

Title of measure:	SPA31 Action Plan 2011-2020: Improvement of energy efficiency of the thermal installations in existing buildings.
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General Description

This Action Plan 2011-2020 makes up the second National Energy Efficiency Action Plan (NEEAP) which, pursuant to article 14 of Directive 2006/32/EC of the European Parliament and of the Council, of 5th April 2006, on energy end-use efficiency and energy services, Spain must submit to the European Commission in 2011. This Action Plan was approved by Cabinet Meeting Agreement as of 29th July 2011, and lends continuity to the energy saving and efficiency plans formerly approved by the Spanish Government within the Energy Saving and Efficiency Strategy for Spain 2004-2012 (E4), approved in November 2003.

The Action Plan 2011-2020 presents a set of measures and actions coherent with the end-use and primary energy consumption scenarios included in other planning instruments, in terms of renewable energies and planning in the gas and electric power sector. In this way, the planning in the field of energy makes up a coherent set, leading to the end-use intensity improvement objective set at inter-annual 2% of period 2010-2020. The measures included in this Action Plan 2011-2020 will involve savings of final energy for 2020 worth 17,842 ktoe and of primary energy worth 35,585 ktoe, calculated with reference to year 2007 and in accordance with the methodology proposed by the European Commission. Savings, in terms of primary energy, includes the savings derived from the measures proposed for the Energy Transformation Sector in this Plan - mainly on promotion of co-generation - and the ones derived from the change in the generation mix stimulated by other planning actions in terms of energy policy not involved with it, and which respond to the obligations derived from Directive 2009/28/EC, of 23rd April 2009, on the promotion of the use of energy coming from renewable sources.

The former savings, in terms of primary energy, equals 20% of the primary energy consumption that would have taken place in 2020 for lack of the renewable energy diversification and promotion policies approved by the Spanish government and this Action Plan 2011-2020. In terms of final energy, saving in 2016 amounts to 13,176 ktoe, which equals 12.2% of final energy in that year, for lack of the Plan. This saving, once discounted the non-included sectors in the field of application of Directive 2006/32/EC, amounts to 11,532 ktoe in 2016, which involves 15.9% of the average consumption in the five last years prior to the enforcement of the Directive, and subsequently the fulfillment of the saving objectives demanded by Directive 2006/32/EC. Additionally, the Action Plan 2011-2020 is coherent with the global objectives agreed on by the European Council of 17th June 2010, in relation to the improvement of primary energy efficiency by 20% in 2020.

The achievement of the said objectives in the sectors covered by this Plan will be possible with the application of the aids to be managed by the public sector, amounting to 4,995 M€ during period 2011-2020 which, along with the regulatory measures, will mobilize an investment turnover of 45,985 M€. The accumulated final & primary energy savings during period 2011-2020 will reach 120,967 ktoe and 247,791 ktoe, respectively, which is associated to a reduction of emissions of 1,012.68 MtCO₂.

Focusing then on the economic analysis of the benefits derived from lower energy consumptions and the lower CO₂ emissions, the total savings accumulated during the period translate into an economic benefit of M€78,687.

The Plan establishes a final energy saving objective of 2.867 Mtoe for the year 2020 in the **Building and Equipment sector** corresponding to the **Services and Household sectors**. This objective involves avoided emissions of around 12.120 MtCO₂. For these purposes, investments worth 27,322 M€ and public aids worth 2,883 M€ will be necessary.

The group of measures within the Action plan 2011-2020 for the household sector is aimed at the buildings used as dwellings and the home equipment, such as it's shown in the following:

- Improvement of the energy efficiency of the electric appliances stock (SPA22)
- Renewal of the thermal casing in the existing buildings (SPA30; Household sector)
- Improvement of energy efficiency of the thermal installations in existing buildings (SPA31; Household sector)
- Improvement of energy efficiency of the indoor lighting installations in existing buildings (SPA32; Household sector)
- Construction of new buildings and rehabilitation of the existing ones with high energy qualification (SPA33; Household sector)
- Construction or rehabilitation of nearly-zero energy buildings (SPA39; Household sector)

Improvement of energy efficiency of the thermal installations in existing buildings

The aim of this measure, considered as a priority one, is to improve the energy efficiency in the thermal installations of the existing buildings to be renovated in a way the minimum energy requirements established by the legislation in force can be met, leading to a reduction of the energy consumption

The energy actions included in this measure shall be those achieving a reduction in the conventional energy consumption of heating and air-conditioning. This is to be done with actions on the thermal installations. The energy actions may be the following, for guidance and non-restrictive purposes:

- Replacement of heating and air-conditioning production gear by other, chosen on the basis of a higher energy performance.
- Replacement of the convector fluid equipment by other, with a higher energy performance.
- Use of free outdoor-air cooling and extraction-air heat recovery systems.
- Systems that combine conventional equipment with evaporative techniques that reduce the energy consumption of the installation: evaporative cooling, evaporative condensation, evaporative pre-cooling of condensation air, direct and indirect evaporative cooling prior to the recovery of extraction air heat, etc.
- Equipment control and regulation systems and/or installations to save energy.
- Integration of thermal subsystems in a home automation system to enable the communication of the various systems, so that these can interact with one another and can be controlled either locally or remotely.
- The new installations with centralised heating and cooling systems, either urban or district ones or providing services to several buildings, as well as the reform and enlargement of the existing ones.

The following actions will be carried out with a view to promoting the renewal measure of thermal installations in buildings:

- Regulatory: The establishment of the minimum requirements on energy efficiency to be met by both the new thermal installations and the existing to be reformed is set forth by the Regulations on Building Heating Installations. All along the enforcement period of the Plan, these requirements will be gradually modified in accordance with Directive 2010/31 EU, relating to the energy efficiency for buildings and their methodological framework, which links energy efficiency features to the economic ones through the calculation of the cost-optimal level all along the building useful life.
- An economic support line will be created on an annual basis, to be managed by each Autonomous Community, which shall contribute to the economic feasibility of the said measure. Preferential actions will be considered those affecting a high number of buildings, and also those to be implemented through “Renove Plans”, aimed at specific actions of given

citizens for the renewal of devices or systems. The aim is to link economic incentives with energy rating levels, especially when dealing with comprehensive rehabilitations.

Priority will be given to the measures that are supported by the report carried out by the agent authorised to carry out the periodical inspection on energy efficiency set forth by the RITE.

- Training: Training activities will be devised and implemented as a supplement to relation to this measure, which may consist, only for indicative and non-restrictive purposes, in in-depth courses aimed at designers, project management and the agents in charge of the external control of the energy policy in this issue, adapted to the functions each of them has to carry out in this process, and particularly relating to the periodical inspection of the energy efficiency and handling of energy certification software for existing buildings.
- Information on the most efficient equipment and systems through Data Bases available on IDAE's Website.
- Inspections: According to the RITE, the regular revision of both the boilers and air conditioning systems in buildings, and the revision of the complete thermal installation whenever it's over 15 years old.
- Other mechanisms, especially in connection with *Renove Plans*, such as a system to guarantee the recycle and management of residues in accordance with the normative in force, once the equipment is removed.

The organisations in charge of this measure will be the Ministry of Industry, Tourism and Trade/IDAE in collaboration with the Autonomous Communities.

As a whole, the development of this measure in thermal installations in buildings will demand actions over 8,200 MW_{thermal/year}, in equipment for refrigeration/heat production, distribution, regulation and control and air-conditioning units. All the above will involve acting on 82,000 MW_{thermal} all along the Plan.

Impact assessment (methods and results)

Ex-ante assessment

The following table states the energy saving, the avoided CO₂ emissions, as well as the necessary investments and public aids during the period 2011-2020:

Measure	Annual Final Energy Saving 2020 (ktoe)	CO ₂ (avoided) 2020 (kt)	Related investments 2011-2020 (M€)	Public Support 2011-2020 (M€)
<i>Improvement of the energy efficiency in the thermal installations of the existing buildings</i>	908	3,449	7,258	283

The energy saving objective affects all the buildings in the household and services sector.

The avoided CO₂ emissions make up the sum of the direct emissions avoided with fuel saving, and the directly avoided ones with saving in electricity generation.

The CO₂ calculations avoided as a result of the saving and energy efficiency measures included in this Plan are ad hoc calculations for it, and involve a translation of the calculated savings, in terms of final and primary energy, into CO₂ emissions avoided - this calculation does not have to coincide with the ones carried out with different approaches as part of the periodical reports done in relation to the evolution of the greenhouse effect gas emissions.

The aid to be managed by the public sector, as estimated to boost and promote this measure has been reached as a percentage of the total investment required, because the rest of the investment will be realised without public support as a result of the induced effect of this measure.

Measure impact level			
<input type="checkbox"/> low	<input type="checkbox"/> medium	<input checked="" type="checkbox"/> high	

Interaction of measures

- Ecodesign requirements for energy-using products (EuPs) (SPA24)
- Action Plan 2011-2020: Renewal of the thermal casing in the existing buildings (SPA30)
- Action Plan 2011-2020: Construction of new buildings and renewal of the existing ones with a high energy certification (SPA33)
- Action Plan 2011-2020: Construction or rehabilitation of nearly-zero energy buildings (SPA39)
- Technical Building Code (SPA36)
- “Revised” Regulation of Thermal Installations in Buildings (SPA37)
- Law on Sustainable Economy (SPA14)

Historical data

The actions within this measure keep the same policy as its homologous ones considered by former Action Plans, which already considered this energy efficiency area and developed actions of a similar kind.

With the approval of the TBC, in force since October 2006, a set of binding requirements were established for the design and construction of new buildings and a reference technical framework to support, with public funds, specific projects led to the modification of the elements included in the conditioning thermal systems of the existing buildings. This allocation of public funds has been carried out since 2006 by means of agreements between IDAE and the various Autonomous Communities, which resort to approved aid orders.

References

- Programme of the Energy Efficiency and Conservation, EECF, 1991-2000.
- Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002, on the energy performance of buildings.
- Energy Saving and Efficiency Strategy in Spain (2004-2012) E4. Ministry of Economy. November 2003.
- Action Plan 2005-2007. Ministry of Industry, Tourism and Trade-IDAE. (July, 2005).
- Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006, on Energy End-Use Efficiency and Energy Services
- Technical Building Code. Ministry of Housing. Royal Decree 314/2006, dated on 17th March 2006.
- Basic Procedure for the Energy Efficiency Certification of Newly-Built Buildings. Royal Decree 47/2007, dated on 19th of January 2007.
- Regulations on Building Heating Installations. Ministry of Industry, Tourism and Trade. July, 2007. Royal Decree 1027/2007, dated on 20th July 2007.
- Action Plan 2008-2012. Ministry of Industry, Tourism and Trade-IDAE. (July, 2007).
- Royal Decree 1369/2007, dated 19 October, on the establishment of an Ecodesign to be applied to EuPs.
- National Allocation Plan (NAP II) 2008-2012. Ministry of the Environment. Royal Decree 1370/2006, dated on 24 November 2007.
- Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.
- Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (recast).
- Directive 2010/31/EC of the European Parliament and of the Council of 19 May 2010, on the energy performance of buildings (recast)
- Law 2/2011, dated on 4th March 2011, on Sustainable Economy.
- Action Plan 2011-2020. Ministry of Industry, Tourism and Trade-IDAE. (August, 2011).
- www.idae.es