

# Measuring the « green economy » : a French perspective.

According to an article published in “Economie Française” Edition 2012 [1]

« *Définir et Quantifier l'économie verte* »

**Abstract.** In order to define and measure “green activity”, two kinds of perspective can be thought of: its finalities or its impacts. An activity is considered as “green” if it aims at protecting the environment (these are “*eco activities*”). On the other hand, an activity is said “green” if it generates less pollution and uses less natural resources than an equivalent “non-green activity” (these are “*adapted activities*”).

Over the past 20 years, according to environmental efficiency indicators, France is getting better, partly due a better energy efficiency in the industrial sector, partly due to a development of the services sector, but also as a consequence of the outsourcing through imports of some previously domestic activities. In 2009, around 450 000 people work in “eco activities”. The figure is around 960 000 if “adapted activities” are given due consideration.

## 1. **Environment and growth: a long history**

Since the 1970's and the oil-shocks we realized that, as mankind, we face a limited amount of natural resources, potentially exhaustible. Since then, the exhaustion of natural resources is more and more considered as an option and the connection between environment and economy has gained interest within academic and political circles.

In 1972, the so-called “Roma Club” published the much debated “Limits to Growth” report which concluded that seeking economic growth might lead in the middle term to more pollution, exhaustion of natural resources, impoverishment of arable lands and ultimately to a fall of world population.

The same year, the United Nation Conference on environment, held in Stockholm, addressed the interconnections between economy and environment and the conditions of a development model consistent with environmental concerns and social fairness. For the very first time the label “eco-development” was set, which prefigures the concept of “sustainable development” defined in 1987 in the “Brundtland report” as “a certain type of development that meets the needs of present générations without compromising the ability of future generations to meet their own needs.”

In the following year, during the 1980s, a serie of industrial accidents (Seveso and Bhopal chemical plants explosions, wreckage of oil-tankers, nuclear plants accidents at Three-Mile Island and Tchernobyl) made environmental concerns more pressing. It was no more only a question of natural resources but also a question of external effects of human activities (“externalities”) on well-being of actual and future human beings as well.

In addition to natural resources and environment, a third wave of concerns emerged as “global warming” became a prominent issue and in 1988 was created the “Inter-Governmental Panel on Climate Change” (IPCC) to assess the magnitude of climate change and its consequences on environment, economy and the society at large.

## 2. Looking for a definition of “green economy”

This quick historical set up illustrates the growing environmental concerns and the needs to measure the relationship between economy and environment. Before measuring “green economy”, it takes first to be defined. Two definitions can be considered. One focuses on the activity and its primary goal: an activity will be said “green” if it produces goods and services which aim at environmental protection and management of natural resources. The other considers the “impacts”: an activity will be told “green” if it generates less pollution or waste and uses less natural resources than an equivalent “standard” (e.g: “non green”) activity.

### 2.1 Economic finality

According to this approach, any economic activity will be labeled “green” if it primarily aims at producing, goods and services protecting the environment

But some caveats have to be considered. For instance, some activity can aim at protecting the environment on the one hand but contribute to harm it on the other hand because of its impacts or its inputs: a good example of it can be electric batteries which contribute to the development of electric cars, which is good for the environment, but which take dangerous inputs to be manufactured. Reciprocally, the so called “new fertilizers” designed to be more environmentally friendly but at the cost of production process which still are highly polluting. The other way round, activities not aiming at the environment protection can have positive impact on the environment if a by-product or use produces so few waste or energy that it can deserved to be labeled as “green”. Generally speaking a good deal of services activities are very thrifty in energy and input and might deserve to be said “green” even if they are not meant to protect the environment. (*Table 1*)

**Table 1: Two criteria for assessing green activities**

|                                    | Activity which purpose is the protection of the environment | Activity which purpose is not the protection of the environment |
|------------------------------------|---|---|
| Low pressure on the environment    | ex : R&D in energy efficacy                                 | ex : teaching, tertiary sector                                  |
| Strong pressure on the environment | ex:chemistry of new fertilizers                             | ex: heavy industry, mining, power generation                    |

## 2.2 *Impacts*

When it comes to the inter-relations between environment and economics, the first step is to define precisely what one labels as “environment”. Generally speaking, it is a whole set of non produced assets such as air, water, forest, biodiversity, rocks, fauna and flora, etc... Economic activity can disrupt these elements either by emitting pollutants into the air, soils, or water, either by producing waste, noise, affecting biodiversity, either by taking off scarce or endangered resources.

Depending of definition or criterions some activities can be labeled “green” or not. A good example are “low consumption bulbs”: they are meant to lower energy requirements, which is good for environmental purposes, but, in the same time it takes toxic chemical products (mercury) to produce them, which ultimately pollute. Same kind of reasoning can be made about nuclear power generation which can save CO<sub>2</sub> compared to coal or oil power generation, but it needs a scarce non-renewable resource (uranium), and produces very dangerous and harmful wastes that can affect future generations’ well-being.

Taking into account time can also lead to different classification depending on the way “green” activities are assessed against short, medium or long run. For example Chlorofluorocarbons (CFC) have very long term effects on the ozone layer: so if evaluated on short term, their impact on environment would be underestimated. Different geographical scopes also have their own implications: less dirty industries at home may very well be the result of outsourcing (typically in low developed countries) these activities. At the end of the day, the total amount of waste or pollution worldwide can very well be higher even if I feel better at home as a result.

With all these caveats in mind, if a given economic activity has less impact (in the sense of less pollution, lower use of natural resources or energy) on its environment, it will be said “greener” than the same activity elsewhere with more impacts on the environment. This definition is “relative” in the sense that is contingent to a certain state of technological knowledge, consumer’s preferences, relative prices of products, etc.... “Green activities” won’t be the same at two different points of time or in two different locations because “standards” won’t be the same.

## 2.3 *Green growth*

Taking into account the overall impacts on environment, one can define the concept of “green growth” which is opposed to, let say, the current “brown/black growth”. Needless to say this is not a standard theoretical economic concept/definition. It is just to mean a less intensive in fossil energy kind of growth such that “Inter-Governmental Panel on Climate Change” (IPCC) recommendations to keep global warming under control are met. A more stringent definition of “green growth” will

be a model of growth which is less intensive, not only in fossil energy, but also in natural resources and which leads to less wastes of any kind in the environment. The issue here is to take into account environmental requirements without abating the overall capacity to generate wealth, employment and investment. The OECD states that “a green growth policy is about fostering and development while ensuring that the natural assets continue to provide resources and environmental services on which our well-being relies. To do this it must catalyze investment and innovation which will underpin a sustained growth and give rise to new economic opportunities.” (“Towards a green growth”, May 2011). “Green economy concept is not a statistical concept but a “macro economic” one.

#### 2.4 *Sustainable development*

As mentioned earlier, this term was first used in the 1980s and made popular in the so-called “Brundtland Report” en 1992. It deals with something which is “self-sustained”, which is also able to accommodate shocks and different kinds of hazards. It is a macro-economic concept which encompasses social dimensions such as education, health and well-being and it tries to take into account long term aspects of development. But the exact meaning of “sustainability” is very much a question of development goals. It also very much depends on considering or not, and to what extent, substitution between natural and produced capital.

This “sustainable development” concept is a two tiers concept: compatibility between present and future generations satisfaction needs on the one hand and compatibility between economic development, environment protection and social fairness on the other hand [matching local needs within global limits]. The first goal express a concern of intergenerational fairness vis-à-vis the use of limited amount of natural resources. One problem here is to find the “good” weight to be accounted for future generations against present ones. The second goal takes into account three competing dimensions: economic, environment and social and raises the question to know how substitutable the four kinds of capital (physical/traditional, natural resources, human and social capital) are.

### 3. **“Eco-activities/eco-products”, “green economy”, “green jobs”**

The last set of definitions we would like to present is about notions that are commonly used when it comes to quantify how “green” the economy is. Let’s first look at the “eco-activities/eco-products”. It is defined by the very aim of its activity, not according to its impact on the environment. The statistical definition envisioned by Eurostat and the OECD makes room to comparisons between countries. In this framework, “eco-activities” means a set of activities which produce goods or

services aiming at protecting the environment or managing natural resources. To define them, a list of products and activities according to the classification of activities or products (CEPA 2000 or CreMA) has been made available by Eurostat in the EGSS (Environment Goods and Services Sector) 2009 HandBook. Of course, “eco/green jobs” are the jobs generated by these activities. These are mainly preventive or curative activities directed to preserving the environment in a traditional way (water, air, soils, waste remediation, noise...). For the most part, these are “traditional” activities, pre-existing to any environmental concerns.

“Green economy” is a more general term, and focus on the way of producing as well as the product/service produced. We are here talking about efficient productions in terms of the uses of natural resources of any kinds and low impact on environment. For the time being, no agreed definition is available but the ILO offered one which takes into accounts jobs aiming at protecting the environment, jobs linked to low impact activities and jobs generated by “eco activities” (even if they have a high impact on environment). According to ILO a job would be labeled “green” “when it contributes to reduce energy or other material use, to lower greenhouse gases, to limit waste and pollution and to protect eco-systems”. This is a rather extensive definition: for example you find out there steel workers producing blades for wind mills.

As far as France is concerned, the scope for “green economy” to be statistically quantified is composed of the so called hard core “eco activities” in the sense of Eurostat definition (see above) and “adapted” activities producing goods and services that are designed so that their use will be more “environmentally friendly” (reduced greenhouse gases emissions, reduced energy input and output wastes than similar products with the same finalities). Even if not designed specifically for environment protection, these activities lead to a more “environment friendly” type of consumption.

In addition to measuring “green production”, France is trying to measure how many people have a “green profession” through a job classification which tracks professional skills whose aim is “to implement, prevent, control or correct negative impacts and damages made to the environment”. In top of “green professions”, we add the so-called “greening professions”, “whose aims are not environment but that encompasses some skills useful to take into account environmental concerns (e.g: architects, forests, fishing or farm technicians, landscape designers, etc...).

#### **4. Economics and environment: facts and figures**

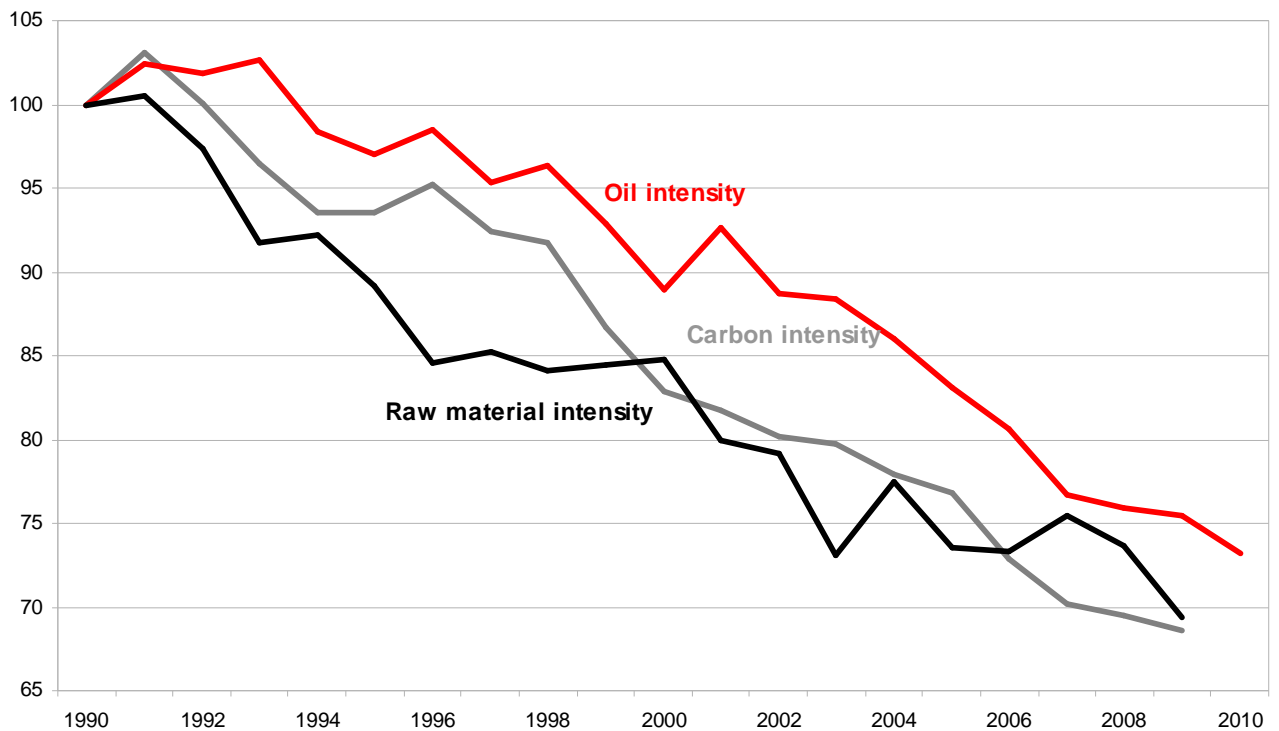
According to the set of definitions above we are now going to present quickly some results concerning the French economy. A first set of indicators measures the “environmental efficiency” of production and consumption. A second set of indicators measures the economic activities

(production, value added or employment) aiming at protecting the environment and managing natural resources (eco-activities, and the so-called “adapted activities”).

#### 4.1 Sustainable development

It is measured through indicators which are included both in the French “sustainable development scoreboard” (CGDD- Insee Highlights, 2012 edition) and in the OECD green growth scoreboard. By and large they say that economic growth has turned more efficient (in terms of natural resources and material uses or waste emitted by unit of production) over the past 20 years.

**Chart 2 - Consumption of raw materials and releases of the French economy since 1990 (index 1995 = 100)**



Scope: France

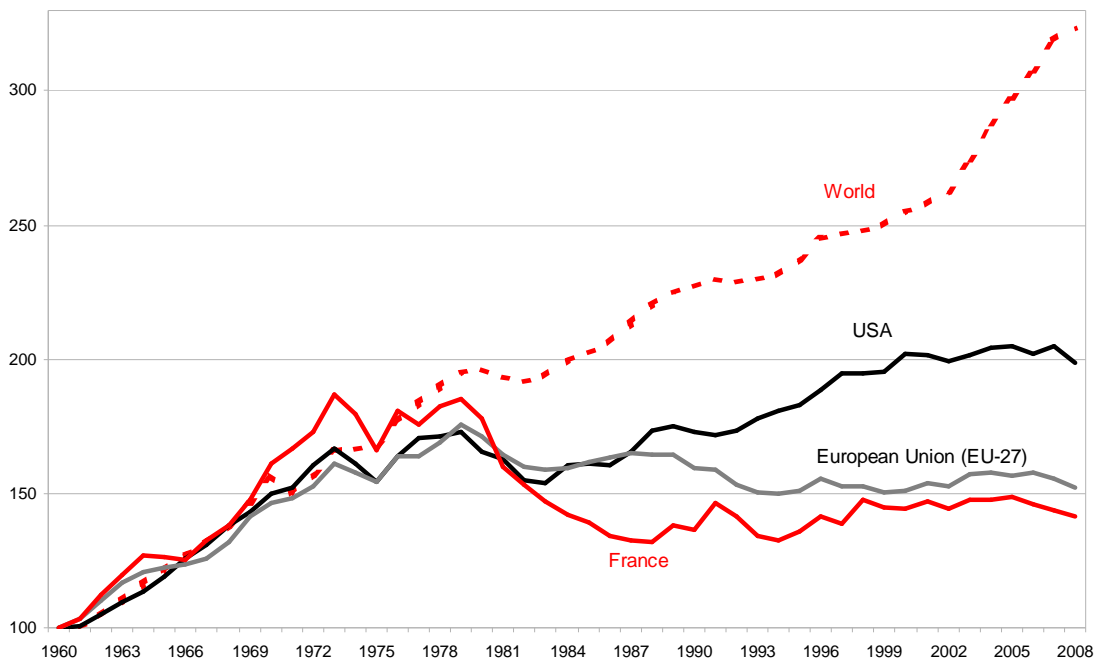
Note: Raw material intensity is defined as the ratio between the apparent domestic consumption of materials and GDP, oil intensity as the ratio between the total oil consumption and GDP and carbon intensity as the ratio of CO2 emissions and GDP.

Sources: Insee, National accounts, base 2005; SoeS

The “intensity in material” (e.g. the ratio of apparent domestic consumption of material to GDP, or the material needed to produce 1 euro of GDP) dropped by 26% between 1990 and 2008. (chart 2). In spite of these progresses, the amount of materials consumed has not reduced, as a result of an

increase in output. Part of this outcome can be assigned to the decrease of “oil intensity” which dropped by 1.5 % a year between 1990 and 2008 which in turn reflects a structural movement in all developed economies: the sectoral shift from industry to services less greedy in energy. It is also fair to note that the improvement is due to the increase of the “intensity in material” of French imports. It is estimated that 40 % of total emissions of greenhouse gases induced by the French final demand are generated beyond national boundaries once due account made of the external trade. In a globalized economy, we have to assess the overall impact of a country’s consumption since climate is a global public good. “Energy efficiency” connected with oil consumption goes hand in hand with some decreases in “carbon intensity” of French production: since 1990, CO<sub>2</sub> intensity has dropped by 30 % (but, since the production increased, the total amount of CO<sub>2</sub> emitted is more or less stable over the period). French trends have been alike those recorded elsewhere in Europe while the situation has been less favourable in the rest of the world: since 1990, CO<sub>2</sub> emissions have grown by about 40 % world wide and about 15 % in the US. (*chart 3*).

**Chart 3: CO<sub>2</sub> emissions since 1960 (index 1960 = 100)**



Source : CAIT, World Resources Institute.

#### 4.1. “Eco-activities” and adapted activities

“Eco-activities” are activities which produce goods and services aiming at protecting environment or managing natural resources. That is the definition adopted by Eurostat in the EGSS Handbook-2009. This book defines “eco activities” and gives an explicit list of activities based on the CEPA

(2000) (environmental protection activities) and the CreMA (management of natural resources activities) classifications.. This statistical definition provides an harmonized framework and paves the way for international comparisons, in space and in time. Seven main fields are identified as far as “protection of environment” is concerned: 1/ air and climate protection, 2/ waste management (used water, waste, street cleaning), 3/ soil protection and sanitation, 4/ fight against noise and vibrations, 5/ protection of landscapes, biodiversity, fight against radiation and 6/7 two types of cross-cutting activities (research and development in the field of environment protection and services activities such as administration, management, training, etc...). When it comes to “management of natural resources” 5 fields and two cross cutting activities are identified: 1/ water management, 2/ forest management, 3/management of fauna and flora, 4/ management of energy (production of renewable energies, management of heat, reduction of fossil resources use, alternative energy resources, etc..), 5/ management of mineral resources, 5/ research and development in natural resources management and 6/ other activities linked with natural resources. Some other activities could presumably have been included in the list such as prevention of natural or technological disasters and urban planning. But the advantage to have done such a choice is to provide an harmonized framework.

To have a broader picture of the green economy, one may want to also include activities which produces goods and services that are favorable in the sense that they contribute to better environmental quality (e.g. condensing boilers, compact fluorescent light bulbs etc...) even if their final use is not aiming at environmental concerns. Nevertheless, for statistical monitoring, Eurostat advocates focusing on the “core” -the eco activities. The reason behind is the question of “adapted” products: these are products which are doing better for the environment than “standard” products. For instance hybrid cars can be said “adapted products” in the sense that their main finality is mobility/personal transportation but, emitting fewer pollutants they can be said more environmentally friendly than their standard counterparts. These “adapted goods and products” differ both from one country to another (it depends very much of national norms and standards) and over time (what is to day an “adapted product” may become the reference several years later and ceases to be an “adapted” product). To take into account adapted activities is important for policy makers but it is much more difficult to design a unique international framework for these products.

France set up statistics on “green activities” which combines “eco-activities” (in the sense defined by Eurostat) and “adapted activities” which have less impact on environment than equivalent activities such as water production and distribution, public transportation in the field of the



“Grenelle de l’ environnement<sup>1</sup>” (rail transportation infrastructures, railways equipment, insulation work contributing to save energy, etc...). Doing the maths lead to the following figures: en 2010, in France, “eco-activities” amounted to 453 000 full time jobs (mainly management of used waters et waste, both around 100 000 jobs each) (*table 4 and chart 5*) . In terms of employment, a lively growth has being recorded with 4.5 % between 2009 and 2010 (0.1% for the overall economy) and in the long run, over the 20 past years, employment has grown by 45 % in “eco-activities” vs 15 % in the economy as a whole. But we have to be aware that this evaluation is partial. It does not take into account indirect jobs and induced jobs. (*chart 6*). Almost 1 million employment are generated in “Green activity” and 70 billions Euros in production.

**Table 4- Production and employment in eco-activities by area in 2010 in France**

| Areas   |                                 | Production<br>(in million of<br>euros) | Employment<br>(full-time<br>equivalent) |
|---|---------------------------------|--|---|
| Environmental<br>protection                             | Radioactive waste               | 700                                    | 2 900                                   |
|   | Air pollution                   | 1 300                                  | 7 400                                   |
|   | Nature, landscape, biodiversity | 1 100                                  | 12 300                                  |
|   | Noise                           | 1 800                                  | 16 400                                  |
|   | Remediation of soil and water   | 3 800                                  | 35 700                                  |
|   | Used water                      | 14 400                                 | 95 500                                  |
|   | Waste                           | 14 100                                 | 97 500                                  |
| <b>Total<br/>Protection de<br/>l’environnemen<br/>t</b> |                                 | <b>37 200</b>                          | <b>267 700</b>                          |
| Resources<br>management                                 | Management of water resources   | 1 000                                  | 6 500                                   |
|   | Energy conservation             | 3 000                                  | 23 000                                  |
|   | Recycling                       | 7 900                                  | 33 100                                  |
|   | Renewable energies              | 12 400                                 | 62 500                                  |
| <b>Total Gestion<br/>des ressources</b>                 |                                 | <b>24 300</b>                          | <b>125 100</b>                          |
| Cross cutting<br>activities                             | Engineering                     | 2 700                                  | 13 100                                  |
|   | R&D                             | 2 800                                  | 17 800                                  |
|   | General public services         | 2 900                                  | 28 900                                  |
| <b>Total Activités<br/>transversales</b>                |                                 | <b>8 300</b>                           | <b>59 800</b>                           |
| <b>General total</b>                                    |                                 | <b>69 900</b>                          | <b>452 600</b>                          |

Scope: France

Notes : preliminary data, total performed before rounding.

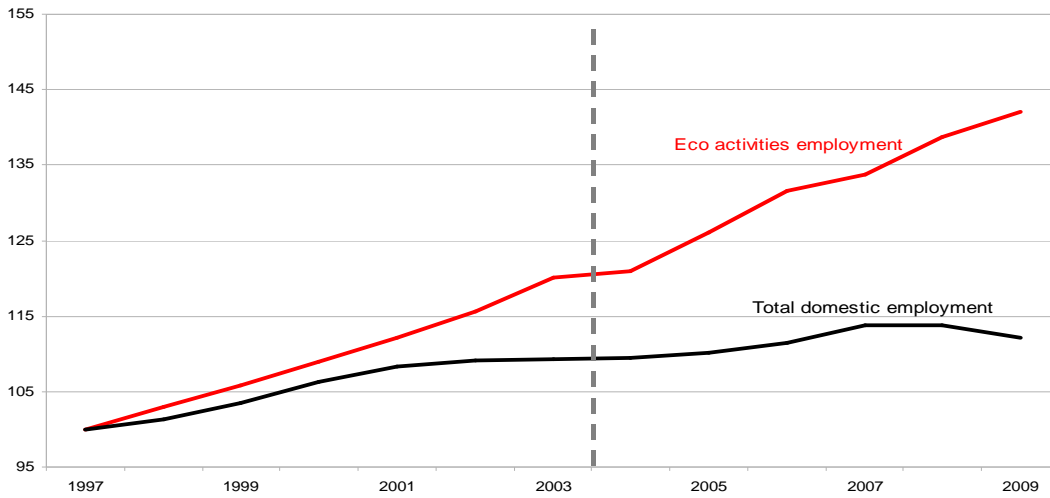
Source : SOeS, 2012.

## 5 Reference

[1] Greffet, P, Mauroux, A, Ralle, P, Randriambololona, C. (2012), Définir et quantifier l’économie verte, *Economie Française*, Edition 2012

<sup>1</sup> A national conference held in 2007 where business, workers unions, NGO, politicians and various public agencies gathered to outline long term policies aiming at promoting a sustainable greener growth.

**Chart 5 - Evolution of employment in eco-activities versus total domestic employment (full-time equivalent - index 1997 = 100)**



Note : Overseas territories are included. (1) Domestic employment data for the years prior to 2009 have been revised following the introduction of environmental engineering in the cross-cutting activities.

Source : Insee, Comptes nationaux - base 2005 ; SOeS, 2012

**Chart 6 - Employment in the activities of the green economy in 2009 (in full-time equivalent**

