1 Introduction: EU Directive on Energy Efficiency

In 2007, Members of the European Council committed to reach a 20% energy efficiency (EE) target by 2020. In 2012, the EU Directive 2012/27/EU on Energy Efficiency was voted in, adopting the 20% EE target; by 2020 the EU consumption should not exceed 1,474 Million tons of oil equivalent (Mtoe) of primary energy and 1,078 Mtoe of final energy.

To comply with their EE commitment, EU Member States resort to a large variety of tools. Among these tools are White Certificates that are considered a cross-sector measure to foster and activate energy savings and long-term energy efficiency. One main reason for the success of White Certificate Schemes (WCS) is their structure, bringing together three major policies’ considerations combining social and environmental benefits with business-oriented concerns.

White Certificates are also known as:
- Energy Efficiency Certificates
- Savings Obligations
- Obligation Schemes
- Supplier Obligation
- Energy Efficiency Obligations

This report provides an overview of the White Certificate Schemes that have been introduced in different European countries. It will focus mainly on the countries that were pioneers of the White Certificates Schemes: Great Britain in 2002, Italy in 2005 and France in 2006.

1.1 The EU directive on energy efficiency

Article 7 of the Directive sets energy savings targets to be achieved by energy suppliers and/or distributors, based on their annual sales. These savings are
equivalent to 1.5% of their annual energy sales to final clients, from 2014 to 2020. To foster energy utilities and help them achieve these savings the Directive strongly advises that Energy Efficiency Obligation (EEO) schemes be implemented. EU analysis of the Member States’ reports highlights that sixteen countries have chosen to implement an EEO as a tool to achieve the EE targets (Figure 1).

Among these sixteen countries, eight already had an EEO scheme before the Directive: Belgium (Flanders), Denmark, France, Ireland, Italy, Poland, Slovenia and Great Britain (GB). While eight others have decided to implement an EEO scheme following the Directive: Austria, Bulgaria, Hungary, Latvia, Lithuania, Malta, Slovakia and Spain.

In France and Italy, Energy Efficiency Obligations are the main tool to achieve the 2020 savings target; while in GB it is the tool responsible for 10% of the country’s savings objective (Figure 2).

2. WCS mechanism, actors and eligibility criteria

2.1 The general mechanism

WCS are used as a policy instrument to steer energy utilities (energy suppliers and/or energy distributors) towards energy efficiency. For major energy utilities WCS are an obligation; for other actors WCS are voluntary. The regulatory authority sets the targets per obligated actor and defines the energy saving measures that are eligible (see Figure 3). To comply with their obligations, energy utilities can either:

1. Launch energy savings programs for their own benefit (e.g. renovation of their buildings)
2. Delegate their energy savings programs to an accredited ESCO company
3. Invest in energy saving programs carried out by other obligated actors
4. Transfer their obligations to another obligated actor or to an accredited ESCO which therefore becomes responsible for generating the amount of energy savings
5. Buy white certificates on the market
6. Pay the penalty set by the regulatory authority of the scheme

2.2 The obligated and eligible actors

In each country the associated Ministry compiles the list of obligated parties; generally energy suppliers or
distributors:

- In GB, they are the six main suppliers of electricity and gas (with more than 250,000 residential clients)
- In Italy, they are electricity and gas distributors (which are responsible for the respective electricity and gas networks) with more than 50,000 customers, namely thirty companies, each operating in a specific region
- France has the widest range of energy actors involved in the scheme: around 2,500 actors hold an obligation

Obligated parties are suppliers of electricity and natural gas, and also of domestic fuel, heating and cooling, liquefied gas and more recently, fuel distributors.

Each obligated actor is to complete an annual EE target, based either on the company’s number of customers, the volume of annual sales, or the amount of energy distributed.

In GB, although the trading of certificates is legally allowed, in practice it is limited to the transfer of obligations between obligated actors.

In France and Italy, other actors (‘eligible parties’) can also participate in the scheme. They are generally designated by the public authority as official actors authorized to collect certificates.

In France, Local State Authorities, Social Landlords and the National Agency for Residential Housing are automatically eligible. Other eligible parties are other suppliers of electricity and gas or ESCOs that are accredited. In the French scheme, trading of certificates is mainly bilateral.

In Italy, eligible parties are other distributors of electricity and gas, or other companies controlled by obligated parties, accredited ESCOs, or finally companies hiring an energy manager. The Italian scheme allows trading of certificates based on market deals between any eligible and obligated parties.

2.3 Eligibility criteria of EE actions in the WCS

There are several required criteria for EE actions to be eligible under the WCS. The main criteria are listed below:

a) The additionality of energy savings

The European Directive defines the principle of “additionality” for an EE action to be adopted in the WCS. Additionality is defined as the ability of a measure to produce more energy savings than the energy savings that would be obtained without its implementation. It takes into account the present regulation and the available technology in the market.

b) Eligibility of actions

Each administrator authority establishes a list of actions or situations that are to be taken into account in the WCS. In GB, actions used to be based on pre-approval by
Savings are also discounted: in France and GB, calculations also include a discount rate (of 4% in France and 3.5% in GB) that takes into account the declining value of the energy savings over time, as the equipment’s efficiency is declining and higher market standards are set. The formula is:

\[
\text{Annual energy savings} \times \text{Lifetime of action} \times \text{Discount factor}
\]

In Italy, in the first and second phases of the scheme, savings were calculated based on the additional yearly savings assuming a constant amount of annual savings and for a lifetime of five years only. These calculations reflected the predominance of actions with a short lifetime. The third phase of the scheme (starting 2013), introduced a discount factor of 2% for technologies with a lifespan of more than five years. In GB and in France, savings are expressed in kWh of final energy; in Italy savings are expressed in tons of oil equivalent (toe) of primary energy.

c) Application with examples from the French and Italian schemes

In France, 304 actions were listed as part of the scheme, in late 2013. Each action is predefined and summarized in a 1 to 3 page document, released by the Ministry of Energy and available on its website. The document clearly defines the legal framework of the EE action, the authorized beneficiaries and a formula explaining the savings’ calculations, expressed in kWh cumac “cumulated and actualized” (kWh accumulated and discounted). Examples in the French scheme are indicated in Table 1.

In Italy, some actions are considered standard and savings are calculated as indicated in the related file issued by the scheme’s authority. However, most actions’ savings calculations are made based on the on-field measurement of energy.

3. WCS increases EE in the residential sector

White Certificate schemes are an efficient policy tool to achieve energy savings in the end-use sector. In countries in which it has been implemented it has widely contributed to an increase in energy efficiency of the residential sector. In GB, the scheme focuses only on the residential sector; in France and in Italy more than 80% of the certificates target energy savings in this sector (Table 2).

WCS contributed to increase EE in the residential sector mainly through the improvement of housing insulation and through upgrade of heating equipments.
Table 1 Examples of savings calculations in the French scheme, in the residential sector

<table>
<thead>
<tr>
<th>Action</th>
<th>Lifetime of action</th>
<th>Total savings expressed in kWh cumac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installing a washing machine labeled A++ or A+++</td>
<td>11 years</td>
<td>190 kWh cumac for A++ label and 350 for A+++</td>
</tr>
<tr>
<td>Installing an individual solar water heater</td>
<td>20 years</td>
<td>From 22,600 to 29,100 kWh cumac depending on the climatic zone where it is installed</td>
</tr>
<tr>
<td>Installing an efficient boiler</td>
<td>17 years</td>
<td>From 25,800 to 40,300 kWh cumac depending on the climatic zone where it is installed</td>
</tr>
<tr>
<td>Insulating walls</td>
<td>30 years</td>
<td>From 2,000 to 3,800 kWh cumac depending on the climatic zone and the energy used for heating (electricity or fuel) and multiplied by m2 of surface insulated</td>
</tr>
</tbody>
</table>

WCS has different impacts on the country’s residential sector, depending on the current stock of equipments, the technology trend, the market structure and the legislation in place:

- In GB, aging buildings with very poor insulation made investments in wall insulation a profitable and popular EE measure.
- In Italy, by the time the WCS was launched, CFLs were available at a very competitive price, enabling WCS actors to collect certificates through the promotion of CFLs.
- In France, boiler replacement was a very popular EE measure as it benefited from lower taxes while end users were rewarded with great energy savings since savings calculations were based on the current stock of boilers (and not the standard market efficiency).

Results of GB’s energy company obligation for the period 2013-2015 show that all savings focused on the residential sector with more than 90% on insulation (Figure 4).

Table 2: Percentage of energy savings from the residential sector (from ECEEE report)

<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>% of energy savings from residential sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium-Flanders</td>
<td>2008</td>
<td>58% (mandated)</td>
</tr>
<tr>
<td>Denmark</td>
<td>2008</td>
<td>42%</td>
</tr>
<tr>
<td>France</td>
<td>2006-2009</td>
<td>87%</td>
</tr>
<tr>
<td>Italy</td>
<td>2005-2008</td>
<td>83%</td>
</tr>
<tr>
<td>GB</td>
<td>2005-2008</td>
<td>100% (mandated)</td>
</tr>
</tbody>
</table>

Figure 4: GB’s Energy Company Obligation most common measures 2013-2015

(for water and space heating).
In France, results are similar: in 2014, most of the WCS actions took place in the residential sector and focused on insulation and boilers (Figure 5).

![Figure 5: French WCS most common actions in 2014](image)

In Italy, in 2010, more than 80% of the WCS actions focused on domestic use of electricity (Figure 6).

![Figure 6: Italian WCS most common actions in 2010](image)

4. WCS’ impacts on the energy markets’ structure

WCS have encouraged changes in the energy markets, with the restructuring of traditional energy companies and the entrance of new ESCOs as EE facilitators.

Energy utilities have traditionally and naturally been driven by the quantity of energy consumed by their customers. WCS introduced direct and indirect incentives for traditional energy utilities to establish a new relation with their customers, helping them to achieve energy savings. However, WCS’s impacts on the energy markets are substantially different when comparing the British, French and Italian schemes. In Italy, WCS has fostered the creation of new energy service companies as most obligated actors (electricity and gas distributors) partnered with an ESCO to comply with their obligations. Therefore, a new landscape of ESCOs emerged, offering all kind of services related to White Certificates, such as:

- Information on the scheme and how to benefit from it
- Coordination with the scheme regulatory authority
- Administrative support
- Certification processes
- Management of certificates once obtained
- Trading of certificates
- Financing solutions
- Information and communication services

In France and GB, new ESCOs have also been encouraged to enter the market, however, as the obligated actors (energy suppliers) benefited from a direct relation with the final consumers, they have been able to integrate White Certificates as part of their own business, as a new commercial or marketing approach. There are substantial differences in the way they were included in GB and in France as part of the company’s business strategy.

In GB, for housing insulation, energy suppliers relied on partnerships with Green Deal actors known as “assessors”, “providers” or “installers” that are authorized to visit one’s property, assess the savings, provide finance services and install the improvements; for home appliances they also directly partner with retail companies.
In France, energy suppliers have also partnered with retailers, installers, manufacturers and banks to develop EE programs, but traditional energy companies have integrated it as a business model, creating their own subsidiaries to develop new businesses in energy efficiency. As examples of this trend, Engie, E.ON and EDF, respectively launched Cofely, Connecting Energies and Dalkia. These subsidiaries provide new types of services to their consumers, such as:

- Awareness on energy savings and energy efficiency
- Energy audits
- Energy project management
- Financial instruments

The impacts of WCS on the energy market structure have been positive towards the emergence of new actors from the housing and retail sectors and, through them, a greater appropriation and participation of end-users to energy savings and energy efficiency.

Although a WCS is not the only tool that triggered changes in the business models of traditional energy utilities, it may be considered a useful tool that supported a new and positive image of energy utilities becoming more concerned with social and environmental matters.

5. Conclusion

5.1. Benefits of WCS

WCS is a key policy tool to achieve energy efficiency targets in a cost-effective way and gives strong incentives for the creation of ESCOs. It has proven more efficient than other policy tools in overstepping the barriers of the implementation of sustainable EE by reaching more easily the end-users, relying on innovative financial solutions that are independent from public spending and successfully raising the level of technical skills on EE. The benefits of WCS encompass economic benefits, such as the creation of jobs and reduction on fuel financial burdens, social benefits in the form of reducing direct household fuel expenses, and environmental benefits, such as a reduction in greenhouse gas emissions.

5.2. Requirements for WCS

Before launching a WCS a number of issues have to be dealt with in order to design the scheme. Prior to these issues, the Ministry and/or the Authority in charge have to set the national energy saving priorities and targets by sector and by obligated actor; and the penalty for every kWh that hasn’t been saved. In order to do so they have to be recognized in their legitimacy to manage the scheme and in their ability to set clear saving targets and to define clear market rules.

The designing of a WCS requires many years of dialogue between all national representatives, in coordination with the Ministry of Energy and Water. The EuroWhiteCert project identified the following key steps for the design of a WCS (Figure 7).

Among many issues to be dealt with, the regulatory authority in charge of the scheme needs to define the criteria listed in table 3.

![Figure 7: Key steps in the design of a WCS](image-url)
Table 3: Examples of issues to be dealt with in the design of a WCS

<table>
<thead>
<tr>
<th>Savings targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>How are the savings distributed by sector?</td>
</tr>
<tr>
<td>Who are the priority groups? (e.g., households suffering from fuel poverty)</td>
</tr>
<tr>
<td>How long is a phase (1-3 years)?</td>
</tr>
<tr>
<td>What is the national annual target?</td>
</tr>
<tr>
<td>Who are the obliged actors?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Savings measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>How are the savings calculated?</td>
</tr>
<tr>
<td>What is the lifetime duration per action? (generally 15-30 years)</td>
</tr>
<tr>
<td>What is the discount rate?</td>
</tr>
<tr>
<td>Are they expressed in primary or final energy?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Verification of savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>ex-ante</td>
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<tr>
<td>ex-post</td>
</tr>
<tr>
<td>on-field measurements</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management of certificates</th>
</tr>
</thead>
<tbody>
<tr>
<td>How long are they valid?</td>
</tr>
<tr>
<td>Can they be traded?</td>
</tr>
<tr>
<td>What is their nominal value?</td>
</tr>
<tr>
<td>What is the penalty in case of non-compliance?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WCS as a policy tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does WCS interact with other policy tools?</td>
</tr>
<tr>
<td>How can double counting of savings be avoided (with another policy)?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WCS costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>How can the cost of generating 1 certificate be minimized?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WCS benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>How are the benefits measured?</td>
</tr>
</tbody>
</table>

5.3. Applicability of WCS in Lebanon: general thoughts

In Lebanon, the energy utility EDL has a monopoly on the production, distribution and selling of electricity to final consumers. A WCS could be a useful market-based tool to generate energy savings in the end-use sectors in Lebanon, if it succeeds in enhancing new market players and new business opportunities. The energy utility EDL would be obliged to generate a certain amount of energy savings – based on its annual sales of electricity to final consumers. A list of certified companies could help EDL in reaching its target by investing in or managing EE projects. This task could fall on the current companies that have been selected by the Ministry of Energy and Water and EDL as ‘service providers’ within the Lebanese electricity distribution networks. Other ESCOs could also take part in the scheme and help in its administration, processes and projects (Figure 8).

![Figure 8: Example of a WCS mechanism in Lebanon](image-url)
The list of actions to be set as part of the scheme has to aim at increasing EE in the end-use sector. In Lebanon, such measures could include the replacement of residential, commercial and industrial equipments with more EE ones, for example:

- Efficient home appliances (refrigerators, washing machines, ACs, TVs, etc.)
- Efficient lighting (residential, commercial industrial, public lighting)
- Solar equipments to heat residential water
- etc.

Prior to the implementation of a WCS, Lebanon would have to define the scheme’s overall mechanism and priority of actions, with regard to its final energy consumption by sector, the technology trend of the available equipments in the market and other ongoing or projected EE policy instruments.

**Notes**

1: 20% energy savings in 2020 compared to EU consumption in 2007 (1,842 Mtoe of primary energy).
4: Each country has estimated this percentage - information can be found in the country’s National Energy Efficiency Action Plan (NEEAP). In the case of France, 90% of the savings achieved thanks to the EEO is probably overestimated. In 2014, a report coordinated by French official authorities (see references) states that at least 20% of French certificates couldn’t be taken into account for the EU 2020 objective.
5: Source: http://www.uni-muenster.de/imperia/md/content/transpose/publikationen/steuwer.pdf
6: Source: The costs and benefits of WCS by CIRED in 2011 (see references). Note that the total number of actors is changing from one phase to another.
8: In 2008, most of the savings by European Energy Efficiency Obligation have occurred in the residential sector. Note the percentage figures relate to the savings required to meet the target not necessarily the percentage of the lifetime savings achieved.
9: For more details, read the 2012 ECEEE report on Energy Efficiency Obligations
11: Data from ATEE French Club on Energy and Environment
12: From report on WCS by European Commission in 2011, in References
13: White Certificates: concept and market experiences, by EuroWhiteCert project
## Annex

Table presenting a cross-country analysis (Source: see References)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>UK</td>
<td>National UK Climate Change Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Certif'ecome (Energie Efficace)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>National Kyoto targets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>1) EU Directive 2012/27/EU, 29th Dec 2012</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) National law 19/2007 on the liberalization of the electricity and gas market</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) European Directive on end-user EE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Targets and ending dates

- **Great Britain**
  - 1st period: 2006-2009
  - 2nd period: 2011-2014
  - 3rd period: 2015-2018
- **Italy**: 2004-2009
- **Spain**: 2014-2020

### Who needs to collect certificates (collecting parties)

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Britain</td>
<td>Energy suppliers with more than 250,000 residential clients:</td>
</tr>
<tr>
<td></td>
<td>- British Gas</td>
</tr>
<tr>
<td></td>
<td>- EDI</td>
</tr>
<tr>
<td></td>
<td>- EDF</td>
</tr>
<tr>
<td></td>
<td>- First Utility</td>
</tr>
<tr>
<td></td>
<td>- Scottish and Southern Energy PLC</td>
</tr>
<tr>
<td></td>
<td>- Scottish Power</td>
</tr>
<tr>
<td></td>
<td>- Utilita Warehouse</td>
</tr>
<tr>
<td></td>
<td>837 companies purchased 2 obligated licenses in Dec 2013</td>
</tr>
<tr>
<td>Italy</td>
<td>P1: suppliers of electricity, natural gas, LPG, domestic fuel, heating and cooling</td>
</tr>
<tr>
<td>Spain</td>
<td>P2: same suppliers + gas distributors with more than 60,000 customers</td>
</tr>
<tr>
<td></td>
<td>Electricity: 10 distributors covering 90% of total population</td>
</tr>
<tr>
<td></td>
<td>Gas: 24 distributors covering 90% of total population</td>
</tr>
</tbody>
</table>

### EE Target distribution between obligated parties

<table>
<thead>
<tr>
<th>Country</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Britain</td>
<td>Based on the volume of global annual sales costs for residential and tertiary sectors.</td>
</tr>
<tr>
<td>Italy</td>
<td>Based on market share ratio of electricity distributed the previous year.</td>
</tr>
<tr>
<td>Spain</td>
<td>Based on the volume of global annual sales.</td>
</tr>
</tbody>
</table>

### Eligible actors (other actors who can collect/generate certificates)

- **Great Britain**: Other energy suppliers with more than 250,000 customers
  - Green Deal (P1)
  - A list of 432 companies between assessment providers: 254 assessors (and property assessments and improvements), 159 providers (can assess + provide finance), 1,791 meters (approval improvements)

### Amount of energy savings

- **Great Britain**: 1.8 TWh
- **Italy**: 1.2 TWh
- **Spain**: 1.0 TWh

### Trading of certificates

- **Great Britain**: Introduction of ECO Q1 in 2013; only certified actors are allowed to trade (Green Deal Provider); a list of only 6 buyers and 152 certificates are allowed by UK government
- **Italy**: One bilateral; 46 trades have been approved by Ofgem
- **Spain**: Bilateral or market platform. Market for White Certificates is organized by Electric Market Operator (MEM) under the supervision of energy regulator.

### Administrator authority

- **Great Britain**: Office of gas and electricity markets
- **Italy**: Ufficio Regionale Energetico
- **Spain**: Instituto para la Diversificación y Ahorro de la Energía (IDEAE)

### Sectors of implementation of savings

- **Great Britain**: Agricultural sectors, buildings and transport
- **Italy**: All end-use sectors
- **Spain**: Residential sector + transport + industry + public lighting

### Penalty

- **Great Britain**: 1) 2% of the total of the obligation; 2) non-compliance by the end-user; 3) the payment of the penalty cancels the obligation. The penalties are paid in 2 years.
- **Italy**: 1) 2% of the total of the obligation; 2) non-compliance by the end-user; 3) the payment of the penalty cancels the obligation. The penalties are paid in 2 years.
- **Spain**: 1) 2% of the total of the obligation; 2) non-compliance by the end-user; 3) the payment of the penalty cancels the obligation.

### Estimated costs

- **Great Britain**: £1.50 per MWh
- **Italy**: £1.50 per MWh
- **Spain**: £2.00 per MWh
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• http://europeanclimate.org/
• http://energycoalition.eu/
• http://ec.europa.eu/europe2020/pdf/themes/16_energy_and_ghg.pdf
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