

GREEN CERTIFICATES MARKET

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The steep economic growth in emerging countries (China, India, Russia, Brazil) leads to a rise in the world demand of energy; in the short run, the predictable result is the a rise of prices, but in the long run, the basic problem is the limited amount of energetic resources that the planet can offer. Discovering new fields of oil, gas or coal may hardly postpone only with a few decades the deadline for the depletion of these resources, but it is obvious that it is not a solution for one hundred years from now on. Even if we ignore market constraints, this limitation is inevitable, so the necessity of discovering alternative sources seems the only valid approach.

Key words green certificates, market energy, renewable energy

As stated above, in the short run, there is a tendency of growing usage of these resources, which is obvious if one looks at the oil price (from \$2,89 in 1970, to about \$30 at the end of the decade, and \$115 – last month). On the other hand, producing energy is, in most of the cases, a polluting activity, and the growing environmentalist pressures might lead to a reduction of production. As it is not very likely that this will happen, the only solution remains to use other sources for obtaining energy.

Both paragraphs above lead to the idea of the necessity of encouraging renewable and clean energy production, both because it is a solution for the externalities in industry and because it is a strategic, long term solution. But implementing this idea in an efficient manner, and according to the economic mechanisms, is a problem more difficult than it may seem. European Union has an important role in this process, for more reasons: massive concentrations of population and its high sensibility at environment issues and the lack of large inhabited areas, as there are in USA, Russia, or China; also, the political and economical organization of the Union mitigates the structural development policies, which means that not only does it have grater need, but also, it has greater capacity to approach such problems, capacity which is due to its institutional frame, and to its previous experience.

The problems deriving from the implementation on non-polluting renewable energy sources arise both from technical aspects concerning the industry itself as from the economic ones, especially those connected with market mechanisms.

The energy market presents a series of particularities of the production factors and of the product's nature; those give the specific features of the companies in this field and implicitly act on competition. First, we are talking about interconnected markets of partially or complete substitute products. Traditional resources are oil, coal and natural gas, the only significant clean alternative being hydro energy. There are several uses for these, as production of fuel for transport (oil- dependent in it's majority), energy for heating and electric energy. This paper aims to analyze mainly the last component, as the technical nature of clean energy from renewable sources encourages this sector.

At present we have the following renewable sources: wind, solar, hydro, geothermal, biomass and tidal wave energy. These should gradually replace the first category, but transition should occur according to market laws, meaning that alternative sources must prove more efficient from the economical point of view in order to be freely chosen by firms. Here we have one problem regarding competition between fossil fuels and renewable sources: the first benefit from a series of advantages in production, a fact that is underlined by today's market itself. In order to encourage electricity production from renewable sources we must identify and eliminate its disadvantages wherever possible.

A first aspect of a technical nature that favors fossil fuels comes from the economies of scale. The entire energy industry seems to be influenced by this phenomena, general market structure depending at first on

this cost reduction form: larger thermal plants and dams are more efficient and operate at lower costs; in Romania, in 2006, 47,7% of the energy was produced by five big thermal plants (Turceni, Rovinari, Deva, Craiova and Elcen Bucharest); adding to these 9,3% from Nuclearelectrica and 31,1% from Hidroelectrica – most of it from large dams like Portile de Fier, it becomes obvious that economies of scale decide the fate of firms in this industry.

The problem with renewable energy sources is that they have technical limitations in size, so they cannot benefit from economies of scale. Micro hydro plants (those having an installed power below 10 MW) are also limited by the energy potential of falling water and are not a viable source in the long run. Geothermal energy is scarce and also has limited potential, at least in the current stages of exploitation; tidal wave energy is currently limited in size, the most recent projects with 750KW (Portugal) and 2 MW (California, USA) -representing small capacities. These energy forms cannot be taken into account in order to solve the energy problem from the quantity point of view, representing a form of diversity in this field at most. To these we must add the problem of energy transportation and production costs, as markets will not choose economically inefficient forms of energy production.

Those forms having long term potential – whose capacities would be compatible with global economy necessities – are wind energy, solar energy and biofuels. If we refer to installed power potential, solar energy out passes by several thousands of times the present day production capacity (about 90,000 TW compared to about 15 TW) and wind energy by 20 times (about 370 TW). The issue of putting this potential to work remains open, but its existence is certain, unlike other renewable sources. Biofuels are a viable alternative to oil in transportation, but have the disadvantage of a high opportunity cost in the current global food crisis.

Analyzing the economic potential of the two remaining sources (wind and solar), we can notice the same problem of size as a way to decrease costs, sun based installations having dimensions ranging from hundreds of kilowatts to about 10 megawatts (Solarpark Bavaria, Germany); one major impediment is the rate of transformation of solar energy into electric energy (panels' efficiency), also this is known to have improved significantly. Still, in order to understand the present day dimension of usage of solar power, the total installed capacity by the end of 2007 was about 12,400 MW, most of it in Japan, Germany and USA. By comparison, the solar energy produced by a developed economy from the top of the chart is about the same with a single thermal plant (Turceni, Rovinari). Wind energy remains for the moment the only important alternative because it has both potential for development and some economic advantages at least compared to other renewable sources. Germany, USA and Spain are the states with the largest installed power (about 22,200MW, 16,800MW and 15,100MW), world total being of about 93.800MW. It is also important to mention annual market growth, in some countries even by 40% per year. One important competitive advantage derives from cost structure; although wind energy does not show economies of scale, it has a very low marginal cost; we can assess that once the fixed cost of the capital is paid – which is high indeed – production itself is extremely cheap, making the cost per Mwh comparable to other forms based on fossil fuels. International Energy Outlook (2006) published by United States Energy Information Administration shows that 1Mwh costs 55,8 USD if obtained through wind energy, 53,1 USD by coal and 52,2 USD by natural gas (other estimations show larger gaps between the three)

We intended to underline in those above two important aspects for the development of policies that would encourage alternative ways of production: the potential of a source (important in the long run) and economic efficiency (necessary to development through market mechanisms). The data presented show that only some types of renewable energy depicted by EU policies have both of them; for the moment there are competitive disadvantages, and the European strategy must attempt to eliminate these.

One additional reason for the European Union to show more interest in this aspect is the configuration of fossil fuel resources. Compared to USA and Russia, Europe is almost totally dependent on oil and gas imports; except for Germany, Great Britain and Poland, coal isn't available either; besides, this only resource Europe has to some extent is also the most polluting. Escalating political tension and the possibility to use energy resources to such purposes further impose a quick solution for the EU.

The strategy is ambitious from this perspective. Directive 77/2001 establishes a target of 21% out of total EU consumption from renewable sources, member states having adopted each a quota system and an annual road map. Preliminary data show a setback in this respect, estimations being of only 19% by 2010. Taken in itself, it is an important number, but composition by types of energy in 2005 proves 66,1% coming from hydro energy, which is not a significant progress and as we have shown neither a

development potential (it refers to existing dams); about 16.3% comes from wind energy and 15.8% from biomass, while only 0.7% is given by solar energy.

Some of the cost advantages of fossil fuels based energy production is provided by the fact that firms in the industry do not pay the full cost; besides the issue of long term exhaustion, fossil fuels have become unwanted due to pollution; negative externalities are costs that population and other agents have to pay. Both reduction of pollution and competitiveness can be solved if cost internalization for polluters is achieved, as well as nonpolluting energy production through market. There are, of course, solutions like subsidies or fines, but economic theory proves these are not viable for a number of reasons: economic calculus is difficult, and intervention could affect market results, while implementing such measures represents a cost in itself. Price control is not compatible with market economy.

One proposal that was accepted in this direction is green certificates market. The idea is based on the Kyoto protocol, a system of transactions with pollution quotas through which less polluting countries sell their rights to the big pollutants; of course, in the last resort, transactions refer to individual companies based in those countries, according to the polluter-payer principle. What differentiates this system from other attempts or hypothetical approaches is its compatibility with market rules: price is established between buyers and sellers, acting as a tax on polluters (thus implicitly internalizing costs) and as well as a subsidy to non polluting industries. The European Union takes this idea one step further, as transactions with green certificates take place between energy suppliers, according to the way they produce it.

One green certificate represents the equivalent of one megawatt-hour of energy produced from renewable sources and is given to the suppliers. They sell the certificates to energy producers using fossil fuels. In Romania, green certificates transactions started – according to ANRE – at 16th of November 2005; these constitute goods in themselves, meaning that can be sold distinctly from the energy and can be transferred between suppliers. A certificate is considered “consumed” when used by a supplier to prove quota payment as imposed by ANRE.

In order to encourage gradual market development, green certificate purchasing quotas imposed on suppliers are of 0.7% in 2005, 2.22% in 2006, 3.74% in 2007, 5.26% for the current year, 6.78% in 2009 and 8.3% for 2010 -2012. In 2006, a supplier had to buy one certificate for every 1893 Mwh delivered, and this quantity decreases as the quota increases. The market administrator is OPCOM, and the eminent is OTS – CN Transelectrica S.A. There are limitations (minimal and maximal) for the price of a certificate, established by the Government to 24 and 42 Euro until 2012.

At the European level, not all states have implemented a specific market, only seven member states actually have such a system. (Belgium, Great Britain, Sweden, Italy, Poland, Bulgaria and Romania) At present there are differences from state to state regarding market rules and functioning.

It is obvious that green certificates system is a better policy than the previous ones, especially because it deals with pollution issues and long term production in a manner compatible with the market. There are yet some limitations to this system, foreseeable from the very beginning. The first is that in a market, transactions are determined by free will; in the green certificates market, even if renewable energy suppliers want – in a natural way – to sell, suppliers of energy produced from fossil fuels have no natural inclination to purchase them, having no practical use. They must therefore be constrained to do so by instating a quota system. Choosing arbitrarily a quota is much more compatible with the market than to establish fines or price control and also serves better in a direct way to the objective of European policy to structurally change energy production from quantitative perspective. Another advantage is that it will allow the development of those renewable energy sources that will prove more efficient, which is impossible to decide ex-ante (are solar energy or geothermal more efficient and viable than wind energy? And how are we going to decide that ex-ante?)

An important characteristic for this market is gradual transformation. We cannot change the industry overnight and not even in several years. The solutions found must prove their sustainability exactly by the duration of efficient functioning. For that reason, it takes time and a progressive quota system, but with acceptable values for the market especially from the technical point of view. It is also necessary that it be transparent, without modifications and communicated in anticipation by at least several years so firms can make calculations and predictions.

There is an important limitation of the potential effects of green certificates market, at least in the manner in which it functions today. The few markets at the European level are national ones and do not form a common market. The most important by size, England, does not allow international trade with green

certificates, Italy permits import and Sweden export. This has serious implications over price, but also over efficiency; due to the fact that the price is determined by demand and supply, it results that the decisive factor is the percentage of the renewable energy and that based on fossil fuels, the ratio between the two. States with a low share of non pollutant sector will have a market with few certificates emitted and many buyers forced to purchase; price will obviously be high, which is supposed to encourage renewable energy. States with already important share of renewable energy (and there are some of those, as hydro energy is considered non pollutant and hydro producers are sellers) will have a lower price. This happens as more and more such suppliers enter the market, leading to two important conclusions: first, green certificates market is a good solution to start the clean energy production from zero to 10 or 20%, not for complete elimination of polluting industries, meaning that as the ratio changes, the way the market works or the quota system will have to be reconsidered; second, since renewable energy is subsidized by pollutant one, the larger the volume of the latter, the more clean energy production will be encouraged. Countries already producing fossil fuels based energy have better chances to develop a high production of clean energy, while those either producing less energy today or have a lower share of coal and gas and higher of hydro have their opportunities to develop large capacities diminished.

The hypothesis above works in conditions on unconnected national markets, with many evidences supporting the statement. The first three producers at European level are Germany, France and Great Britain, the last one being the only one which implemented a specific market; obviously, this is not open to the transactions with the outside. If we follow a classification of the producers based on the weight of unpollutant energy, first states are Norway, Austria and Sweden. The only one which has a green certificates market is Sweden; even more unlike Austria, which gets about a third of the electricity from fossil fuels (coal, gas, oil), in Sweden these are practically missing. The half not obtained from renewable sources comes from nuclear centers. There is a large number of certificates sellers, and a small number of buyers; obviously, Sweden has the lowest price, 25 Euro, and allows green certificates export, this being a way to extend the industry based on other states with large weights of polluted energy and large prices of the certificates. The largest price was registered in Belgium, 103 Euro, the energy from renewable sources being practically absent here. In Italy, the price has grown from 98,9 to 139,1 Euro in 2006. Norway doesn't have a market because it is all based on hydro energy and there are no potential buyers of the certificates.

We have mentioned that certificates transaction is being done separately from the energy, acting more like a financial asset. In this case the prices should be close between different markets; the fact that in reality this doesn't happen clearly shows that we don't have a unique market, but a series of unconnected national markets.

Building a market at Union level would increase the efficiency in the production from ecological sources, because the producers will be able to address also to some buyers outside that state, expanding the potential market and encouraging the sector's development. For now, the numbers show that the green certificates market is more an intention than an accomplishment, by its insignificant effects; in 2006, on the Romanian market have been emitted 22.745 certificates, according to a similar production of MWh; the total production of energy summed up 62,43 Twh, or 62.430.000 Mwh.

The large differences of price lead to the conclusion that similar effects can be obtained by trade with green certificates between E.U. members, even if it doesn't immediately involve trades of actual energy, because it would act like a subsidy for the producers from certain states. The effect is asymmetrical, some countries having a better potential in the "green"energy production, unexploited for now because of a larger market; but if the E.U. members are willing to forget the national aspects, the result will be significantly better.

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