Bases for constituting the

National Agreement for the energy transition of Catalonia

Generalitat de Catalunya

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Document approved by the Government of Catalonia, agreed at the working sessions of the Association of Organisations for the National Agreement for the energy transition of Catalonia

The Catalan Energy Institute acted as the technical office for the National Agreement for the energy transition of Catalonia

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Generalitat de Catalunya

A new energy model for Catalonia

Energy is one of the pillars of the modern economy and for standards of living in our society. Moreover, it is vitally importance for the economic and territorial development of our country. However, despite this important strategic status of energy, Catalonia's energy model continues to suffer from major weaknesses, such as high dependence on fossil fuels and considerable impact on the environment and on the health of people.

It is true that, in the last 25 years, since the establishment of the Catalan Energy Institute, we have made progress in many areas, but not with the intensity desired, especially as regards spreading the use of renewable energy in our country.

One of the biggest challenges we face as a society this century is that of transforming our present energy model, for energy and environmental reasons, of course, but especially for social reasons. We need to find our energy supplies from local renewable energy sources, distributed and close to the points of consumption; we need to stop using fossil fuels to get around, for mobility; we need to transform our buildings into efficient sites; and we need to develop and implement all those technological tools that will enable us to manage energy more efficiently, from production to consumption.

We cannot afford to miss the European train of transition towards a completely carbon-free energy industry. For this reason, the Catalan Government, urged by the Parliament of Catalonia, is leading the creation of a National Agreement for the energy transition of Catalonia, an initiative that is in line with medium- and long-term European energy policy, with the goal of achieving a Catalan energy scenario based wholly on renewable energy by the year 2050.

We look to the future ambitiously, rationally and with a focus on efficiency. As a result, in the context of a new political situation in Catalonia, there opens up before us a range of regulatory tools and instruments that, if use them responsibly and efficiently, will enable us to move forward along the lines established in the National Agreement.

This transition cannot ignore the needs of people and companies. What is more, in full awareness of the challenges that we face, people and companies should help to drive the transition process and should become it main protagonists.

This is precisely the aim of the National Agreement for energy transition: to bring together civil society, the different economic sectors in our country, and political parties around a stable, solid, permanent commitment to transforming the Catalan energy model and implementing the strategic tools necessary to bring this process of energy transition successfully to fruition.

Jordi Baiget i Cantons
Minister of Business and Knowledge
Government of Catalonia

Clean energy. The importance, the priorities and the tools for action

Renewable energy; energy saving and efficiency; energy self-sufficiency and decentralisation of the system; these are the key concepts that underlie the motion for the Energy Sovereignty of Catalonia that the Catalan Parliament approved in December 2013. This document also emphasises the need to establish a major national agreement that will point the way towards a new energy model.

That same year, 2013, Spain approved the new law governing the electricity sector. This new law eliminates all incentives for energy saving and energy efficiency through an extraordinary increase in fixed costs. Moreover, the reform greatly reduces, with retroactive effects, the incentives previously given to renewable energy and, in particular, to small photovoltaic producers. Oil prices over 100 dollars a barrel, and the emergence of energy poverty in Catalan society are other factors in the drive to establish this new strategic and political framework.

As a result of all this, and in a scenario favourable to energy transition, the Government of Catalonia has drawn up a preliminary document describing the challenges and targets for achieving a **100% renewable energy model by the year 2050**, while also setting out a process of agreement with a view to constructing this new model within the framework of the greatest possible consensus. The result is the establishment of the Negotiating Committee for the National Agreement for energy transition, a body that will open up the energy debate to all sectors and bring together initiatives generated within the world of associations and the academic and professional spheres.

Changes that have been made to the international energy model over the last three years have demonstrated, precisely, just how essential it is to evolve towards a distributed, renewable, democratic system, one in which the vertical nature of the conventional system, dominated by large companies, is replaced by a system that is more distributed and horizontal. The fall in oil prices to around 40 dollars a barrel, the emergence of electricity storage, the increased autonomy of electric vehicles, and the availability of photovoltaic technology at reasonable prices are other factors have also helped to place this issue at the centre of debate. Accordingly, in July 2016, the Parliament of Catalonia approved a new motion urging the Government to include all these aspects in the future National Agreement for energy transition.

The international agreement reached in Paris in 2015 regarding the need to transform the energy model in order to address climate challenges has persuaded states to consider the energy transition as an unavoidable process. On November 30 last year, the European Commission published the legislative package “Clean Energy for All Europeans”, in which the priority areas for action include energy efficiency in buildings, energy self-consumption, electric vehicles, citizen empowerment and consumer vulnerability.

The document you now hold in your hands is the result of the consensus reached so far within the framework of the National Agreement for energy transition, though the process will require parliamentary majority support and commitment in order to advance. The challenges that face us are far from simple, and resistance to change seems to be inevitable within a state regulatory framework that, as things stand at present, does not induce optimism when it comes to starting out on the path towards a new, more renewable, cleaner, more efficient, healthier and more democratic energy model.

Assumpta Farran i Poca
Director
Catalan Energy Institute

Table of contents

Introduction

Background

On 15 April 2014, as part of the process for drafting this National Agreement for energy transition, the Government approved a government agreement to promote the National Agreement for Energy Sovereignty:

- Instructing the Department of Enterprise and Employment to begin work on designing the proposed National Agreement for Energy Sovereignty, based on the criteria and objectives established in the motions and resolutions of the Parliament of Catalonia that were approved during the previous and present legislatures related to the transformation of the Catalan energy model, principally motions 63/X and 57/XI of the Parliament of Catalonia. These criteria and objectives are described in Annex 1 of this document.
- Setting up a coordinating committee, chaired by the Secretary for Business and Competitiveness, to guide the process of drafting the bases for the National Agreement and establishing contact with economic and social stakeholders, academic and professional institutions, civil society associations and political groups in order to generate a broad consensus regarding the National Agreement.

In this regard, the aforementioned Government Agreement is based on Motion 63/X, on energy sovereignty, approved by the Plenary Session of the Parliament of Catalonia on 5 December 2013 during the previous legislature. This Motion urges the Government to:

- Establish the bases for a National Agreement in which all stakeholders participate in order to define measures to transform the Catalan energy model into one based on renewable energy, self-supply, and energy saving, efficiency and containment, with a decentralised production model.
- Promote a change in the regulatory framework to ensure democratic control of energy, and that access to energy is classified as a basic right.

On 27 May 2015, after several working sessions, the Coordinating Committee for the National Agreement for Energy Sovereignty approved the “Foundational Document for Constituting a National Agreement for energy transition”, as well as a proposal for the consultation process that will lead up to the National

Agreement for energy transition, based on establishing a Negotiating Council for the National Agreement for energy transition (see Annex 2).

These proposals were submitted to the Government, which, on 7 July 2015, took note of them. Subsequently, the consultation process established was launched.

The National Agreement for energy transition should also take account of the current energy situation in Catalonia and the challenges that will face it in the future.

In this respect, the evolution of the Catalan energy model has been significantly marked by the economic and financial crisis that began in 2008. As a result of this recession, energy consumption in Catalonia has fallen drastically. This reduction in energy consumption, which affects both primary and final energy, is very important, particularly if we take into account, moreover, that for two decades up to 2007 there was a sustained increase in energy consumption, a rise driven mainly by the economic growth of Catalonia and the significant increase in the country's population.

Appendix 3 of this document provides more detailed information on the recent evolution of energy in Catalonia. This description is also found, in a more extended version, in Chapter 2 ("Report on Actions Carried Out in the Field of Energy and Climate Change Mitigation") of the Energy and Climate Change Plan for Catalonia 2012-2020 (PECAC 2020).

In this context, in its Report 3/2014, of July 2014, entitled "The Energy Challenges Facing Catalonia Towards 2030," the Advisory Council for Sustainable Development (CADS) identifies the main challenges that, in its opinion, Catalonia is facing in the field of energy. These include:

1. Obtaining the capacity to design and implement an energy policy.
2. Making Catalonia an efficient and competitive country in terms of energy:
    a. Promoting a low carbon economy, efficient in its use of resources, and competitive.
    b. Promoting demand management and the transformation of society's perceptions of energy.
    c. Ensuring the general application of energy saving and efficiency measures.
3. Reducing dependence on fossil fuels, especially in the field of transport.

4. Ensuring energy supply in the future, by:
    a. Increasing the resilience of the energy sector.
    b. Developing the full potential of renewable energy sources.
5. Addressing the nuclear debate urgently, boldly, and rigorously.
6. Reducing the energy insecurity felt by part of the population.
7. Acquiring tools to manage the energy transition:
    a. Strengthening research and innovation in the energy field.
    b. Mobilising sufficient financing for the energy transition.
8. Improving governance in the energy field:
    a. Placing energy policy at a higher level in decision-making processes.
    b. Building a shared vision with the whole country as regards the energy challenges that face Catalonia and the way forward towards meeting them, establishing clear and ambitious medium-term targets.
    c. Increasing citizens' knowledge and understanding of energy, and their awareness of its economic and environmental costs.
    d. Agreeing the path towards energy transition in cooperation with social stakeholders.
    e. Overcoming resistance to change within the traditional power structures.
    f. Encouraging citizen participation in the decision-making process as regards energy infrastructure and facilities.

Preamble

Energy is a strategic priority for any country that wants to aspire to the maximum heights of self-government. We should remember that energy is important, not only for the development of the Catalan economic system (energy is key to economic growth, competitiveness, employment, etc.), but also for the private sector (in homes and in passenger transport and so on) and due to its impact on other sectoral policies (environment, agriculture, regional planning, housing, etc.).

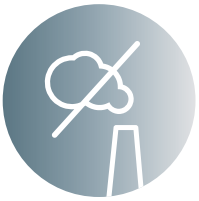
Within the framework of policies aimed at the sustainable development of Catalonia, whose end goal is to establish a future social model in which economic growth, social cohesion and environmental protection are considered as three aspects of a single strategic challenge, energy is a key element. Indeed, energy is the leading cause of many environmental impacts associated with human development; it enables the generation of wealth; and it is essential for our country's social development.

For example, the energy cycle, taken as a whole, accounts for 76% of total greenhouse gas emissions and 93% of CO_2 emissions in Catalonia, according to data from the latest inventories, which date to the year 2012. This major role in overall greenhouse gas emissions in Catalonia that energy plays means that energy policies are key instruments in the fight against climate change in our country. In particular, the introduction of energy saving, energy efficiency and renewable energy technologies, and diversification towards low-carbon fossil energy sources in the different consumer sectors are, at present, the main strategies aimed at reducing overall levels of greenhouse gas emissions in Catalonia.

Local air pollution is another environmental impact in which energy plays a key role. Air quality in Catalonia has improved notably in recent decades, with the exception of nitrogen dioxide (NO_2) and particles with a diameter of less than 10 microns (PM10), which have not followed the same trends as the rest of pollutants. In this regard, we should remember that air pollution continues to be the main environmental factor associated with preventable diseases and premature deaths in the European Union and still generates negative impacts on the natural environment all over Europe. According to the OECD, by 2050 air pollution in the cities will be the leading environmental cause of death around the world, ahead of polluted water and lack of health infrastructure.

Energy policies are also vital in this respect, because one of the main sources of air pollution in Catalonia is the consumption of fossil fuels in transport, industry, buildings and power generation.

We can therefore say that energy has a decisive effect on the three pillars on which sustainable development is based: the economy, the social dimension and the environment.



The cross-cutting, transversal nature of energy and its importance on a global scale, both at present and in the future, makes it essential to full integrate and prioritise energy policies within future strategies for sustainable development, both that of our economy and that of our society.

The technological and social changes required to ensure the sustainable development of our energy model should be implemented in such a way that society as a whole becomes a participant in this paradigm shift and that the decisions which are taken are consistent with this long-term goal.

It is necessary, therefore, to make a gradual transition towards a new energy model in which renewable energy sources and energy saving and efficiency must play a central role. This transition should be based on policy decisions that are consistent with this end goal and which encourage and enable active participation of society. The time factor is also crucial, because these decisions, consistent with the new energy model that Catalonia needs, must be taken as soon as possible.

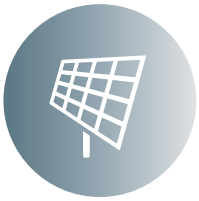
In response to this situation, and taking into account both the strategic nature of energy policy and the new political and social context in Catalonia, it has become essential to establish a National Agreement for energy transition, a nationwide agreement based on dialogue among all political forces and civil society representatives aimed at giving Catalan energy policy the medium- and long-term stability that will enable the goals proposed to be successfully achieved.

A National Agreement for energy transition is necessary to ensure that the most strategic decisions that it is necessary to take have the support of the maximum agreement among Catalan political forces and society in general.

Establishing this National Agreement will also contribute to providing the necessary guarantees concerning legal security that are required to ensure the expansion of investment in energy technology, a key factor for the transformation of the Catalan energy model.

The National Agreement described in this document is designed to become a key tool for advancing towards the energy transition that Catalonia needs, and will lead to the country to take on the highest responsibilities as regards energy, and to advance with the transformation of the energy model towards a sustainable model, just as many other European countries (such as Germany, France and Denmark) are already doing.

The National Agreement will establish, at least, the basic guidelines for action and the principles behind the future Catalan energy model within the framework of the targets established by the European Union in the field of energy by 2020, 2030 and 2050, taking into account economic, environmental and social sustainability, and the security and reliability of energy supply under the Catalan energy model.



The Agreement will also address various specific challenges regarding energy in Catalonia, challenges that energy policies will be called on to resolve in the short and medium term. These issues include overcoming the difficulties that currently exist for the effective implementation of renewable energy in the territory; reaching a consensus on the role of nuclear energy in the future energy transition, since nuclear power generation currently accounts for more than 50% of electricity production in Catalonia; and the need for a drastic reduction in dependence on fossil fuels in sectors such as transport, which at present depends almost entirely on oil products for fuel.

Similarly, the Agreement will take into account the European Union's current framework of action regarding energy and climate, as represented by the "Energy and Climate" and "Energy Union" strategies.

In this respect, the "Energy and Climate Change" package approved by the European Parliament in December 2008 sets out a strategy and establishes targets to be met by the year 2020 in response to the challenges that Europe faces in the field of energy and climate change. The main pillar in this strategy is the establishment of what is called a "core energy objective" – that of reducing greenhouse gas emissions in the EU by 20% by the year 2020 compared to 1990 levels. To achieve this objective, various associated objectives are established. These include reducing energy consumption by 20% compared to a business-as-usual scenario, and ensuring that renewable energy accounts for 20% of gross final energy consumption by 2020.

In October 2014, taking all this into account, the European Council established a new strategic framework for action on energy and climate, with several specific commitments and targets to be met by 2030:

- The binding commitment to reduce greenhouse gas emissions in the EU by at least 40% compared to 1990 levels by 2030. This is consistent with the target of reducing these emissions by 80% by 2050.
- An indicative target in the EU of a 27% improvement in energy efficiency by 2030.
- A binding minimum target in the EU of a 27% share for renewable energy sources in consumption in the EU by 2030.

In 2015, the European Commission approved the Framework Strategy for an Energy Union (full title: "A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy"). This tool brings different areas together into one cohesive strategy in order to promote energy security, sustainability and competitiveness. The Energy Union Strategy is structured around five dimensions, all of which are closely interlinked:

- Energy security, solidarity and trust.

- Integrated European energy market.
- Energy efficiency contributing to moderation of demand.
- Decarbonising the economy.
- Research, innovation and competitiveness.

Subsequently, in November 2016, the European Commission presented the legislative package that will support the roadmap for the European Union's energy transition up to 2030: **the Clean Energy for all Europeans package**. At the same time, the Commission increased commitments on energy efficiency to 30%.

The document Clean Energy for All Europeans - unlocking Europe's growth potential contains new directives in the fields of renewable energy, energy efficiency in buildings, electricity and the governance of the Energy Union. This legal framework is binding for Member States and will enable the EU to join the unavoidable transition towards a new energy model based on clean energy.

The proposals have three main emphases: putting energy efficiency first; achieving global leadership in renewable energies; and providing a fair deal for energy consumers.

The quantitative targets proposed by the Commission in this new package, to be achieved by 2030, are: a 40% reduction in greenhouse gas emissions compared to 1990 levels; a 30% improvement in energy saving and efficiency; and a 27% share for renewable energy.

The legislative package also includes measures to speed up innovation in clean energy and the rehabilitation of buildings in Europe. It presents measures to promote public and private investment (involving energy service companies) and industrial competitiveness and to mitigate the social impact of the transition to new energy model.

The Commission proposes a new way forward for ecological design, as well as a strategy for electric mobility that is closely linked to buildings with electricity generation or self-consumption, basically solar photovoltaic energy, and the need for storage in the vehicle itself or other systems, such as batteries.

This framework gives consumers a central, active role in the new energy model: wider choice of energy supply; access to tools that will enable them to compare energy prices; possibility of producing and selling their own energy; greater transparency, etc. Similarly, the proposals also include a series of measures to protect the most vulnerable consumers and minimise energy poverty.

In this way, the Commission makes the highly positive move of opening the door to speed up the necessary energy transition towards a more democratic

and distributed model, one that allows consumers freedom to produce renewable electricity without facing undue restrictions, and which guarantees that they receive remuneration for the electricity they inject into the grid. For small photovoltaic power facilities, often related to housing, the proposals stress that permits or authorisations will not be required; notification will be enough.

Along the same lines, the package identifies the right of consumers to organise themselves into communities in order to produce, store, consume and sell renewable energy. This proposal is closely linked to the idea of buildings that produce energy, as well as guaranteeing the possibility of recharging vehicles as elements for storage and encouraging demand-side management and the manageability of renewable sources.

However, although the package also incorporates the principle of non-retroactivity in the economic remuneration mechanisms, it is not clear enough in guaranteeing priority clearance for new renewable energy facilities.

The Clean Energy for All Europeans legislative package is, then, a useful tool for starting out along the path towards a new distributed, clean and democratic energy model, but attention is need to monitor and possible intervention by the Council of Ministers and the European Parliament.

Finally, the National Agreement should lay the foundations necessary for Catalonia to exercise full regulatory powers on energy within the framework of the European Union.

It is important also to stress the timeliness of this Agreement within the current international context. For instance, in August 2015 the United Nations General Assembly adopted the global Sustainable Development Goals (SDGs). These goals include those of “Ensuring access to affordable energy, reliable, sustainable and modern for all” (SDG 7) and “Taking urgent measures to combat climate change and its impacts” (SDG 13).

Also important on this point is the international negotiating process on climate which is taking place as part of the United Nations Framework Convention on Climate Change and, particularly, the 21st Conference of the Parties (COP21) held in Paris in December 2015, which approved the new post-Kyoto framework for action. The Paris Accord, adopted by 195 countries, establishes a series of commitments to reduce greenhouse gas emissions starting in 2020. Particularly outstanding among the commitments approved is the target of limiting global warming to a temperature increase less than 2°C above pre-industrial levels with the will to continue making efforts to further limit this increase to 1.5°C above those same pre-industrial levels, as this would significantly reduce the risks and effects of climate change. To implement all this, the subsequent Conference of the Parties (COP22), held in Marrakech in November 2016, established the principles for drafting a set of rules that will govern the Paris Accord.

The National Agreement for the energy transition of Catalonia

General Considerations

In developing the necessary bases to establish a National Agreement for energy transition, the following considerations must be taken into account:

- The objectives of the Agreement, set out in:
  - Government Agreement of 15 April 2014, based on criteria established in Motion 63/X of the Parliament of Catalonia, on energy sovereignty, and Resolution 776/X of the Parliament of Catalonia, on general Government strategy in the field of energy policy (see Annex 1).
  - Subsequent Motion 57/XI of the Parliament of Catalonia, on energy policy (see Annex 1).
- The different stages in the development of the energy transition process in Catalonia.

Stages in the development of the energy transition process in Catalonia

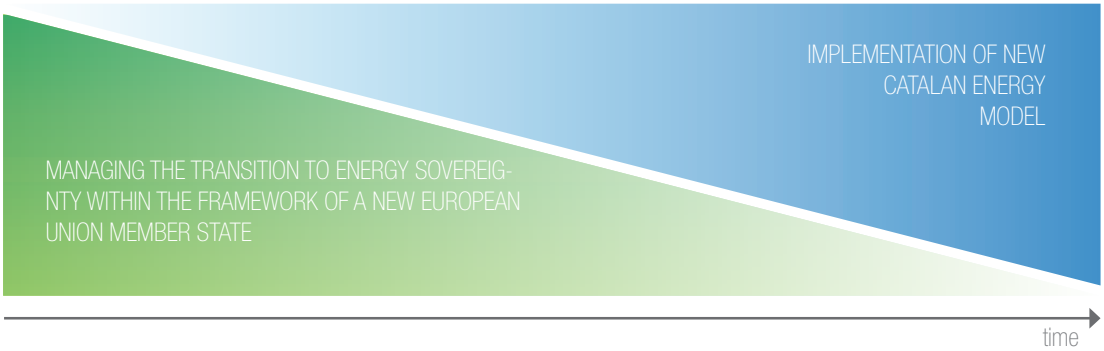
Two different stages can be identified in the development of the energy transition process in Catalonia:

- **STAGE 1: Managing the transition to energy sovereignty within the framework of a new European Union Member State**
  - Guaranteeing energy supply.
  - Establishing and exercising governance of the existing energy model, providing training for management teams, etc.

- **STAGE 2: Implementation of the new Catalan sustainable energy model**
  - The exercise of full competences in the field of energy by the Catalan institutions within the framework of the European Union.
  - Establishing the bases for the development of new Catalan energy model.
  - Developing the basic strategic lines of action in the new Catalan energy policy.
  - Establishing a new model of governance.

Actions taken as part of this second stage will form the core of the future National Agreement for energy transition

These two stages are implemented simultaneously in time, but at different speeds:



The bases for Stage 1 ("Managing the transition to energy sovereignty within the framework of a new European Union Member State") are described in Report 9 (Water and Energy Supply) in the White Paper on the National Transition of Catalonia, drawn up in 2014 by the Advisory Council for the National Transition.

Moreover, the bases for developing Stage 2 (Implementation of the new Catalan sustainable energy model), though not its calendar, will be established within the framework of the National Agreement for energy transition.

The implementation of these new bases, which will begin when the legislative framework making the new energy model possible has been put into place, will entail drafting a new Energy and Climate Change Plan for Catalonia. This new version of the plan will establish its mission, objectives and strategies.

STAGE 1: Managing the transition to energy sovereignty within the framework of a new European Union Member State

The first stage includes all actions aimed at guaranteeing energy supply and establishing and exercising governance of the existing energy model in a new phase in which Catalonia has full competences in the field of energy. This stage is fully described in Report 9 (Water and Energy Supply) in the White Paper on the National Transition of Catalonia.

According to this report, the most outstanding actions required involve:

- Assuring the services of strategic suppliers, renewing and continuing to develop the regulatory framework for energy policy, with existing contracts established with energy companies that already provide energy services in Catalonia. Initially, this renewal should begin with the most important operators: CLH for hydrocarbon fuel transportation; REE for electricity transmission; and ENAGAS for gas transportation.

  The Catalan Government will establish an economic system that guarantees the remuneration of transport and distribution infrastructure within its territory. Similarly, the Government will ensure that private companies are guaranteed continuity of supply, and that contracts will continue to be in force and, where appropriate, provide guarantees for them.

- Taking appropriate measures to guarantee compliance with the regulatory provisions in the field of energy security, and commissioning, if appropriate, experts and qualified managers capable of ensuring that the energy model becomes fully operational.

- Establishing and developing the bases, regulations, planning and implementation for the new Catalan energy model.

The establishment of this first phase does not mean, in any way, that it is necessary to wait to acquire all competences over energy before beginning to focus efforts on the second phase of the transition towards a new Catalan energy model. Rather, work should start on this second phase within the

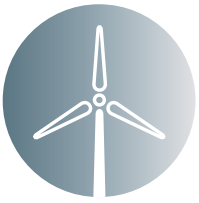
current political context, while advances are being made towards self-government.

STAGE 2: Implementation of the new Catalan sustainable energy model

This second stage includes all those measures that are necessary for the transition towards a new, sustainable energy model for Catalonia and to achieve the complete deployment of the new model. As previously mentioned, **the actions involved at this stage should serve to establish the bases of the future National Agreement for energy transition.**

More specifically, the necessary actions are grouped into the following areas:

- Establishing the principles and objectives of the new Catalan energy model.
- Developing the basic strategic lines of action in the new Catalan energy policy, consistent with the principles and objectives set out above.
- Exercising full competences in the field of energy as corresponds to a politically independent State that is integrated into the European Union.
- Establishing the governance model for the new Catalan energy model.



At this stage, it is necessary to develop the principles and objectives of the National Agreement in accordance with Motion 63/X of the Parliament of Catalonia, on energy sovereignty, and Motion 57/XI of the Parliament of Catalonia, on energy policy. These motions establish the need to transform the current Catalan energy model into one aimed at a future in which the energy system is based 100% on renewable energy; energy self-sufficiency; energy saving; energy efficiency; energy containment; and a decentralised, participatory, democratic production model.

In this regard, the National Agreement aims **to transform the current Catalan energy model into one based 100% on renewable energy, preferably by 2050** if possible technically, environmentally and economically.

Once the principles and objectives of the new Catalan energy model and the strategic lines of action in the new energy policy have been established, in order to implement the in-depth transformation of the energy model proposed by the National Agreement for energy transition, it will be necessary to draw up an energy plan for Catalonia with goals to be achieved by the year 2050. This plan, known as PROENCAT 2050, will take into account the possible future scenarios for the energy model of Catalonia in the long term.

PROENCAT 2050 will be a vital tool for defining key aspects of the new Catalan energy model in the long term and which cannot be specified at present in the National Agreement. These aspects include, for example: the final energy and environmental targets to be achieved by 2030, 2040 and 2050 (percentage of

renewable energy share in primary energy consumption, percentage energy saving, percentage reduction in greenhouse gas emissions); the role to be played by nuclear power and natural gas; the needs for the development of energy storage; the need for new energy infrastructure; the regulatory framework; the governance model, etc.

The PROENCAT 2050 plan will also enable evaluation of the possible future paths that the Catalan energy model may take, according to their advantages and disadvantages, both from the technical and economic perspective and the environmental standpoint.

Accordingly, PROENCAT 2050 will provide the necessary framework to select, in consensus with civil society (citizens and companies) and the Catalan public administrations, the alternative scenario, the strategic options, the roadmap and the developments required in order to achieve the mission and targets defined in the National Agreement.

In order to give an appropriate legal status to the principles and objectives defined in the National Agreement and to the strategic options defined in the alternative scenario in PROENCAT 2050, it is proposed that Parliament should enact, in the future, an "Energy Transition Law for Sustainable Development".

Following the establishment of the National Agreement and the alternative scenario described in PROENCAT 2050, and once the "Energy Transition Law for Sustainable Development" has been approved, a new Energy and Climate Change Plan for Catalonia 2030 will be designed. This new plan will establish the strategic options to be implemented according to the alternative scenario defined in PROENCAT 2050.

In short, the roadmap for the energy transition process is as follows:

- The National Agreement for energy transition, which defines the basic principles behind the transformation of the energy model in Catalonia.
- Work Plan 2017-2025: Clean Energy for All Catalans.
- Energy Prospective for Catalonia 2050, which will assess the possible future evolution of the Catalan energy model and define the strategic options linked to the alternative scenario.
- Law on the Transition of the Energy Model for Sustainable Development, to give legal status to the principles, objectives and strategies described above.
- Plan for Energy and Climate Change in Catalonia 2030, to implement the strategic options set out in the PROENCAT 2050 alternative scenario by 2030.

Principles and objectives of the new Catalan energy model

The Catalan energy model will be required to provide a response to several major challenges:

- The country's great dependence on fossil and nuclear energy resources, mainly oil products, with ever-higher and more volatile fossil fuel prices expected in the future (going beyond the current situation).
- The growing impacts of the current energy model on the environment, basically those associated with climate change and air quality in the major cities.

These challenges generate tensions as regards the economic, social and environmental sustainability of the Catalan energy model. More specifically, the following considerations, among others, should be taken into account:

- Security of energy supply and energy prices are key factors for sustainable development in Catalonia. Energy is a basic factor in economic competitiveness and social development, both due to its effect on the prices of goods and services and its importance in itself as a sector of economic activity.
- Access to energy is a basic right which is essential to ensure a minimum standard of living. When people with insufficient economic resources

have difficulties in covering their basic energy needs, we speak of situations of "energy poverty". The current economic climate has exacerbated this situation, which may worsen even further in the future, as energy prices are expected to rise in the medium and long term.

- Climate change is a global environmental threat of the highest order. In Catalonia, the energy cycle accounts for 76% of total greenhouse gas emissions and 93% of CO_2 emissions, a situation that makes energy policies key to combatting this phenomenon.

A new Catalan energy policy is therefore needed in order to maintain and guarantee future economic development and social welfare and to successfully combat climate change, local pollution and other environmental impacts in Catalonia, implementing measures consistent with European Union policy, and to reduce the country's great dependence on fossil fuels.

The mission that this new Catalan energy policy will pursue is that of enabling Catalonia to build an economy and a society with low intensity in its consumption of material resources, low energy intensity and low carbon emissions. This policy will aim to foster sustainable development in all three dimensions (economic, social and environmental), guaranteeing security of energy supply and reducing vulnerability to environmental impacts and greenhouse gas emissions, and implementing a new energy model that is innovative, competitive, decentralised and distributed, participatory, democratic and socially inclusive in the medium and long term.

In accordance with this mission, the National Agreement proposes a series of specific, ambitious, indicative long-term goals, as well as intermediate medium-term objectives. These targets and the years they should be achieved include:

By 2030:

- Achieving, at least, the targets set out in the European Union's new "2030 Climate and Energy" package:
  - By 2030, 27% of gross final energy consumption in Catalonia should be renewable and 50% of electricity should be generated from renewable sources.
  - Improving energy efficiency in Catalonia by 30% by 2030 compared to projections of future energy consumption, taking into account the European Union's current criteria.
  - Reducing greenhouse gas emissions linked to the energy cycle in Catalonia by 40% compared to 1990 emissions levels by 2030.

By 2050:

- Establishing an energy model based 100% on renewable energy, preferably by 2050 if this is possible technically, environmentally and economically.

As mentioned previously, taking into account the indicative targets set out in this National Agreement, PROENCAT 2050 will establish, in consensus with civil society (citizens and companies) and the Catalan public administrations, the alternative scenario, the strategic options, the roadmap and the developments required in order to achieve the mission and targets defined in the National Agreement, including the final energy and environmental objectives to be met by 2030, 2040 and 2050, respectively.

In order to achieve the mission and targets set out in the National Agreement, the strategic themes in this new Catalan energy policy should be:

- **THEME 1. Guaranteeing the basic right of access to energy and defence of consumer rights.**
- **THEME 2. Guaranteeing energy supply in Catalonia, and the quality and reliability of energy supplies.**
- **THEME 3. Achieving maximum energy saving and efficiency in the Catalan economy and society.**
- **THEME 4. Maximising the use of renewable energy sources, mainly local.**
- **THEME 5. Promoting energy research and innovation as vectors for efficiency and the creation of business activities.**
- **THEME 6. Democratisation of energy and the participation of society in the new energy model.**

Finally, in order to achieve the full implementation of the new Catalan energy model, these strategic lines of action must be supplemented by an additional strategic line that includes the legislative and regulatory measures needed to enable Catalan institutions to exercise full competences in the field of energy within the framework of the European Union:

- **THEME 7. The exercise of full competences in the field of energy by the Catalan institutions within the framework of the European Union.**

THEME 1. Guaranteeing the basic right of access to energy and defence of consumer rights

The rights of citizens and consumers in the field of energy, and their participation in decision-making, are key to any future sustainable energy model, which should include the commitment of citizens to making a more rational use of energy. To this end, the following strategies will be implemented:

Guaranteeing the basic right of access to energy

- Guaranteeing access to and availability of energy as a basic right of the citizens of Catalonia, in order to ensure that a democratic and socially inclusive energy model is implemented.
- Guaranteeing that consumers at risk of energy poverty have the right to sufficient energy supplies to meet their basic needs.
- To prevent situations of energy poverty, the Parliament of Catalonia should enact specific legislation (social electricity and fuel vouchers, checks to cover basic, minimum energy consumption, measures against non-payment of energy bills to avoid consumers' energy supplies being cut off, prioritising energy saving and efficiency measures in the residential sector, etc.), including different financing mechanisms, in cooperation with local authorities and the third sector.

In this regard, in addition to planning and implementing measures to mitigate the effects of energy poverty, other actions of a structural nature will also be introduced. Such measures will include actions associated with the application of energy saving and efficiency solutions and the use of renewable energy in the homes of families in situations of energy poverty. This will also help to reduce the number of people who find themselves in this situation.

Guaranteeing the defence of consumer rights

- With regard to choosing energy supply companies.
- With regard to customer services provided by utility companies.
- With regard to the quality of the products supplied by utility companies.
- With regard to information on the origin of energy products, and freedom of choice of supplier, as well as information about the environmental impact of electricity production.

THEME 2. Guaranteeing energy supply in Catalonia, and the quality and reliability of energy supplies

To guarantee supply and the quality and reliability of energy supply, and increase the resilience of the energy sector in Catalonia, the following strategies are required:

Strengthening the diversification of exterior energy supply

- To guarantee the operation of the electrical system at appropriate levels of security in a future scenario marked by the massive development of renewable power generation technologies and growth in electricity demand, linked to the new technologies implemented on a large scale (for example, the case of the electrification of transport), a future scenario on which this National Agreement is based, the electricity system of Catalonia will need to significantly increase the capacity of its regulatory stocks, promoting the development of large, medium-sized and small scale electricity storage systems and increasing electrical interconnections with the European system.

Another strategic line of action is the commitment to increasing interconnections between the Catalan electricity and gas grids and the European systems in order to fully integrate the country into the European internal energy market.

For all these reasons, in the context of the work of designing the PROENCAT 2050 Catalan energy prospective, it is considered useful to consider increasing international energy supply interconnections by:

- Strengthening electrical interconnections between Catalonia and neighbouring territories.
- Promoting the connection of the natural gas transportation network in Catalonia with France (MidCat) as basic infrastructure for integrating Catalonia into the European Single Gas Market.

- Diversification of supplier countries, especially in the case of natural gas, to ensure a natural gas supply that is sufficiently diversified within source countries.

Strengthening the diversification of internal energy supply

- Diversifying energy vectors, that is to say, enabling citizens and companies to access the maximum possible number of energy sources, especially renewables.
- Providing a power generation mix that is sufficiently diversified technologically.
- Guaranteeing a wide range of energy operators, eliminating barriers to access and ensuring the independence of managers and owners of basic and logistical transmission and distribution networks. Among other actions, this will involve promoting the establishment of new energy operators, such as cooperatives, consortia, partnerships, public-private partnerships, demand aggregators, energy service companies, etc.
- Developing solutions for electrical energy and natural gas storage in order to improve security of supply.

Decreasing exterior energy dependence

- Prioritising energy self-supply, primarily from local renewable energy sources, given that Catalonia has no significant fossil energy resources.
- Promoting local renewable energy and energy saving and efficiency in all sectors, with special attention to the transport sector, in view of that sector's high dependence on fossil fuels. In this regard, priority will be

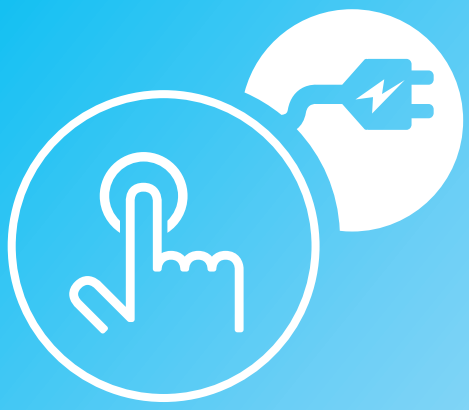
given to the development of electric vehicles and the associated power charging infrastructure.

- Coordinating effective demand management measures by offering appropriate economic incentives.
- Developing solutions for electrical energy storage as a factor to enhance efficiency in the operation of the system.

Guaranteeing the quality and reliability of energy supply

- Energy is an essential element almost all economic activities and for the welfare of people. Therefore, energy supply must be of a quality and reliability that matches this vital status for any economic or social activity.
- Targets must be set regarding quality and reliability of energy supply, and it must be possible to evaluate these clearly and objectively, establishing indicators of the level of quality received by users that enable them to monitor variations and compare them with international indicators.
- Tools must be designed and implemented for technical and economic regulation based on investment efforts, in order to promote investment in new smart grids and guarantee the quality and reliability of energy supply.
- In view of the fact that the nuclear power plants located in Catalan territory will reach 40 years of operation in the middle of the next decade, prospective energy studies should study the appropriate scenarios in order to decide Catalan nuclear policy as the country moves ahead with the transition to a 100% renewable energy model while maintaining the quality and reliability of electricity supply in Catalonia and implementing measures to conserve qualified jobs in the areas linked to Catalan nuclear power stations.

In order to bring all these actions to fruition, energy regulation is needed to guarantee the legal security and stability of the regulatory framework throughout the time required to make the necessary energy investments in the medium and long term to guarantee energy supply in Catalonia and the quality and reliability of energy supplies.



THEME 3. Achieving maximum energy saving and efficiency in the Catalan economy and society

Energy saving and efficiency throughout the energy cycle (production, transformation, transportation, distribution and consumption) are key to ensuring a sustainable energy model for Catalonia in the medium and long term. To meet this goal, a series of actions are required in order to achieve the highest level of energy saving and efficiency in the Catalan economy and in Catalan society:

- Promoting energy saving and efficiency in energy consuming sectors (domestic, industrial, services, transport and primary), including strategies aimed at changing users' habits, encouraging containment and austerity in energy consumption in order to achieve a sustainable energy model in the medium and long term.
- The Catalan Government should establish a powerful public body, provided with the necessary budgetary resources, to carry out the actions described in the previous section, in cooperation with the other ministries and public administrations in Catalonia. The basis for constituting this public body should be provided by the Catalan Energy Institute (ICAEN), either by strengthening ICAEN's powers and competences or by transforming it into a new energy agency.

- Continuing to advance, within the framework of a new global fiscal model, towards a new energy and environmental taxation system that contributes to promoting more efficient use of energy, taxing energy consumption according to its emissions and energy consumption, in line with European Union proposals in this respect. We should note that Spain is occupies last place in the ranking of European Union Member States with regard to the implementation of environmental taxation and the relative weight of taxes on final energy prices. However, Catalonia has enacted several fiscal measures to tax and incentivise certain uses of energy. These measures include taxes on nuclear power production, on gas and particle emissions from power generation over 20 MWt, and on NOx emissions generated by aviation fuel combustion. Reductions in the rates for using Catalan Government-owned toll roads are also provided for vehicles that pollute less and carry more passengers. It is important to continue working along these lines, provided that such measures also contain a component that generates financing for an energy transition based on energy efficiency and renewable energy.
- Promoting, within the framework of the Smartcat strategy, the introduction of smart systems to meter, monitor and control energy consumption ("smart metering") to enable optimal management of energy demand as a key means of reducing energy consumption.
- Adopting best practice in energy management and promoting investment in high efficiency energy systems at the Government of Catalonia in order to reduce its energy consumption by 25% by 2025, compared to the 2007 level. This action by the Catalan Government should serve as an example for other public authorities and service sector consumers, and help to boost companies engaged in the energy saving and energy efficiency sector. All other public administrations in Catalonia should also be encouraged to adopt similar measures.
- Promoting the use of clean, energy efficient technologies in industry:
  - Speeding up technological changes to industrial processes.
  - Promoting the renovation of horizontal energy technologies.
  - Maintaining and improving the implementation of cogeneration (CHP) and electricity self-consumption in the industrial sector.

- Promoting energy saving and efficiency measures in the building industry (domestic and service sectors):
  - Improving energy efficiency in existing buildings by decisively promoting the energy rehabilitation of buildings.

- Ensuring that new buildings are designed according to “Nearly Zero Energy Buildings” (NZEB) criteria and that they are installed with high energy efficiency systems and renewable energy generation facilities.
- Installing the necessary electrical infrastructure in new buildings to enable the recharging of electric vehicles belonging to residents.
- Implementing regional and town planning policies based on urban growth concentrated in specific hubs or nodes and with growth for residential and economic activities linked to urban areas, adopting the concept of greenways in cities and creating resilient cities. The models for district heating and cooling systems should also be strengthened and the requirements to facilitate electricity storage taken into account, as these are drivers of self-consumption and electricity demand-side management that help to promote the development of both distributed electricity production based on small- and medium-scale renewable energy sources and electrical mobility.

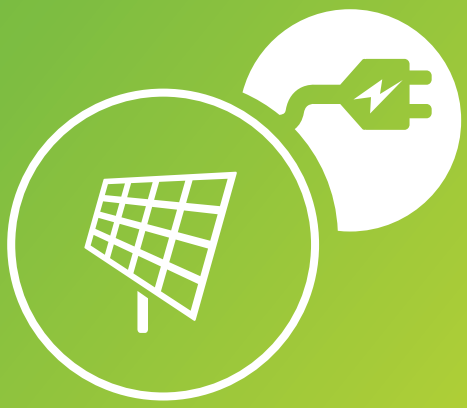
- In transport:
  - Minimising travel distances by adopting a compact and complex territorial model and coordinating town planning and mobility.
  - Promoting a model for the mobility of people that prioritises the modal transition towards more sustainable modes, and in this way encouraging non-motorised mobility (walking, cycling, etc.) and collective transport.

  - Improving the management and optimisation of goods transport and increasing the participation of the railways in this transport system.
  - Encouraging the renewal of the goods transport fleet according to criteria of energy consumption and reducing emissions, whether through fiscal measures such as the introduction of payment systems based on routes or the adaptation of vehicle and road taxes in order to promote cleaner and more efficient technologies.
  - Speeding up the spread of electric vehicles, by developing – among other measures – a strategy for recharging these vehicles that enables them to use the road network under the same conditions as vehicles with conventional heat engines. The widespread use of electric vehicles in transportation is a key strategy for the energy transition, as this will enable the large-scale introduction of renewable energy in the transport sector, where oil products

currently account for 95% of consumption. This will also help to improve overall energy efficiency in the field of transport as regards primary energy, thanks to the increased energy efficiency of electric vehicles compared to vehicles driven by heat engines.

- In the primary sector:
  - Promoting the modernisation of the tractor fleet and other agricultural machinery, by implementing systems that introduce energy saving and efficiency improvements and ICT technologies.
  - Gradually introducing systems and processes to promote the improvement of energy efficiency (efficient irrigation systems, crop farming plans adapted to the soil and climatic conditions in each area, etc.).
- Giving firm support to cogeneration (CHP) technology by:
  - Adopting specific regulations for cogeneration that enable the continuing activity of existing facilities while also encouraging the development of existing but unrealised economic and technological potential.
  - Providing incentives for the renewal of cogeneration plants currently in operation and which have reached the end of their life cycle.

- Promoting feasibility audits for industrial and service sector cogeneration facilities.
- Fostering the good design, operation and maintenance of energy facilities, based on criteria of energy saving and efficiency. Correct operation and good maintenance are key to ensuring the long life and reasonable energy consumption of these energy facilities. Accordingly, work is necessary to increase and promote professional training in this sector.
- Work to establish the technical, human and economic capacities required to enable the implementation of measures that can drive the transformation of consumption in buildings, production processes and mobility systems.
- An increasingly important area for continuing efforts aimed at improving energy efficiency and saving in the Catalan productive sector revolves around the need to promote the circular economy, such as the principles of industrial symbiosis. The circular economy aims to achieve high levels of efficiency in the use of material and energy resources (resource productivity) and integrates increasingly cleaner production into an ever expanding production system. This adoption of the circular economy should also take into account particularly technologies based on renewable energy and low greenhouse gas emissions.



THEME 4. Maximising the use of renewable energy sources, mainly local

In response to both the global and the more specific challenges that Catalonia faces in the field of energy (high energy dependence, environmental impact of energy, the need to increase competitiveness, etc.), a future sustainable energy model for Catalonia should maximise the use of renewable energy, giving preference to local renewable energy sources.

This maximisation should take into account the initial situation as it stands today (high dependence on fossil fuels and nuclear energy), future expectations and technical, economic and environmental conditions for the development of renewable energy (solar, wind, hydro, biomass, geothermal, aerothermal, wave, tidal, etc.).

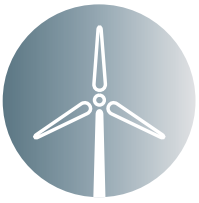
This strategic focus should be consistent with Theme 3 ("Achieving maximum energy saving and efficiency in the Catalan economy and society"). Accordingly, first and foremost, energy consumption should be reduced, minimising the amount of useful energy needed, after which this demand should be covered by renewable energy sources.

To this end, the following actions are necessary:

- Transforming the current Catalan energy model to one based 100% on renewable energy, preferably by 2050, if possible technically, environ-

mentally and economically and with the social and territorial support necessary to make this new model viable.

- Promoting the implementation of local renewable energy sources through territorial planning to determine the best possible sites for such facilities, from the point of view of energy use and environmental impact, taking into account the possibilities and characteristics of each site and enabling the implementation of projects developed by stakeholders, as well as promoting the participation of the territory in developing local projects. A particularly important measure is to revise the Land Act so that general organisational plans provide for the classification of land suitable or unsuitable for capturing biospheric energy flows.



- Designing an appropriate regulatory and technical framework for the introduction of renewable electricity generation, whether connected to the grid or for self-consumption, including simplification of the administrative procedures for authorising facilities.
- Regulating the electricity market so that it promotes self-consumption of electrical energy generated using renewable energy sources.
- Stimulating the development of electricity grids that enable the connection of distributed generation electricity with renewable energy sources. Additionally, major facilities for generating renewable electricity will be required, some them acting as base generation, as well as storage facilities. The two types of facilities are complementary and are vital for achieving an energy model that is balanced, effective and efficient. This rollout of renewable electricity generation and storage facilities will entail major investment in electricity transmission and distribution networks.

- Promoting, in the main, onshore wind technologies, including small wind, marine wind and solar photovoltaic facilities, to generate electricity using renewable energy sources, while also maintaining hydro power generation, taking into account the local renewable energy resources available in Catalonia.
- Promoting the use of solar and geothermal energy for industrial and primary sector heating and for air conditioning and hot water production in residential and service buildings.
- Harnessing the potential of the rural world to produce renewable energy take advantage of the will to make the countryside a strategic bastion of the country's energy sustainability as a way of regenerating local economies, including those of consumers themselves.
- Promoting and appropriately managing the use of biomass resources from the forests of Catalonia for energy purposes, mainly in heating applications, through a specific operational plan that also includes fire

prevention, conservation of the multifunctional nature of forests including their ecological function, which is a priority in protected areas.

- Promoting the production of biogas from waste in the primary sector and other areas of activity (slurry, manure, sewage sludge, plant and animal waste, etc.).
- Promoting the development of technologies for the production of second-generation biofuels, produced mainly from non-food raw materials, taking into account the problems of sustainability (environmental reasons and competition with food uses) raised by first-generation biofuels. Priority should be given to the production of second-generation biofuels of lignocellulosic origin in Catalonia, provided by agricultural and forestry waste and other waste from the food and drink and timber industries.

- Integrating renewable energy projects into the social and economic fabric in the territory, ensuring that, as far as possible, profits are reinvested in the development of the territory. This will help to ensure that facilities are accepted and that the necessary infrastructure is provided and investment made by common consent.
- Continuing to advance, within the framework of a new global tax model of taxation, as mentioned earlier, towards a new energy and environmental fiscal system that contributes to the financing of public policies aimed at promoting the introduction of renewable energy and public energy efficiency, taxing energy consumption and generation according to its pollutant emissions and energy consumption, in line with EU proposals in this respect.
- Fostering electricity self-consumption in buildings and facilities managed by the Catalan Government and local authorities, based, in the main on the introduction of solar photovoltaic energy systems. Similarly, both power generation and energy consumption should be based on renewable energy sources.

THEME 5. Promoting energy research and innovation as vectors for efficiency and the creation of business activities

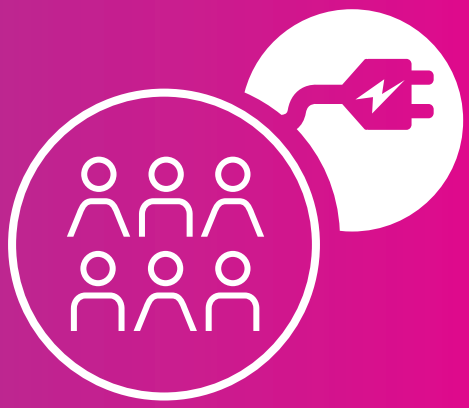
A firm commitment should be made to the development of new technologies in the energy field, with direct involvement in supporting and promoting R&D&I related to sustainable energy technologies, basically energy saving and efficiency and renewable energy sources, in order to provide truly effective, value-generating tools for the whole country. To this end, it is necessary to design an Energy and Materials Research Plan to form part of the Research and Innovation Plan for Catalonia. This plan should provide a response to future strategic needs in the field of energy, taking into account the following fields of action:

- Fostering the work of IREC and other Catalan research centres engaged in the field of energy, promoting their participation in research lines defined by the EU and connecting them up with companies. And, particularly, promoting symbiotic and/or complementary research with European research centres in the field of energy.
- Encouraging applied research into electric vehicles, especially in the field of high efficiency batteries for these vehicles and charging technologies that enable lower power supply while also reducing recharging times.
- Providing incentives to improve smart control systems for processes in order to minimise energy consumption.

- Advancing in the design and construction of smart grids to enable the combination of security of supply, the introduction of distributed power generation, electricity self-consumption, demand-side electricity management and electricity storage, with special attention to the integration of electric vehicles as power storage systems with two-way charging, as well as interconnecting these electricity grids with natural gas systems in order to create smart energy networks.
- Promoting the integration, interaction and management of energy generation and consumption systems and systems designed to optimise this interrelationship. Establishing a big data system in the country that enables the management of energy information in real time and provides support for establishing predictive models.

- Promoting research and innovation in the fields of energy saving and efficiency.
- Promoting research and innovation in the field of electricity generation technologies based on renewable energy sources which are either at the development stage or are already mature.
- Promoting research in the field of construction, focusing on low-energy buildings, nearly-zero energy buildings and the interaction of buildings with energy networks, as well as research into energy storage systems in buildings, neighbourhoods, and cities and towns.

- Promoting research into renewable thermal energy systems (solar thermal, biomass, etc.).
- Promoting research into energy storage systems, with particular emphasis on new, high performance electric batteries for the motor industry and other uses, and other energy storage technologies (hydrogen, molten salts, etc.).
- Establishing a technological prospective observatory to design the roadmap for research in the short, medium and long term, consistent with the objectives for Catalonia's new energy model and enabling resources devoted to research to be used in the most efficient and appropriate way in order to achieve these objectives.
- Raising awareness about the need to involve society as a whole in resolving energy challenges with the aim of training new professionals in the field of energy research.



THEME 6. Democratisation of energy and the participation of society in the new energy model

The involvement of civil society in building a new energy model for Catalonia is a crucial aspect in the process of transition towards a renewable, distributed energy system. This involvement of society as a whole, which will lead us towards a process of energy democratisation, should take various forms: society must be enabled to access information in a transparent way in order to take part in the energy debate; training in energy must be provided; and citizens should take part in building the new energy model itself.

Reducing the cost of solar photovoltaic power and storage systems, whether in batteries or electric cars, will encourage consumers to join the electricity market in an active way. Empowering citizens involves providing them with tools so that consumers can not only self-generate, store and share their energy, but also sell it. This is a new reality that can become a driver for the transition from a centralised energy system to one that is distributed and more democratic.

In this regard, the following strategies will be implemented:

- A permanent task of providing information and social and business awareness-raising regarding the energy challenges that Catalonia faces, involving the whole of society in achieving the energy and climate targets established and implementing the associated energy strategies (including, among others, those focused on energy saving and efficiency and renewable ener-

gy policies). For civil society to become a true driver for change in the energy model, good basic information is essential, along with the communication of ideas and strategies and the arguments that support them.

It will also be necessary to implement specific initiatives to encourage the involvement of civil society and institutions, since it is impossible for technological changes alone to provide the solution to energy challenges; major changes in habits and the current consumption model will also be required.

Efforts should also be made to provide full, rigorous information about energy and its externalities to the media, reporters and opinion makers to ensure that all are aware of the energy problem and accept as their own the strategies applied with the aim of achieving the new energy model.

- Implementing training programmes in energy, taking into account the specificities of Catalan territory (population density, availability of renewable energy resources, etc.) that enable the dissemination of the energy know-how need to understand and use tools and techniques to enable society to make better use of energy. The transition towards a sustainable energy model in Catalonia requires specifically qualified personnel able to implement new technical solutions in the energy field. These solutions include, among others, the deployment of renewable energy sources and technologies that enable levels of energy efficiency to be raised, as well as leading and developing the governance for this new energy model.

It is also necessary to educate the general public with regard to the new energy scenario, including all educational levels and enabling the necessary changes in outlooks to be made that will help citizens to understand and accept the new situation and enable them to adapt comfortably to the new energy context.

- Giving society a key role in building the new energy model in Catalonia. In order to ensure that energy policies are designed with sustainability as the top priority and that these policies can be effectively implemented, citizens and companies must be placed at the centre of thought, change and decision-making processes aimed at driving the transition to the new energy model. The cultural change required to resolve energy challenges cannot be effected without involving Catalan society in the task of achieving the objectives of energy policy. To put it another way: since energy demand is at the service of the economic and social model, the participation of society as a whole is required in order to question this demand and consider how it can be reduced or optimised and covered (the “energy mix” of supply).

Moreover, just as society should participate in designing the energy model for Catalonia, so citizens should also be involved and made jointly responsible for achieving its objectives. Without this commitment and effort by civil society as a whole (citizens and companies), any energy target or strategy that is implemented, even with the joint participation of

society, will become merely well-intended actions without the potential to contribute to the paradigm shift necessary in the Catalan energy model.

THEME 7. The exercise of full competences in the field of energy by the Catalan institutions within the framework of the European Union

To achieve the complete, successful introduction of the new Catalan energy model, the necessary actions must be implemented that will enable Catalan institutions to exercise full competences with regard to energy within the framework of the European Union.

Exercising full competences in energy is necessary and essential to developing the new Catalan energy model, because it will give the country sufficient decision-making capacity, prioritising interests that are different to current State interests, and positioning energy policy at higher levels in decision-making processes. This will enable energy policy to be appropriately coordinated with policies that focus on such areas as territorial organisation, the environment and climate change, among others.

More specifically, new energy legislation and regulations should be enacted that are in line with the regulatory principles of the new Catalan energy model:

- Basic Catalan legislation should include a reference to the fundamental right of access to energy. This legislation could also include the guidelines for the new Catalan energy model.
- The Parliament of Catalonia should approve new basic legislation governing the new Catalan energy model, taking into account the European

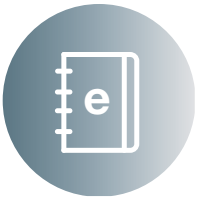
Union Directives on energy. By way of example only, two blocks of provisions with the status of law should be approved:

- As a result of the adoption of the National Agreement, it will be necessary to approve a Law on the Energy Transition towards Sustainable Development (or a framework law regulating the Catalan energy system). This law should regulate, among other things:
  - Energy saving and efficiency.
  - Renewable energy.
  - Energy prospecting, planning and programming.
  - Coordination of energy policy with other sectoral policies.
  - International relations.
  - Energy poverty.
  - Training, information and societal participation in decision-making.
  - Energy R+D+I.

- Measures to reform State energy legislation:
  - Electricity sector law.
  - Carbon fuel sector law.
  - Nuclear energy law.
  - Mining law (concerning energy: coal mining, fracking, geothermal power, etc.).

Measures will be taken to ensure the participation of the key energy sector stakeholders in drafting these legal provisions. This will be effected through the Council of Organisations for the National Agreement.

The new model of governance for the Catalan energy system should be established within the framework of this package of basic laws, taking into account the proposals contained in Report 9 ("Water and Energy Supply") of the White Paper on the National Transition of Catalonia, drawn up by the Advisory Council for the National Transition.



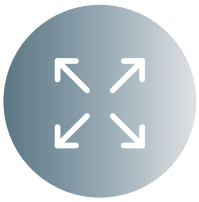
Elements included in this governance system, as described in the aforementioned report, include:

- The operator of the Catalan energy market, which will take on management of the bidding system for the sale of electricity and will be responsible for ensuring a balance in electricity supply and demand in Catalonia. This market operator will coordinate its activities with the operators of the system.

- The operator of the electrical system, which will manage the transmission grid, guaranteeing continuity and security of electricity supply and ensuring appropriate coordination between production and transmission systems in the electricity system in accordance with the principles of transparency, objectivity and independence.
- The operator of the gas system, which will be tasked with ensuring the proper management of the basic and secondary natural gas transportation networks and will act as the authority before the different subjects of the gas system.
- The Commission on Nuclear Safety and Radiation Protection, which will be the reference body before the OECD's International Nuclear Energy Agency, the International Nuclear Regulators' Association and the European Nuclear Security Regulators Association.

It should be remembered that an energy transition cannot be based solely on the technological dimension, because such a transformation will not be socially effective if it is not accompanied by economic and social energy transition. It is necessary, therefore, to simultaneously develop the economic and social dimension, basically by means of:

- Designing and implementing democratic control of energy strategy, planning and management.
- Establishing a new decision-making model to coordinate all the various participatory, consultative, representative and executive dimensions.
- Transparency in the management of energy systems and the establishment of the responsibilities of energy system managers.



Other key aspects in the new governance model for the energy system include:

- The creation of a regulatory authority for the energy market in Catalonia, with duties including those of guaranteeing competition in this market as well as those of protecting the interests of energy users and stakeholders that may reasonably be affected during the energy transition; providing regulatory incentives for the distributed generation of electricity; establishing a system of rights and responsibilities among the various stakeholders; establishing a fair and competitive tariff system; and so on.
- Creating a powerful public body, provided with the human and budgetary resources necessary to carry out the activities mentioned in themes 3 and 4, in cooperation with the other Government of Catalonia ministries and public administrations of Catalonia, as well as the country's citizens and companies. The basis for this new public body should be provided by the present Catalan Energy Institute (ICAEN), which would be given

competences in the field of energy planning and regulation, and control and inspection in the field of renewable energy and energy efficiency. In this respect, one option would be to convert ICAEN into an energy agency. Similarly, the necessary democratisation of energy requires that the main economic and social stakeholders engaged in the energy sector, and recognised experts in the field, should be represented on this governing body, whether it be ICAEN or a new agency.

Finally, another key aspect regarding the governance of the future Catalan energy model is the appropriate involvement of local authorities.

For instance, in a distributed model of power generation, the emphasis should be placed on the leading role that local authorities should play in this new model, as energy producers and consumers.

For this reason, local authorities should be provided with tools that enable them to perform their role as key players in the energy transition towards a decentralised model that is closely linked to the territory. In this regard, for example, local authorities should receive support in pursuing the objectives set out in the Covenant of Mayors for Sustainable Energy, an initiative promoted by the European Union. Similarly, the structure of the future Catalan Energy Agency should be linked to the establishment of a network of local energy agencies.

The territorial factor regarding governance of the new energy model should also take into account two specific territorial areas: the cities and the countryside.

As regards the rural world, this document has already emphasised the need to harness its potential for producing renewable energy and the will to make the countryside a strategic element in the country's energy sustainability and in promoting local economies, including consumers themselves.

Regarding the role of the cities, needless to say, energy is and always will be essential for them to operate, and is a key element concerning air quality and environmental quality in cities. Ensuring quality energy supply in cities entails providing citizens with access to the energy they need, and this means providing energy infrastructure, including facilities for renewable power generation and electricity storage, in urban areas, all of which requires appropriate planning and structure, and to generate distributed energy, using local resources.

Governance and leadership of the National Agreement for energy transition

As was discussed and agreed at the series of working sessions held with the members of the Council of Organisations for the National Agreement, and at meetings and conferences in sectoral areas organised during the eleventh legislature, the process of energy transition in Catalonia will require strong political and social leadership.

To successfully bring this energy transition to fruition, the energy policy implemented by the Government of Catalonia should be considered a leading priority among the policies brought to bear. Energy, therefore, should be positioned at the highest strategic level. Overcoming the future challenges that the energy transition will pose firmly, decisively and proactively will require Catalan policies as a whole to assimilate energy strategy and take it as a key point of reference.

In this regard, there is a clear need to establish governing bodies for the National Agreement that provide rigorous leadership for the transition process. It is also necessary to adapt the functions of the Catalan Energy Institute and its boards, both administrative and advisory, to a new energy model that takes into account the need to empower citizens and steer energy policy towards a decentralised, renewable model.

To this end, the establishment of the following bodies is proposed:

- An Advisory Council for the Energy Transition to replace the Catalan Energy Institute Advisory Board.
- A Coordinating Committee of the National Agreement for energy transition, on which should be represented all sectoral policies implemented by the Government of Catalonia. These policies indispensable to enable the Government to work towards implementing the new energy model. This committee to be chaired by the minister responsible for energy.

  The Catalan Energy Institute will act as the Technical Secretariat for this Coordinating Committee.
- Council for the Energy Transition of Catalonia, whose members should include, among others, representatives from:
  - The PNTE Coordinating Committee.
  - The Advisory Council for the Energy Transition.
  - The Advisory Council for Sustainable Development.
  - Electricity generating companies.
  - Electricity and natural gas distribution companies.
  - Electricity, natural gas and oil product marketing companies.
  - Organisations, associations and companies engaged in renewable energy.
  - Organisations, associations and companies engaged in energy saving and efficiency.
  - Business organisations.
  - Trade unions.
  - Professional associations.
  - Leading technical opinion makers.
  - Associations of municipalities.
  - Consumer associations.
  - Organisations, associations and companies engaged in the field of energy demand (buildings, transport, industry and so on).
  - Environmentalist groups and associations and organisations interested in the energy model.

- Organisations, associations and companies engaged in the field of energy research and innovation.
- Other bodies that may become necessary according as priority lines of action are decided.

The Catalan Energy Institute will act as the Technical Secretariat for this Council for the Energy Transition of Catalonia.

- Monitoring of the National Agreement by political parties represented in the Parliament of Catalonia, within the framework of the Parliamentary Committee proposed by the Parliament of Catalonia.

Financing public policies for the energy transition

The energy transition process described in this National Agreement requires the combined action of all Catalan civil society and, fundamentally, the country's institution, companies and citizenry, all committed to this transition of our economy and our society towards a new model defined by low intensity in the consumption of material resources, low energy intensity and low carbon emissions.

Most of the investment required to bring this energy transition to fruition should come from private initiative, but the public authorities should also provide a high level of financial resources in order to meet the targets set out in the National Agreement. The private sector should promote initiatives that enable us to advance with the energy transition, initiatives based on cooperative action and the development of financial instruments such as *crowdfunding* and green fund systems.

Moreover, public administration project should serve primarily to promote investments which are key to the energy transition energy in Catalonia but which the market does not make due to their high degree of technical and/or economic risk.

More specifically, mechanisms should be designed to finance public policies in a number of areas, particularly:

- Implementation of energy saving and efficiency technologies.

- Use of renewable energy sources.
- Research, development and technological innovation in the field of energy.
- Education, information and social and business awareness raising about the energy challenges facing Catalonia.
- Active participation of society in the process and in decision-making.
- Combatting energy poverty.

Energy and environmental taxation should play an important role in this respect. For instance, a tax on energy consumption according to its pollutant emissions and energy consumption, in line with European Union proposals for the energy sector, would contribute, first and foremost, to promoting more efficient energy use, giving both citizens and companies guidance with regard to their energy consumption behaviour and increasing the share of accounted for by renewable energy in energy production. Secondly, such tax provisions would generate additional resources that would help the Catalan public administration to finance its energy policies.

Work on implementing these energy and environmental taxation strategies can begin with the taxes on nuclear power production, NOx emissions in aviation and on gases and particles generated by the petrochemical industry and electricity generation. All these are levied by the Government of Catalonia to tax risks of impact and damage to the environment caused by electricity production using nuclear facilities; the combustion of aviation fuel; the combustion of fossil fuels in electricity generation; and oil refining activities carried out in Catalonia. Accordingly, the revenues obtained from these taxes could be devoted to developing the Government of Catalonia's new energy, climate and atmospheric policy.

Moreover, in the current context, advantage should also be taken of funding mechanisms generated by the approval of European Directive 2012/27/EU, on Energy Efficiency. Similarly, another source currently available and which could be used to finance Catalan energy policies could be the fund generated by the application in Spain of this Directive and, more specifically, the introduction of the new "National System of Energy Efficiency Obligations" and the establishment of the "National Energy Efficiency Fund".

State law does not at present provide for intervention by the Autonomous Communities (regions) in designing and managing this energy efficiency fund; rather, it establishes a centralised model in which the Ministry of Industry, Energy and Tourism and the Institute for Energy Diversification and Saving (IDAE) hold all competences. However, the current political context indicates that the operational mechanism of this fund may be amended to enable the Autonomous Communities to play an active role in its operation and to employ resources from the fund to develop certain specific lines of action in their energy saving and efficiency policies.

ANNEX 1. Resolutions of the Parliament and the Government in relation to establishing a National Agreement for Energy

Motions and resolutions of the Parliament of Catalonia

- Motion 63/X of the Parliament of Catalonia, on energy sovereignty, urges the Government to establish the bases for a National Agreement in which all stakeholders participate in order to define measures to transform the Catalan energy model into one based on renewable energy, self-supply, and saving, efficiency and containment, with a decentralised production model.
- Motion 63/X of the Parliament of Catalonia also urges the Government to promote a change in the regulatory framework to ensure democratic control of energy, and that access to energy is categorised as a basic right.
- Another motion approved by the Parliament of Catalonia, Motion 53/X, urges the Government to design a strategy for energy independence to plan the action that will be necessary over the next ten years based on sustainability criteria. Motion 53/X also urges the Government to review the Energy and Climate Change Plan for Catalonia 2012-2020 to take into account legislative changes due to the State Government's energy reform.

- Motions 90/X and 91/X Resolution 776/X of the Parliament of Catalonia emphasise in greater depth the need to strengthen and adapt Catalan energy policy strategies to enable Catalonia to achieve a economy and a society with low energy intensity, low carbon, innovative, competitive and sustainable in the medium and long term.
- Finally, the Motion 57/XI of the Parliament of Catalonia, on energy policy, urges the Government to present the bases for the National Agreement for Energy Sovereignty. This Agreement should promote, among other things: electricity storage; electricity self-consumption and electrical mobility, in the context of a distributed, renewable model of power generation, empowering citizens as key players in this transition while also recognising their basic right of access to energy.

The Government Agreement to establish the National Agreement for Energy Sovereignty

- On 15 April 2014, in order to promote this general review of energy planning in Catalonia, from the dual perspective of the damage that State energy reform will cause and the aspiration for maximum energy sovereignty, the Government of Catalonia approved a Government Agreement to establish the National Agreement for Energy Sovereignty, in the following terms:
  - Instructing the Ministry of Enterprise and Employment to promote the development of the proposed National Agreement for Energy Sovereignty.
  - Creating a coordinating committee, chaired by the Secretary for Business and Competitiveness to oversee the design of the bases for the National Agreement and contacts with economic and social stakeholders, academic institutions and professional organisations, civil society associations and political groups to generate broad consensus with regard to the National Agreement.

Objectives of the Agreement according to Motion 63/X of the Parliament of Catalonia, on energy sovereignty

- To transform the current Catalan energy model into one that focuses on:
  - The goal of an energy model based 100% on renewable energy sources.
  - Energy self-sufficiency.
  - Energy saving, energy efficiency and energy containment.

  - A decentralised, democratic and participatory production model.

- Steering the change from a centralised electricity production model to one that enables the development of alternative options such as self-consumption and closed networks.
- Adopting the Catalan Government Administration's commitment to reduce energy consumption by 25% by 2025 based on 2007 levels, and promoting the adoption of similar commitments by local authorities, offering them the necessary technical support.
- Adopting the necessary measures to promote energy saving and efficiency in energy consuming sectors (domestic, industrial, services, transport and primary) within the framework of the Catalan Energy Institute, ensuring that sufficient budgetary provisions are made to cover technical and investment requirements in this line of action.
- Establishing a pricing policy that enables basic consumption to meet family needs while ensuring that more extravagant consumption is discouraged through a price increase.
- Promoting a change in the regulatory framework in order to ensure democratic control of energy and that access to energy is classified as a basic right, while also designing a plan to combat poverty energy that prohibits disconnection from the grid.
- Deciding on the to implement energy infrastructure in Catalonia.
- Establishing a plan to generate energy using biomass from Catalan forests.
- Promoting research into renewable energy sources, especially marine wind power.

Objectives of the Agreement according to Motion 57/XI of the Parliament of Catalonia, on energy policy

- To submit the bases for the National Agreement for energy transition to the Parliament of Catalonia. These bases should describe the following objectives:
  - To implement energy saving and efficiency programmes in the residential, industrial and mobility spheres, and propose an improvement in energy efficiency of at least 2% per year in order to achieve a 50% decrease in final energy consumption by 2050.
  - To ensure energy supply and guarantee its quality and reliability, at reasonable prices.

- To develop the full potential of renewable energy sources, backed up by the necessary social and territorial consensus so that, by 2030, renewable energy accounts for 70% of consumption in the Catalan electricity mix, reaching 100% by 2050.
- To reduce dependence on fossil fuels, especially oil, in the motor transport and goods and pleasure port sectors, by 50% by 2040.
- To recognise the importance of the circular economy and planned or built-in obsolescence.
- To recognise the basic right of access to energy and the protection of consumer rights; to reduce the energy insecurity which affects some citizens; and to design a legal framework for social coverage of a minimum gas and electricity supply service.
- To empower citizens as key players in the energy transition, by cultivating energy culture and strengthening the role of the media in awareness raising in the field of energy.
- To include the principles of transparency and annual assessment in the governance of the Agreement.

• Similarly, within the framework of the task of establishing this Agreement, the Parliament urges the Government to:

- Present, within six months, a strategic plan to implement electric vehicle charging infrastructure that takes among its objectives the target for the Government of Catalonia's entire public fleet shall be electric by 2030 and that 30% of renewals of the fleet should be by electric vehicles by 2025.
- Promote the Catalan Strategy on Energy Renovation in Buildings (ECREE), prioritising accessibility and energy efficiency using renewable energy in homes and buildings. This strategy should stipulate the need to act on a minimum of 10,000 homes annually.
- Present, within six months, a plan for the energy renovation of public buildings using renewable energy. This plan should set an annual target of affecting 3% of the surface of Catalan Government buildings.
- Address the debate on on the convergence of climate and environmentaltargets with the energy transition.
- Present, within six months, a plan for the implementation, with the appropriate legislative proposals, of self-consumption of solar photovoltaic and wind power to encourage introduction of distributed power generation technologies in buildings, through active management of electricity demand and production. This, with the support of energy

storage technologies, reducing energy consumption, maximising the capacity of the electricity system and improving its overall environmental and economic sustainability.

– Design a strategic plan that guarantees the storage of electrical energy in a model in which renewable energy accounts for an increasing share in electricity generation.

– Work on new funding mechanisms in accordance with EU Directives 2012/27/EU, on energy efficiency, and 2010/31/EU, on the energy performance of buildings, which, through public support; and enable private investment to be raised and new energy efficiency markets generated, maximising the attraction of projects in accordance with the Juncker Plan and other financing mechanisms implemented by the European Investment Bank, and prioritising energy service companies (ESCOs).

Objectives of the Agreement according to Resolution 776/X of the Parliament of Catalonia, on the general political orientation of the Government

- To strengthen and adapt Catalan energy policy strategies, thereby enabling Catalonia to create an economy and a society characterised by low energy intensity, low carbon, and which is innovative, competitive and sustainable in the medium and long term, in the context of the current review of the Energy and Climate Change Plan for Catalonia 2012-2020 and in accordance with the conclusions of the National Agreement for Energy Sovereignty.

ANNEX 2. Negotiating Council of the National Agreement for energy transition

Consultative bodies

On 7 July 2015, the Government took note of the "Foundation document to constitute a National Agreement for energy transition", and the consultation process leading up to the National Agreement for Energy Transition approved by the Coordinating Committee for this National Agreement.

This consultation process for the National Agreement for energy transition is based on the establishment of a Negotiating Council for the National Agreement for energy transition, formed by:

- The Coordinating Committee for the National Agreement for energy transition, on which Catalan Government ministries related to the field of energy are represented.
- The Council of Organisations, formed by representatives from all economic and social stakeholders related to the field of energy:
  - Electricity generating companies.
  - Electricity, natural gas, oil products and coal distribution companies.

- Organisations, associations and companies engaged in renewable energy.
- Organisations, associations and companies engaged in energy saving and efficiency.
- Business and union organisations.
- Professional associations.
- Leading technical opinion makers.
- Associations of municipalities, residents and consumers.
- Organisations, associations and companies engaged in the field of the environment.
- Environmentalist and ecologist groups.
- Organisations, associations and companies engaged in the field of energy research and innovation.

Members of the Council of Organisations

Organisations invited to join the Council of Organisations for the National Agreement:

Endesa

Gas Natural Fenosa

Iberdrola

Repsol

Compañía Española de Petróleos S.A.U. (CEPSA)

ASCÓ—VANDELLÓS II Nuclear Association

Alpiq Energía España, S.A.U.

Estabanell y Pahisa Energía, S.A.

Bassols Energía, S.A.

Agri Energía Elèctrica, S.A.

Association of Electrical Energy Producers and Users (APUEE)

Association of Electricity Companies (ASEME)*

Societat Catalana de Petrolis, S.A. (Petrocat)

Meroil, S.A.

Association for the Promotion of Public Transport (PTP)

Mobilitat Sostenible i Segura (Sustainable and Safe Mobility) Foundation

Catalan Association of Energy, Air Conditioning and Cooling Technicians (ACTECIR)

Association of Maintenance Managers (AGEM)

Association of Installation Guilds of Catalonia (AGIC)*

Business Association of Installers, Plumbing and Air Conditioning (FERCA)

Spanish Electrotechnical Association (ESA)*

Official Chamber of Works Contractors of Catalonia

Association of Lighting Designers (APDI)

Green Building Council Spain (GBCE)*

TECNICAT (Technicians Linked to the Public Administrations of Catalonia)*

Group of Scientists and Technicians for a Non-Nuclear Future

CMES Group for a New, Sustainable Energy and Social Model

Association of Independent Engineering and Consulting Companies of Catalonia (ASINCA)*

Association of Automotive Technicians (STA)

Association of Companies in the Biomass Fireplaces, Inserts and Stoves Sector (INNOFOC)

Association of Renewable Energy Professionals of Catalonia (APERCA)

Association of Renewable Energy Producers (APPA)

Spanish Association for the Internationalisation and Innovation of Spanish Solar Power Companies (SOLARTYS)

Spanish Association for the Internationalisation Electronics, IT and Telecommunications Companies (SECARTYS)*

Spanish Association for the Internationalisation and Innovation of Home and Building Automation Companies (DOMOTYS)

Wind Power Association of Catalonia (EolicCat)*

Spanish Photovoltaic Union (UNEF)

Wind Power Business Association (AEE)

Photovoltaic Industry Association (ASIF)

National Association of Photovoltaic Energy Producers (ANPIER)*

Spanish Solar Thermal Industry Association (PROTERMOSOLAR)

Eurosolar*

Energy Efficiency Cluster of Catalonia (CEEC)*

Energy Managers' Group (GGE)*

COGEN SPAIN S.A.

ACOGEN*

Spanish Association of Energy Services Companies (ANESE)

Spanish Association of Comprehensive Maintenance and Energy Services Companies (AMI)

Association of Energy Efficiency Companies (A3e)

Foment del Treball Nacional (National Labour Promotion) *

Association of Food and Drink Industries of Catalonia (AIABECA)

Catalan Federation of Meat Industries (FECIC)

Catalan Association of Feed Manufacturers (ASFAC)*

Catalan Association of Pork Producers (PORCAT)

Association of Cork Companies of Catalonia (AECORK)

Catalan Wood Confederation

Catalan Association of Water Bottlers

Guild of the Graphic Industry and Communication of Catalonia

Forest Consortium of Catalonia

Inter-collegiate Council of Catalonia

Association of Industrial Engineers of Catalonia*

Association of Technical Industrial Engineers of Barcelona*

Association of Architects of Catalonia*

Confederation of Associations of Surveyors, Technical Architects and Construction Engineers of Catalonia*

Association of Environmentalists of Catalonia

Association of Civil Engineers of Catalonia

Association of Public Works Engineers of Catalonia*

Official Association of Agricultural Engineers of Catalonia

Official Association of Farming Technical Engineers and Experts of Catalonia

Official Association of Forestry Technical Engineers of Catalonia

Official Association of Mining Technical Engineers of Catalonia and the Balearic Islands

Association of Public Works Engineers of Catalonia*

Association of Telecommunications Engineers and Experts of Catalonia (COETPTC)

Association of Economists of Catalonia

Association of Chemists of Catalonia

Association of Biologists of Catalonia*

Association of Geologists of Catalonia

Association of Journalists of Catalonia

Association of Lawyers of Catalonia

Official Association of Doctors and

Graduates of Catalonia

Barcelona Provincial Council*

Girona Provincial Council*

Lleida Provincial Council

Tarragona Provincial Council

Confederation of Neighbourhood Associations of Catalonia

Local Government Council City Council - Agency

Barcelona Energy*

Federation of Municipalities of Catalonia (FMC) Catalan Association of Municipalities (ACM)

Association of Microvillages of Catalonia

Barcelona Metropolitan Area (AMB)*

Association of Consumers and Users in Action of Catalonia (FACUA)*

Coordinating Association of Health, Consumption and Food and Drink Users*

Organisation of Consumers and Users of Catalonia (OCUC)

Consumers Union of Catalonia (UCC)

Civic Union Federation of Consumers and Housewives of Catalonia (UNAE)

Consumer Association of the Province of Barcelona (ACPB)

Council of Mayors for Energy of Catalonia (MADE)

Association of Wind Power Towns of Catalonia (AMEC)

Association of Municipalities in Nuclear Areas (AMAC)

Network of Cities and Towns for Sustainability

Metropolitan Region of Barcelona Industrial Pact

Union of Industrial Estates of Catalonia (UPIC)

Catalan Association of Environmental Engineering and Consultancy Companies (ACECMA)

Ecologists of Catalonia (EDC)

Ecologists in Action

University Council of Catalonia

Catalan Association of Public Universities (ACUP)

Energy Research Institute of Catalonia (IREC)

Eurecat*

Catalan Association of Research Institutions (ACER)

Municipal Transport of Barcelona (TMB)

Metropolitan Transport Authority (ATM)*

Automotive Industry Cluster of Catalonia (CIAC)

ClusterMoto

Royal Automobile Club of Catalonia (RACC)

Ecologistes de Catalunya (EDC)

Ecologistas en Acción

Consell universitari de Catalunya

Associació Catalana d'Universitats Públiques (ACUP)

Institut de Recerca en Energia de Catalunya (IREC)

Eurecat*

Associació Catalana d'Entitats de Recerca (ACER)

Transports Municipals de Barcelona (TMB)

Autoritat del Transport Metropolità (ATM)*

Clúster Indústria Automoció Catalunya (CIAC)

ClusterMoto

Reial Automòbil Club de Catalunya (RACC)

* The names of organisations that took part actively in the debate sessions to draft the agreed document are marked by an asterisk

ANNEX 3. 25 years of energy transition

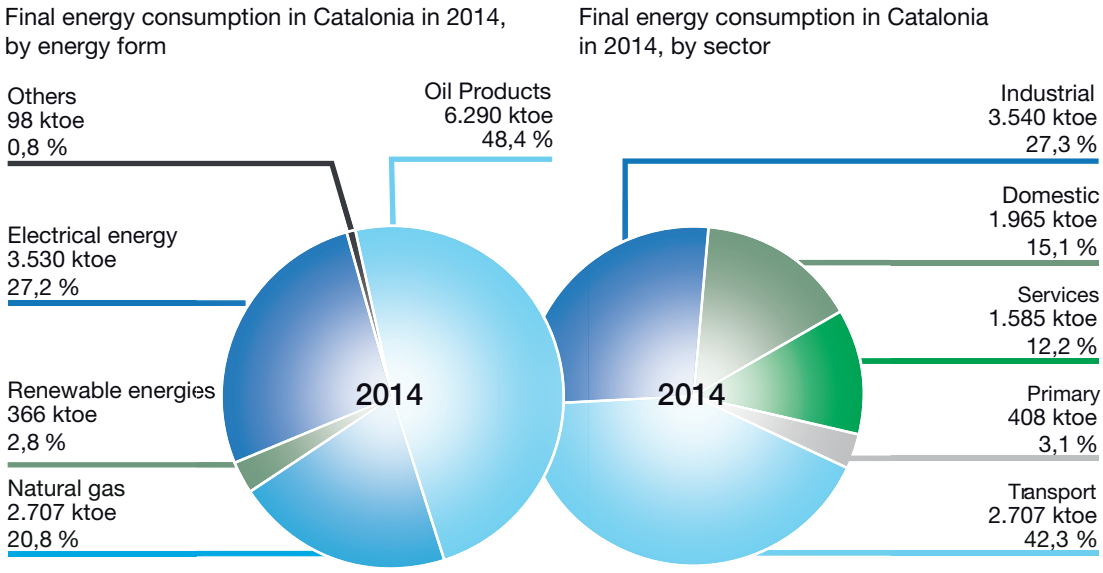
Energy consumption in Catalonia

Final energy consumption in Catalonia in 2014 continued to be based on the consumption of fossil fuels. These fuels (coal, oil products and natural gas) accounted for 66.1% of final energy consumption in Catalonia in that year. More specifically, oil products accounted for nearly half of final energy consumption in Catalonia (44.4%).

Moreover, the transport sector continues to be the biggest final energy consumer in Catalonia, accounting for 42.3% of total consumption. Other sectors where energy consumption was high include industry (27.3%), and the domestic and service sectors (15.1% and 12.2%, respectively).

Figure A3.1 shows final energy consumption in Catalonia in 2014 by energy form and sector

Figura A3.1 ▶
Final energy consumption in Catalonia in 2014, by energy form and sector



Electricity production

Gross electricity production in 2014 was 43,841.7 GWh. Nuclear energy is the main energy form used for power generation in Catalonia, accounting for 54.1%. Nuclear energy is followed by hydro power, combined cycles and cogeneration, which account for 12.8%, 11.9% and 11.7% of the total, respectively.

As a result of the increase in electricity demand, gross electricity production has increased significantly in Catalonia over the last 24 years. In 1990, gross electricity production was 27,627.5 GWh, a figure that grew by 58.7% over the 1990-2014 period.

Figure A3.2 and Table A3.1 show the structure of power and gross production of electricity in Catalonia in 1990 and 2014.

It is notable that, in 1990, nuclear generation accounted for 78.7% of gross electricity production. As Table A3.2 shows, that year, the three nuclear power plants in Catalonia (Ascó I, Ascó II and Vandellòs II) had been in operation for just two, four and six years, respectively.

The development of renewable energy over the 1990-2014 period is also notable. The renewable energy share increased from 11.0% in 1990 to 21.5% in 2014, mainly due to the deployment of wind power.

Figure A3.2 ▶

Gross electricity production of in Catalonia in 1990 and 2014

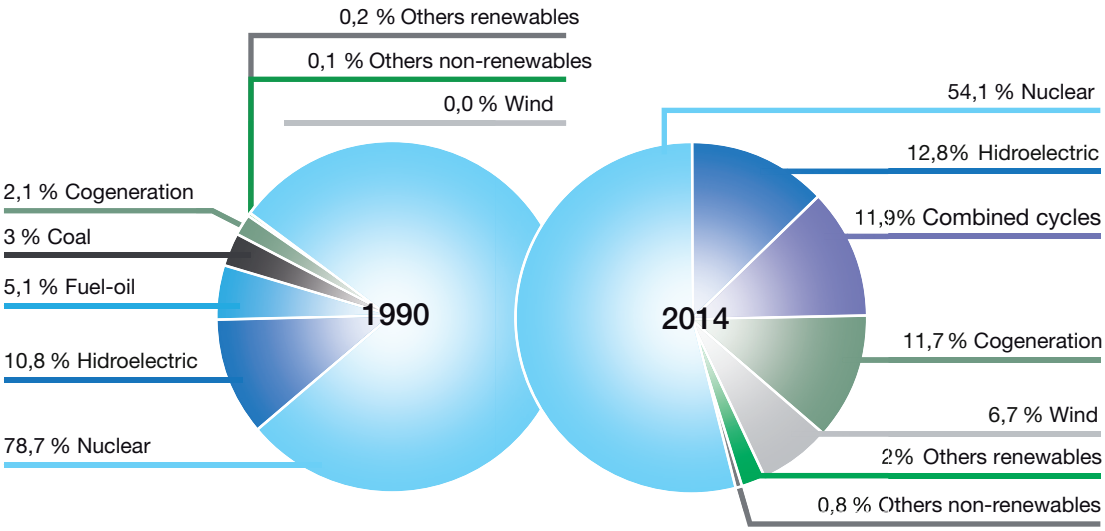


Table A3.1 ▶

Power and gross electricity production of electricity in Catalonia in 1990 and 2014

	1990			2014			Change 1990-2014	
	Power (MW)	Gross Prodution (GWh)	% Gross Prodution	Power (MW)	Gross Prodution (GWh)	% Gross Prodution	Power (MW)	Gross Prodution (GWh)
Nuclear (1)	2.842,0	21.742,9	78,7 %	3.146,9	23.737,1	54,1 %	304,9	1994,2
Combined cycles	-	-	0,0 %	4.112,0	5.223,6	11,9 %	4.112,0	5.223,6
Fuel oil	2.377,6	1.405,1	5,1 %	-	-	0,0 %	-2.377,6	-1.405,1
Coal	160,0	837,2	3,0 %	-	-	0,0 %	-160,0	-837,2
Cogeneration	127,0	578,8	2,1 %	876,3	5.110,9	11,7 %	749,3	4.532,1
Others non-renewables	9,4	31,8	0,1 %	179,4	351,9	0,8 %	170,0	320,2
Hidroelectric	2.243,1	2.971,6	10,8 %	2.366,2	5.599,9	12,8 %	123,1	2.628,3
Wind	0,0	0,0	0,0 %	1.260,2	2.953,2	6,7 %	1.260,2	2.953,2
Solar photovoltaic	0,3	0,3	0,0 %	266,1	409,7	0,9 %	265,8	409,4
Others renovables	9,4	59,8	0,2 %	108,0	455,3	1,0 %	98,6	395,5
TOTAL	7.768,8	27.627,5	100 %	12.315,1	43.841,7	100 %	4.546,3	16.214,2

(1) Increase in gross installed electrical power as a result of the process of renewing the wind park conducted over this period at the three nuclear power stations (Ascó I, Ascó II and Vandellòs II).

Taula A3.2. ▶

Nuclear power stations operating in Catalonia over the 1990-2014 period

Name	Power 31/12/2014 (MW)	Year of entry into commercial service
Ascó I	1.032,5	1984
Ascó II	1.027,2	1986
Vandellòs II	1.087,1	1988

The 1990-2014 period saw great growth in the installation of natural gas combined cycle power stations in the Catalan electricity system. These facilities were introduced as part of the process of completely replacing the conventional old power plants, which used coal, fuel oil and fuel gas.

Table A3.3 shows the power stations in Catalonia, and ordinary operation, along with their main characteristics and which have been replaced by new combined cycle generation.

This group of power generation facilities, which began to close down in the mid-1990s, were based on steam turbine technology, powered by coal, fuel oil and natural gas fuel.

Taula A3.3. ▶

Coal, fuel oil and natural gas fuel power station that ceased to operate in Catalonia over the 1990-2014 period

Name	Power (MW)	Fuel	Year of entry into service	Last year of production
Cercs	160	Coal	1971	2011
Badalona II	344	Fuel oil	1967	1995
Besòs	450	Fuel oil /Gas	1967	2002
Sant Adrià	1.050	Fuel oil/Gas (Units I and III) Fuel oil (unit II)	1973	2011
Foix (Cubelles)	520	Fuel oil/Gas	1979	2010

Overall, gross installed electrical power plants in coal-, fuel oil- and fuel gas-fired power stations in Catalonia was 2,524 MW, of which 1,670 MW could be generated using natural gas as the fuel. The Badalona II power station and Unit 2 at the Sant Adrià facility were the only fuel oil-fired units that were never

adapted to consume natural gas. Accordingly, since 2012, there has been no production of electricity by conventional power plants using coal, fuel oil or fuel gas as the fuel in Catalonia.

Moreover, as part of the replacement process the period from 2002 to 2010 saw the entry into service of nine new combined cycle units in Catalonia, with a total installed gross electrical power of 4,112 MW. Table A3.4 shows, in chronological order of entry into operation, all these combined cycle facilities in Catalonia, indicating their gross installed electrical power and year of entry into service.

It is worth noting that five of the nine new combined cycle plants are located in Barcelona's metropolitan area. This new electricity generation capacity using combined cycle technology replaces a large number of old thermoelectric power plants also located in the metropolitan area of Barcelona, more specifically at the mouth of the River Besòs.

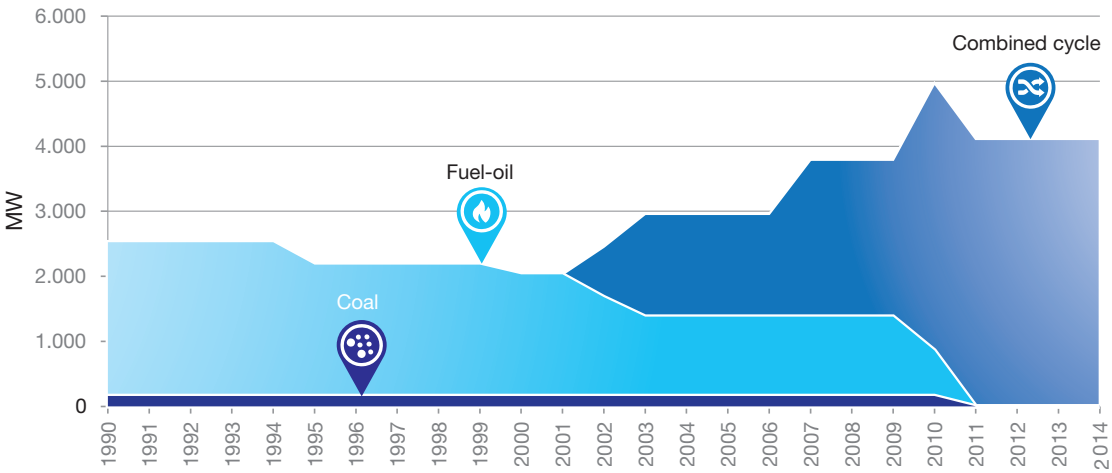
Taula A3.4. ▶
Combined cycle power station that entered into service in Catalonia over the 2002-2010 period.

Name	Municipalities	Power at 31/12/2014 (MW)	Year of entry into service
Besòs III	Sant Adrià de Besòs	373,1	2002
Besòs IV	Sant Adrià de Besòs	401,4	2002
Tarragona I [1]	Tarragona	397,8	2003
Tarragona Power	Tarragona	407,1	2003
Plana del Vent I	Vandellòs i l'Hospitalet de l'Infant	411,6	2007
Plana del Vent II	Vandellòs i l'Hospitalet de l'Infant	421,0	2007
Besòs V	Sant Adrià de Besòs	861,3	2010
Port de Barcelona I	Barcelona	412,6	2010
Port de Barcelona II	Barcelona	426,1	2010

(1) The owners of the facility requested its closure from the Ministry of Industry, Energy and Tourism in 2015

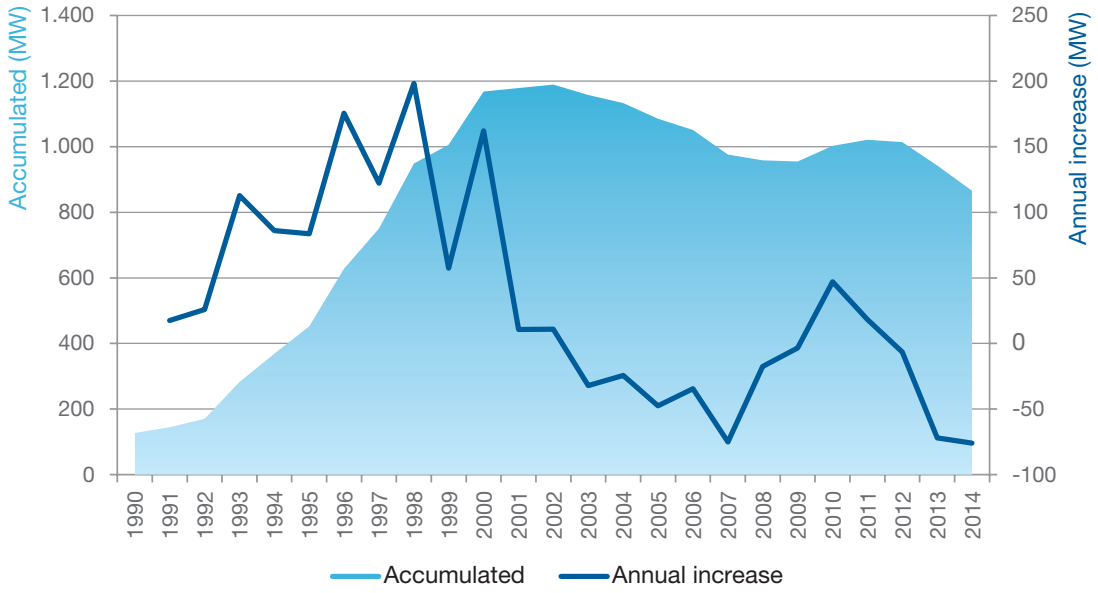
Figure A3.3 shows the process of technological replacement of large conventional thermoelectric power plants over the 1990-2014 period.

Figura A3.3. ▶
Technological replacement of large conventional thermoelectric power plants, 1990-2014.



Moreover, as regards new energy technologies for power generation, the 1990-2000 period saw the deployment of cogeneration in Catalonia. This technology reached its highest point in terms of gross installed electrical power, with 1,189 MW, in 2002. The introduction of cogeneration technology, primarily associated with industrial activity, contributed to the deployment of distributed generation, reducing energy costs for companies and improving the economic competitiveness of the industrial sector.

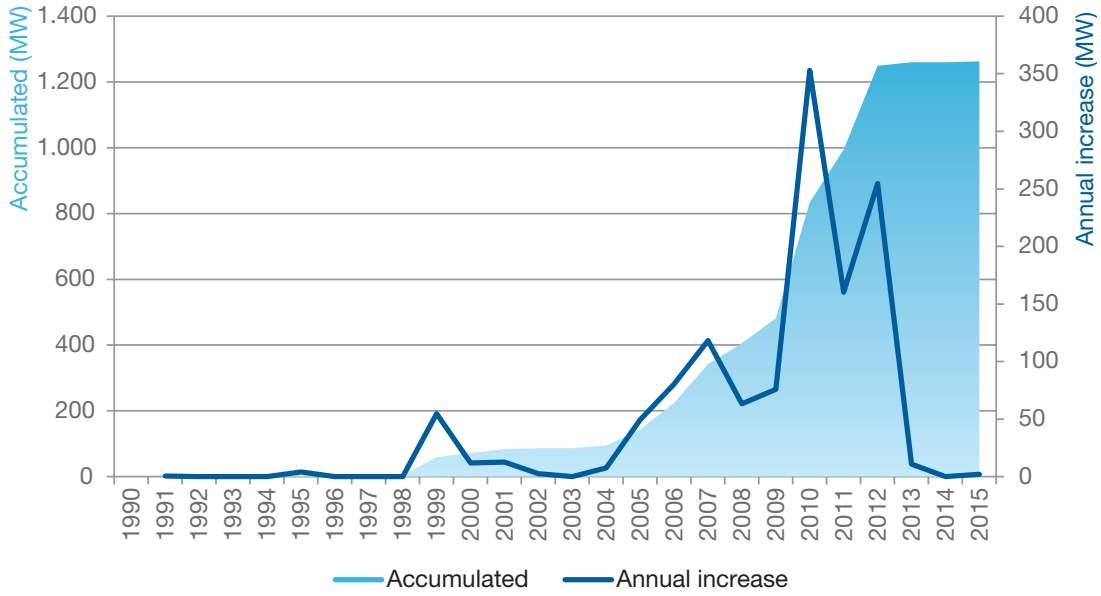
Figura A3.4. ▶
Gross installed electrical power in cogeneration in Catalonia



Subsequently, over the last 15 years, a process involving the closure of several cogeneration facilities began as a result of the closure of many industrial enterprises during this period. This circumstance was worsened by the reduction in the specific remuneration for cogeneration facilities approved by central government in the framework of the reform of the electricity sector in 2013.

Regarding wind energy (the main source of renewable energy in terms of absolute growth), as Figure A3.5 shows, its implementation began to be significant from 2005, that is to say, over the last 10 years. More specifically, over the 2010-2012 period, 768 MW of wind power entered into service, accounting for 61% of total wind power in service in 2015.

Figura A3.5. ▶
Gross installed electrical power in wind power in Catalonia, 1990-2015

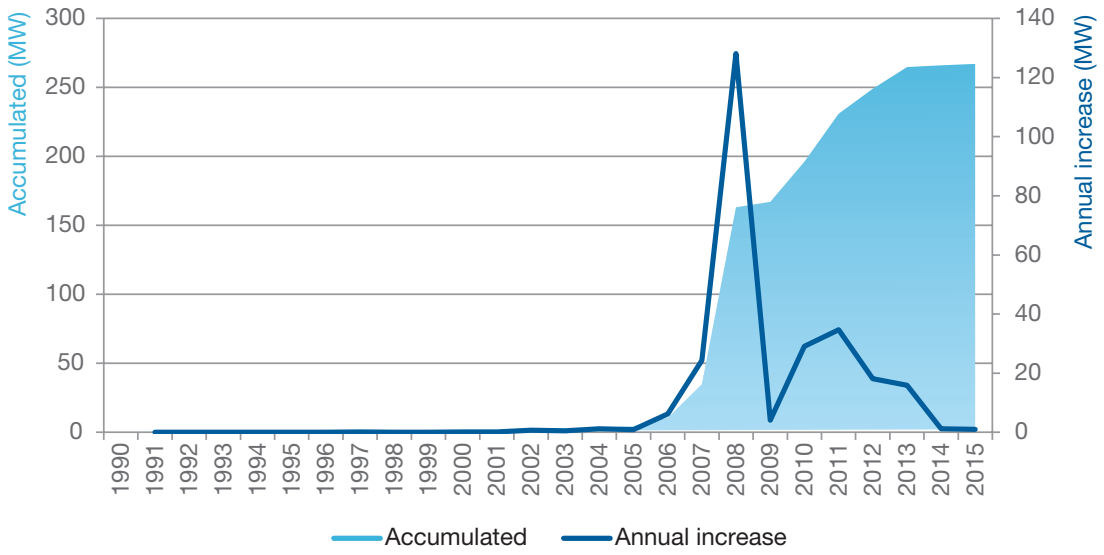


Subsequently, beginning in 2012, as a result of the abolition of economic incentives for new renewable energy facilities, the deployment of wind power in Catalonia came to a complete halt.

As for solar photovoltaic energy, there was a very significant increase in gross installed electrical power in 2008 as a result of a highly favourable framework for remuneration for such facilities, approved by Royal Decree 661/2007. Subsequently, the reduction in this remuneration (principally through Royal Decree 1578/2008) and the complete abolition of economic incentives for new facilities (Royal Decree 1/2012) led to an almost total stoppage in the implementation of photovoltaic technology in Catalonia from 2012.

Figura A3.6. ▶

Gross installed electrical power in solar photovoltaic power in Catalonia, 1990-2015



Regarding hydropower, this form of energy accounted for 12.8% of gross electricity production in Catalonia in 2014. The main hydroelectric facilities located in Catalonia (facilities with capacity of over 50 MW) are listed in Table A3.5.

As for the rest of hydroelectric facilities (capacity of 50 MW or less), Catalonia had 326 such facilities with gross installed power of 1017.9 MW in 2014.

Taula A3.5. ▶

Hydroelectric facilities with capacity of over 50 MW located in Catalonia

Name	Municipalities	River	Gross power (MW)
Estany Gento - Sallente (bombament)	La Torre de Cabdella	Flamisell	446,0
Ribarroja	Riba-Roja d'Ebre	Ebre	262,8
Tavascan Superior	Lladorre	Lladorre, Tavascan i Vallfarrera	120,4
Canelles	Os de Balaguer	Noguera Ribagorçana	108,0
Montamara (bombament)	Lladorre	Lladorre, Tavascan i Vallfarrera	88,0
Susqueda	Susqueda	Ter	86,3
Arties	Naut Aran	Diferents llacs a la capçalera del riu Garona	68,0
Camarasa	Camarasa	Embassament sobre el riu Noguera Pallaresa	60,0
Sau	Vilanova de Sau	Ter	56,0
Llavorsí	Llavorsí	Noguera Pallaresa i Cardós	52,8
TOTAL GROSS POWER			1.348,3

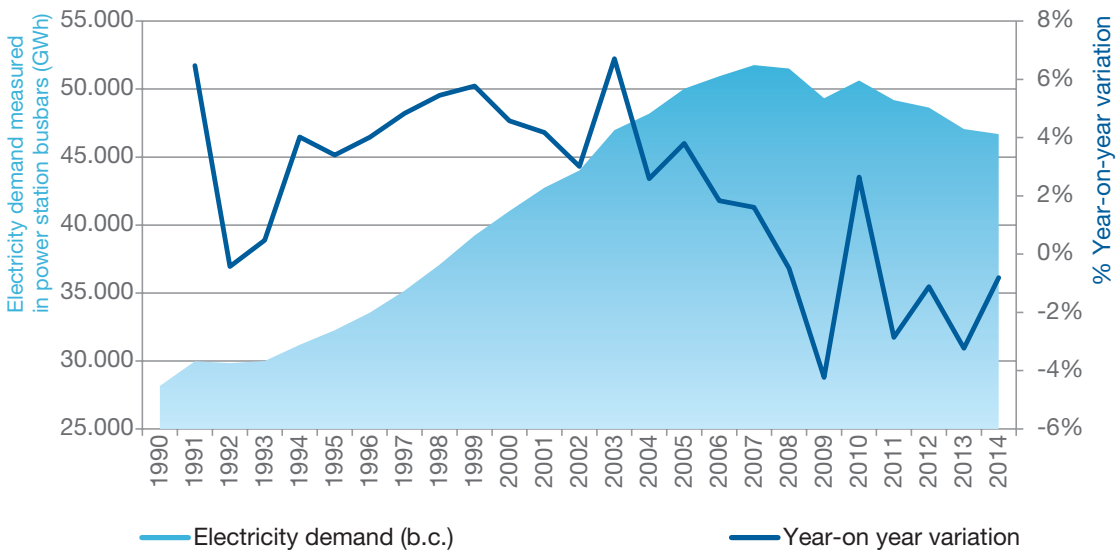
Electricity demand

Electricity demand in Catalonia (a physical variable that corresponds to the consumption of end customers, taking into account losses in the transmission and distribution network) has decreased significantly in recent years as a result of the impact of the economic crisis.

As Figure A3.7 shows, maximum electricity demand measured in power station busbars occurred in 2007, when it reached 51,759 MWh (including electricity self-consumption).

It is worth noting that electricity demand has fallen every year since 2007, except 2010, with an annual average reduction of 1.7%, up to 2014, when demand reached 46,687 MWh (including electricity self-consumption). As a result of this continuous reduction, electricity demand in 2014, including self-consumption, had returned to 2003 levels.

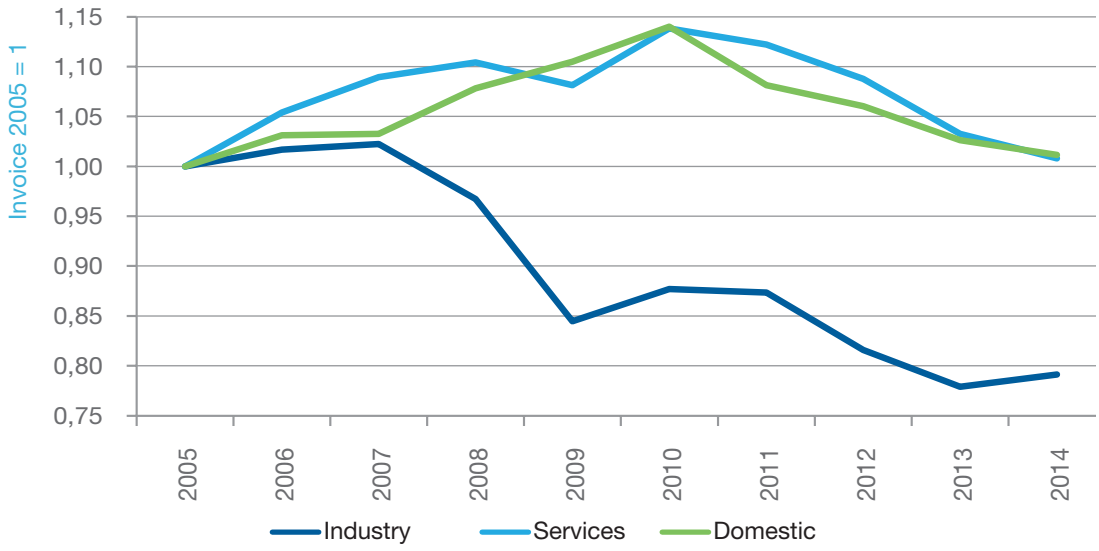
Figura A3.7. ▶
Electricity demand measured in power station busbars in Catalonia, 1990-2014



In terms of electricity invoicing by sector, the last 10 years have seen enormous impact caused by the economic crisis on the industrial sector in Catalonia. Specifically, electricity consumption in this sector (including self-consumption) fell by 22.6% in 2014 compared to the maximum level of consumption, which occurred in 2007. This decrease is a consequence, mainly, of the fall in industrial activity in Catalonia during the period.

Another important aspect is that, in the field of electricity distribution, the grids managed by the main operator (Endesa Distribución S.L.) account for 96% of total electricity consumption in Catalonia.

Figura A3.8. ▶
Electricity invoicing by sector in Catalonia, 2005-2014



The transport sector and oil product consumption

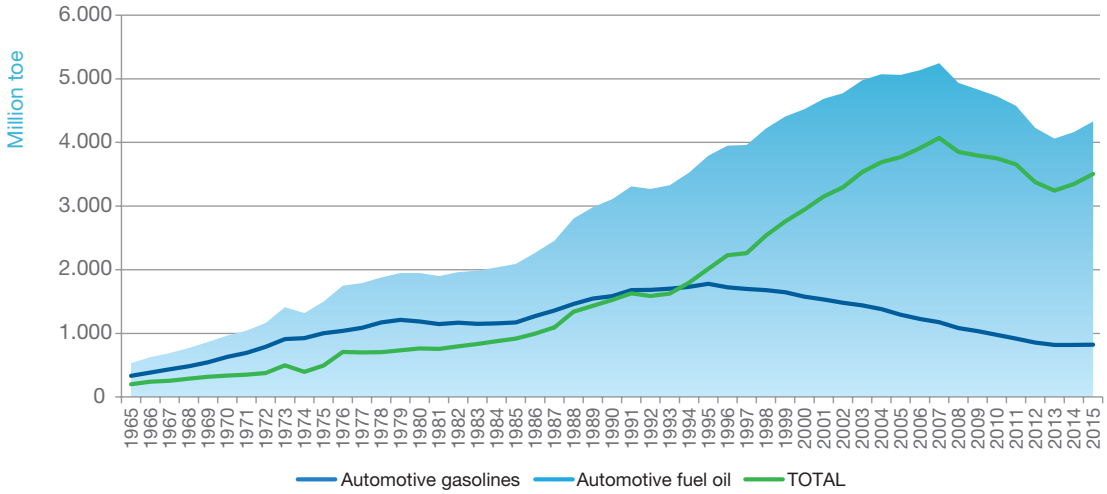
The transport sector is the largest consumer of final energy in Catalonia. This sector also has high dependence on oil product fuels, which accounted for 95.2% of total energy consumption in the transport sector in 2014.

It is worth noting that, over the last eight years, as a result of the economic crisis, reduced mobility and improved energy efficiency in vehicles, automotive fuel consumption has fallen considerably. In this regard, maximum consumption of automotive fuels was in 2007, when this consumption reached 5244.3 ktoe. Compared to this maximum level, and for the reasons stated above, consumption of oil products fell by 22.6% in 2013 (the year when the lowest consumption over the last 15 years was recorded). This reduction has no precedent in the last fifty years.

At present (2015), total consumption of automotive fuels is equivalent to that in the 1998-1999 period. By fuel type, current consumption of diesel oil is equivalent to that for the 2002-2003 period, while current consumption of automotive gasoline is equivalent to 1972-1973. Finally, consumption of automotive fuel oil is higher than petrol consumption in 1994.

Figura A3.9. ▶

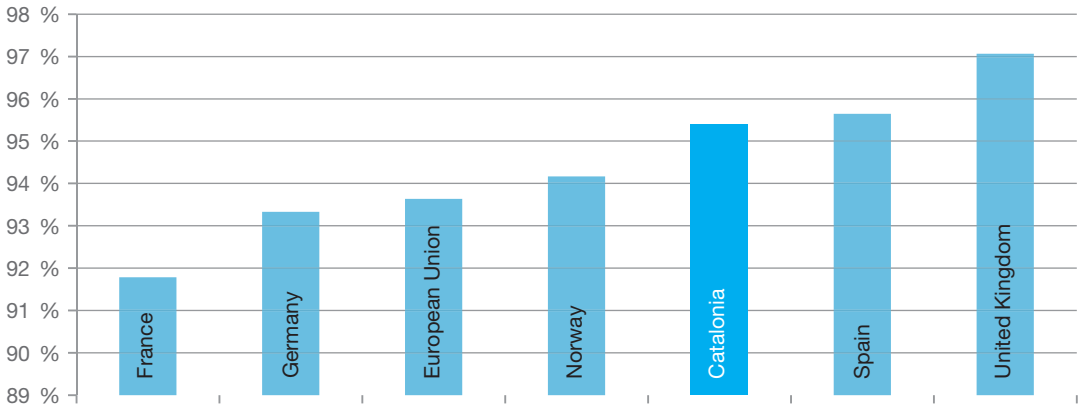
Automotive fuel consumption (by fuel type) in Catalonia over the last 50 years



The high level of oil dependence in the transport sector is also found in the European Union as a whole, though dependence is lower in certain countries such as France and Germany due, basically, to the higher use of biofuel and electricity in their respective transport sectors.

Figura A3.10. ▶

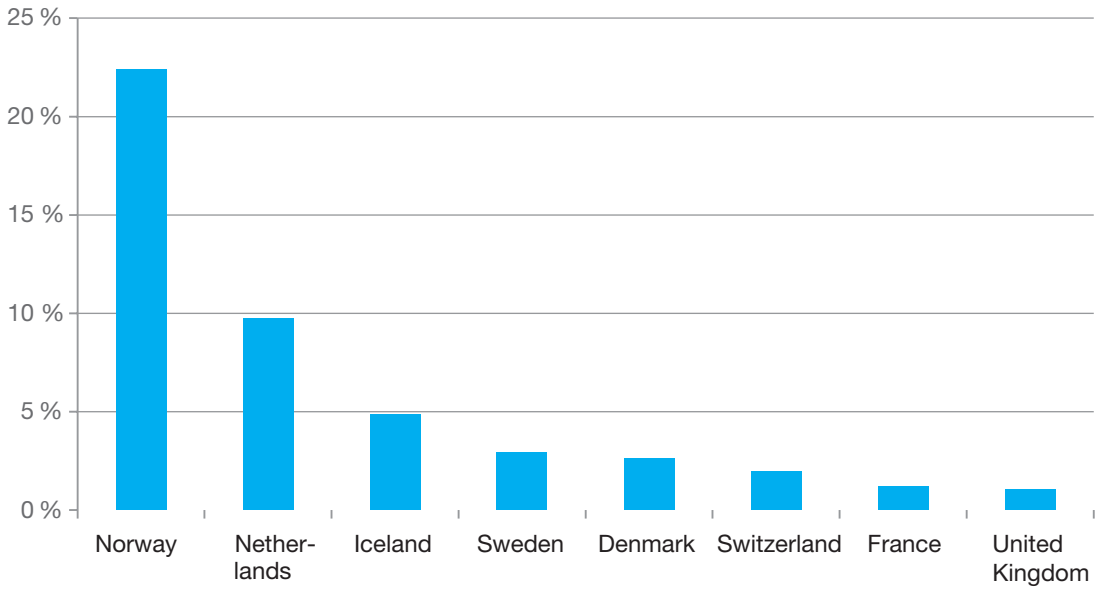
Oil dependence in the transport sector in various European Union countries (2014)

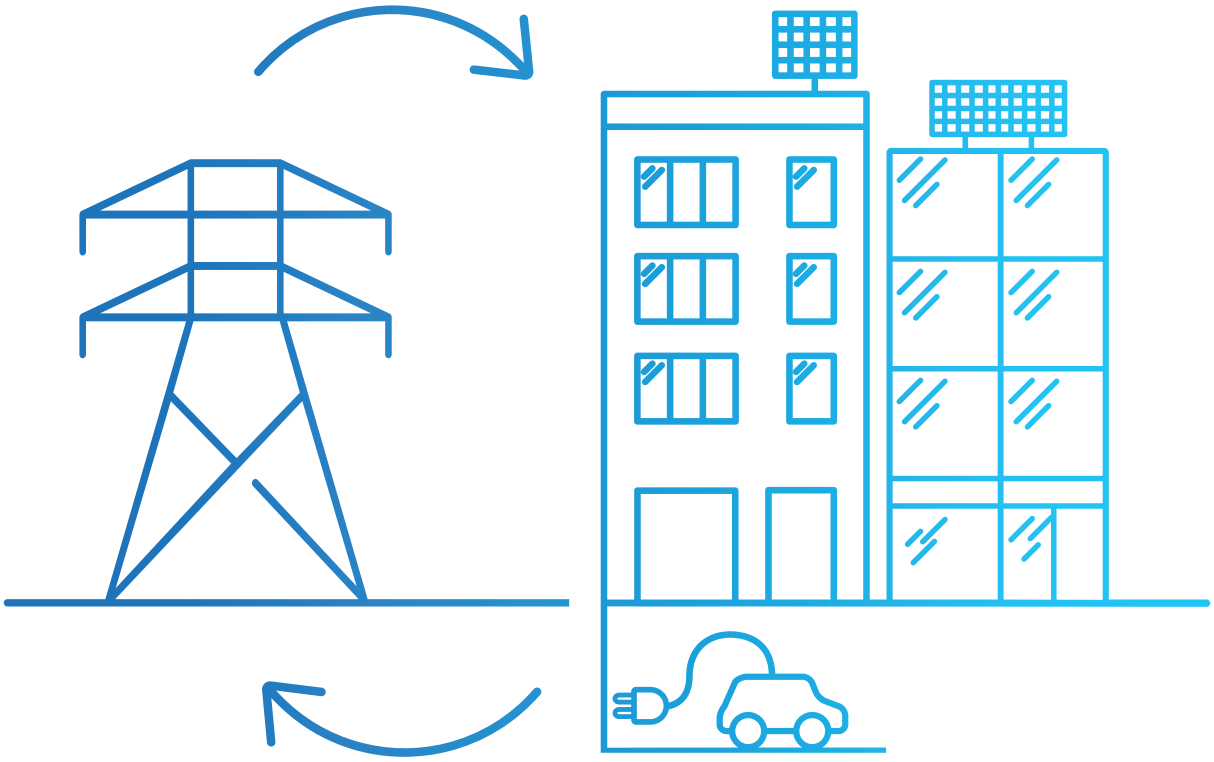


More specifically, as regards electric mobility, it is important to note the varying levels of penetration achieved by electric vehicles in different European countries. In Catalonia, in 2015, 663 electric cars were sold (0.4% of total sales in the sector), while for the whole of Spain sales of electric cars stood at 0.3% in 2015. These market sales shares are significantly lower than the market share of electric cars in the European Union as a whole (1.41%) and, in particular, the share in other countries, such as the Nordic countries, the Netherlands, Switzerland, France and the United Kingdom.

Figura A3.11. ▶

Market share in sales of electric cars in various European countries, 2015





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