

White certificates in Italy: lessons learnt over 12 years of evaluation

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ABSTRACT

Energy efficiency obligation schemes (EEOs) are used in many EU countries as a policy measure to reach energy efficiency targets. Some of the first EEO (UK, Italy, France, Denmark) have been capable to reach positive results over the years, as shown by the ENSPOL and EPATEE projects.

The Italian mechanism, in particular, is an interesting example of white certificate scheme (WhC), since it is one of the most long-lasting schemes (operatively started in 2005), has ambitious targets, covers all sectors and energy efficiency solutions, and has many flexibility options in place (e.g. non-obliged parties, tradable market, bankability, etc.).

Another point of interest is WhC development over the years. In the first phase, most of the projects were related to buildings with deemed savings as energy savings assessment method. Then the industrial sector rose constantly, till covering 80% of the savings in 2014, mostly assessed through metered savings procedures. In the last three years deemed savings procedures have started to recover, while metered savings have remained the most used energy savings evaluation procedure. This last development was not expected and is mainly due to some regulatory decision and to the modification of the assessment of additionality for many industrial projects categories, due to the diffusion of certain energy efficiency solutions and to changes in the methodological approach.

The paper will illustrate the reasons behind these developments, the issues that have arisen over the recent years, and the decisions taken to address them through a major redesign of the Italian scheme that has been introduced with new ministerial guidelines in 2017: many aspects – such as targets, baseline and additionality, saving assessment, and measurement, verification and control procedures – has been deeply affected. The paper will cover such themes under an evaluation point of view, highlighting the savings achieved with respect to the national targets, the differences among sectors, how indicators like additional energy savings, costs, cost effectiveness, and employment have evolved over time, the role of the involved stakeholders (utilities, ESCOs, end-users, etc.), and the effects of tight verification and control procedures.

Introduction

When in 1999 Italy designed the liberalisation of its electricity and gas markets, it was decided to introduce some policy to involve energy distributors (DSOs) in energy efficiency measures. The policy was

defined in 2001¹ as a white certificate scheme with a tradable market, with yearly energy efficiency targets expressed in primary energy savings and electricity and gas distributors as obliged parties.

The main characteristics of the scheme as originally planned can be summarised as follows:

- An EEO scheme – the first in Italy dealing with energy efficiency – with targets increasing year over year (from 0.2 Mtoe in 2005 to 7.0 Mtoe in 2020)²;
- Only additional savings – as defined later in the document – are accounted for the issuing of white certificates (each certificate corresponding to one ton of oil equivalent saved);
- The capability to cover all sectors (from industry and buildings to transport and agriculture) and most energy efficiency solutions (provided they were not related to power production and they didn't consist only in control optimization and management);
- High flexibility, due to the possibility to have third parties implementing the energy efficiency project and for the obliged parties to use the market to supply of white certificates; besides, distributors were allowed to recover up to 40% of each year target in the following year without incurring in fines;
- The idea of also promoting the ESCO market, since originally only ESCOs were allowed as voluntary parties in the scheme, as a way to stimulate their growth.

Evaluation was deeply rooted in the scheme. The aim was not only to monitor the achievements, but also to collect the information needed to set the annual targets, an important aspect of EEO schemes. Some of the key points of evaluation are:

- All projects are presented through a web platform, in order to have all the main data (technical, economical, administrative, etc.) computerised and easy to analyse.
- Information on WhC exchange prices and volumes available per session (spot market) and as monthly averages (bilateral market).
- Monthly reports on issued certificates divided per type of intervention and proponent.
- Regular reports on the number of approved and rejected proposals, with information on proponents and issued certificates for all approved proposals.
- The predominance of measured energy savings, against the usual prevalence of simplified assessment procedures, such as deemed savings;
- Annual reports on control and verification activities and their results.

The scheme is also expected to give the major contribution on the achievement of 2012/27/EU directive (EED) art. 7 targets³. Targets have been defined over times through ministerial decrees D.M. 20 luglio 2004 (two decrees, one for electricity and one for natural gas), D.M. 21 dicembre 2007, D.M. 28 dicembre 2012, D.M. 11 gennaio 2017.

Many public bodies are involved in the scheme evaluation activities. GSE, the public company that manages the scheme, is in charge of the monitoring and the core of evaluation. Other evaluation of the policy are implemented by ARERA (the Italian agency for the regulation of energy, networks and water), mainly on market issues, and ENEA (the Italian agency for new technologies, energy, and sustainable economic development), mainly and as basis for the National energy efficiency action plans. The Ministry of Economic Development and the Ministry of Environment are the main evaluation customers, which

¹ Due to the ambition of the scheme and its innovativeness, the operative design took more time than anticipated and the scheme effectively started in 2005.

² The data refers to the cumulative target, split between electricity and gas. Till 2016 the gas target has been around 80% of the electricity one, whereas in the period 2017-2020 the ratio is inverted. In 2015 obliged electricity and gas DSOs distributed respectively 227 TWh (over a total of 268 TWh distributed at national level) and 27,425 Mm³ (over a total of 31,007 Mm³).

³ See the “Application of Article 7 of Directive 2012/27/EU on energy efficiency obligation schemes” notification by the Ministry of Economic Development to the European Commission on December 4, 2013.

commission and make use of the result of evaluation to improve the scheme and design the other policies related to energy efficiency.

Considering the long life of the Italian mechanism, it is interesting to illustrate how it evolved over time and the transformation it incurred in, in particular to highlight the main issues and the solutions adopted to overcome them.

Before entering into the scheme details, it is useful to briefly explain the scheme basics under the new guidelines issued in 2017 with the Ministerial Decree 11 January 2017, also referred to as new guidelines in this paper.

The Italian WhC scheme's basics under the new guidelines

The Italian WhC scheme (Di Santo et al. 2011, 2014b, various authors 2015, Di Santo, Biele, and Forni 2016, Stede 2017, Di Santo, Biele, and De Chicchis 2018) is an EEO in which the electricity and gas distributors with more than 50,000 clients are obliged to reach increasing annual energy efficiency targets. It is a flexible mechanism – since the energy efficiency savings can be obtained through interventions from market operators (i.e. non-obliged distributors, ESCOs, and companies with a certified energy management system or energy management expert) – managed by GSE. White certificates are used to certify the energy savings and obliged distributors can buy them from voluntary parties, beside obtaining them directly. Each certificate corresponds to one toe of additional annual savings.

Methods for the calculation of energy savings

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

- Deemed savings project, 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 project (a mix of deemed savings and metered savings), 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 project (MPP, a type of metered savings), where the savings were measured on the basis of one or more meters and an appropriate algorithm. 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.).

Taking into account the results of monitoring and evaluation activities, the Ministerial Decree 11 January 2017 modified deemed savings projects and eliminated simplified monitoring projects methods, aiming at improving the quality of the collected data and to reduce the risk of frauds. Therefore now two methods are considered:

- Standard project (SP, a mix of deemed savings and metered savings), 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.

- MPP, 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 year⁴.

The percentage of metered savings in the Italian scheme has always been large, reaching even 82% of the total certificates in 2013-2014 (in 2016 and 2017 it has been respectively 48% and 61%). Figure 1 shows the usage of the original methods over time. The drop in the emission of certificates for MPPs in 2015 and 2016 is mainly due to the rules introduced by D.M. 28 dicembre 2012, which introduced the need to present the proposals before the implementation of the projects, and to stricter rules on additionality applied by GSE.

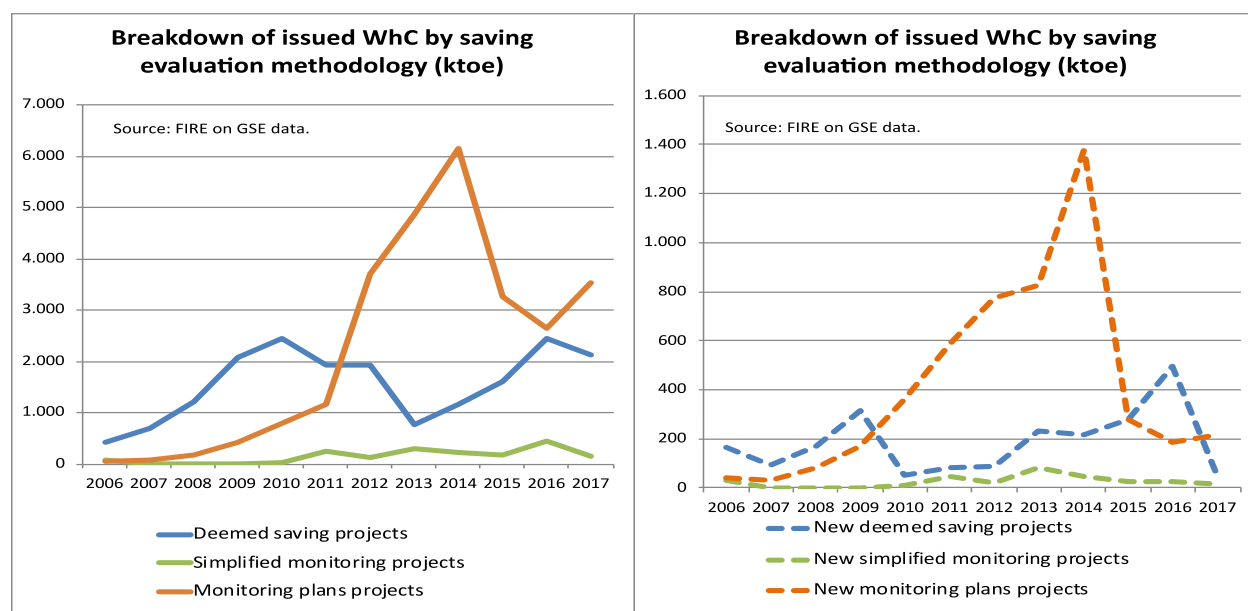


Figure 1. Trend of issued certificates per type of evaluation method. *Source: FIRE on GSE data.*

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.

An increased effort has been put to have reliable energy consumption baselines and to define the additionality of the savings, a difficult task especially for industrial projects, as discussed below. 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).

Additionality

To assess the additionality, the energy savings are evaluated as follows:

1. *Ex-ante* baseline. The energy consumption baseline is evaluated (for example, the consumption of the old lighting system in a manufacturing site, based on fluorescent lamps, is monitored over twelve months);

⁴ Projects' applicants can propose baselines based on less than one years of measurements and without the daily measures, but it has to demonstrate that the result is reliable and capable of adequately represent the inferred annual baseline.

2. Adjusted baseline. The “*ex-ante* baseline” is then adjusted to the reporting period conditions, considering the external variables influencing the consumption (e.g. in the lighting example: effective working hours, illuminated area of the floor, etc.);

3.A Market-adjusted baseline. The “adjusted baseline” is further adjusted considering the application of the new technologies available on the market (as average market offer) to deliver the service provided by the evaluated project (e.g. in the lighting example: since presently the average market offer is based on led lamps, the “adjusted baseline” is reduced as if such lamps were already used in the *ex-ante* situation).

3.B Standard-adjusted baseline. If minimum performance standards exist that affect the acceptable energy consumption of the new technology, they are applied to the “adjusted baseline” (e.g. in the lighting example: in this case there aren’t performance standards that go beyond the led lamps on the market, so there is no “standard-adjusted baseline”).

4. Reference baseline. The minimum value between 3.A and 3.B is used to evaluate the savings by subtracting the *ex-post* energy consumption determined by the new installed solution.

Figure 2 graphically illustrates the different phases. With reference to it, the “adjusted baseline” can be higher or lower than the “*ex-ante* baseline”. The same applies to the “standard-adjusted baseline” with respect to the “market-adjusted baseline”.

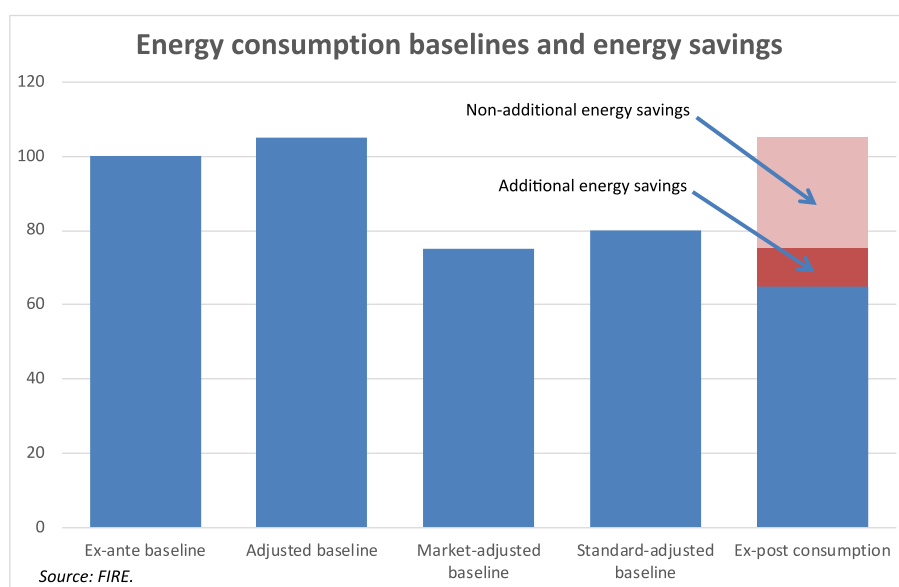


Figure 2. Energy consumption baseline and additional energy saving in the Italian white certificate scheme. *Source:* FIRE.

Considering the industrial lighting example, to be able to deliver savings under the scheme, the new lamps shall have an efficiency higher than the market average⁵ and only the difference of performance between them determines the accounted savings. It can be noticed that such definition of additionality is very tight and goes beyond the EED requirements. Clearly it makes the generation of new white certificates quite difficult, since the confrontation term becomes the technologies available on the market and not the installed ones under the business as usual scenario. The possibility to produce

⁵ The market average is identified through market surveys. It should be noticed that the standard-adjusted baseline is less important than it is in other schemes, due to the focus on the industrial sector and to the consequent limited contribution from solutions that fall under the Ecodesign regulation (e.g. electric motors).

additional savings depends on the particular energy efficiency solution considered, but this approach doesn't help improving the supply of white certificates on the market. Besides, due to additionality, the new guidelines reduce the available options with respect to the previous years in terms of eligible projects.

Before the introduction of the 2017 guidelines, the additionality evaluation process was basically the same, with one important exception. The market-adjusted baseline was calculated with respect to the average efficiency of the given solution on the market, considering both the installed application and the average market offer. Thus its effective value was higher than the one calculated with the present rules.

The data on 2017 confirm such reduction of additional savings per project: MPPs approved with the new guidelines have an average potential of 277 toe per proposal, against 3,340 toe per proposal of MPPs approved with the previous guidelines.

It is worth highlighting that in the Italian scheme it is the proponent that has to evaluate the additionality of the energy efficiency project. This is not an easy task, especially in the industrial sector, where the variety of manufacturing processes makes the definition of a business as usual scenario quite complicated. In practice, the proponent has to present data on the existing plant, on the offer of technologies available on the market with the respective efficiency indicators, and on the forecasted modification of the manufacturing process.

The steps of a project proposal

Both for SPs and MPPs the proponent (i.e. the applicant) has to first present a proposal in which the project is defined and all the required information needed to assess it are provided (i.e. needed meters, algorithm to calculate the savings, consumption baseline, adjustment factors, additionality, forecasted working condition, etc.)⁶. Such request shall be presented before the beginning of the project implementation (project proposal) and this, coupled with the twelve-month measurements for the consumption baseline, introduces an important constraint. GSE verifies the data and the documentation in the proposal and eventually asks for additional information to ensure that the proposed energy saving M&V protocol is acceptable and that the information about the energy efficiency project are sufficient to ensure it is eligible, correctly presented, and compliant with all the relevant regulations and standards.

After such proposal is accepted, the energy savings shall be measured (only for the sample in the case of SP) over at least one year, and then a request of certificates (CR) could be presented. GSE checks both the savings and the additional documentation that demonstrates that the project has been effectively implemented. Then a number of white certificates corresponding to the measured additional savings is issued and the proponent can start trading them (or it will just stock them to fulfil its target if an obliged distributor).

Figure 3 shows the various phases and activities related to the WhC scheme, from the energy efficiency project idea by the end-user (usually an organization, but can also be a person) to the verification of the target achievement for each obliged distributor.

The exchange of white certificates between obliged and voluntary parties takes place on a dedicated platform managed by the GME (public company owned by GSE in charge of the Italian power exchange IPEX and of environmental and energy efficiency markets, i.e. emission trading, green and white certificates), either as a spot market exchange, or as a bilateral agreement between parties. The WhC scheme can thus work as an incentive for the voluntary parties, considering however that the WhC price can vary over the time and that there are no assurances that the certificates can be sold every year (in

⁶ All factors that impact the energy consumption should be considered (e.g. climate, load factors, manufacturing trends, etc.). The process described has to be done for each project presented by the proponent, even if proposals dealing with similar solutions have been presented before. Thus it is ensured that the additionality and the adjusted factors are correctly evaluated.

case of oversupply the price of the certificates drops and it can become difficult to sell the owned certificates).



Figure 3. WhC scheme phases and activities, from project definition to white certificates cancellation. *Source:* FIRE.

The cancellation request consists in the obliged distributor asking GSE to use a certain number of owned certificates to achieve its target (totally or partially). Such certificates are then “cancelled” from the distributor’s GME registry, avoiding the possibility to trade or use them a second time.

Figure 3 also shows the various institutional bodies involved in the white certificate management, apart from evaluation, in addition to GSE: Ministry of Economic Development, which is in charge of the policy and defines the guidelines in accordance with the Ministry of Environment, ARERA, which deals with tariff reimbursement and obliged parties not meeting their minimum targets, ENEA and RSE (public company owned by GSE in charge of research activities in the energy field), which support GSE in its control and verification activities.

Figure 4 shows the timeline of the various activities related to an energy efficiency project that exploits the WhC scheme.

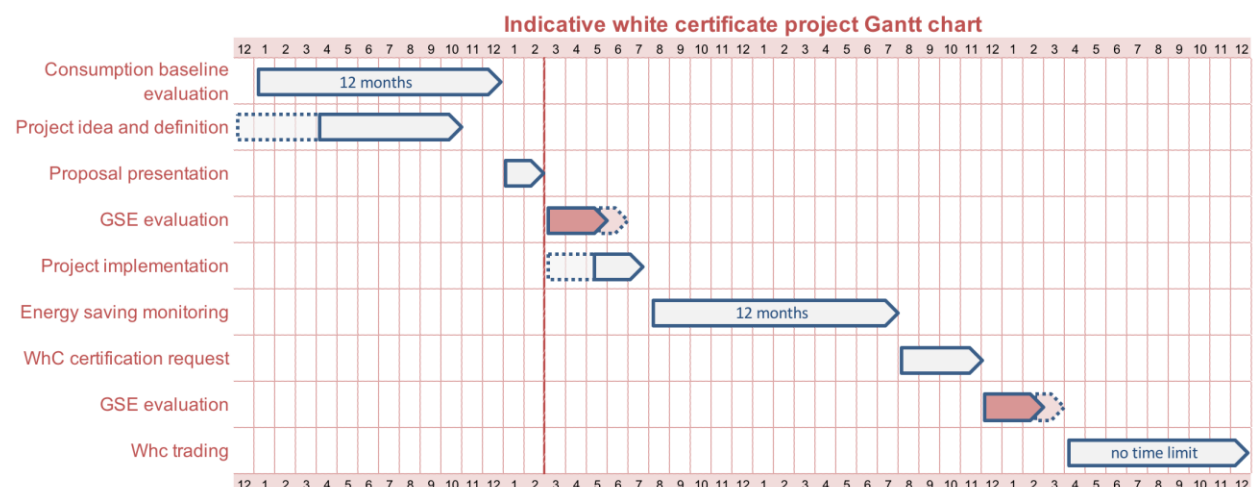


Figure 4. Indicative Gantt chart of a white certificate project. *Source:* FIRE.

WhC lifetime, proponents, cumulability with other incentives, verification and control

The savings generate white certificates for a period of time that varies from seven to ten years, apart from behavioural measures (an option introduced by the new guidelines), which get three years of certificates. Previously the WhC projects lifetime was five years for most cases, eight years for building envelope projects, ten years for high efficiency cogeneration, and fifteen years for district heating. However, high efficiency cogeneration and district heating follow different rules and are not considered in this paper. This change in the rules implies a reduction of certificates of around 40% on the proposals presented under the new guidelines, at the same savings, with respect to the previous rules, considering the elimination of the *tau* coefficient (Di Santo et al. 2014b, various authors 2015)⁷ and the change in the project lifetime.

In terms of verification and control activities, the fact of having white certificates issued over many years implies that GSE could make controls all over the WhC lifetime. This, by the way, was one of the main issue with the *tau* coefficient, because projects got certificates for five years, but with the anticipation of the savings from the sixth year to the end of the project's technical lifetime, that usually ranged between 15 and 20 years. This meant that GSE, for example, could make controls at year 12 and request white certificates back in case of non-conformities, with all the imaginable complications. With the new guidelines such issue is eliminated, while the possibility of controls over all the WhC lifetime reduces the risk of frauds or unauthorised modifications of the incentivised projects.

A project proposal can be presented either by the owner of the refurbished or newly created plant (i.e. the investing subject) or by a proponent (a distributor or an ESCO) that can be delegated to both present the proposal and manage the white certificates (GME registry, trading, etc.) or just present the proposal, with the owner managing the certificates. In the first case both the proponent and the owner share the responsibility of the project against the GSE in case of non-conformities. This has been introduced to better deal with the management of possible non-conformities leading to the need for GSE to get back WhC from the proponent, especially in the frequent case of an ESCO as proponent and another enterprise, e.g. an industry, as owner of the project. It also protected the ESCOs, since in case of modification of the energy efficiency project made by the owner without communication to the ESCO acting as proponent the responsibility is shared (previously it was on the ESCO).

White certificates cannot be cumulated with other state incentives since 2013. This greatly reduced the risk of double counting (this rule applies in particular with the other two national incentives under art. 7, i.e. tax reductions and the "heat account" scheme)⁸.

Main results: issued certificates, annual energy savings, market prices, scheme's cost

As shown on Figure 5, after a first phase of oversupply (available certificates overcoming the yearly targets) lasted three years, in the following seven years the scheme dealt with a slight undersupply. Then, in 2015 and 2016 a large lack of available certificates took the scheme toward a high pressure on supply, with the effect on WhC prices that are shown later in the paper.

⁷ The *tau* coefficient was introduced in 2011 to take into account the technical life of the energy efficiency projects, thus ensuring a better promotion of long life, and usually more complex ones. More information on how it worked are available in the indicated references.

⁸ Theoretically double counting should have been eliminated, but with the old rules there was the risk of frauds (e.g. ESCOs presenting proposals for projects whose beneficiaries already have benefitted from tax reductions or heat account). With the new guidelines, since no ESCO can present projects implemented among different users unless it sustain the investments, double counting will become impossible.

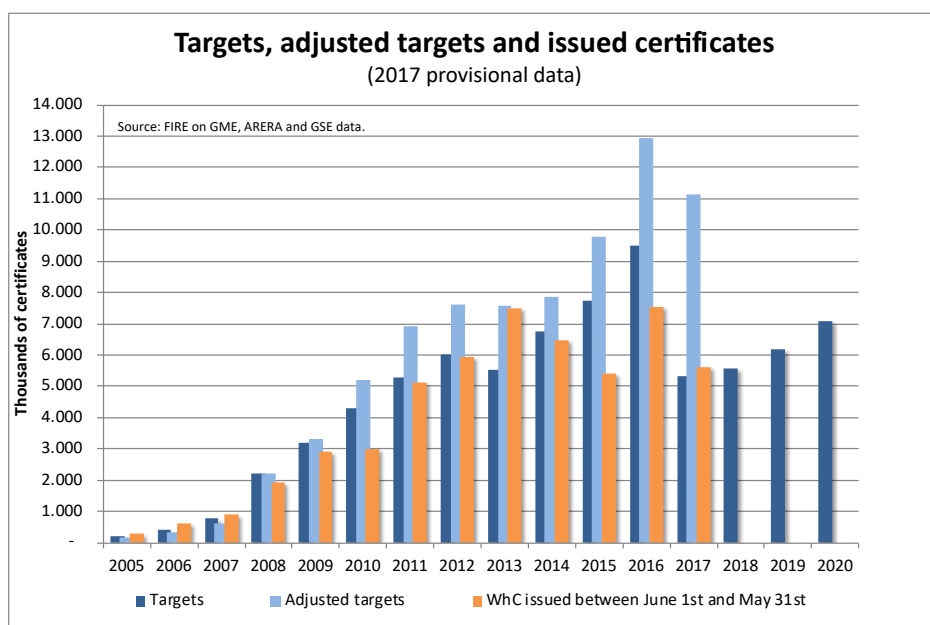


Figure 5. White certificates targets and issued certificates over time. *Source:* FIRE on GME, ARERA, and GSE data.

The reduction of targets set for the last four regulated years take into account both the mentioned undersupply and the elimination of the so called *tau* coefficient.

To be noticed that distributors have the possibility not to incur in fines⁹ if they reach at least 60% of their annual target. In that case, they have to recover the certificates not presented in the next year. These certificates to be recovered increase the targets and are indicated in Figure 5 as adjusted targets. Cumulatively, over 5 million certificates have to be recovered in 2017, making the correspondent adjusted target quite ambitious, despite the targets decrease¹⁰. Despite monitoring and evaluation, the reaction to the setting of the targets and/or the effects of more strict rules has not been quick enough to address the unforeseen supply crisis seen in 2015-2016.

The reduction of the capability of the scheme to produce a quantity of certificates in line with the targets is the results of a mix of factors, which will be illustrated in detail later and can be summarised as follows:

- Introduction over time of very tight requisites on additionality, starting from 2014 in accordance with the 2012 guidelines;
- Progressive reduction over time of the possibility to use deemed savings methodologies, pointing towards effectively measured savings¹¹;
- Introduction with the new guidelines of tighter requirements for the evaluation of the energy consumption baseline in the last years;

⁹ Fines are calculated by ARERA on a single case basis, depending on the entity of the missing target and on the seriousness of the attempt by the distributor to solve the issue.

¹⁰ According to D.M. 28 dicembre 2012, 2015 and 2016 lacking certificates can be recovered over two years, instead of one year as requested for the other annual targets (limit set by the other decrees listed in note 2).

¹¹ The new guidelines in fact eliminate pure deemed saving methods. GSE started in 2013 to require additional documentation and enhanced requirements on deemed saving projects, mainly to reduce the risk of frauds and of projects with an unsatisfactory quality.

- Progressive reduction over time of the eligible projects, due both to the evolution of the additionality and to the saturation of low capital-intensive projects¹².

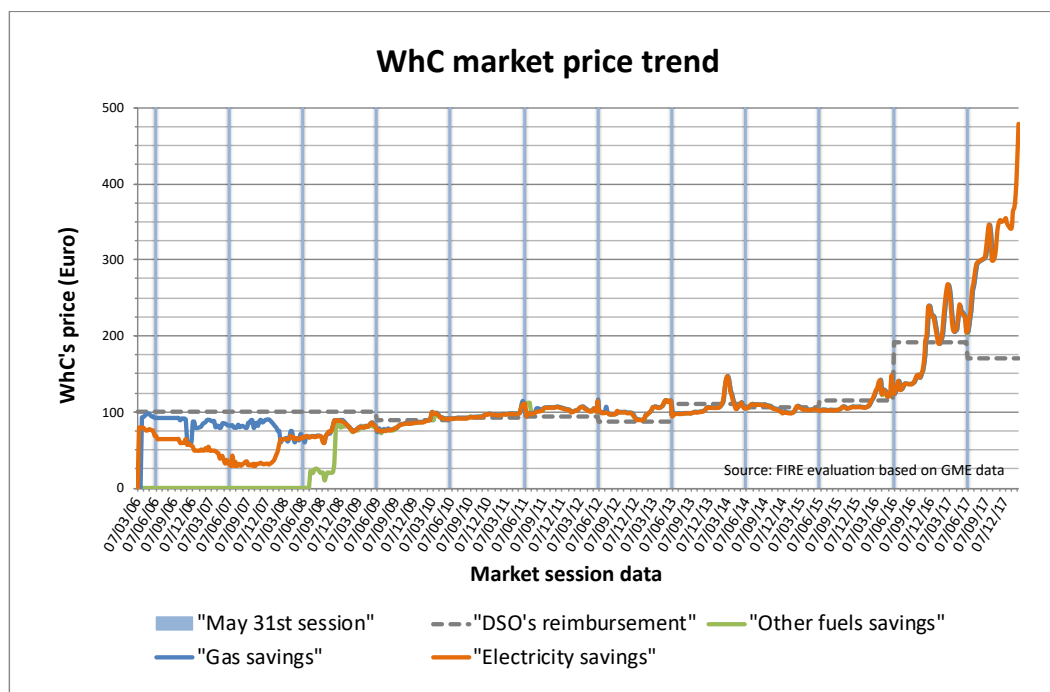


Figure 6. WhC spot market price (euros/certificate) and DSO's reimbursement over time. *Source:* FIRE on GME data.

White certificates can be traded either on the spot market or bilaterally, in both cases on a platform managed by GME. Prices are transparently available: for every weekly spot market session minimum, maximum and weighted average prices and quantities are available, together with the intra-session trend. Bilateral exchanges are reported as monthly averages, divided by price classes.

Figure 6, in particular, shows the spot market price trend since the start of the scheme. It allows to see, comparing it with Figure 5, how the excess of supply produced a drop of prices in the first two years, followed by a long period of equilibrium in 2011-2015 after the recovery of 2008-2010, and how the short availability of certificates in the last two years is having dramatic effects on the price. Early in 2016 the rise of WhC prices started, after many years at 90-110 euros/certificate. In 2017 the threshold of 350 euros/certificate was overcome more than once, bringing the provisional annual weighted average price over 300 euros/certificate. In February 2018 the price reached 480 euros/certificates, leading to the decision of the Ministry of Economic Development to implement only one market session per month in view of a new ministerial decree needed to put the cost of the scheme under control and solve its main issues.

The costs incurred by the obliged distributors (DSOs), being regulated companies, are partially reimbursed through a tariff reimbursement component defined by ARERA and linked to the weighted average price of the certificates in the spot market the previous year. Figure 6 indicates for obligation year 2017 (June 1st 2017 – May 31st 2018) the provisional value of the reimbursement, which only serves to

¹² Capital-intensity is the ratio between the CAPEX and the yearly energy savings of a project. Short pay-back time projects have a capital-intensity below 1,000-2,000 euro/toe, with a cost of energy respectively around 500-1,000 euro.

anticipate a part of it to obliged distributors after the intermediate session of November¹³. At the time of the last market session considered in this paper (February 13th 2018) the value of the weighted average price of the spot market is around 315 euro per certificate.

The cost of the scheme can be calculated as the product of the cancelled certificates and the tariff reimbursement component. Figure 7 shows the estimated cost of the white certificate scheme in Italy, as related to the total value of the tariff reimbursement, together with the yearly additional savings generated under the scheme.

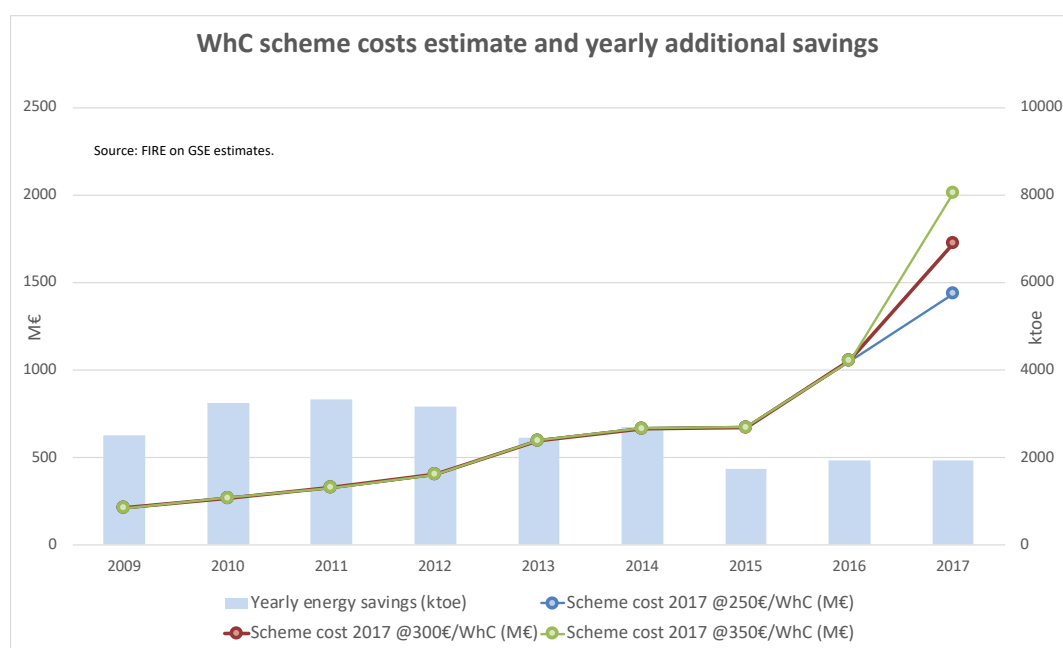


Figure 7. Estimated cost of the WhC scheme and yearly additional energy savings. *Source:* FIRE on GSE estimates.

The yearly savings differ from the issued certificates because of the *tau* coefficient (Di Santo et al. 2014b, various authors 2015). There is no rule to link the two variables, since a) the value of the average *tau* changed over time and b) the *tau* coefficient was not applied to all the issued certificates.

As already mentioned, the Italian WhC scheme has a robust evaluation in place. Comprehensive and exact figures are not available on the dedicated resources. The costs incurred by GSE for information, evaluation, and control has been around 14 million euros in 2016, according to GSE' fiscal documents.

Some important outcomes of evaluation

A complex scheme like the Italian WhC faced many problems during its twelve years lifetime. The main ones are described below, as addressed by evaluation, together with the changes introduced to overcome the issues¹⁴.

¹³ Starting from 2017, each November obliged distributors have the possibility to present part of the required certificates to GSE, to partially cover their targets. This allows them to receive an anticipation on the reimbursement, based as said on the provisional reimbursement value. The corresponding sum is adjusted when the final reimbursement is set after the last May session.

¹⁴ Some aspect related to materiality, additionality, frauds, over incentivizing, etc. are discussed by Di Santo and Biele (2017) and Di Santo, Biele, and De Chicchis (2018). Here we focus on some particular aspects.

The importance of control and verification

Many schemes, especially when based on simplified methods for the assessment of energy savings, don't put enough attention to control and verification, sometimes for fear of increasing the complexity of the policy measure, making it less attractive and thus less useful to reach the expected targets. The risk, however, is to collect unreliable data and to expose the measure to misbehaviours and frauds.

To monitor the results of the evaluation of project proposals, GSE continuously updates the data about the approved and rejected projects. Besides it publishes quarterly the updated lists of projects that receive white certificates and annually data on the results of additional in-depth controls. Figure 8 shows how the amount of rejected proposal has been very high, especially for MPPs (numbers in the titles represent the total amount of proposals presented per year and type).

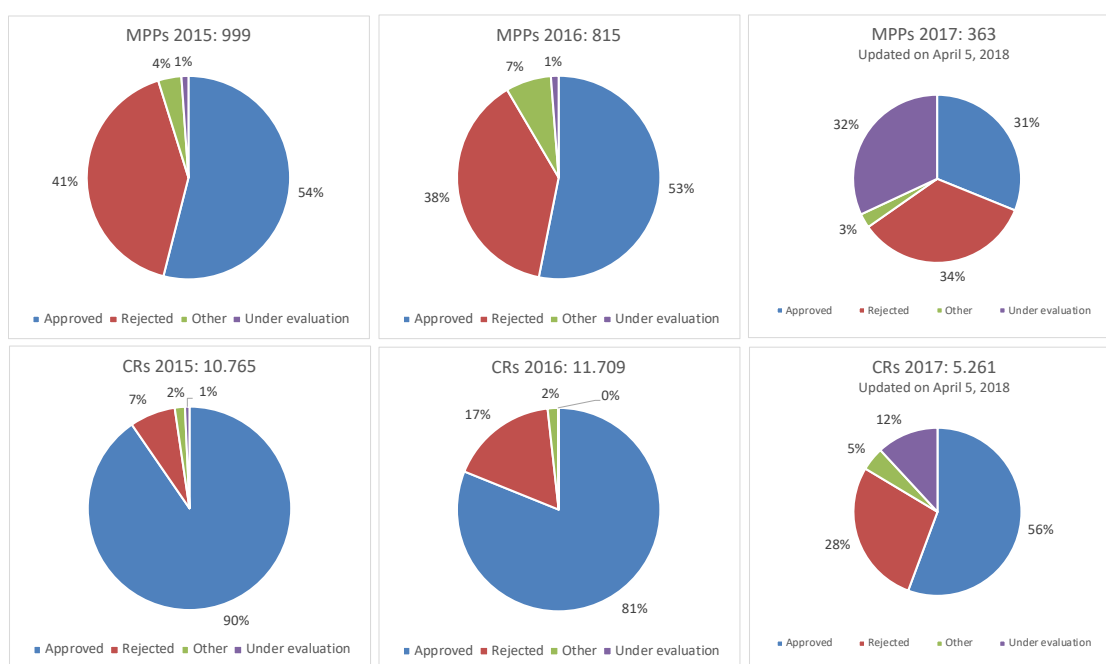


Figure 8. Results of project proposals evaluation for MPPs and CRs. *Source: FIRE on GSE data.*

The lack of learning curve shown by Figure 8 can be explained both with the continuous change of rules and an insufficient support given to the operators (e.g. through guidelines, collection of typical errors, etc.).

The Italian WhC experience shows that complexity doesn't constitute a real barrier, provided the scheme is considered sufficiently interesting for the proponent. Figure 9 shows that the proposals presented in the last two years maintained a good trend. Even the new MPPs presented under the new guidelines are decent in number¹⁵. What has to be avoided is the mix of complexity and uncertainty that characterized the last three years of the WhC scheme, because that will cause loss of interest or, if a tradable market is in place, a rapid increase in the cost of the system, since proponents tend to compensate the uncertainty with an higher price.

¹⁵ Even if with the reduction in the average savings per projects already discussed in the paper.

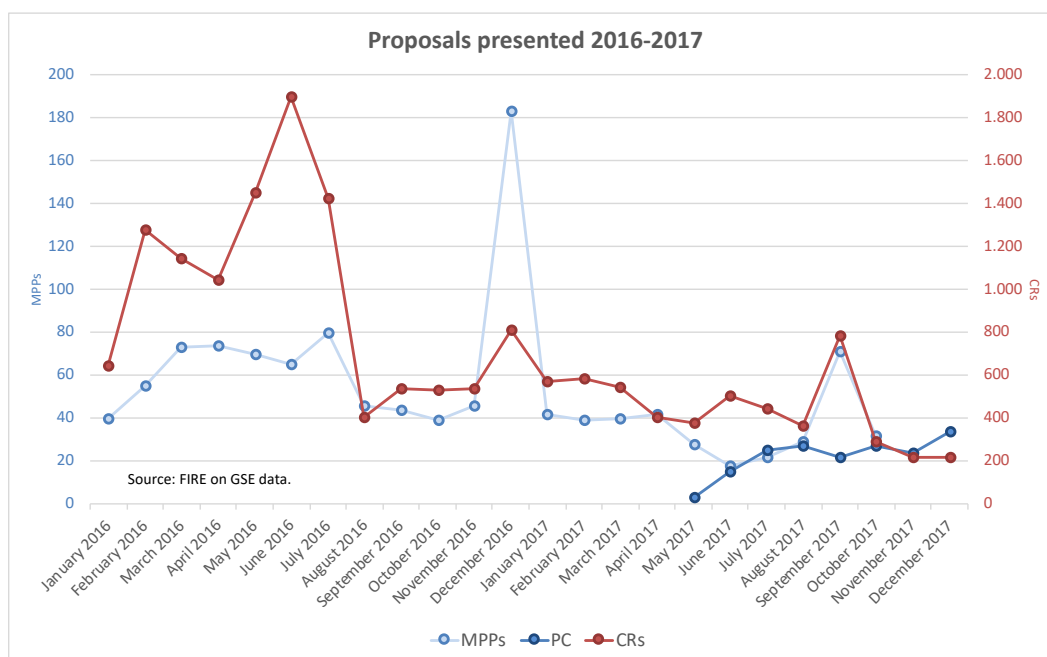


Figure 9. Proposals presented in the last two years. *Source:* FIRE on GSE data.

As Di Santo, Biele, and Forni (2016) illustrated, the control and verification procedure is quite strict and GSE contributed at making it more effective both by improving the documentation required to proponents and by increasing the number of projects subjected *ex-post* to detailed checks. An important result was the discovery of very large frauds in 2017¹⁶. The provisional value of the involved certificates was 700 million euros, of which 105 million euros unfortunately already obtained and delivered to Eastern Europe countries and United Arab Emirates through a series of linked companies.

Similar issues emerged also in France¹⁷ and are unfortunately easy to create with simplified approaches to energy saving evaluation. So, it is important, especially in the case of simplified procedures like standard projects, to pay attention to the documentation requested and to control and verification activities from the managing bodies.

Such risk was already evaluated in the previous years by the Ministry of Economic Development and GSE and is one of the reason behind the withdrawal of the old standard procedure from the new guidelines and the substitution with the SP procedure, which reduces the risk of frauds by requiring the measurement of sample savings as with MPPs. It is interesting to notice that most frauds dealt with the building sector, since it is easier to find ways to produce false documents and data than with the industrial sector.

The impact of rules on WhC supply

One of the main issues with EEOs is the definition of the target that the obliged parties should comply with. Despite the *ex-ante* evaluation implemented to address potentials and options, many variables can affect the effective capability of an EEO scheme to deliver the expected result. In the case of a white certificate scheme with a tradable market, target definition is even more important, since the

¹⁶ Guardia di Finanza: www.gdf.gov.it/stampa/ultime-notizie/anno-2017/ottobre/truffa-ai-danni-dello-stato-e-riciclaggio.-profitti-illeciti-per-105-milioni-di-euro

¹⁷ F. Lacas, "Certificats d'économies d'énergie : alerte aux fraudes", www.batiactu.com, 27 November 2017.

price of the white certificates depends on the trend of demand (target) and supply (available certificates). An inadequate target will either translate in low prices and limited attractiveness of the scheme for voluntary parties, thus reducing its capability of stimulating the market, or raise the market price and the cost of the scheme for the end-users in the energy bill, with the risk of providing a low cost-effectiveness, attracting speculative and/or fraudulent behaviours, or making the scheme non-sustainable.

In this paper, it is interesting to make some other consideration on how evaluation impacted the capacity of the WhC to generate certificates¹⁸.

A first issue is related to the scheme's materiality. The capability of the WhC scheme to effectively promote energy efficiency projects has been changing over the years, depending on general rules and also particular cases. In the first years the connection between the scheme and the adoption of compact fluorescent lamps (CFL) and other low-cost interventions is crystal clear. However, the possibility to present projects after their implementation and start-up posed some questions, in particular on proposals presented as MPPs in the industrial sector. For this reason, it was decided starting from 2014 that proposals should be submitted before the implementation of the project. This is a tough requirement, especially with the new guidelines that introduced other requirements on the timing of the project implementation with respect to the proposal presentation, with the aim to further improve the materiality. Nevertheless, the materiality has been improved over the years thanks to such changes, but at the same time some projects have been given up for the difficulty to stick to the rules.

A second issue is linked to over incentivizing. In a market scheme that incentivises the saved toe irrespective of the project, it is expected that some technological solutions are particularly stimulated (i.e. short pay-back time interventions), whereas others remain slightly moved (i.e. long pay-back time measures). Among the specimen of the first group it is possible to identify solutions that are over incentivised, i.e. get more money than requested to promote the investment (Di Santo et al. 2014b). Due to the Italian focus on the industrial sector, however, over incentivizing is not desirable, to reduce the risk of violating the EU state aids regulation. To ensure this, three actions have been implemented over the years through the change of the guidelines: the exclusion from the scheme of short pay-back time measures, the request of the investment cost for MPPs to verify the potential impact of WhC on it¹⁹, stricter rules on additionality. Also in this case the solution of one issue has created a negative impact on the capacity of the market to produce eligible projects. For example, the choice in the new guidelines to exclude heat recovery in industrial process applies both to projects that effectively don't need any support and to projects that are not implemented without it. Due to the difficulty of managing the life cycle cost (LCC) of projects and to the change of the WhC price over time, the option of making an analysis project by project has not been considered suitable.

Beyond energy savings

Over 25.6 million additional toe of cumulated additional energy savings, around 2 million additional toe and 6 million tCO₂ saved per year, a cost per additional saved toe that has been for a long time around 100 euro and a cost of avoided tCO₂ below 30 euro²⁰: these are some of the macro results of the WhC scheme. However, they are not the only outcome of the scheme.

As pointed out by Bini, D'Ambrosio, and Di Santo (2017), most evaluation focus on energy savings/GHG²¹ emissions and investments/cost associated with the analysed policy measure. That is

¹⁸ Target setting and the role of additionality are discussed by Di Santo, Biele, and De Chicchis (2018).

¹⁹ Due to the change of the WhC price over time it is not possible to determine *ex-ante* the impact of WhC on investments, but a sensitivity analysis with various price options is possible.

²⁰ For CO₂ data see Giannetti (2018).

²¹ GHG emissions: greenhouse gas emissions.

reasonable, since the main aim of energy efficiency policies is to promote investments in energy efficiency solutions and to contribute the art. 7 EED targets. However, other effects are equally important, and sometimes desired, such as employment, qualification of market operators, development of the efficiency market, technology advancement, etc. The importance of the multiple benefits of energy efficiency should not only raise the awareness of the real contribution of energy efficiency to competitiveness and well-being, but also stimulate policy makers in trying to understand how their energy efficiency policies produced important side effects.

For example, GSE estimates around 11,000 full time (Giannetti 2018) equivalent direct and indirect jobs created by the WhC scheme. Due to the important role envisaged and effectively played by ESCOs in the scheme, presently around 890 ESCOs certified according to the Italian UNI CEI 11352 standard are on the market. Moreover, the scheme allowed to spread the know-how of industrial energy efficiency good practices among ESCOs, energy managers, and energy management experts, creating the condition to accelerate the diffusion of energy efficiency solutions in a sector that has always suffered of a lack of diffused know-how on the available opportunities. This, combined with the diffusion of energy management systems (ISO 50001), can effectively facilitate a better integration between the core business of industries and a more efficient energy use.

No comprehensive information is available on the investments made to implement the energy efficiency projects, even if in the recent years such data have been requested for all MPPs. Nevertheless, GSE estimates investment slightly below 1 billion euros and an added value around 0.7 billion euros (Giannetti 2018).

Conclusion

The Italian scheme faced in twelve years of activity many issues. Evaluation was fundamental to uncover them and allow to find more or less efficient solutions. While addressing some of these issues, others were unexpectedly created. This confirms that evaluation has to be based on a continuous and effective monitoring and has to be aimed at the continuous improvement of the analysed policy, at least for large and durable schemes.

The scheme has succeeded in producing interesting results in terms of capability to reach important targets, covering a wide variety of sectors and technologies, and in spreading the know-how of industrial energy efficiency solutions among ESCOs and practitioners. The consistent and large set of data collected and organised within the scheme's projects' database provided a lot of valuable information and allowed to better understand technological developments and trend, especially in the industrial sector. Information collected by the WhC scheme has also been used to populate the EIEEP platform created under the EU-MERCI project²², which lists the available best practices and good practices for the main industrial sectors. In that case the Italian schemes showed a much more large set of available data as compared with the other schemes covered by the project. This emphasises the importance of having a robust set of data collected through incentive schemes.

One aspect highlighted by evaluation was the need of a certain degree of complexity. Simple procedures unfortunately expose such schemes to the risk of frauds, with the involvement of criminal organisations even at international level. The adoption of procedures for energy savings assessment based on metered savings both improves the quality of the collected data, ensures more reliable statistics, and reduces the risk of misbehaviours.

An important issue is related to additionality. Having it directly included in the scheme made the presentation and evaluation of projects more complex, but also allowed to understand additionality much better than in other schemes in which it is evaluated *ex-post* (e.g. as for tax reductions and the heat

²² EU-MERCI website: www.eumerci.eu. EIEEP platform website: www.eumerci-portal.eu.

account scheme in Italy). A discussion at EU level on the procedures and options to evaluate the additionality should be promoted, both to provide tools to policy makers and evaluators and to spread some common approach among the MSs. Some perplexity remains in the choice of additional savings to define the mandatory target of the existing EED and of the new proposal, as Di Santo, Biele, and De Chicchis (2018) pointed out. More flexibility should be granted to MSs to find out cost-effective schemes and approaches to reach their targets.

Many changes to the previous rules introduced by the new guidelines in 2017 have improved even further the reliability of the energy efficiency projects presented under the WhC scheme and of the assessed savings, besides reducing the risk of frauds. Unfortunately, such approach also determined a growing difficulty in presenting new projects, a critical aspect in a period characterised by an important undersupply due to the previous rules and high certificates prices. As recent evaluation suggested, some further changes are thus needed and, hopefully, they will go beyond the easy route, i.e. a reduction of the targets, and try to find a new equilibrium capable of stimulating new energy efficiency projects, not only in the industrial sector.

References

- Bertoldi, P., and S. Rezessy. 2006. "Tradable certificates for energy savings (white certificates) - theory and practice." *European Commission Joint Research Centre, Institute for Environment and Sustainability*. EC.
- Bertoldi, P., L. Castellazzi, N. Artemis Spyridaki, V. Oikonomou, N. Renders, I. Moorkens, and T. Fawcett. 2015. "How is article 7 of the Energy Efficiency Directive being implemented? An analysis of national energy efficiency obligation schemes", *ECEEE Summer Study - First Fuel Now*. ECEEE.
- Bini, V., S. D'Ambrosio, and D. Di Santo. 2017. "Report on the interviews to the key stakeholders and the first EPATEE survey". *Synthesis Report*. EPATEE.
- Di Santo, D., D. Forni, V. Venturini, and E. Biele. 2011. "The White Certificate scheme: the Italian experience and proposals for improvement". *ECEEE Summer Study - Energy efficiency first: The foundation of a low-carbon society*. ECEEE.
- Di Santo, D., D. Forni, and E. Biele. 2012. "White certificate for the industrial sector". *ECEEE Summer Study - Industry: A third of Europe's energy use*. ECEEE.
- Di Santo, D., G. Tomassetti, E. Biele, and S. D'Ambrosio. 2014a. "Italian white certificates scheme: the shift toward industry". *ECEEE Summer Study - Retool for a competitive and sustainable industry*. ECEEE.
- Di Santo, D., G. Tomassetti, E. Biele, and S. D'Ambrosio. 2014b. "White certificates in industry: the Italian experience". *IEPPEC conference in Berlin*. IEPPEC.
- Di Santo, D., E. Biele, and D. Forni. 2016. "White certificates as a tool to promote energy efficiency in industry", *ECEEE 2016 summer study*. ECEEE.
- Di Santo, D., and E. Biele. 2017. "EPATEE case study - ITALY: white certificates". *EPATEE case studies*. EPATEE.
- Di Santo, D., E. Biele, and L. De Chicchis. 2018. "White certificates as a tool to promote energy efficiency in industry". *ECEEE summer study – Leading the low-carbon transition*. ECEEE.

- Eyre, N., M. Pavan, and L. Bodineau. 2009. Energy company obligations to save energy in Italy, the UK and France: what have we learnt?. *ECEEE Summer Study - Act! Innovate! Deliver! Reducing energy demand sustainably*. ECEEE.
- Giannetti, D. 2018. "Evaluation of Energy Efficiency policies in Italy". *1st EPATEE peer-learning workshop in Paris*. EPATEE.
- Labanca, N, and P. Bertoldi. 2016. "Energy Savings Calculation Methods under Article 7 of the Energy Efficiency Directive". *EUR 27663 EN*. doi 10.2790/855880.
- Rosenow, J., D. Forster, B. Kampman, C. Leguijt, Z. Pato, A. Kaar, and N. Eyre. 2015. "Study evaluating the national policy measures and methodologies to implement Article 7 of the Energy Efficiency Directive". *ED59360 - Issue Number 2*. Ricardo-AEA.
- Stede, J. 2017. "Bridging the industrial energy efficiency gap - Assessing the evidence from the Italian white certificate scheme". *Energy Policy* 104. 112-123.
- Various authors. 2012. "Best Practices in Designing and Implementing Energy Efficiency Obligation Schemes". *Research Report Task XXII of the International Energy Agency Demand Side Management Programme*. IEA DSM.
- Various authors. 2013. "White certificates". *CEN/CLC/TR 16567*. CEN.
- Various authors. 2015. "Energy saving policies and energy efficiency obligation scheme". *D2.1.1: Report on existing and planned EEOs in the EU – Part I: Evaluation of existing schemes*. ENSPOL project.
- Various authors. 2017. "Snapshot of Energy Efficiency Obligations schemes in Europe: 2017 update". *Fourth European Workshop Meeting of the White Certificates Club*. ATEE.
- Various authors. 2018. "Rapporto Annuale sul meccanismo dei Certificati Bianchi". *Annual report on white certificates*. GSE.

Links of institutions related to white certificates in Italy:

MiSE, Ministry of Economic Development, www.sviluppoeconomico.gov.it

ARERA, Regulatory Authority for Energy, Grids, and Environment, www.autorita.energia.it

GSE, Italian energy services operator, www.gse.it

ENEA, Italian Agency for new technologies, energy and environment, www.enea.it

GME, Italian energy market operator, www.mercatoelettrico.org

RSE, Energy System Research center, www.rse-web.it