ANDORRA i el canvi climàtic | 2020 - 2050

LONG-TERM STRATEGY ON ENERGY AND CLIMATE CHANGE

2020-2050

Oficina de l'Energia i del Canvi Climàtic
Principat d'Andorra

The Long-Term Strategy on Energy and Climate Change (LTSECC)

Approved by the Government of Andorra on 3 February 2021

Main authors:

Agency of Energy and Climate Change

Technical team

Albert Gomà Roca
Head of the Unit of Energy and Climate Change of the Agency of Energy and Climate Change

Meritxell Cuyàs Lamana
Anna Boneta Herrero
Technical experts from the Agency of Energy and Climate Change

Management

Carles Miquel Garcia
Director of the Agency of Energy and Climate Change of the Ministry of the Environment, Agriculture and Sustainability

Ministry of the Environment and Sustainability of the Government of Andorra

Marc Rossell Soler, Secretary of State for the Environment and Sustainability
Natàlia Rovira, advisor to the Ministry of the Environment and Sustainability

With the participation of the National Energy and Climate Change Committee advisory body

Mayors in representation of the communes:
Mr Josep Majoral Obiols, Mayor of Sant Julià de Lòria
Ms Rosa Gili Casals, Mayoress of Escaldes-Engordany

Representative of the Department of Territorial Planning on behalf of the Government in the field of building:
Carles Blasi Vidal, Head of the Public Building Department

Representative of the Department of Mobility on behalf of the Government in the field of mobility:
Jaume Bonell, Head of the Mobility and Paving Department

Representative of the Department of Business, Trade, Industrial Development and Transport on behalf of the Government in the field of transport and industrial safety:
Josep Lluís Pujol Carrascosa, Director of Business, Trade, Industrial Development and Transport

Representative of the Department of Educational Systems and School Services on behalf of the Government in the field of school transport:
Joan Marc Guàrdia Llorens, Head of the Unit of Educational Planning and Schools

Representative of the Ministry of Foreign Affairs
Florència Aleix, Director of Multilateral Affairs and Cooperation

Representative of Andorran Electric Forces (FEDA):
Albert Moles Betriu, Director de FEDA

Representatives of the four distribution companies (Nasa, Mútua, EE and Sercensa):
Yolanda Palmitjavila, President of AESE

Representative of the Association of Electricity, Plumbing and Air Conditioning Companies of Andorra (Adelca):
Edgar Francome Martínez, President of Adelca

Representative of the Association of Fuel Importers and Distributors (AIDC):
Carles Visent Guitart, Member of the AIDC

Representative of the Andorran Association of Architects (COAA):
Albert Villamajor Rosados, Member of the COAA

Jaume Rifà i Giribet, President of the COATA

Representative of the Andorran Association of Engineers (COEA):
Vicenç Jorge Seco, Member of the COEA

Representative of the Andorran Association of Work Contractors (Acoda):
Mònica Dalmau Gamarra, Manager of Acoda

Representative of the Andorran Association of Estate Agents and Property Managers (AGIA):
Jordi Ribó Casanovas, Vice-President of the AGIA

Representative of the Andorran Chamber of Commerce, Industry and Services:
Jordi Duró Espineta, Member of the Andorran Chamber of Commerce, Industry and Services

Representative of the Andorran Business Confederation:
Miquel Àngel Armengol, Vice-President of the Andorran Business Confederation

Representative of the university and research sector:
Jordi Llombart Pubill, technical expert from the Department of Higher Education and Qualification Recognition

Representative of the innovation sector:
Marc Pons Pons, Director of ActuaTech

Representative of the Automobile Club of Andorra:
Enric Pujal Torres, President of the ACA

Representative of the two associations for the protection of nature (ADN and Apapma):
Jordi Deu, technical representative of ADN and Apapma

Representative of the Andorran National Youth Forum:
Marta Calsina, Member of the Andorran National Youth Forum

INTRODUCTION

In recent years Andorra has endowed itself with a set of resources and instruments to demonstrate its willingness to support the international commitments acquired in 2015 under the Paris Agreement.

The objectives and initiatives established in Law 21/2018 of 13 September on the promotion of the energy transition and climate change (Litecc) and the 2020-2050 Long-Term Strategy on Energy and Climate Change should lead to a decrease in greenhouse gas emissions and ensure carbon neutrality is achieved by 2050.

As the experts explain, mountainous areas are among the first to notice the effects of climate change. Andorra, where the signs are already noticeable, is a particularly vulnerable country due to its dependence on snow tourism, which is why it's essential for it to make a firm undertaking to prevent an increase of more than 1.5ºC (compared to pre-industrial levels) by the end of the 21st century.

For this reason, the set of actions launched in recent years and the short and mid-term objectives are ambitious and will hopefully lead to a decrease in emissions while promoting an improvement in the quality of the environment, with benefits related to human health and a positive impact on the prevention of potential natural hazards stemming from climate change.

In 2020 Andorra was one of the first countries in the world to update its nationally determined contribution with a document by means of which countries can demonstrate their efforts to reduce national emissions and adapt to the effects of climate change. The above once again demonstrates the importance of Andorra's commitment to the fight against climate change. Similarly, on 23 January 2020, the General Council approved the Agreement on the acknowledgement of the climate crisis and the declaration of the state of climate and ecological emergency, which tasks the Government with different actions in this area.

Some initiatives are already having an impact on our reality, such as the confirmed increase in the contribution of renewable energies to the national energy package. The actions triggered by the Government are necessary and the objectives it has set won't be achieved without a robust, realistic and ambitious roadmap. However, we won't achieve a long-lasting energy transition if we aren't able to secure a real accompanying social transition to ensure that everyone in Andorra is informed, aware and capable of applying this indispensable change of model to society so as to combat climate change.

As Prime Minister Xavier Espot declared on 12 December at the 2020 Climate Ambition Summit:

“The Principality of Andorra’s commitment to climate change remains firm and, despite the exceptional situation, we’ve worked tirelessly to reinforce our fight against climate change. (...) We’re convinced that only the coordination of all our intense efforts will allow us to reverse the current trend. Let’s be ambitious!”

Sílvia Calvó Armengol
Minister of the Environment, Agriculture and Sustainability

The Long-Term Strategy on Energy and Climate Change

Contents

Annexes to the Long-Term Strategy on Energy and Climate Change

1 Introduction and diagnosis of the current situation

Evidence of climate change in the Pyrenees and Andorra

Mountainous territories such as Andorra are particularly sensitive to the effects of climate change[1]. Therefore, although the country's emissions account for a tiny share of the global total (less than 0.001% in 2017), the Long-Term on Energy and Climate Change must set the path towards implementing firm, decisive and immediate climate action that integrates the initiatives required to achieve a territory which is more resilient to this climate challenge.

A recent study titled *Climpy*[2] shows how **the evolution of the average temperature in the Pyrenees has been +0.24ºC/decade and the evolution of the average annual rainfall has totalled -1.87% between 1959 and 2015** (according to the 1981-2010 reference period), and that these impacts have been most noticeable in summer and spring in terms of temperature and in winter and autumn in terms of rainfall.

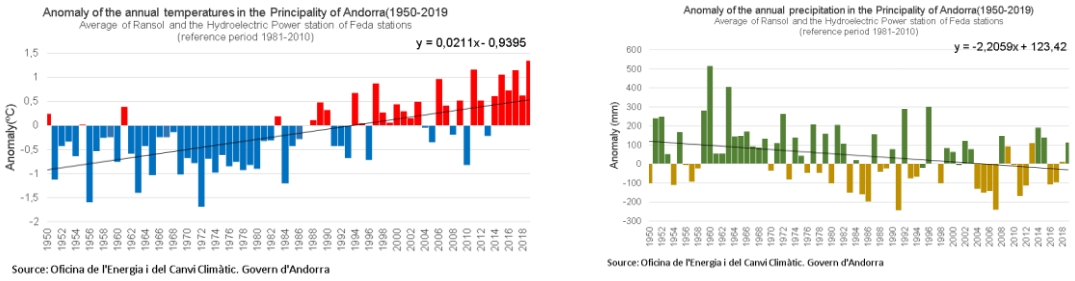
The same study also evaluates the trend of the snow cover in the Pyrenees. Overall, the study highlights the fact that the snow cover decreased between 1958 and 2017 and that the most noticeable reduction can be detected above an altitude of 2,100 metres. One of the analyses carried out within the framework of this study addresses the evolution of the days with snow cover via satellite images and, although there is no statistically representative data history, a certain downward trend can be observed.

Similarly, one of the main conclusions drawn by this study is that **it is essential to continue with the systematic observation of these climate indicators.**

According to the results of the study, the upward trend in the temperature will persist with different intensities during the 21st century (depending on the evolution of the greenhouse gas concentrations) and, **in any event, the maximum daily temperature is expected to increase by between 4ºC and 6.3ºC with respect to the average values for the 1986-2005 period, while the rise will total between 3.2ºC and 4.9ºC for the minimum temperature.**

In the specific case of Andorra[3], as demonstrated by the climate data on annual average temperatures and rainfall in the 1950-2019 period under study (Chart 1), the average annual temperature has risen by +0.21°C/decade and, if we analyse this evolution over the last 50 years (1970-2019), the increase is even more remarkable, totalling +0.36ºC/decade. The average annual rainfall has fallen by -22.01 mm/decade since 1950 (Chart 2).

[1] High mountains are some of the areas particularly sensitive to the effects of climate change, according to the fourth report (2007) published by the IPCC (Intergovernmental Panel on Climate Change).
[2] Study conducted by the Pyrenean Climate Change Observatory (OPCC); this is a cross-border territorial cooperation initiative on climate change launched in 2010 and headed by the Pyrenees Working Community (CTP), seeking to monitor and understand the phenomenon of climate change in the Pyrenees. This initiative enjoys the support of the Government of Andorra, together with the Pyrenean regions of the two neighbouring countries.
[3] According to the data provided by FEDA's Central and Ransol weather stations and processed by the Andorran Meteorological Service.



Charts 1 and 2. *Evolution of the anomaly of the average annual temperature and rainfall in Andorra (1950-2019) according to the 1981-2010 reference period. Source: the authors, based on the data from two weather stations (Central and Ransol)*

The annual climate bulletins published by the National Meteorological Service contain updated data on climate anomalies in the Principality and related events.

Upon the basis of the results of the PAAC (participatory process for the adaptation of Andorra to climate change) in 2014 and the foundations of scientific knowledge of the impacts and vulnerabilities of the Pyrenees in the face of climate change[4], Annex 1 lists the main impacts and associated vulnerabilities for the socio-economic and biophysical sectors and indicates the degree of prioritisation resulting from the above-mentioned participatory process. The set of identified impacts have been grouped together as much as possible to obtain an overall diagnosis to facilitate analysis of the situation.

The most recent studies carried out within the framework of the Pyrenean Climate Change Observatory serving to identify the chief impacts and vulnerabilities in the face of climate change (Annex 1) include the Canopee project, which, following on from the Bosc project, has provided an assessment of the impact on the forest masses by means of the phenological observation of different species, the evolution of the defoliation and the distribution by climatic areas. The main results worth highlighting are that climate change can lead to changes in structure, composition, health status, areas of geographical distribution and vulnerability to external phenomena (pathogens, climate phenomena, etc.).

In addition, the Florapyr project, a continuation of the Biodiversity project of the Pyrenean Climate Change Observatory (2011-2014), has led to an updated version of the *Atlas of the Flora of the Pyrenees* and triggered a device to monitor Pyrenean snowdrifts. The results show how the flora and vegetation of the Pyrenees are likely to be affected by climate change, with consequences both for the maintenance of this exceptional heritage (species, communities, landscapes and living conditions) and for the value of the resources they constitute.

Finally, the Replim project has characterised the impact of climate change on high mountain wetlands and aquatic ecosystems particularly vulnerable to the above effects. Climate change in the Pyrenees will affect the ability of these ecosystems to be carbon sinks and regulators of the quantity and quality of the water in the safeguarding of biodiversity.

The purpose of the Piragua project currently underway is to analyse the hydric resources in the Pyrenees and identify the main problems and the adaptation initiatives to be undertaken. This issue is particularly sensitive in a territory such as Andorra due to the multi-sectoral nature of the uses of this resource.

[4]Study *Climate change in the Pyrenees: impacts, vulnerabilities and adaptation* (2018), conducted by the Pyrenean Climate Change Observatory (OPCC).

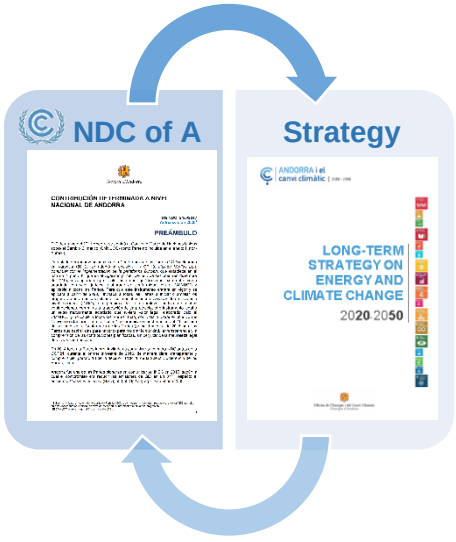
Active commitment in the face of climate change

Given that the effects of climate change are already perceptible, the set of actions defined by the Strategy are not only goals to be achieved in the long term, but also short and mid-term objectives, given the urgency of the need to act on a global scale.

The commitments currently made at a global level in the field of mitigation propose a future scenario very different from the objective defined by the United Nations Framework Convention on Climate Change (UNFCCC), namely preventing any rise in temperature beyond 2ºC (compared to pre-industrial levels) by the end of the 21st century. However, the scientific community has emphasised the importance of taking the action required to prevent any rise in global warming beyond 1.5ºC with respect to pre-industrial levels and the international call to overcome this challenge is increasingly intense.

Andorra therefore supports the implementation of the actions envisaged in the Paris Agreement entailing a reduction in domestic greenhouse gas (GHG) emissions until carbon neutrality is achieved[5]. In addition, in domestic terms, reducing emissions will lead to an improvement in the quality of the environment, with benefits for human health and a positive impact on the prevention of the potential natural risks associated with climate change. In both cases the goal is to ensure better quality of life for present and future generations. At the same time, the energy transition must allow the creation of a new ecosystem that promotes high added value activities, thus improving the diversification of our economy.

The Strategy establishes the mid and long-term goals and is sustained by the updates of the Principality's nationally determined contribution (NDC), a statistic which demonstrates its efforts to reduce its domestic emissions and adapt to the effects of climate change in accordance with the Paris Agreement (article 4, paragraph 2).



Subsequently, on 17 April 2019, the Council of Ministers approved the National Strategic Plan for the implementation of the United Nations 2030 Agenda for Sustainable Development, which complements these international objectives and transfers them to a national level.

[5] These actions are specified in the nationally determined contributions (updated in 2020) declared to the Secretariat of the United Nations Framework Convention on Climate Change.

National Law 21/2018 of 13 September on the promotion of the energy transition and climate change (Litecc) establishes the energy-related future of Andorra and defines its objectives in the area of climate change, while, more recently, on 23 January 2020, the General Council approved the Agreement on the acknowledgement of the climate crisis and the declaration of the state of climate and ecological emergency, which tasks the Government with different actions in this area.

In response to these commitments and the above-mentioned regulations, the Long-Term Strategy on Energy and Climate Change is Andorra's roadmap for addressing climate change and increasing its resilience to its effects while, in terms of emissions, it will seek carbon neutrality in keeping with the Horizon 2050. To achieve this goal, the Strategy also seeks to reduce the carbon footprint[6] of the sectors in the country that emit these gases.

Annex 2 of the Strategy outlines the national and international regulatory contexts in greater detail and is correlated with the objectives, milestones and programmes that have been set.

Characterisation of the greenhouse gas emission and absorption sources

The calculation of the GHG emissions is based on the information available and is subject to a process of continuous improvement, in such a way that it should be understood that the GHG emission values lack accuracy but enable us to assess the relative importance of each sector with regard to the entirety of the emissions and therefore identify the areas of action to be prioritised. The calculation is performed in accordance with the guidelines defined by the International Panel of Climate Experts for the determination of the national inventories. However, given the systemic vision that this Strategy seeks to provide, the information on GHG emissions expands its scope to emissions that are not included in the national inventories, e.g. emissions related to the production of electricity beyond national borders.

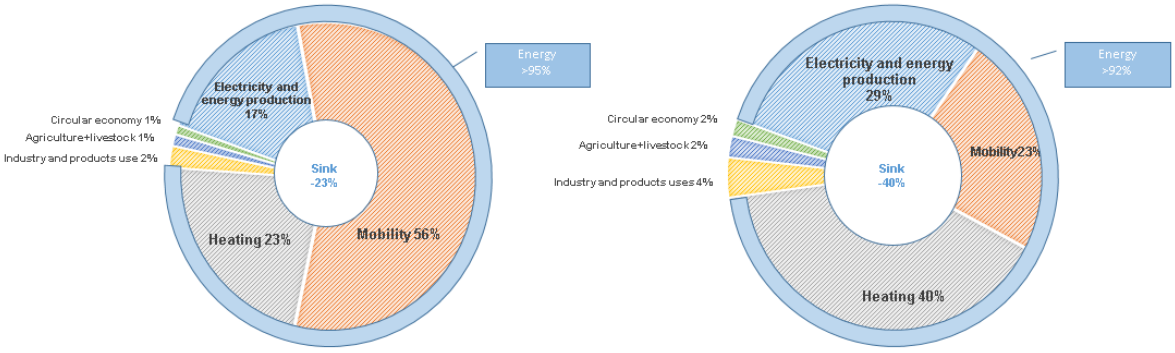
According to the data for 2017[7], about 600 Gg CO_2-equivalent are emitted in Andorra and the country's sinks absorb 23% of them (the sink capacity of the forest mass is almost -140 Gg CO_2-equivalent/year). However, these data are obtained by calculating all the fuels sold in the country[8] but, if only emissions produced by domestic traffic are taken into account, the emissions actually attributable to the activity carried out within the territorial boundaries amount to approximately 340 Gg CO_2-equivalent and the absorption by the sinks totals 40%.

In terms of emissions per inhabitant and year, the values in Andorra stand at around 4.6 tonnes of CO_2-equivalent[9] (a value lower than the average for European countries (6.8 tonnes of CO_2-equivalent per person and year) and those of the neighbouring countries (5.44 and 5.12 tonnes of CO_2-equivalent per person and year in Spain and France, respectively)[10].

Chart 3 shows that the energy sector emits more than 95% of GHG emissions (about 570 Gg CO_2-equivalent/year[11]) and that approximately 56% is produced due to the consumption of mobility-related fossil fuels, 23% corresponds to the consumption of fossil fuels in buildings (the

[6] The carbon footprint is the total amount of greenhouse gases (GHGs) directly or indirectly emitted due to human activity.
[7] Data drawn up upon the basis of the national GHG inventory submitted in the third biannual update report in compliance with the UNFCCC, to which the GHG emissions related to the consumption of imported electricity are added to assess the country's total carbon footprint.
[8] With high demand for fuel tourism.
[9] Indicator calculated according to the census population (source: Department of Statistics of the Government of Andorra) and GHG emissions, without taking fuel tourism into account.
[10] Source: *Fossil CO_2 & GHG emissions of all world countries*, EDGAR (2017). The data in the report are indicators for 2016.
[11] A gigagram (1 Gg) is equivalent to 1,000 tonnes.

commercial, institutional and residential sectors) and 17% to electricity consumption and energy production. Moreover, the forestry and other land use sector absorbs approximately 23% of the emissions generated, while the country's forest mass, which covers 40% of the territory's surface area, is the chief absorber of these emissions (-140 Gg CO_2/year).



Charts 3 and 4. *Source of the GHG emissions in 2017, taking into account all the emissions produced by mobility (left) and only internal mobility (right). (Source: the authors, based on the data from the national GHG inventory)*

One characteristic feature of energy consumption in Andorra is the significant influence of fuel tourism, in other words, the amount of fossil fuels for road transport sold in Andorra but actually consumed in the neighbouring countries. If we integrate the data obtained from the analysis of the evolution and composition of traffic in the country showing that approximately 76% of fuels for road transport are consumed outside Andorra,[12] the data change significantly. Despite the fact that the energy sector remains the main source of GHG emissions (Chart 4), the forests' capacity to absorb GHG emissions accounts for almost 40% of the emissions actually generated in the country. Approximately 23% of emissions correspond to the consumption of mobility-related fossil fuels, 40% correspond to the consumption of fossil fuels in the residential, commercial and institutional construction sector and 29% of the emissions correspond to electricity consumption and energy production.

Therefore, the management **of the energy sector and the forest mass within the territory gives rise to two key elements** of Andorra's contribution to the fight against climate change. As a result, the strategic policies must be geared primarily, albeit not exclusively, towards achieving key objectives in these two sectors.

Carbon neutrality entails a balance between GHG emissions and carbon sequestration in natural ecosystems such as forests, the main carbon sinks currently in existence in Andorra. The importance of the ecosystem services and so-called "nature-based solutions" is thus highlighted.

The cross-cutting nature of energy and its global importance mean it is essential to fully integrate the energy policies into the future strategies, prioritising the sustainable development of our economy and society.

As for energy sources, 80% of electricity is imported[13] (see Chart 5, which shows the sources of electrical power in the country), as well as almost 100% of thermal energy and any which is required for mobility. This leads to external dependence totalling more than 90% of the total energy demand, constituting a risk to the energy supply in the event of potential fossil fuel price

[12] Source: *Analysis of the evolution and composition of traffic in Andorra (1990-1995-2000-2005-2010-2012) conducted by DOYMO* (2014).
[13] Source: FEDA (https://www.feda.ad/energia-i-meteo/energia)

crises and generating uncertainty and vulnerability for the national economy. As shown in Chart 5, almost all the energy produced in Andorra comes from renewable sources.

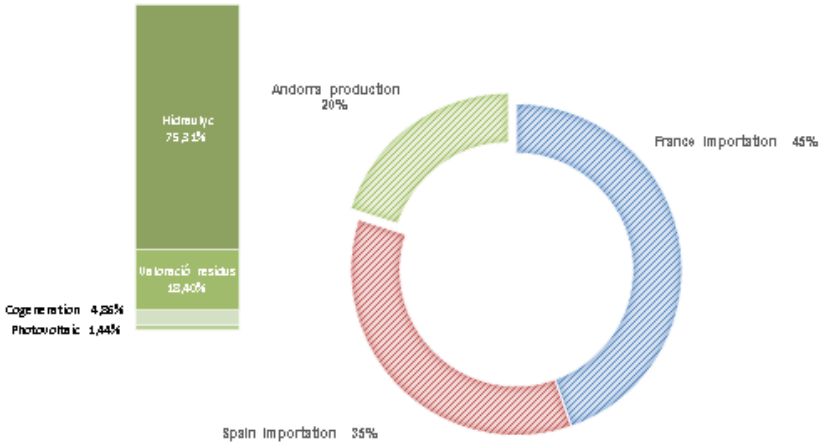


Chart 5. *Energy source (source: the authors, based on data from the Office of Energy and Climate Change (2019)*

It should be emphasised that, although the consumption of fuels for road transport constitutes one of the main sources of GHG emissions, the trend since 2010 has displayed a certain stabilisation in terms of consumption, despite a continuous rise in the size of the fleet. This situation is the result of the enhanced technology within the sector, albeit a very incipient one, and the arrival on the market of electric vehicles, which accounted for 568 of the total of 81,284 (47 electric vans, 443 electric cars and 75 electric motorbikes), is more visible, with the respective percentages in each category totalling 1.2%, 0.73% and 0.51%.

2 The Long-Term Strategy on Energy and Climate Change

The Long-Term Strategy on Energy and Climate Change implements article 10 of Law 21/2018 of 13 September on the promotion of the energy transition and climate change (Litecc). It has been drawn up by the Ministry of the Environment, Agriculture and Sustainability (to which the Agency of Energy and Climate Change reports) and reviewed within the framework of the National Energy and Climate Change Committee. In addition, to support the global movement towards carbon neutrality, **Andorra contributes to the general efforts to achieve the above by 2050** by significantly increasing the targets set by the Litecc.

What is it?

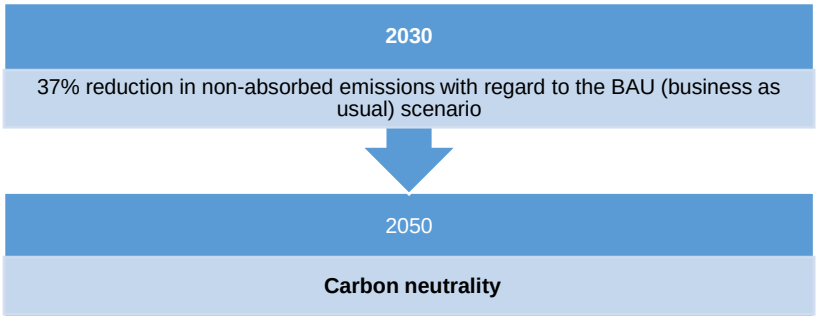
It is the instrument that allows the planning, coordination and rationalisation of the actions, measures and projects to combat climate change and the achievement of the goals of Law 21/ 2018 of 13 September on the promotion of the energy transition and climate change (Litecc) in a way that is binding on the Public Administration.

The commitment to achieve carbon neutrality by 2050 is a highly ambitious goal given the current GHG emissions within the territory, although it is regarded as a minimum commitment objective to be achieved. If the global situation and the technology available in the future make a reduction beyond this commitment possible, the achievement of a more ambitious fall will be pursued with the aim of reducing emissions below the territory's sink capacity.

The activities may be aimed at specific sectors such as energy, mobility, agriculture and waste management and include different sectors to address more cross-cutting issues such as the promotion of the circular economy, changes in our consumption habits, the promotion of research in the above areas and the inclusion of new concepts in the sensitisation of all the citizenry.

The main objectives set out in the Strategy are:

- **Achieve carbon neutrality by 2050:**



- **Reinforce resilience to the effects of climate change** by means of a national climate change adaptation plan.

The Strategy is expected to be reviewed at least every six years in order to adapt it to new technical, economic and social knowledge and any new obligations arising from the international situation, depending on the achievement of the objectives established in each area. Therefore, the path towards carbon neutrality, taking into account each of the planned reviews of the Strategy, should be as follows (Chart 6).

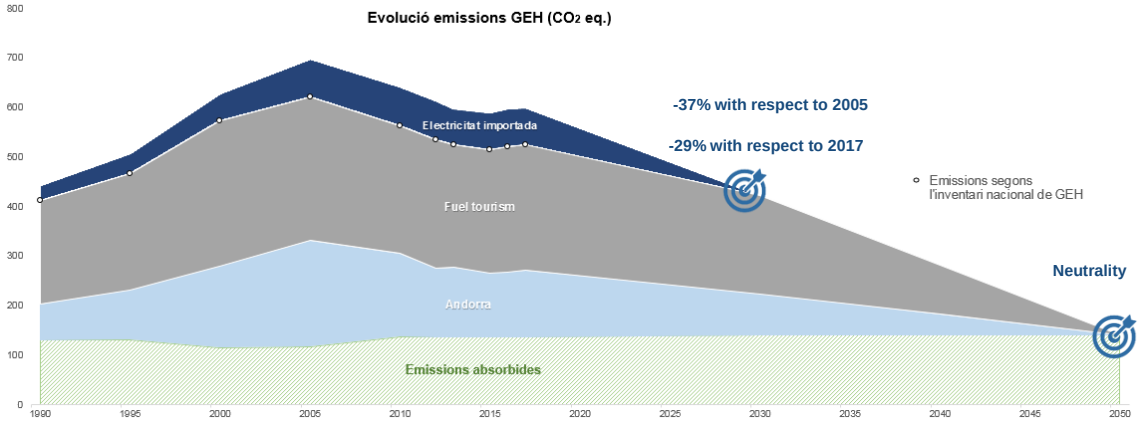


Chart 6. *Evolution of GHG emissions and periods for the review of the National Energy Strategy for the Fight against Climate Change to achieve carbon neutrality by 2050*

The Strategy consists of **five action programmes and seventeen activities** to meet the emission reduction targets for achieving neutrality by 2050, developing a climate change adaptation plan to address the current and projected situation, structuring a funding system to carry out the planned actions, sensitising, educating and training the population and performing the research and innovation tasks required to understand and respond to the new environmental and technological challenges.

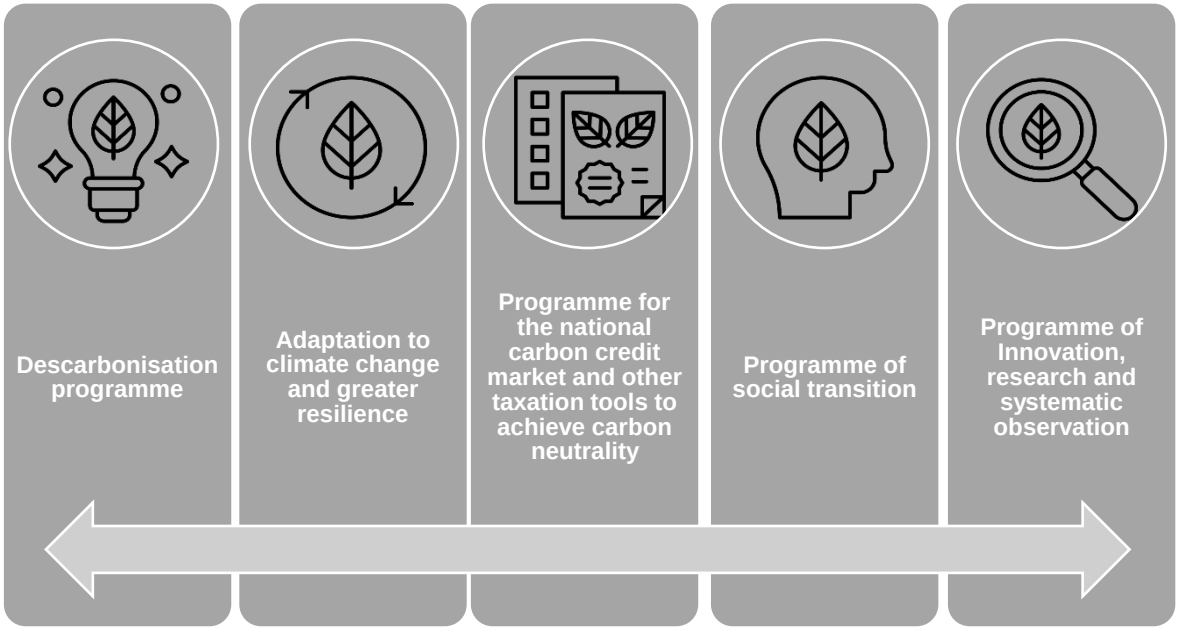
Based on the above diagnosis and bearing in mind that 95% of GHG emissions come from the energy sector, the Strategy's first programme must focus on decarbonising this sector as well as other equally strategic sectors with fewer emissions (**programme I**). At the same time, given that the effects of climate change in Andorra are already noticeable (see section 1 titled Evidence of Climate Change in the Pyrenees and Andorra), it is essential to work on adapting to this phenomenon to reduce risks and improve the country's resilience (**programme II**).

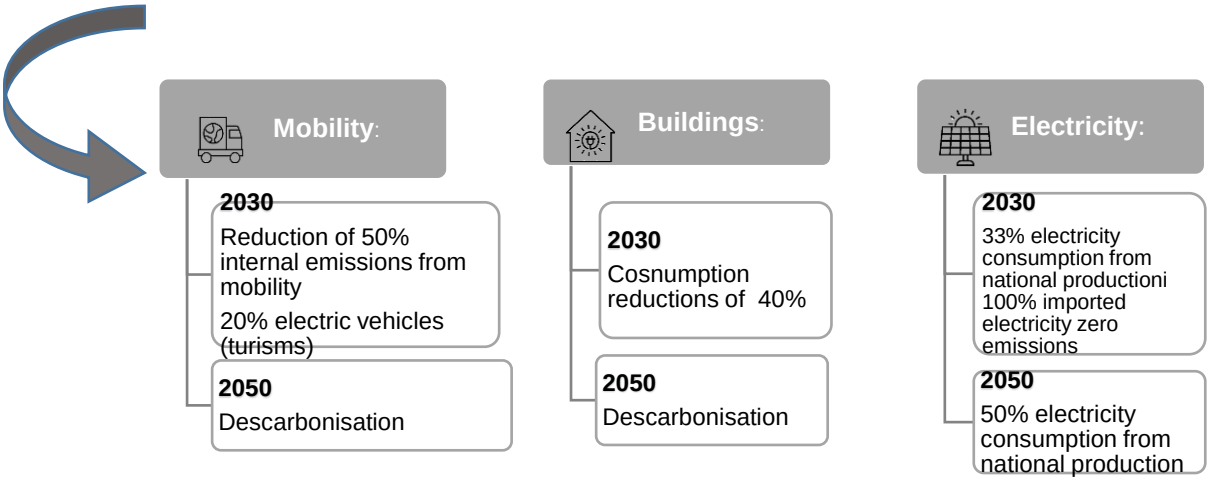
In order to achieve the mitigation and adaptation objectives it is vital to anticipate their financing system, as a result of which the programme for the national carbon credit market and other taxation tools has been created to contribute to bearing the cost of the implementation and functioning of the activities envisaged in the Strategy (**programme III**).

Finally, it is important to emphasise that this is a relatively recent problem with a significant degree of uncertainty and, therefore, the mechanisms to promote innovation and research must always be reinforced to implement the most advanced technologies and continue with a systematic observation of the phenomena that occur in order to readjust the planned activities (**programme IV**).

However, it will not be possible to make a paradigm shift in the energy sector and the fight against climate change without the implementation of a social transition allowing the education, training, sensitisation and empowerment of society as a whole with regard to the importance of these strategic goals and the changes in habits required to achieve them (**programme V**).

Each of the above-mentioned programmes is broken down into a set of activities that will be conducted in different actions. The Strategy has a set of indicators, as shown in Section 4 titled Strategy Indicators. The set of programmes and specific goals for the decarbonisation programme are shown in the following image:





The set of programmes also permits a response to the regulatory framework and international commitments in the area, as well as the challenges concerning adaptation and the fight against climate change detected in the Pyrenees. Annex 2 schematically displays the relationship between the Strategy and this national and international regulatory framework.

3 The Strategy's action programmes and activities

The five (5) programmes and the seventeen (17) activities planned are as follows:

I. **Decarbonisation to achieve carbon neutrality: national action programmes to mitigate greenhouse gas emissions**

1. Energy transition
2. Sustainable, connected and safe mobility
3. Agriculture and forest management respectful towards the territory's sink capacity
4. Circular economy
5. Industry and use of industrial products

II. **National action for adaptation to climate change and greater resilience**

6. Plan for adaptation to climate change
7. Promotion of nature-based solutions for greater resilience

III. **Programme for the national carbon credit market and other taxation tools to achieve carbon neutrality**

8. National carbon credit market and renewable energy
9. Green Fund and other taxation tools

IV. **Social transition**

10. Sensitisation and dissemination regarding carbon neutrality
11. Educational transition
12. Training to achieve carbon neutrality
13. User information and protection
14. Participation of the different agents in the process to achieve carbon neutrality

V. **Innovation, research and systematic observation**

15. Innovation
16. Research and knowledge transfer
17. Systematic observation

Programme I. Decarbonisation to achieve carbon neutrality: mitigating greenhouse gas emissions

The Strategy seeks **carbon neutrality** by 2050. The concept of carbon neutrality has increased the awareness of a wide range of actors in light of the challenge of combating climate change, thus facilitating the empowerment of all the agents in this stage of the transition, a process essential for adapting to and dealing with this climate phenomenon.

In Andorra, the far-reaching decarbonisation of the energy sector is a key condition for achieving the most demanding objectives in the fight against climate change, given that this sector accounts for 95% of the country's global GHG emissions. Within this sector, approximately 56% of emissions correspond to energy consumption associated with mobility (23% if only internal mobility is included) and 24% to the energy consumption of buildings (40% if only internal mobility is included).

Therefore, the **decarbonisation programme (I)** sets out the **energy transition** required to reduce energy consumption, improve energy efficiency and promote energy production from renewable sources, among other targets. Similarly, decarbonisation also encompasses a shift of model towards **more sustainable, connected and safer mobility**. The National Sustainable Mobility Strategy therefore needs to be developed.

Although the other economic sectors account for less than 5% of domestic GHG emissions and given that the mitigation actions often represent synergies with each other, the decarbonisation programme also aims to boost the **circular economy** as a new economic model for promoting savings on resources, chiefly materials, energy and water, and generating fewer emissions than the linear consumption models developed until now. Similarly, actions are planned in the field of **industry and the use of products**.

As for the primary sector, contrary to what occurs in most countries which is responsible for a significant part of the emissions, there is a radically different situation in Andorra, as the forest management sector is the only existing CO_2 sink. Approximately 23% of the GHG emissions emitted are absorbed by the forest mass, which covers 40% of the country's surface area (191 km^2). Therefore, in order to achieve carbon neutrality, the Strategy includes **agricultural and forestry management to ensure the maintenance and improvement of the country's sink capacity**.

Activity 1. Energy transition

The main objectives in terms of the energy transition are the improvement of the electricity sector, the promotion of renewable energies and high-efficiency energy technologies and the encouragement of energy savings and energy efficiency, particularly in construction. More specifically, the set of activities envisaged for each of these sectors are summarised below.

As for the promotion of energy production from renewable sources, it is essential to promote new investments to develop the existing production potential in the country by means of the forecasts established in the Sectoral Plan for Energy Infrastructures [14] (PSIEd'A) in terms of solar power, hydraulic energy and biomass use. The production potential of these renewable sources in accordance with the Plan is chiefly based on the production of photovoltaic energy, followed at a considerable distance by energy production based on hydraulic power and the use of forest biomass, in such a way that the diversification of energy production is pursued at the same time. At the time of the writing of the PSIEd'A the potential for wind energy production was also studied and estimated at 67.4 installed MW and production totalling 154.1 GWh/year, in accordance with the technologies available at the time of the study (2017) and the locations deemed most suitable from the point of view of production, execution costs, the environmental impact, etc. The deployment of this technology must also be the subject of sectoral planning, in accordance with the provisions of the Qualified Law on the delimitation of the powers of the communes.

The Strategy must promote the evolution of the energy system towards internal production on large, medium and small scales with the encouragement of self-consumption and electricity production from exclusively renewable sources. Therefore, Law 21/2018 stipulates the granting of aid for the promotion of distributed electricity generation and self-consumption, while the provisions of Law 21/2013 specify aid for the acquisition and installation of equipment for micro-cogeneration and electricity generation using renewable sources.

[14] The Sectoral Plan for Energy Infrastructures in Andorra was approved by the Government on 16 May 2018.

In this regard, it is possible to study tools to promote the self-consumption of electricity, including relocated consumption based on the establishment of an “energy transport toll” allowing electricity to be generated by an owner and consumed at another point in the territory as if it were its own energy in exchange for paying a toll for the cost of transporting the energy to the point of consumption.

In the specific case of the exemplary role of the communal public administration, the Litecc states that the communes must work on creating a value chain based on the management of the communal forest masses for energy use, thus primarily covering the thermal needs of their buildings.

Buildings are a key factor in energy consumption for driving the energy transition, as they are some of the chief consumers of electricity and fossil fuels. The implementation of energy saving and efficiency measures in the building must be guaranteed at the time of the design of the buildings and during their use. To this effect, sufficient regulations must be implemented to ensure that newly-built homes have nearly zero-energy consumption and incorporate a minimum percentage of in-situ energy production based on renewable sources, adapting the urban planning regulations if necessary. As for the new housing stock, the resulting plan must encompass the possibility of implementing centralised heat networks in the action units in the phase prior to the building projects, in such a way that it will be necessary to adapt the urban planning regulations to include these energy studies in the planning phase. In the case of the existing housing stock it is important to maintain and further the momentum of energy renewal and refurbishment by means of aid programmes and preferential funding systems. One example is the aid for the refurbishment of the housing stock (the Renova programme); a large part of this line of aid is intended for energetic improvements to the stock in existence since 2011. This programme should also focus on the refurbishment of buildings in a more unfavourable energy situation and thus encourage energy improvements in often older buildings that have poorer energy ratings.

The Public Administration has an exemplary role to play in creating a new model of energy consumption and, therefore, lighting systems and public buildings must meet energy efficiency criteria and have high-efficiency production systems or renewable energy sources, especially those produced in situ. In order for public buildings to guarantee the transition to carbon neutrality during their operation, the Litecc envisages integrating the position of the energy manager into the public operational organisation charts. Energy audits in heated buildings are a mandatory tool of the Litecc, in such a way that the planning of the execution of all the audits required 2022 is an action that needs to be expedited.

As well as the energy consumption of public buildings, any work or service must apply energy efficiency criteria.

It is therefore necessary to encourage companies to implement environmental management systems within the framework of their corporate responsibility, integrating GHG emissions and, therefore, energy efficiency into their operations and including these voluntary systems in the criteria for assessing public tenders or providing tools for calculating GHG emissions within organisations, such as the dissemination of the simplified emission calculation tool that the Government provides free of charge.

Activity 2. Sustainable, connected and safe mobility

The mobility sector accounts for 56% of GHG emissions and internal mobility is responsible for approximately 24% of the emissions produced by this sector, according to the data for 2017. For this reason it will be necessary to develop a **national mobility strategy** with the aim of reducing emissions and respecting the hierarchy in the prioritisation of transport systems established in the Litecc; firstly, it will be essential to prioritise public transport and promote motorised or assisted

non-public mobility (walking, cycling, etc.) and, secondly, electric motorised mobility without a source of GHG emissions.

With the aim of reducing the consumption of fossil fuels in transport, it will be necessary to study alternative means of transport (e.g. cable transport) interoperable with each other and accessible in terms of mobility and economic competitiveness. In addition, according to the Litecc, the administrations, public entities and companies with more than one hundred workers must have a sustainable mobility plan for their workers, according to the hierarchical criteria mentioned above. These plans should evaluate the possibility of reducing travel by means of reorganisation and changes in operation such as teleworking. These mobility plans must provide the necessary elements to promote the use of bicycles when travelling, such as having indoor parking or charging points for electric bicycles.

The experience of the pandemic caused by COVID-19 in 2020 has shown how policies to restrict mobility, which have forced the implementation of teleworking or reduced mobility to essential minimum levels, could mean the country witnesses a 52% reduction in GHG emissions if they are maintained throughout a year (see Chart 7), taking into account domestic mobility, fuel tourism and the reduction in electricity consumption. This reduction in GHG emissions is accompanied by an improvement in air quality, especially with the reduction of NO_2 levels, with values 70% lower than usual. Although this situation is not a desirable one, the post-COVID-19 policies must take into account the connection between health, air quality and climate change, in such a way that positive experiences need to be drawn from them, assessing the possibility of incorporating those that allow us to better reconcile the impact on GHG emissions and the maintenance of the economy into mobility habits.

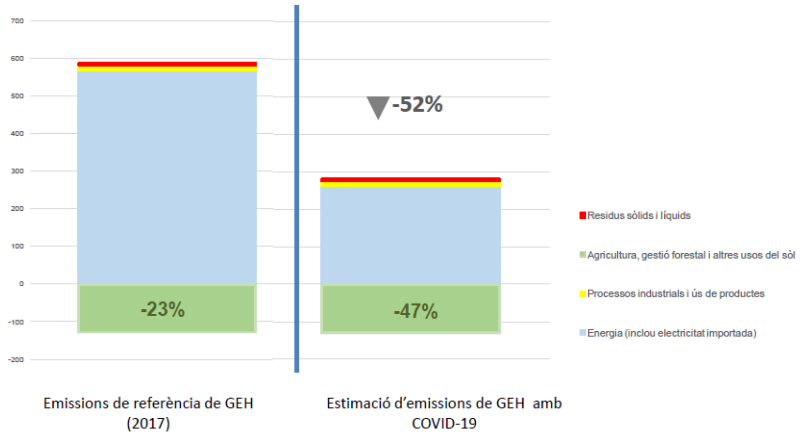


Chart 7. *Comparison of annual GHG emissions with and without COVID-19 (source: the authors, based on data on the reduction of mobility and electricity consumption in the Principality during the 2020 lockdown)*

The promotion of electric mobility should facilitate the energy transition with a reduction in dependence on fossil fuel consumption; therefore, these actions must be accompanied by an increase in the percentage of renewable sources in the country's energy mix (see activity no. 1). Ultimately, renewable energies should be promoted to have greater presence in mobility.

The electrification of mobility requires an increase in the vehicles of this type in both the private and public mobile fleets and the implementation and management of the charging infrastructures for these vehicles must be continued; the aim is to have a fully interoperable and compatible national network and for both publicly and privately owned car parks for public use have these infrastructures. It is vital to ensure that the public parking spaces for cars and bicycles have publicly or privately owned connection elements for electric vehicles in buildings, not only on the public highway. In this regard, the implementation of a regulation that establishes the conditions for the transmission of electrical energy and the possibility of the Administration creating a

mediator and informative campaigns for residents' associations and individuals who want to execute these facilities may be tools to secure the implementation of these infrastructures and private investment in this sector.

Similarly, the possibility of modifying the urban planning regulations governing public car parks must be studied to increase the degree of demand for the availability of spaces for new constructions, in keeping with the aim of introducing electric vehicles.

With regard to the Administration's fleet of vehicles, care must be taken to ensure that 100% of the cars purchased are EVs or ones that don't produce GHG emissions, with the exception of those that cannot be adapted due to service safety requirements. This criterion must be included in any new contractual specifications for this type of product.

With regard to aid for the improvement of the energy efficiency of the vehicle fleet, in 2014 the Government approved the Engega Plan, an aid programme which has assigned financial support to the acquisition of rechargeable electric and hybrid vehicles since 2016. Although this aid programme has caused a relatively insignificant change in the total mobile fleet (0.73% of cars were electric vehicles in 2019), the Plan is thought to be causing a shift in consumption habits towards vehicles emitting fewer GHGs and thus encouraging the electric vehicle market. The Plan needs to popularise the use of the electric vehicle, especially with regard to internal travel in the country, and concentrate efforts on vehicles intended for logistical purposes with more intense use than private ones.

However, aid for sustainable mobility should be diversified and potential allowances or premiums associated with the implementation of charging points or the promotion of individual journeys on foot or by PMVs (personal mobility vehicles without emissions) should be studied via Andorra's public transport integrating platform (Mou_T_B) or any other.

With regard to public transport, distribution logistics, urban waste collection, the construction sector and new piste-grooming machines, among other types of vehicles, it will be necessary to ensure a transition to a model with fewer or zero emissions, using other technologies such as those based on green hydrogen[15].

Activity 3. Agriculture and forest management respectful towards the territory's sink capacity

The agricultural and livestock farming sectors account for less than 2% of the total GHGs (2017), so actions in this sector are not aimed at mitigation but rather at promoting production to boost the consumption of local food and thus reduce food waste and emissions associated with food transport. It is currently estimated that the meat products provided by the country's livestock farmers generates about 1,500 tonnes of food marketed through wholesalers, butchers and restaurants. This amount accounts for approximately 15% of the meat consumed in the country.

Given the uncertainty generated by the current climatic circumstances, the preservation of traditional systems that have adapted over time is essential. Extensive livestock farming is not only able to adapt to climate change but it also helps to mitigate it as a result of its relationship with the environment and the ecosystem services provided by grazing in the form of maintaining the forests, the main sinks in Andorra.

In this regard, it is estimated that the forest mass of Andorra is able to absorb 23% of GHG emissions (2017), in such a way that managing the forests properly and ensuring adaptive forestry as a nature-based solution allowing the maintenance and improvement of the

[15] Green hydrogen, unlike grey hydrogen, is produced using water and electricity from renewable sources. Once produced, it can be stored or used; it recovers energy in the form of heat through direct combustion with oxygen (1) (in the case of hydrogen engines) or in the form of electricity by means of a fuel battery (2). O the other hand, grey hydrogen is produced by bringing methane and water to high temperatures, resulting in hydrogen and carbon dioxide, to which the emissions from the production of heat required for the reaction must be added.

Principality's sink capacity is a key element within the actions to be implemented as part of the Strategy.

Law 7/2019 of 7 February on the conservation of the natural environment, biodiversity and the landscape attributes a multi-functional role to the forest masses (which occupy more than 40% of the country's surface area) in the environmental and economic fields, due to their productive and regulatory role in the biological cycle, its function as a reservoir for biodiversity, its ability to protect the soil from erosion and its social function in aspects related to leisure, recreation and the landscape.

More specifically, Law 7/2019 recognises the forest masses as the main GHG sink in Andorra and recommends managing them as such in response to the global obligations arising from the UNFCCC and the Paris Agreement. Section V regulates the management of the Principality's forest masses and establishes communal forest management plans as basic instruments for regulating them. These plans should preferably incorporate the demand anticipated for the thermal energy needs of the communal buildings into the forest management planning. In this regard, the Sectoral Plan for Energy Infrastructures in Andorra also provides for the use of biomass energy by means of these forest management plans and considers that the management must ensure their maintenance and improve the sink capacity.

In any event, the current sink capacity of the territory is calculated upon the basis of the available data and variables, often national bibliographic sources or other from nearby territories, which outline the most representative scenario of Andorra's forest mass. Within the framework of the drawing up of the national GHG Inventory and in accordance with the guidelines of the IPCC of 2006, this estimate must be continuously improved and therefore it will be necessary to make a systematic observation of the variables that are determined essential to better allocate the Principality's sink capacity. This task is included **in the innovation, research and systematic observation programme (V)**.

Activity 4. Circular economy

After 20 years of the implementation of the National Waste Plan that was approved in 2001 with objectives set for 2020, it can be stated that the goals set out in the Plan have been achieved and the country's waste management complies with the European regulations. Currently, however, in the fields of waste and other areas of production and consumption it's necessary to change the model and move towards a circular economy allowing significant savings in the consumption of raw materials, energy and water. Work is therefore already underway on the drafting of a circular economy bill and a circular economy strategy to be implemented in tandem with it. The general objectives will be to reduce the consumption of materials in relation to the GDP and minimise food waste and waste generation in general.

This regulation will also implement obligations on labelling requirements in relation to GHG emissions from different products and services.

More specifically, the construction sector is a key sector for the reuse of materials such as residual forest biomass for the generation of new building materials. It is therefore appropriate to explore the possibilities in this regard. Similarly, subsidies for products designed to optimise their useful life and to be as efficient as possible, such as the most efficient tyres and the reuse of tyres of heavy goods vehicles by means of retreading leads to reductions in GHG emissions.
Potential allowances or taxation tools should be studied in order to promote these initiatives.

Activity 5. Industry and use of products

The industrial sector accounts for less than 2%[16] of the country's gross domestic product and its share of GHG emissions is small in comparison with other countries (less than 2.5%). However, we must not forget the importance of ensuring the development of a green economy with high value added industries based on clean and sustainable technologies and giving increasing characterisation to this sector in order to specify the appropriate mitigation measures to be undertaken and have a sector which is better prepared for the future changes that may occur, such as the increase in competition for hydric resources, the regulation of the use of certain products with heating power, etc.

The above also applies to the use of products such as refrigerant gases, solvents, foaming agents, aerosols, etc. There is limited knowledge of the use of these products and, therefore, the related diffuse and fugitive emissions, and, although no consumption that could generate significant GHG emissions is expected due to the type of economy and size of the country, it is important to identify the emitting sources so as to define the actions to be implemented.

Therefore, an initial set of actions in this sector require better identification and characterisation of these emission sources and the continuity of the line of work that has been carried out so far to reduce the consumption of gases with high warming potential that have already led to international agreements, such as the Kigali Amendment to the Montreal Protocol to the Vienna Convention.

The proper implementation of the Vienna Convention and its protocols has had positive effects in terms of achieving the objectives of the UNFCCC. Carbon dioxide (CO_2) is the best-known greenhouse gas, but there are others that have a much higher potential greenhouse effect that are of industrial origin, including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). The development of HFCs was a consequence of the Montreal Protocol as a response by the chemical companies to address the ban on the use of ozone-depleting CFCs and HCFCs.

Therefore, the Kigali Amendment, the latest amendment to the Montreal Protocol, seeks to progressively reduce HFCs, which, while not being harmful to the ozone layer and accounting for only a small percentage of the GHGs.in the atmosphere, have an impact a thousand times greater than that of carbon dioxide, due to their global warming potential. These gases are chiefly used in air conditioning and cooling appliances, which are therefore one of the sectors that this Strategy will strive to improve in terms of the quantification and qualification of the gases used in them.

The reduction schedule of the Kigali Amendment for countries such as Andorra (parts classified as "Non-article 5") stipulates that the reduction phase should begin in 2019 and a reduction of 85% should be achieved in its baseline by 2036.

Achieving these reduction objectives entails having a good strategy that envisages both the technical aspects associated with the use of a new generation of refrigeration gases and the essential associated administrative and regulatory adaptations within a context of cooperation with the chief national economic sectors most affected.

This activity is closely related to the 2017-2030 Atmospheric Environment Strategy.

[16] Source: Department of Statistics, 2018

Programme II. Programme for national action for adaptation to climate change and greater resilience

The impacts caused by the increase in the frequency and intensity of extreme weather phenomena and the progressive changes in the climatic conditions of the Pyrenees are already noticeable in Andorra (see section 1 and annex 1). Therefore, the Strategy envisages a national action programme for adaptation (II) to climate change that increases the resilience of the socio-economic and environmental sectors.

Activity 6. Plan for adaptation to climate change

On an international scale the UNFCCC acknowledges the vulnerability of all countries to the effects of climate change. Although the adaptation processes received less attention than the efforts to mitigate GHGs during the first years of the Convention, the need to work on adaptation issues has acquired greater prominence since the publication of the third IPCC Evaluation Report (2001) and all the signatories of the Convention agree that it is of vital importance. In 2010, during the COP16, the process for the national adaptation plans (NAPs) was established to enable the parties to identify their mid and long-term adaptation needs with the aim of developing strategies and programmes to respond to said needs (the Cancun Adaptation Framework). The development of the adaptation plans should be an ongoing, progressive, iterative, participatory and transparent process.

The participatory process for the adaptation of Andorra to climate change (PAACC) was carried out in 2014 with the aims of identifying the potential impacts of climate change on the socio-economic and environmental sectors, assessing the vulnerabilities of each of them and identifying the adaptation measures to address them and reduce their vulnerability. Annex 1 lists the chief impacts and associated vulnerabilities for the socio-economic and biophysical sectors and indicates the degree of prioritisation resulting from the PAACC.

Upon the basis of this work and the information contained the recent report updating the bases of the scientific knowledge with regard to the impacts and vulnerabilities facing the Pyrenees in terms of climate change titled *Climate change in the Pyrenees: impacts, vulnerabilities and adaptation* (2018) performed by the OPCC2 project, Annex 1 lists the main impacts and associated vulnerabilities for the socio-economic and biophysical sectors and indicates the degree of prioritisation resulting from the PAACC. The set of identified impacts have been grouped together as much as possible to obtain an overall diagnosis to facilitate analysis of the situation.

The scientific consensus in relation to the main challenges facing the Pyrenees in terms of climate change, as indicated in the above-mentioned OPCC2 report, is directly correlated with the set of impacts identified for the different sectors in Annex 1 for Andorra and are as follows:

1. Prepare the population to cope with extreme weather
2. Increase safety in view of the natural risks
3. Support the actors from the territory in the event of water scarcity and droughts
4. Guarantee the quality of the surface waters and groundwater
5. Maintain the tourist appeal of the Pyrenees
6. Address the changes in crop productivity and quality and capitalise on the emerging opportunities
7. Anticipate irreversible changes in the landscape
8. Consider the potential loss of biodiversity and changes in the ecosystems
9. Adapt to the imbalances between energy supply and demand
10. Address the increased spread of diseases, pests and invasive species

These challenges are taken into account when defining the Long-Term Strategy on Energy and Climate Change and, in particular, will need to be incorporated when a climate change adaptation plan is defined for the country.

The United Nations recommends that the NAPs include four general and cyclical components: (1) assessment of the impacts and associated vulnerabilities and risks, (2) drawing up of the adaptation plans, (3) implementation of the measures and (4) monitoring and evaluation of the adaptation. 43 measures were identified (table 1) in the 2014 process, of which more than 30% are currently under development. However, it will be necessary to update some of the actions envisaged in the PAACC in order to plan them in terms of time and funding and integrate them into the policies, plans and programmes of the administrations, making it easier to transfer them to the private sector.

Typology of measure	Number of measures	Thematic field
Planning	15	Hydric resource, energy, tourism, natural risks and mobility
Operational	10	Agriculture and livestock farming, health and energy
Regulation	5	Natural spaces, landscape, renewable energies and hydric resource
Research and studies	5	Natural spaces, landscape and natural risks
Sensitisation	3	Hydric resource, energy and natural risks
Financial instruments.	5	Tourism and natural risks

***Table 1**. Number of actions per typology of the PAACC*

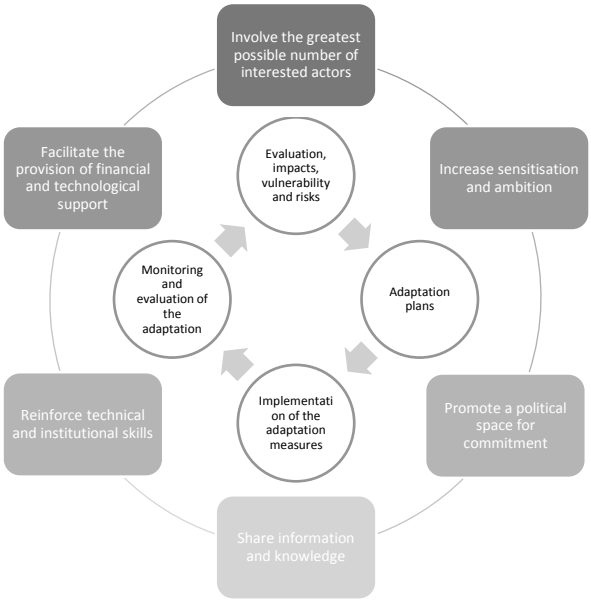


Image 1. *Adaptation cycle under the climate change regime of the United Nations*[17]

For the implementation of the PAACC, the impacts of climate change on the territory of the Principality were identified upon the basis of previous scientific work carried out in Andorra and the Pyrenees as a whole within the framework of the cooperation project of the Pyrenean Climate Change Observatory (OPCC)[18]. To ensure that the adaptation measures are consistent and suited to the real and foreseen changes in the territory, it's necessary to continue studying the impact and vulnerability in terms of climate change and to identify and calculate the indicators required to monitor it properly.

The OPCC, with funding from members of the CTP and the Poctefa programme, is currently developing a Pyrenean strategy for adaptation to climate change as part of the Adapyr project[19] (due to be completed in 2022), in such a way that this document will also constitute a basic tool for defining Andorra's plan for adaptation to the effects of climate change.

In order to plan the actions, priority will be given to studies in the health, agriculture, energy and tourism sectors, as stipulated by the Litecc. To carry out these studies, the Government will rely on the country's research and investigation centres and cross-border territorial cooperation initiatives addressing climate change (without ruling out other potential collaboration).

Activity 7. Promotion of nature-based solutions for greater resilience

If biodiversity and the ecosystems are protected and managed sustainably, they can offer a wide range of services. The sustainable management and restoration of the ecosystems can generate

[17] https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/what-do-adaptation-to-climate-change-and-climate-resilience-mean.

[18] The Pyrenean Climate Change Observatory is a cross-border territorial cooperation initiative on climate change launched in 2010 and conducted by the Pyrenees Working Community (CTP) that seeks to monitor and understand the phenomenon of climate change in the Pyrenees.

[19] Project of the Interreg V-A programme for Territorial Cooperation between Spain, France and Andorra (Poctefa 2014-2020).

social, economic and environmental benefits (e.g. use of the forest biomass), improving the exploitation of natural resources and protecting the ecosystem services that stem from them.

Well-preserved ecosystems have a cushioning effect on the climate and can help to reduce the risks and impacts of extreme weather events such as storms, avalanches and floods, the frequency and intensity of which will be exacerbated by climate change. Preserving and restoring wetlands and riverbank vegetation are solutions that can reduce the intensity of flooding and the damage it causes and protect hydric resources during droughts.

Protected natural areas are among the privileged tools for conserving biodiversity in the face of the main threats and for maintaining the ecosystems' potential for resilience and adaptation. They are therefore receiving increasing recognition as effective, economical and sustainable tools for combating climate change and acting as carbon sinks.

As a result, it is important to envisage measures to prevent the loss of habitats and to manage and control invasive species and those most vulnerable to the effects of climate change. The conservation and expansion of protected areas must ensure the maintenance of biodiversity in the future. These areas must remain connected internally and with cross-border areas of interest in order to allow certain species to move around in the event that future climatic conditions oblige them to do so to survive (a factor of particular importance in mountainous areas where the differences in altitude are significant).

The protected area management plans must incorporate aspects of vulnerability and sensitivity to the effects of climate change and, as appropriate, schedule actions to restore and recover the ecosystems and ecosystem services regarded as priorities. Mechanisms must be provided to ensure that these plans incorporate the results of the monitoring and associated recommendations (see **Programme V, Innovation, research and systematic observation**) in the decision-making processes during the land planning management.

More specifically, the mountain forests help to stabilise the soil and provide protection against avalanches and landslides, as well as being CO_2 sinks. Older and more mature forests are thought to be able to store greater amounts of carbon above the ground (in the trunk and branches) and underground (in the roots), but a well-managed forest (with suitable clearings) further optimises their ability to absorb CO_2.

Identifying the factors that condition the sink capacity of the forest mass and defining the management criteria to be integrated into the different management tools for these areas to optimise said factors are key to improving GHG absorption.

Green spaces also play an important role in urban areas, as they help to combat the effects of heatwaves and cool the air while improving its quality. In addition, reducing the waterproofing of cities helps to minimise the risk of flooding, facilitates the infiltration of rainwater into the soil and restricts surface runoffs. In this regard, it's essential for the urban planning regulations and parish urban development schemes to allow the creation of green roofs and façades, taking into account the limitations imposed by cultural heritage protection and the promotion of natural green public spaces and streets with a greater density of vegetation. Similarly, the use of rainwater is also an important element to be borne in mind for the maintenance and management of these spaces, given the potential scarcity of this resource in the future.

The traditional extensive livestock farming system developed in the Principality has a positive impact on the territory because it indirectly contributes to the cleaning of the forests and mountains, thus minimising the risk of fires and promoting biodiversity. It also naturally fertilises the soil, so there is no need to use synthetic fertilisers. The mowing of the meadows at the bottom of the valley, an activity inherent to livestock farming, is important for the landscape and it also has a positive impact on biodiversity. Encouraging these traditional activities is therefore a significant measure to be maintained and prioritised.

In the same vein, the more extensive implementation of other crop alternatives could be studied, ones based on the application of permaculture techniques to minimise the sector's emissions, maintain the richness of the soil, use water efficiently and so on; in short, sustainable agriculture.

Nature-based solutions constitute an economically viable and sustainable alternative which is often less costly than technological investments or the construction and maintenance of infrastructures in the long term.

Therefore, the consolidation of a territorial management model that takes into account the protection of biodiversity and the extension and enhancement of the forest mass and the ecosystem services[20] will improve the Principality's resilience to mid and long-term changes.

Programme III. Programme for the national carbon credit market and other taxation tools to achieve carbon neutrality

To implement all the actions envisaged for decarbonisation to achieve carbon neutrality and the actions required to ensure proper adaptation to the planned changes, the Strategy includes the programme for the **national carbon credit market and other taxation tools** (III) to sustain **the Green Fund** created by the Litecc.

Activity 8. National carbon credit and renewable energy market

The creation of a voluntary and regulated emission offset system entails the adoption of innovative initiatives in the field of GHG emission mitigation. The implementation of this system is key to supporting organisations, entities and companies within the framework of social, corporate and entrepreneurial responsibility, as it facilitates the offsetting of their carbon footprint and the approval of policies to combat climate change in its operation. Similarly, the articulation of a national GHG emission offset system can serve to encourage and coordinate disperse activities related to the environment to be conducted by institutions and companies. For this system to be reliable it is essential to create the foundations to ensure the full transparency and integrity of the carbon credits that enter the system. Therefore, in parallel with the creation of the emission offset system, it will be necessary to determine a carbon standard that demonstrates the environmental integrity of the carbon credits generated by the different projects and the creation of a credit registry system that clarifies the ownership of the credits and their traceability.

More specifically, with regard to the energy system, mechanisms must be created and the necessary instruments must be provided for the certification of the origin of the electrical power as an incentive to use renewable energies in the field of electricity with the aim of transmitting and marketing this renewable energy by means of guarantee of origin certificates to validate that it is 100% renewable.

To promote the offsetting of GHG emissions, a straightforward tool must be provided to facilitate the simplified calculation of the emissions generated by users who may be interested in them, either at home or in economic activities in the private sector or activities conducted by the public sector.

Within the framework of international commitments, it should be borne in mind that although the Paris Agreement doesn't explicitly refer to the offsetting of GHG emissions, article 6.4 provides for the creation of a new mechanism to support countries in reducing their emissions and

[20] The ecosystem services are generated upon the basis of the functions inherent in the ecosystems and generate benefits for society by improving the economy and the quality of life of people. Ecosystem services that generate provisions of resources and others of a regulatory or cultural nature or supportive of the above can all be identified.

promoting sustainable development and acknowledges the possibility of the parties voluntarily participating to enable them to be more ambitious; therefore, it sets out certain principles that must be complied with, including transparency, environmental integrity and solid accounting. These principles must be taken into account when designing a national carbon credit market.

In this regard, in October 2020, the Government approved its support for the San Jose Principles Coalition for High Ambition and Integrity in International Carbon Markets established in article 6 of the Paris Agreement.

Activity 9. Green Fund and other taxation tools

The Government promotes the Green Fund to encourage plans and actions for the development of climate change mitigation and adaptation initiatives. This Fund, as stipulated by the Litecc, is incorporated into the draft general budget law and is sustained by any earmarked taxes that are determined for this purpose, as well as the complementary budgetary allocations provided for in the State's general budget laws, the donations and contributions it receives and any other potential income. At the same time, the acknowledgement of the climate crisis and the declaration of the state of climate and ecological emergency promoted by the General Council (2020) establishes that the proceeds from the tax on vehicle ownership also sustains said Fund.

Decision 1/CP.21 of the Paris Agreement recognises the need, among other measures, to provide incentives to reduce emissions by means of instruments such as national policies and carbon pricing. In this regard, the regulation of carbon taxes may lead to increases in the prices of fossil fuels, reducing pollution and encouraging the business sector and consumers to choose cleaner and more affordable options. Specifically, the proposal involves creating a price for carbon as an additional element of the general branch of the excise tax on hydrocarbons whose use generates or is likely to generate greenhouse gas (GHG) emissions. Gradually integrating the CO_2 element would internalise the social and environmental costs of the negative effects of fossil fuel use and improve the competitiveness of other less polluting energy sources. Ultimately, the chief goals of a tax such as this one are to send out a price signal to the economic agents and improve the competitiveness of other less polluting counterparties.

These taxes can sustain the Green Fund and other mechanisms for distribution and a return for the citizenry can be studied in the future. This Green Fund should serve to financially sustain aid programmes such as the Engega Plan and the Renova Programme, as well as other aid programmes created to promote mitigation and adaptation initiatives associated with climate change and activities related to the purposes of Law 21/2018.

Similarly, the issuance of green bonds that seek to implement projects for climate change mitigation or adaptation by public and private institutions that are qualified to manage them must allow funding to be obtained from investors interested in carrying out plans that would be more difficult to execute without this fiscal mechanism. These bonds must also comply with the transparency and publicity guidelines required for carbon credits and 100% renewable energy certificates.

Lastly, the implementation of energy efficiency criteria for other national taxes and communal levies must be studied and, if necessary, the regulations should be adapted to apply them and allocate the revenue to climate change mitigation and adaptation projects around the county and in the parishes. In this regard, it will be necessary to study the possibility of subsidising buildings that go beyond the regulatory requirements and achieve the characteristics of passive buildings.

Programme IV. Social transition programme

Technological progress is not enough to limit GHG emissions so as to achieve carbon neutrality, and therefore the transition to a low-carbon economy cannot be solely technological, which is why the Strategy includes a social transition programme (IV) on individual, collective and professional scales.

Society must receive the necessary information by means of **dissemination and sensitisation to achieve carbon neutrality** and an appropriate **educational transition** must be performed to generate a future society aware of the importance of the effects of climate change and individual influence in achieving carbon neutrality. The Strategy also schedules the **training** of the professional sector, a key element in the execution of actions within the framework of the energy transition (energy efficiency, renewable energy production, etc.).

Although the citizenry is aware of the phenomenon of climate change, to ensure that the decarbonisation initiatives related to energy, mobility and the economy are clear and transparent and allow them to act consciously, the Strategy envisages **user information and protection** to provide them with sufficient tools to enable them to make their decisions as active agents with opinions and good judgement.

However, in order for the social transition to be real and close to the needs and concerns of society, the programme includes the **participation of the different actors in the process to achieve carbon neutrality** and ensures that there is institutional reinforcement and the structure and resources required to ensure its functionality.

Activity 10. Sensitisation and dissemination regarding carbon neutrality

The transition towards a low GHG emission economy is not only a technological transition and one of research and innovation, it also entails a change in the habits of citizens (how we move, work, consume, etc.). The role of consumers becomes a key element in ensuring that the transition towards carbon neutrality is a success. Individual decisions when it comes to choosing a home or food or purchasing a vehicle have a direct impact on the carbon footprint of society as a whole.

Some widespread lifestyles around the world, such as long-haul international flights and the generalisation of a meat-rich diet, etc. have an environmental impact and until now technological progress has not been enough to limit their effect on the generation of GHGs (among other environmental impacts), in such a way that the selection of lifestyle choices can make a real difference in terms of the speed at which society can make the transition towards carbon neutrality.

In view of the above, it's important for society to obtain the right information and education so as to make individual decisions with regard to their habits and lifestyles and how they influence society as a whole on the path towards carbon neutrality. For this reason, thematic initiatives such as the holding of international events like Energy Week and other specific actions including Earth Hour and the celebration of historical milestones such as Andorra's accession to the UNFCCC are important for maintaining and improving the content and the scope of the target audience. It is also important to make more technical activities available to the public, such as the international and Pyrenean conferences and the international seminars on climate change conducted by the OPCC which, thanks to remote tools, enable more people to gain access to them and extract the information they regard as relevant in keeping with their interests.

From the standpoint of changing the mobility model, it is important to tell users how their actions can affect GHG emissions, in such a way that informing them about how their emissions can be reduced if they travel on foot or in a PMV via the country's mobility applications such as Mou_T_B is a channel that requires study.

Furthermore, information on the social and economic importance of the ecosystem services and the need to adapt to future climate scenarios will also lead to a positioning closer to the climate reality of society in the face of the management policies that are applied. In this respect, it is vital to obtain more information on our environment and study it to ensure that it is accessible and understandable to the citizenry or any specific public.

However, one of the key elements in terms of sensitisation to reach the citizenry is the business world. Its involvement in sensitisation and outreach initiatives also demonstrates its corporate and entrepreneurial social responsibility and the organisations allow contact with the different employment stakeholders who wouldn't otherwise be easily accessible, including suppliers, customers, etc.

Activity 11. Educational transition

The educational transition must permit the drawing up and implementation of training and educational actions in the fields of climate change and energy, particularly with a view to disseminating the available information on the effect of social positioning on all the socio-economic sectors and biodiversity and the associated ecosystem services and the capacity for future adaptation with the purpose of enhancing the citizenry's knowledge to facilitate conscious decision-making.

The training tools must be adapted to the educational sphere and pedagogical resources must be created and updated in keeping with the available information. It is therefore crucial to include the climate dimension in school syllabuses. The ministry responsible for education will ensure the sensitisation and education of the country's school population with regard to climate change and the national action in accordance with this Strategy.

More specifically, in the case of higher education it will be necessary to cover the climate dimension in the syllabuses of state higher education qualifications within the cross-cutting competence related to the Sustainable Development Goals (SDGs) and, more specifically, the syllabuses developed by the Bachelor's Degree in Educational Sciences.

In addition, the climate neutrality of schools should be included in the Green Schools project as a goal for the participants. The schools' energy audits are a basic tool for this objective; they must be planned in accordance with the deadlines defined by the Litecc (by 2022) in order to ensure sufficient resources. 82% of the country's schools were affiliated to the Green Schools programme during the 2018-2019 academic year and the aim is for all the public and denominational schools to join it.

The set of educational sustainability initiatives must be aligned with the future environmental education strategy for sustainability, as well as the future Pyrenean environmental education strategy, which is currently being drafted as part of the Interreg-Poctefa project (ADNPYR)[21]. It is worth noting that this Pyrenean education strategy to achieve sustainability will include a specific axis related to encouraging the involvement of the Administration and society in climate change mitigation and adaptation.

[21] *ADN Pirineus*, a project for the valorisation of Pyrenean heritage and cooperation with the *Pyreneus Vius* Education Network.

Activity 12. Training to achieve carbon neutrality

Professionals from the energy sector are key players in the transition, which is why it is essential to plan training for technicians engaged in the refurbishment of buildings, the installation of energy production systems from high-efficiency renewable sources, electrical mobility and other more cross-cutting energy sectors such as energy management and audits. Training and retraining programmes must be designed for the professionals in these sectors, ensuring the quality of the training provided, adaptation to the current regulations and their full attendance.

To design these training programmes it will be vital to collaborate with the country's higher education institutions in order to create ones that abide by the principles of the EHEA (student-centred learning and programmes defined by competences and learning outcomes), measured in accordance with the European Credit Transfer and Accumulation System (ECTS) and quality standards.

The professionals' training must lead to the creation of a more competent business environment that offers qualified work in the energy sector and consolidates said sector as having potential for economic growth.

Furthermore, within **the Administration**, the development of the tools, plans and programmes for the mitigation of and adaptation to climate change will require updated and enhanced institutional and vocational training in order to develop new skills, such as planning in accordance with unstable climate scenarios, and apply institutional adjustments to facilitate the implementation of the identified measures.

In this respect, during the international process for the analysis and consultation of the reports issued within the framework of the UNFCCC conducted by climate change experts held every two years, a set of skill development requirements are identified to improve the characterisation of GHG emissions and specify and optimise the most suitable mitigation and adaptation initiatives.

One of the tools to be implemented is a programme to enhance skills and competences related to adaptive forest management and the management of natural areas and the biodiversity most vulnerable to climate change.

Activity 13. User information and protection

According to the Litecc, user information and protection are becoming key elements in the field of climate change. Empowering consumers requires informing them so that they can make their decisions as active agents with opinions and good judgement. This user empowerment will mean the energy policies can be implemented more effectively as a result of the citizenry's decisions, in such a way that the citizenry will drive the energy transition.

At the same time, making information available to consumers constitutes a defence of their rights, which is why the information must be clear, understandable and transparent. The creation of public registries providing rapid access to the information is an important process that requires implementation.

However, general speaking and without limitation, users should be able to obtain information on the following data:

- The contribution of each energy source to the electricity they consume.
- The energy consumption of the properties they live in and public buildings.
- The energy efficiency ratings of the properties they live in.

- Consumption and CO_2 emissions and the rate of ownership of new and second-hand vehicles for sale.
- The energy efficiency of new household appliances that are marketed.

Energy can be regarded as an essential resource, particularly in mountainous areas and in winter. It will therefore be necessary to ensure the quality and reliability of the energy supply by means of a regulation that determines the criteria, to identify users who are liable to suffer from energy insecurity and to provide information to companies and entities within the energy sector on how to act in the above cases. These initiatives must be accompanied by a protocol of action to be applied by the Public Administration in the event that it becomes necessary to protect users.

Activity 14. Participation of the different agents in the process to achieve carbon neutrality

To ensure the participation of the key players in the strategic energy and climate change policies for achieving carbon neutrality, the Litecc (with the unanimous approval of the General Council) has created the **National Energy and Climate Change Committee (CNECC)**. The Committee has a particularly important role to play in the evaluation and monitoring of the national Strategy outlined in this document. This Committee is made up of representatives of the Public Administration, the private sector and the third sector of the Principality, including the National Youth Forum of Andorra, which was also a promoter of the acknowledgement of the climate crisis and the declaration of the state of climate and ecological emergency.

In order to give greater scope to the envisaged participation in the above-mentioned strategic policies, the Committee will approve the creation of the **work sub-committees** required to facilitate the evaluation of the proposals and concerns of the different actors with regard to initiatives under development or in operation, such as the future National Mobility Strategy.

Given that the CNECC is an inter-ministerial committee, this organisation must improve the coordination between the ministries so as to facilitate the prior implementation of the standards by the Public Administration as an exemplary act.

Similarly, to deploy the Litecc it will be vital to obtain the collaboration of the different agents from the public and private sectors and formalise said collaboration by means of cooperation agreements if deemed necessary, In this respect, there are currently several **working groups involved in the area of mitigation**, such as the one that focuses on energy efficiency in buildings, with the participation of the Andorran Association of Architects and the Andorran Association of Engineers, and the one that focuses on vocational training in the energy field, with the participation of the Association of Electricity, Plumbing and Air Conditioning Companies and the Andorran Association of Engineers. There is also the **working group involved in the area of adaptation**, made up of research institutions from the country such as the Institute for Andorran Studies. These working groups will have to be updated and expanded as part of the development of new adaptation and mitigation initiatives, in accordance with the topics that need to be worked on.

The results generated by these working groups may be reported at the meetings of the CNECC if said Committee so requests.

As for the Public Administration, any public procurement of works, supplies or technical services will have to apply efficiency criteria, in such a way that all the **public agents** from the central and communal administrations must be involved in the integration of the actions to achieve neutrality when it comes to defining the bases of the new technical and administrative specifications regulating the awarding of the above procurement.

Finally, it is important to bear in mind the possibility of creating **crowd-funding projects** in the areas of mitigation and adaptation in which any individual, company or organisation can participate in order to implement plans to promote the fight against climate change. These projects

can be launched via a private or public platform and the Administration must promote policies aimed at facilitating the development of initiatives in this regard. These projects also acquire an added value in terms of sensitisation and dissemination.

Programme V. Innovation, research and systematic observation

Lastly, it should be borne in mind that the technologies are evolving very rapidly and that it is urgent to apply the most advanced ones for decarbonisation and adaptation to the phenomena of climate change; the application of these technologies requires their subsequent evaluation by means of the indicators that are defined. In view of the above, the Strategy envisages the **innovation, research and systematic observation programme (V)**.

To ensure that the transfer of all the information generated by this programme is useful and practical, it will be essential to anticipate how the results will be disclosed and how the different players that implement and execute the mitigation and adaptation initiatives within the territory will be involved.

Activity 15. Innovation

As established by the Litecc, the Public Administration must promote innovation, and, to do so, it will be necessary to encourage interaction among the different agents in the economic and scientific systems so that they can study, evaluate and determine the usefulness and appropriateness of certain technologies and measures. It is therefore intended to authorise pilot tests to implement new technologies, particularly within the energy sector. In this regard, a key element that needs developing is a value chain associated with the use of hydrogen and other energy sources such as synthesis gas obtained from renewable energy sources as potential energy for achieving carbon neutrality, particularly within the transport sector and other sectors that are difficult to decarbonise. These forms of energy also allow storage, which is why they can constitute an excellent alternative for storing electrical power from renewable sources and subsequently transforming it into electricity or directly using it as fuel.

One platform that promotes these tests is made up of living labs and care must be taken to include real research and innovation in the fight against climate change.

Activity 16. Research and knowledge transfer

The activities envisaged within the Strategy's programmes will have an impact on the mitigation of GHGs, which are expected to total 21% by 2030 in comparison with the emissions in 2017 (equivalent to a 37% reduction in global emissions with respect to a static scenario for 2030) and 77% by 2050 compared to 2017, thus achieving climate neutrality. Achieving carbon neutrality requires contributions from all the sectors, especially those entailing higher energy consumption, in order to guarantee a sustainable energy transition and maintain the reduction in emissions over time.

Therefore, research and the development of new products, technologies and work methodologies are key to achieving the goals set by the Strategy and international commitments.

One of the lines of research regarded as a priority is the optimisation of the sink capacity of different ecosystems in the country, taking into account the integration of their ecosystem values and the climate neutrality goal which is set.

However, it is not only necessary to conduct research to optimise the reduction of emissions, we must also adapt more effectively and become more resilient. Therefore, the research programmes in the fields of biodiversity, ecosystems, forest management, health, energy and agriculture must be adjusted to prioritise climate factors**.**

Climate projections are an important element when it comes to assessing the incidence of climate change in the different sectors and, therefore, defining the projections on a more local scale will help to improve and adapt the recommendations of the research studies that are conducted.

One of the lines of applied research that needs prioritising consists of nature-based solutions to deal with extreme climatic phenomena, measures that are less costly than the traditional grey ones. The success of measures such as forests to ward off avalanches, which enjoy specific protection due to their function of reducing risks, has already been demonstrated, but other measures, including the treatment of high mountain river courses with nature-based techniques, have not yet been sufficiently tested, particularly given the uncertainty of the pluviometric regimen in the future.

The set of results must be transferred in a streamlined way between the actors with planning capacity and the researchers, and this information must also reach society as a whole in an understandable and useful manner, in such a way that an **information exchange platform** is promoted to bring the research studies closer to the territory's real mitigation and adaptation needs. Knowledge transfer is a key element in the development of new technologies.

Activity 17. Systematic observation

The effects of climate change are already noticeable in the Principality and to improve and envisage mitigation and adaptation initiatives in view of this phenomenon it is essential to monitor the chief indicators, variables and phenomena that provide the most information and best reflect the effects of climate change.

The Government has identified the information required to draw up the GHG Inventory by decree, in accordance with the forecasts defined in the methodologies established by the Intergovernmental Panel on Climate Change in relation to the United Nations Framework Convention on Climate Change (UNFCCC). This legislative tool will institutionally enhance the management of the systematic observation required to sustain the Inventory, a basic tool for steering the mitigation actions to be implemented.

One of the key variables for achieving the Strategy's goals is the improvement of the estimate of the territory's sink capacity, which is currently calculated upon the basis of the data and variables that are available. Within the framework of the drawing up of the national GHG Inventory and in accordance with the IPCC's 2006 guidelines, this estimate must be continuously improved and

it's therefore essential to systematically observe the variables deemed essential for better allocation of the Principality's sink capacity. Another example would be better characterisation and consideration of fuel tourism.

In addition, the National Energy Registry is the tool for centralised monitoring and control of the country's energy flows. The Registry contains information on the amounts of thermal and electrical power produced, distributed, consumed, stored, imported and exported on a national scale. The aim of the National Energy Registry is to determine the country's energy balance from a quantitative standpoint in order to provide objective and transparent information in relation to the results of the national Strategy and the energy policy. In this regard, one of the improvements that should be incorporated is the definition of the emission factors of each energy agent, in such a way that the GHG emission estimates made for the national GHG Inventory are more and more accurate, in accordance with the IPCC's 2006 guidelines.

As well as the climate indicators, among others, it's essential to envisage long-term supervisory and monitoring programmes for the populations of species most sensitive to climate change (e.g. those related to snowdrifts) and the control and monitoring of invasive species in order to plan the appropriate measures to prevent any loss of habitats. Some cross-border cooperation projects such as Phenoclim or Faunapyr generate these kinds of indicators and citizen science is becoming increasingly important in maintaining them over time.

To implement these tasks it will be necessary to obtain the collaboration and cooperation of administrative and research institutions (both domestic ones and others from neighbouring countries and abroad) One key example of the above is the close collaboration with the Centre for Snow and Mountain Studies of Andorra (CENMA) through the Monitoring Committee of the Agreement between the Institute for Andorran Studies and the OECC, which should permit the organisation of the working groups required to plan and carry out the systematic observation of climate change, together with the collaboration with the same institution's Centre for Sociological Research (CRES) so as to obtain information on the perception of the effects of climatic change and the population's anxiety in this matter.

The promotion of cross-border and international cooperation for the development of this programme's activities is of particular importance. This is the case of the Adapyr project conducted by the Pyrenean Climate Change Observatory previously discussed in **programme II, which addresses national action for adaptation to climate change and greater resilience**.

The Agency of Energy and Climate Change plays the role of an integrating agent that compiles all the information generated and a facilitator that engages the different parties so as to ensure that the information resulting from the systematic observation proves useful and allows the adaptation of the energy policies and, more generally, those on climate change within the Principality.

4 Monitoring indicators

A set of quantitative and qualitative indicators are defined to assess the degree of achievement of the objectives set by the Strategy and the need to review and/or modify the associated activities. These indicators are summarised in the following table and constitute an essential tool for the participation of the National Committee in the monitoring of this Strategy. An assessment of the status of the indicators made on at least an annual basis will enable the CNECC to evaluate the monitoring and implementation of the Strategy.

The chief indicators of the energy situation and the fight against climate change in terms of emissions and mitigation are listed below as a summary of the current situation for the monitoring and implementation of the Strategy.

		Current situation	Objective for 2030	Objective for 2050
Global	GHG emissions	600 Gg CO_2-equivalent/year[22] (2017)	-37% with respect to the BAU scenario -21% GHG emissions[23]	Carbon neutrality
	Energy intensity	89 TEP/€M of nominal GDP (2010)	-20%	-30%
	Sink capacity	Approx. -140 Gg CO_2-equivalent/year (2017)	Maintain the territory's sink capacity and improve its quantification	Improve the territory's sink capacity
Decarbonisation programmes to achieve carbon neutrality				
Energy production sector	National energy production	24% (2018)	33%	50%
	Percentage of national electricity production from renewable sources and distribution by source	96% (2018) 75% hydraulic, 18% waste recovery, 5% LNG cogeneration and 2% photovoltaic	>75% Increase energy diversification	>80% Maintain the energy diversification of renewable sources
Mobility	Percentage of electric propulsion vehicles in the car fleet in 2020	1% (554 vehicles)	20%	50%
	Percentage of electric propulsion vehicles in the Administration's car fleet	-	30%	70%
	GHG emissions produced by internal mobility	80 Gg de CO_2-equivalent (2017)[24]	-50% GHG emissions	Decarbonisation
Building	Reduce the building's energy consumption		-40%	Decarbonisation
	Heated public buildings energetically audited until 2020[25]	Government buildings:	100%	-

[22] For international purposes the national GHG Inventory presented within the framework of the UNFCCC includes information on imported electrical power and the GHG emissions for 2017 total approximately 520 Gg CO_2-equivalent (and a balance of 390 Gg CO_2-equivalent).

[23] Or a reduction of 37% with respect to the BAU scenario for 2030.

[24] Taking into account that fuel tourism accounts for 76.1% of the consumption of locomotion fuels.

[25] Both the Litecc and the Agreement on the acknowledgement of the climate crisis and the declaration of the state of climate and ecological emergency stipulate that the administrations have to conduct audits of all their heated buildings by

		31.5% of property: seventeen buildings audited		
Industry and use of products		39 Gg CO_2-equivalent [26]	-85% of the HFC consumption baseline	Identify and eliminate fugitive and diffuse emissions

Programme for adaptation to climate change and greater resilience

Global adaptation indicator	Definition and calculation of a **global adaptation indicator** (quantitative targets are not set until the first indicator and its calculation become available)

Programme for the national carbon credit market and other taxation tools

National carbon credit and green energy market	**Implementation and introduction of market credits** (quantitative targets are not set until the market can operate) Implementation and introduction of green energy certificates, 100% renewable sources
Green Fund and other taxation tools	**Implementation of the Green Fund and evolution of the annual amount in euros allocated to each of the projects** related to climate change (quantitative targets are not set until the Green Fund can operate)

Social transition programme

The citizenry's perception of climate change as a more serious problem	38.6% CRES observatory (first quarter of 2020)	**Increase** the citizenry's perception of the problem of climate change
Families suffering from energy insecurity (user protection)	0,28% (88 families, 2020)	**Reduce the number of families suffering from energy insecurity to 0%**

Innovation, research and systematic observation programme

Systematic observation	**Definition of climate change indicators to be systematically followed**

2022. The aim is to reduce CO_2 emissions; when these tools become available, a sub-indicator corresponding to the energy consumption of these buildings will be considered.

[26] Baseline emissions in accordance with the UNEP's instructions.

5 Monitoring and review of the Long-Term Strategy on Energy and Climate Change

The Long-Term Strategy on Energy and Climate Change enables the Government to plan, coordinate and rationalise the actions, measures and projects aimed at achieving the objectives defined by the Litecc, as well as the long-term goal of carbon neutrality.

The objectives, actions and measures provided for in the Long-Term Strategy on Energy and Climate Change are binding on the Public Administration and are integrated into its sectoral planning and programming. The Ministry responsible for climate change will be responsible for disseminating the Strategy document to the rest of the Administration and will provide technical support for its implementation.

The Strategy is a public document that must be made available to the public and, as provided for by the Litecc, it will be reviewed at least every six years. The approval and subsequent reviews will be published in the Official Gazette of the Principality of Andorra.

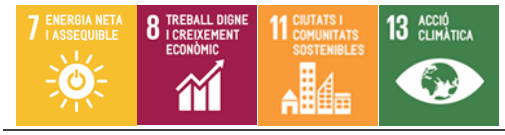
The National Energy and Climate Change Committee is the advisory body whose function is to monitor the Strategy, as well as to participate in the reviews, modifications and adaptation of its objectives. To ensure that it can carry out these tasks, the Committee and the sub-committees will receive information on an annual basis to determine the status of the indicators associated with each of the programmes and activities identified in the Strategy.

The Strategy establishes mid and long-term goals and includes the objectives that the Litecc has already set for 2030 and 2050. This planning tool will constitute the basis for the updates of the Principality's nationally determined contribution (NDC), a statistic which demonstrates its efforts to reduce its domestic emissions and adapt to the effects of climate change in accordance with the Paris Agreement (article 4, paragraph 2).

6 Relationship between the Long-Term Strategy on Energy and Climate Change and other national strategies

To ensure the proper implementation and suitability of the Strategy, it will be necessary to analyse its relationship with other Governmental strategies. Therefore, a search has been conducted to identify the main recently approved strategies with a special relationship with the field of climate change in accordance with the diagnosis submitted in this document (energy, mobility, agriculture, forest management, health, tourism, atmospheric quality, biodiversity, landscape, sustainable development, economy, industry, education, research, etc.).

In April 2019, the Government of Andorra approved its National Strategic Plan for the implementation of the 2030 Agenda, in a further step towards making this roadmap a national priority and a state project. These sustainable development goals (SDGs) include achieving affordable and non-polluting energy (SDG 7), ensuring sustainable cities and communities (SDG 11) and action on climate (SDG 13). All these SDGs are directly integrated into the Strategy and, in particular, are correlated with the following programmes and activities within the Strategy:

Sustainable development goals (SDGs)	The Long-Term Strategy on Energy and Climate Change (LTSECC)
	**Programme I.** Decarbonisation to achieve carbon neutrality: mitigating greenhouse gas emissions
	**Programme II.** Programme for national action for adaptation to climate change and greater resilience
	**Programme III.** Programme for the national carbon credit market and other taxation tools to achieve carbon neutrality
	**Programme IV.** Social transition programme
	**Programme V.** Innovation, research and systematic observation

At the 1992 Rio Earth Summit, the two conventions that were drafted focused on climate change and biodiversity. In this regard, the 2016-2024 National Biodiversity Strategy of Andorra (ENBA) responds to the commitment to the Convention on Biological Diversity, adopted in Rio de Janeiro on 5 June 1992, defines how Andorra can contribute to the international objectives regarding biodiversity preservation and sets out the guidelines for the management of biodiversity in the country. The ENBA is divided into five strategic objectives broken down into 24 activities and takes into account that climate change and its effects, such as desertification, bioinvasions, deforestation, soil loss, the extinction of species and varieties and the overexploitation of resources represent a failure on an international scale and action must be taken to achieve a reversal of the trend and a recovery of biodiversity.

In this respect, we should highlight the following ENBA activities in relation to the Long-Term Strategy on Energy and Climate Change and their correlation with the programmes and activities within this Strategy:

Objectives and activities of the ENBA	The Long-Term Strategy on Energy and Climate Change
OBJECTIVE 1. INVENTORY THE BIODIVERSITY OF ANDORRA AND ITS TREND AND IMPROVE KNOWLEDGE **Activity 1.4. Identify the factors that may affect biodiversity and the state of conservation of the ecosystems**	Programme V. Innovation, research and systematic observation Activities 16 and 17. Research and systematic observation
OBJECTIVE 3. PROMOTE THE CONSERVATION OF BIODIVERSITY IN NATIONAL AND LOCAL SECTORAL POLICIES **Activity 3.3. Promote and conserve forest biodiversity. The content of the forest plans should focus on the axes of productive forestry (biomass and green economy), protective forestry (erosion, environmental services, river basins, forest health), forestry for the conservation of biodiversity (mixed masses, strong biomass, old forests, relict spaces, etc.) and adaptive forestry (climate change, CO_2 fixation)**	Programme I. Decarbonisation to achieve carbon neutrality: national action programmes to mitigate greenhouse gas emissions Activity 3. Agricultural and forest management respectful towards the territory's sink capacity
OBJECTIVE 5. GOVERNANCE AND COOPERATION **Activity 5.2. Encourage cooperation in international initiatives and cross-border projects related to biodiversity**	Programme V. Innovation, research and systematic observation Activity 16 and 17. Research and systematic observation

Axes of action that are incompatible with the Long-Term Strategy on Energy and Climate Change are not detected in any of these cases.

The National Landscape Strategy and the Circular Economy Plan are currently being reviewed and drafted; since previous versions of these strategies and action plans have already been finalised, it is considered more appropriate to assess the appropriateness and the relationship with these strategies when they have been reviewed and approved.

In this regard, within the framework of the National Energy and Climate Change Committee, the suitability, compatibility and relationship of the Strategy with the new plans, programmes and strategies that are approved in the future can be considered.

ANNEX 1

Impacts and vulnerability in the face of climate change in Andorra

Sector	Prioritisation of the PAACC[27]	Impacts of climate change[28]	Associated vulnerabilities[2]
AGRICULTURE AND LIVESTOCK FARMING	1	Changes in plant productivity (crops and pastures or mowed meadows) and animal productivity and the demand for hydric resources within the sector	-Crop vulnerability -Pasture vulnerability -Vulnerability of the livestock to changes in the composition and quality of the pastures
		Changes in the composition and quality of the pastures	-Vulnerability of the livestock to changes in the composition and quality of the pastures
		Changes in the phenology of the plant species that could generate misalignments with the pollinating insect cycles	-Vulnerability of the crops to the difficulties facing insect pollination
		Rise in the altitudinal limit of the forest to the detriment of the pastures	
		Extension of the pasturage period due to the rising temperatures	
		Viability of new crops due to the rising temperatures	
	2	New pests and diseases due to the new climatic conditions	-Vulnerability of the crops to the presence of diseases and pests -Vulnerability of the livestock's health to the presence of diseases and pests
	3	Damage and difficulties in the management of the agricultural and livestock farming land, infrastructures, meadows and pastures due to the increase in the number of extreme climatic phenomena and the year-on-year variability of the climatic conditions (storms, gales, floods, landslides, etc.)	-Vulnerability of the soil to extreme climatic phenomena such as heavy rainfall and storms, floods and landslides that will generate more soil erosion -Vulnerability of the livestock's health to heatwaves -Vulnerability of the economy of the farmers and livestock breeders to declining production due to droughts -Vulnerability of the crops to the difficulties faced by insect pollination -Vulnerability of the soil to extreme climatic phenomena such as heavy rainfall and storms, floods and landslides that will generate more soil erosion
BIODIVERSITY		The disappearance, displacement or modification of the distribution and functioning of habitats, with a consequent change in the distribution of animal and plant species and the risk of their extinction	-Vulnerability of the habitats of ombrophilous species and others with poor tolerance of droughts (such as the fir tree) to the reduced availability of water and the rising temperatures -Vulnerability of species associated with habitats linked to the forest's

[27] Source: Participatory process for the adaptation of Andorra to climate change (2014)

[28] Source: Participatory process for the adaptation of Andorra to climate change (2014) and the study titled *Climate change in the Pyrenees: impacts, vulnerabilities and adaptation* (2018), conducted by the Pyrenean Climate Change Observatory (OPCC)

Sector	Prioritisation of the PAACC[27]	Impacts of climate change[28]	Associated vulnerabilities[2]
	2		altitudinal limit to the rise in this limit. Changes in the distribution of habitats that favour some species of fauna due to the rise in the forest's altitude -Vulnerability of the springs, a habitat directly related to the presence of water, to droughts. Vulnerability of the species linked to this habitat -Vulnerability of the habitats related to the presence of snow. Vulnerability of animal and plant species linked to these habitats, such as the white partridge and flora species in snowdrifts -Vulnerability of species linked to host plants due to the variability of the distribution of these habitats
	1	Changes in the phenology of the species that could generate misalignments with the pollinating insect cycles	-Vulnerability of plants to the phenological changes that may generate misalignments with the pollinators' cycles
		Rise in the rate of soil erosion due to the increase in heavy rainfall that leads to losses of the habitats of several species	
	3	Entry of new vectors and new allochthonous species that may lead to new pests and diseases or the displacement of native species	-Vulnerability of the native flora to the colonisation of exotic invasive species -Vulnerability of the forests due to the increased risk of fires, the possibility of periods of drought and the presence of pests -Vulnerability of the wildlife's health due to the potential presence of diseases and pests
FOREST MANAGEMENT	1 and 2	Changes in the phenology and distribution of the species	
		Changes in the distribution of the forest plant species and an increase in the forest's altitudinal limit due to the rising temperatures and the reduce pressure of the livestock	
		An increase in biomass production (due to the rise in CO_2)	
		An increased likelihood of droughts (greater hydric stress) and less atmospheric humidity, which will increase the risk of forest fires and affect vegetation, reduce the growth of vegetation, cause its defoliation and discolouration, weaken the forests and increase their vulnerability to diseases and pests and other natural damage that may even lead to their death from drought	-Vulnerability of the forests to drought -Vulnerability of ombrophilous species and others with poor tolerance of droughts (such as the fir tree) to the reduced availability of water and the rising temperatures -Vulnerability of the forests to potential attacks by pests and diseases The forest will be more vulnerable if it is weakened by drought conditions -Vulnerability of the forests to the risk of fire -Vulnerability of the forests due to changes in soil quality and increased erosion
	3	Damage to the forests caused by extreme phenomena such as heavy storms, heavy rainfall and winds may lead to falling and uprooted trees, greater soil erosion and landslides	-Vulnerability to severe weather events, such as high winds and torrential rain causing physical damage to the forest, resulting in falling trees, landslides, etc.

Sector	Prioritisation of the PAACC[27]	Impacts of climate change[28]	Associated vulnerabilities[2]
WATER MANAGEMENT	1 and 4	Fewer hydric resources (due to increased ETP), which may lead to drinking water supply problems. A decrease of 14.9% is expected in the 2021-2050 Horizon (240 Hm^3/year) and 37.6% is forecast in the 2071-2100 Horizon (176 Hm^3/year) in relation to the 1961-1990 period (282 Hm^3/year)	-Vulnerability of the hydric resources to the decrease in rainfall and the rising temperatures. The quality and quantity of the available surface waters and groundwater may be affected -Vulnerability of the public economy in its response to the increase in costs associated with the treatment of water, given the potential decrease in its quality and quantity -Vulnerability of the consumer economy in terms of it assuming the potential increase in the cost of supplying drinking water to homes in the event that the supply companies increase the charges associated with the treatment of water to ensure its quality
	3	A reduction in the volume of water stored in the form of snow, the duration of this storage (snow season) and the modification of the hydrological regimes, a reduction in the snow-related nature of the rivers, a potential increase in the winter flows, a fall in the thawing points and the advancement of the start of the thawing period	
		The increased risk of flooding due to the greater potential for torrential rain and severe storms	
	2, 7 and 8	The increased competition between the different uses of water The need for prioritisation based on requirements and the emergence of conflicts over water use: drinking water, irrigation, energy use, recreational use, etc.	-Vulnerability of the hydroelectric sector to variations in availability linked to surface hydric resources
	5 and 6	Changes in the monthly regime of the rivers and a decrease in the volume, with a consequent reduction in the quality of the water, an increase in the concentration of pollutants, a loss of quality in the aquatic ecosystems and an increase in the costs of treating the water to make it drinkable	-Vulnerability of the public economy in its response to the increase in costs associated with the treatment of water, given the potential decrease in its quality and quantity -Vulnerability of the consumer economy in terms of it assuming the potential increase in the cost of supplying drinking water to homes in the event that the supply companies increase the charges associated with the treatment of water to ensure its quality -Vulnerability of the ecological state of the aquatic systems due to the decrease in the quantity and quality of the water
HEALTH	4	An increase in the frequency of heatwaves, leading to negative impacts on health, especially that of children and the elderly	-Vulnerability of the health and well-being of the population to extreme climatic phenomena such as heatwaves, natural risks associated with climate change, etc. -Vulnerability of the most sensitive groups (children and the elderly) and people with a fragile state of health to the health-related impacts of climate change

Sector	Prioritisation of the PAACC[27]	Impacts of climate change[28]	Associated vulnerabilities[2]
	1, 2 and 3	The rising temperatures and humidity conditions may lead to negative health problems: a greater presence of gases and polluting particles in the atmosphere, an increase in new disease vectors, drinking water supply problems with repercussions for health and changes in the phenology of plants that may lead to an increase in the risk of allergies	-Vulnerability of the health and well-being of the population to extreme climatic phenomena such as heatwaves, natural risks associated with climate change, etc. -Vulnerability of the health and well-being of the population due to the appearance of new vectors transmitting diseases due to the rising temperatures -Vulnerability of the health and well-being of the population due to the rise and diversification of allergies and the increase in cases of asthma and rhinitis
		The increase in temperature in winter could have a positive impact on the health of the population, with a decrease in diseases typical of this season of the year (colds, flu, etc.)	
NATURAL RISKS	1, 2, 3 and 4	A greater likelihood of extreme weather events, storms, exceptional flooding, torrential rain, major movements due to heavy rain, drag currents, falling blocks and avalanches that may have an impact on the country's socio-economic sector, infrastructures and natural habitats	-Vulnerability of the infrastructures, chiefly buildings, public services and roads, to the greater frequency and intensity of avalanches, fires, floods, snowfalls, hail, strong winds, collapses, fallen trees, etc. -Vulnerability of the human and animal populations to the greater frequency and intensity of fires, snowfalls, cold and heat waves, frosts, lightning, landslides, drag currents, etc. -Vulnerability of the aquatic and terrestrial ecosystems to the greater frequency and intensity of fires, floods, droughts, strong winds, landslides, fallen trees, etc.
INFRASTRUCTURES AND MOBILITY	1 and 3	Effects on specific infrastructures, service networks (telecommunications, energy, etc.) and the road network and a reduction in citizen mobility in Andorra and abroad	Vulnerability of the electrical networks (for energy and communications) to temperature variations and extreme temperatures -Vulnerability of accessibility to the country due to the impact of extreme climatic phenomena -Vulnerability of the economy, which is highly dependent on the existing network of infrastructures and the transport of goods
	2	Improvement in the internal and external movement and transport of fluids through pipes in winter (given the fewer days with ice and cold spells)	

Sector	Prioritisation of the PAACC[27]	Impacts of climate change[28]	Associated vulnerabilities[2]
URBAN PLANNING	1, 4 and 5	Damage to or weakening of the structures of buildings and public and private infrastructures due to the greater frequency of extreme climatic events (floods, heavy rain, etc.) and increased construction and building costs for protection against these phenomena	-Vulnerability of old buildings with weakened structures or buildings with construction shortcomings due to exposure to extreme climatic events and their consequences -Vulnerability of the people exposed to damage caused to buildings and infrastructure by the effects of extreme climatic events -Vulnerability of the infrastructures to extreme climatic events and the risk of flooding, landslides and other natural risks influenced by the effects of climate change -Vulnerability of developed and developable areas close to watercourses (development guarantee) to the risk of major flooding - Vulnerability of developed areas downstream from canalised areas
	2	Changes in the energy demand of buildings Increased energy consumption in summer due to the air conditioning of buildings as a result of the greater frequency of urban heat islands	
	3	Increased competition for water resources from different environmental, social and economic sectors: irrigation of grassed areas, human consumption, etc.	-Vulnerability of parks and gardens and other public urban services to the water deficit -Vulnerability of the population to drinking water supply problems due to a decrease in the availability of hydric resources and their quality
ENERGY	3	It will be necessary to refurbish buildings and homes to adapt them to the new thermal gradients and comply with the degree of climate comfort. Consideration of energy poverty	-Vulnerability of the domestic economy to potential increases as a result of fluctuations and increases in energy prices (fossil fuels, production systems, etc.)
		Increased risks in relation to the linear distribution networks and specific electrical infrastructures	-Vulnerability of the electricity transmission and distribution systems to a loss of efficiency when the environmental operating conditions such as the temperature are higher -Vulnerability of the energy installations to damage caused by storms, fires, droughts, falling trees, etc.
		Increased energy demand in the summer, which may exceed the supply capacity provided by the existing infrastructures	-Vulnerability of the electricity supply capacity to a peak in energy demand due to the saturation of the supply network
		The rising temperatures will reduce energy needs in winter	

Sector	Prioritisation of the PAACC[27]	Impacts of climate change[28]	Associated vulnerabilities[2]
		A potential increase in the price of hydrocarbons, not only due to the rise in demand and the progressive depletion of the natural resources that provide this energy source, but also compliance with any potential regulations (e.g. in accordance with the decisions resulting from the United Nations Framework Convention on Climate Change)	-Vulnerability of the domestic economy to potential increases as a result of fluctuations and increases in energy prices (fossil fuels, production systems, etc.)
	1	Modification of the operating guidelines for the hydrological system of Andorra's hydroelectric power plant and the potential impact on production due to less water availability as a global resource and the modification of the annual hydrological regime	-Vulnerability of the hydroelectric power plants due to the variability of river flows and water availability Potential associated technical problems -Vulnerability of the electricity supply capacity to a peak in energy demand due to the saturation of the supply network
		Wind energy production could be negatively affected in the coming decades due to climate change	
	2	New strategic opportunities stemming from preparation for the effects of climate change to increase national production and reduce current energy dependence, including the use of national renewable resources	
INDUSTRY	2 and 3	The increase in economic costs, energy availability and the cost of water due to changes in the climatic conditions could affect the performance and competitiveness of industry.	-Vulnerability of the industrial sector to variations in the prices of energy, raw materials (provided by means of transport) and water, preventing it from continuing its activity under the same conditions as those to date
	1	The increase in adverse weather phenomena such as heavy storms, gales, hail, etc. may affect the infrastructures of the industrial areas and their buildings	-Vulnerability of the industrial sector to the foreseeable increase in natural risks -Vulnerability of public and private industrial infrastructures and communication in the event of adverse climatic events
	4	Consideration of stricter regulations arising from compliance with international agreements designed to prevent the exceeding of the threshold level for greenhouse gases emissions and particles emitted into the atmosphere, potentially affecting the industrial activities that emit pollutants into the atmosphere.	-Vulnerability of the industrial sector to variations in the prices of energy, raw materials (provided by means of transport) and water, preventing it from continuing its activity under the same conditions as those to date
		Opportunity for the country's future industrial fabric still to be developed, with the capacity to include climate change in its strategic approach from the outset	

Sector	Prioritisation of the PAACC[27]	Impacts of climate change[28]	Associated vulnerabilities[2]
TOURISM	3 and 5	The changes in rainfall distribution and the rising natural snow level will affect the quality, thickness and covering of the snow at ski resorts	-Vulnerability of the ski resorts due to the decrease in natural snow, depending on the altitude -Vulnerability of the ski resorts due to the fact that the production of artificial snow requires water and energy and a certain temperature, leading to rising temperatures and less water availability -Vulnerability of snow sports, which are heavily dependent on the weather and climatic conditions -Vulnerability of the country's economy, which is closely linked to tourism and, therefore, snow tourism The tourism sector has a very significant influence on the domestic GDP in the current economic model -Vulnerability of the ski resorts due to the fact that the production of artificial snow requires water and energy and a certain temperature, leading to rising temperatures and less water availability
	2	Difficulty in the planning of investments and the scaling of infrastructures designed for tourism activities, as well as increased associated costs such as the production of artificial snow	-Vulnerability of snow sports, which are heavily dependent on the weather and climatic conditions -Vulnerability of the country's economy, which is closely linked to tourism and, therefore, snow tourism The tourism sector has a very significant influence on the domestic GDP in the current economic model -Vulnerability of the ski resorts due to the fact that the production of artificial snow requires water and energy and a certain temperature, leading to rising temperatures and less water availability
		Less availability of water for tourism-related uses: snow production, catering, shopping malls, etc.	-Vulnerability of the ski resorts due to the fact that the production of artificial snow requires water and energy and a certain temperature, leading to rising temperatures and less water availability
		Rising temperatures in both summer and winter Improved climate comfort for summer tourism, measured by the climate comfort index (ICT), which will rise from the current *acceptable* values (1961-1990) to *good* and *very good* values	
		Changes in the natural ecosystems and landscape that may have an irreversible effect on some iconographic elements of the Pyrenean landscape	-Vulnerability of mountain tourism in terms of the enjoyment of nature and the landscapes in relation to the impact of climate change on biodiversity and the ecosystems

Sector	Prioritisation of the PAACC[27]	Impacts of climate change[28]	Associated vulnerabilities[2]
		The increased pressure from summer tourism may have an impact on the landscape and the natural environment	
	4	An increase in Andorra's competitiveness in the Pyrenees in winter and summer	
	1		
TRADE AND SERVICES	1	Decrease in the influx of tourism linked to winter sports and, therefore, all the economic activity related to shops, bars, restaurants and accommodation services associated with snow tourism	-Vulnerability of the sector due to its dependence on tourism and winter sports
	3 and 4	The greater likelihood of severe and extreme weather events that could result in heavy flooding, landslides, etc., cause damage to goods, infrastructures, shops and service and financial buildings and lead to an increase in the maintenance costs and investment to adapt the infrastructures to these extreme events	-Vulnerability of the trade and service infrastructures to extreme climatic events -Vulnerability of the logistics of the shops and services due to their direct dependence on the networks (roads, electricity, telecommunications, etc.)
		Uncertainties in the insurance sector	
	2	New opportunities for the market and the diversification of range of commercial products, generated by the deseasonalisation of tourism envisaged as a response to the threats to snow tourism posed by climate change.	

ANNEX 2

Regulatory framework and relationship with the Strategy's programmes

The Long-Term Strategy on Energy and Climate Change	Paris Agreement/United Nations Framework Convention on Climate Change	Challenges when addressing climate change in the Pyrenees[29]	Law 21/2018 (Litecc)	Andorra's energy infrastructure sectoral plan (2018)	Acknowledgement of the climate crisis and the declaration of the state of climate and ecological emergency (2020)
Decarbonisation to achieve carbon neutrality: national action programmes to mitigate greenhouse gas emissions	Long-term temperature objective (article 2): restrict the increase in global temperature to below 2ºC and then restrict the increase even further to 1.5ºC High point and climate neutrality/mitigation (article 4): reach the GHG emission high point as soon as possible Communicate and maintain the nationally determined contributions (NDCs) and implement national measures to achieve them Deposits and sinks (article 5): encourage the conservation and improvement of the GHG sinks, including the forests	Adapt to the imbalances between energy supply and demand	33% of the country's electricity demand by 2030 with domestic production 67% of this source of renewable energy resources in the energy mix Procure the infrastructures necessary for the transport of the energy and increase the capacity to import electrical power in accordance with the guidelines of the 2016-2026 FEDA master plan for electrical infrastructures Reduce GHG emissions by 32% in the case of electrical energy (84g CO_2equivalent/kWh) and by 7% in the case of thermal energy (248g CO_2 equivalent/kWh)	33% of demand for electricity per year by Horizon 2030 and at least 50% per year by Horizon 2050 >75% of this source of renewable energy resources in the energy mix Reduce GHG emissions by 37% per year in relation to the BAU scenario by Horizon 2030	80% of national electricity production must come from renewable energies, promoting hydraulic, solar, wind, geothermal and biomass energies One third of electricity production must be nationally produced by 2030 It's necessary to use renewable energies in all the Administration's buildings and to reduce the consumption of electricity and heating in public establishments The energy efficiency of public lighting has to be improved by means of the passing of a regulation within a year It will be necessary to incorporate an energy manager by the end of 2020 and to conduct energy audits in all the Administration's heated buildings by 2022 Housing refurbishment needs more promotion to make it more efficient
Programme for national action for adaptation to climate change and greater resilience	Adaptation (article 7): increase the capacity for adaptation and resilience and reduce the vulnerability to climate change. We should highlight the parties' commitment to the formulation of national adaptation plans Losses and damages (article 8): increase the capacity for adaptation and resilience and reduce the vulnerability to climate change. We should highlight the parties' commitment to the formulation of national adaptation plans	Increase safety in view of the natural risks Support the actors from the territory in the event of water scarcity and droughts Guarantee the quality of the surface waters and groundwater Address the changes in crop productivity and quality and capitalise on the emerging opportunities Adapt to the imbalances between energy supply and demand			It's necessary to incorporate the measures of the PAACC (Participatory Process for the Adaptation of Andorra to Climate Change) into the National Energy Strategy for the Fight against Climate Change, re-edit the participatory process if necessary and incorporate new measures to adapt the Strategy to any changes and needs that arise
The national carbon credit market and other taxation tools for achieving carbon neutrality	Voluntary participation/related and non-related approaches to the market[30] (article 6): Establish a mechanism to contribute to mitigating GHG emissions and supporting sustainable development and define a framework for non-mercantile approaches to sustainable development				
Social transition programme		Prepare the population to cope with extreme weather Maintain the tourist appeal of the Pyrenees Address the increased spread of diseases, pests and invasive species			Consumers need to be informed by means of the energy labels for vehicles, household appliances and buildings by 2023. Workshops must be incorporated into the Andorran School to study the ecological footprint, raise awareness of climate change and encourage better use of natural resources
Innovation, research and systematic observation programme	Transparency (article 14): a solid transparency and accounting system to provide clarity with regard to the measures and the support of the parties, with flexibility for different capabilities	Anticipate irreversible changes in the landscape Consider the potential loss of biodiversity and changes in the ecosystems			An environmental audit of the economic, tourist, commercial and industrial sectors must be conducted within three years (24 January 2023). The agreement specifically stipulates that these audits will incorporate the GHGs generated and the consumption requirements (e.g. energy)

[29] *Climate change in the Pyrenees: impacts, vulnerabilities and adaptation (2018)*, conducted by the Pyrenean Climate Change Observatory 2.

[30] In accordance with the San Jose Principles on high Ambition and Integrity in the international carbon markets established in article 6 of the Paris Agreement.