



WP1.1 – ENERGY POLICY PLANNING, RESEARCH AND DEVELOPMENT  
D 1.1.2 Final Report

CONCERTO INITIATIVE  
RENAISSANCE

Renewable ENergy Acting In SuStainable And  
Novel Community Enterprises

Instrument (e.g. Integrated Project)  
Thematic Priority

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**Reminder of WP 1.1 "Urban and energy planning" objectives:**

- To make the most of all innovation opportunities that arise (due to the large scale of this operation) with regard to energy policy;
- To incorporate the results of this exemplary operation into local and national policies, in order to enable the immediate replication of results;
- To share experience acquired with other developers and builders.

## **SUMMARY**

### **1 – EUROPEAN CONTEXT**

### **2 – NATIONAL LEGAL AND REGULATORY CONTEXT:**

#### **FRANCE:**

#### **Building-related energy regulation historical context**

**1946:** Nationalisation Law of the electricity and gas markets, creation of monopolistic State-owned companies EDF and GDF.

**1974:** First energy regulation for new buildings (minimum insulation), up-dated and extended to non-residential buildings in 1988 (RT 1988)

**2000:** up-dated regulation (RT 2000) as result from “Air-quality and Rational Use of Energy Law”, establishing calculation methods and imposing 20% decrease in comparison with RT 1988 (40% for non-residential buildings)

**2006:** up-dated building thermal regulation (RT 2005) with a 15% decrease compared to RT 2000, an extension to existing buildings, the introduction of high performance labels and a 15% decrease planned each 5 years (2010, 2015 and 2020)

#### **Energy efficiency and renewable energy policies main milestones**

**2000:** The "Law for the modernisation of public electricity services" establishes support mechanisms for renewable electricity sources (call for tenders and feed-in-tariffs)

**2004:** the National Climate Action Plan (Plan Climat 2004) introduces 50% tax credit for individual low-energy and renewable energy equipments.

**2005:** the Program and Orientation Law on Energy Policy (Loi POPE) set up national commitment in favour of energy savings and renewable energy sources; it confirmed and reinforced pre-existing measures such as building thermal regulation, tax-credits or feed-in-tariffs, established new measures such as “white (energy savings) certificates” or guarantee of origin for RES, and finally created several sectorial Plans.

#### **Main developments since the launch of the Concerto project**

**2007:** launch of the so-called “Grenelle de l’Environnement” consultation process, including energy and climate related working group, concluded in October 2007 by a series of “Conclusive Round Tables” setting up recommendations, some of them explicitly influenced by Concerto-Renaissance way of doing.

**2008:** continuation of the “Grenelle” process with 34 specific “Operational Committees”, among which 6 concerning urban planning, energy in buildings and renewable energy sources, preparing detailed reports of measures to be taken by law or regulation.

## **SPAIN:**

### **Building-related energy regulation historical context**

**1979:** Royal Decree 2.429/79 as first Spanish building energy law (*Normativa Básica de la Edificación NBECT-79*), regarding thermal conditions in buildings, defined building performance through global thermal coefficient, and established maximum limits according to climatic zones.

**1980:** Royal Decree 1618/1980 on Regulation of thermal, cooling and hot water Facilities, which aims to rationalise energy consumption.

**1998:** Royal Decree 1751/1998 on Thermal Facilities of Buildings Regulation and its Additional Technical Instructions established the conditions that heating, cooling and sanitary hot water facilities must respect to ensure rational use of energy

**1999:** Law 38/1999 on building regulation (LOE) didn't change energy requirements, but laid down obligations and responsibilities of different parties involved in building process, and paved the way for a new law on safety and habitability requirements (see next)

### **Energy efficiency and renewable energy policies main milestones**

**2004:** The Energy Efficiency and Savings Strategy in Spain (2004–2012) is introduced; however, it is not sufficiently detailed.

**2005:** Energy Action Plan 2005–2007 aims at generating 12 Mtoe of primary energy savings, i.e. 8.5% of primary energy consumption and 20% of energy imports in 2004, resulting in a reduction in CO<sub>2</sub> emissions of 32.5m tonnes.

**2005:** Renewable Energy Plan 2005–2010. The objective of this plan is to ensure that, by 2010, 12% of total primary energy consumption comes from RES. It includes financial guidelines and innovative research.

### **Main developments since the launch of the Concerto project**

**2006:** Royal Decree 314/2006 on Building Technical Code established basic safety and habitability requirements for buildings and laid down two guidelines: a “prescriptive” one, dealing with insulation and solar protection, and a “performance-related” one, defining energy-saving objectives, but not the means to obtain them. It also established minimum contributions from solar thermal and photovoltaic energy, and some requirements related to lighting. The aim is to achieve a reduction in heating demand of 25%.

**2007:** Royal Decree 47/2007 on Energy Certification, which approves the basic procedure for energy certification in newly constructed buildings. This involves measuring energy consumption and CO<sub>2</sub> emissions, and passing on this information to buyers and users via an energy tag. Each region decides how to apply it within its territory.

**2007:** Spanish Climate Change and Clean Energy Strategy, Horizon 2007–2012–2020 (*La Estrategia Española de Cambio Climático y Energía Limpia Horizonte 2007–2012–2020*): the so-called “Clean Energy chapter” includes measures in various sectors, including buildings.

### **3 – REGIONAL AND LOCAL CONTEXTS**

#### **FRANCE:**

**Rhône-Alpes Region:** strong and long-lasting commitment of the Regional Council in favour of energy efficiency and renewable energy: creation of a Regional Energy Agency (1975), support policy to solar and wood energy (1992), development of a network of local energy information centres (2000), comprehensive Regional Energy Action Plan (2004), Low-energy Social Housing Plan (2007)

#### **Grand Lyon:**

- Sustainable development-related policies: Urban Ecology Charter (1992), Agenda 21 (2005), Air Quality Protection Plan (2007), Climate Local Action Plan (2007)
- Energy-related policy and actions: FP5 Restart program (1997-2001), creation of the SAVE Local Energy Agency (2000), Grand Lyon-owned buildings energy audit (2003), participation in Interreg IIIC AMICA (2004), Study on renewable energy sources potential in the Grand-Lyon area (2007)
- Sustainable urban planning and construction: experimental Housing Improvement Scheduled Plan in Caluire-et-Cuire city (2001), adoption of Environmental Approach of Urban Planning as operational tool (2003), enforcement of the Sustainable Housing Reference Code (2005) and of the Sustainable Office Code (2007)

#### **SPAIN**

**Aragón autonomous Community:** first version of Energy Plan in 1994, now replaced by a new Kyoto Protocol related Plan 2005 – 2012 Plan; “Plan for electric domestic appliances renewal” established in 2008; approbation in October 2008 of the Aragon Strategy for Climate Change and Clean Energy) Horizon 2007-2012-2020

#### **Zaragoza**

- Previous experience of bioclimatic urban planning in Barrio Goya (THERMIE 1995)
- The Strategic Diagnosis Plan for Saragossa (Diagnóstico Plan Estratégico de Zaragoza) was published in 1996 as first follow-up of the 1994 Aragon Energy Plan.
- Autonomous Community Order (13/11/2006) subsidies for energy savings and diversification, rational use of energy, use of local and renewable resources and energy infrastructures for the year 2007.
- Municipal Order on energy ecoefficiency and the use of renewable energies in buildings and their facilities

### **4 – EXPERIENCE SHARING**

Mains issues that impressed each consortium from the other’s way of doing are:

#### **⇒ From Spain to France:**

- Methods used in Picarral for involving residents in the urban renewal process since early stages
- Design and implementation of the sophisticated technical and social monitoring system in Valdespartera
- In depth exchanges with Zaragoza urban planning City Departement

⇒ **From France to Spain:**

- Urban planning approach: functional and social diversity, disadvantaged districts upgrade, private/public partnerships, centralised monitoring and assessment, site visit (major renovation program in La Duchère)
- Workers professional training scheme for facilitating the introduction of new technologies and know-hows needed by low-energy and renewable energy design and techniques

## **5 – BENEFITS OF RENAISSANCE TO LOCAL AND NATIONAL PUBLIC POLICIES**

### **FRANCE:**

- Enforcement and improvement of Grand Lyon local energy performance standards for new residential and office buildings
- Preparation of a local action plan focused on low-energy renovation of privately-owned housing co-ownerships in Ste Blandine neighbour district
- Development and enforcement at regional level (Rhône-Alpes) of a massive low-energy new social housing support policy, including economic monitoring, based on Renaissance outputs
- Example-based highly positive influence on the on-going political decisions process at national level (Grenelle de l'environnement)

### **SPAIN:**

- Official approbation at national level of the Master Plan used in Valdespartera as pioneering development and advisable for replication.
- Numerous amendments of Municipal orders favouring low-energy renovation and introduction of renewable energy sources
- A series of agreements between Ministry for Housing, the Government of Aragon and the City of Zaragoza to develop a massive renovation program for low-income and precarious families in Zaragoza, based on the pilot experience led in Picarral.
- Influence of Zaragoza experience in Valdespartera and Picarral on national policy improvements.

## **6 – RESISTANCE AND OBSTACLES TO CHANGE**

### **FRANCE:**

#### **Social/Cultural:**

- General reluctance to innovation, unequal and difficult to measure but actual
- Historical lack of cooperation between architects and engineers
- Distorted image of constraints on architecture due to energy efficiency

#### **Legal / administrative:**

- Incorrect calculation methodology of energy needs in Thermal Regulation
- Numerous regulations and rules inadapted to PV technology

#### **Economics:**

- Difficulties to appreciate additional cost due to energy efficiency design

## **SPAIN**

### **Social/Cultural:**

- Demotivated society, lack of communication, reluctance to change, poor awareness on environmental issues

### **Legal:**

- Ancient laws inadapted to new situation, such as the “Horizontal ownership Law”
- Planning instruments inadapted to low-energy renovation, need to apply compulsory standards like in new buildings
- Specific difficulties for installing lifts on the façade outside (i.e. in public space)

### **Economics:**

- Price regulation system in social housing that makes low-energy-related over-investments hardly possible
- Economic crisis dissuading investors to invest, particularly in the building sector

## **7 – RECOMMENDATIONS**

### **FRANCE:**

#### **Social/cultural**

- To develop awareness raising and education campaign toward general public
- To open architecture courses to technical issues given by engineers
- To develop a co-operative culture between architects and engineers in design teams

#### **Legal**

- To embrace and apply with the highest fidelity those major recommendations expressed in the final report of the Grenelle de l’environnement Working Group on energy and climate related to low-energy in new and renovated buildings, including up-date of the regulatory calculation methodology.
- To adopt a range of consistent measures for simplification and clarification of solar energy legal and administrative framework, especially BIPV.

#### **Economics**

- To accelerate the massive implementation of low-energy design and techniques so as to reduce the additional materials and labour costs associated with their innovative character.

### **SPAIN:**

#### **Social/cultural**

- To favour the involvement of local populations in renovation programs by supporting local active agents (social workers, small shops, SMEs,...), offering local people employment in renovation works and corresponding training courses
- To develop a true “Business culture” of major renovation works in disadvantaged districts, opposite to the current poor consideration for such programs

## **Legal**

- To urgently improve accuracy of the methodology used for building energy certification system and to extend it to existing homes
- To revise some parts of the Construction Energy Code (notably on energy optimisation of building design and ventilation systems)
- To revise numerous ancient laws such as the so-called “Horizontal Ownership Law”, the “Urban Development Legislation”, the “Urban Renting Law”,
- To reinforce the legal capability of Local Authorities to impose renovation works in some particular districts (deteriorated, historical, ...)
- To take model from the French comprehensive approach of Urban Renewal (social, economic, environmental), including creation of dedicated Regional Agencies.

## **Economics**

- To modify tax regime for low-energy renovation works expenses (reduced VAT rate) and for related grants received (exemption of tax)
- To create and develop a range of publicly and privately-funded financing tools available for low-energy renovation (soft loans, tax exemptions, subsidies, ...) at national/regional/local levels
- To coordinate energy efficiency and housing rehabilitation programs between Ministry for Industry and Ministry for Housing
- To support the creation of Community-based Owners associations.

## 1 EUROPEAN CONTEXT

EU, faced with low quality requirements regarding the thermal performance of buildings, drew up a series of applications to be implemented by Member States in **its Directive 93/76/EEC of 13 September 1993**<sup>1</sup>. These included the energy certification of buildings by 1 January 1995.

Provisions laid down were as follows: *“Member States shall draw up and implement programmes on the energy certification of buildings. Energy certification of buildings, which shall consist of a description of their energy characteristics, must provide information for prospective users concerning a building's energy efficiency. Where appropriate, certification may also include options for the improvement of these energy characteristics.”*

This was considered ambiguous, allegedly the reason for the slowness of the process, which failed to materialise in procedures in all but a few Community countries.

Several years later, **Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001**<sup>2</sup> **on the promotion of electricity produced from renewable energy sources** was approved; this was one of the priorities of the European Community in order to ensure the safety and diversification of energy supplies, as well as environmental protection and economic and social cohesion.

This Directive was presented as a follow-up of **the White Paper on Renewable Energy Sources** (published in 1998) confirming the objective that renewable energies should represent 12% of gross national energy consumption throughout the Community by year 2010, and that electricity produced from those renewable sources should amount to 22.1%. These objectives covered a significant part of the measures required to comply with the commitments contracted by the European Union in the 1997 Kyoto Protocol concerning the reduction of greenhouse-gas emissions.

At the moment, EU countries are taking the lead worldwide in the development of new technologies for producing electricity from RES. The Directive aims to encourage an increase in the contribution of these energy sources, while observing the principles of the internal market.

Directive 2001/77/EC required Member States to adopt and publish (by 27 October 2002 at the latest and every five years thereafter) a report establishing, for the following 10 years, national indicative targets for the future consumption of electricity from RES, and the national measures adopted or planned in order to achieve these targets. National targets were to take account of reference values set out in the annex to the directive on

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<sup>1</sup> It should be mentioned that this Directive was repealed by Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006.

<sup>2</sup> Directive [2001/77/EC](#), of the European Parliament and of the Council of 27 September 2001, on the promotion of electricity produced from renewable energy sources in the internal electricity market [Official Journal L 283 of 27.10.2001].

Member States' national indicative targets for electricity produced from renewable energy sources in gross electricity consumption in 2010.

Subsequently, **Directive 2002/91/EC on the energy performance of buildings**<sup>3</sup> broached the subject of energy certification for buildings referred to in 93/76/EEC (repealed by Directive 2006/32/EC). Evidence was collected in 2002 by the Member States, which have to apply minimum requirements for the energy performance of new or existing buildings, ensure the certification of the energy performance of buildings and impose a periodic inspection of boilers and air-conditioning systems in buildings.

The aim of this Directive is to improve efficiency in the building sector, taking into account external climatic conditions and local peculiarities, as well as internal environmental requirements and cost/efficiency ratios. The areas of implementation are as follows:

- General framework of methodology for calculating the integrated energy efficiency of buildings.
- Application of minimum energy efficiency requirements for new buildings.
- Application of minimum energy efficiency requirements for existing large buildings subject to major renovation.
- Energy certification of buildings.
- Periodic inspection of boilers and air-conditioning systems of buildings together with an assessment of operation conditions of boilers over 15 years old.

Note: although it is true that a directive on the energy certification of buildings already existed, it was adopted in a different political context prior to the conclusion of the Kyoto agreement and the uncertainties over the EU energy supply. Directive 2002/91/EC also constitutes an additional instrument proposing specific action to fill the existing gaps.<sup>4</sup>

Moreover, Article 6 of the Directive refers to application on existing buildings as follows: *“Member States shall take the necessary measures to ensure that when buildings with a total useful floor area of over 1,000 m<sup>2</sup> undergo major renovation, their energy performance is upgraded in order to meet minimum requirements insofar as this is technically, functionally and economically feasible”*.

As can be appreciated, European Directive 2002/91 aims to be an instrument for limiting CO<sub>2</sub> emissions by improving the energy performance of buildings. For that purpose, Member States have to fix minimum energy performance requirements for new buildings and for the **retrofitting of existing buildings** (when major works are involved), as well as criteria and methods for energy certification.

This is the most important directive for generating a change in the industry and European agriculture and, consequently, in the building industry as well. The principle of prevention applies to potential generators of emissions, as well as the principle of ‘polluter pays’.

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<sup>3</sup> See Annex 1 to Directive 2002-91-EC on the energy performance of buildings (2002).

<sup>4</sup> Period of application up to 4 January 2006.

Moreover, the following year saw the approval of **Directive 2003/96/EC of the Council of 27 October 2003**, restructuring the Community framework for the taxation of energy products and electricity. On this basis, energy products and electricity are taxed when they are used as fuels or heating fuels and not when they are used as raw materials or used in chemical reductions or in electrolytic or metallurgical procedures. On the basis of this principle, the directive establishes the minimum levels of taxation applicable to fuels, to fuels intended for industrial or commercial use and to fuels and electricity.

**The Green Paper on energy efficiency, or doing more with less<sup>5</sup>** was published in 2005. With this Green Paper, the Commission aimed to boost the activity of the European Union on energy saving. It invited the public authorities to make all citizens and companies take responsibility by rewarding them for making energy savings.

In this document, energy efficiency is considered an important goal, particularly given the threat that the current development of energy consumption presents for the environment and the economic growth of the EU, on which account efforts must be made, particularly in the transportation, energy production and building sectors.

Finally, within the Community regulations, **Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006<sup>6</sup>** on energy end-use efficiency and energy services, and repealing Council Directive 93/76/EEC, was published<sup>7</sup>.

It aims to develop a beneficial improvement in efficiency in the end-use of energy in the Member States (energy saving of 9% for the ninth year of application of this directive):

- by providing targets that aim to eliminate the existing obstacles on the market and defects preventing the final efficient use of energy, offering incentives and the general institutional, financial and legal standards;
- by establishing conditions for development of a service-based energy market and provision of other measures for improving energy efficiency intended for final consumers.

As can be appreciated, the aim of this directive consists not only in continuing developing energy services provision but also in establishing greater incentives for reducing demand.

Given that the aims of this directive, namely the development of efficiency in the end-use of energy and the development of an energy services market, cannot be achieved satisfactorily by Member States and, consequently, can be better achieved at Community level, the Community may adopt measures in accordance with the principle of subsidiarity.

This Directive provides that energy performance certification of a building is considered equivalent to an energy audit intended for very small companies and for small and medium-sized companies with the resulting recommendations on profitability.

Member States had to apply necessary legal, regulatory and administrative measures to comply with provisions of this Directive by 17 May 2008 at the latest, except for those

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<sup>5</sup> See COM (2005) 265 end.

<sup>6</sup> It came into force on 25 April 2006.

<sup>7</sup> Published in Official Journal L 114 of 27.4.2006.

provisions addressed in Article 14, Subsections 1, 2 and 4, which had to be incorporated into national law by 17 May 2006 at the latest (points relating to reports, and energy-saving and energy-efficiency plans).

Similarly, on 19 October 2006, the Commission adopted an **Energy Efficiency Action Plan**<sup>8</sup> which aims to make use of the possibilities for improvement exceeding 18% still existing in the Union owing to trade barriers preventing a satisfactory dissemination of techniques intended to increase efficiency and the efficient use of energy.

In this document, the Commission proposes measures to better integrate energy efficiency into Community actions and programmes not related to energy, such as regional and urban policy, taxation and energy prices, research, and technology. It also proposes to highlight those Community measures that have produced good results, as well as new common and coordinated actions and measures.

Finally, with regard to the reference European framework, the “**Intelligent Energy – Europe IEE II (2007–2013)**”<sup>9</sup> programme has been adopted. It aims to provide financial support for local, regional and national incentives within the scope of renewable energies, energy efficiency, energy aspects of transportation and international promotion. Its specific aims are as follows:

- To provide necessary elements for energy efficiency promotion and greater use of renewable energy so as to reduce energy consumption and CO<sub>2</sub> emissions.
- To develop instruments and means usable by the Commission and Member States for supervising and assessing impact of measures adopted by Member States.
- To promote well-founded, efficient and intelligent models for energy production and consumption. These measures essentially refer to experience-sharing and circulation of information at the most appropriate levels in order to guarantee effective application of legislation and favour practical improvements by local authorities. It incorporates several projects demonstrating the application of research into integrated urban planning and transport (e.g. Snowball) or the feasibility of energy certification (e.g. Impact, Reshape).

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<sup>8</sup>[COM/2006/545/FINAL](#)

<sup>9</sup> Decisión de la Comisión de 31 de mayo de 2007 por la que se modifica la Decisión 2004/20/CE con objeto de transformar la Agencia Ejecutiva de Energía Inteligente en la Agencia Ejecutiva de Competitividad e Innovación(2007/372/CE).

## 2 NATIONAL CONTEXTS IN FRANCE AND SPAIN

### 2.1 THE FRENCH NATIONAL CONTEXT IN DETAILS

#### 2.1.1 Buildings energy performance legal and regulatory framework

The very first regulation for energy consumption in buildings (RT) has been established in France by a governmental simple decree (not a law) in 1974, i.e. just after the first oil prices shock. It firstly applied only to new residential buildings, but was slightly reinforced and extended by another decree in 1988 to new residential and non-residential buildings (RT 1988).

The third version of the thermal regulation (RT 2000) was directly resulting from the “Law on air quality and rational use of energy” passed in December 1996 and established not only the minimum thermal requirements, but also the methodology to be used and the reference characteristics to be taken for calculating the “conventional energy consumption” of a building. In comparison with RT 1988, a theoretical reduction of 20% for new residential buildings and of 40% for new office buildings was then imposed.

RT 2000 was then replaced in September 2006 by the so-called “RT 2005” with a new reduction of 15% of theoretical energy consumption for new buildings and an extension for the first time to the refurbishment of existing buildings, and some improvements in calculation method such as incorporation of thermal bridges (resolved through external insulation) and of solar contribution to summer and winter comfort.

In addition, a range of energy labels for those buildings with performance over regulations were created: HPE for “High energy performance” (-10%), THPE for “very high energy performance” (-20%), HPE-EnR and THPE Enr when associated with renewable energy sources and finally BBC for “low-consumption building”.

The later, rated for the first time in France in absolute value at 50 kWh/m<sup>2</sup>.yr of primary energy can be considered as a direct consequence of the three Concerto program in which French cities were involved that had demonstrated it was possible and acceptable by developers and architects.

Application of RT 2005 has so far led to a 15% improvement in energy performance in new constructions for the 2005–2010 period compared with the previous regulation (RT2000), corresponding to a final energy need of 90 to 100 kWh.m<sup>2</sup> per year.

Compulsory energy performances established by RT 2005 were anticipated to decrease by 15% each 5 years when a new version on regulation comes into force (i.e. RT 2010, RT 2015 and RT 2020), but this process has been overcome and made obsolete by the follow-up of the “Grenelle de l’environnement” consultation process started in 2007 (see below)

The European Directive on the energy performance of buildings (EBPD) has been transposed *a minima* through the establishment of energy performance certificates (relating to consumption in kWh/m<sup>2</sup>.yr) made compulsory for homes put up for sale as of

1 July 2006 onwards and for homes put up to let as of 1 July 2007 onwards, and through an obligation to take account of energy performance during major renovation works.

In parallel, a low-rate loan named *Prêt Énergie Performance/Réhabilitation* (Energy Performance/Renovation Loan) was said to be offered to homeowners by the State-owned bank Caisse des Dépôts et Consignations (CDC) in order to support renovation operations taking account of the environmental performance of buildings.

This loan, which may complement an existing main loan, benefits from an interest rate of 3.5% over 15 years and can be used to cover 30% to 50% of the cost of renovating a home, was made available on an experimental basis in 2008, with the CDC encouraging local authorities to partly subsidising the loan.

Furthermore, in order to encourage as many households as possible to carry out work, banking partnerships may be developed.

### **2.1.2 National plans for combating greenhouse gases emissions and their consequences**

#### *Plan Climat 2004* (National Climate Action Plan 2004)

The *Plan Climat* (Climate Plan), adopted by the government in 2004, aims to reduce greenhouse-gas emissions in France, with two main objectives:

- to reduce annual emissions in France by 54 MtCO<sub>2</sub>eq (million tonnes of carbon dioxide equivalent) by 2010, i.e. almost 10% of total emissions in 2003 (557 MtCO<sub>2</sub>eq);
- to reduce greenhouse-gas emissions in France by a factor of 4 to 5 by 2050.

The *Plan Climat* requires the implementation of various actions and measures, in particular:

- a major information and communication campaign initiated in May 2004 and coordinated by ADEME (National Energy and Environment Agency);
- introduction of tax credits for individuals up to 50% of the equipment cost for promoting low-energy housing (insulation, low-energy windows, high-performance equipments) and home renewable energy equipment (solar water heaters, wood stove and boilers, photovoltaics systems, heat-pumps);
- creation of "foundations" to promote research into attenuating the greenhouse effect.

#### The PNAQ (*Plan National d'Allocation des Quotas d'Émissions* – National Emissions Quota Allocation Plan)

The PNAQ was approved by the government and published in summer 2004. Within the context of the energy market, greenhouse-gas emissions quotas constitute one of the tools implemented by the European Community in order to achieve the objectives of the Kyoto Protocol, and which are incorporated in the French climate plan.

This plan lays down emissions quotas to be respected for 700 industrial sites in France,

drawn from the iron and steel, cement, glass, paper, ceramics, brick and tile, and energy industries. Five airports (including Aéroports de Paris), around 20 hospitals and six universities are also affected.

For the sites concerned, this plan has led to a reduction in emissions of 2.4% for the period 2005–2007. A new PNAQ is scheduled for after 2007.

### **2.1.3 Renewable Energy legal framework**

The "Law for the modernisation of public electricity services" passed on 2 February 2000 as a transposition of the European Directive 96/92 of 19 December 1996 for the implementation of the internal electricity market, was the first law on this topic in France since the one of 8 April 1946 that nationalised electricity and gas sectors and created the two single national State-owned energy suppliers, EDF for electricity and GDF for gas.

In anticipation of Directive 2001-77 for the promotion of electricity from renewable sources, this Law established several basic tools for the promotion of renewable electricity sources, such as the possibility of calls for tenders and the principle of purchase obligation, for which it opened up the possibility to implement specific feed-in tariffs for each source, whose first versions were finally published between June 2001 and March 2002, depending on technology.

Then, not less than four laws were passed between 2003 and 2007, with the aim, in particular, of organising electricity and gas markets de-regulation. Among them, the most important was the "Program and Orientation Law on Energy Policy (known as the "**POPE Law**")" passed on 13 July 2005, following a national debate on energy that took place between late 2003 and mid-2004.

The POPE Law, while confirming main measures from previous legislation or regulation such as the purchase obligation for renewable electricity sources or the decrease of building consumption through RT 2005 (see below), aimed at defining a new framework for France's energy policy. Its objectives, which are in line with or go even further than European Directives, are as follows:

- reduction of energy intensity (i.e. rate between energy consumption and economic growth) of 2% per year by 2015, and of 2.5% per year between 2015 and 2030;
- reduction of greenhouse-gas emissions by 3% per year with the aim of achieving a fourfold reduction in emissions by 2050 ("Factor 4");
- supply of 10% of total energy demand by renewable sources by 2010;
- supply of 21% of electricity demand by renewable sources by 2010 (from 12% in 2005)
- 50% increase in the production of renewable heat by 2010;
- increase in the share of biofuels up to 2% in 2006 and 5.75% in 2010.

POPE Law also provides for implementation of three major plans to encourage energy savings and increase of renewable energy production:

- the so-called “*Plan énergie pour le développement*” aiming at extending access to energy services in developing countries;
- the so-called “*Plan Face Sud*” (“South Façade”) aiming at installing 200,000 solar-thermal water heaters and 50,000 PV roofs until 2010;
- the so-called “*Plan Terre Énergie*” aiming at saving cumulated 10 Mtoe (million tonnes-oil-equivalent) by 2010 using biomass for heat and biofuels.

The Government should report annually to the Parliament on the implementation of renewable energy and energy savings related measures.

Finally, POPE Law expressed a wish to “keep the nuclear option open for France”.

A special role was reserved for R&D activities in new energy technologies, with a national research strategy to be published by the Government and revised every five years thereafter.

In order to implement research and innovation strategies, France created two new complementary agencies following the POPE Law: the *Agence Nationale de la Recherche* (National Research Agency, ANR) for R&D programs and the *Agence de l’Innovation Industrielle* (Industrial Innovation Agency, AII) for major industrial programmes.

In the context of change in the organisation of State-funded research in France, the Article 95 of the POPE law changes the status of IFP (*Institut Français du Pétrole* – French Oil Institute), making it a “National Public Establishment of an Industrial and Commercial Nature” (EPIC)

The POPE Law contained a series of **practical measures** expected to help achieving the objectives set. Apart from the transposition of European Directives (in particular 2002/91/EC of 16 December 2002 on the energy performance of buildings and 2001/77/EC on electricity production from renewable energy sources), it created the following new tools:

- The **energy savings certificates**, CEE (known as “white certificates”) which aim at encouraging energy operators to make energy savings: in addition to existing instruments (regulation, tax benefits, etc.), this system is based on an obligation imposed on bigger energy suppliers to prove for energy savings, proportionately with their sales, that they can either implement by themselves or for which they can buy certificates from third parties, including businesses and local authorities, having registered their energy savings actions, which must go beyond their usual activities, in a specific national register. The market thus created with a quota of 54 TWh “cumac” (i.e. cumulated and discounted) for the first 3 years period, is expected to value the biggest saving potential at the lowest possible cost.
- The redefinition of the role of **local Authorities**, which are to obtain greater powers for acting in the field of rational use of energy, in line with action undertaken by the Government: local authorities – veritable “front-line” forces when it comes to putting an active energy reduction policy into practice, thanks to the knowledge they have of their area and their proximity to local residents – are institutions that enjoys particularly good relations with the public. They therefore have a key part to play in

raising awareness and providing information about the goals at stake with regard to rational use of energy, and encouraging changes in perceptions and behaviour. They must also set an example by reducing their own energy consumption.

- The importance attached to **consumer information**: the law aims at improving information available to consumers. Furthermore, energy and energy-related services suppliers must integrate promotion of energy savings in their advertising. Education and awareness-raising among general public is encouraged by the implementation of long-term information campaigns and the inclusion of energy-related issues in school curricula. Finally, the law requires full cost of energy, both for purchase and consumption, be given in euros for all products on the market.
- Creation of a system for **renewable energy guarantee of origin**, in compliance with Directive 2001/77/EC: for the development of hydroelectric power – the largest source of renewable electricity in France to-date – in addition to measures to simplify administrative procedures, the POPE Law encourages establishment of hydroelectric power plants using minimum water flow rate (which all operators are obliged to ensure downstream of dams) by allowing electricity produced in this way to benefit from purchase obligation. The law also makes it possible to dedicate water use to the development of renewable energy production and incorporate issues associated with electricity production safety into water management policy. For wind power, a regulation in favour of controlled development is in place. Wind-power development zones will be defined on the basis of proposals from the local authorities concerned, bearing in mind local characteristics (electricity networks, protection of sensitive sites and landscapes). Finally, a multi-year investment programme needs to be established for renewable heat.
- Specific measures to guarantee the **quality of electricity**, improve the **safety of the electricity and gas networks**, and enhance **security of supply**: in particular, having learnt lessons from the electricity production problems encountered during the heatwave of summer 2003, the law obliges the electricity transport network operator to check that production safety can be guaranteed in the medium term, and alert the ministry responsible for energy of any risk of imbalance. The powers of the Commission de Régulation (Regulatory Committee) have been extended.
- The law provides for the creation of a **Conseil Supérieur de l'Énergie** (Supreme Energy Council), which will be able to deal with questions relating to gas or electricity, as well as energy reduction and renewable energy development issues. In particular, this council will be consulted with regard to regulations concerning energy savings certificates.

Finally, the law provides for all measures related to energy distributed among numerous laws, decrees and orders to be grouped together in a "*Code de l'Énergie*" ("Energy Code"), in order to facilitate their application and make it easier for the public and operators to find out about and adhere to the measures considered.

#### **2.1.4 Mid-term outlook: follow-up of the “Grenelle de l’environnement” consultation process**

The so-called “Grenelle de l’environnement” consultation process was initiated by the Government in July 2007 and gathered the State administration, employers, trade-unions,

local Authorities and NGOs for discussing all major environment-related issues including a specialised Working Group on “Energy and Climate” dealing with energy conservation and renewable energy production. It was concluded in October 2007 by a series of “Final Round Tables” that provided consensual recommendations to policy makers.

It must be noticed that, despite all the difficulties endured all along the development of the European contract, the Concerto-Renaissance area as such and the methodology used for obtaining a shift toward actual low-energy urban and building planning were included in the final report as the main reference to-date in France and the “good example to be followed”.

34 “Operational Committees”, among which 3 dealing with building-related energy issues, 2 with urban planning and 1 with renewable energy sources were then established in early 2008 so as to prepare draft laws and regulation with view to make those recommendations from Round Tables entering into force, and provided the Government with final reports as of Summer 2008.

This long-lasting process will certainly lead to a complete reviewing of existing laws, standards and codes in related fields, which the final results will not be known before end of 2009, out of the scope of the present report.

However, the targets likely to be set up are expected to be much more ambitious than those mentioned in the “POPE law” and should be highly influenced by the contents of the “Climate and Energy Package” to be elaborated and passed by EU institutions by end 2008, under the French Presidency.

A first draft of the future law dubbed as “Grenelle 1” circulated in Spring 2008 gives some indications as follows (see § 6.1 below for more details) :

- Concerning **new buildings** energy performance, the objective of making “BBC label” (see § 212) compulsory for all buildings as of 2012 and “Positive energy building” as of 2020 should be enacted, but complicated discussions are expected on the definition of these labels and on the methodology used for calculating and measuring actual performance: nature and number of uses to consider, possible modulations for specific technologies, precise meaning of “positive energy”, ...
- The objective concerning **existing buildings** is claimed to be a decrease of the overall consumption for the whole park by 38% in 2020, which is quite ambitious, but the few means (only incitation) and figures (150 kWh/m<sup>2</sup>.yr in social housing) given in the related articles do not fit at all with this ambition.
- The objective of 23% of **renewable sources** in final energy consumption in 2020 is confirmed, quite in line with European targets as set up in the “Climate Energy Package”

A “Grenelle 2” law, supposed to provide with more operational measures is expected in late 2009.

## 2.2 THE SPANISH NATIONAL CONTEXT IN DETAILS

### 2.2.1 Legislative background

In 1979 a building energy regulation was established for the first time, in **Real Decreto 2.429/79, Normativa Básica de la Edificación NBECT-79 sobre Condiciones Térmicas en los Edificios**<sup>10</sup>. [*Royal Decree 2.429/79, Basic Building Regulation NBECT-79 on Thermal Conditions of Buildings*]. This regulation aims to define the performance by buildings by means of the coefficient of global thermal transmission of the building KG, establishing a maximum permitted KG according to the climatic region in which that building is situated.

Thermal systems are now regulated since 1980 by **Real Decreto 1618/1980 approving the Regulation of Heating, Air-Conditioning and Sanitary Hot Water Systems** in order to rationalise their energy consumption.<sup>11</sup>

This new regulatory framework made it necessary to revise the Spanish technical standards on energy efficiency, as it should have been transposed before 2006. In the initial proposal, no distinction was made between new and existing buildings, which meant that any renovations to be carried out had to take account of an improvement in the energy efficiency of the building. However, this initial intention was withdrawn and the approved wording indicates that it applies only to major renovations.

Renovations are deemed to be major when, for example, the total costs of the renovation relating to the external enclosure of the building or energy systems such as heating, hot water supply, air conditioning, ventilation or lighting amount to more than 25% of the value of the building, excluding the value of the land on which it is built, or when more than 25% of the external enclosure of the building is being renovated.

The Directive on energy performance in buildings (EPBD) has been transposed in Spain by means of three documents that must be complied with (dealt with in greater detail below):

- The Código Técnico de Edificación [*Technical Building Code*]
- Reglamento de Instalaciones Térmicas en los Edificios (RITE) [*Rules on Thermal Installations in Buildings*] and their Instrucciones Térmicas (ITE) [*Thermal Instructions*].
- Decreto de Certificación Energética [*Energy Certification Decree*].

### 2.2.2 Current legislation

The main standards on the subject contained in the Spanish legal system are currently as follows:

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<sup>10</sup> Published in the BOE of 22/10/79. It repeals Real Decreto 314/2006 of 17 March 2006.

<sup>11</sup> This Reglamento was repealed in 1998 by Real Decreto 1751/1998 of 31 July 1998.

**a) Reglamento de Instalaciones Térmicas en los Edificios (RITE) and its Instrucciones Térmicas (ITE)<sup>12</sup>.**

This Real Decreto 1751/1998 of 31 July 1998 approves the Reglamento de Instalaciones Térmicas en los Edificios (RITE) and its Instrucciones Técnicas Complementarias (ITE) [*Additional Technical Instructions*] and sets up the Comisión Asesora para las Instalaciones Térmicas de los Edificios [*Advisory Commission for Thermal Systems of Buildings*].

This regulation and its additional instructions aims at establishing the conditions that must be observed by thermal systems of buildings intended to deal with the demand for thermal well-being and hygiene through heating, air-conditioning and domestic hot water systems, all in order to achieve a rational use of energy, owing to both economic considerations and environmental protection.

The current wording of its Articles 8 states that the RITE shall apply when the facilities are renovated, understood to mean “*the inclusion of new air-conditioning and domestic hot water services, as well as the expansion, reduction or modification of the existing services, the replacement, expansion or reduction of heat or cold generating equipment and the replacement of energy sources*”.

It should be mentioned that a revision of the standards on thermal equipment efficiency (RITE) is planned for 2008.

**b) Ley 38/1999 sobre Ordenación de la Edificación (LOE)<sup>13</sup> [Law 38/1999 on Building Regulations]**

This Law came into force in 2000 aiming at establishing obligations and responsibilities of the various agents involved in the building process.

Despite the fact that this Law does not change the requirements for energy saving laid down in the Normativa Básica de Edificación [*Basic Building Regulation*], its Second Final Provision, the LOE opens the way for a new technical compilation of regulations authorising the Government to approve a *Código Técnico de la Edificación* which lays down the requirements that buildings must comply with in relation to basic safety and habitability requirements. However, the development of this compendium was much delayed and finally completed in March 2006, with the approval of the new *Código Técnico de la Edificación*.

**c) Código Técnico de la Edificación<sup>14</sup>**

The *Código Técnico de la Edificación* is the regulatory framework governing the basic quality requirements that buildings and their facilities must observe to satisfy

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<sup>12</sup> It was approved by Real Decreto 1751/1998 of 31 July 1998. See Annexes 4 and 5, RD1751 (1998)-HE2 (RITE) and RD1218 (2002) – Amendment to the RITE.

<sup>13</sup> Published in BOE no. 266 of 6 November 1999.

<sup>14</sup> Real Decreto 314/2006 of 17 March 2006, approving the *Código Técnico de la Edificación*.

See ANNEX 3 CTE, DB-HE Documento Básico de Ahorro Energético perteneciente al *Código Técnico de la Construcción* (March 2006).

the basic requirements of safety and habitability, implementing the provisions of the LOE 1999. An initial document defines the basic requirements, guidelines and conditions of implementation. The second part groups together a series of Basic Documents based on knowledge of the different building techniques, which may be updated periodically.

From an energy point of view, the Código lays down two ways of satisfying the minimum conditions: a “*prescriptiva*” [prescriptive] condition based on the satisfaction of minimum insulation and solar protection and another “*prestacional*” [performance] condition that aims to define the savings targets and leave the design solutions in the hands of the designer (recorded in a program called LIDER on the energy consumption of the building). The Código also lays down a series of minimum thermal energy contributions of solar and photovoltaic electric origin, as well as compliance with a series of requirements relating to the lighting systems.

The Código deals with the requirements of the Ley, two basic requirements for structural safety, six on safety in case of fire, eight on safety on use, five on hygiene, health and environmental protection, one on protection from noise and five on energy saving. The aim is to achieve an average reduction in the demand for heating of 25%. It will also affect savings on lighting.

#### **Article 1. Aim**

*1. The Código Técnico de la Edificación, hereinafter the CTE, is the regulatory framework governing the basic quality requirements that buildings and their facilities must comply with in order to satisfy the basic requirements of safety and habitability, implementing the provisions of the second additional provision of Law 38/1999 of 5 November on building regulations, hereinafter LOE.*

*2. The CTE lays down these basic requirements for each of the basic requirements of “structural safety”, “safety in case of fire”, “safety on use”, “hygiene, health and environmental protection”, “protection from noise” and “energy saving and heat insulation”, laid down in article 3 of the LOE, and provides procedures allowing compliance therewith to be proven with sufficient technical guarantees.*

*3. The basic requirements on “functionality” and the functional aspects of the structural features shall be governed by its specific regulations.*

*4. The basic requirements must be complied with in the planning, construction, maintenance and conservation of buildings and their facilities.*

Moreover, its Documento Básico de Ahorro de Energía DB HE [*Basic Energy Saving Document DB HE*] lays down the limitation of the demand for energy by defining the parameters of the casing, as well as the energy efficiency of the lighting facilities, minimum solar contribution of sanitary hot water and photovoltaic energy.

Any industry with polluting potential must apply for authorisation and take responsibility for dealing with the effects of its activity. It applies several maximum pollution thresholds and refers to the best techniques available for each sector of activity.

**d) Real Decreto 47/2007 sobre Certificación Energética [Royal Decree 47/2007 on Energy Certification]**

Specifically on the subject of the energy certification of buildings, **Real Decreto 47/2007 of 19 January 2007<sup>15</sup>** has been approved recently, **approving the basic procedure for the certification of the energy performance of newly constructed buildings**. For existing buildings, the drafting of another Real Decreto is planned before January 2009.

The compulsory energy certification of all new buildings will provide significant information for users, who will be able to establish the level of consumption of their buildings, as well as the criteria for the correct use thereof. Energy certification will be a training tool for the technicians responsible, a market tool for consumers and salespersons and a planning tool for the administration to be able to control the thresholds of energy consumption in one of the sectors experiencing the highest growth in recent years.

The first wording of 1985 did not include any of the subjects studied here. Its scope of implementation was limited to a series of facilities of high risk to the environment, focusing on the principle of precaution. The second directive on Strategic Environmental Evaluation approved in 2001 deals with the plans and programmes and applies to any urban development plan and the activities of the planning authority. It has been established in the autonomous community land laws in various formulations: environmental impact studies that must be observed, integrated environmental assessment and other formulations.

Real Decreto 47/2007 requires the energy certification of new buildings as from 2007 measuring energy consumption and CO2 emissions, which is passed on to purchasers and users of the building by means of an energy label. Each Autonomous Community has the competence to develop this matter (applying the method or computer program it decides on, establishing inspection procedures, etc.). In Aragon, this competence has not been developed as yet.<sup>16</sup>

The aim of this regulation is to establish the basic procedure that must be observed for complying with the methodology for calculating energy performance, starting with the certification process, taking into consideration those factors that have the greatest impact on the energy consumption of newly constructed buildings or buildings modified, renovated or rehabilitated over a specific extension.

It also establishes the technical and administrative conditions for energy performance certification of projects and completed buildings (partial transposition of Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002).

With regard to the energy certification of buildings, Real Decreto 47/2007 of 19 January 2007<sup>17</sup> was approved last year, establishing the basic procedure for the certification of the energy performance of newly-constructed buildings. For existing buildings, the drafting of another Real Decreto is planned before January 2009.

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<sup>15</sup> It came into force voluntarily and will be compulsory as from 19 October this year.

<sup>16</sup> Situation in the region of Aragon

<sup>17</sup> It came into force voluntarily and will be binding as from 19 October this year.

**e) Real Decreto 1027/2007, new RITE (REGLAMENTO DE INSTALACIONES TÉRMICAS EN EDIFICIOS) [REGULATION ON HEATING FACILITIES IN BUILDINGS]**

The new RITE falls within the CÓDIGO TÉCNICO DE LA CONSTRUCCIÓN (CTE) in the Documento Básico de Ahorro de Energía (BD-HE) as basic requirement 2 (HE2). The new regulation lays down the conditions that must be observed by facilities intended to deal with the demand for thermal well-being and hygiene through the heating, air-conditioning and sanitary hot water systems, to achieve a rational use of energy.

The greatest energy efficiency requirements laid down by the Real Decreto are as follows:

- Greater energy performance of the heat and cold generating equipment as well as the equipment intended for the movement and transportation of fluids.
- Better insulation of the heating fluid equipment and pipes.
- Better regulation and control to maintain the design conditions laid down for air-conditioned premises.
- Use of renewable energies available, particularly solar energy and biomass.
- Incorporation of energy recovery subsystems and use of residual energies.
- Compulsory systems for metering consumption in the event of collective facilities.
- Gradual disappearance of more polluting solid fuels.
- Gradual disappearance of less efficient generating equipment.

The RITE also lays down the obligation to check and periodically update the energy efficiency requirements, at least every 5 years. This task is to be performed by the Comisión Asesora del RITE [*RITE Advisory Committee*], which is responsible for making proposals according to the development of technology and the national energy policy.

### **2.2.3 The Energy Saving and Efficiency Strategy in Spain 2004–2012<sup>18</sup>**

This strategy, approved in 2003, did not contain a detailed specification of the specific measures, periods, responsibility of the different public bodies involved or identification of lines of financing and budgetary items associated with each case. In 2005 the 2005–2007 Action Plan<sup>19</sup> was approved for correcting this lack of definition, with

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<sup>18</sup> Approved by the Council of Ministers on 28 November 2003.

<sup>19</sup> On 8 July 2005 the Council of Ministers approved the 2005-2007 Action Plan on Energy Saving and Efficiency.

several targets for generating a total primary energy saving of 12 Mtoe, 8.5% of primary energy consumption for the year 2004 and 20% of oil imports that year, and a reduction in CO<sub>2</sub> emissions of 32.5m tonnes. By sectors, the greatest volume of saving planned is found in Transportation.

The 2005–2007 Action Plan focuses on seven sectors, specifies 20 urgent measures for each one and 23 additional measures to increase the reduction in greenhouse-gas emissions. The measures to be taken in the different sectors were identified according to criteria such as the actual saving potential of the sector and the public and private cost per tonne of oil equivalent (toe) saved. The transposition of the Directive on the Energy Performance of Buildings of 2002 lays down the obligation to fix minimum energy performance requirements for new buildings, for buildings undergoing restoration works, the energy certification of buildings and the periodic inspection of boilers and air-conditioning systems.

#### **2.2.4 2005–2010 Renewable Energies Plan (PER)<sup>20</sup>**

The 2005–2010 Renewable Energies Plan revises the 1999–2010 Renewable Energies Development Plan, which failed to achieve targets in its initial phase, partly owing to the energy intensity of the period and partly because only the wind, biomass and biofuels energy strategies were suitably developed.

Its target is for 12% of the total consumption of primary energy to come from renewable energies by 2010, guaranteeing the quality and safety of the supply and reducing energy dependency, general targets of the national energy policy. Although its targets are directly related to the production and supply of energy, it lays down guidelines on financing and research into technological innovation in the specific application of these renewable energies.

#### **2.2.5 The Estrategia Española de Cambio Climático y Energía Limpia Horizonte 2007–2012–2020<sup>21</sup> [Spanish Strategy on Climate Change and Clean Energy, Horizon 2007–2012–2020].**

On 20 July this year (2007), the Council of Ministers approved the Estrategia Española de Cambio Climático y Energía Limpia, Horizonte 2007–2012–2020 which incorporates the allegations and comments received during the public consultation period, as well as the contributions of the members of the Consejo Nacional del Clima [*National Climate Council*] and the Comisión de Coordinación de Políticas de Cambio Climático [*Climate Change Policies Coordination Commission*].

It has two chapters, one relating to Climate Change strictly speaking and the other to Clean Energy. This second chapter aims to gradually reduce energy intensity in Spain.

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<sup>20</sup> Approved by the Council of Ministers on 26 August 2005.

<sup>21</sup> Approved by the Council of Ministers on 20 July 2007.

The areas of implementation where measures are established are as follows: energy efficiency, renewable energies, managing demand, research, development and innovation in the development of technologies with low carbon dioxide emissions.

It includes a whole series of measures in the so-called broad sectors, including very specific suggestions for the residential, commercial, institutional and mobility sectors.

## 2.2.6 Autonomous Communities framework

### 1. Andalucía

- a. **Incentives for the sustainable energy development of Andalusia 2007.** Agencia Andaluza de la Energía [*Andalusian Energy Agency*]. Consejería de Innovación, Ciencia y Empresa [*Innovation, Science and Business Advisory Service*]. Programme of incentives for activities based on a more sustainable energy development model in Andalusia: savings and energy efficiency projects, renewable energy facilities, production of biofuels and energy supply, etc. Period open until 30 November 2007. General beneficiaries: citizens, companies, groups, foundations, local authorities.

### 2. Aragón.

- a. ORDER of 13 November 2006 of the Department of Industry, Trade and Tourism calling for **subsidies for energy savings and diversification, rational use of energy, use of indigenous and renewable resources and energy infrastructures** for the year 2007. Isolated photovoltaic solar energy, thermal solar energy, isolated wind energy, applications with biomass, mini hydraulic plants with a power of less than 5 MW and investments in the optimisation and development of energy infrastructures may receive subsidies.

### 3. Asturias.

- a. **Subsidies for local authorities of the Principality of Asturias for energy saving and use of renewable energy programmes.** Measures for the rational use of energy and replacement of energy sources as well as the use of renewable sources may receive subsidies.

### 4. Canarias

- a. **Subsidies for 2007, for the execution of different measures increasing energy saving and efficiency.** Consejería de Industria, Comercio y Nuevas Tecnologías [*Industry, Trade and New Technologies Advisory Service*].

### 5. Castilla y León

- a. The Consejería de Economía y Empleo [*Economic Affairs and Employment Advisory Service*] is calling for **subsidies** within the 2005–2007 Energy Saving and Efficiency Strategy Action Plan, **for an improvement in the thermal casing of existing buildings**, intended for natural persons, associations of owners, non-profit-making bodies and local authorities.

- b. Within the Castilla y León Solar Plan, the Junta de Castilla y León [*Council of Castilla y León*] annually calls for **subsidies intended to finance thermal solar energy, photovoltaic solar energy not connected to a network and wind-photovoltaic energy not connected to a network** within the scope of the autonomous community. They are intended for local or provincial corporations; natural persons; owners' associations and non-profit-making associations or bodies; companies, small and medium-sized companies and autonomous bodies.

## 6. Castilla la Mancha

- a. **Assistance in the improvement of energy efficiency and saving in public lighting, industrial and cogeneration sector and in the building sector.** Consejería de industria y sociedad de la información [*Industry and information society advisory service*]. Recipients: natural persons, legal persons and public or private bodies.

## 7. Catalunya

- a. **Decret de Ecoeficiència 21/2006 [*Ecoefficiency Decree 21/2006*]**. This is a step in the direction of the approval of the Código Técnico, drawn up by the Consejería de Medio Ambiente y Vivienda de la Generalitat de Catalunya [*Catalonia Council Environment and Housing Advisory Service*]. It governs the adoption of environmental and eco-efficiency criteria for newly constructed buildings, focusing on four parameters in particular: water, energy, waste and building materials and systems, both during the construction of the building and during its use. The Decree must be applied both to newly constructed buildings and buildings undergoing major restoration and also to buildings resulting from the conversion of old buildings.
- b. **Subvencions 2007 per a actuacions en matèria d'energies renovables [*2007 subsidies for renewable energy measures*]**. Institut Català d'Energia [*Catalan Energy Institute*]. Facilities using biomass, thermal solar energy, independent photovoltaic solar energy and gas energy may receive subsidies.
- c. **Subvencions 2007 per a actuacions en matèria d'estalvi i eficiència energètica en règim de concurrència competitiva [*2007 subsidies for competitive energy efficiency measures*]**. Institut Català d'Energia. Investments in technologies for improving energy efficiency made by ESCOs; investments in technology for improving energy efficiency in industrial process facilities; and individual measures on emerging efficient technologies intended for the industrial sector, buildings and services may receive subsidies.
- d. The Generalitat de Catalunya has established a **línia de finançament especial en matèria d'eficiència energètica i l'ús d'energies renovables [*special financing line for energy efficiency and the use of renewable energies*]**, in collaboration with the financial institutions Caixa d'Estalvis i Pensions de Barcelona ("La Caixa"), Caixa Catalunya, Banco Bilbao Vizcaya Argentaria (BBVA), Caixa Penedès, Banc Sabadell and Banc Santander Central Hispano, intended to grant loans and/or leasing for measures (projects and investments) on energy efficiency and the use of renewable energies.

## 8. Xunta de Galicia [*Council of Galicia*]

- a. **Subvencións e axudas a proxectos de aforro e eficiencia enerxética e proxectos de enerxías renovables [*subsidies and assistance for energy saving and efficiency projects and renewable energy projects*]** in the year 2007. It includes the industry, transportation, building (restoration of the thermal casing of existing buildings, improvement to the thermal facilities of existing buildings and improvement to the interior lighting in existing buildings), energy transformation and renewable energy projects sectors.

## 9. La Rioja

- a. **Assistance for promoting the rational use of energy and the use of renewable energy sources**, intended for companies and public or private bodies, groups of such companies, non-profit-making institutions and intermediate organisations set up in the Autonomous Community of La Rioja, for projects involving the rational use of energy, the use of renewable energy; projects demonstrating and circulating any of the renewable energy sources; creation or expansion of energy infrastructures and R+D in the energy field.

## 10. Madrid

- a. The Government of the Community of Madrid has drawn up an **Energy Plan** with a times pan fixed for 2012, which constitutes its energy strategy plan. Its aims include developing energy saving and improving efficiency in the sector at various levels; as well as promoting the use of its own renewable energy resources; and checking the environmental effects resulting from the use of the energy resources.
- b. It includes the **Madridsolar** campaign, organised by the Directorate General for Industry, Energy and Mines with the collaboration of nine large companies in the energy sector for developing the use of solar energy in the Community of Madrid.
- c. **Madrid Ahorra con Energía [*Madrid saves energy*]** is a campaign organised by the Community of Madrid in collaboration with the IDAE for developing energy saving and the efficient use of energy.

## 11. Navarra

- a. **Concession of subsidies for investing in facilities using renewable energies for the year 2007**. Assistance may be provided for investments made in Navarra, in the following types of facility: thermal solar; photovoltaic solar isolated from network; photovoltaic solar connected to the network with didactic purposes; wind isolated from network; heat generation with biomass for non-industrial use; geothermal energy and mixed facilities of two or more of the above types.
- b. Call for 2007 for **subsidies for energy saving and efficiency measures in the building sector**, intended for investments and expenses aiming to reduce energy consumption in existing buildings in the residential and tertiary sector, according to the following measures: restoration of the heating system of existing buildings; improvement in the energy efficiency of the heating systems of buildings; other measures to reduce the consumption of the heating facilities of existing buildings.

## 12. País Vasco

- a. **Public assistance for investments in energy efficiency within the 2005–2007 action plan.** Ente Vasco de la Energía [*Basque Energy Authority*]. It promotes investment in projects for the improvement of energy efficiency in the Autonomous Community of País Vasco in industry, transportation, building, public services and energy transformation.
- b. **Public assistance for new projects in the areas of solar and biomass energy.** This applies to thermal solar facilities; photovoltaic solar facilities isolated from the electrical network; and facilities using biomass to generate thermal energy. This programme will not be able to include assistance for those facilities partially or totally prohibited by the Código Técnico de la Edificación.

## 13. Murcia Region

- a. Concession of **assistance, intended for the execution of projects and measures on energy saving and efficiency** contained in the Energy Saving and Efficiency Strategy Action Plan in Spain (E4).
- b. **Assistance** intended for the execution and operation of projects involving **sustainable energy management** in the rural and urban environment, by facilities using renewable energy resources, in the thermal solar and biomass areas. Promote the execution and operation of projects involving facilities using renewable energy resources in the thermal solar and biomass areas.
- c. Concession of **assistance, intended for the restoration of the heating system of existing buildings**, in order to reduce the demand for energy for the heating and cooling of the building.
- d. Assistance for companies and families and non-profit-making institutions, intended for the execution and operation of **projects involving facilities using renewable energy resources**, encouraging the replacement of conventional energies with clean and inexhaustible sources in industry, services and building, contributing to environmental protection, for the year 2007.

### **3 REGIONAL AND LOCAL CONTEXTS**

Both in France and Spain, regional and local actors and institutions generally prove being much more pro-active and able to move than the national regulation actually require.

Although the political, legal, regulatory and financial means that regional and local Authorities in France and Spain have at their disposal for developing their strategy considerably differ, it is quite noticeable that their capability to innovation and their reactivity to adapt to a quick evolving context pave the way in both countries to the further and slower evolution of national legislation.

This is of course particularly true with those Communities involved in Concerto projects as Lyon and Zaragoza, which demonstrate *per se* a strong commitment toward action and partnership, but this is more generally the case for all Regional and Local Authorities.

In this prospect, the idea developed and implemented by the European Commission to directly deal with those most dynamic European local Authorities through the DG-TREN Concerto call procedure can be seen as a particularly positive and clever one, allowing a considerable time saving for experimenting and disseminating low-energy and renewable energy best practices over Europe.

#### **3.1 LOCAL CONTEXT IN LYON**

##### **3.1.1 Regional framework (Rhône-Alpes)**

The strong commitment of Rhône-Alpes Regional Council in favour of sustainable energy dates back more than 30 years, with the creation in 1975, just after the first Oil Prices Shock, of the first French Regional Energy Agency with view to develop both energy savings and renewable energy sources.

A noticeable quantitative and qualitative reinforcement of the Regional Council support policy to local actors (individuals, SME and local Authorities) initiatives in these fields took place in 1994, then followed by a strong support to the development of an extensive network of local Energy Information Centre distributed all over the Region territory and managed by 11 non-profit associations including two "SAVE local energy Agency" (in Lyon and Grenoble) and 9 other independent structures (including Hespul), in close coordination with the national initiative from ADEME.

A comprehensive and extended Regional Energy Action Plan, including 21 detailed support measures related to all fields of interest (including awareness raising, education, technical studies, financing tools and many others) and targeted to all kinds of actors, which was the very first major political decision to be unanimously approved by all elected representative came into force in 2004.

Finally, a large Low-energy Social Housing Plan was designed and passed in 2007 with the objective to finance more than 1 200 new dwellings per year (i.e. half of the annual flow) with very low-energy performances, close to those established in Renaissance-Concerto area, including training and technical support for those employees from social housing public and private organisations in charge of implementing these objectives.

### 3.1.2 Local framework

#### 3.1.2.1 Grand Lyon sustainable development policy

The strong commitment of Grand Lyon in favour of sustainable development dates back more than 15 years, with the first taking place in 1992, in the wake of the Rio Earth Summit: this was the birth of Grand Lyon's Urban Ecology Charter – one of the first created in France, which was a commitment to improving the environment and living conditions for inhabitants.

One section presents the objectives to be achieved, with over 100 individual actions detailed and subdivided into 10 themes relating to the urban area: urban territories, water, waste, air, noise, energy, risks, environmental survey, information, and large public awareness raising.

A reviewed Charter was then passed in 1996 in order to pursue the work undertaken as part of the first version.

In parallel, the concept of sustainable development has come to take an increasingly important role in numerous issues; it is now a subject for research and discussion, and has a major influence on policies throughout the urban area via the revision of the urban mobility plan (PDU), the local housing plan (PLH) and the local urban development plan (PLU).

With the creation of an Agenda 21 working group, charged with the task of drawing up an Agenda 21 and ensuring its application, Grand Lyon acquired certain technical and budgetary resources. The Greater Lyon Agenda 21 was approved in May 2005.

In 2007, Grand Lyon committed itself to producing a **Plan Climat Territorial (Area Climate Plan)** that aims at stabilising greenhouse-gas emissions by 2012, reducing them by 20% by 2020, and ultimately cutting them by a factor of 4 by 2050. This Climate Plan offers an assessment of greenhouse-gas emissions across Grand Lyon urban area and with regard to property owned by the Grand Lyon as such, as well as clearly defined actions to limit and reduce these emissions. The Climate Plan also acts as a tool for change, by encouraging people to become more aware of the issues, thus leading to changes in behaviour.

Grand Lyon, like all urban areas with more than 250,000 inhabitants, must also be covered by a **PPA (Plan de Protection de l'Atmosphère – Atmospheric Protection Plan)** to ensure that air quality levels remain within the established legal limits. The role of the PPA is to propose a raft of preventative and corrective measures – some permanent, some temporary – with the aim of reducing and/or maintaining atmospheric pollution levels (other than levels of greenhouse gases dealt with in the Climate Plan) below European thresholds, throughout the urban area. Thresholds are established for each pollutant. The aim of this document is to achieve tangible results.

In addition, it should not be forgotten that Grand Lyon's involvement also extends to its Department for international economic development (DGDEI), which provides support and assistance to **regional clusters** and **competitiveness clusters**, which in turn bring together networks of actors that work in the field of renewable energy sources and their use in other sectors.

A good example is AXELERA, the Chemical & Environmental cluster which aims at speeding up the move towards an *avant-garde* chemicals sector that incorporates environmental management through eco-design. Also of particular note is Lyon Urban Trucks & Bus 2015, which seeks to improve the performance of urban passenger and freight transport systems, by proposing efficient and innovative transport solutions that incorporate an energy-saving dimension.

### **3.1.2.2 Grand Lyon energy policy**

As a producer, distributor and consumer of energy, Grand Lyon has a key incentivising role to play through its various competences, particularly with regard to:

- reducing energy consumption;
- making the most of energy consumed;
- ensuring the diversification of energy sources.

This action takes the form of studies, direct action to improve the energy efficiency of Urban Community property, partner-based action in conjunction with European programmes, the implementation and creation of special tools, and awareness-raising via public policy.

#### **➔ Studies:**

The aim here is to analyse and quantify, in order to find out facts, take action, change habits and practices, and bringing together and evaluating different players through exemplary procedures:

- Global Energy Audit of Urban Community Buildings: carried out in 2003.
- Inventory of CO<sub>2</sub> emissions in Grand Lyon: 2007.
- Assessment of potential of renewable energy sources suitable for implementation within Grand Lyon: 2007.
- Participation in the European INTERREG IIIC Amica programme, coordinated by the Climate Alliance (an international network of 12,000 local authorities which works on local policies to combat climate change). The AMICA programme aims to combine adaptation and reduction of climate change, by linking existing emission-reduction methods with new adaptation strategies.
- Evaluation of the carbon footprint of the Urban Community's property and departments, including its delegated bodies: in progress.

#### **➔ Actions concerning Grand Lyon property**

- Installation of a solar power plant comprising 300 m<sup>2</sup> of photovoltaic cells on the roof of the Hôtel de Communauté
- Creation of a "Corporate Transport Plan" in 2007.
- Research in progress on the subject of optimising the energy performance of public buildings through the implementation of public-private partnership contracts (cf. EDF/Schneider Electric, etc.)
- Investigation into energy-savings certificates in progress.

#### **➔ Partner-based actions**

Housing:

- Creation of 160 high-performance homes in partnership with 7 social landlords as part of a European programme: **RESTART**, which involves Rhône-Alpes Regional Council and

ADEME

Transport:

- Creation of a new major tramline (**T3**, formerly known as "**LEA**") between the main train station Part-Dieu and Meyzieu.
- The "**REAL**" project, which concerns not only transport and mobility, but also the way the urban area is structured.

Both projects aim at reducing energy expenses for inhabitants.

### ➔ Specific tools

- Creation of the **ALE (Agence Locale de l'Énergie de l'Agglomération Lyonnaise – Lyon Local Conurbation Energy Agency)** in 2000.

This not-for-profit association takes action in the fields of energy efficiency and rationalised energy use, water management, air quality, renewable energy sources, and reducing consumption by changing people's habits.

ALE responds to requests for information, training and education from the general public, local authorities and other contracting authorities, and professionals, and provides advice through the "Info Énergie Centre" centre set up and funded by ADEME and Rhône-Alpes Regional Council.

Finally, Grand Lyon is strongly involved in search for operational tools with the aim of implementing sustainable development approaches in the context of urban development projects.

In these views, a tool designed by ADEME, dubbed **AEU (Approche Environnementale sur l'Urbanisme – Environmental Approach of Urban Planning)**, was put into practice on an experimental basis in 2003/2004 as part of several urban development projects at the feasibility study phase.

The goal of the AEU is to combine development and environment, in order to more effectively take account of sustainable development on a project-wide scale.

Feedback from AEU's established during the test phase was very promising; in early 2005, therefore Grand Lyon Vice-Presidents in charge of related fields approved a proposal to make the use of AEU standard for all urban development projects initiated by the Urban Community.

Since then, 30 or so AEU's have been carried out within Grand Lyon area.

#### **3.1.2.3 Approaches adopted in favour of new constructions**

Since 2001, Grand Lyon has invested in research into the environmental quality of housing, in terms of the urban area as a whole, and in particular regarding the issue of tools to be used.

One of the first areas to benefit from this research was the construction of new housing, with the aim of reducing greenhouse-gas emissions, encouraging energy-efficient buildings and proposing energy-saving homes that are likely to lead to reduced charges and expenses.

The coordination of this research was delegated to the ALE, one of the roles of which is to assist the Urban Community in the implementation of its energy efficiency and sustainable development policies.

This partnership has made it possible to produce reference criteria for the construction of new homes, known as the "*Référentiel Habitat Durable*" ("Sustainable Housing Reference Criteria").

The content and requirements of this document are based on:

- 1) feedback from the European RESTART programme, in which Grand Lyon and ALE were both involved, in partnership with social landlords within the Lyon urban area;
- 2) the requirements established in the HQE<sup>®</sup> (High Environmental Quality) specifications which served as a basis for responses during the request for proposals for the European Concerto programme.

As of 1 January 2005, the sustainable housing reference criteria are applicable within Greater Lyon in the following cases:

- for all development operations initiated by the Urban Community ("ZACs", or mixed development zones);
- for plots of land sold by the Urban Community to public or private operators;
- for the construction of social housing where the contracting authorities wish to invest in a High Environmental Quality approach.

#### **3.1.2.4 Actions on existing buildings**

##### **Issues at stake**

In Lyon, the residential and tertiary sectors account for one third of all greenhouse-gas emissions. Therefore, the need to reduce greenhouse-gas emissions combined with the rising cost of energy requires a proactive energy policy, particularly with regard to buildings.

The number of homes built before 1975 within Greater Lyon is estimated to total more than 380,000, including around 284,000 flats and around 96,000 houses.

In order to meet the objectives established nationally for the reduction of greenhouse-gas emissions and locally through the implementation of the Greater Lyon Climate Plan, around 9,000 homes (flats and/or houses) would theoretically have to be renovated each year within the Lyon urban area.

To achieve this, a better way of taking account of energy efficiency issues must be found, while still pursuing the priority objectives laid down in the PLH (Local Housing Programme), which aim to safeguard the social vocation of the existing private housing stock.

With this in mind, the Urban Community decided to undertake research into new tools that would respond to both the reduction of greenhouse-gas emissions and the requirements of the PLH.

The Urban Community sought to bring this work to a close by the end of 2008, bring existing and future measures into line with one another, and introduce an action programme that would encourage energy efficiency in existing housing.

### ☞ Approaches adopted with regard to private housing

To date, little has been done to encourage the renovation of the existing housing stock with a view to improving energy efficiency and reducing energy consumption.

Experiment undertaken: experimental OPAH (*Opération Programmée d'Amélioration de l'Habitat* – Scheduled Housing Improvement Scheme) in Caluire-et-Cuire (2002/2004)

This OPAH (government-subsidised Scheduled Housing Improvement Scheme) included a special section dedicated to energy. This led to work on cost control, with the aim of sustainably reducing the overall cost of housing for tenants.

This approach involved the creation of an "energy working group", concerning all landlords wishing to benefit from an OPAH subsidy. Thermal performance was calibrated for older housing and measured in terms of the quality of thermal insulation (RT1989) and the level of energy costs (€10/m<sup>2</sup>/year inc. VAT).

The resources made available consisted of a free energy assessment for all landlords, carried out by the ALE in order to evaluate the energy performance of their properties and provide decision-making and follow-up assistance.

Reassured by the possibility of a limited monetary incentive, funded by the financial partners, many landlords were willing to participate (since housing that does not meet the necessary heat efficiency criteria is not eligible for public funding). Additional funding that complements that of the ANAH (*Agence Nationale pour l'Amélioration de l'Habitat* – National Agency for Housing Improvement) is provided by Grand Lyon and Caluire-et-Cuire Council, increasing the subsidy level to 55% for properties benefiting from *loyers maîtrisés* (controlled rents), 65% for *loyers conventionnés* (rents at social housing levels) and 80% for *loyers PST* (rents at especially low social housing levels), with a subsidy for intermediate rents that do not benefit from ANAH assistance.

The results obtained revealed a reduction in charges for tenants, while surplus costs for landlords associated with this work were generally limited (around 5%).

However, the measure selected, namely an OPAH, does have a certain number of weak points, which make taking account of energy issues slow and complicated.

These weak points include the following: the operational duration of OPAHs is too short; establishing "joined-up" energy measures is delicate, as there are several different measures which are difficult to implement together; goals for improving the living environment are not achieved because of a reduction in the types of work eligible for subsidies.

The question of what the best approach is remains unanswered; it would appear that the best approach is yet to be invented, but it would ideally be based on greater flexibility for occupied housing, greater coherence with existing measures (ANAH, European directive on the energy performance of buildings) and greater openness towards other aspects of sustainable development

### ☞ Approaches currently being studied:

- **OPATB (*Opération Programmée d'Amélioration Thermique des Bâtiments* – Scheduled Scheme to Improve Buildings' Thermal Performance) in Vénissieux**

A feasibility study is in progress on a 363-hectare site with 30,000 inhabitants in Vénissieux, one of the towns that make up Greater Lyon.

In addition to the questions raised in the previous section, concerning the type of measures that would make it easier to attain the necessary energy performance requirements, work has begun with regard to action processes:

- One option would be an overall programme covering all areas and aspects, bearing in mind that significant investment would be required of landlords, who would need a high borrowing capacity. Under this approach, few landlords would have the necessary financial capacity to carry out work, leading to poor results for the OPATB.
- An alternative option would be to carry out jobs sequentially, in order to spread costs and thus the financial burden for landlords, which might give more promising results. In this case, the time frame of the OPATB would not be suitable (too short).

Similarly, should the OPATB concentrate on energy classes or on increases in energy class? Should efforts to achieve high energy performance be concentrated on just those homes with the most serious energy problems, or should efforts be made to ensure that all housing is improved?

In this regard, the ANAH is still considering new options for its financial assistance in the context of OPATBs. It would seem that preferences are leaning towards targeting those households with major financial and energy efficiency problems.

#### **↪ Action under way with regard to social housing**

##### **- Launch of a study into energy and deprivation**

In late 2006, ARRA HLM [the regional association of social housing organisations] launched – in partnership with ADEME, Rhône-Alpes Regional Council, the CDC (*Caisse des Dépôts et Consignations*), Grand Lyon, and social landlords in the Rhône-Alpes region – a study entitled "*Énergie et Précarité: Proposition de plan d'action pour l'amélioration de la performance énergétique dans le logement social en Rhône-Alpes*" ("Energy and Deprivation: A proposed action plan to improve the energy performance of social housing in Rhône-Alpes").

More precisely, this study aims to:

- provide detailed and realistic knowledge of the potential energy savings that could be made with regard to the region's social housing stock, and evaluate their environmental impact;
- categorise properties by degree of urgency and identify "heat black spots" which represent both a source of energy savings and a risk for tenants in terms of dangerously high expenses;
- measure the effects of rising energy costs on vulnerable social groups;
- identify the volume of investment required for each property category identified;
- take stock of market capacity (the way the construction sector is structured, available workforce, etc.) to absorb a massive renovation programme on a regional scale.

The results of this study will make it possible to assess the areas of action to be implemented in order to ensure that policies that France is committed to (which aim to cut greenhouse-gas emissions by a factor of 4) are respected.

In particular, this will involve assessing the funding levels to be mobilised by all partners concerned (the State, Regional Councils, Departmental Councils, EPCIs [intercommunal structures], ADEME, and the CDC).

All these parameters together (programmes of action, financial stakes, etc.) should lead to the establishment of a schedule and calendar of operations, with a view to achieving massive renovation of social housing by 2050.

## **3.2 LOCAL CONTEXT IN ZARAGOZA**

### **3.2.1 Regional framework (Aragón)**

A first version of an Energy Plan (Plan Energético de Aragón) was adopted published in 1994, and later replaced by new versions, with the latest covering the period 2005 – 2012 and setting up Kyoto Protocol related goals to accomplish, including a focus on windparks and in a lesser extent on other RES (Aragón is currently the third Comunidad Autónoma in Spain for wind turbines based energy production).

A “Plan for electric domestic appliances renewal” (Plan Renove de Electrodomésticos) which goal is to help people buying more efficient electric appliances has also been established in 2008, prior the approbation by the Aragón Government.in October 2008 of the Aragon Strategy for Climate Change and Clean Energy Horizon 2007-2012-2020 (Estrategia Aragonesa de Cambio Climático y Energías Limpias)<sup>22</sup> that includes an examination of the different areas and sectors, including the residential and commercial sector, as well as proposals which are currently at draft circulation stage with the incorporation of suggestions in a process of public participation in which the Zaragoza Municipal Council, the Sociedad Municipales Ecociudad Valdespartera and Sociedad Municipal Zaragoza Vivienda are participating and contributing their experience, particularly that deriving from their participation in the Renaissance project of the Concerto initiative.

### **3.2.2 Local framework**

- 1) The **Ordenanza Municipal de ecoeficiencia energética y utilización de energías renovables en los edificios y sus instalaciones** [*Municipal Order on energy ecoefficiency and the use of renewable energies in buildings and their facilities*] obtained initial approval in March 2007 and is being submitted to tender and public participation. The aim is to regulate heating systems, facilitating the incorporation of renewable energies and favouring energy efficiency in the residential and tertiary sectors so that, without detriment to comfort, the consumption of fossil fuels and electrical energy is reduced, saving and efficiency are developed, the local management of energies is improved, the compulsory incorporation of renewable sources is promoted (particularly ACS) and citizens are provided with adequate information. It applies to all restorations, renovations or changes of use of existing buildings, apart from special cases or renovation of buildings with an installed capacity of less than 20kW. Ask current state.

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<sup>21</sup> Proposed by the Government of Aragon in October 2008 (at the Public Information stage)

- 2) The **Strategic Plan for Zaragoza and its area of influence** established, based on an appraisal of the city, a general aim for development up to 2010. Throughout the process, the concept of sustainable development was introduced as a vertebral and cross factor. Its economic, social and environmental lines of action were presented in 1996.

Based on this general objective, three strategic lines were developed:

1. Zaragoza, logistically important city and regional capital.
  2. Zaragoza, suitable business environment with criteria for innovation, total quality and environmental sustainability.
  3. Zaragoza, creative city of art, humanities and communication.
- 3) Zaragoza signed the **carta de Aalborg [Aalborg Charter]** and takes an active part in the main Spanish and international environmental networks. In 2001, it began developing the Agenda 21, focusing on the following priority objectives: Integrate nature into the city and its area of influence; improve the air quality; promote the development of clean technologies and adopt waste management operating systems; improve the water quality, reduce its unsuitable use and encourage its study. Some of its measures and indicators are related to the subject of this study, such as the development of non-motorised mobility, the integration of parks and green spaces or the indirect impact of water or energy measures.

## **4 EXPERIENCE-SHARING BETWEEN LYON AND ZARAGOZA: THE BENEFITS OF A PARTNERSHIP PROGRAMME**

The lessons learnt by each consortium from the other are numerous, various and extensive, reflecting the diversity of national as well as local/regional context and the actual richness of exchanges between partners, that took place mainly during those thematic workshops and site tours organised in parallel with each Program steering group meeting, i.e. every 6 months alternatively in Lyon, Zaragoza and Milano.

Main memorable issues addressed are those developed below.

### **4.1 WHAT FRENCH PARTNERS LEARNED FROM ZARAGOZA PROGRAMMES**

#### **4.1.1 Social issues (residents involvement)**

With only new building developments in Lyon, with the impossibility to know future inhabitants before they actually move home, the issue of involving inhabitants and neighbourhood could not be dealt with in the same way as in Zaragoza, especially in retrofitted district of Piccaral. However, the approach used by Zaragoza partnership for involving residents proved being highly interesting for Lyon partners and a source of ideas for future developments, especially those considered in the district of Ste Blandine, close to Renaissance area.

The active participation of the Asociación de Vecinos del Barrio [*District Residents' Association*] and of Estudio Social y Técnico del Conjunto Urbano del Picarral [*Social and Technical Study of the Picarral Housing Estate*] in the Study of the 21 Estates examined throughout the city of Zaragoza deeply facilitated a personalised dissemination process by

municipal social and technical workers among owners and residents and therefore the future acceptance of other communities interested in the restoration proposals examined.

For that purpose, the Asociación de Vecinos del Barrio made premises available to the Sociedad Municipal Zaragoza Vivienda allowing it to set up a district information office open for one afternoon a week.

On the basis of this process, the Asociación de Vecinos del Picarral organised several “Jornadas de Revitalización Urbana” [*Urban Revitalisation Days*] in the district with the collaboration of Sociedad Municipal Zaragoza Vivienda for three days in the month of February 2008. During those days, various subjects arising from the studies conducted on the 21 housing estates, the experience of other Spanish cities and the restoration process itself were discussed.

#### **4.1.2 Energy consumption monitoring system**

The monitoring process will be coordinated with this section in order to deal with the actual specifications of the project in Zaragoza and those deriving from the document SE\_matrix\_core\_indicators\_Zaragoza\_1.xls.

With this in mind, during the two years of the project, not only will actions within the scope of Valdespartera be increased but also an attempt will be made to set up an independent local monitoring system, not specified but advisable, through which monitoring will take place, including information and training, both in the area of Picarral and in the Colegio Público so as to supplement the actions in Valdespartera and in the Valespartera demonstration building.

The results on consumption will be compared to those of Lyon to confirm or re-evaluate the validity of indicators previously estimated.

Valdespartera also aims to create affinity groups working on local consumption and examining habits so that, based on dissemination and training by notice of meetings to be held in the Oficina de obras [*Workshop*], until the Centro Demostrativo [*Demonstration Centre*] comes into operation, and working papers, the effectiveness of the various ways of interacting with users can be checked.

#### **4.1.3 Skills exchange**

Renaissance project laid the foundations for a close and in-depth collaboration between Zaragoza and Grand Lyon urban planning Departments.

In spring 2006, the City of Zaragoza hosted an engineer officer from Greater Lyon for a week-long training and exchange session.

The exchange programme included a number of visits and meetings:

- -a grand tour of the newly-built Valdespartera district and of el Picarral and las Fuentes districts where major renovation works are currently under development
- a visit to districts in Madrid similar to that of el Picarral in Zaragoza,
- a meeting with an energy technical consultancy (URBIC) and a non-governmental organization (ECODES) both involved in Concerto-Reniassance

During this week, the French Greater Lyon officer made an in-depth presentation of the urban renewal projects being developed in the suburban Municipality of Vaulx-en-Velin, part of Greater Lyon, in which he was personally involved as project manager.

Officers from both Communities had a unique opportunity to share their experience and feedback, and to carry out comparative analysis of how urban planning is performed in their respective Cities in ancient districts as well as in those districts enduring an increasing impoverishment.

During these exchanges, the Greater Lyon officer also had the opportunity to watch a presentation designed and developed for inhabitants, as full part of housing renovation projects in districts being built between 1945 and 1960 with ambitious energy saving objectives.

One of the main lessons learnt from this exchange is the need for a significant amount of resources (technical, economic, and social engineering) to make a success of an energy renovation project in old buildings.

For example, all renovation projects in Zaragoza were subject to public presentation in consultation meetings involving housing units inhabitants, and the project team was available each week in the districts to motivate inhabitants to get involved in the renovation and to answer any questions they might have.

This made obvious that such an information and consultation approach towards inhabitants had to be considered in Lyon-Confluence area as a whole, especially for the future major renovation program to be developed in the 20 000 inhabitants old district Ste Blandine, close to the Concerto area itself, with major socio-economic challenges if the medium-to-low-income families, currently the main category, are to stay living in the renovated buildings.

Following this quite beneficial initiative, the City of Zaragoza invited two Greater Lyon representatives to take part in a French-Spanish conference on “Urban Revitalization of Social Housing Districts” held in Zaragoza from November 22nd to 24th 2006.

This conference was the closing event of the Interreg III-A program “Revitasud” targeted to renovation of those districts built just after World War 2 in the 7 border Regions along the Pyrenees mountains (Cataluña, Aragon, Navarra and Basque Country for Spain, Languedoc-Roussillon, Midi-Pyrénées and Aquitaine for France), with Zaragoza, Toulouse and Vitoria as main Cities involved.

Spanish participants in this conference revealed highly interested by the integrated approach of urban policy developed in France in general and particularly in Lyon, which is not restricted to “hard” issues like housing and town planning as such, but also considers in a cross-referencing way “soft” issues such as economics, employment, travelling and the environment.

As explained below, this resulted in an intensification of exchanges between Lyon and Zaragoza about all these crucial issues.

## **4.2 WHAT SPANISH PARTNERS LEARNED FROM LYON’S PROGRAMMES**

### **4.2.1 Urban planning and local social policies**

Based on some specific topics addressed by Greater Lyon representatives during the conference mentioned above that revealed to be highly interesting for those participants from Zaragoza, exchanges of information on practice and analysis became more and more intense between both Cities in 2007 and 2008.

More precisely, the request was made by Zaragoza about four issues to be investigated more in-depth, to which French partners answered during the successive Concerto-Renaissance international consortium meetings that took place in Milan on July 5<sup>th</sup> and 6<sup>th</sup> 2007, in Lyon on 30<sup>th</sup> and 31<sup>st</sup> October 2007 and in Zaragoza on April 24<sup>th</sup> and 25<sup>th</sup> 2008.

These issues were:

### **1) How to favour functional and social diversity at territorial level?**

Greater Lyon representatives explained to their Zaragoza counterparts the role played in France by city planning tools such as the so-called “Territorial coherence scheme” (SCOT) which, as its name indicates, aims at favouring adequate conditions for a comprehensive coherence at territory level, by proposing planning/distribution of balanced urban and social functions (housing, economic activities, offices, leisure, public equipments, etc.), not only at the Greater Lyon level, but throughout the whole Lyon urban area.

This way of getting to grips with town planning and development is strongly rooted in the Lyon tradition, since the decisions of the SCOT are then adapted at the level of town planning projects, which are to contribute to a fair balance of urban functions and the various social components.

To achieve this, fine-tuned sociological analyses are made, for example as regards the way housing is distributed throughout the whole area, highlighting disparities as well on a geographical point of view (location) as on a social one (standard of living) with view to identify and develop strategies for restoring a more balanced distribution.

These approaches have been consolidated by previous changes in legislation, especially with the “Solidarity and urban renewal Law” (“SRU Law”) passed in 2000 and known as “Voynet law” (from the name of Mrs Dominique Voynet, who was at that time Ministry of environment), which make it necessary to cross-reference the various components of the “development” concept, in order to avoid thinking with a sector-based approach, and to ensure all issues to be fully and coherently addressed.

Since this law is in force, municipal Authorities must prove that social housing represents at least 20% of the total existing housing offer in their area, with penalty for not reaching this target based on deduction on locally levied taxes made by the State for funding land and properties with view to increase rental social housing offer through building construction or retrofitting.

### **2) How to upgrade disadvantaged districts using environmental and social approaches**

Greater Lyon representatives presented to their counterparts from Zaragoza the legislative framework that made it possible launching large urban renewal operations, especially the “Urban renewal framework and programming Law” n° 2003-710 dated August 1<sup>st</sup>, 2003 which makes provision for major renovation works in neglected districts.

This programme is mainly intended to sectors with large units built during 60s and 70s and makes provision for re-introducing social and functional diversity by means of demolitions/rebuilding of existing housing, redevelopment of public spaces and introduction of new facilities, trades and services within these districts.

Zaragoza representatives were particularly interested in the fact that:

- this approach aims at rallying all those people involved in the city so that all issues are tackled (transport/accessibility, social diversity, employment-based social integration, living environment, safety).

- the urban renewal policy includes a large component for social integration through employment. Among others, measures to encourage setting up new economic activities in the so-called “rough” districts have been put into place.

Finally, the dimension of restoring social balance (reduction in the proportion of social housing and introduction of a proportion of starter homes or mid-price rental homes for households with average incomes) also caught the attention of the Zaragoza partners.

### **3) Private/public mixed partnership, involvement of private developers**

In France, large-scale urban projects generally result from a public initiative and are run by local Authorities. As a consequence, urban development and planning largely depend on local political commitment, a characteristic that makes it possible, for those Communities with a high level of determination, to apply specific architectural, urban or environmental local standards.

For more than 15 years Greater Lyon has shown such a level of determination as regards urban quality and has more recently extended this major orientation to sustainable development.

To achieve this, a number of rules have been defined for each stage of urban projects, aiming at ensuring architectural and urban quality and taking sustainable development into account:

- comprehensive environmental analysis of the area before defining any urban project layout
- contractual obligations for developers, through a “development concession contract” defining ground plan to be followed, construction schedules, public space layout and public facilities programme,
- architectural, urban, environmental and landscape specifications, describing standards required for each section of the project,
- a tendering procedure specifically designed for selecting developers and builders on the basis of the above-mentioned specifications,
- making builders’ obligations contractual in the framework of the land sale contracts and then at building permit process stage.

Methodology used and rules applied have been presented in-depth to representatives from Zaragoza

#### **4) Centralised monitoring and assessment procedure**

Zaragoza representatives asked for details about the way Greater Lyon and other French towns organize the assessment procedure for urban projects implemented in their area.

The capability of French local Authorities to finely assess the impact of urban projects on their environment is due mainly to the uniqueness of the project management.

The fact that most large-scale urban projects in France are run by the local public Authority makes it possible to provide assessments and obtain experience feedback that can then be considered as public policy evaluation measures.

In Lyon urban area, many assessments have been made of the various sections of town planning operations:

- public spaces management costs
- contribution of town planning programs to social diversity and to social housing new offer objectives
- contribution of town planning operations to a better geographical distribution among districts of public facilities available offer.

In conjunction with a town planning approach, especially through the Territorial coherence scheme (SCOT) which imposes to define urban development-related issues on the medium to long term, and with the decisions made concerning future local public policies, the organization of a strong and efficient public project management is one among favourite tools that makes it possible to correct urban and social dysfunctions in urban areas.

In order to complete Zaragoza partners' knowledge of approaches used in France by a concrete vision, Grand Lyon representatives organised for them during the PSG from April 27<sup>th</sup> to 29<sup>th</sup> 2009a guided tour of a "Great town policy program", namely in the district of "la Duchère", which is quite typical of the urban policy that was dominating in the 60s and where a major urban renewal project is currently under development (see details at <http://www.gpvlyonduchere.org/>)

During this highly interesting tour, Zaragoza representatives had the opportunity to talk with the management team about its concrete implementation of this project and about specific approaches and tools used in French social housing districts.

Finally, these intensive exchanges between Lyon and Zaragoza had a significant and positive prolongation at national level, since Juan Rubio Del Val, Director of urban renewal and innovative residential projects at the Zaragoza Municipal Society for Urban Renewal was officially invited to sit as international guest in the selection Committee of the "Sustainable urban renovation and town planning call for projects" launched by the National Urban Renovation Agency (ANRU) and the State-owned bank Caisse des Dépôts (CDC), on request of the French Ministry for Ecology, Energy, Sustainable Development and Land Settlement

Not less than 57 applications were registered in response to this call, and the Committee, jointly chaired by the member of the Académie Française and former President Mitterrand's counsellor Eric Orsenna and the town-planner François Grether who was the main designer of the whole Lyon-Confluence urban project, selected 8 winners and awarded 2 special prizes during their session on June 8<sup>th</sup> and 9<sup>th</sup> 2008.

## **4.2.2 Professional training scheme for upgrading workers knowledge and qualification**

### Origin and context

One of the most original approaches developed by the French consortium for successfully implement their local low energy building policy lies in their strategy for ensuring the level of quality required by new technologies used and know how needed by low-energy techniques through a training program, specifically designed and developed by ALE and HESPUL for workers and team managers employed by construction enterprises working on blocks A, B and C as part of the Work Package 5 (see annual progress report WP 5.1 and 5.2).

From the early beginning of development of Renaissance, even at preparation stage, this has been identified by Zaragoza partners as of major interest for their own strategy: that is why they wished to actively follow the progress of these activities with view to learn from Lyon's experience and replicate and adapt to the Spanish context such training programs in their future activities.

Quality of works in the building sector has been quite an issue for a while in France, and a long time before low energy design and the integration of renewable energy facilities became of interest for the building industry.

Indeed, this phenomenon finds its roots in the accelerated industrialisation of the construction sector that was demanded by the need for quickly re-build those very numerous buildings destroyed during the World War 2, in addition to the phenomenal increase of population due to the post-war so-called "Baby-boom" in conjunction with the coming of large numbers of immigrants from former colonised countries and from European poorer countries like Spain and Portugal employed in the boom industries, including building sector.

From the 50s until mi-70s, the only objective was to produce as many dwellings as possible at lowest cost as possible in order to resorb the growing number of people and their families living in unacceptable conditions around the main conurbations like Paris and Lyon.

This has clearly led to a loss of the traditional craftsmen's "quality culture" in the way of doing at working place, replaced by highly industrialised design and implementation techniques, symbolised by an increasing use of concrete and systematic pre-fabrication of major components that led to a continuous decrease of skills and ability required from workers and from works supervisors.

In a period of time when the issues of comfort and wealth were assessed in comparison with the living conditions endured by slum-dwellers, when energy was considered as endlessly available and cheap, and when the environment, local as well as global, did not even exist yet in minds, the consequences of this evolution in terms energy consumption were far from being understood and anticipated, with a general indifference to energy needs for heating and other purposes.

The first oil prices chock in 1973, at a time when a large majority of building were heated by oil or natural gas directly led to the first building "thermal regulation", i.e. minimum standards considering energy need for heating to be matched for getting building permits.

However, the calculation methodology used for assessing those projects applying for permits was completely theoretical and based on a so-called "reference building" for which no occupation scenarios were developed so as to have a link with ground reality. In addition, these calculated standards were never subject to control by monitoring the energy

consumption of buildings built, a way of doing that did not allow any return on experience on actual energy efficiency and practices.

When the very first projects of low-energy building developed in Lyon in the framework of the FP5 “Restart” program were being built and monitored in 2001-2002, it clearly appeared that the technical quality of implementation of construction works and of systems installation were as influential to actual results as occupiers’ behaviour, and may ruin even the best quality of low-energy design.

This observation, correlated with other experiences endured by contracting owners under the “HQE ®” label (for “High Environmental Quality”), led the Lyon Renaissance partnership to address the issue of “how to ensure the quality of implementation works when dealing with low-energy buildings?” since the very early stage of European project development.

With Olivier Sidler from Enertech involved as master builder in the previous Restart program and in another Concerto I program with the City of Grenoble, the second largest City in Rhone-Alpes (SESAC), the idea came to focus not only on design phase by the mean of technical support to architects and engineers, including dynamic simulation and reviewing of all documents before building permit application (see WP 1.2), but also on construction phase itself by the mean of awareness-rising activities and of training sessions specifically designed and implemented for building workers, but also portfolio managers and businesses leaders.

Taking advantage of the long-lasting and quite positive relationships between Lyon and Grenoble Concerto partnerships and among individual partners from each team, reinforced by the presence of Enertech in both Consortia, the list of specific topics to be addressed and of individual crafts to be targeted by training sessions has been elaborated through close cooperation between French SESAC and Renaissance consortia.

By chance for Lyon, the SESAC demonstration activities in Grenoble started much earlier than those in Lyon, essentially because they were based on several medium-scale construction projects distributed over smaller constructors instead of a limited number of very large projects as in Lyon managed by only three developers, who in addition had to firstly become full contractors of the program with EC through an amendment agreed in 2006.

Thanks to this, Lyon had the unique opportunity to benefit from the very first experiences of training sessions developed and implemented by the Grenoble Local Energy Agency, subject to in-depth analysis and brainstorming on how to improve their contents as well as their pedagogical methodology so as to actually match the challenge of ensuring the best quality of the results in terms of energy consumption, but also of possible replication and dissemination over the whole building sector in France.

Although being originally developed since 2003 at local level and only for the purpose of the Lyon and Grenoble Concerto projects, this strategy revealed to be a major source of inspiration when the discussion came on low-energy building national policy in the framework of the so-called “Grenelle de l’environnement” process, from which major changes in these fields are being expected.

### Objectives and means

#### ⇒ Pedagogical objectives

With the generally poor quality of work observed in the building sector as explained above, the introduction of low-energy building design and construction represents twice a challenge for building workers:

- to become quickly familiar with new technical concepts and techniques that may be quite different from those that they learnt at school and used during all their professional life. One meaningful example of this can be found in insulation works, that have been made for decades in France on the indoor side of the walls, while low energy design recommends to insulate façades on the outdoor side so as to avoid thermal bridges, save available surface for living and decrease costs;
- to understand how important the quality of implementation works is for actually reaching the energy consumption objectives, which means that workers themselves must beforehand be aware of the reasons why they are asked to be more meticulous in their work. A good example of this is the crucial importance of air-tightness, which has previously never been an issue as such, contrarily to water-tightness.

To be short, both the questions of “How” and of “Why” doing differently than before must be addressed if the requested quality is finally to be matched, which means that technical, practical and “cultural” objectives must be simultaneously pursued when developing both contents and “pedagogical environment”, including presentations, practical exercises and validation of acquired knowledge.

It must also be taken into account that workers in the building sector in France are generally unskilled and of low educational level, and very often not native French speakers, which makes it difficult for them sitting several hours in a classroom listening to a trainer, and that the pressure of time makes it difficult for their employers to let them leave the working place for such unproductive activity as training is usually seen.

⇒ Replication and dissemination objectives

With the possibility in mind of replication and dissemination beyond the purpose of helping reaching performance indicators in Concerto Renaissance area, exploratory early contacts had been taken with AREF, the authorized regional organisation jointly managed by workers trade-unions and employers organisations for collecting compulsory contribution paid by all sectorial enterprises based on their number of employees for financing training programs in the building sector.

Funds collected by AREF are used not only for financing direct costs of training sessions such as trainers’ fees, classroom renting, trainees’ travel and subsistence, but also for paying wages to employers for those employees who leave the workplace for training, which is a prerequisite for letting them attend training sessions instead of working at their place.

A small part of these funds are made available for experimentation of new contents and/or of innovative pedagogical set-up, with view to test in real scale these training sessions and courses to be later integrated in the basic catalogue on which professional training centres can then elaborate their own offer to building sector companies.

Although those training sessions designed in the framework of both Concerto Renaissance and SESAC were obviously quite in line with this experimental feature, the negotiation with AREF were long-lasting and rather complicated, reflecting a general reluctance of building companies to innovation and changes in their practice, especially when their order books were overloaded.

⇒ Contents and pedagogical terms

In early 2008, both Lyon and Grenoble Local Energy Agencies worked together with HESPUL and Enertech as strategy and technical advisers for defining a specific training

program for those workers from building companies selected by Concerto SESAC and Renaissance developers.

The principle being to embrace both issues of “Why” and “How” as explained above, the first idea experimented in Grenble was to organise at the very beginning of each construction works a large meeting for all enterprises and workers with a general presentation on energy and climate threats and on means to combat them, including rational use of energy and renewable energy sources, and only then the technical training sessions with a small number of trainees (12 to 15). However, the choice for Lyon will be to do the other way: starting by technical sessions, close to the knowledge and daily concerns of enterprises and workers and then lead them to open their minds to larger issues such as energy and climate change, with view to compare which has better operate.

Taking into account the average knowledge of the different building trades concerned by changes or novelties in their practice due to low-energy techniques and requirements, a list of highly priority topics have been established as follows, with a particular focus on air-tightness:

- external walls insulation, with focus on thermal bridges ruptors and façade air-tightness
- dual-flow CMV / natural ventilation, with focus on shaft airtightness
- technical ducts treatment with focus on air-tightness
- primary and secondary heating networks (distribution and balancing)
- wood boiler rooms, including boilers settlement and wood storage
- solar DHW
- heating pumps of extracted air
- photovoltaic electricity
- metrology and metering
- electricity demand management
- green roofs

It must be underlined that three first topics have the same characteristic of involving several building trades who are not used to work in cooperation but rather in competition, such as façade contractor, window installer, insulation and sheetrock layer, electrician, plumber, CMV installer, , ... , but who absolutely need to understand how each other work for avoiding any air-tightness defect.

The idea is therefore to organise common training sessions for all companies working in the same block on a multi-trade basis, which can be seen as major innovation in France where each trade is traditionnaly proudly ignorant from the others.

A technical working group comprising Concerto partners and experts from AREF and other experts if relevant will analyse and validate all contents before their implementation, and a specific session will be organised afterthought for analysing the lessons learnt from experience with view to develop training tools and sessions for trainers.

Practically, the training sessions will be organised on-site in the construction camp in a 2 to 3 days format with 10 to 15 trainees. They will require professional external trainers specially selected for their technical and pedagogical competences and include an indoor role-playing practical part and if possible a site visite for concretely illustrating acquisitions.

### Provisonal conclusions

This rather ambitious training program has been thought and elaborated in the context of the French building sector and more specifically in close collaboration between French partners of Concerto SESAC and Renaissance programs.

It must be underlined that the framework of Concerto programs offered, despite of a very limited budget allocated to this topic, a unique opportunity for clearly defining the shape and experimentally implement such a crucial program for ensuring on the long term that climate and energy objectives will actually be met.

It is strongly expected that the results, even if they are disappointing with respect to initial ambitions, will be useful at national level for accelerating the development of the large-scale training program that is so much needed in France.

It would also be particularly satisfactory if these lessons learnt by French Concerto contractors in the French context could be disseminated and transposed in other countries like Spain, where problems regarding quality in the building sector are more or less equivalent as those faced in France.

That is why the first exchanges on these issues between Lyon and Zaragoza Communities will carry on during the next two years and will even be intensified when the return on actual experience will provide with many lessons learnt to disseminate.

## **5 THE BENEFITS OF RENAISSANCE PROGRAMME FOR LOCAL AND NATIONAL PUBLIC POLICIES**

### **5.1 IN FRANCE**

Even before the Renaissance programme operations were completed and the performance of these operations measured, it was clear that the new working methods in the building design phase (from operator selection to building permit allocation) were having a significant and positive effect on many different levels (local, regional and national).

#### **5.1.1 Benefits of Renaissance project for local policies**

An evaluation is currently under way of the dissemination effect of the work carried out as part of WP 1.1 of the Renaissance project.

This has enabled a number of public policies to progress from the experimentation phase to the generalisation phase.

##### **➔ Creation of a new set of sustainable housing criteria for new-build developments**

Having applied the new criteria for two years, the partners involved (Grand Lyon and ALE) drew up an initial report, which was judged to be highly satisfactory.

In order to take account of changes to French insulation and energy efficiency regulations, which set the requirements for 2005–2010 at the same level as the Greater Lyon reference criteria, it was decided to change the requirements of these criteria.

At the end of 2006, the partners involved (ALE, Enertech) produced the updated version (version 2) of the Greater Lyon "*Référentiel habitat durable*" (sustainable housing reference criteria).

This new version, which includes stricter building energy efficiency requirements, was created with the benefit of feedback from the design phase of the Renaissance project. It came into force on 1 January 2007.

## Summary of requirements

THEME	CONTENT	COMMENTS
ENERGY	Automatic Bioclimatic approach (Workshop 1),  Insulation: <b>0.6 ≤ U BAT ≤ to 0.70 W/m².K</b> Heating < <b>50 kWh/m²</b> (PE, habitable surface area) Hot water < <b>30 kWh/m²</b> (PE, habitable surface area)	<b>Result requirements</b> Equivalent THPE RT 2005 (According to standard THCE calculation method) ... Moving towards RT 2010
COMFORT IN SUMMER	A free strategy based on a combination of various technical solutions <b>Medium to high</b> thermal inertia required	Quality of sun protection devices
WATER	Specifications relating to pressure, plumbing fixture quality, WC, etc Rainwater management: collection if required for watering	Reduced consumption
HEALTH	Free strategy but with an improved framework (appendix 2)	Using markings such as NF Environnement, CTBP+
WASTE	Specifications on storage premises, sorting labels, external access	Waste disposal management

Since 2005, more than 4,600 houses have been designed or built in accordance with these criteria across the Lyon urban area.

### ➡ Creation of a set of "office" reference criteria, based on the objectives of the Concerto office programme

Following positive feedback from the introduction of the housing criteria, Grand Lyon decided to expand the programme in the tertiary sector.

A set of office criteria was produced, in the same way as the housing criteria, with the help of ALE, Enertech and Hespul. These criteria were based on the objectives of the Concerto Renaissance programme for office building construction programmes.

The environmental performance objectives focus on the following areas:

- Energy: limiting consumption and moving towards renewable energy sources
- Comfort during the summer months: priority for passive treatments
- Water, visual comfort, acoustics, health, materials, waste, etc.

This new tool underwent experimental testing throughout 2007, with the aim to roll it out across all development operations managed by Grand Lyon and on land allocated to public or private developers by the Urban Community from 2008.

100,000 m<sup>2</sup> of offices were tested in 2007 (in the planning or design stage).

The environmental performance objectives focus on the following areas:

- Energy: limiting consumption and moving towards renewable energy sources
- Comfort during the summer months: priority for passive treatments
- Water, visual comfort, acoustics, health, materials, waste, etc.

## Performance requirements

THEME	CONTENT	COMMENTS
ENERGY	Bioclimatic, Insulation: U BAT < 0.70 W/m <sup>2</sup> .°C Heating < 25 kWh/m <sup>2</sup> (surface area per year) Cooling < 30 kWh/m <sup>2</sup> (surface area per year) Inclusion of renewable energy sources Consumption targets for lighting and other electricity uses	Result requirements Importance of limiting energy consumption for cooling
COMFORT IN SUMMER	A free strategy based on a combination of the following technical solutions: thermal inertia, sun protection devices, ventilation	T > 28°C for less than 80h/year Use of dynamic simulation
OTHER COMFORT	Improved visual and acoustic comfort	Natural lighting, sound level limits and daylight factors
WATER	High-performance equipment Rainwater collection study	No result requirement
HEALTH	Use of non-dangerous products, limits on the use of certain materials	Using markings such as NF Environnement, CTBP+

### ➤ Adoption of an environmental quality programme for social housing by the Rhône-Alpes region

In 2006, the Rhône-Alpes region demonstrated its desire to push forward with an environmental quality programme for social housing construction across the region.

The Rhône-Alpes region asked the partners in the Renaissance project to draw up a set of environmental quality criteria for social housing based on the Greater Lyon reference criteria.

The Concerto/Renaissance project acted as a useful technical foundation upon which to build the regional programme (technologies, construction choices, equipment, etc.).

In order to make these programmes as transparent as possible for developers, collaborative work was undertaken to ensure harmony between both sets of criteria.

### ➤ Study into the extra investment required to apply the environmental quality criteria for social housing.

In addition to the creating a set of regional criteria, a suitable system of funding for social housing was also investigated jointly by the Rhône-Alpes region and Grand Lyon. This funding was designed to limit the financial impact of applying the environmental quality criteria.

The Urban Community appointed an external service provider to carry out a study into the extra investment required to apply the environmental quality criteria to social housing construction projects.

This study provided an opportunity to measure the following factors for different levels of energy performance:

- The financial impact for tenants:
  - ✓ Savings related to personal utility consumption (electricity, water, etc.)
  - ✓ Communal costs collected from tenants (maintenance of communal areas, maintenance of solar equipment, etc.).
- The impact on construction costs and the financial health of operations.

The results of this study show that housing projects constructed in accordance with the

Greater Lyon or Rhône-Alpes sustainability criteria offer a 20% to 46% saving on heating and water costs, depending on the level of performance achieved.

It was also shown that a higher level of environmental and energy performance results in lower costs and offers savings in a number of areas, thereby benefiting the operation as a whole.

Furthermore, this study produced a number of observations about working methods, and in particular:

- correcting or changing an operation designed using old concepts is expensive, whereas integrating environmental solutions in the design phase is often more efficient,
- there is still some way to go in the process of integrating global environmental indicators, but they are beginning to be introduced in construction projects. An obligation should be introduced to keep a documented record of these aspects – by making this a compulsory element it will raise awareness about environmental issues

This study provided an opportunity to build a cohesive funding and rental policy for Rhône-Alpes Regional Council and Grand Lyon. In this way, the study represents a significant step forward in the process of incorporating energy efficiency and renewable energy concerns into local policy-making.

At regional level, this funding scheme involves providing grants for social housing construction (a percentage of the extra investment required).

For Greater Lyon, the funding system is based on removing the cap on local margins, meaning that tenants will pay slightly higher rent in return for a reduction in rental costs above the increase in rent.

## ➔ **Towards an environmental quality programme for existing private housing**

### **- "Eco-renewal" in the Sainte-Blandine neighbourhood**

Under the initiative of SPLA Confluence, the developer of the Confluence operation, a working group has been created, with core members from the Concerto project (Hespul, ALE, Enertech, SPLA Confluence and Grand Lyon). This working group is currently investigating how to implement an eco-renewal project at neighbourhood level.

The aim is to conduct a pilot renewal project with “factor 4” energy efficiency. It is hoped that this pilot project will open the way for the scheme to be rolled out on a wider scale.

A quick overview of the tools and financial support available demonstrated the limitations of the current system and highlighted the need to offer an innovative, “all-in-one package” that offers technical expertise, operational solutions and suitable sources of funding.

This scheme will be carried out in conjunction with a number of volunteer co-owners, and will involve the provision of technical and financial support for a number of operations.

## ➔ **Capitalising on the innovation potential of Concerto in terms of energy policy**

Between 2006 and 2007, a number of feasibility studies on the use of wood-burning heating systems were carried out in neighbourhoods undergoing programmes of renewal:

- feasibility study into the use of a wood-burning heating system in the town of Sathonay-Camp (decision to introduce this facility by 2010/2011),
- Bron Terrailon urban renewal project: assessment of the existing system and proposals for changing the heating system, primarily through the use of wood-burning equipment.

The feedback from the Concerto programme on the use of wood-burning heating systems for sections A, B and C of ZAC Confluence changed perceptions towards the use of wood-burning heating systems in urban areas.

### ➔ Sharing experience with other developers

The work carried out as part of WP 1.1 also had an impact on property developers, who were initially highly sceptical about achieving such high levels of requirement, but who were then able to see the feasibility of this type of project in practice.

The developers of sections A, B and C of ZAC Confluence are currently in a position to provide feedback on the amount of effort required to create a programme of this type, dispelling some pre-existing myths.

The Renaissance project specifications have been used to set the energy efficiency and renewable energy use requirements for operators at the Confluence site who are not part of the Concerto project.

The programme is expected to have a significant impact on new construction projects located in the ZAC: for example, the new headquarters of Rhône-Alpes Regional Council planned for the Confluence site will meet the same requirements as buildings constructed as part of the Concerto/Renaissance programme.

The bar has also been raised for the majority of construction programmes in the second phase of the Confluence site development.

To the north of sections A, B and C, bordering the new central square, Place Nautique, a second phase of housing, offices, facilities and public spaces is planned. The buildings in sections E and F will include 240 to 250 houses, 6,000 m<sup>2</sup> of office space and crèche facilities. All of these buildings will meet the requirements of a set of environmental quality specifications. The energy efficiency aspects of these specifications are based on the requirements of the Renaissance project.

The energy consumption levels of some of these buildings will be significantly better than the thresholds set out in the specifications, with figures of between 28 and 60 kWh/m<sup>2</sup>.

One of the projects even includes a plan for "zero energy" collective housing, which will be the first of its type in France.

In practice, the project will include the construction of a building with high thermal efficiency using extensive insulation: the energy needs of each home will thereby be reduced to less than 40 kWh/m<sup>2</sup> of living space per year. Heating needs will primarily be met through the use of an air heat pump.

The installation of more than 1,000 m<sup>2</sup> of solar panels on the roof will complete this "zero energy" project.

### 5.1.2 Benefits of Renaissance project for national policy

#### Monitoring of the Concerto/Renaissance programme by ADEME

ADEME is a public industrial and commercial body under the joint authority of two French government ministries: the Ministry for Ecology, Energy, Sustainable Development and Planning and the Ministry for Higher Education and Research.

ADEME has four main missions:

- managing and providing funding for research and innovation. It is also involved in designing and managing zonal observation systems.
- providing information and raising public awareness about various environmental issues. As part of this responsibility, ADEME works with a number of partners to carry out wide-scale communication campaigns designed to change purchasing and investment mentalities, behaviour patterns and actions.
- providing advice to guide the decisions of socioeconomic actors. A key element of the agency's expertise role involves direct provision of quality advice through information centres (assistance for project managers, support for information centres and networks to provide advice through a reduced number of channels). ADEME also creates tools and methods designed to meet the needs of these actors.
- direct help with turning projects into reality. ADEME offers a progressive scheme of financial support. It also encourages the application of regional and national criteria.

Its remit covers energy, air and noise, waste and soil and environmental management (sites and products).

ADEME has expressed an interest in participating in the Concerto programmes of French cities in order to:

- draw lessons from the feedback from these programmes,
- use these experiences to feed into future national energy efficiency and renewable energy policies.

This participation involves providing financial support for research, development and construction.

#### The *Prébat* request for proposals by PUCA: collating the experiences of French cities in the Concerto programme and engaging in direct communication with national public bodies

In 2005, ADEME and PUCA (*Plan Urbanisme Construction et Architecture* – Urban Development, Construction and Architecture Plan) launched a request for proposals under the name "*Prébat*".

PUCA is a government organisation whose board of directors includes representatives from several French ministries, including the Ministry of Ecology, Energy, Sustainable Development and Planning, the Ministry for Employment, Social Cohesion and Housing, the Ministry for Higher Education and Research and the Ministry for Culture and Communication.

The request for proposals was initiated as part of the climate plan programme and has two focuses:

- sustainable modernisation of existing buildings,
- construction of new "positive energy" buildings.

Hespul association, one of the partners in Lyon's Concerto programme, submitted a proposal as part of the *Prébat*. This proposal, called "*Concert'action*", focused on the socioeconomic element of the four French Concerto projects, and more specifically on encouraging all actors in the building industry to understand the issues at stake and accept changes to their professional practices.

The Concerto projects offer wide scope for experimentation within a clearly defined framework, thereby providing an excellent opportunity to find appropriate solutions that, where possible, can be reproduced.

The objectives, methodology and structure of the *Concert'action* project were selected under the *Prébat* request for proposals and a contract was signed in 2005 by the Ministry for Ecology, Energy, Sustainable Development and Planning and Hespul, as coordinator of the *Concert'action* project.

The operational objective of the *Concert'action* project is to communicate the conclusions and recommendations drawn from feedback as widely as possible. The main recipients of these communications are other local authorities, project managers and members of the building profession in general. The scheme is designed to encourage these actors to make an environmental commitment by supporting them through the process and helping them to avoid the main pitfalls.

Another key target is political decision-makers and other parties involved in the legislative and/or regulatory framework, who will be sent proposals for changes to the law designed to encourage and support the dissemination of good practices.

Due to purely administrative difficulties with PUCA for making granted funding available, *Concert'action* work program had to be stopped and the contract finally cancelled in 2008.

However, the level of interest from all Concerto Cities involved and the unique opportunity made for them to exchange on their experiences have unquestionably help accelerating the level of understanding of concrete issues and improving the overall vision in France of those political decisions that are urgently possible and necessary for facing energy and climate challenges.

### **The Grenelle de l'Environnement: a parliamentary bill in progress**

The *Grenelle de l'Environnement* is a series of political meetings organised in France, beginning in October 2007, with the aim of taking long-term decisions about the environment and sustainable development.

This programme of debates was organised around six working groups of 40 members, divided into five colleges. The purpose of these colleges was to represent the actors involved in sustainable development: the government, local authorities, NGOs, employers and employees.

The working groups were divided into the following subject areas:

- Group 1 "Fighting climate change and controlling energy demand"
- Group 2 "Preserving biodiversity and natural resources"
- Group 3 "Creating a healthy environment"
- Group 4 "Adopting sustainable modes of production and consumption"
- Group 5 "Building an ecological democracy"
- Group 6 "Promoting forms of ecological development that support employment and competitiveness"

Each group was then divided into workshops. Group 1, for example, was split into three workshops:

- Workshop no.1: Transport and mobility
- Workshop no.2: Construction and Urban Planning
- Workshop no.3: Energy and carbon storage

The minutes and reports of each group were published in September 2008.

In terms of energy efficiency, the report produced by Group 1 identified two examples: one was in Mulhouse and the other referred to the Confluence project in Lyon.

Hespul and Enertech representatives were present at the Group 1 workshops, and were able to contribute to the debate with feedback from the Concerto programme at the Confluence urban project.

The main contribution of the Lyon Concerto project was in the area of methodology. The decision made at the project tender stage by the Lyon Concerto team to focus on performance objectives was approved by all members of the Group 1 workshop and it was decided to include this methodology in the parliamentary bill.

**At the end of the consultation phase, a bill under the name "Grenelle 1" was submitted to France's National Assembly. This bill includes a number of objectives for improving the energy efficiency of housing.**

These provisions can be summarised as follows:

### **New-built developments**

The government's objectives state that:

- the "low-consumption building" standard applies to all new homes for which a building permit is applied for before the end of 2012 and, provisionally, to all new public and tertiary-sector buildings before the end of 2010.

The "low-consumption building" standard represents average energy consumption levels below 50 kWh/m<sup>2</sup> per year. This threshold will be adjusted depending on a building's location, characteristics, usage patterns and greenhouse-gas emissions.

- the "positive energy building" standard applies to all new developments for which a building permit is applied for before the end of 2020. Unless otherwise stated, the "positive energy building" standard represents a level of energy consumption that is lower than the quantity of energy produced from renewable sources.

The purpose of these standards is to reduce energy consumption and CO<sub>2</sub> emissions. The standards will also be adjusted for buildings that use wood as a material, whilst ensuring that only certified wood is used.

The government has also set the objective that all new buildings constructed as part of the national urban renewal programme (law no. 2003-710, dated 1 August 2003, on urban planning and direction and urban renewal) comply with "low consumption building" standards.

In order to help achieve these objectives, the government will provide additional support for people buying properties that exceed the regulatory requirements. This will be administered

as part of the ownership support system set out in article 200 *quaterdecies* of the general taxation code and the zero-rate loan scheme set out in article 244 *quater J* of the same code. Any benefits provided as part of the ownership support system set out in article 200 *quaterdecies* of the general taxation code will require the purchaser to provide proof that the property in question meets the relevant energy efficiency regulations.

**Existing buildings**

The government’s objective is to reduce energy consumption among existing buildings by 38% by 2020.

**Public buildings**

All government and public buildings will undergo an energy audit by 2010. Based on the outcome of this analysis, the government and public bodies will be required to renovate all their buildings by 2012 and to deal in particular with the least energy efficient premises. This renovation will form part of a tailored programme designed to meet the specific needs of each authority and public body, with the aim of reducing energy consumption by 40% and greenhouse-gas emissions by 50% within ten years.

Although their independence will be respected, local authorities will be invited to commit to an energy performance renovation programme under the same conditions and the same timescale as apply to central government.

Energy performance renovation works will be carried out on 50 million square metres of government buildings and 70 million square metres of public body premises. These works will be subject to a call for tenders that will favour public/private partnerships and energy performance contracts in particular.

From 2010, each ministry will be required to submit a report on the implementation of these provisions, and the government will present a general report to Parliament that outlines the energy efficiency works carried out on government and public body buildings, comparing the results with the objectives set.

**Social housing**

The government has set an objective that all social housing should eventually be renovated, starting with 800,000 social housing units with energy consumption levels greater than 230 kWh of primary energy per square metre per year. These will undergo energy efficiency renovation works by the end of 2020, with the aim of reducing their annual consumption levels to below 150 kWh of primary energy per square metre per year.

The extensive renovation timetable is as follows:

Year	2009	2010	2011	2012–2020
Social housing units renovated	40,000	60,000	70,000	70,000/year

In order to achieve this objective, a system of reduced-rate loans will be introduced for social housing leasing bodies. The conditions for the renovation programme will form part of agreements between the government and the bodies concerned. These agreements will set out how the renovation works will be funded through savings gained once the works have been completed. The government will be able to provide additional support for these agreements through financial grants of up to 20% of the total cost of the works.

Social housing leasing bodies will commit to encouraging the use of renewable energy sources.

## **Private housing**

In order to accelerate the programme of energy efficiency renovation for existing residential properties, the government will introduce specific actions including a set of financial incentives designed to encourage renovation works. In particular, the following plans are in place:

- the government will look to set up agreements with the banking and insurance sectors to fund energy saving investment through future income from savings; these agreements will include the provision of personal loans that can be repaid through the resulting energy savings; the government will also encourage the simplification and development of energy performance contracts, with the aim of distributing these contracts subsequently;
- the income tax credit set out in article 200 *quater* of the general taxation code will be changed to encourage owners to complete energy performance renovation works on rental properties and to purchase the most energy efficient equipment;
- the owners of large quantities of tertiary-sector properties, particularly holding companies, will be required to comply with the energy saving certification system.

The government will oversee a programme of consultation between landlords and tenants to decide how the energy savings resulting from these investments will be shared.

In addition to these measures, the government will carry out a study of financial incentive systems designed to encourage households and co-owner unions to undertake extensive energy efficiency renovation works on old buildings with poor energy efficiency ratings. These systems will favour the use of innovative funding methods, which consider the income from future energy savings. The study will also look at the possibility of introducing compulsory renovation work requirements in the future.

The government will encourage all actors involved in energy efficiency renovation works to form a group responsible for monitoring and adapting energy efficiency renovation sites in the residential and tertiary sectors.

A professional training, recruitment and qualifications programme will be created for all those working in the construction industry. This programme will be designed to encourage energy efficiency, acoustic and air quality renovation works.

Public research programmes in this field will focus on a new generation of low-consumption buildings and high-performance renovation techniques.

## **5.2 IN SPAIN**

### **5.2.1 Benefits of the Renaissance project for local policy**

#### **1. Plan Parcial de Valdespartera [*Valdespartera Master Plan*].**

The Master Plan developed with the support of Renaissance-Concerto in Zaragoza Valdespartera district that affects the entire development; i.e. almost 9000 VPOs, was approved at national level as a pioneering one, setting an example to follow in other Spanish locations. It is a Master Plan that specifically includes aspects affecting the performance of homes, starting with the layout of streets and space between buildings. Maximum deviations are established in relation to the geographical South of the main facades, level of glass, minimum insulation, solar protection, quality of windows, separation of irrigation channels, efficiency of facilities, etc.

The effect of this initiative is confirmed by measures such as the order published recently for the city of Málaga (Nov 2008) laying down preferential criteria for the orientation of facades.

## 2. **The Ordenanza Municipal de Fomento a la Rehabilitación Urbana [City Council Regulation on the Promotion of Housing Restoration]**

### *1.- Presentation.*

Promoted from the Agenda 21 municipal office and taken over by Sociedad Municipal Zaragoza Vivienda, the City Council Regulation on the Promotion of Housing Restoration intends to improve Zaragoza housings energy efficiency and to increase savings by installing and / or changing different kinds of sources of energy demand such as boilers, enclosures, windows, etc...

Thus, this regulation organises the way subsidies will be granted depending on many aspects commented below.

### *2.- Regulation contents.*

The regulation defines different actions that may be subsidised and the way the subsidies will be granted, including the typology of buildings and restorations, as well as minimum economical requisites.

The scope of regulation includes any building over 70% of residential use and exceeding 40 years of age. This condition may be cancelled in case of disabled persons accessibility works, introduction of RES or some RUE-related actions (adjustment to the new Spanish Energy Standards such as CTE).

Many types of works are specifically addressed by the regulation, including inner patios (new or existing), glazed balconies (green-house effect), previously non ventilated rooms, stairs and hallways, elevator installation, parking increase or fire prevention.

Finally, the regulation text specifies the percentage of works costs that may be subsidised, describes application procedure and reduces the number of documents needed for application.

### *3.- Influence of RENAISSANCE on this regulation*

Renaissance influence is clearly present in the new regulation, since it incorporates lessons learnt from experience in Picarral, including the difficulties encountered there for integrating outdoor lifts or restore enclosures, and tries to improve two aspects:

- What are main objectives of restoration works ?
- What is the most efficient way for works development and application for subsidies ?.

### *4.- Main chapters related to Renaissance.*

The main chapters in this regulation (which just encourages restoration) are the ones related to RES and RUE.

As far as RES are concerned, projects involving RES are significant in the text, since RES installation evades the 40 years requisite and guarantees preferential treatment for subsidies in all actuation zones and types, including fixed 50% subvention.

On the other hand, RUE is also preferentially treated (exactly equally), and applicable subsidies may reach up to 60% of the total costs, possibly exceeded only for disabled persons accessibility works (up to 70%).

### *5.- Conclusions.*

This regulation, that has significantly been fed by Picarral experience, intends helping users to adapt their buildings to more efficient standards, supporting them during the whole process, from building licence application to subsidies, that can reach high percentages of costs, especially in cases of accessibility, RUE and RES.

The law can be downloaded at

<http://www.zaragozavivienda.es/021departamentos/3rehabilitacion/01presentacion.htm>

Other measures being implemented locally with agreements with the regional and national government are as follows:

- **Propuestas de Rehabilitación de 21 Conjuntos Urbanos de Interés [Restoration Proposals for 21 Housing Estates of Interest]:** affecting over 8,000 homes built between 1950-1965 in the districts comprising the expansion of Zaragoza in the '60s. As well as the aid they can receive under the Order, new assistance has been incorporated to carry out restoration measures in 4 Housing Estates in which the Pilot Projects have been established (Picarral, Virrey-Roisellón, Alférez Rojas and Girón), declared to be ARIs (Areas of Integral Restoration) and establishing an agreement with the Ministry of Housing, the Government of Aragón and the Zaragoza Municipal Council so that the financial assistance for these four estates is increased to up to €30.000 per home.
  - **Intervención en Edificios en Precariedad Física y Social [Aid for Physically and Socially Precarious Buildings]:** this measure proposes to improve the quality of life of the occupants of precarious homes through social planning measures as a means of the dignification of life. The necessary mechanisms are promoted to intervene in situations of serious physical and social risk and funding is obtained through the municipal budgets that earmarked €750,000 in 2006/2007. This project has been incorporated into the same agreement with the Ministry of Housing and the Government of Aragón established in the ARIs in order to prioritise those measures on social and physical precariousness in the historic centre of Zaragoza. These two measures have been combined in another measure described below.
  - **Convenios de Declaración de Áreas de Rehabilitación Integral [Agreements on the Declaration of Integral Restoration Areas]** (signed by the Ministry of Housing, the Government of Aragón and the Municipal Council). This groups the two fields together (Housing Estates of Interest and Historic Centre of Zaragoza). The aim is to finance the measures involved in the restoration of buildings and homes in the ARIs in order to develop residential use, applying provisions on the elimination of architectural barriers, promotion of accessibility and improvement in energy performance.
  - **Intervención Integral en la Manzana Armas- Casta Álvarez- Sacramento [Integral Intervention in the Armas- Casta Álvarez- Sacramento block].** This consists of a Guideline aiming to obtain the renovation and urban improvement of this area of the historic hub so that this measure constitutes a strong point of reference as well as an area of regeneration. Actions have been planned for that purpose making it possible to live in the centre of the block by building 82 VPA homes [*regional subsidised housing*] (occupied by different types of residents favouring integration), a public space inside the block of 1,300m<sup>2</sup> in which planned outdoor activities will take place, a public square of 1,000 m<sup>2</sup> and a Music Centre to be enjoyed both by residents of the district itself and by other citizens.
3. The **Ordenanza Municipal de ecoeficiencia energética y utilización de energías renovables en los edificios y sus instalaciones [Municipal Order on energy ecoefficiency and the use of renewable energies in buildings and their facilities]**  
1.- *Presentation.*

The Municipal Order on energy eco-efficiency and the use of renewable energies in buildings and their facilities intends to set minimum rational criteria in order to achieve energy demands reduction aiming to their causes and promoting RUE and RES.

#### *2.- Contents.*

This regulation obtained initial approval in March 2007 and is being submitted to tender and public participation. The aim is to regulate heating systems, facilitating the incorporation of renewable energies and favoring energy efficiency in the residential and tertiary sectors so that, without detriment to comfort, the consumption of fossil fuels and electrical energy is reduced, saving and efficiency are developed, the local management of energies is improved, the compulsory incorporation of renewable sources is promoted (particularly DHW) and citizens are provided with adequate information.

It applies to all restorations, renovations or changes of use of existing buildings, apart from special cases or renovation of buildings with an installed capacity of less than 20kW.

This Order is obligatory for developers, constructors and construction employees for any new or restoration construction that will require energy for their common uses, with power over 20 kW.

As a consequence of this, some requisites become obligatory in terms of glazing, orientations, power production systems, comfort conditions, etc.

For example, the following aspects show current requisites in Zaragoza, derived from all this Order:

- Glazing percentages depending on orientation (minimum or maximum).
- Minimum façade surface orientated to South  $\pm 35^\circ$ .
- Shading devices in orientations West  $\pm 30^\circ$ .
- Minimum shadows over windows in summer and maximum ones in winter.
- Considerations on green zones and forestation to be placed.
- Air changes and ventilation considerations.
- In power production facilities, new ideas on tele-management and minimum efficiency are introduced, in order to reduce consumptions.

As far as solar thermal facilities are concerned, there are some requisites on production and characteristics, as well as the chances to change this facility and place for photovoltaic or other RES systems.

#### *3.- Renaissance influence over the Order.*

UNIZAR (GEE) has worked on RUE and RES for a long time, so some initiatives have taken place in Zaragoza by means of collaborations with City Council and DGA (Aragón regional government).

These include:

- Previous experience of bioclimatic urban planning in Barrio Goya (THERMIE 1995)
- The Strategic Diagnosis Plan for Zaragoza (Diagnóstico Plan Estratégico de Zaragoza) was published in 1996 as first follow-up of the 1994 Aragon Energy Plan.
- Autonomous Community Order (13/11/2006) subsidies for energy savings and diversification, rational use of energy, use of local and renewable resources and energy infrastructures for the year 2007.
- Valdespartera Master Plan.
- Municipal Order on energy eco-efficiency and the use of renewable energies in buildings and their facilities

Main activity on this topic was Valdespartera Master Plan, which has been included in Renaissance project as a key stone. Experiences and demonstration carried out under this project have turned City Council to awareness and collaboration with UNIZAR in the elaboration of energy regulation like this Order.

#### *4.- Key chapter analysis.*

Under Renaissance point of view, main chapter is the one related to solar gains and blockings, ventilation and others, which corresponds to chapter 10 "Energy saving and efficiency measures".

This chapter establishes the arc South  $\pm 35^\circ$  (Samp arc) as the one related to solar gains, so that shadows at noon on December the 21st are limited, as well as the existence of 25% of the total amount of enclosures in this arc.

Also, facades in the arc will have at least a glazing percentage of 40%, while North will have as minimum as required for lighting and health questions, and other will not exceed 20%.

There are also some instructions on green zones and forestation and some reductions for enclosures transmittance, referring to enclosures placed in separations between buildings and dwellings (limited to 0,8 W/m<sup>2</sup> K).

Finally, windows in North and West will be installed with double frame and maximum transmittance at 2,6 W/m<sup>2</sup> K.

#### 5.- Conclusions.

This order intends to place Zaragoza one step forward general Spanish regulation in terms of energy saving and efficiency, profiting Renaissance experiences and City Council willingness.

The law can be downloaded in

[http://www.zaragoza.es/ciudad/normativa/detalle\\_Normativa?id=245](http://www.zaragoza.es/ciudad/normativa/detalle_Normativa?id=245)

### 5.2.2 Benefits of the Renaissance project for national policy

Thanks to the RENAISSANCE project, Zaragoza, a pioneering city in bioclimatic actions (see the THERMIE 1995-2000 project of Barrio Goya, 3,500 VPO [*subsidized homes*], 300 monitored), has drawn up the first MASTER PLAN specifying the bioclimatic criteria which take into consideration the orientation of buildings, solar protections, cross ventilation and an estimate of the energy demand for heating and cooling. During this period from the start of the programme to the current date, a substantial change in the regulations has taken place as a result of the transposition of the WEEE directive and actions such as Renaissance have been far more ambitious than the regulations in force at the time (see § 2.2.2 for details):

- Código Técnico de la Edificación [*Technical Building Code*]<sup>23</sup>.
- Real Decreto 47/2007 sobre Certificación Energética [*Royal Decree 47/2007 on Energy Certification*]
- Real Decreto 1027/2007, new RITE (Reglamento de Instalaciones Térmicas en Edificios) [*Regulation on heating facilities in buildings*]
- Estrategia Española de Cambio Climático y Energía Limpia Horizonte (2007-2012-2020)<sup>24</sup> [*Spanish Strategy on Climate Change and Clean Energy Horizon (2007-2012-2020)*].
- Estrategia Aragonesa de Cambio Climático y Energías Limpias Horizonte (2007-2012-2020)<sup>25</sup> [*The Aragonese Strategy on Climate Change and Clean Energies Horizon (2007-2012-2020)*]

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<sup>23</sup> Real Decreto 314/2006 of 17 March 2006, approving the Código Técnico de la Edificación.

See ANNEX 3 CTE, DB-HE Documento Básico de Ahorro Energético belonging to the Código Técnico de la Construcción (March 2006).

<sup>27</sup> Proposed by the Government of Aragon in October 2008 (at the Public Information stage)

## **6 RESISTANCE AND OBSTACLES TO CHANGE: DIFFICULTIES ENCOUNTERED AND MEASURES TAKEN TO OVERCOME THESE DIFFICULTIES**

The collaborative work carried out between the French and Spanish partners led both sides to observe that whilst resistance and obstacles to change were not identical in both Communities, they were similar in nature.

The obstacles encountered can be divided into three categories: social/cultural barriers, legal barriers and economic barriers, with a separate report for each Community.

### **6.1 BARRIERS IN LYON**

#### **6.1.1 Social / cultural barriers**

##### **☞ Resistance to innovation: myth or reality?**

The question of social/cultural barriers is a difficult one to address because the source of resistance is not always clear.

For example, it is a widely held view that the general public is not yet ready to accept certain patterns of behaviour related to the use of high-performance equipment or systems, and that resistance is therefore mainly on the part of the user.

However some surveys show that, in fact, awareness of renewable energy and energy consumption limitation techniques is high among the general public.

It is therefore difficult to measure whether the reluctance of property developers to move towards energy efficient building techniques is the result of a genuine lack of interest in this type of housing among users or whether, in fact, it is an assumption about users' expectations that continues to be propagated without objective analysis.

Surveys carried out as part of WP 1.5 have shown that some end users see environmental quality programmes as a current "trend" and that they see a benefit in following such programmes.

Buying an environmentally friendly product is seen as a positive step. Such a purchase is seen as both environmentally friendly and innovative, giving the purchaser comfort, in the same way as the energy efficiency of an individual's home will enable him/her to make financial savings.

Yet other experiences suggest that the population remains reticent about accepting energy efficiency programmes and the use of renewable energy sources.

This was the case in the Lyon urban area with a 20 MW collective wood-burning heating system project designed to supply a whole district of the city of Lyon: the project was postponed in order to carry out a wide-scale consultation programme on the use of wood-burning heating systems in urban areas.

The Renaissance project, which includes plans for three wood-burning heating systems in the basements of buildings, was not met with the same level of resistance.

Any reservations about the use of this heating method and the issues of supplying and

installing this type of equipment on the part of the developers were raised at the design phase and the parties involved were quickly reassured.

As for house buyers themselves, they do not appear to be resistant to this type of heating. Finally, attitudes towards energy innovation are therefore contrasting, with progress made in some areas and enduring resistance in others.

Feedback from the Renaissance programme points to the existence of two types of cultural barriers:

#### ☞ **Traditional boundaries between Architects and Engineers trades and skills**

Architecture is traditionally considered in France as an artistic discipline and taught as such, with architecture schools legally depending upon the Ministry of Culture and not of Housing, Industry or Environment, and students not given any technical teaching during their whole cursus.

Opposite to this, building and civil engineers are exclusively taught technical issues related to their specific branch and often focused on individual technical systems without holistic approach.

Practically, Architects and Engineers are not used at all to work simultaneously in a co-operative way on the same project design, but sequentially with no back and forth process and if ever generally on a conflictual range.

When architectural and aesthetic elements of a building are chosen without any consideration of technical constraints, it may then be very difficult and costly, and sometimes impossible, to later make up some major defects only with technologies and active systems.

This type of organisation is particularly not suitable when a project requires a high level of energy efficiency and environmental quality, which must become commonplace as soon as possible. If energy efficiency objectives are not taken into account at the early stage of the architectural design phase, it becomes significantly more difficult to meet targeted level of performance and the project becomes more expensive.

The long-lasting design phase of blocks A, B and C of ZAC Confluence suffered from the historical unadapted distribution of roles between architects and engineers, but, thanks to the framework of Concerto that put a financial and contractual pressure and to the local Renaissance consortium organisation that involved all developers as full contractors, this disadvantage could be overcome, at least partially, and finally a more cooperative way of working could be initiated.

The experience gained within Renaissance has indeed demonstrated two major recommendations to be crucial:

- the earliest energy efficiency and more generally environmental quality is considered, the best and cheapest results are
- traditional boundaries between architects and engineers trades are not consistent with climate and energy requirements and must change into a closer and more co-operative way from the outset of a project.

#### ☞ **Distorted image of constraints put on architecture and design by energy efficiency and environmental quality**

The Renaissance project highlighted certain types of behaviour and resistance towards environment quality and energy efficiency improvement programmes due to the perception that the associated technical constraints can limit architectural creativity and lead to poorer architectural choices.

This argument, popular with some in the architectural community, is also echoed among property developers who occasionally assert that, in addition to increasing costs, these building performance improvement techniques and materials will scare off their potential purchasers.

Such assertions are based on a conservative vision that environment-friendly and low-energy buildings design are only additional costs without any social and/or financial benefit, and therefore is contradictory to willingness-to-pay from their usual clients.

However, the basic increasing trend of energy prices, either for market (offer vs demand) or policy-driven (energy taxes) reasons, should lead to a better value of low-energy building including from an economic (cheaper operation costs) and social (low-income families protection) point of view.

### **6.1.2 Legal / administrative barriers**

#### **☞ Incorrect calculation methodology of energy needs in thermal regulation**

Generally speaking, low-energy building design and construction suffer in France of a very complicated and inadapated legal framework and of a general reluctance to change environment that considerably slow down and limit the penetration of new technologies and good practices needed for France to be actually in position to comply with those objectives that are recurrently claimed to be shared by decision-makers as well as the building and energy industries.

Detailing all these barriers should take hundreds pages and would largely exceed the scope of the report, but the main one is probably the demonstrated inconsistency and the inappropriateness of the current “thermal regulation” (RT 2005) with those environmental and social ambitions put forward by politicians, not only on a quantitiave point of view (how many kWh/m<sup>2</sup>.yr?) but much more damaging on the long term because of a faulty calculation methodology based on theoretical bias scientifically incorrect when dealing with low-energy, to the point that dual calculation of energy performance must made for obtaining building permit on the one hand and for knowing provisional consumption for heating on the other hand.

This major problem has actually been been brought to light in the frame of Concerto-Renaissance project and explicitly reported during the Grenelle de l’environnement process, but clarification and correction that are now urgently needed for implementing a regulation consistant with objectives are not on the table yet and will expectedly endure long-lasting, difficult and controversial discussions before coming into force.

#### **☞ Inadapated regulation and rules for PV systems implementation**

##### **- Grid connection**

Although Renaissance project is not sufficiently advanced to be able to confirm this issue (the project is at the end of its third year and the solar panels have not yet been installed), the problem is sufficiently widespread in France to merit discussion.

Grid connection application and approval procedure is still very complicated, with the main grid operator (ERDF, a 100% subsidiary of EDF operating 95% of distribution grids in France) taking an inexplicable long piece of time for processing contracts, despite some progress made since a couple of years.

In addition, together with the regulation in place for grid connection and for feed-in tariffs application, the fully vertical organisation of operational departments inside ERDF itself and between ERDF and the department of EDF in charge of purchasing renewable electricity (EDF-AOA) creates an absurd and inextricable situation in the case of new urban development areas like those in Lyon-Confluence.

Indeed, although consumers and producers of electricity connected to the low-voltage grid should logically be considered both as “users”, with the direction of the current inside the meter as single difference, they must apply for grid connection to two different departments inside ERDF, which have absolutely no link one with each other and do not cooperate.

While it is quite natural and usual that developers of new buildings give ERDF all data needed for calculating technical characteristics (including transformers, trenches, wires, connection stations and individual meters) of local grid for consumption and for quoting related implementation costs without knowing the name of the final user who will be either the future owner or even his tenant, such an application for an anonymous third party is considered by ERDF as legally impossible in accordance with the regulation currently in force, which impose that only the future producer of renewable electricity himself is allowed to apply for grid connection and feed-in-tariff contract.

In the case of medium size PV systems like those planned on top of the three blocks included in Renaissance, with several hundreds kW of nominal peak power, it will obviously be necessary to them into account when sizing (and quoting) local grid, and to create specific lines and stations for connecting them to the grid.

Following the rules currently in force meaning that grid connection application for PV system can start only when the final user is clearly identified, the “logical” procedure would lead to undertake studies and works only after all buildings are completed and inhabited, trenches filled up, street and pavements covered and excavators parked away.

Common sense however dictates that underground cable installations should be designed to accommodate PV systems production capacity from the outset, in order to avoid destructive, costly and finally absurd roadworks after project completion.

In the case of Lyon-Confluence Renaissance project, this easily avoidable situation could be anticipated thanks to the long-lasting experience of Hespul, who early enough advised SPLA to alert ERDF so that they could take PV in consideration when sizing the grid, but even this revealed highly complicated given their vertical organisation.

Since building integrated PV (BIPV) technology is likely to quickly develop in France, particularly because of the significant BIPV premium associated with feed-in-tariffs that is said to be of a strategic importance by the State himself with the so-called “positive energy building” concept in the outlook, there is an obvious and urgent need to change the rules for application.

#### **- BIPV-related rules and practice**

In order to benefit from the maximum feed-in-tariff from EDF at 0.6 €/kWh, PV modules must be an integrated element of the building (one of the constituent parts of the building itself).

The PV system owner is responsible for gaining approval, and must submit a statement confirming that PV modules are an integral element of the building.

At present, this statement is processed by the regional Department of the Ministry for industry, research and the environment (DRIRE) who confirms whether the installation is considered as building-integrated and approves the relevant pricing level.

Facing a quickly increasing demand for approvals, DRIRE are no longer able or willing to continue processing these cases.

Furthermore, the Ministry for the Environment is currently examining a new intermediary feed-in-tariff in the range of 0.40-0.45 €/kWh that should apply to non-integrated PV systems attached to a building.

In light of these two elements, the current system and approval process should be reviewed.

Another obstacle to the use of solar panels is the process of obtaining technical certification for solar panel systems.

In France, the new building insurance system compulsorily provides a 10-year guarantee, which certifies that a building meets all the relevant construction quality requirements.

This 10-year guarantee is based on the certification of systems and materials used to construct the building, and of implementation rules. This certification, supposed to represent a guarantee of quality of a given product or system, can be awarded by a unique authorised State-owned public body, the “Scientific and Technical Building Centre” (CSTB).

Without this certification, insurance companies will generally not provide the 10-year guarantee, even if the product or system has been certified in another country. Unfortunately, the certification process is abnormally long, complicated and expensive: to-date, only one single PV module has received certification!

This position represents a genuine obstacle to the development of BIPV systems in large buildings, in contradiction with the signal given by the feed-in-tariff structure, and may also constitute an infringement to the EU internal market rules.

#### **- Restriction to installation of modules in heritage areas**

In theory, the current French legislation does not prohibit installation of solar panels on the walls or roofs of new or existing buildings. However, in areas under the control of an *Architecte des Bâtiments de France* (senior architects responsible for overseeing construction work in heritage areas), specific regulations may be in place with view to preserve the character of a building or of the area in which it is located.

These regulations are sometimes interpreted as suggesting that solar panel installations may not be “in keeping” with the building being preserved or restored, leading to a refusal of works planned.

In some French cities, there is a gradual reconciliation under way between those who wish to defend architectural heritage and those who wish to promote the use of renewable energy sources, with each side ready to consider the opinions of the other and find the best compromise. However, more often than not, historical preservation and environmental preservation remain irreconcilable.

### **6.1.3 Economic barriers**

In general, one of the main reasons for resistance to environmental quality programmes in France is the idea of extra investment that such programmes generate, and Renaissance programme did not avoid this phenomenon.

During the tender competition phase, some of the developers/construction companies announced that they would rather withdraw from the competition than run the risk of the extra levels of investment required to meet the demands of the Renaissance project and the high environmental quality requirements for sections A, B and C.

Once the developers had been chosen, the question of extra investment remained a central point of debate for some time, although the impact was different for each section.

It soon became clear that the levels of extra investment required varied significantly from one programme to the next, depending on when and how the Concerto requirements were integrated into the building design process.

This point, already dealt with in depth above, confirms that the earlier these energy efficiency and renewable energy use requirements are considered in a project (through bioclimatic design), the less extra investment they require.

Detailed information is not available yet about the level of extra investment generated by the Renaissance project for Blocks A, B and C, primarily because developers use to consider these data about costs confidential, particularly as regard to their competitors.

An attempt was made to identify the design and engineering costs that could be directly attributed to the Concerto programme for the three developers. However this attempt was unsuccessful because it was impossible to distinguish between those costs incurred through independently selected energy efficiency solutions and those required by the Renaissance project.

Feedback from the design phase shows that each of the developers of the three sections had a very different approach to the question of extra investment.

Some of them saw this as genuine costs undermined the balance of the project, whilst others saw this investment as a relatively minor element which could be absorbed by the final sale price of the building and existing financial support systems.

What is certain is that without the grant scheme created by the Renaissance project, it would not have been possible to apply such strict levels of requirement in 2004/2005.

Interestingly, whilst the specifications were difficult to comply with in 2004/2005, it seems that in 2008, almost all programmes included in the phase two of the Confluence projects have achieved those levels required in the first phase (sections A, B and C) or even higher without any grant system in place.

This seemingly exceptional quickness of progress in environmental quality programmes at the Confluence site can be explained by the fact that it is an experimental site, where the urban project requires constant innovation and improvement.

It can also be explained by the fact that some of today's high-performance technologies did not exist or were only at the prototype stage in 2004/2005 and that, in the space of three

years, these technologies have become more widely used and less expensive through mass industrial production.

## **6.2 BARRIERS IN ZARAGOZA**

### **6.2.1 Social / cultural barriers**

We are generally faced with a demotivated society, in which it is difficult to change habits. The lack of communication between neighbours is also a communication barrier, preventing good interaction between them, which is a fundamental part of our project as it is based on the direct relationship of the EEG with the residents and between the residents themselves.

User's lack of perception of the need for buildings that significantly reduce the demand for energy and the absolute advisability of assuming targets consistent with the foregoing.

### **6.2.2 Legal barriers**

Rigidity of the national regulations badly supported by the corresponding regional and local initiatives.

**Legal difficulties due to the Ley de Propiedad Horizontal [Law on Horizontal Ownership] that do not facilitate the execution of works.** Social housing in Spain, most of which is jointly owned, is governed by an old Law, the Ley de Propiedad Horizontal, based on ownership. This fact combined with the shortage of public social housing for rental (in Spain there are only some 200,000 public homes for rental) makes it a very different situation from that found in France. In order to restore a building, the agreement of the majority of the owners must be obtained, which makes it difficult to achieve and slows down restoration initiatives somewhat more than if the building were public property.

### **The planning instruments are not prepared and do not relate to restoration.**

The lack of systematic restoration policies implies that energy wasting (if their inhabitants can pay for the energy required to provide comfort) or situations of poor quality of life for their inhabitants (when they may simply resign themselves to putting up with uncomfortable conditions) will continue. This second scenario has been the norm for these suburbs in previous decades. The option for individual solutions to improve climate comfort, without affecting the improvement of construction, leads to a vicious circle, which is extremely serious for the users (individual electric facilities, heat or heating pumps using butane gas or the like) which are at the same time extremely wasteful from the energy point of view.

Compared to current buildings, within the framework determined by the Código Técnico, maintaining comfort in these homes involves multiplying consumption by a factor of 2.47 for the more extreme climate of Zaragoza. To fix ideas, we could summarise this data with a simple but categorical statement: maintaining this housing sector without restoration implies "approving" buildings that use twice the energy currently permitted in newly-constructed homes.

In Spain, if we manage to ensure that the new Código Técnico is applied to the restoration of districts built in the period 1945-1960, major changes would be required as the building guidelines for these districts, before the first oil crisis, with a low demand for environmental quality and low building budgets, can only as an exception comply with the requirements of this legislation in indicators such as casing transmittance or use of solar energy for air conditioning or sanitary hot water.

**The difficulty in installing a lift in a public space.** Many of the buildings that need to eliminate this greater architectural barrier lack sufficient space in the common yards or staircases to install a lift and comply with the current regulations on minimum stair width. They would need to install a lift outside the building and in that respect there are no clear legal tools to do so at national level, as there are only local initiatives that depend on municipal desire.

### **6.2.3 Economic barriers**

In building new social (protected) housing, there is little room for manoeuvre due to the maximum price fixed by the regulations on the sale of this type of housing on the market which dissuades the private developer from introducing environmental improvements beyond the Código Técnico de Edificación as they are not profitable.

The current economic climate establishes a series of economic difficulties far surpassing any we might have been able to examine in the original situation.

## **7 RECOMMENDATIONS TO NATIONAL AUTHORITIES**

In line with the obstacles and areas of resistance identified above, the recommendations for national authorities can also be divided into three categories: social/cultural, legal and economic.

### **7.1 RECOMMENDATIONS TO FRENCH AUTHORITIES**

#### **7.1.1 Recommendations from a social and cultural viewpoint**

As stated in section 6.1 on cultural barriers, the main obstacles identified are the stage at which environmental quality concerns are considered in the architectural design process and the perception among the public and within the property and construction industry that architectural design and environmental quality may be incompatible.

The key to changing behaviour patterns and encouraging acceptance of new types of housing based on energy efficient buildings, low energy consumption and renewable energy sources can be summarised in one word: education.

#### **General public awareness raising and education:**

Public authorities will have to play a major role in informing the general public and raising awareness about energy efficiency elements of construction. There are numerous not-for profit associations working towards these goals on a local level, but they often do not have sufficient resources for the task.

The national Government and local Authorities together will therefore need to take the baton and provide a single, relevant source of information and education to the general public, with a large national “Environmental education Plan” so as to spread a consistent message to the public and provide national communication support coordinated with local education Plans within each local authority, including a programme of actions tailored to specific local contexts, in partnership with key actors in the area.

Although an ever increasing portion of the population is aware of environmental issues, there is a lack of facilities on an individual level to be able to contribute to the global effort.

It would therefore be sensible to focus communication on taking the “right action” or promoting “eco-citizenship” to individuals. A programme of this type already partly exists in France but needs to be strengthened.

#### **Opening architecture courses to energy-related issues:**

One key target is to move towards a new organisation of tasks within contractor teams, with the aim of including technical design office at as early a stage as possible.

The traditional distribution of tasks between architects and design offices has been subject to lengthy negotiation and has been fixed for many decades within each corporation, and cultural barriers are, by their nature, difficult to break down because there is little scope for manoeuvre.

However, one area of action that could help to change certain professional practices is education, particularly in architecture schools that should systematically integrate more

energy-related technical issues and courses, preferably given by building and civil engineers so as to favour direct exchanges and cooperation between those two worlds so as to make possible to change professional practices.

### **Low-energy building project management:**

The most effective way for developing acceptance of the idea that environmental quality programmes can add to the architectural quality of a building is to “plead by example”, and programmes such as Concerto can have a significant impact in this way by creating buildings that are “exemplary” both in terms of architectural quality and energy efficiency and proving that these two elements are actually compatible.

Our recommendations are aimed at project managers with the following message: a high level of environmental and energy quality can and must be combined with a high level of architectural quality, and a building should always be designed with both these elements in mind.

Design teams should always integrate architectural and technical staff at the same level of responsibility and in a co-operative manner, so that architectural quality should never be disregarded because of environmental and energy quality - and vice versa.

#### **7.1.2 Recommendations from a legal viewpoint**

With numerous changes and improvements expected from the follow-up of the so-called “Grenelle de l’environnement” process as explained above, the main recommendation to decision makers should be **to resolutely embrace and apply all those recommendations included in the final report of the “Energy-Cimate” working group published in October 2007** (i.e. just before the “Final round tables”), above all those concerning the definition of energy objectives in the new and existing buildings including the implementation of a consistent calculation methodology, and to be aware that any reduction in ambitions or in the speed at which changes must be done in the future legislation could jeopardise the actual possibility to reach those crucial objectives resulting from the imperative need of “Factor 4”, and therefore question their actual willingness to take those appropriate measures, even if they might disturb long-lasting habits and behaviour or irritate some well-established interests.

In addition to this quite general but essential recommendation, **a range of very specific update to legal and administrative framework applying to solar technologies, specially PV** that is expected to quickly become mainstream in the building industry, should be undertaken as soon as possible, such as:

- To really simplify and rationalise all procedures applying to grid connection and feed-in-tariffs,
- To clarify and make transparent all BIPV-related procedures concerning tariffs and certification for insurance
- To remove or at least significantly lighten constraints weighing on solar systems installation in heritage areas

#### **7.1.3 Recommendations from an economic viewpoint**

Currently, innovative energy efficiency solutions and renewable energy sources increase building construction costs by between 6% and 20%, depending on the specific level of requirement.

As a result, a short-term priority should be to investigate how to reduce the cost of environmental quality, both in terms of the technical solutions and high-performance materials used, and in terms of design engineering.

As far as technical solutions and materials are concerned, it will only be possible to lower the production cost of these by rolling them out in higher volumes. The higher the numbers manufactured, the lower the production costs will be.

In the same vein, it may also be worthwhile to use innovative, non-reproducible techniques.

In terms of design engineering, the current structure of contractor teams, traditionally comprising an architecture firm and a technical design office, will need to be strengthened with the inclusion of a specialist building environmental quality design office. This current lack of environmental quality expertise in some technical design offices leads to increased contractor costs.

## **7.2 RECOMMENDATIONS TO SPANISH AUTHORITIES**

### **7.2.1 Recommendations from a social and cultural viewpoint (refurbishment)**

These two aspects are much related:

Social Barriers, situation and recommendations:

- ✓ In some population, the social and economical characteristics oblige to do a social supervision by specific and trained personal (social workers, mediator, and educator).
- ✓ In this districts and buildings, the work from the very beginning has to start in connexion with the people that live there. The programs, even if they cover long periods, request some time for diffusion and have to promote the active participation (you can't wait for the tenants to go to the office, you have to give them some proposals).
- ✓ We must support the more active agents located in the area where we are acting, promoting the initiatives that are already started (modernising small shops, implantation of new productive activities).
- ✓ Pursue a major implication in the refurbishment works, propitiating that this initiatives serve as employment measures in the areas where we are acting (training schools, professional training specialised in this type of works).
- ✓ Dedicate resources to professional training in different disciplines so they can specialise in management of urban refurbishment, offering them some practice in the existing organisations

Cultural Barriers, situation and recommendations:

- ✓ In compare to the new development plans, these districts haven't got integral actuaciones and are considered inferior (the new public politics assure this point).
- ✓ Meanwhile the refurbishment is considered just a maintenance cost and not a real inversion that improves the quality of live in a short time, it won't exist a real culture of rehabilitation.

- ✓ There is an absence of Business culture about these aspects with some exceptions (for example: some promoters that work in this subsector). It's necessary to encourage it.

## 7.2.2 Recommendations from a legal viewpoint

### Concerning new buildings

- There is an urgent need to introduce an Energy Certification process that includes homes already built. In this process it should be possible to evaluate the reliability of the certification made with regard to methodology and good use of the tools made available to the technicians.
- The conditions on ventilation laid down by the current CTE should be revised as they involve a high reduction in the energy benefits that had been incorporated into the thermal part.
- Similarly, the incorporation of express criteria on energy optimisation in the design both of new urban development projects and in that of restoration projects is fundamental. The creation of an indicator that assesses the sustainability of a specific project in some way should be an immediate objective.
- With regard to restoration, as mentioned above, the amendment to the Ley de Propiedad Horizontal and the Legislación Urbanística [*Urban Development Legislation*] is a clear requirement to promote and facilitate the restoration of the large number of existing homes with criteria of energy efficiency and saving (improvement in insulation, replacement of obsolete and inefficient heating/cooling systems, closure or incorporation of collector galleries, etc.).

### Concerning buildings refurbishment

- **To modify the Urban Renting Law:** The objective is to adapt the law to promote the total refurbishment of districts operations, regulating the obligations of the owners and the tenants in the payment of the works, the total refurbishment of the building and if there is a ruin situation, the relocation of the inhabitants of the building.
- **To modify the Tax Legislation:**
  - ✓ **Reduce the VAT (7%)** of all the works involving refurbishment of buildings or even reduce the VAT to 0% if the refurbishment of the buildings involves significant savings in energy consume o if the refurbishment was done in public or private houses with low rent.
  - ✓ **Eliminate the obligation of declaring as an income the grants received** for refurbishments works in certain cases (low incomes, scope of investment, energy savings, etc)
- **To modify the Urbanistic Legislation**  
Some suggestions:
  - ✓ We need simple and effective tools that allow us acting in urban soils (deteriorated districts, historical, etc)

- ✓ Expanding the concept of "duty of conservation" to aspects such as the inadequacy energy systems of the buildings, the obsolescence of installation, adapting to current regulations, etc..
  - ✓ Facilitate the creation of management bodies (public or mixed: public and private) in these areas and with the support that the urbanistic legislation will give, similar to other support that already exists for land in extension (Compensation Organs, Conservation Bodies, etc) and that now days are inefficient in urban consolidated land.
- **To modify the Housing legislation:**
- ✓ **New Law of Urban renovation** that will give legal cover to the sectorial politics (in housing, energy saving, redevelopment, etc) and that will impulse in our country this type of politics in a similar way to what has been done in France (Ministry of the City, Law of Cities) and also impulse the Regional Agencies to promote the Urban renewal.
  - ✓ **Concentration of economic aids exclusively in the areas that are more needed** necessarily linked to the existence of management bodies with the participation of local governments, with minimum requirements in thermal efficiency, and implementation of renewable energy and accessibility.

### **7.2.3 Recommendations from an economic viewpoint:**

#### **Concerning new buildings**

The implementation of the energy saving measures proposed involves financial costs both for newly-constructed works and for the restoration of existing buildings, even though these additional costs are depreciated over relatively short periods of time (largely dependent on the energy costs, which are still low in Spain in relation to other European countries) owing to the reduction in the energy bill for homes.

Nevertheless, the investments to be made by home owners should be increased more than is currently the case by means of policies promoting these measures through all levels of the public authorities (State, regional and local), both direct (subsidies) and indirect (tax exemptions)

#### **Concerning buildings refurbishment**

- ✓ The costs of rehabilitation even if they are not very high, due to the type of owners that are mostly affected, require a public funding, also we must graduate the limits of the sale.
- ✓ Improve and develop the private financing products: reverse mortgage, loans to the Community of ownerships, government guarantees, micro credit, etc.
- ✓ Coordinate the support for energy efficiency (Industry Ministry) with the helps to the rehabilitation of housing (Ministry of Housing)
- ✓ The ability to generate more jobs, much more than with the construction of new buildings and the mobilization of private resources thanks to the public incentives, should encourage public authorities to implement the direct aid to the rehabilitation with energy criteria.
- ✓ Promote the professionalization of the sector helping to the constitution of Community of Owners o Associations like this where they do not exist.