

# Italian Energy Efficiency White Certificate Scheme

Rethinking Decarbonisation Incentives – Policy Case  
Studies

**CATAPULT**  
Energy Systems

energy  
technologies  
institute

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# Italian Energy Efficiency White Certificate Scheme

This case study has been developed for the UK's Energy Systems Catapult under the *Rethinking Decarbonisation Incentives project*, aiming to draw lessons from international experience of policies to improve the framework of economic drivers for decarbonisation in the UK.

Successful climate change mitigation will require major investment in energy efficiency across all sectors of the economy. Energy efficiency trading systems (known as white certificate systems) are a powerful market based approach to creating the investment signal to meet energy efficiency targets at the lowest cost. They are most common in the residential sector but can include commercial settings too.

However, with such policies denominated in energy savings, not carbon, and often sitting alongside carbon pricing systems, energy efficiency trading challenges the notion that decarbonisation could be achieved through a single price incentive across all abatement measures. Indeed, with important co-benefits in terms of improved public health and reduced fuel poverty, these policies can provide strong examples of why a differential equivalent carbon price can be justified.

This case study examines the white certificate system in Italy, known as the *Titoli di Efficienza Energetica* (TEE) to draw lessons on whether and how consistent decarbonisation investment signals can be established with energy efficiency policies sitting alongside carbon pricing.

## Key findings

- The white certificate system in Italy has delivered substantial savings in electricity and heat use across many sectors. The primary energy savings certified in 2017 amounted to about 1.92 Mtoe, of which more than 55% was achieved through the reduction of natural gas consumption and 26% from savings in electricity consumption.
- In Italy a higher level of incentive was necessary to deliver target energy efficiency savings in industry than in the residential sector. The system initially focused on residential sector savings that were achieved under a price cap, but once extended to the industrial sector the cap was removed and higher market prices were realised. Energy savings in the industrial sector were also awarded a higher number of certificates, to create a stronger incentive than that experienced by other sectors.
- Where energy efficiency incentive systems overlap, a more consistent incentive can be achieved by excluding technologies that would otherwise receive a double incentive. Over the years the Italian system went through three major reviews aimed to harmonise the regulatory framework, during these reviews project types subject to other incentive measures were excluded, to try to create a fairer incentive landscape.
- In Italy the carbon price incentive provided by the EU ETS was insufficient to meet energy savings targets (especially in the industrial sector) and had to be complemented by this energy efficiency scheme.

“Thanks to the Energy Efficiency Certificates (TEE), an innovative and pioneering system, we have achieved from 2005 to 2013 annual energy savings of 5Mtoe/year and incentivised more than €22 billion investments in energy efficiency.”

Federico Testa, ENEA General Director  
Rapporto annuale efficienza energetica 2015



## Abbreviations

<b>CFL</b>	Compact fluorescent lamp
<b>EU ETS</b>	European Union Emissions Trading System
<b>GME</b>	Gestore Mercati Energetici (Market trading)
<b>GSE</b>	Gestore Servizi Energetici
<b>TEE</b>	Titoli di Efficienza Energetica (i.e. Energy Efficiency Certificates)

## Nomenclature

<b>tCO<sub>2</sub></b>	Tonnes of carbon dioxide
<b>toe</b>	Tonnes of oil equivalent

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## Policy overview

### Policy narrative

Italy has operated an energy efficiency (or “white certificates”) system since 2005. Developed in response to requirements under European Directives, the Titoli di Efficienza Energetica (TEE) (i.e. Energy Efficiency Certificates) system establishes a market based incentive signal for certain energy efficiency interventions. This is a complex mechanism that provides for "obligations" for distributors of electricity and natural gas, combined with "benefits" offered to parties that implement measures to reduce final energy use.

The TEE involves the creation of certificates to represent energy savings made. It sets an annual energy savings target which is distributed across the energy suppliers. These suppliers can comply with their targets by either acquiring certificates on the traded market or by implementing energy efficiency intervention schemes themselves, in any energy consuming sector. The architecture of the system is shown in Figure 1.

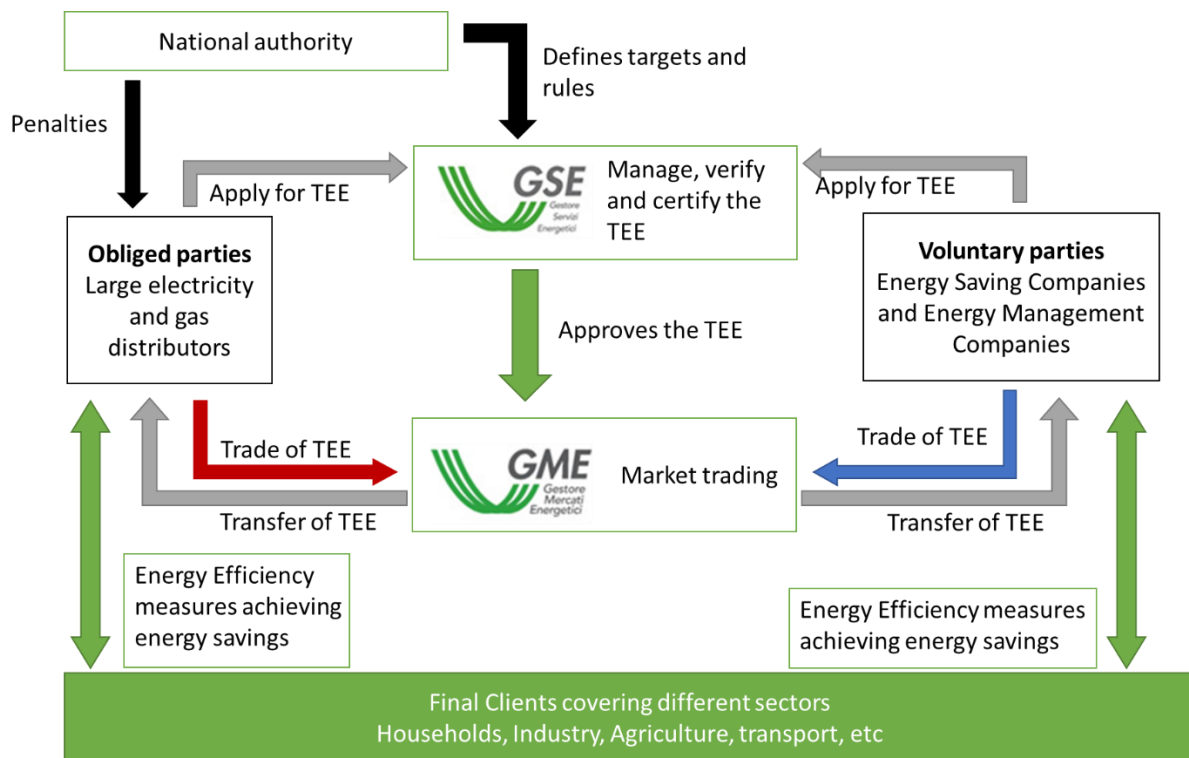


Figure 1: Actors involved in the Italian “Titoli di Efficienza Energetica” scheme

### Coverage, obligated entities and eligibility

There are two main actors in the Italian TEE scheme (Figure 1)

- **The beneficiaries (or final clients):** those who carry out energy efficiency measures (certain and measurable). An amount of TEE is issued equal to the energy savings achieved.
- **Obligated parties** are the major distributors<sup>1</sup> of electricity and natural gas who are required (by law) to achieve specified energy savings. There are 14 electricity and 62 natural gas distributors obligated to meet energy saving targets. The main actor is ENEL whose obligation is more than half of the total target. Within the gas sector three companies account for more than 40% of the gas sector target.

<sup>1</sup>Obligated parties must have more than 50,000 end-users connected to their grid.

Obligated parties can directly perform energy efficiency interventions with their customers, obtaining the corresponding TEE or, they can buy TEE in quantities corresponding to the unachieved savings.

In addition to the obligated parties, some types of intermediate operators able to "manage" sufficient amounts of final consumption and therefore to organise energy saving measures on a sufficient scale can also be beneficiaries and obtain TEE. Since these subjects are not obligated parties, they will sell their TEE to the obligated parties who do not reach their quota. It should be noted that a cash contribution is received by the obligated parties to partially cover the costs incurred for the implementation of energy efficiency measures or for the purchase of TEE.

Figure 2 shows the total emissions in Italy in 2014 (note that net land-use change and forestry emissions are excluded). Since the start of the TEE mechanism, in the period 2006-2017, total primary energy savings of 25.7 Mtoe have been achieved (i.e. 66.8MtCO<sub>2e</sub>). In 2014 the scheme delivered 2,600 ktoe of saving, equivalent to approximately 6.7MtCO<sub>2e</sub>, i.e. equivalent at 1.7% of the total country emissions in that year.

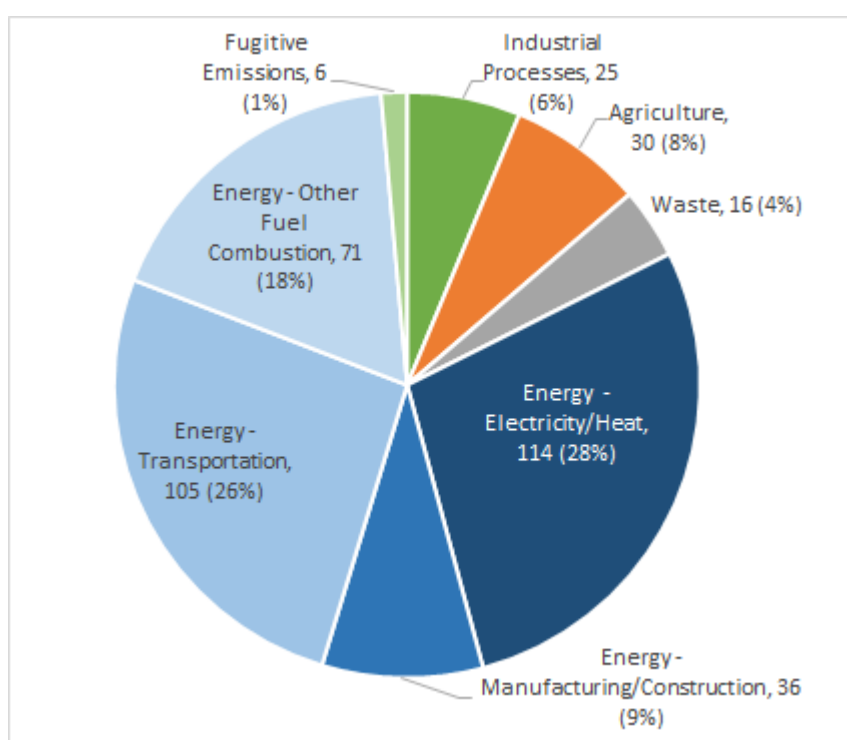


Figure 2: Total GHG emissions in Italy 2014 (MtCO<sub>2e</sub>)<sup>2</sup>

### Mechanism and economic incentive

White certificate schemes are a policy instrument aimed at accelerating the diffusion of energy efficient technologies, e.g. lighting, heating, insulation and energy management. They are characterised by three main components: (i) an obligation is placed on energy companies (hereafter "the obligated parties") to achieve a quantified target of energy savings; (ii) energy savings are certified using standardised calculations that minimise transaction costs; (iii) certified energy savings can be traded to allow obligated parties to fulfil their target. The price signal is mainly driven by the cost of the certificates, which, in the Italian scheme, is not controlled by the Government, but simply left to market forces.

### Compliance

Obligated parties receive yearly energy savings targets set at by the national government, which they must meet by carrying out savings or purchasing TEEs. The penalty for not meeting the obligation is

<sup>2</sup> Based on data from CAIT Climate Data Explorer. 2017. Washington, DC: World Resources Institute. Available online at: <http://cait.wri.org>

25,000 to 155 million EUR assessed on a case-by-case basis. However, there is a one year grace period before the penalty is issued provided that at least 60% of the obligation has been met. The penalty does not cancel the obligation to meet the target. Banking of certificates is allowed within the scheme and certificates can be carried over through regulatory periods without restrictions<sup>3</sup> (Pavan 2008).

### Institutional set-up

The institutional set up is represented in Figure 1 above. The Ministry of Economic Development, in agreement with the Ministry for the Environment and Protection of the Territory and the Sea has the task of setting the annual saving targets and to define and update the regulatory framework, as well as update the Guidelines. The Italian Authority for Electricity and Gas managed the scheme until 2012 when it was moved to the Gestore Servizi Energetici. The assistance of the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), certifies the delivered energy savings. The market is managed by Gestore Mercati Energetici (GME) that also manages the Italian Power Exchange, IPEX.

### Effectiveness and cost effectiveness

Recently, the regulatory framework has been modified and 2017 was a record year for both TEE prices and volumes. In 2017 approximately 5.8 million TEE were certified, equivalent to approximately 1.92 Mtoe of annual savings, which was an increase of 5.3% compared to 2016. At the same time, the average price, has increased to €267/TEE, i.e. an increase of 81% compared to the previous year. This increase in price, which in February 2018 was over €427/TEE will impact on the cost effectiveness of the scheme both for obliged parties and for the National Authorities.<sup>4</sup>

## Economic incentive

**This section examines the creation of the economic incentive within the TEE system.** The TEE system is an incentive mechanism based on a mandatory primary energy saving obligation for electricity and natural gas distributors with more than 50,000 end customers. Mandatory savings targets that distributors must achieve through the implementation of energy efficiency measures are set for each year and are calculated based on the market share own by each company.

The obliged parties can fulfil the savings obligation either by directly perform energy efficiency interventions with their customers, obtaining the corresponding TEE or, they can buy TEE equivalent to the unachieved savings from other distributors, certified energy saving companies or public or private end users who have received certificates.

One certificate is equivalent to one ton of oil equivalent (toe) and its monetary value was originally capped at €100/toe, a value that was subject to change depending on the performance of the energy market, controlled by the Gestore Mercati Energetici (GME). In general, a toe is equal to 5,300kWh of electricity and 11,700kWh<sub>th</sub> or about 1200 m<sup>3</sup> of natural gas<sup>5</sup>. In terms of emissions, a toe is roughly equivalent to 2.6 tCO<sub>2</sub>e<sup>6</sup>.

In summary, the system is characterised by elements which are regulated directly by the Government (i.e. targets and obligations are set by a national legislation and regulated by specific rules), and aspects that instead rely on the market, i.e. the price of the certificates is defined by supply and demand forces:

- The state establishes the objectives of energy saving to be achieved,

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<sup>3</sup> Pavan, M. (2008). *Tradable energy efficiency certificates: the Italian experience*. Springer Science 257-266. doi:DOI 10.1007/s12053-008-9022-x.

<sup>4</sup> Gestore dei Servizi Energetici (GSE). (2017). *Rapporto Annuale Certificati Bianchi*. Accessed on 26/03/2018 from.

[https://www.gse.it/documenti\\_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto\\_annuale\\_CB\\_2017.pdf](https://www.gse.it/documenti_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto_annuale_CB_2017.pdf)

<sup>5</sup> Ede, (2017). *Certificati Bianchi: cosa sono e come ottenerli*. Accessed on 26/03/2018 from <https://www.ediliziaenergetica.it/blog/item/certificati-bianchi-cosa-sono-gli-attori-in-gioco-quanto-valgono.html>

<sup>6</sup> Nextville, (2017), *I Certificati Bianchi*. Accessed on 26/03/2018 from [http://www.nextville.it/Incentivi\\_e\\_Bandi/509/Certificati\\_Bianchi#](http://www.nextville.it/Incentivi_e_Bandi/509/Certificati_Bianchi#)

- The state establishes the benefits for the savings obtained,
- Those who are subjected to obligations, must meet energy saving targets through savings or by purchasing certificates,
- The price of the certificates is not fixed, but is established by the matching of market demand and supply.<sup>7</sup>

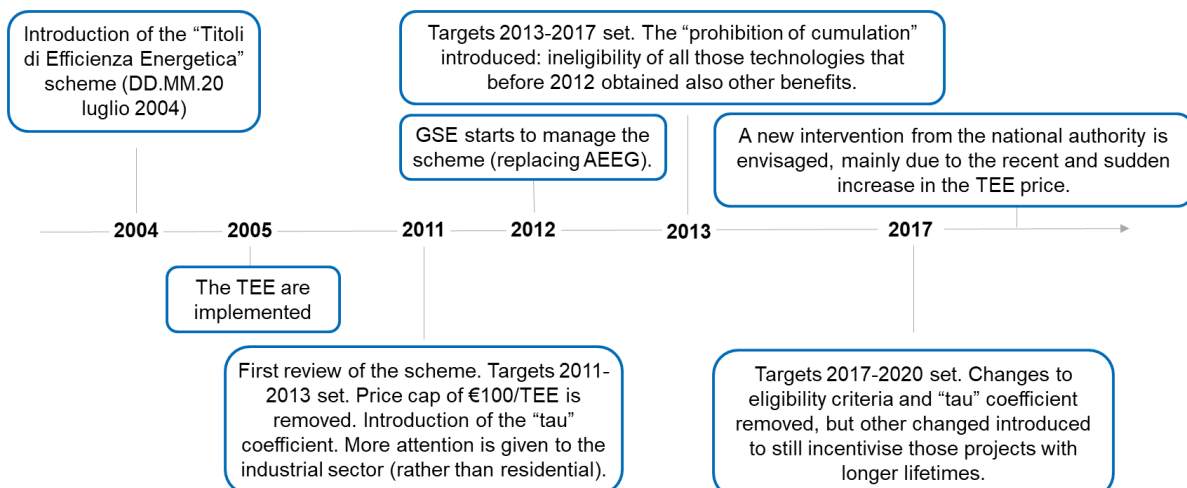
## Harmonisation of the regulatory framework

**This section describes how the TEE system has evolved and the changes that have been made to it.** Since its original implementation, the scheme has been reviewed and revised three times, mainly with the aim of harmonising it with the regulatory framework and the national plans for renewable energy and energy efficiency published by the Government within the objectives set by the Energy-Climate Package 20-20-20. A timeline is provided in Figure 3.

- The first review was in November 2011, when the Authority launched an overall review of the technical regulation of the mechanism, modifying the Guidelines. The new provisions remained in force from 1 November 2011 to 3 January 2013.

Prior to 2011 the scheme had a price cap of €100/TEE and more than 80% of the energy efficiency savings were implemented in the residential sector, mainly thanks to the implementation of compact fluorescent lamps (CFL). The mechanism did not provide any additional incentive to stimulate new investments in the industrial sector. In 2012 the attention of the market shifted to industrial applications, mainly due to the introduction of the durability coefficient "tau" that allowed up to 3.36 Energy Efficiency Certificates to be earned for each toe saved. The "tau" coefficient anticipated part of the savings achieved during the technical life of the project by concentrating them in the 5 years of the TEE incentive payment. Therefore, all the savings that will be achieved by the project, throughout its technical lifetime are rewarded and recognised under the scheme. Moreover, the €100/TEE cap was removed and the mechanism became a real lever to promote investments<sup>8</sup>. In 2012, 2013 and 2014, an average of 6 million energy efficiency certificates were issued annually, of which approximately 80% were from interventions in the industrial sector.

In addition, in 2011, another form of TEE was introduced, which applied only to high-efficiency cogeneration.



**Figure 3: Italian white certificate scheme timeline.**

<sup>7</sup> [http://www.nextville.it/Incentivi\\_e\\_Bandi/509/Certificati\\_Bianchi#](http://www.nextville.it/Incentivi_e_Bandi/509/Certificati_Bianchi#)

<sup>8</sup> Qualenergia.it. (2017) *Prezzo die TEE alle stelle: "effetto Governo e GSE"* Accessed on 26/03/2018 from <http://www.qualenergia.it/articoli/20170316-prezzo-dei-tee-alle-stelle-effetto-governo-e-gse>

- The second review was in January 2013, when the energy saving targets were defined for electricity and gas distribution companies for the years 2013-2016 and a further revision of the mechanism was implemented.

In particular, in 2013 the “prohibition of cumulation” was introduced, which effectively posed an ineligibility from the mechanism for all those technologies that before 2012 obtained other benefits, such as the tax deduction at 50% or 65% available through other national mechanisms. Therefore, solar thermal, photovoltaic, building insulation, replacement of door and window frames, condensing boilers, high efficiency heat pumps and high efficiency light bulbs were not eligible anymore if they were also obtaining the tax deduction incentives. These applications, before the change introduced, represented over 70% of the energy efficiency certificates generated. From 2013 the general preference of end users has been the simplest and most accessible tax deduction. Whilst not constituting a deliberate carbon price alignment, this policy change sought to standardise, to a degree, the level of investment incentive provided by government policies.

- Finally, the third revision was in April 2017, which defined the energy savings targets for the years 2017-2020<sup>9</sup>. The most important change is the abolition of the durability coefficient “tau” which provided an incentive for projects with long technical life particularly in the industrial sector. However, the minimum thresholds for eligibility of a project are lowered considerably (from 20 toe/year to 5toe/year) and the duration of the incentive payment was changed to between 7 and 10 years (compared to 5 to 8)<sup>10</sup>.

Following the recent revision in 2017, a new intervention from the national authority is already envisaged, this is mainly due to the recent and sudden increase in the TEE price. The prices of white certificates increased from just over €100 to €350 from late 2016 to November 2017 and there are several reasons that could have contributed to such a price increase.

First, it should be noted that the expenses incurred by the obliged parties are largely covered by a tariff contribution, financed through specific components of the electricity and gas tariffs. This contribution is linked to an average price of the TEE in the previous year. Therefore, if the price of the certificates doubles, so will the contribution and the cost of the scheme for the National Authority. In addition, this funding mechanism it is one of the reasons behind the observed increase in price, since the reimbursement method does not offer a strong disincentive to the purchase of TEE at increasing prices.

Secondly, the Italian system is characterised by a short market where the supply of TEE was just slightly higher than the demand represented by the minimum targets of the obliged parties. The “tau” coefficient introduced in 2011 reduced the short market, as more certificates than actual savings were then available. However, recent changes in the rules, particularly the removal of the “tau” coefficient and an increase in project proposal rejection rates (some retrospective) has pushed up prices. The rejection rates issue in particular highlights a lack of understanding of the rules by operators, a scheme which is too complex and an overall uncertainty which have probably impacted on the price of the certificates.

Such an increase in costs is hardly sustainable, will impact on all the parties involved, and will eventually be passed-through not only to industry but also households. In addition, this increase in cost is not accompanied by an increase in energy savings generated, which have substantially stabilised since 2010 and which suggests that the savings implemented in the industrial sector are more expensive (Figure 4).

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<sup>9</sup> Gestore dei Servizi Energetici (GSE), (2017) *Rapporto Annuale Certificati Bianchi - Executive summary*. Accessed on 26/03/2018 from [https://www.gse.it/documenti\\_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/CB%202017\\_executive%20summary.pdf](https://www.gse.it/documenti_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/CB%202017_executive%20summary.pdf).

<sup>10</sup> Orioni, G., Cappelli, g., & Partners (2017) *Il nuovo regime dei certificati bianchi: cosa cambia?* Accessed on 26/03/2018 from [http://www.gop.it/doc\\_pubblicazioni/652\\_3j1fi3dkur\\_ita.pdf](http://www.gop.it/doc_pubblicazioni/652_3j1fi3dkur_ita.pdf)



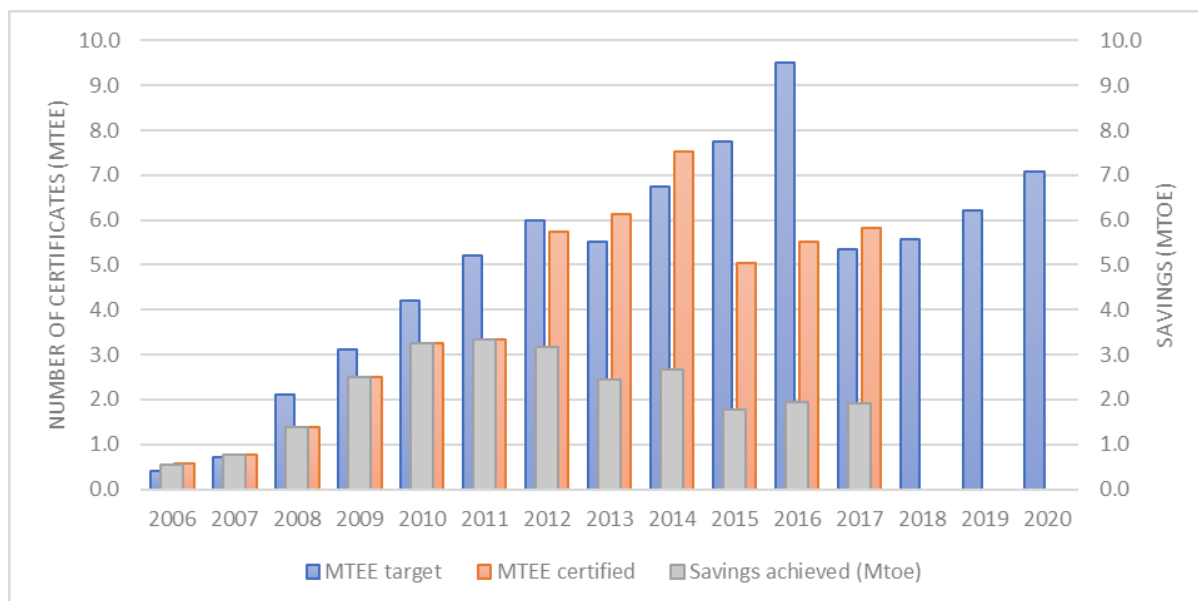


Figure 4: The graphs shows the targets in million TEE (MTEE) (blue), the certified MTEE (red) and the savings achieved in Mtoe (grey).<sup>11</sup>

This growth in price had three immediate consequences: a) parties obliged to purchase the TEEs to reach their targets will now find it much more expensive to do so, which will have an impact on cash flow, b) owners of projects approved in recent years will receive a much higher income for the sale of the certificates and, above all, c) the cost of the mechanism (for consumers) has suddenly increased<sup>12</sup>.

Due to the above, experts expect<sup>13</sup> that measures to rebalance supply and demand, and bring prices into a sustainable price range will be needed by the National Authority. In addition, a revision and simplification of the eligible process and application procedures should be introduced.

## Observed savings and level of incentive

The energy efficiency scheme is focused on technical projects leading to improved energy efficiency in the use of natural gas and electricity. Projects can come from all sectors including small-scale cogeneration and photovoltaic systems (i.e. “standard projects”). Standard projects were dominated by the household sector (e.g. 70% in 2011/2012), and mainly concern the air conditioning installations, PV installations and efficient boilers. However, in 2017 the industrial sector presented 54% of the approved “program” projects, followed by the lighting sector (30%), household (14%) and transport (2%)<sup>14</sup>.

This mixture of projects led to a verification and certification of 5,807,831 TEEs in 2017. More than 55% of TEE refer to primary energy savings achieved through the reduction of natural gas consumption, while only 26% refers to savings on electricity consumption. The primary energy savings certified in 2017 amounted to about 1.92 Mtoe, an overview of where the saving occurred is provided in Figure 5.

<sup>11</sup> Analysis based on:

Gestore Servizi Energetici (GSE) (2014) *Rapporto Annuale sul meccanismo dei Certificati Bianchi Gennaio-Dicembre 2013* Accessed on 26/03/2018 from

[https://www.gse.it/documenti\\_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/\\_RAPPORTO+ANNUALE+SUL+MECCANISMO+DEI+CERTIFICATI+BIANCHI.PDF](https://www.gse.it/documenti_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/_RAPPORTO+ANNUALE+SUL+MECCANISMO+DEI+CERTIFICATI+BIANCHI.PDF) and Gestore dei Servizi Energetici (GSE) (2017) *Rapporto Annuale Certificati Bianchi* Accessed on 26/03/2018 from [https://www.gse.it/documenti\\_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto\\_annuale\\_CB\\_2017.pdf](https://www.gse.it/documenti_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto_annuale_CB_2017.pdf).

<sup>12</sup> Santo, D. di, (2017) *Certificati bianchi: una revisione annunciata?* Accessed on 26/03/2018 from <http://www.nextville.it/approfondimenti/138>

<sup>13</sup> Santo, D.Di, (2018) *Certificati bianchi: un aggiornamento* from *Il Blog della FIRE* Accessed on 26/03/2018 from <http://blog.fire-italia.org/certificati-bianchi/>.

<sup>14</sup> Gestore dei Servizi Energetici (GSE) (2017) *Rapporto Annuale Certificati Bianchi* Accessed on 26/03/2018 from [https://www.gse.it/documenti\\_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto\\_annuale\\_CB\\_2017.pdf](https://www.gse.it/documenti_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto_annuale_CB_2017.pdf).

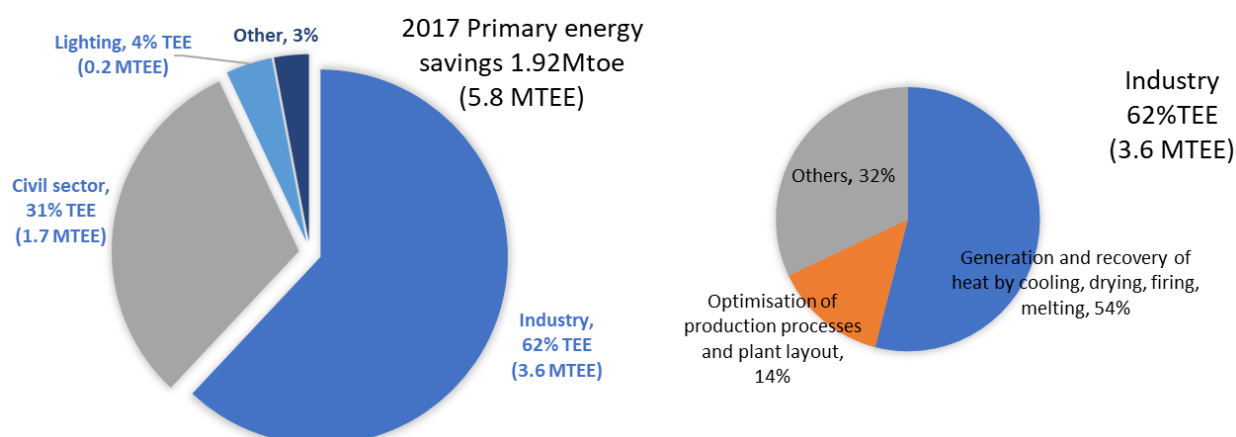


Figure 5: Savings achieved and TEE certified in 2017<sup>15</sup>.

Thus, the TEE overlaps with the EU ETS in Italy in terms of addressing end-use consumption in energy intensive industries. As explained above, most of the energy saving activities implemented in the industrial sector refer to generation and recovery of heat, therefore, by increasing the heat generation and consumption the TEE system induces a decrease in primary energy demand and associated greenhouse gas emissions. This implies, for example, that TEEs can lower costs due to the EU ETS, therefore providing an overlapping incentive<sup>16</sup>.

In terms of price signal, the scheme is defined and developed around energy efficiency and energy savings targets expressed as toe. However, considering that a toe is roughly equivalent to 2.6 tCO<sub>2e</sub> the equivalent carbon price signal can be calculated, as in Table 1. The initial price of €100/TEE compares to around €38/tCO<sub>2e</sub>, which is higher than the price of carbon under the EU ETS of €25/tCO<sub>2e</sub> in 2008 and around €15/tCO<sub>2e</sub> until mid-2011<sup>17</sup>. However, as mentioned above, the price of €100/TEE was not received as a high enough incentive by the industry sector and the authority has implemented, in 2013, a coefficient that allows projects which are implemented in the industrial sector, to receive 3.6 TEE for each certified saving. In other terms, providing a price signal which is more than three time higher than the one received by other sectors.

Table 1: Carbon price signal based on price on one TEE

Date	Value €/TEE	Value €/tCO <sub>2e</sub>
2013 - 2015	100	38
Nov 2017	350	135
Feb 2018	427	164

The Italian TEE incentivises cogeneration units that simultaneously generate electrical and thermal energy. A different type of white certificate was introduced in September 2011 exclusively for high-efficiency cogeneration.

As mentioned above, in 2013 the “prohibition of cumulation” was introduced, with which the Italian Government aims to avoid the same project obtaining more than one incentive. Therefore, projects

<sup>15</sup> Analysis based on Gestore dei Servizi Energetici (GSE) (2017) Rapporto Annuale Certificati Bianchi Accessed on 26/03/2018 from [https://www.gse.it/documenti\\_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto\\_annuale\\_CB\\_2017.pdf](https://www.gse.it/documenti_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto_annuale_CB_2017.pdf).

<sup>16</sup> EuroWhiteCert. (2007) *Certificati bianchi: il concetto e le esperienze* Accessed on 26/03/2018 from [http://www.ewc.polimi.it/documents/EWC\\_Brochure\\_IT.pdf](http://www.ewc.polimi.it/documents/EWC_Brochure_IT.pdf)

<sup>17</sup> Scott, A (2013) *EU Carbon Emissions Trading Scheme In Freefall*. In Volume 91 Issue 7, 16-20. Chemical & Engineering News. Accessed on 26/03/2018 from <https://cen.acs.org/articles/91/i7/EU-Carbon-Emissions-Trading-Scheme.html>.

concerning solar photovoltaic would not be eligible if they also obtain tax deduction incentives (a threshold of 20kW is set for eligibility under the TEE scheme).

### Role of national authorities

The roles of the various actors involved in the scheme has changed over time. The scheme has been characterised by elements which are regulated directly by the Government (i.e. targets and obligations are set by a national legislation and regulated by specific rules), and aspects that are instead relying on the market, i.e. the price of the certificates. The responsibilities for the subjects involved are currently defined as follows:

- The Ministry of Economic Development, in agreement with the Ministry for the Environment and Protection of the Territory and the Sea has the task of setting the annual saving targets and to define and update the regulatory framework, as well as update the Guidelines;
- The Authority defines the operating procedures and rules of the mechanism and informs the competent Ministries and the Gestore Servizi Energetici (GSE) of the amount of electricity and natural gas distributed on the national territory by the obliged parties, their respective quotas and applies the penalties;
- The GSE is responsible for the management, evaluation and certification of savings related to energy efficiency projects;
- The National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) provides technical support to GSE in order to evaluate the energy savings and economic benefit of possible projects;
- The Gestore Mercato Energetico (GME) is responsible for managing the energy efficiency certificates market.

### Key findings

The above analysis illustrates important lessons on market based mechanisms that aims to incentivise energy efficiency across a variety of sectors spanning from domestic, industrial, agriculture and transport.

**White certificate systems can deliver substantial energy savings in electricity use and heat production throughout different sectors.** The primary energy savings certified in 2017 amounted to about 1.92 Mtoe. While initially the scheme incentivised savings in the electricity sector, mainly due to the large deployment in CFL lights, in 2017 more than 55% of TEE refers to primary energy savings achieved through the reduction of natural gas consumption, while 26% refers to savings on electricity consumption.

**In Italy, a higher level of incentive was necessary to deliver target energy efficiency savings in industry than in the residential sector.** The system initially focused on residential sector savings that were achieved under a price cap of €100/TEE until 2013 simple and cost-effective CFLs deployments were carried out. However, the cap was considered too low to incentivise energy efficient projects within the industrial sector. Therefore, once the system was extended to the industrial sector, the cap was removed and higher market prices were realised, reaching €427/TEE in February 2018. This probably reflects the fact that implementation of energy efficient projects in non-residential sector can be more expensive and less “standard”, reflecting the fundamentals of the costs of energy efficiency interventions. In addition, energy savings in the industrial sector were awarded a higher number of certificates, to create a stronger incentive than that experienced by other sectors. A “tau” coefficient allowed savings in the industrial sector to receive 3.36 TEE per toe saved, which stimulated investment in the sector. In 2017 62% of the certified TEEs refer to energy efficiency projects carried out in the industrial sector.

**Where energy efficiency incentive systems overlap, a more consistent incentive can be achieved by excluding technologies that would otherwise receive a double incentive.** The Italian TEE scheme provides incentives to deploy energy efficient projects via an obligation imposed on large electricity and gas distributors and the possibility to receive income from certificate trading for voluntary parties. Energy efficiency support mechanisms, if concerning the industrial sector, inherently overlap with the EU ETS, however, the EU ETS affects the price for carbon for electricity generation therefore providing a different price signal. Moreover, when initially developed, mainly incentivised “standard projects” in the household sector e.g. air conditioning installations, PV installations and efficient boilers and only in recent years the industrial sector has received higher attention. Therefore, the scheme did not consider alignments and interactions with the EU ETS, however, this topic might become more relevant in the future. On the other hand, over the years the Italian system went through three major reviews aimed to harmonise the national regulatory framework and during these reviews project types subject to other incentive measures were excluded, to try to create a fairer incentive landscape.

**In Italy the carbon price incentive was insufficient to meet energy savings targets especially in the industrial sector.** In Italy the incentive levels to meet energy efficiency targets for the industrial sector were substantially higher than those the sector experiences under the EU ETS. The TEE certificate price in February 2018 was approximately equivalent to €160/tCO<sub>2</sub>, compared with EU ETS prices which have been less than €15/tCO<sub>2</sub> in recent years and rarely above €30/tCO<sub>2</sub> even at times where significant emissions abatement was envisaged to be required.

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