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Policy Roadmap for large-scale biogas implementation in Greece

Deliverable 3.3



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1. Introduction

This report was compiled in the frame of the BIG>EAST project (EIE/07/214), which is supported by the European Commission within the Intelligent Energy for Europe programme.

The objective of this report is to propose suitable national and regional policies in order to overcome existing barriers for large-scale biogas implementation in Greece. The pages that follows attempt to illustrate the main findings of Deliverables 3.1 and 3.2 concerning the main policies and barriers in the field of biogas exploitation.

The scope of this report is assisting the policy makers to give inputs for the formulation of biogas plans in the respective of new national legislation in the RES sector. Furthermore, a broader scope of this report is the promotion of the production and use of biogas as a sustainable and environmental friendly energy source.

The report is one of a series of six reports dealing with the target countries of the BiG>East project: Bulgaria, Croatia, Greece, Latvia, Romania, and Slovenia. The target group of this report is mainly the policy makers.

The analysis of the biogas exploitation possibilities and status in Greece so far, which was presented in previous project Deliverables, demonstrated that biogas can be a promising energy source. In this report we will focus on describing the necessary steps that should be made in order for biogas to become an attractive investment.

The roadmap which is a sequence of actions can be categorized in two main general categories:

- actions aiming to address market and financial issues and
- actions related to energy and environmental policy.

2 Biogas potential

During 2007 fifteen biogas plants were operated in Greece as it is shown in **Figure 1**¹. The utilisation of biogas in most of these cases mainly covers heat demands of the plants. Nevertheless, the installed capacity of electricity generation from biogas was 37.4 MW and the gross electricity generation reached to 155.9 GWh². The most energy was produced in the area of Athens due to the operation of the Municipal Wastewater Treatment Plant (WWTP) of Psytallia and the Sanitary landfill (SL) of Ano Liosia, which treat liquid and solid wastes respectively.

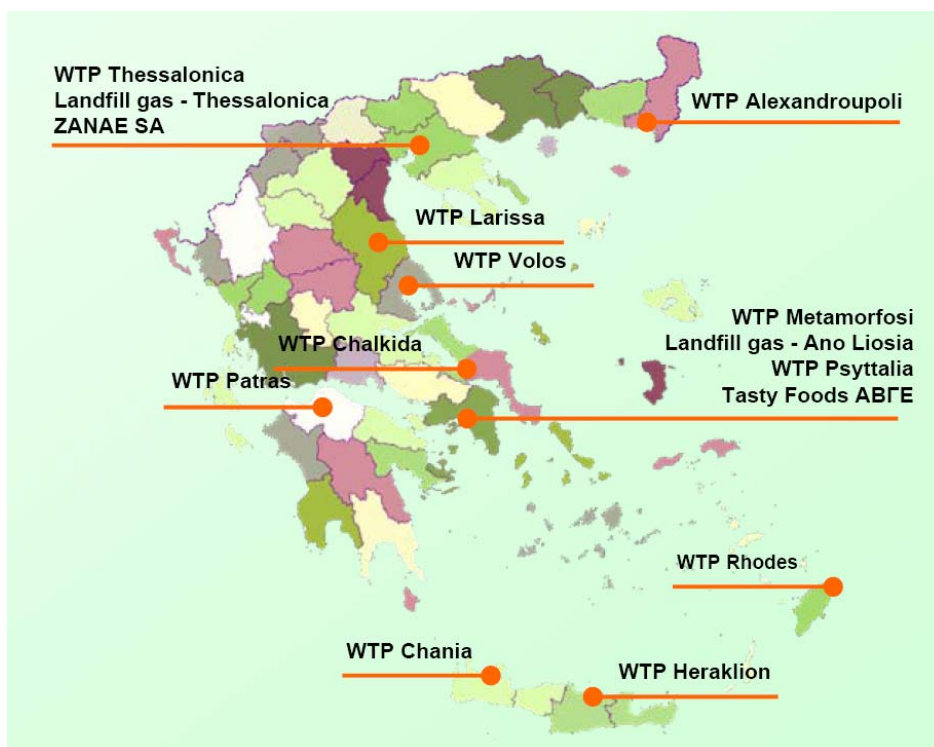


Figure 1: Biogas plants in Greece (in operation during 2007)

Biogas can be produced of nearly all kinds of organic materials. Nowadays in Europe, there are quite a few biogas process volumes at the current wastewater treatment plants, landfill gas installations, and industrial biowaste processing facilities. However, the largest volume of produced biogas will be, by 2020, originate from farm biogas and from large co-digestion biogas plants, integrated into the farming – and food – processing structures³.

In Greece the picture is different as the produced biogas derives mainly from landfills, wastewater treatment plants and a couple of industrial applications. Although Greece has a

¹ CRES Energy Policy and Planning Division Database.

² Hellenic Transmission System Operator S.S (www.desmie.gr)

³ Nielsen J. and P. Oleskowicz-Popiel (2007): The future of Biogas in Europe: Visions and Targets until 2020, European Biogas Workshop The Future of Biogas in Europe – III, Esbjerg, Denmark.

promising potential of organic wastes and especially animal manure currently there is no farm scale biogas plant. It is worth mentioning that taking into account only the breeding animals in Greece (cattle and pigs) and based on different assumptions, several authors have estimated that the theoretical annual manure production comes up to 10-17 million tonnes⁴.

According to estimates made by CRES⁵, and based on a conservative scenario, it is estimated that the AD of manure and organic wastes from the slaughter houses and milk factories could feed CHP plants of total installed capacity of 350 MW and a mean annual electricity production equal to 1.121.389 MWhe.

A detailed analysis concerning the estimation of the potential feedstock availability in Greece and the other 5 target countries of BIG>EAST project can be found in project Deliverable 2.3 (www.big-east.eu)

4 Nielsen J. and P. Oleskowicz-Popiel (2007): The future of Biogas in Europe: Visions and Targets until 2020, European Biogas Workshop The Future of Biogas in Europe – III, Esbjerg, Denmark.

Zafiris C. (2007): Biogas in Greece: Current situation and perspectives, European Biogas Workshop The Future of Biogas in Europe – III, Esbjerg, Denmark.

Boukis I. and A. Chatziathanassiou (2000): State of Biogas production, energy exploitation schemes and incentives in Greece, 1st World Conference on Biomass for Energy and Industry, pp. 1346-1349.

University of MISKOLC (2008): A computer aided database “Estimation of the existing biomass potential for the conversion into biomethane taking into account the shares of all existing competitors”, report of REDUBAD EIE-06-221 project, www.redubar.eu

5 Zafiris Christos (2007). Biogas in Greece. Current situation and perspectives. European Biogas Workshop proceedings “The Future of Biogas in Europe – III”, University of Southern Denmark Esbjerg, Denmark 14-16 June 2007.

3 Biogas benefits and prospective

According to the Ministry of Development estimations reflected to its national reports regarding the penetration level of RES the installed capacity required for 2010 in order for the target to be achieved, are presented in **Table 1**⁶. Law 3468/2006 adopts the Directive 2001/77/EC into the Greek legislation.

Table1: RES installation requirements to meet the 2010 target.

	Requirements in installed capacity by 2010, in MW	Energy gene-rated in 2010 in Twh	Percentage share of every renewable energy source in 2010
Wind parks	3,372	7.09	10.42
Small-scale hydro	364	1.09	1.60
Large-scale hydro	3,325	4.58	6.74
Biomass	103	0.81	1.19
Geothermal	12	0.09	0.13
Photovoltaics	18	0.02	0.03
Total	7,193	13.67	20.10

Source: Ministry of Development

It is worth mentioning that Directive 2001/77/EC target for Greece is in line with the country international commitments and especially with the Kyoto Protocol signed in December 1997 within the context of the Rio UN framework agreement on climate change (under the Kyoto Protocol the European Union agreed to reduce emissions of greenhouse gases by 8 percent for the period 2008-2012 in relation to the base year 1990 and Greece must reduce the rate of increase of CO₂ and other greenhouse gases by 25 %).

Furthermore, the revised Greek National Programme for Climate Change, estimates realistic CO₂ savings of 4.5 Mt CO₂-eq from the increased use of Renewable. Among others it is estimated that Anaerobic Digestion of pig manure (35% of the total breeding animals in 2010 and 50% of the total breeding animals in 2015 respectively) can reduce greenhouse gas emissions by 60,000t CO₂-eq in 2010 and 83,000t CO₂-eq in 2015.

⁶ Ministry of Development (2005). 3rd national report regarding the penetration level of RES up to the year 2010, Athens October.

4 National Policies

The energy sector in Greece undergoing the last years significant changes due to the EU and national policies in the field of energy and environment (eg. full liberalization of the energy market and environmental protection). As a result the impact and effects of the implementation of these policies are not yet visible and especially for the near future (eg. energy price, energy mix). Lignite, the main domestic fossil fuel resource of Greece, it seems that will continue to play a major role in the country's fuel mix in the future, but further RES penetration is a necessity.

The promotion of RES in Greece is based not only to the great potential of the country but also to the state priority toward RES electricity and emissions reduction. Although today there is still heavy state involvement in the economy the policy for the future is the reduction of the role of the state and the further development of the market rules and financial-support schemes.

The new law for RES (3468/2006) is dedicated to the promotion of RES, sets a new environment in the electricity generation and among others, simplifies the licensing procedures, the guaranteed market price is increased (the new pricing tariff system for electricity production from RES and CHP systems set a tariff of 73€/MWh for biogas plants, €75.82/MWh for the year 2007) while the licensing deadlines are being reduced. However, it seems that the situation for the attractiveness of new biogas investments has not been significantly changed until now.

A detail report concerning the policies in Greece can be found in project Deliverable 3.1 (www.big-east.eu)

5 Barriers to biogas projects

During last years renewable development in Greece is positively affected by the country's very good resource potential and the state policy. The Legislative framework has significantly improved by the introduction of new RES and environmental legislation. However, although the legislative framework (eg. energy and environmental policy, EU and country commitments, new law for RE matters, etc) and the financial environment have changed the picture, so that new biogas plants were constructed and operated, there are still barriers (mainly no technological) which affect to further biogas exploitation and deployment in Greece (eg. public perception, experience and awareness mainly on farm scale and industrial biogas applications, lack of price for the heat production, licensing procedure, lack of «gate fees» for waste disposal, externalities like eutrophication, groundwater pollution, replacement of fossil fuels which are not assessed and monetized, price of the biogas-produced electricity, etc).

A detail report concerning the barriers for biogas implementation in Greece can be found in project Deliverable 3.2 (www.big-east.eu)

6 Policy Measures to Support Biogas

Market roadmap

Besides the technical or other form of barriers it is even more important to identify barriers related to market and dealing among others with financial and administrative issues. The necessary actions to overcome such barriers comprising the market roadmap for the promotion of biogas projects are described in the following paragraphs:

- **Energy industry development:** The main market for biogas production in Greece is the electricity market (WWTP and landfill gas) and the heat market is a small one (internal use to the AD plants for the process heat). Nowadays there is a mature «Energy Market» in Greece concerning the AD technology (eg. technology vendors, plant designers and operators). Nevertheless what is needed is the further strengthening and growth of the local energy industry (this will promote the implementation of biogas projects and will reduce the high investment costs).
- **Feedstock availability:** Agricultural and animal wastes are a matter of special concern due to the high potential and their spatial distribution almost all over Greece. In some cases there is still lack of knowledge about the technical potential of wastes in a certain area and their biogas exploitation alternative. Parameters like stable supply of raw material and feedstock composition are fundamental for the biological process and biogas production. In some cases the seasonal production of some wastes like agro-industrial residues (eg. citrus processing industries, or olive oil mill residues) is crucial for the successful implementation of a biogas scheme and needs very careful examination. In such cases long-term contracts between biogas plant operators and feedstock suppliers must be guaranteed and the use of different wastes (eg. agro-industrial waste with animal manure) is necessary (Co-fermentation with other raw material).
- **Energy Market issues:** Nowadays there is a mature “Energy Market” in Greece. Despite this, the development of a full liberalized electricity market in Greece suffered a significant delay. Apart to the need of Full Liberalization of the Electricity Market, elimination of end users barriers is needed (eg. development of heat market, biogas use as a transportation fuel, injection to the natural gas grid etc).
- **Costs and revenues:** Biogas projects still need high investment costs. Taking also into consideration that a) project financing remains a major concern, b) the revenue comes mainly from the new pricing tariff system for electricity production for RES, c) externalities are not assessed and monetized, d) there is no “gate fees” in Greece, e) the «polluter pays» principle is not efficiently applied, further improvement of the financial and economical instruments for the support of RES and especially biogas project are needed (eg. examination of differentiation of public funds, introduction of tradable green certificates, higher electricity price according to the form of Biomass). This will attract new biogas projects.

Policy roadmap

- **Commitment:** in political level a stronger commitment concerning the exploitation of biogas as a sustainable energy and environmental choice is needed. This commitment will affect the other levels too (eg. regulatory, institutional, administrative, financing etc).

- **Legislative framework for biogas:** Although the new RES law (law 3648/2006) sets a new reality in the electricity generation, and among others, simplifies the licensing procedures, the regulatory and institutional framework for the promotion of biogas must further be improved (eg. further administrative simplification and coherence, specific legislation concerning biogas).
- **Energy price:** Although the new pricing tariff system for electricity production from RES and CHP systems set a tariff of 73€/MWh (€75,82/MWh for the year 2007) for biogas plants the electricity prices are rather low. A higher electricity price must be examined based on the form of Biomass (there is no differentiation according to biomass form).
- **Awareness:** Nowadays there is still lack of knowledge and adequate information not only to the farmers but also to the industries (owners) and the general public about the possible energy exploitation of wastes, their final uses (eg. electricity, heat, injection to the natural gas grid, transport fuel) and benefits. Public Awareness in all levels is needed.
- **Public acceptance and participation:** A biogas plant must be adapted to the particular regions and must be accepted from neighbors and the general public. Thus apart from its economical and technological viability a biogas plant must have also “environmental and social compatibility” based on thorough examination of the project and public awareness and participation.
- **Strategic Biogas Plan:** The penetration of Anaerobic Digestion schemes in Greece concerning farm scale applications (biogas exploitation from animal manure and agricultural residues) is not still mature. A Strategic biogas Plan must be incorporated within the National and Regional Energy and Environmental Policy. The Agricultural Policy (Ministry of Agricultural Development and Food), Environmental Protection (Ministry of Environment) and Energy Investments (Ministry of Development) concerning biogas exploitation should be further coordinated.