Friulian Journal of Science **12.** 2009, 25-35

The use of incentives for the promotion of agro-energy production in rural development planning in Friuli Venezia Giulia[1]

STEFANIA TROIANO*

Abstract. This study presents the results of a research analysing the economic incentives designed to encourage agro-energy production. The first part of the study provides a general introduction to the economic incentives used to develop agricultural activities aimed at the production of bioenergy. After a brief examination of the measures taken by policy makers in order to promote agro-energies, the study concentrates on the importance of monetary payments to farmers who by producing agro-energy also benefit the environment. The second part of the study analyses the incentives for the promotion of agro-energy production which are contained in the Rural Development Plans 2000-2006 and 2007-2013 published by the Autonomous Region of Friuli Venezia Giulia, in an effort to understand how they have evolved.

Key-words. Agro-energy, incentives, social benefits.

1. Introduction. In recent years, much attention has been given to the promotion of new energy sources derived from agriculture – firstly because of the increased demand for energy, the price volatility of fossil fuels and the difficulties to obtain them, and secondly, due to pollution and climatic changes caused by greenhouse gas emissions from burning fossil fuels (Bonari et al. 2009, FAO 2008). The economic crisis has also played a role in this issue requiring a more efficient management of energy resources and highlighting the need to expand our renewable energy source base (ENEA 2009).

Agro-energy, such as biomass de-

* Department of Economics, University of Udine, Udine, Italy. E-mail: stefania.troiano@uniud.it
English translation: Stefania Garlatti-Costa, Angela Lenarduzzi.

rived from purposely-grown crops and organic residues, can contribute to the solution of some of these problems, also offering farmers an opportunity to diversify their income.

In order to promote agro-energies, policy makers can make use of different instruments. Among these, however, a fundamental role is played by the category of economic instruments: the European Commission, in fact, has recommended their use due to their potentially greater efficiency and effectiveness (European Commission 2007a and 2007b).

The incentives can take the form of subsidies, tax breaks, or investment incentives. Applied to the sustainable energy sector, these instruments have in common the function of reducing the difference in cost between traditional and renewable energy sources, a difference which, above all in the beginning, is very significant. The first motivation in favour of the creation of subsidies in the agro-energy sector, in fact, regards the necessity to support business initiatives with initial expenses and market development.

This study arose from the observation that, up to now, a large part of the institutional incentives to promote agro-energies have been designed according to a "coupled" model, mostly linking incentives to production levels. Although these measures are different and may be aimed at different production stages, they have proven to produce potentially distorsive effects (FAO 2008). Furthermore, while acknowledging the positive social effects which can derive from the production of sustainable agro-energies, no incentives exist that are directly aimed at promoting an optimal supply for the entire community.

2. European- and state-funded incentives in favour of agro-energy. The European Union (EU) has been working for a number of years to promote agro-energy. The documents issued in recent years are especially important, beginning with Directive 2001/77/EC, and in particular Directive 2003/30/EC, the 2005 Biomass Action Plan and Directive 2009/28/EC on the promotion of renewable energy sources (RES), which has established the goal to reach 20% of RES in the final energy consumption by 2020, obliging the member States to adopt a national plan of action for energy obtained from RES.

The EU intervention supporting agro-energy finds its natural and preferential collocation within the Common Agricultural Policy (CAP). Foremost the CAP sustains the energy supply originating from agriculture and forestry, but also the use of agro-energy in agricultural businesses and rural areas.

The support in favour of agro-energy played a prominent role within the CAP 1992 reform, with energy crop cultivations becoming an additional source of income for farmers who were allowed to use the portion of land they were obliged to set aside.

With the Fishler reform of 2003, the CAP placed an even greater emphasis on the opportunity to cultivate agro-energy crops on set-aside land:

there are approximately 1 million hectares of land subject to set-aside farming destined for crops not intended for consumption, of which 0.85 million for the production of oil seed crops for biodiesel (European Commission 2009). While on this subject, note that as of 2009 agricultural businesses are no longer required to practice set-aside farming.

To further stimulate the production of agro-energies, the CAP introduced a scheme linking the payment of a bonus to production levels. In fact, farmers growing energy crops, in virtue of Directive 2003/1782/EC, could take advantage of a special aid programme paying € 45 per hectare (up to an eligible area of 2 million hectares maximum) with the obligation to conclude a contract with a collector or first processor (private consumption excluded). This scheme, however, has been abrogated starting in 2010, as dictated by Directive 2009/73/EC.

Therefore, as of 2010, the measures providing support for the production of agro-energies have been eliminated. Notwithstanding, agro-energy production is still encouraged, both by the growing international demand (also boosted by the need to reach the objectives established by the institutions by 2020) and by the EU interventions in the field of rural development.

In the Rural Development Programmes – RDP (*Programmi di Sviluppo Rurale – PSR*) published by Italian regional authorities in implementation of European and national strategies, there are in fact many financial opportunities in favour of investments aimed at stimulating the production of agro-energy sources.

Additional resources can also be obtained from the so-called "Health Check" of the Common Agricultural Policy and from the progressive increase of compulsory modulation, which gradually shifts financial resources from market policies to those aimed at rural development. Due to these interventions, Italian regional documents regarding rural development plans have been reviewed, resulting in the request to the European Commission for a additional allocation of almost € 60 million in favour of agro-energies (Mipaaf – Rete Rurale 2009).

Moving on to analyzing the intervention of the Italian government, one can observe that the system of incentives for the agriculture sector to develop agro-energy resources is rather varied and can be inserted in a more general context of support offered to renewable energy sources (Giuca 2007, Jodice and Tomasinsig 2006). However, a system of tax reliefs is available to those farmers who produce biomass as an alternative fuel.

The advantages contained in the most recent Budget Laws are particularly important, even if their application is hindered by a lack of bureaucratic and administrative simplification. Notable is the introduction of the all-inclusive tariff of 0.28 €/kWh in favour of small systems of biomass production (inferior to 1 MW power) and an increase of the multiplication factor used to calculate the "green certificates" in favour of systems

above 1 MW power. Also worth note is the fiscal advantages available for the production of bioethanol and ethyl-tert-butyl-ether (ETBE) originating from agriculture.

From this concise summary of the institutional interventions aimed at promoting agro-energies, an important step which the policy maker has not yet been able to take, in designing incentive instruments, consists in an exhaustive identification and support of the social benefits arising from the production of agro-energy.

3. Social benefits derived from agro-energy businesses. Agricultural businesses can be distinguished from other economical business for their elevated multi-functional capacity. In fact, not only do they produce food and fibres (Commodity Outputs – COs), but they can simultaneously supply, and in certain cases inevitably, a series of other goods and/or services which are beneficial to the entire community.

When referring to the multi-functionality of agricultural activities one generally thinks of their positive contribution to the community. Actually, the multi-functionality of agriculture refers to a series of consequences which are positive, such as those measurable in terms of rural development, food safety and animal welfare; and those of a dual nature, positive or negative, such as those concerning the impact on the resources of the landscape and environment.

The goods and services which originate from agricultural multi-functionality do not always have a market – occasionally a market does exist but is incapable of functioning adequately (Non Commodity Outputs – NCOs) (OECD 1998 and 2001). Therefore these goods and services could be construed, instead, as externalities or public goods, with non-competitive and non-exclusive characteristics. Thus, the supply of NCOs depends on the decisions taken by agricultural entrepreneurs regarding the management of their economical activity. The absence of a market to support an exchange of these NCOs, of course, does not motivate agricultural entrepreneurs to continue their production. So, in order to maintain a continual supply of these NCOs and the benefits which they produce in favour of the community, the existence of incentives is necessary.

It is important to remember that this multi-functionality aspect, and consequentially the supply of NCOs, functions differently in relationship to the spatial and temporal context in which the agricultural activity operates (Casini 2003). In conclusion, that which is perceived as a benefit for the community, may not appear as such in another context.

Social benefits can originate from the production of agro-energy (Bonari et al. 2009, Reho 2009). More precisely, it is a question of positive externality derived from a production of sustainable biomass. In fact, to obtain social benefits the production of agro-energy must be environmentally, economically, and socially sustainable, according to criteria which not always easily identifiable (Bonari et

al. 2009). These factors, for example, have recently reduced the production of first generation biofuels: FAO (2008) has criticized their environmental sustainability, raising doubts on their capacity to reduce atmospheric emissions.

This significant negative aspect together with other equally important factors of an economic nature have stimulated the development of second and third generation technologies, which appear to be more adapt for sustainability. In particular, these technological solutions work in such a manner as not to create competition between agricultural food production and that of agro-energy, regardless of the fact that both involve, in one way or another, the occupation of rural space. In certain cases, they permit the utilization of marginal portions of land, not intended for agricultural production, such as in the case of third-generation biofuels, which are obtained from microalgae (ENEA 2009).

Nevertheless, the relationship that agro-energies develop with the surrounding landscape and environmental resources is fundamental, with consequences also on the services rendered to the landscape and environment. For example, agro-energies can contribute to the reduction of pollution, sustain the development of biodiversity, increase the presence of organic substances in the soil, conserve or create habitats for birds and other animal species, create positive buffering effects, offer an alternative to monocultivation.

The sustainable production of agro-energies can also have significant positive effects on rural development – for example, creating employment opportunities and favouring the occupation of rural areas – and on food safety, as sustainable agro-energies do not diminish the provision of food supplies. Agro-energies also play an important role in the reduction of energy dependence.

These benefits, even if "often adequately considered by the local authorities responsible for territorial planning and rural development policies" (Bonari et al. 2009, p. 30), are not monetarily quantified and, consequently, the corresponding cash compensation is not easily obtainable.

4. Incentives in favour of agro-energy production in regional Rural Development Programmes: a comparative analysis of RDPs from Friuli Venezia Giulia and the other regions of north-east Italy. A comparison of Rural Development Programmes (RDP) issued at the regional level offers the opportunity to observe the type of subsidies created to stimulate agricultural bioenergy sources, their main characteristics and their local application in line with European regulations. The primary objective of the comparison is to trace the evolution of the incentives used, both in their characteristics and objectives, in an effort to identify the existence of actions supporting the supply of social benefits.

The analysis considers two financial planning periods, namely the period between 2000 and 2006 and the current period which extends from 2007 to 2013.

An analysis of the RDPs for 2000-2006 has revealed that measures concerning agro-energies have not always been present – for instance, they are not contained in the RDP from the Autonomous Province of Trento. Furthermore, measures to support agricultural bioenergy sources in the remaining RDPs are not concentrated in one single priority Axis[2]. In fact, the majority are present in the Axis dedicated to conservation and maintenance of landscape and environmental resources, but they also appear in the Axis regarding rural development.

The Axes propose to encourage the production of agro-energies in a number of ways: 1) through the creation of tree farm systems for the production of biomass energy; 2) through the realization of facilities and the acquisition of machinery for the production of biomass energy; 3) through the encouragement to produce biomass energy obtained from existing forests, as long as they are sustainably managed; 4) through the promotion of the use of renewable energy sources for agricultural purposes or for the protection of the rural environment; 5) through the appreciable reduction in the use of fertilizers and pesticides which results from the cultivation of biomass for the production of energy or other industrial uses.

From the data collected concerning the implementation of the measures, it has emerged that not all the interventions led to concrete results. In certain cases, calls for admission to funding failed to be issued (Bolzano), while in others, they were issued but met with a lack of response (Friuli Venezia Giulia – Measure F).

From the analysis of the RDPs for the current financial planning period (2007-2013), there is clearly the presence of a broader plan of action and more effective incentives to stimulate agro-energy sources compared to the previous RDPs, in compliance with the National Strategic Programme (*Programma Strategico Na*zionale – *PSN*) and the European Community Strategic Guidelines.

The subsidies introduced are dedicated primarily to promote income diversification among farmers. In particular, the RDPs place a special emphasis on the role of agro-energy sources, not only to pursue the objectives of the Kyoto Protocol, but also as a potential source of alternative income and employment.

Alongside these measures, the RDPs also include aid to encourage business investments for the production and transformation of biomass (measure 121 "Farm modernization" – "*Ammodernamento delle aziende agricole*"), as well as measures helping companies to invest in the transformation of biomass into energy (measure 123 "Adding value to agricultural and forestry products" – "*Accrescimento del valore aggiunto dei prodotti agricoli e forestali*").

However, the small dimensions of farming businesses and the fragmentation of cultivations represent a limitation to the development of certain agro-energy sources, particularly in some regions, as shown by the analysis of the characteristics of the incentive measures present in the RDPs.

Incentives for the realization of agro-energy infrastructures in rural areas are also contained in measure 321 of the RDPs, which is dedicated to "Basic services for the economy and rural population" ("*Servizi essenziali per l'economia e la popolazione rurale*").

In general, in their provisions for the development of biomass energy production, RDPs lay a particular emphasis on the promotion of innovative solutions. In some cases, less traditional solutions are encouraged, for example supporting the production of sustainable energy from solid waste and agro-industrial by-products.

Incentives have also been designed to support the realization of facilities for the production of biogas from animal waste, although definitely more incentives have been created for the production of energy from the forestry sector.

In the RDPs analyzed there appears, even if not explicitly, a preference for integrated projects which have an overall beneficial effect on rural areas. Therefore, the following projects are favoured: integrated territorial projects (*progetti integrati territoriali – PIT*), integrated production-chain projects (*progetti integrati di filiera – PIF*), as well as the development of local action groups (*gruppi di azione locale – GAL*) within Axis 4 (LEADER), in an effort to approach agro-energy themes in a transversal manner.

As mentioned before, based on increased modulation and the "Health Check" of the Common Agricultural Policy, additional resources have been allocated to the Rural Development Programme 2007-2013 to sustain specific aims including renewable energy, with agro-energies playing an especially important role, in some cases exclusive. Nonetheless, from the analysis of data it emerges that not all the regions examined have decided to direct the additional subsidies to the promotion of renewable energy (Table 1). More precisely, while the Veneto region has destined € 16.6 million for renewable energy, a sum significantly higher than all the other Italian regions (27.26% of total national resources for renewable en-

Table 1. Distribution of additional resources in favour of renewable energies – public expenditure (euros).

Region	Renewable energies	Total additional resources
Bolzano	/	18,023,685.00
Emilia Romagna	385,361.67	51,378,596.67
Friuli Venezia Giulia	/	13,221,343.33
Trento	/	9,376,671.67
Veneto	16,644,605.67	79,052,420.00
Total for Italy	*61,063,477.14*	*775,806,667.00*
%	*7.87*	*100*

Source: Mipaaf – Rete Rurale 2009.

ergy), and the Emilia Romagna region has opted for an additional € 390.000 (0.63%), Friuli Venezia Giulia and the Autonomous Provinces of Bolzano and Trento have decided not to direct additional resources to sustainable energy (Mipaaf – Rural Network 2009).

From an observation of the data on the national average, one can note that these additional resources in favour of renewable energy, which, in any case, will be negotiated with the European Commission, have been evenly distributed among the first and the third Axis (respectively, 52.43% and 47.57% of total resources). The measures which prevail within the Axes are measure 311 "Diversification into non-agricultural activities" (40.80%), measure 121 "Farm modernization" (28.22%), and measure 123 "Adding value to agricultural and forestry products" (13.88%).

From the analysis carried out in these pages, it can be evinced that the incentives provided by the policy maker are not linked to the production of social benefits: in other words, the subsidies for agro-energy sources have not been designed to provide positive consequences for the community. Notable is the fact that OECD (2007) had already pointed out that often the development of agro-energy production use instruments incapable of generating landscape and environmental benefits. So if the aim of the policy maker is to produce social benefits, they must opt for another category of incentive instruments which are truly capable of reaching these goals (Tinbergen 1952).

5. "Payments for Ecosystem Services" in favour of the social benefits derived from agro-energy production. The acknowledgment of the importance of the social benefits deriving from agro-energy production should be an ulterior and fundamental step to be taken by the policy maker. Only starting from this premise it will be possible to move on to new class of incentives, specifically aimed at rewarding social benefits.

The identification and acknowledgment of the main benefits (positive externalities / public goods) which can result from agro-energy productions are fundamental to the elaboration of adequate incentives. In particular, it is necessary to single out those externalities which appear to be most advantageous, so as to reward the social benefits they produce.

One incentive specifically dedicated to recompensing the social benefits obtained from the supply of landscape and environmental services is the so-called "Payment for ecosystem services – PES". It consists of a voluntary transaction, in which a landscape and environmental service (or use of the land to provide it) is purchased from at least one buyer, who has at least one supplier (an agricultural entrepreneur or manager of a protected area) who controls the supply of the service (Wunder 2005). The transaction is carried out if, and only if, the supplier guarantees the supply.

This type of incentive is advocated

by authoritative international institutions, including OECD, the World Bank, and FAO, each of which have experience implementing incentives in diverse contexts (developed and developing countries), reaching the same positive conclusions regarding their effectiveness and efficiency (Pagiola e Platais 2007).

PES, in fact, if applied correctly, proves to be a "key element" stimulating the production of environmental services, including those deriving from agro-energy.

This type of economic instrument is based on the principle that the suppliers of environmental services should be compensated/motivated and the beneficiaries of such services should pay for the benefits received. The level of PES should be fixed so that it is higher than the added benefit the supplier of the environmental service would have derived by not producing it. On the other hand, PES should be lower than the value of the benefit obtained by the consumers, otherwise their willingness to pay would diminish. It is understood that this reasoning is based on the possibility of identifying the beneficiaries of the environmental services.

In order to be a truly valid incentive, PES should have continuity and a duration equal to that of the environmental service supplied; it should be differentiated, depending, for instance, on the costs sustained by the supplier – also taking into account the possible increase in costs.

The use of this incentive attempts to "get around" the intervention of the policy maker, considered inefficient (Pagiola and Platais 2007), creating a market for the exchange of landscape and environmental services. However, it does not lead to immediate results. The market is not yet capable – except minimally – to adequately appreciate the products derived from the production of agro-energy. In this case, public subsidies are still necessary to start up a market where private buyers and suppliers can independently operate.

The introduction of subsidies to sustain this kind of market becomes, therefore, an indispensable aid to guarantee the production of services which have a collective value, but do not have a monetary value yet. They are incentives designed to help suppliers continue and improve their production, by offering temporary assistance during the initial period of market awareness and growth. This kind of temporary assistance has already produced beneficial effects in other agricultural sectors, such as with agritourism and the certification of quality products.

This type of public intervention must not be confused with an indiscriminate distribution of subsidies, where agricultural entrepreneurs decide if it is to their advantage to concentrate on agro-energy products rather than on food produce. As described above, the aim is to create the conditions necessary for the compensation of a service which has beneficial effects for the entire community.

6. Conclusion. The function of public incentives in the promotion of

agro-energy production remains fundamental, particularly as a support to the development of technologies that agricultural businesses on their own, due to their structure, would not be able to produce and tend to obtain abroad (ENEA 2009). Although support for research and development exists, incentives are not adequate to sustain second and third generation technologies, more advanced and efficient. And it is from scientific research that we can expect satisfactory and prompt solutions so that the agro-forestry sector can guarantee, within its multi-functional role, the vital quality-quantity function (this latter aspect especially important in certain geographical areas) of food production.

At the same time, though, it is crucial that agricultural entrepreneurs develop a capacity to create markets for the benefits their activity generates in favour of the community, preferably without the intervention of the public sector.

Up to now, institutional incentives to promote bioenergy sources have been used to bridge the gap between the costs of production and the selling prices in the market. Since the incentives created still need to be coordinated, a duplication of incentives has occurred. Moreover, their adoption is not usually based on an evaluation of their particular effectiveness, and consequently it is not clear if the goals established have been achieved (Marangon et al. 2007). The analysis has also brought to light the lack of incentives designed to encourage the creation of positive externalities and public goods through agro-energy production. This is probably the result of the inability to identify and quantify the social benefits deriving from the multi-functional role of agricultural businesses linked, in this case, to the production of agro-energy.

In order to enhance the supply of benefits in favour of the community, the conditions must be created for an adequate market to develop. To attain this goal, the use of PES appears to play a fundamental role, first through the participation of the policy maker, and subsequently, when the market has grown to appreciate the social benefits, through the exchange of goods and services between private parties.

[1] The author wishes to thank Professor Francesco Marangon for his constant scientific support and precious cooperation.

[2] The RDPs are organized according to priority Axes (*Assi*). Every Axis includes a series of measures and actions to allow the implementation of the objectives. For 2000-2006, the Axes were dedicated to encouraging business competiveness, to the environment and to integrated rural development. For the current period 2007-2013 they concentrate on: the improvement of competiveness in the agricultural and forestry sectors (Axis I), the improvement of the environment and rural areas (Axis II), the improvement of the quality of life in rural areas and the diversification of rural economy (Axis III). A fourth Axis, called LEADER, promotes the realization of integrated strategies through a wide partnership base, on a local scale.

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