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Ministry of Economic Development

DEPARTMENT FOR ENERGY

Directorate-General for Nuclear Energy, Renewable Energies and Energy Efficiency

Application of Article 7 of Directive 2012/27/EU on energy efficiency obligation schemes

Notification of methodology

4 December 2013

Contents

1. Introduction

The conclusions of the European Council of 17 June 2010 confirmed that the promotion of energy efficiency is among the policy priorities of the Union's new strategy for smart, sustainable and inclusive growth ("Europe 2020 strategy"). In the framework of this process, and in order to implement this objective at national level, Member States are required to set their national targets in agreement with the Commission and to indicate in their respective national reform programmes how they intend to achieve them.

The conclusions of the European Council of 4 February 2011 highlighted the need to increase energy efficiency in the Union in order to deliver the 20% energy efficiency target compared to projections by the year 2020. Projections performed in 2007 indicated a primary energy consumption in Europe in 2020 of 1 842 Mtoe. A 20% reduction corresponds to a consumption of 1 474 Mtoe in 2020, i.e. a reduction of 368 Mtoe with respect to projections.

Some of the fundamental means to achieve the necessary energy savings are obligation schemes, covered by Article 7 of Directive 2012/27/EU on energy efficiency (hereinafter EED).

This document, as provided for by Article 7(9) EED, sets out the guidelines for the policy measures Italy plans to put in place to deliver the volume of energy savings required. These measures will be formally evaluated and implemented by approval of the Legislative Decree transposing the EED. In particular, after describing the methodology for calculating the reduction in final energy consumption to be achieved in the period 2014-2020, this report sets out the main instruments and facilities to be used and their relative contributions.

2. Calculation of the energy saving target

Pursuant to Article 7(1) EED, the energy saving target set for each Member State, to be achieved between 1 January 2014 and 31 December 2020 shall be equivalent to savings of 1.5% of mean final energy sales each year in 2010, 2011 and 2012.

2.1 Statistical data underpinning the calculation

The first step for calculating the required amount of energy saving is to determine the amount of final energy distributed in the years 2010, 2011 and 2012 at national level. The Commission's guidelines on transposition of the EED suggest to this end use of the statistical data collected by Eurostat. As no Eurostat data are available as yet for the year 2012, for this year the National Energy Balance was provisionally taken as reference[1]. Transport fuels are excluded from the volume of final energy sales, as allowed by Article 7(1) of the EED. Table 1 sets out the statistical data for Italy.

Table 1 - Final energy distributed and average over the three-year period 2010-2012 (data in Mtoe)

[1] The National Energy Balance is an annual publication used as a data source by many energy sector studies. It is produced from the data collected by the Ministry on domestic productions of the oil and coal sectors, and by the gathering of data on electricity and natural gas from the other operators included in the national statistics circuit SISTAN.

	2010 (*)	2011 (*)	2012 (**)
Final energy consumption	124.769	122.312	119.676
Final energy consumption in the transport sector	41.957	42.042	39.132
Total taken as a basis for the calculation	82.812	80.270	80.544
Average over the three-year period 2010-2012	81.209		

Source: (*) Eurostat data;

(**) Data from National Energy Balance 2012.

2.2 Calculation of the savings to be achieved in the period 2014-2020

Based on the average final energy sales over the three-year period 2010-2012 the 1.5% annual savings to be achieved over the period 2014-2020 can be calculated, and hence the cumulative energy required by 31 December 2020. These values are shown in Table 2.

Table 2 - Savings to be achieved over the period 2014-2020 (data in Mtoe)

Average over the three-year period 2010-2012		81.209							
Year	Annual savings	Annual energy savings							TOTAL annual savings
2014	1.5%	1.218							1.218
2015	1.5%	1.218	1.218						2.436
2016	1.5%	1.218	1.218	1.218					3.654
2017	1.5%	1.218	1.218	1.218	1.218				4.872
2018	1.5%	1.218	1.218	1.218	1.218	1.218			6.090
2019	1.5%	1.218	1.218	1.218	1.218	1.218	1.218		7.308
2020	1.5%	1.218	1.218	1.218	1.218	1.218	1.218	1.218	8.526
TOTAL cumulative energy savings over the period 2014-2020									34.104

Hence, the total cumulative energy savings to be achieved over the period 2014-2020, pursuant to Article 7(1) of the EED, amount to 34.104 Mtoe.

2.3 Reduction in the savings target as allowed by Article 7(2)

Article 7(2) EED allows Member States to reduce their cumulative energy saving target by applying several different criteria, also jointly, up to a maximum reduction of 25% of the total cumulative savings to be achieved over the period 2014-2020. After this reduction, the required cumulative end-use energy saving target for Italy is 25.58 Mtoe.

As concerns the Italian situation, the reduction was calculated with reference to the option set out in Article 7(2)(a). This option allows Member States to calculate the annual energy saving target using values of 1% in 2014 and 2015; 1.25% in 2016 and 2017; and 1.5% in 2018, 2019 and 2020. The result, shown in Table 3, shows that by applying this option, the cumulative saving of final energy to be achieved over the period 2014-2020 is 27.002 Mtoe.

This reduction is lower than the maximum allowed reduction of 25%.

Since a number of national schemes have been in force for several years, including the white certificate obligation scheme, Italy may use early actions to bring its cumulative saving of final energy to be achieved over the period 2014-2020 to the above-mentioned required value of 25.58 Mtoe. In any case, a detailed calculation of the options offered by Article 7(2) EED which Italy will decide to use will be notified to the Commission by 5 June 2014 as required by Article 7(3) EED.

Table 3 - Savings to be achieved over the period 2014-2020 with application of Article 7(2)(a) EED (data in Mtoe)

Average over the three-year period 2010-2012		81.209							
Year	Annual saving	Annual energy savings							TOTAL annual saving
2014	1.0%	0.812							0.812
2015	1.0%	0.812	0.812						1.624
2016	1.25%	0.812	0.812	1.015					2.639
2017	1.25%	0.812	0.812	1.015	1.015				3.654
2018	1.5%	0.812	0.812	1.015	1.015	1.218			4.873
2019	1.5%	0.812	0.812	1.015	1.015	1.218	1.218		6.091
2020	1.5%	0.812	0.812	1.015	1.015	1.218	1.218	1.218	7.309
TOTAL cumulative savings over the period 2014-2020									27.00
Minimum cumulative savings to be achieved over the period 2014-2020									25.58

3. Schemes put in place to achieve energy savings

In order to deliver the minimum cumulative savings of final energy consumption to be achieved over the period 2014-2020, in the amount of 25.58 Mtoe, Italy intends to rely on the white certificate obligation scheme. This scheme is flanked by two additional energy efficiency schemes: the tax deductions and the "Thermal Account" (*Conto termico*). All the above schemes are already operational nationwide.

3.1 White certificates

White certificates, also known as "Energy efficiency securities", are tradable securities certifying the achievement of energy saving in the final uses of energy through energy efficiency measures and projects. The economic value of the certificates, which varies depending on the cost of energy and as a function of market trends, was originally set at 100 €/TEE.

The white certificates mechanism is based on the creation of an obligated market for these certificates. The obligation scheme was introduced by the legislative decrees that liberalised the electricity and the natural gas markets (Ministerial Decrees of 20 July 2004), placing Italy at the forefront in Europe and worldwide and yielding positive results over time especially in terms of cost/effectiveness. Since the launch of the mechanism, primary energy savings in excess of 20 Mtoe have been achieved.

Over the period from 1 January to 31 October 2013, the technical assessment of more than 14 000 projects was completed, and approximately 5 million white certificates were issued. In the first half of 2013, in the course of 25 market sessions, a total of 1 481 463 white certificates were traded on the market organised and managed by GME (Electricity Market Operator). Table 4 shows the market performance data in the half-year.

Table 4 - Performance of the organised market for white certificates, first half of 2013.

Number of white certificates traded on the organised market	1 481 463
Value (€)	159 232 368
Average price (€/certificate)	107.5

Italy's National Energy Strategy (*Strategia Energetica Nazionale - SEN*), approved and published in 2012, assigns to white certificates the task of covering about one third of the new energy savings to be achieved by 2020, especially within the measures for the industrial and services sectors. Accordingly, this scheme, in force for a number of years now, will be confirmed also in respect of EED targets, by actively monitoring delivery of the targets and making any changes as appropriate to maintain a balance between scheme effectiveness and efficiency, in view of the high level of savings targeted and of the fact that the EED requires a minimum growth rate of the annual savings generated.

3.1.1 Obligated parties, participating parties and implementing public authorities

The system rests on the obligation, imposed on electricity and gas distributors having more

than 50 000 end users, to generate each year a certain amount of savings or, alternatively, to purchase an equivalent amount of certificates. These parties are required to deliver, each year, a number of certificates proportionate to the energy they distribute. The sum total of all the certificates to be delivered each year constitutes the national energy saving obligation and is set in advance by the Ministry of Economic Development together with the Ministry of the Environment and Protection of Land and Sea.

The certificates are issued after energy efficiency measures are put in place and they are given not only to obligated parties, but also to ESCOs and to all those companies that have appointed an energy manager. Table 5 below lists the types and number of parties that generate white certificates.

Table 5 - Types and number of parties that generate white certificates

Types of parties that generate white certificates	Number as at 31 May 2012
Obligated electricity distributors	8
Obligated gas distributors	23
Non-obligated distributors	14
Energy service companies (ESCOs)	329
Companies with an energy manager (CEMs)	22
Overall total	396

Several authorities are involved in implementing and managing the scheme. The Ministry of Economic Development, in agreement with the Ministry of the Environment and Protection of Land and Sea, sets the annual energy saving obligations and the general rules of the scheme. GSE (Energy Services Operator) is the entity which authorises the issue of the certificates and which performs technical assessment, checks and verifications on the energy efficiency projects submitted by market players and which monitors the energy saving achieved, with support from ENEA (the Italian National Agency for new technologies, energy and sustainable economic development) and RSE (*Ricerca sul sistema energetico*). GME (Energy Market Operator) operates a market platform dedicated to certificate trading. AEEG (Regulatory Authority for Electricity and Gas) measures the economic impact of the scheme, which is funded indirectly from the electricity and gas tariffs, and sets the penalties for infringement of the rules governing the scheme or for failure to meet saving obligations.

3.1.2 Target sectors

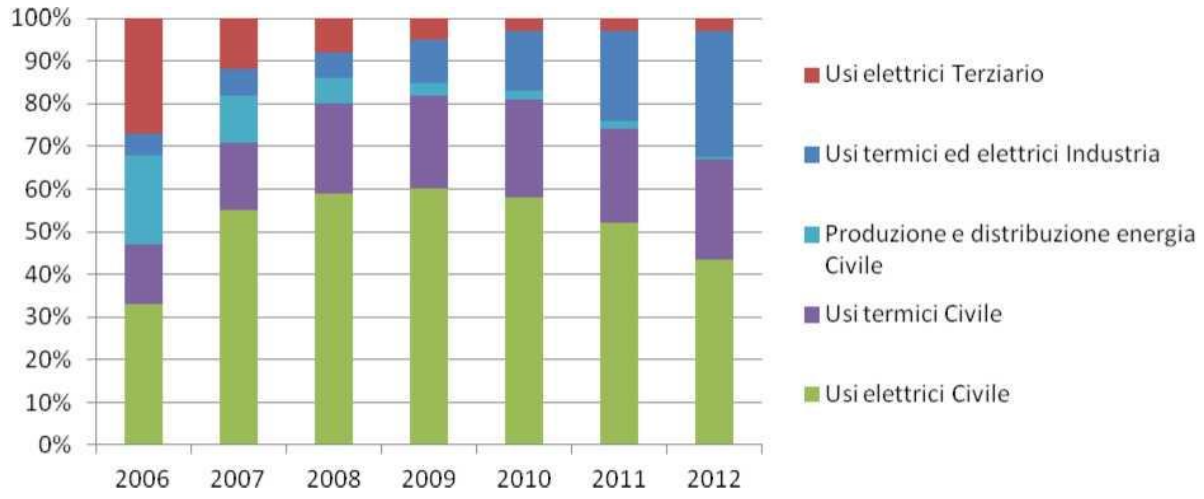
The certificates may be generated through different types of actions. The main ones are:

- electricity savings;
- natural gas savings;
- savings on other fuels (transport fuels and others).

From 2005 to the first half of 2012, monitoring data show that 60% of the savings achieved concerned electricity, 26% natural gas and 14% savings on energy other than electricity and natural gas not used as transport fuels.

These actions covered all economic sectors, including civil, industry, transport and services. Figure 1 shows the composition of the savings generated between 2005 and the first half of 2012.

Figure 1 - Evolution of certificate generation by sector



Legend:
Electrical uses by the services/commercial sector
Industrial thermal and electrical uses
..Production and distribution of civil energy
..Civil thermal uses
..Civil electrical uses

As shown by Figure 1, the share of actions in the industrial sector is gradually on the increase. This trend is partly driven by the recent regulatory changes, which have directed the scheme towards the industrial and service sectors and towards the promotion of infrastructural-type energy savings in sectors heretofore less addressed (ICTs, water supply, transport).

3.1.3 Eligible measures

Within the white certificate scheme, an "action" means a single measure to reduce primary energy consumption. Thus, each action is an elementary activity, technically complete in itself. On the other hand, a "project" is any activity or set of activities producing objective and measurable primary energy savings via the implementation, for one or more parties, of one or more actions that can be evaluated by the same method, or via the implementation, for one party, of actions that can be evaluated by different methods. The types of actions qualifying for evaluation for the purpose of obtaining certificates are currently inserted into tables, grouped by type of saving, Annex 1, Tables 1 and 2).

3.1.4 Saving calculation methodology

The methodologies for calculating the savings achievable by each project are currently designed for three types of projects.

- Standard projects

Standardised evaluation is performed with reference to technical data sheets which set out preliminarily the specific saving of the single reference physical unit (RPU). The distinctive characteristic of this method is that the savings associated with the specific action are determined exclusively with reference to the number of RPUs covered by the elementary action (for instance, the number of electrical motors or air conditioners with fresh air intake,

the number of square metres of solar panels etc.). The technical and quality standards to be complied with in executing the project are always shown in the reference technical sheet and are regularly updated to reflect regulatory evolution. This is the most immediate and simple method, as the applicant is not required to produce measurements or surveys during operation for the purpose of certifying the savings. Currently, 28 technical data sheets for standardised evaluation are available, as shown in Annex 1, Table 3 but their number is constantly growing.

- Analytical projects

For these projects, certain measured physical parameters are measured and the savings achieved are obtained analytically by means of standardised methodological sheets. In this case, the algorithm is fed by few parameters characterising the operating and energy-consumption status of the equipment covered by the action. Consequently, in order to receive the white certificates, the applicant must submit these data every year. Thus, while in the standardised method the saving certified the first year is maintained over time, with the analytical method the saving must be recalculated each year using the parameter values submitted by the applicant. The calculation algorithm is formalised after public consultation with the parties concerned. In this case too, the technical and quality standards to be complied with in executing the project are always shown in the reference technical sheet and are regularly updated to reflect regulatory evolution. Currently, 10 technical data sheets for analytical evaluation are available, as shown in Annex 1, Table 3 but their number is constantly growing.

- Projects with *ex-post* calculation

In the case of complex or large-scale projects, for which no pre-set methodologies are available, all parameters must be measured by means of an *ad hoc* measurement programme. By its very nature, this method requires a much more extensive and complex technical assessment compared to both the standardised and the analytical methods. The savings obtained are always calculated by reference to measurements of the applied technology's operating parameters. The result of the technical assessment shall also include instructions on the technical and quality standards to be met in executing the project.

The saving generated and calculated by the above methods is rewarded by the periodic issue of white certificates.

The white certificate scheme only considers additional energy savings: in other words, any energy savings which would have been achieved even without the action or project, as a consequence of technology, regulatory and market development are not counted. This exclusion is made by applying the additionality coefficient, which takes into account the effects of market dynamics and is applied to the standardised and analytical methods.

The saving generated by any given project may be declared by one party only, and cannot be counted more than once. The risk of double counting is avoided, since with effect from 1 January 2013 it is forbidden to cumulate different national incentives on the same project (including the white certificates, the tax deductions and the thermal account).

If the projects with *ex-post* calculation deliver savings in excess of 35 000 Toe per year and have a technical life-cycle in excess of 20 years - and are therefore considered to be "large-scale projects" - they can be awarded premiums via coefficients multiplying the number of certificates that may be issued. These coefficients are defined by assessing the projects' level of technological innovation and their impact in cutting CO2 emissions.

3.1.5 Lifetimes of actions

The savings generated by each action are expected to last each year for a time equal to the action's technical lifetime, minus a performance decay coefficient δ, which reduces the savings over the years, up to the end of the technical lifetime. The technical lifetime of the actions is established in advance; a list of the most frequent cases is shown in Annex 2, Table 1.

3.1.6 Monitoring, verification and audit

For some months now, GSE has been tasked with overseeing the management, evaluation and certification of the savings achieved by energy efficiency projects carried out under the white certificate scheme. GSE performs this duty with the assistance of ENEA and RSE. In the past, management of the system was handled by the Regulatory Authority for Electricity and Gas, which was also responsible for issuing Project Assessment Guidelines.

For monitoring purposes, by 31 January of each year, GSE must send to the Ministry of Economic Development, the Ministry of the Environment and Protection of Land and Sea, GME, the Authority for Electricity and Gas and the Unified Conference of the State, Regions and Local Authorities, a report on activities and on projects implemented, including their geographical location, complete with data on the savings achieved in the year (in Mtoe), the volume of certificates issued and forecasts for the subsequent year based on the projects submitted and the ratio between the cumulative volume of the certificates and the value of the national obligation, both referred to the previous year. On its part, GME submits a six-monthly report to the Ministry of Economic Development, the Ministry of the Environment and Protection of Land and Sea, GSE and the Authority for Electricity and Gas on certificate trading performance, and reports promptly to the same authorities any forms of behaviour detected in the trading transactions that do not comply with the principles of transparency and neutrality. These reports are published on the reporting entities' websites.

For the purpose of verifying compliance with national saving obligations, each year GSE checks that each obligated party holds a number of certificates corresponding to its assigned annual obligation, and informs the Ministry of Economic Development, the Ministry of the Environment and Protection of Land and Sea and the Electricity Market Operator as to the securities received and the outcome of its verifications. GSE also informs the Authority for Electricity and Gas that, where the assigned obligations are not met, it will charge penalties for each missing security, pursuant to Law No 481 of 14 November 1995, reporting to the Ministry of Economic Development, the Ministry of the Environment and Protection of Land and Sea, GSE, ENEA and the Region or Autonomous Province having territorial jurisdiction, the infringements found and the penalties applied.

GSE, assisted by ENEA, also performs the necessary checks to verify the proper technical and administrative execution of the projects that have generated savings and obtained white certificates. To this end, GSE makes spot-checks on the regular execution of the projects, their conformity with the approved project, and the completeness and regularity of the documents to be kept on file as required by the technical data sheets, including any approved changes. Site visits and inspections may be carried out at the installation site both during project implementation and throughout its lifetime, to check correct fulfilment of the obligations linked to the certificates. GSE must submit to the Ministry of Economic Development and the Ministry of the Environment and Protection of Land and Sea for approval an annual programme of checks, as well as an annual report on checks conducted

and their outcome. This programme must include on-the-spot checks for projects that generate energy savings in excess of 3 000 Toe/year. If irregularities or discrepancies are detected with respect to execution of the approved project, and are such as to affect the calculation or disbursement of the incentives, GSE will annul the certificates associated with the irregularity found and apply to the non-compliant party the penalties provided by law.

3.1.7 Evolution of the mechanism and possible weaknesses

White certificates are a successful innovation in the Italian system and since the development of compulsory regulatory standards, they have been the top-ranking scheme in terms of energy-saving potential. Since 2005 the scheme has been repeatedly fine-tuned to eliminate certain initial shortcomings. Thanks to the lessons learned, we can already identify the possible weaknesses to be kept in mind in the near future, both for national purposes and to facilitate the deployment of EU-wide obligation schemes.

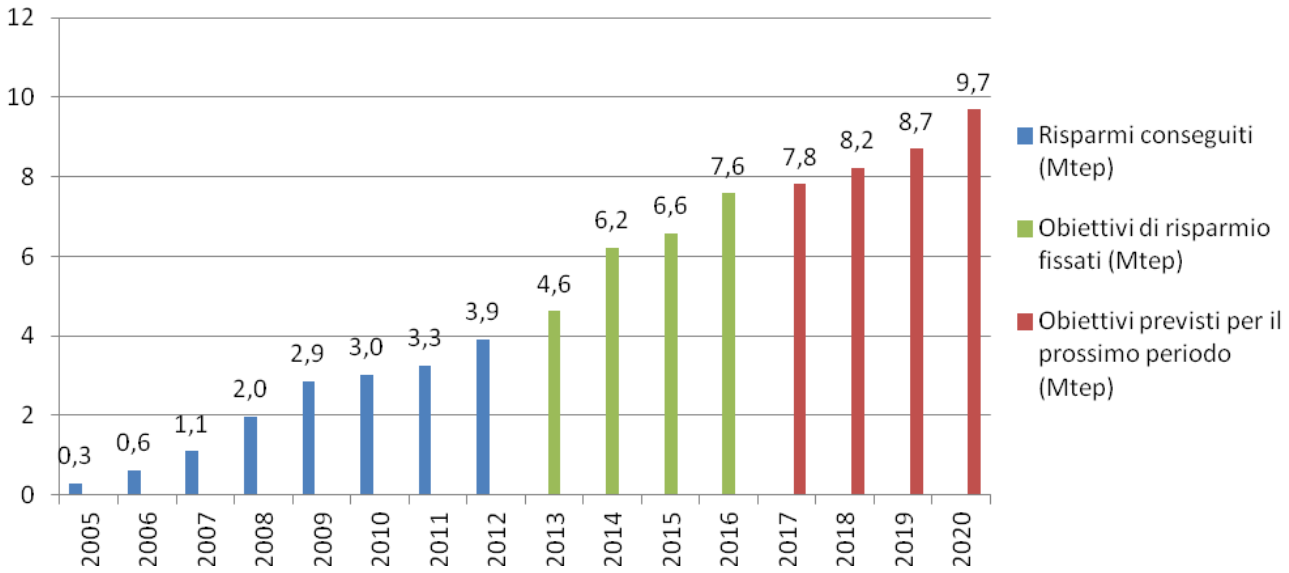
As highlighted by the chart in Figure 1, in the early years of scheme implementation most savings were concentrated in the civil and services sector, with a clear prevalence of electricity uses. After the changes introduced to the system by AEEG, recent years have witnessed a steady rise in savings in the industrial sector. On the other hand, some sectors with significant potential have still to benefit from the savings that can be delivered by white certificates; one case in point is the transport sector. The present limitations would seem to be due to the current system whereby obligations are placed on electricity and gas distributors whose activities are subject to tariffs regulated by AEEG. Savings on transport fuels have not so far been remunerated, and this has led to scant interest in efficiency improvement projects in this area. The Authority has now launched a consultation on a document which, on the basis of the Ministerial Decree of 28 December 2012, amends the method for determining the contribution towards costs incurred by obligated distributors, establishing a remuneration for fuel savings via gas tariffs. In any case, several options are being considered, and will be decided on at the time of EED transposition, aimed at charging the costs arising from transport fuel-saving measures to the transport sector itself, as is already the case for electricity and gas.

It is important to address the method for determining the amount of saving that is effectively additional, i.e. for excluding from the calculation those energy savings which would have been achieved even without the action or project as a consequence of technology, regulatory or market developments. To do this, it is necessary to take a technology baseline which, in the case of common actions, is the market for the technologies used. On the other hand, it is difficult to identify homogeneous benchmarks to evaluate projects directed at improving the energy efficiency of industrial processes, and in this case determining the scope of the reference market may also be complicated. In these cases, simplification and/or the provision of examples would be helpful because, without presuming to be exhaustive, it would facilitate the feasibility of investments; this could also be accompanied by an adjustment of the scheme. To this end, the Decree of 28 December 2012 has made provision for the drafting of operational manuals to promote the identification and definition of projects with *ex-post* calculation with particular reference to different industrial sectors. These guides, which should be published in the early months of 2014, will be accompanied by a description of the best technologies available and of the financial and energy savings they can deliver.

3.1.8 Expected savings to be achieved and duration of the obligation period

Under the white certificate scheme, the Ministry of Economic Development, together with the Ministry of the Environment and Protection of Land and Sea, sets the annual saving obligations. Figure 2 shows the annual savings achieved since the inception of the scheme, and those forecast up to the year 2020.

Figure 2: Past and forecast annual primary energy savings under the white certificate scheme

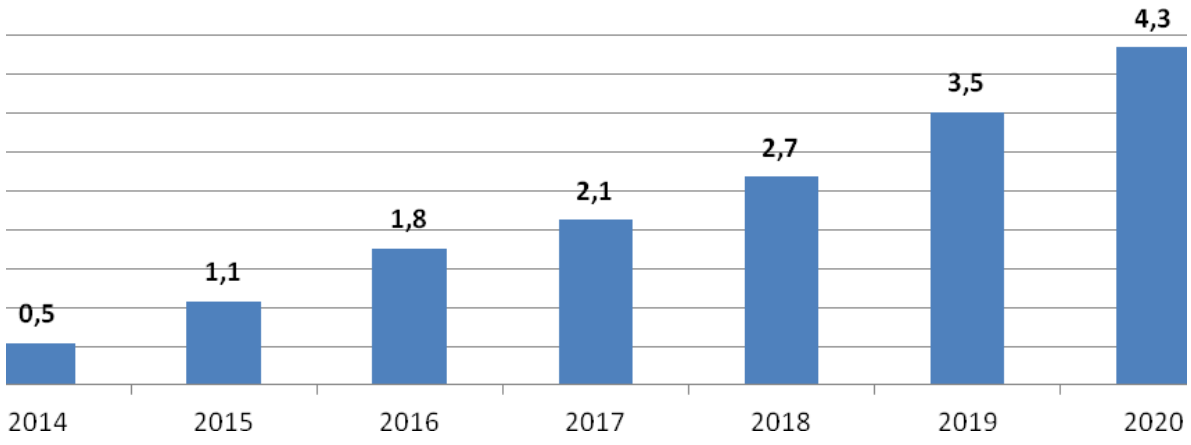


Legend:

Savings achieved (Mtoe)
Saving targets (Mtoe)
Targets for the coming period (Mtoe)

In order to estimate the contribution of the white certificate scheme to the saving targets set out in Article 7(1) of Directive 2012/27/EU and calculated in this report, it is necessary to extract the final energy savings expected to be achieved by the new projects installed from 1 January 2014 and which are expected to continue to yield benefits at least up to 31 December 2020. Figure 3 plots an estimate of the annual savings, having a cumulative value of 16.03 Mtoe of final energy.

Figure 3: Annual savings of final energy expected from the white certificates mechanism (Mtoe)



3.2 Tax deductions for improving the energy efficiency of buildings

Tax deductions for the energy upgrading of buildings were introduced in Italy by the Budget Law for 2007 and are still in force. These deductions have been key drivers of energy efficiency improvements in the housing sector. The total number of actions implemented (approximately 1.5 million as at 31 December 2012), helped generate final energy savings which are currently in excess of 0.86 Mtoe/year, corresponding to more than 2 million tonne/year of CO_2 emissions avoided.

3.2.1 Beneficiaries, actors concerned and implementing authorities

The tax deductions can be claimed by all taxpayers, including natural persons, professionals, companies and undertakings incurring costs for installing the actions on existing buildings, parts thereof or any real estate units of any cadastral category, including rural buildings, owned or otherwise held. If the actions are executed via financial lease agreements, the deduction is granted to the user, and is calculated on the basis of the cost incurred by the leasing company. In particular, the facility is granted to:

- individuals, including persons pursuing trades or professions;
- taxpayers having income from business activities (individuals, partnerships, limited liability companies);
- professional associations;
- public and private entities not pursuing business activities.

Among individuals, the facility may also be claimed by:

- the holders of a right *in rem* on the property;
- co-owners, for actions on common parts of the buildings;
- tenants;
- those holding the property in loan for use.

The operational players include authorised engineers registered with the relevant professional register or association. Their duty is to certify compliance with heat loss thresholds and with the technical specifications for the works implemented. For certain simple installations, this certification may be replaced by a declaration from the producer of the installed element.
ENEA (National Agency for new technologies, energy and sustainable economic development) is the body in charge of assessing the level of energy saving achieved by the action, while the Revenue Agency handles the fiscal side.

3.2.2 Target sectors and eligible actions

The tax deductions for energy efficiency improvement actions are granted to the civil sector, including housing and services/commercial, and consist of reductions of IRPEF (personal income tax) and IRES (corporate income tax) granted for actions improving the energy efficiency of existing buildings, in particular for expenses incurred to:

- reduce heating demand by means of overall upgrading of the building's energy performance;
- improve the building's thermal insulation (replacement of windows, including blinds or shutters, and insulation of roofs, walls and floors);
- install solar thermal panels;
- replace heating systems with condensing boilers or heat pumps);

- replace electrical water heaters with heat pump water heaters.

An essential requirement for eligibility for the tax deduction is that the works be carried out on existing residential units and buildings or parts of buildings, of any cadastral category, including rural buildings, and including commercial-use premises (for business or professional activities). In respect of some types of action, furthermore, the buildings must meet certain requirements, for example:

- they must already be equipped with a heating system, also in the spaces where the new systems are to be installed (with the exception of solar panel installation);
- in the case of refurbishments where a single property is divided into several property units, the facility is only granted for the installation of a centralised heating system serving said units;
- in the case of refurbishments involving demolition and reconstruction, the facility is granted only if the new building is a faithful replica of the original building. Consequently, any installations concerning building extensions are ineligible.

All the above-mentioned actions must meet specific minimum requirements set out in the Ministerial Decree of 19 February 2007 as amended and in the Ministerial Decree of 11 March 2008, coordinated with the Ministerial Decree of 26 January 2010. For instance, new windows or work on walls must provide the building with a good level of insulation which differs according to the building's climatic zone. In practice, the works must meet dispersal limits for the whole building or for the individual property unit covered by the action. In the case of installation of solar panels or replacement of the heating system, the new systems installed must also meet the technical specifications laid down in the Decrees. Actions covering whole buildings are also eligible. In this case what must be assessed is overall energy efficiency on conclusion of the works.

3.2.3 Saving calculation methodology

The saving delivered by each action is calculated against expected savings based on the preliminary calculation of the savings afforded by similar technologies applied in equivalent contexts.

From the operational viewpoint, energy savings can be calculated independently by the engineer chosen by the beneficiary or can be derived from calculation algorithms provided by ENEA. Moreover, for actions targeting the overall upgrading of the building or property unit or for actions on the opaque parts of the building shell, since the energy performance certificate must be provided, the value of the energy saving generated by the action can be easily derived.

The tax deductions cannot be combined with other national incentives (white certificates, thermal account), this prevents the risk of double-counting the savings.

3.2.4 Lifetimes of the actions

The savings generated by each action are expected to last each year for a time equal to the action's technical lifetime. The reference technical lifetime for the actions is shown in Annex 2, Table 1.

3.2.5 Monitoring, verification and audit

In accordance with Article 11 of the Ministerial Decree of 19 February 2007 as amended ("Buildings Decree") laying down "Provisions on tax deductions for works to improve the

energy efficiency of existing buildings", ENEA processes the information contained in the documents submitted by market operators for access to the incentive and, by 31 December of each year sends to the Ministry of Economic Development, the Ministry of the Economy and Finance, the Regions and the Autonomous Provinces of Trento and Bolzano, each in respect of their geographical jurisdictions, a report on the results of the actions. Monitoring activity includes the following steps:

- preliminary selection of the parameters capturing the results of the fiscal scheme;
- checks on the reliability of the technical data supplied by beneficiaries;
- removal of files with significant technical abnormalities from the database;
- verification - on a national scale and in detail - of the statistical sample extracted;
- final interpolation of the filtered data.

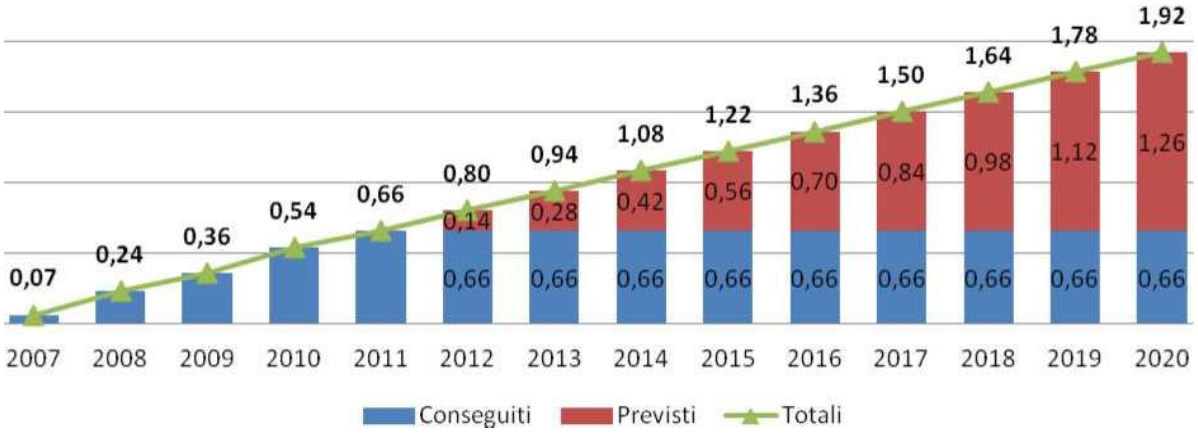
The savings reported in the application for tax deductions are checked for congruity by ENEA. On its part, the Revenue Agency performs tax spot-checks to verify the correctness of the tax deductions claimed against invoiced expenses.

3.2.6 Expected savings to be achieved and duration of the intermediate periods

The National Energy Strategy published in 2012 is intended to overcome the barriers to the deployment of energy efficiency improving solutions and to achieve the challenging saving targets the Italian State has set itself, by streamlining and strengthening the schemes and actions in each sector. This includes the extension over time of the tax deductions for energy efficiency improvement actions, specifically in the civil building renovation sector. The Government has currently extended the action through 2015 (up to June 2016 for actions on the common parts of buildings) but it has already decided to revise it, with a view to rationalising expenditure, so as to turn the scheme into a structural incentive.

The results so far delivered by the scheme are substantial and allow us to estimate its saving potential in the coming years up to 2020. Figure 4 plots actual final energy savings from the start of the scheme to 2012 and the estimated annual savings up to 2020.

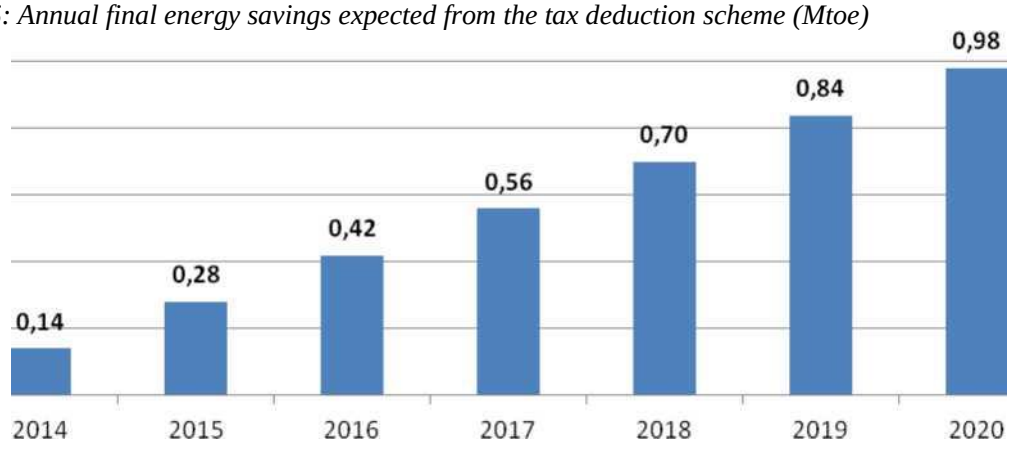
Figure 4: Final energy savings achieved since the launch of the scheme and expected savings (Mtoe)



Legend:
Achieved
Expected
..Total

In order to estimate the contribution of the tax deduction scheme to the saving targets set out in Article 7(1) of Directive 2012/27/EU and calculated in this report, it is necessary to extract the final energy savings expected to be achieved by the new actions implemented from 1 January 2014 and which are expected to continue to yield benefits at least up to 31 December 2020. Figure 5 plots an estimate of the annual savings, having a cumulative value of about 3.92 Mtoe of final energy. Given that actual savings will be closely monitored and checked against the expected annual savings shown below (based on one-year time intervals), corrective measures will be taken as necessary if expectations are not met.

Figure 5: Annual final energy savings expected from the tax deduction scheme (Mtoe)



3.3 The Thermal Account

The Ministerial Decree of 28 December 2012 introduced a new incentive system for actions to improve energy efficiency and generate thermal energy from renewable sources. This incentive mechanism, dubbed Thermal Account, is the first nationwide direct incentive scheme for the generation of renewable thermal energy, as well as being the first scheme encouraging public administrations to implement energy efficiency improvement actions in buildings and technical installations. The Thermal Account became operational in July 2013.

3.3.1 Beneficiaries, actors concerned and implementing authorities

The incentive scheme is addressed to two types of beneficiaries:

- Public administrations;
- Private parties i.e. individuals, buildings held in co-ownership and businesses or farms.

These beneficiaries may implement the actions via an ESCO, by means of a third-party financing contract, an energy service contract or an energy performance contract.

GSE (Energy Service Operator) is in charge of implementing and managing the scheme. It also awards, disburses and revokes incentives and carries out checks.

ENEA assists GSE in preparing the technical rules for implementing the decree and takes part in the verifications and checks. It also provides specialist assistance to GSE in monitoring activities and, again in cooperation with GSE, draws up the annual report.

The Authority for Electricity and Gas prepares the model contract between GSE and the beneficiary and defines the manner whereby the funding for the incentives is to be drawn from the income from natural gas tariffs. The Authority also covers the costs incurred for GSE's and ENEA's activities.

3.3.2 Target sectors and eligible measures

The Thermal Account is intended for the actions implemented in the civil sector, which covers housing, services/commercial and the public administration.
The following energy efficiency improvement actions implemented by public administrations are eligible:

- thermal insulation of walls;
- replacement of transparent vertical structures (windows);
- installation of screening and shading systems;
- replacement of heating systems with condensing boilers;

As to the generation of heat from renewable sources, one or more of the following actions carried out by public administrations or private parties are eligible:

- replacement of heat generators with electrical and gas heat pumps, including heat pumps for the production of sanitary hot water;
- replacement of heat generators with biomass-fed heat generators, heating fireplaces and stoves;
- installation of solar thermal collectors and solar cooling systems.

The incentive supports actions to improve the energy performance of the shell of existing buildings and the energy performance of conditioning, heating and cooling systems and for the production of sanitary hot water. The incentive targets almost exclusively the replacement of already installed, less efficient equipment, with the exception of new thermal solar systems, which are usually installed as add-ons to other thermal generation systems.

Access to the incentive is governed by minimum eligibility requirements by type of action. The maximum power limit in order to qualify for the incentive is 1000 kW thermal power or 1000 gross m^2 of surface area for thermal solar systems. In the case of energy efficiency actions, an expenditure ceiling has been set for each type of action. The Thermal Account also provides specific incentives for energy audit and energy certification, as these are considered to be important awareness-raising tools able to steer end users' choices and daily behaviour.

3.3.3 Saving calculation methodology

The savings delivered by each action are calculated against expected savings, which are derived from the savings afforded by similar technologies applied in equivalent contexts.

In order to simplify access to the scheme in the start-up phase, it was decided not to measure the heat generated by the subsidised equipment, which in any case is almost invariably of small size. However, a performance measurement requirement for larger equipment will soon be introduced: the Decree provides that guidelines must be prepared for installing heat meters to measure and transmit electronically data on the thermal energy generated by the subsidised equipment; these guidelines will be used to include heat measurement and reporting systems in the next review of the Thermal Account Decree.

The incentive focuses on actions to increase energy efficiency by improving the energy performance of buildings and/or by installing equipment that uses renewable sources. The incentive consists of a cost subsidy, paid out in annual instalments for a period from 2 to 5 years according to the actions implemented.

The Thermal Account introduced innovative requirements for disbursement of the incentive, such as equipment maintenance, types of fuels used and specific maximum costs per action. All these requirements have been introduced to maximise the scheme's effectiveness.

Containing the costs of the scheme, which is covered by the natural gas tariffs, is a necessary condition for its long-term sustainability.

Among the various instruments to achieve energy saving targets, the National Energy Strategy includes the creation of guarantee funds dedicated to energy efficiency measures. Law No 90/2013 has established a guarantee fund to support the installation of energy efficiency projects in public buildings, in particular schools and hospitals. The implementation of this fund, which is complementary to the Thermal Account incentives, will make it possible to mobilise a greater volume of private financing towards ESCOs, increasing the number of energy efficiency improvement actions in public buildings.

3.3.4 Lifetimes of the actions

The savings generated by each action are expected to last each year for a time equal to the action's technical lifetime. The reference technical lifetime for the actions is shown in Annex 2, Table 1.

3.3.5 Monitoring

Under Article 13 of the Ministerial Decree of 28 December 2012, in order to monitor delivery of the targets relating to thermal energy generation from renewables, GSE, in cooperation with ENEA, regularly updates on its website the data on the incentive applications received, broken down by type of action, with their key parameters, aggregated national and regional statistical data and the consequent evaluations relating to energy generation or savings and GHG emissions avoided. GSE also publishes data on the annual amount of incentive expenditure, incentive costs, both cumulative and per action, and the cumulative projections of incentive costs over the years of their duration.

By 30 April of each year GSE, with ENEA's technical assistance, must prepare and submit to the Ministry of Economic Development and the Regions a report on the performance of the incentive scheme. The report must provide information on the number of the applications received, the number of actions installed, the value of the investments made, the value of incentives granted, an estimate of the costs of the scheme in the coming years, the primary energy savings achieved and the thermal energy generated via the actions as well as GHG emissions avoided, showing the energy supply costs avoided and the number and outcomes of checks carried out, broken down by type of action and Region. GSE must share the databases, organised at regional level, with the Regions concerned and the representatives of ANCI (the Association of Italian Municipalities) and UPI (the Union of Italian Provinces).

Lastly, under the Ministerial Decree of 28 December 2012, by the end of 2013 and every two years thereafter, ENEA must submit to the Ministry of Economic Development for approval a specific two-year monitoring programme on the status and outlook of heat-producing technologies and energy efficiency technologies, with a focus on new technology options, the expected medium and long-term commercial costs of innovative systems and the residual national potential of renewable thermal sources and energy efficiency.

3.3.6 Verification and audit

GSE carries out its checks on the subsidised actions on the basis of an annual programme which it submits to the Ministry of Economic Development. This activity includes document verification and on-site checks (inspections), to verify the proper installation and operation of the actions. The checks, which can be implemented with the assistance of ENEA or public service concessionaires and other specialised bodies, cover at least 1% of approved

applications.

Lastly, to ensure the scheme is not combined with other State incentives (and to avoid double counting of the saving produced by the actions), procedures are in place to share the relevant information with the monitoring bodies in charge of the other incentive schemes.

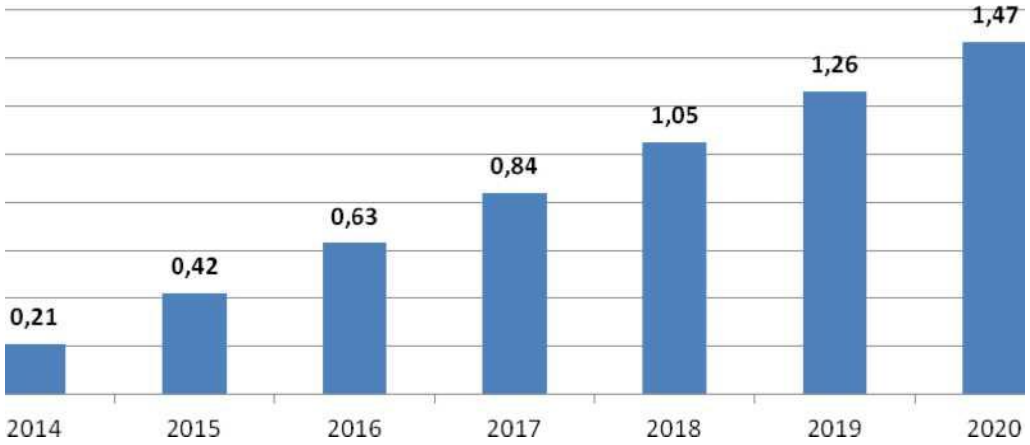
3.3.7 Expected savings to be achieved and duration of the intermediate periods

Since the Thermal Account was rolled out in July 2013, we do not yet have sufficient monitoring data to estimate expected savings based on past performance. Nevertheless, a number of simulations have been carried out in order to measure the contribution of the Thermal Account to the saving targets laid down in Article 7(1) EED.

Compared to the forecasts in the National Energy Strategy, the reference scenario for estimating the savings that can be achieved through the Thermal Account has partly changed. The National Energy Strategy envisaged a regulatory review of the tax deductions for energy efficiency-improving measures in order to avoid overlapping of the two incentive schemes. As it is necessary to maintain the types of actions qualifying for tax deductions unchanged (in June 2013 the deductions were raised to 65%), this review has been postponed, and this fact might entail changes to the types of actions currently covered by the Thermal Account. Nevertheless, a prudential estimate of the savings achievable by the Thermal Account compared to the earlier estimate made in the National Energy Strategy has been made, keeping in mind that the prohibition on combining incentives prevents any risk of double counting.

Figure 6 shows the predicted annual savings, yielding a cumulative value of about 5.88 Mtoe of final energy. Given that actual savings will be closely monitored and checked against the expected annual savings shown below (based on one-year time intervals), corrective measures will be taken as necessary if expectations are not met.

Figure 6: Annual final energy savings expected from the Thermal Account (Mtoe)



3.4 Conclusions

As explained in the preceding chapters, Italy intends to achieve its final energy saving targets, calculated in accordance with Article 7(1) EED, by means of three basic mechanisms, already implemented at national level:

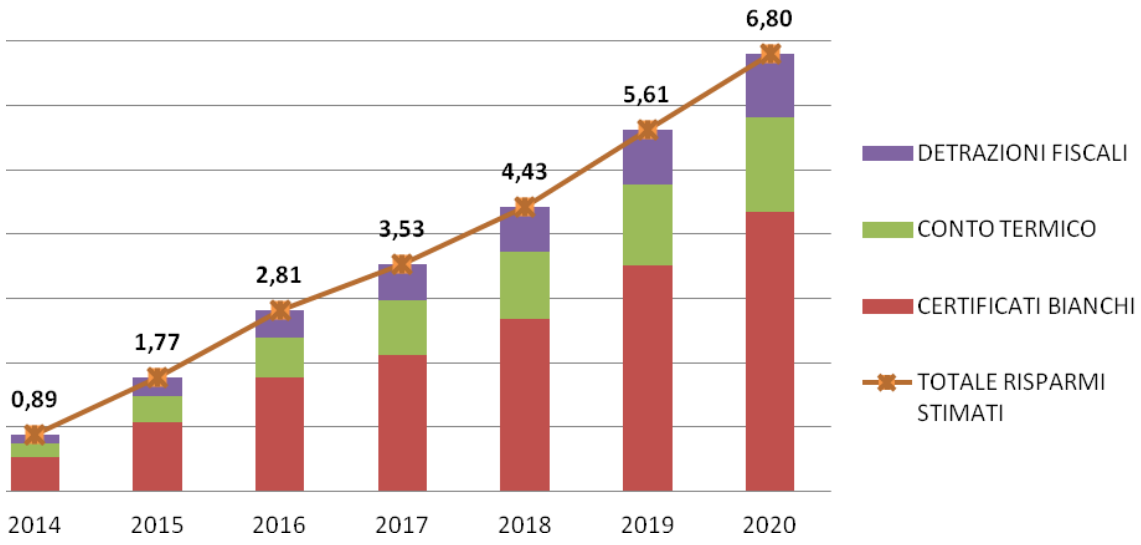
- the white certificate obligation scheme;
- tax deductions for improving the energy efficiency of existing buildings;

- the Thermal Account to promote the uptake of renewable thermal energy sources and energy efficiency actions by Public Administrations.

Figure 7 summarises the saving targets assigned to each scheme. Against the minimum overall saving target of 25.58 Mtoe of final energy, the proposed schemes should generate cumulative savings of 25.83 Mtoe, approximately 62% of which should result from the white certificate obligation scheme. Tracking of the annual results supplied by the tried and tested monitoring instruments associated with the three schemes will make it possible to take prompt action if savings performance is found to fall short of the targets.

Lastly, it should be noted that these binding final energy saving targets are a share of the targets laid down in the National Energy Strategy which Italy notified to the Commission in April 2013, as provided for by Article 3 of Directive 2012/27/EU. In evaluating the savings, no account was taken of the effects of implementing the rules under EU Directives (EPBD and Ecodesign) or of the measures that will be introduced after transposition of Directive 2012/27/EU. Lastly, planned savings do not include the contribution of energy efficiency policy measures promoted at local level, some of which are funded from structural funds.

Figure 7: Summary of expected savings (Mtoe of final energy)



Legend:
...Tax deductions
...Thermal Account
White Certificates
[plotted line] Total expected savings

Annex 1. Actions qualifying for the white certificate schemes

Table 1 - White certificates, actions to reduce natural gas consumption

Action type 1 *Equipment burning non-renewable energy sources* Actions to replace existing equipment with higher-efficiency equipment
Action type 2 *Reduction of gas consumption for heat generation* Installation of systems and products for reducing gas consumption for water heating
Action type 3 *Conditioning of buildings and heat recovery in buildings that are conditioned using non-renewable energy sources* Measures for the thermal insulation of buildings Actions to control solar radiation penetrating through glass surfaces in the summer months (selective glass, external sun shades etc.) Applications of bioclimatic architecture, passive solar design and passive cooling techniques Direct conditioning via district heating from cogeneration (CHP) Cogeneration (CHP) and micro-cogeneration systems as defined by the Authority for electricity and gas Trigeneration (CCHP) and quadrigeneration systems Fuel cell Systems Remote control systems Heat control and metering for centralised heating equipment Use of recovered heat
Action type 4 *Installation of equipment for use of renewable sources by end users* Use of biomass-fuelled equipment for heat generation Use of solar panels for water heating Use of low enthalpy geothermal heat and of the heat from cogeneration (CHP) or geothermal systems or from systems fuelled by plant products and organic and inorganic waste for space heating and to supply heat for civil applications Use of photovoltaic systems having a capacity of less than 20 kW
Action type 5 *Energy recovery* Energy recovery on the gas network
Action type 6 *Electrical rephasing* Rephasing at end users
Action type 7 *Electric motors and their applications* Installation of electronic frequency regulation systems (inverters) System optimisation and management of pumping systems operated by electric motors Installation of high-efficiency motors and motor-power transmission systems Energy recovery in LNG regasification systems
Action type 8 *Lighting systems* Installation of automated switch-on, switch-off and intensity regulation systems (occupancy, daylight and sunset sensors etc.) Efficiency improvements in street lighting systems Installation of more efficient systems and components (light sources and light fixtures, power supply units, voltage regulators etc.)
Action type 9

Electricity leaking Installation of low stand-by power equipment or of devices reducing the stand-by power consumption of existing equipment Systems for putting occasional-use equipment on stand-by mode Systems to automatically switch off equipment in stand-by mode
Action type 10 *Measures replacing another energy source or carrier with electricity, in case of reduction in primary energy consumption* Drying with microwave and radiofrequency equipment Melting and firing in conduction and radiant furnaces Equipment for mechanical vapour compression
Action type 11 *Applications where the use of natural gas is more efficient than other energy sources or carriers* Replacement of hot water cylinders with natural gas fuelled systems
Action type 12 *High efficiency white goods and office equipment* Replacement of refrigerators, washing machines, dishwashers, water heaters, ovens, water circulation pumps etc. with similar, higher-efficiency products Installation of high-efficiency computers, printers, fax machines etc.
Action type 13 *Measures to reduce air conditioning energy demand* Measures for the thermal insulation of buildings Actions to control solar radiation penetrating through glass surfaces in the summer months (selective glass, external sun shades etc.) Applications of bioclimatic architecture, passive solar design and passive cooling techniques Conditioning and absorption systems Installation of electric or gas heat pumps for heating and cooling in newly built or renovated buildings having a volume heat loss coefficient by transmission through the building shell, Cd, less than the established limits, with reference to the degree-days of the locality Solar thermal equipment using heat pump-type absorption refrigerators, also reversible
Action type 14 *Training, provision of information, promotion and awareness-raising* Education and training, promotion and awareness-raising campaigns targeting end users for consumption reduction
Action type 15 *Electric and natural gas vehicles* Initiatives to promote the use of electric and natural gas-powered vehicles

Table 2 - White certificates, actions to reduce electricity consumption

Action type 1 *Electrical rephasing* Rephasing at end users
Action type 2 *Electric motors and their applications* Installation of electronic frequency regulation systems (inverters) System optimisation and management of pumping systems operated by electric motors Installation of high-efficiency motors and motor-power transmission systems Energy recovery in LNG regasification systems
Action type 3 *Lighting systems* Installation of automated switch-on, switch-off and intensity regulation systems (occupancy, daylight and sunset sensors etc.) Efficiency improvements in street lighting systems Installation of more efficient systems and components (light sources and light fixtures, power supply units, voltage regulators etc.)
Action type 4 *Electricity leaking* Installation of low stand-by power equipment or of devices reducing the stand-by power consumption of existing equipment Systems for putting occasional-use equipment on stand-by mode Systems to automatically switch off equipment in stand-by mode
Action type 5 *Actions to promote the use of more appropriate electricity sources or carriers* Actions to replace electric water heating equipment (for sanitary hot water or for dishwashers, washing machines etc.) with equipment powered by other energy sources or having higher efficiency, or via district heating
Action type 6 *Reduction of electricity consumption for heat generation* Installation of systems and products to reduce hot water requirements
Action type 7 *Actions to reduce air conditioning energy demand* Actions for the thermal insulation of buildings Actions to control solar radiation penetrating through glass surfaces in the summer months (selective glass, external sun shades etc.) Applications of bioclimatic architecture, passive solar and passive cooling techniques Solar thermal equipment using heat pump-type absorption refrigerators, also reversible
Action type 8 *High efficiency white goods and office equipment* Replacement of refrigerators, washing machines, dishwashers, water heaters, ovens, water circulation pumps etc. with similar, higher-efficiency products Installation of high-efficiency computers, printers, fax machines etc.
Action type 9 *Equipment burning non-renewable energy sources* Actions to replace existing equipment with higher-efficiency equipment
Action type 10 *Actions replacing another energy source or carrier with electricity, in case of reduction in primary energy consumption* Drying with microwave and radiofrequency equipment Melting and firing in conduction and radiant furnaces Equipment for mechanical vapour compression
Action type 11

Heating and cooling and heat recovery in buildings heated/cooled with non-renewable energy sources Measures for the thermal insulation of buildings Applications of bioclimatic architecture, passive solar design and passive cooling techniques Direct heating via district heating from cogeneration (CHP) Cogeneration (CHP) and micro-cogeneration systems as defined by the Authority for electricity and gas Trigeneration (CCHP) and quadrigeneration systems Fuel cell systems Installation of electric or gas heat pumps for heating and cooling in newly-built or renovated buildings having a volume dispersal coefficient by transmission through the building shell, Cd, less than the established limits, with reference to the degree-days of the locality Remote control systems Heat control and metering for centralised heating equipment Use of recovered heat
Action type 12 *Installation of equipment for use of renewable sources by end users* Use of biomass-fuelled equipment for heat generation Use of solar panels for water heating Use of low enthalpy geothermal heat and of the heat from cogeneration (CHP) or geothermal systems or from systems fuelled by plant products and organic and inorganic waste for the heating of spaces and to supply heat for civil applications Use of photovoltaic systems having a capacity of less than 20 kW
Action type 13 *Electric and natural gas-powered vehicles* Initiatives to promote the use of electric and natural gas-fuelled vehicles
Action type 14 *Training, provision of information, promotion and awareness-raising* Education and training, promotion and awareness-raising campaigns targeting end users for consumption reduction

Table 3 - standardised and analytical evaluation sheets

No	*Title*	*Evaluation method*
02T	Replacement of electric hot water cylinders with gas water heaters	*standardised*
03T	Installation of single household 4-star efficiency boiler fired with natural gas with nominal thermal capacity not exceeding 35 kW	*standardised*
04T	Replacement of gas water heaters with more efficient gas water heaters	*standardised*
05T	Replacement of single pane windows with double pane windows	*standardised*
06T	Insulation of walls and roofs	*standardised*
07T	Use of photovoltaic systems with power output < 20 kW	*standardised*
08T	Use of solar collectors for the production of sanitary hot water	*standardised*
09T	Installation of frequency regulation electronic systems (inverters) on electric motors operating on pumping systems with power of less than 22 kW	*standardised*
10T	Electricity recovery from natural gas decompression	*analytical*
15T	Installation of fresh air intake heat pumps instead of boilers in new or restored residential buildings	*standardised*
16T	Installation of frequency regulation electronic systems (inverters) on electric motors operating on pumping systems with capacity of 22 kW or more	*analytical*
17T	Installation of light flow regulators for high pressure mercury vapour lamps and sodium vapour lamps in street lighting systems	*standardised*
19T	Installation of high-efficiency external air intake conditioners with cooling power of less than 12 kWf	*standardised*
20T	Thermal insulation of walls and roofs for summer cooling in the housing and commercial sectors	*standardised*
21T	Application in the civil sector of small cogeneration (CHP) systems for space heating and cooling and the production of sanitary hot water	*analytical*
22T	Application in the civil sector of district heating systems for space conditioning and the production of sanitary hot water	*analytical*
26T	Installation of centralised systems for the heating/cooling of civil-use buildings	*analytical*
27T	Installation of electric heat pump for the production of sanitary hot water in new and existing domestic equipment	*standardised*
28T	Installation of high efficiency systems for the lighting of motorway and main road tunnels	*standardised*
29Ta	Installation of new high-efficiency lighting systems in roads intended for vehicle traffic	*standardised*
29Tb	Installation of high efficiency lighting fixtures in existing lighting systems in roads intended for vehicle traffic	*standardised*
30E	Installation of higher-efficiency motors	*standardised*
31E	Installation of frequency regulation electronic systems (inverters) in electric motors operating on compressed air production systems with a power of 11 kW or more	*analytical*
32E	Installation of frequency regulation electronic systems (inverters) in electric motors operating on ventilation systems	*analytical*
33E	Rephasing of distributed-type electric motors at users' premises	*standardised*
34E	Mechanical Vapour Recompression (MVR) in the concentration of solutions	*analytical*
35E	Installation of air and water condensing refrigerators for industrial applications	*analytical*
36E	Installation of high-efficiency uninterruptible power supply equipment (UPS)	*standardised*
37E	New installation of heating equipment fuelled by woody biomass with power output <= 35 kW thermal	*standardised*

38E	Installation of heating automation and control systems in residential buildings (BACS) in accordance with standard UNI EN 15232	*standardised*
39E	Installation of internal thermal screens for the thermal insulation of greenhouses	*standardised*
40E	Installation of heating equipment fuelled by woody biomass in greenhouse agriculture	*standardised*
41E	Use of biomethane (BM) in public transport in place of methane (NG)	*analytical*
42E	Spread of electric vehicles for private passenger transport	*standardised*
43E	Spread of hybrid thermoelectric vehicles for private passenger transport	*standardised*
44E	Spread of hybrid thermoelectric vehicles for private passenger transport	*standardised*
45E	Spread of LPG fuelled vehicles for passenger transport	*standardised*
46E	LED street lighting in pedestrian areas: LED technology systems replacing previous systems with mercury vapour lamps	*standardised*

Annex 2. Technical life-cycle of the measures and duration of savings

In order to achieve the saving obligations set out in the EED, the monitoring of the schemes described in this document is based on the fact that the savings generated by the efficiency-improving actions will last for the same number of years as the expected technical life-cycle of each technology. Table 1 below shows the technical life-cycle of the most frequent types of actions.

Table 1 - Technical life-cycle of the actions

Industrial processes: heat generation or recovery for cooling, drying, firing, casting etc.	
Examples of actions	*Technical life-cycle (years)*
Energy recovery in LNG regasification systems Equipment burning non-renewable energy sources Actions to replace existing equipment with higher-efficiency equipment Drying with microwave and radiofrequency equipment Melting and firing in conduction and radiant furnaces Equipment for mechanical vapour compression Use of recovered heat Use of biomass-fuelled equipment for heat generation	20
Industrial processes: generation of electricity from recovery or from renewable sources or cogeneration (CHP)	
Examples of actions	*Technical life-cycle (years)*
Use of recovered heat for the generation of electricity Electricity recovery from natural gas decompression	20
Industrial processes: efficient drive systems (motors, inverters etc.), automation and rephasing actions	
Examples of actions	*Technical life-cycle (years)*
Rephasing at end users Installation of electronic frequency regulation systems (inverters) Installation of high-efficiency motors and motor-power transmission systems Energy efficiency improvement measures in the water distribution sector Application of hardware and software IT systems for industrial automation Use of communications technologies for energy saving	15
Industrial processes: actions other than the above, for the energy optimisation of production processes and equipment layout to achieve measurable, lasting reduction in final energy demand without affecting the quantity and quality of production	
Examples of actions	*Technical life-cycle (years)*
Integration of several phases of the production line, to limit product cooling and heating requirements Changes in equipment layout to reduce energy losses linked to fluid transport Insulation to reduce heating and cooling requirements	20
Residential, agricultural and services/commercial sector: heating and cooling systems for space conditioning and	

water heating	
Examples of actions	*Technical life-cycle (years)*
Actions to replace electric water heating equipment (for sanitary hot water or for dishwashers, washing machines etc.) with equipment powered by other energy sources or having higher efficiency, or via district heating Solar thermal equipment using heat pump-type absorption refrigerators, also reversible Space conditioning - Fuel cell systems Installation of electric or gas heat pumps for heating and cooling Use of recovered heat Use of biomass-fuelled equipment for heat generation Use of solar panels for water heating Use of low-enthalpy geothermal heat and of the heat from geothermal systems or from systems fuelled by plant products and organic and inorganic waste for the heating of spaces and to supply heat for civil applications	15
Residential, agricultural and services/commercial sector: small-size electricity generation and cogeneration (CHP) systems	
Examples of actions	*Technical life-cycle (years)*
Use of photovoltaic systems having a capacity of less than 20 kW Cogeneration (CHP) and micro-cogeneration systems as defined by the Authority for electricity and gas Trigeneration (CCHP) and quadrigeneration systems	20
Residential, agricultural and services/commercial sector: actions on building envelopes to reduce the need for artificial lighting	
Examples of actions	*Technical life-cycle (years)*
Installation of light tubes for optimum exploitation of sunlight	30
Residential, agricultural and services/commercial sector: passive building design and actions on the building shell to reduce space cooling and heating requirements	
Examples of actions	*Technical life-cycle (years)*
Measures for the thermal insulation of buildings Actions to control solar radiation penetrating through glass surfaces in the summer months (selective glass, external sun shades etc.) Applications of bioclimatic architecture, passive solar design and passive cooling techniques	30
Residential and services/commercial sector: consumer electronics (high-efficiency entertainment systems and consumer ICT equipment)	
Examples of actions	*Technical life-cycle (years)*
Installation of low stand-by power equipment or of devices reducing the stand-by power consumption of existing equipment Systems for putting occasional-use equipment on stand-by mode Systems to automatically switch off equipment in stand-by mode Installation of high-efficiency computers, printers, fax machines etc.	5
Residential and services/commercial sector: washing machines and food preservation appliances	

Examples of actions	*Technical life-cycle (years)*
Replacement of refrigerators, washing machines, dishwashers, water heaters, ovens, water circulation pumps etc. with similar, higher-efficiency products	15
Residential, agricultural and services/commercial sector: reduction in hot water demand	
Examples of actions	*Technical life-cycle (years)*
Installation of systems and products to reduce hot water requirements	10
Residential, agricultural and services/commercial sector: reduction of energy demand by means of ICT applications	
Examples of actions	*Technical life-cycle (years)*
Remote operation systems Heat control and metering for centralised heating equipment Efficiency improvement of data processing centres Installation of home automation and building management systems to reduce energy consumption in buildings IT actions including in particular the use of remote servers/services, including virtual ones	10
Street lighting: installation of new efficient equipment or complete renovation of existing systems	
Examples of actions	*Technical life-cycle (years)*
Installation of high-efficiency street lighting in previously unlit areas	15
Street lighting: retrofitting of existing street lighting systems to improve energy efficiency	
Examples of actions	*Technical life-cycle (years)*
Replacement of lamps with high-efficiency lights Installation of automated switch-on, switch-off and intensity regulation systems (occupancy, daylight and sunset sensors etc.)	10
Private lighting: installation of new efficient equipment or complete redesign of existing equipment	
Examples of actions	*Technical life-cycle (years)*
	15
Private lighting: retrofitting of existing street lighting systems to improve energy efficiency	
Examples of actions	*Technical life-cycle (years)*
Replacement of light sources with high-efficiency and long-life lights Installation of automated switch-on, switch-off and intensity regulation systems (occupancy, daylight sensors etc.)	10
Transport systems: improvement of vehicle energy efficiency	
Examples of actions	*Technical life-cycle (years)*
Initiatives to promote the use of electric, natural gas and LPG-powered vehicles	10

Actions to improve the efficiency of electricity and natural gas networks	
Examples of actions	*Technical life-cycle (years)*
	20