Challenges and Funding Opportunities for the Energy Efficient Renovation of Spain’s Residential Building Stock

With the collaboration of:

European Climate Foundation
With the collaboration of CLIMATE & STRATEGY PARTNERS

Texts Georgios Tragopoulos & Peter Sweatman
Translation: Candice Andersen (Mondo Services)
Texts’ Review: Mar Asunción, Enrique Segovia & Arianna Vitali
Edition: Amaya Asiain
Layout: Amalia Maroto Franco

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Summary

In 2010, WWF published a study entitled *Potential energy savings and CO2 emissions reduction of Spain’s housing stock by 2020*, analyzing the positive impact that the renovation of Spain’s residential stock would have in terms of reduced energy consumption, economic stimulus, and reduced CO2 emissions. The report concluded that the Spanish residential buildings sector can reduce its final energy consumption from existing residential buildings by over 30% by 2020 (vs. 2008) and has the technical and economic capacity to achieve this. This decrease would produce a CO2 emissions reduction of 8.7 million tonnes per year, and average annual savings of 2,312 million Euros, with a much higher home renovation rate than the current one.

To complement this study and review further the economic impact of its prior work, WWF worked with Climate Strategy & Partners in 2011 to produce this new report entitled *Challenges and Funding Opportunities for the Energy Efficient Renovation of Spain’s Residential Building Stock*.

The increased energy efficiency of existing building and the delivery of energy savings through deep renovation are key objectives for the EU and Member States for four main reasons: Cost effective energy savings through reduced energy consumption, reduced CO2 emissions to fight climate change, greater energy independence and the creation of long-term and sustainable new jobs to contribute to our exit from the current financial crisis.

Unfortunately, and despite the best efforts and strong will from many Governments of the EU Member States the necessary decisions and national policy implementation which would lead to the optimal delivery of energy efficiency from the building sector have not yet been taken.

Some countries in the EU, such as Germany and the United Kingdom, have already developed policies and targeted funding mechanisms to stimulate the deep renovation of their housing stock and other buildings. In Germany, the state bank (KfW) has developed several funding programs for deep renovation projects, which are delivered through a deep network of private banks that offer subsidized 2.75% or less interest rate over the long-term. The UK has developed an innovative new legal framework – the Green Deal – that enables private companies to offer renovation services to home owners and small businesses at no up-front cost for the owner and which recover payments through an extra charge, in instalments, on the building’s energy bill.

In addition to these European programmes, the United States has also developed a new programme – the Property Assessed Clean Energy Program (PACE) – where owners can receive an energy efficiency loan facilitated by their municipality to carry out renovation works and small renewable energy installations that they repay through an additional annual contribution added to their property tax bill. These PACE loans can be repaid up to 15-20 years.

These tools that have been developed and implemented successfully in other countries should be considered by the institutions responsible for decision making in Spain as a way of complementing and strengthening Spain’s existing policy framework. This new policy approach can inject the dynamism which the sector presently lacks to focus resources on achieving ambitious goals and deep renovation to reduce energy consumption, greenhouse gas emissions and create new jobs and improve the quality of life for Spanish citizens.

It is crucial for Spain to support an ambitious deep renovation programme for the residential building sector, given that this sector is responsible for 17% of final energy consumption and one third of national greenhouse gas emissions. We
estimate that Spain could productively invest between 0.5 and 0.8% of its GDP in the deep renovation of its building stock per annum from now until 2020 and beyond.

Recent examples, such as the decision to take Spain to the European Court of Justice for failure to comply with Directive 2002/91/EC on the energy performance of the buildings (5), and the relatively low ambition of the recent 2011-2020 Energy Efficiency Action Plan confirm a reality which in the opinion of WWF must change fast.

To comply with the targets for energy efficiency and CO2 emissions in the framework of the EU by 2050, WWF believes that Spain should establish an annual rate of deep renovation of 400,000 homes, which represents 1.5% of the existing housing stock each year.

This report Challenges and Funding Opportunities for the Energy Efficient Renovation of Spain’s Residential Building Stock highlights the fact that it is also necessary to remove regulatory barriers to greater energy efficiency, such as the ones that hinder decision-making in multi-unit dwellings, and to clearly promote the benefits of deep renovation through information campaigns to Spanish citizens. In addition, it is also critical to align the economic interests of the different building sector stakeholders, concentrate investments in deep renovations, and deliver long-term and low-cost funding for retrofits.

Our report concludes that by 2020, Spain can deliver the deep renovation of 3.3 million housing units, through the creation and maintenance of 150,000 jobs and with the reduction of 8 million tons of CO2 emissions per year. The total investment required is 46.7 billion Euros to achieve this goal. Seventy-seven percent of this amount can be repaid directly in a period of 20 years, through the energy savings eight percent through the reduction of CO2 emissions and the remaining 15% through subsidies (direct/or incentives). In addition, beyond 2020 we project that there will be no further need for direct subsidies, as the market will then be consolidated and future economies of scale will make it more profitable to renovate.

In the midst of one of the worst financial crises since the 1930s, no country can ignore the opportunity to invest in energy efficiency. Both in Spain and in other countries, the energy efficiency of existing buildings has been substantially ignored by politicians and by markets since the oil crisis of the 1970s. this period has come to an end, and both Europe, with its proposed Directive and 2050 road map for a resource efficient and sustainable economy, and the Member States each with their own national energy efficiency roadmaps must set binding targets to ensure aggregate energy savings of at least 20% for 2020.
Outline of Spain’s Residential Energy Efficiency Challenge

Spain has a residential housing stock of approximately 25 million homes. These homes consume 17% of Spain’s final energy and are responsible for a quarter of national CO2 emissions, increasing to one third if emissions released during home construction are also included. They also have a poor energy performance, by modern standards: 53% of existing Spanish homes were built before the adoption of any kind of energy standards for buildings, first introduced in 1979 (RD 2429/1979: NBE-CT/79), and the remainder were mostly built prior to the introduction of strict energy standards with an upgraded buildings code in 2006.

In the context of Europe’s targets to save 20% of primary energy consumption by 2020, and reduce greenhouse gas emissions by 80% by 2050, there clearly exists a huge opportunity to save energy in Spanish homes, but there are also several key features which must also be considered:

1. **Climatic Region**: Renovation investments in temperate climates will take longer to pay back through energy savings than those in areas with greater extremes;

2. **Constancy of Use**: Over 8 million (33%) of Spanish homes are secondary residences (often “at the beach”) which may remain unused for large proportions of the year, or empty (10%);

3. **State Sponsored Housing**: Over 2.7 million (11.5%) of Spanish homes are State Sponsored homes for economically underprivileged families who are unlikely to have resources to invest in refurbishment;

4. **Communal Decision Making**: Over half the homes are located in 10% of the buildings with 5 or more homes per building. These buildings mostly take decisions via a committee making intervention slower and harder due to their decision dynamics;

5. **High Owner-Occupancy Rates**: 82% of Spain’s primary residences are occupied by their owners and only 12% rented. This is a benefit for energy efficiency renovation as the owner of the property who controls the investment will also see the energy savings benefits.

Any plan to renovate Spanish homes needs to segment those homes by their defining characteristics and to build momentum and capacity in a renovation sector by starting with those primary residences with the highest savings potential. In order to begin the process of segmentation and estimate the potential for 2020 energy savings, WWF published a report in December 2010 which assessed 918 different sub-segments of Spain’s buildings through a classification based upon:

- 6x Building typologies (2x different types of: Single family homes, semi-detached dwellings and apartments)
- 3x Climatic Zones (Madrid, Seville and Burgos)
- 3x Construction modes (Pre-1945, 1945-1980 and post 1980)
- 3x Types of heating systems (Electric, Natural Gas and Mixed-conventional)
- 6x Forms of Intervention (E1 – Business as usual, E2 – Primary Insulation, E3 – Secondary Insulation, E4 – Renewables, E5 – Renewal of household appliances and E6 – Mix combination of E3, E4 and E5)
The following diagram illustrates the structure and methodology used by WWF in its December 2010 report:

Using the LIDER methodology, as described in the Housing Ministry and IDAE’s HE1 buildings code, combined with the CALENER buildings’ energy classification program, WWF was able to calculate a “before” and “after” energy and emissions profile for the above matrix of buildings profiles, locations, ages and renovation programmes with savings illustrated here:

The work concludes that energy demand can be reduced by 66-83% through improved insulation (E2 and E3 respectively) and that the addition of solar thermal hot water production, PV with an upgrade of air conditioners and boilers (E6) also brings energy consumption reductions to 85% and CO2 emissions reductions to 82% of the business as usual tendency (E1).
Using an average energy price of 7.6 €/KWh, the WWF report estimates annual energy savings from insulation interventions (E2, E3 and E6) at between Euro 450-680 for the average 81 m² home and concludes that insulation interventions E2 and E3 pay-back in 10-11 years and that a full “deep renovation” E6 would payback in just under 29 years.

Finally, to help illustrate the magnitude of the potential energy savings available from the different renovation programmes WWF uses four annual “renovation rates” (118k, 313k, 626k and 1.25mm) showing how much energy (%) can be saved in Spanish homes by 2020 through each form of intervention:

WWF’s 2010 study draws the following key conclusions from its considered analysis:

1. Spanish homes have the technical and economic potential to deliver 30% final energy consumption savings by 2020 through the renovation of between 500,000 to 1 million units per year (some 3-7x the currently contemplated rates);

2. Saving 30% of the energy consumption of Spanish homes will save Euro 2.3 billion of energy costs and 8.7 million tons of CO2 emissions per annum and by 2020 the total amount of energy saved will sum to 290 TWh;

3. To achieve these results, home renovation must have a priority focus on insulation improvements which go deeper than the present recommendations of the Spanish buildings code;

4. If the buildings envelope is not improved through insulation, the integral impact on the building stock of upgrades to appliances and household renewable energy installations will be limited.

And in order to deliver these substantial benefits and results for Spain in 2020, WWF recommends:

1. To establish a mandatory target of 30% energy savings from existing homes by 2020 through the implementation of a National Action Plan with clearly identified methods, timeframes and budgets to achieve those objectives;

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1 Average of Domestic Gas, Electricity and Fuel-oil taken from BOE and MyTIC sources in 2010
2. **Improve the normative energy efficiency standards for Spanish buildings** from the DB-HE in the existing code (CTE) closer to pan-EU levels;

3. **Improve compliance, especially in energy efficiency, of the existing buildings code** for new construction;

4. **Increase the support programmes and renovation investment cost subsidies** in order to hit targets with special attention on stimulative fiscal benefits for energy efficiency investments by home-owners (including tax deductibility, low cost loans and direct subsidies);

5. **Include energy efficiency renovation criteria in Municipal buildings refurbishment licenses** which should be mandatory for any entity receiving subsidies for such activity;

6. **Improve coordination between national, regional and local administrations** especially in areas concerning buildings and energy efficiency;

7. **Promote best practice and practical learning** through the leadership of energy efficiency renovation of the regional and local Administration’s buildings;

8. **Develop Citizen Education Programmes** to raise awareness among buildings owners and tenants of the benefits to energy efficiency renovation of their homes as well as the fiscal and other support programmes available. **A citizen’s advice helpline** is also recommended to provide practical support and guidance to homeowners in these matters.

Against this background, in the following sections, we assess the changing policy framework in Europe and review existing finance and support mechanisms to provide insights into how Spain might move to achieve these results.
Political context and financial mechanisms

Face of an environmental and economic crisis as severe as the present one, no country may disregard potential energy savings provided by building renovations. In order to achieve these savings two basic elements are necessary: political will and appropriate financial mechanisms. Countries such as Germany, the United Kingdom, and the United States have combined both elements within the renovation sector, demonstrating considerable progress.

European Context

The European Union has established as an objective the reduction of the annual primary energy consumption by 20% for the year 2020, which represents 368 million tons of oil equivalent (Mtoe). It is hoped that through energy savings, CO2 emissions can be reduced by 780 million tons and a billion Euros can be saved in fuel costs. Buildings are responsible for 40% of final energy usage in Europe which demonstrates that they constitute a fundamental component in realizing this objective. In addition, the European Commission estimates that up to 2 million jobs could be created and/or conserved through energy efficiency measures. Since the year 2000, the EU has attempted to adopt a legislative framework aimed at improving the energy efficiency of buildings. This objective is expressed largely within the following directives:

- Directive 2002/90/UE (EPBD) relative to the energy efficiency of buildings.
- Directive 2010/31/UE relative to the energy efficiency of buildings (revised)

Within the legislation of both directives, a common methodology has been developed in order to calculate the energy efficiency of buildings, the minimum requirements for new buildings and significant renovations, systems for the energy certification of these buildings, and the requirements for periodic inspections of boilers and central air conditioning systems. The EU estimates that with the implementation of the Directive 2010/31, it will be possible to achieve a reduction in energy consumption by 5-6% while 280,000-450,000 new jobs will be created. In addition to both requirements directly connected with energy efficiency, the Energy Efficiency Action Plan 2011 recognizes that the EU "is not on track" to achieve the objectives of energy savings and needs to double their efforts. To achieve this, the EU is planning their policies towards energy efficiency, for 2020, based on the Energy Efficiency Directive (4), currently being debated within Parliament and the European Counsel. WWF participates actively within this process and has drafted a position paper in order to strengthen the possibility that Europe will achieve its objectives of energy savings and efficiency by 2020. Amongst other measures, WWF proposes the implementation of a common energy savings objective of at least 20% for Member States, the adoption of a common definition for deep building renovation, and the creation of a National Fund to facilitate the financing of projects relative to energy efficiency, especially those concerning building stock.

In short, WWF asks European and national institutions to support an Energy Efficiency Directive that provides the necessary tools for energy, economic, and labour stability. The insufficient advances within Europe are mostly owed to failures within regulations (such as the lack of global political frameworks, the application of deficient and incoherent policies, and low ambition levels) and within the market
(such as insufficient price signals\(^2\), split incentives\(^3\), asymmetric information\(^4\), missing or incomplete markets\(^5\) and initial high costs).

In the specific context of commercial and residential retrofits, the Commission also sees increased measures on financing as “essential to tackle the serious limitations on the availability of liquidity for high upfront costs”. Furthermore, EU level resources are seen as providing risk-sharing\(^6\), project guarantee support and the better engagement of third party financing as well as the provision of more technical assistance to Member States and local authorities.

**National Context**

In Spain, the building policies for energy savings and efficiency are expressed mainly though the following regulatory and legislative measures:

- State Plan for Housing and Renovation, 2009-2012 (18).
- Plan 2000ESE (Energy Service Companies)

Aside from regulatory and legislative measures that are directly connected to the improvement of energy efficiency within the building sector, the policies over the objectives of energy savings and efficiency are expressed mainly through the Energy Savings and Efficiency Strategy 2004-2012 (E\(E\)) and through the Energy Efficiency Action Plans (PAEE 2008-2011 and PAEE 2011-2020), presented by the IDAE. The following table demonstrates the total investment in energy efficiency measures within the building sector and its projected savings.

\(^2\)Message that the markets send to the consumers and the producers through the cost of a good. The last can be seen as a signal that indicates to the producers that they can raise the supply and the consumers reduce the demand.

\(^3\)For example, if the owner of a house pays for the energy consumption, the tenant will not have any incentive to reduce the consumption. On the contrary, if the tenant pays the energy bill, the owner does not have incentives to invest in energy efficient measures.

\(^4\)Difference between information that is available to the sellers and buyers in a market (12)

\(^5\)Market that does not supply a determined good or service in sufficient quantity even though the cost of production is inferior to the price the consumers are willing to pay

\(^6\)Instrument that permits the channelizing of public, private, or mixed resources in order to resolve the insufficient funding of the investors and their initial limitations to accede the risk capital or the credit required to carry out productive projects, that are viable and of interest as much for the private investors as for the source of resources of shared risk
The table summarizes the different types of measures for energy efficiency within the building sector and lists the energy savings, the reduction in CO2 emissions, the public aid, the savings in energy costs, and projected time needed to recuperate investments by these measures for 2020. WWF considers the building sector to have a much greater energy savings potential, such as was indicated within the 2010 study, but in order to achieve the potential it is important to perform a series of actions to reinforce the legislative framework and the financing sources at a national level. Included among these actions are the enlargement of the energy certification to encompass all housing stock (not only those that are sold and/or rented) and the ambitious transposition of the Directive 2010/31/UE. Likewise included are the implementation of criteria more demanding than those expressed within the Technical Building Code, in order to bring about deep energy renovations to reduce building energy consumption by at least 75% as compared to previous consumption; the rise in the annual rate of public building renovations in order to reach three percent of the total surface; and the implementation of efficient financial tools that could contribute to achieving ambitious and profitable objectives.

WWF considers the current policies over energy efficiency insufficient as they are not compulsory nor do they present the level of ambition necessary to achieve a 20% reduction in primary energy consumption in absolute terms (in comparison to consumption within a typical year, i.e. 2007). However, it is true that there has been progress within the legislative and general regulatory framework in attempting to achieve these objectives.

Overall within the building sector Spain, to date, has demonstrated major setbacks in the transposition of energy efficiency directives over buildings even leading to a claim by the Justice Tribunal of the European Union due to the poor and incomplete integration of the various measures. WWF believes that actions needed to invigorate the construction sector including the creation of an integrated legislative framework that would offer the necessary tools, financing as well as regulating, in order to facilitate the sustainable growth of the buildings’ energy rehabilitation market and would contribute to the creation and preservation of employment.

The following table was presented within the document of allegations from social organizations to PAEE 2011-2020 (July 2011) and demonstrates the projected energy consumption for 2020 in comparison to the energy consumption during the years 2004, 2007, and 2010. The table does not consider any type of evolution of energy intensity but instead compares the energy consumption of various years.
### Year Primary energy consumption* (% Energy consumption (comparison to 2020 Spain’s target)

<table>
<thead>
<tr>
<th>Year</th>
<th>Primary energy consumption* (mtoe)</th>
<th>% Energy consumption (comparison to 2020 Spain’s target)</th>
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</thead>
<tbody>
<tr>
<td>2020</td>
<td>142.213*</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>142.817</td>
<td>+0.42</td>
</tr>
<tr>
<td>2007</td>
<td>146.645</td>
<td>+3</td>
</tr>
<tr>
<td>2010</td>
<td>131.927</td>
<td>-7</td>
</tr>
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*Spain’s Energy consumption target

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**Existing Financial Instruments**

In 2010, EuroACE (11) identified in excess of 100 financial or fiscal instruments which were in place across Europe and which represented “a total investment of the order of tens of billions of Euros”. The work goes on to provide analysis of 30 comparable core instruments which fall into eight categories: Preferential Loans, Subsidies, Grants, Third Party financing, Trading (White/Energy Certificates), Tax Rebates, Tax Deductions and VAT Reductions.

It is important to consider that, independent of the instrument, the investment capital for Europe’s buildings renovation will come from just six sources: Government, Building Owner, Building Occupier, Bank, Renovation Contractor or Energy Supplier. The amount of capital that is made available by each of these sources to renovate Europe’s buildings depends upon three factors: the source’s access to and cost of funds; its perception of the risk/return characteristics of the renovation investment and other competing investment priorities. When assessing each financial instrument and associated regulatory policies it is important to determine on which financing source it is designed to act and how it impacts that source in each of these three areas.

Aside from being a significant direct investment capital provider (through subsidies and grants), and indirectly through fiscal measures, Government – through appropriate policies – can significantly impact each of the private sector funding source’s investment priorities, perception of the risk/return characteristics of the investment and potentially also access to and cost of funds. At an international level, financial instruments exist that could help Spain carry out an ambitious and profitable energy renovation of buildings. WWF considers it possible to reach an annual renovation rate of 1.5% through these instruments.

Below, three cases of financial tools utilized within three countries – Germany, the United Kingdom, and the United States – are analyzed. These tools are used to finance buildings’ energy rehabilitation projects and to stimulate the renovation market.

**Case Study 1: Germany and KfW**

Germany, with an annual renovation objective of 2% and an objective to reduce building energy demand by 80% before 2050, has been one of the most successful European countries in terms of stimulating energy renovation. In addition, Germany has reached impressive levels of public/private co-financing for energy renovation projects. Since 2006, each Euro that the German government has invested as a

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*The renovation contractors include the construction companies, the installers, and the Energy Services Companies ESCOS (whose contracts are connected to energy performance)
capital contribution to the state bank KfW has resulted in four Euros invested by the markets and by building owners. Within recent years, that ratio has increased up to 9 times. That is to say that six billion Euros contributed by the state to KfW prompted 27 billion Euros within KfW lines and on part of property-owners totalling 54 billion within three years (19). This cascade effect was generated thanks to, among other things, the participation of private banks. Their participation guaranteed a wider reach and a greater regulation of the processing capacity of retail transactions, and the subsidized interest rates of 2.75% or less to encourage building renovations.

**German Case Study – KfW***

Germany has 39 million homes of which 75% were constructed before 1979, prior to the introduction of higher energy savings standards. Germany currently refurbishes around 200,000 buildings a year (equating to c. 400,000 homes) and to date has retrofitted 9 million units to high energy-efficiency standards. Existing German homes use around three times more energy for heating than new buildings and energy efficiency investments have halved the energy use in the buildings treated since 2002.

From 2001–2006, the German Alliance for Work and Environment was very successful in using subsidies to stimulate private sector finance: €3.8 billion of public subsidies stimulated a total investment of €15.2 billion in buildings retrofits creating or maintaining some 140,000 jobs. In addition, the coalition believes around €2.9 billion of the government input was recovered through tax and needs for unemployment benefits was averted.

From 2006-2009, KfW’s financing activities across various programs deployed €27 billion in loans and grants leading to a total investment in energy efficient homes of more than €54 billion. KfW’s funding has enabled the energy efficient renovation of 1 million homes, and the building of 400,000 new highly efficient homes, and is credited with the creation of 240,000 new jobs per year in the building and building supply-related industries.

Building upon this success, Germany is looking to double its historic energy efficiency activity rates to meet its current refurbishment targets.

**Case Study 2: United Kingdom and the Green Deal**

In the year 2000, the UK began to provide grants of up to £3,500 (3,900€) per household for home efficiency measures targeting fuel poverty which a decade later had reached over 2 million low income homes (21). In 2008, the UK launched the Carbon Emissions Reduction Target (CERT) programme requiring all large domestic energy suppliers to make savings in the amount of CO₂ emitted by households they serve and began to require Energy Performance Certificates (EPCs) any time a home is sold or rented. This increased the amount of household retrofit activity and was complemented in 2009 by the Community Energy Saving Programme (CESP), which focused on the insulation improvement within dwellings of low-incomes (22).
Case Study 3: United States and PACE

US building energy efficiency policy have been advanced through a mix of federal and state level policies, with the majority of the major policy innovations happening at the state level\(^8\). However, the federal government has set a standard for federal government buildings, requiring them to reduce energy use to 30% below 2003 levels by 2015. The federal government also provides some support for energy efficient mortgages (EEMs) which provide finance for energy efficiency improvements by increasing existing mortgages. EEMs typically provide additional loans of up to 5% of home value. When lenders can prove they know how to write EEMs, they can become Energy Star partners. The Energy Star program had 23 lender partners as of July 2010\(^9\).

The government also provides significant subsidies to retrofit low-income homes through the Weatherization Assistance Program (WAP), created in 1973, weatherizing a total of 6 million homes by 2008, approximately 4.5% of all US residences. In 2009, the Weatherization Assistance Program received US$ 5 billion

\(^8\) US EPA (2008).
\(^9\) For a lender to maintain their partnership they must issue a minimum number of EEMs each year.
in funding to weatherize 600,000 homes as part of the American Recovery and Reinvestment Act (7).

Twenty four US states have passed an Energy Efficiency Resource Standard (EERS), requiring electric utilities (and in eight states gas utilities as well) operating in the state to meet a specified energy savings target by a specified date (2). Most of the programs require energy savings of around 15% by 2020. Some states also have tax incentives for energy efficiency: State tax incentives vary greatly, and include incentives linked to personal tax, corporate tax, property tax, or sales tax incentives. For each type of tax, between 6 and 16 states have some form of energy efficiency incentive.

**US Case Study - PACE**

Of all the US state grant and loan programs, a particularly innovative new program is the Property Assessed Clean Energy (PACE) program. Under the PACE program a municipality issues bonds whose proceeds are lent to commercial and residential property owners to finance energy efficiency retrofits and small renewable energy installations. Property owners repay their loans over 15-20 years via an added annual assessment on their property tax bill. PACE enabling legislation has now been passed by twenty seven US states and 14 municipalities have implemented a PACE program so far.

PACE is designed to solve two key barriers to increased adoption of energy efficiency and small scale renewable energy: High upfront costs and the fear that project costs won’t be recovered prior to a future sale of the property. PACE proponents believe that the basic energy efficiency measures can cut energy costs by up to 35% and that annual energy savings will typically exceed the cost of PACE assessments and so the upfront cost barrier actually turns into improved cash flow for owners. PACE assessments stay with a property upon sale and will be fully repaid by future owners who continue to benefit from the improvement measures.

Although complete and comparable information is not available about the energy renovations of different countries and of the number of renovations already completed, including their magnitude and renovation rate tendencies, the following table illustrates a comparison of renovation programs that exist within distinct countries and within Europe. The estimations for the rates of renovations within buildings carried out by the European Institute for Building Performance (Instituto Europeo para el Rendimiento de los Edificios)(1) vary between 0.5 and 2.5% of the building stock each year with the mean amount for Member States around one percent.
The following table summarizes the rehabilitation programs of Germany, the United Kingdom, the United States, and Spain:

<table>
<thead>
<tr>
<th>Country</th>
<th>Rehabilitation Rate %</th>
<th>Programme Type</th>
<th>Investment Type</th>
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<tbody>
<tr>
<td>Germany</td>
<td>2%</td>
<td>Federal Mandate and KfW Programmes</td>
<td>Public/ Private Mix</td>
</tr>
<tr>
<td>UK</td>
<td>&gt;2%</td>
<td>Certificate Programmes and Green Deal</td>
<td>Mainly Private with Strong Policy Support</td>
</tr>
<tr>
<td>USA</td>
<td>1</td>
<td>State Utility Programmes and Green Mortgages/ PACE</td>
<td>Mainly Private with Strong Policy Support</td>
</tr>
<tr>
<td>Spain</td>
<td>&lt;0.3%</td>
<td>Direct Subsidy</td>
<td>Public/ Private Mix</td>
</tr>
</tbody>
</table>
Financial Analysis

The strengthening of the Spanish legislative framework is very important in achieving optimum results and in boosting the energy renovation to a national level. In this respect, a clear necessity is perceived to create financing mechanisms, obligation regimens, and incentive programs to stimulate the flow of capital from private and public funds within the sector. In order to finance energy savings, strategic use of grants is fundamental to put into action the adequate level of activity as well as the provision of financial resources at a low-cost and long-term.

There are various key factors that influence the financial matrix and that have a strong impact upon the amount and forms of state participation within the renovation sector:

1. **Cost of Finance for Long-term Energy Savings**: The character of the renovation sector is determined by whether consumers can fund deep renovations over the long-term at low cost (e.g., 5% for 20 years) as opposed to only having access to short-term finance at unsecured lending rates (e.g., 9% for 5 years);

2. **Energy Prices**: The future evolution of Spanish energy prices, especially those (like gas) which have the most significant impact on the cost of home heating, is a critical determinant of the returns for deep renovation measures;

3. **CO2 Value**: The ability for the household (or funder) to financially perceive the value of the CO2 emissions savings commensurate with deep renovation actions can materially impact renovation rates, especially as prices rise over the 2020-2050 horizon;

4. **Technology Curve for Renovation**: It is likely that as sector momentum builds, firms that are serving this new market will find economies of scale, process efficiencies and labour savings as they renovate hundreds of thousands of Spanish homes per year as opposed to a few buildings;

The impact of low-cost, long-term financing for energy savings is fundamental and easy to illustrate: a deep renovation of an average Spanish home (€6 Mix for 81m² living space) saves 83% of the energy demand, or about €684 annually on the domestic energy bill. Financing gained at 9% for 5 years allows a capital available from future energy savings, for up-front investment of only 2,660 Euros. The same energy saving, with 20 years financing and an interest rate of 5%, would suppose an initial investment capacity of approximately €8,530. In a world where the cost of deep renovation for the average Spanish home is estimated at over Euro 14,000, there will clearly be very little deep renovation if consumer finance is only offered at 9% for 5 years.

The above illustrative calculation is highly simplistic and assumes that there is no increase in future energy prices, no value to the householder for saving CO2 emissions and no cost reductions over time or economies of scale for the renovation sector. However, this is not necessarily true. In order to illustrate the impact of the variables in quantity (€) and time (years) of state contribution on energy renovations (with respect to the scenarios presented within the WWF study *Potential Energy Savings & CO2 Emissions Reduction of Spain’s Residential building Stock by 2020*), an adequate model has been developed to offer an sensitivity analysis and which results are summarized in the following table:
<table>
<thead>
<tr>
<th>Energy Scenario</th>
<th>Renovation Rate by 2014</th>
<th>Aggregate Subsidy 2012 - 2020 (Euro Million)</th>
<th>Cumulative Inv. 2012-2020</th>
<th>Jobs created 2012-2020</th>
<th>Year when 50% renovated</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2 Value</td>
<td></td>
<td>High Included</td>
<td>High Excluded</td>
<td>Low Included</td>
<td>Low Excluded</td>
</tr>
<tr>
<td>Average subsidy per job created</td>
<td></td>
<td>€ 6.470</td>
<td>€ 9.684</td>
<td>€ 11.262</td>
<td>€ 14.526</td>
</tr>
<tr>
<td>Average subsidy per job created</td>
<td></td>
<td>€ 6.037</td>
<td>€ 9.373</td>
<td>€ 10.995</td>
<td>€ 14.337</td>
</tr>
<tr>
<td>Scenario 3</td>
<td></td>
<td>625.500</td>
<td>11.491</td>
<td>18.072</td>
<td>21.260</td>
</tr>
<tr>
<td>Average subsidy per job created</td>
<td></td>
<td>€ 5.895</td>
<td>€ 9.272</td>
<td>€ 10.907</td>
<td>€ 14.275</td>
</tr>
<tr>
<td>Scenario 4</td>
<td></td>
<td>1,250.000</td>
<td>22.446</td>
<td>35.543</td>
<td>41.877</td>
</tr>
<tr>
<td>Average subsidy per job created</td>
<td></td>
<td>€ 5.822</td>
<td>€ 9.219</td>
<td>€ 10.862</td>
<td>€ 14.244</td>
</tr>
<tr>
<td>New Scenario</td>
<td></td>
<td>400.000</td>
<td>7.535</td>
<td>11.763</td>
<td>13.816</td>
</tr>
<tr>
<td>as % of Total EE Investment</td>
<td></td>
<td>16%</td>
<td>25%</td>
<td>30%</td>
<td>39%</td>
</tr>
<tr>
<td>Average subsidy per job created</td>
<td></td>
<td>€5.976</td>
<td>€9.329</td>
<td>€10.957</td>
<td>€14.311</td>
</tr>
</tbody>
</table>

The sensitivity analysis presented takes into account the four renovation rate scenarios developed by WWF in the previous study and evaluates the total quantity of public grants, direct and indirect, necessary for financing the energy rehabilitations under the context of two scenarios of future energy prices (high and low), a scenario with an added value to the reduction of CO2 emissions (equivalent to the evolution of the European carbon price) and a scenario with a zero value towards the savings of CO2. Apart from the calculation of the total public grants, the average grant per job generated is estimated for each scenario (from 5,800€ to 14,500 Euros annually), while there are provided figures of accumulated investments and an overall average of generated employment. Finally, in addition to the four mentioned scenarios, the analysis includes a new scenario where half the Spanish building stock can be renovated by 2050.

The conclusions of the analysis can be summarized as follows:

1. **Higher Future Energy Prices Cut the Public Cost of Spain’s Household Renovation by nearly 50%**: In all scenarios, the amount of public funds required to kick-start the deep renovation sector is halved if future energy prices follow the BCG/IDAE a “high case” as opposed to a “low case”;

2. **Deep Renovation Rates must be greater than 312,500 per annum in 2014 to ensure Spain meets 2050 targets**: For Spain to reach 2050 emissions reductions targets commensurate with European objectives in its homes it must deep renovate over 50% of its most energy intensive homes by 2050: In this case a renovation rate greater than that of WWF’s scenario 2, at 312,500, is required;

3. **Obligation Certificate Schemes which allow householders to Value CO2 Emissions Savings lower Public Funding Costs by 30-50%**: 

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Public finance requirements are clearly lower for deep renovations if utilities are obliged to invest in household energy efficiency through obligation schemes. If these obligation schemes were to give value to householders for the CO2 emissions savings created through deep renovations then public funding requirements would decrease by 50% in the high energy price scenario and by 30% in the low energy price scenario;

Within this new scenario, WWF considers that Spain is able to achieve around 400,000 deep energy renovations a year by 2014 (with high energy prices attributing an economic value to CO2 savings), and able to create a sustainable renovation sector with an optimum public investment whose evolution can be as follows:

1. **Direct Public Subsidy is only required until 2021**: Due to the “technology curve” assumption that the real cost of deep renovation will decrease by 1% per annum, and increasing energy and CO2 prices, the up-front investment cost of deep renovation can be fully recovered through 20 years of energy savings (with 5% cost of funds)

2. **The New Renovation Sector will support 140-150 thousand direct jobs for many decades**: Assuming the creation of 18 direct jobs for every million Euros invested in deep renovation, and a 50% additional non-energy efficiency related “cosmetic” upgrade to homes undergoing deep renovation, the New Renovation Sector in Spain can create and sustain around 140-150 thousand jobs until at least 2044;

3. **The Public Investment Subsidy per Job Created can be as low as 6,000 Euros per annum**: Under “high case” energy prices and with a utility obligation scheme, the public subsidy per sustainable job created is below 6,000 Euros per annum. It is highly likely that the fiscal benefits (of workers taxes and other macroeconomic impacts) of these new jobs will compensate the public investment expenditures, such as in Germany, without mentioning the positive impact on the net energy balance of Spain.

4. **The Term Profile of Subsidized Low Cost, Long-term Energy Efficiency Loans is Very Attractive**: The public finance impacts of the interest rate subsidy for the provision of low cost (5%) 20 year deep
It is interesting to note that under this new scenario, the aggregate investment required to deep renovate 3.3 million homes (267 million m²) by 2020 is close to 46.7 billion Euros and requires a minimum public sector support of Euro 7.5 billion (16% of total investment), CO2 Value of 3.7 billion Euro (or 8%, potentially through an obligation scheme) and a favourable energy price evolution. This is 3x the public support levels included in the NEAAP and the total investment required is nearly double to deep renovate only 46% of the surface area (m²) projected in the plan, although once the sector has momentum (2020-2030) subsidies reduce to 12% of total investment (through soft loans). Deep renovation rates and renovation programmes which do not seek reductions of the order of 75-80% of energy savings are unlikely to be sufficient to substantially to diminish CO2 emissions from Spanish homes by 2050.
WWF’s Petitions

Government’s role is central in bridging the policy and funding gaps through the structuring and catalysing of financing solutions which involve banks, energy suppliers, ESCOs and other distribution agents to efficiently connect low cost, long-term financing with the specific deal economics (energy and emissions savings) and co-benefits for the renovation customer.

In the European and national environment, the current standard framework is insufficient for stimulating the deep reforms and creating a new investment sector at a pace sufficient for achieving the 2020 and 2050 objectives.

Within the European environment, the proposal of the new Energy Efficiency Directive (EED) includes the following key requirements:

1. The energy efficiency objectives should be mandatory for Member States and established according to an action plan with adequate sources of financing in order to achieve the European objectives for 2020 and 2050.
2. The leadership of the public sector should renovate at least 3% of the surfaces of public buildings, as much within the central government as within autonomous communities and councils every year beginning 2014. They also should acquire exclusively products, services, and buildings of high performance energy.
3. The legal obligation to establish savings plans so that all energy distributors, or companies that sell energy to minor groups, that operate within the territory of each State Member reaches annual energy savings equal to 1.5% of energy sales.
4. Improvement of transparency for energy consumers and facilitated access to potential savings.
5. Create more incentives for the energy efficiency of Small & Medium Enterprises (SMES)
6. Achieve greater efficiency in the generation of electricity

In addition, WWF believes that the EED needs to be strengthened (24) through the introduction of a binding 20% energy savings commitment for Member States, deep renovation targets for all buildings, mandatory Energy Efficiency Obligation Schemes to finance deep renovations and the introduction of National Technical and Financial Facilities.

To meet Europe’s 2020 targets, the amount of additional financing required from all sources, public and private, for energy efficiency retrofits in buildings is around 50 billion Euros annually. In achieving this financing objective, WWF asks that the policies of the sector energy renovation sector for buildings be focused upon three priority areas:

The removal of regulatory and non-economic hurdles (3);

The improvement of renovation economics and alignment of the economic interests of the five principle non-Governmental financial actors: Building Owners, Building Occupiers, Banks, Renovation Contractors and Energy Suppliers in delivering target levels of retrofit activity;

The inclusion, and adequate capitalisation, of financing facilities (potentially structured similarly to those of KfW) which offer long-term, low cost funding and can lever public funding.

Therefore, within the Spanish context WWF asks for:

- **Removal of Regulatory and Non-Economic Hurdles:**
Facilitate Renovation Decision Making in Multi-unit Dwellings: Adapt the Horizontal Property law specifically to make it easier for property-owner communities (comunidades de propietarios) to undertake energy efficiency renovations to their entire buildings;

Provide Clear and Unambiguous information to Consumers regarding the benefits of deep energy efficiency renovations;

Accredit quality guarantee standards: Assure that the energy efficiency reforms are under the control of accredited providers that follow the high quality standards (with important guarantees) through standardized contracts and procedures and procedures de-risks the investment in the resulting energy savings

Significantly Increase Customer Demand: Retail distribution networks can be more “reactive” than “proactive” and hence the success of Government led education programmes, mandatory buildings energy performance certification, awareness campaigns and customer fiscal incentives should be oriented at considerably increase client demand and widening the market

Raise the Profile of the Non-Financial co-Benefits of Deep Energy Efficiency Renovations: There are non-financial yet material co-benefits delivered through the execution of a deep energy efficiency retrofit including enhanced health and comfort, better acoustics, increased working productivity and improved standards of living.

Improvement of Renovation Economics and Alignment of Economic Interests of Counterparties:

Value CO2 Emissions: The addition of value streams for the householder for the CO2 emissions reduced (through a utility obligation scheme or white certificate programme); 10

Fiscal Measures: Tax deductions for deep renovation investments or a property tax (IBI) which reflects the Energy Certificate rating of the home (higher for lower energy certified homes) would improve the economics of deep renovation;

CO2 Tax or Energy Efficiency Levy: The introduction of a new CO2 tax or energy efficiency levy would both provide the public funding required to stimulate the renovation sector and improve the economics of deep renovation;

Full Energy Cost Pass-through to Consumers: The removal of distorting energy price subsidies which keep household energy prices artificially low would improve the economics of deep renovation;

Long-term, Low Cost Funding Streams:

Public Co-financing or Risk Sharing in the Transaction: Government programs can part or fully finance energy efficiency retrofit transactions (such as the ICO lines for energy efficiency)

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10An energy certificate (white certificate) represents a certain amount of energy savings that has been achieved during a determined period. The countries where they are operative have established energy savings objectives for energy distributors and generators. The white certificates are emitted as a way to counteract investments or projects that result in energy savings according to the trending scenario.
investment), subsidized interest rates and placement fees to bank or utility distribution networks for renovation sale and transaction processing services;

- **On-bill Finance**: Including energy efficiency retrofit repayments in energy bills (as in the UK’s Green Deal) or in property taxes (eg. USA PACE programme) and attaching them to the property itself (as opposed to its occupant) raises the seniority of renovation payments, increasing their bank-ability by reducing their repayment risk. This will increase the low cost funding channels available to home-owners and improve their financial characteristics;

The key to access sufficient financing energy efficiency renovation at a national level is to be able to provide households with access to low cost funding for forecast energy and emissions savings. Spain's renovation sector can increase to a total annual investment capacity of 0.5-0.8% of GDP (6), generating sustainable employment and productive benefits for home-owners constituting a fundamental tool in the fight against climate change.
Conclusion

In November of 2011, The Economist (20) reported that the word could save approximately 2.9 billion dollars (2.2 billion Euros) (13) extracting and using their resources in a more productive manner.

Around 70% of these savings originate from 15 categories, from the reduction of food waste to the improvement of the energy efficiency of buildings. It is clear that in this crisis no country, business, nor home can be allowed to ignore the important benefits that come from the improvement in energy efficiency nor waste energy through inappropriate or inefficient use.

The path towards a sustainable economy passes is by way of a reduction in home energy consumption. In this way reductions in CO2 emissions are guaranteed and Spain’s energy security and independence facing unsure future energy prices.

Twenty-six percent of Spain’s final energy is consumed within third sector buildings and within dwellings and 17% in 25 million dwellings. Just as happens within other European countries, energy is wasted and utilized inefficiently within Spanish dwellings and buildings. In the majority of cases, the intervention is profitable. The fact that this situation exists is an accident of history (low energy prices, limited buildings construction standards, technology improvements and so on) but now it has become unsustainable as many factors converge and make this opportunity attractive to invest in at a national and individual household level.

This document proportions a financial analysis, developed with Climate Strategy & Partners, from the deep investigation carried out by WWF in 2010 in order to study the opportunity that exists for energy efficiency within Spanish dwellings. The conclusion has been made that Spain could achieve the deep renovation of approximately 400,000 homes annually until the year 2050. In this manner the property-owners, tenants, national economy, and the emission reduction targets will be benefited. These actions would also assist in the completion of the European objectives for energy efficiency for 2020 and to get on track for the year 2050.

Following the deep energy renovation planned by WWF, 3.3 million Spanish dwellings could be renovated before 2020, which would create up to 150,000 sustainable local jobs for the long-term, in a sector as depressed as construction. It would also generate a reduction of CO2 emissions of more than 8 million tons by 2020. The total necessary investment for these reforms is 46.7 billion Euros, of which 77% would be returned directly after 20 years of energy savings, 8% from the value of the savings in CO2, and the remaining 15% from grants (direct, fiscal, and interest rates). Furthermore, beyond 2020 the need for direct subsidies is eliminated as a result of savings generated by the scale economies inside the new energy renovation sector.

There are many countries facing similar challenges (eg. Germany, the UK and USA) and they have adopted a series of recent measures to resolve the key financial barriers to the greater penetration of energy efficiency renovation in their buildings. Spain has a useful base of existing programmes at a national and regional level from which it can build a comprehensive new framework using best practice and international experience. To deliver the benefits outlined here and build the momentum required to create a self-sufficient renovation sector, Spain needs to implement a series of policy measures which cross a number of areas and provide consistent support for the deep renovation of its homes.

At the time when Europe is trying to construct an economy with resources used more efficiently, energy efficiency should be a central concert for all Member States.
The year 2012 is critical as there has been the approval for a new energy efficiency directive. This directive could fill the gap between the energy efficiency objectives Europe has for 2020 and the current situation.

The benefits of energy efficiency and deep renovation are felt at every level of society and are a form of national savings and insulation against future energy price volatility and external shocks. Spain, where 80% of the primary energy is imported, cannot be permitted the luxury of not participating within the activities and strategic energy efficiency policies immediately.
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