# **FIGUERES:**

# ENERGY IN THE 2050's













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## 1. EXECUTIVE SUMMARY

The Roadmap of Energy in the Figueres of 2050 is a long-term strategy for changing the city's energy model. This Roadmap has been drawn up by the citizens and the social agents of the city by way of a process of public participation which has made it possible to gather information, stimulate debate and propose and agree on a model and the necessary actions to achieve it. The details of its drafting are set out in Section 4, which contains a description of the instruments and processes of public participation used to construct this strategy.

The Roadmap includes an extensive vision of the energy model of the future (detailed in Section 6.1), along with the actions necessary to achieve it (Section 6.3). Consequently, it includes an aim (the energy model of the future), but also a route to follow (the actions to be implanted).

This Roadmap goes far beyond the agreements of the covenant of Mayors and the Sustainable Energy Action Plan (SEAP), approved by the Figueres City Council in 2009 and 2010, respectively. While these documents set as their principal aim the reduction of greenhouse gas emissions and established certain necessary actions to achieve it, the Roadmap which is now presented put forward a global proposal of transformation of the energy model with far-reaching implications which affect aspects as vital as urban mobility, energy consumption in homes and economic activities, the construction of new dwelings, local energy production and the use of new technologies, but also radical modifications in the productive model and in social relations.

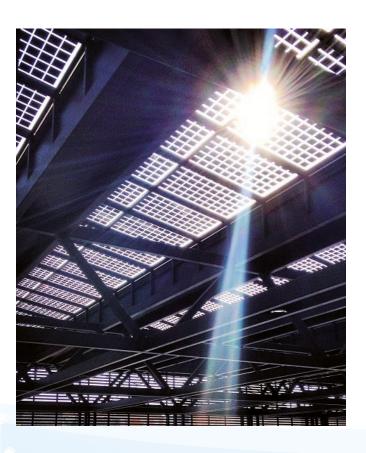
This Roadmap has been drawn up by the citizens and the social agents

The vision of this Roadmap is: "In the year 2050 Figueres will be an energy-efficient city with a high quality of life." Energy-efficient in the sense that it will promote energy saving to consume the essential minimum of energy and the efficient use of the energy consumed, will produce energy by means of renewable and non-pollutant local resources, will meticulously control energy consumptions and will strive to raise the energy awareness of its citizens. With a high quality of life, because energy efficiency does not signify a lowering of

living standards but a better use of energy to improve the comfort, wellbeing and urban and environmental quality of the city.

Communication, education and public awareness have been identified as priorities

Communication, education and public awareness have been identified as priorities for accomplishing the vision of the Figueres of 2050, acknowledging the importance of the citizens' habits and patterns of energy consumption in promoting the new energy model. The new patterns of citizens' consumption revolve around introducing energy efficiency into homes, converting them into energy producers, using the most sustainable means of mobility (walking, cycling and public transport), committing to the purchase of local products (foodstuffs, services), and fostering local cooperatives and neighbourhood solidarity. The vision also places emphasis on the capacity of leadership and mobilisation of the citizenry to propitiate the political and policy changes required to promote the new energy model.



## 2. INTRODUCTION

Why IMAGINE? Why do we have to act? Energy is an indispensable element for our everyday life, both at the individual level (journeys, operation of homes), and on the collective scale (operation of companies and public facilities, public transport, street lighting). It can be said that without energy the economic system and the functioning of our towns and cities would come to a standstill. We are totally dependent on energy.

We are totally dependent on energy

In western countries, the economic growth and increased welfare experienced from the second half of the 20th century onwards have been made possible thanks to a rise in energy demand and consumption. During this period, energy has been abundant and at a relatively affordable price. Little or no importance has been given to the ways energy is obtained or what environmental impacts they have: the priority has been to supply energy to companies and citizens. The route chosen has been the exploitation of massive natural resources like uranium, coal, natural gas and, particularly, petroleum derivatives.

The use of these energy sources has caused an enormous environmental impact (use of resources that are exhaustible and therefore non-renewable, pollution of the atmosphere, soils and waters, generation of radioactive wastes, effects of energy transmission infrastructures on the landscape), which has been aggravated with the evidence that the principal cause of climate change is the emission of CO<sub>2</sub> into the atmosphere, generated primarily by the combustion of fossil fuels like coal and petroleum derivatives.

The strategic importance for states of having and controlling energy resources has generated geopolitical tensions with worldwide connotations which have often resulted in wars (the economic crisis of 1973 caused by an increase of the price of oil, the wars in Iraq for control of oil production, or the conflict between Russia and Ukraine for the control of the gas supply).

The increase in the price of energy in recent years (especially of oil and electricity) has represented a considerable expenditure for families, companies

and public administrations and has given rise to the phenomenon of energy poverty.

Nevertheless, energy is a sector of the future with enormous possibilities if we promote a new energy model based on local energy production from renewable sources, foster energy saving and efficiency and exploit the possibilities of creating employment at the local level. This new model has to permit the local scale to become a vigorous actor on the basis of the planning, production and distribution of energy, replacing the old pollutant, concentrated and centralised model.



With the aim of conceiving the energy of the future, Figueres has participated, along with the cities of Munich (Germany), Lille (France), Odense (Denmark), Modena (Italy), Bistrita (Romania) and Dobrich (Bulgaria), the Energy Cities association and the Hafen University of Hamburg, in the IMAGINE project, funded by the European Union by way of the Interreg IV-C programme. The document you now have in your hands is the result of this project carried out during the period 2012-2014.

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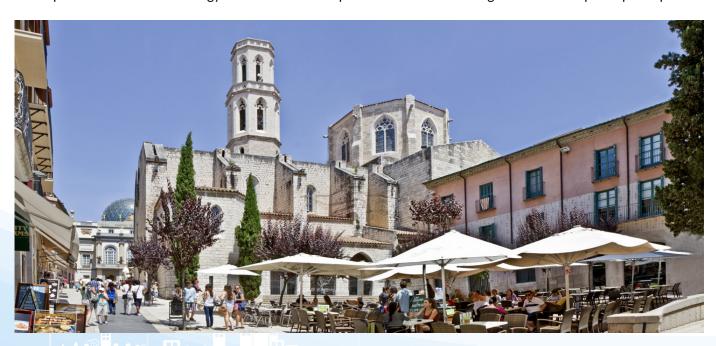
## 3. AIMS AND SCOPE OF THE PROJECT

The principal aim of the IMAGINE project in Figueres has been to define the city's energy model with the time horizon of the year 2050 and to establish a roadmap to achieve it. This aim has three singular characteristics:

- 1. For the first time, the city openly contemplates, and from a local perspective, the future of energy. It does so from a broad conception of energy and taking into consideration its multifaceted nature. This means discussing energy sources, energy production and distribution, energy management, its economic, social and environmental costs, but also the energy consumption patterns that affect the habits of the citizenry in such essential matters as everyday mobility, the use of energy in homes or the promotion of local production of products and services. In this respect, education, communication and awareness among the public in relation with energy is vital. The analysis of energy from the city viewpoint is also an innovative aspect of the project, in the sense that the cities have traditionally delegated energy planning and management to the State and large energy companies. The future of energy revolves around cities ceasing to be simple consumers of energy to become leading actors in energy management.
- 2. The project contemplated a debate on the longterm future of energy, that is to say, with an wide time horizon (the year 2050) to permit a calm analysis, removed from immediateness, which will permit an unlimited exercise of prospection and imagination. As is well expressed by the name of the project

- (IMAGINE), it is a matter of imagining the city's energy future with no restrictions of any kind. This is one of the most innovative aspects of the project, since forming a long-term vision is not a very habitual practice. Thinking freely about the city of the future is an exercise of imaginative creation, of depiction of desires and wills, but at the same time it has to incorporate the principle of realism and uncertainty over the future evolution of events.
- 3. The project started out from the premise that the vision of energy for the Figueres of 2050, and the drafting of the Roadmap to achieve it, had to be based on public participation. That is to say, the series of agents involved in energy, from citizens, experts, politicians, energy managers, residents' associations, researchers, etc., had to be the central figures of the process and the authors of the definition of the energy model of the city of the future. This gave voice to the various visions and sensibilities (avoiding a strictly technical or expert-based approach), debating options and reaching positions of consensus. The decided participation of the various social sectors involved was necessary due to their knowledge of the transversal and universal character of energy and their awareness that its future revolves around changes in consumption patterns.

In another respect, the joint work carried out with the other European cities participating in the project has enabled us to compare both the current energy models and future options and the methodologies of work and public participation.



## 4. HOW THIS ROADMAP HAS BEEN DRAFTED

With the aim of promoting the participation of the various social sectors of the city of Figueres in the drafting of this Roadmap of Energy for the Figueres of 2050, various activities were carried out addressed to specific social groups:

#### Forums of public debate and with experts

Three forums were organised with public participation. The first participatory workshop was open to all the public and the debate centred on three major blocks: energy in the personal and family setting, energy in the public and collective setting, and energy production and distribution. The participants were asked to say how they thought energy should be in these three blocks, and to describe the principal obstacles to be overcome. The second workshop was addressed solely to experts in energy and dealt with the same three large blocks of the first forum, with the added element that they had to define the changes that would have to be fostered. Finally, the third forum brought together the participants of the first and second workshops and made it possible to determine more precisely some of the aspects that arose in the previous sessions and to reach a broader consensus.

#### Public survey

With the aim of obtaining the general opinion of the citizens in an easily accessible manner, an online survey was carried out by way of the municipal website. The citizens were able to respond freely to a questionnaire with 15 questions on energy consumption habits and the future of energy in our city.

#### Conferences

Three conferences were organised, open to the public, to offer more information on energy and its future. The first, under the title "The consumer in the electricity market," provided the citizens with patterns for interpreting their electricity bill and stimulating energy saving in the home. The second presented the experience of the German village of Wildpoldsried, which has succeeded in producing by renewable means up to fivefold the energy it consumes, with projects financed by the residents themselves. The third conference presented the Transition Towns movement, which proposes an alternative model of energy management, the recovery of the concept of collectiveness and living in closer harmony with the natural environment.

#### Energy projects contest in secondary schools

This was addressed to all the secondary school students of Figueres and its aim was for the students to reflect on the energy model of the future and represent it in models, videos, diagrams or other supports.

## Training workshops on energy and climate change in primary schools

With the aim of involving the city's primary school pupils and their parents and relatives, during the 2013-2014 school year workshops were carried out on energy and climate change with the pupils of the second stage of primary education. The same pupils, accompanied by their relatives, responded to the survey on energy.

#### Photography and energy contest

The aim was to involve young people and users of the new technologies and enthusiasts of image and photography as a means of expression. The chosen instrument was a selection of images sent via Twitter and Instagram.

All of these public participation activities have provided the necessary information to draw up the Roadmap for Energy in Figueres in the year 2050.



## 5. INITIAL SITUATION

### 5.1. Energy at the worldwide level

Petroleum is the most commonly used fuel, accounting for 33.1% of the world's energy consumption. It is followed by coal (30.3%), natural gas (23.7%), hydroelectric power (6.4%) and nuclear energy (4.9%), while the renewable energies represent only 1.6%. Europe is the area of the world with the greatest use of renewable energies, representing 4.8% of its total energy consumption.

The projections on energy foresee problems due to the exhaustion of energy resources. At the current rate of consumption, petroleum will last another 40-50 years, gas 64 years and coal 112 years. In addition, the increasing costs of extraction, the growing demand of certain countries (China and India) and market speculation indicate that the price of energy will continue to rise more and more.

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The strategic importance for states of having and controlling energy resources generates geopolitical tensions with worldwide connotations which often result in wars: we need only recall the economic crisis of 1973 caused by an increase of the price of oil, or the wars in Iraq for control of oil production.

The main environmental effect of the energy model is climate change. The combustion of large quantities of fossil fuels (mainly coal and petroleum derivatives) generates the emission into the atmosphere of large quantities of CO<sub>2</sub> which is the cause of the greenhouse effect, the origin of climate change. The experts believe that climate change is the most complex scientific challenge humanity will have to face.

Apart from the triggering of climate change, the energy model has other negative effects on the environment and on people, such as the risk of a nuclear accident, management of nuclear waste, episodes of acid rain or the impacts on ecosystems of spills and dumpings of petroleum derivatives, among others.

The price of energy has risen in recent years. In 2011, the average annual price of the barrel of Brent petroleum exceeded \$100 for the first time and the price of electricity has risen at a rhythm of over 10% in recent years. The concept of energy poverty refers to the difficulties for certain persons or social groups to have access to energy. This is associated with the incapacity of some homes to achieve adequate thermal comfort, but also other energy demands such as electrical appliances or hot water. The reason is the triangle formed by low incomes, increased energy prices and the energy inefficiency of homes. In Catalonia, the Red Cross has already come face to face with numerous situations of energy poverty, particularly among old people, to whom it has provided blankets and stoves.

However, energy problems do not form part of most citizens' agenda of concerns. It seems that as long as the supply is guaranteed and the price is bearable, the public feels no concern regarding the consequences of the energy model or its future. However, a change of habits by the public in energy matters is vital for achieving a new energy culture based on saving, efficiency and the use of renewables. It is considered that success in accomplishing the policies of struggle against climate change in a city depend to an extent of 50% on a change of behaviour on the part of its residents.

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## 5.2. Repercussions of the current energy model at the local level

Cities are the main points of consumption of energy. Energy is indispensable for the functioning of cities, and the energy model has repercussions at the local level. It is in cities where we see the concentration of pollution produced by vehicle engines or the gases emitted by boilers of homes that cause respiratory diseases, deaths and a worsening of the quality of the air and life itself. It is in cities where the phenomenon of energy poverty is manifested, affecting the citizens most vulnerable to increases in energy prices (particularly

electricity and petroleum derivatives) and obliging the local administrations and social entities to act in favour of families and especially elderly people. It is in cities where people suffer – and will suffer more severely in the future – the effects of climate change caused by the current energy model, in the form of heat waves that will increase the demand for air-conditioning, or in the form of droughts or rainstorms that will require investments and more energy expenditure for better control of the water cycle. It is in cities where public awareness-raising campaigns can be implanted with greater guarantees of success in fostering energy saving and efficiency, due to the proximity of the local administration to the citizens.

Consequently, the local administration can play a leading role in energy management, since this has enormous repercussions for the management of the city and the welfare of its citizens.

The role of cities in energy matters is linked to the energy model of each country. In this way, in centralised models like those of France or Spain, where energy is controlled by the states and the large companies, cities are simple consumers of energy who do not play any part in energy planning and management. In contrast, in decentralised models such as those of Germany, Sweden or Denmark, the cities and the regions have competences and responsibilities in the local production and distribution of energy, in energy saving and efficiency policies, in the promotion of renewable energies or in the articulation of public awareness-raising campaigns.

## 5.3. Energy in Figueres

The first turning point in the concern for energy in the city was the drafting in 2003 of the Local Agenda 21, which contained an initial approach to the city's energy consumptions and sources and spurred an interest in improving the energy efficiency of the municipal buildings.

Subsequently, the impulse for better planning and management of the municipality's energy passed a new landmark in 2009 with the signing of the covenant of Mayors and the creation of the Local Energy Agency. Also during 2009 the first global energy audit of all the municipality was carried out. In 2010 the SEAP (Sustainable Energy Action Plan) was passed, containing

the roadmap for achieving the commitments of the covenant of Mayors.

In 2013 the Urban Mobility Plan of Figueres was aproved definitively, laying down a commitment to sustainable mobility and a reduction of energy consumption in journeys, with an ambitious goal of reducing  ${\rm CO}_2$  emissions by 31.5%, reducing vehicle mobility by 10%, making bicycle mobility account for 5% of journeys and increasing collective public transport mobility and walking by 4% and 1%, respectively.

The creation of the Local Energy Agency established a basic infrastructure for starting to plan and manage energy at a municipal level. Its goal was an orientation towards improved environmental quality and sustainable development of the city based on the promotion of energy saving, energy efficiency, the use and knowledge of renewable energies, the optimisation of the quality of services related with this sector and the stimulation of a local production sector.

When energy is analysed at the local level there is a problem of lack of data. The case of Figueres has been no exception, as relatively few data are available. The first attempt to obtain global data on energy in the city was made in 2009 with the drafting of a municipal energy audit, which was the first step towards the production of the SEAP.

The energy audit and the SEAP used data from the years 2005 and 2007, setting 2007 as the base year for the calculation of energy consumptions and for the strategy of reduction of  $\mathrm{CO}_2$  emissions. Subsequently, in 2008 and 2009 the data on the city's energy consumptions and  $\mathrm{CO}_2$  emissions were updated. These are the basic data that are currently available, while we await an updating of the SEAP and in the absence of easily accessible energy data originating from higher-level administrations.

## 5.3.1 Current consumption and CO<sub>2</sub> emissions in Figueres

In the evolution of energy consumption in the city from 2005 to 2009, there is a decrease of 3.3%, from 884.63 GWh/year to 817.42 GWh/year, a reduction that has to be related with the period of economic crisis, especially from 2007 onwards. Thus, the level of consumption per inhabitant in 2005 was 21,712.9 kWh/year/inhabitant

(average daily consumption 59 kWh/inhabitant), while by 2009 it had fallen to 18.386 kWh/year/inhabitant (average daily consumption 50 kWh/inhabitant). In contrast, the average daily consumption worldwide is 17.5 kWh/inhabitant.

In regard to  $CO_2$  emissions, there was also a decrease of 8% between 2005 and 2009, from 284,448 tons of  $CO_2$  to 261,707 tons. This reduction must be related with the decrease of energy consumption in the city.

As for consumption by energy sources, the principal ones are petroleum derivatives, which in 2009 represented 52.6% of the total energy consumption, followed by electricity with 27.1% and natural gas with 20.3% The evolution over time, however, shows a fall in the weight of petroleum derivatives and a slight increase in electricity and natural gas. This decrease in the consumption of fossil fuels may be attributed to a reduction in mobility due to rising unemployment and the reduction of goods transport.

Consequently, the consumption of fossil fuels in the city represents 73% of the total and electricity 27% (without taking into consideration that the electricity mix also includes the fossil fuels used to generate it).

In relation with energy consumption by sectors, the following table shows that the principal sector of consumption is mobility, representing 44.8% of the municipality's total energy consumption, followed by the domestic sector (29.4%), which includes the energy consumptions of homes (lighting and climatisation). In the third place is the tertiary sector, with 12.9%.

CONSUMPTIONS BY SECTORS, 2007		
SECTOR	MWh/year	%
Mobility	373.319,36	44.8
Domestic	245.441,68	29.4
Tertiary	107.345,30	12.9
Primary	60.162,43	7.2
Industrial	34.482,72	4.1
Municipal	9.829,48	1.2
Water	2.408,44	0.3
Construction	1.165,45	0.1
Waste	75,18	0.0
TOTAL	834.230,04	100

Table 1. Energy consumption by sectors (base year)

The above data show how just two sectors (mobility and domestic) represent 74.2% of the city's energy consumption, and considering that the tertiary sector operates in buildings, we see that transport and

buildings represent 87.1% (44.8% transport and 42.3% construction). Attention should be drawn to the little weight of the industrial sector and the primary sector, which reflects their minimal presence in the city.

### 5.3.2 Energy production

Energy production in the city of Figueres is almost zero. There are only a few solar installations for sanitary hot water in some public and private buildings, and two municipal photovoltaic installations. The energy produced by these installations does not even cover 0.5% of the city's consumption.

The use of the sun's power for sanitary hot water received a certain stimulus with the passing in 2006 of the Technical Code of Construction which promoted the installation of solar panels in new buildings. This means that a certain number of buildings constructed after 2006 have solar panels to support the provision of sanitary hot water.

## 5.3.3 Energy management at the local level

Local government becomes a vital element for energy management by way of integrated strategies, since this is the level of administration that is closest to the citizens, and in spite of the fact that the juridical and/or economic limitations often act against optimal management, a familiarity with the city, the surroundings and society from a first-hand viewpoint is crucial for taking decisions that have such a profound impact on the city.

Local government becomes a vital element for energy management by way of integrated strategies

In view of this, thinking of the scenario of decentralisation of energy and production by cities, towns and even neighbourhoods, an important change in energy generation and consumption will be brought about, and it will have to be planned from the ground upwards, from the neighbourhood to the territory. The results of the project discussed here indicate that in the Figueres

of 2050 the energy systems will have undergone substantial changes, and the energy wastes produced by a sustainable source will be reused directly in situ: for example, the residual heat from producing electricity by combustion will be fed directly into homes to provide heating in winter or converted into cooling energy in the summer.

Consequently, local government will not be a passive object in energy terms but will take responsibility for coordinating the enormous puzzle into which energy generation and consumption will be converted, and local government will have to face the challenge signified by passing from a model of energy importing to a model of energy import/export and local consumption.

### 5.3.4 Qualitative analysis

In order to assess the state of the matter and the city's strengths and weaknesses in relation with the achievement of a future city of low energy consumption, the working group of the IMAGINE project has created a tool named Assessment GRID which assesses in traffic-light mode (1,2,3) up to 66 milestones (grouped into 8 sectors) and their relationship with 19 variables which contemplate from short-, mediumand long-term regulations to institutional parameters, interdepartmental cooperation, financial resources, instruments at the disposal of the administration, relationships between actors and agents and the ownership structures of the energy generation and consumption facilities.

This grid makes it possible to obtain an overall vision of the initial situation, identify the weakest points on which it would be advisable to perform urgent actions, and determine whether the measures carried out to date are well balanced or have centred exclusively on a single line of action

The utility of the grid lies in the fact that, in order to face the problem of reducing  $\mathrm{CO}_2$  emissions and energy dependence and increasing renewable sources, multiple actions must be put into practice in parallel, ranging from the regulatory framework (which can be at both the national or regional level and at the local level as complementary actions), by way of direct investments or financial incentives, awareness-raising, training and cooperation both within the organisation itself and towards the citizenry, to dialogue between public and private agents and society in general. This fosters the reflection on the fields in which attention must be concentrated and also the sharing of a list of milestones which each city will enlarge or reduce in accordance with the available knowledge.

The result of applying the grid to Figueres is that although at the national, regional and local levels certain measures have been taken in relation with climate change and the reduction of energy demand, in none of the 8 categories analysed has a situation been reached which could be considered satisfactory (table 2).

The graph shows the evolution towards an optimal state of the measures that can be taken to make a city sustainable in the eight Sections into which the actions are classified. It must be pointed out that it is equally important to make advances in each of the spheres until reaching an optimal situation as it is for these advances to maintain a coherent mutual balance, because very positive actions in one sphere may not have the expected results if progress has not been made in the other spheres, since they are all interrelated. For instance, it

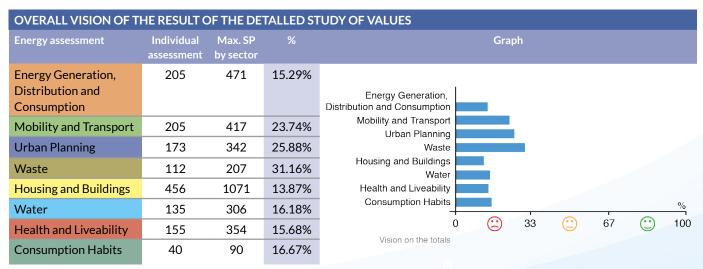


Table 2. Assessment grid. Analysis of sectors

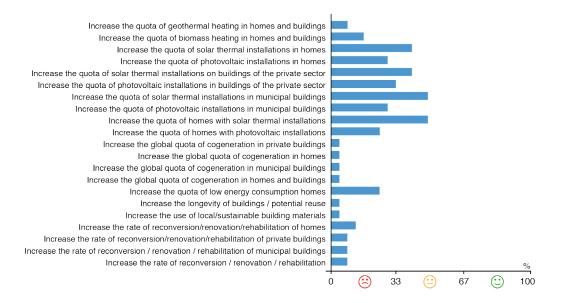
could happen that great advances are made in "health and liveability" but the expected results are not obtained because progress in "consumption habits" has not evolved at the same level.

In this respect, it is observed that "Waste," "Urban Planning" and "Mobility and Transport" are the areas where most evolution has occurred, although an optimal situation of satisfactory results in terms of reduction of emissions has not been reached. And as an example of analysis, in regard to "Housing and Buildings," the low score is due to the fact that neither the Technical Code of Construction (CTE) nor the energy certification of buildings has been an appropriate policy in the long term, despite the fact that any new buildings constructed from 2020 onwards will have to be of practically zero consumption. This is so because, if the final target is to reduce emissions by 80% by 2050, it is unlikely that in 30 years 80% of the buildings will have been renovated: rather, with an optimistic renovation rate of 1% of the housing stock per year, only 30% of the buildings would be renovated, a figure very far removed from the goals set.

On the other hand, it is observed that while in some desirable aims the Technical Code of Construction and the certification process represent an improvement and a firm step towards improving the sustainability of buildings, they do not signify an improvement in other Sections of equal importance, such as policies for increasing the quota of buildings, both private and public, that are rehabilitated with high energy standards, increasing their longevity, and committing to cogeneration, stimulating the use of geothermal energy (graph 1).

It is also important to understand the proposed grid as a tool that is adaptable to the local circumstances, and that as the strategies become defined new aims may be included or certain enumerated aims may be discarded for a justified reason due to not constituting a relevant goal in the integrated strategy to be defined.

#### Housing and buildings



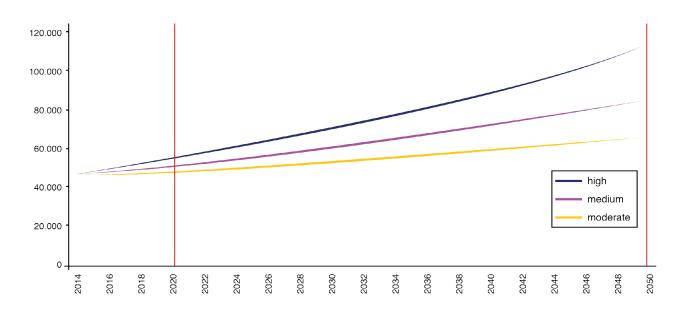
Graph 1. Detailed analysis of Housing and Buildings: summary of milestones by sector

### 5.3.5 Projection of growth

The population plays an important role in energy consumption and its future trends. Therefore, it must be taken into account that demographic growth is an important factor in the aims of reducing emissions, because the goals are fixed globally, whether the population increases or decreases. In this way, in a scenario of reduction of energy consumption per capita and, in parallel, a growth in population, the final result can be negative in terms of global decrease of consumptions or emissions. Consequently, in the face of a scenario of significant growth of the population, the measures for reducing the global energy demand would have to be intensified.

In this context, the latest demographic projections (drawn up in 2014) foresee three scenarios of evolution of the number of inhabitants in the city: a maximum scenario in which the population would grow to 62,000 inhabitants in 2026 and 120,000 in 2050; an intermediate scenario, reaching 56,900 inhabitants in 2026 and 80,000 in 2050; and a moderate scenario, rising to 52,000 inhabitants in 2026 and 60,000 in 2050. It is considered reasonable that by 2026 and 2050 the most likely scenario will be situated between the intermediate and the moderate, and therefore the population of Figueres in 2050 would be around 70,000 inhabitants.

#### **Projection of population**



Graph 2. Projection of population 2020 and 2050

### 5.3.6 SWOT analysis

As the latest step in the energy diagnosis of the city of Figueres, a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) has been conducted, observing the following characteristics which have to be taken into account in future planning, and which manifest the origin of the failings observed and counterpose them with the strategic points to be considered.

#### Strengths

- Figueres has a relatively moderated climate which, compared with other latitudes of the continent, requires less energy use in climatisation and lighting.
- Figueres is a compact city, which makes it possible to replace motorised vehicles with mobility on foot or by bicycle in urban journeys, reducing energy consumption and atmospheric pollution.
- Proximity to the rural environment and biofuel energy sources (biomass, biomethane).
- Potential for exploiting the wind to generate energy (wind power).
- Potential for exploiting solar radiation to generate energy.
- Possibility of availability of agricultural and livestock products of proximity.
- The lack of treatment of urban wastes in the district, particularly organic waste, becomes a possibility for executing a project that will respond to the needs for treatment of this waste and combine it with a project for generating energy.

#### Weaknesses

- Few projects of energy efficiency and local energy production under way.
- Few social awareness-raising actions at the local level.
- Little if any assistance for renewable energies.
- Low budget for energy efficiency measures.
- Low prevision of renovation in homes.
- Difficult detection of generic economic measures to reduce energy demand in existing construction that will guarantee an economic return within a reasonable period.
- The energy expenditure of families in the home does not represent a disproportionate expense for the family unit (between 5% and 15% of the family income), with the exception of cases of energy poverty, and the measures in isolated form do not significantly reduce the global energy demand.

#### **Opportunities**

- Continued and unpredictable growth of the costs of fossil fuels against a reduction in the costs of renewables.
- The context of crisis may help to catalyse the desire to reduce energy dependence, materialising when the economic situation improves if work is done on social awareness-raising and information on the viable alternatives.
- The prevision of low population growth and the restriction of available development land may entail an increase in rehabilitations of buildings. If these are carried out under criteria of very low energy demand and local generation of a part of the social demand, it may become a very positive scenario.
- The city has experienced periods of powerful growth followed by periods of moderate or low growth, meaning that a single construction model may be very present in the city and that identifying standard measures could be a successful method, reducing implementation costs through standardisation and specialisation of local companies.

#### Threats

- Expectation of low return on investment in energy generation projects and reduction of demand in construction.
- Negative regulatory framework for initiatives of decentralised electricity production.
- Technical Code of Construction with little strictness concerning obligatory insulations, which implies that with a low rehabilitation rate it will contribute very little to the reduction of the city's energy consumption and CO<sub>2</sub> emissions.
- The investment capacity of the private sector and households will be limited as long as the situation of economic crisis continues.
- The new non-renewable technologies and the unfavourable economic strategies addressed to lengthening the life of the conventional energy model (such as fracking) may jeopardise the payback of many measures. Consequently, it would be irresponsible to propose payoffs in the long term (especially to families beyond a 4-year payback period), with the exception of the measures which could truly confront the new strategy of the energy market.

## 6. ENERGY IN THE FIGUERES OF 2050

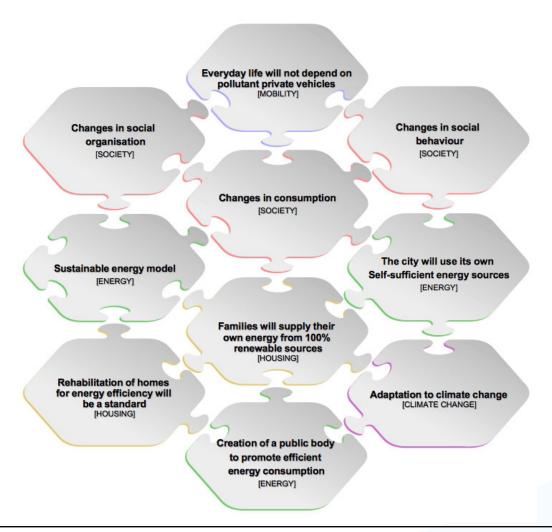
As a result of the various public participation actions carried out during the execution of the IMAGINE project, the citizens of Figueres have defined a vision of energy for the Figueres of 2050 and a Roadmap for achieving it.

## 6.1. The vision of energy in the Figueres of 2050

The vision of energy in the Figueres of 2050 defines a future energy model envisaged by the inhabitants and the social agents of the city. It is a long-term vision (horizon 2050) which encompasses all the aspects linked to the local energy level. It is presented on the basis of large thematic blocks.

A puzzle makes it possible to fit together the different pieces of a set in a coherent and ordered manner. The puzzle of energy in Figueres is composed of the following pieces: Society, Mobility, Energy, Housing and Climate Change.

The puzzle represents the integration of the parts and their profound interrelationships. The energy model of the Figueres of the future proposes to articulate a global and integrated strategy which will take into consideration the parts and their multiple interactions. The actions and classifications of these groups are set out in the Actions section, which classifies within each group the technical, social or planning actions into which the actions detected during the drafting of this document can be grouped.



Graph 3. The puzzle of the vision

## **6.1.1** Energy, consumption habits and public awareness

The citizens of the Figueres of the future will have very different levels of awareness and understanding of the significance of energy consumption in all of its aspects. They will be educated in the value of efficiency and responsibility. They will be austere in relation with energy consumption, using only what is indispensable. They will be aware that the best energy is what is not consumed, and they will be familiar with the cost and difficulties of energy supply. They will know at every moment what is their consumption, how much it costs them, where the energy comes from and what repercussions it has for the environment. The citizens will understand that an increase in energy consumption is not proportional to an increase in their quality of life and happiness. They will be fully aware of the problems associated with energy poverty.

## 6.1.2 Energy and construction

Families will supply their own energy by means of 100% renewable energy sources. This self-sufficiency will be at the home and/or building level or, failing this, at the neighbourhood or residential estate level. Buildings will seek a zero energy balance, or even positive with a surplus of energy production. Energy monitoring of the buildings will be generalised. The energy of homes will be considered an asset of collective management in contrast with today's individualism.

All newly-constructed buildings will have to be energy-efficient, capable not only of producing the necessary energy for self-sufficiency but also of producing it to sell it or to inject it into the grid, which will be publicly owned and managed by the local administration.

Buildings will have to be insulated from the exterior with sustainable materials, and all lighting will be of low consumption and maximum efficiency (using LEDs, for example).

In relation with existing buildings, it will be necessary to undertake energy rehabilitation actions in order to make them more efficient, reducing their energy expenditure and making them self-sufficient. It will be necessary to make energy efficiency of constructions compulsory by law and for the public administration to establish advantages and incentives for individuals in order to promote the transformation of energy.

### 6.1.3 Energy and mobility

Everyday life will be organised without depending on pollutant private vehicles, and there will be an extensive offer of public transport and sustainable and efficient transport alternatives such as electric vehicles and car sharing. The city will be essentially for pedestrians and cyclists. There will also be trams and trains for mobility to and between towns and villages. Dissuasive car parks will be located at the entrances to the city, with good public transport services close to the centre. The city's neighbourhoods will be selfsufficient in the sense that they will have all the basic services in order to avoid forced mobility: schools, shops, services, etc., maintaining their idiosyncrasy and without affecting the stimulation of the city's historic centre. As for the distribution of goods in the city, distribution micro-platforms will be created with delivery vehicles which will operate with electricity or more sustainable energy sources.



## **6.1.4 Energy production and management**

The city will use its own energy resources and will move towards self-sufficiency. The centralised model of energy management will be abandoned and a decentralised public service model will be promoted which is not an object of corporate speculation and is in the hands of the local administration and civil society.

This will prevent energy from being a business controlled by a small number of oligopolies. Since the local administration will manage energy, a part of the local budgets will have to be allocated to energy assets to promote micro-generation and local generation. It will also be necessary for the public administration as a whole to allocate substantial amounts of expenditure to research and development of renewable and efficient energy sources (biomass, wave power, etc.), and efficient methods of storing energy.

At the same time, the public administration will have to establish tax incentives for improving energy efficiency and production by means of renewable sources.

## 6.1.5 Transformations of the economic and social model

This energy model proposed for Figueres is associated with a series of transformations in the sphere of the economy and social relations:

Figueres will be a city where individual participation in collective matters will be a normalised phenomenon, and even regulated by the administration. There will be a high degree of cooperativism, presence and importance of residents' communities and solidarity.

There will be promotion of proximity products (km 0), sustainable in both production and distribution and of excellent quality. In contrast, there will be taxation and symbolic and social penalisation of products manufactured in countries that do not comply with environmental regulations or employment rights or are made by companies that show little responsibility for the environment and the territory.

A change of habits is essential to become aware of energy consumption and reduce it significantly. It is proposed to adopt rhythms of life adapted to the solar hours for better energy use.

It is proposed to eliminate the planned obsolescence of products (especially electronic devices) which entails an increase in consumption and the generation of wastes.

It is proposed that environmental costs be incorporated into the end price of products.

The city will give great importance to the "three R's" (Reduce, Reuse, Recycle) and will promote a drastic reduction of the consumption of superfluous products.

Advanced technologies will be used to access all the information and communication channels by way of a single platform, which will represent a notable saving of resources.

The reduction of energy consumption is linked to the forms of social organisation. It is proposed to return to living in larger family units (not necessarily of biological relationship, but also social) with the aim of creating new and more efficient forms of housing and to foster social relations of proximity to promote the exchange of products and services, the lengthening of their life and the habit of sharing.

The production of sustainable local foods will be encouraged with a good supply of urban allotments.

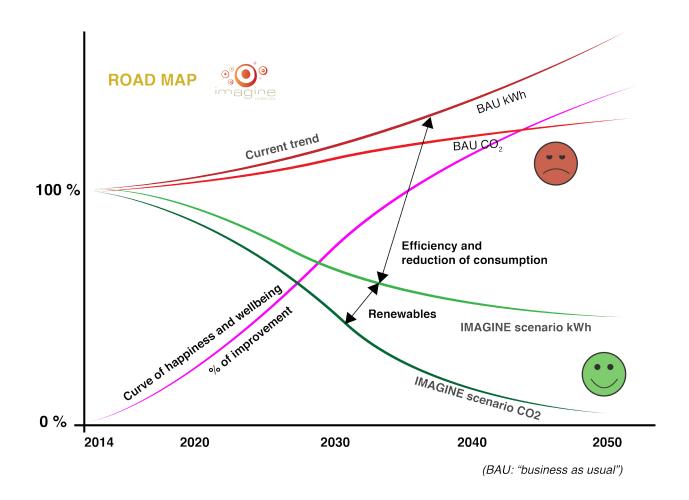
The city will move out of the adolescence of capitalism and into its adulthood, beginning to practise capitalism in a different manner, as a form of human development.

### 6.1.6 The city and climate change

The city will have to take measures to tackle the consequences of climate change, especially its most extreme episodes. Adopting these measures (for example, the need to reserve water to face periods of drought) will signify an increase in energy consumption. It will be necessary to plan for possible one-off extreme episodes in the short term.

### 6.2. Energy scenarios for the future

The next graph represents visually the evolution of three scenarios contemplated for studying the energy future of Figueres. A first scenario is BAU (Business As Usual), that is, where no changes are considered and the inertia of the passing of time is followed with no interventions or transformations. This scenario is represented by the top two lines (dark red and light red) which mark a tendency of continued growth of energy consumption (in KW/h) and  $CO_2$  emissions, respectively.



Graph 4. Graphic synthesis: towards the Figueres of 2050

The second scenario contemplates a profound transformation on the basis of energy saving and efficiency, which is translated into a very notable reduction of energy consumption. This is the tendency shown by the light green line. The third scenario (dark green line) envisages adding to the second scenario (energy efficiency) a determined commitment to the use of renewable energies, which will entail a continued reduction of  $\mathrm{CO}_2$  emissions. It must be observed that attempting to reach the dark green line solely with renewables means that the investment cost may prove to be so high as the goal is unattainable.

The harmonised shapes of the green curves are not accidental: they exemplify a planned and gradual progression of adaptation to the reduction of  $\mathrm{CO}_2$  emissions, accompanied by continued and evolutive investment and management of the progressive social change and adaptation. Transferring the change to the last years marked as a milestone can only entail an accumulation in the duty to invest, the need to make large expenditures at the same time, a social impact in triggering a sudden adaptation to the planned change and the impossibility and failure of accompanying the investments with the opportunity of refurbish homes, replacing vehicles and electrical appliances or changing climatisation systems when improvement

works have to be carried out due to other needs or a renovation is necessary due to the natural ageing and depreciation of the assets.

In contrast to these scenarios, the curve of happiness and wellbeing (pink line) rises positively as energy consumption and  $\mathrm{CO}_2$  emissions are reduced, exemplifying the citizens' satisfaction with doing things correctly and seeing that their effort brings results and that locally there are more employment opportunities since the resources are produced and consumed in proximity.

The vision of energy for the Figueres of 2050 proposes attaining the dark green scenario, that of least energy consumption and lowest emissions of pollutant gases and the highest level of happiness and wellbeing.

The city's commitment to this scenario signifies:

A commitment to achieving a city of low energy consumption and high quality of life for everyone. Contrary to what some people maintain, high energy consumption does not presuppose an increase in wellbeing and happiness. Precisely what the vision of Figueres envisages is that with the use of new technologies, the efficiency of installations, the use of renewable energies and the change in consumption habits, comfort and wellbeing will increase and energy consumption will be reduced.

A commitment to a return to the place and to the use of local resources. Having passed through the process of globalisation, there follows a stage of revaluation of local assets and proximity, adapting the patterns of life to the local resources available but currently under-exploited (local food production, local energy production, local knowhow).

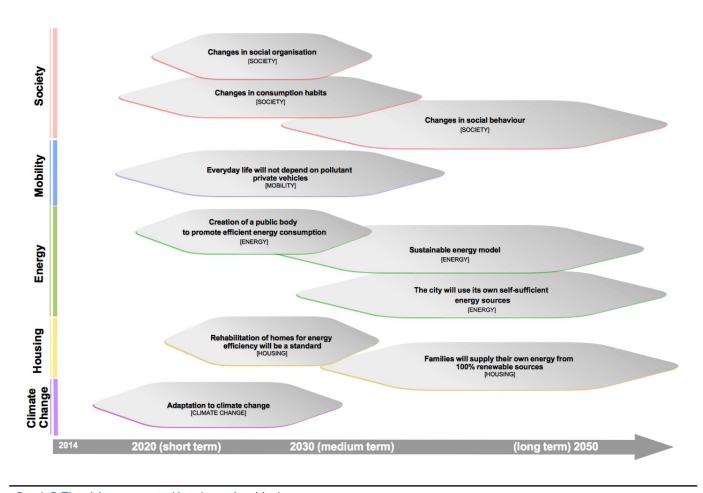
A commitment to autonomy and self-sufficiency, generating a local structure of energy production and consumption safeguarded from external instabilities.

**Understanding change as an opportunity and not as a punishment.** The profound social and economic transformations contemplated by the vision are an opportunity, a challenge, to construct a city with greater social, economic and environmental justice.

A commitment to a long-term vision and a guide project which make it possible to bring the citizens together and activate the public around a conception of a city.

### 6.3. The Roadmap towards the Figueres of 2050

The Roadmap is defined as the set of strategies to be carried out to attain the vision of energy for the Figueres of 2050. While the Vision defined the desired energy model, the Roadmap defines the specific actions that have to be promoted.



Graph 5. The vision segmented into large time blocks

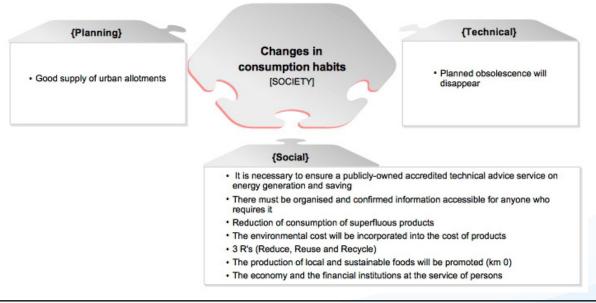
## 6.3.1 Energy, consumption habits and public awareness

- To attain the intended levels of energy awareness, it will be necessary to promote a global strategy to reach the various social groups. The city will have to consolidate constant and effective actions of pedagogy and social education, focussed on transversal awareness-raising in energy matters. In this respect, it will be necessary to:
  - Introduce the energy vector into school education.
  - Promote public awareness in energy matters.
  - Stimulate dynamic campaigns with a conception of public service, and therefore with a more social sense.

- Raise the awareness of the political class in order for it to promote the transformation of the energy model.
- Clear and comprehensible information to the citizenry regarding:
  - What is energy? Where does energy come from? How is energy generated? Positive and negative consequences? How do we use energy? How should we use it? How do we generate energy? How should we generate it?
- Design and implementation of intense and specific campaigns in the communications media. The energy companies should assume a part or the whole of the cost of these media campaigns. We must also take into account the need to assume that these campaigns require time and therefore need to be of long duration.

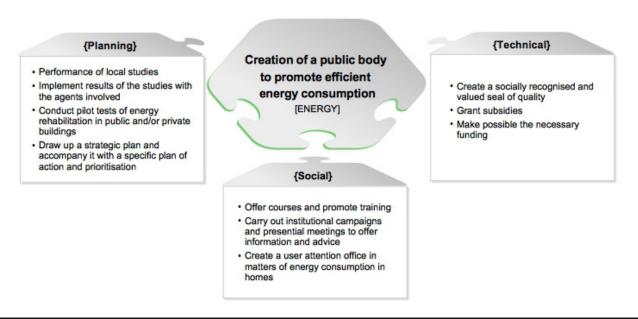
- Creation of clubs or channels of opinion in order to articulate the awareness-raising initiatives. Much more pressure is required from a more aware citizenry in order to neutralise the current situation (connivance of the powers that be with principal actors like multinationals, oil companies, shipping firms, etc.)
- One form of awareness-raising on energy will be the introduction of regulations which encourage good practices and penalise energy waste. The revenues from these penalisations can be invested in improving the homes of persons who are unable to carry out technical changes or cannot pay their energy bill.
- The introduction of domotics and energy management systems (control of consumptions at each moment, evolution, origin of consumptions, environmental impacts, cost, etc.) will be an instrument for enhancing the knowledge and awareness of the energy consumption of the citizens' everyday actions.
- Promoting this transformation requires fostering a change of habits in the citizens, and certain difficulties are detected, such as that of assuming this change of habits by citizens accustomed to irresponsible levels of comfort which they do not want to relinquish, individualistic attitudes and the comfort-mindedness of present-day society. In addition, it will be necessary to face up to the interests of the energy monopolies which, moreover, are favoured by the political class.
- The city's development model itself must become one of the major factors of public awareness-raising. A local and transversal commitment is necessary in this respect in order to set an example, by way of specific actions, development of ecological neighbourhoods, etc.

- Creation of a local public body which will operate proactively to promote efficient energy consumption in homes by means of the following actions:
  - Offering courses and promoting training and refreshment courses in energy saving matters (insulations, domotics, monitoring and energy generation) for the technical agents and architects of both the public and private sectors.
  - Carrying out institutional campaigns and presential meetings (in homes and proprietors' and residents' associations) to inform the users and offer them advice on the behaviour of their homes and the necessity and advantages of implementing systems of energy efficiency and reduced consumption in homes. In this respect, what is required is the implementation of strategic joint fieldwork actions in this matter covering all the territory, by means of collaborations between the local public administration, users, companies and specialised technicians.
  - Placing at the citizens' disposal a user attention office in matters of energy consumption in homes.
  - Creating a seal of quality that is socially recognised and valued.
  - Granting subsidies for the installation of the necessary technology to promote this form of energy consumption in homes, and to enable users to have the necessary funding to carry out improvements (insulations) and invest in the necessary apparatus for the generation of clean energy with the purpose of achieving self-sufficiency.



Graph 6. Actions in consumption habits

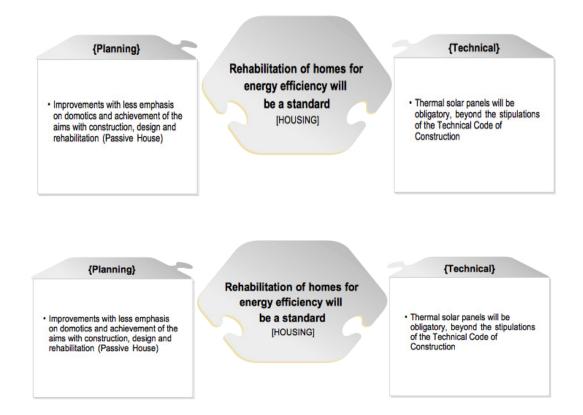
- Conducting studies, adapted to the various zones and characteristics of Figueres, on formulas of shared energy generation.
- Implementing the results of these studies jointly between the stakeholders involved (administration, users, organised collectives, companies and specialised technicians), contributing a part of the funding and/or promoting public-private collaborations to obtain the necessary resources to execute them.
- Conducting pilot tests of energy rehabilitation in public and/or private buildings to improve the efficiency of installations.
- In order to carry out all of these actions in an orderly, efficient and intelligent manner, it is proposed that this public body should have a strategic plan and accompany it with a specific plan of action and prioritisation.



Graph 7. Creation of a public body

## 6.3.2 Energy and construction

- It is proposed, in the refurbishment actions of homes in order to improve their energy efficiency, to use natural materials (wood, cork, etc.) to avoid pathologies in buildings and reduce energy consumption in the production of insulating materials.
- With respect to the urban planning regulations, it is proposed that thermal solar panels (those used to heat water) be always obligatory, independently of any other clean and renewable energy sources which may be incorporated into buildings.
- It is recommended that all actions carried out to improve energy efficiency in homes place more emphasis on domotics and focus particularly on achieving this saving by means of construction, design and rehabilitation (insulating materials).

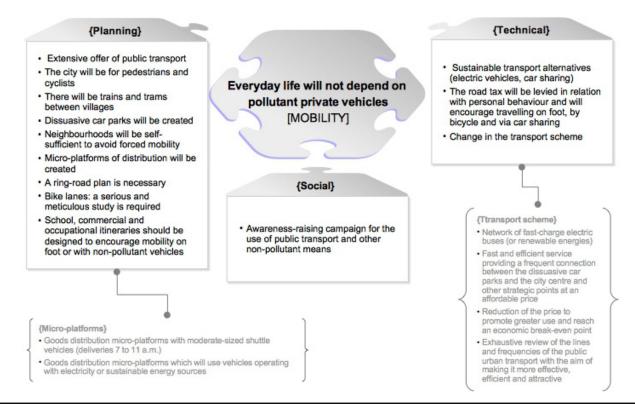


Graph 8. Actions in renewable energy sources and efficiency as a standard

## 6.3.3 Energy and mobility

- In regard to public transport:
  - The city should have a network of fast-charge electric buses and/or buses that operate with nonpollutant renewable energies and that provide a fast and efficient service providing a frequent connection between the dissuasive car parks and the city centre and other strategic points at an affordable price.
  - It is proposed that the local administration undertake a campaign of awareness of proximity (neighbours' meetings, for example) to favour the use of public transport and other non-pollutant means of transport.
  - Similarly, emphasis is placed on the reduction of the price of the city's public transport in order to promote greater use of it.
  - At the general level, the need is manifested to carry out an exhaustive review of the lines and frequencies of the public urban transport with the aim of making it more effective, efficient and attractive.

- The City Council should draw up school, commercial and occupational itineraries to encourage the citizens to travel around the city on foot or with non-pollutant vehicles that represent a clear competitive advantage over the use of the private car (particularly in regard to the time and safety of these journeys).
- With regard to bike lanes, it is proposed to draw up a serious and meticulous study.
- It is also proposed to create a car park in the city centre to provide a service fundamentally to the residents and workers of this part of the city and occasional visitors.
- It is considered important to have goods distribution micro-platforms with moderate-sized electric or hybrid shuttle vehicles. Deliveries should be made within a limited timetable, which could be from 7 to 11 a.m.
- It is considered indispensable to have a plan of urban/ neighbourhood ring roads which enable the city to be emptied of traffic.
- The road tax will be levied in relation with personal behaviour and will encourage travelling on foot, by bicycle and via car sharing.



Graph 9. Actions in mobility

## 6.3.4 Energy production and management

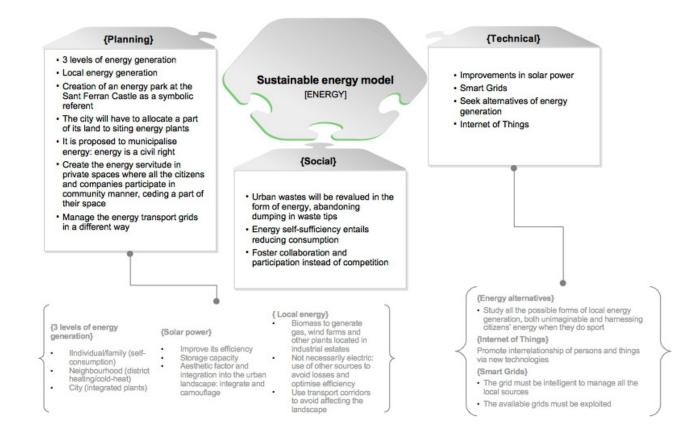
Three levels of renewable energy generation are proposed:

- 1. At individual/family scale (self-consumption)
- 2. At neighbourhood scale (district heating/cold-heat)
- 3. At city scale (nearby plants).

This will permit a model of distributed generation as a model of territorial equity with the possibility of a mixed and balanced structure between micro-generation, local generation and centralised generation. In this way, the place of production is located close to the point of consumption, avoiding the losses entailed by the transport and distribution of energy.

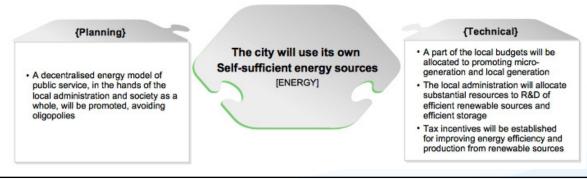
- As exploitable local sources, biomass is used to generate gas, while wind farms and other plants located in industrial estates generate electricity which is conveyed along transport corridors to avoid affecting the landscape.
- The local generation of energy does not necessarily have to be of electricity: other local sources will also be used to avoid energy losses and optimise efficiency.
- Urban wastes will be revalued in the form of energy, abandoning dumping in land fills and opting for waste management systems which generate energy.

- It is proposed to create an energy park at the Sant Ferran Castle as a symbolic referent of a city committed to self-generation and renewable energies.
- It will also be necessary to study all the possible forms of local renewable energy generation, without overlooking options such as harnessing the citizens' efforts when they do sport (static bicycles) to feed the energy generated into the grid.
- With regard to solar power, in addition to improving its energy efficiency and storage capacity, it will be necessary to take into consideration the aesthetic factor and its integration into the urban setting. It will be necessary to adopt measures to integrate and camouflage the energy generation systems in the city (panels, plants).
- In another respect, the city will also have to dedicate a part of its land to siting energy production plants.
- In this model of local energy production, management of the network is essential in order to adapt the demand to the available production. For this reason it is necessary to have a "smart grid." At the same time, the grids already available (gas, electricity) must be exploited.
- It must be understood that energy self-sufficiency entails reducing the energy consumption of the city as a whole and changing the habits of the entire population. Finally, the conversion of energy into a public service will mean having to come face to face with the interests of the large energy companies.



Graph 10. Actions in energy production and management

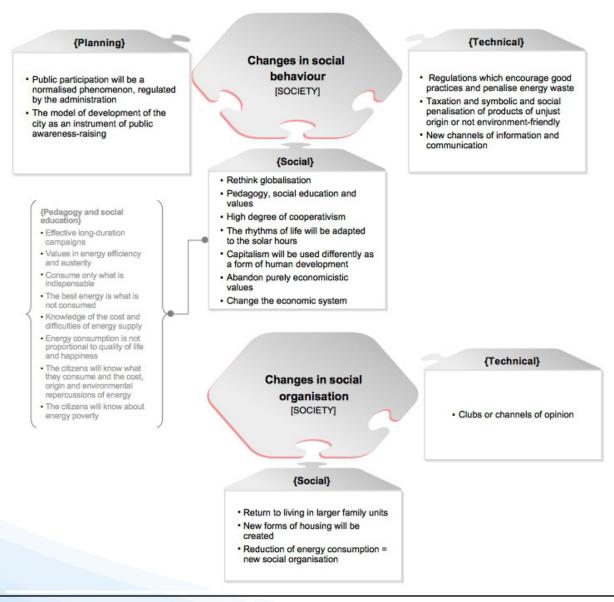
- It is proposed to municipalise the energy system, understanding energy as a civil right, with public control to avoid individual abuses. In order to rethink the bases of the economy there are strategic aspects which have to be public, such as energy, water, telecommunications, etc.
- It is necessary to ensure a publicly-owned accredited technical advice service on energy generation and saving, addressed especially to private citizens but also to traders and professionals (for example installers). In summary, what is proposed is to have organised and confirmed information accessible for anyone who requires it.
- To regulate energy use in private spaces with requirements, in such a manner that it would take the form of Energy Servitude and all the citizens and/or companies would participate in community manner in the municipal generation system, ceding a part of their space (roofs, gardens, etc.) It could be regulated as (or within) the urban planning scheme. On the basis of this action, it is also necessary to regulate in a similar manner the communications networks, wiring systems, etc.
- To seek alternatives of energy generation, such as biogas, from organic wastes and/or from wind turbines that produce methane (hydrogen + carbon dioxide, as in the example of Germany).



Graph 11. Actions in energy production and management

## 6.3.5 Transformations of the economic and social model

- It is proposed to foster collaboration and participation instead of competition. The local bodies can and must optimise the methodologies and formulas to foster cooperative and sustainable thinking and efficient lifestyles. The City Council, due to its proximity, can educate and move in this direction, always in a transversal and decided manner. Spaces must be offered to channel the citizens' opinions and initiatives. In relation with the cooperativist culture, it is important to be aware of the lack of habits of the people of the Alt Empordà in this respect. In any case, the crisis of the current globalised model and, especially, the doors that can be opened by Internet and the mentalities of the younger generations have
- to become instruments for correcting this shortage of cooperativism in the territory: "History teaches us that people only advance by way of crises."
- The current economic system will not change all by itself. This will require shared reflections, an interest in public matters and an awakening of consciences, and the activation of mechanisms of local control and management by the citizenry: "Information is power, and it must be guaranteed."
- Globalisation has generated development and positive elements, but it must be accepted that it has to be rethought. Globality (global consciousness) must be combined with hyperlocality. In fact, efficient management of local resources and assets signifies benefits for globality.
- The economy and the financial institutions at the service of persons, not the reverse. Actions must be



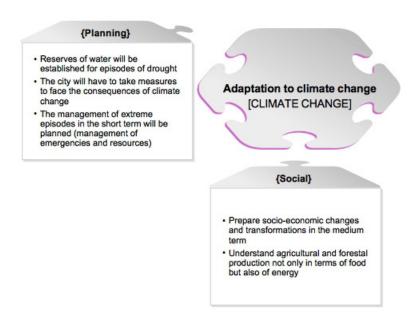
Graph 12. Actions in the economic and social model

- set in motion to change this paradigm in the future, through initiatives like local currencies.
- To promote the interrelationship of persons and things by way of the new technologies.
- A scenario would have to be attained which abandons purely economicistic considerations (more production = more economic profit) and includes energy balance + production of waste and pollution + regeneration + correct distribution of goods.
- Local production of proximity. It is becoming vital to view the future with a commitment to production of proximity and km 0 in almost everything we consume (food, goods, services, etc.) This commitment, in fact, will open the doors to change the bases of the economy from the local world. Proximity, moreover, is a synonym of quality.

### 6.3.6 The city and climate change

The city will have to plan the management of emergencies and the resources related with them, for example how to retain water in episodes of flooding in order to have it available in times of drought. It will have to prepare socio-economic changes and transformations in the medium term, since there will be climatic patterns and

conditions which will undergo substantial changes in the medium term which will have to be faced. One example is to regard agricultural (and forestal) production in terms not only of food but also of energy.



Graph 13. Actions of adaptation to climate change

### 6.4. Calendar and monitoring

There follows a proposed calendar of each of the actions encompassed by large blocks (society, mobility, housing, energy and climate change). Three time periods have been established: the short term would cover from the present moment to the year 2020, the medium term from 2020 to 2030 and the long term from 2030 to 2050.

This calendar aims to be orientative, since establishing it is complex due to referring to a very long period of time and being subject to the uncertainty of the evolution of events. However, it shows that the bulk of the actions are concentrated in the short and medium term (table 3).

		ACTION	
SOCIETY		Changes in social behaviour	
	TECHNICAL	Regulations which encourage good practices and penalise energy waste  Taxation and symbolic and social penalisation of products of unjust origin or not environment-friently	
		New channels of information and communication Rethink globalisation Pedagogy, social education and values	
	SOCIAL	High degree of cooperativism The rhythms of life will be adapted to the solar hours	
	SOCIAL	Capitalism will be used differently as a form of human development  Abandon purely economicistic values	
		Change the economic system  Public participation will be a normalised phenomenon, regulated by the administration	
SOCIETY	PLANNING	The model of development of the city as an instrument of public awareness-raising  Changes in consumption habits	
	TECHNICAL	Planned obsolescence will disappear	
		It is necessary to ensure a publicly-owned accredited technical advice service on energy generation and saving  There must be organised and confirmed information accessible for anyone who requires it	
	SOCIAL	Reduction of consumption of superfluous products The environmental cost will be incorporated into the cost of products	
	000	3 R's (Reduce, Reuse and Recycle) The production of local and sustainable foods will be promoted (km 0)	
	PLANNING	The economy and the financial institutions at the service of persons	
SOCIETY		Good supply of urban allotments  Changes in social organisation	
	TECHNICAL	Clubs or channels of opinion Return to living in larger family units	
	SOCIAL	New forms of housing will be created  Reduction of energy consumption = new social organisation	
MOBILITY		Everyday life will not depend on pollutant private vehicles	
	TECHNICAL	Sustainable transport alternatives (electric vehicles, car sharing) The road tax will be levied in relation with personal behaviour and will encourage travelling on foot, by biccycle and via car sharing Change in the transport scheme	
	SOCIAL	Awareness-raising campaign for the use of public transport and other non-pollutant means	
	· · · · · · · · · · · · · · · · · · ·	Extensive offer of public transport The city will be for pedestrians and cyclists	
		There will be trains and trams between villages	
	PLANNING	Dissuasive car parks will be created  Neighbourhoods will be self-sufficient to avoid forced mobility	
	PLAININING	Micro-platforms of distribution will be created	
		A ring-road plan is necessary Bike lanes: a serious and meticulous study is required	
		School, commercial and occupational itineraries should be designed to encourage mobility on foot or with non-pollutant vehicles	
HOUSING		Families will supply themselves from 100% renewable energy sources  Energy in buildings will be totally monitored	
	TECHNICAL	Homes will generate energy to sell or contribute The municipality will establish advantages and incentives	
	TECHNICAL	This will have to be a legal obligation	
		Introduction of domotics Supply at the home, building, neighbourhood or residential estate level	
	DI ANNINO	Zero or even positive energy balance	
	PLANNING	Energy as an asset of collective management Buildings will be well insulated with sustainable materials	
HOUSING		Actions will be taken in energy rehabilitation of buildings, reducing consumption and making them self-sufficient Rehabilitation of homes for energy efficiency will be a standard	
	TECHNICAL	Thermal solar panels will be obligatory, beyond the stipulations of the Technical Code of Construction	
ENERGY	PLANNING	Improvements with less emphasis on domotics and achievement of the aims with construction, design and rehabilitation (Passive House)  The city will use its own self-sufficient energy resources	
	TECHNICAL	A part of the local budgets will be allocated to promoting micro-generation and local generation  The local administration will allocate substantial resources to R&D of efficient renewable sources and efficient storage.	
	PLANNING	Tax incentives will be established for improving energy efficiency and production from renewable sources.  A decentralised energy model of public service, in the hands of the local administration and society as a whole, will be promoted, avoiding oligopolies	
ENERGY	FLANNING	Create a public body to promote efficient energy consumption	
	TECHNICAL	Create a socially recognised and valued seal of quality Grant subsidies	
		Make possible the necessary funding Offer courses and promote training	
	SOCIAL	Carry out institutional campaigns and presential meetings to offer information and advice	
-		Create a user attention office in matters of energy consumption in homes  Performance of local studies	
	PLANNING	Implement results of the studies with the agents involved Conduct pilot tests of energy rehabilitation in public and/or private buildings	
		Draw up a strategic plan and accompany it with a specific plan of action and prioritisation	
ENERGY		Sustainable energy model Improvements in solar power	
	TECHNICAL	Smart Grids	
		Seek alternatives of energy generation Internet of Things	
	SOCIAL	Urban wastes will be revalued in the form of energy, abandoning dumping in waste tips  Energy self-sufficiency entails reducing consumption	
		Foster collaboration and participation instead of competition	
		3 levels of energy generation  Local energy generation	
	PLANNING	Creation of an energy park at the Sant Ferran Castle as a symbolic referent The city will have to allocate a part of its land to siting energy plants	
	I LAIVINING	It is proposed to municipalise energy: energy is a civil right	
		Create the energy servitude in private spaces where all the citizens and companies participate in community manner, ceding a part of their space  Manage the energy transport grids in a different way	
ADAPTATIO		Adaptation to climate change  Prepare socio-economic changes and transformations in the medium term	
	SOCIAL	Understand agricultural and forestal production not only in terms of food but also of energy	
	PLANNING	Reserves of water will be established for episodes of drought The city will have to take measures to face the consequences of climate change	
		The management of extreme episodes in the short term will be planned (management of emergencies and resources)	











