[ITALY] The Italian white certificates scheme

Meccanismo dei certificati bianchi

About the measure

Policy instrument	Sector	Starting date and status
Market-based (Energy efficiency obligation)	**General (cross-cutting)**	**[2005] – [on-going]**

The Italian White Certificates (WhC) scheme is an Energy Efficiency Obligation (EEO) scheme in which the electricity and gas distributors with more than 50,000 clients are obliged to reach increasing annual energy efficiency targets. The Ministry Decree of 11 January 2017 set the WhC energy savings target in 2020 to 11.19 million tons of oil equivalent (toe) of primary energy.

WhC is a flexible mechanism, since the energy efficiency savings can be obtained through interventions from market operators. The scheme is managed by the National Agency GSE with the support of other National Authorities (MiSE, AEEGSI) and Agencies (ENEA, RSE, GME). White certificates are used to certify the energy savings and the obliged distributors can buy them from voluntary parties or obtain them directly. Voluntary parties are non-obliged distributors, ESCOs, organizations with an energy management expert (UNI CEI 11339 certified) or with an ISO 50001 energy management system. A very large number of energy efficiency projects in almost all sectors is allowed, with particular emphasis on the industrial sector. The exchange of white certificates between obliged and voluntary parties takes place on a dedicated platform managed by GME (owned by GSE) or with bilateral agreements over the counter.

The WhC scheme can thus work as an incentive for the voluntary parties, even if the WhC price can vary over time and there are no guarantees about WhC sales (no minimum price, no withdrawal if WhC are not sold to obliged parties). Due to a shortage on the market related to challenging targets, in 2017 the price has gone beyond 300 euro per white certificate, after being in the range 90-110 euros/certificate for over five years.

Each certificate corresponds to one ton of oil equivalent (toe) of annual energy savings. The savings are additional, meaning that only savings over a regulatory and market baseline are accounted for, and generate white certificates for a period between three and ten years, according to the Ministry Decree 11 January 2017. Actions that received a national incentive (e.g. tax credit) are not eligible for the WhC scheme.

Expected energy savings in 2020	Benchmark
The energy efficiency target for Italy for WhC is 4.3 Mtoe/y as final energy in 2020 (from actions over 2014-2020), which correspond to 16.03 Mtoe cumulated over 2014-2020 (source: NEEAP 2014).	60% of the national target for EED art. 7 (Italian notification for EED art.7).

Means and outputs

Most of the costs incurred by the obliged distributors are recovered through tariff components (electricity and natural gas bills). Every end-user thus contributes to this cost recovery mechanism.

Obliged DSOs obtain a reimbursement when they present certificates to GSE according to their specific targets. The reimbursement is set by AEEGSI and is linked to the WhC market price in the previous year. The following figure shows the annual withdrawals from consumers electricity and gas tariffs through the years 2006-2016, i.e. the yearly cost of the WhC scheme.

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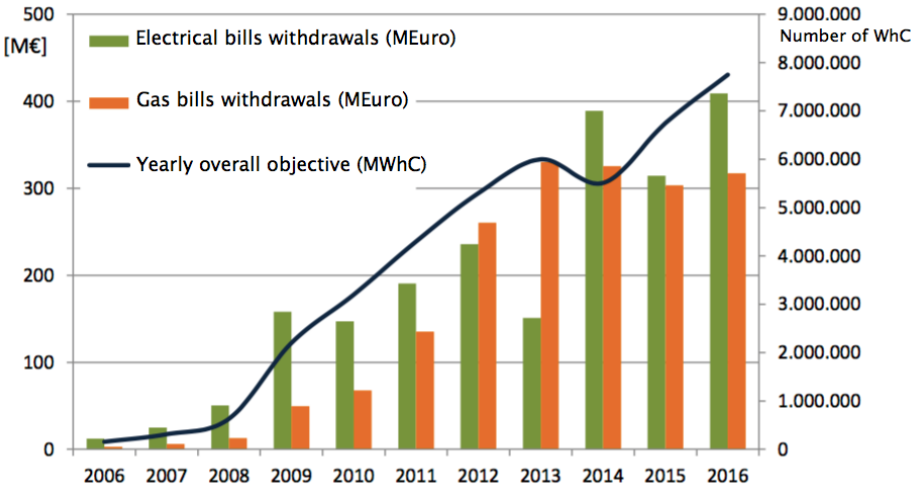

Figure 1: Overall costs for consumers in the period 2005-2016 (AEEGSI and GSE data)

There are presently no official data on the global value of the investments done by ESCOs and end-users.

Management and evaluation activities by GSE are paid since 2015 through a fee due for each application presented by the proponents. It ranges from 100 euros for a very small project (with less than 100 certificates issued per year) to 2,000 euros plus 1,1 euros/issued certificate for very large projects (with over 50,000 certificates issued per year). According to GSE's balance sheet this amounted to 6.5 million euros in 2016.

Data about energy savings

Unit	Main source of data
Annual primary energy savings in tons of oil equivalent (toe) and number of white certificates annually issued	GSE and GME data (weekly, monthly and annual bulletins and reports)

The following figure shows the annual targets in terms of white certificates, the issued certificates, and the achieved additional annual primary energy savings. Due to the *tau* coefficient, a multiplier introduced in 2011 to consider the ratio between savings monitored along the WhC recognition period (5 years) and savings achieved along the technical life of the projects (10-20 years depending on the intervention), the number of certificates doesn't correspond to the number of achieved toe starting from that year. The new WhC regulation (MD 11/01/2017) extended the WhC recognition period and removed the *tau* coefficient for the projects presented by 2017 so in the next years white certificates and annual saving should correspond again.

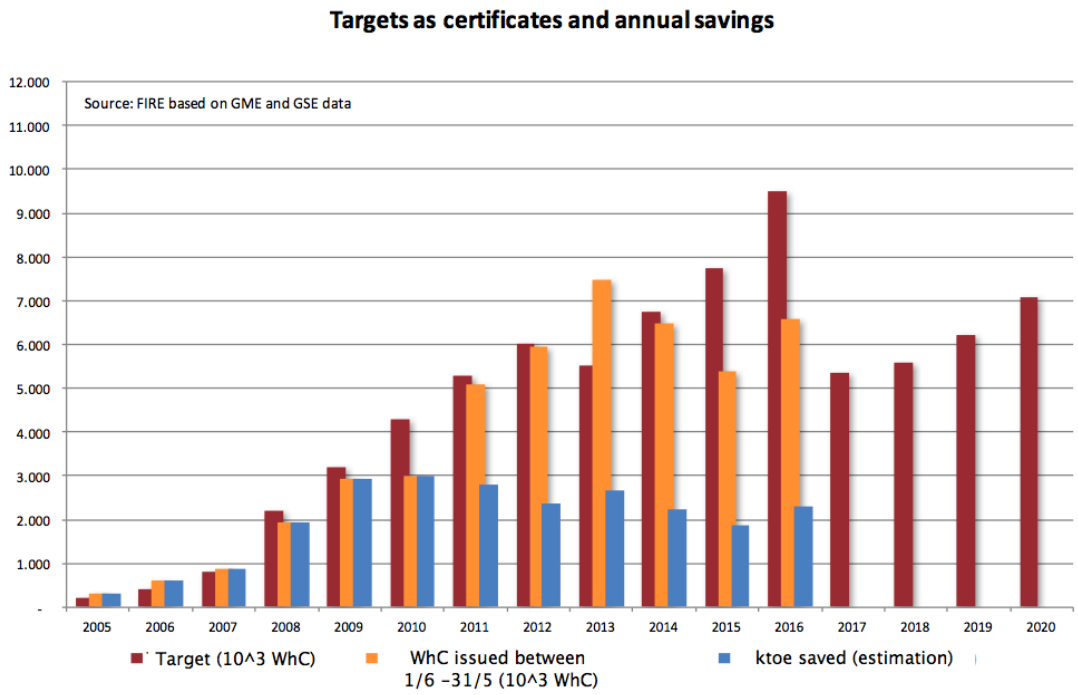

Figure 2: Targets as certificates and annual savings (FIRE on GSE data)

Legend:

- Red bars: total target in thousands of certificates for each year for electricity and gas obliged distributors.
- Orange bars: thousands of certificates issued in the obligation period (1st June- 31st May of each year).
- Blue bars: annual energy savings in terms of thousands of toe of primary energy, that correspond to additional energy savings (see explanations below).

Sources of uncertainties about energy savings

The main source of uncertainties has been:

- Errors in the calculations and reporting of the energy savings, which are monitored by GSE by documentation controls and on-site inspections.
- Uncertainties related to the use of engineering calculations or deemed savings (until 2017) and in a new standardised method introduced by Decree 11 January 2017, which is based on measures on samples of interventions.
- Uncertainties related to monitoring plans related to energy processes in which a large number of variables is involved.

Evaluation of the energy savings

Calculation method(s) and key methodological choices

Within the period 2005-early 2017 there have been three methods of calculation for WhC.

- **Deemed savings projects** (DSP, **method 3**), where the savings were assessed through the number of installed units (e.g. number of lamps or small boilers, square meters of solar thermal collectors, kW of installed high efficiency engines, etc.) considering standardised values for the

energy consumption baseline and the additionality, and taking into account **corrective factors** (e.g. geographical location, climate zone, working hours, etc.).

- **Simplified monitoring projects** (SMP, a **mix of deemed savings and metered savings, method 4**), where the savings were quantified based on a predetermined default algorithm and the direct measurement of some system operating parameters after the intervention is performed. This method was applied to a limited set of solutions, such as district heating, public lighting, etc.

- **Monitoring plans projects** (MPP, a type o **metered savings, method 1**), where the savings were measured on the basis on one or more meters. The energy consumption baseline and the additionality were determined on single projects, taking also into account **adjustments** for the variables affecting the savings (e.g. manufactured volumes, plants usage, weather, etc.). To facilitate the evaluation and the management of MPPs, a Project and Measurement Program Proposal (PPPM) – describing the project and proposing the measurement and verification of energy savings (M&V), the consumption baseline, the adjustment factors, and the additionality – has to be previously submitted and accepted by GSE.

In all cases the proposals have to be submitted through a web platform, to facilitate evaluation. Documents such as plants schematics, performance certificates, meters characteristics, etc. have to be presented, whereas more specific documents such as operational permits, certificates, detailed layouts, meters logs, etc. can be requested by GSE under in-depth controls.

The Ministry Decree 11 January 2017 modified DSP and eliminated SMP methods, aiming at improving even more the quality of the collected data. Therefore now two methods are considered:

- **Standard projects** (a mix of **deemed savings and metered savings, method 4**), where savings are calculated based both on the installed units and the measurements done on a statistically representative sample. This will ensure a more reliable evaluation of energy savings for standardised solutions.

- **Monitoring plans projects** (MPP, a type o **metered savings, method 1**), which remain similar to the past, but with additional requirements for the consumption baseline that has to be based on meters capable of at least daily measures of the savings and on recorded data for at least one year.

The percentage of metered savings in the Italian scheme has always been large, reaching even 80% of the total value in 2013-2014 (in 2016 it has been around 50%).

An increased effort has been put to have reliable energy consumption baselines (on a project basis for MPPs) and to define the additionality of the savings (also on a project basis for MPPs), a difficult task especially for industrial projects. Dedicated evaluation procedures have been defined and improved over the years. Energy consumption **baselines** are determined as "**market average**" **for MPPs** (a market research has to be implemented for each project) and as "**stock and/or market average**" **for DSPs and SMPs**. Stricter M&V protocols have been requested over the years.

Energy savings are to be **additional**, meaning that for each project measured consumption baselines are compared with legislative requirements (minimum performance standards, industrial BATs, national and regional legislation, etc.) and market averages and supply (i.e. the effective performance values adopted by end-users if exceeding standards). The highest baseline is then used to define the savings accounted for the WhC.

An effort has also been put to avoid double counting and to reduce the free riders effect (but no detailed data are available on this second issue).

Ex-post verifications and evaluations

In 2016 11,709 applications requesting white certificates have been presented to GSE (56% regarding the industrial sector). In particular:

- 1,803 MPP requests;
- 2,935 SMP requests;
- 6,971 DSP requests.

In addition, 815 PPPMs have been presented.
Overall, in terms of applications submitted in 2016, there was an increase of about 6% compared to the previous year.

After the documental evaluation, only 48% of the PPPMs were accepted, and 82% of the applications requesting white certificates (corresponding to around 5.5 million certificates). The rejected applications were characterised by various type of issues.
Additionally, GSE carried out in 2016 in-depth control activities for 255 projects (31 on-site).
The types of intervention submitted to the in-depth control activities have been selected taking into account typical evaluation issues, indicated in parenthesis:

- installation of biomass boiler/furnaces both in residential, services and industrial buildings (possible issues with boiler performance or certification);
- installation of centralized heating systems for winter and/or summer air-conditioning of residential and office buildings (possible double counting or additionality issues);
- installation of photovoltaic solar power plants below the 20 kW threshold (possible double counting);
- heat recovery from industrial processes and other interventions in industry (possible additionality issues).

Other indicators monitored and/or evaluated

Indicator	Explanations
New proposals/projects presented in a year	It represents the activity of new initiatives, showing how many of the overall proposals/projects presented in a certain year are new initiatives or the continuation of past projects (which last 5-8 years). In 2016 this ratio has been 68%.
Approved proposals/presented proposals	It shows the capability of ESCOs, end-users and distributors to present projects that can deliver additional savings, without non conformities. In 2016, 85% of the applications evaluated by GSE were approved.
Public expense for an additional electricity kWh saved (until 2011)	The total costs to stimulate savings of one 'additional' electricity kWh has not exceeded 1.7 c€ (euro-cents) in the years 2005-2011 (2011 is the last year of available AEEGSI data). It is a very good result if compared to the other Italian incentive schemes used to promote the electrical production from renewables (in the range 8-40 c€/kWh in the same period) or, considering thermal energy, to the tax deduction scheme (with a cost per kWh around ten times higher than WhC).

Impact of the annual cost of the scheme for a typical family (until 2011)	It represents the overall impact on the electricity and natural gas bills of a "standard family", due to the cost recovery mechanism. In 2016, according to GSE, it amounted to 18 euro per year per family, of which 12 euro on the gas bills and 6 on the electricity bills.

Other aspects evaluated

A characteristic of tradable EEOs, at least in theory, is the capability of prioritising the most cost effective solutions, thus leading to high cost effectiveness in terms of total costs over achieved savings. The evaluation activities showed that in fact the increase of the share of energy savings achieved in the industrial sector over the years was due to the higher availability of short pay-back time solutions in this sector, even if the higher complexity of industrial projects requires more time for ESCOs and end-users to present projects.

A study on this topic has been made in 2012-2013 (with seven years of data available) and analysed the indicator related to the ratio between the value of the certificates linked to a given project to its capital cost on a large number of PPPMs (Biele, et. al. 2013, Di Santo et al., 2014). This study showed that this indicator is usually in the range 5%–20% for projects implemented in the residential and service sectors. It is usually low both for the typical medium term pay-back time of the investments in this sector and since minimum standard requirements, ecodesign criteria, and legislative obligations set a high baseline for energy efficiency and thus a low additionality (i.e. small amount of certificates per action). For industrial processes, on the other hand, pay-back times are often shorter and the additionality baseline often coincided with the ex-ante situation, apart from typical cross-cutting solutions (e.g. high efficiency engines, inverters, etc.) or process modifications that already became current practice.

Unfortunately, the investment cost field in the PPPMs has been optional until 2016, so there was insufficient data to determine the ratio for the complete database. Only 8% of the several hundreds of PPPMs analysed by FIRE indicate the capital cost.

The following figure is based on the available data and should not be considered representative, but it shows how the economic weight of WhC can vary and thus affect investment decisions. The earnings are the cumulated value of the white certificates received by the proponent over the project's lifetime, assuming a fixed price for the certificates.

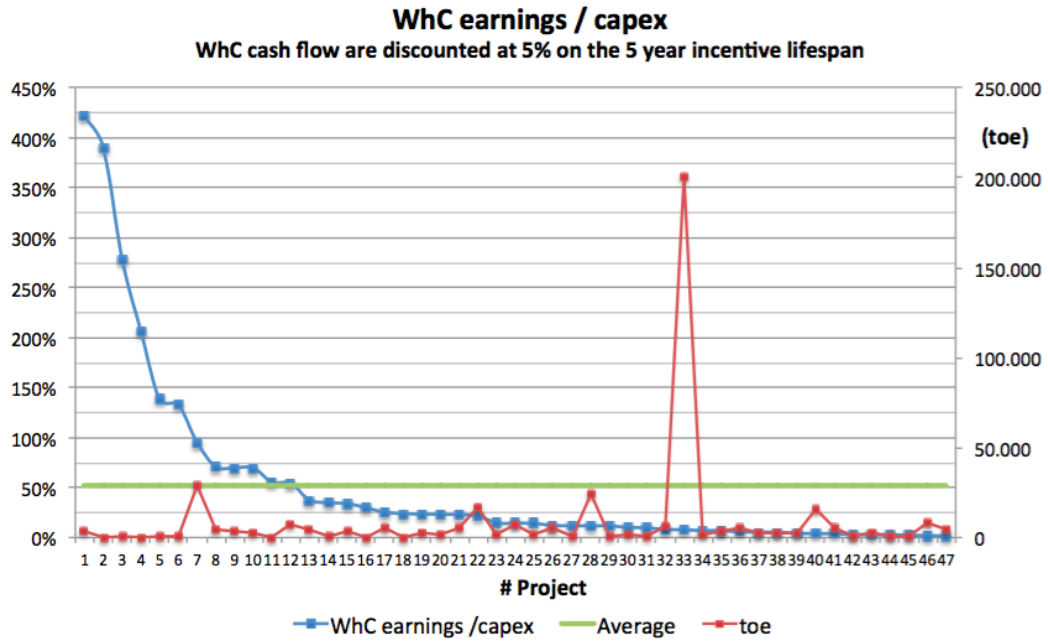

Figure 3: WhC earnings / CAPEX ratio for the 47 PPPMs that report the investment costs (source: Di Santo et al., 2014)

It is important to observe that if the analysis is limited to the sectors that have at least 20% of PPPMs with a reported CAPEX, the average ratio is quite reasonable, as showed in the figure below.

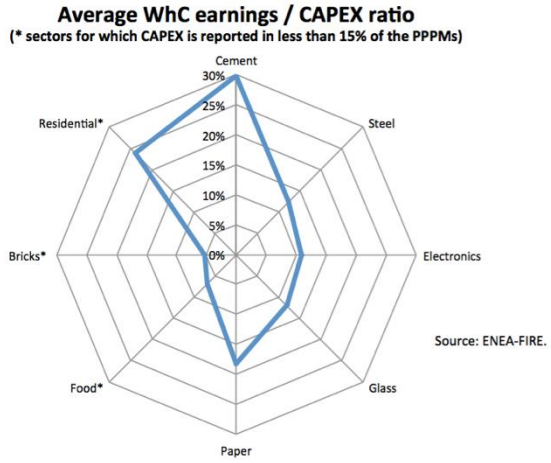

Figure 4: WhC earnings/CAPEX for the most indicative sectors, with at least 20 % of PPPMs with the CAPEX indicated (source: Di Santo et al., 2014)

It is also worth noticing that in market mechanism, the price of the certificates can drop, so this type of economic evaluation is only hypothetical, unless made at the end of the projects' timeline. It is possible that the incentive is higher than the capital cost for particular solutions, especially when the additionality is full and the economic performance of the adopted technology or process modification is excellent, but either this is for a widespread type of project and thus produces a strong drop in the WhC market prices – as happened with CFLs in the first two years of the scheme (prices around 30 euros/certificate) –, or it regards a small number of applications and thus the effect is negligible.

In any case, in order to promote solutions that are more in need of an economic support to be implemented, after the above mentioned study, more attention has been put in the evaluation of the economic impact of the white certificates on the industrial projects, leading to the progressive increase of the additionality requirements and to a consistent reduction of the eligible energy efficiency solutions in the industrial sector. This, together with other stricter requirements, reduced the number of highly cost effective projects eligible to the scheme, producing in the last two years an important rise in the WhC market price (over 300 euros/certificate).

This example shows how for complex schemes such as tradable white certificates evaluation is fundamental both to achieve cost effectiveness, to ensure the best use of public or consumers resources, and to promote the qualification of technicians, energy managers, ESCOs, and other market operators by setting increasing requirements, thus enhancing the accuracy and reliability of the accounted energy savings and supporting the growth of the energy efficiency market.

Focus on the challenges related to the industrial sector

One of the peculiarity of the Italian scheme is the role of the industrial sector. After a first phase (2005-2010) characterized mainly by intervention in the domestic and building sector (e.g. CFLs, boilers, windows and insulation, district heating, etc.), the second phase (2010-2014) saw a strong growth of the savings linked to projects implemented in the industrial sector, mainly related to manufacturing processes (i.e. services like electric motors, pumps, lighting, etc. played a limited role). At its peak, the percentage of industrial savings rose beyond 80% of the total, and it has been above 50% in the last years (56% in 2016).

This fact translated in a challenge from an evaluation point of view, since industrial processes present many differences and personalization, and only seldom can be treated in a standardized way. This implies a higher degree of difficulty in dealing with M&V protocols, consumption baselines, and additionality, if compared with the building or service sectors.

The approach used to overcome this issue was to transfer part of the effort on the proponents – and this is the reason why they should present a PPPM for each project, trying to find acceptable solutions to M&V, baseline, and additionality – and to learn by doing, increasing step by step the requirements and the accuracy of the information requested to the proponents (e.g. more detailed information are requested nowadays on the manufacturing processes and the proposed adjustment factors, baseline should be based on daily measures registered over at least one year, sectoral guidelines will be produced in 2017 by GSE clarifying the criteria to be used and setting higher requirements for the additionality, etc.).

This effort ensured the collection of a huge amount of valuable information on the projects presented under the WhC scheme and this richness has been confirmed also in the EU-MERCI project (http://www.eumerci.eu/), which links industrial energy efficiency good practices to the results obtained through incentive schemes in Austria, Italy, Poland, and UK. Unfortunately, the original structure of the database is not adequate to such detailed information and thus the evaluation activities are complex. It is advisable for new schemes to pay the due attention to this aspect to facilitate indexing and analysis activities.

Experience feedback from stakeholders

Interview with GSE (evaluators)

1. **What is the role of evaluation in the management of the scheme?**

The role of evaluation is crucial to assess the eligibility of an energy efficiency project and the amount of WhC required. In particular the evaluation process is even more determinant to evaluate the additional energy savings (from baseline) and the affordability of the measurement campaign proposed by investors to demonstrate the energy saving related to the energy efficiency projects.

2. **What were the main lessons learnt from the evaluations (about the impacts of the scheme and what could be improved)?**

Monitoring WhC evaluation process is really important for detecting the effective achievement, reasonableness and rationality of the goals settled during the design of the energy efficiency policies.

3. **What were the lessons learnt in terms of evaluation practices?**

The complexity of energy efficiency intervention is increasing. In the first period, single component interventions (e.g. boiler, inverter etc.) were predominant, whereas currently sectorial-specific interventions and industrial process reengineering are more frequent. This increases the complexity of energy savings measurement and also the cost of savings.

4. **What would you like to highlight about your experience related to the evaluations of the scheme?**

The amount of energy savings generated by white certificates are higher than all the other energy efficiency measures active in Italy (fiscal rebate, heating account, energy label etc.). Currently the scheme is characterized by the lowest cost/saving ratio.

To go further

About the measure

Web page on the white certificates scheme of the managing Agency GSE (in Italian): www.gse.it/it/CertificatiBianchi/Pages/default.aspx

ENSPOL, 2015. Report on existing and planned EEOs in the EU – Part I: Evaluation of existing schemes (in English):
http://enspol.eu/sites/default/files/results/D2.1.1%20Report%20on%20existing%20and%20planned%20EEOs%20in%20the%20EU%20-%20Part%20I%20Evaluation%20of%20existing%20schemes.pdf?v=2

Ministry Decree 11 January 2017 concerning the period 2017-2020 (in Italian): www.sviluppoeconomico.gov.it/images/stories/normativa/DM-Certificati-Bianchi_2017.pdf

References of the evaluation(s)

ENEA, 2017. National report on energy efficiency (in Italian): http://www.enea.it/it/seguici/pubblicazioni/pdf-volumi/raee-2017.pdf

GSE, 2017. Report on the results of the white certificates scheme in 2016 (in Italian): www.gse.it/_layouts/GSE_Portal2011.Structures/GSEPortal2011_FileDownload.aspx?FileUrl=http://www.gse.it//it/CertificatiBianchi//GSE_Documenti%2fRapporto+Annuale+CB+2016.pdf&SiteUrl=http://www.gse.it//it/CertificatiBianchi/

Italian Authority on Electricity, gas and water services, 2017. Survey and analysis on the white certificates market behaviour in 2016-2107 (in Italian): www.autorita.energia.it/allegati/docs/17/292-17all.pdf

Other useful references

Biele, E., Di Santo, D., Forni, D., 2016. White certificates as a tool to promote energy efficiency in industry. Proceedings of the ECEEE 2016 Industrial Summer Study. www.dariodisanto.com/Flipbooks/ECEEEpaper2016/index.html#p=1

Biele, E., D'Ambrosio, S., Di Santo, D., Tomassetti, G. et.al., 2013. Metodo a consuntivo: analisi delle proposte di progetto e di programma di misura 2005-2012. FIRE study for ENEA. www.fire-italia.org/prova/wp-content/uploads/2014/03/Analisi-delle-proposte-di-progetto-e-programma-di-misura-PPPM-dei-certificati-bianchi-2005-2012.pdf

Di Santo, D., Tomassetti, G., Biele, E., D'Ambrosio, S., 2014. White certificates in industry, the Italian experience. Proceedings of IEPPEC 2014. www.dariodisanto.com/wp-content/uploads/2014/09/2014-08-di-santo-IEPPEC-paper.pdf

ENSPOL, 2016. Energy Saving Policies & Energy Efficiency Obligation Scheme. ENSPOL Final Report. http://enspol.eu/sites/default/files/results/ENSPOL%20Publishable%20Report.pdf

Stede, J., 2017. Bridging the industrial energy efficiency gap–Assessing the evidence from the Italian white certificate scheme. *Energy Policy*, 104, 112-123. https://www.econstor.eu/bitstream/10419/130219/1/856128953.pdf

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