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# Europe and the Mediterranean:
## Towards a Sustainable Built Environment

Edited by Ruben Paul Borg, Paul Gauci, Cyril Spiteri Staines

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# SBE 16 Malta

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International Conference

16th March – 18th March 2016

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SBE MALTA

Sustainable Built Environment Malta

SBE Malta (Sustainable Built Environment Malta) is an organisation committed to Sustainable Development, education and research in green buildings and sustainable built environment. SBE Malta acts as the National Chapter of iiSBE, the International Initiative for a Sustainable Built Environment (www.iisbe.org). SBE Malta was set up in 2012 and registered as a voluntary organisation with the Commissioner for Voluntary Organisations in Malta. It is also registered as a legal entity with the Government of Malta. The primary objective of SBE Malta is the advancement of environmental protection and improvement by promoting Principles of Sustainable Development and Sustainability in the Built Environment. SBE Malta was set up as the Green Building and Sustainable Built Environment organisation in Malta, to establish relationships with professionals, public and private organisations at the local and the international level; to participate in international organisations; to promote the advancement of education; to conduct and promote research (www.sbemalta.org).

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**Europe and the Mediterranean**
**Towards a Sustainable Built Environment**

# Chapter 3

## Sustainable Development & Spatial Planning

# The regulatory framework in urban biogas plants realization to define new steps for a Common development of regulatory guidelines in EU member States

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**Abstract**. The importance of renewable energy exploitation is a main topic in European Union since the 2001/77/CE Directive publication, reaffirmed with the Directive 2009/28/CE on promotion of the use of energy from renewable sources. Among the renewable energy sources, biogas is getting its space. Indeed Community has underlined the biogas role in 2006/208/CE Regulation, through the Community Resolution on biogas of 12 March 2008, and finally with the European Directive 2009/28 which restates the importance of biogas as renewable source for environmental advantages in terms of heat and power production. Especially the biogas urban nature concerns other European rules as the waste directive 2008/98/CE. Despite European guidelines, national independent receptions have generated several biogas regulations which have created different countries conditions to the biogas plants development. Nowadays few studies on European biogas regulatory are available. Authorizations, waste chain management, public incentives, emissions limits have been programmed and developed differently State by State, producing an irregular biogas diffusion in European Community.

## 1. INTRODUCTION

The development of new Energy Efficiency practices, as fixed by 2020 EU guidelines towards the "20-20-20" European targets, has to be supported by a clear regulatory framework. Its aim is to prepare a full involvement of new energy solutions, so to achieve European strategies related to Renewable Energy Sources (RESs) promotion and Greenhouse Gas (GHG) reduction; biogas is one of the most complex RES to run. Because of its technological complexity the biogas regulatory framework has to challenge various laws usually not related to the most diffused RES.

This paper wants to be a contribute in the analyze of biogas regulatory framework in European countries where these RESs are a meaningful part of the energy market constantly increasing since the start of 21$^{st}$ century. This work tries to better understand the regulatory conditions which contribute, or obstruct, biogas development and diffusion with the aim to define a first step towards new common guideline inside Community. The paper choice is to consider urban biogas plants, so to include consideration on waste exploitation and related regulatory, being an additional contribution for the development of biogas plants in urban areas, nowadays still marginal rather than rural plants.

The first part of this paper will describe the EU regulatory framework, through the directives' subjects and the guidelines established in the last years. The second part will focus the attention on national directives' acceptances and composition of regulatory instrument for the biogas development; this part will research among the national laws in relation with biogas state of art and its development in next years comparing adopted solutions. The last part will

define possible steps towards the definition of communitarian strategies for biogas development through regulatory framework.

## *2.* BIOGAS IN EU REGULATORY: INTRODUCTION TO COMMUNITARIAN REGULATORY

The advancement of new technologies and the emerging topic of energy efficiency and sustainability is one of the meaningful issue in the European Union debate. Since the starting of this century, EU has started to focus its attention in the development of energy policies able to contribute for a deep transformation in the Community; the whole EU regulatory framework has been created to accomplish the conditions for a new sustainability concept, based on environmental, economic and social implementation. This climate and energy package of binding legislation has to ensure EU meets 2020 energy targets; biogas is part of this scenario.

Although the 2009/28/EC Directive defines biogas as a RES, its urban application is difficult. Despite biogas and anaerobic digestion are known for centuries and the technology is not complex, the biogas difficulties depend on various aspects, involving many EU regulatory authorities. Whereas the most of RESs depend primarily on two directives, the Energy Directive 2009/28/EC and Energy Taxation Directive 2003/96/EC, biogas needs to afford at least the Waste Directive 2008/98/EC and the Fertilizer Regulation 2003/2003; here there is the biogas intricacy. The need to relate different policies and regulatory is primary to better understand biogas regulatory potential.

### 2.1. *Biogas and Eu framework Policies*

Development of biogas cannot be successful without clear and working Community Policies. Nowadays the main barrier is represented by old and improper Directives guidelines, overall the Directive 2003/96/EC on Energy Taxation, to be upgraded and changed towards new objectives. The need to review biogas EU framework has been underlined by the European Parliament with the Resolution of 12 March 2008. Although it focused the attention on biogas in agriculture, the resolution highlighted the biogas potential, underlining the environmental and the economic importance to guarantee financial viability and adequate support schemes so to achieve biogas installation operators to combine and use all available organic matters. The Resolution outlines the actions needed to evolve this potential: EU legislation urges to develop a coherent biogas policy to underline the necessary changes in Community and national laws so to point out the most efficient ways of using EU funds and programs.

The Directive 2003/96/EC on Energy Taxation is without any doubt the one that need the huge improvements. Although the Commission recognizes the need to modernize EU rules on energy taxation, restructuring the taxation of energy products, in order to remove current imbalances and distortions and support the EU's wider environmental and energy goals, the proposed revision of 2011 was withdrawn by the Commission in 2015, because of the unsuccessful negotiations with EU Member States. The Energy Tax Directive was born to guarantee common rules in EU Energy market so to safeguard the Energy competitiveness, imposing a tax minimum level throughout flexibility instruments that achieve to each Member State to define and implement peculiar policies to own national circumstances, but without having a perspective of further development in Renewable Energy sector and in the latest EU programs on RESs development. Although the The Energy Tax Directives needs a review, it forecasts the development of environmental dispensations and promoted the use of Combined Heat and Power (CHP) generation in order to promote use of alternative energy.

The Waste Directive 2008/98/EC offers another suggestion to define biogas application in urban district; bio-waste in urban biogas plant is the main matter for energy production. Indeed urban biogas can be a technical, environmental and economical efficient measure to achieve high quality standards in waste collection as required by the Directive. As predicted by the Waste Directive, Member States should promote the separated collection of bio-waste with a view to composting and digestion, part of biogas production, so to achieve an high level of

environmental protection through the treatment of bio-waste; the result is not only avoiding land filling, but reaching energy efficiency thanks to biogas production and utilization. In addition to these addresses, biogas from waste can encourage policies based on citizens sensitivity in order to prepare for waste re-use, waste energy recover, decrease waste disposal, all parameters required by the Waste Directive for waste hierarchy.

### *2.2. Support schemes: taxation and incentives*

One of the most important voice in biogas system diffusion is represented by the financial and economical support schemes established by each Member State. Indeed Parliament Resolution 12/03/2008 affirms that an adequate subsidies or other economical measures are the most successful in promoting biogas until the biogas sector could become commercially viable. The support schemes based on incentives and subsides established by Member States during these last years have increased biogas and RESs diffusion instead of traditional fossil fuel. Fundings are basic to increase *green electricity* and *green gas* so to research, develop and promote specific projects with this aim. In the mentioned Resolution, CHP is recognized as one of the strategic technology towards biogas energy exploitation so that it should have fundings guaranteed to be invested in the most efficient and sustainable installations; CHP generator importance is underlined in Energy Taxation as mentioned.

The Energy Tax Directive 2003/93/EC is the one that is actually responsible for part of biogas utilization cost. In art. 4 the Directive establishes a total level of taxation levied in respect of all indirect taxes (except VAT) calculated directly or indirectly on the quantity of energy products and electricity at the time of release for consumption. If the Directive article is quite clear, it is not for national applications where the Directive aim is not respected for two causes. The first is Member States' taxes generated differently by central and local authorities, that create very complex scenarios for consumers and for enterprises. The second problem is represented by some States' dependence on energy import, as primary sources or as usable energy. The result is having Countries with higher energy costs than the EU average so to create advantageous or disadvantageous energy market conditions. Energy Tax Directive offers to Biogas a way to overcome this energy difficulties. In fact art.14 predict for total or partial fiscal exemptions, or taxation reduction, for pilot projects, for technological development of environmental products, for electricity generated from biomass – one of the matter for biogas production, or CHP generation. In this way the taxation can be controlled and decreased for virtuous environmental project, as long as to be refunded (art.15) if produced by biomass.

### *2.3. Authorizations and plans*

The complexity of the authorization procedure is still one of the major obstacles to the increase in use of renewable sources. Despite European Parliament recognizes that Member States' support schemes should draw attention not to create unnecessary hindrance trough their approval procedures, regional planning, granting of license and approval schedule, much is still to do. Member States' support schemes should call for simplified planning permission procedures in biogas construction installations, but nowadays simplification is restricted too often to exceptional cases of "*urgent works in the public interest*", as provided for Italian Legislative Decree No. 387/2003.

In addition to b*iogas p*lant energy production authorization, urban biogas challenges the waste management approval too. In fact art.16 of Waste Directive 2008/98/EC compels Member States to take appropriate measures to establish an integrated and adequate network of waste disposal installations and of installations for the recovery of mixed municipal waste collected from private households, including where such collection also covers waste from other producers, taking into account the best available techniques. Bio-waste district exploitation could achieve to improve environmental measures for re-use, recycling, recovery of waste, in order to support the implementation of the Directive's objectives (art.28), and to exempt from disposal permit in case of disposal of at the place of production for waste recovery (art.24).

### *2.4. Cooperation and participation*

A final stressed point is the role of cooperation, considered a meaningful part of biogas urban development. Indeed the development of a biogas plant inside the urban context can not excluded a strict debate with citizens and local actors. Also the Commission highlights with art.31 of Waste Directive that Member States should ensure the opportunity to participate in the elaboration of the waste management plans especially if these have relevant environmental effects; urban biogas has to go though cooperation. The European Parliament asks for something more. In fact with the mentioned Resolution, the Parliament asks for support schemes able to encourage farmers cooperation in biogas production; if the speech is efficient for farmers, it can be more significant for district and its actors too. From the district scale, also the cooperation among Member States is underlined by the Resolution; indeed for the Parliament, EU legislation needs to ensure cooperation and collaboration between Member States, to learn about each other best practices and export efficient biogas models.

## 3. NATIONAL ACCEPTANCE

The EU Countries have a huge potential for biogas development. Agriculture products, animal manure, water treatment and, in urban scenario, bio-waste offer a widespread sources for biogas national energy production so that each Member States could develop biogas plant depending on their typical feedstock. Considering feedstock a source present in each EU Countries with its peculiarity, biogas is not developed and exploited in the same way for the restraints given by the uncertainties of the regulatory framework. Indeed its production and utilization depends on national policies, incentives, subsides, authorizations, all aspects that create the national framework for biogas appliance, important part for its development in RESs scenario, to impede or allow its improvement.

Under the Energy Efficiency Directive 2012/27/EU, each Member State has established binding national targets for raising the share of renewable energy in gross energy consumption. The aim is to achieve the EU targets by 2020, using National Energy Efficiency Action Plans – NEEAPs as regulatory framework, a set of policies dependent on national renewable energy benchmark and final targets; biogas is part of these NEEAPs. In fact it represents a potential in a range of 170Mtoe/yr and 235Mtoe/yr in Europe and can be developed by each Countries with precise policies. Biogas as renewable electricity and as heat energy thanks to co-generation, can contribute to the increase of the RES share in EU energy mix. In addition, biogas represents the opportunity for many EU Countries to decrease the energy dependence on natural gas. Indeed biogas can be used in almost all the applications that are developed for natural gas and for the other it has to be upgraded, so to be injected directly into the natural gas grid. Biogas is an opportunity and Member States have grabbed it in their Energy Plans. Whereas in some countries biogas already provides more than 5%, 2300 MW of the total electricity demand like in Germany, Member States like Spain or eastern Countries like Romania and Hungary, have an enormous potential to exploit biogas through national acceptances of EU Directives and to promote central policy or separate plan proposing specifically measures.

The following paragraphs will review EU Countries' existing framework throughout their national policies, incentives, subsides predicted and authorizations needed for biogas plant realization.

### 3.1. *National Policies' Strategies*

Biogas can represent a double opportunity in national scenarios; despite the EU regulatory framework focuses on electricity production as primary energy source, the demand for heat consumes is the largest share of the primary energy supply. Biogas can be a solution for a sustainable co-generation and many EU Countries have created national policies and strategies for biogas exploitation and its promotion as in Germany, where biogas is playing a key role in the strategy to reach a share of RESs of 20% in the final energy consumption and of 35% in the electricity sector by 2020, in Finland where through the Finnish national action plan is predicted

to account for at least 20% of renewable transportation fuels, or Denmark experience where in particular the Danish government has created a Biogas Task force to monitor the expansion of biogas, to support specific projects and suggest for additional initiatives. The aims are different: providing base load electricity, as valuable option to balance other RES energies more fluctuating like wind power and photovoltaic, injecting a cost competitive biogas into the grid, replacing natural gas and its import, especially in decentralized CHPs, or having a sustainable fuel for transportation.

Not all Member States have biogas policies; while small Countries like Malta or Cyprus prefer to invest in more efficient and less expensive RES for their dimension, as for Photovoltaic, other Countries like Czech Republic or Sweden have not policies proposing specific measures for biogas. Despite the lack of biogas policies, in this scenario some Country as Hungary entrusts a crucial role to the biodegradable fraction of land filled municipal solid waste. In fact accepting 1999/31/EC Directive on landfills disposal the biodegradable part of municipal solid waste can be used as biomass in biogas plant so to reduce the amount of land filled waste and also to limit the $CO_2$ emission. As for lack of policies, another pitfall is represented by uncertain policies, especially connected to uncertainty of incoming budget; Sweden is an example. Despite a very noticeable Renewable Energy sector the current subsidy situation is an obstacle, stopping the biogas development, only minimally reduced thanks to transportation fuel policies, related especially to biogas upgrade and tax exemption.

There is not a perfect national framework, because it depends on financial resources, economic interests, local culture and sustainable attitudes. The single lacks are different: not coherent policy framework regulating the biogas sector as in Italy, where the decree No. 28/2011 can be considered the only legislative act for entire sector of RES' electricity production; biogas for heat is not directly supported, despite it is considered eligible to be used for new house as renewable heat obligation law as in German; creditor difficult to find as in Hungary; green certificate price set by market and not fixed by legislation as in Sweden; absence of further policies development after a certain date as in Sweden or in Italy; long procedure for authorization; complicate incentivisation systems.

### *3.2. Support schemes: taxation and incentives*

In last years many different support schemes have been issued in order to promote biogas and the gross scenario of RESs. The cost for biogas production is not yet competitive with traditional fuels, depending on feedstock used, technologies applied, plant size, so Member States have issued national support schemes based primary on financial incentives and tax exemption. In the Table 1 is possible to have a look on Member States' adopted incentives measures.

The most diffused instruments are Feed-in-tariff (FIT) and Premium-tariff (PT). In fact as shown in 'table 1', among the 28 actual, 16 Member States have FIT, 8 Member States have PT only 5 Member States – Belgium, Cyprus, Malta, Romania and Sweden - have neither FIT, neither PT. Many Countries have adopted FIT because PT is demonstrated to provide higher total payments than FITs. Whereas FIT has an energy price issued to cover the biogas energy production, independent of energy market spot, the aim of PT policy is offering a premium above the average spot electricity market price in order to address the environmental strategy of RE generation, or to better approximate renewable energy generation costs. This is in contrast to the FIT approach, where a purchase is typically guaranteed so to keep the renewable energy generation separate from spot market fluctuation. Some Member States offer both a FIT and a PT option, so that producers can choose for electricity tariff in order to meet enterprises financial needs. FIT and PT needs a guaranteed incentivisation period, different Country by Country, from 10 years to 20 years. In addition to these tariffs there is an interesting extra incentive adopted in Finland to promote investments on CHP through biogas.

Table 1. Biogas EU Member States national policies. MS – Member State, FIT – Feed-in-tariff, PT – Premium Tariff, SUB – Subsidies, QS – Quota System, L – Loan, NM – Net Metering, Tax, CfD – Contract for Difference.

| MS | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | UK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FIT** | • | | • | | | • | | | • | | | • | • | • | • | • | • | • | • | | | | • | | | • | • | • |
| **PT** | | | | | | • | • | • | | • | • | | | | | • | | | | | • | | | | | • | | |
| **SU** | • | • | | | | • | • | • | • | | • | • | | | | | • | • | | | | • | | • | | • | • | |
| **QS** | | • | | | | | | | | | | | | | | | | | | | | • | | • | • | | | • |
| **L** | | | • | | | • | | | • | | | | • | | | | • | | | | | • | | | | • | | |
| **NM** | | • | | | | | • | | | | | | | • | | • | | | • | | • | | | | | | | |
| **Tax** | | • | | | • | | | | • | | | | | | | • | • | | • | | • | • | | | • | | • | • |
| **CfD** | | | | | | | | | | | | | | | | | | | | | | | | | | | | • |

Feed-in-tariff and Premium-tariff do not concern all plants. In fact among the possible incentives, the are other financial systems based on subsidies systems, financial policies that guarantee incomes for covering designing, commissioning, installation costs, depending on State or local funds issued by each Government related to specific period. The period predicted for funds represents the main problem. In fact the large part of Member States have annual funds, established by yearly financial programs, an obstacle for enterprises. In fact it is more favorable to offer a subsidy framework self-assured and steady in the long period budget, as issued in Poland, or Romania for 7 years.

One of the system thought to promote biogas is RESs Quota-system. The idea was to produce a certain amount of green electricity certificates established by Countries' Governments so to achieve Renewable Energy target issued by EU Directive. The main problem with quota System is the price for the green certificates usually determined by the market so to fluctuate over time and only green certificate with price fixed by legislation could represent a safe investment for energy suppliers.

Among the incentives, one of the most important support is represented by the grid priority access. In fact thanks to Net metering the RESs' energy produced can be priority injected in grid and receive the same quota produced for free. Some hints exist among the Member States, as in Flanders, Belgium, where the energy fed into the grid and not taken back, is not reimbursed, or in Italy where the exceeding energy is remunerated; someone else like the Netherlands has to pay a grid use charge.

In this scenario an important role could be the definition of loan schemes. In fact rarely an enterprise has the cash flow for realizing a biogas plant so to oblige for a bank loan with loan interests subject to free market. Despite private bank system, some Member States throughout their national bank promote loan to realize biogas plant so to promote sustainable targets and international goals through loan system with low interests guaranteed by national funds.

An absolute innovation in support scheme context is the Contract for Difference - CfD. Emanated by UK Government is a private law contract between a RES generator and a Low Carbon Contracts Company - LCCC, owned by the UK Government. The CfD is based on a difference between the market price and an agreed “strike price” and the payment of this difference to the contractor with the payable credit. The efficiency of this support scheme need to be testified during next years to understand if it can increase RES and biogas scenario, following the sole rules of free market.

In addition to the different incentives schemes over mentioned, another important instrument is the taxation. In fact Member States are free to set their own national taxes. Energy taxes are part of the budgetary policies of each Countries, free to set rules on what should be taxed, when and what exemptions are allowed. Taxation role can be a persuasive instrument in order to influence consumer behavior or promote certain political, social and cultural aims. In fact taxes applied in fossil fuels affects citizens behaviors and can be considered an indirect subsidy for green energy development. Countries as Sweden, Finland, Denmark, Ireland have carbon tax in place.

The energy tax exemption could be fulfilled by waste taxation. The Swedish example is meaningful. A landfill tax has been introduced with the result of a progressive reduction of land filling and the complementary raise of recycling; biogas from household waste could take advantage of a policy of this type. Nowadays in spite of diffused recycling practices, there are not economical incentives or penalties so that a huge part of waste is still land filled with a great lost of energy that organic fraction of waste could generate.

### *3.3. Authorizations and plans*

Efficiency standards, environmental impact, pollution limits, noises and odors emissions, strictly depending on national, regional or local rules contribute to create a complex scenario in authorization processes, so to be often a bureaucratic trap and a limit for biogas development.

The examples are multiples. In some Countries like Denmark, municipalities have to lay down specific areas for the construction of biogas plants, difficult to locate for social and cultural barriers, in other, the plants have to be processed and approved independently by local and regional authorities.

The result is a long authorization process. The approval period for biogas plants, from documents preparation to the ending final approval, depends on plant size, on authorities' skilled personnel, workload and local conditions. In spite of some exceptions as in Germany where the time approval of biogas plants by authorities is considered adequate (3 months for biogas plant up to 500kW and 5 months for biogas plants with an electric capacity over 500kW) in the greater part of EU Member States the authorization time is a barrier for biogas development with average time of 12/20 months. In Hungary the time-scale for projecting and licensing biogas plants is twice or even three times longer than the plant construction itself. The authorization process guarantees a whole control of projects, but it risks slowing down the investments. For these causes Member State are predicting some exceptions to shortcut authorization processes as issued in Italy, especially for plant up to 250kW.

In addition to authorization time approval, the biogas plant have to challenge with the coming neighbours. In fact people are worried regarding odors, noises, safety having a biogas plant in the backyard, and distance has a central importance; it is therefore important to inform on the planning process, especially in an urban biogas plant where the citizens are part of biogas production.

## 4. CONCLUSION

Regulatory framework is fundamental to achieve to develop urban biogas in district area. The analyze of the EU regulatory frameworks allows to define good practice and address to issue more efficient policies and support schemes. It is possible to identify two levels of actions for the development of urban biogas plants.

The first level acts on the European Community scenario where EU can propose a primary framework to address national policies towards urban biogas promotion, especially promoting practical solutions to achieve new energy targets and create the condition to have aware citizens. The action could be the definition of specific guidelines based on national policies, support schemes, authoritative processes experiences in order to identify the best economical, environmental and social solutions applicable to the various contexts of the member Countries. The aim will be to align existing policies and, at the meantime, to transfer the experiences among the Countries.

This anyway could not be enough without a contemporary revision of the existing Energy Tax Directive. As a matter of fact taxation is an indirect incentive towards the promotion of biogas, through the taxation of traditional fossil fuel with the introduction of new taxes based on CO2 emission and energy content. In addition the Directive should identify European tax to dissuade public and private waste producers to landfill, in spite of promoting energy efficiency use of bio-waste. The aim will be to guarantee the promotion of those resources able to generate alternative energy with low CO2 emissions and high energy content. Coming to the essential

second promoting action, it's clear that if EU could attend with general rules, national Governments and Parliaments have on the other hand a huge responsibility and effort to do. Whether Member States believe in RESs and biogas, they have primary to create the conditions to have competitive energy sources in their market. For this reason they should provide long-term budgetary plan; considering that European research programs and some Countries have 7 years long scheduled, this could be the address so to definite period for budget able to allow long period investments, and overcoming the uncertainty of unknown future economic resources both for public municipalities both for private enterprises. The incentives schemes should promote the innovative solutions that can optimize biogas and energy production, as for co-generation and tri-generation.

In the same way Member States should guarantee stability and long-term certainty for support schemes and regulatory framework conditions too. An overly alterable national framework discourages investments and energy innovations, and it is due exactly to the absence of a common and shared vision. Each Country accordingly should work to identify the most possible shared framework.

Strategically an important part could be covered by a more careful waste collection. Waste is business for management, disposal or incineration, and a cost for producers. The extended introduction of incentives in recycling activities could diffuse recycling practices, recovering the waste nowadays land filled and saving the energy that organic fraction of waste could generate. Member States should promote actions to allow that householders, economical activities or industries could collect and separate waste being aware of their contribution in waste prevention and energy production. A strong and pervasive information campaign by the Members Countries to quantify the economic benefits induced by the user will be crucial to support policies.

Decentralized energy plants could support these involving scenario too. The adoption of local supply programs are more suitable, sustainable and manageable than more articulate nationwide projects and they can lead to energy independence through self-production and self-consumption. At this aim public authorities should issue policies which could contribute to create a Zero Kilometer energy too. The cooperation production needed in biogas plant could be a significant environmental and social opportunity to develop decentralized energy plant.

A way to advantage the decentralized biogas plants diffusion could be the incentives schemes and the authoritative processes. If incentives have an economic importance, a certain timing of projects approval can encourage the investment and find shortcut for the authoritative process so to support biogas projects. This is absolutely important when these are based on social and economic cooperation. The diffusion of urban biogas, in the end, go through the reduction of waste and energy costs, achievable by district efficiency plant projects; urban biogas micro-generation plants just need to be encouraged by clear, safe, stable and innovative regulatory framework in addition to shared guidelines now being finalized.

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# “Evaluation of Vegetation in Urban Space” Barcelona Base Model and Proposed to Dominican Republic.

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**Abstract**. Nowadays, urban regeneration is a crucial problem. Vegetation is always an option but, usually, a lack of scientific knowledge prevents to using it. We will try to evaluate the influence of vegetation (mainly trees) in some “well living” parts. We shall use Barcelona (Mediterranean climate) as reference. Results could then be extrapolated to other climates (our interest is in Dominican Republic). Based in a previous study for summer 2013, we have prepared a more extended plan in order to systematize the precise influence of each species in the comfort of people in Barcelona. We have also identified, in Ochoa’s model, parameters to be measured for its right use in Barcelona. From 20 of June to 20 of July 2015, a wider campaign of measures has been undertaken. With these data, a “summer calibration” of the model has to be done. A campaign of measures in winter (end of January 2016) will be used for a “winter calibration”. Once it will be done, we will be able to predict numerically the influence of some types of trees in the comfort of the people. Implementing our results in common use software will be the final phase in this work.

## 1. INTRODUCTION

The vegetation has been through the years an element of great use to people. It has been used as protection, building material, subsistence element, among others. So the value that currently characterizes human life. Due to the growing climate change has generated an increase in studies to decrease this phenomenon, vegetation being one that brings great changes, especially in the urban heat island.

The vegetation characteristic metabolism contribute though his many factors that make changes in the immediate and surrounding environment. This metabolism include evapotranspiration (transpiration and evaporation), photosynthesis, oxygen, among others. These processes performed by a natural life cycle, achieved countless contributions to the welfare of the user. In this article we will study how radiation affects a town and as vegetation through their protection creates a shadow helping to reduce energy inputs making the welfare of the user in urban areas. The structure of the article will be the research objectives, methodology and results.