sets forth criteria based on which the Commission will assess whether aid for certain R&D activities, including experimental development, is compatible with the internal market under Article 107(3)(c) of the TFEU.

(41) The R&D&I Framework provides conditions for two different levels of compatibility assessment:

- *A general level of analysis*: Chapters 5 (in particular section 5.1 Aid for R&D projects), 6 (Incentive effect and necessity of the aid) and 8 (Cumulation) lay down general conditions for the compatibility of R&D aid.

- *A detailed level of analysis*: For certain aids for which the risk of distortion of competition is higher (e.g. where aid amounts exceed certain thresholds), a detailed analysis has to be carried out in addition to the general analysis. The purpose of this analysis is to ensure that high amounts of aid for R&D do not distort competition to an extent contrary to the common interest, but actually contribute to the common interest. This occurs when the benefits of State aid in terms of additional R&D&I outweigh the harm to competition and trade. Chapter 7 of the R&D&I Framework provides assessment criteria for positive and negative effects of the aid and the balancing of such effects.

(42) The notified aid amounts to SEK 222 million (ca. € 24 million) and the Project under examination consists exclusively of experimental development. According to section 7.1 of the R&D&I Framework, aid which is covered by the Framework and supports projects in which the supported activities are not predominantly fundamental research or industrial research, should be subject to a detailed assessment if the aid amount

exceeds € 7.5 million per undertaking and per project. On that basis, a detailed assessment of the notified aid will be carried out.

(43) In order to carry out such an assessment, the Commission first has to identify the beneficiary of the aid. In this case, the aid will be paid to the project company, GoBiGas AB, which will get support for R&D costs that otherwise would have been covered from its own resources. Therefore, the Commission considers that the direct beneficiary of the aid is GoBiGas AB. However, Göteborg Energi owns […] % of GoBiGas AB and has the decisive power in the company. Contracts relating to the Project will be signed by Göteborg Energi and/or GoBiGas AB. Moreover, it was Göteborg Energi who initiated the Project and applied for and was granted the aid. It is therefore appropriate to conduct the detailed assessment of the compatibility of the aid both at the level of GoBiGas AB and of Göteborg Energi.

(44) The analysis below follows the order of the criteria for detailed assessment, as presented in Chapter 7 of the R&D&I Framework. However, the assessment of the fulfilment of the general conditions is integrated in the appropriate part of the detailed assessment. More precisely, the fulfilment of the conditions of Chapter 6 regarding incentive effect and necessity of the aid is assessed under point 3.4.3 below, while the compliance with the conditions set out in section 5.1 on aid for R&D projects and Chapter 8 on cumulation is assessed under point 3.4.4 regarding proportionality.

3.4. Positive effects

3.4.1. Existence of a market failure

(45) According to points 1.3.2 and 7.3.1 of the R&D&I Framework, market failures may prevent the market from achieving optimal output, and State aid may be necessary to increase R&D in the economy only to the extent that the market, on its own, fails to deliver an optimal outcome. Certain market failures hamper the overall level of R&D in the Community.

(46) It stems from point 7.3.1 of the R&D&I Framework that the analysis of the level of R&D activities as well as of market failures should be carried out at the Community level. The Commission will consequently analyse if the level of R&D activities undertaken within the Community would be inferior if the Project would not be undertaken and, if so, if this result is optimal or if a market failure exists.

(47) In October 2009, the Commission acknowledged in its Communication ”Investing in the Development of Low Carbon Technologies (SET-Plan)”[12], that there is a significant need for demonstration plants, ranging from pilot to full scale, for demonstrations of new, carbon dioxide efficient, technologies. It stated clearly that the markets and energy companies acting on their own are unlikely to be able to deliver the needed technological breakthroughs in order to meet EU's energy and climate change goals. "*Locked-in investments, vested interests, as well as the high risks and need for significant investments in less profitable alternatives, mean that change will be slow without a major push. Public policy and public investment partnering with the*

[12] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Investing in the Development of Low Carbon Technologies (SET-Plan)", COM (2009) 519 final, 7.10.2009

private sector is the only credible route to meet our goals…"[13] The Commission concluded that public financial support is crucial in establishing the new carbon dioxide efficient technologies in order to minimize the financial risks associated with the introduction of new technologies[14].

(48) Therefore, there seems to be a general market failure in this area. Nevertheless, according to the R&D&I Framework, the Commission should establish precisely the specific market failure which the beneficiary is faced with and which justifies the aid subject to the detailed assessment.

(49) Depending on the specific market failure addressed, the Commission takes into consideration mainly the following elements: knowledge spill-over, imperfect and asymmetric information and coordination failure.

3.4.1.1. Knowledge spill-over

(50) As described in point 1.3.2 of the R&D&I Framework, R&D often generates benefits for society in the form of knowledge spill-over. For the creation of general knowledge, it is impossible to prevent others from using the knowledge (public good), whereas more specific knowledge can be protected through patents. Undertakings tend to free-ride on the general knowledge created by others, which makes them unwilling to create the knowledge themselves.

(51) In the present case, the basic technologies (gasification, gas upgrading and methanation) and knowledge that will be applied in the Project are held by different technology providers and contractors that will be involved in its implementation. Whilst any new patents will thus be limited, during the entire GoBiGas project non-patentable and certain patentable knowledge will be transferred to contractors (e.g. technology suppliers REPOTEC, Metso Power and Haldor Topsøe) and sub-suppliers, as well as to external consultants working on the Project. Insofar as new IPR relates to design of individual sub-processes, it will remain with the process suppliers. However, IPR relating to the system design will be split between the suppliers and GoBiGas AB. The IPR that is developed in cooperation can be freely used by each partner and licensed to third parties. Even the limited IPR stemming from the Project can thus be used by other companies.

(52) While energy companies generally invest in conventional and proven technologies with low risks, known costs and relatively predictable economic life-time, the Project at hand involves development of a production method that is uncertain, risky and unproven. As described, most of the know-how generated will not be proprietary and it will thus be valuable to the industry in general, in Europe as well as outside of Europe. There is thus very little private value in taking the lead in this process instead of

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13 See p. 3 of the SET-Plan.

14 See p. 13 of the SET-Plan in which it is stated that *"Moving towards a low carbon economy needs new technology to be conceived, tested, and then deployed. To make this happen, the EU has given policy direction through the comprehensive policy framework proposed in the energy and climate package… Now, the private sector has to take up the challenge, secure in the knowledge that they will have public support when the risks are too high because of the importance of delivering a low carbon economy. It is now clear that public and private investment in energy technology development has to increase substantially – starting immediately. An injection of public finance is fully justified to achieve public policy goals and help overcome market failures…The Commission therefore calls on the Council and Parliament to: … Invite Member States to increase their efforts to support the financing of low carbon technologies…"*

waiting for other actors to carry the R&D costs and then free-ride on the results of the project. This so-called "waiting game", referred to by the Swedish authorities, is substantiated by the relative shortage of projects in this field and by the fact that representatives of other energy companies in Europe already have expressed interest in the results from the Project at trade shows, industry conferences and various seminars and presentations that have been held during its feasibility stage.

(53) As described in section 2.5 above, development is on-going in a number of European countries in order to obtain information on the feasibility of bio-methane production. According to the Swedish authorities, the Project will provide missing information that will enable European and international utility companies to invest in the technology and thereby have a triggering effect on its future development (both concerning the increased use of renewable methane and increased activity in the industrial sector for engineering and construction of bio-methane plants). To this purpose, Göteborg Energi will in particular ensure that patentable knowledge is patented and made available to anyone on licence basis. Moreover, several dissemination activities are already planned for the Project, including by means of publications and access to the entire plant for universities performing guest research activities[15], and exchanges on gasification processes with Chalmers University of Technology. The GoBiGas plant could also make substantial contributions to knowledge concerning the on-going standardisation work especially regarding gas quality issues and thereby be useful for the European standardisation efforts by CEN to produce technical specifications and standards for bio-methane as a vehicle fuel.

(54) In view of the above, it thus seems that the Project will indeed entail significant knowledge spill-over in terms of non-patentable knowledge, which will not be fully appropriated by the aid beneficiary.

3.4.1.2. Imperfect and asymmetric information

(55) The Swedish authorities consider that the aid for the GoBiGas project is necessary in order to cope with a market failure that mainly consists in imperfect and asymmetric information on the financial markets. According to them, the demonstration phase of technical development is, by definition, difficult for potential financers to analyse, since the cost of investment is high while the uncertainties of both technical and financial risks are difficult to estimate.

(56) The Commission will therefore analyse whether financial partners could be reticent to provide sufficient finance for the Project due to the facts that (a) risks are high and difficult to estimate and (b) it is difficult to get a clear view of its profitability.

(a) Risk and complexity of research

(57) According to the Swedish authorities, the Project is linked with a large number of important risks of various natures: technical risks, financial risks and market risks (including distribution risks and regulatory risks).

(58) The areas containing the highest *technical risks* are the following:

[15] The Swedish Energy Agency will also have the right to use the demonstration plant in its external activities (e.g. show it to politicians and industry representatives).

- Compared to the existing small pilot of the gasification technology, input biomass of very different quality will be used, which can cause problems in the plant (e.g. […]) and result in a product that is not sufficiently clean to feed into the grid.
- The gasification technology has never been combined with the methanation and gas cleaning that will be used in this project.
- The tar removal process is commercially unproven and has only been tested in lab-scale using […].
- The methanation system […] is complex and critical for the quality of the end product and the efficiency of the entire plant. It has never been used for gas from biomass gasification and hence has to be proven. This part is critical to the entire production and if it is not operating as per specifications, the gas quality will not allow grid injection.

(59) Since the technology by definition has not been proven commercially, there are also *financial risks* involved in the Project:

- The introduction of bio-methane technology relies upon assumptions on increased prices of natural gas/oil and political incentives for renewable methane.
  - Ø Predictable and low biomass prices are essential for a more reliable assessment of the financial feasibility of the technology. Sweden already has an effective biomass market, but a significant increase in the use of biomass will affect e.g. pricing.
  - Ø Incentive systems (e.g. CO_2 taxation, certificate systems) for injection of renewable gas are still not as wide-spread as incentive systems for injection of renewable electricity into the European electricity grid. Therefore, there is a considerable financial risk to develop a technology when the legislative tax and incentive framework still is under development.
  - Ø The biomass market in the majority of European countries is not as well developed as the Swedish one and the uncertainty is, therefore, even greater. Bio-methane from wood has so far not been implemented on the market due to a lack of R&D in the equipment production sector in view of high technical and financial risk involved.
- If the bio-methane, due to insufficiently developed regulatory frameworks and value chains, cannot be distributed and sold as transport fuel, it could be sold from the gas grid to any customer, but this would be at significantly lower prices compared to fuel for transportation.

(60) Finally, there are also *market risks* in the biomass market:

- An important barrier for increased production of bio-methane is the lack of a general regulatory framework and standards for distribution and trading via the

natural gas network.[16] At present, no European country has a comprehensive system for trading in renewable gas that facilitates deliveries[17].

– The application process, not least the process of applying for environmental permits, is complicated by a lack of experience and the fact that applicants, those granting permits and any ancillary players have questions, which can only be answered with estimates. The first plants to be constructed may well face unnecessarily prohibitive requirements, purely as a result of uncertainties.

– Changes in subsidies for e.g. personal vehicles and renewable fuels may prevent the sale of gas for vehicle use; it will in such cases be sold to other markets where considerably lower prices apply (see financial risks).

– Delayed build-up of filling stations for bio-methane is also a risk for the profitability and marketability of bio-methane. This would have an impact not only on the volume that could be sold, but would also have preventive effects on the sale of vehicles with possibility to use gas as a fuel.

(b) Reluctance of banks to finance long-term valuable projects

(61) Due to the above-mentioned risks, projects using unproven gasification and methanation technologies for production of biofuels from biomass, suffer from a general shortage of financing, which is even more accentuated in a time of economic and financial crisis.

(62) The Commission has assessed the asymmetry of information with specific reference to the company's ability to obtain financing on the market and its need to do so. These variables are also affected by the very nature of the project underlying the request for funding. Projects targeting the development of new products, with high up-front investment and long delays for the return on capital encounter more difficulties in obtaining financing on the market due to the higher risks involved in successful completion. Therefore, the characteristics of both the Project and the company were considered when assessing the asymmetry of information.

(63) According to the Swedish authorities, it was not possible for Göteborg Energi to obtain bank financing for the Project. This is because of high initial investments, a high level of risks, very long-term prospects of profitability (in potential future projects) and lack of an acceptable collateral, since the demonstration plant would be integrated with Göteborg Energi's production of district heating and the scrap value of physical assets is negligible. The 20 MW plant therefore must be financed with equity.

(64) In section 3.4.3.2 below, some financial projections of the Project are set out. It is clear from those forecasts that the net present value (NPV) of the Project is negative. It should also be noted that the weighted average cost of capital (WACC) of the Project

[16] It is e.g. not clear what kind of instruments of control will be required and how they will be used, how conditions in different EU countries will evolve, and how and at what pace legislation and directives will be amended.

[17] Germany is one of the countries that have adopted a regulatory framework for the co-distribution of natural gas and biogas in the gas network, which allows sellers to develop product ranges for renewable gases reflecting customer demand. A further step would be the development of a trading mechanism similar to that of electricity certificates, which would facilitate greater international trade and generate additional incentives.

(20%) is significantly higher than a potential return (if an IRR would have been calculated for the Project, it would have been negative). According to the Swedish authorities, an acceptable return on equity could only be obtained if the Project, at a later stage, is extended by a new plant of a commercial size and, even then, it could only be expected in a time-frame of 30-40 years.

(65) Göteborg Energi can nevertheless raise certain bank credits, given its steady and secure cash-flow from core business. Credits for such a risky project will, however, require guarantees that, in practical terms, mean that equity financing of the existing business is replaced with bank financing while equity is transferred to the GoBiGas project[18]. This means that any such financing that could be obtained, would not decrease the risk of Göteborg Energi.

(66) In order to find a partner with whom it could share the risks of the Project, Göteborg Energi has held discussions regarding its funding with several potential cooperation partners and funders. Companies that have been considered are e.g. […], […], […], […] and E.ON. While the discussions with E.ON later led to a cooperation agreement, the other parties declined the offer of participation due to that it was out of the scope of their core business, lack of capital and to the financial outlooks for the Project[19].

(67) The fact that the Project involves important risks, only very long-term and uncertain profitability prospects and that attempts to obtain financing have been declined e.g. with reference to the poor and uncertain profitability, imply that there is indeed asymmetric information causing a specific market failure in the present case.

3.4.1.3. Other positive externalities

(68) In accordance with point 1.3.2 of the R&D&I Framework, R&D projects may lead to other positive externalities for the society.

(69) In the present case, the Project contributes to several Community objectives, in particular increased levels of R&D, environmental protection and security of energy supply.

(70) The research carried out under the Project will contribute to the aim of the Europe 2020 strategy of R&D&I spending approaching 3% of GDP by 2010[20]. In addition, the theme second generation biofuels is included in the research portfolio "Energy and transport" of the Seventh Framework Programme as an element for which strategic research technological development and demonstration is important.

(71) The Project also responds to the objectives of the *EU Energy Package*[21], i.e.: reduction of at least 20% in greenhouse gases (GHG) and the increase the share of renewable energies in EU energy consumption to 20% (and a 10% share of renewable energy in the transport sector) by 2020. With respect to GHG, if used for vehicles, the bio-methane produced in the Project is expected to reduce CO_2 emissions with 40 000 ton

[18] E.g. collaterals from other investments would have to be used for loans for the financing of the Project.

[19] Copies of […] have been submitted to the Commission and prove these contacts.

[20] Communication from the Commission: EUROPE 2020 – A strategy for smart, sustainable and inclusive growth, COM (2010) 2020, 3.3.2010, see e.g. p. 3.

[21] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 2020 by 2020 - Europe's climate change opportunity; COM (2008) 30 final

per year. As for the binding renewable energy targets set out in Directive 2009/28/EC on the promotion of the use of energy from renewable sources, the bio-methane produced through the Project would according to the Swedish authorities contribute to achieving the mentioned 10% share of renewable energies in the transport sector. For Sweden, the national targets are set to a 49% share of energy from renewable sources and a 10% share of renewable energy in the transport sector by 2020. The Project was referred to in the action plan submitted by Sweden for meeting these targets[22].

(72) Finally, natural gas plays an important role for the energy consumption in Europe, while only a fraction of the world's natural gas reserves are located in Europe[23]. An increased use of bio-methane replacing natural gas would therefore lead to a higher level of security of energy supply.

3.4.1.4. Conclusion

(73) Against that background, the Commission finds that the aid is provided in order to correct a specific market failure, which is mainly due to knowledge spill-overs in terms of non-appropriable R&D results, imperfect and asymmetric information and considerable positive externalities.

3.4.2. Appropriateness of the instrument

(74) An important element in the balancing of positive and negative effects of the aid is whether and to what extent State aid for R&D can be considered an appropriate instrument to increase R&D activities, given that other less distortive instruments may achieve the same results.

(75) According to the Swedish authorities, the notified aid is required in order to compensate for the market failure and enable the implementation of the Project.

(76) In the field of biofuels, tax incentives or other measures such as supply obligations are common. However, such more general measures would not be sufficient for over-coming market failures for projects as the one at hand with high up-front investments in early stages, high risks and very long pay-back periods.

(77) According to the Swedish authorities, aid in the form of a repayable advance was considered. It was however concluded that, since the Project is not expected to generate any profit, such an advance would not lead to any significant repayment of the aid, if any. Moreover, a State loan would not have been suitable since it would not have increased the profitability of the Project to an acceptable level. Therefore, the Swedish authorities considered a direct grant to be the most appropriate instrument to overcome the market failure described above.

3.4.2.1. Conclusion

(78) On that basis, the Commission also finds that State aid in the form of a direct grant is an appropriate instrument in order to overcome the market failure and to enable the implementation of the Project.

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22 See "The Swedish National Action Plan for the promotion of the use of renewable energy in accordance with Directive 2009/28/EC and the Commission Decision of 30.6.2009", in particular page 5.

23 See section 3.5.1.1 below.

3.4.3. Incentive effect and necessity of aid

(79) State aid must have an incentive effect, i.e. result in the recipient changing its behaviour so that it increases its level of R&D activity. Identifying the incentive effect means assessing whether the planned aid will induce the beneficiary to pursue R&D which it would not otherwise have pursued.

(80) As laid down in Chapter 6, second paragraph, of the R&D&I Framework, aid does not present an incentive for the beneficiary where the R&D activity commences prior to the beneficiary applying for aid to the national authorities. In the case at hand, Göteborg Energi submitted its aid application on 30 April 2009, requesting a grant of SEK 222 million (ca. € 24 million) for the Project. Although the aid was preliminary granted by the Swedish Energy Agency in its decision dated 25 September 2009, the Project has still not started[24]. This is because the beneficiary awaits the Commission's approval of the measure before commencing the R&D activities, which supports further the statement by the Swedish authorities that the Project will not be carried out at all without the aid. The formal conditions relating to the presence of an incentive effect are thus fulfilled in the present case.

(81) However, when a measure is subject to a detailed assessment, the Commission requires that the incentive effect of the aid is substantiated more precisely in order to avoid undue distortion of competition. In its analysis, the Commission takes into consideration the following elements set out in point 7.3.3 of the R&D&I Framework: specification of intended change, counterfactual analysis, level of profitability, amount of investment and time path of cash flows, the level of risk involved in the research project and continuous evaluation. The Swedish authorities have provided all elements required under point 7.3.3 of the R&D&I Framework enabling the Commission to assess the incentive effect of the aid.

3.4.3.1. Counterfactual analysis and specification of intended change

(82) Point 7.3.3 of the R&D&I Framework sets out that the intended change in behaviour which the State aid aims at has to be well specified and that the change of behaviour has to be identified by counterfactual analysis, i.e.: what would be the level of intended activity with and without the aid? The difference between the two scenarios is considered to be the impact of the aid measure and describes the incentive effect.

(83) According to the Swedish authorities, without the aid, the Project would not be carried out at all by GoBiGas or Göteborg Energi due to the financial and risk arguments outlined in section 3.4.1.2 above. A project on a smaller scale would be of no interest, since this would not provide the breakthrough associated with a 20 MW plant. A larger scale-up may have been more profitable, since economies of scale could be achieved. However, it would have led to a level of risks that was unacceptable. In fact, the risks would have been so high that no supplier was prepared to provide the necessary technology[25].

(84) The fact that Göteborg Energi would not proceed with the Project without the aid is confirmed by a preliminary decision of Göteborg Energi's Board of Directors, in which

[24] With the exception of feasibility studies.

[25] The original plan was to build a larger plant. However, no offers of acceptable quality were obtained.

references are made to the contacts with the Swedish Energy Agency and the maximum aid intensities allowed under the Swedish aid scheme (STEM)[26].

(85) Compared to the counterfactual situation where the project would not have been carried out, the change brought about by the aid can be summarised as follows:

- The effect of the aid on the increase in the total project costs is an increase of the entire project costs, i.e. SEK […] million, since the Project would not be carried out without the aid.
- The effect of the aid on the increase in the number of people assigned to R&D&I activities, is approximately 22 researchers, technicians and other supporting staff (chemists, process engineers, management, operators, etc.) within GoBiGas AB who are employed on the research project. In addition, 3-5 external R&D staff will work on the Project on an on-going basis.
- The effect of the aid on the increase in the scope of the Project is its entire scope, since the Project would otherwise not have been undertaken.

3.4.3.2. Level of profitability

(86) According to point 7.3.3 of the R&D&I Framework, if a project would not in itself be profitable to undertake for a private undertaking, but would generate important benefits for society, it is more likely that the aid has an incentive effect.

(87) As set out above, considering the risks involved and the scale of investment, Göteborg Energi would not proceed with the Project without the aid. This is mainly because the Project would lead to a financial outcome which is unacceptable for the company.

(88) Based on the financial projections prepared by Göteborg Energi, the Swedish authorities indicate that without aid the Project would generate a negative net present value (NPV) of SEK […] million. With the aid, that value would improve so that it amounts to SEK […] million. Both figures are based on a discount factor of […] %, which was used at the time of the aid application and corresponds to the company WACC of Göteborg Energi. Consequently, although the aid would increase the NPV of the Project, it would still be significantly negative with the aid.

(89) Pursuant to Göteborg Energi's internal decision-making procedure, projects with a total expenditure of up to SEK […] million can be decided upon by the Managing Director, while investment decisions for larger projects have to be taken by the Board of Directors. The GoBiGas project has according to the Swedish authorities been brought to the attention of the Board a number of times, but no final investment decision has been taken. The need of aid was, however, recognised and described in the preliminary investment decision by the Board of Göteborg Energi dated 23 April 2008, of which the Commission has received a copy.

(90) Göteborg Energi is interested in carrying out the Project even with a negative NPV since the company sees a potential in this market and, subject to its technological success, intends to develop a larger, commercial bio-methane plant. The projections of

[26] This is supported by a copy of Göteborg Energi's preliminary investment decision proposal and subsequent decision, which has been provided to the Commission.

both projects together would result in a NPV of zero with the aid. This means that an acceptable return on equity is only expected in the very long-term of 30-40 years.

(91) In addition to obtaining a reasonable profit in the very long term, Göteborg Energi has qualitative objectives to carry out the Project. The vision of Göteborg Energi and its owner, the municipality of Göteborg, is "*to help to bring about 'a sustainable Gothenburg*', for which the prerequisites are economic value creation and profitable growth"[27]. This is one of the reasons why it is willing to carry out this Project, despite the high level of risks and only very long-term financial gains, if any. However, the company is not willing to do this at any cost and can, therefore, only implement the Project if it at least sees some potential of recovering the costs in the long-term, i.e. in a future commercial application of the technology.

3.4.3.3. Investment amount and cash-flow

(92) High start-up investment, low level appropriable cash flows and a significant fraction of cash flows arising in the very long-term future are considered positive elements in assessing whether aid has an incentive effect.

(93) The beneficiary, GoBiGas AB, was established in 2009 and its only business is the Project. Apart from the capital provided by its owners, it has no cumulated cash-flow which could be used for financing the Project.

(94) The total investment of the project would be SEK […] million (€ […] million) over three years, of which SEK 978 million consists of R&D costs. The high investment amounts would occur mainly during the first three years of the Project, which is not expected to reach break-even point.

3.4.3.4. Level of risk involved in the research project

(95) The assessment of risk will in particular take into account the irreversibility of the investment, the probability of commercial failure, the risk that the project will be less productive than expected, the risk that conducting the project would undermine other activities and the risk that the project costs undermine the undertaking's financial viability. As described in section 3.4.1.2 above regarding market failure, there are high technological, financial and market risks in this Project.

3.4.3.5. Continuous evaluation

(96) Measures which define well specified milestones resulting in the project being terminated in the event of failure or where a publicly available ex-post monitoring is foreseen, will, according to point 7.3.3 of the R&D&I Framework, be considered more positively as regards the assessment of the incentive effect.

(97) In the case at hand, each payment requisition submitted by the beneficiary to the Swedish Energy Agency must be accompanied by a status report. An annual report of the work progress and deviations from plan, as well as important results achieved by the Project and actual costs compared to budgeted amounts, must also be submitted to the Swedish Energy Agency. Moreover, a written final report must be submitted to the Swedish Energy Agency at the end of the Project. That report must focus on the

[27] Annual report 2009 of Göteborg Energi, p. 3.

fulfilment of objectives specified in the preliminary granting decision and must cover also the financial part of the Project. In addition to these reports, the Swedish Energy Agency requires to be informed when certain milestones of the Project are reached.

(98) On the basis of the above, the Commission concludes that the project under examination is subject to continuous evaluation.

3.4.3.6. Conclusion on incentive effect

(99) The information provided by Sweden, in particular the fact that GoBiGas AB did not start the Project before knowing for certain that it can rely on the aid, the fact that the Project is not profitable without the aid and the time-path of its cash-flow demonstrate that the beneficiary would not carry out the Project without the aid. However, with the aid the Project will, if successful, bring the forecasted cash-flow of a planned future investment in the same technology to a more acceptable level of profitability. On that basis, it can be concluded that the aid has an incentive effect on the company.

3.4.4. Proportionality of the aid

(100) Section 5.1 of the R&D&I Framework sets out general conditions for analysing the proportionality of State aid for R&D projects. Compliance with these rules is examined in Section 3.4.4.1 below, as regards research categories and eligible costs and in Section 3.4.4.2 for aid intensity.

(101) The R&D&I Framework states that additional information is necessary to demonstrate the proportionality of aid above certain thresholds. In accordance with point 7.3.4 of the R&D&I Framework, the Commission analyses in section 3.4.4.3 of the present decision the extent to which the notified aid is limited to the minimum necessary.

(102) Finally, compliance with the cumulation rules set out in Chapter 8 of the R&D&I Framework is assessed in section 3.4.4.4.

3.4.4.1. Research categories and eligible costs

(103) In accordance with point 5.1.1 of the R&D&I Framework, activities falling within one or several of the following three categories are within the scope of the R&D&I Framework: fundamental research, industrial research and experimental development.

(104) According to the Swedish authorities, the R&D activities of the GoBiGas project constitute experimental development within the meaning of Point 2.2(g) of the R&D&I Framework. These activities consist of acquiring, combining, shaping and using existing scientific, technological, business and other relevant knowledge and skills for the purpose of producing plans and arrangements or designs for new, altered or improved products, processes or services. The Swedish authorities have confirmed that to the extent that the supported activities comprise producing drafts, drawings, plans and other documentation, these are not intended for commercial use. The development of commercially usable prototypes and pilot projects is also included where the prototype is necessarily the final commercial product and where it is too expensive to produce for it to be used only for demonstration and validation purposes.

(105) In this case, the demonstration plant is of a pre-commercial size and will according to the Swedish authorities not be in commercial use after the completion of the Project

since its capacity is too small for commercial viability. This will be followed-up by the Swedish authorities and if the situation has changed so significantly that the Project is actually generating revenue, the entire aid amount including interest or part thereof will be clawed-back.

(106) It is set out in point 5.1.1 of the R&D&I Framework that, in its classification of different activities, the Commission will refer to its own practice as well as to the Frascati Manual[28]. In a previous Commission decision, the Commission already found that some activities similar to the ones in the notified Project were indeed experimental development[29]. According to point 116 of the Frascati Manual, the construction and operation of pilot plants is part of R&D as long as the principal purposes are to obtain experience and to compile engineering and other data to be used in: evaluating hypotheses, writing new product formulae, establishing new finished product specifications, designing special equipment and structures required by a new process and preparing operating instructions or manuals on the process. The principal purpose of the Project is to obtain experience of the designing of special equipment and structures required by a new process and to prepare operating instructions or manuals on the process. The Project will however also contribute to the establishment of new finished product specifications relating to the quality requirements for feeding bio-methane into the natural gas grid.

(107) As a result of its examination of the description of activities, the Commission can therefore conclude that the activities and the proposed breakdown comply with the definition given in point 2.2(g) of the R&D&I Framework.

(108) The Commission has also verified that the eligible costs specified in the notification are in line with the eligible costs listed in point 5.1.4 of the R&D&I Framework:

- personnel costs are included to the extent that researchers, technicians and other supporting staff are employed on the research project;
- the only costs included for instruments, equipment, buildings and land are the costs corresponding to the life of the research project, as calculated on the basis of good accounting practise;
- costs of contractual research, technical knowledge and patents are bought or licensed from external sources at market prices;
- other operating expenses (including e.g. the costs of materials and consumable supplies for the experimental development phase).

(109) The Commission can, therefore, conclude that the proposed aid is in compliance with points 5.1.1 and 5.1.4 of the R&D&I Framework.

3.4.4.2. Aid intensity

(110) According to section 5.1.2 of the R&D&I Framework, the maximum allowed intensity for aid for experimental development activities is 25%.

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[28] The Frascati Manual on the Measurement of Scientific and Technological Activities, Proposed Standard Practice for Surveys on Research and Experimental Development, Organisation for Economic Co-operation and Development, 2002.

[29] See State aid case N 493/2009 (in particular paragraphs 288-290), OJ C 213, 6.8.2010, p. 9.

(111) It is set out in point 2.2(c) of the R&D&I Framework that aid payable in several instalments shall be discounted to its value at the time of the granting. The rate used for discount purposes shall be the reference rate applicable at the time of the grant.

(112) In the aid calculations of the Swedish authorities, a discount rate of […] % has been applied, which corresponds to the weighted average cost of capital of Göteborg Energi at the time of the grant. That discount value results in a net present value of the eligible costs SEK […] million and a net present value of the grant of SEK […], which results in an aid intensity of 23% of the eligible costs.

(113) There would have been no material difference if Sweden instead would have used a discount rate based on the Communication from the Commission on the revision of the method for setting the reference and discount rates[30] (hereinafter "the Communication"). According to the Communication, for discount purposes, a rate corresponding to the reference rate plus 100 basis points should be applied. The reference rate for Sweden was 1.49% at the time of the preliminary granting decision by the Swedish Energy Agency[31], i.e. a discount rate of 2.49% should be used according to the Communication. Such a rate would have led to an aid intensity corresponding to 22.89% of the eligible costs.

(114) The Commission, therefore, concludes that the aid intensity in this case is below the 25% which is allowed by the R&D&I Framework.

3.4.4.3. Aid limited to the minimum necessary

(115) In addition to the general provisions regarding proportionality, in cases with detailed assessment the Commission assesses in accordance with point 7.3.4 of the R&D&I Framework whether the aid is limited to the minimum amount necessary to implement the project in question.

(116) According to the Swedish authorities, the aid amount is the minimum required by the beneficiary in order to carry out the project. It is not only limited to, but is in fact below, the maximum allowed under the R&D&I Framework. In addition, the fact that the aid is not excessive is evident from the poor profitability prospects for the Project indicating a negative NPV also with the aid. Even when taking into consideration a potential future commercial plant, the forecasts show only an NPV close to zero. Moreover, by requiring repayment of the aid or part thereof in case the actual outcome is more positive than forecasted to an extent that the IRR of the project exceeds its WACC (including risk), the Swedish authorities have ensured that there will be no excessive profitability.

(117) On that basis, the Commission considers the aid to be proportional and limited to the minimum necessary.

3.4.4.4. Cumulation of aid

(118) According to Chapter 8 of the R&D&I Framework, aid ceilings shall apply regardless of whether the aid is financed entirely from State resources or is partly financed by the Community. The Swedish authorities have confirmed that the aid measure at hand

[30] OJ C 14, 19.1.2008, p. 6.
[31] OJ C 236, 1.10.2009, p. 4.

cannot be cumulated with aid received from other local, regional, national or Community schemes to cover the same eligible costs. The conditions set out in Chapter 8 of the R&D&I Framework are thus met.

3.4.4.5. Conclusion on proportionality

(119) The aid intensity is below the maximum allowed by the R&D&I Framework, the aid amount is limited to the minimum necessary and cannot be cumulated with other aids for the same eligible costs. Therefore, the Commission finds that the aid is proportionate.

3.5. The distortion of competition and trade

(120) As set out in section 7.4 of the R&D&I Framework, the Commission focuses its analysis of the distortions of competition on the foreseeable impact the R&D aid has on competition between undertakings in the product markets concerned. The relevant markets for the case at hand are identified in section 3.5.1 below.

(121) In the following sections, the potential effects of the aid on these markets will be analysed. As set out in point 7.4, fifth paragraph, there are three distinct ways in which R&D aid can distort competition in product markets: it can distort the dynamic incentives of market players to invest (crowding out effect) (section 3.5.2), it can create or maintain positions of market power (section 3.5.3) and it can maintain an inefficient market structure (section 3.5.4).

(122) Moreover, it is stated in point 7.4, third paragraph, of the R&D&I Framework that in certain cases the results of R&D (e.g. intellectual property rights) are in themselves traded in so-called technology markets, for instance via patent licensing. In such cases, the Commission may also consider the effect of the aid on competition in the technology markets.

3.5.1. Identification of the relevant markets

(123) The project under assessment concerns R&D for the development of a pre-commercial scale demonstration plant producing bio-methane from forest residue. The bio-methane produced during the Project will be fed in to the gas grid and sold on the market at market conditions.

(124) According to the Swedish authorities, bio-methane should not be seen as a separate market, in particular since the bio-methane produced by this Project will be combined with natural gas on the grid. The product market is hence the market for gas of natural gas quality including both natural gas and bio-methane on the grid.

(125) The Commission agrees with Sweden that the total methane market is the relevant product market for bio-methane. This is in line with a State aid decision taken by the Commission on a similar case[32]. It is also in conformity with a large number of decisions taken on the basis of the Community Guidelines on State aid for environmental protection[33] and, more particularly, with cases regarding aid for

[32] See e.g. the GAYA case, in particular paragraph 206.
[33] OJ C 82, 1.4.2008, p. 1

cogeneration and district heating[34]. In such cases, the Commission has in particular not distinguished between energy sources solely on the basis of their environmental performance as long as the products are substitutable.

(126) As for the technology market, even if the envisaged technologies to be used in the Project do not exist in the sense that they will not be operational before a rather long period of R&D, the Commission considers that some technology markets potentially could be affected by the notified aid.

(127) The markets to be analysed are therefore the following:

- the market for the supply of methane (or natural gas) (3.5.1.1); and
- the market for the supply of the associated technologies (3.5.1.3).

(128) This definition of relevant markets will be subject to a forward-looking analysis focusing, on the on hand, on the use of the product and on the substitutes from a demand perspective (the product market) and, on the other hand, on the most appropriate delimitations of that market from a geographical dimension (the geographical market).

3.5.1.1. The methane market

(129) Methane (CH_4) is a hydrocarbon which can be found in a natural state (fossil "natural gas"), but which can also be artificially synthesized from biomass ("bio-methane"). From the point of view of environmental performance and security of energy supply, there are differences between methane and bio-methane, since natural gas is a fossil fuel, while bio-methane is a decarbonised and renewable energy source. From a chemical and technical point of view, however, bio-methane is in all aspects similar to methane and the two gases are perfect substitutes.

(130) Natural gas is the most frequently used energy gas accounting for 22% of the world energy mix and demand is growing, particularly in the electricity sector in OECD countries. At the European level, the natural gas market has increased by almost 50% since 1990 and has a size of about 5 600 000 GWh per year[35].

(131) The natural gas market is expected to grow globally and at the European level. This is in particular due to the environmental performance of natural gas in comparison with other fossil fuels. Contrary to fossil fuels like coal and oil, the combustion of natural gas does not lead to emissions of sulphur and heavy metals. It does not either result in ash or soot residuals. Also, natural gas has the highest energy/carbon ratio of any fossil and thus results in significantly lower CO_2 emissions than coal and oil.

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[34] See e.g. State aid cases N 428/2008 – LV – Development of Cogeneration Power Plants Utilising Renewable Energy Sources, OJ C 62, 17.3.2009, p. 12, N 6/2007 – PL – Prolongation of scheme PL 10/2004, OJ C 298, 11.12.2007, p. 5, N 147/2006 – DK – Exemption from Danish waste levy: incinerated manure fibre, OJ C 68, 24.3.2007, p. 5, N 356/2008 – DK – Supplement for electricity generated with biogas, OJ C 151, 3.7.2009, p. 16, N 436/2007 – ES – Modification of aid for energy saving, energy efficiency, co-generation and renewable energy, Castilla y Léon, OJ C 54, 27.2.2008, p. 2, and N 478/2007 – NL – Stimulating renewable energy, modification and prolongation of the MEP (N 707/2002) and MEP stimulating CHP (N 543/05), OJ C 39, 13.2.2008, p. 3.

[35] See e.g. *Natural Gas Consumption in EU*27, Turkey and Switzerland in 2008, Eurogas, 12.3.2009.

(132) The natural gas reserves are estimated to last some 60 years with today's consumption, technology and prices. The main part of the reserves is located in the ex-Soviet republics (31%) and in the Middle East (41%). Less than 1.6% of the world's natural gas reserves are located in Europe.

(133) Natural gas was introduced in Sweden in 1985 and its use increased rapidly until 1990 when it stagnated. It has however increased lately due to an expansion of the Swedish natural gas net. Natural gas is currently distributed to some 30 municipalities in Sweden in which it represents about 20% of the energy use. However, at a national level, natural gas represents only about 1.6% of the total energy consumption. With a total consumption of more than 10 000 GWh[36] per year, the natural gas market in Sweden is thus small compared to the European average. The natural gas market in Sweden is expected to increase due to environmental and energy policies, as well as to the fact that the natural gas grid will be expanded and investments in gas-powered combined heat and power plants are planned.[37]

(134) The largest consumer category on the Swedish natural gas market is large industrial customers (54% of the market), followed by combined heat and power plants and boilers in district heating grids (29%). The remaining 17% is household consumers, small commercial users and vehicle gas.[38] From the supply side, the natural gas market in Sweden is dominated by a few big actors; DONG Energy (21%), E.ON (53%) and Göteborg Energi (14%)[39]. The remaining 12% are provided by smaller actors.

(135) As indicated above, the total methane market also includes bio-methane. Bio-methane is obtained through upgrading of biogas, which is normally produced from domestic raw material such as waste or sludge from sewage water plants, but which would in the present case be obtained by gasification and methanation of forest residuals. In Europe, a very large number of producers collectively produce about 60 TWh of biogas and no producer has a market share higher than 10%.

(136) There are about 230 biogas/bio-methane plants in operation in Sweden, mostly municipal sewage water treatment plants and landfills. The annual biogas production in Sweden is expected to increase from ca. 1.6 TWh in 2009 to more than 3.0 TWh in 2012[40]. This is mainly due to environmental and energy policies and the fact that bio-methane is a decarbonised fuel. The use of bio-methane will count towards the Community target of 20% of energy consumption coming from renewable energy sources by 2020, which should increase the use thereof. Moreover, it has advantages in terms of security of energy supply in comparison with natural gas, which is nearly completely imported from outside of Europe.

(137) As mentioned, before the gas can be used for mixing into methane or as a vehicle gas, it has to be upgraded. In Sweden, there are currently about 30 plants upgrading biogas for this purpose. There are currently four large distributors of biogas (Göteborg Energi,

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36 See e.g. 2008 Energigas Sverige and *Natural Gas Consumption in EU27, Turkey and Switzerland in* 2008, 12.3.2009, Eurogas

37 See e.g. 2009 Energiläget, the Swedish Energy Agency, p. 102 and forward.

38 Source: Statistics Sweden

39 *EI 2009:08 Energimarknadsinspektionens rapport enligt EGs direktiv för de inre marknaderna för el och naturgas 2009*, p. 47, which is based on data from 2006.

40 Source: http://www.biogasportalen.se/sv-SE/BiogasISverigeOchVarlden/BiogasISiffror/Prognos.aspx

E.ON, Nordvästra Skånes Renhållnings AB and the Community of Helsingborg). The distribution is done either via the grid pipes or tank trucks.

(138) In a number of merger decisions, the Commission has sub-divided gas supply activities into the following five distinct markets, i.e. supply of gas to (i) dealers, (ii) gas-powered electricity plants, (iii) large industrial customers, (iv) small industrial customers and (v) household customers[41]. Göteborg Energi supplies energy to large and small industrial customers and to households.

Segmentation by area of utilisation of methane

(139) The Swedish authorities have indicated that the bio-methane produced through the Project will be sold for use in vehicles. Within the scope of the Project, it is deemed as not feasible to develop different product lines. The produced bio-methane will be sold at market conditions and preferably to the more high-yield market for vehicles[42]. It could be used by private vehicles as well as by buses and trucks.

(140) Therefore, the Commission will also analyse the segment of the methane market, which concerns methane used as a vehicle fuel, natural gas vehicle (NGV). Vehicle gas is often sold as a blend of bio-methane and natural gas. For the time being, the European NGV market is dominated by use of methane from fossil fuels, i.e. natural gas. However, this is not the case in Sweden where the use of natural gas is rather limited and where the average share of bio-methane has been steadily growing and is now amounting to approximately 60% of vehicle gas[43]. In 2009, the delivery of vehicle gas in Sweden was in total 68 Nm^3, of which 42.3 Nm^3 was biogas and 25.7 Nm^3 was natural gas[44]. The segment is expected to grow due to political ambitions and climate goals, the installation of new filling stations and the higher output of biogas for vehicles notably in city areas.

(141) An overview of the current situation of the NGV market can be obtained from the latest statistics published by the International Association for Natural Gas Vehicles:

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41 See e.g. Commission decisions of 15 October 2008 in case M.5220 ENI/Distrigaz (paragraph 15); of 14 March 2006 on case M.3868 Dong/Elsam/Energi E2 (paragraph 121) and of 14 November 2006 in case M.4180 GDF/Suez (paragraph 63).

42 Currently prices for vehicle fuel are higher than prices for heating purposes or industrial use. Concerning heating purposes, gas has a very small impact in Sweden.

43 Source: SCB Shares of biogas and natural gas in SE vehicle fuel sector

44 Source: Statistics Sweden

Country	Number of vehicles	Number of filling stations
Italy	628 624	730
Germany	85 000	860
Bulgaria	60 270	77
Sweden	23 000	104
France	12 450	125
Austria	4 983	208
Spain	1 863	42
Poland	2 106	32
Czech Republic	1 755	37
Netherlands	1 502	50
Latvia	500	4
Finland	700	13
Slovakia	426	7
Greece	520	2
Portugal	407	5
Belgium	300	5
United Kingdom	221	31
Luxemburg	203	7
Hungary	110	13
Lichtenstein	101	1
Lithuania	133	2
Ireland	2	1
Denmark	-	1
TOTAL	**825 176**	**2 357**

Figure 3: *NGV market in different European countries*[45]

(142) The number of NGVs has been steadily increasing: between 2000 and 2009 there was an average growth of 20% per annum at the global level and an average growth of 15.8% per annum at the European level. In Sweden the number of NGVs increased from 1 500 in 2000 to 23 000 in 2009, i.e. by 143.3% in total during that period. [46]

(143) There are, in accordance with Figure 3, currently slightly more than 100 gas filling stations in Sweden and most of these are owned by producers or distributors. Four large actors dispose of more than 75% of the filling stations. Due to the existing infrastructure, most of the filling stations are located in Southern Sweden and in the regions of large cities.

(144) The two main actors in the end consumer market for vehicle gas, Fordongas Sverige AB and E.ON Gas AB, are active throughout Sweden. Apart from these, there are a large number of small companies operating on a local basis. Where bio-methane production takes place close to the natural gas grid, it is usually injected to the grid and sold as bio-methane to consumers along the grid either in a blend of bio-methane/natural gas (typically 50% of each) or as 100% bio-methane. There is also exchange between filling stations located off-grid, in order to balance supply and demand. As mentioned above, in 2008, 355 GWh was upgraded to bio-methane. Out

45 http://www.iangv.org/tools-resources/statistics.html (as per 22.11.2010)
46 http://www.iangv.org/tools-resources/statistics.html (as per 22.11.2010)

of this, 140 GWh was injected to the grid, while the remaining 260 GWh was sold directly as a vehicle fuel.[47]

3.5.1.2. Geographical market

(145) The gas market is liberalised and Directive 2003/55/EC[48] enables international trade with natural gas and bio-methane. The gas market is as such thus open to at least any European gas distribution company. Accordingly, the gas market has been examined by the Commission in a number of merger decisions, in which it has consistently concluded that there is one market for the upstream supply of gas (comprising also the development and production of gas) to customers in the EEA. The Commission has concluded that this market most likely comprises the EEA, plus Russian and Algerian gas imports, but has left open the precise geographic market definition[49].

(146) However, the natural gas market in Sweden is in practice restricted to only one supply possibility via Denmark. Few new players have entered the market, probably due to the small size of the market and the lack an expanded transmission grid in Sweden. This situation with a limited transmission system has led to a multiplication of decentralised production of bio-methane in order to supply gas also in parts of the country that are not connected to the natural gas grid. So far, 100 km of such decentralised bio-methane grids have been built and distribute 280 GWh of bio-methane per year[50].

(147) Therefore, although international trade patterns for bio-methane should be established in the long run, at present bio-methane can be seen as being traded nationally for the purpose of the present case. The Commission will therefore also analyse the impact of the aid on the national gas market (see in particular section 3.5.1.3 (a) considering market power of the beneficiary and market structure of the methane market).

3.5.1.3. Markets for the associated technologies

(148) The Commission notes that any patentable knowledge stemming from the Project is expected to be very limited and will, according to the Swedish authorities, be licensed to third parties since one of the aims of the Project is to stimulate the market to take off. In addition, it should be noted that neither GoBiGas AB nor Göteborg Energi, are active on the technology market. Nevertheless, since it is not excluded that certain patents can be obtained through the Project, the Commission will analyse potential effects of the aid on the technology market(see in particular section 3.5.1.3 (b) considering market power of the beneficiary and market structure of the markets of gasification/methanation).

3.5.1.4. Conclusion regarding the relevant markets

(149) The relevant product market is the total market for methane, which from a geographical perspective is at least European. However, since the methane market in

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47 ES 2010:01 Produktion och användning av biogas år 2008, p. 17-19

48 Directive 2003/55/EC of the European Parliament and of the Council concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC, OJ L 176, 15.7.2003, p. 57

49 See e.g. M.1573, Norsk Hydro/Saga (paragraph 15), M.1383, Exxon/Mobil (paragraph 18), M.3086 Gaz de France/Preussag Energie (paragraph 10), M.2208, Chevron/Texaco (paragraph 8), M.2681, Conoco Inc./Phillips Petroleum (paragraph 10), M.3288, TNK-BP/Sibneft/Slavneft JV (paragraph 9) and M.3052, ENI/Fortum Gas (paragraph 14) and M.5220 ENI/Distrigaz (paragraphs 35-36).

50 *Distributionsformer for biogas och naturgas*, J Benjaminsson, R Nilsson, November 2009

this case in practice is national, the Commission will also assess the effects of the aid at the national level. The relevant technology market consists of similar technologies, regardless of whether the end-product is a renewable energy fuel or a fossil fuel. That market is global.

3.5.2. Distorting dynamic incentives

(150) According to the R&D&I Framework, the main concern related to R&D aid is that competitors' dynamic incentives to invest are distorted. When an undertaking receives aid, this generally increases the likelihood of successful R&D on the part of this undertaking leading to an increased presence on the product market in the future. This increased presence may lead competitors to reduce the scope of their original investment plans (crowding out).

(151) In its analysis of the potential distortion of dynamic incentives, the Commission considers the following elements: aid amount, closeness to the market, open selection process, exit barriers, incentives to compete for the future market and product differentiation and intensity of competition on the market.

3.5.2.1. Aid amount

(152) In total, the aid amounts to SEK 222 million (ca. € 24 million) over a period of three years. As shown e.g. in section 2.5 above, there are many R&D projects in this field, under implementation or at the planning stage, albeit they concern different technologies, different end-products and/or different plant capacities. The investment amounts for such projects are significant. According to the Swedish authorities, several of those projects may moreover actually benefit from the knowledge resulting from the GoBiGas project, which will be widely disseminated.

(153) Therefore, the Commission considers that although the aid amount is significant, it is not likely that it will distort the incentives of other actors and thereby lead to crowding out. It is, on the contrary, possible that the aid will trigger other complementary R&D projects in this field.

3.5.2.2. Closeness to the market

(154) The more the aid measure is aimed at R&D activity close to the market, the more it is liable to develop significant crowding out effects. The activities supported in this case by nature are rather close to the market, since they are experimental development activities. It should however be noted that the demonstration plant is too small to be commercially viable and it will therefore not be in commercial operation after the end of the Project.

(155) Therefore, the Commission finds that the notified aid does not appear to result in significant crowding out effects.

3.5.2.3. Open selection process

(156) The Swedish Energy Agency published a call for tender on 11 December 2008 "*Call for interest for demonstration and commercialisation of second generation biofuels and other energy technology*", which attracted 39 responses of interest. Following

evaluation of the applications, the GoBiGas project and two other projects were selected for funding based on open, transparent and non-discriminatory criteria.

(157) The Commission notes that the aid beneficiary was selected after an open and transparent selection process based on objective criteria, which is regarded positively since it may have encouraged competition between companies active on the market.

3.5.2.4. Exit barriers

(158) Point 7.4.1 of the R&D&I Framework indicates that the existence of exit barriers may reduce distortions of competitors' dynamic incentives. The reason is that competitors are more likely to maintain (or even increase) their investment plans when exit barriers to the innovation process are high.

(159) According to the Swedish authorities, the exit barriers in the bio-methane market are high, which is mainly due to the high initial investments required. The fact that such investments are significant and that the costs cannot be amortised on alternative use in case of failure was recognised by the Commission in a previous State aid case[51]. Some examples of different, on-going projects using gasification and/or methanation technologies are referred to in section 2.5 above. These technologies are to a large extent specific when it comes to the choice of technologies made by the actors. Therefore, the abandonment by these actors of their R&D in this area as a response to the notified aid is very unlikely.

(160) Consequently, the Commission concludes that there are high exit barriers on the relevant market and that these barriers make any crowding out effect of the aid measure at hand less likely to occur.

3.5.2.5. Incentives to compete for a future market

(161) R&D aid may lead to a situation where competitors to the aid beneficiary renounce competing for a future market, because the advantage provided by the aid (in terms of the degree of technological advance or in terms of timing) reduces the possibility for them to profitably enter this future market.

(162) The innovation process within the bio-methane sector (and the potential impact of GoBiGas thereof) can according to the Swedish authorities be divided into the following categories:

- The innovation process at universities and R&D institutes will be reinforced by the Project through R&D cooperation. Göteborg Energi has e.g. in 2007 invested in a pilot scale gasification plant at Chalmers that will be used to do supporting R&D. This program will partly comprise supporting R&D for the Project.
- Innovation at gas utilities will be encouraged by the GoBiGas project by supplying information about the technical feasibility of bio-methane production.
- Innovation at the level of product suppliers has been and will be encouraged through the feasibility studies that are carried out throughout the Project. In addition, the technology selection process will provide an incentive for European technology providers to present new and more competitive processes.

[51] See the GAYA case, in particular paragraph 228.

(163) According to the Swedish authorities, there are therefore strong reasons to believe that the Project will trigger an interest among potential competitors in continuing to invest in innovative technology, rather than reduce the likelihood of them doing so.

(164) For these reasons, the Commission also concludes that there is no significant risk that the aid will discourage competitors to compete on the market for natural gas and bio-methane or on the technology market for gasification and/or methanation in the future.

3.5.2.6. Product differentiation and intensity of competition

(165) According to point 7.4.1 of the R&D&I Framework, where product innovation concerns developing differentiated products (related e.g. to distinct standards, technologies and consumer groups) and when there are many effective competitors on the market, competitors are less likely to be affected by the aid.

(166) It should be noted that large multinational groups, with important innovation potentials, are already established on the European energy markets. Consequently, at least in the long-term, numerous companies will be able to position themselves as effective competitors in the market of biofuels and its diverse applications.

(167) According to the Swedish authorities, competition will emerge for solutions that are in addition to or in competition with the Project. This could in particular be in the form of other methods for gasification (for the use of raw material, the process for gasification, mixtures to transport the gas to consumers, etc).

(168) Therefore, the Commission finds that it is unlikely that the aid will stifle the intensity of competition.

3.5.2.7. Conclusion on distorting dynamic incentives

(169) Taking into account the significant exit barriers, the fact that other projects may benefit from the knowledge created by the Project, the intensity of competition on the relevant markets and the fact that they are rapidly growing markets, the aid will not have the effect of distorting the dynamic incentives of the market.

3.5.3. Creating market power

(170) As mentioned in point 7.4.2 of the R&D&I Framework, R&D aid may have distortive effects in terms of increasing or maintaining the degree of market power in product markets. Market power is the power to influence prices, output, the variety or quality of goods and services, or other parameters of competition on the market for a significant period of time, to the detriment of consumers.

(171) The Commission is concerned mainly about those R&D measures allowing the aid beneficiary to transfer or strengthen market power held on existing product markets to future product markets. The Commission is therefore unlikely to identify competition concerns related to market power in markets where each aid beneficiary has a market share below 25 % and in markets with a market concentration with Herfindahl-Hirschman Index (HHI) of below 2000.

(172) In its analysis of creation of market power, the Commission takes into account the following elements: market power of aid beneficiary and market structure, level of entry barriers, buyer power and the selection process.

3.5.3.1. Market power of the beneficiary and market structure

(173) Where the recipient is already dominant on a product market, the aid measure may reinforce this dominance by further weakening the competitive constraint that competitors can exert on the recipient undertaking. Similarly, State aid measures may have significant impact in oligopolistic markets where only a few players are active.

(174) The relevant markets identified above are the methane market, which should be assessed at a national and a European level (a), and the technology markets for gasification and/or methanation, which should be analysed at a global level (b).

(a) Market for methane

(175) The Project may have an impact on the bio-methane production market in Sweden. In addition, the ensuing technology can also contribute to expanding such market in the future by making available a completely new raw materials base for biomethane production. As mentioned in section 3.5.1.1 above, the size of the natural gas market is 5 600 000 GWh per year at a European level[52] and 10 000 GWh per year in Sweden. The market share of GoBiGas AB is currently zero on any market. However, its mother company, Göteborg Energi, is active on the methane market. Its market share is approximately 0.04% of the European market. Based on 2006 figures, Göteborg Energi held a share of 14%[53] of the Swedish market. […], according to the Swedish authorities, that market share […] is currently about [15-20]** % (more specifically, it holds a [5-10] % market share of supply to large industrial customers, ca. [5-10] % of supply to small industrial customers and [less than 1] % of supply to households). Neither the beneficiary, nor its mother company, does thus have significant market power on the methane market.

(176) The GoBiGas plant is foreseen to have a total production of […] GWh of bio-methane in 2013, […] GWh in 2014 and […] GWh in 2015 and forward until the plant is dismantled at the completion of the Project, i.e. after 10 years. The impact of increased bio-methane production in Sweden on geographically larger markets such as the EEA will be rather limited and there will only be negligible if any impact on the larger natural gas markets in Sweden or beyond. Indeed, even when full production is reached in 2015, this would mean that Göteborg Energi would have only a slightly higher share of the natural gas market in Sweden than it has currently; the increase would correspond to approximately 2% of the present natural gas market in Sweden (disregarding the expectations that the concerned markets will grow significantly in the coming years).

(177) The Commission considers, thus, that the Project is very unlikely to have any significant impact on the trade on the methane production market.

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52 Eurogas Natural gas consumption in EU27, p. 2.

53 *The Natural gas market actors in Sweden 2006*, Energimarknadsinspektionen El 2009:08.

** Range value due to business secrets.

Segment of methane used as vehicle fuel

(178) The total production of biogas in Sweden was 1 359 GWh, of which 355 GWh was upgraded to bio-methane for usage in vehicles. In 2008, Göteborg Energi had a share of [15-20] % of the total amount of biogas that was upgraded to bio-methane.

(179) The market for vehicle gas is expected to grow due to the installation of new filling stations and the higher output of biogas for vehicles notably in city areas. Also for gas in industrial use, several projects are in place, while the share of gas in use in households is not expected to grow significantly or not at all. As mentioned in section 3.5.1.1 above, the forecast of biogas production in 2012 is 3 000 GWh. If all the added biogas is upgraded to bio-methane, this would give a bio-methane market for vehicles of in total 355 + (3000-1359) = 1 996 GWh per year. The GoBiGas project would at full production provide 160 GWh vehicle gas per year. This would correspond to a market share of only 8%[54] of the vehicle gas market in Sweden, even when disregarding the expected increase of the total production of vehicle gas in Sweden.

(180) Taking into account that GoBiGas and Göteborg Energi have very limited market shares of the methane market even at a national level, which would be even more limited at a European level, the foreseen growth of the market and the limited production resulting from the Project, in case of success, it is unlikely that any dominant positions would be created or maintained through the notified aid.

(b) Market for the supply of gasification and methanation technologies

(181) In the present case, although the technologies to be used as background are already patented by the technology providers, the Project could result in some new IPR. According to the Swedish authorities, any such IPR would however be very limited. Furthermore, it would be widely licensed to third parties, since one of the aims of the beneficiary is to stimulate the bio-methane market to take off.

(182) As for the non-appropriable knowledge which can be expected to result from the Project, it will be widely disseminated to universities and research institutions, to suppliers and to other associations active in this field (see sections 2.5 and 3.4.1.1 above). The results from the Project will, therefore, to a large extent stimulate research and use of the technologies as well as competing technologies in the field of gasification/methanation of biomass.

(183) In addition, collaboration with a number of companies providing gasification/ methanation technologies is envisaged. Therefore, competitors of Göteborg Energi could either develop their own technologies or collaborate with existing actors on the technology market in order to carry out research with technologies that are competing with the ones used in the Project.

(184) On that basis, the Commission finds it very unlikely that aid will lead to creation of market power of GoBiGas or Göteborg Energi in the market for the associated technologies.

[54] 160 GWh per year/1 996 GWh per year

3.5.3.2. Level of entry barriers

(185) As set out in point 7.4.2 of the R&D&I Framework, in the field of R&D, significant entry barriers may exist for new entrants. These barriers include legal entry barriers (in particular intellectual property rights), economies of scale and scope, access barriers to networks and infrastructure, and other strategic barriers to entry or expansion.

(186) In this particular case, there are entry barriers for new entrants on the bio-methane market, such as high costs of establishing the production facilities, high degree of know-how in order to be able to manufacture product gas of sufficient quality and limited availability of land suitable for a production site, which should be located close to the main gas grid and with logistics for fuel supply that are cost-efficient and not adding environmentally harmful effect. As for the gasification and methanation technology markets, the level of entry barriers is also high, since the technologies are protected through IPR.

(187) According to the Swedish authorities, since most of the knowledge expected to be generated from the Project is not appropriable and the investment costs and risks are high, companies on the methane market are waiting for another actor on the market to bring this technology closer to the market. Therefore, a successful completion of the GoBiGas project could rather contribute to lower the present barriers by contributing to the development of the market and proving the potential commercial viability of bio-methane production via gasification.

3.5.3.3. Buyer power

(188) In general terms, the customers on the methane market are mainly industries with high buyer power due to the fact that orders normally concern large quantities. Likewise, the customers on the NGV and bio-NGV market are major international fuel suppliers who are sophisticated purchasers. The buyer power on the relevant product markets thus seems high, which should further limit any market power of GoBiGas AB or Göteborg Energi.

3.5.3.4. Conclusion on the creation of market power

(189) Taking into consideration GoBiGas AB's and Göteborg Energi's limited existing and future market shares on the methane market and the limited intellectual property rights that are expected to arise from the Project, the expected growth of the market and the strong buying power of customers, the aid does not seem likely to create or maintain any significant market power in favour of either GoBiGas AB or Göteborg Energi.

3.5.4. Maintaining inefficient market structures

(190) R&D aid must not support inefficient undertakings and thus lead to market structures where many market players operate significantly below efficient scale. In its assessment of the market structure, the Commission will consider whether the aid is granted in markets featuring overcapacity, in declining industries or in sensitive sectors. Concerns are less likely in situations where State aid for R&D aims at changing the growth dynamics of the sector, notably by introducing new technologies.

(191) In the cases under assessment, given that the concerned markets (natural gas, biofuel and technology markets) are growing and are thus not markets with overcapacity in declining industries, the aid does not lead to maintaining inefficient market structures.

(192) In addition, GoBiGas AB is a newly established company and, on the basis of its Annual Report of 2009, Göteborg Energi has a strong solidity and is not a company in financial difficulty.

(193) The Commission hence concludes that there are no indications that the aid would contribute to maintaining inefficient market structures. On the contrary, it could even create an incentive for stronger competition on the market.

3.6. Balancing test

(194) Pursuant to section 7.5 of the R&D&I Framework, the Commission balances the effects of the measure in light of the positive and negative elements assessed above and determines whether the resulting distortions adversely affects competition and trading conditions to an extent contrary to common interest.

(195) Following a detailed assessment, the Commission considers that the project suffers from market failure since the market would not deliver the same outcome without aid mainly because of imperfect and asymmetric information linked to the level of technological, financial and market risks of the Project and knowledge spill-overs in terms of non-appropriable and disseminated R&D results. It can thus be considered that State aid is necessary for the Project to be carried out and has a clear incentive effect. Moreover, the envisaged State aid appears to be proportionate and limited to the minimum necessary.

(196) Due to the number of players on the highly fragmented market, due to the limited market share of the beneficiary and its mother company, due to the expected growth rate of the market and conditions of the aid measure, the negative effects of the aid are limited. The aid measure does not support the creation of a position of power nor maintain inefficient market structures.

(197) Under these circumstances, since the positive effects of the measure significantly outweigh its negative effects, the Commission concludes that the balancing test for the aid under assessment is positive.

4. DECISION

(198) The Commission considers the aid compatible with the TFEU on the basis of Article 107(3)(c) thereof and has accordingly decided not to raise objections to the implementation of the notified measure.

(199) The Commission reminds the Swedish authorities of their obligations to submit an annual report on implementation of the aid.

(200) The Commission further reminds the Swedish authorities that, in accordance with Article 108(3) of the TFEU, all plans to alter the project must be notified to the Commission.

If this letter contains confidential information, which should not be disclosed to third parties, please inform the Commission within fifteen working days of the date of receipt. If the Commission does not receive a reasoned request by that deadline, you will be deemed to agree to the disclosure to third parties and to the publication of the full text of the letter in the authentic language on the Internet site:

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Yours faithfully,
For the Commission

Joaquin ALMUNIA
Vice-President