Basque Energy Strategy 2030

EUSKO JAURLARITZA
EKONOMIAREN GARAPEN ETA AZPIEGITURA SAILA

GOBIERNO VASCO
DEPARTAMENTO DE DESARROLLO ECONÓMICO E INFRAESTRUCTURAS

ENERGIAREN EUSKAL ERAKUNDEA
ENTE VASCO DE LA ENERGÍA

Legal register: BI-454-2017
100% recycled ECF paper

PHOTOGRAPHS
Pages 3, 8, 19, 27, 30, 51, 61, 63, 64, 65, 66, 67, 71, 78, 80, 82, 85, 87, 90, 94, 95, 115, 120, 124, 127:
CC BY-3.0-ES 2012/Basque Government/Irekia-Basque Government/Mikel Arrazola
Page 125: CC BY-3.0-ES 2012/Basque Government/Irekia-Basque Government/Pedro Odriozola

CONTENTS

1 INTRODUCTION

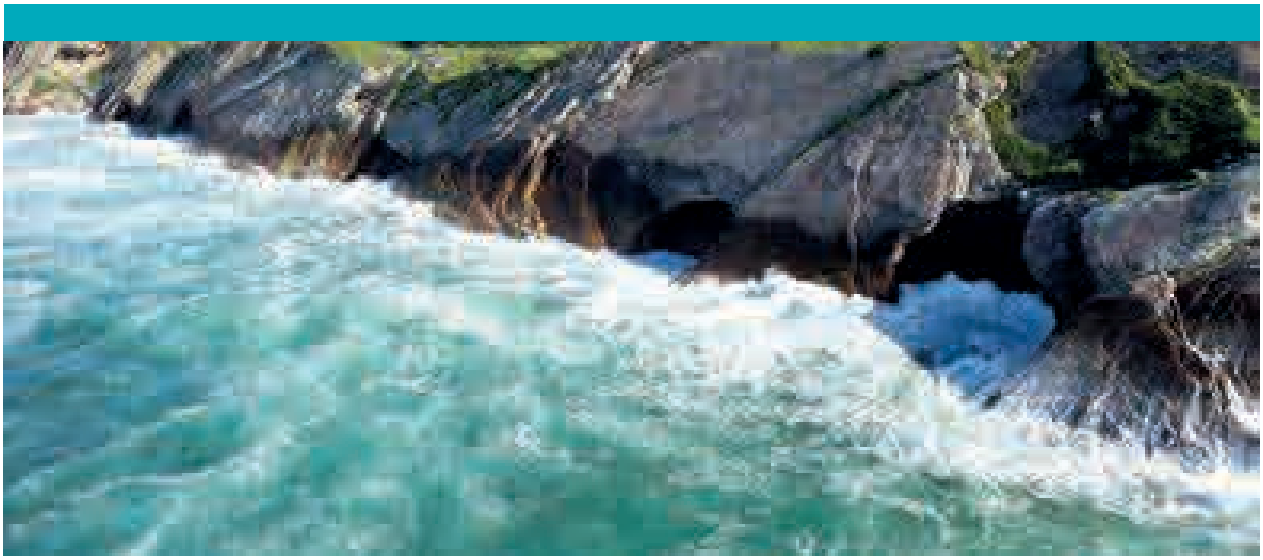
Since Basque energy policy was first established in 1981, its guidelines and directives have been set out in a series of documents. The Basque Energy Strategy 2020 (known as 3E2020), set out the strategic objectives, areas of activity and initiatives for the Basque Country in the period 2011-2020. The document was approved by the Basque Government in December 2011 and debated by the Industry Committee of the Basque Parliament in May 2012. The committee recommended that after some years, a review of the strategy should be made *"to adapt and update it to the legal, economic and budgetary framework and to any technological advances that had taken place since it was commissioned that substantially altered the strategic scenario, incorporating any proposed changes and indicators in the targets set".*

In recent years a number of factors have made a review of the Basque Energy Strategy necessary. The economic crisis has prevailed longer than initially forecast and recovery from the recession has been slow. Some areas of the economy have yet to return to pre-crisis levels of business. This is especially true in industry, where the repercussions in some subsectors may ultimately become structural.

At the same time, over the last four years a series of reforms in the energy industry in general, and the power industry in particular, have had a major impact. *Inter alia*, this reform has led to reductions in revenue from all regulated activities and an increase in costs for all consumers. There has also been a significant impact on CHP and renewable power generation facilities. Moreover, the policy of suspending the development of new renewable facilities and cutting back the bio share of motor fuel has resulted –at best– in the halting of progress in use of this resource. In the area of energy efficiency, these reforms have put the central government's initiatives to promote energy saving on the back burner and much of the EU's energy efficiency directive still remains to be transposed into Spanish law. There has also been a major change in the promotion of energy efficiency, with aid now centralised in the Spanish authorities, depriving the regional autonomous communities of their capacity for action and reducing effectiveness in the implementation of such measures.

In the technological area, some of the medium-term advances forecast have failed to take off at the anticipated rate. Vehicle electrification and alternative energy sources in transport are a case in point. Although structural changes in this industry are always slow, progress is well below target and the timescale for large-scale incorporation of alternative vehicles is being delayed. In addition, there was an abrupt change in the energy price scenario in 2014, with oil prices falling by 50%, which had a negative impact on other fuels such as natural gas. As for renewables, technological advances and cost reductions continue apace, allowing global development in this area, especially in the field of wind energy and solar photovoltaic. Despite the slowdown in implementation in this region in recent years, the use of renewables in distributed power generation is therefore expected to continue spreading in the medium term.

The Basque Energy Strategy 2020 (3E2020) allowed a large number of actions to be launched in the area of energy policy, though not all are on target. Indeed, while there have been notable improvements in energy efficiency and technological development, despite the economic crisis, and several energy infrastructures have been commissioned, progress has not been as marked in the area of renewable energy, despite the efforts of the Basque



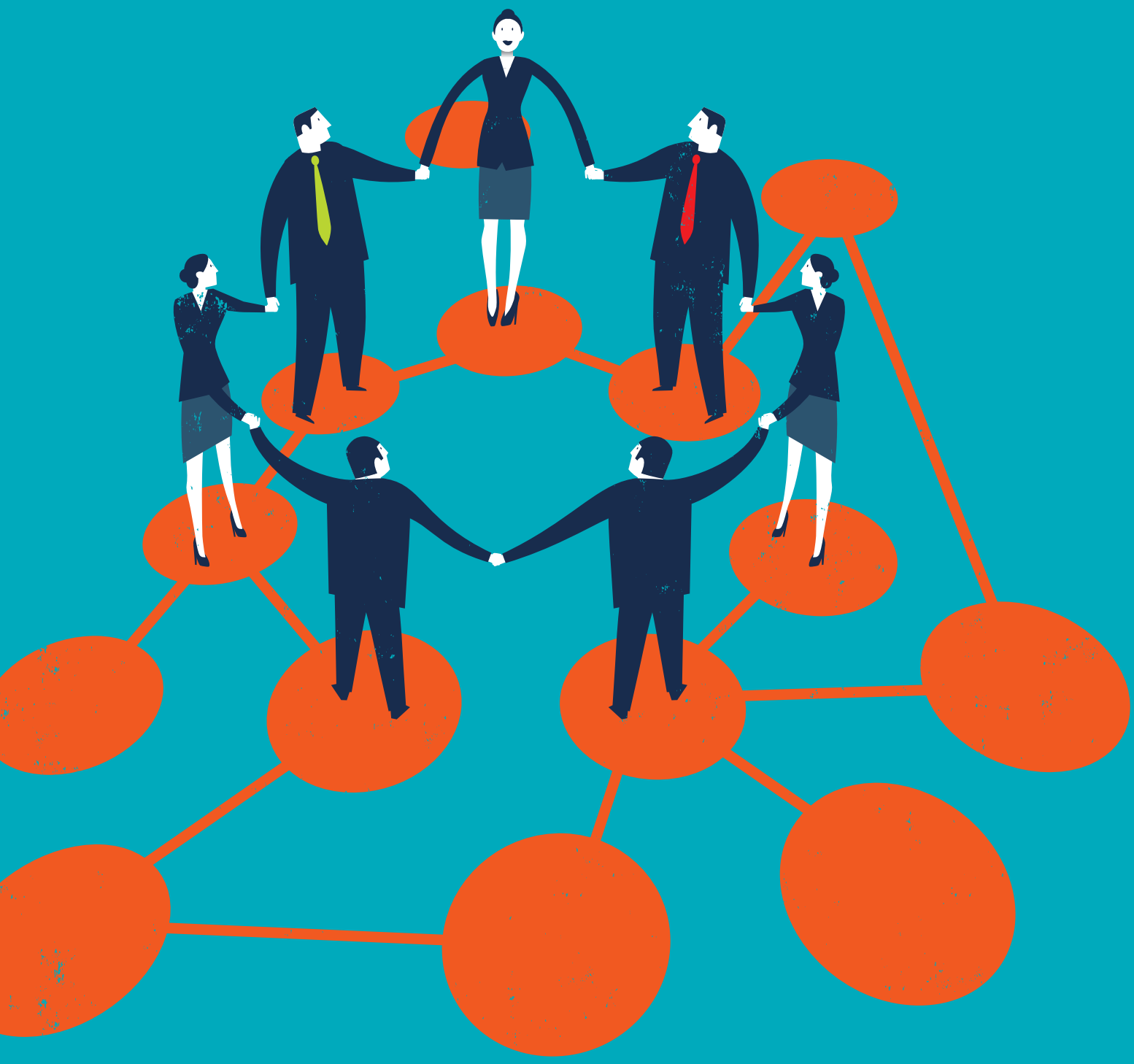
Government in providing support to a large number of small facilities.

The fight against climate change is one of the principal motivations for action in the area of energy sustainability. The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), published in 2014, reiterated that there is a clear human influence on the climate system through greenhouse gas emissions; that each of the last three decades has been hotter than the previous one and that climate change will magnify existing risks and create new ones for natural systems and human society. Decision making in this area is essential in order to limit climate change and its effects and to contribute to sustainable development and a more equitable world. The report states that without additional efforts to mitigate change on top of those already underway, by the end of this century the impact will be irreversible. The European Union, which is the world's leading player in fighting climate change, has established a number of actions with a view to meeting its energy and climate targets for 2020 and 2030, and it is within that framework that this Energy Strategy is published.

At the same time, with the global population increasing and with the GDP of certain developing countries growing far faster than that of developed countries, there is increased competition for raw materials, including energy, on globalised markets. Reserves of these raw materials, such as gas and oil, are limited and they are concentrated in a small number of countries with large reserves. This entails geostrategic risks and a volatility in prices that affects our markets.

It is necessary to review the targets set for 2020 and establish new ones for 2030. Within this context, energy efficiency and renewable energy are key tools for mitigating the environmental impact of our activities, reducing the cost of energy consumption for our populace, strengthening the competitiveness of our companies and advancing towards a sustainable society

2 ENERGY CONTEXT



2.1 EUROPEAN ENERGY POLICIES

STRATEGIC OBJECTIVES 2020 AND 2030

In order to meet its economic, social and environmental targets the European Union will need to face up to some major challenges in the area of energy: a growing dependence on imports; the volatility of oil and gas prices; climate change; increased demand and obstacles to the internal energy market.

In 2010 the European Commission proposed a new political strategy for supporting employment, productivity and social cohesion in Europe as a response to the period of transformation resulting mainly from globalisation, climate change and an ageing population. This strategy was set out in a communication entitled "Europe 2020: A strategy for smart, sustainable and inclusive growth"[1]. The document proposed a series of energy-related targets for the European Union:

1. A reduction in greenhouse gas emissions by 20% compared to 1990 figures with a commitment by international agreement to raise the target to up to 30%.
2. To achieve 20% of renewables in the EU's energy consumption by 2020 and 10% in the transport sector.
3. To increase energy efficiency in order to save 20% of the EU's energy consumption by 2020 as compared to projected figures.

The 2020 targets for reducing greenhouse gas emissions are set out in the "Climate and Energy Package". Legislative measures include Directive 2009/29/EC and Decision No 406/2009/EC, which seek to reduce greenhouse gas emissions (GGEs) by at least 20% by 2020. The Directive regulates approximately 40% of total GGE emissions, while the remaining 60%, generated in non-ETS sectors, are governed by Decision 406/2009/EC, which will therefore have a major influence in determining the actions to be undertaken to 2020. The aim of the Directive is to reduce all EU emissions covered by the emissions trading scheme (ETS) in specific industrial sectors by 21%, as compared to 2005 levels. The Decision determines the burden to be shouldered by each Member State in industries not included in the ETS market ("non-ETS sectors"), principally in the tertiary sector and transport. It sets specific 2020 GHG emission limits for each Member State, based on 2005 figures. Emissions reductions must be linear between 2013 and 2020. If any international agreement is reached on climate change, the emission allowances of Member States must be readjusted to meet the EU's collective reduction commitments.

The targets for renewables were set out in Directive 2009/28/EC[2] on the promotion of the use of energy from renewable sources.

With regard to energy efficiency, in a communication of July 2014[3], the European Commission stated that with the measures established and at current trends, the European Union would achieve energy savings of 18-19% in 2020. However, it said that even if all Member States properly implemented current legislation, it would be impossible to achieve a 20% reduction without additional measures.

Although the European Union is making progress in achieving its 2020 targets, creating an internal energy market and meeting other targets of energy policy, it is also involved in a deliberation on the best way of promoting continuous progress towards a low-carbon economy in the longer term. The ultimate aim is to build a secure and competitive energy system that will guarantee affordable energy for all consumers, increase the EU's energy supply security, reduce its dependence on imported energy and create new opportunities for growth and employment. A communication of January 2014[4], set out the targets within this new framework:

- A 40% reduction in greenhouse gas emissions by 2030 compared to 1990 to ensure that the lines of action are aligned towards meeting the 80% reduction target set for 2050.

[1] Europe 2020. A strategy for smart, sustainable and inclusive growth. COM(2010) 2020 final, Communication of the European Commission 3.3.2010.

[2] 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.

[3] Energy Efficiency Communication 2014. European Commission, 23 July 2014. http://ec.europa.eu/energy/efficiency/events/2014_energy_efficiency_communication_en.htm

[4] Communication from the Commission "A policy framework for climate and energy in the period from 2020 to 2030" Brussels, 22.1.2014, COM(2014) 15 final. http://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=CELEX:52014DC0015&from=EN.

- Increase in the share of renewable energy by at least 27% for the EU as a whole. This increase is necessary in order to promote investment in the renewable energy industry, which helps create growth and employment and improve supply security.
- By 2030, the Commission proposes a new energy efficiency target of achieving savings of 27% in comparison with the business-as-usual (BAU) scenario, having conditioned the previously proposed target of 30%[5]. The intended long-term benefits of this policy are to achieve cheaper energy, reduce dependence on external supplies and create opportunities for the economy and employment.
- Reform of the EU emissions trading scheme. The Commission proposes to establish a market stability reserve at the start of the next emissions trading period in 2021.
- Competitive, safe and affordable energy. A series of key indicators are proposed to assess progress over time and provide an objective basis for any political action that may be required. For example interconnection capacity among Member States, differences in energy prices between countries, dependence on local energy sources, etc.
- A new system of governance. A single voice based on national plans for competitive, secure and sustainable energy.
- Publication of a report comparing energy prices and costs in Member States and their trading partners.

The 2030 framework also takes into account the more long-term perspective established by the Commission in 2011, in the "Roadmap for moving to a competitive, low-carbon economy in 2050", the Energy Roadmap 2050[6] and the White Paper on Transport. These documents reflect an overall EU target of reducing greenhouse gas emissions by 80-95% compared to 1990 levels by 2050, as part of the effort required from developed countries.

[5] Energy Efficiency Communication 2014. European Commission, 23 July 2014.

[6] Energy Roadmap 2050, COM(2011) 885/2, European Commission.

ENERGY EFFICIENCY PLAN 2011

In March 2011, the European Commission approved the "Energy Efficiency Plan 2011" [COM(2011) 109 final], replacing its previous 2006 plan. The goal of achieving a 20% saving in primary energy consumption by 2020 is a key one for meeting long-term energy and climate change targets. Important steps have been taken in this direction, such as in the field of buildings and electrical appliances, but the European Commission feels that further steps are still required if the target is to be met. To this end, it proposes:

- Promoting the exemplary role of the public sector. High standards of energy efficiency should systematically be applied when public authorities purchase goods (e.g. ICT equipment), services (e.g. energy) and works (e.g. refurbishment of buildings). Targets include annual refurbishment of 3% of the floor area of public buildings, twice the present rate; promoting ESCOs; supporting the Covenant of Mayors and launching the Smart Cities initiative.
- Improving efficiency levels in existing homes. Integrating district heating in urban planning, promoting ESCOs, and technical training, especially in refurbishment of buildings.
- Defending consumer interests through labelling, energy metering and the use of ICT, providing clear information on energy consumption (labelling and eco-design of elements such as windows; presentation of consumption information to allow consumers to improve efficiency, making use of the opportunities provided by smart grids and smart household appliances).
- Efficient generation of heat and electricity in industry and the energy sector. Promotion of best available technologies (BAT), integration of CHP with district heating, encouragement of energy efficiency in power distribution, savings in industry through the ETS and a new directive on energy taxes, compulsory energy audits and provision of information to SMEs on financing and best practice.
- Publication of a white paper on efficiency in transport.
- Continuing to develop technology through the SET plan as a method for meeting targets at the lowest cost.

> " The goal of achieving a 20% saving in primary energy consumption by 2020 is a key one for meeting long-term energy and climate change targets"

THE 2012 ENERGY EFFICIENCY DIRECTIVE

Directive 2012/27/EU on Energy Efficiency was published following an assessment by the Commission of the situation with regard to national targets on energy efficiency for 2020 set by Member States within the framework of the 'Europe 2020 strategy', showing that the EU was far from meeting its 20% target. The Directive makes binding many of the fundamental measures proposed in its 2011 Energy Efficiency Plan. The measures established include: the need for a long-term strategy in each Member State to mobilise investment in the renovation of residential and commercial buildings, annual renovation of 3% of the total floor area of heated and/or cooled buildings owned and occupied by government, adoption of the obligation for suppliers to achieve 1.5% energy saving per year, design of a plan for potential development of high-efficiency CHP, preparation of plans on the potential for efficiency in transmission and distribution networks and promotion of the energy services market. Energy Efficiency Funds may be established. In Spain, the obligation on large companies to perform energy audits has been transposed through Royal Decree 56/2016[7].

[7] Royal Decree 56/2016, of 12 February 2016, transposing Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012, on energy efficiency, with regard to energy audits, accreditation of service providers and energy auditors and promotion of efficiency of the energy supply.

ENERGY CERTIFICATION FOR BUILDINGS

Directive 2002/91/EC[8] establishes the need for energy certification to promote energy efficiency of buildings in the European Union. Following several amendments, a new version was issued in Directive 2010/31/EU[9], which requires the establishment of an independent control mechanism in each Member State to ensure the quality of the Energy Efficiency Certificates.

[8] Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.

[9] Directive 2010/31/EC of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

ALTERNATIVE ENERGY SOURCES IN TRANSPORT

Directive 2009/28/EC set a target of a market share of 10% for renewable energy in transport by 2020. In its White Paper "Roadmap to a Single European Transport Area: Towards a competitive and resource efficient transport system" published in March, 2011, the European Commission called for a reduction in oil dependence in transport. It proposed a 60% reduction in greenhouse gas emissions from transport by 2050 compared to 1990 levels. *Inter alia*, it also considered the creation of a sustainable strategy on alternative fuels and the development of adequate infrastructure. Directive (EU) 2015/1513, amending Directive 2009/28/EC, sets a limit of 7% content of conventional biofuels by 2020, with the remainder up to 10% to be met by second-generation fuel and electricity from renewables.

In October 2014, the EU approved Directive 2014/94/EU[10] whose aim is to establish a common framework of measures for the creation of an alternative fuels infrastructure in the EU in order to minimise dependence on oil in transport and define the minimum requirements for the creation of this infrastructure and common technical specifications, particularly charging stations for electric vehicles and refuelling points for natural gas (LNG and CNG) and hydrogen.

[10] Directive 2014/31/EU of the European Parliament and of the Council of 22 of October of 2014 on the deployment of alternative fuels infrastructure.

INTERNAL MARKET AND INFRASTRUCTURE PROJECTS OF COMMON INTEREST IN THE EU

One of the EU's priority objectives in the area of energy is to create a competitive internal market, in order to offer consumers a choice between different gas and electricity suppliers at fair prices and to allow access to the market to all companies. In recent years the European Union has taken significant steps towards integration of its energy markets, encouraging aspects such as price transparency, consumer protection, cooperation among energy regulators and energy transport networks[11]. Although exchange between different European markets has grown, the capacity of international gas and electricity connections continues to be low and projects must therefore be developed to improve this area.

The initiative "*Connecting Europe Facility*" has a budget of 5.85 billion euro to support trans-European energy infrastructures to 2020. A list has been drawn up of 248 key projects, known as "projects of common interest" (PCIs) [12].

This list includes an underwater electrical interconnection between Aquitaine and the Basque Country as part of the priority corridor of electricity interconnections in the north-south axis of Western Europe, as well as a phase-shift transformer in Arkale to increase capacity of the interconnection between Argia and Arkale. In November 2014, funding was received from the EU to study the first of these two projects. A PCI must represent significant benefits for at least two Member States, contribute to market integration, encouragement of competition and reduction of carbon emissions. The list of PCIs will be updated every two years. (Regulations 347/2013[14] and 1391/2013[15]).

A project has been submitted to the *Connecting Europe Facility* programme for supplying liquefied natural gas to ships in Bilbao Port. The project has been rated positively by the European Commission.

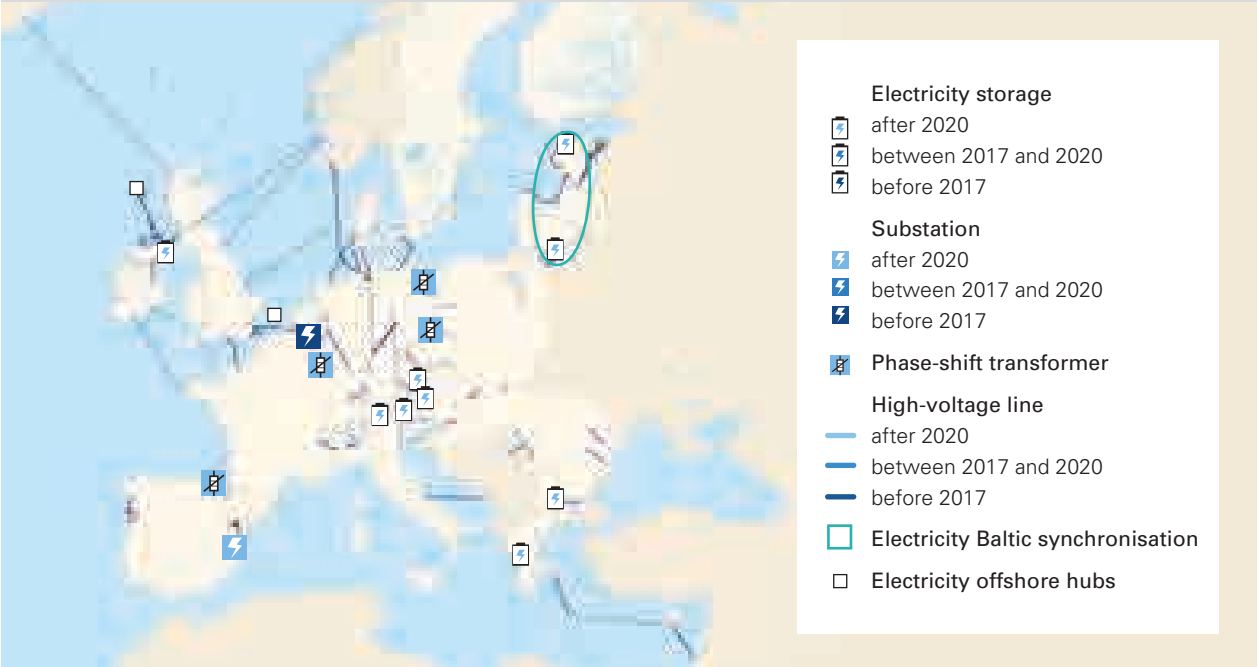


FIGURE 1. European Projects of Common Interest: power lines (Source: European Commission)[13]

[11] http://europa.eu/legislation_summaries/energy/internal_energy_market/

[12] http://ec.europa.eu/energy/infrastructure/pci/pci_en.htm

[13] https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest

[14] Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009.

[15] Commission Delegated Regulation (EU) No 1391/2013 of 14 October 2013 amending Regulation (EU) No 347/2013 of the European Parliament and of the Council on guidelines for trans-European energy infrastructure as regards the Union list of projects of common interest.

2.2 ENERGY POLICY WITHIN THE SPANISH STATE FRAMEWORK

Spain's energy demand depends to a great extent on imports, with a very significant share of fossil fuels in total energy consumption. Consumption grew at a fast rate during the years of the economic boom and has increased moderately since 2008. There is extensive penetration of natural gas with diversification of supply sources despite the absence of local resources. Renewable energy sources now account for a significant share of power production; nuclear power has been maintained as the base producer, meeting nearly a quarter of power demand, while output from fossil-fuel-fired power plants (using local and imported coal and natural gas) has been cut as a result of a fall in consumption.

Spanish strategy in this area has been determined by the guidelines of European energy policy and centres on climate change, energy saving and efficiency, renewable energy, diversification of primary energy sources and development of infrastructures.

THE RENEWABLE ENERGY PLAN 2011-2020

Directive 2009/28/EC targets a minimum share of 20% of energy from renewable sources in the EU's final gross energy consumption (the same target is established for Spain), and a minimum share of 10% of energy from renewable sources in energy consumption in the transport sector by 2020.

In November 2011, the government approved the Renewable Energy Plan (REP) 2011-2020, which included design of new energy scenarios and established targets in line with Directive 2009/28/EC. The year before, a National Renewable Energy Action Plan (NREAP) had been presented in Brussels, charting the path for meeting the Spanish government's commitments. The REP 2011-2020 sets an overall target of a 20.8% contribution from renewable energy by 2020. It also envisages that 38.1% of electricity consumption and 11.3% of consumption in transport will be met by renewables, essentially through 35,000 MW of onshore wind, 750 MW offshore wind, and 12,050 MW solar.

During the first decade of the century, a legal framework for supporting renewable energy was built up. This included tools such as payment for power produced by "Special Framework" facilities, approval of a Technical Building Code (TBC)[16] with greater demands on new buildings with regard to supply from renewables, and the imposition of minimum biofuel levels in the distribution of transport fuels. As a result of this framework, by 2010 renewables accounted for 11.3% of primary energy.

However, above-forecast growth, primarily in the installation of wind and photovoltaic facilities, was slowed by the government through the imposition of

a series of measures (described below in the section on reform of the power industry). In 2013, renewable energy contributed to meeting 14.2% of Spain's final gross energy consumption[17]; in 2010 the percentage was 13.2%.

[16] Royal Decree 314/2006 of 17 March 2006, approving the Technical Building Code.

[17] Energy in Spain 2013, Ministry for Industry, Energy and Tourism.

ENERGY SAVING AND EFFICIENCY

The Energy Saving and Efficiency Action Plan 2011-2020 is the second national action plan in this area, continuing on from the plans previously approved by the Spanish government within the framework of the Spanish Energy Saving and Efficiency Strategy 2004-2012 (E4), approved in November 2003. It therefore includes an assessment of the energy savings resulting from the 2005-2007 and 2008-2012 action plans.

The Action Plan 2011-2020 establishes a series of measures and actions, and the target scenario includes a target of a 0.8% year-on-year increase in primary energy consumption from 2010 and a 1.5% annual improvement in primary intensity between the two years. The measures included in the Action Plan 2011-2020 will lead to savings equivalent to 20% of the primary energy consumption that would have existed in 2020 without the policies on diversification and promotion of renewable energy approved by the Spanish government and those contained in the action plan itself. The Action Plan 2011-2020 therefore meets the saving targets required under Directive 2006/32/EC and is consistent with the overall targets agreed by the European Council on 17 June 2010 with regard to a 20% improvement in primary energy efficiency by 2020. To meet this target, it will be necessary to mobilise investment of €46 billion, with public support of 11%.

> " Each Member State must set up an energy efficiency obligation scheme to ensure that energy distributors and retailers achieve savings equivalent to 1.5% of their annual energy sales from 2014"

Article 7 of Directive 2012/27/EC on energy efficiency establishes that each Member State must set up an energy efficiency obligation scheme to ensure that energy distributors and retailers achieve savings equivalent to 1.5% of their annual energy sales from 2014. In order to meet their annual obligations, obligees must make a financial contribution to a National Energy Efficiency Fund as established in Royal Decree-law 8/2014[18] and Order IET/289/2015[19].

[18] Royal Decree-Law 8/2014, of 4 July, approving urgent measures for growth, competitiveness and efficiency.

[19] Order IET/289/2015, of 20 February, establishing obligations to contribute to the National Energy Efficiency Fund in 2015.

PLANNING OF ELECTRICITY AND GAS TRANSPORT NETWORKS

The current infrastructure plan covers the period 2008-2016, and applies to both the electricity and gas industries. It was approved in May 2008. Since this time, there have been a number of deviations between forecast and real growth in supply and demand, essentially as a result of the economic crisis. New electricity and gas network plans are being developed within the framework of the process of reform of the Spanish energy industry, which targets tariff sufficiency and long-term economic balance on the one hand, and adaptation of the electricity and gas industries to the new economic scenario on the other. This is to be achieved by rationalising costs and introducing mechanisms of efficiency that will enable improvements in the competitiveness of the economy in general and industry in particular.

The electrical planning process was reviewed in 2010, but this process was halted in 2012, when measures were introduced to correct the tariff deficit in the electricity and gas industries caused by a fall in energy demand in recent years and a surplus of installed capacity. In December 2012 a new review process was launched for planning of the electricity industry to 2020. Following submissions from agents in the industry, new generators, regional governments, etc., the document 'Energy Planning - Development Plan for the Power Transmission Network 2015-2020' was finally approved in December 2015.

COMMITMENTS ON REDUCTION OF GREENHOUSE GAS EMISSIONS

For non-ETS sectors (i.e. those not covered by the European Emissions Trading Scheme), a decision by the European Parliament and of the Council of 23 April, 2009 requires Spain to cut greenhouse gas emissions by 10% in 2020 as compared to 2005. The guideline draft energy plan prepared under the provisions of the Sustainable Economy Act (Act 2/2011), establishes the new scenarios for Spanish energy trends to 2020, the resulting energy balances and an analysis of demand coverage based on existing supply and the forecast incorporation of new infrastructures. This draft estimates that in a central scenario non-ETS emissions will be cut by 15.7% with respect to 2005. With these plans and initiatives, a major effort is expected from the Spanish government to comply with the principal targets of the Kyoto Protocol; during the period 2008-2012, emissions were 23.7% higher than in 1990, nearly 9 points above the 15% target set under the Kyoto protocol. This difference has been covered with the flexibility mechanisms established in the treaty, purchase of emission allowances and accounting of changes in land use.

STRUCTURAL REFORM OF THE ELECTRICITY INDUSTRY

Over the last decade an imbalance has developed between income and expenditure in the power system. This is what is known as the "tariff deficit". The imbalance has been exacerbated by the economic and financial crisis, which led to a reduction in energy consumption and in the use of energy infrastructures following the expansion of the boom years. The need to correct the imbalance between costs and the revenue obtained by the system has led to a major reform of various aspects of Spanish energy markets in recent years. Measures include a new Electricity Industry Act, a limitation on premiums for existing renewable and CHP facilities, the suspension of the premium for new installations and the levying of new taxes. The result has been a profound remodelling of the energy scenario.

Since 2012, the Spanish government has introduced measures to try to slow down the imbalance in the electrical system (the so-called "tariff deficit"). *Inter alia*, a regulation was introduced suspending the procedures for pre-allocation of payments and temporarily removing economic incentives for new Special Framework facilities until the problem of the deficit in income of the electrical system was solved. The bulk of the "energy reform" was adopted in 2013, as part of the move to correct these imbalances. The reform seeks to reduce costs and increase revenue through access charges. New measures have been introduced to correct imbalances between the costs of the electricity industry and the income it obtains from regulated prices. The formula for updating Special Framework facilities was amended. Under the new arrangement, payment to all Special Framework facilities should be made on the basis of the regulated tariff formula, unless the owner of the installation chose to receive only the market price (with no premium). The bulk of the regulations reforming the electricity industry were approved in July 2013. These included the first draft of the Electricity Industry Act, published in December of the same year, which established a series of measures affecting all activities of the electricity industry, which were intended to ensure the financial stability and economic sustainability of the electrical system. Nine Royal Decrees were also published (covering areas such as self-consumption, renewable energy, CHP and waste, new payment to transport, distribution, non-mainland territories, the new interruptibility service, capacity and hibernation mechanisms, marketing and contracting conditions, new invoice model), and two Ministerial Orders (one on access charges and the other on unconsumable renewable energy).

These legislative developments accompanying the energy reform continued with publication of new methods for calculating payment to transport and distribution. Finally, the CESUR auctions, which had determined the price of the Tariff of Last Resort, were cancelled.

Also in 2013 targets on biofuels in transport for 2013, 2014 and 2015 were reduced. The policy on biofuels was "reoriented" on the grounds that biofuels are more expensive than fossil fuels and have a significant impact on the retail price of diesel.

Other legislation included new methodology on voluntary prices for small consumers, distribution of the social bonus and regulation and new payment methodology for renewable energy sources, CHP and waste. Standards on payments for renewables and combined heat and power were subsequently issued which had a major impact on sectors such as industry, where CHP is extensively used. The 'power interruptibility' system was also amended to introduce a system of competitive auctions for products related to the service.

> " New measures have been introduced to correct imbalances between the costs of the electricity industry and the income it obtains from regulated prices"

One of the key ways of increasing development of small distributed power facilities using renewables (such as PV) is to encourage self-consumption. Royal Decree 900/2015, passed in October 2015, regulates electricity supply with self-consumption and requires consumers operating under the self-consumption system to pay a share of the costs of the system.

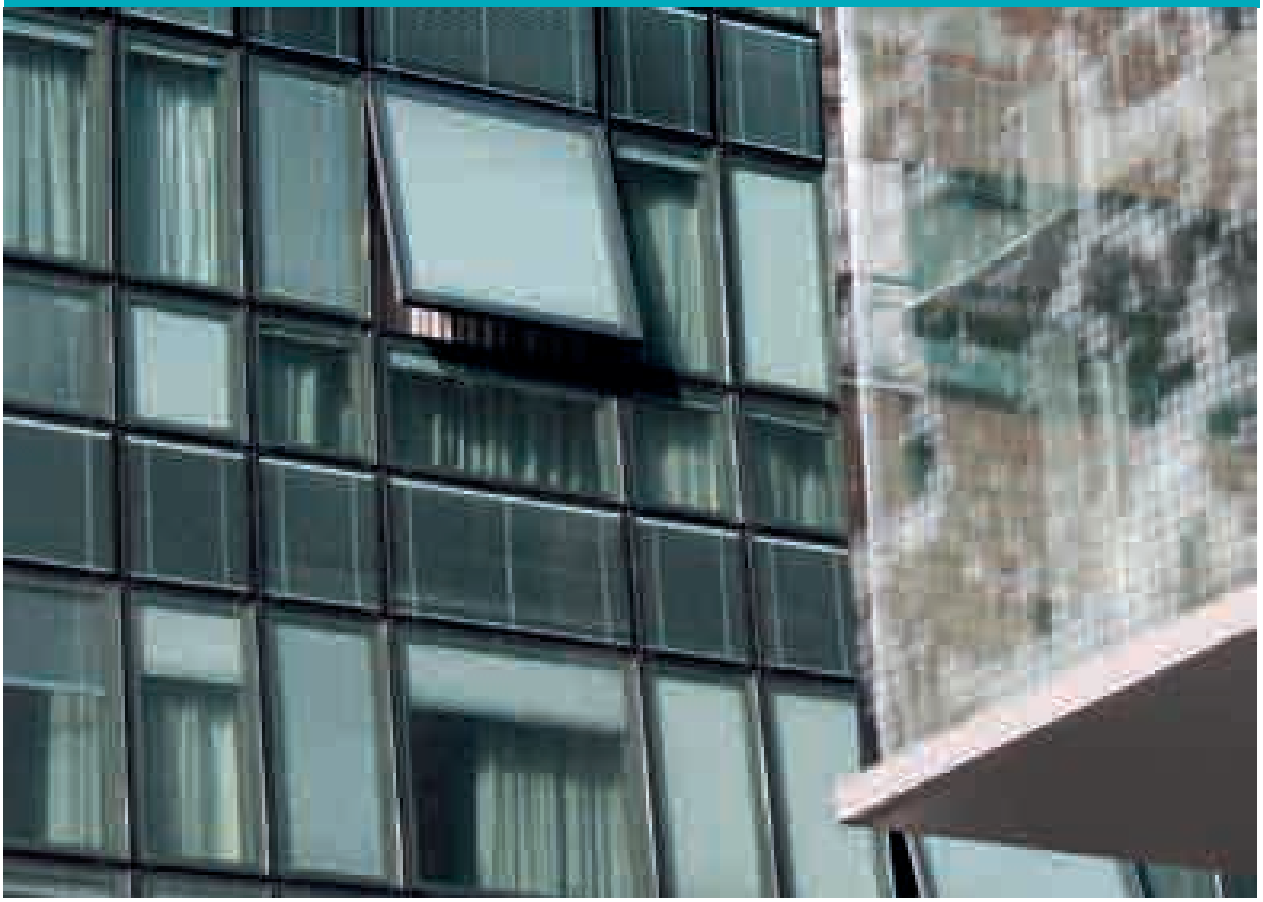
NEW ENERGY TAXES

Act 15/2012 on fiscal tax measures for energy sustainability (27 December 2012) seeks to harmonise Spain's tax system with more efficient, environmentally-friendly and sustainable usage, in consonance with the basic principles underlying the EU's fiscal, energy and environmental policies. The additional revenue is to be used to help alleviate the tariff deficit. New taxes are established on power generation and natural gas consumption in general. Taxes are also levied on the consumption of coal, fuel oil, diesel for the generation of electricity, and a charge is introduced on hydroelectric production. Act 16/2013 also modifies "special taxes" (excise duty), and enacts a 85% reduction in electricity tax for certain uses of electricity (chemical reduction and electrolytic processes, mineralogical processes, metallurgical processes, etc.). They may be no lower than €0.50/MWh when the electricity supplied is for industrial uses.

CHANGES TO THE REGULATIONS ON NATURAL GAS

The mismatch between income and expenses of the gas system may be considered to be a structural deficit. This situation made it necessary to update the regulatory framework governing payment for regulated activities. Having identified the extent of the deficit in the gas system, Royal Decree Law 8/2014 established measures for reducing payment for all regulated activities: transport, regasification, basic storage and distribution. The law also covered technical management of the system. The parameters for payment of these activities are established for regulatory periods of six years, taking into account the cyclical situation of the economy, demand for gas, adequate payment for these activities and the economic and financial balance of the system during the regulatory period.

" Act 16/2013 also modifies "special taxes" (excise duty), and enacts a 85% reduction in electricity tax for certain uses of electricity (chemical reduction and electrolytic processes, mineralogical processes, metallurgical processes, etc.)"



ENERGY CERTIFICATION FOR BUILDINGS

Royal Decree 47/2007, approving the basic procedure for the energy efficiency certificate in new buildings, allows for the possibility that the energy efficiency certificate should be subject to external control in the form and within the scope established by the competent body in the autonomous community. This control must be performed on all Energy Efficiency Certificates, both for designs and for finished buildings, classified as A, B or C. Decree 240/2011, governing energy efficiency in new buildings, regulates exercise by the regional government of the administrative functions required for due application of the basic procedure for energy certification of buildings located in its territorial area.

Royal Decree 235/2013, transposing the regulation on the certificate of energy efficiency in buildings established in Directive 2010/31/EU, sets out the basic procedure certifying energy efficiency in buildings. When premises are built, sold or leased, buyers or users of the buildings must be furnished with an energy efficiency certificate containing objective information on energy efficiency. In this way, the owners or lessees of the building (or any part thereof) can compare and assess its energy efficiency. All new buildings built from 31 December 2020 (31 December 2018 if they are publicly-owned) must be nearly zero-energy buildings. The minimum requirements that must be satisfied by those buildings have yet to be defined and will be as established in the Technical Building Code. It is mandatory to obtain the certificate and exhibit the energy efficiency label in publicly-used buildings. Each autonomous community has a system for registering the energy efficiency certificates of buildings, homes and other premises.

In December 2014, Decree 226/2014, published in the Official Gazette of the Basque Country approved the basic procedure for energy efficiency certification in buildings in the Basque Country and included the provisions of Royal Decree 235/2013. Subsequently, the Order of 16 March, 2015 regulated control and registration of Energy Efficiency Certificates. Energy efficiency must be certified by an authorised technician in the following cases:

- New buildings.
- Buildings or parts of existing buildings that are sold or rented to a new lessee, provided that they do not have a valid and current certificate.
- Buildings or parts of buildings in which a public authority occupies a total usable floor area of more than 250 m^2 and which are commonly frequented by the public.

3 VISION AND OBJECTIVES OF THE ENERGY STRATEGY

3.1 ENERGY IN BASQUE INSTITUTIONAL POLICIES

ENERGY IN THE BASQUE GOVERNMENT'S SECTORAL POLICIES

Sustainability

The Strategy on Sustainable Development - EcoEuskadi 2020 - approved by the Government in July 2011 is transversal in nature and forms a framework strategy for all public action by the Basque Government. In its diagnoses of the situation, EcoEuskadi 2020 states that of the three main threats to the welfare system, two are related to energy: depletion of resources (including energy fossils) and climate change, also linked to the current energy model. Of the nine strategic objectives of EcoEuskadi 2020, two are related to the energy strategy:

- To preserve our natural resources and biodiversity by undertaking respectful and balanced planning of land, infrastructures, amenities and homes.
- To minimise energy dependence on fossil-based energy types and mitigate emissions of greenhouse gases and the effects of climate change.

The action lines contained in the Sustainable Development Strategy include promotion of energy efficiency and reduction in consumption, backing for generation and use of renewable energy sources and promotion of the most sustainable forms of transport. The transverse foci include the work line on promoting investment in education, R&D+I and ICT, developing habits of sustainable consumption, advancement in the development of more sustainable cities and promotion of values of sustainability.

Land Use Planning

Given the influence of planning on the urban model and thus on energy consumption in areas such as the residential and transport sectors, it is necessary to coordinate land use planning with other policies such as energy policy.

The philosophy behind redesign of spatial development planning guidelines is set out in a document entitled "Change to Spatial Development Planning Guidelines resulting from restudy - document for initial approval"[20] ["*Modificación de las DOT como consecuencia de su reestudio - documento para la aprobación inicial*"]. The document highlights the key importance of the territorial model and of land and urban planning initiatives in ensuring sustainable development. In contrast to a previous emphasis on growth, it calls for a recovery of the density of urban settlements and a limit on the expansion of built areas. The urban configuration and location of certain services are vitally important for reducing the need for motor transport and promoting the use of shared transport systems. It is therefore proposed to reinforce linear development axes that incentivise activity and the use of public transport services and a denser

[20] Amendment to the SDPG arising from Restudy. Document for Preliminary Approval. Basque Government Department of the Environment, Spatial Development Planning, Agriculture and Fishing, February 2012.

and more effective urban structure based on polycentralism in order to reduce travelling needs. The extension of the pedestrian and cycle network and a policy of reinforcing traditional urban centres are key to reducing the need for motorised mobility. It is also necessary to incorporate the bioclimate principles of urban and architectural design into new developments. The document highlights the importance of solar and wind energy collection for domestic and tertiary supply as a means of reducing greenhouse gas emissions.

The section of the document covering strategies of sustainability and climate change argues that priority must be given to actions that will help increase energy efficiency. It also sets out criteria for developing Partial Provincial Plans (PPPs), Territorial Sector Plans (TSPs) and municipal planning in the areas of energy efficiency and renewable energy sources. Within these criteria it is proposed to include action programmes for improving the energy efficiency of existing buildings and urbanised spaces, requiring the use of bioclimate criteria that minimise energy consumption, using vegetation in buildings and public spaces, promoting the use of systems of energy self-sufficiency (through systems for harnessing solar, wind, biomass energy, etc.), in buildings and facilities of all kinds, regulating public lighting and planning wind farms via a territorial sector plan.

The targets proposed in the base document for reviewing the spatial development planning guidelines of November 2015 in the area of energy[21] centre on:

- Integrating guidelines on energy sustainability into public policies, and more specifically into territorial and urban planning[22].
- Orienting the targets of the urban environment in the areas of housing and mobility towards zero greenhouse-gas emissions, through a major increase in energy efficiency, generalisation of the use of renewable energy sources and a stimulus to self-consumption.
- Advancing towards nearly-zero energy building solutions.
- Encouraging use of public transport with clean and effective shared transport systems.

Territorial guidelines must be geared towards:

- Including measures in territorial and urban planning to reduce energy consumption requirements, increase the efficiency and use of non-pollutant energy sources and systems, and increase any land reserves that may be required to create the necessary infrastructures.
- Promoting the publication of studies assessing the energy sustainability of territorial and urban planning, taking the following into account as criteria for adapting to energy sustainability requirements: implementation of renewable energy in buildings, infrastructures, sustainable mobility.
- Transposing sectoral energy targets to the territory through the adaptation of Partial Provincial Plans.
- Reviewing the TSP on wind power and adapting it to current energy requirements, based on the sectoral targets to be met with renewable energy and specifically wind power.
- Promoting the use of public transport services and effective and densified urban structures in order to reduce displacement needs, and encouraging transport systems that use non-oil energy sources, such as electricity and natural gas.
- Favouring energy self-sufficiency by way of systems for harnessing solar, wind, biomass energy, etc. in buildings and facilities of all kinds, prioritising heating solutions using renewable energy and the use of energy self-consumption systems in isolated buildings located on undeveloped land.
- Encouraging the use of energy-efficient public lighting devices.
- Ensuring that when planning power lines, the municipal plan and relevant sectoral actions take into account a variety of sustainability criteria, for example in relation to maintenance pruning, fireproofing systems, line supports, requirements for routing new lines, alternatives for new power transport lines, etc.
- Studying the cumulative effect of hydroelectric power facilities.

[21] Review of Spatial Development Planning Guidelines of the Autonomous Community of the Basque Country - Base Document - November 2015.

[22] In accordance with the terms of Decree 178/2015 of 22 September, on the energy sustainability of the public sector in the Autonomous Community of the Basque Country.

Mobility

Part of the mission of the Master Plan on Sustainable Mobility in the Basque Country 2020[23] is to improve the environmental quality and conservation of the natural environment, with a commitment to the most energy-efficient and least pollutant alternatives and options. The plan's seven strategic lines of action therefore include: achieving an integrated passenger transport system, taking the train as its reference point; promoting an integrated logistical system to foster intra-regional goods distribution; promoting the most sustainable means of transport and discouraging individual car use while incentivising efficient driving and use of the most sustainable energy sources and promoting mobility governance.

Measures established in the Master Plan on Sustainable Mobility in the Basque Country 2020 in the area of "Promoting the Most Sustainable Means of Transport and Discouraging Individual Car Use":

- Regulation on mobility in urban and territorial planning.
- Definition of contents of mobility planning.
- Incentivising the creation of Sustainable Urban Mobility Plans and activity centres.
- Incentivising the creation of sectoral mobility plans.
- Introducing subjects related to sustainable mobility into the school curriculum.
- Information campaigns.
- Training of mobility managers and technicians.

Housing

According to the diagnoses performed under the Housing Master Plan 2013-2016[24], Basque housing stock includes a large number of homes that require rehabilitation. The plan's guiding principles include: "Promotion of rehabilitation, renovation and urban regeneration: Making full use of the built city, particularly any actions intended to improve sustainability and energy saving". Specifically, the fourth strategic axis of action seeks to promote a new model of sustainable rehabilitation. Its lines of action include support for building conservation and maintenance, promotion of a new comprehensive management model for rehabilitation, promotion of new ways of fostering employment related to rehabilitation and reinforcing the quality of housing. The actions established within these lines include support for the performance of technical building inspections, moves towards a low-carbon economy through actions in homes with high rates of energy consumption, promotion of urban regeneration, creation of tax incentives for rehabilitation, simplification of aid programmes and publicising of the existence of this aid, and promotion of the role of Urban Rehabilitation Companies.

[23] Master Plan for Sustainable Mobility in the Basque Country 2020, Department of Housing, Public Works and Transport 2012.

[24] Housing Master Plan 2013-2016. Department of Employment and Social Policy. December 2013.

Environment

Given that one of the main pillars of the energy strategy is environmental improvement, the strategy must be in line with the government's environmental objectives. The Basque Government's successive environmental programmes have set out guidelines and lines of action for developing the energy strategy. The aim of the current Environmental Framework Programme 2015-2020 is to channel all the government's public policies, directives and targets in the field of the environment and sustainable development. The programme is geared towards a horizon of 2020, in order to align it with the principal EU environmental references and in particular, the Seventh General Union Environment Action Programme to 2020, "Living well, within the limits of our planet". Considering each environmental theme area, priority is given to the transformation of the energy model, the circular economy and mobility management.

Among the environmental challenges thought likely to mark the course of the Basque Country's environmental policy in coming years, there is one that is directly related to the Energy Strategy 2030. This is the energy/climate-change binomial, which entails transforming the energy model, and its relationship with the shift towards a low-carbon economy. This must all be in line with the global challenge of climate change which will require a new way of understanding and using energy, taking measures to reduce its impact, with a particular emphasis on mobility and urban regeneration. Natural gas and renewables are seen as key factors in demand, the economy and energy and environmental sustainability.

The vision of the Environmental Framework Programme 2015-2020 is summarised in its 6 strategic objectives:

- To protect, preserve and restore our natural capital, conserving the services provided to us by our ecosystems.
- To progress towards a competitive, innovating, low-carbon and resource-efficient economy.
- To promote and protect the health and welfare of our populace.
- To increase the sustainability of the territory.
- To guarantee the consistency of policies by intensifying environmental integration.
- To contribute to the international projection and responsibility of the Basque Country.

The objectives of the energy strategy are closely linked to the second of these strategic objectives, through the promotion of energy saving and

efficiency and renewable energy sources, in other words, through the contribution to a low-carbon resource-efficient economy. The Energy Strategy will be the main instrument for developing one of the actions included in Action Line 2.1 "To promote a competitive low-carbon economy".

In 2015 the Basque Government approved the Basque Strategy on Climate Change 2050. This Strategy sets a 35-year horizon, with an initial execution period running from 2015 to 2020, during which the progress of the actions and targets established in the strategy, as well as implementation of inter-departmental and inter-institutional actions, will be assessed. In 2020 the actions for the second period of execution, 2020-2030, will be redefined. Seventy specific actions have been identified for the first period to 2020 in order to meet the nine proposed targets and progress towards meeting the 2050 targets, which involve:

- Reducing Basque GHG emissions by at least 40% in 2030 and at least 80% in 2050 (compared to 2005).
- Achieving 40% of final consumption from renewable energy by 2050.
- Assuring the resilience of the Basque territory to climate change.

Given that climate change mitigation and reduction of greenhouse gas emissions is closely related to energy saving, energy efficiency and renewable energy, the Basque Strategy on Climate Change 2050 establishes the following lines of action in line with the strategic objectives of the Energy Strategy:

- To improve energy efficiency and manage energy demand.
- To promote renewable energy sources.
- To promote criteria of energy efficiency and renewable energy in the urban environment, working towards "zero emission buildings".
- To promote intermodality and the use of transport with lower GHG emissions.
- To replace the consumption of petroleum products.
- To commit to a low-carbon energy model.
- To advance towards emissions-free transport.
- To reduce emissions from the primary sector.
- To promote innovation and improve and transfer scientific knowledge.

Basque Government's plan for energy sustainability of buildings

Decree 178/2015 on the energy sustainability of the public sector of the Autonomous Community of the Basque Country has now been approved. This Decree establishes the basic objectives for improving energy efficiency and incorporating renewable energy in buildings, facilities and vehicles owned by the Basque Government and its dependent companies. This initiative stresses the example-setting role of the public administration in this area.

TERRITORIAL AND LOCAL ENERGY PLANS

Historical Territories (Provinces)

The Provincial Government of Alava's Mugarri Plan sets out a strategy and action plan for promoting and developing renewable energy in the province in the period 2010-2020 and for improving energy efficiency. Following an analysis of potential, the plan sets out the lines of action for promoting solar, mini-wind, geothermal, biomass and hydroelectric power. It also lays out actions intended to seek more energy-efficient urban models, a reduction in the dependence on private vehicles and an improvement in efficiency in the industrial and agricultural sectors. Finally, it sets out the initiatives that must be taken to encourage a commitment by society and to make use of business opportunities among companies in the sector. The plan involves total investment of €12m for its first five years.

The Provincial Government of Bizkaia has rolled out a set of strategic lines, aims and actions intended to advance towards greater sustainability under its Bizkaia 21 programme (2011-2016). Specifically in the field of energy, in December 2013, the provincial government approved its Sustainable Energy Strategy for Bizkaia (EESB 2020), which establishes lines of action in the areas of responsible citizenship, exemplary public administration and smart territory. The strategy is intended to foster active and responsible citizens in order to promote more sustainable transport and more efficient housing, government tax incentives and public green procurement and reduction in consumption by public authorities and to promote the incorporation of energy as a core element in the action plans contained in municipal Local Agenda 21 programmes. It also seeks to promote opportunities for industrial and business development in sustainable energy.

In October 2013, the province of Gipuzkoa approved its Energy Plan 2012-2015. Actions proposed in the plan include fiscal policies, promotion of sustainable energy among SMEs, actions in the area of mobility and public transport, urban planning, promotion of distributed generation, encouragement of local action through Local Agenda 21, sustainable energy management of buildings owned by the provincial government and actions in the area of training, communication, promotion and demonstration of energy saving and efficiency and renewable energy. The government of Gipuzkoa has aid programmes for encouraging energy saving and local efficiency.

The provincial governments have established a number of aid programmes to foster energy sustainability in their territories, covering both the promotion of energy efficiency and the installation of renewable energy[25].

Local plans

Municipal authorities have extensive tools available for the purpose of performing actions in the field of sustainable energy in the area of mobility and the government sector. They have other more limited tools in the industrial, residential and tertiary sector. Through their general urban development plans they have the power to take action with regard to some of the items with most influence on energy consumption at a local scale, such as building heights, residential density, car parks and transport infrastructures. Design criteria are also introduced in public lighting which accounts for a significant proportion of energy consumption by local authorities. Municipal authorities have extensive powers when it comes to managing mobility in their municipalities. Restrictions on vehicle access, traffic calming, parking policies and the availability of bicycle lanes all depend on decisions taken at municipal level and all affect energy consumption in transport. Municipal authorities can also influence the decisions made by citizens through awareness-raising campaigns, fiscal policies and reductions in rates.

Many municipal authorities have mechanisms in place for transferring the overall concept of sustainable development to a local scale. These include Local Agenda 21 or, concentrating more specifically on the area of energy, the Covenant of Mayors. The Covenant of Mayors, promoted by the European Commission, recognises the important role of municipal and local government in policies on sustainable energy. Municipal and local governments that have signed up to the Covenant have to prepare sustainable energy action plans (SEAPs) setting out the measures to be introduced to meet that target. SEAPs prepared within the framework of the Covenant of Mayors include measures relating to the residential and tertiary sectors, such as rehabilitation of facades, renovation of boilers and household appliances, encouragement of renewable energy, use of low-consumption bulbs and adjustment of the temperature in the home. These measures are normally levered with awareness-raising campaigns, backed by strategies and aid from other institutions. In some cases local tax measures are also proposed in the plans, such as tax allowances on the tax on construction, installations and site work and property tax, for rehabilitation or renewables and amendments to motor tax to incentivise more efficient vehicles and penalise higher consumption and emissions, in order to influence local people's purchase decisions. The SEAPs also propose other measures for promoting efficiency such as the requirement for a certain minimum level of energy classification for services buildings, and the installation of micro-CHP and district heating systems.

" Design criteria are also introduced in public lighting which accounts for a significant proportion of energy consumption by local authorities"

The area of mobility covers promotion of the use of public transport, bicycles and walking, as well as the use of cleaner vehicles and more efficient driving practises. Initiatives include traffic calming, improvement in pedestrian accessibility, introduction of bike-lanes and parking for bicycles, among others. Naturally, there is greater room for action in municipal buildings and there are stricter-than-minimum requirements on the efficiency of future amenities, implementation of management systems and control, training and awareness raising, improvement of insulation and lighting and green procurement, among others. The SEAPs also cover the area of waste disposal, which is of great importance for greenhouse gas emissions. Some also include actions in the primary sector and in the production of renewable energy.

[25] For example, the government of Bizkaia's Territorial Decree 204/2013 regulates the programme of grants for promoting projects of saving, energy efficiency and renewable energy in residential buildings.

POLITICAL INSTRUMENTS AVAILABLE TO LOCAL AUTHORITIES	PRIVATE BUILDINGS			PUBLIC BUILDINGS		
	New	Renovated	Existing	New	Renovated	Existing
Regulations on minimum energy efficiency	++	++	-	+	+	-
Tax incentives and credits	++	++	+	+	+	-
Information and training	++	++	++	++	++	++
Promotion of good practice	++	++	+	++	++	+
Demonstration buildings	++	++	-	++	++	-
Promotion of energy audits	-	++	++	-	++	++
Regulations and urban development plans	++	+	-	++	+	-
Increase in rate of rehabilitation	-	++	-	-	++	-
Energy taxes	+	+	+	+	+	+
Coordination of policies with authorities at different levels	++	++	++	++	++	++

++ Very relevant + Relevant - Not very relevant

TABLE 1. Instruments available for the sustainable energy policies of local authorities.
(Source: European Commission, COM Guidelines)

ECONOMIC DEVELOPMENT, INDUSTRY AND TECHNOLOGY

The main objective of the Industrialisation Plan 2014-2016, published by the Sub-Department of Industry, is to strengthen the competitiveness of Basque industry on the global market, supporting the restructuring and survival of viable business projects, maintaining and reinforcing the weight of industry in the Basque economy, diversifying the provision of sources and instruments of funding available to the industrial fabric and establishing a framework of support that is adapted to their capacities and needs within the current context of crisis, which will stimulate technological and non-technological innovation and diversification towards new areas of opportunity. One of the objectives of the plan directly related to the Energy Strategy is to promote development of the energy policy in such a way as to leverage the growth, competitiveness and sustainability of the Basque Country. This approach, centring on industrial development and competitiveness, is in line with the Energy Strategy.

" The main objective of the Industrialisation Plan 2014-2016, published by the Sub-Department of Industry, is to strengthen the competitiveness of Basque industry on the global market"

The primary mission of the Science, Technology and Innovation Plan, PCTI Euskadi 2020, is to improve the welfare, sustainable economic growth and employment of Basque society by means of a research and innovation policy based on smart specialisation and an improvement in the efficiency of the Science, Technology and Innovation System. Smart specialisation (RIS3) will allow the Basque Country to continue advancing towards a knowledge-based economy, in other words, towards a society that demands and produces knowledge and values it in economic terms. One of the three strategic priorities is energy. The energy priority of the RIS3 in the Basque Country establishes technological and industrial research and development in the areas marked by the EnergiBasque Strategy throughout the different stages of the value chain (generation, transport, storage, distribution and associated auxiliary industry), as applied to the different energy sources in which the Basque Country has a major presence: electricity, oil and gas, and alternative energy sources. Basic areas of action include wind power, wave power, solar thermoelectric, power storage, smart grids, transport electrification and energy services management.

3.2 DIAGNOSIS OF THE ENERGY SITUATION IN THE BASQUE COUNTRY

ENERGY DEMAND

Total primary energy demand or gross domestic consumption decreased by 13% in the Basque Country during the period 2010-2014. Final energy consumption also fell by 8%. The reduction has been general both in final energy consuming sectors (except transport) and in generation.

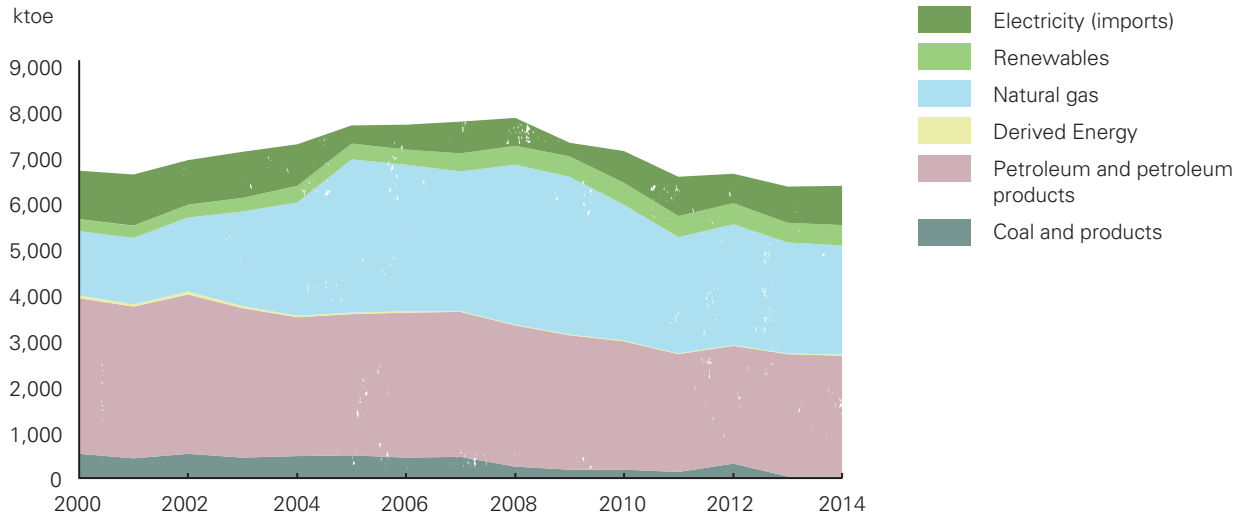


FIGURE 2. Distribution of gross domestic consumption in the Basque Country by energy type 2000-2014
(Source: EVE)

ENERGY CONSUMPTION BY SECTOR

Consumption of natural gas and oil products has fallen but continues to represent more than 78% of the total energy demand in the region. Imports of electricity represented 14% of demand, coal fell to 0.7% and renewables increased slightly to 7%. In terms of final energy consumption, the largest falls in 2010-2014 were in coal (-31%) and renewable energy (-23%); followed by electricity (-13%) and natural gas (-10%), while petroleum and petroleum products remained unchanged. The sectors with the highest final energy consumption were industry, (42%) and transport (37%). By sectors, there was a fall in consumption between 2010 and 2014 in the industrial sector (-16%), primary sector (-15%), residential sector (-12%), and services sector (-7%), while consumption in transport increased (+6%).

Natural gas is used mainly in industry (46%), power generation (26%) and buildings (16%). Petroleum products are concentrated in transport (86%) while the highest consumption of electricity is in industry (53%). By sector, consumption in industry is shared fairly evenly between natural gas (47%) and electricity (36%). The same is true in the buildings sector (36% and 53% respectively). Transport, for its part, is powered almost entirely by petroleum products (96%).

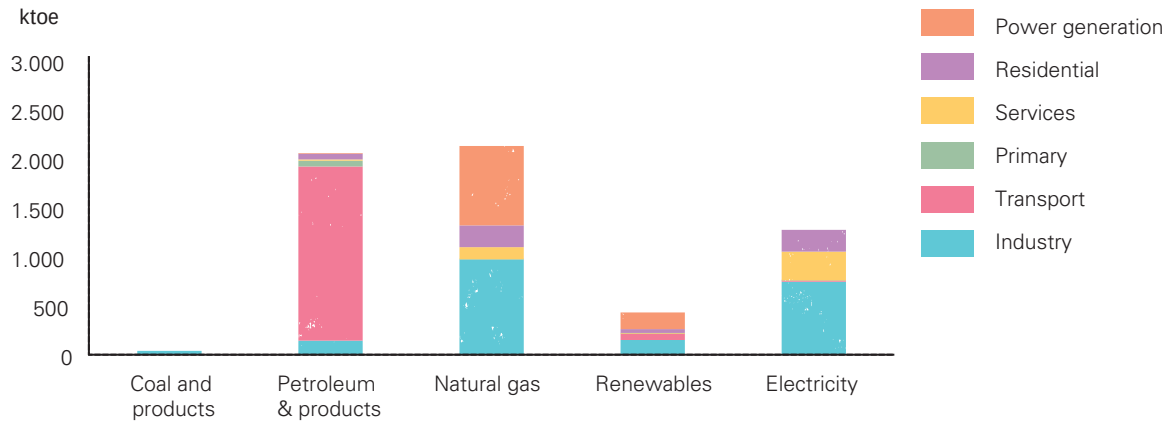


FIGURE 3. Distribution by sector for each energy type, 2014 (Source: EVE)

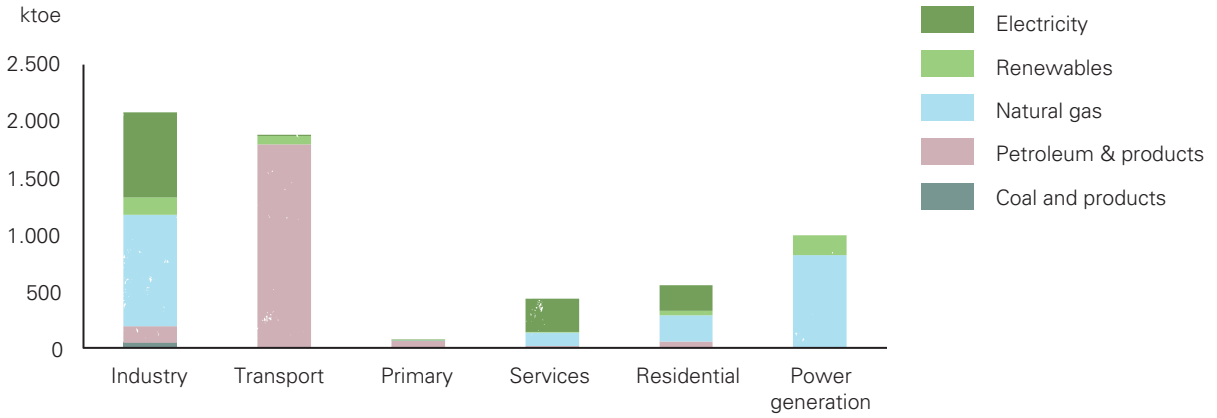


FIGURE 4. Distribution of energy in each industry, 2014 (Source: EVE)

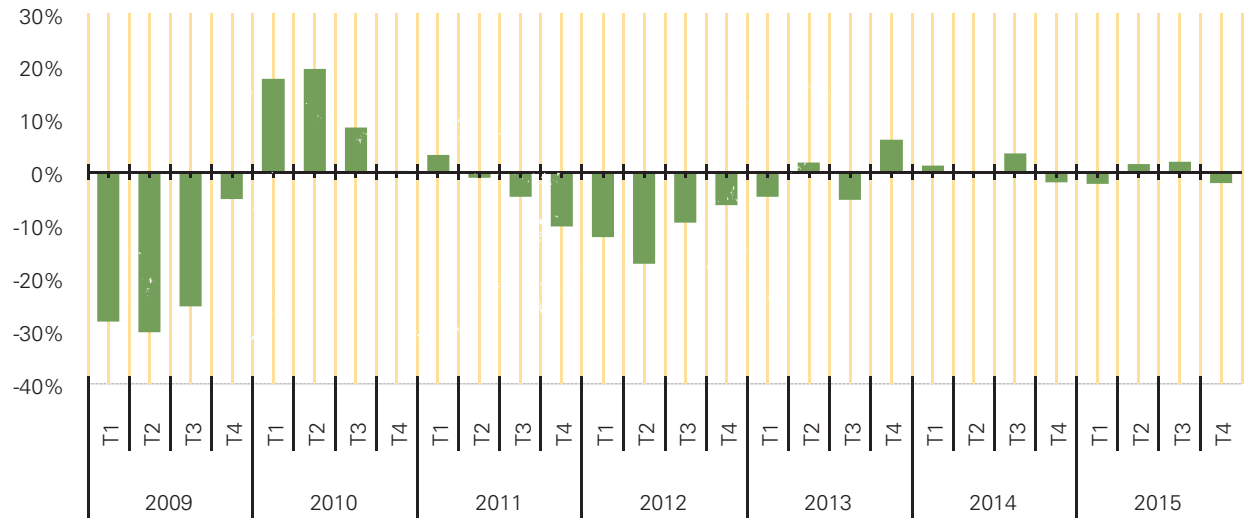


FIGURE 5. Inter-quarterly variation in Basque industrial electricity demand (Source: EVE)

ELECTRICITY MARKET IN THE BASQUE COUNTRY

Electricity accounts for 25.6% of final energy consumption in the Basque Country. Total power demand in the Basque Country came to over 20,000 GWh between 2006 and 2008, subsequently falling to 16,300 GWh in 2014 for a variety of reasons. On the one hand, the influence of the financial crisis on industrial output -and thus on industrial power consumption is evident, particularly on the steel industry which came to account for one third of total power consumption. At the same time, there is a greater awareness on cost reduction amongst consumers and improvements in energy efficiency resulting from technological developments, which are being seen as more important among domestic and services customers, including public authorities.

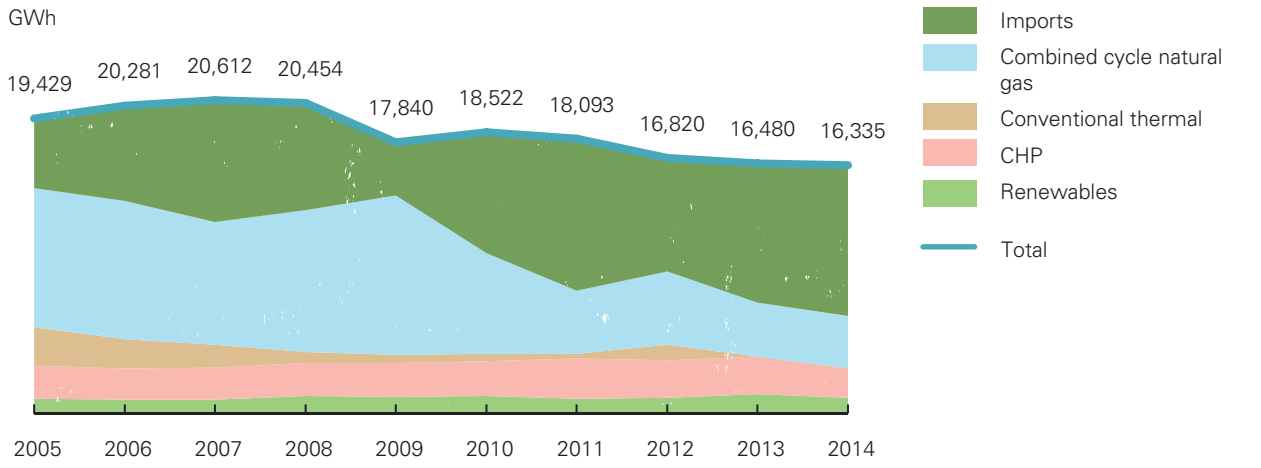


FIGURE 6. Total consumption and sources of power supply in the Basque Country (Source: EVE)

GROWING COST OF THE ENERGY BILL

Basque end consumers paid a total of €5.87 billion for their energy consumption in 2014. Over the last ten years, despite an 11% reduction in energy consumption, the energy bill has risen by over 30%, due to a 46% increase in the specific average cost of energy.

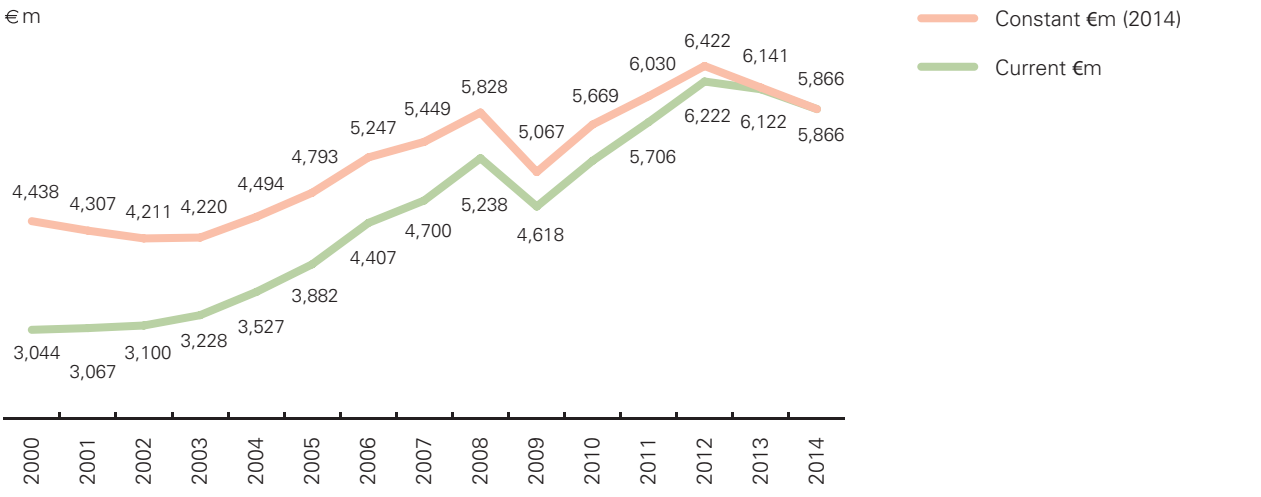


FIGURE 7. Trends in annual energy bill in the Basque Country (Source: EVE)

DEVELOPMENT AND INTRODUCTION OF RENEWABLE ENERGY IN THE BASQUE COUNTRY

Renewable energy sources for power production, mainly photovoltaic and wind power, have now attained a sufficient degree of maturity to be considered as economically efficient alternatives to the use of fossil fuels for power generation. Technological developments have led to a fall in generating prices in recent years, allowing renewables to be competitive, even without support in the form of premiums or regulated purchase prices. Within this framework, there has been significant growth in power output from renewables on the Spanish market, and in 2014 they accounted for 43% of total consumption. Twenty percent of consumption is met by wind power, while solar photovoltaic and solar thermal account for 3.1% and 2% respectively.

However, the present framework is not favourable to the establishment of new renewable power facilities in the short and medium term. The economic crisis has led to a reduction in electricity consumption on the electricity market. However production capacity had previously been sized –within certain established standards regarding market freedom– on the basis of far higher consumption forecasts. The result was a surplus in generating capacity. In 2012, this situation, combined with the need to reduce the tariff deficit, led the Spanish government to cancel economic incentives for new electrical installations powered by renewables.

Within the current framework, it is possible to commission new renewable production installations paid on the electricity market in competition with conventional power generation, although the advantages of not being subject to the carbon emissions market or taxes such as those on natural gas, coal and nuclear energy still remain.

In the Basque Country wind and photovoltaic met 2.1% and 0.2% of power demand respectively in 2014. Solar thermoelectric power has yet to be introduced into the system. The development of power production from renewables is therefore slower than elsewhere in Spain, despite the shared regulatory framework. Total power generation from renewables came to 1,068 GWh in 2014, representing 6.5% of total generation.

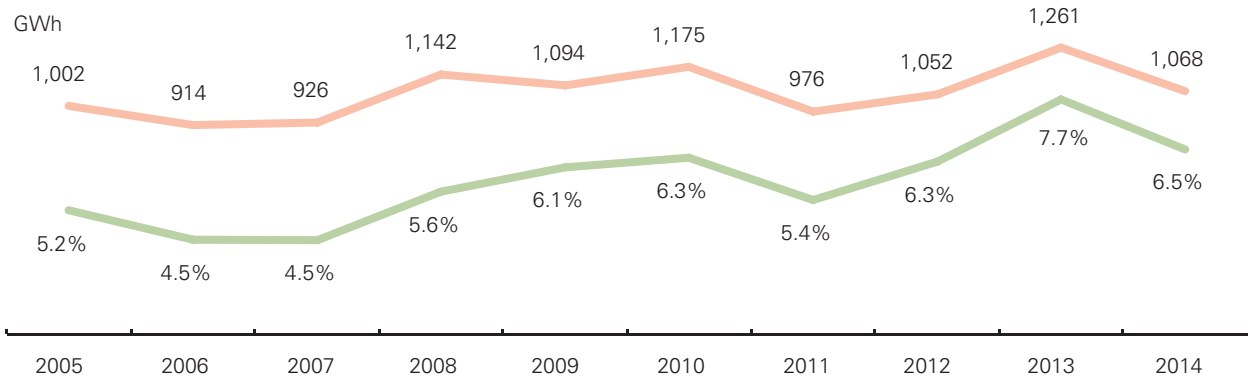


FIGURE 8. Trends in power production from renewables in the Basque Country, in absolute (GWh) and relative terms (percentage of total electricity demand) (Source: EVE)

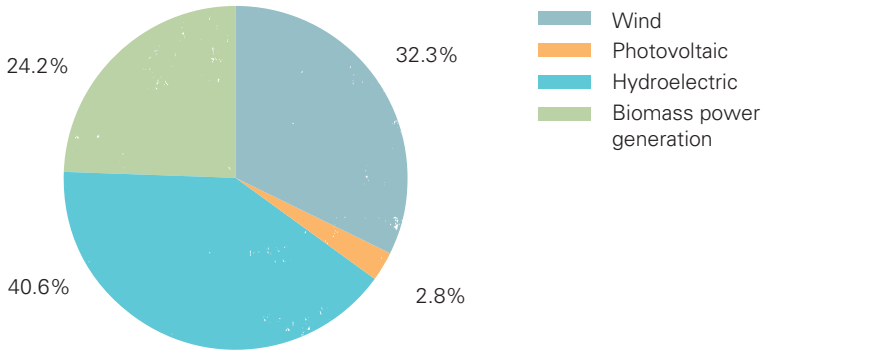


FIGURE 9. Distribution of power production from renewables in the Basque Country by energy types, 2014 (Source: EVE)

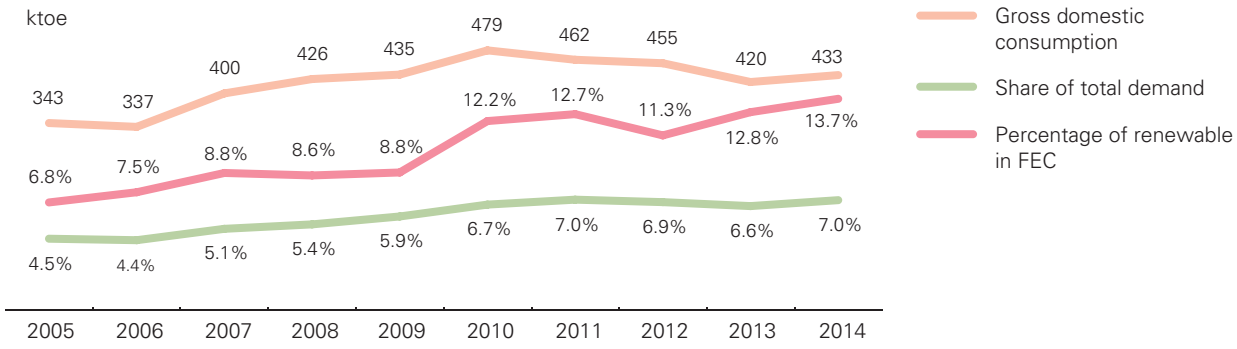


FIGURE 10. Trends in use of renewable energy in the Basque Country and share of renewables in total energy demand and final energy consumption (FEC) (Source: EVE). Note: The share of renewables (%) in final energy consumption (FEC) includes imported renewable electricity.

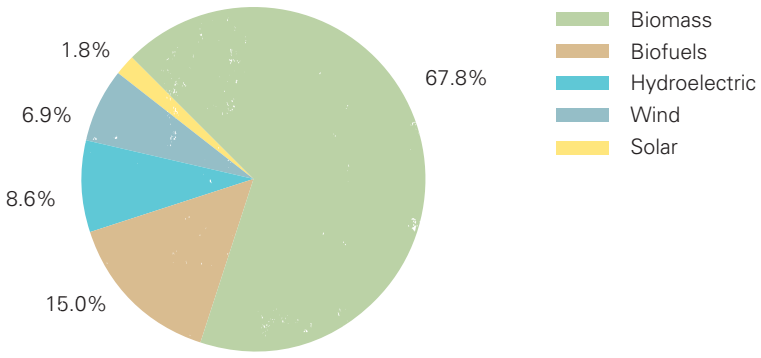


FIGURE 11. Use of each renewable energy type, 2014 (Source: EVE)

433 ktoe of energy was produced from renewables in 2014. Of this amount, biomass accounted for 68%, biofuels 15%, hydroelectricity 8.6% and wind 6.9%. Seven percent of final energy consumption was met by renewables[26] – 13% if imported renewable electricity is included. The highest levels of direct demand for renewable energy are found in industry, mainly in the paper industry.

[26] Calculated on the basis of the criteria contained in Directive 2009/28/EC.

ENERGY SAVINGS

Accumulated savings from the energy efficiency measures implemented in 2011-2014 come to 307,000 toe, representing a 83% achievement in 2014 and 29% of the target for 2020 established in the 3E2020. In sectoral terms, the contribution of the industrial sector is particularly important, accounting for 59% of the savings achieved.

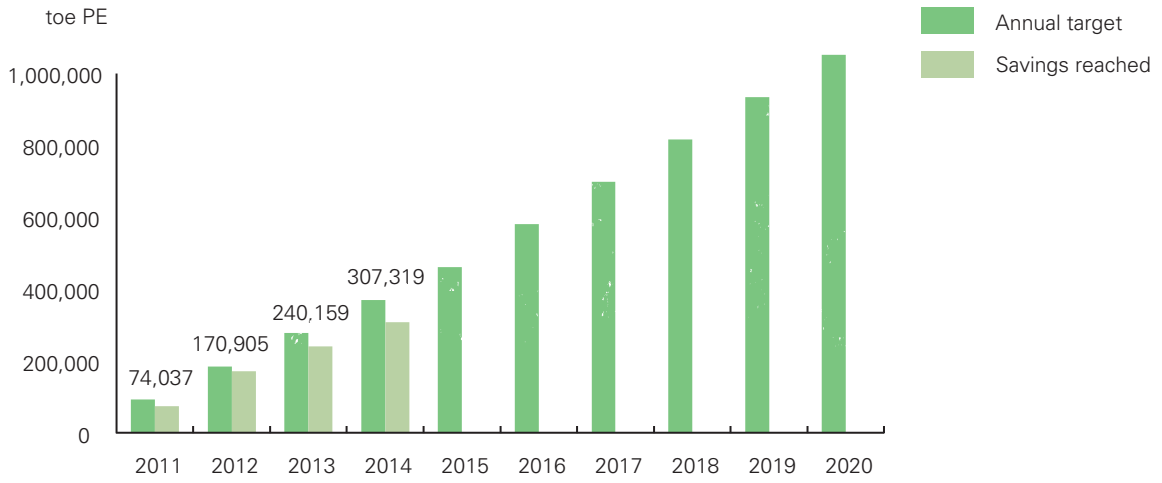


FIGURE 12. Trends in energy saving due to efficiency programmes, 2011-2020 (Source: EVE)

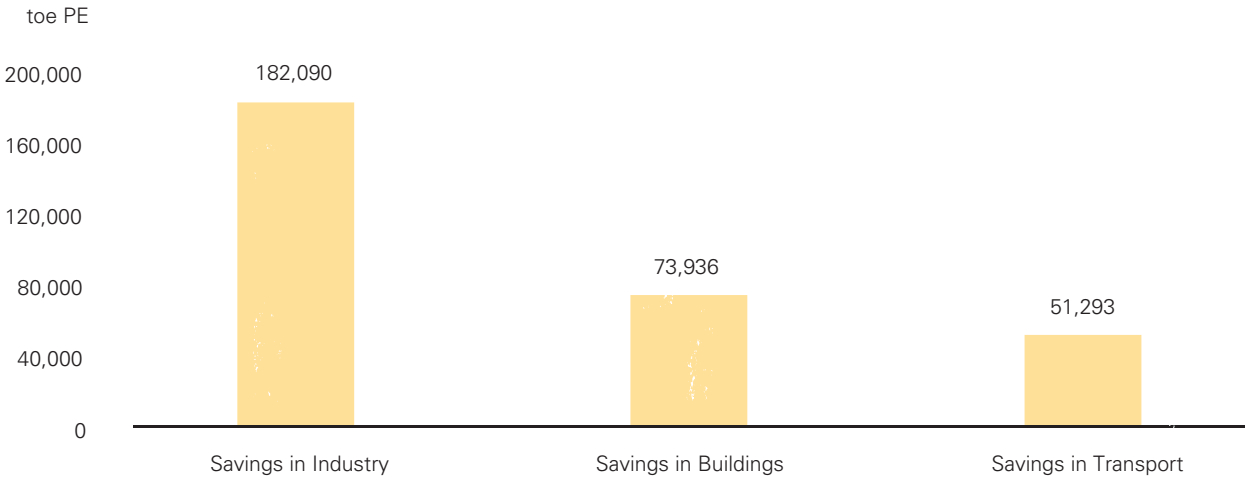


FIGURE 13. Sectoral contribution to energy efficiency (toe PE), 2011-2014 (Source:EVE)

3.3 SECTORAL PERSPECTIVES AND ENERGY TRENDS

DEMOGRAPHIC TREND

2000 saw a turning point in Basque population trends, with the decline of previous years giving way to a new period of demographic growth. However, demographic forecasts point to a fresh inversion of the trend, with a sustained decline in the Basque population to 2,077,000 by 2026, similar to the figure at the beginning of the century. This represents a loss of around 100,000 people compared to 2013.

For the period as a whole, an annual rate of decline of -3.7 per thousand is predicted. At the same time, the process of population ageing is forecast to intensify at both the base and the apex of the population pyramid. Those large-scale demographic trends will be common to all three provinces, with some differences in terms of pace and intensity.

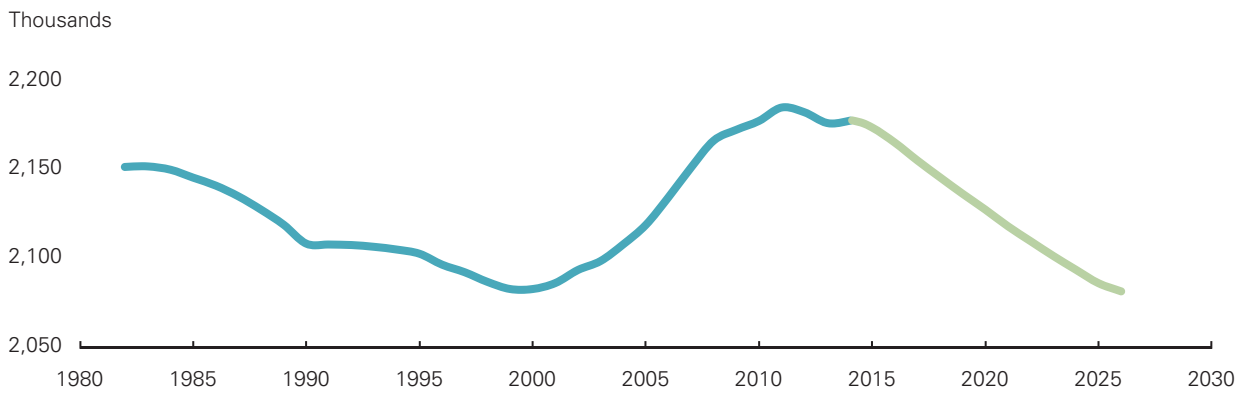


FIGURE 14. Basque population development scenario (Source Eustat)

ECONOMIC TREND

2010 and 2011 saw some recovery in the Basque and European economies, but in 2012 and 2013 the Basque economy again recorded negative growth. 2014 saw a renewed increased in the interannual rate of growth in GDP in the region. The current situation can be defined as one of moderate recovery globally and in the European Union, although with varying growth rates in different economies. This suggests that economic activity, taken in the round, has not entirely emerged from the recessionary stage in which it has been immersed since 2008.

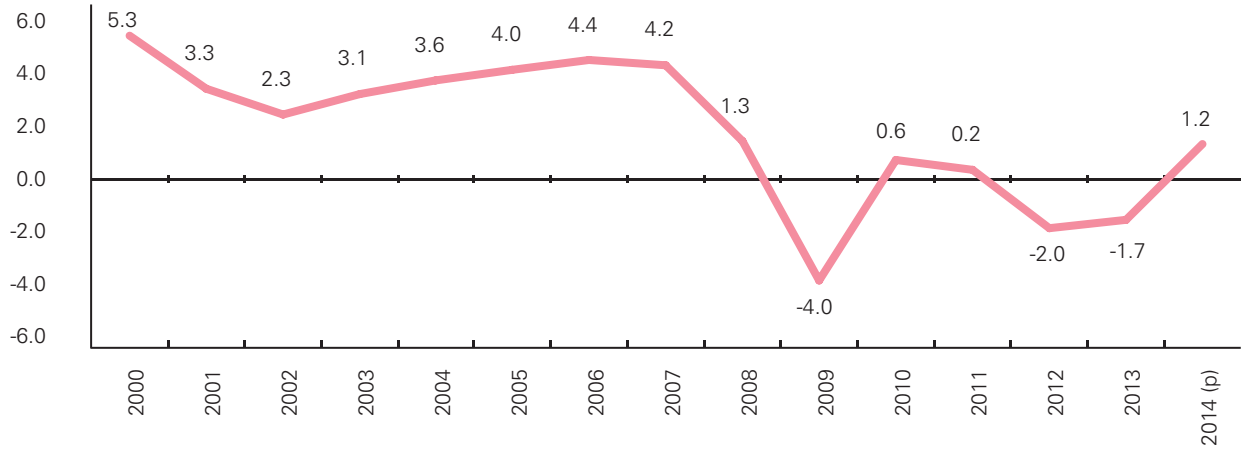


FIGURE 15. Trends in Basque GDP in recent years (Source Eustat)

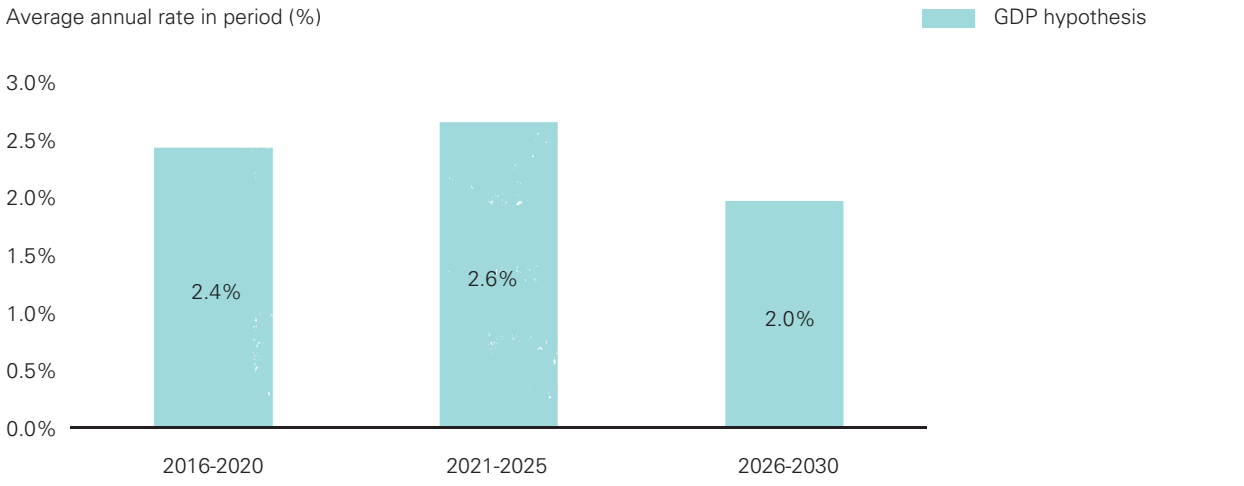


FIGURE 16. Forecast scenario of trends in Basque economic activity (Source: EVE)

> " 2014 saw a renewed increased in the interannual rate of growth in GDP in the region"

PERFORMANCE OF THE INDUSTRIAL SECTOR

Among different industries, manufacturing has seen positive but moderate signs of recovery. However, the relative contribution of Basque industry to GDP has fallen in recent years; in 2013 it accounted for 24% of the total economy as compared to 28% in 2008. This figure is higher than in Spain as a whole (16.1%). The Basque productive structure is more akin to Germany's than those of Spain or France. The Basque industrial sector has a tendency to export. Different subsectors are emerging from the crisis at different rates.

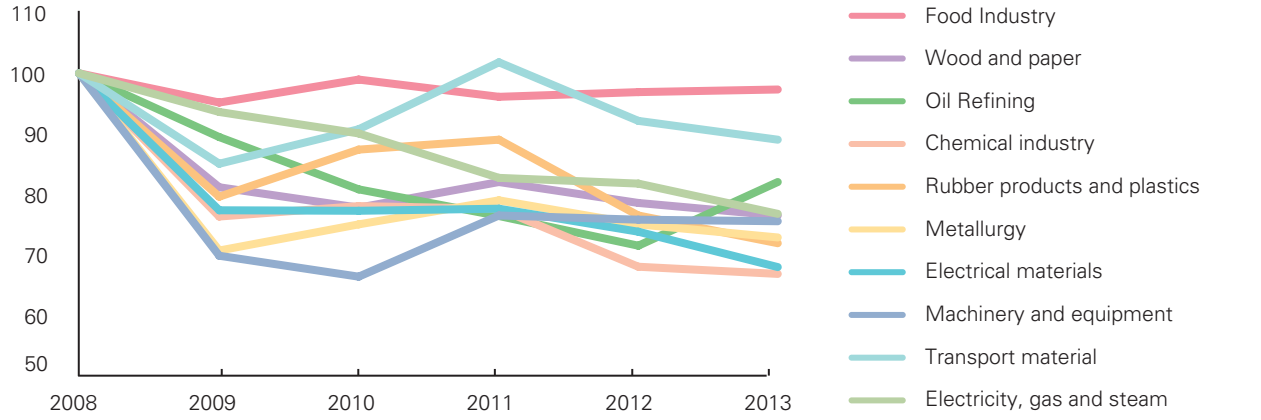


FIGURE 17. Trends in the Index of Industrial Production in the Basque Country (base 100=2008) (Source EUSTAT)

TRENDS IN HOUSING STOCK

An analysis of trends in the number of homes built in the Basque Country in recent years shows a strong deceleration in the rate of construction from 15,000 homes per year in the 00s to around 6,000 in 2013. 25% of the construction industry is devoted to new residential building and 13% to restoration of existing residential buildings. New civil engineering accounted for 15% of the industry. During the period 2016-2025, it is estimated that at current construction trends, around 38,000 new homes may be built, with a further 25,000 between 2025 and 2030.

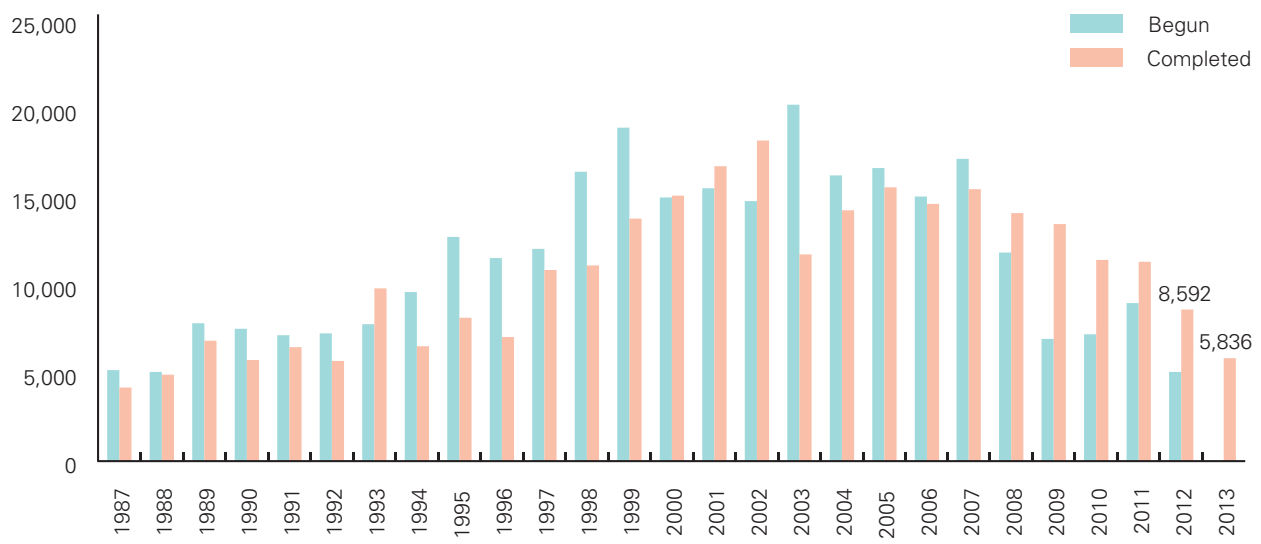


FIGURE 18. Construction of new housing in the Basque Country by type of dwelling: 1987-2013 (Source: EVE)

BUSINESS-AS-USUAL ENERGY SCENARIO

In order to analyse the long-term energy needs of the Basque Country the business-as-usual (BAU) energy consumption scenario has been modelled and analysed. This scenario uses trends in demand based on trends in socio-economic needs. The scenario assumes a recovery in industrial production that varies by subsector, in some cases to pre-crisis levels, and does not include savings resulting from measures introduced after the base year. The following aspects should be noted in the BAU scenario for 2015-2030:

- BAU Basque energy demand, i.e. the energy that would be required in the Basque Country to satisfy its needs, could increase by 14% in 15 years to 7.2 Mtoe in 2030.

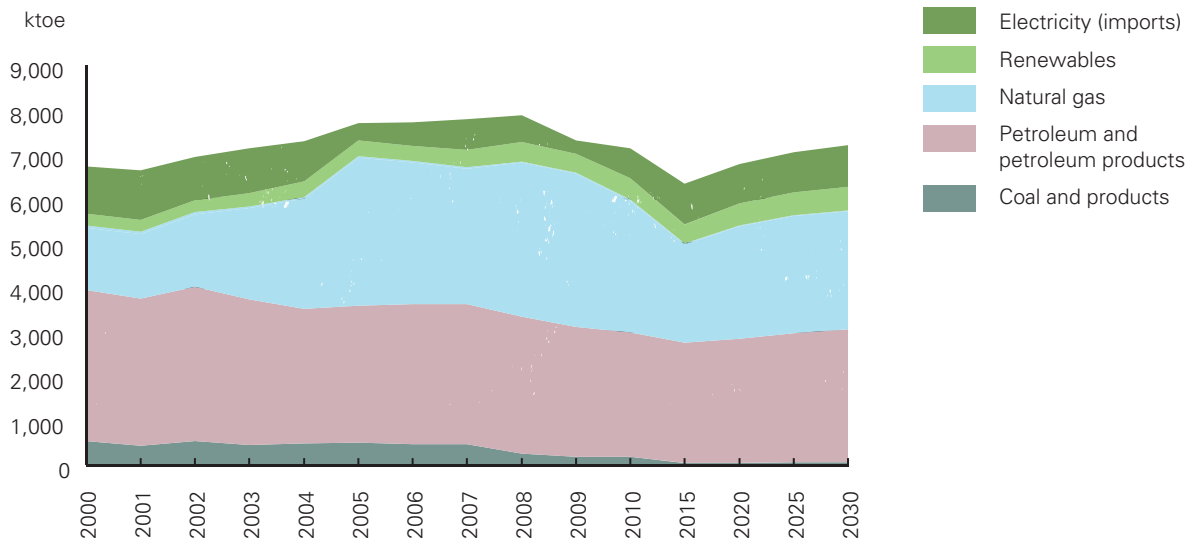


FIGURE 19. Basque Country. Trends in energy demand 2015-2030. Business-As-Usual (BAU) scenario
(Source: EVE)

- By energy type, there is a noticeable growth in renewables (up by around 95,000 toe (+22%)), natural gas (+20%), and to a lesser extent petroleum products (+11%).

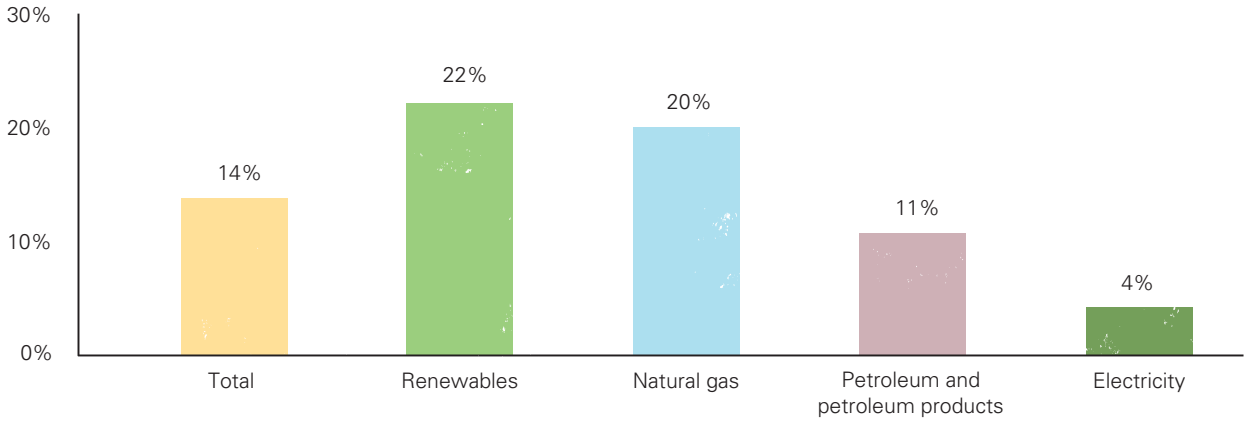


FIGURE 20. Basque Country. Increase in energy demand 2015-2030. Business-As-Usual (BAU) scenario
(Source: EVE)

- In the Basque energy supply mix for 2030, the energy type contributing most to meeting demand would be petroleum products, at 42%.

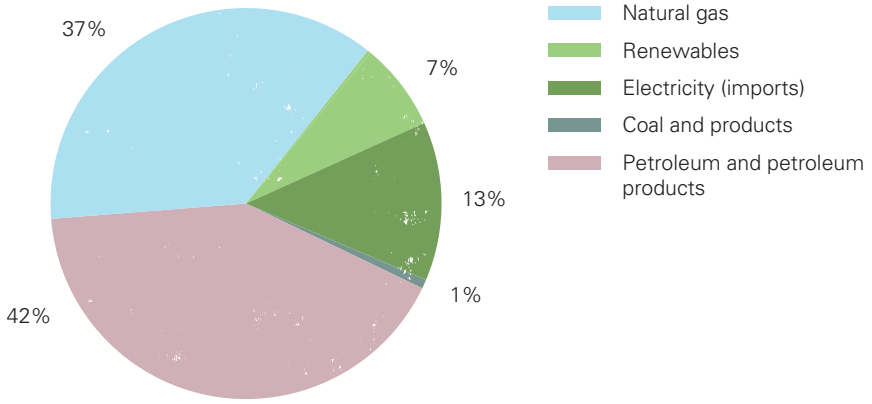


FIGURE 21. Basque Country. Energy mix 2030. Business-As-Usual (BAU) scenario (Source: EVE)

- In the BAU scenario, electricity demand increases by 15% in 15 years. In 2030, the power supply mix would be made up of 41% local production and 59% electricity imports.

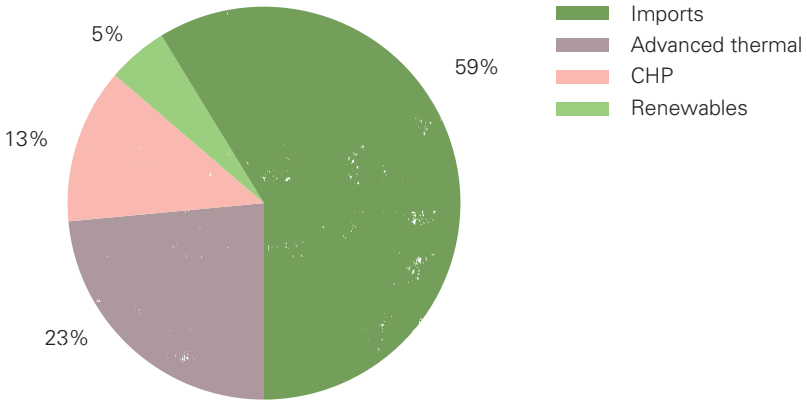


FIGURE 22. Basque Country. Electricity supply mix 2030. Business-As-Usual (BAU) scenario (Source: EVE)

- BAU sectoral energy consumption as a result of an increase in business activity due to economic recovery would rise by 13% over the next 15 years, an annual average of close to 0.8% over the period.

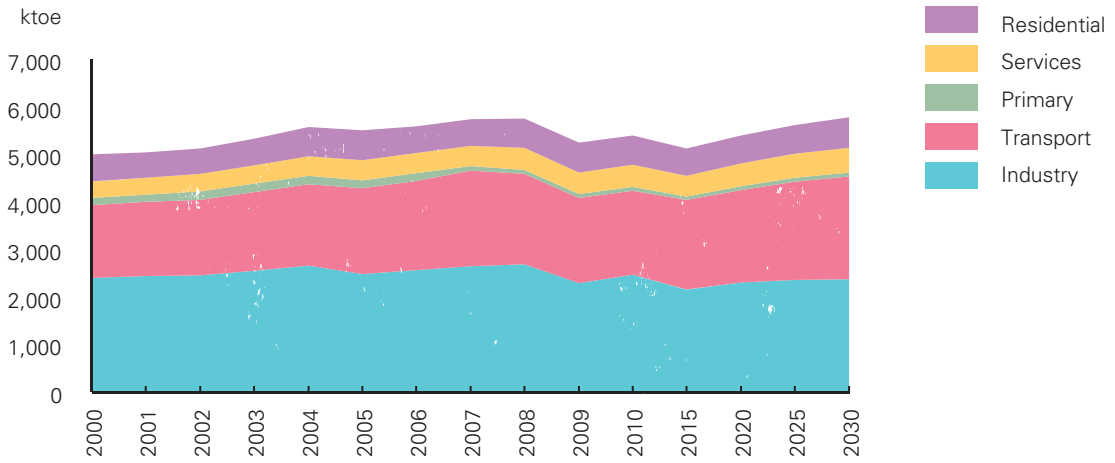


FIGURE 23. Basque Country. Sectoral energy consumption 2015-2030. Business-As-Usual (BAU) scenario (Source: EVE)

- This growth in final energy consumption would be due to increases in the transport and buildings sectors (both +15%), and to a lesser extent to a recovery in industrial activity. (+10%).

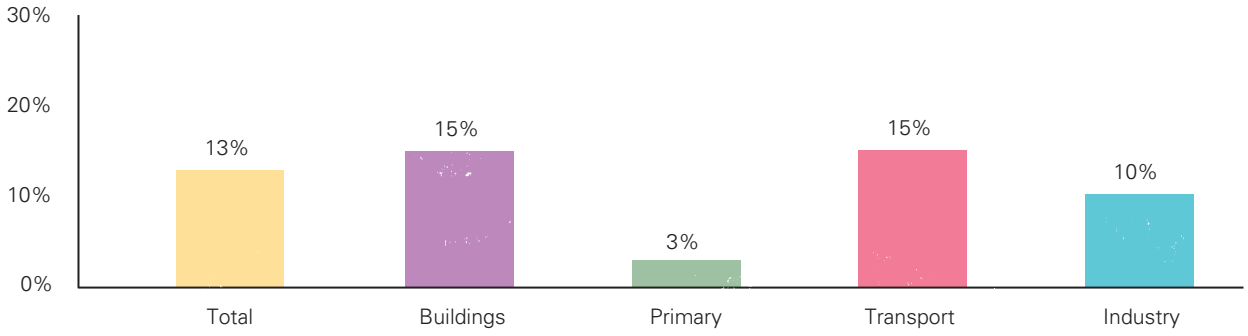


FIGURE 24. Basque Country. Variation in sectoral energy consumption 2015-2030. Business-As-Usual (BAU) scenario (Source: EVE)

3.4 LONG TERM VISION OF BASQUE ENERGY POLICY

79% of Basque energy demand is currently met by fossil fuels and 14% by electrical imports. This means that the region is mostly dependent on non-local energy resources, which in many cases come from politically unstable areas of the world. Fossil fuel markets, including both oil and natural gas markets are characterised by price volatility and the risk of supply shortages, creating potential problems for supply security and competitiveness. The progressive depletion of reserves, greater difficulties involved in exploration and extraction, and upward pressure on prices due to high consumption by emerging countries all make it necessary for advanced economies –including the Basque Country– to work towards replacing these energy types with other renewable sources and to reduce energy intensity through savings and efficiency. The fall in oil prices over the last year should not blind us to the very real risk that prices may again return to the level of previous years with all the negative repercussions this could have for the economy. The transport sector, which is 96% dependent on petroleum products, is especially sensitive to these risks; it is the least diversified sector in terms of energy sources and is dependent on the most expensive of the fossil fuels.

Climate change policies are a major lever for advancing towards more sustainable energy. As well as the Basque Strategy on Climate Change 2050, European policies, set out in different actions such as business participation in the emission trading market, directives on energy efficiency and buildings, and limitations on consumption and emissions in vehicles and equipment in the home and business will all contribute in coming years to a reduction in consumption in the Basque Country.

However, as stated in European directives, it is also necessary to go even further and bring influence to bear on consumption at local and regional levels. Local and regional government need to take action on the model of mobility, construction and urban planning, markets and performance, in a way that cannot be achieved at state and European levels.

The consumer's needs and preferences evolve with social and technological progress. This evolution has influenced energy consumption, and energy policy must therefore also influence behaviour through training and awareness-raising with a view to ensuring responsible consumption.

The technological advances seen in the area of renewable energy and its ever greater contribution to global energy production hold out the promise of having locally-generated renewable energy in the medium-term future. However, within the timescale of the present energy strategy (i.e. 2030), fossil fuels will continue to be the predominant energy source throughout the world and also in the Basque Country. The availability and affordability of alternative energy sources will not be enough to change the current model before 2030; any radical changes must therefore be considered in longer timeframes. The characteristics of the territory mean that the potential is limited with current levels of technological development.

In the medium and long term, the electricity system will also play a leading role in the move towards greater security and competitiveness, given its role in channelling the energy harnessed from renewable sources –local and imported– towards Basque end consumers. Moreover, the Basque business sector has traditionally played a leading role in industrial power equipment markets and therefore has a great potential for future industrial development.

The Basque Country must remain firm in its decision to advance towards the sustainability of the energy system, in its environmental aspects determined by its impact on the climate, on pollution levels and on the availability of limited resources; in social and economic aspects related to the availability and affordability of energy, the vision of an ambitious long-term energy model requires ongoing forward-looking action to overcome and minimise the impact of global difficulties.

LONG-TERM VISION OF THE BASQUE ENERGY SYSTEM

Progressive evolution of the socio-economic model, particularly with regard to industry, buildings and transport, towards a new model of lower energy consumption, with consumption oriented towards progressive incorporation of renewable energy, and with electricity as the principal energy vector.

The long-term targets are:

- Zero consumption of oil for energy uses by 2050, requiring a structural change in the transport system.
- Contribution to the targets of the Basque Strategy on Climate Change 2050:
  - Reduce Basque GHG emissions by at least 40% by 2030 and at least 80% by 2050, compared to 2005.
  - Achieve 40% contribution of renewable energy to meeting final consumption by 2050.
- Complete untying from fossil fuels and zero net greenhouse gas emissions by the end of the century, with renewable energy as the only energy supply.

3.5 SCENARIOS OF ENERGY POLICY 2030

Various long-term energy scenarios have also been analysed for the Basque Country. These apply different measures of energy policy, with varying intensity in the application of energy efficiency programmes and the advancement of renewable energy, involving different targets and levels of investment.

The target scenario of energy policies to 2030 involves an important effort to achieve the proposed goals, especially in the most fragmented sectors of buildings and transport. The keys to energy policy that have been considered were as follows:

- Maximising the promotion of energy efficiency and fostering the incorporation of new renewable energy facilities in Basque industry, capitalising on existing possibilities for saving in the industry, renovating and incorporating new high-efficiency CHP facilities, all with the ultimate goal of reducing energy costs and improving competitiveness and sustainability.
- Intensifying actions involving energy saving and extending renewable energy installations in buildings, allowing a reduction in the energy bill, especially in the case of buildings and public lighting owned and run by Basque public authorities.
- Progress in transport and sustainable mobility, in the awareness that actions in this area require long-term structural changes, through a more rational and sustainable usage, by promoting the use of public transport use and the gradual incorporation of vehicles fuelled by non-oil alternative fuels with lower specific consumption.
- Improving the sustainability of power generating facilities by incorporating new facilities based on renewables and CHP, increasing distributed generation and encouraging self-consumption.

The following conclusions may be drawn from an analysis of this scenario.

ENERGY SAVING AND DEMAND

- With an active energy policy such as that established in the energy policies scenario, it is possible with the proposed measures to reduce energy demand in 2030 by up to 6.4 Mtoe compared to the Business-As-Usual (BAU) scenario, 19% lower than in 2008. This would mean containing energy demand at current levels despite an increase in economic activity. Savings in primary energy during the period would come to 1,250,000 toe in 2030. This represents a saving of 17% in the period 2016-2030 as compared to the BOA demand.

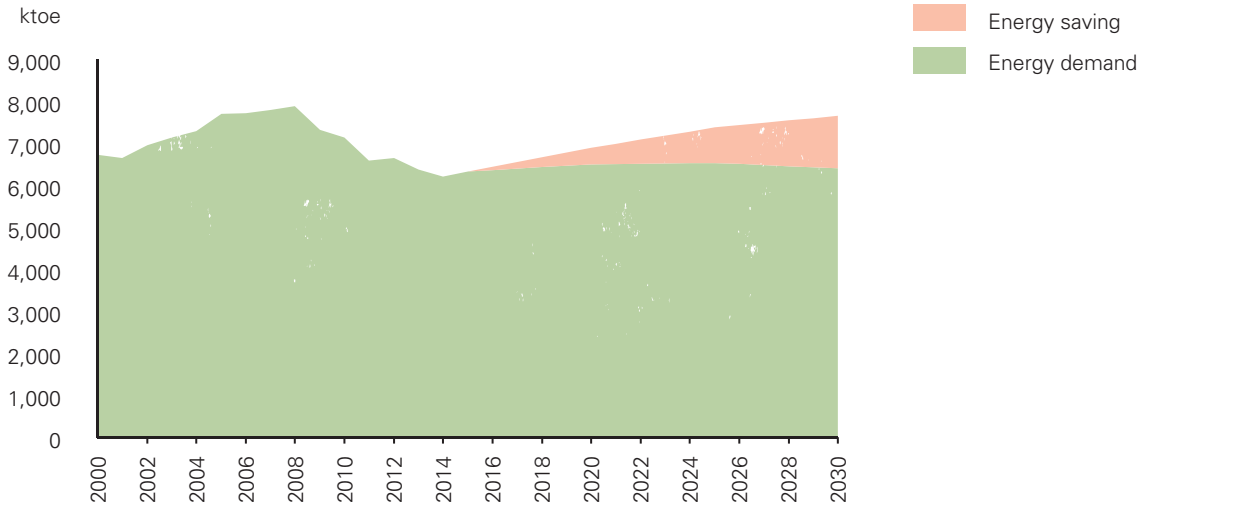


FIGURE 25. Basque Country. Energy savings 2016-2030. Energy Policies Scenario (Source: EVE)

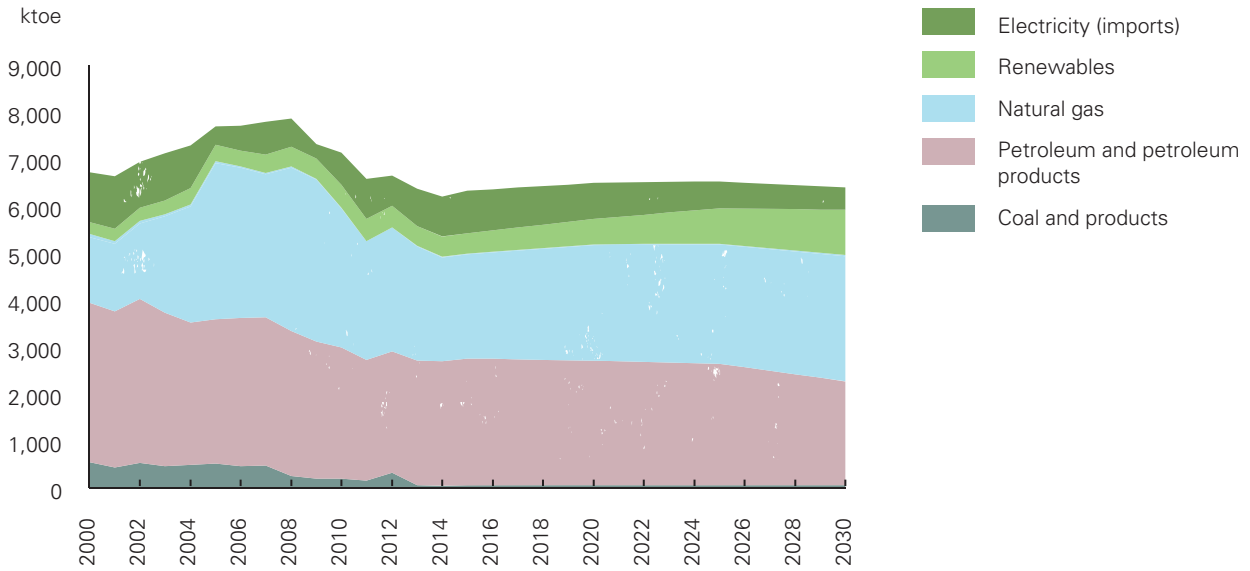


FIGURE 26. Basque Country. Energy demand 2030. Energy Policies Scenario (Source: EVE)

- The measures established in the energy policies scenario would make it possible to alter the trends to 2030, increasing renewable energy by up to 126% compared to 2015, and reducing the demand for oil by 26% and electrical imports by 49% as compared to the BAU scenario.

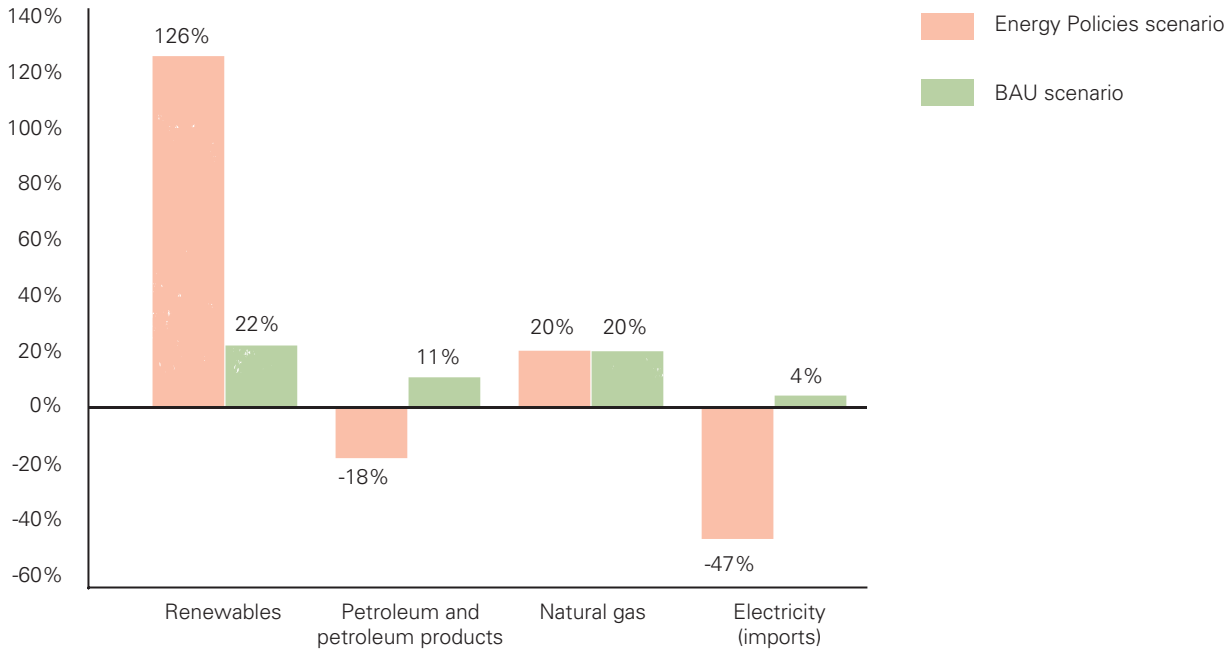


FIGURE 27. Basque Country. Comparison of demand scenarios by energy type 2015-2030 (Source: EVE)

- In terms of the energy mix, the share of petroleum products and electricity imports would fall in favour of renewables and natural gas between 2015 and 2030.

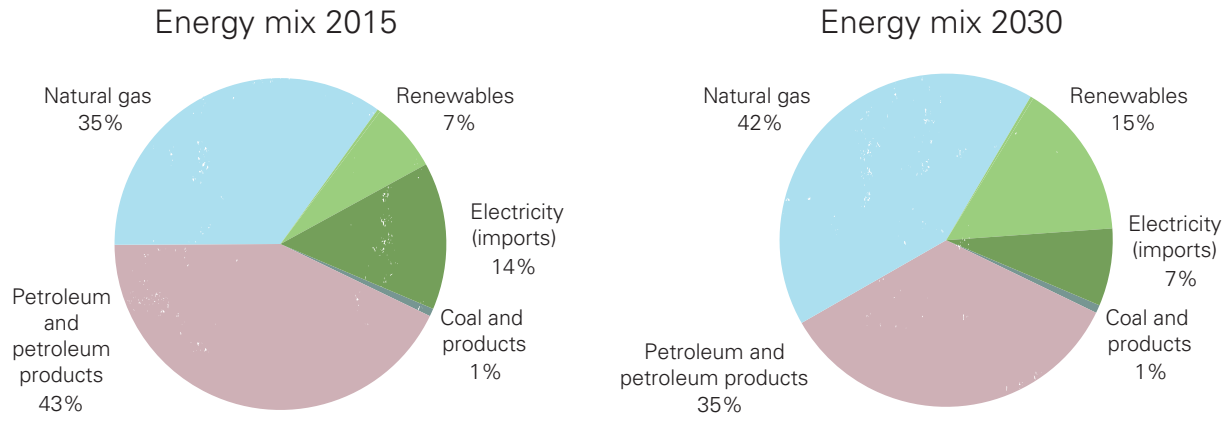


FIGURE 28. Basque Country. Energy demand mix 2015-2030. Energy Policies scenario (Source: EVE)

POWER CONSUMPTION AND SUPPLY

- The strategy envisages restricting the increase in electricity demand in 2030 to 2015 levels, which were 20% below those for 2007. This involves achieving 12% savings in electricity through the measures established. As for the power supply, the goal is to improve local generation by incorporating new CHP and renewable power generation, doubling their share from 20% in 2015 to 40% in 2030. Electricity imports would fall from 65% to 34%.

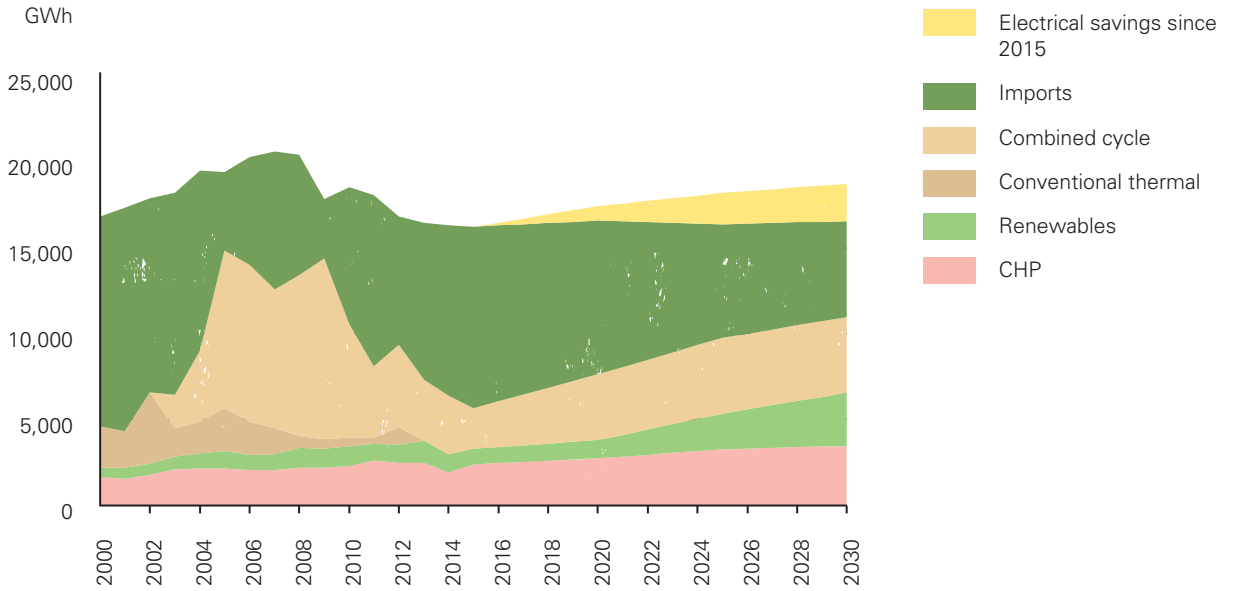


FIGURE 29. Basque Country. Power supply 2030. Energy Policies Scenario (Source: EVE)

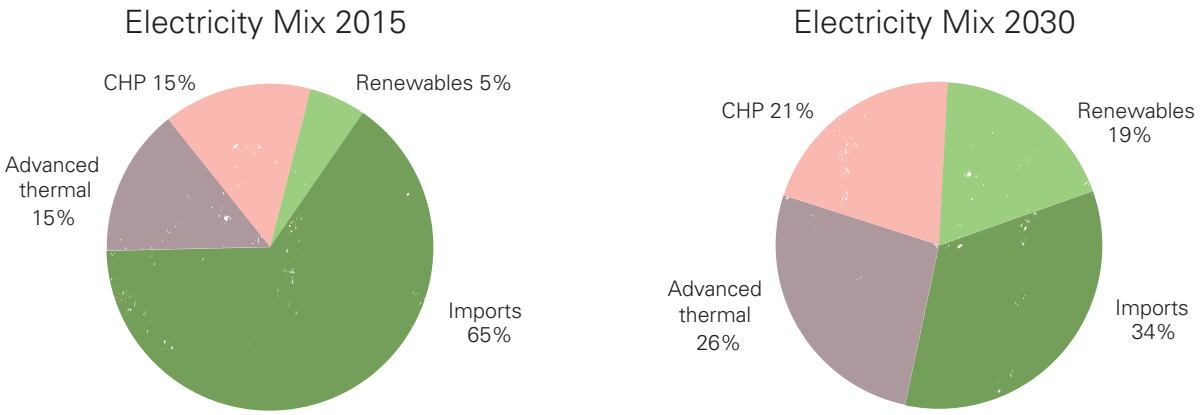


FIGURE 30. Basque Country. Electricity supply mix 2030. Energy Policies Scenario (Source: EVE)

RENEWABLE ENERGY

- The possibilities for increasing the use of renewables in the short/medium term involve continuing to promote thermal renewables (biomass, geoexchange, solar). In the medium to long term, it mostly involves harnessing the resources with greatest potential in the Basque Country, such as biomass and wind, which account for 90% of planned use of renewables. These developments would allow 966,000 toe to be obtained from renewables. By 2030, renewables would account for 21% of final consumption (including imports of renewable electricity).

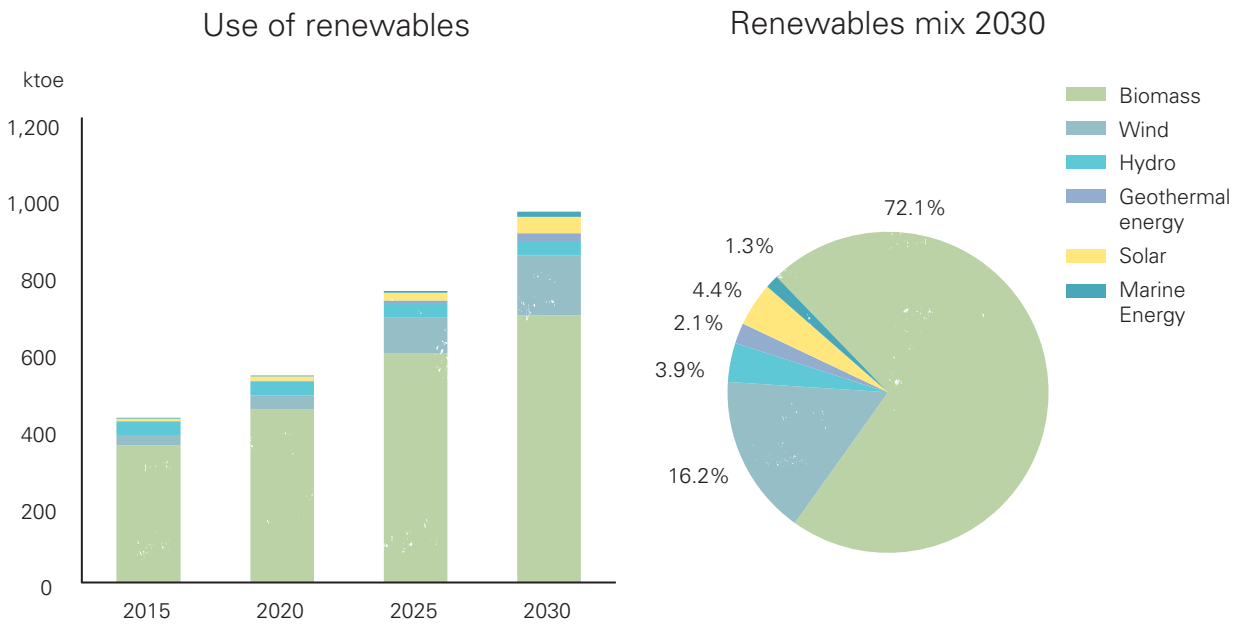


FIGURE 31. Basque Country. Use of renewables. Energy Policies Scenario (Source: EVE)

INSTALLED CAPACITY		2015	2020	2025	2030
Hydro	MW	173	175	177	183
Wind	MW	153	167	463	783
Photovoltaic	MW	25	55	108	293
Solar thermal	thousand sq. m.	64	90	137	202
Biomass	MW	71	69	106	111
Marine Energy	MW	0	10	20	60
Geoexchange	MWg	13	41	96	253
Geothermal Energy	MW	0	0	4	10

TABLE 2. Basque Country. Renewable installations 2030. Energy Policies Scenario (Source: EVE)

SECTORAL ENERGY CONSUMPTION

- Implementation of the measures contained in the Energy Policies Scenario would reduce final consumption by energy-consuming sectors by 16% in 2030, as compared to the BAU scenario. The most significant targets for the period are in the services and transport sectors, requiring varying levels of investment.
- Important progress has already been made over recent years to improve energy efficiency in the industrial sector, with a large number of actions already in place. The potential for saving is therefore increasingly limited and more costly; nonetheless, as well as being the largest energy consumer, the need for a constant increase in business competitiveness calls for continued energy improvement in this sector.

" The need for a constant increase in business competitiveness calls for continued energy improvement in this sector"

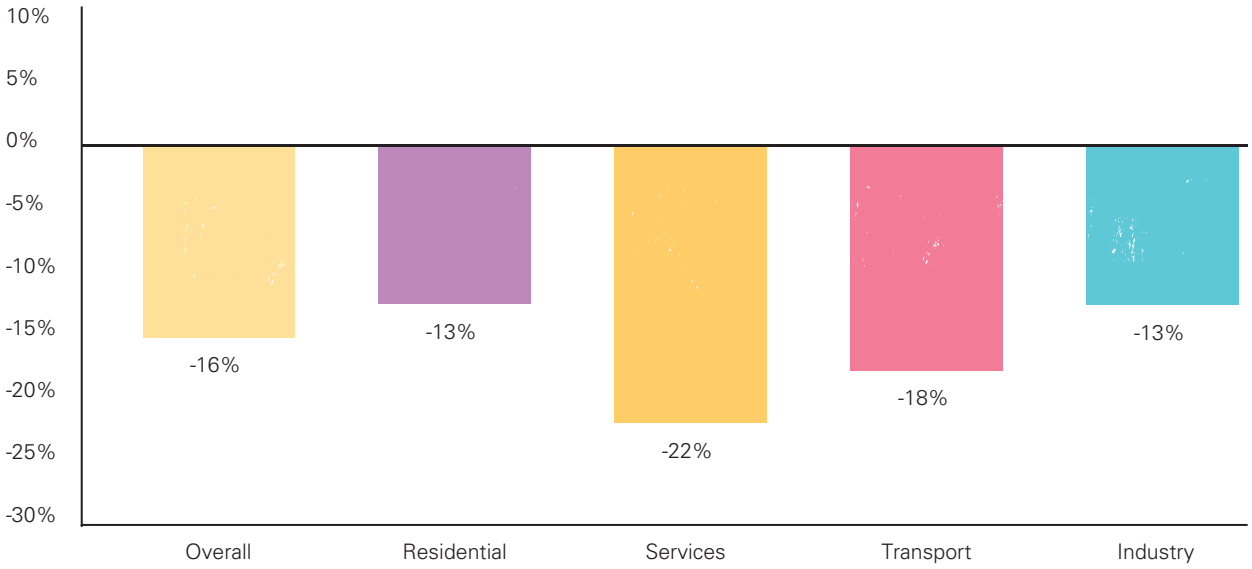


FIGURE 32. Basque Country. Reduction in sectoral energy consumption 2030. Energy Policies scenario vs BAU scenario (Source: EVE)

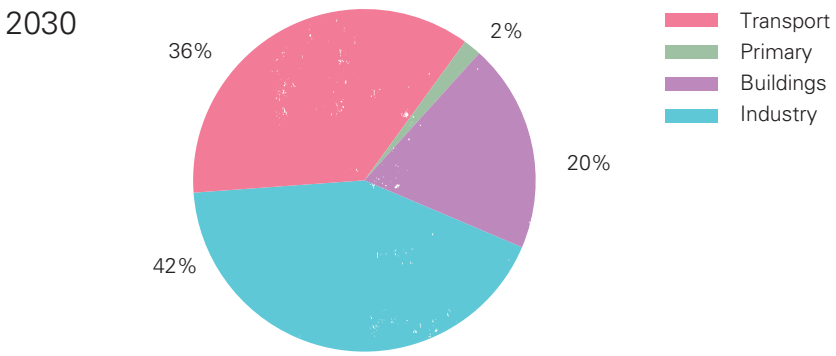


FIGURE 33. Basque Country. Structure of sectoral energy consumption 2030. Energy Policies Scenario (Source: EVE)

- In the transport sector, which is almost entirely dependent for its energy needs on petroleum products and is characterised by very fragmented consumption and constant growth, continuous efforts are needed to reduce consumption and replace petroleum products, in order to change the structure of the transport fleet.
- In the buildings sector, where long-term structural changes are also required, continuous improvement is still needed in equipment, consumption habits and the integration of renewables. Exemplary actions in buildings owned and occupied by the Basque public authorities will make it possible to improve the overall results in the sector.
- With regard to final energy intensity (the ratio of final energy consumption to GDP, measured in toe per €m), an improvement of nearly 33% could be achieved in the Energy Policies scenario. Of this amount, 20.4% would be due to structural changes, legal obligations, etc. and the remaining 12.4% to new energy policy.
- Finally, it would be possible to raise overall energy self-sufficiency from 6% in 2015 to 12% in 2030 in the Energy Policies scenario.

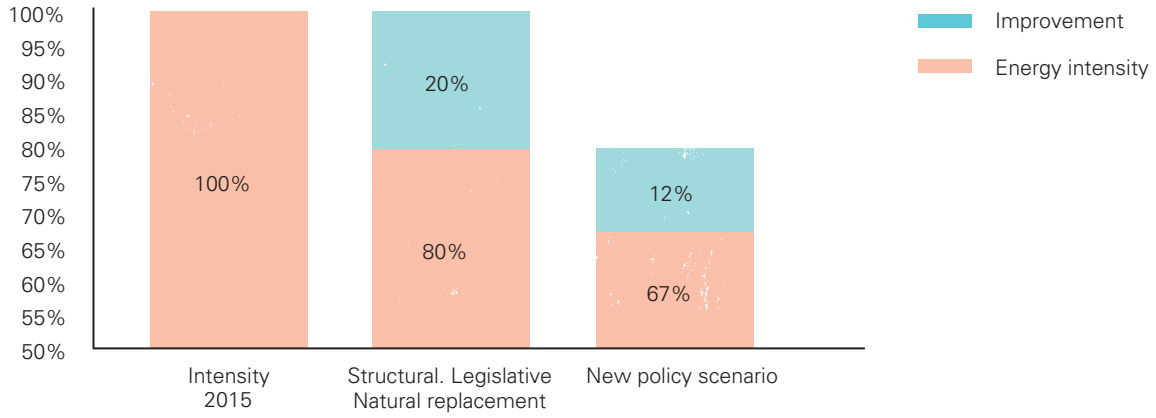


FIGURE 34. Basque Country. Improvement in final energy intensity 2015-2030. Energy Policies Scenario (Source: EVE)

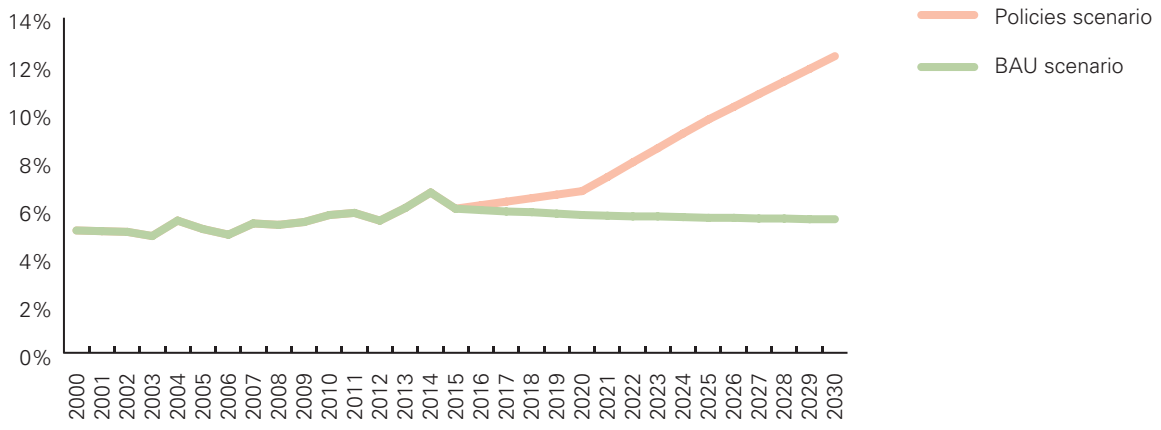


FIGURE 35. Basque Country. Trends in rate of energy self-sufficiency 2030 (Source: EVE)

3.6 OBJECTIVES OF ENERGY POLICY TO 2030

The strategic objectives of Basque energy policy for the period 2016-2030 are as follows:

OBJECTIVES OF THE BASQUE ENERGY STRATEGY 3E2030

1. Primary energy savings of 1,250,000 toe per year between 2016-2030, equivalent to a 17% saving in 2030[27]. This entails maintaining the same level of energy demand as in 2015, and improving energy intensity by 33% over the period.

2. 126% increase in use of **renewable energy**, to 966,000 toe in 2030, giving renewables a 21% share in final consumption.

3. Promotion of an example-setting commitment by **Basque public authorities** to reduce energy consumption in their facilities by 25% in 10 years, creating renewable energy installations in 25% of their buildings and incorporating alternative vehicles in their own fleets and in public service fleets.

4. Reduction in **oil consumption** of 790,000 toe by 2030, (26% compared to the BAU scenario), contributing to a progressive untying from oil in the transport sector and greater use of alternative vehicles.

5. Increase in participation of **CHP and renewables in power generation** from 20% in 2015 to 40% in 2030.

6. Promotion of competitiveness of the network of Basque science-technology companies and agents in the energy industry at an overall level, fostering **9 priority areas** of research, technological and industrial development in the field of energy, in line with the RIS3 strategy on smart specialisation in the Basque Country.

7. Contribution to **climate change** limitation through a 3 Mt reduction in CO_2 emissions achieved through the measures contained in the energy policy.

[27] This indicator refers to the measures planned for the period 2016-2030. The savings indicator, which takes into account all accumulated measures since 2005 would come to 25% in 2030.

4 AREAS OF ACTIVITY

Basque energy policy will be based on the following key aspects:

- Contributing to create a social and economic system that requires less energy to produce goods and services in business, the home and transport, encouraging energy saving and efficiency.
- Producing and consuming more renewable energy to replace fossil fuels, in a way that is compatible with conservation of the natural environment, preparing for a long-term future in which renewables will be the only available energy source.
- Promoting the replacement of oil in transport with alternative energy sources, thus reducing the environmental impact and limiting vulnerability to future oil shortages.
- Achieving a reduction in carbon emissions, through savings, energy efficiency, renewable energy and oil replacement, thus contributing to mitigating climate change.
- Supervising the energy system to ensure that it adapts to the needs of consumers, influencing markets and regulation within the government's jurisdictional area and contributing to guaranteeing supply.
- Harnessing the potential for Basque industry of developing new products and markets offered by new energy efficiency and renewable energy technologies.

To do this, the following areas of activity have been established:

L.1

IMPROVE COMPETITIVENESS AND ENERGY SUSTAINABILITY IN BASQUE INDUSTRY

L.2

REDUCE DEPENDENCE ON OIL IN THE TRANSPORT INDUSTRY

L.3

REDUCE ENERGY CONSUMPTION AND INCREASE THE USE OF RENEWABLES IN BUILDINGS AND THE HOME

L.4

PROMOTE A MORE ENERGY-EFFICIENT BASQUE PUBLIC ADMINISTRATION

L.5

ENCOURAGE EFFICIENCY AND HARNESS EXISTING RESOURCES IN THE PRIMARY SECTOR

L.6

PROMOTE RENEWABLE ENERGY PRODUCTION

L.7

SUPERVISE ENERGY SUPPLY INFRASTRUCTURES AND MARKETS

L.8

ORIENT TECHNOLOGICAL ENERGY DEVELOPMENT

LINE 11

IMPROVE COMPETITIVENESS AND ENERGY SUSTAINABILITY IN BASQUE INDUSTRY

FRAMEWORK OF ACTION

The relatively large contribution of industry to the Basque economy as compared to other countries and regions, together with its high levels of energy consumption, call for continued efforts to improve energy savings and efficiency and promote the use of renewable energy.

Energy consumption in Basque industry

The Basque Government has carried out a range of actions to improve the competitiveness and energy sustainability of Basque industry. Through aid programmes in energy saving and efficiency in the industrial sector, it has supported monitoring of energy consumption, the introduction of energy management systems, the preparation of comprehensive energy audits and incentivisation of investment in renewable energy and energy efficiency for equipment and processes. Energy consumption in industry represents 42% of final energy consumption in the Basque Country. This figure is much higher than the EU average of 26%, and is due to the industrial nature of the Basque economy. The typical profile of the industrial consumer in the Basque Country is in many cases, that of a large company or an SME in a high-energy consuming industry; the industrial subsectors with the highest consumption are industrial steelmaking and foundry (35% of total), paper and cardboard (17%) and machines and metal processing (10%).

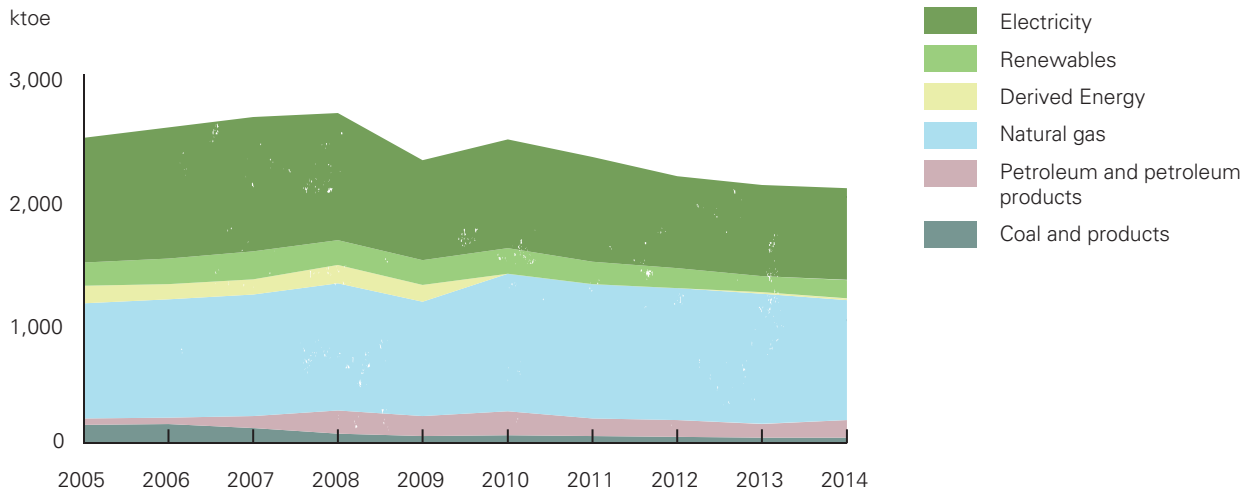


FIGURE 36. Trends in industrial energy consumption in the Basque Country (Source: EVE)

Between 2008 and 2014, energy consumption in the Basque industrial sector fell by 23%. This reduction was closely related to a drop in industrial output (20% over the same period), with energy intensity falling 3% in terms of energy consumption per unit of GDP. Possible improvements in energy efficiency are only partially reflected in energy intensity, given that the drop in industrial output means greater consumption per unit of production.

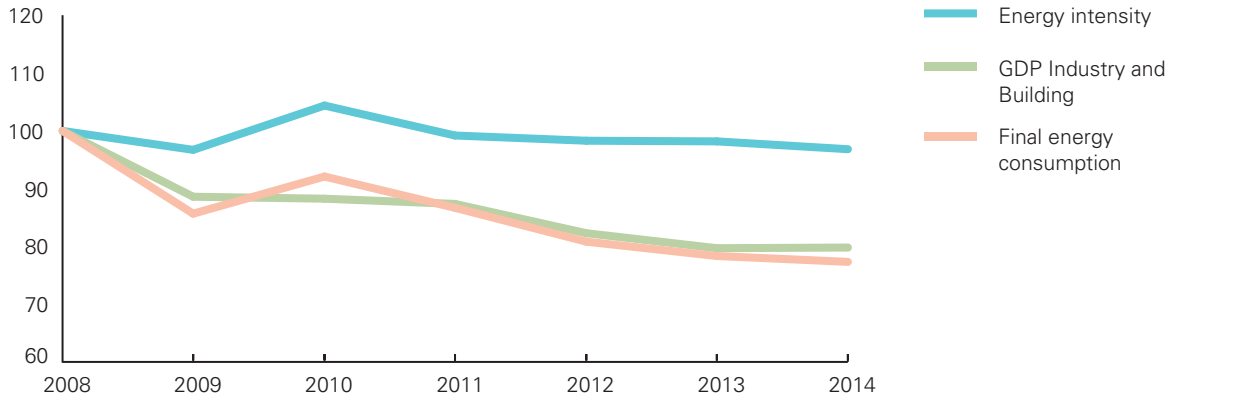


FIGURE 37. Trends in energy intensity in industry in the Basque Country in terms of energy consumption per unit of GDP (index 2008=100) (Source: EVE)

Since the start of the crisis in 2008, energy consumption has fallen in practically all industrial subsectors. The figure below shows trends in electricity consumption in the industrial subsectors with most energy consumption. The only subsector in which consumption did not fall over the period was food, drink and tobacco; in all others, it was down between 15 and 35%.

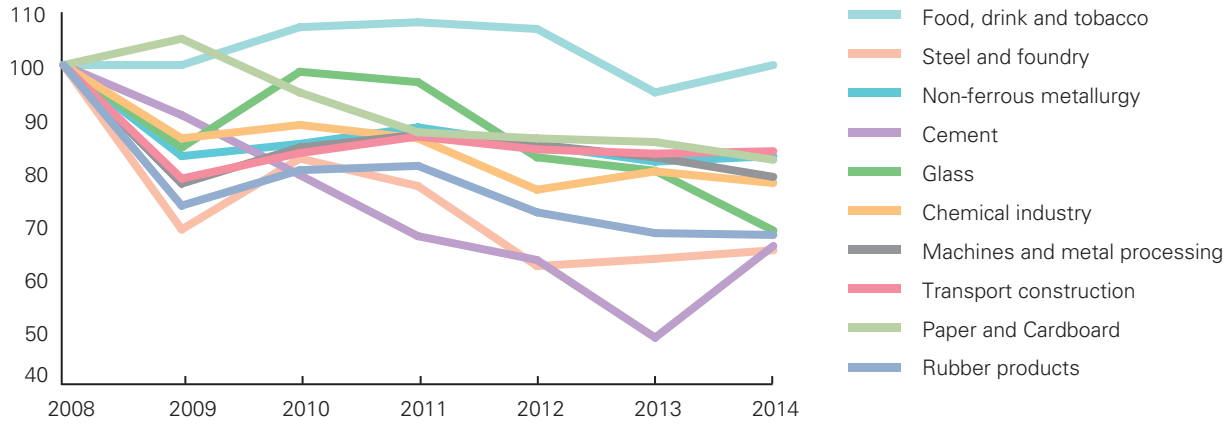


FIGURE 38. Trends in electricity consumption 2008-2014 by industrial subsector in the Basque Country (index 2008=100) (Source: EVE, based on data from Iberdrola)

The energy types most consumed by Basque industry are natural gas (accounting for 47% of total consumption) and electricity (36%), followed at a large distance by renewable energy (7%), petroleum products (7%) and coal (2%). There is therefore little potential for replacing petroleum products and coal in industry; among the petroleum products most used is petroleum coke, which is employed in the cement industry. This accounts for 75% of all use of petroleum products in industry, with the rest being made up of diesel, fuel oil and LPG, in that order. The technical, environmental and economic advantages of natural gas over petroleum products mean that, wherever possible, there has been a shift towards natural gas.

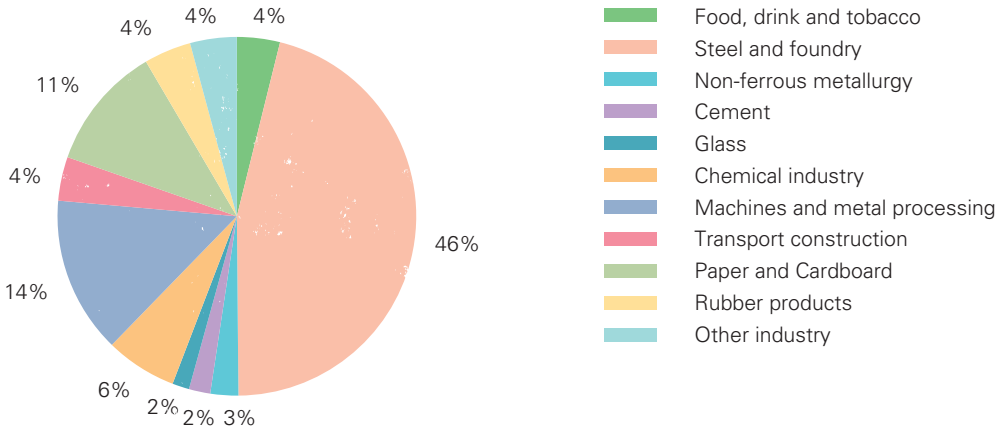


FIGURE 39. Distribution by subsector of industrial electricity consumption in the Basque Country, 2014
(Source: EVE, with data from Iberdrola)

More than a third of gas consumption in the industrial sector corresponds to steelmaking and foundry, where it is used in heating and heat treatment processes. Other energy-consuming subsectors, by order of importance, are paper, machines and metal processing, glass, chemicals, non-ferrous metallurgy, food, and rubber products. The use of renewable energy in industry is limited to the paper and wood industries, where by-products such as black liquors, bark and wood shavings are valorised to produce steam which is used in industrial processes and to produce electricity in CHP facilities. The use of coal has gradually declined and it now accounts for just 2% of consumption. Its use is restricted to the metalworking industry, where it is used as a raw material and for its energy contribution.

Energy saving in industry

In recent years, the regulatory framework has required improvements in energy efficiency in industry through participation in the European Emissions Trading Scheme for larger companies, the creation of a new special duty on natural gas consumption and an increase in the power transmission charges paid by consumers. The crisis has also led to a decline in industrial output, with the result that investments in energy efficiency have been put off. However, over recent years 870 energy efficiency projects and 110 energy audits have been subsidised in industry, as well as 317 systems for monitoring consumption.

A total of 58 Basque facilities now operate within the European Emissions Trading Scheme. Of these, 53 industrial facilities, including the largest energy consumers are subject to participation in the ETS, with total emissions in 2013 of nearly 5.2 million tonnes of CO_2, i.e. 30% of total greenhouse gas emissions. ETS participation gives these facilities –which are mainly in the steelmaking, pulp and paper, glass, cement, chemical, food and rubber industries– an additional incentive to save energy, in order to reduce spending on emission allowances. These subsectors are amongst those considered to be at risk of "carbon leakage". In other words, they are in competition with other geographical regions with more lenient regulations on carbon emissions. To address this problem, the EU has unified its criteria on allocating emission allowances, making allowances free up to a given limit (covering the emissions levels of the most efficient installations).

Basque industry has been making continuous efforts to improve energy efficiency in its production equipment and processes, in many cases incorporating best practice, and given its importance in terms of consumption, it continues to be a key sector when it comes to applying new savings and efficiency measures. A study by EVE in 2010 showed that with the technologies currently on the market, there was a potential for between 5% and 23% energy saving in Basque industry, depending on the subsector in question.

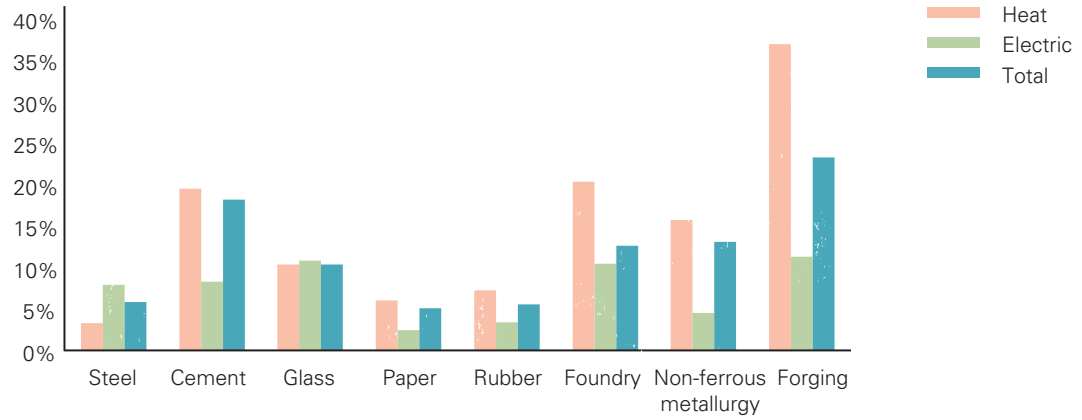


FIGURE 40. Technical energy saving potential in large energy-consuming Basque industrial sectors (Source: EVE)

Although these energy-saving technologies are very well-established in Basque industry, there is therefore still room for improvement in areas such as furnaces and boilers (combustion adjustments, replacement of burners, installation of checkers, preheating of charges, enrichment of combustion air with O2, insulation), reduction in electrical consumption (variable frequency drives, more efficient electric motors, turning off transformers, improvements in compressed air systems and in cooling units) and, in general, improvements in the configuration and control of systems and introduction of CHP systems. Energy efficiency in industry may also be an area for R&D; Innobasque's "Calor" project is looking at new innovative arrangements for harnessing residual heat.

Directive 2012/27/EU on energy efficiency requires that energy audits be compulsory and regular for large companies and must take into account European and international standards, such as ISO 50001 (energy management systems), EN 16247-1 (energy audits) and ISO 14000 (environmental management systems). These audits must be performed independently by qualified experts and supervised by independent authorities no later than 5 December 2015 and, at least, every four years from the date of the previous audit. The requirement to perform audits every 4 years applies to companies that are not SMEs, under Royal Decree 56/2016 partially transposing the Energy Efficiency Directive.

CHP

Combined Heat and Power (CHP) is a very efficient way of generating electricity and heat in conjunction for industrial processes. For this reason, it has been promoted under Basque energy policy and the region now has installed capacity of around 420 MW in 48 industrial CHP plants. These plants have been introduced over the last two decades in subsectors with most potential for effective harnessing of the technology, such as paper (7 plants, 140 MW), refining (92 MW), food (6 plants, 47 MW), rubber products (1 plant, 47 MW), chemicals (3 plants, 33 MW), machines and metal processing (3 plants, 12 MW), wood-related products (7 plants, 18 MW) and foundry (1 plant, 8 MW).

Although the areas of greatest efficiency by size and potential heat use have already been occupied, there may still be isolated opportunities for growth in industrial CHP. However, cutbacks and uncertainty as to legislative developments continue to undermine CHP and affect the associated industry. The reforms implemented since 2012 in the energy industry have led to a reduction in output and the closure of CHP facilities. The moratorium on the renovation of installations, from January 2012, combined with triple application of energy taxes –gas, electricity and CO_2–, limitations on payments to special framework installations under regulated tariff formulas, and the recent additional cutbacks which have done away with payment for higher efficiency and the reactive complement, are having a serious impact on one of the most efficient technologies for this country and its industry. The reforms have created a situation which is no longer favourable to the installation of new CHP plants. The prospects for new installations in the short and medium term in the Basque Country are not positive, even if industrial output returns to pre-crisis levels. As well as the halt in the creation of new projects, there has also been a major reduction in average usage hours of the plants, given the retroactive nature of the legislation, applying to the entire useful service life of the installations.

Use of renewable energy in industry

Most of the biomass used for energy purposes in Basque industry comes from the by-products of sawmills, carpentry plants and furniture manufacturers (timber waste, sawdust, bark), bark and black liquors in the paper industry, and small quantities of waste from the food industry. The waste is frequently used in the same industrial facilities in which it is produced. A number of plants in the paper industry generate electricity and steam from this waste in CHP facilities. There are other opportunities for introducing renewables in industry, although normally on a small scale, such as geothermal and solar thermal. These may be suitable in cases in which the industry requires heat at low temperatures. Over recent years programmes have been developed to subsidise investment in renewable energy. These grants have been used to launch a variety of biomass and geothermal projects. With regard to photovoltaic output, the available roof area on industrial premises may offer opportunities for self-consumption installations as the price of this technology falls. Installations for self-consumption can be competitive in the short to medium term, starting with companies connected to low voltage networks with high electricity consumption in peak hours, even without premiums for renewable production, if the costs of photovoltaic energy continue to fall and the right regulatory conditions arise.

Industrial competitiveness

On many occasions, energy forms an important part of the cost structure for companies competing on a globalised market. Energy consumption and the price of energy are therefore important factors of competitiveness for the Basque industrial fabric. Spending on energy accounts for 4.1% of the running costs of industries in the Basque Country[28], although the figure is over 10% in the paper, steelmaking and metalworking industries. Legislative reform of the Spanish energy industry is having a notable effect on the business of the different sectors. In addition to the economic crisis, which in some cases has led to a major fall in output, the measures established to reduce the tariff deficit mainly affect industrial subsectors that compete on international markets, a factor which may be slowing economic recovery.

The Basque Government has given its backing to the demands of Basque industry for a more stable regulatory framework that does not hinder the competitiveness of companies in aspects such as the payment for CHP and electrical interruptibility and the cost of grid access charges. It has passed these concerns on to the regulator.

The current systems for managing purchase on wholesale markets through retailers means that prices vary depending on the period of consumption. This means that prices are higher at times of greatest demand, and lower in off-peak hours, opening up possibilities for companies that adapt or manage their operating conditions in an attempt to optimise costs through systems of energy management cut their energy bill. A company can determine the best operating profiles of its different sections and equipment by identifying the installation's precise consumption at any given time. According to Eurostat, the cost of electricity supply for industrial firms in Spain grew by 30% during the period 2007-2013, a similar rate to the rest of Europe. However, the fact that there are countries in our region with lower electricity costs hinders competition in energy intensive industries. The industrial sector has had to bear an increase in the costs of grid access; since 2007, the demand charge for Tariff 6.1 of the NATs increased by a factor of four, while the energy rate remained more stable, even falling in some periods (in August 2013 a change in the tariff structure led to an increase in the demand charge and a reduction in the energy charge). The creation in 2015 of Tariff 6.1B for 30-36 kV distribution networks has brought some relief to industry connected at this voltage level, since it entails a 15% reduction in the demand charge and a 12% cut in the energy charge as compared to the previous Tariff 6.1.

[28] The Transformation of the Basque Energy Industry, Cuadernos Orkestra, September 2013.

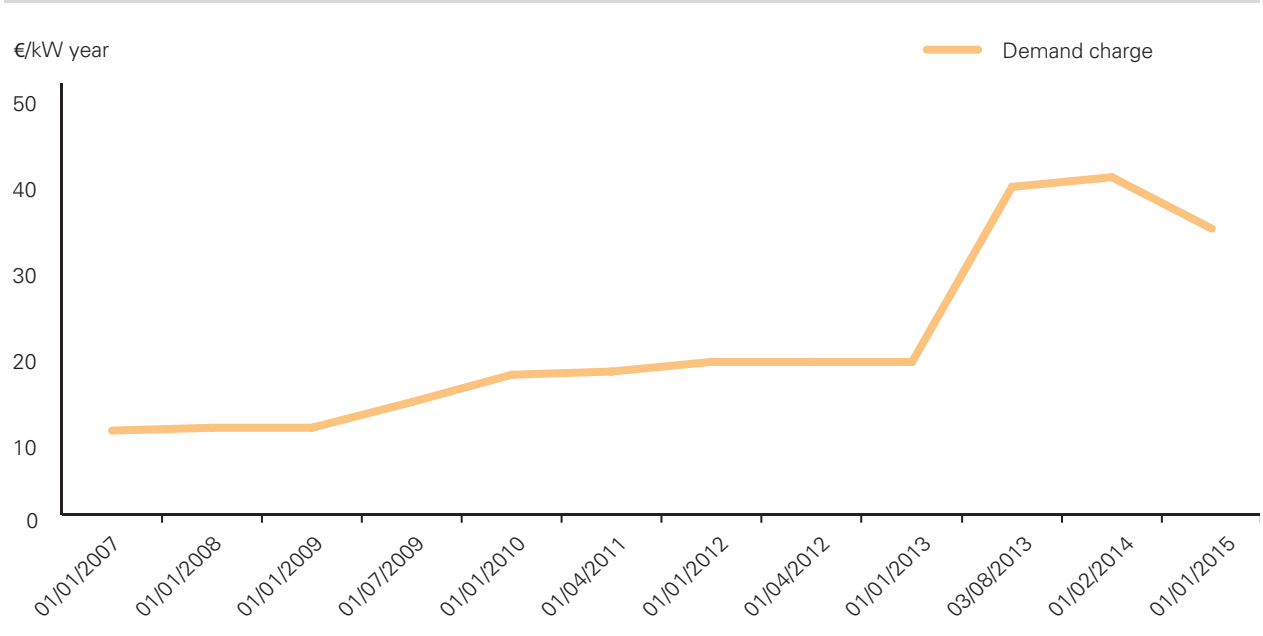


FIGURE 41. Trends in 30 kV network access tariff 6.1/6.1B (Source: EVE)

ACTIONS IN THE INDUSTRIAL SECTOR

Overall objective

The goal of the energy policy in the area of energy sustainability in the industrial sector is to contribute to improving the competitiveness of industry and to reducing its environmental impact by reducing energy consumption and encouraging the use of more sustainable types of energy.

Indicators and targets 2030

INDICATORS	2015	2025	2030
Reduction in industrial energy consumption vs. BAU (toe/yr.)	-	248,000	308,000
Percentage reduction in consumption vs. BAU (%)	-	10.5%	12.9%
Industrial energy consumption vs 2015 (%)	-	-2.1%	-4.2%
Installed capacity in CHP (MW)	416	552	558
Increase in use of renewables vs. 2015 (%)	-	52%	66%
Share of renewable energy in industry (%)	6%	9%	10%

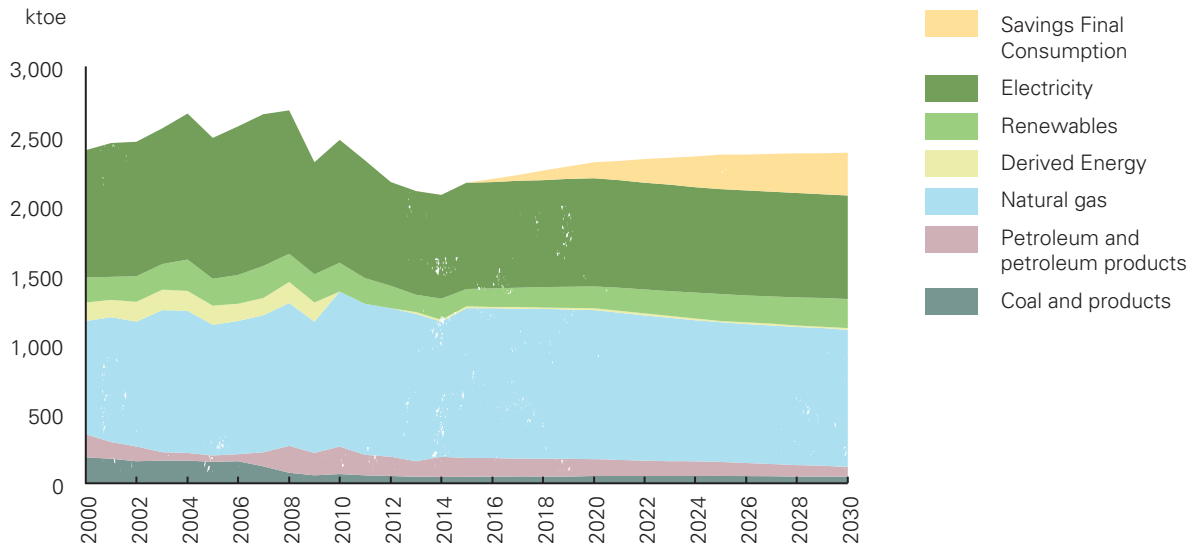


FIGURE 42. Scenario of industrial energy consumption (Source: EVE)

Bodies with responsibility for the line of action

Department of Economic Development and Infrastructure (Sub-Department of Industry) with the collaboration of the Department of Public Revenue and Finance and the territorial (provincial) governments of Araba, Bizkaia and Gipuzkoa.

Initiatives and actions

LINE L1

IMPROVING COMPETITIVENESS AND ENERGY SUSTAINABILITY IN BASQUE INDUSTRY

INITIATIVE L1.1.

ENCOURAGEMENT OF ENERGY SAVING AND DEMAND MANAGEMENT IN INDUSTRY

L1.1.1. Audits, studies and energy management

L1.1.2. Pilot projects for sectoral application of new saving and efficiency measures

L1.1.3. Investment in energy efficiency for equipment and processes

L1.1.4. Monitoring of energy consumption and process control

L1.1.5. Tax incentives for investment in sustainable energy in SMEs

L1.1.6. Backing for a regulatory framework that protects the competitiveness of Basque industry

INITIATIVE L1.2.

STIMULUS FOR USE OF MORE SUSTAINABLE ENERGY TYPES IN INDUSTRY

L1.2.1. Promotion of use of renewable energy in industry

L1.2.2. Increased energy use of biomass

L1.2.3. Use of renewable energy for heat and power

INITIATIVE L1.1

ENCOURAGEMENT OF ENERGY SAVING AND DEMAND MANAGEMENT IN INDUSTRY

The goal of this initiative is to increase energy efficiency and saving in industrial firms in order to promote their competitiveness and reinforce the sustainability of their processes.

L1.1.1. Audits, studies and energy management

The purpose of energy management in companies is to increase their energy efficiency and help the organisation to develop a system for continuous improvement in its energy performance. Energy management can result in energy efficiency certification, audits and viability studies for new facilities which form the basis for optimisation of processes in aspects related to energy consumption and for decision-making on investment in efficiency measures. The figure of the energy manager in industrial establishments is a key element of energy management, as the person in charge of designing and implementing energy management systems, mainly in SMEs.

Energy audits are a necessary preliminary step for detecting new opportunities for reducing energy consumption and costs in the companies, ultimately leading to investments in processes and equipment. The energy policy for the industrial sector encourages energy audits and energy management in SMEs, by informing and raising awareness on their advantages for their business and through a range of aid programmes. This line of action also includes performing viability studies for CHP facilities and the introduction of more efficient equipment and systems.

L1.1.2. Pilot projects for sectoral application of new saving and efficiency measures

It is necessary to continue performing studies and analyses on possible incorporation of emerging advanced technologies in industry. This will require identifying and promoting innovative energy projects whose application can be extended to the rest of the industry or industries.

L1.1.3. Investment in energy efficiency for equipment and processes

As a result of developments in technology, new systems and equipment are gradually appearing that enable the energy efficiency of industrial processes to be improved, both in terms of technologies that are specific to one industry and horizontal technologies, such as variable frequency drives, compressors, cooling, lighting and monitoring systems, etc. The replacement of obsolete systems and equipment by more efficient ones will be promoted through aid schemes. Grants are awarded on the basis of the level of energy saving achieved in each measure adopted. This line also includes investment in new industrial CHP plants and replacement of equipment in existing CHP plants in order to improve efficiency.

L1.1.4. Monitoring of energy consumption and process control

In implementing saving and demand management measures efficiently, it is very valuable to have a detailed knowledge of the consumption. This can be achieved through systems for monitoring processes that break down the consumption figures by units or production lines. This is useful for studying the viability of implementing energy efficiency measures, for better management of electricity contracting and participation in complementary electrical system services, such as the interruptibility service.

L1.1.5. Tax incentives for investment in sustainable energy in SMEs

The tax deductions by the three provincial governments through the Basque List of Clean Technologies on investment in equipment and advanced energy technologies, very high-efficiency CHP systems and renewable energy, promote actions oriented towards more sustainable energy use. These deductions should be geared towards incentivising available technologies which, while more efficient, are difficult to implement because of their limited profitability or low level of commercial penetration. This list must be regularly reviewed and updated to adapt it to technical developments.

L1.1.6. Backing for a regulatory framework that protects the competitiveness of Basque industry.

Reform of the electricity industry has led to increased energy costs through taxes on gas consumption and power production and an increase in ATRs. Measures need to be created to help provide reasonable electric costs in order to strengthen industry's business and export capacity. The Basque Government must exercise its capacity

of influence within its area of power to try to ensure that electricity costs are kept within levels that do not hinder the competitiveness of Basque industry, particularly through the following aspects:

- Maintenance of charges for accessing power and gas networks that reflect the real costs of these networks and of a stable long-term framework.
- Maintenance of a payment framework for CHP that is free from uncertainties for new and existing and plants and which will encourage the operation of efficient installations.
- Establishment of a new system of electrical interruptibility that will allow access by all companies to reduce the regulated costs of the system.

> " The energy policy for the industrial sector encourages energy audits and energy management in SMEs"

- Application of sectoral tax exemptions for industries in which regulated costs represent a loss of competitiveness on international markets.

INITIATIVE L1.2.

STIMULUS FOR USE OF MORE SUSTAINABLE ENERGY TYPES IN INDUSTRY

L1.2.1. Promotion of use of renewable energy in industry

There is still only a limited knowledge in the industrial sector as to the possibilities of applying renewable energy in industrial processes, especially among SMEs. It is therefore necessary to raise awareness and to train the industry in this area, demonstrating new technologies and models of good practice in order to develop existing potential in this area.

L1.2.2. Increased energy use of biomass

Industrial biomass by-products, such as bark, sawdust and black liquors, can be used in a way that is efficient in energy and economic terms, replacing conventional fuels for heat generation in industrial processes. The energy policy must therefore provide backing for initiatives whose purpose is to achieve a higher level of harnessing of biomass by-products. Although the potential in this area is limited due to the fact that the highest levels of efficiency have already been exploited, it is considered possible to extend the current use of biomass in industry to a larger number of firms. This will require the creation of programmes to support the introduction of biomass boilers in SMEs.

L1.2.3. Use of renewable energy for heat and power

Some industrial subsectors in the Basque Country can use low temperature heat –in DHW and heating systems and also in their production processes– although in general this accounts for only a small percentage of industrial energy consumption. One line of action should consist of supporting the installation of complementary systems/equipment for thermal harnessing of renewable energy (solar thermal, geo-exchange, biomass) with a view to maximising the use of renewables in industry, reducing its energy dependence, reducing the energy bill and cutting carbon emissions.

It is also necessary to support and encourage companies in capitalising on the opportunities that technological progress is beginning to offer to integrate power production from renewables, especially photovoltaic, in consumption points.

LINE L2

REDUCE DEPENDENCE ON OIL IN THE TRANSPORT INDUSTRY

FRAMEWORK OF ACTION

Energy consumption in industry

The transport sector consumes 1.86 Mtoe of energy, 95% of it in road transport. The transport sector accounts for 37% of final energy consumption in the Basque Country, as compared to less than 25% twenty years ago. The reasons for this growth lie in an increase in the number of vehicles and drivers (who now number 1,263,000).

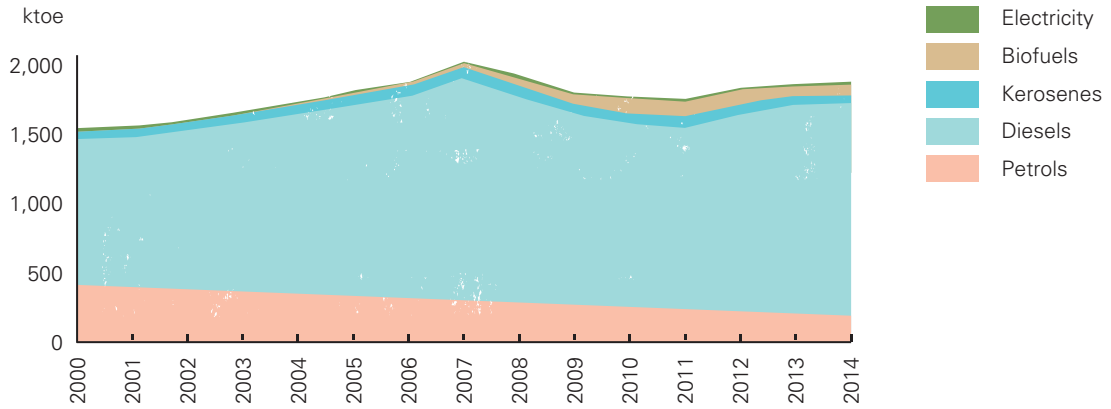


FIGURE 43. Trends in energy consumption in transport in the Basque Country (Source: EVE)

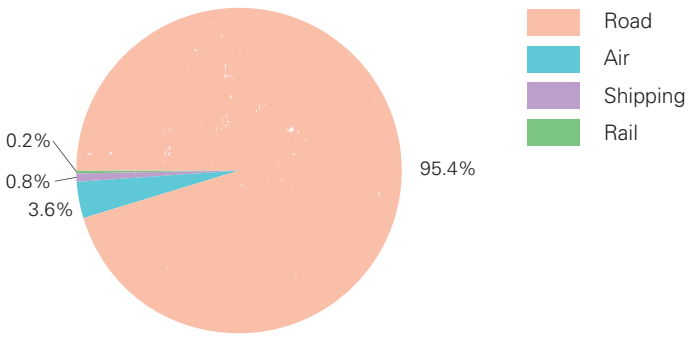


FIGURE 44. Distribution by subsector of energy consumption in transport in the Basque Country (Source: EVE)

Number of automobiles in the Basque Country

The number of vehicles in the Basque Country has stabilised in recent years at around 1.2 million units, following a 70% growth from 1990. Of this number, 945,000 are cars, 187,000 trucks and vans and 3,120 buses. Registration of new vehicles peaked at around 80,000 between 1999 and 2007, falling progressively to 35,000 in 2012 and 2013. There have been significant advances in the efficiency of motor engines and reductions in emissions of pollutants as a result of European regulations and policies to promote more efficient vehicles. However, the increase in the number of vehicles and kilometres travelled, as well as a trend towards "dieselization" means that NOx emissions from motor engines currently constitute the leading problem facing air quality in our region.

" There have been significant advances in the efficiency of motor engines and reductions in emissions of pollutants as a result of European regulations and policies to promote more efficient vehicles"

Movement of people and goods transport in the Basque Country

The average number of trips per person per day in the Basque Country has increased from 2.7 in 2003 to 3.05 in 2011, according to a survey conducted periodically by the Basque transport observatory OTEUS. The principal means of transport used to satisfy mobility needs is pedestrian, followed by automobile, bus, rail and bicycle in that order. Proportionally, use of the automobile fell from 38.8% to 35.8% between 2007 and 2011. In absolute terms, automobile use has fallen 6% to 2,220,000 daily trips. There has been a significant increase in bicycle use, which doubled during the period to over 100,000 trips per day, while the use of shared transport has fallen from 17.5% of all trips to 15%.

The predominant transport system is determined by specific urban characteristics, resulting in a different transport profile in each province. In Bizkaia, use of collective transport (bus and rail) accounts for 17.6% of trips as compared to 8.6% in Alava. However, bicycle use is more significant in Alava, accounting for 6.5% of trips, as compared to a Basque average of 1.9%. As regards road traffic, the graph below, taken from reports published annually by the provincial governments, shows a reduction in movement on Basque roads since 2007, apart from a slight upturn in 2010. In six years, mobility has fallen by 10.4%

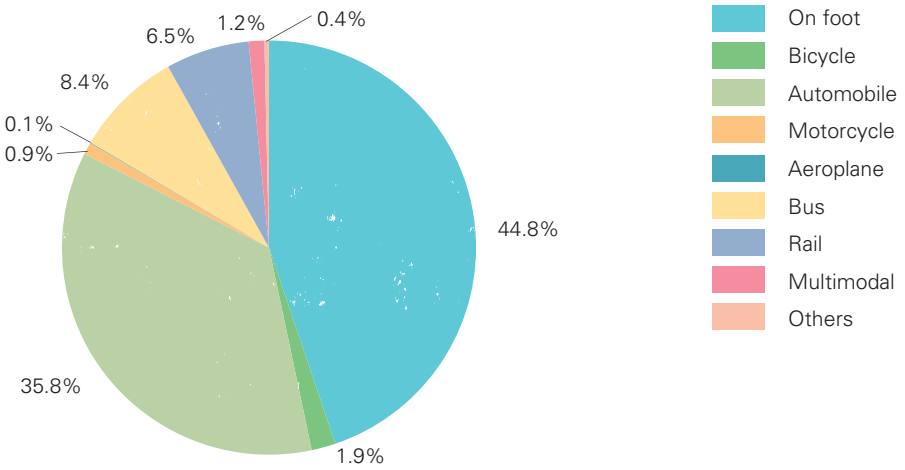


FIGURE 45. Distribution of trips by means of transport in the Basque Country, 2011
(Source: Department of Housing, Public Works and Transport of the Basque Government. 2011)

Commuting –i.e. travel for reason of work and study– generates 37.3% and 12.3% of trips in the region respectively.

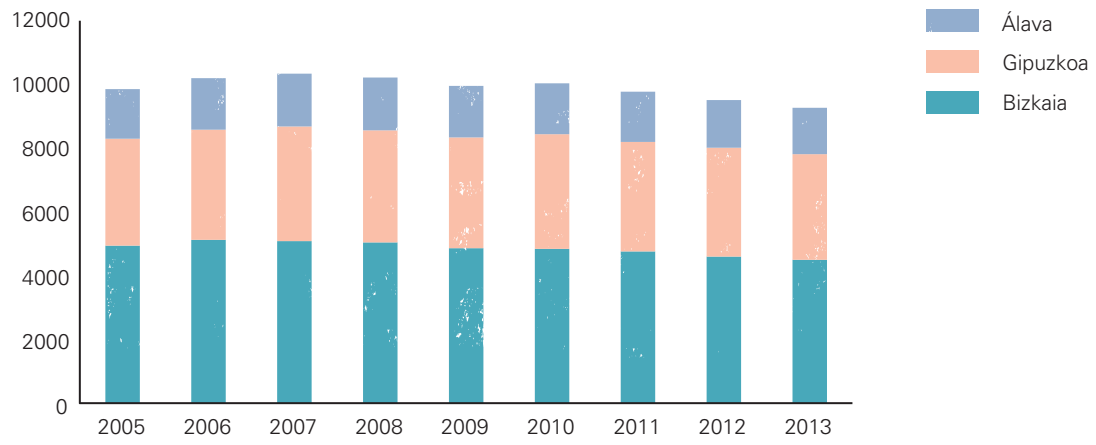


FIGURE 46. Mobility in the provinces (million vehicles/km per year). (Source: Traffic studies by the provincial governments)

There has been a significant reduction in goods transport in recent years as a result of the economic crisis. Average daily intensity of heavy vehicles – which can be seen as an indicator of goods transport –fell between 2007 and 2013 by 24% in Gipuzkoa, 22% in Alava and 20% in Bizkaia.

Trends in vehicle efficiency and emissions

From the point of view of the energy efficiency of vehicles, there have been two complementary trends: an effort by manufacturers to optimise thermal engines and in recent years the start of the process of vehicle electrification, which began with hybridization and will end with fully electrically-driven vehicles, independently of how the energy is stored. There have been significant improvements in internal combustion engines through downsizing of engines while maintaining power and torque performance. Other aspects that influence consumption include aerodynamics, tyres and the air-conditioning system.

The main impetus behind these developments is the EU regulation on reduction of greenhouse gas emissions, which sets limits for the coming years that are forcing manufacturers to make important efforts. The agreement signed between the EU and automobile manufacturers in 1998 (the ACEA agreement) sought to limit average CO_2 emissions to 140 g/km for all new cars by 2008. That agreement has led to an improvement from 186 g/km in 1995 to 160 g/km in 2005. In 2007, the European Commission proposed long-term targets of 120 g/km in 2012 and 95 g/km in 2020. In 2007 European regulations were issued on harmonisation of motor vehicles with regard to emissions from cars and light commercial vehicles (Euro 5 and Euro 6) and access to information on vehicle repair and maintenance. The regulation set limits for emissions of hydrocarbons, carbon monoxide (CO), nitrogen oxides (NOx) and particles for the different vehicles. The difference between Euro 6 and Euro 5 lies in the limit on the mass of nitrogen oxides (NOx) in diesel engines, which has been significantly reduced.

Alternative fuels

There are a number of uncertainties surrounding the future supply of petroleum products, including price instability and the risk of price hikes, supply security, capacity to meet demand and the effect of petroleum products on global warming. In addressing these uncertainties, there is great potential for the development of policies that promote the use of alternative non-petroleum fuels. However such policies also face certain limitations. The process of switching the automobile fleet from one type of fuel to another is a very lengthy one; in addition to technological challenges and social awareness, it also involves replacing a good whose current useful service life is calculated at around 16 years.

The European Union has been very active in recent years in encouraging alternative fuels. In its 2011 White Paper, entitled "Roadmap to a Single European Transport Area: Towards a competitive and resource efficient transport system", the Commission called for a reduction in transport's dependence on oil. This goal must be achieved through a series of political initiatives, particularly by drawing up a sustainable strategy on alternative fuels and the development of appropriate infrastructure. The Commission's Communication of 2013, entitled "Clean Power for Transport: A European alternative

fuels strategy ", mentions electricity, hydrogen, biofuels, natural gas and liquefied petroleum gas (LPG), as well as their possible simultaneous and combined use as the main alternative fuels with potential to replace oil in the long term.

Directive 2014/94/EU on the deployment of alternative fuels infrastructure, establishes a common framework of measures for the implementation of an infrastructure for alternative fuels in the Union in order to minimise the dependence of transport on oil and mitigate the environmental impact of this sector. The directive lays down minimum requirements for the creation of an infrastructure for alternative fuels, including charging stations for electric vehicles and LNG, CNG (compressed natural gas) and hydrogen refuelling points. These requirements will have to be applied through the national frameworks of action of the Member States, as well as through common technical specifications for charging and refuelling stations and requirements on information for users. With regard to shipping, it establishes that Member States must create electricity supply facilities and ensure that there are a suitable number of LNG refuelling points in ports for maritime transport.

Biofuels

Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport established a minimum proportion of 5.75% of biofuel contents by 2010. Subsequently, Directive 2009/28/EC on the promotion of the use of energy from renewable sources, set a target of a market share of 10% for renewable energy in transport in 2020 and the White Paper also proposed a 60% reduction in greenhouse gas emissions from transport by 2050, compared to 1990 levels. Studies and debates on the environmental sustainability of biofuel production have led to some qualification of the 2020 targets in this area. In 2015, the European Parliament approved Directive 2015/1513/EU[29] limiting the amount of first-generation biofuels in transport in 2020 to 7%. The remaining percentage up to 10% must be met with second-generation fuels (whose contribution is to be calculated as twice their energy content for the purposes of determining compliance with targets) and the renewable share in the electricity used in transport.

In Spain a minimum was established in 2011 of 6.5% of biofuels by 2013 (7% in diesel and 4.1% in petrol). The target was subsequently reduced to 4.1% in diesel and 3.9% in petrol for the period 2013-2015. The policy of promoting the consumption of biofuels ended with the new tax on hydrocarbons, which since the beginning of 2013 has been levied on biofuels in such a way that the high-bioethanol blend (E-85) is similar in price to petrol.

This type of fuel will have to face the challenge of sustainability and its overall carbon cycle will have to be improved. EU legislation already requires a 35% cut in emissions, and the figure is due to rise to 60% from 2017. Production costs will also have to be cut in order to compete with conventional fuels. This will require major investment in R&D, as well as specific support for advanced biofuel plants.

[29] Directive 2015/1513/EU amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources.

Electric vehicles

In April 2010, the Basque Government presented its strategy for promoting the use of electric vehicles in the Basque Country as a means of improving energy efficiency in transport and an impetus to new business opportunities in the Basque industrial fabric. The target initially set was for 10% of vehicles to be electric (pure or plug-in hybrid) by 2020. However, the actual development of the market and costs of electric vehicles has resulted in sales

figures that indicate that the target will be far from being met. In 2014, there were around 400 electric vehicles operating on Basque roads. The strategy to encourage electric vehicles in the Basque Country is based on the development of an infrastructure of charging stations, the creation of a critical mass of electric vehicles in circulation, adaptation of the legal framework and a boost to technological development in this area. As for charging infrastructure, there are over 65 public charging stations in the Basque Country, of which three (located in Donostia-San Sebastián, Vitoria-Gasteiz and Barakaldo) are fast-charge points.

In 2010, the Spanish Government presented a comprehensive strategy for encouraging electric vehicles in Spain, which targeted a figure of 250,000 electric vehicles by 2014. The figure of the charge manager was created for charging of these vehicles. Regulations for the business were issued in 2011 and technical instructions were published for standardising the charging infrastructures. Aid has also been established for purchasing electric vehicles as part of the 'Movele' programme. The budget for the programme was reduced to €7 m in the 2015 edition.

Natural gas in transport

Natural gas is one of the most attractive alternatives for reducing the predominant position of oil in the transport sector. In recent years, there has been major growth in the use of natural gas in Spain, particularly in long-distance heavy vehicles (liquefied natural gas or LNG) and in heavy urban services vehicles (compressed natural gas or GNC). The main obstacle to development of this fuel lies in the need for relatively large-scale investment to introduce the supply infrastructure. At present, this fuel is supplied in four service stations in the Basque Country, two In Alava, one in Bizkaia and another in Gipuzkoa. Development in the use of LNG in maritime transport are expected. This is an area in which the Basque Country has the option of participating, especially through Bilbao Port where there are supply facilities. Use of this fuel is being promoted by the EU through the Directive on the deployment of alternative fuels infrastructure, discussed above.

Liquefied petroleum gases

Liquefied petroleum gases (LPGs) –principally propane and butane– are alternatives to diesel and petrol. They are generally obtained from the distillation of petroleum, although they can also be obtained as a by-product of natural gas extraction. Although the use of LPGs in transport is not new, over the last decade it has expanded considerably, mainly as a result of determined support from oil operators and a more favourable tax regime than for petrol. Although the situation is not yet comparable to that enjoyed in countries such as Italy, France or Germany, there are now more than 20 LPG supply points in the Basque Country. It is mainly used in cars and light commercial vehicles.

Tax on fuels

Directive 2003/96/EC established the current community regime on taxation of energy products and electricity. Within this framework, taxes in Spain are lower than in France. Under the terms of Act 25/2006, the autonomous communities can levy a tax on the retail sale of certain hydrocarbons of up to 48 euros per 1000 litres. This rate is not applied in the Basque Country. For both of these reasons, sales of vehicle fuel in the Basque country are higher than actual consumption.

Promotion of more sustainable vehicles

Renovation of the transport fleet entails a reduction in energy consumption, with additional positive effects for the environment and road safety. To encourage renovation, the government launched "Incentive programmes for Efficient Vehicles (PIVE)". The funds for the programme were used up in a much shorter time than anticipated, a reflection of the great success of these plans in their six previous calls. The most recent scheme[30], launched in 2015 with a budget of 175 million euro, hopes to achieve the accumulated replacement of a total of 885,000 vehicles throughout the entire programme, as well as an increase in vehicle registration. These grants are for people wishing to purchase new vehicles, definitively deregistering an older vehicle of the same category registered in Spain and having passed its motor inspection test at the time when the Royal Decree came into force. The aim of the programme as a whole, at the end of the 2015 edition, is to replace a total of 885,00 older vehicles with the same number of new one. It is hoped that the programme will result in major savings in fuel and carbon emissions, avoiding importation of nearly 2 million barrels of oil per year.

Policies on sustainable mobility

As well as the Energy Strategy, which in its area of operation encourages the use of more sustainable fuels and technologies in transport, the Basque Country also has a number of policies promoting actions that will reduce energy consumption in the transport sector. The strategic aim of the Master Plan for Sustainable Mobility to 2020 is to develop a high-quality system of mobility that is more efficient economically, socially, environmentally and in energy terms and which will act as an economic driving force for the country. One of the strategic objectives of the plan is to achieve a system of mobility that is less dependent on private vehicles and on fossil fuels. To this end, a number of strategic lines are set out, such as achieving an integrated passenger transport system, promoting a sustainable and multimodal logistics system, promoting the economic sustainability of the mobility system, encouraging sustainable means of transport and the use of clean fuels and in particular, promoting use of the train. There are also a number of plans for cycle ways, such as the Cyclable Master Plan of Bizkaia (2003-2016) and the Territorial Sector Plan for Cycle Ways in Gipuzkoa (2013), the Bicycle Strategy of Gipuzkoa (2014-2022) and the Vitoria-Gasteiz Master Plan for Cycle Mobility (2010-2015). These establish guidelines for creating cycle capacity in everyday transport and for recreation purposes in their respective areas, with the aim of promoting the bicycle as a means of transport in competition with low-occupation vehicles and as an alternative to other means of transport.

Actions in the area of the Energy Strategy

During the period 2011-2014 a number of aid programmes were approved in the Basque Country as part of the sustainable transport programme of the Basque energy agency, Ente Vasco de la Energía. These include initiatives targeting vehicles acquisition, promotion of bicycle use, management of transport fleets, mobility plans, pilot projects and charging infrastructures.

[30] Royal Decree 124/2015, of 27 February 2015, governing the direct awarding of grants under the "Programme of Incentives for Efficient Vehicles" (PIVE-7)".

ACTIONS IN THE TRANSPORT SECTOR

Overall objective

To reduce energy consumption and oil dependence in the transport sector, replacing this fuel with other alternative types of energy and contributing to an improvement in air quality and a reduction in greenhouse gas emissions.

Indicators and targets 2030

INDICATORS	2015	2025	2030
Reduction in energy consumption by road transport (toe/yr.)	-	203,000	367,000
Percentage of energy saving in road transport (%)	-	11%	19%
Share of alternative energy sources in road transport (%)	4%	10%	25%
Reduction in use of derived oil in road transport vs 2015 (%)	-	10%	30%

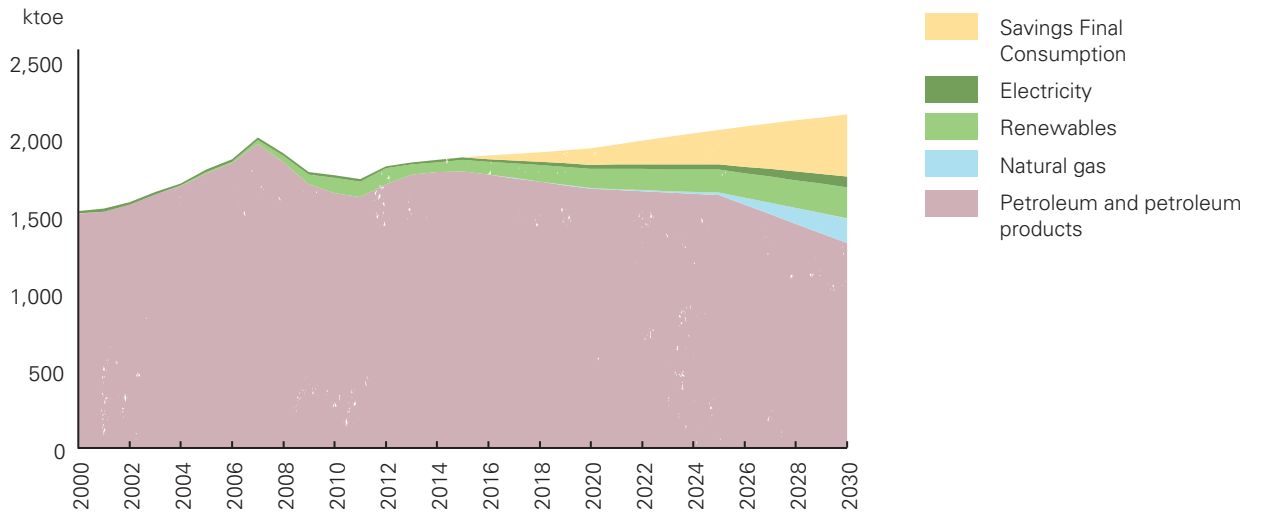


FIGURE 47. Scenario of energy consumption in transport (Source: EVE)

Bodies with responsibility for the line of action

- Department of Economic Development and Infrastructure (Sub-Department of Industry).
- Department of Environment, Spatial Planning and Housing (Sub-Department of Transport).

Initiatives and actions

LINE L2

REDUCE DEPENDENCE ON OIL IN THE TRANSPORT INDUSTRY

INITIATIVE L2.1.

ENCOURAGE SUSTAINABLE MOBILITY AND USE OF MORE EFFICIENT MEANS OF TRANSPORT

L2.1.1. Promotion of sustainable urban transport

L2.1.2. Promotion of the use of bicycles as a means of transport

L2.1.3. Promotion of sustainable transport to business centres

INITIATIVE L2.2.

PROMOTE THE USE OF MORE EFFICIENT VEHICLES AND EFFICIENT USE OF SAME

L2.2.1. Promotion of audits and smart systems for transport fleet management

L2.2.2. Promotion of lower-fuel-consuming vehicles

L2.2.3. Promotion of efficient driving

INITIATIVE L2.3.

PROMOTE THE USE OF ALTERNATIVE FUELS AND TECHNOLOGIES

L2.3.1. Stimulation for transition towards alternative fuels and technologies in public and private fleets

L2.3.2. Promotion of electrical transport

L2.3.3. Stimulation for introduction of natural gas in transport

L2.3.4. Stimulation for other alternative fuels

INITIATIVE L2.1.

ENCOURAGE SUSTAINABLE MOBILITY AND USE OF MORE EFFICIENT MEANS OF TRANSPORT

L2.1.1. Promotion of sustainable urban transport

The sustainable urban mobility plan offers an opportunity to reflect at local level on the habitation model of the urban space. This is the planning instrument for policies undertaken by municipalities to define future strategies in consonance with the most sustainable forms of transport. One of the aspects covered is energy. Mobility plans must set out the sustainable mobility strategies of municipal authorities and define the model of mobility, in terms of traffic, parking, pedestrian movement, bicycles, car sharing, the public transport network and goods distribution. The aim is to achieve effective, efficient and sustainable mobility with lower energy consumption and a reduction in greenhouse gas emissions. The goal of this action is to encourage municipal authorities to consider energy sustainability criteria in local urban mobility plans.

L2.1.2. Promotion of the use of bicycles as a means of transport

In recent years, bicycles are increasingly being included in the EU institutional discourse as a means of urban transport. It is instructive to note the extent to which it has been included in different resolutions and documents which set out policies and criteria for planning, traffic, transport, health and the environment in relation to the bicycle. In the Basque Country, this wider impetus has been reflected in a major increase in bicycle use, although it still stands far behind the levels of other parts of Europe. This means of transport must be promoted by different tiers of government within their different areas of jurisdiction by establishing the urban conditions for its use, building dedicated cycle lanes, facilitating bicycle traffic and raising awareness of its advantages.

L2.1.3. Promotion of sustainable transport to business centres

Plans for mobility to business centres are promoted by EU and national institutions with a view to achieving energy savings and an increase in quality of life in cities. The European *White Paper on Transport* (2011) and the Spanish *Action Plan on Energy Saving and Efficiency Strategy (2004-2012)* both seek to encourage commuting plans, particularly in the case of enterprises with 200 or more employees. This type of instrument is applied in large transport nuclei, such as companies, industrial estates, hospitals, administrative centres and universities and involves encouraging the use of public transport, carpooling, transport on foot or by bicycle, etc. The Basque government must set out the criteria for implementing such plans and economic support when execution of the plans is not compulsory.

INITIATIVE L2.2.

PROMOTE THE USE OF MORE EFFICIENT VEHICLES AND EFFICIENT USE OF SAME

The aim of this initiative is to achieve a more efficient fleet of vehicles and to train drivers in efficient use of their vehicles.

L2.2.1. Promotion of audits and smart systems for transport fleet management

Measures for optimising management and operation of vehicle fleets offer great potential for energy saving due to the high level of fuel consumption involved. Fleets of heavy goods vehicles are particularly important, given their levels of consumption. Through promotion and aid, incentives will be provided for performing audits and fleet management studies and for creating systems for optimising management.

L2.2.2. Promotion of lower-fuel-consuming vehicles

Independently of the type of technology or fuel used, it is necessary to encourage individuals and fleet owners, public and private, to take energy efficiency criteria into consideration when purchasing vehicles. This must be achieved by working with municipal authorities to ensure that they include this concept in their motor tax and by raising public awareness and providing aid for purchasing vehicles that use innovative technologies in developing markets.

L2.2.3. Promotion of efficient driving

From the point of view of reduction in fuel consumption, efficient driving is complementary to proper fleet management and the use of lower-consuming vehicles, both in the private and in the professional sphere. Driver training schemes will be set up to achieve savings of between 5% and 10% in consumption.

" It is necessary to encourage individuals and fleet owners, public and private, to take energy efficiency criteria into consideration when purchasing vehicles"

INITIATIVE L2.3.

PROMOTE THE USE OF ALTERNATIVE FUELS AND TECHNOLOGIES

Objectives:

- To favour the transition of private and public fleets towards vehicles using alternative fuels and technologies.
- To promote the introduction of vehicles using alternative fuels and technologies, especially electricity and natural gas, as well as the necessary charging and supply infrastructure.
- To promote the introduction of natural gas as a fuel in the maritime sector.

L2.3.1. Stimulation for transition towards alternative fuels and technologies in public and private fleets

In order to ensure energy optimisation of public and private transport fleets, audits must be carried out to plan transition towards the best combination of fuels and alternative technologies. This process must take into account the services to be provided, the price of the vehicles, the cost of maintenance and the need for charging and supply infrastructure. These studies and audits must be promoted by the government through technical advice and economic support.

L2.3.2. Promotion of electrical transport

The Basque Government's strategy for Introduction of Electric Vehicles in the Basque Country, published in 2009, sees the encouragement of electric vehicles in the Basque Country as a means of improving energy efficiency in transport and as an impetus to new business opportunities within the Basque industrial fabric.

The development of a public charging infrastructure covering the entire territory, the creation of a critical mass of electric vehicles in circulation, and adaptation of the regulation will all facilitate penetration of a technology that requires a change in the way mobility is perceived.

L2.3.3. Stimulation for introduction of natural gas in transport

In overland transport, natural gas (compressed and liquefied), is one of the main alternatives to petroleum products, due to its capacity to cover most required transport services, with better environmental conditions and with costs which, under certain conditions, are capable of competing with conventional alternatives. Public bus fleets are a good opportunity for use of this alternative energy. For proper introduction of this fuel, it will be essential to establish a suitable network of supply points. This will require the creation of lines of collaboration between the different tiers of government and private initiatives.

In the maritime area, liquefied natural gas (LNG) is a competitive alternative to conventional oil-based fuels, within the framework of strong regulatory pressure on emissions, as set out in the MARPOL convention, ECA zones, etc. This trend also constitutes an opportunity for industrial development in a sector of interest to the Basque Country. To promote it, alternative use will be developed in ships as well as port systems for supplying this type of fuel.

L2.3.4. Stimulation for other alternative fuels

The current context is characterised by the co-existence of several different alternative fuels and technologies which, with different degrees of development, are vying to gain a dominant position to replace conventional fuels over coming decades. As well as electrical transport and natural gas, other possibilities include liquefied petroleum gases (LPGs), biofuels, and other alternatives that have further to go to achieve a market position, such as hydrogen in fuel cells and synthetic fuels.

Close attention must be paid to the development of the different alternatives, and to adapting strategies to ensure the greatest possible impact, taking into account the sustainability of each option.

LINE 3

REDUCE ENERGY CONSUMPTION AND INCREASE THE USE OF RENEWABLES IN BUILDINGS AND THE HOME

FRAMEWORK OF ACTION

Energy consumption in buildings in the Basque Country

Energy consumption in residential buildings and in the services sector has seen major growth in the Basque Country due to a growing stock of buildings and an increase in comfort levels, with greater use of energy-consuming equipment. After doubling between 1990 and 2010, consumption in buildings in the Basque Country has fallen by 10% in the last four years. Demand for electricity in buildings has dropped by 8% in 4 years. The main reasons for this reduction are twofold: on the one hand, the economic crisis, combined with an increase in energy prices, has led companies and households to pay greater attention to their energy consumption because of the potential for financial savings; on the other, actions promoted by the government to improve energy efficiency and promote investment through aid programmes, awareness and information campaigns and regulatory changes in areas such as energy efficiency in buildings, energy-consuming equipment and lighting.

At present, each Basque household consumes energy equivalent to 0.63 tonnes of oil, costing about €410 per capita. Residential energy consumption represents 56% of all consumption in buildings. It is predominantly used in heating, which accounts for nearly half the total. The rest is divided between domestic hot water, domestic appliances, cooking and lighting, in that order.

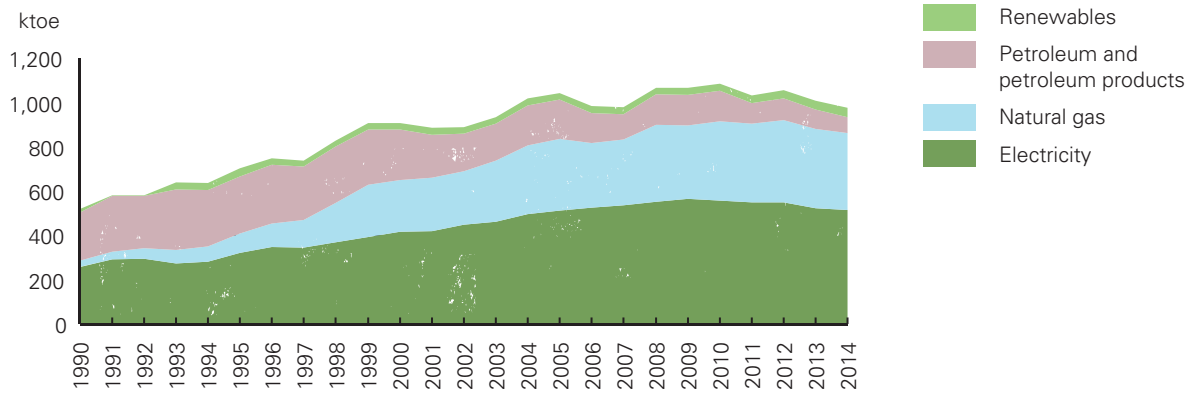


FIGURE 48. Energy consumption in buildings in the ACBC, 1990-2014 (Source: EVE)

The stock of buildings in the Basque Country

The Basque Country currently contains around one million dwellings. More than 70% of Basque homes were built before 1980. The average size of household currently stands at 2.5 people, as compared to 3.4 twenty years ago.

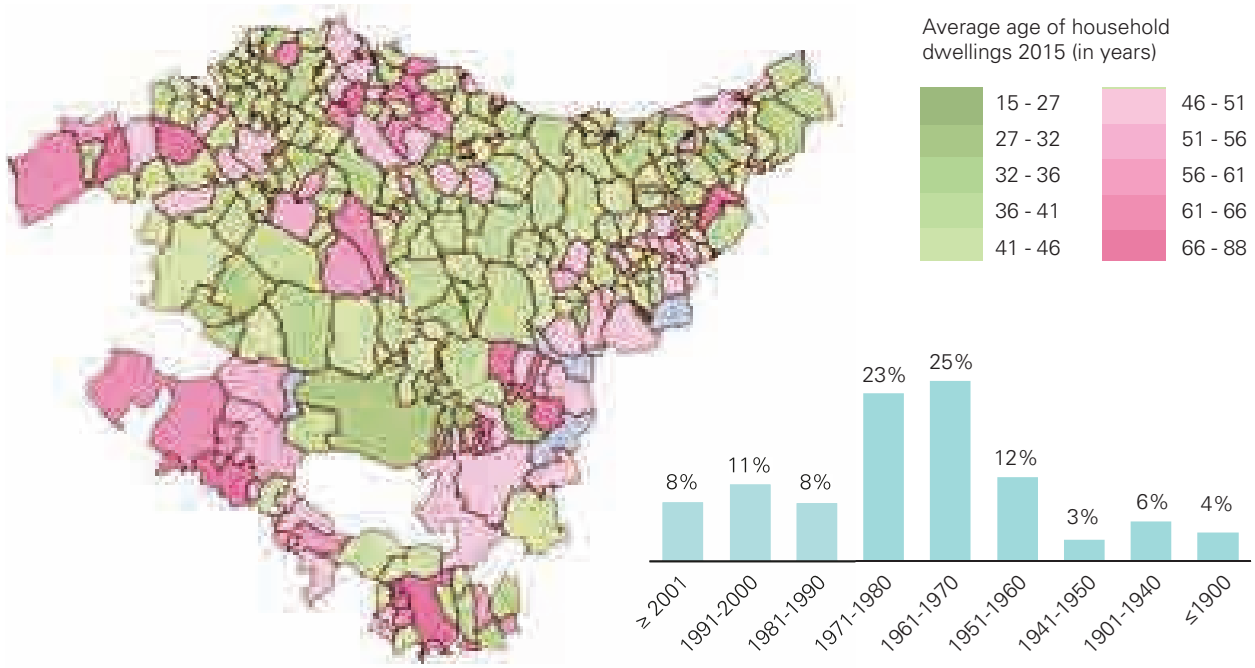


FIGURE 49. Distribution of age of Basque homes (Source: Eustat)

Promotion of energy efficiency in buildings

The Technical Building Code approved in 2006 established stricter requirements on levels of insulation in new buildings and greater use of renewable energy, with a clear impact on the energy quality of the buildings constructed in recent years. For example, in the Basque Country, at least 30% of the annual DHW needs of smaller buildings have to be met by solar power, while large buildings in the services sector have to use solar PV energy to produce electricity. In 2013, the Basic Document DB-HE "Energy saving" was updated[31], introducing new requirements that will lead to improvements in the energy quality of homes. Among other new features, the document establishes that this minimum solar contribution may be partially or totally replaced by an alternative installation using other types of renewable energy, and that buildings for tertiary use must have an energy classification of B or higher. These requirements will continue to be tightened in the future with the introduction of the measures established under Directive 2010/31/EU on energy efficiency.

Decree 241/2012, governing the technical inspection of buildings in the Autonomous Community of the Basque Country, subsequently modified by Decree 80/2014, establishes that from June 2018 all residential buildings aged over 50 years must have an up-to-date technical inspection. *Inter alia*, the function of this inspection is to determine the characteristics of the building in order to assess any deficiencies in energy saving. The scope of the decree does not extend to facilities whose technical inspection is subject to specific sectoral regulation, such as heating and domestic hot water installations.

Directive 2010/31/EU on energy efficiency in buildings establishes that from 31 December 2020 (31 December 2018 in the case of publicly-owned buildings) all new buildings must have nearly zero energy consumption. In other words they must have a very high level of energy efficiency and the very small amount of energy required should be covered to a very large extent by renewable sources produced on site or locally. The minimum requirements that must be satisfied by those buildings have yet to be defined and will be established in the Technical Building Code.

[31] Order FOM/1635/2013, of 10 September, updating Basic Document DB-HE: "Energy saving", of the Technical Building Code, approved by Royal Decree 314/2006, of 17 March 2006.

All these measures affect the energy quality of new and refurbished homes. The Basque housing stock has a large number of buildings in need of rehabilitation[32]. Nearly 50% of Basque homes were built in the 1960s and 1970s, with much lower efficiency requirements than at present. The improvements introduced by the Technical Building Code of 2006 also came late; while in the first eight years of the 00s, around 10,000-15,000 new homes were being built each year, in 2013 and 2014 the figure was below 3,000. At the same time, the number of rehabilitated homes rose slightly after bottoming out in 2009.

With support from aid programmes, 2,100 energy efficiency improvement projects were undertaken in existing buildings (improvements in the thermal envelope, replacement with high energy efficiency equipment in boiler rooms and indoor lighting, etc.) in the period 2011-2014. During these years, the renovation of windows was also promoted in 6,700 homes, existing boilers were replaced by condensation ones in 6,000 homes and 54,000 household appliances were replaced with high efficiency models.

Within the legislative framework, the latest amendment to the TBC and the moratorium on the Special Framework have radically changed the definition and development of centralised heat supply systems in new housing developments. As an alternative to the CHP-based systems, for which there are now no premiums, the government's efforts can be redirected towards an analysis of new supply alternatives based on the incorporation of renewable energy (primarily biomass, geoexchange and photovoltaic for self-consumption).

The 2012 Energy Efficiency Directive speaks of the need for final customers to have individual meters that provide real-time information on energy use. In the electricity industry, the Spanish plan for meter replacement establishes that all meters with a contracted power of up to 15 kW must be replaced by new equipment allowing time-of-use and remote management before 31 December 2018. The replacement of electricity meters by smart meters has been advancing at an adequate pace in the Basque Country, with a total of 858,000 new meters installed by March 2016. In the Basque Country, the replacement of meters has been backed through the Bidelek Sareak Project. The new meters can help reduce energy consumption by providing detailed information. They can also help shift the load curve towards the hours of the day when electricity costs least.

For its part, the IDAE has established an aid programme for energy rehabilitation of existing buildings (the PAREER-CRECE programme), as part of the Energy Efficiency Action Plan 2014-2020. To be eligible for aid, the actions in question must improve the total energy classification of the building by at least one letter measured on the scale of carbon dioxide emissions, as compared to the initial energy classification of the building. All actions must entail improvements in the thermal envelope, heat facilities or lighting installations or replacement of conventional energy in heat facilities by biomass or geothermal energy.

[32] Based on the diagnosis contained in the Housing Master Plan 2013-2016.

Certificate of energy efficiency in buildings

Energy regulations related to energy certification for buildings in the Basque Country have been boosted with the publication of Decree 226/2014 regulating certification of energy efficiency in new and existing buildings and homes and the Order of 16 March, 2015 governing the control and registration of Energy Efficiency Certificates. In the case of existing buildings, the certificate may be required for sale or lease contracts executed from 1 June 2013.

In the same year, the registry of energy efficiency certificates in the Basque Country was launched. The information in the registry shows that the most frequently assigned energy consumption classification is E (48%), while only 1.1% and 1.8% were classed as A and B respectively.

This result is closely related to the age of the buildings. A clear improvement in energy classification can be observed in newer buildings, both in terms of emissions and consumption. In 2014, 53% by consumption and 60% by emissions received an A or B classification. There were no F and G classifications, and 30% of homes received C ratings

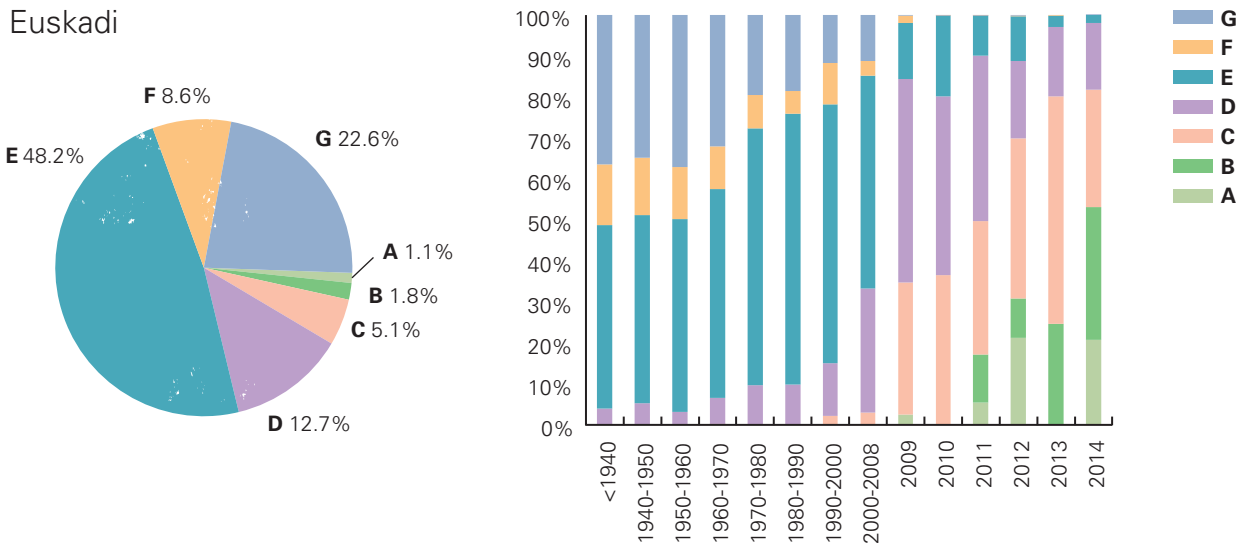


FIGURE 50. Energy classification of homes in the Basque Country by age of buildings (Source: EVE)

Renewable energy in buildings

Promotion of renewable energy is one of the axes on which energy sustainability policies in homes and other buildings are based. However, use of renewable energy sources in the tertiary sector still stands at around 7% in the case of homes and less than 1% in the services sector. Initiatives in this area have led to an increase in the use of solar thermal energy, with 63,000 square metres of panels installed in the Basque Country, of which most are in housing.

Solar thermal energy is used mainly for Domestic Hot Water, and its potential use is therefore less than other types of renewable energy such as biomass, used for heating, and low-enthalpy geothermal, which is used for heating and cooling. However, biomass and geothermal are difficult to adapt in existing buildings, mainly in urban spaces, due to the need for storage space, in the case of biomass, and the capture space in the case of geothermal energy.

The new requirements of the TBC and the promotion of biomass markets have led to a significant increase in the number of biomass boilers installed. More than 2,200 biomass installations have been promoted with a total installed capacity of nearly 90,360 kW. As a result of the impetus to new geothermal, there are now 580 geoexchange installations with an installed capacity of 13,350 kWg. The slow pace of new home construction has not helped attempts to increase the share of renewables.

Efficiency in household appliances

With regard to consumption of domestic appliances, Directive 2010/30/EU on the indication of the consumption of energy and other resources by energy-related products establishes the framework for measures relating to information to end users, through labelling and standard product information on energy consumption, in order to allow end users to choose more efficient products. This directive has been transposed in regulations on labelling of appliances such as home dishwashers, washing machines, cooling apparatuses and individual boilers. Regulations developing this directive require, *inter alia*, a minimum performance for boilers of less than 70 kW. In practice, this means that all new boilers must be condensation boilers. The results of this directive and aid for replacing household appliances can already be seen in the retail sector, with sales of low consumption appliances now becoming commonplace. This has a positive impact on reducing electricity and heat consumption among domestic customers in the Basque Country. Regulation (EC) 1275/2008 also establishes, among other requirements on eco-design, that all electrical and electronic appliances for use in the home or office marketed after 2013 must consume less than 0.5W in stand-by mode. A study by EVE in 2013 estimated that consumption in stand-by mode accounts for over 6.8% of domestic electricity consumption.

> " A study by EVE in 2013 estimated that consumption in stand-by mode accounts for over 6.8% of domestic electricity consumption"

Energy costs for tertiary consumers

The total energy bill increased by 20% between 2010 and 2013 in the residential sector, and by 15% in the services sector, although it fell in 2014. These increases were due to higher energy prices across the board, given that consumption slowed during the period. In the case of electricity, for example, the voluntary price to the small consumer (previously known as the Tariff of Last Resort or TLR) rose by 104% between 2010 and 2014 in the demand charge and 5% in the energy charge. In the case of gas, the fixed rate rose by 13% and the variable rate by 26%. However, the rise in prices has slowed – in the case of natural gas from 2013 on and in the case of petroleum products from mid-2014.

Energy poverty

The term "energy poverty" refers to a household's inability to meet the cost of its basic energy needs; this issue may be considered to be an extension of more general poverty. There are various factors underlying energy poverty: a fall in household income, high energy prices and low energy efficiency of homes. In the case of electricity consumption, there are measures in place such as the "social bonus" (*Bono Social*) which help partially alleviate this problem, but there are no such measures for natural gas. Energy poverty must be combatted through social policies; in 2015, for the first time, the Basque Government introduced a budgetary provision to help families with difficulties paying their heating bills who did not have access either to emergency social aid or to the guaranteed income. Improving energy efficiency in homes is one of the key ways of reducing this problem.

Education and awareness raising

In recent years, a number of information, education and awareness-raising campaigns have been carried out to encourage energy sustainability. Actions include campaigns on rational use of heating and advice on saving in the press, radio and information publications; talks for public-sector workers and the general populace in cultural centres on rational use of energy; training courses for energy managers with dissemination of the seminars organised, within the action plan on energy service companies; and the staging of specialist symposia.

ACTIONS IN THE TERTIARY SECTOR

Overall objective

To improve efficiency in energy use in buildings in the Basque Country and promote greater use of renewable energy, both in homes and in the services sector.

Indicators and targets 2030

INDICATORS	2015	2025	2030
Reduction in energy consumption in buildings (toe/yr.)	-	135,000	199,000
Percentage of energy saving in buildings (%)	-	12.1%	17.2%
Reduction in consumption in buildings compared to 2015 (%)	-	-3%	-5%
Use of renewables in buildings	42,900	70,300	110,700
Share of renewable energy in buildings (%)	4%	7%	12%

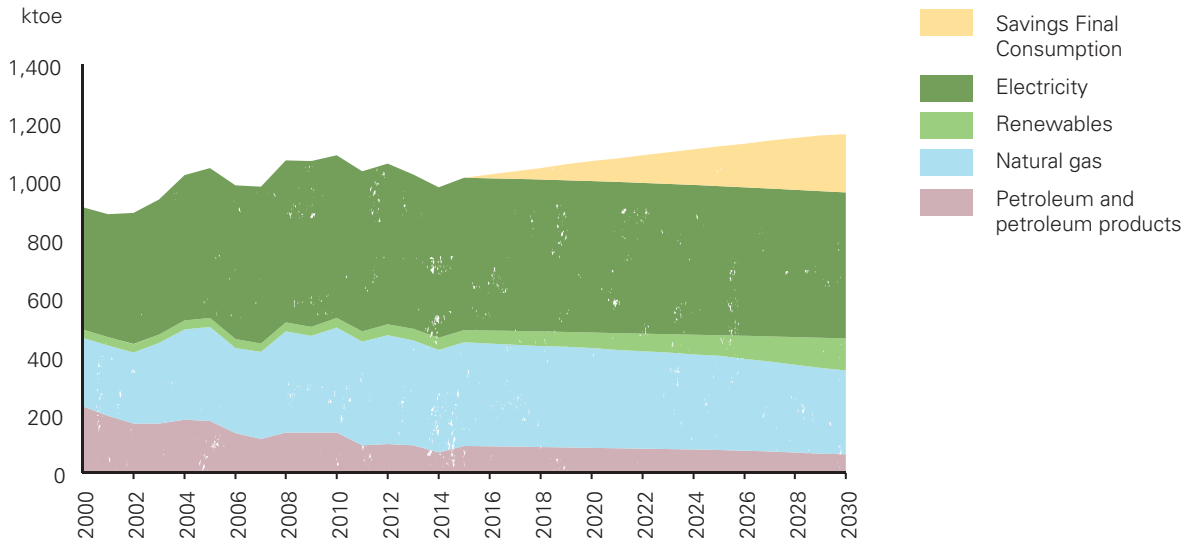


FIGURE 51. Scenario of energy consumption in the buildings sector (Source: EVE)

Bodies with responsibility for the line of action

- Department of Economic Development and Infrastructure (Sub-Department of Industry).
- Department of Employment and Social Policies (Sub-Department of Housing).

Initiatives and actions

LINE L3

REDUCE ENERGY CONSUMPTION AND INCREASE THE USE OF RENEWABLES IN BUILDINGS AND THE HOME

INITIATIVE L3.1.

PROMOTION OF ENERGY IMPROVEMENTS IN BUILDINGS AND HOMES

L3.1.1 Promotion of energy audits and diagnostics in buildings

L3.1.2 Promotion of rehabilitation of thermal envelope in buildings

L3.1.3 Renovation of energy-consuming equipment

L3.1.4 Stimulus to introduction of renewable energy in buildings

INITIATIVE L3.2

TRAINING AND AWARENESS RAISING FOR EFFICIENCY AND ENERGY MANAGEMENT IN BUILDINGS

L3.2.1 Information and awareness-raising campaigns on rational energy use and harnessing of renewables

L3.2.2 Promotion of training of professionals in companies and institutions

INITIATIVE L3.1.

PROMOTION OF ENERGY IMPROVEMENTS IN BUILDINGS AND HOMES

The aim of this initiative is to reduce energy consumption in buildings and homes and increase the use of renewable energy.

L3.1.1. Promotion of energy audits and diagnostics in buildings

The first step in identification of improvement projects and decision making on improvements in the thermal envelope, changes in boilers and efficient lighting is to perform an audit or diagnosis of the installations and a study of the viability of proposed changes. These studies will be promoted through awareness raising and training of the agents involved (consultancy firms, public authorities, property managers, etc.) and through aid programmes.

L3.1.2. Promotion of rehabilitation of the thermal envelope in buildings

Incentives will be given to replacing windows and, in general, rehabilitation of the thermal envelope and improvement in the energy classification of homes, reducing their consumption in heating and improving their level of comfort. Investment in rehabilitation of the envelope for purely energy-related reasons has a long pay-back period, and it is therefore advisable to coordinate such actions in the energy area with those of other areas such as housing to take advantage of any synergies that may exist.

" Incentives will be given to replacing windows and, in general, rehabilitation of the thermal envelope and improvement in the energy classification of homes"

L3.1.3. Renovation of energy-consuming equipment

The aim is to influence demand for new equipment and energy-consuming systems to promote a move towards more efficient models: condensing boilers, household appliances, small CHP, heat pumps and air conditioning systems. Developments in technology and in the regulations mean that equipment is now available on the market with better energy characteristics. The aim is to speed up change towards these units and systems through aid programmes. These programmes will be established on an annual basis, taking into account the efficiency of the equipment in terms of energy saving, as well as developments in markets and regulations.

SMEs can also benefit from tax deductions and incentives to adopt cleaner and more efficient technologies in their buildings through the tax deductions included in the Basque List of Clean Technologies. This forms part of the action described above for Basque industry in Action Line L1.

L3.1.4. Stimulus to introduction of renewable energy in buildings

Under the regulations, with certain exceptions, new and rehabilitated buildings must include a certain degree of renewable energy usage. This may be in the form of solar thermal energy for domestic hot water, biomass for heating or geothermal energy for heating and cooling. Aid to the introduction of renewables for thermal use will be applicable only for facilities that exceed the demands of the regulation, and for existing installations. The amount will depend on their energy production capacity and costs, according to the technology in question. It is also necessary to reinforce systems for monitoring correct energy contribution from renewable energy facilities in buildings after a certain time has elapsed since they were installed.

Developments in solar PV technology with a subsequent reduction in the price of installations means that self-consumption installations are now a viable option for some consumers. Consumers must have the possibility of choosing between purchasing their energy from the grid or self-producing unhindered. This is seen as being good for the power system since it contributes balance and price signals and reduces losses in the grid. Self-consumption must be promoted through aid and training programmes. Where applicable, storage could be considered as an option to be encouraged in the event that it offered advantages to the electricity system as a whole.

INITIATIVE L3.2.

TRAINING AND AWARENESS RAISING FOR EFFICIENCY AND ENERGY MANAGEMENT IN BUILDINGS

The aim of this initiative is to increase knowledge and awareness among Basque society with regard to energy sustainability, furnishing key individuals with the necessary skills.

Following the introduction of smart meters, the aim is to further use their potential as a tool for obtaining detailed information on consumption and introducing saving measures.

L3.2.1. Information and awareness-raising campaigns on rational energy use and harnessing of renewables

There is important potential for energy savings associated with awareness among building users. It is therefore necessary to continue the awareness-raising campaigns in the media. Consumer participation in management of their demand will be actively promoted, helping them to understand how to access the energy information available from smart meters, and use it to change their habits and reduce costs.

L3.2.2. Promotion of training of professionals in companies and institutions

Action will be taken to train energy managers and other agents involved in companies and public authorities, particularly municipal authorities, to allow them to have suitable knowledge on efficiency measures and encouragement of renewables according to their needs.

LINE 4

PROMOTE A MORE ENERGY-EFFICIENT BASQUE PUBLIC ADMINISTRATION

FRAMEWORK OF ACTION

Energy consumption in Basque public administrations accounts for approximately 30% of all consumption in the Basque services sector. However, the importance of acting in the area of the energy sustainability of the public authorities does not lie so much in the consumption levels of their buildings, facilities and services as in the public administration's capacity for influence in different domains and the example-setting role it exercises with other consumers.

Directive 2010/31/EU of May 2010 on energy efficiency in buildings defines nearly zero-energy buildings. Article 9 establishes that from 31 December 2018 all new buildings occupied and owned by public authorities should be nearly zero-energy buildings. This obligation has been brought forward for Basque Government buildings by way of Decree 178/2015. Directive 2012/27/EU on energy efficiency requires renovation from 2014 of 3% per year of the floor area of buildings owned and occupied by the central governments of the member states. Likewise, public authorities must purchase only products, services and buildings with high standards of energy efficiency, introducing an energy efficiency plan and introducing an energy management system.

Energy consumption of public authorities in the Basque Country

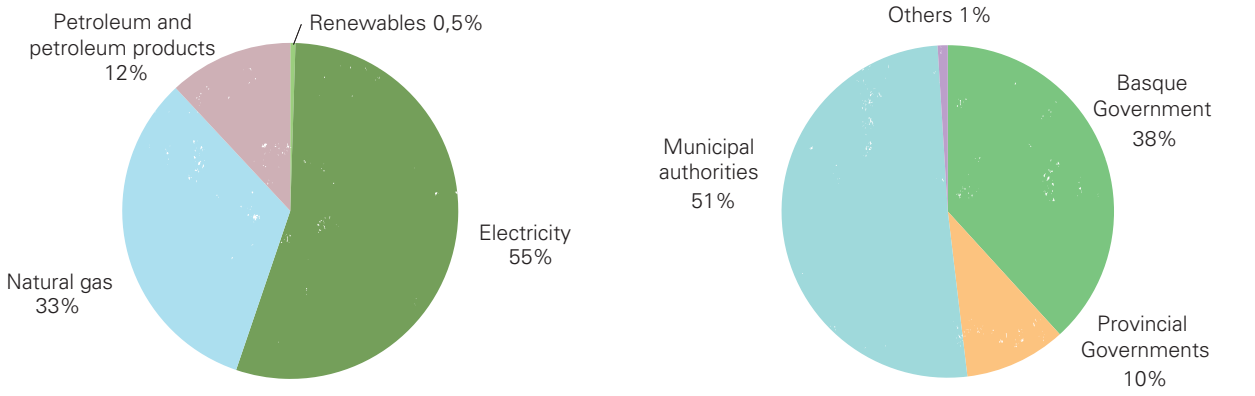


FIGURE 52. Distribution of energy consumption of Basque public authorities (buildings and public lighting) by energy type and administration, 2013 (Source: EVE)

In 2013, the Basque Government, through its energy agency, EVE, prepared an initial energy inventory of buildings owned and occupied by public authorities in the Basque Country. This information, together with the analyses already carried out and the actions that are now being launched, will serve as the basis for preparing specific plans to reduce energy consumption in government buildings. Energy consumption by Basque public authorities is estimated at 1,610 GWh, with an energy bill of around 195 million euro, including buildings and public lighting.

Among the actions to improve energy sustainability among Basque public authorities, it will be necessary to develop the contents of Decree 178/2015 referring to the buildings, facilities and transport fleets of the Basque Government and to establish actions on energy saving and use of renewables in buildings, as well as the use of alternative energy in vehicles.

Energy service companies in Basque public authorities

Energy services are one of the tools that can be used to progress towards meeting the efficiency targets set for public authorities, since the companies that offer these services can have a dynamic impact on investments in the public sector. In June 2011, the Basque Government passed its 100 ESCO Plan, intended to promote projects for energy efficiency and renewable energy in the buildings and outdoor lighting of Basque public authorities through energy service companies. The goal of the plan is for buildings and installations belonging to the Basque Government, municipal authorities and provincial governments to achieve savings of 20% in their energy consumption by 2020 by contracting investments in energy efficiency and renewable energy sources through energy service companies (ESCOs). Under this plan, a number of energy audits, public bids for tender and contracting have been carried out in the period 2012-2014.

Collaboration with local authorities

Municipal authorities have a wide range of powers in areas that have a major impact on energy consumption, such as urban planning, transport and municipal installations. Local authorities therefore have a vital role in encouraging energy sustainability. The level of awareness among municipal authorities in the area of energy sustainability has increased both at a political and a technical level although there is still room for improvement. Collaboration between different tiers of government in this area is essential in order to promote the advancement, especially in smaller municipalities that normally require greater support for launching actions. Local Agenda 21s promote implementation of action plans on sustainability in Basque municipalities, which also include activities in the area of energy. Udalsarea 21, the Basque Network of Municipal Authorities for Sustainability, is the forum of cooperation promoting the Local Agenda 21s of Basque municipalities. Its members include 200 municipal authorities and various other tiers of government.

The Covenant of Mayors is an initiative set up by the European Commission which is directed more specifically at energy sustainability and a reduction in greenhouse gas emissions. Signatory municipalities commit to exceeding the EU target for a 20% reduction in carbon emissions by 2020 throughout their municipal area, through a 20% increase in energy efficiency and covering 20% of demand

with renewable energy. Among other obligations, the Covenant involves drawing up a sustainable energy action plan (SEAP) and implementation of projects based on prior planning. The plan includes a number of specific actions to be implemented in all energy-consuming sectors in the municipality except industry (which may be included optionally). These include municipal facilities (public buildings and lighting), the residential sector, services sector and primary sector. For each of the energy-consuming sectors, actions are established in areas of energy efficiency, renewables and efficient transport. By the end of 2014, 19 Basque municipalities had signed up to the Covenant, representing 50% of the population of the Basque Country. By the same date, 17 of the 19 municipal authorities were already working to implement their plans.

It was seen that the requirements governing the scope and timescale involved in developing a Municipal Energy Plan could not be the same for all municipal authorities. As a result, a second initiative "Advancing towards the Covenant" was developed. This has similar aims to those of the Covenant of Mayors but without the same derived commitments. The targets vary depending on the technical, economic and personnel resources available to the council in question. As of 31 December 2014, nine Basque municipalities had signed up to the "Advancing towards the Covenant" initiative.

Framed within the aid programmes to municipal authorities, grant schemes have been set up to incentivise the projects established in the action plans within the Covenant of Mayors and Advancing towards the Covenant initiatives. The energy efficiency programme has subsidised projects relating to actions in buildings (thermal envelope, indoor lighting, heat facilities and monitoring) and public lighting installations, as well as the performance of audits and Sustainable Energy Action Plans. Subsidies have also been given for the use of renewable resources, incentivising projects using solar thermal and photovoltaic, biomass, geoexchange, wind, etc., as well as the performance of viability studies for different types of project.

Within the area of sustainable mobility, there has been collaboration with several municipal authorities through the programme of aid for efficient transport and mobility, with the drafting of sustainable urban mobility plans and improvements in management of bus and MSW disposal fleets.

Other recent areas of collaboration between different administrative domains in the area of sustainable energy include:

- Modernisation of public lighting in municipalities of fewer than 200 inhabitants.
- Contracting of energy service companies in different municipal authorities, to manage municipal buildings, sports facilities and public lighting.
- Studies for harnessing local forestry biomass through valorisation of forest resource and analysis of energy solutions[33]. The projects analysed include individual buildings owned and occupied by local authorities and comprehensive solutions using municipal heat networks for multiple buildings. To date, eight agreements have been signed with municipalities.
- Collaboration to establish a joint information base on sustainable energy at municipal level, as a basis for measuring the progress of sustainable energy action plans[34].

[33] Collaboration agreement between HAZI and EVE.

[34] Collaboration project between IHOBE and EVE.

ACTIONS IN THE GOVERNMENT SECTOR

Overall objective

The government sector is treated as a specific line of action within the buildings sector. There are two objectives: on the one hand, to reduce energy consumption in this sector, which accounts for a significant percentage of the energy consumed in the services sector and, on the other, to encourage the example-setting role that government should play in establishing measures, by incorporating services and innovating technologies.

Indicators and targets 2030

INDICATORS	2015	2025
Reduction of government energy consumption (toe/yr.) (FEC)	-	36,500
Percentage of government energy saving (%)	-	25%
Buildings with renewable installations (%)	9%	25%

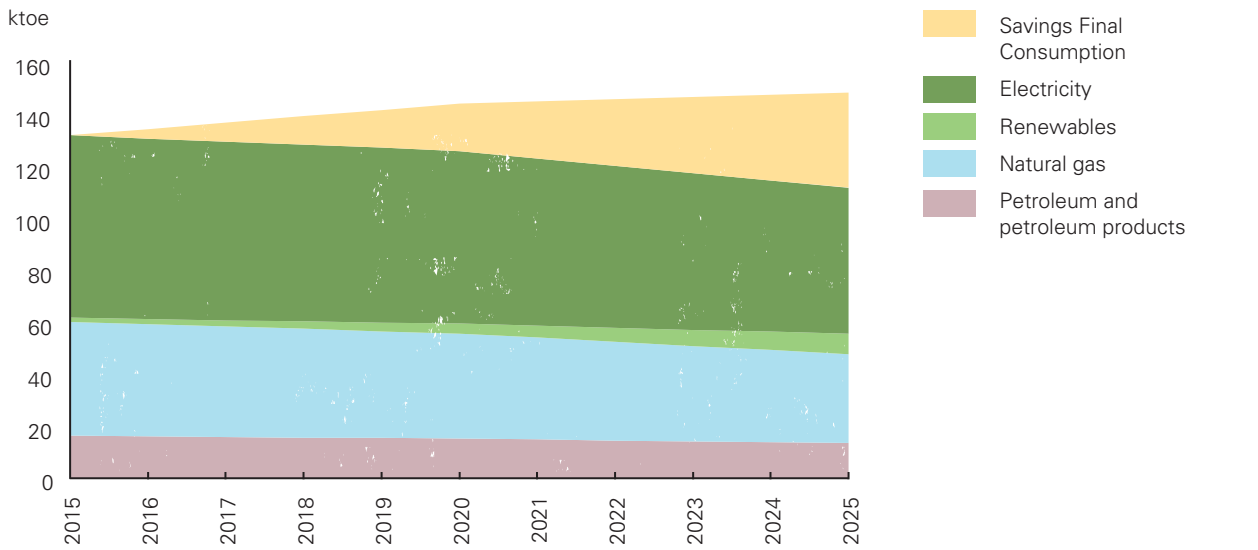


FIGURE 53. Scenario of energy consumption in Basque public administration (Source: EVE)

Bodies with responsibility for the line of action

- Department of Economic Development and Infrastructure (Sub-Department of Industry).
- Departments of the Basque Government, Provincial Governments and Municipal authorities.

LINE L4

PROMOTE A MORE ENERGY-EFFICIENT BASQUE PUBLIC ADMINISTRATION

INITIATIVE L4.1

PROMOTE ENERGY SUSTAINABILITY IN GOVERNMENT BUILDINGS AND PUBLICLY-DEVELOPED HOMES

L4.1.1 Improvement in energy efficiency and installation of renewable energy in buildings, facilities and vehicles owned by the Basque Government

L4.1.2 Improvement in energy management among Basque public administrations

L4.1.3 Encouragement of energy service companies for managing public facilities

L4.1.4 Promotion of green procurement in the administration as an instrument for reducing energy consumption.

L4.1.5 Construction of publicly-developed housing with high energy grade criteria

INITIATIVE L4.2

COLLABORATION BETWEEN ADMINISTRATIONS TO PROMOTE ENERGY SUSTAINABILITY

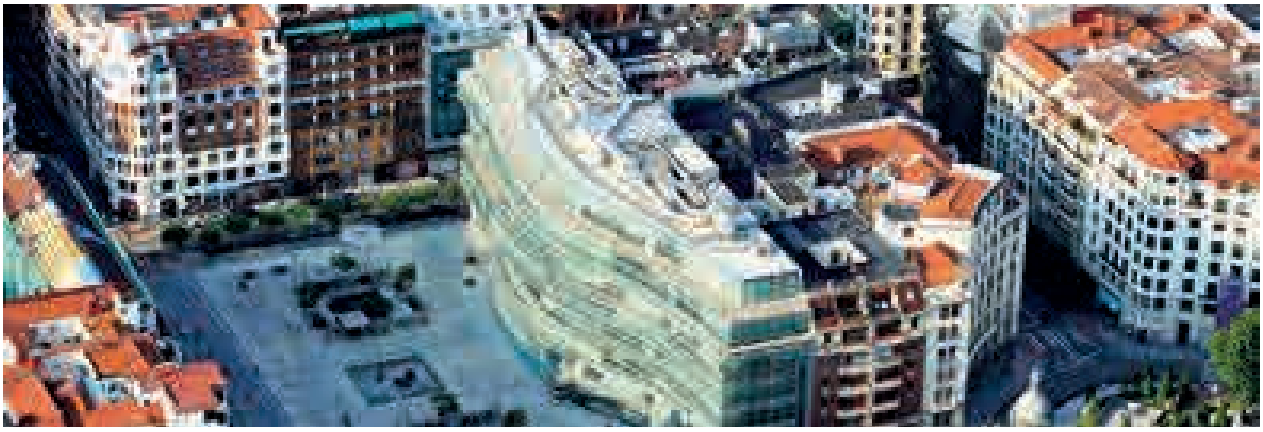
L4.2.1 Promotion of improvements in municipal energy management

L4.2.2 Voluntary commitments by local authorities

L4.2.3 Integration of energy sustainability in other Basque public policies

L4.2.4 Plans for sustainable renovation of the transport fleet of Basque public authorities

L4.2.5 Developments in law and regulations promoting energy sustainability



INITIATIVE L4.1

PROMOTE ENERGY SUSTAINABILITY IN GOVERNMENT BUILDINGS AND PUBLICLY-DEVELOPED HOMES

The goal is to increase the energy sustainability of the public administration by reducing the economic and environmental impact of energy use, acting as a model for the private sector.

L4.1.1. Improvement in energy efficiency and installation of renewable energy in buildings, facilities and vehicles owned by the Basque Government

The Basque Government's decree on energy sustainability, approved in 2015, will be applied in buildings and facilities owned by the Basque Government. This will be based on criteria of economic rationality with priority given to energy investments according to their effectiveness, improving the energy classification of buildings. An action plan will be drawn up by the government and a monitoring committee will be set up to identify actions in:

- Rehabilitation of the thermal envelope.
- Replacement of windows.
- Improvements in indoor and outdoor lighting.
- Renovation of heating and cooling equipment in buildings (boilers and boiler rooms, climate control systems, cooling equipment in server rooms).
- Geoexchange installations, biomass boilers and photovoltaic installations.
- Improvement in efficiency and use of alternative energy sources in the transport fleet.

L4.1.2. Improvement in energy management among Basque public administrations

Improvements in energy management among public authorities will be promoted through the performance of studies and the setting up of systems such as:

- Monitoring and control systems.
- Energy management systems.
- Energy audits and certification.
- Mobility studies.
- Training courses for technicians and officers.
- Awareness-raising campaigns.
- Measures to reduce the energy bill.

L4.1.3. Encouragement of energy service companies for managing public facilities

Management of installations will be promoted via energy service companies in buildings and public lighting, as a useful tool for reducing energy consumption and limiting the need for investments by public authorities.

L4.1.4. Promotion of green procurement in the administration as an instrument for reducing energy consumption

Application of energy sustainability criteria will be promoted by adapting existing guides to new technological developments, for the acquisition of products and systems that involve savings in energy consumption.

L4.1.5. Construction of publicly-developed housing with high energy grade criteria

Public housing developments have normally been implemented with standards of energy quality that are above the minimum regulatory requirements. The aim is that this criterion should continue to be applied in order to create a housing stock with a high energy classification, regardless of whether the homes are intended for sale or rental, to act as a driving force and a model for private developers. As well as higher standards of insulation, centralised or district heat-producing installations will be promoted, using biomass, geothermal energy or heat and electricity by means of CHP units.

INITIATIVE L4.2

COLLABORATION BETWEEN BASQUE ADMINISTRATIONS TO PROMOTE ENERGY SUSTAINABILITY

L4.2.1. Promotion of improvements in municipal energy management

Approval of a specific regulation to define the criteria for energy management among municipal authorities, preparation of energy audits of their facilities, action plans in this area with certain minimum targets and training of municipal technical managers will be promoted.

> " The energy sustainability variable must be taken into account in all domains of the administration's planning"

L4.2.2. Voluntary commitments by local authorities

Support will be provided to municipal authorities making voluntary commitments in the area of energy sustainability, as part of the Covenant of Mayors, Advancing towards the Covenant or in other areas, contributing technical support and economic aid in drafting action plans on sustainable energy and for implementing them.

L4.2.3. Integration of energy sustainability in other Basque public policies

The energy sustainability variable must be taken into account in all domains of the administration's planning. The aim is to achieve full integration of savings, energy efficiency and renewable energy in the design and development of the policies of Basque public authorities in aspects such as mobility, public transport and other transport infrastructures, urban planning and housing. Greater consideration will be given to energy sustainability in the preliminary studies and analyses of alternatives included in land-use planning instruments and transport infrastructures, analysing compliance with the targets set in this energy strategy. Facilities will be provided for district heating networks when considered viable, especially those using biomass. Responsible policies on local rates for improving energy sustainability in vehicles and encouraging energy efficiency and use of renewables in homes and buildings will be promoted.

L4.2.4. Plans for sustainable renovation of the transport fleet of Basque public authorities

The large number of vehicles in services and public transport fleets owned by local organisations, provincial governments and public companies, means that a specific line of action is required that needs to be coordinated through target-setting and criteria for renovating the fleet. The government will promote the enactment of specific legislation to determine the criteria for renovating fleets, promoting the use of more efficient vehicles and those that use non-petroleum-based alternative fuels.

L4.2.5. Developments in law and regulations promoting energy sustainability

The powers of the Basque public authorities include the development of regulations, territorial organisation, fiscal policy, taxes, rates, etc. Within this framework, new developments and rezoning must be encouraged to promote more determined progress in the area of energy efficiency and to boost renewable energy within the scope of the authorities' powers: urban building zoning, facilities for creating renewable installations, speeding-up of municipal licencing, urban mobility plans, public lighting, differentiated policies on taxes and rates, etc.

LINE 5

ENCOURAGE EFFICIENCY AND HARNESS EXISTING RESOURCES IN THE PRIMARY SECTOR

FRAMEWORK OF ACTION

Energy consumption in the primary sector

Although in overall terms, the primary sector accounts for just 1.5% of final energy consumption in the Basque Country, fuel costs have a very important impact in the sector, affecting running costs in fishing, agriculture and forestry. The bulk of the energy consumed comes in the form of diesel, which after years of high prices has seen a tendency to moderate since mid-2014.

In the last thirty years, the primary sector has gone from representing around 3% of Basque GDP to just 0.8% at present. However, output from the sector has remained at similar levels, with around 50,000 tonnes of inshore fishing unloaded each year in Basque ports and a reduction of 7% in the land farmed between 1989 and 2009. As in other sectors, the energy audit is the first step for identify saving measures in the primary sector. In recent years, audits have been carried out in the cattle industry and forest nurseries, resulting in proposals for economically viable improvements.

The primary sector as a potential supplier of biomass

From an energy perspective, one important aspect in the primary sector is the harnessing of forest and agricultural resources for energy use. There is a significant quantity of resources which can be used for energy purposes and which is already creating opportunities for the primary sector. Although specific energy crops are not, in principle, seen as an energy source, at certain moments of decline in other markets, products can be sourced from forestry, valorising them through energy usage.

- The forestry industry covers nearly 400,000 hectares of land, approximately 55% of the total land area of the Basque Country. The resource available each year varies depending on climate and market factors. Over the last 40 years, the forested area of the Basque Country has increased by 12% and timber-yielding stock has doubled. In recent years, the production of pellets has grown in parallel with the market for them. The biomass market has been galvanised in recent years by other factors such as the increase in oil prices and by public policies leading to a significant increase in the number of boilers for heating using pellets or biomass in the form of woodchips: in 2014 alone, more than 1,000 boilers and 35,000 kW were installed.

  According to AVEBIOM, average pellet prices stood at between €50 and €60 per MWh in 2014, depending on format, while the price of woodchips was around half that of pellets. These costs are lower than those paid by users for other fuel energy sources. However, biomass also has disadvantages, such as the higher cost of the boilers and the greater need for space for boilers and storage.

- Wood and herbaceous agricultural waste in the Basque Country is mainly concentrated in Alava. The most important quantity of woody waste is generated in vine pruning where it is estimated that 30,000 tonnes per year could be made available for energy harnessing. As for herbaceous waste, some 180,000 tonnes per year of straw and stubble are produced, but the variety of destinations and uses of this waste reduces the potential for organised energy use.
- Finally, large scale energy use of livestock waste is not currently being considered because its physical characteristics mean that it has little energy potential, although in isolated cases the biogas from anaerobic digestion, for example, might be harnessed.

ACTIONS IN THE PRIMARY SECTOR

Overall objective

The aim is to encourage energy efficiency in the primary sector and to achieve maximum use of biomass by-products for use as heat in industry or in heating and hot water systems in buildings and facilities in the tertiary sector.

Bodies with responsibility for the line of action

Department of Economic Development and Infrastructure (Sub-Department of Industry).

Initiatives and actions

LINE L5

ENCOURAGEMENT OF ENERGY EFFICIENCY AND HARNESSING OF RESOURCES IN THE PRIMARY SECTOR

INITIATIVE L5.1

IMPROVEMENT IN ENERGY EFFICIENCY AND USE OF RENEWABLES IN THE PRIMARY SECTOR

L5.1.1 Aid for improvements in energy efficiency and use of renewables in the primary sector

INITIATIVE L5.2

ENERGY USE OF AGROFORESTRY RESOURCES

L5.2.1 Stimulus to markets for agroforestry resources

L5.2.2 Analysis of potential and monitoring of sustainable energy usage of biomass

INITIATIVE L5.1

IMPROVEMENT IN ENERGY EFFICIENCY AND USE OF RENEWABLES IN THE PRIMARY SECTOR

L5.1.1 Aid for improvements in energy efficiency and use of renewables in the primary sector

Lines of aid will be established for improving energy efficiency in the primary sector, subsidising energy audits and investments whose main purpose is to improve energy efficiency in equipment and vehicles in the primary sector. Support will also be given to the use of renewable energy in greenhouses, livestock and arable farms and food industries.

INITIATIVE L5.2.

ENERGY HARNESSING OF AGROFORESTRY RESOURCES

L5.2.1. Stimulus to markets for agroforestry resources

Through other initiatives, the introduction of biomass boilers is being promoted in buildings and industry. In order to fully develop the potential of biomass, an adequate level of local production and appropriate marketing channels are also required.

This action involves providing support in the form of information and training for the development of local markets in pellets and general wood for use in boilers in buildings and SMEs.

L5.2.2 Analysis of potential and monitoring of sustainable energy usage of biomass

The studies performed for energy usage of agricultural and forestry resources will be further assessed and evaluated and their sustainability and contribution to energy self-consumption will be monitored in collaboration with the public authorities responsible for sustainable management of the forest resource.

LINE L6

PROMOTE RENEWABLE ENERGY PRODUCTION

FRAMEWORK OF ACTION

Objectives in renewable energy

In 2014 power generation from renewables in the Basque Country came to 1,060 GWh. Power production capacity from renewables stands at 422 MW, broken down as follows: 173 MW from hydroelectric, 153 MW from wind, 46 MW from industrial biomass, 25 MW from solar photovoltaic, 25 MW from municipal waste, including biogas, and 0.3 MW from wave energy. The capacity of renewable power generating facilities has not increased in the Basque Country since 2010, given that a small increase in the installed PV capacity has been offset by a reduction in biomass plants.

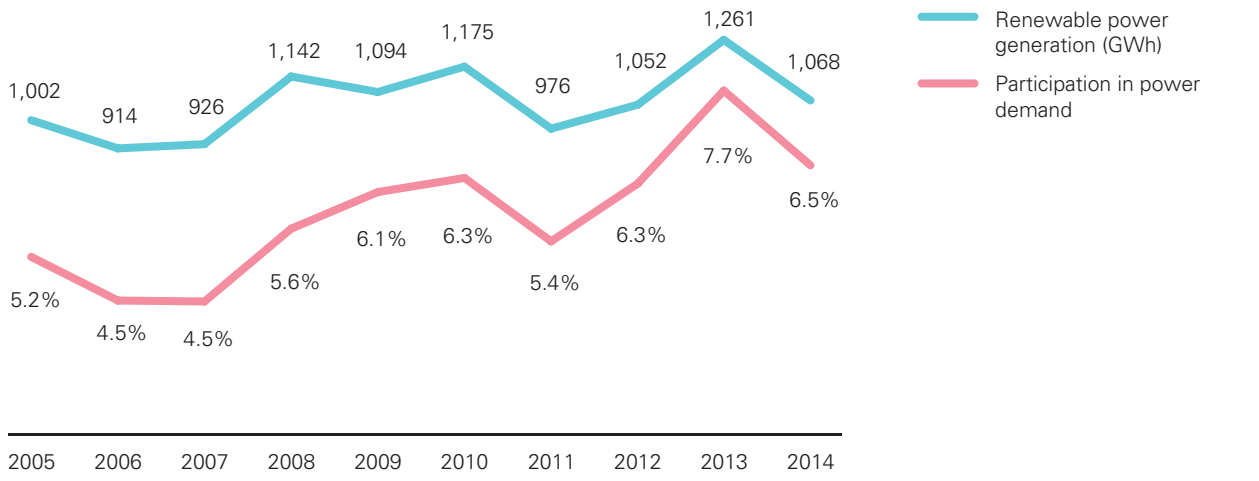


FIGURE 54. Trends in electricity production in the Basque Country and its share in meeting power demand, 2005-2014 (Source: EVE)

In 2014, 6.5% of total electricity demand was met by renewables generated in the Basque Country. However, these figures do not take into account the fact that a significant proportion of electrical imports (which represent 60% of power demand) come from renewables. Taking into account both output from renewables located in the Basque Country and imports, renewables account for 32% of demand. Indeed, in the mainland Spanish power system of which the Basque Country forms part, of a net generation of 253,000 GWh, 41% was produced by renewable energy in 2014. The renewable energy types making the greatest contribution to the electrical system are wind power (20.3%), hydroelectricity (15.5%) and photovoltaic (3.1%). Actions to be taken to significantly increase output of renewable electricity in the Basque Country involve promoting the development of wind power, power generation with biomass and photovoltaic.

Development of onshore wind power

The first wind farm in the Basque Country was in Elgea, Alava and had a capacity of 27 MW. It was commissioned in 2000 under a public-private partnership, which led to the creation of Eólicas de Euskadi, joint-owned by Ente Vasco de la Energía and Iberdrola. In 2002, the Wind Power Territorial Sector Plan was approved. The plan set out areas in which wind farms with more than 8 wind turbines and capacity of 10 MW could be built. Following an assessment of the potential in the Basque Country with the technology available at that time, a potential of 1,300 MW was identified in 29 sites. More farms were commissioned bringing the capacity to the current figure of 153 MW, 94% of which came on line before 2005.

In light of the difficulties in developing the Territorial Sector Plan and making new investment in wind power in the Basque Country, in 2011 work began on the preparation of a second Territorial Sector Plan (TSP) for Wind Power in the Basque Country whose chief objective was to achieve government, political and social consensus to allow adequate development of onshore wind power in the Basque Country. It is important to note that not all sites are suitable for installing wind farms, since viability also depends on environmental and other aspects such as the cost of connecting them to the power grid and equivalent wind hours. In late 2012, an initial draft of the TSP was already available and an environmental sustainability report was drawn up. The report concluded that although there are sites which might be suitable for wind farms, based on the equivalent hours of output (dependent on the available wind) and environmental conditions, the regulatory framework for the sale of the energy generated restricted the development of new wind farms in 2012. Over recent years, studies have been conducted in the Basque Country to consider the construction of mini farms (which could be developed outside the TSP) in various locations, but regulatory changes have restricted their development.

During the same period (between 2010 and 2014) global wind power grew by 87%, (57% in Europe and 11% in Spain). At the forefront of this global market are two companies based in the Basque Country, Iberdrola -the world's second-largest developer in 2013- and Gamesa, the world's sixth largest manufacturer. In Spain, development of new wind farms has been halted since 2012 as a result of the suspension of economic incentives for new power production facilities using renewables, as part of measures to reduce the tariff deficit. Despite the downward trend in the cost of equipment, wind power has very little capacity to compete with other power production technologies without the support of economic incentives, and therefore in the short term, no significant growth in this energy is expected in this region.

Development of solar photovoltaic energy

At the end of 2014, the Basque Country had a total installed photovoltaic capacity of 25 MW, with annual output of around 34 GWh. Since 2008, when 10 MW was installed, the number of new facilities being commissioned has fallen year on year as a result of the cuts in premiums for PV generation and the difficulties imposed by the regulatory framework. At the same time, new buildings in the commercial sector are required, depending on usage and size, to include a certain capacity of photovoltaic generation. However, the low level of construction in the sector is also limiting development of the technology.

Nonetheless, solar photovoltaic power has great potential for development in the medium term, given that the technology is at a commercial phase but has not yet reached full maturity. In other words, costs are continuing to fall as the market grows. More investment is being made in R&D and usage is spreading worldwide, to such an extent that it has now overtaken wind power in terms of annual new installed capacity. Despite the fact that development of PV energy began later than wind power, in 2014 global installed capacity came to 39,000 MW per year, as compared to 51,000 MW for wind power. The great advantage of PV, as compared to wind power, is its modular nature and its applicability on a small scale. Although large photovoltaic plants in areas with high insolation will produce cheaper electricity, small "self-consumption" installations, mainly roof-mounted, may be an economically profitable alternative to replace the purchase of electricity from the grid for some consumers, provided that no obstacles are raised to their introduction.

Hydroelectric energy

Throughout the 1980s and 1990s, major work was carried out in the Basque Country to recover former hydroelectric facilities and build new installations. There are now 96 installations of less than 10 MW in operation, with a combined installed capacity of 60 MW, as well as two larger power stations with an installed capacity of 113 MW. Nearly all existing falls have been recovered and there is very limited potential for additional output. Energy development in the river medium has therefore been relegated to a residual level, and it is not a line of action directly promoted by the 3E2030. However, this does not prevent the possibility of projects arising, normally developed by municipal authorities.

Although hydroelectric power is currently the form of renewable electricity that contributes most to local output in the Basque Country, covering 2.6% of Basque electricity demand, no significant development of this energy type is expected in the future.

Power production from biomass

Total electrical output from biomass in the Basque Country comes to 258,000 MWh per year, equivalent to 1.6% of electricity demand. More than half of this energy corresponds to the power output of industrial facilities harnessing waste from the paper industry.

Production of electricity is an option for biomass that could be considered as an alternative when efficient use in the form of heat is not viable. The power production associated with CHP in the paper industry is an efficient way of using biomass by-products such as black liquors. There are two plants of this type in the Basque Country, with a combined installed capacity of 41.4 MW of electricity, following the recent closure of a third plant. For timber waste such as woodchips, bark and sawdust, it is normally considered preferable to carry out energy recovery in boilers to produce heat for processes or for heating buildings, for which there is a growing market; this is discussed above in the sections on the agricultural (L5), industrial (L1) and buildings (L2) sectors. However, if sufficient potential is demonstrated, it would be possible to produce electricity using forestry biomass or agricultural waste.

In the area of municipal solid waste (MSW), the Zabalgarbi Plant in Bilbao has been operating since 2005, harnessing energy from MSW for power generation, in a process known as energy valorisation; no new lines are currently planned at Zabalgarbi due to the reduction in the generation of municipal waste and a growth in recycling [35]. In Gipuzkoa energy valorisation has been considered as a possible solution to the gradual saturation of landfills, although no project has yet been approved. In Alava there is a waste biomethanation plant and no energy valorisation projects are under consideration. There are also 4 plants harnessing biogas at the main landfills in the Basque Country, although in recent years several plants of this type have been closed due to low performance resulting from gradual depletion of the resource.

[35] Second review (2012) of the Second Comprehensive Waste Management Plan of Bizkaia 2005-2016.

Development of other technologies for renewable power generation

There are other technologies which can be used to produce renewable electricity, as well as onshore wind and photovoltaic. However, their short and medium term potential in the Basque Country is limited to small non-commercial pilot plants, which would only be viable in the Basque Country with aid which could be linked to technological development. These technologies include:

- **Offshore wind.** The construction and operation of offshore wind farms is more complex and costly than on land, making marine wind power between 2 and 2.5 times more expensive than onshore wind power. It currently accounts for only 3% of the total world market. Despite the fact that the Basque Country has 246 kilometres of coastline, the particular geographic characteristics mean that it is not well suited to offshore wind power development with the current state of the technology, given that the sea bed is very deep even at a short distance from the coast. If marine wind power were to be developed in the Basque Country, it would therefore require floating platforms. This technology is still at a pilot phase globally, but could generate opportunities for Basque companies from the shipbuilding, maritime and wind-power industries. The commissioning of the Bimep technological development centre on the coast of Bizkaia is an opportunity to install a prototype of floating wind turbine.
- **Solar thermoelectric**. Solar thermoelectric technology uses mirrors to concentrate the heat of the sun to warm a fluid which is then used to generate electricity. This technology has already been developed, with some 4,300 MW worldwide, of which 53% are in Spain, with Basque companies leading the technology. However, the level of development reached by this technology is not sufficient to allow it to be installed in sites with few hours of insolation and low direct irradiation, as is the case in the Basque Country.
- **Marine energy.** Among the different types of marine energy, the most suitable technology for use on the Basque coast is wave energy. There are various different technologies for obtaining energy from the waves, but until they reach commercial development phase, possible implementation will be limited to prototypes in installations such as Bimep. The only plant of this type operating in the Basque Country is at Mutriku, with a capacity of 300 kW.

  Given the capacities of the Basque shipbuilding and capital goods sectors, particularly in the field of electrical materials, this sector is considered to be of strategic importance for the Basque Country. However, this is still a fledgling, technologically immature, industry. With today's technology, the Basque Country has a technically harnessable capacity of 1,200-1,600 GWh per year, 7%-10% of total Basque electricity consumption.
- **Electrical output from geothermal energy.** Studies of the potential of geothermal energy in the Basque Country indicate that is restricted to low-temperature (or low enthalpy) varieties. This is difficult to harness commercially for power generation with today's technology, although it can be used for heating buildings and for industrial processes.

ACTIONS IN RENEWABLE ENERGY PRODUCTION

Overall objective[36]

Promoting power generation from renewable energy in the Basque Country with criteria of economic and environmental sustainability and promoting industrial development in industry.

Indicators and targets 2030

INDICATORS	2015	2025	2030
Renewable electrical capacity (MW)	422	878	1,440
Renewable power generation (GWh)	1,072	2,309	3,454
Share in electricity supply (%)	6%	13%	19%

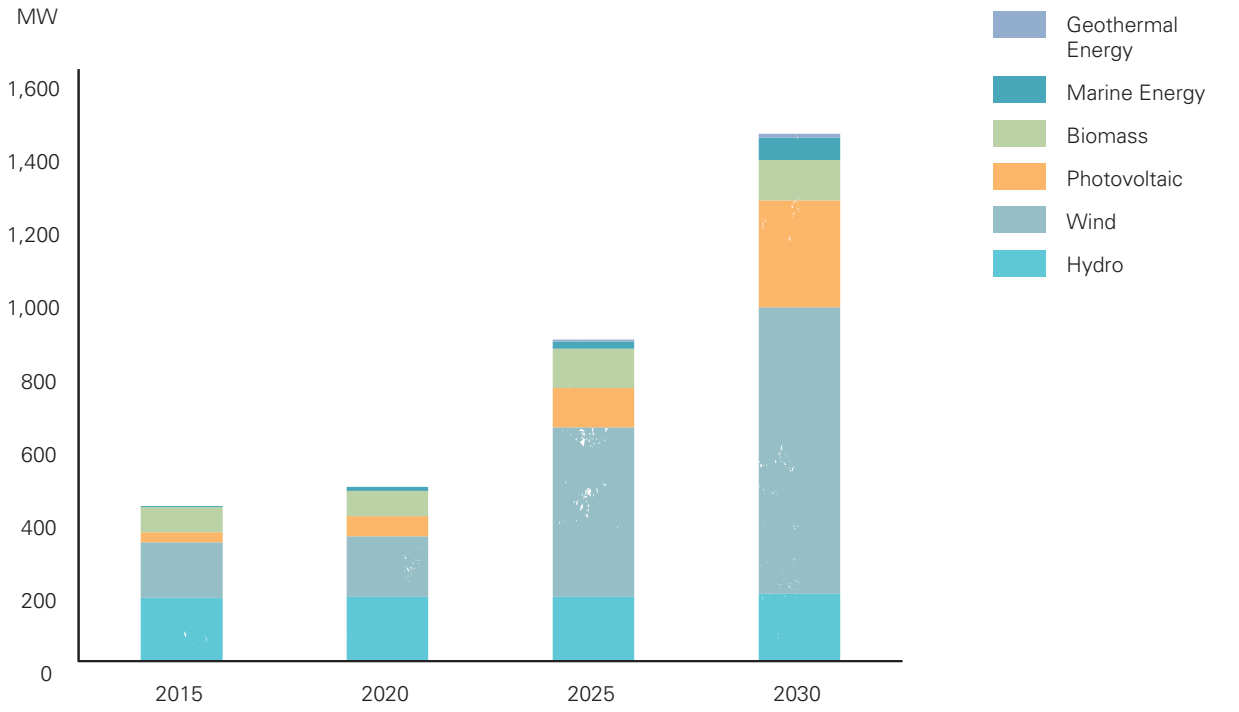


FIGURE 55. Scenario of installed renewable electricity capacity in the Basque Country (Source: EVE)

Bodies with responsibility for the line of action

Department of Economic Development and Infrastructure (Sub-Department of Industry).

[36] Note: The lines of action corresponding to energy consuming sectors also include actions for promoting renewables in industry, buildings and the public administration. These are therefore not included in this line of action. Promotion of the biomass market is included in the line on the primary sector.

LINE L6

PROMOTE RENEWABLE ENERGY PRODUCTION

INITIATIVE L6.1.

INCREASE CAPACITY FOR RENEWABLE GENERATION WITHIN A FRAMEWORK OF INSTITUTIONAL CONSENSUS AND WITH CRITERIA OF SUSTAINABILITY

L6.1.1. Development of a Territorial Sector Plan for wind power in the Basque Country

L6.1.2. Promotion of renewable energy projects in collaboration with local authorities

L6.1.3. Promotion of renewable and low-power distributed generation

INITIATIVE L6.2

PROMOTE THE DEVELOPMENT OF NEW RENEWABLE ENERGY

L6.2.1. Stimulation for activities of the Bimep research platform

L6.2.2. Lay the foundations for commercial development of wave energy

L6.2.3. New studies of technologies and potential for harnessing renewable energy sources

INITIATIVE L6.1.

INCREASE CAPACITY FOR RENEWABLE GENERATION WITHIN A FRAMEWORK OF INSTITUTIONAL CONSENSUS AND WITH CRITERIA OF SUSTAINABILITY

L6.1.1. Development of a Territorial Sector Plan for wind power in the Basque Country

The objective is to develop the second territorial plan on wind power in the Basque Country, adapted to the current level of technological development, to reach the necessary consensus for its approval in order to establish the bases that will allow development of wind potential with criteria of economic and environmental sustainability.

During processing of the plan, it will be submitted for an assessment of its impact on the Natura Network 2000. Design will take into account the limitations imposed by Article 45 of Act 42/2007 of 14 December 2007 on natural heritage and biodiversity.

L6.1.2. Promotion of renewable energy projects in collaboration with local authorities

Municipal authorities and other local organisations can play a very significant role in promoting the installation of renewable energy facilities at local level, for example in small hydro, medium-sized photovoltaic facilities, wind turbines (isolated or in mini wind-farms, and biomass-fired power generating plants, using either forestry or agricultural waste. This activity will consist of technical and financial support from the Basque Government for analysis and development of projects by local authorities when considering and implementing investments in this type of installation, when suitable regulatory and market conditions arise for developing power production from renewables at a local level.

L6.1.3. Promotion of renewable and low-power distributed generation

The possibility of generating electricity for self-consumption must be available to consumers as an alternative to purchasing electricity, especially when a form of technology –photovoltaic– already exists which is suited to producing electricity locally.

Support will be given to self-consumption of electricity generated in the same building or industry in which it is produced, by way of aid programmes to compensate for the lack of a mature market in this area. At the same time, the government will work to ensure that a suitable regulatory framework exists for the development of self-consumption, identifying and trying to overcome the administrative stumbling blocks within its areas of jurisdiction and through its capacity for influence within the Spanish state regulatory framework. Support will also be given by means of lines of aid to the creation of small renewable energy facilities with a capacity to export power to the grid. Commissioning of facilities of this type in government buildings will be promoted as an exercise in example-setting and a boost to the local market.

INITIATIVE L6.2.

PROMOTE THE DEVELOPMENT OF NEW RENEWABLE ENERGY

L6.2.1. Stimulation for activities of the Bimep research platform

Following the commissioning of an offshore platform for researching marine energy technologies in 2015 (Bimep), it is necessary to attract developers/ technologists of wave energy converters to use the platform as a test bench. For this purpose aid programmes are planned to attract new technologists and the development of new units or components; organisation and participation in forums of interest and participation in frontline European projects. For its part, the Bimep must enter agreements with agents from the industry on use of the facilities and perform commercial actions to attract technologists.

L6.2.2. Lay the foundations for commercial development of wave energy

Marine energy is expected to begin its commercial take-off in the next decade. In order to promote the first phases of development in the Basque Country, it will be necessary to analyse in detail the potential, achieve the necessary social and political consensus and encourage adaptation of the legislation and administrative regulation to help overcome difficulties in commissioning. This action will be undertaken when it is judged that this technology is close to commercial take-off point, and in the light of the experience in Bimep.

L6.2.3. New studies of technologies and potential for harnessing renewable energy sources

Technological developments in the area of renewable energy, both for power production and for heat uses, may lead to the emergence of new technological alternatives on the market. In order to make use of these, it will be necessary to have a detailed understanding of this market and provide support for conducting studies on their potential. As well as wave energy and offshore wind, this may include new geothermal exchange systems at greater depths, solar collection, different types of biomass use and wind power in areas with a low wind intensity.

These studies could culminate in the development of pilot projects which would provide better knowledge of the potential for implementing these technologies and for supporting their technological development provided that they are of interest for Basque business development.

LINE L7

SUPERVISE ENERGY SUPPLY INFRASTRUCTURES AND MARKETS

FRAMEWORK OF ACTION

Natural gas infrastructures and markets

Natural gas, which first came to the Basque Country in the early 1980s, currently meets 35% of Basque energy demand. Natural gas first overtook oil as the primary source of energy demand in 2005. By 2009 it was covering 47% of demand. This development has been possible thanks to policies on extending gas networks to bring the fuel to a greater number of industrial and residential consumers, replacing other more expensive and pollutant sources of energy. The Basque Country enjoys a reasonably secure and competitive gas supply, despite its total dependence on imports.

Consumption of natural gas peaked in 2008-2009 at nearly 45,000 GWh, coinciding with maximum use in power stations. By the end of 2013, the total number of natural gas customers in the Basque Country stood at 518,840, of whom 5 are high-pressure customers (Group 1 in the terminology of the tariff system) and 673 medium-pressure (Group 2), while the rest are low-pressure (Group 3). In the period 2011-2013, there were 23,154 new customers, well above the number of new homes built during this period. This means that natural gas continues to spread as the preferred alternative among consumers wherever network availability exists. A total of 145 municipalities have access to natural gas, representing more than 90% of the Basque population.

Development of the natural gas transport and storage network in the Basque Country is carried out under the aegis of the Spanish government's plans on gas infrastructures. The Basque Country has a mature gas network and a liquefied natural gas (LNG) import terminal at Bilbao Port. The region has mature infrastructures for the supply of natural gas, and any investments made are therefore related to interconnection of markets and optimisation of

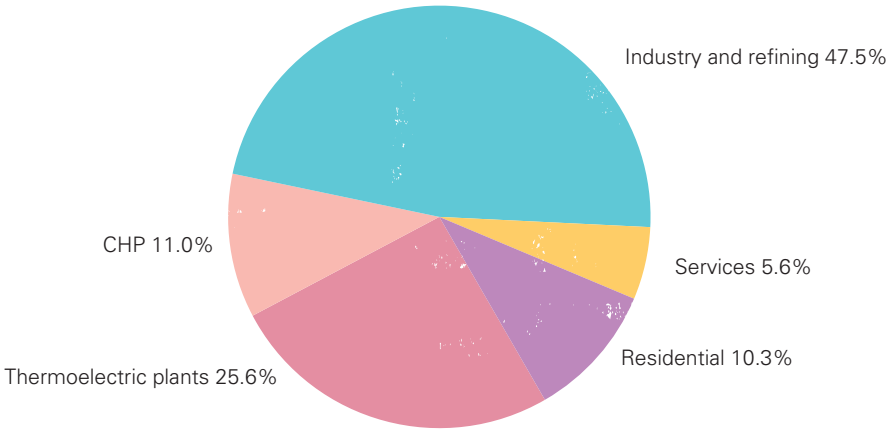


FIGURE 56. Distribution of natural gas consumption by sectors, 2014 (Source: EVE)

installations, as well as to extension of distribution networks. Significant actions carried out by operators in the Basque gas system in recent years include:

- Extension of the BBG regasification plant in Bilbao Port with the construction of the third LNG tank (150,000 cubic metres). The work concluded in 2014, and an LNG loading system for ships was also constructed which provides the plant with greater commercial flexibility.
- Construction of the Bilbao-Treto gas pipeline in the northern axis, linking Cantabria and Bizkaia, which came on line in December 2013.

At the same time, steps are being taken by the Spanish government to create an organised market which may form the basis for the formation of a secondary gas market. This move will help companies to obtain the fuel under the best market conditions and improve their competitiveness.

Exploration of natural gas resources

Since 1950 over 55 onshore and offshore wells have been drilled by different operators in the Basque Country in search of oil and gas. Of these, more than half detected the presence of natural gas, although the reserves were not commercially exploitable with the technology of the time.

The Gaviota and Albatros fields were discovered off the coast of Bizkaia in 1986 and 1997 respectively and subsequently exploited. Gaviota was later transformed into the first underwater natural gas storage facility in Europe.

Working on a nationwide basis, updating the data obtained from previous wells and applying the best of current technologies, investigative work has continued to try to locate and assess this energy resource. Several exploratory licenses are currently active in the Basque-Cantabrian Basin and Ebro Basin.

Activity at these permits, in which the publicly-owned company SHESA participates, will make it possible to further extend our knowledge and appraisal of local energy resources and analyse the possibilities of exploiting them.

Oil and gas exploration and production are regulated by the Hydrocarbons Act and by the Environmental Act (Act 21/2013) and Act 6/2015, recently approved by the Basque Parliament.

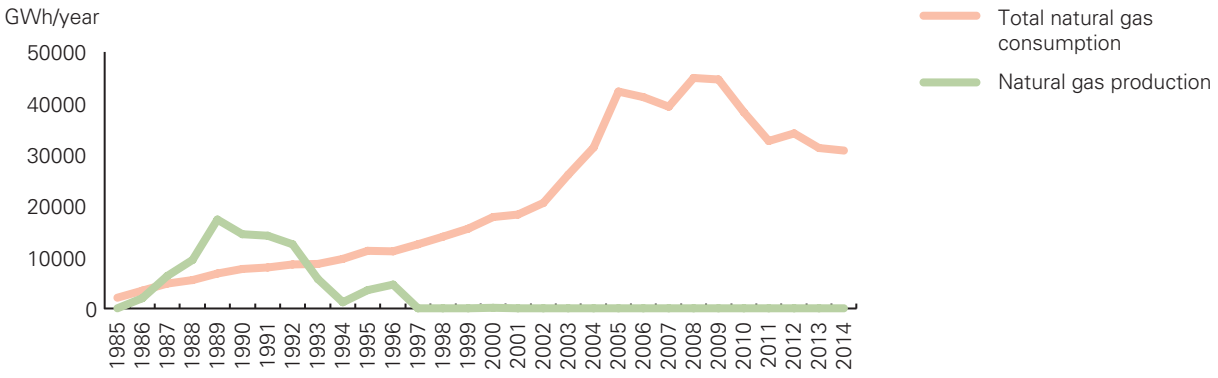


FIGURE 57. Natural Gas Production and Consumption in the Basque Country, 1985-2014 (Source: EVE)

Electricity Market and Infrastructures in the Basque Country

Total electricity demand in the Basque Country came to over 20,000 GWh between 2006 and 2008, subsequently falling to 16,300 GWh by 2014. This drop was caused by a range of factors, including the financial crisis, a decline in industrial output and improvements in energy efficiency, as discussed in Section 3.2.

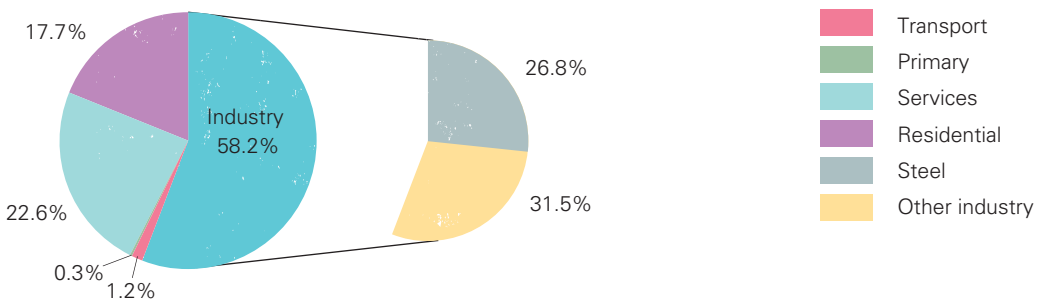


FIGURE 58. Distribution of electricity consumption in the Basque Country, 2014 (Source: EVE)

The Basque Country forms part of the Iberian market, from which its consumers are supplied and to which Basque producers send their output. In a net balance, the internal electricity output of the Basque Country represents 44% of consumption for 2014, a figure which peaked at 81% in 2009. The reason for the reduction in domestic power production is a lack of competitiveness of combined-cycle power stations on the electricity market. At current prices, this means that they only operate for a few hours a year.

The growth in renewable power generation, high fuel prices and a decline in demand have meant that there is less room for power stations burning fossil fuels, such as combined-cycles. There are 3 such plants in the Basque Country, which have been operating at between 18% and 25% of their joint capacity over the last four years. These three combined cycle plants have a total capacity of close to 2,000 MW, and no new plants are expected to be built in the short to medium-term future. Iberdrola's fuel oil plant at Santurtzi and coal-burning plant at Pasaia ceased operating in 2009 and 2012, respectively. The Basque Country has a total installed capacity of 470 MW in CHP and 420 MW in renewables.

The electricity supplied to Basque consumers is thus largely imported, given that operation of power plants is discontinuous. This means that transmission networks are needed with enough capacity to manage the flows required between producers and consumers at any time. The availability of an interconnected network also makes it possible to use the producer with the least costs at any time, thus reducing supply costs.

The "Electricity and Gas Industries Plan" is the instrument used to manage the Spanish transmission network. Given that most energy supply activities are performed in free competition, energy planning mostly takes the form of guidelines, taking into account forecasts of demand behaviour, the necessary resources to meet that demand and environmental criteria. These forecasts act as the basis for binding planning, which includes a series of infrastructures that need to be undertaken in order to properly meet future needs.

Royal Decree Law 13/2012 suspended execution of the Electricity and Gas Industries Plan 2008-2016 and established the need to approve new planning of the transport network, adapted to the macroeconomic scenario. The awarding of all new government authorisations for transmission facilities was suspended pending approval of a new plan, except for planned infrastructures required for international connections and other specific cases where construction was considered strategic.

In December 2015, the electricity industry plan for 2015-2020 was published. The principal actions set out in this plan for the coming years that affect the Basque Country are the reinforcement of the Northern Axis, the link with Navarra and reinforcement of the internal network to increase the number of energy interchanges with France with the construction by 2020 of the Güeñes-Itxaso and Itxaso-Navarra lines. An underwater line between France and the coast in Bizkaia is currently being studied. For 2017-2018 it is also planned to extend the substations for supplying the high-speed rail line, and to build a new substation in Luminabaso.

The actions carried out by the Basque Government and EVE in this area include monitoring, assessment and supervision, within their area of jurisdiction, of development of the transport network plan and actions by the grid operator (REE).

One indicator frequently used to measure the quality of the power supply is the ICDET (installed capacity downtime equivalent time, measured in hours per year). This indicator has remained stable over the last 10 years at between 1 and 2 hours, except in 2009 and 2010 when it rose to 3.89 hours and 2.38 hours respectively. In 2014, it stood at 1.08 hours, slightly above the Spanish average of 1.06 hours.

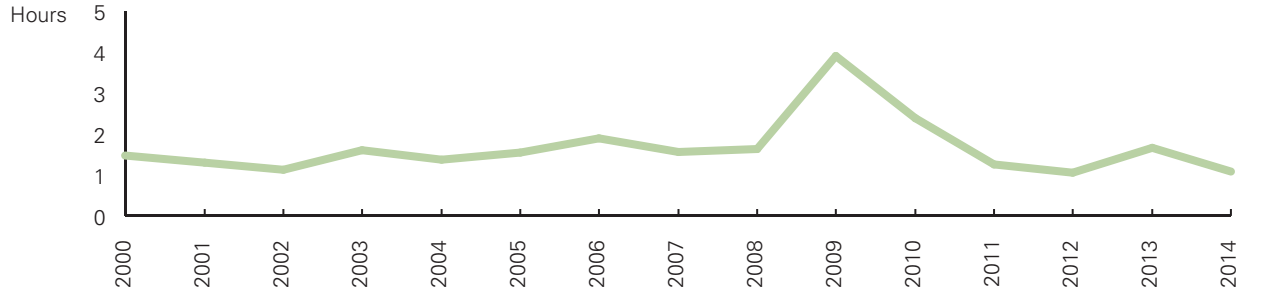


FIGURE 59. ICDET in the Basque Country (Source: Secretariat of State for Energy)

The Basque power distribution network services a total of 1,280,000 customers, 3,700 at high voltage. In 99% of cases, the distributor is Iberdrola; the other 1% are supplied by local distributors of which the two largest are those in Oñati and Tolosa.

Directive 2012/27/EU speaks of the need for final customers to have individual meters that provide real-time information on energy use. The Spanish plan for meter replacement establishes that all meters with a contracted power of up to 15 kW must be replaced by new equipment that allows time-of-use and remote management before 31 December 2018.

Replacement of electricity meters is progressing at a satisfactory rate in the Basque Country, with a total of 858,000 new meters installed by March 2016 out of a total of 1,280,000 low voltage supply points. In the Basque Country, the installation of smart grids has been backed through the Bidelek Sareak Project. As well as the replacement of meters, the project involves actions in 2,400 transformer centres, of which 2,300 had been installed by the end of February 2016, and in three substations. In combination, these actions will result in a smarter distribution system, in which it will be easier to detect faults and even prevent them before they happen thanks to the large amount of information available on the distribution network, as well as advancing towards the introduction of distributed generation.

ACTIONS IN THE AREA OF INFRASTRUCTURES AND MARKETS

Overall objective

To supervise infrastructures, energy markets and applicable regulations, comparing how they have been adapted and acting within the limits of regional powers to ensure that consumers have access to energy in suitable conditions.

Bodies with responsibility for the line of action

Department of Economic Development and Infrastructure (Sub-Department of Industry).

Initiatives and actions

LINE L7

SUPERVISE ENERGY SUPPLY INFRASTRUCTURES AND MARKETS

INITIATIVE L7.1

SUPERVISION OF GAS SYSTEM IN THE BASQUE COUNTRY

L7.1.1. Determine potential natural gas resources in the Basque Country

L7.1.2. Promote secondary natural gas markets

L7.1.3. Supervision of gas system in the Basque Country

INITIATIVE L7.2

SUPERVISION OF THE POWER TRANSMISSION AND DISTRIBUTION NETWORK

L7.2.1. Continuously supervise the electricity transmission system and the actions carried out

L7.2.2. Supervise quality of power supply and distribution network

INITIATIVE L7.3

ANALYSE THE EFFECTS OF CLIMATE CHANGE ON THE ENERGY SYSTEM

L7.3.1. Analyse the effects of climate change on the energy system

INITIATIVE L7.1.

SUPERVISION OF GAS SYSTEM IN THE BASQUE COUNTRY

The goal of this initiative is to contribute to ensuring that consumers have access to a secure and economically competitive natural gas supply within the established area of powers.

L7.1.1. Determine potential natural gas resources in the Basque Country

Efforts in this area will continue along the same lines as in recent years, performing studies, work and analyses as required to determine the possible presence of potential oil and gas resources. Studies to determine the presence of oil and gas resources will require drilling exploratory wells, always within the framework of current legislation. In the case of unconventional gas, they will take into account the limitations imposed by Articles 3 and 5 of Act 6/2015 on additional measures of environmental protection for the extraction of unconventional hydrocarbons and the hydraulic fracturing or "fracking".

If the results of the exploratory work indicate the presence of a significant exploitable resource of natural gas, the operator must perform the procedure established in basic Spanish legislation to obtain the mandatory "production concession", which requires detailed design of a development plan taking into account, *inter alia*, the synergic effects of the different potential projects. In this case, Act 6/2015, Article 4 requires the performance of a strategic environmental assessment.

L7.1.2. Promote secondary natural gas markets

The aim is to actively promote the instruments or platforms necessary to facilitate commercial transactions for the sale and purchase of natural gas, increasing transparency and competition in the industry, within the framework of the Iberian gas system.

L7.1.3. Supervision of gas system in the Basque Country

Analyses are regularly performed on the gas system, gathering the necessary information from operators on the characteristics and use of market and infrastructures to ensure that natural gas supply needs in the territory of the Basque Country are adequately covered. Legislative proposals on the industry at a European and Spanish level are also analysed, and within the limits of the regional government's powers, it brings its influence to bear to ensure that they do not hinder the availability of natural gas in competitive conditions for Basque consumers.

INITIATIVE L7.2

SUPERVISION OF THE POWER TRANSMISSION AND DISTRIBUTION NETWORK

The goal is to contribute to the availability of a secure and economically competitive power supply for consumers within the government's area of powers, supervising the power system, both in terms of existing transport and distribution infrastructures in the Basque Country and the regulatory framework of the industry and establishing the bases for applying any corrective measures that may be required where a risk of any deviation from supply quality targets is detected.

L7.2.1. Continuously supervise the electricity transmission system and the actions carried out

The actions carried out by the Basque Government and EVE in this area include monitoring, assessment and supervision (within their area of power) of the development of the transport network plan, actions by the grid operator (REE) and legislative proposals.

L7.2.2. Supervise quality of power supply and distribution network

Regular analyses will be made of the power distribution system, collecting the information necessary from the operators to ensure service quality and proposing corrective measures in the event of any deterioration in this quality.

INITIATIVE L7.3

ANALYSE THE EFFECTS OF CLIMATE CHANGE ON THE ENERGY SYSTEM

L7.3.1. Analyse the effects of climate change on the energy system

Climate change can influence the energy system through variations in energy consumption due to temperature changes, which can lead to peak load demands for which the energy system is not prepared. At the same time, it may have impacts on the energy infrastructures which must be guarded against. As our understanding of the effects of the climate change develops, studies can be performed to analyse its consequences on the energy system.

" The aim is to actively promote the instruments or platforms necessary to facilitate commercial transactions for the sale and purchase of natural gas, increasing transparency and competition in the industry, within the framework of the Iberian gas system"

LINE L8

ORIENT TECHNOLOGICAL ENERGY DEVELOPMENT

FRAMEWORK OF ACTION

In the global energy context, the main changes in the energy scenario involve increased use of natural gas, a questioning of the benefits of nuclear energy and greater competitiveness of more mature renewables, such as solar photovoltaic and wind power. Standing at the intersection between this global energy situation and Basque business capacities and R&D activity, there are a number of industrial and technological energy-related areas which should be prioritised in the Basque Country. For this reason, a Basque strategy on industrial and technological development in the area of energy needs to be established.

At the same time, the European, Spanish and Basque strategic context must also be taken into account in selecting these priority areas. At a European level, with the Energy Strategy for Europe 2020 and Strategic Energy Technology Plan SET PLAN as the central axis, energy and climate targets have been extended from 2020 to 2030. The aim is to achieve a 40% reduction in greenhouse gas emissions, a 27% share of renewables (without specific targets for each member state) and a 25% improvement in energy efficiency, in line with the target of reducing GHG emissions by 80-95% by 2050. At a Spanish level, key references include the Renewable Energy

Plan 2011-2020, the Energy Saving and Efficiency Plan 2011-2020 and the Spanish Plan for Scientific and Technical Research and Innovation 2013-2016. In the Basque Country, they include the RIS 3 Strategy on Smart Specialisation and the Science, Technology and Innovation Plan PCTi2020.

> " Implementation of Europe 2020 targets has reinforced the need to design research and innovation strategies for smart specialisation (RIS3)"

The RIS 3 is the strategic framework that includes Basque priorities on smart specialisation. The strategic work lines are developed specifically in the Science, Technology and Innovation Plan PCTi2020. The aim of the Basque RIS 3 (Smart Specialisation Strategy) is to define a strategy that will concentrate Basque resources and investments in areas where there are clear synergies with existing and potential production capacity in the Basque Country. Within the framework of the RIS 3, the Basque Government has defined 3 priorities for smart specialisation: advanced manufacturing, energy and bioscience.

The Science, Technology and Innovation Plan (PCTI Euskadi 2020) takes as its reference the RIS3 smart specialisation strategy approved by the European Union as a mandatory requirement for access to cohesion funds. Implementation of Europe 2020 targets has reinforced the need to design research and innovation strategies for smart specialisation (RIS3). The new "PCTI Euskadi 2020" is aligned with the growth strategy established by the European Union for this decade, through the Basque RIS 3, in order to maintain optimum conditions for smart, sustainable growth.

Strategic Objectives

The Basque Strategy of Industrial and Technological Development in the Area of Energy (known as EnergiBasque 2.0) is a basic line of action of the Energy Strategy. Its essential aim is to consolidate the network of Basque science & technology companies and agents in the energy industry and their global competitiveness to contribute to smart specialisation of the Basque Country (RIS 3) and to become a source of wealth, employment and quality of life. This consolidation of the energy industry seeks to:

- Consolidate Basque business-generating companies as technological reference points in their respective energy areas, creating a magnet effect throughout the value chain that centres on high value added products.
- Develop business activities in new emerging energy areas, in which both industry and the science-technology agents already have competitive advantages that can act as a launch pad.
- Promote the integration of key cross-cutting technologies for developing value solutions in the prioritised energy areas for the Basque Country

Bodies with responsibility for the line of action

Department of Economic Development and Infrastructure (Sub-Department of Industry).

LINE L8

ORIENT TECHNOLOGICAL ENERGY DEVELOPMENT

INITIATIVE L8.1 Power Networks

INITIATIVE L8.2 Electric Traction

INITIATIVE L8.3 Energy efficiency in industry

INITIATIVE L8.4 Oil & Gas

INITIATIVE L8.5 Wind

INITIATIVE L8.6 Marine

INITIATIVE L8.7 Solar thermoelectric

INITIATIVE L8.8 Storage

INITIATIVE L8.9 Power Electronics

INITIATIVE L8.1
POWER NETWORKS

Competitive international offer.

It is necessary to provide support for the development of a competitive and integrated offering in segments of the value chain in which Basque companies are vying for a lead position on international markets.

Technological and business collaboration.

In order to favour the positioning of Basque companies in the area of smart grids, collaboration actions between companies and agents should be increased, covering aspects ranging from research to projects in real settings.

INITIATIVE L8.2
ELECTRIC TRACTION

Differentiated international offer.

Basque companies must have the necessary institutional support to develop a differential offer in terms of infrastructures for electric vehicles and vehicle components associated with energy use.

Orientation towards advanced transport solutions.

It is necessary to promote the technological development of competitive and efficient solutions for applications of electric traction in transport.

Efficient innovations in the lifting industry.

To promote the development of new lifting concepts with greater levels of efficiency and 'smartness', in equipment, components and associated services.

INITIATIVE L8.3
ENERGY EFFICIENCY IN INDUSTRY

Collaboration in key efficiency projects.

To promote greater energy efficiency in sectors with greatest consumption in the Basque industrial fabric, with particular focus on areas that involve collaboration, as in the case of the use of residual heat in industrial processes.

Comprehensive Basque offer of products and services.

To promote the development of the Basque offering of products, services and technological capacities in the area of energy efficiency in industry

INITIATIVE L8.4
OIL & GAS

Basque industrial Portfolio of Suppliers.

To organise the Basque industrial fabric of suppliers in the Oil & Gas industry, strengthening the position of companies currently operating in it and adding the potential of new agents.

Improvement in the offer of products and services.

To support Basque companies in initiatives for increasing the added value of their offering of products and services and to undertake new business opportunities, such as those associated with hostile conditions.

Key Basque companies.

To position key Basque companies as technological reference points in their respective niches of activity, together with a Basque Science, Technology and Innovation Network with a greater level of specialisation in the oil & gas industry.

" It is necessary to promote the technological development of competitive and efficient solutions for applications of electric traction in transport"

INITIATIVE L8.5
WIND

Equipment and services for the offshore market.

To promote the development of equipment, components and services that meet the demanding technical and economic requirements of the offshore wind market.

Segmented competitive offer.

To support the development of a competitive offer at a global level in those segments of the wind power value chain in which Basque companies already enjoy good positioning, both in equipment and components for wind turbines and in systems and services associated with wind farms.

INITIATIVE L8.6
MARINE

Positioning in the Basque value chain.

To launch initiatives that favour the positioning of the Basque value chain in marine energy demonstration projects, starting by maximising the benefits of having an iconic international infrastructure in the form of the Bimep.

INITIATIVE L8.7
SOLAR THERMOELECTRIC

Basque Country as international benchmark.

Consolidate the Basque Country's position as a region of reference in the development of solar thermoelectric technology, promoting R&D activities oriented towards reducing the cost of generation and plant operation.

New advanced solutions.

Support the development of new auxiliary solutions such as storage, transfer or hybridization systems, that allow the overall efficiency of the plants to be increased.

INITIATIVE L8.8
STORAGE

High added value applications.

Promote the incorporation of storage in specific applications in all niches in which these alternatives represent added value, mainly in areas of integration of renewable energy, smart grids and electric traction.

Position as technological reference point.

Develop a technological reference position in storage, generating new technological capacities and promoting the creation of a local business fabric in specific niches with a knowledge base and the competitive advantages necessary for market success.

INITIATIVE L8.9
POWER ELECTRONICS

Advanced training.

Reinforce training in Basque companies in power electronics.

New products and applications.

Support the development of products and solutions based on these technologies, with particular emphasis on applications for smart grids, wind power and electric traction.

" Consolidate the Basque Country's position as a region of reference in the development of solar thermoelectric technology, promoting R&D activities oriented towards reducing the cost of generation and plant operation"

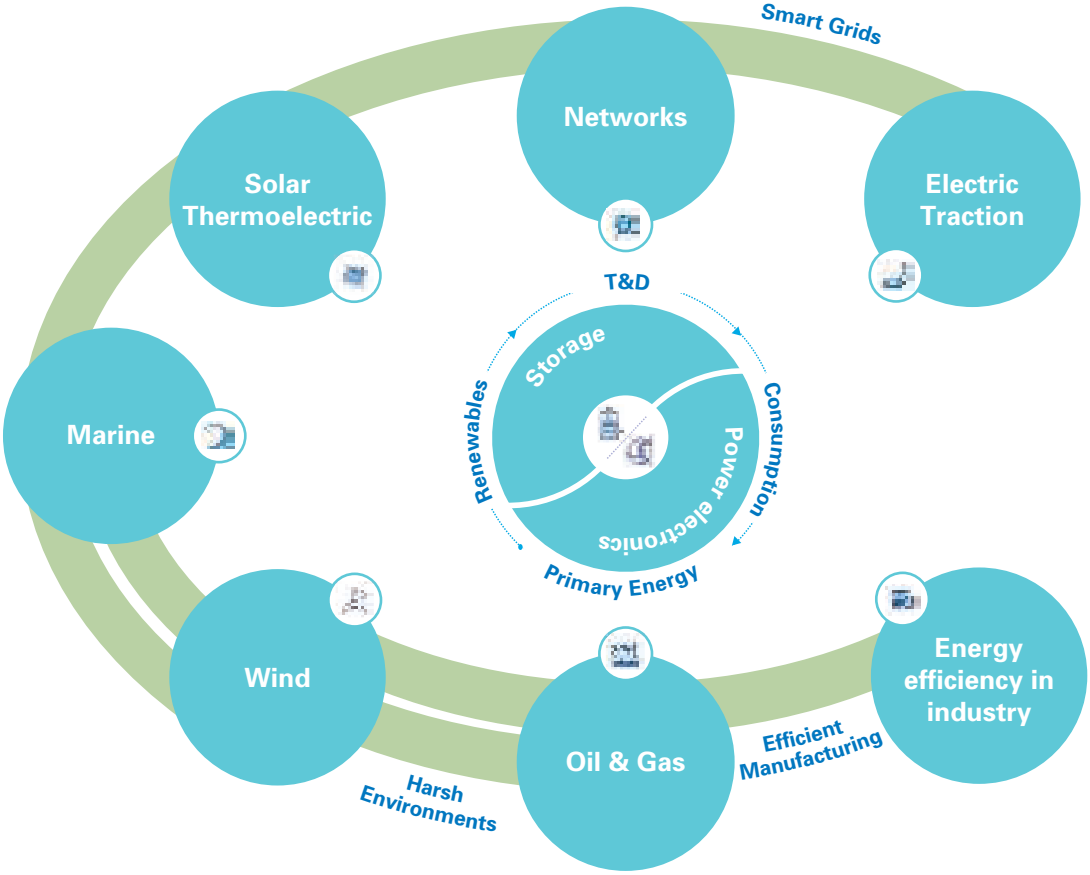


FIGURE 60. Industrial and technological development. Strategic areas (Source: EnergiBasque 2.0)

5 INVESTMENT AND FINANCING

MOBILISATION OF INVESTMENT

Total investments of €4.93 billion will be required in all industries involved between 2016 and 2030 to meet the energy targets set. This amount does not include the investments in energy-related technological development R&D covered in the EnergiBasque Strategy 2.0 or the investments made in the Basque Country in regulated gas and electricity activities, which are subject to approval by the Spanish authorities in the corresponding sectoral plan. By areas, the most important investments will be in energy consuming sectors (66%) and in new renewable power generating facilities (29%).

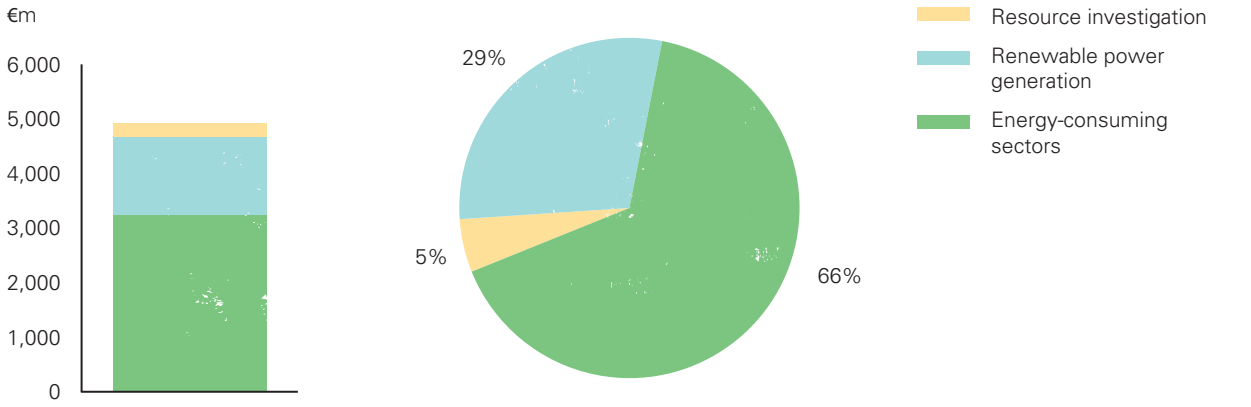


FIGURE 61. Distribution of investments by areas of activity 2016-2030 (Source: EVE)

By type, the investments are concentrated in energy efficiency (45%) and use of renewable resources (50%).

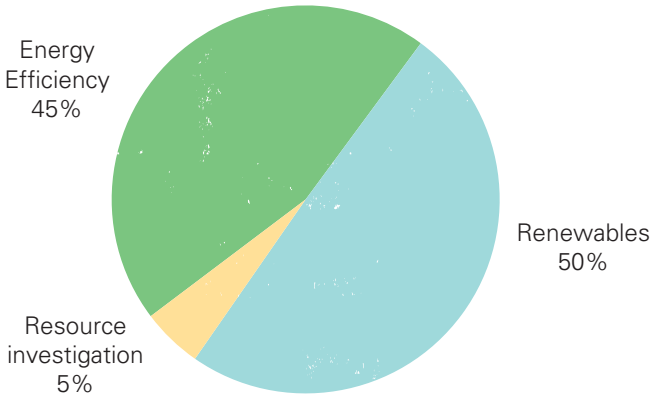
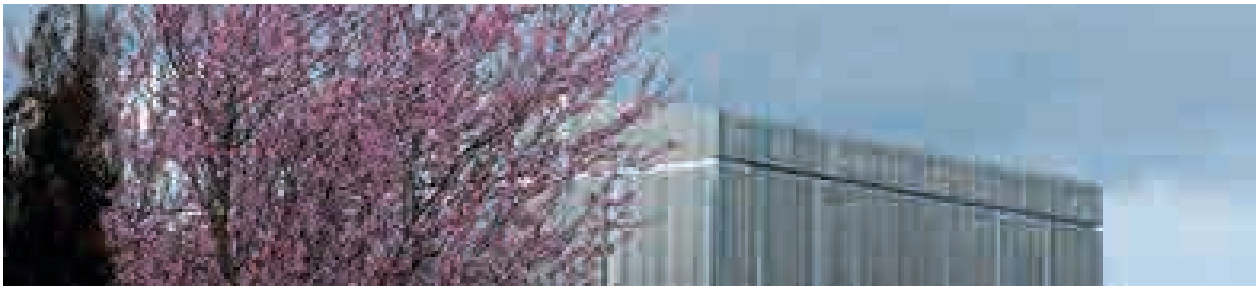


FIGURE 62. Distribution of investments by type of measure 2016-2030 (Source: EVE)



Of the €2.24 billion to be invested in energy efficiency in energy consuming sectors, the largest investment will be in the services sector in general (38%) –due to the investment effort in the public administration (20%)– followed by the residential sector (33%), transport (16%) and industry (13%), where specific investments in efficiency are lower.

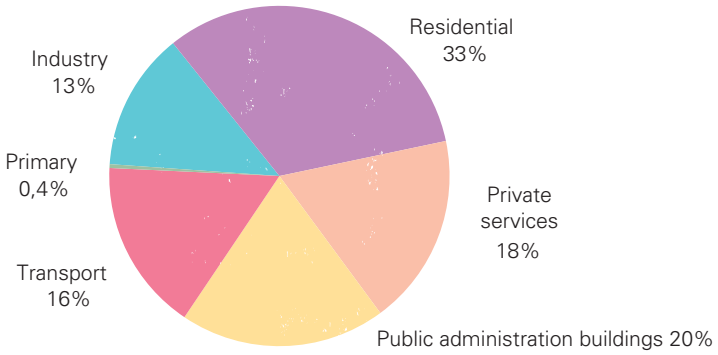


FIGURE 63. Distribution of sectoral investments in efficiency 2016-2030 (Source: EVE)

Sectoral investments in renewables will total €1 billion. Of this, the largest investment will again be in the services sector (€720m), due to the incorporation of new biomass, geoexchange and photovoltaic installations for self-consumption.

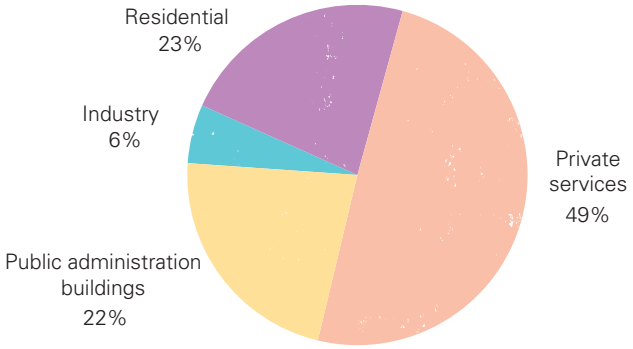


FIGURE 64. Distribution of sectoral investments in renewables 2016-2030 (Source: EVE)

Investments in grid-connected renewable power generation will come to around €1.44 billion, largely due to the incorporation of new wind (62%), biomass (10%) and solar (10%) facilities.

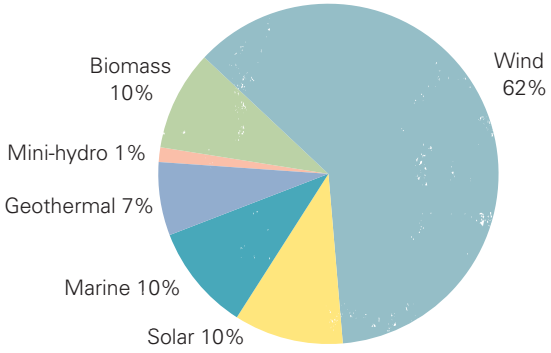


FIGURE 65. Distribution of investments in renewable power generation 2016-2030 (Source: EVE)

PUBLIC CONTRIBUTION: AID AND INVESTMENT

The Basque public authorities will contribute €1.1 billion between 2016 and 2030, taking into account investments in installations, aid and promotional expenses, of which more than 80% are investments.

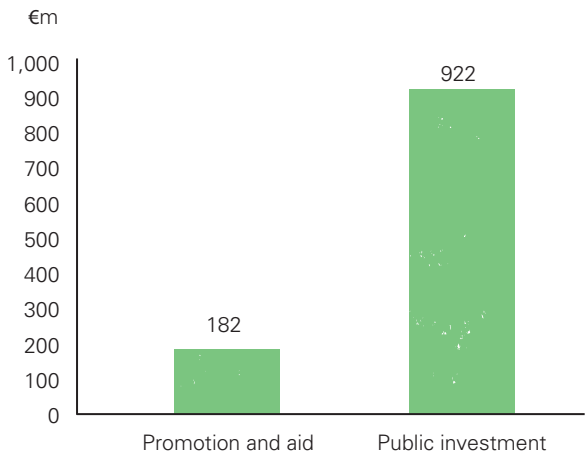


FIGURE 66. Distribution of the economic contribution of public authorities. 2016-2030 (Source: EVE)

Aid from the public administration for efficiency and renewables is estimated at €169m, distributed between industry (41%), buildings (38%), and other sectors (21%). A further €14m is forecast in promotion.

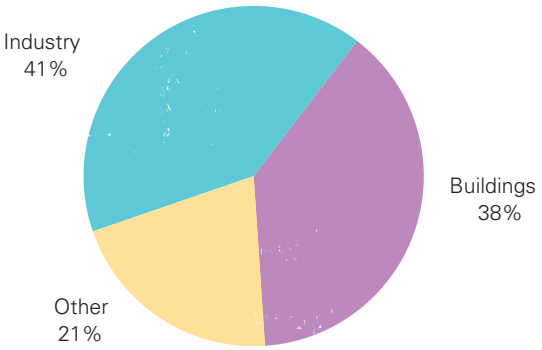


FIGURE 67. Distribution of public aid in efficiency and renewables 2016-2030 (Source: EVE)

The €922m of investment from the public administration represents 19% of total investments. The bulk of public investments centre on improvements in efficiency and renewables in public buildings (60%), and efficient renovation of public lighting and alternative vehicles in transport fleets (18%).

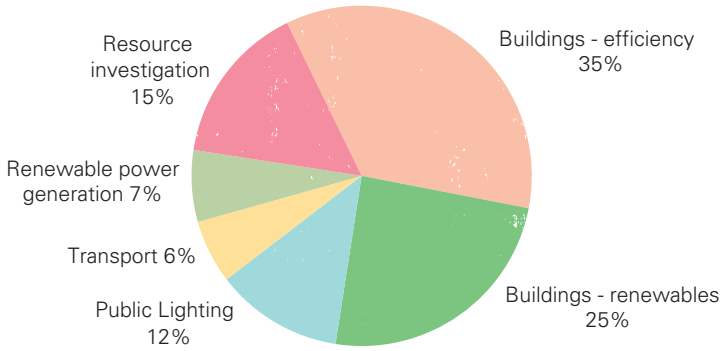


FIGURE 68. Distribution of investments by Basque public administration 2016-2030 (Source: EVE)

6 PLAN FOR MONITORING AND REVIEW

In order to assess development of the energy framework and the progress of the Basque Energy Strategy, a regular mechanism has to be established for monitoring and overseeing the measures included the strategy and their effects. By comparing the targets set in the Strategy with the results actually achieved, over time it will be possible to monitor progress, detecting any deviations and proposing corrective measures.

The monitoring plan will be made up of the following elements:

- Annual progress reports summarising the actions undertaken in the area of the strategy for the year, any changes in the energy framework and the development of follow-up indicators related to the targets set.
- Interim assessment reports, which will be published every three years. As well as the information set out in the progress reports, these interim reports will also assess any deviations in achievement of the targets and indicators and will propose possible corrective measures.

These reports will be drawn up by the Ente Vasco de la Energía, using information from its own sources and energy operators, energy consumers and public institutions.

The monitoring indicators must be based on consistent high-quality information reflecting the real energy situation in the Basque Country and must provide a measurement of the actions carried out and their impact. These indicators are grouped into a scorecard and cover the following aspects:

- Energy efficiency
- Oil dependence and fossil fuels
- Use of renewable energy
- Structure of electricity supply
- Actions of technological development
- Environmental impact
- Investment and aid

On an annual basis, working in collaboration with Ihobe, energy-related emissions of greenhouse gases and other pollutants such as nitrogen oxides, sulphur dioxide, carbon monoxide and particles will be calculated.

Every 5 years, there will be a process of reflection on the Energy Strategy. The purpose will be to determine whether it needs to be adapted to developments in technology, society, legislation and European policies and to keep it aligned with the sustainability targets established in Basque policies.

3E2030 - STRATEGIC INDICATORS		2015 SITUATION	TARGET 2025	TARGET 2030
ENERGY EFFICIENCY				
Energy saving vs. BAU	ktoe/yr.	-	840	1,250
Rate of energy saving	%	-	12%	17%
Share of saving (European indicator)	%	-	21%	25%
Improvement in final intensity vs. 2015	%	-	24%	33%
OIL DEPENDENCE				
Reduction in oil vs. 2015	ktoe	-	120	500
Reduction in oil vs. 2015	%	-	4%	18%
Alternative energy sources in road transport	%	4%	10%	25%
RENEWABLE ENERGY				
Level of renewable energy use	ktoe	428	758	966
Increase in use of renewables vs. 2015	%	-	77%	126%
Share of renewables in final consumption (incl. imported electricity)	%	13%	17%	21%
Installed power generation capacity	MW	422	878	1,440
POWER GENERATION				
Power demand	GWh	16,249	16,395	16,570
CHP facilities	%	15%	20%	21%
Renewable power generation	%	6%	13%	19%
Electricity self-supply rate	%	35%	60%	66%
ENVIRONMENTAL CONTRIBUTION				
Reduction of GGEs from energy vs. BAU	Mt CO2/yr.	-	1.7	3.0
Reduction of GGEs from energy vs. 2005	%	-	29%	35%
ECONOMIC INDICATORS				
Investment in the period	€m	-	2,802	4,927
Public contribution	€m	-	742	1,104
Public contribution vs. total investment	%	-	26%	22%

TABLE 3. 3E2030. Strategic indicators and targets 2025-2030 (Source: EVE)

APPENDIX I. RECOMMENDATIONS ON ENVIRONMENTAL MEASURES

The purpose of this appendix is to identify proposed measures for preventing and reducing the environmentally negative impacts that might arise out of the Energy Strategy. These include measures that are already mandatory under current legislation and others that are considered recommendations or good practices which should be applied to reduce the impact of projects.

This appendix has two sub-sections. The first describes measures intended to make the Energy Strategy itself more environmentally sustainable. The second sets out recommendations for reducing the environmental impact of projects that are

A1.1 CORRECTIVE MEASURES IN THE ENERGY STRATEGY

Given that the Energy Strategy itself has been developed to achieve a more sustainable energy system, most of the actions contained in it could be included in this section. This is the case of measures in the industrial sector and in buildings (both homes and the services sector), which seek to encourage investment in sustainable energy, in terms of savings / efficiency and renewable energy installations.

In order to reduce the impact of renewable energy, it is necessary in general to prioritise the commissioning of renewable energy facilities that are associated with the place where the energy is to be consumed, be it an industrial, residential or tertiary installation. In other words, it is necessary to encourage local energy production on a decentralised basis, thus reducing the need for energy infrastructures.

As for the promotion of renewable energy in transport, the Strategy goes no further than the targets proposed by the European Union. The manufacture of biofuels –biodiesel and bioethanol– mostly involves the use of energy crops grown outside Basque territory, with global impacts that are difficult to assess. Analysis of these impacts at a European level led to a qualification of the EU's targets on biofuel use within its general targets on renewables for 2020; for all of these reasons, it has been decided not to set targets in the Strategy that go beyond European levels.

The Energy Strategy encourages the use of biomass for heat generation in boilers, without specifying their origin. In general, the use of biomass waste is preferable to dedicating forest or arable crops to this use, thus preventing other more sustainable uses of the land. In industrial facilities it is necessary to encourage the use of biomass generated in the installation itself to avoid transport; this is the case of black liquors produced in the paper industry and sawdust and bark from the timber industry, which are already being used in boilers for this purpose. However, in order to supply biomass to boilers in the tertiary sector it is also necessary to maximise the use of waste, such as waste from pruning operations and forest clearings or sawdust and bark from industrial processing, in the form of pellets, woodchips, etc. These aspects must be taken into account in forest management plans. For this reason, a new line of action has been included as a preventative measure to reduce the possibility of impact in this area: L5.2.2 "Analysis of potential and monitoring of sustainable energy usage of biomass". The goal is for monitoring to be performed in coordination with the public administrations responsible for sustainable management of the forest resource.

We should avoid providing public financing for any projects which should be subject to environmental impact assessment, but are implemented without performing the procedure or in contravention of its findings.

directly or indirectly related to the Strategy or to energy more generally, although in many cases their planning does not fall within the remit of the Energy Strategy; for example, energy supply infrastructures. It should be noted that the Energy Strategy does not determine whether specific projects should be introduced or the framework within which this work should be carried out. Potential sites will therefore be decided on in other domains. Some of these projects will be subject to environmental impact assessment (EIA) and integrated environmental authorisation (IEA) procedures; some may even involve a strategic environmental assessment as part of a sectoral planning process. The government therefore guarantees that during those procedures the impacts derived from their construction and operation will be identified and assessed in detail.

A1.2 RECOMMENDATIONS ON MEASURES FOR ENERGY-RELATED PROJECTS

Projects arising from the Energy Strategy must comply with current legislation and where applicable include the preparation of the corresponding environmental impact studies. They must also take into account and apply as far as possible the recommendations and considerations set out in this section.

Insofar as current legislation establishes, the competent bodies for approving or authorising plans and projects should not encourage or give their consent to any plans or projects that negatively affect habitats of community importance, or those that have significant adverse effects on other areas that are environmentally significant because of their outstanding natural or cultural values or which pose a present or future risk to human health or the environment.

At the same time, environmental assessments of mobility and transport plans and structural organisation plans (insofar as they concern residential zoning), even if they do not fall within the actions set out in the Energy Strategy, must take into account the way in which the criteria on energy efficiency and energy saving set out in it have been incorporated.

General measures for environmental protection

With regard to the protection of biodiversity, infrastructures shall for preference be located outside protected natural areas, points of geological interest, well preserved plant formations or areas containing specimens listed in the Catalogue of Endangered Wild and Marine Flora and Fauna Species of the Basque Country. Without prejudice to the provisions of the plans for managing the species included in the catalogue, specific measures will be designed and applied to avoid or minimise the impact on populations of these species and to restore and improve their habitats.

In order to ensure the quality of the land, the stability of the lands occupied will be ensured, preventing any erosion and degradation. As far as possible any impact on land of high agrologic value will be avoided for siting any type of project. Alternative locations for energy generation, transport and distribution infrastructures will be prioritised and favourably assessed in the following areas: areas of little natural or landscape significance or of little agrologic quality, with preference being given to artificialized settings; areas of little cultural significance; areas in which natural hazards (such as the risk of flooding or erosion) are insignificant; areas of little vulnerability to contamination of underground water; sites close to existing infrastructures or communication routes, and, in general, locations with least need for connection infrastructures.

The necessary precautions shall be taken with regard to soil which has previously been used for potentially pollutant activities, and the provisions of the applicable regulations on soil protection shall be observed.

With regard to the water environment, when establishing locations for energy projects, the impact on surface and underground water must be taken into account. For the protection of surface water, special attention must be given to the location of new mini hydroelectric power stations and suitable sites must be sought for energy transport infrastructures for crossing rivers and bodies of water with the least impact. With regard to underground water, location is especially important for oil and gas exploration.

In order to protect air quality, it is necessary to:

- Minimise the generation of pollutant emissions into the atmosphere and the spreading of dust.
- For the purpose of avoiding noise disruption, projects must adhere to the provisions of Royal Decree 1367/2007, of 19 October 2007, developing the Noise Act (Act 37/2003, of 17 November 2003); and Royal Decree 212/2002, of 22 February 2002, governing noise emissions in the environment due to specific outdoor machines, and the complementary rules, as well as the Basque Noise Pollution Decree (Decree 213/2012, of 16 October 2012).

In order to ensure protection of the landscape, projects must seek to minimise the landscape and visual impact caused by energy infrastructures. Design measures shall be applied to the installations to adapt them to the morphology of the area of location and the use of visual screens must be encouraged.

Finally, when performing actions in areas with any of the overlapping conditioning factors identified in the Spatial Development Planning Guidelines of the Autonomous Community of the Basque Country, the terms of the Directives and in their matrix of uses must be observed. Areas with superimposed conditioning factors identified in the Spatial Development Planning Guidelines are areas that are vulnerable to Pollution of Aquifers, areas liable to erosion, areas of natural interest, lands of high agrologic value, eco-corridors and areas with unspoilt landscapes.

Measurements related to CHP

Combustion engines give off nitrogen oxides. In order to minimise atmospheric emissions from the combustion engines used in cogeneration (CHP), the most efficient technologies with the lowest levels of emissions must be considered as alternatives.

Design of the CHP System must take into account the potential impact of the noise of the engines.

" With regard to the protection of biodiversity, infrastructures shall for preference be located outside protected natural areas, points of geological interest, well preserved plant formations or areas containing specimens listed in the Catalogue of Endangered Wild and Marine Flora and Fauna Species of the Basque Country"

Measurements related to biomass use

Priority must be given to the use of biomass waste over biomass from energy crops and any impact on autochthonous woodland shall be avoided. In addition, consumption of biomass in energy consuming sectors and its origin will be regularly reviewed to ensure sustainable use of the resources.

It is necessary to avoid impacts on flora, habitats and ecosystems, for preference gathering biomass during the period when it will have least impact on wildlife, in the case of forestry and agricultural biomass, avoiding overfelling of woodlands, optimising the logistics and management and collection of the biomass, performing an energy balance on transport and on conditioning and storage of the biomass. In the case of forestry biomass, the management plans established by the authorities and good practice in the industry should be observed.

Use of biomass and other waste must take into account the impact on atmospheric emissions and reduction of same through the use of the best techniques available. In this regard:

- In order to reinforce compliance with the community hierarchy of waste disposal and in application of the provisions of Article 8 of Act 22/2011, of 28 July 2011, governing waste and polluted soils, only waste whose primary destination (preparation for re-use and recycling) is not economically or environmentally viable may be used for energy valorisation.
- Particular care must be taken in environmental monitoring of the installations in which biomass is used, since improper combustion of this type of diverse fuel can lead to an increase in emissions of carbon monoxide, particles, nitrogen oxides and other acid gases.
- Although the environmental quality of biomass boilers has improved considerably, in larger facilities, including those used for municipal waste, treatment of combustion gases may be necessary. Depending on the type of installation and fuel, the treatment needs will be established to comply with current legislation on atmospheric emissions.
- If gas scrubbing is required, the resulting waste water must not be emitted without prior treatment and any chemical substances used in the treatment of gases and the reaction products must be stored, used and disposed of in a technically appropriate manner.
- Given the significance of methane as a greenhouse gas, it is advisable to avoid any methane emissions resulting from processes of anaerobic fermentation of the biomass. If possible, the energy contained in the gas should be harnessed.
- Given that biogas often requires intermediary storage between production and use, the corresponding safety rules must be observed for gas tanks (against the risk of poisoning, fire and explosion).

Measures related to solar thermal energy

In order to reduce the impact of solar thermal energy, production facilities should be located for preference close to the place where the energy produced is to be used, preferably on roofs.

Measures related to solar photovoltaic energy

The impact of solar PV energy can be reduced by locating the installations, for preference, in distributed arrangements on roofs in urban settings. As far as possible, locations on rural land should be avoided, using for preference low-productivity land with gradients of under 5% to reduce the visual impact. In general, locations should be sought close to the electrical connection points, also prioritising proximity to existing infrastructures such as the edges of communication routes. This will avoid large-scale land occupation and will improve integration into the landscape.

Measures related to geothermal energy

Design of the plants must avoid any impact on underground water, taking into account the characteristics of the soil. In particularly sensitive areas or in larger projects, it may be advisable to monitor the underground water on a regular basis

Measures related to mini-hydro energy

Priority should be given to the rehabilitation of derelict power stations and improvement of existing ones over the construction of new power stations, avoiding as far as possible any changes to river courses. During construction, appropriate corrective measures should be erected (barriers, etc.) to pollution of rivers. Bypasses or other techniques should be used for exploiting the falls and minimising the environmental impact. Specifically, to minimise the impact on river wildlife, the following recommendations are given:

- Do not locate the power station in areas where river resources have a high level of biodiversity.
- Create protected areas in the rivers for spawning grounds that allow reproduction of fish species. In order to enable proper emigration of certain aquatic species, ladders should be constructed to allow fish to pass dams. Grilles should be installed to prevent fish from getting into turbines and to ensure a certain flow of water (ecological flow) from the dam to maintain the phreatic layer and free circulation of fish. The ecological flow must be the minimum flow that will guarantee conservation of life, movement and reproduction of the species inhabiting the water at the time when the plant is installed.

In order to avoid impact on habitats, measures must be taken to avoid any reduction in the plant, functional and landscape diversity of these spaces. These may include designing weirs that generate thin sheets of water, with good water quality

and enabling the existing riverside plant-life to be maintained as far as possible. In river courses affected by the work and their environs, restorative and compensatory actions must be taken to ensure and reinforce the function of connectivity of the river courses.

When the morphology of the channels is significantly altered, restorative or, if necessary, compensatory measures must be taken to recover the naturalised forms of the channels.

Measures should be adopted to avoid dispersion and to eradicate invasive species.

Measures related to wind energy

Sites should be selected following an analysis of alternatives, seeking locations for new wind farms that entail the least environmental impact, both in terms of the location of the wind turbines and the associated infrastructures (roads, trenches, substations, power lines). Wind farms should be designed in such a way as to minimise the creation of new associated infrastructures, giving priority to the use of existing infrastructures in order to avoid occupation of any additional land.

In order to minimise the noise impact of rotating parts, the design must take into account the quality of the machining and the surface treatments of the materials forming the blades. It is always recommended that the turbines be located at a sufficient distance from inhabited areas and that the design, manufacture and assembly of the wind turbines be strictly monitored to ensure that they operate within design specifications.

New wind farms and their associated infrastructures must not significantly affect natural forests, natural repopulations and priority habitats under Directive 92/43/EEC of the Council on the conservation of natural habitats and of wild fauna and flora. Where possible, the impact on natural plant life shall be minimised, giving preference to the occupation of crop land, wasteland and lands of little environmental value. Construction of wind farms in sensitive areas for bird life (nesting, breeding, migratory corridors, etc.) should be minimised.

In order to favour integration into the landscape, it is recommended that intervisibility studies be conducted to determine the best location for the wind turbines.

Measures related to exploratory oil and gas wells

All unconventional oil and gas investigation and exploration projects must comply with the provisions of Act 6/2015, of 30 June 2015, on additional measures of environmental protection for the extraction of unconventional hydrocarbons and hydraulic fracturing or "fracking".

In order to minimise the environmental impact, and for reference purposes, the general recommendations proposed in the communication

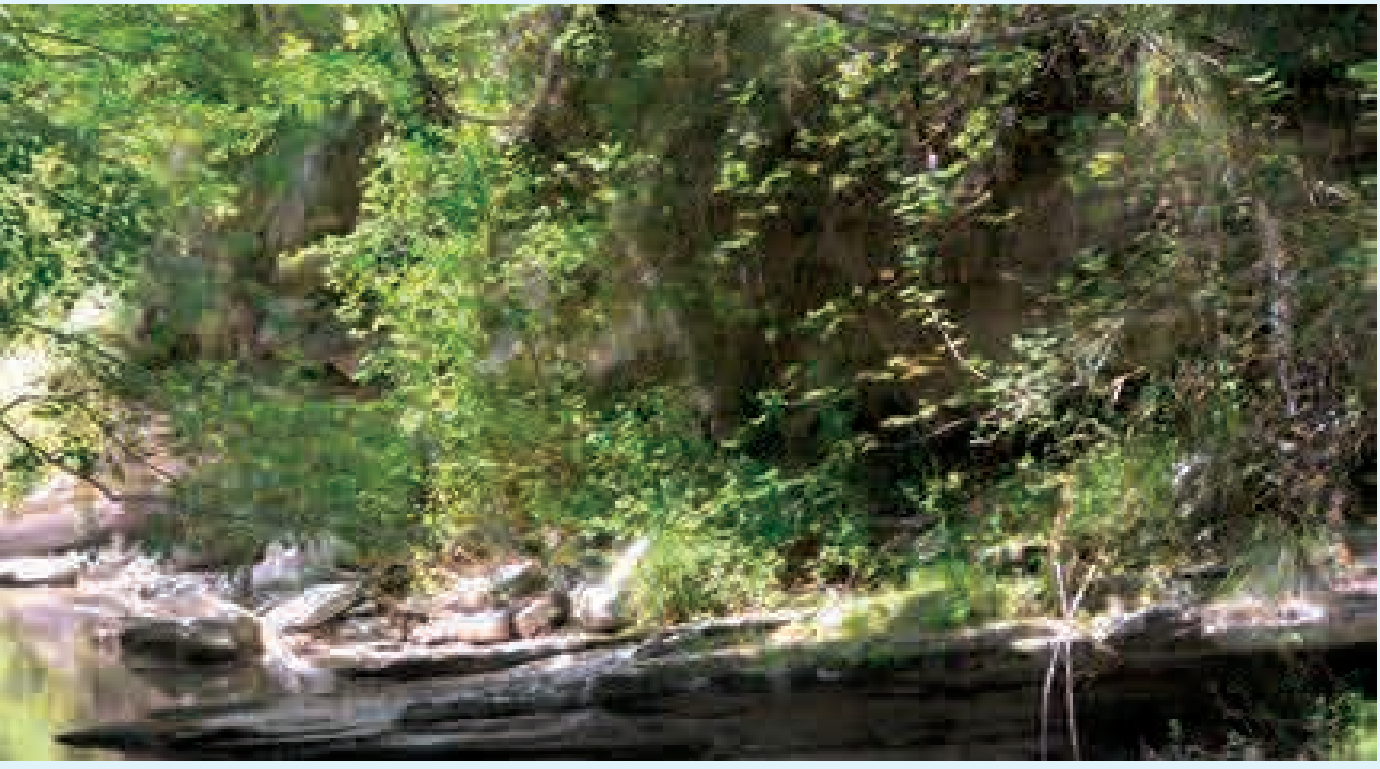
of the European Commission[37] on high-volume hydraulic fracturing should be taken into account. This communication sets out recommendations on the need to perform a site-specific risk characterisation and assessment related to both the underground and the surface; to determine the baseline of the site before operations commence; to build the installation in such a way as to prevent possible surface spillage or leakage into the ground, water or air; to use any technical improvements available, develop management plans for water resources and transport, reduce atmospheric emissions, perform the process of fracturing in a controlled fashion, guarantee the integrity of the well and minimise the use of chemical substances, among other recommendations. In addition, an integrated approach should be taken to the area of production and the installation, surrounding area and subsoil should be monitored.

Act 21/2013 makes it compulsory in order to obtain authorisation from the substantive body for the drilling of an exploratory well involving use of hydraulic fracturing, to obtain a favourable decision on an ordinary Environmental Impact Declaration. This requires a complete study of the environmental impact with a public information procedure. This procedure in itself requires greater assurance and rigour than the recommendations of the European Commission.

In addition, within the framework of this strategy the following specific recommendations for all types of exploration projects are proposed:

- Exploratory wells should be sited in the neighbourhood of existing gas transport networks in the Basque geography (gas pipelines), in order to limit carbon emissions associated with the phase of production testing.
- Exploratory wells should be sited in the neighbourhood of points of water supply, so that water can be pumped to the wells through pipes, in order to avoid the traffic and carbon emissions associated with supply by means of tanker trucks.
- Exploratory wells should be sited in points located outside protected areas and areas listed as being of high environmental value.
- Exploratory wells should be sited in points that are already accessible from existing roads or tracks, to avoid the impact associated with the construction of new infrastructures.
- Exploratory wells should be sited in level areas or areas with a gentle relief, to minimise impacts associated with the works of land clearing and levelling.

[37] Commission Recommendation of 22 January 2014 on minimum principles for the exploration and production of hydrocarbons (such as shale gas) using high-volume hydraulic fracturing, OJEU 8 February 2014.



Measures related to natural gas and electricity networks

The Energy Strategy does not plan natural gas and electricity transport and distribution networks. Nonetheless, some general recommendations are included here for reducing the environmental impact of the infrastructures that may be needed to connect other facilities such as renewables.

The route of new power and natural gas lines must be determined following an analysis of the different possible alternatives, including as a base alternative the possibility of not building the line. The route must take into account aspects such as distance from inhabited areas and protected spaces or areas of singular value, and should for preference run through publicly-owned areas. The design of the line or pipe must take into account the minimisation of impacts in both construction and the opening of access roads; as far as possible, existing access roads shall be used.

For power lines, every attempt shall be made to situate supports in least productive areas and at the boundaries of meadows, next to existing paths. As far as possible any impact on sensitive spaces and wildlife shall be avoided, and this criterion shall be taken into account in the design of the route, of the technical elements for the design of the line (screeds, anti-collision or anti-electrocution elements, etc.) and construction, including the period in which it is carried out (breeding season, etc.).

APPENDIX II. ABBREVIATIONS

3E2020 / 3E2025	Basque Energy Strategy
ACBC (CAE)	Autonomous Community of the Basque Country
BAT	Best Available Technology
BG (GV)	Basque Government
BOPV (OGBC)	Official Gazette of the Basque Country
CNG	Compressed Natural Gas
COM	Covenant of Mayors
DHW	Domestic Hot water
E4	Spanish Energy Saving and Efficiency Strategy
EC	European Commission
ECA	Emission Control Area
EcoEuskadi	Basque Government's Sustainable Development Strategy
EIA	Environmental Impact Assessment
ESC4F	Energy Service Company
ETS	Emission Trading Scheme

EU	European Union
EVIP (PIVE)	Efficient Vehicle Incentive Programme
FC / FEC	Final Energy Consumption
GDP	Gross Domestic Product
GHG	Greenhouse Gas
ICDET	Installed Capacity Downtime Equivalent Time
ICT	Information and Communication Technology
IDAE	Institute for Energy Diversification and Saving (*Instituto para la Diversificación y Ahorro de la Energía*)
IEA	Integrated Environmental Authorisation
Imp.	Imports
IPCC	Intergovernmental Panel on Climate Change
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MARPOL	International Convention for the Prevention of Pollution from Ships

MSW	Municipal Solid Waste
NOx	Nitrogen oxides
NREAP	National Renewable Energy Action Plan
OJEU	Official Journal of the European Communities
p	Provisional
PCI	Projects of Common Interest
PE	Primary Energy
PPP / PSP (PTP / TSP)	Partial Provincial Plan / Provincial Sector Plan
PT (IBI)	Property Tax
RDI	Research, Development and Innovation
REE	Red Eléctrica de España (Spanish Electricity Network)
REP	Renewable Energy Plan
RIS3	Research and Innovation Smart Specialisation Strategy
SDPG (DOT)	Spatial Development Planning Guidelines

SEAP	Sustainable Energy Action Plan (Covenant of Mayors)
SESB (EESB)	Sustainable Energy Strategy for Bizkaia
SET-Plan	Strategic Energy Technology Plan
SHESA	Sociedad de Hidrocarburos de Euskadi
SME	Small and Medium Enterprises
STIP	Science, Technology and Innovation Plan
TBC	Technical Building Code
TCIW (ICIO)	Tax on Construction, Installations and Works
TLR	Tariff of Last Resort
toe	Tonnes of oil equivalent
TPAG	Third-party Access to the Grid
VRI (ITV)	Vehicle Roadworthiness Inspection (*Inspección Técnica de Vehículos*)