ENERGY SYSTEM TRANSITION THROUGH STAKEHOLDER ACTIVATION, EDUCATION AND SKILLS DEVELOPMENT

ENTRUST

Review of market-driven approaches in sustainable energy policies

Deliverable D4.3

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About the ENTRUST Project

ENTRUST is mapping Europe's energy system (key actors and their intersections, technologies, markets, policies, innovations) and aims to achieve an in-depth understanding of how human behaviour around energy is shaped by both technological systems and socio-demographic factors (especially gender, age and socio-economic status). New understandings of energy-related practices and an intersectional approach to the socio-demographic factors in energy use will be deployed to enhance stakeholder engagement in Europe's energy transition.

The role of gender will be illuminated by intersectional analyses of energy-related behaviour and attitudes towards energy technologies, which will assess how multiple identities and social positions combine to shape practices. These analyses will be integrated within a transitions management framework, which takes account of the complex meshing of human values and identities with technological systems. The third key paradigm informing the research is the concept of energy citizenship, with a key goal of ENTRUST being to enable individuals overcome barriers of gender, age and socio-economic status to become active participants in their own energy transitions.

Central to the project will be an in-depth engagement with five very different communities across Europe that will be invited to be co-designers of their own energy transition. The consortium brings a diverse array of expertise to bear in assisting and reflexively monitoring these communities as they work to transform their energy behaviours, generating innovative transition pathways and business models capable of being replicated elsewhere in Europe.

For more information, see **http://www.entrust-h2020.eu**

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Executive Summary

The ENTRUST project aims to analyse the social dimension of the European energy system to achieve a deep understanding of the human factor. It is not possible to have a comprehensive understanding of the energy system without analysing the policy landscape and its influence on energy consumption, and that is the main objective of the WP 4 of ENTRUST.

The first task already resulted in a first deliverable, the D4.1 "Report on policy & regulation landscape", that provides an overview of the legislation related to the European energy system. As per one of the objectives of ENTRUST, to better understand the human factor in the energy system, a specific analysis focusing on the influences of the energy market and its impact on behavioural change, was added to the mapping undertaken in D4.1. This deliverable 4.3 "Review of market-driven approaches in sustainable energy policies" is the result of this action.

This deliverable aims to review this type of approach in supporting sustainable energy policies. The first part of the deliverable provides an overview on the use of market-based instruments (MBIs) in the six selected countries with specific attention on differences between their strategic orientations. The second part highlights particularly successful uses of MBIs and identifies the best practices to be replicated in the future applications of similar instruments.

To work towards these energy and environmental 2020-objectives and more generally to tackle environmental issues due to human activities, the Member States have several policy approaches to support the sustainable energy policies set at European level: command & control and market-driven approaches. Many emerging sustainable energy technologies are not fully competitive yet, compared to conventional ones. One of the main challenges of the EU Member States is to support their deployment and to "use every tool at [their] disposal to drive down costs, to ensure renewable energy technologies become competitive and ultimately market driven" (EC, 2012-2). Therefore, this report will target specific instruments used by governments or public entities, known as market-based instruments, to stimulate market actors and encourage these actors to direct their choices towards more sustainable solutions.

For the purposes of this deliverable, the following working definition has been adopted, informed by the previous ones:

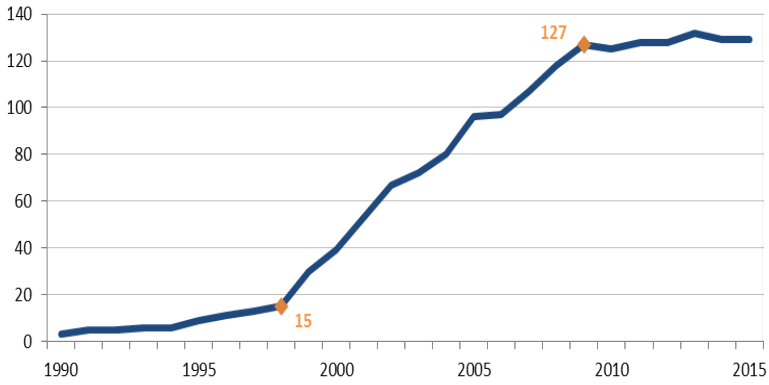
> *Market-based instruments are policy tools that seek to address the market failure of environmental externalities by using market signals (either prices or quantities) to stimulate certain behaviours, activities or investments. They either incorporate external costs of production or consumption activities or create property rights in order to encourage citizens or businesses to change their behaviours towards more sustainability*.

Market-based policy instruments are classified into two categories depending on the type of market signal they use. If a tool modifies the **cost or the price** of a good, a service or an activity, it will be considered as a **price-based** instrument. However, if it limits or regulates the **quantity** of products or emissions that can be either produced or traded, it will be considered as a **quantity-based instrument**. The different categories of market-based instruments are represented in the following figure.

The study identified a total of 216 market-based instruments launched between 1953 and 2012. Almost 60% of them are still being used in 2016. Some of the results are presented in this Executive Summary.

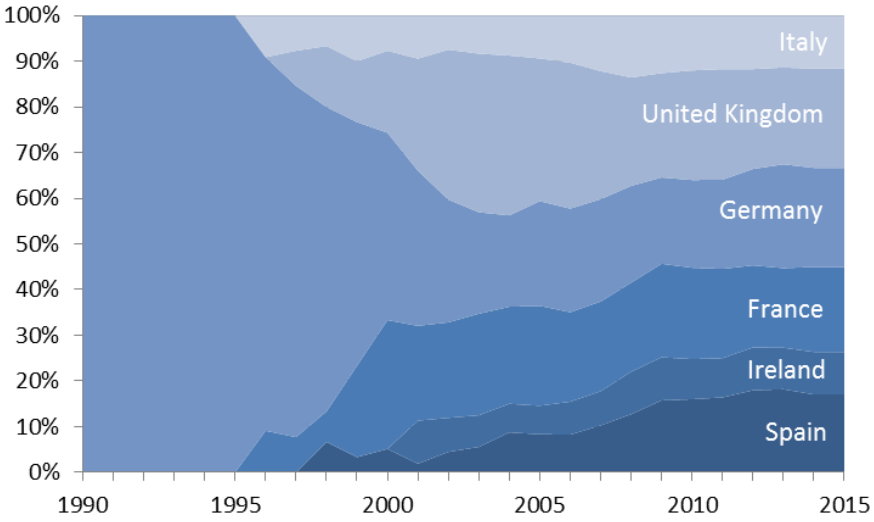
Quantity

The first decade of the 21st century was especially prolific as between 1998 and 2009 the number of in force instruments increased from fifteen (15) to one hundred and twenty-seven (127), which represents an annual increase of ten tools over the nine-year period. Since 2009 however the total amount of applied MBIs has not changed much, staying within a range ±4%.



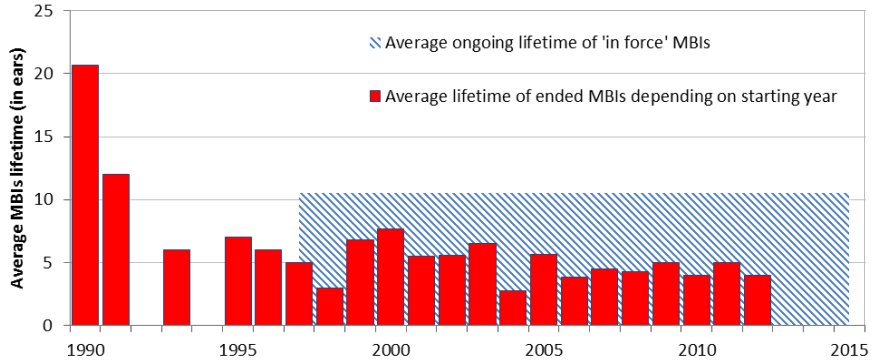
Country share

The spread of in force instruments per country has tended to be stable since 2009. During the period [2009-2015] there was a stabilisation of the number of MBIs in operation and suggests that the six countries have reached a certain maturity in the use of such policy instruments.



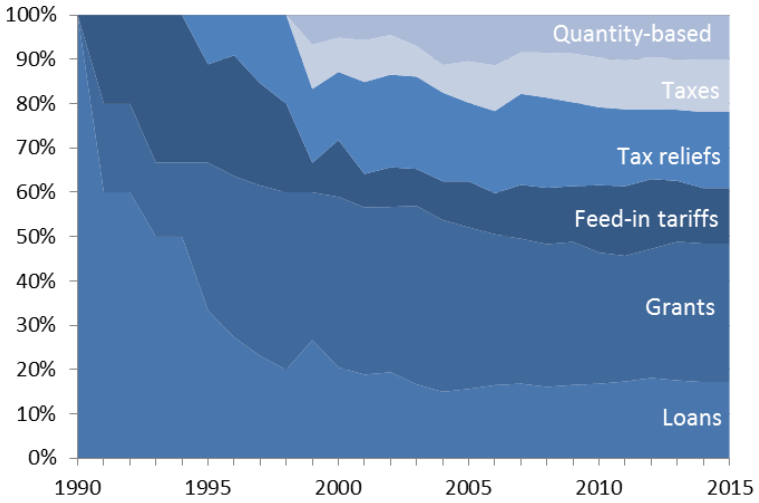
Length

This maturity seems to be confirmed when looking to durations. The average duration of MBIs ended between 1990 and 2012 depending on their first year of effectiveness. Since 1995 all MBIs have been ended before their 8th year of application with an average run of 6 years.

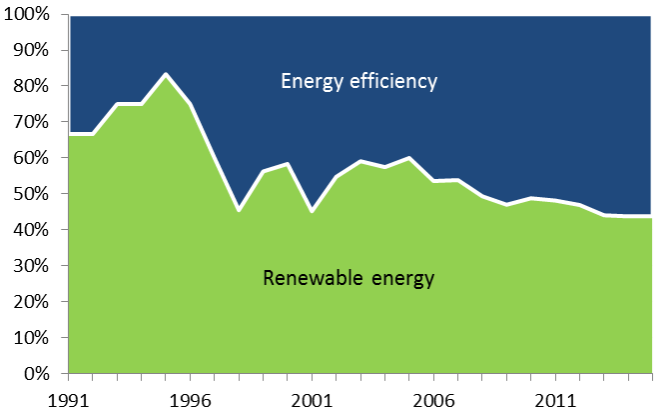


Type of price-based instruments

More than 90% of the MBIs identified are price-based instruments and when analysing the typology of instruments implemented in the six countries analysed in the last years it can be appreciated that historical tools, as grants and loans, remain the most preferred, even if new tools entered into service in the meantime. In fact loans and grants have always been the most applied MBIs since 1990.



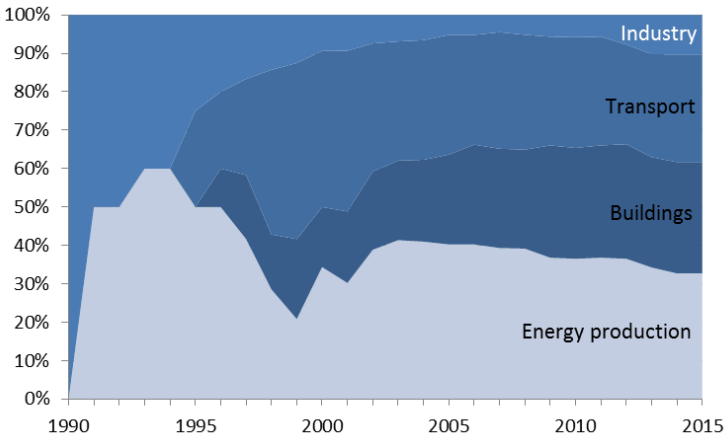
Objectives



When comparing the sustainable objectives of the instruments identified, it appears that for the last decade the share of energy efficiency supporting instruments has progressively increased compared to renewables-dedicated instruments. In 2005, energy efficiency instruments represented a share of 40% of specific measures, while in 2015 it has reached 56%.

Sector of application

In line with the previous observations on the volume of use as well as the type of instruments the evolution in targeted sectors has also become quite stable since 2010, except for the industry domain that shows increases due to a series of seven measures launched in Germany between 2012 and 2013 and particularly dedicated to Small and Medium-sized Enterprises (SMEs).



To complete the quantitative analysis, a qualitative analysis was undertaken within two successful applications of MBIs from each of the countries studied, one price-based and one quantity-based instrument. The instruments have been grouped by their area of application: energy efficiency in buildings, low-emission vehicles, energy production from renewable sources and GHG reduction. The cross-analysis of the quantitative results presented in the section 3 and the qualitative observations issued from the case study descriptions of section 4 enables the drawing of first lessons learned regarding the use of market-based instruments in the European Union.

The set of parameters examined during the quantitative analysis suggests that EU Member States reached in 2009 a certain maturity regarding the use of market-based instruments. Indeed, after two decades of evolution the number of tools in operation has stabilised, as well as the type of instruments used. The increasing average duration of applications also indicates that governments better prepare the launch of MBIs and use lessons learned to anticipate potential side effects.

With the emerging awareness of environmental issues, several international agreements have been negotiated to both define global objectives and propose approaches to achieve them. Policy instruments

played an important role and new tools such as certificates (green or white), GHG emissions allowances or feed-in tariffs were designed to specifically address environmental issues due to energy uses. Surprisingly these specific instruments have not been the most used by governments or institutions as they represent a share of less than 20% of sustainable energy policy tools.

One success factor that frequently crops up when it comes to the promotion of low-emissions vehicles is the financing of capital costs. Price-based instruments are therefore the most suitable policy tools in such situations as grants, low-interest loans or even tax abatements immediately reduce the amount of investment to be provided by the buyer.

Looking at a different domain such as the promotion of energy efficiency operations in buildings, some similarities appear. Price-based instruments are here also preferred to quantity-based due to the need of financing a part of a significant initial investment. If the type of instruments varies depending on the country, the study also shows that in the building sector market-based instruments may be associated not to direct investments as in transport but to other MBIs to ensure the success of a measure. The wider the market, the more flexible shall be the instrument. Thus, it is not surprising to see such parallel measures within the building sector as several kinds of stakeholders can be targeted, ranging from individuals, householders to energy suppliers, including businesses, public institutions or professional from the construction.

The sector of energy production from renewable sources is quite different from the domains previously studied. First of all, it gathers relatively homogenous stakeholders with large energy suppliers. Secondly, the initial investment is not a major problem as actors are already used to develop large-scale power plants. While the regulation ensures the achievement of the objective (i.e. a given share of renewables), the instrument provides some flexibility to market actors that can either invest directly in renewable sources or indirectly finance other stakeholders by buying green certificates.

Finally, price-based instruments and quantity-based instruments can be applied in parallel to address global issues such as CO_2 emission limitations. It is the case for instance with the CO_2 trading scheme whose scope is defined at EU level and the carbon tax managed at national level to cover “out-of-the-scope” sectors. While the first one ensures a maximum level of emissions but does not raise revenues, the second does not guarantee direct decrease of emissions but collects revenues by incorporating in products or resource prices the cost of environmental externalities. These revenues can be further used to support other sustainable policies.

Acronyms

ADEME	Agence de l'environnement et de la maîtrise de l'énergie (French agency for sustainable development)
CEE	Conversion des économies d'énergie (French energy savings certificates)
CHP	Combined heat and power
CIDD	Crédit d'impôt développement durable (French sustainable development tax credit)
CO_2	Carbon Dioxide
DRES	Distributed renewable energy sources
EEA	European Environment Agency
EKF	Energie- und Klimafonds (German Energy and Climate Fund)
ESB	Electricity Supply Board (Ireland)
ETS	Emissions Trading Scheme
EV	Electric Vehicle
FIP	Feed-in premium
FIT	Feed-in tariff
GDP	Gross Domestic Product
GWh	Gigawatt-hour
IDAE	Instituto para la Diversificacion y Ahorro de la Energía (Spanish Energy Agency)
IEA	International Energy Agency
IMF	International Monetary Fund
LPG	Liquefied Petroleum Gas
MBI	Market-based instruments
Mtoe	Million Tonnes of Oil Equivalent
MWh	Megawatt-hour
NEEAP	National Energy Efficiency Action Plan
RO	Renewables Obligation
ROC	Renewable Obligation Certificate
ROI	Return on Investment
RTE	Réseau de Transport d'Électricité (French transmission system)
SME	Small and Medium-sized Enterprises
TEE	Titoli di Efficienza Energetica (Italian energy saving certificates)
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

1.1 Introduction to the deliverable

The ENTRUST project aims to analyse the social dimension of the European energy system to achieve a deep understanding of the human factor. To leverage knowledge, the project uses a mixed-methods approach addressing the issue from multiple angles, such as: policy reviews, social-economic analysis, and extensive qualitative data collection, including data from interviews with case study communities.

The current energy system faces various challenges including, security of supply, climate change, and the resultant threats to human health and ecosystems. To overcome these issues, the energy system needs to transition from one based on fossil fuels to one with a more sustainable foundation, based around greater efficiencies in energy consumption and increased use of renewable energy sources (Creutzig et al., 2014; Verbong & Geels, 2010). The transition of an energy system towards a more sustainable model depends on several aspects. The technical dimension is often considered as its main driver as no changeover could occur without an important evolution of the available technology. Whether it is renewable energy sources from a production perspective or more efficient equipment from the consumption side, both play a central role in the progressive modification of the European energy system.

Nevertheless, other aspects, just as important, shall also be considered. A technology, however good as it may be, cannot disrupt a market without the awareness and acceptance of its main actors. Therefore, the social factor has to be taken into account if a successful sustainable transition wants to be achieved. The study of human behaviour and pactices raises a lot of uncertainties and remains a difficult parameter to assess.

It is not possible to have a comprehensive understanding of the energy system without analysing the policy landscape and its influence on energy consumption, and that is the main objective of the WP 4 of ENTRUST. It aims at providing an updated picture of the current policy and regulation landscape (task 4.1); at analysing the Europeanisation of different EU countries in the national policy dialogue (task 4.2); at identifying energy behaviour change initiatives (task 4.3); and at creating a collection of all policies and lessons to be inserted in a policy tool-kit for policy makers (task 4.4).

The first task already resulted in a first deliverable, the D4.1 “Report on policy & regulation landscape”, that provides an overview of the legislation related to the European energy system. Targeting a pre-defined range of European countries (France, Germany, Italy, Spain United Kingdom and Ireland) the report created a comprehensive mapping of existing policies in the supply and the demand sides, with an additional focus on countries’ main energy related problems and objectives. Identified policies at European level were sorted into 3 main categories: the ones promoting a liberalisation of the energy market (liberalisation-based), the ones ensuring a better energy security (security of supply-based) and finally the ones supporting a more sustainable energy system (sustainability-based).

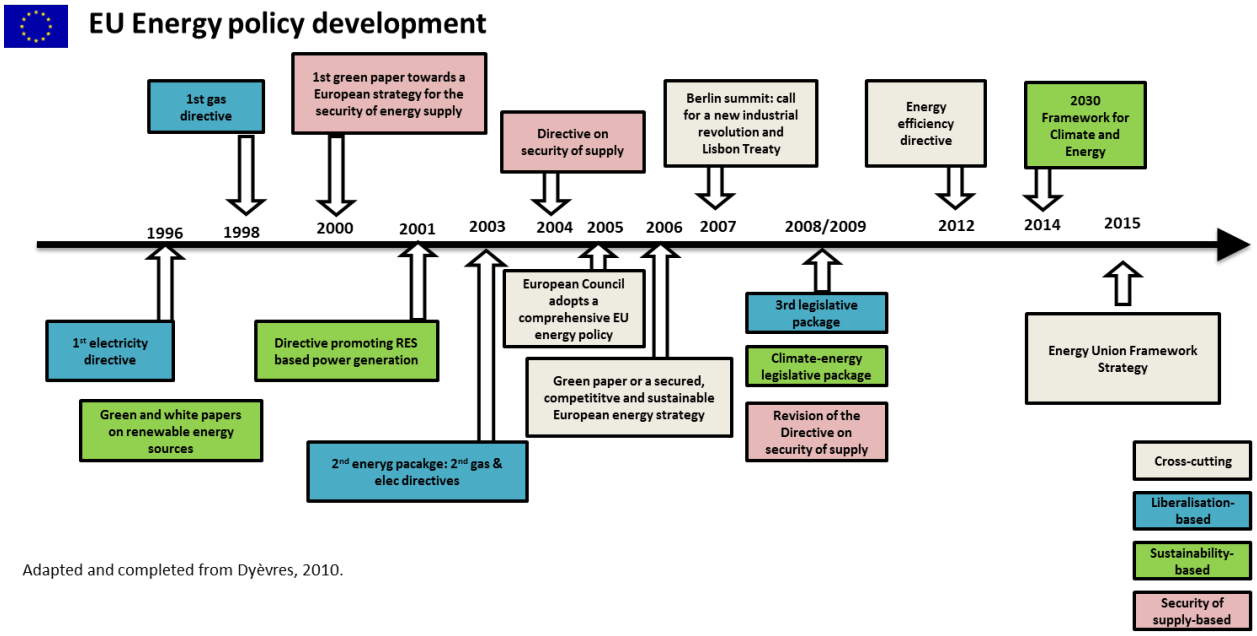


Figure 1: EU energy strategy (Dallamaggiore *et al.*, 2015)

As per one of the objectives of ENTRUST, to better understand the human factor in the energy system, a specific analysis focusing on the influences of the energy market and its impact on behavioural change, was added to the mapping undertaken in D4.1. This Deliverable 4.3 "Review of market-driven approaches in sustainable energy policies" is the result of this action. It provides a special focus on sustainable-based policies (see Figure 1). Governments and other official institutions use energy policies as a first step to encourage businesses and citizens to modify their behaviours towards more sustainability. Whether they are directly defined at national level or transposed from EU policies, energy policies set a high-level overall plan defining the global objectives and acceptable procedures to be followed in specific situations.

However, a policy *per se* may not be sufficient. If voluntary approaches for environmental policy are becoming increasingly popular their environmental effectiveness and economic efficiency can still be questioned (OECD, 2000). Policy-makers have several approaches and related instruments at their disposal to ensure the achievement of designated goals, including the so called "market-driven approach".

This deliverable aims to review this type of approach in supporting sustainable energy policies. The first part of the deliverable provides an overview on the use of market-based instruments (MBIs) in the six pre-selected countries with specific attention on differences between their strategic orientations. The second part highlights particularly successful uses of MBIs and identifies the best practices to be replicated in the future applications of similar instruments.

1.2 EU approach regarding sustainable energy policies

1.2.1 EU engagements in sustainable energy

The 2020 climate & energy package

With The Kyoto Protocol expiring in 2012, the European Union decided to take a pro-active approach and achieve a shared vision before the following international negotiations in order to strength its position and play a leading role in the definition of the next international agreement. Therefore, in early 2007 the European Commission presented to the EU Member States a framework containing ambitious targets in order to address the issue of greenhouse gases (GHG) emissions. The 23 April 2009, it was legally enacted into the directives 2009/28/EC, 2009/29/EC and the decision 406/2009/EC under the name of "2020 climate & energy package" (EC, 2009-1).

The package contains three main targets known as the "20-20-20 targets" to be achieved by 2020. The two first ones are binding at EU-level, not national, whereas the third target is indicative only. These targets are:

- Reducing GHG emissions by **20%** compared to 1990 levels;
- Increasing the share of renewables in final energy consumption to **20%;**
- Moving towards a **20%** increase in energy efficiency.

The objectives at EU-level have been transposed into national targets for each country taking into account their specificities. Regarding the reduction of GHG emissions, the principle of effort-sharing has been applied (EC, 2009-2). Therefore national targets have been defined according to the country's wealth, ranging from a "20% decrease" goal for the Luxembourg to a "maximal 20% increase" for Bulgaria as shown in Figure 2.

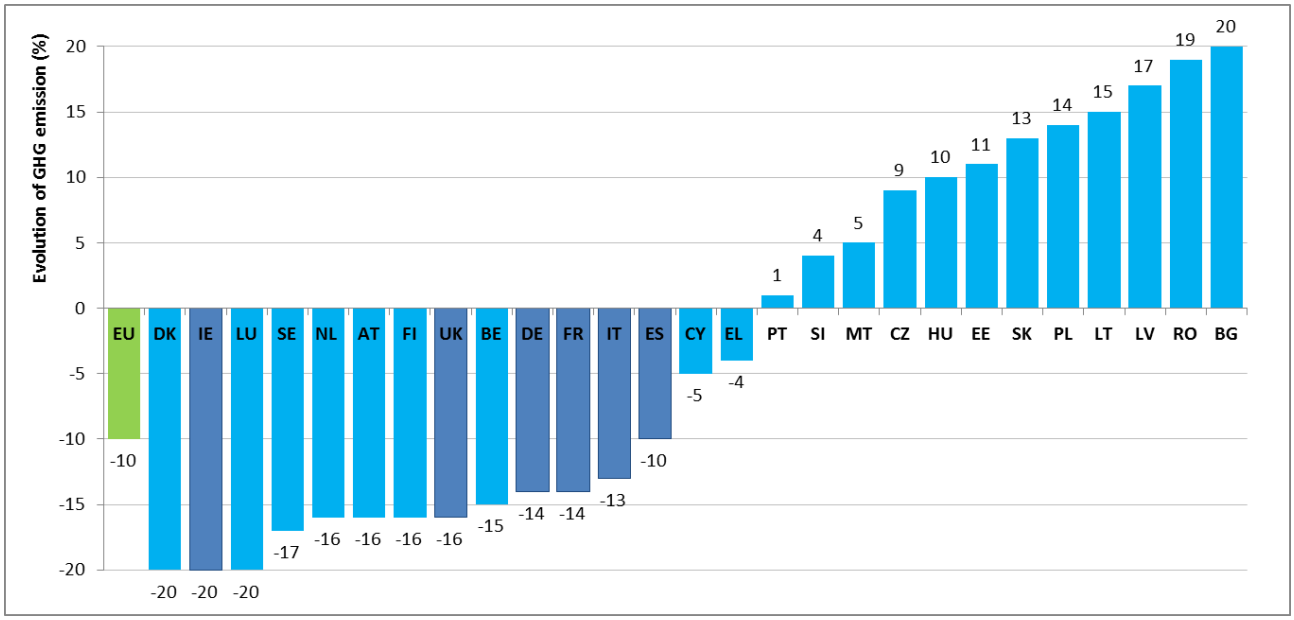


Figure 2: Member States' GHG emission limits in 2020 compared to 2005 level
(Original data: European Parliament and the Council of the European Union, 2009-A, annex II)

National targets for the share of energy from renewable sources have also been established, following the effort-sharing principle, but based on different factors, namely: the starting point of the country, meaning the share of renewables in the national gross final consumption of energy in 2010, and the ability of the country to increase this share, mainly based on its available natural resources. Therefore, related national targets range from 10% for Malta to 49% for Sweden as shown in Figure 3.

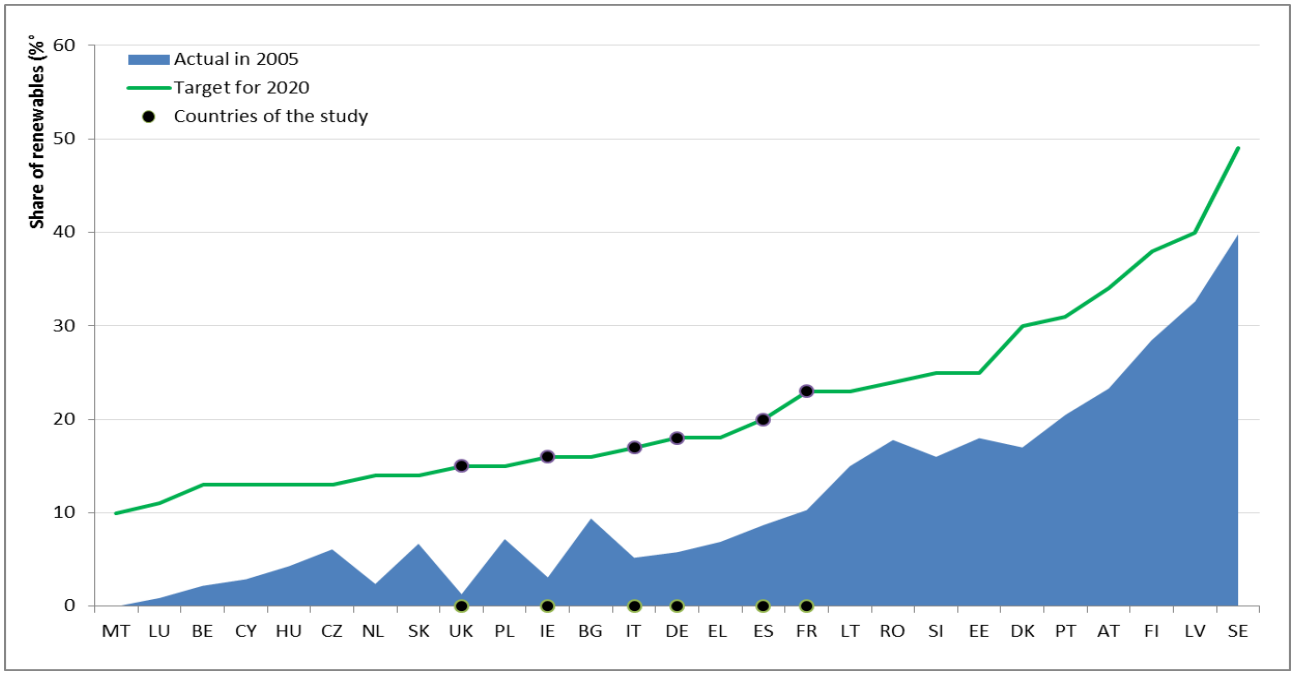


Figure 3: Trends in share of energy from renewable sources in gross final consumption of energy
(Original data: European Parliament and the Council of the European Union, 2009-B, annex II)

The third target dedicated to energy efficiency is more flexible. Indeed, besides the fact that it is given on an indicative basis, the EU Member States can set their national targets based on their preferred parameter from amongst primary or final energy consumption, primary or final energy savings or energy intensity variables. Figure 4 shows the reported targets for EU countries.

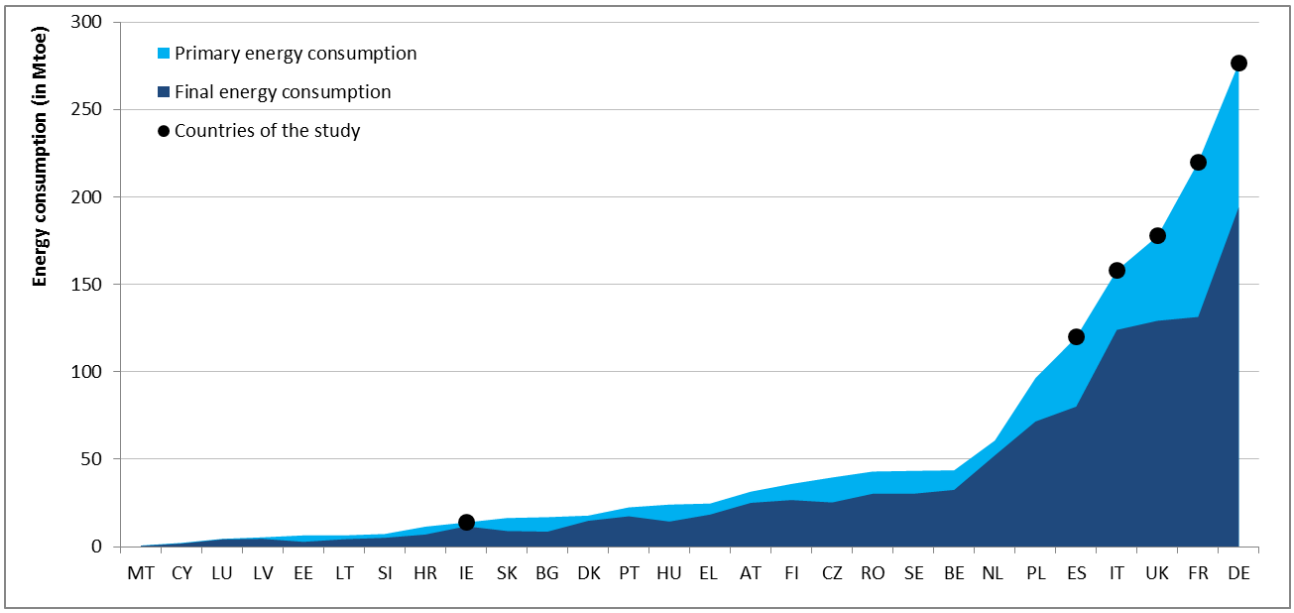


Figure 4: Absolute level of energy consumption in 2020 [Mtoe] as notified from Member States
(Original data: EC, 2015-1)

Europe 2020 strategy

In 2010 the European Union launched Europe 2020 (EC, 2010), its growth strategy for the following decade. The high-level objective of the ten-year plan is defined in a single sentence: "deliver smart, sustainable and inclusive growth". As shown in Figure 5, the smartness is ensured by directing more investments to education and research purposes. The inclusivity is guaranteed by fostering employment within the EU whereas the sustainability is established by promoting a greener and more efficient energy economy.

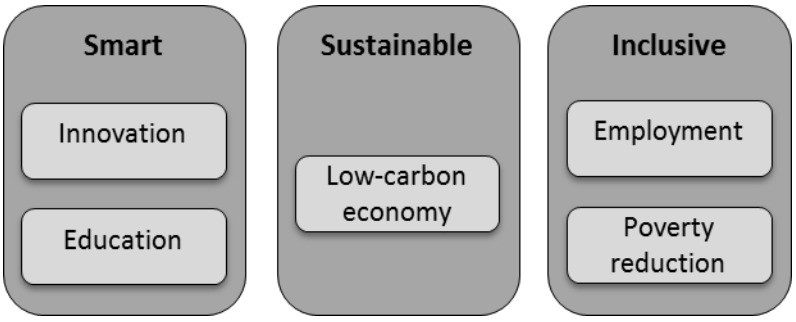


Figure 5: Illustration of objectives and targeted domains of the EUROPE 2020 strategy (EC, 2014)

The sustainable dimension of growth has been set up to tackle several challenges the European Union is currently facing: an over-dependence on fossil fuels, an increasing lack of natural resources, effects of climate change caused by human activities, and the need for more competitiveness.

The European Commission has clearly defined the meaning of sustainable growth by highlighting seven constituent pillars (EC, 2012-1). Among these, four are either directly or indirectly related to the energy system:

- Building a more competitive low-carbon economy that makes **efficient use of resources;**
- Protecting the environment, **reducing emissions;**

- Developing **new green technologies** and production methods;
- Introducing **efficient** smart electricity grids.

The 2030 climate & energy framework

Early 2014 the European Commission proposed a new energy framework for the 2020-2030 period that was agreed later in the year by the Member States (EC, 2014). It includes the same objectives as the previous version, but with new quantified targets:

- A 40% cut in GHG emissions compared to 1990 levels;
- At least a 27% share of renewable energy consumption;
- At least 27% energy savings compared with the business-as-usual scenario.

In this new framework as with the 2020 package, the two first targets are binding at the EU level whereas the last one remains indicative only.

1.2.2 Approaches and related instruments

To work towards these energy and environmental 2020-objectives and more generally to tackle environmental issues due to human activities, the Member States have several policy approaches to support the sustainable energy policies set at European level.

Command and control approaches

The earliest environmental protection policy approach is known as the **command and control approach and "refers to environmental policy that relies on regulation" (OECD, 2007, p. 115).** It is based on the principle that the environment can self-regenerate up to a certain limit. Recent intensification of human activities has breached ecological limits and according the ecological law of Aphasy "organic evolution is slower than environmental change on the average" (Edward Williams, 1974). Governments have started to regulate for environmental protection with binding legal rules set up on most environmental impacting activities. **Command and control instruments** are applied at the EU-level as regulations, directives or decisions but Member States have similar tools at their own national level (EC, 2015-2).

Every country identifies its main environmental issues based on geographic (available resources), environmental (level of deterioration vs. tolerance) and social (public acceptance) factors. When major contributors are clearly identified, whether they represent a specific industry or a whole sector, national regulations are set up to control their activities.

Even if a command and control approach may be appropriate to address serious risks on the environment and provide a clear understanding on the behaviour to adopt in specific situations, such approaches may face strong obstacles to be correctly implemented and applied.

Industry sector often represents an important share of the national economy and major industrial bodies do not hesitate to lobby governments to either abrogate environmental regulations or obtain loopholes for

specific domains (Andreas Polk, Armin Schmutzler, 2003, p. 1). Under these circumstances a regulation may emerge only after an environmental disaster, inducing various levels of protection depending on the issue (air pollution, water pollution, hazardous waste management, global warming, greenhouse effect or climate change) and the strength of related lobbyists. Thus, gaps may occur between the different policies implemented by different countries to address the same problem. The disparity is even more obvious when it comes to comparing industrialised to developing countries. While the stable economic situation of the first mentioned allow the introduction of a stringent environmental legislation, developing countries may be tempted to maintain lax regulations on specific sectors to attract international companies facing strict rules in their own countries (Pushkar Maitra, 2002)Moreover, environmental questions do not concern only governments but many stakeholders such as citizens, industry, related suppliers and customers or voluntary and non-governmental organisations. Using exclusively regulatory instruments, the 'command and control' is a limited approach that does not provide the chance to other actors to be involved in the decision process. In parallel people or entities working in a domain that has a severe impact on the environment but suffers from a lack of regulation may not consider questioning their behaviours as long as they remain unchallenged by the law.

Finally, a command and control approach requires a strict monitoring to ensure the respect of the law by the targeted stakeholders. Therefore, such measure is viable in the case of direct point source pollution, meaning when pollutants are discharged from "a stationary location or fixed facility" (EEA, 2008), as for instance with large-scale power plants. Oppositely, the monitoring of diffuse or nonpoint source pollutions is by nature more complicated and may explain the lack of efficiency of traditional control programs in reducing such type of pollution (Byun and Seung Ah, 2014).

Market-driven approaches

Following the perceived shortcomings in command and control policy measures, stakeholders looked for alternative approaches to specifically address environmental issues and most of these are gathered under the **market-driven approach** term.

The meaning of the word 'market' in this context does not stick to its generic definition, as a place "where buyers and sellers transact business for the exchange of particular goods and services" (OECD, 2003, p. 54). It is used as a larger term that includes direct and indirect users of energy products, services but also resources instead of institutional customers, as well as emerging and alternative technologies and not only commercialised and conventional ones.

The market-driven approach is based on the assumption that a deep understanding of the sustainability concept and a high awareness of related solutions, whether products or services, is a key driver to encourage people to change their habits towards more environmentally-friendly behaviour. Following this principle, the promotion of sustainable initiatives is considered more efficient than punishing polluting practices with the following supposed impacts[1]:

[1] Note: Market based instruments by their nature are based on a individualistic behaviourist paradigm

- A customer fully aware of environmental challenges and solutions will be more likely to express this awareness in his/her consumption choices and will gradually require higher standards for the products she consumes;
- The more citizens appreciate environmentally friendly products, the more companies will be forced to consider this emerging market and develop new products and manufacturing processes to match the new market-driven standards;
- If the demand for unsustainable solutions decreases significantly companies will not be interested in investing and developing on such products anymore.

In opposition to command and control instruments that use a reactive approach against polluting behaviours, market-driven approaches are more pro-active and in line with the principle that prevention is better than cure, particularly in an environmental context.

2 Methods and tools

2.1 Definitions & scope of the study

The title of the deliverable 4.3 "review of market-driven approaches in sustainable energy policies" raises several questions that need to be clarified before getting to the heart of the matter. The following answers help to get a better understanding of the subject and the scope of the presented study as well as an easier assimilation of the correlated methodology.

2.1.1 Considerations regarding sustainable energy

EU Member States together with their national policy makers have for decades created, reviewed, superseded or simply abandoned policies related to energy production, transport, distribution or consumption. However not all of them can be considered as supporting the concept of sustainability.

There are numerous definitions of the concept of sustainability when it comes to development but the literature hardly defines it regarding energy. In its communication related to the EUROPE 2020 strategy the European Commission declares its objective to ensure a sustainable growth by "promoting a more **resource efficient**, **greener** and more **competitive** economy" (EC, 2010).

Based on this generic definition and with the help of the three targets of the 2020 Climate & Energy package, this deliverable considers as in favour of sustainable energy all policies that either:

- Encourage the use of **renewable energy** sources, regardless of the type of energy resources (wind, solar, biomass…) and targeted activity (energy production, industry, buildings or transport);
- Support any technology or service that aims at improving the **energy efficiency** of a given system, regardless of the way it does it;
- Limit the impact on the environment of any energy use without providing a specific means to do it.

The chosen definition deliberately focuses on the environmental dimension of the sustainability principle as market-driven approaches were created to precisely address environmental issues and most of market-based instruments have been used in this context so far.

2.1.2 Market-driven approaches

Many emerging sustainable energy technologies are not fully competitive yet, compared to conventional ones. One of the main challenges of the EU Member States is to support their deployment and to "use every tool at [their] disposal to drive down costs, to ensure renewable energy technologies become competitive and ultimately market driven" (EC, 2012-2). Therefore, this report will target specific instruments used by governments or public entities, known as market-based instruments, to stimulate market actors and encourage these actors to direct their choices towards more sustainable solutions.

Moreover, this deliverable will not consider behaviour changes that occur on voluntary basis as this aspect is part of the scope of deliverable D4.4 "Identification and characterisation of energy behaviour change initiatives" of the ENTRUST project.

2.1.3 Market-based instruments

There are numerous definitions of market-based instruments and a further analysis of the literature on the subject shows that none of these win unanimous support.

The **Organisation for Economic Co-operation and Development** (OECD) defines market-based instruments as mechanisms that "*seek to address the market failure of 'environmental externalities' either by incorporating the external cost of production or consumption activities through taxes or charges on processes or products, or by creating property rights and facilitating the establishment of a proxy market for the use of environmental services*" (OECD, 2007 p. 472).

The **European Commission** considers that "if a tool affects the cost or price in the market, then it is a market-based economic instrument … If it changes the cost or price of a good, service, activity, input or output then it is a market-based instrument". (EC, 2015-2, p. 93)

Finally, the **International Energy Agency** (IEA) does not provide a definition of market-based instruments but considers them as assorted economic instruments and defines the latest as tools that "stimulate certain activities, behaviours or investments using financial supports and price signals to influence the market" (IEA, 2016-1, section "Definitions"). It divides them into 3 types: direct investments, fiscal/financial incentives and market-based instruments.

If these three definitions slightly differ on the exact nature of market-based instruments, they all agree on the fact that they use market signals to influence the market. For the purposes of this deliverable, the following working definition has been adopted, informed by from the previous ones:

> *Market-based instruments are policy tools that seek to address the market failure of environmental externalities by using market signals (either prices or quantities) to stimulate certain behaviours, activities or investments. They either incorporate external costs of production or consumption activities or create property rights in order to encourage citizens or businesses to change their behaviours towards more sustainability*.

Market-based policy instruments will be classified into two categories depending on the type of market signal they use. If a tool modifies the **cost or the price** of a good, a service or an activity, it will be considered as a **price-based** instrument. However, if it limits or regulates the **quantity** of products or emissions that can be either produced or traded, it will be considered as a **quantity-based instrument**.

There are five types of price-based instruments:

- **Feed-in tariffs (FIT)**: policy mechanism that guarantees that actors who own a FIT-eligible renewable electricity generation facility will receive a set price from their utility for all of the electricity they generate and provide to the grid. It is therefore used to encourage deployment of renewable electricity technologies;
- **Grants**: bounty, contribution, gift, or subsidy bestowed by a government or other organisation for specified purposes to an eligible recipient;

- **Loans**: temporary transfer of money from an owner to a borrower who promises to return it according to the terms of the agreement, usually with interest for its use;
- **Taxes**: compulsory monetary contribution to the state's revenue assessed and imposed by a government on the activities, enjoyment, expenditure, income, occupation, privilege, property, etc., of individuals and organisations;
- **Tax reliefs or abatements**: reduction or exemption from taxes granted by a government for a specified period, usually to encourage certain activities.

There are three types of quantity-based instruments:

- **GHG emissions permits**: In GHG trading schemes, industries must hold permits to cover their GHG emissions; if they emit more than the amount of permits they hold, they must purchase permits to make up the shortfall. If they emit less, they may sell these;
- **White certificates**: These systems stem from energy efficiency or energy savings obligations; White certificate schemes create certificates for a certain quantity of energy saved, for example a MWh; regulated entities must submit enough certificates to show they have met energy saving obligations. Again, if they are short, this must be made-up through measures that reduce energy use, or through purchase of certificates;
- **Green certificates**: These systems are based on obligations to produce or purchase renewable energy-sourced power (generally electricity). Green certificates refer to renewable energy certificates which represent the certified generation of one unit of renewable energy, generally one megawatt-hour (MWh). Certificates can be traded and used to meet renewable energy obligations among consumers and/or producers.

Figure 6 summarises the different types and related categories of MBIs:

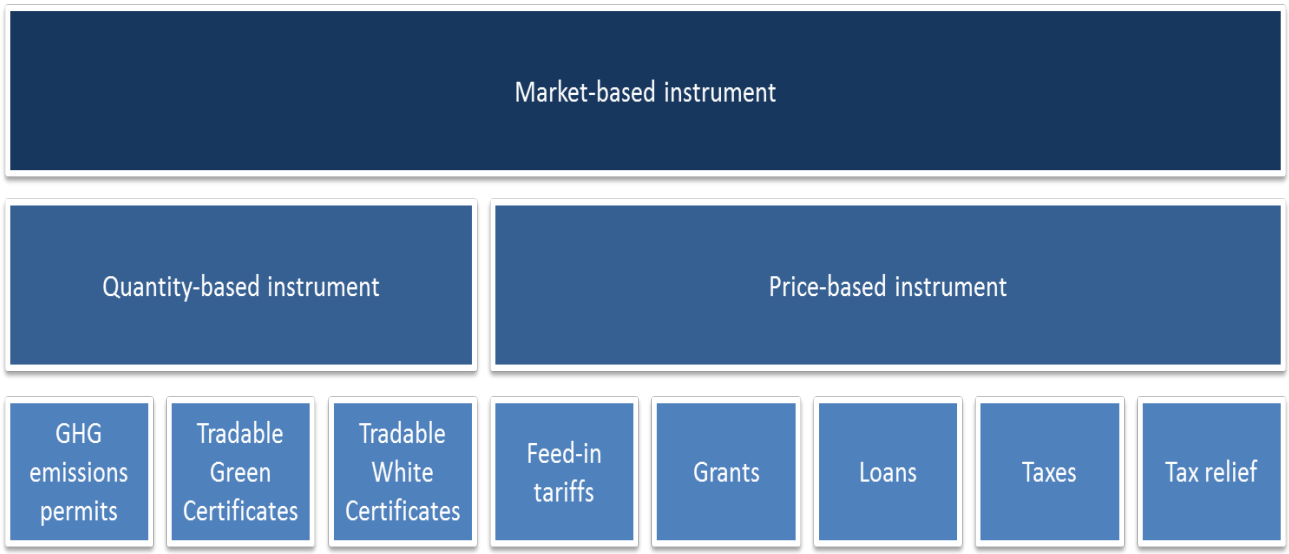


Figure 6: Categories and types of market-based instruments

2.2 Methods

This section explains how deliverable 4.3 has been structured. The work has been divided into three parts: a review of market-based instruments (MBIs) applied in the European Union, a quantitative survey of the use of these policy tools and a qualitative analysis of selected successful applications of MBIs.

2.2.1 MBI selection

A state of the art review has been conducted to identify market-based instruments and several criteria were defined to ensure its reliability. As per the previous definition of MBIs, an exhaustive list of MBI types has been set up to launch the research.

To complete the MBI selection two additional instrument-specific criteria have been used. Indeed, the review of policy instruments requires a certain experience to be relevant and a short period of time would likely not be sufficient to conclude on whether a tool actually drove behaviour changes, had significant environmental impacts, or led to any positive or negative side effects. Therefore, any instrument whose application has been interrupted or superseded within three years after its launch was not considered for the study. For the same reason any tool started after 2012 has also been excluded.

Moreover, the quality of the analysis highly relies on the data found during the state of the art review. Depending on the sources the quantity of information available was not the same for all instruments. To ensure a minimal level of knowledge of all studied tools the following criteria have been deemed as *mandatory* to include the MBIs in the study:

- Category and type of instrument;
- Entry into service date (effective date);
- Instrument status;
- Related policy.

The research focused on official websites of targeted countries to list all ongoing policies and associated instruments. Websites of the European institutions or international organisations such as the International Energy Agency were interrogated to identify applications of MBIs.

The geographic scope of the study has been previously defined by the ENTRUST Description of Action as “the five largest energy using countries, *viz*., France Germany, Italy, UK and Spain along with Ireland, which offers a contrasting context as a small country, dispersed population, in an economic upturn”.

2.2.2 Identification and categorisation of MBIs

Market-driven approaches are a relatively new way of addressing environmental issues (Whitten *et al.,* 2003, p. 1). The objective of this first analysis was to get an overview on the use of MBIs in Europe without considering their results. It aimed at providing information on the emergence period of such approaches, quantifying its increasing popularity, identifying its main goals and targets, and noticing changes in its uses over the last decades. It also helped to name pioneers in the use of MBIs and highlight major differences

between countries in the application of such instruments in terms of period of introduction, duration, objectives or targets.

An in-depth desktop review was performed to characterise the previously identified MBIs. In order to harmonise the description of the instruments and thus ease the drawing of statistics a template has been created. It ensures the collection of all necessary information by using fourteen criteria:

Criteria	Type	Description
Reference	Fixed choice	Ensures a harmonised way of referencing the identified tools with the format MBI_AA_00, where "AA" characterises the country and "00" is used to differentiate two MBIs in a country.
Description	Free text	Contains all relevant information on the application of the MBI (context, issue, funding, modifications…).
Category	Pre-defined list	Specifies if the instrument is price or quantity based.
Type	Pre-defined list	Specifies the kind of instrument (feed-in tariffs, grants, loans, taxes, tax reliefs or abatements, GHG emissions permits, white and green certificates).
Policy	Free text	Specifies the name of the supported policy.
Link	Free text	Provides a link to a detailed description of the supported policy.
Country	Pre-defined list	Specifies the country that applied the MBI (Spain, Italy, France, Germany, Ireland, UK).
Effective date	Date	Specifies the starting date of application.
End date	Date	Specifies the end date of application (if applicable).
Duration	Number of years	Specifies the total duration of the application.
Policy status	Pre-defined list	Specifies the status of the policy (in force, superseded, ended)
Objective	Pre-defined list	Specifies the objective intended by the measure (develop renewable energy sources, increase energy efficiency, not specific)
Sector	Pre-defined list	Specifies the target sectors (energy production, buildings, transport, industry or multi-sectoral)
Techno	Free text	Give details on the technology supported if specific.

Table 1: List of fourteen criteria used to describe the MBIs

All instruments were listed and characterised in a single Excel sheet whose format was based on the above template. With the help of successive filters on the fourteen criteria and associated values, statistics on the application of MBIs in Europe were created. All of these data were analysed firstly from a purely numerical

point of view and then subsequently, with the help of contextual analysis in a second stage. Most interesting lessons were illustrated with graphs and presented in the deliverable. They mainly concerned the period and the duration of use, the category and type of tool, the country and sector affected and the objective intended. Regarding sectors, the report characterises these following the domains highlighted in deliverable D2.1 "Development of energy actor-network typology" of the ENTRUST project.

2.2.3 Qualitative analysis

This part aims at performing an in-depth analysis of several case studies selected from the state of the art review achieved in the previous task and that have been identified as particularly successful by experts. A first section details the context in the given country before the launch of the instrument with a special focus on the issue it addresses. These sections also provide detailed information on the support measure itself, its objective, the way it has been funded or advertised and how it intends to support eligible entities. A third part describes the requirements to be fulfilled to be eligible, whether it is from a human, technological, time or financial point of view. Finally, it provides an analysis of social and economic impacts of the MBI, whether there were expected benefits or side effects, as well as a short study of replicability.

In addition to highlight successful examples of MBIs applications, this deliverable also aims to find key success factors and best practices that shall be checked to consider how these may be replicated somewhere else. To do so, a cross-analysis will be performed between the twelve use-cases (two per country, one focusing on a quality-based instrument, the other on a price-based) based on the information provided by the different experts. Positive as well as negative ones will be identified to draw recommendations in the form of best practises. To facilitate the analysis of the selected MBI and to ensure a harmonised way of describing these, a template has been created. It takes over the four sections and all criteria described above. The template comes with a guideline that explains the aim of each section and sub-section and provides tangible examples to illustrate what is expected. The template is available for review in annex 1.

3 Use of market-based policy instruments in the EU

3.1 Major periods and volume of MBI applications

Market-based instruments are renowned for being used to support environmental policies. Indeed, their economic nature makes them particularly competent to address environmental market failures by incorporating external costs (EC, 2015-2, p. 93). Therefore, it is legitimate to wonder at what point exactly European governments started to use MBIs and if they were applied on a large-scale or sporadically only. The study identified a total of 216 market-based instruments launched between 1953 and 2012. As shown in Figure 7 almost 60% of them are still being used in 2016.

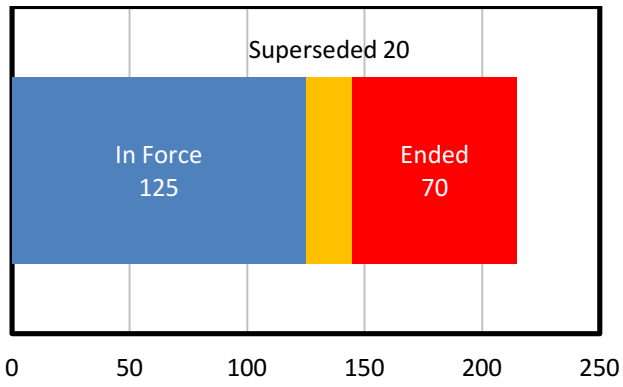


Figure 7: Status in 2016 of identified MBIs [2]

There are of course more MBIs supporting sustainable energy policies that have been used in the six studied countries. Therefore, this deliverable does not claim to provide an exhaustive list but outlines the use of MBIs in the European Union based on the analysis of a sample identified within the resource and time constraints. The list of identified MBIs can be found as annex 2 of this document.

To get a first estimation of the period of time market-based instruments started to be introduced the Ngram Viewer[3] tool was used. A search with "market-based instrument" (see Figure 8) shows that the expression started to be used in the literature from 1989.

[2] The Irish 'tax relief for investment in renewable energy generation' has an unknown status
[3] Google tool that displays graphs showing how words occurred in a corpus of books over the selected years

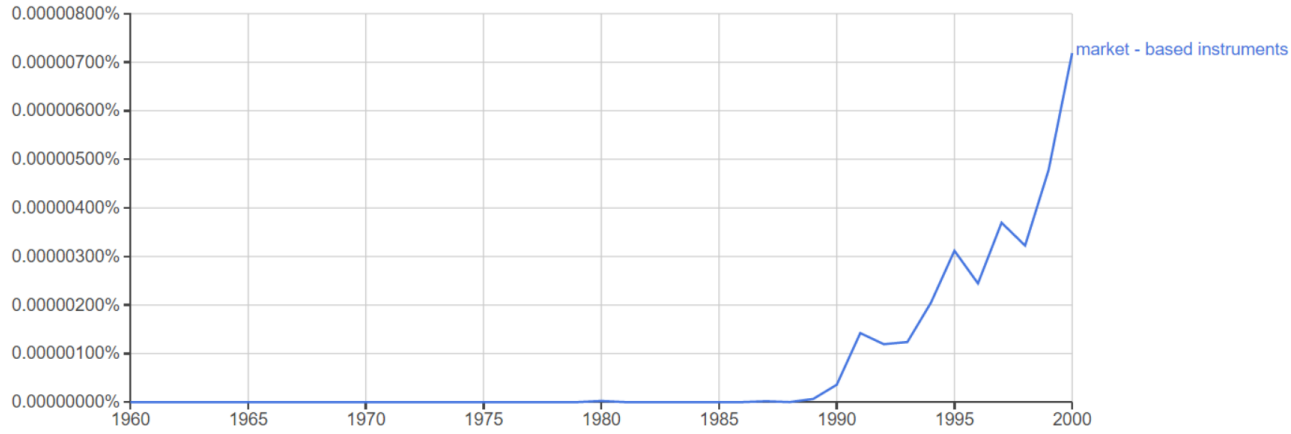


Figure 8: Result of the search "market-based instruments" in Google Ngram Viewer

The analysis performed on data gathered during the state of the art review confirms this trend: the first MBI application in Europe dates back to the beginning of the 90s[4]. That being said, Figure 9 shows that the use of MBIs did not really take off during the 20th century as the number of in force instruments never exceeds fifteen before 1998.

In contrast, the first decade of the 21st century was especially prolific as between 1998 and 2009 the number of in force instruments increased from fifteen (15) to one hundred and twenty-seven (127), which represents an annual increase of ten tools over the nine-year period. Since 2009 however the total amount of applied MBIs has not changed much, staying within a range ±4%.

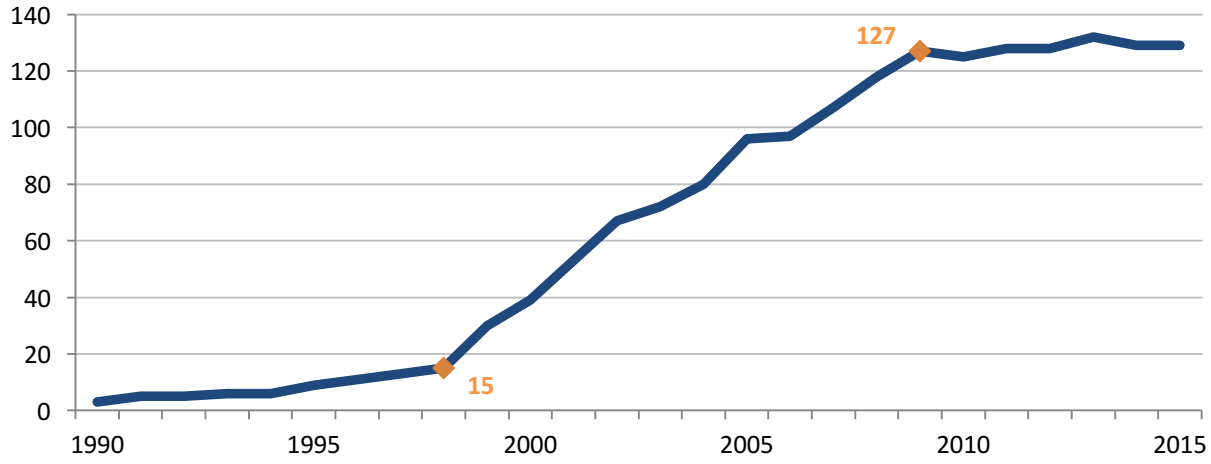


Figure 9: MBIs in force between 1990 and 2015

International events related to climate change and energy management may be used as a first approach to draw a first explanation of these three phases.

The first appearance of MBIs coincides with the United Nations Framework Convention on Climate Change (UNFCCC) that occurred in Rio in June 1992 and aimed at the "stabilisation of greenhouse gas concentrations

[4] The Italian 'bollo auto' (road tax) applied since 1953 has been considered as an exception and omitted.

in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (Article 2 of the UNFCCC). This event raised the awareness of attending countries, including the European Union, and may explain the start in use of MBIs. However, no binding targets were set during the summit leading to a lack of engagement and therefore a limited used of policy instruments.

The following international environmental treaty, the Kyoto protocol, was negotiated a few years later, at the very end of 1997. Based on the objectives set during the UNFCCC obligations have been addressed to the countries and market-based instruments have been proposed to reach their respective targets. The establishment of obligations combined with the promotion of tools both at international levels seem to be the main parameters that drove the increased use of MBIs within the EU.

Regarding the spread of market-based instruments across Europe it comes as no surprise that all countries do not use the same amount of policy tools (Figure 10). The three biggest energy consumers, namely Germany, the United Kingdom and France launched nearly 65% of the selected MBIs.

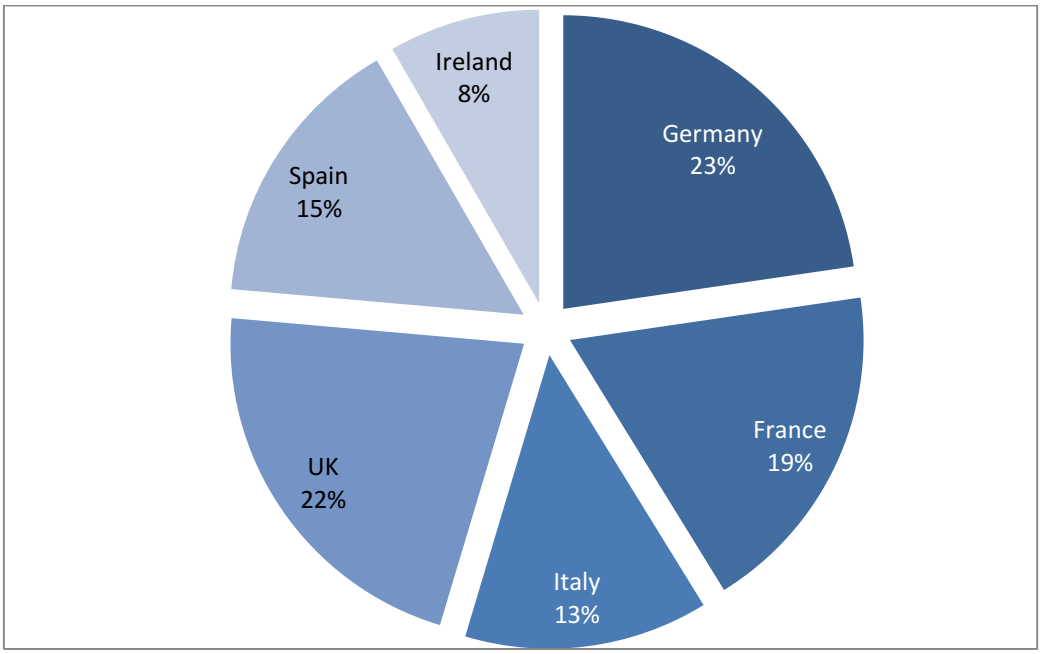


Figure 10: Distribution per country of identified MBIs

The analysis of the six countries from both policy and energy points of view (Figure 11) suggests that there is a close correlation between the energy consumption and the amount of measures a country set up to support sustainable energy goals.

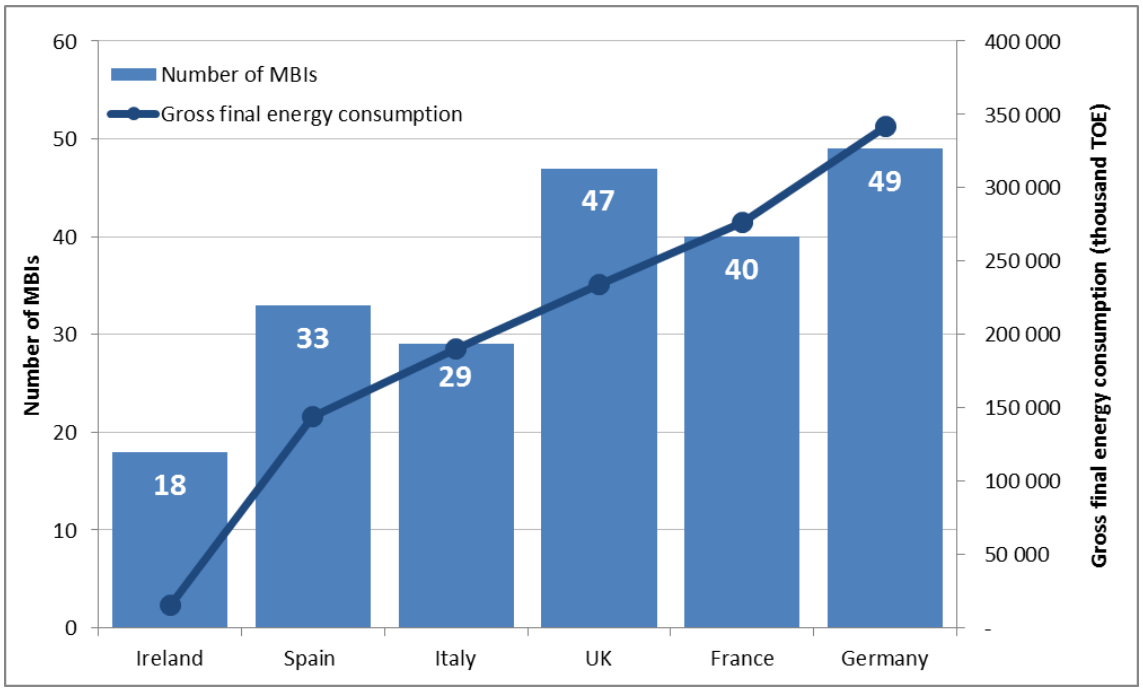


Figure 11: Number of MBIs used compared to the 2005 gross final energy consumption (Original data: Eurostat, 2014)

However, a further analysis suggests that the largest countries do not necessarily make the biggest effort in terms of sustainable energy policies, proportionally speaking. Figure 12 represents the ratio between the number of MBIs used in a country and its energy consumption (Eurostat, 2014). While Germany, France and Italy develop similar effort (almost 7 000 TOE/number of MBIs), Ireland implements eight times more MBIs for the same level of consumption (as there is 1 MBI per 848 TOE). A similar comparison has been done using the number of inhabitants as parameter instead of the country energy consumption and this analysis produced a similar outcome.

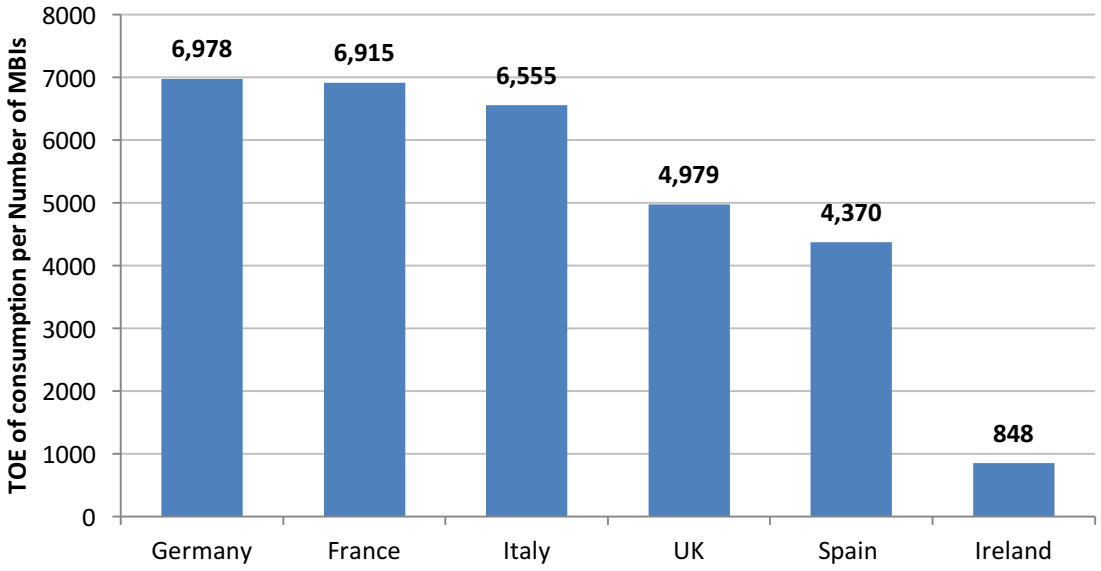


Figure 12: Number of used MBIs in proportion to the gross final energy consumption

Country specificities are not limited to the volumes of use. As shown in Figure 13 Germany was the first country to start deploying MBIs in the early nineties whereas Italy, the UK and France waited for the end of the century (1996 and 1997, respectively) and Ireland until 2001.

Another trend can be deduced from Figure 13 : the spread of in force instruments per country has tended to be stable since 2009. This is in line with previous observations made on the period [2009 - 2015] regarding the stabilisation of the number of MBIs in operation and suggests that the six countries have reached a certain maturity in the use of such policy instruments.

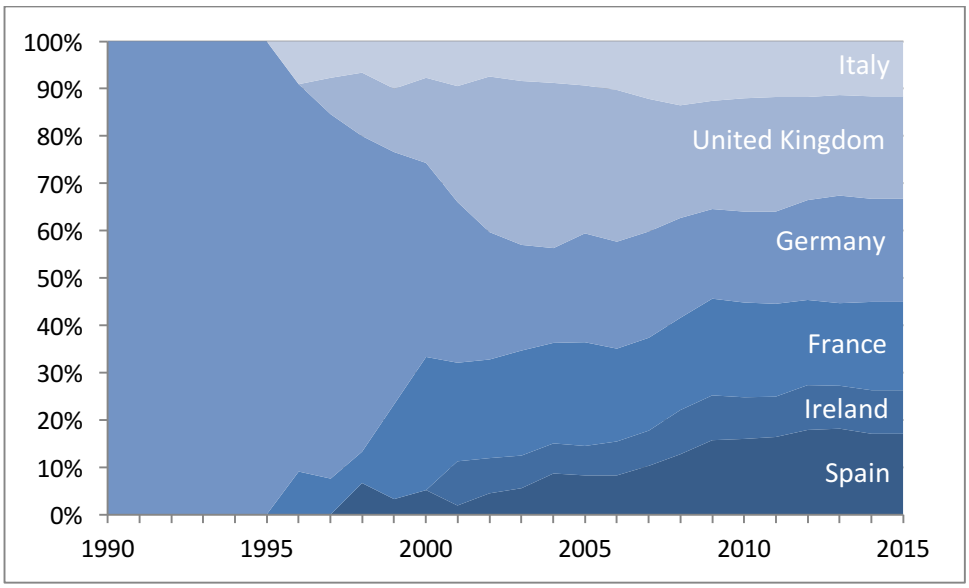


Figure 13: Spread of MBIs per country between 1990 and 2015

This maturity seems to be confirmed when looking to durations. Figure 14 shows the average duration of MBIs ended between 1990 and 2012 depending on their first year of effectiveness. Since 1995 all MBIs have been ended before their 8th year of application with an average run of 6 years. In the meantime the average lifetime of still in force MBIs is over ten years which suggests that governments have a tendency to maintain their policy tools longer in operation.

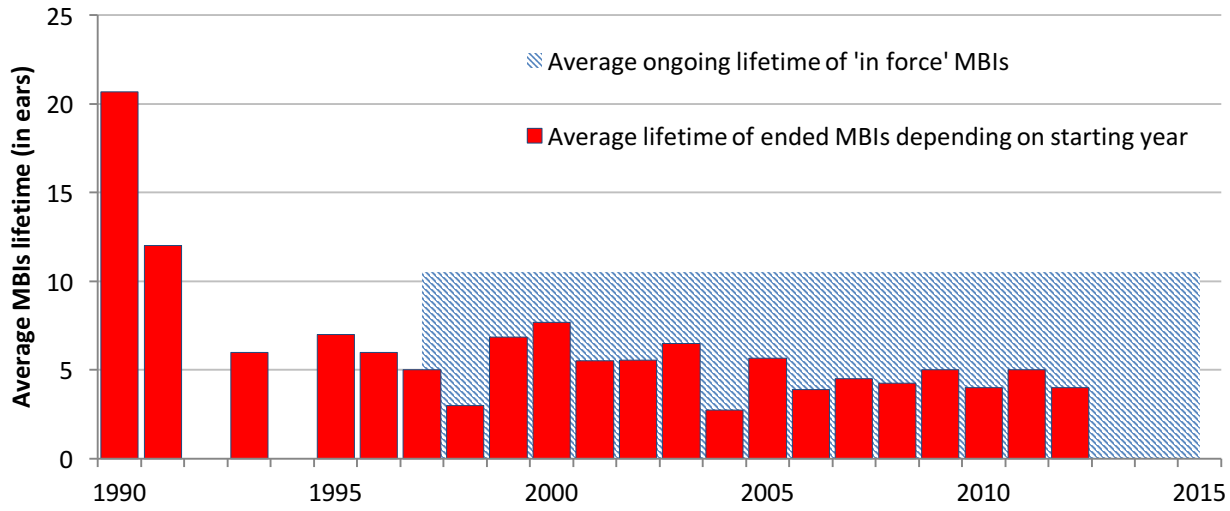


Figure 14: Duration of MBIs applications

3.2 Categories and types of MBIs

Figure 15 clearly shows that price-based instruments are largely preferred to quality-based and are involved in more than 90% of MBI applications.

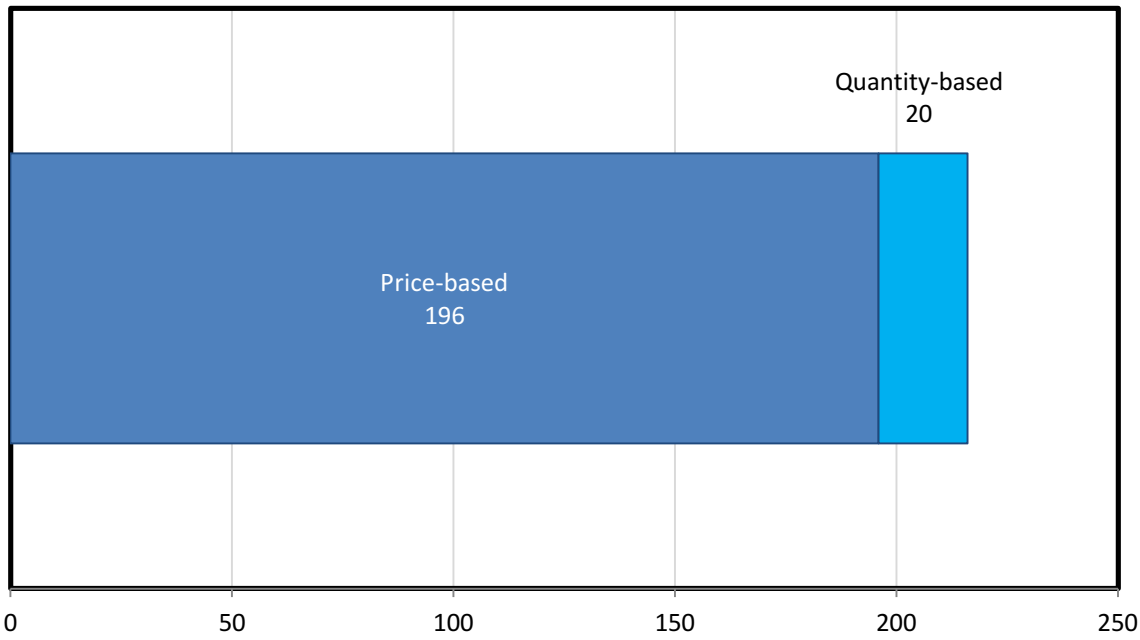


Figure 15: Collected MBIs sorted according to category

Looking to the countries individually a similar trend can be observed with some differences. If all of them launched a majority of price-based instruments, Italy is the country that proportionally uses the most quantity-based instruments (21% of applications) while Germany deploys almost exclusively price-based tools (98% of applications).

At first sight, it seems logical that economic instruments are the most efficient and consequently the most used tools in a society wherein the economy has a central role. However other arguments can be put forward to try to explain this disparity. In addition, the majority of applied price-based instruments, namely taxes, grants and loans, have been already used for different purposes, long before the advent of environmental issues. Stakeholders are familiar with their uses and aware of potential pros and cons whereas governments or public utilities have already gathered sufficient lessons learned to forecast and anticipate reactions. This absence of uncertainties may make them attractive for both sides.

According to the low amount of quantity-based tools the following analysis focuses only on the types of MBIs classified as price-based. If the gap is less impressive than for other categories, there are some disparities that are worth highlighting. As shown in Figure 16 grants are by far the most used instruments within the six EU Member States with 39% of applications. Tax reliefs, loans and feed-in tariffs are then used at a similar level with a respective share of 19%, 18% and 16%. Taxes bring up the rear with 8%.

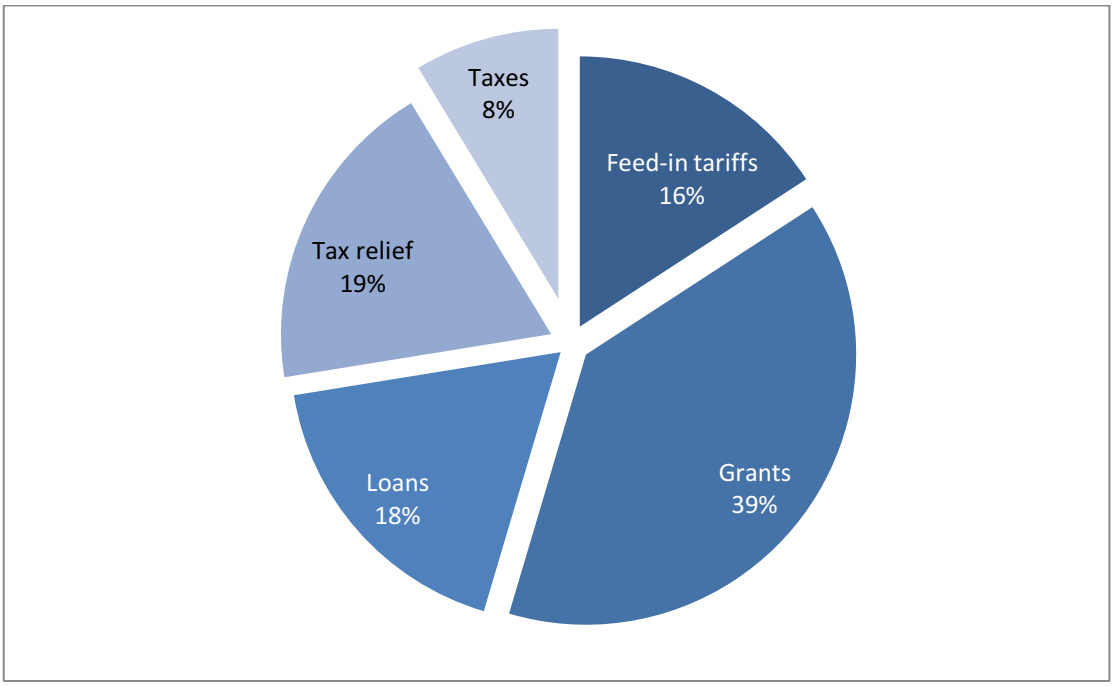


Figure 16: Collected MBIs sorted according to category

Several characteristics of a grant may explain its success. Similar to a loan, it provides an immediate support before the investment, whereas tax reliefs and feed-in tariffs retrocede progressively a part of the capital after the initial investment. However, a grant is free of charge for its beneficiary whereas a loan has to be paid back, often with additional interest. Finally, from the trigger point of view, a grant may seem easier to be managed as it is treated in one part in opposition to loans or feed-in tariffs that require a follow-up over the years.

It is important to note that only taxes that specifically discourage unsustainable behaviours have been considered in this deliverable. Therefore, all general taxes implemented on a product, service or resources whose main objective was not to incorporate externality costs related to environmental issues were rejected,

which may explain the low number observed. However, their role is central in the support of sustainable energy policies as they are the fundamental sources of revenues to finances all other price-based instruments.

Regarding the type of instruments applied countries have their own specificities. In **Germany** loans are the most used tools with 41% of applications. This may be explained by the fact that the KfW, a government-owned development bank, is the main trigger of policy support measures in the country. 30% of the German MBIs are either proposed or supported by the bank, a large majority of which are loans.

In contrast, **Italy** and **Ireland** do not favour loans. While Italy launched a single loan scheme with the Kyoto fund, none has been found from the Irish side. However, the amount of grants (56%) used in Ireland suggests that the lack of loans is compensated by a more extensive use of grants.

Finally, **France** uses tax reliefs as its main policy instrument covering one third of all MBIs applications. France has the second highest combined corporate income tax rate of OECD countries after the United States with 34.43% in 2016 (OECD). For this reason, it seems logical that tax abatements are efficient tools which are they are attractive for both business owners and individuals.

The evolution over time of the type of used instruments tends to confirm the theory that historical tools remain the most preferred, even if new tools entered into service in the meantime. In fact loans and grants have always been the most applied MBIs since 1990.

Figure 17 also shows that the stability observed in the number of instruments used since 2009 is also applicable for the type of instruments.

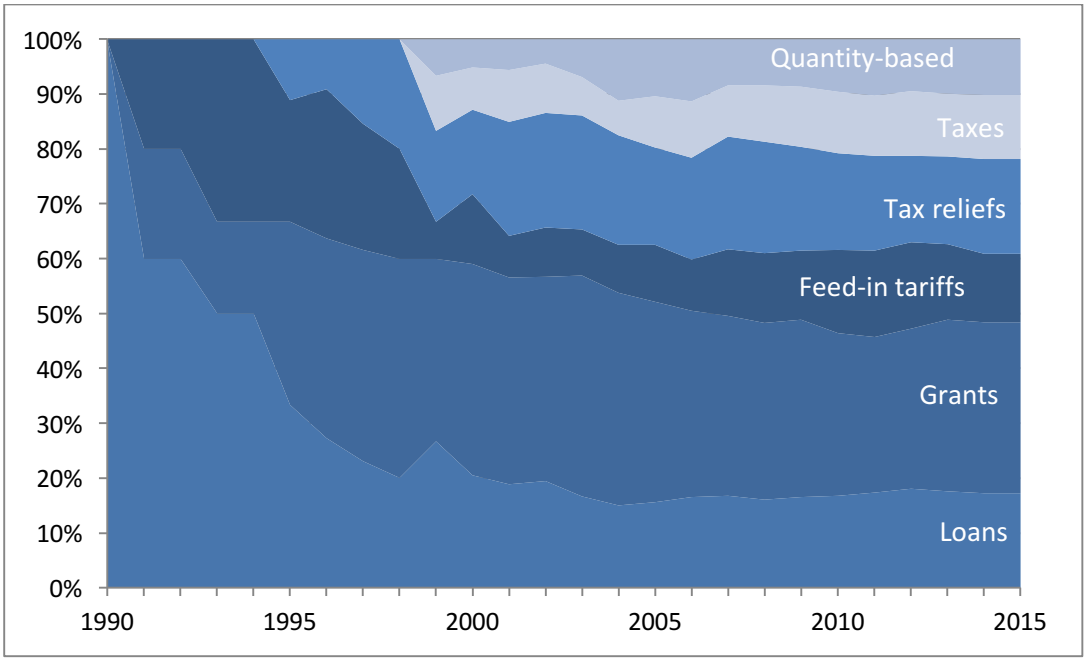


Figure 17: Spread of MBIs per type between 1990 and 2015

In any case some events or political decisions may disrupt this order soon. Feed-in tariffs were designed to support the take-off of renewables and particularly the distributed renewable energy sources (DRES). In the

case of electricity production, the feed in of the produced electricity creates some issues for grid operators. In some EU countries, i.e. Italy or Germany, where certain sources of renewable energy are getting more economically viable and are not so far from grid parity in terms of cost-competitiveness, the end of the feed-in tariffs has been announced. On the contrary an international agreement limiting GHG emissions could be a driver to the implementation of a worldwide trading scheme and the multiplication of quantity-based instruments.

3.3 MBIs' sustainable objectives

Besides the volume of applications and the category of instruments used, the intended objective is another important parameter to be studied to better understand the use of market-driven approaches by EU Member States. Based on the 20/20/20 targets of the Climate & Energy Package two main objectives have been defined to characterise sustainable energy tools in this deliverable. An MBI can either aim at:

- Boosting the share of renewables;
- Increasing energy efficiency.

In those cases, where the instrument addresses environmental issues caused by energy uses without proposing a direct energy-related solution (such as GHG emissions limitation) or the tool supports a measure encouraging without distinction actions towards more renewables and energy efficiency, the MBI is considered as a non-specific policy tool within the scope of the study.

Looking at the statistics elaborated based on data collected during the state of the art review (see Figure 18) the EU preferred targeted approaches with nearly two third of specific instruments applied. Some country specificities can however be highlighted. Italy and France are the countries where the MBIs are the less specific with a respective share of 48% and 45%. Nevertheless, it can be noted that even in these countries the share of specific tools holds the majority.

Focusing on renewables and energy efficiency specific objectives it should be noted that in the two Climate & Energy packages, namely the 2020 and 2030 version), they are both associated to the same measurable target of 20%. This balance expresses the wish of the European Union to address both subjects on the basis of equality. Looking to the spread of energy sustainable measures per objective (Figure 18) this balance seems to be well respected at the EU-level as approximately one third (30%) of the MBIs are energy efficiency specific whereas a second third (33%) is focusing on renewable energy.

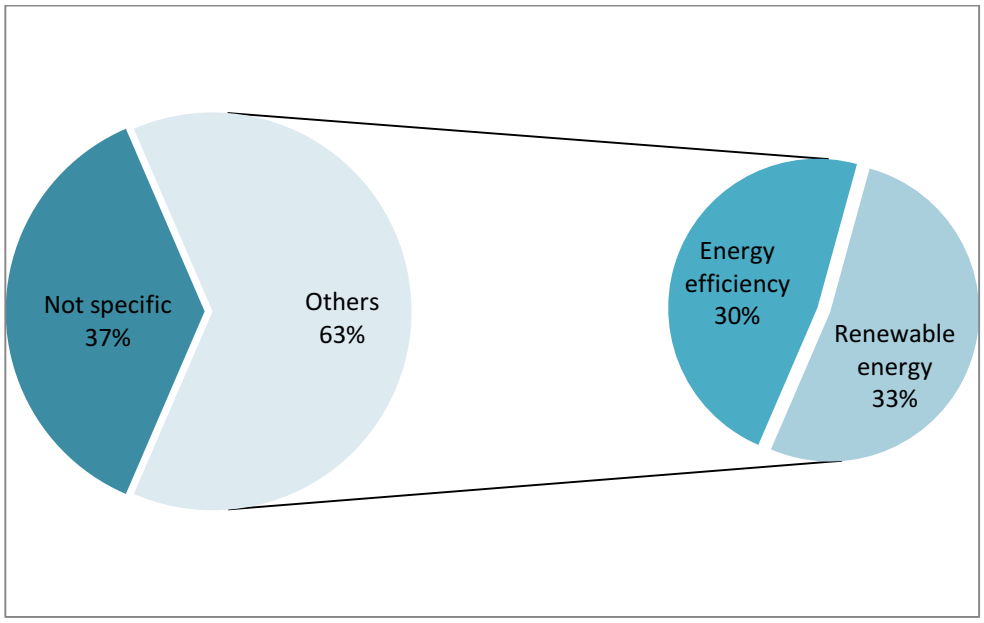


Figure 18: Split of MBIs per objective

This balance at EU level is globally reflected at country level, with some exceptions however. A focus on two countries shows that they decided to slightly favour one objective more than the other:

- In **France** the government tends to favour the deployment of renewable energy and dedicated 43% of its specific MBIs applications for this objective. It can be explained by the fact that the French territory has one of Europe's biggest potentials in renewables with about 700 GW (ADEME et al., 2016). In addition, the country needs to boost the deployment of renewables as it failed in 2011/2012 to meet its intermediary renewable targets related to the 2020 Climate & Energy Package (EC, 2015);
- While **Germany** supports more demand side energy efficiency projects (39% of specific MBIs), mainly in the buildings and industry sectors. On the one hand, it reflects the key influence of the KfW[5] development bank as a MBI trigger, which operates mainly on the building sectors. On the other hand, it is explained by a high dependency on the industry (30.2% of the GDP) of the German industry (CIA, 2015)

Even though, France and Germany seem to have initially implemented different strategies, some similarities appear when examining at the current trend. Figure 20 shows the evolution of MBIs in terms of objectives until 2015 in France (left) and in Germany (right). The differences between the two countries in terms of priorities are obvious but a common trend emerges: While both jurisdictions started by supporting renewables energy in the nineties they both progressively turned towards energy efficiency issues, at a different rate however.

[5] The KfW was initially set up after World War II to reconstruct the country

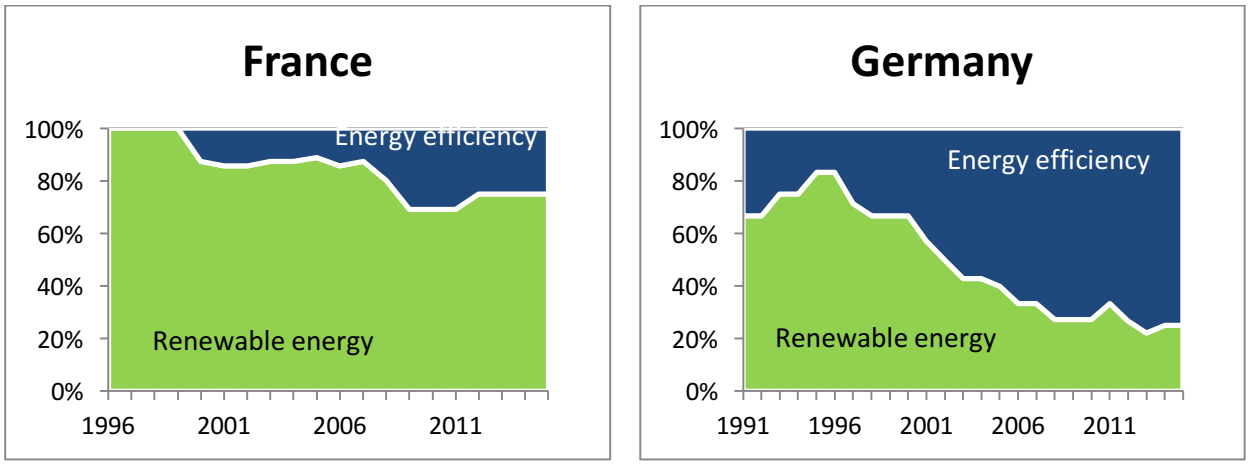


Figure 19: Spread of MBIs per objective in France (L) and Germany (R)

Furthermore, this observation is not only valid for France and Germany. Figure 20 displays the same information agglomerated at EU level. It appears that for the last decade the share of energy efficiency supporting instruments has progressively increased compared to renewables-dedicated instruments. In 2005, energy efficiency instruments represented a share of 40% of specific measures, while in 2015 it has reached 56%.

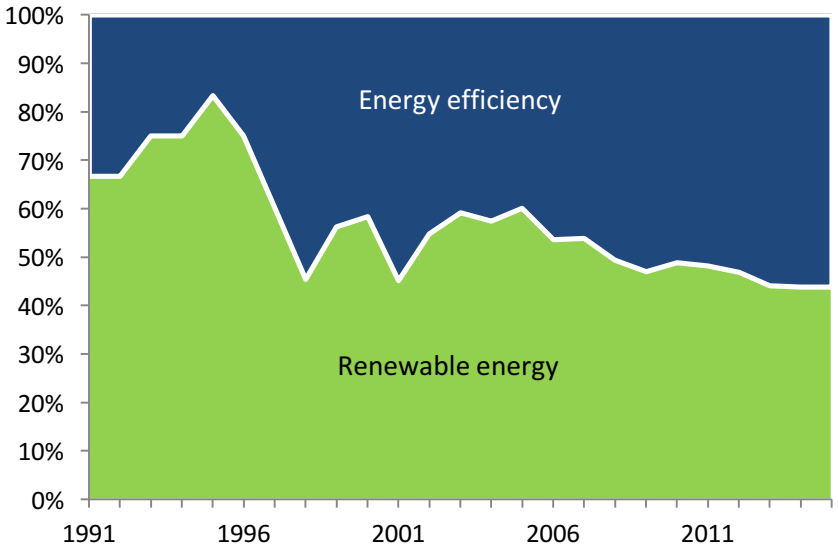


Figure 20: Spread of MBIs per objective between 1991 and 2015

3.4 MBIs' main targeted sectors

The last criterion that has been chosen to analyse market-driven approaches in the EU is the sectors affected by the applied measures. Each of the collated MBIs was studied to conclude on whether it impacts one specific domain or covers several of them, based on the four high-level sectors highlighted in the deliverable D2.3 of the ENTRUST project, namely: buildings, energy production, industry and transport.

According to the gathered data it appears that a very large majority of MBIs (83%) are sector-specific (Figure 21). Moreover, a similar analysis over the last decades shows that the share of sector specific instruments

has always been roughly the same, varying between 76% and 84% since 1998. Finally, a focus on countries confirms the trend, with Spain being the country that operates the most multi-sectoral instruments with a share of 27%.

Regarding the four sectors it appears that the dispatch is not homogenous (see Figure 21). Overall energy production domain is the most targeted at EU level with a third of all MBIs dedicated to it. This can be explained by a close correlation between the objective 'increase the share of renewables' and the sector 'energy production'. Indeed, in the case of electricity production, the share of distributed electricity generation, which is either produced by private individuals (building sector) or industrialists, represents only a low share of the overall generation. In France for instance only 2% of installed capacity in 2015 was distributed (ENEDIS, 2016) (RTE, 2016). Conversely energy efficiency improvement measures are implemented accross the four identified sectors. As a similar number of MBIs are used to develop the share of renewables and improve energy efficiency it is not surprising that energy production is the first targeted domain.

Building and transport sectors have a similar share of respectively 22% and 21%. Industry is by far the less targeted domain with only 4% of the measures. The progressive shift operated by EU countries from an industry-based economy towards a service-based economy as well as changes within the industry sector towards less energy intensive activities (EEA, 2013) may have played a role in the disinterest in the industry sector from the domain of policy-makers.

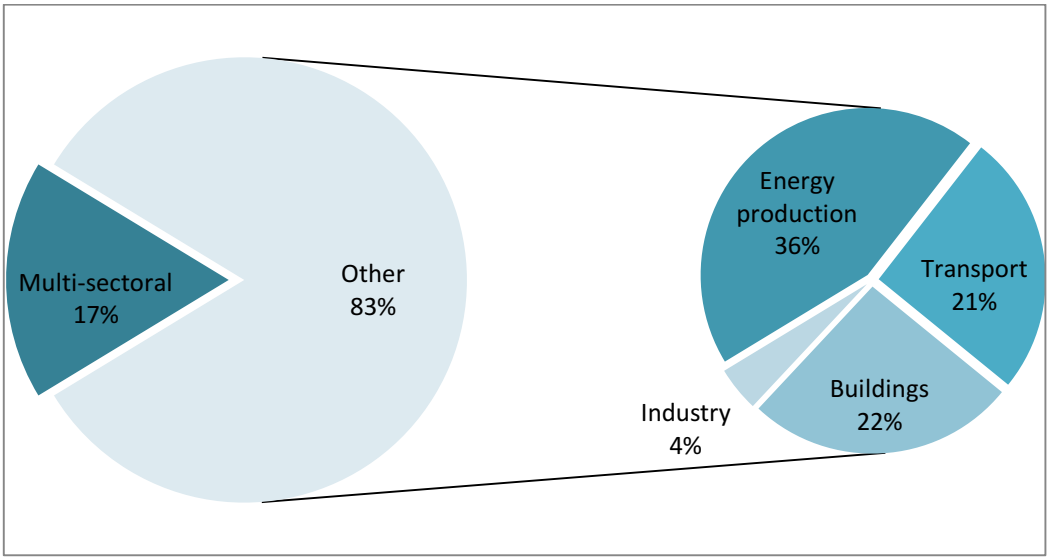


Figure 21: targeted sectors

The evolution in targeted sectors between 1990 and 2015 tends to confirm this hypothesis. Indeed, the first MBIs to be implemented in the early 90s were dedicated to industry. Since then the share of industry-specific MBIs progressively decreased whereas the energy production sector became the more targeted sector. However, it should be noted that energy production is the only domain where the number of dedicated instruments has decreased since 2009 even if it still remains the main targeted sector.

In the transport sector market-based approaches emerged later and did not develop as quickly as in other domains. One possible explanation can be found in the lack of mature alternative technologies to be subsidised such as electric cars or biofuels as well as the slow deployment of a well-established charging network, essential when dealing with mobility. However, a take-off in the number of MBIs dedicated to the transport sector may be expected in the coming years as it is the second domain in Europe in terms of GHG emissions, after the energy industry (Eurostat, 2014).

In line with the previous observations on the volume of use as well as the type of instruments the evolution in targeted sectors has also become quite stable since 2010, except for the industry domain that increases due to a series of seven measures launched in Germany between 2012 and 2013 and particularly dedicated to Small and Medium-sized Enterprises (SMEs).

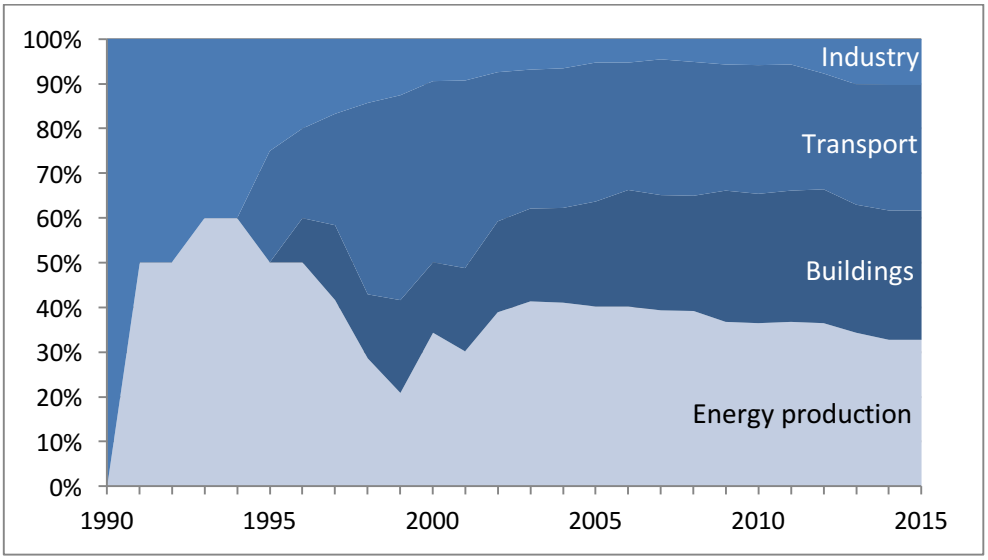


Figure 22: Evolution of targeted sectors over time

All countries do not apply the same strategy when it comes to the choice of sectors. Between 2000 and 2005 **Ireland** started exclusively with the buildings sector. From 2007 on, the country made energy production a priority which became the most targeted sector with a minimum of one third of instruments addressing this issue for the last nine years.

The **United Kingdom** followed a quite similar path as Ireland and started in 1997 with the buildings sector too. Afterwards it focused mainly on energy production, the first targeted domain with at least one third of MBIs since 2002.

Italy started to use MBIs in 1996 in the transport sector and two years later in energy production. In contrast to the UK and Ireland, Italy did not give priority to the buildings sector and the first measure in this sector was only implemented in 2007. Moreover, no market-based approach was found for the Italian industry sector.

Since 1996 **France** has always put more efforts in energy production with an average of 35% of its instruments. It launched several market-driven approaches on transport and buildings domains in 1999 and

continued its efforts in both sectors at a similar rhythm. The use of MBIs in the industry came in 2009 only and never exceeded 4% of the total amount of instruments.

Germany started by targeting both industry and energy production domains in 1990 before launching similar approaches in the buildings and transport sectors, respectively in 1995 and 1997. If the number of MBIs applied to the transport took long to take off with a share of only 6% in 2004 the last decade was more prolific and it increased to stabilise at about 25%. Nowadays and from a sectoral point of view only, it appears that Germany applied the most balanced strategy as it balances the use of MBIs among the four domains, with a share of between 14% and 25% for each sector.

Finally, the **Spanish** strategy is the most difficult to analyse. While the buildings domain was the first to be targeted in 1998 all measures were stopped two years later and no others were launched before 2006. An important effort has been put on energy production at the beginning of the 21st century but the number of MBIs applied to this domain fell down ten years later. Nowadays the buildings and the transport sectors are the most targeted with a share of approximately of one third of the instruments each. Similarly to Italy, no market-based approach addressing the industry was found in Spain.

4 Country case studies: highlighted success stories

The observations presented in the previous section resulted from a quantitative analysis of the use of market-based instruments. It aimed at identifying current trends as well as evolutions over time but simple quantification does not enable the identification of best practices.

In order to perform some qualitative analysis two successful applications of MBIs were selected from each of the study countries, one price-based and one quantity-based instrument. The harmonised description of the eleven case studies is ensured by the provision of a template along with guidelines. The following sub-sections present the contribution of all partners across Europe on the most successful market-based instruments used in Spain, Italy, France, Germany, United-Kingdom and Ireland.

4.1 Energy efficiency in buildings

Four out of the eleven case studies chosen by the ENTRUST project partners concerned the promotion of energy efficiency measures in buildings. Two MBIs were used in France, one in Italy and the last one in Germany. This section is dedicated to a detailed description of these in a first stage and to the results of the cross-analysis in the form of key lessons and insights obtained.

4.1.1 Case Study 1: Italian grant scheme

Reference	Category	Type	Sector	Techno
MBI_IT_29	Price-based	Grant	Buildings	Not specific

Table 2: Characteristics of MBI_IT_29 case study

Global context

Dependency on energy imports, the problem of guaranteeing fuel fossils supply and climate change have led countries to a more efficient use of energy. For this reason, over the last decade Italy has adopted specific measures aiming at diminishing the quantity of energy used and at increasing respect for the environment. In doing so, Italy has achieved good results. Today, it is one of the OECD's countries with the highest levels of energy efficiency. The following diagram illustrates the increase of energy efficiency in the period between 1990 and 2010. It shows that primary energy consumption (that is the quantity of consumed energy for one unit of Gross Domestic Product-GDP), which is used to calculate energy efficiency, did not vary so much between 1990 and 2005, but it decreased between 2006 and 2009. While it increased in 2010, the whole period between 1990 and 2010 registered a decrease of primary energy consumption by 5.8%. Final energy has a similar trend registering a reduction of 5.4% (ENEA, 2012, p. 2).

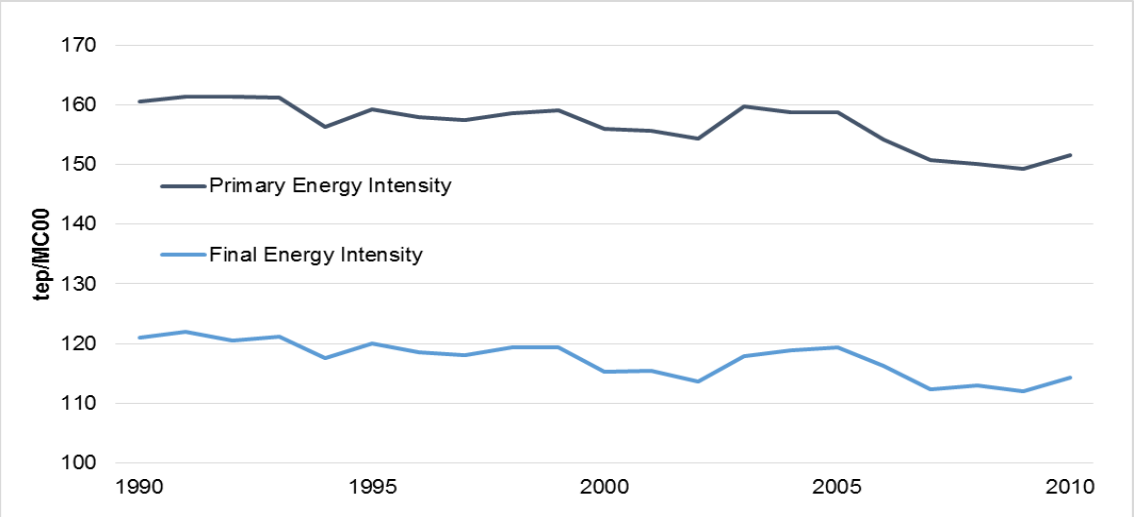


Figure 23: Primary and final energy in Italy between 1990 and 2010 *(Original data: ENEA, 2012, p. 2)*

Issue description

Several sectors have contributed to achieving the increase of energy efficiency in Italy. Between 1990 and 2010, the residential sector achieved the most important results, while the transport sector is the least affected. The industrial sector achieved good results only during the last four years (see).

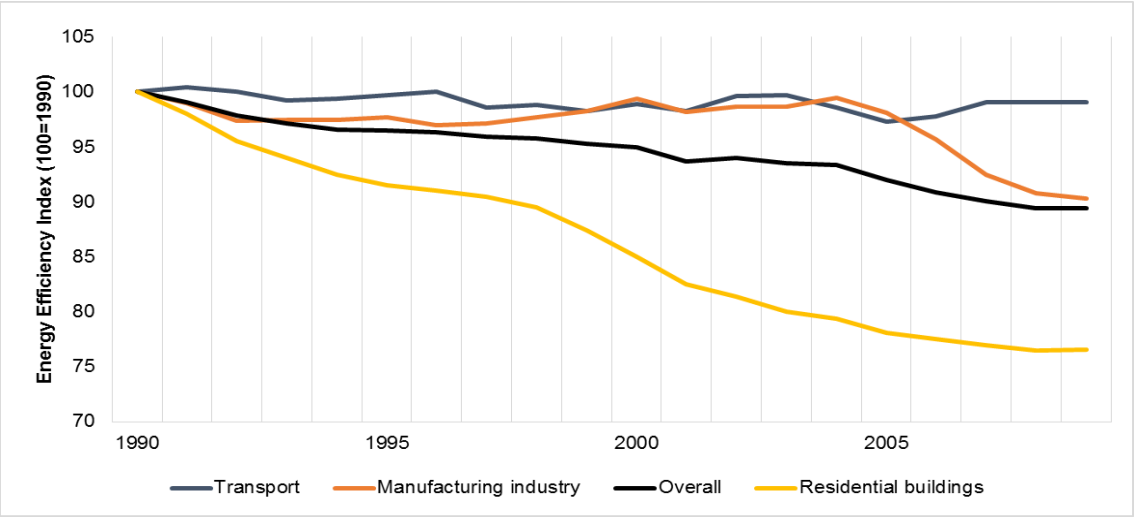


Figure 24: Energy efficiency in the residential, industrial and transport sectors (Original data: ENEA, 2012, p. 3)

Objective of the support

In 2012, the Ministerial Decree dated 28th December also called 'Renewable Energy for Heating & Cooling Support Scheme' regulates a scheme of support for small-scale projects of energy efficiency improvement and production of thermal energy from renewables. GSE is in charge of implementing and managing the scheme, as well as of responsibility for awarding financial incentives (GSE, 2013).

Launching phase

Ministerial Decree dated 28th December 2012 implemented the Legislative Decree 3rd March 2011 n. 28 that transposes Directive 2009/29/CE, promoting the use of renewable energy (Italian Government, 2011, p. 2).

Funding of the instrument

Ministerial Decree dated 28th December 2012 "allocates funds for a maximum yearly cumulative disbursement of €200 million for projects implemented or to be implemented by public administrations and a yearly cumulative disbursement of €700 million for projects implemented by private parties" (GSE, 2013) Applications for support are not accepted after 60 days after reaching the above limits. However, public administrations can follow a special procedure to 'book' incentives for their projects. The yearly cumulative disbursement allocated for public administrations opting for this procedure does not exceed €100 million (50% of the €200 million allocation for public administrations). The incentives are subject to periodical revision pursuant to Legislative Decree 28/11 (GSE, 2013).

Support provided by the instrument

According to the Decree of 28th December 2012, support is granted on the basis of the type of project as well as on the improvement of the energy performance of the building which may be achieved and/or on the energy which may be produced by renewable-energy systems. The incentive (that is to say the contribution to the costs incurred for the project) is paid in yearly instalments over a variable support period (from 2 to 5 years), depending on the projects. Additionally, the incentives may be granted only for projects which do not benefit from other forms of government support, except for guarantee funds, revolving funds and loans. However, in the case of publicly-owned buildings for public use, the incentives may be cumulated with grants, in accordance with national and EU legislation (GSE, 2013).

Targeted elements and people

The targeted elements are buildings, existing systems for winter heating, replacement and, in some cases, construction of new renewable-energy systems. Public administrations and private parties (e.g. individuals, apartment block owners and parties with business or agricultural income) can benefit from incentives (GSE, 2013).

Supported technology

The incentives concerned:

- Thermal insulation of walls, roofs and floors;
- Replacement of doors, windows and shutters, installation of solar screens;
- Heat pumps, biomass boilers, heaters and fireplaces, solar thermal systems, including those based on the solar cooling technology (GSE, 2013) .

Time and financial related conditions

Projects vary between 2 and 5 years. There are no specific financial requirements (GSE, 2013) .

Impact - Level of deployment

There are no available data for the Renewable Energy for Heating & Cooling Support Scheme.

Impact on the energy system / environment

The measures adopted by Italy to increase energy efficiency have contributed to wider efforts to face the challenges imposed by the necessity of increasing the quantity of energy necessary to the country and by climate change. They have led to link energy security and environmental security that have traditionally been separated in Italy. In doing so, these measures have assured a high quality of life to consumers.

4.1.2 Case study 2: German loan & grant scheme

Reference	Category	Type	Sector	Techno
MBI_DE_39	Price-based	Loan & grant	Buildings	Not specific

Table 3: Characteristics of the MBI_DE_39 case study

Global context

The energy intensity of the German industry sector has decreased in the last decades of the 20th century. Therefore since 1993 the residential sector has been the biggest energy consumer sector until 2006 as shown on Figure 25.

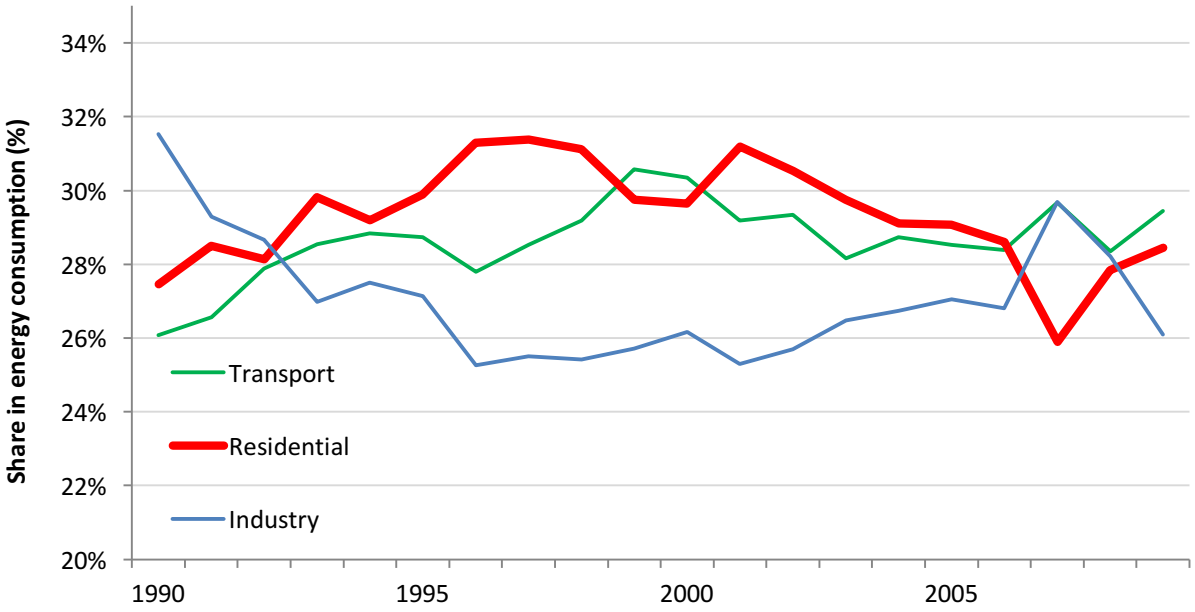


Figure 25: Share of the transport, residential and industry sectors in the German final energy consumption (Original data: Eurostat, 2016-1)

Issue description

Germany is the biggest producer of energy from renewable sources in Europe, and most of this energy is transformed into electricity. However, residential equipment for activities such as heating, cooling and hot water production, are not necessarily electric and therefore consume a non-negligible share of non-renewable energy. Moreover, most of existing buildings in Germany were built within a few decades after World War II, before the first insulation requirements were established in 1978.

In addition to the low energy insulation of its existing building stock Germany faces a double issue that prevents an increase of the energy-efficiency standards of buildings:

- The share of existing buildings being refurbished is very low;
- When buildings get refurbished only urgent works are implemented, leading to a limited improvement in energy efficiency.

In addition, issues to financing renovation projects as well as a long time return on investment have been identified as blocking points to existing building refurbishment.

Objective of the support

The "KfW energy-efficient refurbishment programme" is a market-based instrument set by the KfW development bank in 2009 and still in-operation in 2016. It aims at encouraging householders to renovate their houses towards more energy-efficiency.

In order to do this, it provides either low-interest loans or grants whose amount depends on the level of energy-efficiency achieved at the end of the refurbishment.

Even though the main aim of the instrument is to fund complete refurbishment projects it also finances energy-efficiency single measures.

Launching phase

In 1948 Germany was suffering from a lack of houses due to intensive bombing during World War II. The KfW development bank was therefore founded to rebuild the country and started to provide low-cost financing subsidies to support the construction of housing. Decades later the institute continues to finance projects in the building sector with a stronger focus on the environment protection and the mitigation of climate change. In 2001 the CO_2 Building Restructuring Programme was launched to reduce CO_2 emissions from the residual sector.

In 2009 the KfW energy-efficient refurbishment programme superseded it.

Funding of the instrument

During the two first years of application the MBI was funded by the national budget. In 2011 the Energy and Climate Fund (EKF), established in 2010 after the Fukushima incident, started to finance a part of the instrument and became one year later the single source of funding.

Support provided by the instrument

The eligible beneficiary can choose to get a low-interest loan along with a repayment bonus or a grant. To calculate the amount of support the Energy-Conservation Ordinance (EnEV), the German standard for buildings is used to evaluate the level of energy-efficiency of the buildings after the refurbishment.

For instance, if the refurbished building consumes 55% or less than the given standard the project is classified "KfW Efficiency House 55" and receives the related support, in such case the highest amount. Table 4 and Table 5 summarise the different levels of support granted depending on the efficiency achieved.

Efficiency achieved	Share of the total investment	Maximal amount granted (€)
KfW Efficiency House 55	30%	30 000
KfW Efficiency House 70	25%	25 000
KfW Efficiency House 85	20%	20 000
KfW Efficiency House 100	17,5%	17 500
KfW Efficiency House 115	15%	15 000
Individual measures	10%	5 000

Table 4: Grant conditions according to energy efficiency achievements (source: KfW, 2016-1)

Annual interest rate	Maximal amount borrowed (€)	Level of efficiency achieved	Share of the total loan	Maximal amount repaid (€)
0.75%[6]	100 000	KfW Efficiency House 55	27.5%	27 500
		KfW Efficiency House 70	22.5%	22 500
		KfW Efficiency House 85	17.5%	17 500
		KfW Efficiency House 100	15%	15 000
		KfW Efficiency House 115	12.5%	12 500
	50 000	Individual measures	7.5%	3 750

Table 5: Loan conditions according to energy efficiency achievements (source: KfW, 2016-2)

Targeted elements and people

The instruments target old residential buildings being refurbished or recently refurbished and being sold. Anyone who invests to make an older residential building more energy-efficient or purchases a newly refurbished home can benefit from the support, namely:

- Private buyers;
- Private homeowners;
- Landlords;
- Housing companies.

Supported technology

Regarding the complete refurbishment of a dwelling there is no specific notification about the technology that shall be used and it is the overall energy-efficiency of the building after the refurbishment that matters. Regarding single measures, the following list is covered and will be funded through the programme:

- Thermal insulation of walls, roof and floor space;
- Renewal of windows and exterior doors;
- Installation/renewal of a ventilation system/ventilation package;
- Renewal of the heating system/heating package;
- Optimisation of heat distribution for existing heating systems.

[6] The interest rate has been modified several times since 2009. The table displays the value in 2016.

All projects beneficiating from the KfW energy-efficient refurbishment programme have to comply with the technical efficiency standards. The compliance has to be approved by an energy expert.

Time and financial related conditions

There is no specific time related condition when using a grant as subsidies. Concerning the loan, the following table summarises them:

Annual interest rate	Reimbursement period	Repayment-free period	Fixed interest rate period
0.75 %	4 to 10 years	1 to 2 years	10 years
0.75 %	11 to 20 years	1 to 3 years	10 years
0.75 %	21 to 30 years	1 to 5 years	10 years

Table 6: Time conditions for loans (source: KfW, 2016-2)

The financial requirements (maximal amount granted or repaid) are detailed in section 2.4.

Impact - Level of deployment

Between 2009 and 2013, more than one million homes received KfW funding.

	2009	***2010***	***2011***	***2012***	***2013***
Affected housing units	*36 000*	*344 000*	*181 000*	*242 000*	*276 000*

Table 7: Number of houses refurbished (source: BPIE, 2015, p. 33)

A study handled by the French agency for sustainable development (ADEME) in 2012 shows that the KfW energy-efficient refurbishment programme has invested an average of €16 per capita whereas it is limited to €10 or less in other EU state members. It is therefore by far the largest refurbishment support tool in the EU.

Impact on the energy system / environment

The following table provides estimation on the energy and CO_2 emission savings due to the programme:

	2009	***2010***	***2011***	***2012***	***2013***
Carbon reduction (tones per years)	*955 000*	*847 000*	*457 000*	*576 000*	*650 000*
Energy savings (GWh/a)	*2 680*	*2 450*	*1 250*	*1 720*	*1 750*

Table 8: Estimation on CO_2 emission savings (source: BPIE, 2015, p. 33)

From 2013 on, it is estimated that the carbon emission reduction reached around 800,000 tonnes CO_2 annually.

Potential for replicability

A few countries have already been inspired by the programme. The Czech Republic for instance developed the New Green Savings Programme based on some principles of the KfW programme such as the choice between loans or grants and the level of financial support increasing with the energy efficiency improvement of the project.

Side effects

The program brought other positive effects on the job market and especially for SMEs.

	2009	2010	2011	2012	2013
Overall job creation (person-years)	*11 000*	*92 500*	*52 000*	*69 000*	*79 000*

Table 9: Estimation on job creations (source: BPIE, 2015, p33)

4.1.3 Case Study 3: French tax relief scheme

Reference	Category	Type	Sector	Techno
MBI_FR_23	Price-based	Tax relief	Buildings	Not specific

Table 10: Characteristics of the MBI_FR_23 case study

Global context

In France, buildings are by far the most energy intensive sector. In 2005, the building sector represented 42.5% of final energy consumption, which accounts for about 23% of GHG emissions. Moreover, while industry has become less and less energy intensive over the last decades, the share of energy consumption related to buildings has remained quite stable since 1973.

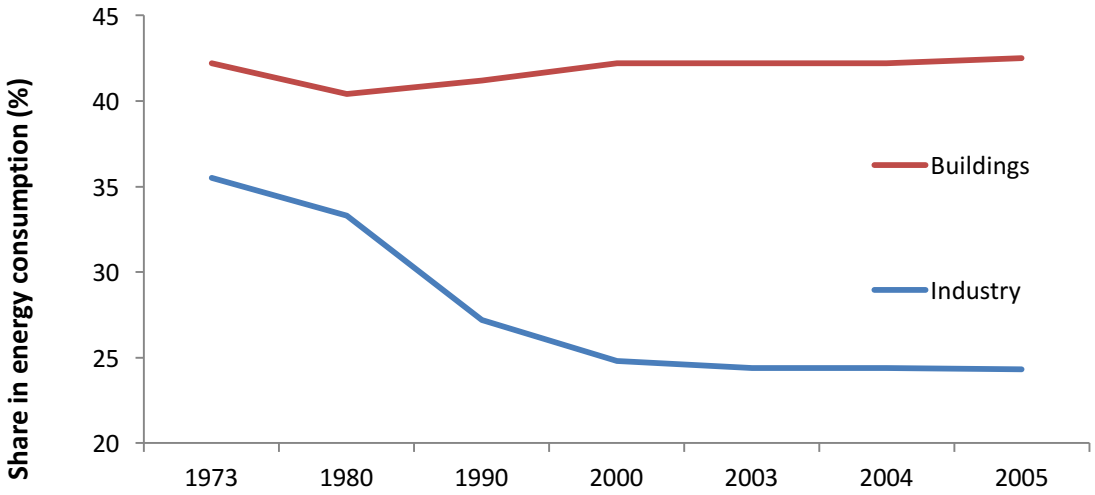


Figure 26: Share of the French final energy consumption in buildings and industry sectors (original data: Eurostat, 2016-1)

Following the first oil crisis in 1973, a first thermal regulation has been set up in France, the RT1973, in order to improve wall insulation and heating system management. Since then the regulation has been updated regularly to implement higher standards: RT1988, RT2000, RT2005 and more recently, the in-force regulation, RT2012.

Issue description

All these thermal regulations have a similarity: they are related to new constructions only. Thus, the low turnover in the French real estate is an important barrier to the reduction of the global energy consumption of the national housing stock.

Moreover, energy efficiency projects are often capital intensive and the return on investment (ROI) requires several years. It was therefore difficult for French householders to self-finance their projects or to get financial support from banks.

Objective of the support

The sustainable development tax credit: crédit d'impôt développement durable (CIDD) is a market instrument set by the French government in 2005. This tax relief instrument encourages householders to perform energy renovations to their homes or to use renewable energy by offering a tax relief on the most efficient equipment on the market.

The CIDD aims therefore at reducing energy consumption in buildings and emissions of associated GHG. It does not have dedicated and measurable objectives but it is part of a larger national law (the POPE Law) of which the objectives are:

- Fourfold reduction in GHG emissions between 1990 and 2050
- Reduce the final energy intensity by 2%/year by 2015

Launching phase

Before 2005 and the launch of the CIDD, householders could benefit from a tax credit to support renovation projects on their main residence. Nevertheless, no energy performance criterion was taken into consideration to evaluate the projects. The CIDD has been launched as a stand-alone instrument by the French government and the Department of Climate and Energy (DGEC) at the Ministry of Ecology, Energy, Sustainable Development and the Sea. However, it is part of a policy instrument package that has been implemented to support the objectives of the POPE law.

Funding of the instrument

No specific fund or tax has been created to fund the deployment of the CIDD. A share of the tax on revenues is used to fund it.

Support provided by the instrument

Thanks to the CIDD householders that carry out energy renovation can get a tax relief on their annual tax on revenues. The tax relief is proportional to the amount invested and the rate depends on the implemented technology. The conditions and credit rate were changed in 2006, 2009, 2010, 2011 and 2012. As an example, the following table shows a non-exhaustive list of conditions for the year 2011:

Equipment	Tax relief rate
condensation boilers	13%
PV panels	22%

insulation of opaque	22%
wood burning appliances	22% or 36%[7]
Heat pump	36%
Solar hot waters	36%

Table 11: Example of tax relief rate per technology applied in 2011
(French ministry of energy ecology and sustainable development, 2012-1)

Targeted elements and people

The CIDD is dedicated to stand-alone houses and flats under two conditions:

- The dwelling is use as main place of residence;
- For energy efficiency retrofits, the dwelling shall be at least two-year old.

Both household owner occupiers and tenants can benefit from the CIDD as long as they use the given dwelling as main residence.

Supported technology

The CIDD concern the following technologies (exhaustive list):

- Energy efficiency: condensation boilers, insulation of opaque and glass walls;
- Renewable energy: Solar hot waters, heat pumps, wood burning appliances, PV panels.

Time and financial related conditions

The project shall occur between the start and the end date of the CIDD. The tax relief applied to a maximal cost of €8,000 for a single person, €16,000 for a couple with a common taxation. An additional amount of €400 is granted per dependent person attached to the enquirer. If the beneficiary is a lessor, the cap is €8,000 per dwelling, within the limit of three dwelling per year.

Impact - Level of deployment

	2005	2006	2007	2008	2009	2010	**Total**
Beneficiaries (# millions)	0.98	1.25	1.32	1.47	1.46	1.41	**7.89**

Table 12: Number of dwellings (Commissariat Général au Développement Durable, 2012, p. 2)

Over the 7.89 million beneficiaries, there are 6.2 million unique dwellings, meaning that 1/7 of main residents in the country have been restored between 2005 and 2010.

Impact on the energy system / environment

The Menfis, a model developed by the French agency for sustainable development (ADEME) estimated in April 20011 that the CIDD already reduced the primary energy consumption of residential buildings by 8% in 2010 compared to 2008 (7.5% for the GHG emissions).

[7] 22% for a first purchase, 36% for a substitution

It also forecasted that if the instrument was maintained until the end of 2012 and then stopped, it would reduce induce GHG emissions 25% lower in 2020 than in 2008. The SceGES, another model developed by the DGEC has made similar projections.

Side effects

Beside its main objective of reducing the energy consumption and GHG emissions, the CIDD had secondary objectives, namely:

Support economic growth and job creations in the thermal renovation sector. According to the evaluation performed by the MEDDTL, MINEFI, MBCPFP and ADEME, the CIDD would have increased the turnover of the thermal renovation sector by €4.8bn between 2008 and 2012. However, no data were found regarding job creations.

Structure and organise the sustainable energy industry. The abrupt and regular adjustments of the tax credit, whether it was related to technology, the requirement or the credit rate, have created instabilities and a lack of visibility for industrials. This uncertainty could have had negative effects on the development of industrial clusters.

Stimulate the innovation and guide markets towards more energy efficient solutions. If the technology evolved over the past years, both in the energy efficiency and renewable energy domains, it is difficult to estimate the impact of the CIDD itself in this evolution.

In addition, this kind of market-instruments usually faces side effects, which are difficult to quantify:

The **rebound effect** corresponds to behaviour change usually occurring when people deal with the deployment of new and more efficient technologies. In the specific case of energy efficiency, several studies have shown that householders tend to improve their comfort by an increase of the temperature or a more intense use of electric devices after a renovation. The actual decrease in energy consumption is therefore not as high as initially expected, which limits the impact of the given instrument regarding its initial objective.

The **deadweight effect** describes the specific case in which people who beneficiated from the incentive to perform the renovation would have done the work anyway. While it remains difficult to assess properly, the deadweight effect was estimated to affect several tens of percent of CEE beneficiaries (French ministry of energy, ecology and sustainable development et al., 2011, p. 26). As for the rebound effect, the evaluation of the instrument might be overrated if the deadweight effect is not taken into account.

4.1.4 Case study 4: French White Certificates

Reference	Category	Type	Sector	Techno
MBI_FR_29	Quantity-based	White certificates	Buildings	Not specific

Table 13: Characteristics of MBI_FR_29 case study

Global context

In 2005 the POPE Law (the French Energy Policy Law) follows the commitments made under the Kyoto Protocol and announced in outline the direction to be taken regarding energy management improvement in

France. The law includes several policy instruments and article 14 deals with Energy Savings Certificates (CEE) and sets a trading market related to these certificates.

Issue description

In 1998 France overtook the United Kingdom in terms of final energy consumption and became the second biggest energy consuming country within the European Union after Germany.

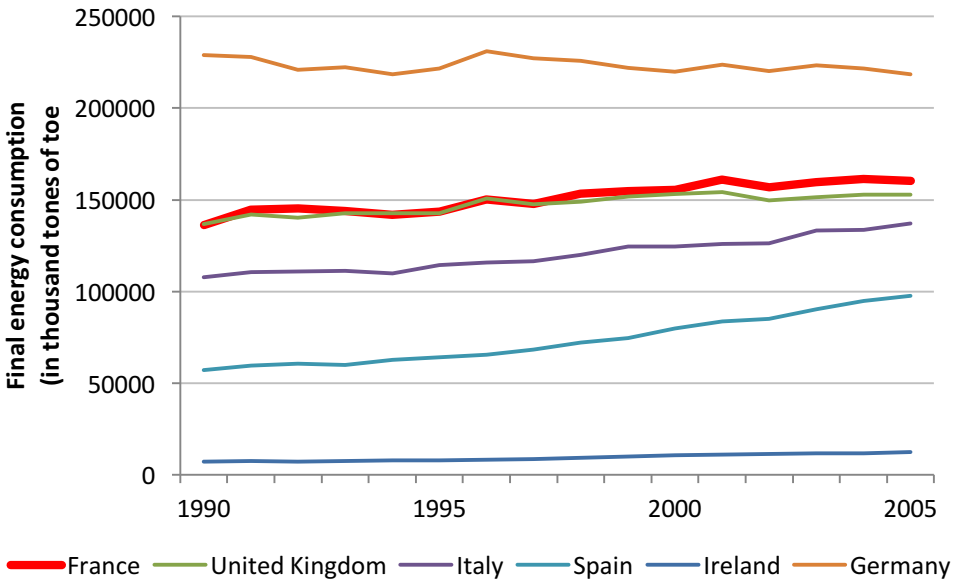


Figure 27: Final energy consumption of France and other study countries (original data: Eurostat, 2016-1)

Objective of the support

The CEE aims at reducing the French overall energy consumption. It targets various sectors such as light industry, agriculture and transport but the buildings sector remains the most targeted. The instrument aims at achieving the following energy savings:

First period (July 2006 - June 2009)	Transition period (July 2009 - Dec 2010)	Second period (Jan 2011 - Dec 2014)	Third period (Jan 2015 - Dec 2017	Fourth period Jan 2018 - Dec 2020
54 TWh	No target	345 TWh	700 TWh	TBD

Table 14: Overall energy saving target at national level
(source: French ministry of energy, ecology and sustainable development, 2014, p. 10,)

Launching phase

Energy Saving Certificates (CEEs) are a white certificate scheme that has been introduced in France in 2005 by the POPE Law. It is a stand-alone instrument launched by the French government and the Department of Climate and Energy (DGEC) at the Ministry of Ecology, Energy, Sustainable Development and the Sea. However, it is part of a policy instrument package containing also:

- VAT reduction on energy efficiency investments;

- Sustainable Development Tax Credit;
- Local energy information centres (EIE);
- Zero-rated eco-loan.

Funding of the instrument

No specific funding has been set up as the instrument does not provide a financial support but creates market opportunities to support and make more flexible an energy efficiency regulation.

Support provided by the instrument

For each defined period, energy suppliers have to meet energy saving targets defined by the regulation.

In parallel the program offers the choice of actions to be run to obtain CEE and achieve the objectives, such as informing customers on opportunities to reduce energy consumption, running promotional programmes or providing incentives to customers. The establishment of the instrument came with a list of ratified activities.

Finally, suppliers that exceed their obligations and those who do not reach their objectives can trade energy savings certificates among themselves.

Targeted elements and people

Several sectors are concerned by the measure such as light industry, agriculture and transport. However, the main targeted sector remains the buildings one. People affected by the measure are called “obligated parties”. During the first period it included:

- Suppliers of electricity, natural gas, LPG and heating or cooling with annual sales exceeding 0.4 TWh;
- Domestic fuel suppliers from the first litre sold. Each domestic fuel supplier is entrusted with an individual obligation but could transfer this obligation to a professional consortium structure, then in charge of implementing the entire obligation of its members.

For the second period conditions have been slightly modified: automobile fuels suppliers are affected if their annual sales exceed 7 000 m^3 and domestic fuel suppliers selling less than 500 m^3 are exempted.

Supported technology

The instrument does not support a specific type of technology. However, several types of actions can be performed to get a CEE. To help participants an official catalogue describing basic measures based on Standardised Operations information sheets has been drawn up with stakeholders.

Moreover, CEE can also be obtained for additional actions that are not included in the Standardised Operations catalogue called “non-standard” actions.

Time and financial related conditions

Obligations are defined and monitored over three-year periods, namely:

- First period: 2006-2009;

- Transition: 2010 (no target was set up but obligated parties could continue to get CEEs);
- Second period: 2011-2014;
- Third period: 2015-2017;
- Fourth period: 2018-2020.

At the end of each period, parties which do not meet their individual obligation have to pay a penalty depending on the amount of kWh missing. Its cost is fixed by decree at €0.02/kWh.

Impact - Level of deployment

Between 2006 and 2012, 3.3 million projects have benefited from the CEE scheme.

Impact on the energy system / environment

The following table shows that for the first and the second period the level of energy savings targeted at national level was reached:

First period (July 2006 - June 2009)	Transition period (July 2009 - Dec 2010)	Second period (Jan 2011 - Dec 2014)	Third period (Jan 2015 - Dec 2017
54 TWh	No target	345 TWh	700 TWh
65.2 TWh	351 TWh		Ongoing

Table 15: National targets and achievements
(source: French ministry of energy, ecology and sustainable development, 2014, p. 10,)

However, these figures do not mean that all stakeholders reached their goals: some have failed where others exceeded their obligations.

Potential for replicability

A similar instrument is used in Italy under the name Titoli di Efficienza Energetica (TEE). Besides the Italian example, this instrument is not so popular in Europe. The ex-post analysis of the two first periods shows that four criteria shall be ensured to replicate the instrument:

- Make mandatory ex-post analysis to better know the share of energy saved by the measure;
- Update the list of certified operations by deleting the less efficient ones based on lessons learned;
- Simplify the procedures and the management of certificates;
- Ensure more transparency regarding the cost of the measure.

Side effects

There is a risk of fraud attempt by professionals that would try to get CEE for energy efficiency operations that are not eligible within the frame of the programme or even for non-existing operations.

4.1.5 Key points and lessons

The energy efficient buildings market gathers a large variety of actors, from individual house owners to large-scale construction companies, including office buildings managers and service-oriented SMEs specialised in energy efficiency. **Different market players** with diverse roles and objectives require the use of more than a single instrument as it has been shown by the analysis of these four case studies.

New sustainable solutions are more expensive than conventional ones and they represent a significant upfront investment for the end users. In this context the objective of the deployed MBIs is to encourage decision-makers to buy more sustainable solutions by providing incentives that reduce their financial efforts. Therefore, **price-based instruments** such as **grants**, **loans** but also **tax abatement** are preferred in this case, even if quantity-based instruments may be efficient too.

The more instruments, the more **flexibility** is offered to market actors. Indeed, they can decide depending on the nature of the project or their current financial situation the type of support they want to be provided with. This feature enables attracting more beneficiaries and therefore the success of the instrument.

Oppositely, a high number of operating instruments in parallel leads to a more **complex environment**, in which an entire assessment of the most adapted instruments for each case turns to be a difficult task for the general public. It is common to find stakeholders with little knowledge of the large variety of instruments available or not aware of the eligibility conditions of a specific tool. Therefore, the more instruments, the more communication actions are required to promote the tools and ensure the different actors use the most adequate ones.

Finally, market instruments tend to take into account the **actual improvement in energy efficiency** to determine the level of support to be provided. This new parameter ensures that available budget is spent more efficient ways as the financial support increases with the level of energy standard achieved.

4.2 Low-emission vehicles

Two out of the eleven case studies chosen by the ENTRUST project partners concerned the promotion of low-emission vehicles. One was applied in Ireland whereas the second was operated in Spain. This section is dedicated to their detailed descriptions in a first stage and to the results of the cross-analysis in the form of key lessons and points.

4.2.1 Case study 5: The Irish grants and tax relief

Reference	Category	Type	Sector	Techno
MBI_IR_17	Price-based	Grant & tax relief	Transport	Electric vehicles

Table 16: Characteristics of MBI_IR_17 case study

Global context

The transport sector is one which has been traditionally heavily dependent on petroleum-derived fuels. Furthermore, energy use and demand in this sector has increased substantially. There is a growing emphasis

on renewable energy technologies including the electrification of road vehicles to meet emerging energy and environmental demands (NRA, 2011; WWF UK, 2011).

In Ireland the transport sector is still responsible for over a third of total energy consumption and of energy related CO_2 emissions as per 2015 figures (SEAI, 2015). This is higher than most other sectors of the economy. As part of the EU Climate and Energy policy agenda, which focus significantly on reducing CO_2 emissions, the Irish Government has agreed to a number of key targets. Namely it has set out to achieve an overall 20% reduction in primary energy use through energy efficiencies and it has also agreed to significantly increase the share of energy from renewable sources to 10% in the transport sector by 2020 (Foley et al, 2009.

Issue description

Improving energy efficiencies in vehicles is seen as a substantial element in terms of reaching the CO_2 emissions targets. Incremental enhancements in traditional vehicles are not a sufficient approach to reach the desired targets. The role of Electric Vehicles in the transport sector is considered as a critical component of the strategy to reduce emissions. The Irish government has established a further target that 10% of all vehicles will be electric by 20208 (Foley et al, 2009). To achieve this target, action is required in improving this technology, both in terms of reducing costs and improving vehicle performance. Further action is also required in securing greater uptake of these vehicles in the future and building the necessary infrastructure for this (Foley et al, 2009; WWF UK, 2011; Morrissey et al, 2015).

Objective of the support

The Electric Vehicle Grant Scheme is a market based instrument introduced by the Irish Government in 2011 to both incentivise and to support the deployment of electric vehicles in Ireland. This market based instrument is expected to function both in terms of reducing purchase costs and as a tax incentive. Following International best practice on this matter, which suggests that the capital costs of purchasing this technology are a main factor, the existing programme aims to encourage buyers to purchase environmentally cleaner vehicles by supporting some of these costs (Caufield et al, 2009; WWF UK, 2011; Morrissey et al, 2015).

Launching phase

Electric vehicles (EV) have occupied a very small share of the Irish Market and to tackle this low uptake the Irish Government has put together a programme of incentives. The Electric Vehicle Grant Scheme was introduced in April 2011 to incentivise and support the early deployment of electric vehicles in Ireland. The scheme includes a grant towards the purchase of the first 6,000 EVs. The grant amount is €5,000 and relates to the initial purchase of the vehicle. The grant is offered to an approved Electric Vehicle Dealer who passes on the discount to the vehicle purchaser. This method is used to ensure a reduction on the loan amount required by the Consumer in order to purchase the vehicle. In addition to the grant amount for the vehicle, the Consumer will also benefit from a zero rate of Vehicle Registration Tax (VRT) for Battery Electric Vehicles (BEVs) and up to €2,500 rebate on VRT paid for Plug-in Hybrid Electric Vehicles (PHEVs).

[8] Includes battery operated and Plug-in Electric Vehicles

Funding of the instrument

The tax relief programme is administered by the Irish Revenue Commissioners. The grant is administered by the Sustainable Energy Authority of Ireland (SEAI).

Support provided by the instrument

Additional to the supports referred above regarding tax relief and grant incentives for buyers of EVs there are some supplementary supports offered which include:

- The Irish Electric Supply Board (ESB) will provide free connection points in the home of each of the first 2,000 vehicles purchased;
- The ESB is also committed to supplying the necessary infrastructure necessary for the growth of the Electric Vehicle fleet. By the end of 2013, the ESB had installed 700 public AC charge points and 50 fast chargers;
- SEAI carried out a €1 million pilot scheme to assess the suitability of electric vehicles in Ireland and test the infrastructure.

Targeted elements and people

Electric Vehicle Grant Scheme focuses on the transport fleet with the aim of increasing the amount of vehicles that are powered by electricity. The grant scheme incentivises the purchase of both Battery Electric Vehicle (BEV) and a Plug-in Hybrid Electric Vehicle (PHEV).

The main beneficiaries of the Electric Vehicle Grant Scheme are consumers across the Irish state purchasing new transport vehicles for either domestic or commercial use.

Supported technology

The development of Electric Vehicles is significantly tied in with technology innovation which includes:

- Battery technology and chemistry. Extensive research is being carried out internationally to improve the battery system and storage capacity of EV vehicles. These are seen as critical to making this alternative transport system a viable option (Foley et al, 2009; EEK UK, 2011, NRA, 2011);
- Development of a smarter electricity grid to meet the specific demands for power from the national grid (Foley et al, 2009; WWF UK, 2011).

Time and financial related conditions

There are no specific time related conditions attached to the Electric Vehicle Grant Scheme.

The Electric Vehicle Grant Scheme is administered by SEAI and it is provided to an Approved EV Dealer. The maximum grant payable by SEAI is €5,000. The grant awards are outlined below:

Range Prices of Approved EV (€)	Grant amount (€)
14,000 to 15,000[9]	2,000
15,000 to 16,000	2,500
16,000 to 17,000	3,000
17,000 to 18,000	3,500
18,000 to 19,000	4,000
19,000 to 20,000	4,500
Greater than 20,000	5,000

Table 17: Range of price and grant awards (source: SEAI, 2016)

Impact - Level of deployment

Electric Vehicles still occupy a very small share of the Irish Market and current Irish EV market sales indicate a penetration level of 0.25% (Morrissey et al, 2015). This strongly suggests that in order to achieve the pre-established target of 10% by 2020 the Irish Government, as well as EV car manufacturers, need to take more aggressive measures to increase market share (ibid).

However, the Electric Vehicle Grant Scheme was very successful in terms of sustaining momentum in what is a relatively new and still weak global market.

Impact on the energy system / environment

Improvements in the Irish electrical grid have led to a growing capacity in terms of catering for the future growth of the EV fleet. Furthermore, these improvements suggest that the entire EV fleet may be powered substantially by renewable energy if the target of 40% electricity coming from renewable sources is reached. It can be argued that this potentially could see the EV fleet being marketed as being carbon-neutral fleet, which will give it a significant advantage in the years to come.

4.2.2 Case study 6: The Efficient Vehicle Incentives Programme (PIVE) Spain

Reference	Category	Type	Sector	Techno
MBI_ESP_29	Price-based	Grants	Transport	low-emission vehicles

Table 18: Characteristics of the MBI_ESP_29 case study

Global context

Transport is the sector that consumes more energy in Spain. It has always been around the 40% of total final energy consumption in Spain, Figure 28**Error! Reference source not found.**. It has to be highlighted that the domestic vehicles represent approximately the 15% of the total energy consumption in Spain.

[9] Approved EVs with a List Price of less than €14,000 will not receive a Grant.

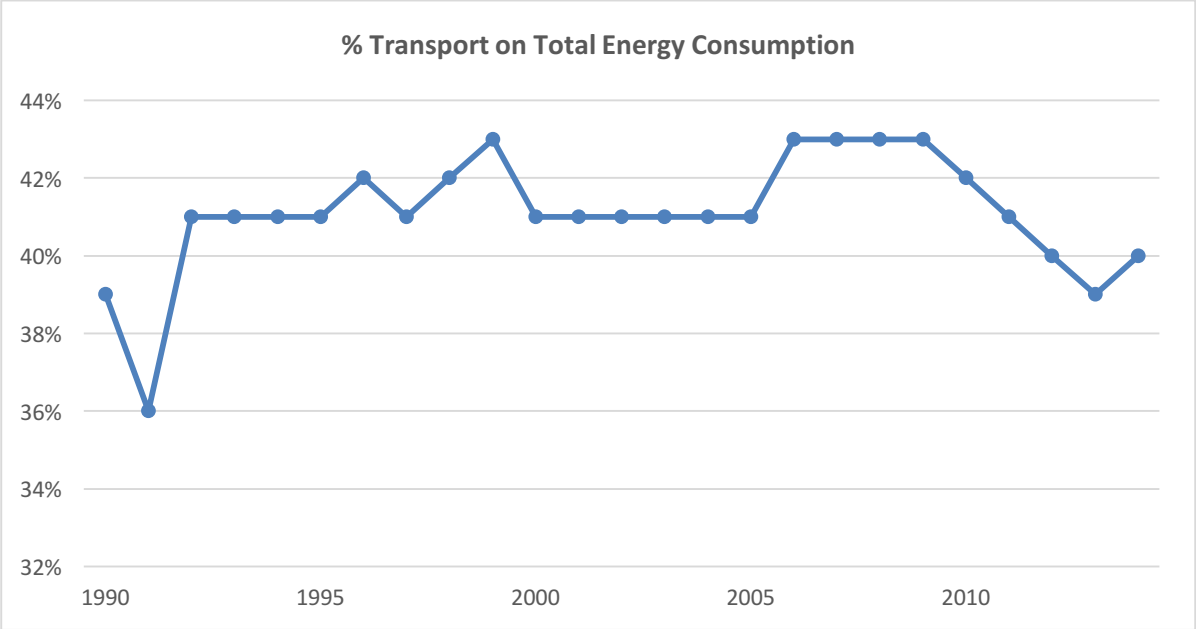


Figure 28: Evolution of transport energy consumption compared to the total final energy consumption in Spain (IDAE, 2016)

Issue description

In 2014, the total consumption of the transport sector ascended to 32,003 ktoe, in which 25,699 ktoe are due to road transport, a 94.8% of this consumption is based on petroleum derivate meaning fossil fuels. This has repercussions on the CO_2 emissions, which have achieved a peak on 2007 of 97,540 kt of CO_2, and decreasing constantly until the 76,361 kt of CO_2 in 2012 (CNMC, 2016).

These significant emissions caused by the transport, need to be reduced in order to be able to achieve the reduction by 20% of GHG emissions by 2020.

This MBI is focused on tackling the renovation of the vehicle fleet, substituting the old vehicles for new ones that consume and pollute less.

Objective of the support

Specifically, the MBI-ESP-29 is referred to the Program of Incentives to the Efficient Vehicle (PIVE Plan), which consists of plans towards encouraging the renovation of the vehicle fleet, supporting the purchase of efficient vehicles, promoting the reduction of the energy consumption as well as the pollution associated. The program was/is focused on light domestic and commercial vehicles. These new vehicles must be substituted by new ones which less consumption and CO_2 emissions.

Launching phase

The first PIVE plan was launched in 2012, with a provision of €75M, the great reception among the society made that four PIVE plans were launched by the end of the 2013, with a total demand of 365.000 vehicles and with a total budget of €365M.

After the successive PIVE5, PIVE 6 and PIVE 7, the current plan launched in 2015 is the PIVE 8, it accounts for €225M budget aiming to substitute around 300.000 vehicles, among the particular and light commercial.

Funding of the instrument

Like its previous predecessors, the financial funding of the PIVE 8 is regulated by the RD 380/2015, it will be given by the contributions received by the IDAE from the Budget of the Secretary of State of Energy under the hood of the Ministry of Industry, Energy and Tourism, with the specific item 20.18.425A.746 "To IDAE for the Program of Incentives to the Efficient Vehicle (PIVE8)". A summary of the budget for each plan is shown in Table 19.

PIVE PLAN	BUDGET
PIVE 1	EUR 75 Million
PIVE 2	EUR 150 Million
PIVE 3	EUR 70 Million
PIVE 4	EUR 70 Million
PIVE 5	EUR 175 Million
PIVE 6	EUR 175 Million
PIVE 7	EUR 33 Million
PIVE 8	EUR 225 Million

Table 19: the 8 PIVE plans and their respective allocated budgets (IEA, 2016-2)

The quantity of the funding to perceive for each beneficiary will come from two sources:

- From the sales points adhered to the PIVE 8;
- From the already mentioned funds of the IDAE entity under the hood of the Ministry of Industry, Energy and Tourism.

The quantities can be classified in 3 different points according to the type of vehicle and beneficiary:

- Minimum of €1,500 for vehicles M1 or N1. The Ministry contributes with €750 and the sales point must discount at least other €750;
- Minimum of €3,000 for vehicles of more of 5 places. The Ministry contributes with €1,500 and the sales point must discount at least other €1,500. The beneficiary must prove the status of large family;
- Minimum of €3,000 for adapted vehicles. The Ministry contributes with €1,500 and the sales point must discount at least other €1,500. The beneficiary must prove the status of person with disabilities.

Targeted elements and people

The Efficient Vehicle Incentives Programme (PIVE) aims to support the continued modernisation of the nation's motor vehicle stock. The Plan aims to promote substitution of a total of 886,000 vehicles, over 10 years old in the case of passenger cars (category M1), and more than seven years in the case of light commercial vehicles (N1), and to modernise the fleet by encouraging the purchase of new energy-efficient vehicles.

Are concerned by the measure people owning a car matching one of the following conditions:

- Passenger cars (category M1) over 10 years old;

- Light commercial vehicles (N1) with more than 7 years.

Supported technology

The funding required will be intended to the purchase of new vehicles M1 category (engine vehicle with at least 4 wheels devoted to the passenger transport with a maximum of 9 seats) or the N1 category (with a weight less than 3.5 tons and designed for the freight transport), that accomplish:

- M1- passenger vehicles:
    - Conventional, hybrids, chargeable hybrids and electrics of extended autonomy. Qualified as A or B class in the "IDAE database of fuel consumption and CO_2 emissions of new cars";
    - Pure electric vehicles;
    - Vehicle propelled by natural gas or Liquefied Petroleum Gas (LPG).
- N1 – light commercial vehicles:
    - Conventional, hybrids, chargeable hybrids and electrics of extended autonomy propelled totally or partially by gasoline, gasoil, LPG and natural gas, that hold the certification of CO_2 emissions lower than 160 g/km (grams per kilometre);
    - Pure electric vehicles
- Vehicle propelled by natural gas or Liquefied Petroleum Gas (LPG).
    - The price before taxes of these vehicles must be lower than:
    - €25,000;
    - €40,000 in the case of pure electric vehicle, chargeable hybrids and extended autonomy;
    - €20,000 for conventional passenger vehicles classified in B energy category with CO_2 emissions larger than 120 g/km (grams per kilometre).

Further specific information, can be found in the Article 4 of the RD 380/2015 (BOE, 2015-2)

Time and financial related conditions

Each PIVE plan has a limited date until which the purchasers can demand for the funding, if the funding is over before the deadline the PIVE plan ends. If there is still budget available after the deadline the date is extended until the end of the budget. The amount devoted to each PIVE plan is explained in section 2.3 and the maximum aid for each vehicle is detailed in 2.4.

Impact - Level of deployment

The PIVE program, since its first launch in 2012, has been consolidated due to the acceptance among the Spanish society of this direct aid for a new vehicle purchasing. This success can be seen as in 2015, the PIVE 8 plan was launched with the largest amount of funding of the PIVE plans (€225M).

Impact on the energy system / environment

After the conclusion of the last PIVE plan (PIVE8) IDAE estimates that the energy savings obtained from this initiative could be approximately 412 million of litres of fuel, which is equivalent to 2.6 million petroleum barrels. It implies a reduction of the GHG emissions of around 850,000 tons of CO_2 every year.

4.2.3 Key points and lessons

The mobility market is a **market in which the final user is the general public** wherein individuals play a key role as they remain the ones deciding what vehicle they buy. Therefore, it is not surprising that market-based instruments target buyers instead of car manufacturers.

Low-emission vehicles and especially electric cars are for now much more expensive than conventional diesel or gasoline cars and represent a significant initial investment or capital outlay. In this context, the objective of MBIs is to support buyers by providing incentives that reduce their upfront financial costs. Therefore, **price-based instruments** such as **grants** and **loans** are preferred.

However, a market instrument may not be enough and other actions shall be considered to ensure the success of the measure, i.e. it is necessary to ensure that the corresponding **infrastructure** with roads and charging stations is dimensioned accordingly. Whatever the level of the economic support proposed it will remain inefficient if no investment is made on network development simultaneously.

Similar attention needs to be devoted to the technology to be subsidised. Indeed, a technology that is not mature may require an important economic incentive to become attractive to buyers. Under such conditions, the risk of creating an artificial market that will disappear as soon as the incentive will be removed is high. **The choice of technologies** as well as the level of support associated to each of them is an important factor for the future success of the measure.

Nowadays, the level of support offered is mostly technology-dependant. To go further in the design of market-based instruments, by taking into account **social parameters,** such as the economic situation of the buyer, could be helpful in order to provide adapted incentives linked to the income generated by the household.

4.3 Energy production from renewable sources

Three out of the eleven case studies chosen by the ENTRUST project partners concerned the promotion of renewable sources. The two first MBIs, operated in Italy and in the UK, focus on electricity production whereas the third one supports the use of biofuels in Spain. This section is dedicated to their detailed descriptions in a first stage and to the results of the cross-analysis in the form of key lessons and points.

4.3.1 Case study 7: Italian Green Certificates

Reference	Category	Type	Sector	Techno
MBI_IT_03	Quantity-based	Green Certificates	Energy production (electricity)	Big-scale power plants (renewable sources)

Table 20: Characteristics of the MBI_IT_03 case study

Global context

Over the last ten years, the importance of renewable energy has very much increased in Italy. Today, all municipalities have renewable energy plants satisfying most of their electricity and heating energy needs (Rubino, 2015). In 2015, the production of renewable energy covered 35.5% of the national electricity needs and represented 17% of the energy needs as a whole. These numbers are significant since in 2005 renewable energy only covered 15% of the national electricity needs and represented 5.3% of the energy needs as a whole (Legambiente, 2016). In this context, the production of solar energy is particularly meaningful as Italy is amongst the world's largest producers of solar energy and the country where solar energy covers most of the national electricity consumption (Legambiente, 2016).

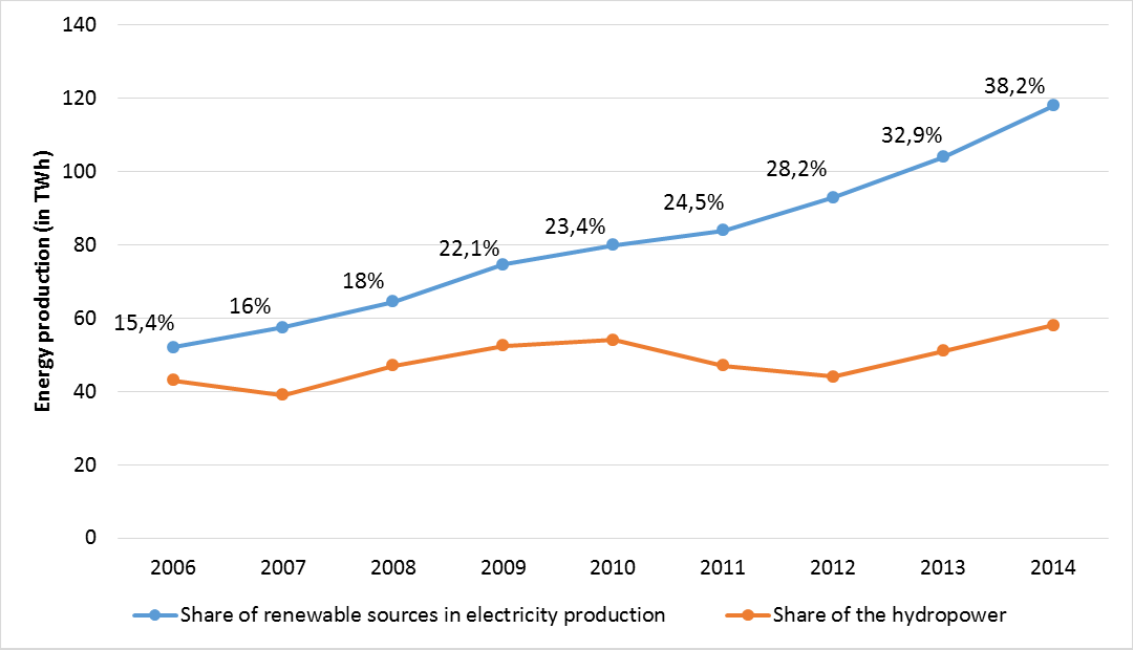


Figure 29: Renewable energy growth from 2006 to 2014 (Rubino, 2015)

As a result, Italy has reduced the import of fossil fuels and the production of energy from plants damaging the environment. The price of electricity has also diminished (from €76 to 48 per megawatt between 2008 and 2014), but not for consumers for a number of reasons such as incomplete liberalisation of the system, insufficient technological innovation, and delay in the construction of smart grids (Rubino, 2015).

Issue description

The current situation is the result of legislative provisions which have changed the national energy system. Italy established the first legislative scheme to support renewable energy in 1992 (ENEA, 2016). It was a Feed in Tariff (FIT) scheme, namely a mechanism incentivising investments in renewable energy technologies. It considered 'mere' renewable energy and 'assimilated' renewable energy (fossil energy with a high energy yields such as CHP) as equal. According to some analysts, as more investments were necessary to produce these latter sources, the production of mere renewable energy was reduced (ENEA, 2016) . Since then, Italy has introduced new rules in its legislation that have increased the relevance of renewables in its energy system.

Objective of the support

In 1999, Italy launched a new system to increase electricity production from renewable energy called Green Certificates. These titles are given for free by the Gestore dei Servizi Energetici (GSE) to companies managing renewable energy plants producing less CO_2 than a fossil fuel plant. A green certificate certifies the production of 1MWh of renewable energy and corresponds to a certain quantity of CO_2 emission. They are calculated on the basis of the production of the running year and used the following year and are tradable on the market. In 2006 the price of Green Certificates was about €200/MWh, while since 2009 it has been maximum €180 /MWh.

Furthermore, the Financial Law of 2008 introduced several modifications to the system. The most important ones concern the length of the validity of Green Certificates (at the moment they have a 3-year validity (GSE, 2016)) and the introduction of a 'Tariffa Onnicomprensiva', which is an alternative mechanism to Green certificates and which includes both the economic incentive and a fixed tariff on the electricity purchase (ENEA, 2016). The Tariffa Onnicomprensiva' and the Green Certificates cannot be cumulated.

Launching phase

The Green Certificates system is quite complex. It stems from Decree 16th March 1999 n.79 also called Bersani Decree, which imposes on operators producing more than 100 GWh/year to produce at least 2% of electricity from renewable energy. This obligation was annually increased by 0.35% between 2004 and 2006 and by 0.75% between 2007 and 2012 (ENEA, 2016) . If the operator does not achieve that target, she is imposed a sanction according to Law 14th November 1995, n.481.

Funding of the instrument

No specific fund has been introduced for Green Certificates. Their value is calculated on the market.

Support provided by the instrument

No specific support has been introduced for Green Certificates given that they correspond to a certain quantity of CO_2 emissions. However, the GSE takes the exceeding Green Certificates from the market in order to ensure the functioning of the system.

Targeted elements and people

The introduction of modifications in the Green Certificates system has led to guarantee incentives that differ on the basis of the kind of renewable energy sources, the size of the electricity plants, the date of the construction of plants or of the connection to the electricity system. The most important changes are the following:

- Since 2008 Plants working with renewable energy (IAFR) cannot apply for Green certificates, but for the 'Tariffa Onnicomprensiva', which has a fifteen-year validity;
- Since 2013 two mechanisms for renewable energy sources for the electricity production (FER-E) have been introduced, namely a Feed in Tariff (FIT) for plants having a power of maximum 1 MW and Feed in Premium (FIP) for plants having a power of less than 1 MW;

- Legislative Decree 28/2011 and Ministerial Decree 6th July 2012 have ended Green Certificates for the plants that became operational after the 31st December 2012, which can benefit from other forms of incentives.

Producers of energy from renewable sources and owners of IAFR plants can apply for Green Certificates (ENEA, 2016) .

Supported technology

Technology concerns plants producing electricity from renewable sources (ENEA, 2016).

Time and financial related conditions

Green Certificates are valid for 3 years (ENEA, 2016) .

No specific financial requirements are envisaged.

Impact - Level of deployment

In 2015, 39 million Green Certificates were given to plants producing renewable energy (Energindustria, 2016).

Impact on the energy system / environment

The impact of Green certificates can be evaluated in the context of the policy followed by Italy in the field of energy. Since the Kyoto Protocol of 1997 the production of renewable energy has very much increased especially through the introduction of incentives such as the Green Certificates**.** Consequently, the Italian system of incentives for renewable energy is giving relevant results in the context of the energy system as a whole. Additionally, the environment benefits from the reduction of CO_2 emissions.

Potential for replicability

Green Certificates systems are already present in several EU countries.

Side effects

Green Certificates risk making, the Italian incentives system for renewable energy less efficient. This is due to the fact that the GSE is not able to take all the exceeding Green Certificates from the market because of their increasing (Bruzzi, 2010) number. Consequently, the supply of Green Certificates is much bigger than the demand on the market, leading to a diminution of certificate price and finally a slow-down in the development of renewable energy.

4.3.2 Case study 8: UK Green Certificates

Reference	Category	Type	Sector	Techno
MBI_UK_23	Quantity-based	Green Certificates	Energy production (electricity)	Large-scale power plants (renewables)

Table 21: Characteristics of the MBI_UK_23 case study

Global context

Prior to the implementation of the UK Climate Change Act 2008, the UK was heavily reliant on fossil fuels and imported fuels for energy production. To meet the challenges of energy consumption and addressing climate change, the UK Climate Change 2008 provides the Secretary of State for Energy and Climate Change with the necessary powers to meet the long-term target of reducing carbon emissions by 80% from 1990 levels by 2050 (DECC, 2008). To address these issues of transitioning from the UK's reliance on fossil fuels and ensuring energy security, the UK must ensure that renewable and sustainable sources of energy are used as part of the energy mix.

To support the renewable energy sector, the Renewables Obligation (RO) is a mechanism designed to support large-scale renewable electricity generation. Through the RO, the Government places an obligation on all licensed electricity suppliers to source a proportion of electricity supplied to customers from renewable energy sources. All suppliers in England, Wales, Northern Ireland and Scotland are affected by the charge and meet their obligations by purchasing Renewables Obligation Certificates (ROCs) form renewable generators or from the ROCs market.

Issue description

The Renewable Energy Roadmap 2011 outlines that to meet the carbon budgets in the UK Climate Change Act 2008, the UK should meet the target of delivering 15% of the UK's energy consumption from renewable sources by 2020. The roadmap outlines that taking into account their long term potential and cost effectiveness, there are 8 technologies that are capable of delivering more than 90% of the renewable energy we need for 2020 (DECC, 2011). These 8 technologies include: renewable transport, offshore wind, onshore wind, ground source and air source heat pumps, biomass heat, biomass electricity, solar energy and marine energy. Consequently, the RO encourages generation of electricity from eligible renewable sources in the UK and since the first RO period the percentage of supply has increased from 3% in 2002/2003 to 34.8% in 2016/2017.

Objective of the support

The EU Renewable Energy Directive (2009/28/EC) commits the UK to meeting 15% of its energy needs from renewable sources by 2020. The Renewables Obligation (RO), introduced in 2002, has been the Government's main financial policy mechanism for incentivising the deployment of large scale renewable electricity generation in the UK including solar photovoltaics at or below 5 megawatts. Feed-in-Tariffs support the development of microgeneration of renewable energy. The RO places an obligation on UK electricity suppliers to source an increasing proportion of the electricity they supply from renewable sources (DECC, 2015-1). Renewable Obligation Certificates (ROCs) are issued to operators of accredited renewable generating stations for the eligible renewable electricity they generate. ROCs are then used by suppliers to demonstrate that they have met their obligation.

Launching phase

The RO was launched in 2002 by the Office of Gas and Electricity Markets (OFGEM) and the Government. Before the launch of the RO, the renewable energy sector was not subsidised to a significant extent, making the RO the Government's main financial mechanism. In principle, the overall responsibility for the Renewable Obligation remains with the Government, specifically the Department for Energy and Climate Change who delegate administration to OFGEM.

Funding of the instrument

The RO is not supported by a fund rather the ROC's create a market for generating renewable energy across energy suppliers where they have to meet a specific percentage of their total energy to be derived from renewable sources. The ROC's are given a buy-out price (£/MWh) and effective price per unit and issued by OFGEM for each reporting period.

Support provided by the instrument

As a result of the RO, the energy system is now transitioning to using more low-carbon sources of energy. The main component of the RO is the ROCs that are issued to operators of accredited renewable generating stations for the eligible renewable energy they generate.

OBLIGATION PERIOD (1 APRIL - 31 MARCH)	BUY-OUT PRICE	OBLIGATION FOR ENGLAND & WALES AND SCOTLAND (ROCS/MWH)
2010-11	£36.99	11.1%
2011-12	£38.69	12.4%
2012-13	£40.71	15.8%
2013-14	£42.02	20.6%
2014-15	£43.30	24.4%
2015-16	£44.33	29.0%
2016-17	£44.77	34.8%

Table 22: ROC buy-out price and percentage of supply (source: OFGEM, 2016a)

Targeted elements and people

ROCs are certificates issued to operators of accredited renewable generating stations for the eligible renewable electricity they generate. Operators can trade ROCs with other parties. ROCs are ultimately used by suppliers to demonstrate that they have met their obligation (OFGEM, 2016b). Where suppliers do not present a sufficient number of ROCs to meet their obligation in the reporting period (one year), they must pay an equivalent amount into a buy-out fund. The administration cost of the scheme is recovered from the fund and the rest is distributed back to suppliers in proportion to the number of ROCs they produced in meeting their individual obligation (OFGEM 2016b).

The targeted industries affected by the RO are large-scale energy suppliers. Microgeneration of renewable energy is supported by feed-in tariffs.

Supported technology

The RO supports eligible renewable energy sources in the United Kingdom including solar energy, onshore and offshore wind energy, biomass energy and marine energy. It should be noted that under the RO, different technologies receive different levels of support reflecting their underlying costs.

Time and financial related conditions

Each RO runs for a year beginning on 1st April and running to 31st March. Supply companies have until the 31st August following the period to submit sufficient ROCs to cover their obligation, or to submit payment to the buy-out fund to cover the shortfall.

The buy-out price related to the ROCs has been increasing year-on-year (see Table 22). Essentially, the cost of ROCs is effectively paid by electricity consumers of supply companies that fail to present sufficient ROCs, whilst reducing the cost to consumers of supply companies who submit large numbers of ROCs. However, this assumes that all costs and savings are passed on to consumers. Companies such as Eon do pass this charge to their consumers.

Impact - Level of deployment

The number of accredited stations since the deployment of the ROCs in April 2002 has risen exponentially. This is identified clearly in Figure 30 below. In April 2002 there were 395 accredited stations, and has risen to 2,513 accredited stations in April 2016. Consequently, the RO has led to a 536% increase in the number of participating stations in the UK.

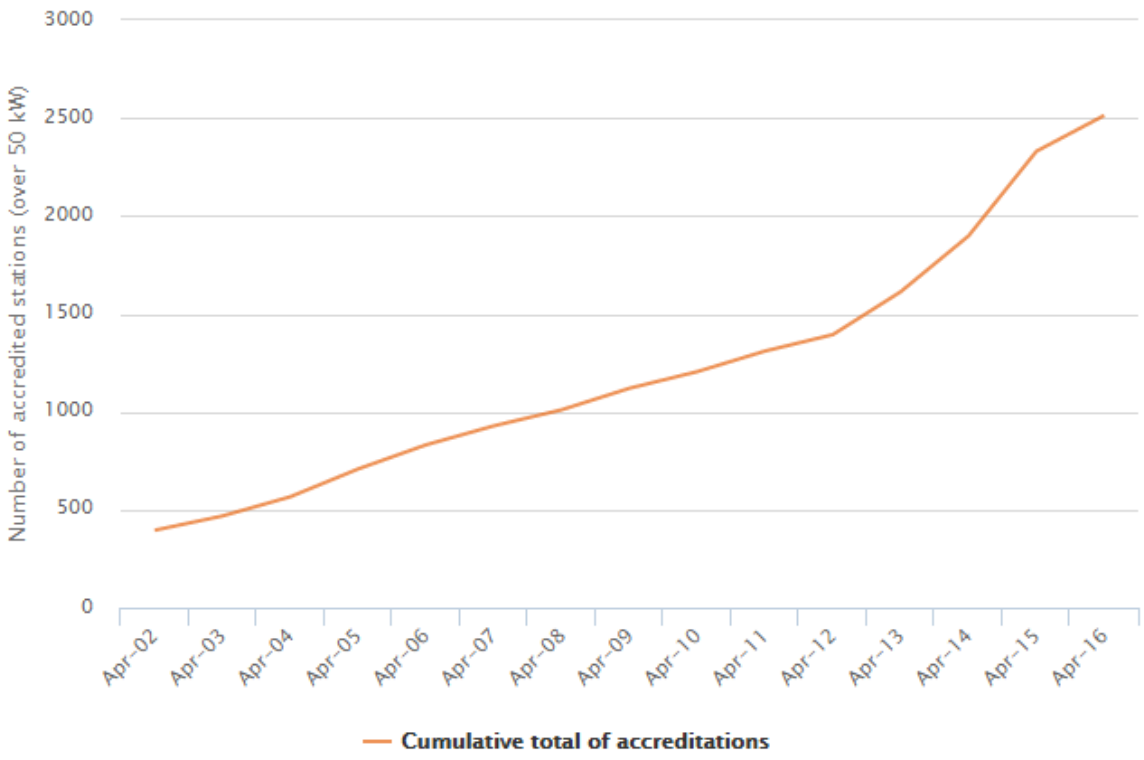


Figure 30: Number of accredited stations (cumulative) over 50kW since 2002 (OFGEM, 2016b)

Impact on the energy system / environment

As a result of the Renewables Obligation (RO), the UK is generating much more renewable energy than ever before. This is exemplified in Table 23Table 23: Recent and predicted UK energy consumption by source (DECC, 2016) below.

Energy Source	Renewables (e.g. solar, hydro and wind including bioenergy and waste)
Energy Consumption 2011[10]	9.56 Mtoe
Energy Consumption 2012[23]	10.58 Mtoe
Energy Consumption 2013[23]	12.42 Mtoe
Energy Consumption 2014[23]	14.31 Mtoe
Energy Consumption 2015[23]	17.37 Mtoe
Future Energy Consumption 2035[11]	21 Mtoe
Difference between current consumption (2015) and future consumption (2035)	+3.63 Mtoe

Table 23: Recent and predicted UK energy consumption by source (DECC, 2016)

Potential for replicability

There are lessons that can be shared from the RO and there are elements of the intervention that could be utilised in other EU Member States. The major component that could, if not should, be replicated is that all energy suppliers have to source a percentage of energy from renewable sources. This percentage has increased year-on-year in line with UK carbon reduction targets. This ensures that the UK is transitioning to a low-carbon energy system.

Side effects

The RO has increased the percentage of renewable sources of energy contributing to the overall energy mix of the UK. In addition, this has also supported the decrease of carbon emissions resulting from the energy system. Moreover, the support this has provided to the growth of renewable energy industry in the UK has also supported employment and economic growth. However, one negative side effect of the RO is that the charge is passed on to the consumers from the energy suppliers and therefore places an extra burden on the cost of renewable energy.

4.3.3 Case study 9: Spanish Green Certificates

Reference	Category	Type	Sector	Techno
MBI_ESP_21	Quantity-based	Green Certificates	Transport	Biofuels

Table 24: Characteristics of MBI_ESP_21 case study

Global context

The transport sector is the segment with largest energy consumption in Spain, in the last two decades it has amounted to around 40% of total final energy consumption in Spain (see Figure 31)**Error! Reference source not found.**. In 2014, the total consumption of the transport sector ascended to 32,003 ktoe which a large

[10] Figures based on observed energy trends (DECC, 2016)
[11] Future energy consumption based on existing energy policies (DECC, 2015-1)

share of this fuel is based on the consumption of petroleum derivate, fossil fuels. This implies that the CO_2 emissions due to transport is significant, placed in 76,361 kt of CO_2 in 2012 (CNMC, 2016).

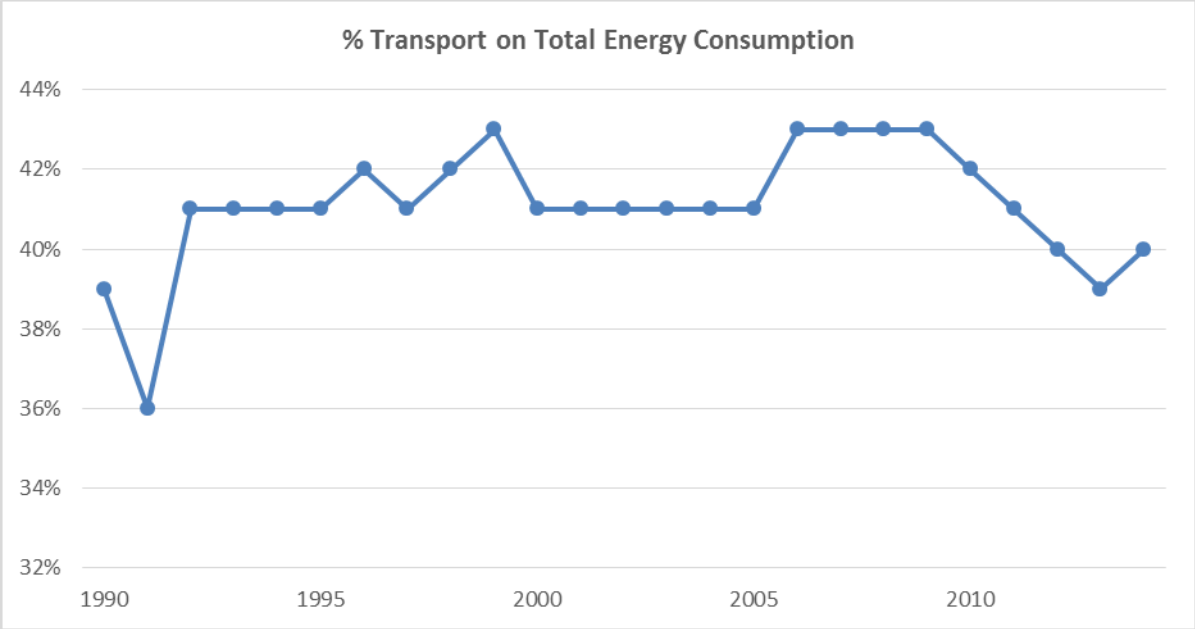


Figure 31: Evolution of transport energy consumption compared to the total final energy consumption in Spain (IDAE, 2016)

Issue description

The issue that this MBI wants to tackle is the low presence of renewable energy sources in transport fuels. These low percentages on renewable fuels used in transport (Table 25) need to be addressed, in order to be able to accomplish the increase by 20% on renewable energies by 2020.

Energy prevision	2005		2012 progress	2020	
	%	TWh	%	%	TWh
Heating and cooling	8,9%	41.175	11,9%	17,3%	62.291
Electricity	18,4%	53.768	29,2%	39%	144.827
Transport	0,8%	2.849	4,8 %	11,3%	37.396
Total	8,2 %	96.536	13,5%	20,8%	238.665

Table 25: Evolution of the Renewable Energy percentages in Spain by typology (source: CNMC, 2016)

Objective of the support

The order ITC/2877/2008 (BOE, 2008), establishes a mechanism to foment the use of biofuels and other renewable fuels for a transport usage. It is aligned to Directive 2003/30/EC that states that any member state should commercialise in their markets a minimum portion of biofuels and other renewable fuels. In the case of Spain, the old Hydrocarbons law (Law 34/1998) sets a mandatory objective of 5.83%.

This order had continuity afterwards with the RD 459/2011 which stablished even harder minimum objective for the years 2011, 2012 and 2013 (BOE, 2011).

However, in 2013 the Spanish government approved RD-L 4/2013 (BOE, 2013) and relaxed the minimum objectives to be achieved by 2016, modifying as well the objective for 2013. The reason for of this decrease of the minimum objectives was the economic situation and high prices of the oil.

Again in 2015, the government decided to raise gradually the minimum objectives on biofuels by 2020, approving the RD 1085/2015 (BOE, 2015-1).

Year	Minimum obligation Gasoline certificates %	Minimum obligation Diesel certificates %	Minimum obligation Global certificates %
2008	1.9%	1.9%	1.9%
2009	2.5%	2.5%	3.4%
2010	3.9%	3.9%	5.83%
2011	3.9%	6.0%	6.2%
2012	4.1%	7.0%	6.5%
2013	(4.1%) 3.9%	(7.0%) 4.1%	(6.5%) 4.1%
2014	3.9%	4.1%	4.1%
2015	3.9%	4.1%	4.1%
2016	4.3%	4.3%	4.3%
2017	5.0%	5.0%	5.0%
2018	6.0%	6.0%	6.0%
2019	7.0%	7.0%	7.0%
2020	8.5%	8.5%	8.5%

Table 26: Obligation per type of fuel between 2008 and 2020 (source: CNMC, 2015)

Launching phase

To support Spain's biofuel blending requirements, the system to monitor compliance with the obligatory biofuel objective was developed in October 2008. The former National Energy Commission (CNE), currently the National Commission of Markets and Competence (CNMC) will issue tradable biofuel certificates, certifying that 1 toe of biofuels has been sold or purchased in a given year.

Funding of the instrument

There is not a dedicated fund devoted to develop this instrument. It is a mandatory measure established by the government to align national objectives to the European ones. However, if the obligated subjects are not able to accomplish the minimum objectives set, those must pay (in €) for the deficit in certificates in respect to the gasoline, diesel and global objectives.

These payments represent a penalty to the subjects not able to reach their biofuels' mandatory objectives. Payments that the certified entity will distribute among those subjects that were able to overcome their goals and therefore have an excess of certificates.

Support provided by the instrument

Two types of certificates will be issued, a Certificate of Biofuels in Diesel (CBD) and a Certificate of Biofuels in Gasoline (CBG). Obligated parties must provide necessary data to the CNMC and request the appropriate certificate, which holders can transfer between each other provided that CNMC has been informed. As of 2010, up to 30% of certificate obligations will be transferable from year to year.

Targeted elements and people

This order aims to support the promotion of biofuels (biofuels in gasoline and biofuels in diesel) and other renewable fuels devoted to transport. It establishes mandatory objectives for the subjects, which have to accredit annually the minimum certificates of biofuels.

The subjects obligated to the accomplishment of this order are:

- The authorised operators to distribute at wholesale level the petroleum products;
- The companies that develop a distribution activity at the retail level of petroleum products;
- The consumers of petroleum products, in the part of its annual consumption no supplied by any of the two prior options.

Supported technology

The measure supports the integration and implementation of renewable energy sources in the transport sector, biofuels in this specific case. This implies objectives for integration of biofuels on the actual gasoline and diesel market.

Time and financial related conditions

The order contemplates the option that these certifications can be transferred or passed to the next year, so the time related conditions to accomplish the objective are annual, starting in 2008. Subjects must present accreditation annually to the certification entity National Commission of Markets and Competence (CNMC) then this entity validates them and issues the certificates.

The economic requirements appear in term of compensation/penalisation when the obligated subjects are not able to accomplish the minimum objectives set, those must pay (in €) for the deficit in certificates in respect to the gasoline, diesel and global objectives.

Impact - Level of deployment

The last report from the CNMC states that the number of certificates in 2014 was (CNMC, 2015):

- For Certificate of Biofuels in Diesel (CBD), 830,005 definitive certificates were accepted;
- For Certificate of Biofuels in Gasoline (CBG), 186,964 definitive certificates were accepted.

Impact on the energy system / environment

The initiative has had a positive impact in the energy system. The objectives were accomplished increasingly until the year 2012 (Table 27), thanks to the objectives fixed by the RD 459/2011. However, in 2013 the Spanish government approved the RD-L 4/2013 (BOE, 2013) and relaxed the minimum objectives so the achieved percentages decreased.

Year	Gasoline certificates %	Diesel certificates %	Global certificates %
2009	1.8%	3.0%	2.8%
2010	4.2%	5.1%	4.9%
2011	4.3%	6.6%	6.2%
2012	4.1%	9.5%	8.5%
2013	3.4%	3.4%	3.4%

2014	3.7%	3.7%	3.7%
2015	3.8%	3.6%	3.6%

Table 27: Evolution of the % achieved of biofuels in past years (source: CNMC, 2015)

Hopefully, this last RD approved in 2016 with higher objectives will help to achieve the 8.5% in 2020.

4.3.4 Key points and lessons

Even if the share of distributed generation increases with time, centralised generation remains by far the most used way to produce energy. This trend is reflected in the use of market-based instruments to promote the use of renewable sources in energy production as they are likely to target **large-scale actors** mostly. Its objective is not to provide economic incentives but to offer more **flexibility** to a regulation that sets obligations and binding targets. Therefore, **quantity-based instruments** are preferred.

The setup of **essential parameters**, whether it is the price of a certificate, its corresponding quantity of energy or the amount of the non-compliance fee is paramount for the success of the measure. A too high price for a certificate may lead to a lack of flexibility whereas too low non-compliance fees may result in a total absence of incentive.The analysis also shows that the role of the **institutional organisation managing the mechanism** is central to ensure the success of the measure. This organisation, in addition to be responsible for the setup of the parameters, it also has to rule the newly created market, avoid fraud, update parameters according to market variations and manage the administration part of the measure.

Finally, **specific instruments** that distinguish and therefore support various sources of energy differently seems to be preferred to more global tools, which reflects the wish of more flexibility. Indeed, the support of a specific technology can be revised upwards or downwards depending on achieved development.

4.4 Greenhouse gases emissions reduction

Two out of the eleven case studies chosen concerned the overall reduction of GHG gases emissions. One MBI was applied in Ireland whereas the second was operated in Germany. This section is dedicated to their detailed descriptions in a first stage and to the results of the cross-analysis in the form of key lessons.

4.4.1 Case study 10: Irish carbon tax

Reference	Category	Type	Sector	Techno
MBI_IR_16	Price-based	Tax	Transport	Not techno-specific

Table 28: Characteristics of the MBI_IR_16 case study

Global context

Policies aiming to tackle human-induced climate change processes are a major priority in the EU's environmental agenda. Particularly significant in these activities are continued efforts to reduce CO_2 emissions. Complying with these EU targets for reducing GHG emissions poses particular challenges in the Irish context as Ireland is one of the highest per-capita producers of GHG in Europe (Wissema and Dellink, 2007). This issue is further compounded by the fact that energy consumption in Ireland has increased significantly across most sectors of the economy in the last 20 years (Di Cosmo and Hyland, 2013).

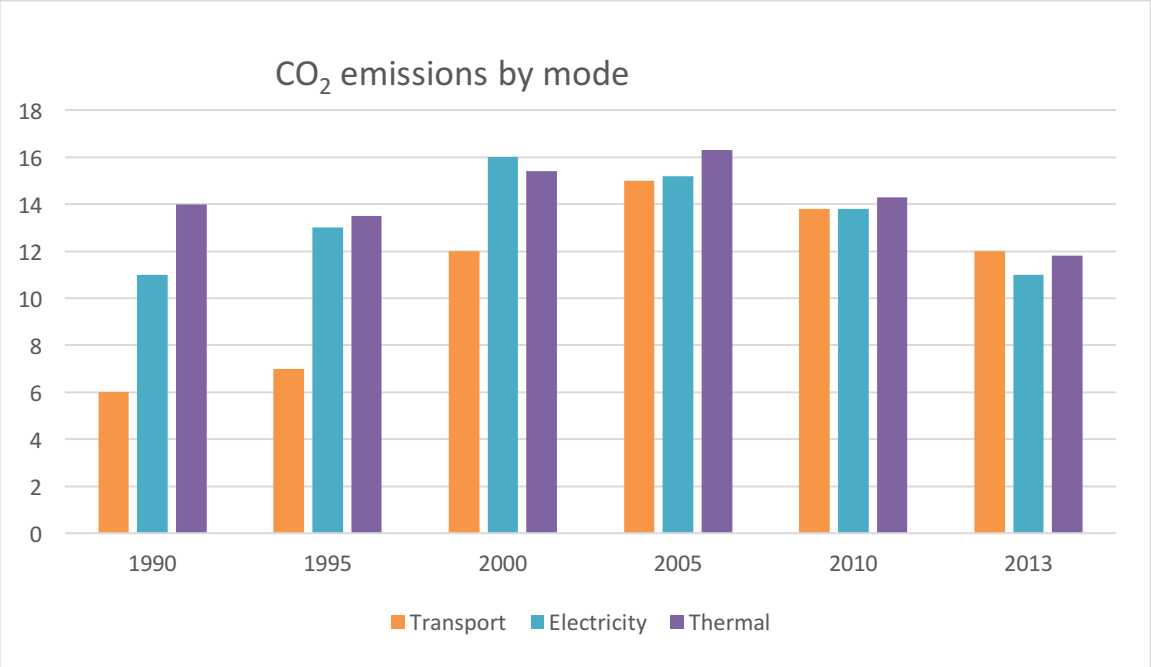


Figure 32: CO_2 Emissions by Mode in Ireland (Source: SEAI, 2014)

Ireland has established specific targets to combat these issues including a 20% reduction in total non-ETS GHG[12] emissions by 2020.

Issue description

Carbon tax has a direct impact on the price of energy in Ireland. This not only impacts the purchasing behaviour and power of individual households, but also all the other sectors of the Irish economy such as industry, commerce, agriculture and transport (Callana et al, 2009). Concerns have been raised around the detrimental impact of the carbon tax on the manufacturing and the industrial sector more generally. This impact is made more acute due to the fact that most manufacturing sectors are foreign owned, which poses challenges for Ireland in terms of remaining a competitive market at the international level (Conefreya et al, 2008).

Objective of the support

The solid fuel carbon tax (SFCT) was initially based on a charge of €10 per tonne of CO_2 emissions. This has recently increased to €20 per tonne, from May, 2014. The Carbon Tax is used as a means to reduce CO_2 emissions by putting an added charge on consumption related to fuel emissions. The SFCT is also expected to work towards stimulating the use of renewable energies. However, this will depend on how the monies generated from this tax are ultimately used, which brings us to the third added advantage of this instrument

[12] ETS refers to the EU's emission trading scheme where indicator calculations are based on the emissions covered under the Effort Sharing Decision directive (406/2009/EC). Under the EU Climate and Energy Package, the 20% reduction target for total GHG emissions was divided into two sub-targets: a 21 % reduction target compared to 2005 for the emissions covered by the EU ETS (including domestic and international aviation); and a 10 % reduction target compared to 2005 for the remaining non-ETS emissions (excluding emissions from LULUCF and international shipping). While the EU ETS target is to be achieved by the EU as a whole, the non-ETS target was divided into national targets to be achieved individually by each Member State

in terms of its ability to generate tax revenue for the Irish State. It has been suggested that this revenue can be used to offset the negative impacts of GHG emissions and their link to global warming. Most notably, it may prove important for countering any significant negative effects from this tax instrument in segments of the population (such as the poor) or at a sectoral level (Farrell, 2015).

Launching phase

Carbon tax has been on the government agenda since 2009 as it has been seen as a reliable instrument to reach emissions reduction targets. The solid fuel carbon tax on energy use was introduced in the 2010 budget at a rate of €15 per tonne of CO_2; this initially applied to oil and gas and excluded peat and coal. It was later announced by the Minister of Finance, as part of Budget 2013, that a carbon tax charge would be applied to all solid fuel energy sources. This was put into effect on the 1st of May 2013. The tax operates as a self-assessed tax that is payable by the responsible suppliers when making a first supply of solid fuel in the Irish State. In order to process the payment these suppliers must be registered with the Revenue Commissioners.

Funding of the instrument

No specific fund or tax has been created to fund the deployment of the Carbon Tax in Ireland.

Support provided by the instrument

At present, there are complementary measures which look to support householders in reducing the burden of energy costs. Since 2009 'The Better Energy Homes Scheme' was introduced to support and improve energy efficiency in homes through retrofitting domestic buildings with poor insulation or inadequate home heating systems. There is also a National Fuel Allowance scheme administered by the Department of Social Protection, which helps counter fuel poverty and the price increases related to the Carbon Tax charges.

Targeted elements and people

The tax applies to consumption of oil, gas, coal and peat. Electricity, the production of cement and alumina are excluded from carbon tax charges as these are covered by the EU-ETS[13] agreement.

The SFCT has a direct effect on most sectors of the economy and therefore it is a broad based tax charge which impacts and targets most people living and working in the Irish state.

Supported technology

Clean and renewable energy technologies benefit from this added cost incurred through the Carbon Tax in Ireland (Wissema and Dellink, 2007). The existing strength of the information technology sector is also expected to benefit and contribute substantially to the desired transition in terms of reduced CO_2 emissions and the development of cleaner, 'smarter' infrastructure that reduces waste and is more energy efficient.

Time and financial related conditions

There are no time related conditions apart from the fact that accountable suppliers of fuels liable for SFCT must make their tax returns and make the payment for the applicable Carbon tax liability for each tax year.

[13]The European Union's Emissions Trading System covering CO_2 emissions derived from the generation of power and other large industries.

Impact - Level of deployment

Between 2010 and the end of 2012 it is estimated that over this three-year period the carbon tax scheme raised nearly one billion euro. In 2012 alone an estimated 400 million euro was raised (Rosenthal, 2012).

Impact on the energy system / environment

The carbon tax scheme is seen to being a significant influencing factor in terms of promoting renewable energy sources and reducing the use of peat and coal. Recent figures show that while Ireland's economy was growing by 5.2% in 2014, energy demand fell by 0.5% and CO_2 emissions decreased by 1.2% (SEAI, 2015).

Potential for replicability

This environmental tax enjoys support across most political parties in the state and its success has been acknowledged by the International Monetary Fund (IMF), which was responsible for overseeing the economic recovery of the Irish economy after a period of economic recession between 2008 and 2014 (Rosenthal, 2012). The tax has been majorly successful in terms of raising money for the Irish economy and promoting the use of renewable energies.

Side effects

There are concerns over links between carbon tax charges and fuel poverty. It is suggested that further improvements in technology and grants for retrofitting homes be targeted to the most vulnerable to counter potential growing inequalities relating to price increases in home heating fuels (Farrell, 2015).

4.4.2 Case study 11: German GHG emissions scheme

Reference	Category	Type	Sector	Techno
MBI_DE_24	Quantity-based	GHG emission allowance	Multi-sectoral	Not specific

Table 29: Characteristics of MBI_DE_24 case study

Global context

In 1997 in Kyoto, 84 countries signed an international agreement in order to reduce emissions of GHG with the year 1990 as baseline. Within the frame of the protocol the European Union committed itself to reduce by 2012 average emissions by eight percent compared to 1990 levels.

In addition to measurable targets and the timeframe within which countries shall reach them, the Kyoto protocol introduced market-based instruments to achieve the goals at the lowest possible cost. The emissions trading scheme is one of these systems.

Issue description

Within the European Union, Germany is the country emitting the most GHG. If the United Kingdom, Italy, France and Spain are also in the top 5 they remain far behind Germany as shown in the following figure:

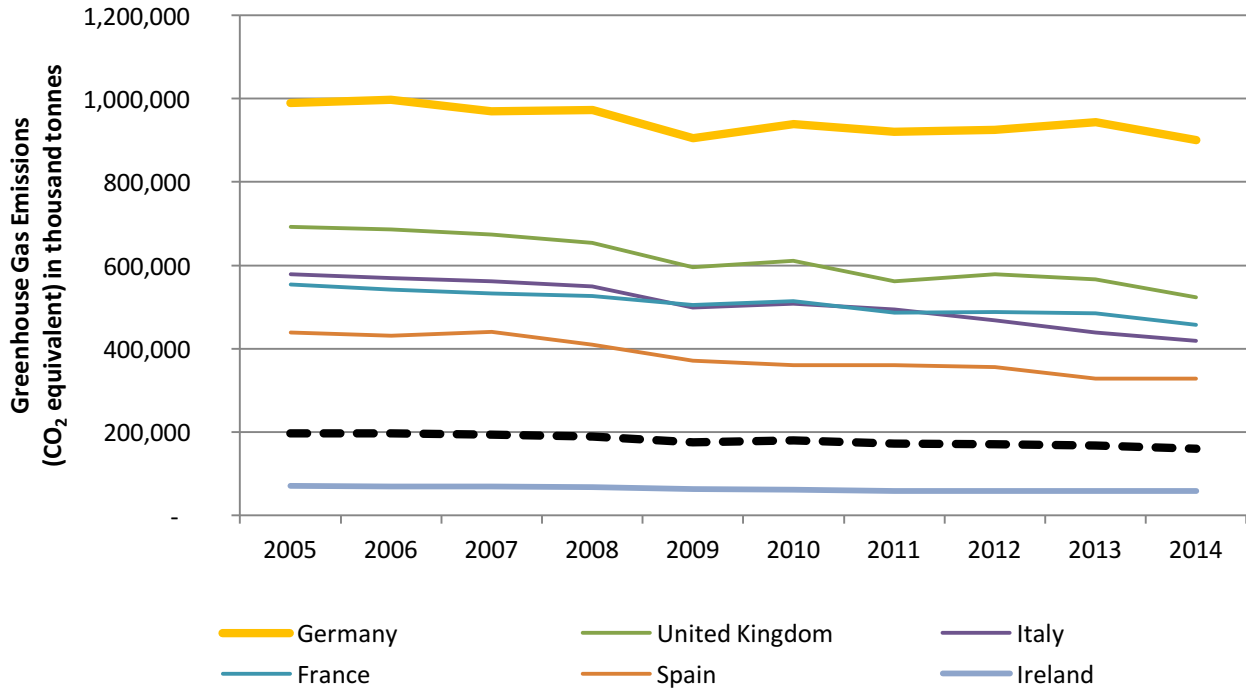


Figure 33: GHG emissions in Germany and other studied countries for comparison (Original data: Eurostat, 2016-2)

Objective of the support

The German Greenhouse Gas Emissions Trading Act (TEHG) is a "cap and trade" scheme that aims at reducing the overall emissions of GHG. The "cap" characteristic of the system ensures a maximum level of annual emissions produced by power plants or industries by distributing emission rights. Meanwhile, the "trade" aspect provides flexibility by allowing the trading of these rights between involved stakeholders.

Launching phase

The Greenhouse Gas Emissions Trading Act (Treibhausgas-Emissionshandelsgesetz) implements the EU Directive for a Europe-wide emissions trading system (Directive 2003/87/EC) into the German law.

The law passed the German Bundestag on 28 May 2004 and the Bundesrat on 11 June 2004 to finally enter in force on 15 July 2004 and provides the legal framework for emission allowance trading in Germany.

Funding of the instrument

There is no specific funding for the instrument as it does not provide a financial incentive but establishes a market. However, the German emissions trading authority (DEHSt) is responsible for the distribution of emissions allowances, the monitoring of the emissions trading system, and the national and the international communication.

Support provided by the instrument

The Emissions Trading System allocates an emission quota to power plants and industries involved a fixed period, taking into account the emission reduction target set for the relevant period. At the end of the period

each stakeholder shall prove that it did not overcome its target. If it did, the instruments offer the possibility to buy emission rights from other stakeholders.

Targeted elements and people

The European Emissions Trading Scheme addresses thermal power plants with an output of over and above 20 megawatts (MW), as well as a variety of industrial facilities in the transformation sector, including cooking plants, refineries and cracking facilities.

Operators of about 2400 installations are able to participate in emissions trading from 2005 onwards. On 7th August 2007, the Act was amended by the legal basis for emissions trading in terms of the allocation period from 2008 to 2012. Two years later, on 16.7.2009, the TEHG was further broadened, as other sectors, like air traffic, are now subject to the legislation, as well.

Time and financial related conditions

Emission rights are valid for a fixed period known as the trading period. The penalty during the first trading period was 40 euros per tonne of carbon dioxide for the first trading period (2005-2007) and 100 euros for the second period (2008-2012). The missing allowances must still be submitted in the following year.

Impact on the energy system / environment

An assessment carried out by Delarue *et al.* (2008) only considering emissions from electricity generation reveals that Germany achieved 35.3 million tonnes (2005) and 27.4 million tonnes emissions reduction, which amounts for respectively forty and forty-seven percent of the reduction all over the EU.

This high share is not due to the instrument itself or the way Germany implemented it but can also be explained by a drop in the electricity generation, wherein coal has an important share.

Potential for replicability

This instrument is already deployed in all EU Member States as it comes from the European Directive on the European trading scheme for GHG emission allowances (2003/87/EG).

Side effects

If the number of emission allowances distributed to stakeholders is too generous, a lot of them will not be used or offered in the market. The value of allowances will decrease according to the supply/demand law. It would therefore become more interesting to buy allowances from other stakeholders rather than invest in CO_2 reduction measures. Carried to extreme lengths such system could lead to an increase of emissions if not correctly set up.

4.4.3 Key points and lessons

The reduction of CO_2 emissions is a high level issue that is likely to be tackled by a cross-sectoral approach thanks to either **price-based** or **quantity based instruments**, sometimes in parallel. Similarly, to what has been observed in other domains price-based MBIs address the general public market whereas quantity-based ones are reserved to large-scale actors.

If a carbon tax and a GHG emissions scheme share the same final objective with an overall reduction of polluting emissions, they are based on two **different ways** to achieve it that may lead to **negative interferences**. The former aims at integrating environmental externalities into the price of product and use the collected money to incentive sustainable behaviours. Although the price of carbon applied in such instruments is usually relatively low it may encourage people to change to more sustainable behaviours. If such a change can be seen positively it can also have negative side effects as it tends to increase the number of allowances available on the market created by the GHG emissions scheme. Following the supply/demand law the price of emissions allowance drops down, leading to a less efficient quantity-based instrument. Therefore, a **clear scope definition** for the two instruments is essential to avoid such issues.

Whereas the quantity-based instrument highly depends on market prices of allowances, the price-based presents a lack of flexibility. Indeed, it is applied uniformly to all products, resources or services within the defined scope and it impacts all citizens, no matter their income.

5 Conclusions

The cross-analysis of the quantitative results presented in the section 3 and the qualitative observations issued from the case study descriptions of section 4 enables the drawing of first lessons learned regarding the use of market-based instruments in the European Union.

This last part of the deliverable 4.3 of the ENTRUST project aims at summarising the current trends as well as explaining them by identifying pros and cons of the different types of tools depending on the context, the stakeholders involved and the objectives to be achieved.

Key lessons are split into two main sections: the first one corresponds to general lessons regarding market-driven approaches in general; the second proposes a review of particular instruments supporting the achievement of specific objectives.

5.1 General lessons

The set of parameters examined during the quantitative analysis suggests that EU Member States reached in 2009 a certain maturity regarding the use of market-based instruments. Indeed **after two decades of evolution the number of tools in operation has stabilised**, as well as the type of instruments used. The increasing average duration of applications also indicates that governments better prepare the launch of MBIs and use lessons learned to anticipate potential side effects.

A further study of objectives to be achieved as well as targeted sectors **reveals a progressive evolution in policy approaches developed by countries in their sustainable energy strategies**. The first MBIs were exclusively dedicated to the development of renewable energy sources and this objective remained the principle one until 2008. Since then, however, more market-based tools are committed to improve the energy efficiency of the EU energy system. A glance at the evolution over time in targeted sectors tends to confirm this trend: although it remains the main targeted domain the number of MBIs dedicated to energy production has started to decrease recently whereas it increases in sectors such as buildings or transport, with a support mainly on energy efficiency measures.

With the emerging awareness of environmental issues, several international agreements have been negotiated to both define global objectives and propose approaches to achieve them. **Policy instruments played an important role and new tools such as certificates (green or white), GHG emissions allowances or feed-in tariffs were designed to specifically address environmental issues due to energy uses**. **Surprisingly these specific instruments have not been the most used by governments or institutions as they represent a share of less than 20% of sustainable energy policy tools.**

This imbalance may be explained by the set of uncertainties that comes with new and therefore less mastered instruments. Indeed, **loans, grants or taxes have been used for different purposes long before the emergence of environmental issues**. Governments have learnt the necessary lessons, mastered the procedures and were aware of potential side effects when applying such instruments. Targeted stakeholders know well these types of tools and the absence of uncertainties encourages them to invest quicker.

If at first sight price-based instruments seem to be the easiest way to incentive sustainable behaviours with a limited risk, quantity-based instruments have also non-negligible advantages. They can be associated to a regulation that ensures the goal achievement while they provide some flexibility to actors by creating a market. In addition, oppositely to price-based instruments that require an important funding to ensure the provision of financial or fiscal incentives, the only costs associated to quantity-based tools are operating costs, usually covered by non-compliance fees paid by stakeholders who failed to achieve their obligations.

In fact, both categories have their own pros and cons and the use of one or the other highly depends on a few context-related parameters. If the quantitative analysis mostly focused on differences between the countries, the case studies revealed similarities and therefore potential best practises in specific cases.

5.2 Domain-specific lessons

One success factor that frequently crops up when it comes **to the promotion of low-emissions vehicles is the financing of capital costs**. Indeed, efficient cars are often more expensive than more conventional ones and this is especially the case with disruptive technologies such as Electric Vehicles (EVs). The price difference between a standard car and most efficient vehicles has been identified as one of the main barriers to massive development of low-emissions automobiles. **Price-based instruments are therefore the most suitable policy tools in such situations as grants, low-interest loans or even tax abatements immediately reduce the amount of investment to be provided by the buyer**.

Nevertheless, the study of this specific case has also shown that **financial incentives are necessary but sometimes not sufficient to get the desired impact** and non-economic parameters shall also be taken into account. Subsidised technologies need to be mature enough to attract buyers and upstream investments in R&D may be essential. In addition, the infrastructure is indispensable when dealing with mobility as the most efficient cars won't be seen as a potential option if there is not a wide and reliable network of charging stations deployed.

Looking at a different domain such as the promotion of **energy efficiency operations in buildings**, some similarities appear. **Price-based instruments are here also preferred to quantity-based due to the need of financing a part of a significant initial investment**. If the type of instruments varies depending on the country, the study also shows that in the building sector market-based instruments may be associated not to direct investments as in transport but to other MBIs to ensure the success of a measure. It has been the case in France where several tools such as the CEEs or the CIDD have been launched in parallel within the frame of the POPE Law, or in Germany with the KfW refurbishment programme that leaves to beneficiaries the choice in the type of tools between grants or loans. The multiplication of support opportunities increases even more the natural flexibility of market-based instruments.

The wider the market, the more flexible shall be the instrument. Thus, it is not surprising to see such parallel measures within the building sector as several kinds of stakeholders can be targeted, ranging from individuals, householders to energy suppliers, including businesses, public institutions or professional from

the construction. **These actors play various roles, have different goals and therefore may react differently in front of a single incentive**.

The sector of **energy production from renewable sources** is quite different from the domains previously studied. First of all, it gathers relatively homogenous stakeholders with large energy suppliers. Secondly, the initial investment is not a major problem as actors are already used to develop large-scale power plants. In addition, the EU defined binding targets for the development of renewables sources which led to the implementation of regulations. In contrast, energy efficiency is only associated with indicative goals. In such situations, quantity-based instruments are preferred to price-based instruments by policy makers. Indeed, **while the regulation ensures the achievement of the objective (i.e. a given share of renewables), the instrument provides some flexibility to market actors that can either invest directly in renewable sources or indirectly finance other stakeholders by buying green certificates**. Another positive aspect to be noted is related to dedicated targets that accompany such instruments and which **makes all actors aware of their responsibilities instead of using pure economic levers to change their behaviours**.

Nevertheless, to be efficient a quantity-based instrument requires a meticulous set up of its parameters such as the price of a certificate, the number of emissions allowances to be distributed or the amount of the non-compliance fee. Any wrong estimation in the configuration process may lead to an inefficient tool or to unexpected side effects. For instance, too many allowances would end up with ridiculously low market prices and this might be a barrier to further investments, whereas a too high non-compliance charge would be passed to the final customers and have a negative impact on energy poverty. Following the upstream configuration of the instrument another success factor lies in the quality of monitoring activities ensuring that implemented rules remain in line with market evolutions as well as identify potential frauds.

Finally, **price-based instruments and quantity-based instruments can be applied in parallel to address global issues such as CO_2 emission limitations**. It is the case for instance with the CO_2 trading scheme whose scope is defined at EU level and the carbon tax managed at national level to cover “out-of-the-scope” sectors. While the first one ensures a maximum level of emissions but does not raise revenues, the second does not guarantee direct decrease of emissions but collects revenues by incorporating in products or resource prices the cost of environmental externalities. These revenues can be further used to support other sustainable policies.

Nevertheless, it is important to analyse and monitor potential interactions between the two types of instruments to ensure their efficiency. Indeed, a raise in the carbon tax may convince stakeholders to switch to more sustainable activities, leading to a reduction of their respective levels of GHG emissions. Meanwhile, it increases the number of GHG emission allowances that are not used and which become available for trading on the market, leading in its turn to a drop in the market price of allowances. Under a certain limit, it becomes economically more interesting for actors to buy allowances than invest in more sustainable technologies, making the instrument inefficient or even counterproductive.

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Annex 1 Template and guideline used to describe case studies

1. OVERVIEW ON THE SITUATION

1.1. Context

Aim: Provide an overview on the ongoing context in your country before the implementation of the MBI. Write here all information that seems relevant for the understanding of the MBI use, whether it is from a technological, political, economic or social point of view.

Examples: you may highlight a recent technological breakthrough, a set of sustainable energy policies, some recurrent economic barriers to massive sustainable investment, a sudden growth of social awareness regarding environmental issues…

1.2. Issue

Aim: Describe the observed issue that led to the use of the given MBI, whether it focuses on energy production, building, transport, industry or cover all of them. Illustrate it with key figures reflecting the situation before the implementation of the MBI.

Ideally this key figure is in line with the one provided to characterize the **issue (1.2)**

Examples: installed capacity in renewables, % of national energy consumption related to buildings, number of electric car sales, energy losses from industry processes, growth of renewable share…

2. SUPPORT DESCRIPTION

2.1. Objective

Aim: Describe the Market-Based Instrument (MBI) and its objective. If possible, quantify the objective.

Examples: install 500MW of wind turbine, boost the sale of electric cars to 5000/year, reduce the energy consumption of buildings by 1%...

2.2. Launching phase

Aim: Describe the launch of the MBI: who did it, how was it done…

Questions:

- Is it a new launch or does the MBI supersedes a former one? In the second case, please specify which one.
- What agency triggered the use of the MBI? Slightly describe its role and function, precise if it is a private / public institution.
- Were parallel measures launched along the MBI to promote it? (Communication campaign, network providing dedicated support to customers…)

2.3. Funding of the instrument

Aim: Describe the way the support provided by the MBI was funded.

Questions:

- How was the measure financed (specific fund, related fund…)? Whether it is from a specific fund, a tax… Please describe it slightly (private/public). EU involved?
- How much was invested in total (in € or local currency)? If the MBI is still in force, please provide the latest information available and the related period (ex: 1999 – 2014)
- If the allocated budget is split between several techno/projects, specify the amount dedicated to each one.

2.4. Support provided by the instrument

Aim: describe the way the instrument provides support (price-based instrument) or regulate the market (quantity-based)

Example: maximal amount granted per project/purchase, maximal amount granted per year, grant shall not exceed a percentage of the total investment, maximal income (for energy poverty related measures)…

3. REQUIREMENTS & CONDITIONS

Note: The conditions related to a MBI may evolve over the time. If this is the case, please specify the modification in your description.

3.1. Targeted elements

Aim: describe and characterize the elements that are in the scope of the MBI (energy production units, buildings, vehicles, businesses, industry…

Example: residential buildings, offices, car constructed before a given date, diesel cars, power plan over/under a certain capacity…

3.2. Targeted people

Aim: describe and characterize people that are targeted / potentially interested by the proposed support.

Example: industrials, individuals, house owners, SMEs…

3.3. Type of related technology

Aim: Indicate what technologies are promoted by the MBI (if any specific). If any technical label is required, please specify it.

Example: Solar PV, heat pump, hydrogen cars, off-shore wind…

3.4. Time related conditions

Aim: Indicate if the support provided by the MBI is associated to a time constraint.

Example: the purchase shall be done between 2 given dates; the project shall be operating before a certain date…

3.5. Financial related requirements

Aim: Indicate If the support is associated to a financial constraint.

Example: the total project investment shall not exceed a certain amount of money; the project cost shall be over a certain limit, beneficiaries shall have an income lower than a certain limit.

4. IMPACT ANALYSIS

4.1. Quantitative criteria

4.1.1.Level of deployment

Aim: quantify the success of the MBI on targeted people by providing key figures on the people / entities that were interested.

Example: number of applications received to get the support, total number of beneficiaries…

4.1.2.Impact on the energy system / environment

Aim: evaluate the impact on the energy system of the projects supported by the MBI.

Ideally this key figure is in line with the one provided to characterize the **issue (1.2)** and the **objective (2.1)**

Examples:

- Amount of renewable energy produced, number of MW installed…
- Amount of energy saved, number of building renovated & assessment of the reduction in energy consumption…
- Amount of CO2 avoided

4.2. Qualitative criteria (optional)

4.2.1.Potential for replicability

Aim: Evaluate the potential of replicability of the MBI use in other EU countries.

Questions:

- Does it make sense to replicate this MBI into other countries?
- Has it been done already?
- Did the MBI get international recognition?
- What parameters shall be checked to allow a successful replicability?
- If these parameters are not checked in the receiving country, is there an alternative solution to remedy?

4.2.2.Side effects

Aim: Evaluate the social or economic effects the use the MBI may have had.

Examples of positive effects:

- Creation of new jobs / training
- Reduction of energy poverty
- Increase of the economic growth / competitiveness
- Improved work environment
- Improvement of energy security, health etc.

Examples of negative effects:

- "unfair" burdening of the measure costs
- Relatively high burden for low-income households
- Direct rebound effects (e.g. more lighting, higher room temperature)
- Indirect rebound effects due to economic interrelations.
- Grid instabilities due to high share of renewables

Annex 2 List of identified market-based instruments

German MBIs

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_DE_01	Price based	Loans	ERP Environmental Protection and Energy Efficiency Programme A	Germany	1990	2012	Not Specific	Industry
MBI_DE_02	Price based	Loans	ERP Environmental Protection and Energy Efficiency Programme B	Germany	1990	2012	Energy Efficiency	Industry
MBI_DE_03	Price based	Loans	ERP-Environment and Energy Saving Programme	Germany	1990	2008	Not Specific	Multi Sectoral
MBI_DE_04	Price based	Grants	250 MW Wind Programme	Germany	1991	2006	Renewable Energy	Energy Production
MBI_DE_05	Price based	Feed-in Tariffs	Electricity Feed-In Law of 1991 ("Stromeinspeisungsgesetz")	Germany	1991	2000	Renewable Energy	Energy Production
MBI_DE_06	Price based	Feed-in Tariffs	Full Cost Rates (Kostendeckende Vergütung)	Germany	1993	1999	Renewable Energy	Energy Production
MBI_DE_07	Price based	Grants	100 Million Programme	Germany	1995	1998	Renewable Energy	Energy Production
MBI_DE_08	Price based	Grants	Eco allowances within the framework of the homeowner allowance	Germany	1995	2002	Not Specific	Buildings
MBI_DE_09	Price based	Tax relief	Home Eco Grant (Eigenheim-Ökozulage)	Germany	1995	2006	Renewable Energy	Buildings
MBI_DE_10	Price based	Tax relief	Vehicle Taxation	Germany	1997	2002	Energy Efficiency	Transport
MBI_DE_11	Price based	Grants	BAFA On-site Consultation	Germany	1998	In Force	Not Specific	Buildings
MBI_DE_12	Price based	Taxes	Ecological Tax Reform	Germany	1999	2003	Not Specific	Multi Sectoral

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_DE_13	Price based	Loans	100 000 Roofs Solar Power Programme	Germany	1999	2003	Renewable Energy	Buildings
MBI_DE_14	Price based	Taxes	Eco-Tax Reform	Germany	1999	In Force	Not Specific	Multi Sectoral
MBI_DE_15	Price based	Loans	KfW CO2 reduction	Germany	1999	2004	Not Specific	Buildings
MBI_DE_16	Price based	Loans	Preferential Loan Programmes offered by the Reconstruction Loan Corporation (KfW)	Germany	1999	In Force	Not Specific	Buildings
MBI_DE_17	Price based	Grants	Market Incentive Programme (Marktanreizprogramm)	Germany	1999	In Force	Not Specific	Multi Sectoral
MBI_DE_18	Price based	Loans	Market Incentive Programme (Marktanreizprogramm)	Germany	1999	In Force	Not Specific	Multi Sectoral
MBI_DE_19	Price based	Feed-in Tariffs	Renewable Energy Act	Germany	2000	In Force	Renewable Energy	Energy Production
MBI_DE_20	Price based	Loans	KfW CO2 Building Redevelopment Programme	Germany	2001	2009	Energy Efficiency	Buildings
MBI_DE_21	Price based	Tax relief	Fiscal consideration of commuting expenses	Germany	2001	In Force	Not Specific	Transport
MBI_DE_22	Price based	Loans	Energy Provisioning	Germany	2002	In Force	Energy Efficiency	Energy Production
MBI_DE_23	Price based	Feed-in Tariffs	Combined Heat and Power Law (Kraft-Wärme-Kopplungs Modernisierungsgesetz)	Germany	2002	In Force	Energy Efficiency	Energy Production
MBI_DE_24	Quantity based	GHG emissions allowances	Emissions Trading Law	Germany	2004	In Force	Not Specific	Multi Sectoral
MBI_DE_25	Price based	Taxes	Heavy goods vehicle toll	Germany	2005	In Force	Not Specific	Transport
MBI_DE_26	Price based	Taxes	LKW Maut Electronic road use charge fortrucks using motorways	Germany	2005	In Force	Not Specific	Transport
MBI_DE_27	Price based	Loans	KfW Build Ecologically Programme ("Ökologisch Bauen")	Germany	2005	2009	Energy Efficiency	Buildings

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_DE_28	Price based	Grants	KfW Ecological Construction	Germany	2005	2009	Energy Efficiency	Buildings
MBI_DE_29	Price based	Loans	KfW Housing Modernisation Programme – Eco Plus (CO2 Building Redevelopment Programme)	Germany	2005	2009	Not Specific	Buildings
MBI_DE_30	Price based	Loans	KfW-Programme Producing Solar Power	Germany	2005	2009	Renewable Energy	Energy Production
MBI_DE_31	Price based	Taxes	Energy Taxes: Coal, Biodiesel, Natural Gas	Germany	2006	In Force	Renewable Energy	Multi Sectoral
MBI_DE_32	Price based	Tax relief	Tax exemption for biofuels (in relation to Directive 2003/30/EC)	Germany	2006	2009	Not Specific	Multi Sectoral
MBI_DE_33	Price based	Grants	Clean Truck Procurement Subsidies	Germany	2007	In Force	Not Specific	Transport
MBI_DE_34	Price based	Loans	Clean Truck Procurement Subsidies	Germany	2007	In Force	Not Specific	Transport
MBI_DE_35	Price based	Grants	Special Fund for Energy Efficiency in SMEs	Germany	2008	2014	Energy Efficiency	Multi Sectoral
MBI_DE_36	Price based	Loans	Special Fund for Energy Efficiency in SMEs	Germany	2008	2014	Energy Efficiency	Multi Sectoral
MBI_DE_37	Price based	Tax relief	Government Electromobility Programme	Germany	2009	In Force	Not Specific	Transport
MBI_DE_38	Price based	Loans	KfW Renewable Energies Programme (KfW-Programm Erneuerbare Energien)	Germany	2009	In Force	Renewable Energy	Energy Production
MBI_DE_39	Price based	Loans	KfW-Programme Energy-Efficient Rehabilitation (Energieeffizient Sanieren)	Germany	2009	In Force	Energy Efficiency	Buildings
MBI_DE_40	Price based	Taxes	New vehicle car tax system	Germany	2009	In Force	Energy Efficiency	Transport
MBI_DE_41	Price based	Loans	IKK - Energy-Efficient Urban Refurbishment - Energy-efficient Redevelopment (IKK - Energetische Stadtsanierung - Energieeffizient Sanieren)	Germany	2009	In Force	Energy Efficiency	Buildings

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_DE_42	Price based	Loans	KfW Programme Offshore Wind Energy	Germany	2011	In Force	Renewable Energy	Energy Production
MBI_DE_43	Price based	Loans	KfW Environmental Programme, ERP predecessor programmes	Germany	2012	In Force	Energy Efficiency	Industry
MBI_DE_44	Price based	Loans	Investment Grants for the Use of Highly Efficient Generic Technologies in Small and Medium-Sized Enterprises	Germany	2012	In Force	Energy Efficiency	Industry
MBI_DE_45	Price based	Grants	Energy consulting in SMEs (“Energieberatung Mittelstand”)	Germany	2012	In Force	Energy Efficiency	Industry
MBI_DE_46	Price based	Grants	Financial support for investments in cross sectional technology	Germany	2012	In Force	Energy Efficiency	Industry
MBI_DE_47	Price based	Tax relief	Tax cap ("Spitzenausgleich")	Germany	2013	In Force	Energy Efficiency	Industry
MBI_DE_48	Price based	Grants	Richtlinie für die Förderung von energieeffizienten und klimaschonenden Produktionsprozessen	Germany	2013	In Force	Energy Efficiency	Industry
MBI_DE_49	Price based	Grants	Richtlinie für die Förderung von Energiemanagementsystemen	Germany	2013	In Force	Energy Efficiency	Industry

Spanish MBIs

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_ESP_01	Price based	Grants	Plan for Public Housing (Plan Vivienda de Protección Oficial 1998-2001)	Spain	1998	2001	Energy Efficiency	Buildings
MBI_ESP_02	Price based	Feed-in Tariffs	Special Regime for Electricity Generated from Renewable and CHP Sources (Producción de energía eléctrica por instalaciones abastecidas por recursos o fuentes de energía renovables, residuos y cogeneración)	Spain	2000	In Force	Renewable Energy	Energy Production
MBI_ESP_03	Price based	Grants	Aid Programme for Solar Photovoltaics and Solar Thermal Energy (Plan de Fomento de las Energías Renovables en España 2000-2010)	Spain	2002	2010	Renewable Energy	Energy Production

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_ESP_04	Price based	Loans	Financing for Renewables and Energy Efficiency (Plan de fomento de las energias renovables en Espana 2000-2010)	Spain	2002	In Force	Not Specific	Multi Sectoral
MBI_ESP_05	Price based	Loans	ICO-IDAE Financing Line	Spain	2002	?	Not Specific	Multi Sectoral
MBI_ESP_06	Price based	Tax relief	Modification of Corporate Tax Regulation (Impuesto sobre sociedades)	Spain	2003	In Force	Not Specific	Multi Sectoral
MBI_ESP_07	Quantity based	GHG emissions allowances	Adoption of the EU Directive on Emissions Trading (Ley 1/2005, regulacion del regimen del comercio de derechos de emision de gases de efecto invernadero)	Spain	2004	In Force	Not Specific	Multi Sectoral
MBI_ESP_08	Price based	Grants	Carbon Fund for a sustainable economy - Fondo de Carbono para una Economía Sostenible (FES – CO2)	Spain	2004	In Force	Not Specific	Multi Sectoral
MBI_ESP_09	Price based	Feed-in Tariffs	Special Regime for the production of electricity from RES (Royal Decree 436/2004) (Real decreto 436/2004 por el que se establece la metodología para la actualización y sistematización del régimen jurídico y económico de la actividad de producción de energía eléctrica en régimen especial)	Spain	2004	2006	Renewable Energy	Energy Production
MBI_ESP_10	Price based	Grants	Renewable Energy Plan 2005 - 2010 (Plan de energias renovables de España, PER 2005-2010)	Spain	2005	2010	Renewable Energy	Energy Production
MBI_ESP_10	Price based	Grants	Renewable Energy Plan 2005 - 2010 (Plan de energias renovables de España, PER 2005-2010)	Spain	2005	2010	Renewable Energy	Energy Production
MBI_ESP_11	Price based	Grants	Renove Plan for Electric Appliances	Spain	2006	In Force	Energy Efficiency	Buildings
MBI_ESP_12	Price based	Grants	Energy audits (Plan Nacional de Accion de Eficiencia Energetica)	Spain	2007	In Force	Energy Efficiency	Buildings
MBI_ESP_13	Price based	Feed-in Tariffs	Feed-in tariffs for electricity from renewable energy sources (Special regime) (actividad de producción de energía eléctrica en régimen especial)	Spain	2007	2013	Renewable Energy	Energy Production

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_ESP_14	Price based	Feed-in Tariffs	Feed-in tariffs for electricity from renewable energy sources (Special regime) (actividad de producción de energía eléctrica en régimen especial)	Spain	2007	2013	Renewable Energy	Energy Production
MBI_ESP_15	Price based	Taxes	Car registration tax linked to CO2 emissions (Ley 34/2007, de 15 de noviembre, de calidad del aire y protección de la atmósfera)	Spain	2008	In Force	Energy Efficiency	Transport
MBI_ESP_16	Price based	Grants	Energy Saving and Efficiency Plan 2008-11 (Plan de Eficiencia Energetica 2008-2012)	Spain	2008	2011	Not Specific	Multi Sectoral
MBI_ESP_17	Price based	Grants	Grants for Energy Efficiency in Buildings	Spain	2008	In Force	Energy Efficiency	Buildings
MBI_ESP_18	Price based	Loans	Programa de Incentivos al Vehículo Eficiente (VIVE Plan)	Spain	2008	In Force	Energy Efficiency	Transport
MBI_ESP_19	Price based	Grants	Automotive Sector Competitiveness Plan (Plan de Competitividad del Sector Automoción)	Spain	2009	In Force	Energy Efficiency	Transport
MBI_ESP_20	Price based	Loans	Automotive Sector Competitiveness Plan (Plan de Competitividad del Sector Automoción)	Spain	2009	In Force	Energy Efficiency	Transport
MBI_ESP_21	Quantity based	Green Certificates	Promotion of biofuels and other renewable fuels (ORDER ITC/2877/2008) (ORDEN ITC/2877/2008 por el que se establece un mecanismo de fomento del uso de bioarburantes y otros combustibles renovables con fines de transporte)	Spain	2009	In Force	Renewable Energy	Transport
MBI_ESP_22	Price based	Grants	MOVELE Programme for Electric Vehicles (Real decreto 287/2015 por el que se regula la concesión directa de subvenciones para la adquisición de vehículos eléctricos en 2015)	Spain	2009	In Force	Not Specific	Transport
MBI_ESP_23	Price based	Loans	Renove Tourism Plan 2009 (Plan Renove turismo 2009)	Spain	2009	2016	Energy Efficiency	Buildings
MBI_ESP_24	Price based	Feed-in Tariffs	Correction of the tariff deficit in the electricity sector (Royal Decree-Law 14/2010)	Spain	2010	?	Renewable Energy	Energy Production

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_ESP_25	Price based	Feed-in Tariffs	New regulation on electrical energy from wind and thermal electric technologies (Royal Decree 1614/2010) (Nueva regulacion de aspectos relativos a la actividad de produccion de energia electrica a partir de tecnologias solar termoeléctrica y eolica)	Spain	2010	2014	Renewable Energy	Energy Production
MBI_ESP_26	Price based	Feed-in Tariffs	New tariff regulation for the production of photovoltaic electrical energy (Royal Decree 1565/2010) (Real decreto 1565/2010 por el que se regulan y modifican determinados aspectos relativos a la actividad de produccion de energia electrica en regimen especial)	Spain	2010	2014	Renewable Energy	Energy Production
MBI_ESP_27	Price based	Tax relief	Sustainable Economy Law (Ley 2/2011 de Economia Sostenible)	Spain	2011	In Force	Not Specific	Multi Sectoral
MBI_ESP_28	Price based	Grants	Carbon Fund - Climate Projects (Real decreto 1494/2011 por el que se regula el Fondo de Carbono para una Economia Sostenible)	Spain	2011	2015	Not Specific	Multi Sectoral
MBI_ESP_29	Price based	Grants	Efficient Vehicle Incentives Programme (PIVE) (Programa de Incentivos al Vehiculo Eficiente PIVE-7)	Spain	2012	In Force	Energy Efficiency	Transport
MBI_ESP_30	Price based	Taxes	Fiscal Measures for Energy Sustainability (Medidas fiscales para la sostenibilidad energética)	Spain	2012	In Force	Not Specific	Multi Sectoral
MBI_ESP_31	Price based	Grants	PAREER Programme (Aid Programme for Energy Rehabilitation in Buildings in the Household and Hotel Sectors) (Programa de ayudas para la rehabilitacion energetica de edificios existentes del sector residencial, uso vivienda y hotelero)	Spain	2013	In Force	Not Specific	Buildings
MBI_ESP_32	Quantity based	Green Certificates	PIMA SOL (Plan for promoting environmentally friendly behavior in the tourism sector)	Spain	2013	In Force	Energy Efficiency	Buildings
MBI_ESP_33	Price based	Grants	Royal Decree Law 9/2013 on urgent measures to guarantee financial stability in the electricity system (Real decreto 9/2013 por el que se adoptan medidas urgentes para garantizar la estabilidad financiera del sistema electrico)	Spain	2013	In Force	Renewable Energy	Energy Production

French MBIs

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_FR_01	Price based	Grants	Tax Credit for Sustainable Development (Le Crédit d'impôt Développement Durable)(CIDD)	France	2005	2014	Not Specific	Buildings
MBI_FR_02	Price based	Feed-in Tariffs	Programme EOLE 2005	France	1996	2001	Renewable Energy	Energy Production
MBI_FR_03	Price based	Tax relief	Alternative Vehicle Differential Tax Exemption	France	1999	In Force	Not Specific	Transport
MBI_FR_04	Price based	Tax relief	Reduced VAT for Residential Renewable Energy Equipment	France	1999	In Force	Renewable Energy	Buildings
MBI_FR_05	Price based	Taxes	Reduction in Price Gap Between Diesel and Gasoline	France	1999	In Force	Not Specific	Transport
MBI_FR_06	Price based	Grants	Renewable energy market development (support for demonstration and diffusion)	France	1999	In Force	Renewable Energy	Energy Production
MBI_FR_07	Price based	Grants	Solar-Powered Water Heaters - Helios 2006	France	1999	2006	Renewable Energy	Buildings
MBI_FR_08	Price based	Grants	Wood Energy Programme	France	2000	2006	Renewable Energy	Energy Production
MBI_FR_09	Price based	Feed-in Tariffs	Electricity Law 2000	France	2000	In Force	Renewable Energy	Energy Production
MBI_FR_10	Price based	Tax relief	Exemption of the Internal Tax on Fossil Fuels for Cogeneration Facilities	France	2000	2003	Energy Efficiency	Energy Production
MBI_FR_11	Price based	Feed-in Tariffs	Tariffs in Favour of Renewable Energy	France	2000	2001	Renewable Energy	Energy Production
MBI_FR_12	Price based	Grants	Survey and Pre-feasibility Assistance: Disposition Général des Aides à la Décision	France	2000	In Force	Not Specific	Multi Sectoral
MBI_FR_13	Price based	Loans	Government Crediting and Loan Guarantee for Energy Efficiency and Renewable Energy Investment - FOGIME	France	2001	In Force	Not Specific	Multi Sectoral

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_FR_14	Price based	Feed-in Tariffs	Renewable Energy Feed-in Tariffs (I)	France	2001	2002	Renewable Energy	Energy Production
MBI_FR_15	Price based	Tax relief	Extension of Tax Credit for Large Collective Equipment, Renewable Energy Equipment, Thermal Insulation and Heating Regulation Equipment	France	2002	2005	Not Specific	Multi Sectoral
MBI_FR_16	Price based	Feed-in Tariffs	Renewable Energy Feed-in Tariffs (II)	France	2002	2006	Renewable Energy	Energy Production
MBI_FR_17	Price based	Tax relief	Tax Credit for the Purchase of Low Emissions Vehicles	France	2002	In Force	Not Specific	Transport
MBI_FR_18	Price based	Grants	Territorial Actions for Environment and Energy Efficiency (Actions Territoriales pour l'Environnement et l'Efficacité Energétique) (ATEnEE)	France	2002	2006	Not Specific	Multi Sectoral
MBI_FR_19	Price based	Grants	Clean Vehicles Plan (super bonus)	France	2003	2012	Not Specific	Transport
MBI_FR_20	Price based	Tax relief	Flexible depreciation	France	2003	?	Renewable Energy	Industry
MBI_FR_21	Price based	Tax relief	Tax credit in favor of high efficiency natural gas boilers	France	2003	In Force	Energy Efficiency	Buildings
MBI_FR_22	Price based	Grants	Tender Procedure for Biomass and Biogas Power Generation	France	2003	In Force	Renewable Energy	Energy Production
MBI_FR_23	Quantity based	GHG emissions allowances	French National Allocation Plan 2005-2007	France	2004	2007	Not Specific	Multi Sectoral
MBI_FR_24	Price based	Tax relief	Tax Credit in favor of Sustainable Development and Energy Efficiency	France	2005	2009	Not Specific	Buildings
MBI_FR_25	Price based	Feed-in Tariffs	Expansion of Feed-In Tariffs for Wind Power	France	2005	In Force	Renewable Energy	Energy Production
MBI_FR_26	Price based	Tax relief	Tax credit for energy transition (CITE)	France	2014	In Force	Not Specific	Buildings

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_FR_27	Price based	Taxes	Vehicle Pollution Tax	France	2005	In Force	Not Specific	Transport
MBI_FR_28	Price based	Tax relief	Vehicle Emission Reduction Plan	France	2005	2010	Not Specific	Transport
MBI_FR_29	Price based	Feed-in Tariffs	Renewable Energy Feed-in Tariffs (III)	France	2006	2010	Renewable Energy	Energy Production
MBI_FR_30	Quantity based	White Certificates	White Certificate Scheme	France	2006	In Force	Not Specific	Energy Production
MBI_FR_31	Price based	Loans	Livret de Developpement Durable: Preferential loans for energy saving measures	France	2007	In Force	Not Specific	Buildings
MBI_FR_32	Price based	Grants	Bonus-Malus: vehicle CO2 bonus and penalty system	France	2007	In Force	Not Specific	Transport
MBI_FR_33	Price based	Feed-in Tariffs	Renewable Energy Feed-In Tariff: Hydropower (IV)	France	2007	In Force	Renewable Energy	Energy Production
MBI_FR_34	Price based	Grants	Heat Fund	France	2008	In Force	Renewable Energy	Energy Production
MBI_FR_35	Price based	Loans	Eco-loan	France	2009	In Force	Energy Efficiency	Buildings
MBI_FR_36	Price based	Grants	Plan for the energy performance of agricultural exploitations	France	2009	In Force	Not Specific	Industry
MBI_FR_37	Price based	Feed-in Tariffs	Renewable Energy Feed-In Tariff: Biomass	France	2009	In Force	Renewable Energy	Energy Production
MBI_FR_38	Price based	Tax relief	Property Tax Exemption	France	2009	In Force	Energy Efficiency	Buildings
MBI_FR_39	Price based	Tax relief	Scellier Law	France	2008	2012	Energy Efficiency	Buildings
MBI_FR_40	Price based	Feed-in Tariffs	Renewable Energy Feed-In Tariff: Solar PV	France	2010	In Force	Renewable Energy	Energy Production

Irish MBIs

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_IRE_01	Price based	Tax relief	Tax relief for investment in renewable energy generation	Ireland	1998	?	Renewable Energy	Energy Production
MBI_IRE_02	Price based	Grants	House of Tomorrow Programme	Ireland	2001	2008	Not Specific	Buildings
MBI_IRE_03	Price based	Grants	National Development Plan 2000 - 2006 (Funding)	Ireland	2001	2007	Not Specific	Multi Sectoral
MBI_IRE_04	Price based	Grants	New House Grants	Ireland	2001	In Force	Energy Efficiency	Buildings
MBI_IRE_05	Price based	Grants	Public Sector Programme	Ireland	2001	2006	Not Specific	Buildings
MBI_IRE_06	Price based	Grants	Better Energy Warmer Homes Scheme (BEWH)	Ireland	2001	In Force	Energy Efficiency	Buildings
MBI_IRE_07	Price based	Feed-in Tariffs	Renewable Energy Feed-In Tariff (REFIT 1)	Ireland	2005	In Force	Renewable Energy	Energy Production
MBI_IRE_08	Price based	Grants	CHP Deployment Programme	Ireland	2006	2010	Energy Efficiency	Energy Production
MBI_IRE_09	Price based	Tax relief	Biofuels Scheme II Programme for Mineral Oil Tax (MOT) Relief on Biofuels	Ireland	2006	In Force	Renewable Energy	Transport
MBI_IRE_10	Price based	Grants	Greener Homes Scheme	Ireland	2007	In Force	Renewable Energy	Energy Production
MBI_IRE_11	Price based	Grants	Renewable Heat Deployment Programme (ReHeat)	Ireland	2007	2011	Renewable Energy	Energy Production
MBI_IRE_12	Price based	Tax relief	Acelerated Capital Allowance (ACA)	Ireland	2008	In Force	Energy Efficiency	Industry
MBI_IRE_13	Price based	Taxes	Motor Tax	Ireland	2008	In Force	Energy Efficiency	Transport
MBI_IRE_14	Price based	Grants	Microgeneration Support Programme	Ireland	2008	In Force	Renewable Energy	Energy Production

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_IRE_15	Quantity based	White Certificates	Ireland National Allocation Plan (NAP) 2008-12	Ireland	2008	In Force	Not Specific	Multi Sectoral
MBI_IRE_16	Price based	Taxes	Ireland Carbon Tax	Ireland	2009	In Force	Not Specific	Multi Sectoral
MBI_IRE_17	Price based	Grants	Electric Vehicles Grant Scheme	Ireland	2011	In Force	Not Specific	Transport
MBI_IRE_18	Price based	Feed-in Tariffs	Renewable Energy Feed-in Tariff 2 and 3 (REFIT 2 & 3)	Ireland	2012	2015	Renewable Energy	Energy Production

Italian MBIs

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_IT_01	Price based	Taxes	La tassa automobilistica, o bollo auto (road tax)	Italy	1953	In Force	Energy Efficiency	Transport
MBI_IT_02	Price based	Grants	Incentives for Renewal of Car Fleet	Italy	1996	2003	Energy Efficiency	Transport
MBI_IT_03	Quantity based	Green Certificates	Certificati verdi	Italy	1999	2012	Renewable Energy	Energy Production
MBI_IT_04	Price based	Grants	Ammissione a cofinanziamento dei comuni aderenti al programma per la realizzazione di interventi strutturali per la razionalizzazione della mobilita' in ambiente urbano diretti alla riduzione dell'impatto ambientale derivante dal traffico urbano (Energy Efficiency Co-financing)	Italy	1999	In Force	Energy Efficiency	Transport
MBI_IT_05	Quantity based	White Certificates	Titoli di Efficienza Energetica (TEE)	Italy	2001	In Force	Not Specific	Energy Production
MBI_IT_06	Price based	Tax relief	Esenzione dall accisa sul biodiesel (Biofuels Tax Exemption)	Italy	2001	2008	Renewable Energy	Transport
MBI_IT_07	Price based	Grants	Incentives for Alternative Vehicles	Italy	2002	?	Not Specific	Transport

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_IT_08	Quantity based	White Certificates	Italian Carbon Fund (ICF)	Italy	2003	In Force	Not Specific	Multi Sectoral
MBI_IT_09	Price based	Grants	Incentives for Gas Powered Cars	Italy	2003	In Force	Not Specific	Transport
MBI_IT_10	Price based	Grants	Incentives for Cities to Purchase Environmentally Friendly Vehicles	Italy	2004	2007	Not Specific	Transport
MBI_IT_11	Price based	Grants	Bonus for Drivers Scrapping Old Vehicles to Join Car-Sharing	Italy	2005	?	Not Specific	Transport
MBI_IT_12	Price based	Taxes	Fuel Tax Increases to Fund Clean-Running Public Buses	Italy	2005	In Force	Not Specific	Transport
MBI_IT_13	Price based	Grants	Incentives for Converting Vehicles to Run on Methane and LPG	Italy	2005	?	Not Specific	Transport
MBI_IT_14	Price based	Feed-in Tariffs	I-II-III-IV Conto Energia ("Old" Feed-In Premium for PV)	Italy	2005	2012	Renewable Energy	Energy Production
MBI_IT_15	Price based	Grants	Rebates for Low-Emission Motorcycles	Italy	2005	?	Not Specific	Transport
MBI_IT_16	Quantity based	GHG emissions allowances	Aviation & GHG Emission Trading	Italy	2006	In Force	Not Specific	Transport
MBI_IT_17	Price based	Tax relief	Detrazioni-fiscali-del-55-65 (55% tax rebate schemes)	Italy	2007	In Force	Energy Efficiency	Buildings
MBI_IT_18	Price based	Tax relief	Tax allowance for efficient fridges	Italy	2007	2010	Energy Efficiency	Buildings
MBI_IT_19	Price based	Tax relief	Tax allowance for electric motors	Italy	2007	2011	Energy Efficiency	Transport
MBI_IT_20	Price based	Feed-in Tariffs	Ritiro dedicato (Simplified Purchase and Resale Arrangements)	Italy	2007	In Force	Renewable Energy	Energy Production
MBI_IT_21	Price based	Tax relief	Budget Law 2007 - Energy efficiency provisions	Italy	2008	In Force	Not Specific	Buildings

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_IT_22	Price based	Grants	Scambio sul posto (Net Metering)	Italy	2008	In Force	Renewable Energy	Energy Production
MBI_IT_23	Price based	Feed-in Tariffs	"All inclusive" Feed-in Tariff for small renewable energy power plants	Italy	2008	2012	Renewable Energy	Energy Production
MBI_IT_24	Price based	Feed-in Tariffs	Feed-In Tariff for Solar Thermodynamic Energy	Italy	2008	In Force	Renewable Energy	Energy Production
MBI_IT_25	Quantity based	White Certificates	PIANO NAZIONALE DI ASSEGNAZIONE DELLE QUOTE DI CO2 2008-2012 (National Allocation Plan 2008-2012)	Italy	2008	?	Not Specific	Multi Sectoral
MBI_IT_26	Quantity based	White Certificates	Titoli di Efficienza Energetica (TEE) - Cogenerazione ad Alto Rendimento	Italy	2011	In Force	Energy Efficiency	Energy Production
MBI_IT_27	Price based	Feed-in Tariffs	Incentivi DM 6 luglio 2012 (Feed-in premium for renewable energy sources other than photovoltaic)	Italy	2012	In Force	Renewable Energy	Energy Production
MBI_IT_28	Price based	Loans	Fondo Kyoto (Kyoto Fund)	Italy	2012	In Force	Not Specific	Multi Sectoral
MBI_IT_29	Price based	Grants	Conto Terminco (Renewable Energy for Heating & Cooling Support Scheme)	Italy	2012	In Force	Not Specific	Buildings

UK MBIs

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_UK_01	Price based	Grants	Northern Ireland Energy Efficiency Levy / Sustainable Energy Programme	United Kingdom	1997	In Force	Energy Efficiency	Buildings
MBI_UK_02	Price based	Tax relief	Reduced VAT for energy-saving materials	United Kingdom	1998	In Force	Energy Efficiency	Buildings
MBI_UK_03	Quantity based	GHG emissions allowances	Emissions Trading Agreement	United Kingdom	1999	2002	Not Specific	Multi Sectoral
MBI_UK_04	Price based	Loans	Scotland - Small business energy efficiency loans	United Kingdom	1999	In Force	Not Specific	Industry

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_UK_05	Price based	Grants	Energy Crops Scheme - England	United Kingdom	2000	In Force	Renewable Energy	Energy Production
MBI_UK_06	Price based	Grants	Wales Home Energy Efficiency Scheme - Nest	United Kingdom	2000	In Force	Energy Efficiency	Buildings
MBI_UK_07	Price based	Grants	Warm Front Scheme	United Kingdom	2000	2012	Energy Efficiency	Buildings
MBI_UK_08	Price based	Tax relief	Climate Change Agreements	United Kingdom	2001	In Force	Energy Efficiency	Industry
MBI_UK_09	Price based	Tax relief	Enhanced Capital Allowance (ECA) scheme	United Kingdom	2001	In Force	Energy Efficiency	Multi Sectoral
MBI_UK_10	Price based	Grants	Energy Assistance Scheme	United Kingdom	2001	In Force	Energy Efficiency	Buildings
MBI_UK_11	Price based	Tax relief	Exemption from Climate Change Levy for Good Quality CHP	United Kingdom	2001	In Force	Energy Efficiency	Energy Production
MBI_UK_12	Price based	Taxes	Climate Change Levy	United Kingdom	2001	In Force	Not Specific	Energy Production
MBI_UK_13	Price based	Taxes	Vehicle Excise Duty (VED): fuel type and CO2 emission vehicle bands	United Kingdom	2001	In Force	Energy Efficiency	Transport
MBI_UK_14	Quantity based	GHG emissions allowances	UK Emissions Trading Scheme	United Kingdom	2002	2006	Not Specific	Multi Sectoral
MBI_UK_15	Price based	Grants	Bio-energy Capital Grants Scheme	United Kingdom	2002	In Force	Renewable Energy	Energy Production
MBI_UK_16	Price based	Tax relief	Biofuels Duty Incentive	United Kingdom	2002	In Force	Renewable Energy	Transport
MBI_UK_17	Price based	Taxes	Company Car Tax Reform	United Kingdom	2002	In Force	Energy Efficiency	Transport
MBI_UK_18	Price based	Grants	Major PV Demonstration Programme	United Kingdom	2002	2007	Renewable Energy	Energy Production

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_UK_19	Price based	Grants	Offshore Wind Capital Grants Scheme	United Kingdom	2002	2008	Renewable Energy	Energy Production
MBI_UK_20	Price based	Tax relief	Preferential Tax Regimes for Biofuels	United Kingdom	2002	In Force	Renewable Energy	Transport
MBI_UK_21	Price based	Loans	Scotland - Household microgeneration loans	United Kingdom	2002	In Force	Renewable Energy	Buildings
MBI_UK_22	Price based	Grants	Large-scale PV Demonstration Project	United Kingdom	2002	2007	Renewable Energy	Energy Production
MBI_UK_23	Price based	Feed-in Tariffs	Renewables Obligation (RO)	United Kingdom	2002	In Force	Renewable Energy	Energy Production
MBI_UK_24	Quantity based	Green Certificates	Renewable Energy Guarantees of Origin (REGOs)	United Kingdom	2003	In Force	Renewable Energy	Energy Production
MBI_UK_25	Price based	Grants	Bio-energy Infrastructure Scheme	United Kingdom	2003	2008	Renewable Energy	Energy Production
MBI_UK_26	Price based	Grants	Clear Skies - Household and Small Community Renewable Energy Fund	United Kingdom	2003	2006	Renewable Energy	Energy Production
MBI_UK_27	Price based	Tax relief	Combined Heat and Power Strategy to 2010	United Kingdom	2004	?	Energy Efficiency	Energy Production
MBI_UK_28	Quantity based	GHG emissions allowances	UK National Allocation Plan 2005 - 2007	United Kingdom	2004	2007	Not Specific	Multi Sectoral
MBI_UK_29	Price based	Tax relief	Landlords Energy Saving Allowance (LESA)	United Kingdom	2004	In Force	Energy Efficiency	Buildings
MBI_UK_30	Price based	Loans	Scotland - Public Sector Central Energy Efficiency Fund (CEEF)	United Kingdom	2004	In Force	Energy Efficiency	Buildings
MBI_UK_31	Price based	Grants	Biomass Task Force Report	United Kingdom	2005	In Force	Renewable Energy	Energy Production
MBI_UK_32	Price based	Grants	Carbon Abatement Technology Strategy	United Kingdom	2005	?	Not Specific	Energy Production

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_UK_33	Quantity based	GHG emissions allowances	UK Implements EU Linking Directive	United Kingdom	2005	In Force	Not Specific	Multi Sectoral
MBI_UK_34	Price based	Grants	Low Carbon Buildings Programme	United Kingdom	2006	2010	Energy Efficiency	Energy Production
MBI_UK_35	Quantity based	GHG emissions allowances	Climate Change Programme 2006	United Kingdom	2006	?	Not Specific	Multi Sectoral
MBI_UK_36	Price based	Grants	Scottish Biomass Support Scheme	United Kingdom	2006	2011	Renewable Energy	Energy Production
MBI_UK_37	Price based	Loans	Salix Project	United Kingdom	2006	In Force	Energy Efficiency	Multi Sectoral
MBI_UK_38	Price based	Loans	Energy Efficiency Loans for Small or Medium sized Enterprises (SMEs)	United Kingdom	2007	?	Energy Efficiency	Industry
MBI_UK_39	Price based	Grants	Environmental Transformation Fund (ETF)	United Kingdom	2007	2011	Renewable Energy	Multi Sectoral
MBI_UK_40	Price based	Tax relief	Stamp Duty Relief for Zero Carbon Homes	United Kingdom	2007	2012	Not Specific	Buildings
MBI_UK_41	Price based	Grants	Community Energy Savings Programme (CESP)	United Kingdom	2009	2012	Energy Efficiency	Buildings
MBI_UK_42	Price based	Grants	Low Carbon Industrial Strategy (LCIS)	United Kingdom	2009	?	Not Specific	Energy Production
MBI_UK_43	Price based	Loans	Low Carbon Industrial Strategy (LCIS)	United Kingdom	2009	?	Not Specific	Multi Sectoral
MBI_UK_44	Price based	Feed-in Tariffs	Feed-in Tariffs for renewable electricity for PV and non-PV technologies	United Kingdom	2010	In Force	Renewable Energy	Energy Production
MBI_UK_45	Quantity based	GHG emissions allowances	Carbon Reduction Commitment Energy Efficiency Scheme (CRC)	United Kingdom	2010	In Force	Energy Efficiency	Buildings

REF	CATEG.	TYPE	RELATED POLICY	COUNTRY	ON	END	OBJECTIVE	SECTOR
MBI_UK_46	Price based	Grants	Plug-in Car Grant	United Kingdom	2011	In Force	Not Specific	Transport
MBI_UK_47	Price based	Feed-in Tariffs	Renewable Heat Incentive (RHI) for domestic and non-domestic generators	United Kingdom	2011	In Force	Renewable Energy	Energy Production