More than 30 years ago, the first petrol crisis highlighted European energy dependency but it was the second petroleum shock, early in the 1980s that caused European citizens to review their principles and habits regarding energy. In fact, more than 40% of our energy consumption can be attributed to buildings in which heating, hot water, lighting and air conditioning are the main users of energy. It was during that period that buildings which respect the environment made their appearance but economy was the primary preoccupation.

Even so, certain scientists drew attention to a very disturbing phenomenon - the impact of our consumption of fossil fuels on the environment and the resultant climatic warming. Since then, few have given sufficient importance to this alarmist message and it is only recently that climatic events have imposed the evidence that we and our descendants will be obliged to reduce our influence on the environment of ‘planet earth’ or suffer even more major crises - a drastic reduction in resources, regional conflicts, substantial migration, etc.

Without doubt, it will once again be our wallet that has to react - in fact, the Stern Report recently outlined the future cost of non-action in environmental terms, amounting to a reduction of 5% to 20% of GDP on a global scale.

Environmental impacts do not recognise frontiers and counter measures - that are already known - must be carried out on a global scale to be effective. Practical steps must be implemented at local level and be adapted to suit each region of the world on the basis of a fundamental principle - that of sustainable development.

It is in that sense that FEDARENE has been active at European level for several years, supporting and encouraging the action of the regions with their local measures. The transport and building sectors, renewable energy technologies and the rational use of energy are just some of the domains of action addressed by FEDARENE’s regional energy and environment agencies.

Staying ahead of European policies in this matter, FEDARENE follows its own avant-garde procedures stimulating, on one hand, the various European bodies and, on the other, the regional authorities within the member states with the aim of enabling the regions of Europe to deliver an environment in good condition to future generations.

Jean-Louis Joseph
Fedarene President

The aim of the Ecobuilding concept is to provide comfortable life standards in buildings without heating. Suitable and environmentally friendly technologies can be used to provide low-consumption buildings.

Many projects show that the passive house construction standard can be achieved all over Europe. Fast and O.Ö. Energiesparverband, both Fedarene members, are leading such ecobuilding projects.

Bill Dunster, the architect who designed the famous "Bedzed" project, one of the first eco-communities, talks about his experience.

An example of eco-refurbishment in Ranica in the province of Bergamo

The building we are talking about is 30 years old and was completely refurbished during the period 2005-2007, with great care and attention to energy performance.

After refurbishment, its energy consumption had been reduced from 212kWh/m2a to 11.6kWh/m2a. Particular attention was paid to acoustic comfort, internal air quality and lighting. A major target was to improve the use of renewable energy sources, especially solar energy and biomass.

Very few volumetric changes were made and the building was kept to the same overall size. The basement, in traditional masonry, was retained in order to maintain continuity. The building envelope was insulated with very thick layers (about 20cm) of insulating material in vertical walls and about 25cm in the roof and on the terraces. The windows have very high energy performance - they are built with PVC frames and are triple glazed with argon gas in the cavities. All thermal bridges have been eliminated.

Horizontal shading device for windows are installed to optimise solar gain from glazing surfaces - in summer they reduce cooling needs, while in winter they allow radiation to penetrate the building to reduce heating load.

Internal air quality is provided by a mechanical ventilation system which has a heat-exchanger that is 95% efficient.

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Low energy and passive home building in Upper Austria

With the European Buildings Directive - aimed at increasing the energy efficiency of buildings - the general framework for the calculation of energy performance indicators for the minimum requirements of buildings and the preparation of energy performance certificates, have also been defined.

In Upper Austria, the construction of energy efficient buildings has been supported since 1993 through a soft loan programme which combines a financial incentive with targeted information. More than 95% of all new house building is supported by this programme. The most significant programme elements are, the calculation of an energy performance indicator, participation in an obligatory individual energy advice session by homeowners and an energy performance certificate for every new building, which has been obligatory since 1999. If the requirements ("NutzheizEnergiekennzahl") are satisfied, the home owner receives an additional soft loan.

When this programme was started, the maximum permissible value for the energy performance indicator of a building was 75kWh/m²a, which was continually lowered during the following years. In 1999 a new category was introduced - the Upper Austrian low energy building - followed in 2001 by the Upper Austrian passive home. Passive home buildings are extremely low energy structures that can provide a comfortable indoor climate without a conventional heating system. The Upper Austrian passive home buildings have an energy performance indicator of a maximum of 10kWh/m²a, which means only around one fifth of the heat demand of conventional new buildings.

In 2005 new criteria were introduced. Private new buildings with an energy performance of more than 60kWh/m²a do not get subsidies and, since the 1st January 2007, the maximum value has been defined as 50kWh/m²a.

In 2006, around 3,800 energy advice sessions for new homes and 4,700 of renovated homes were carried out by the O.Ö. Energiesparverband. The average energy performance indicator of around 63kWh/m²a, achieved so far in new building construction (all buildings since 1993), is remarkable. In 2006, the indicator was an average of 49kWh/m²a.

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As an architect, what is your definition of "Eco-building"?

We have evolved our own ZEDstandards check-list over the years, which tries to consider how building and masterplanning can also affect the environmental impact of food and travel. We are still using today the ZEDwheel diagram that we used to design BedZED ten years ago. All of our projects have the potential to become zero carbon through a planned upgrade process.

How did you become involved with Eco-building?

I first designed a self build solar house kit in my second year at university in 1979. At the time surface decoration and post modernism were highly fashionable with Charles Jenks, Robert Venturi and Charles Moore feted as rising stars. I intuitively felt the problems of the early 70’s [Club of Rome, Limits to Growth, Oil Crisis, Overpopulation] had been postponed without anyone really finding solutions. I remain convinced today that little progress has been made on any of these agendas.

What motivated your commitment to Eco-Building?

Another decade of laissez-faire in the UK, with market deregulation by Margaret Thatcher and funded by North Sea Oil revenue made it harder to find clients wishing to pursue an low environmental impact agenda, but also fuelled an extra determination to find workable Powerdown solutions for a very overcrowded country - ready for when the oil and gasfields ran dry. Which they almost have today.

How do you implement this concept in your projects, what kind of specific technologies do you introduce?

We think it is very important to design for building integrated microgeneration technologies using renewable energy systems. In the UK only 15% of current electric demand could ever come from offshore wind. This means there will always be a chronic shortage of renewable generating opportunity - with the limited stock of green grid national renewable energy reserves being required to run communal services and power inefficient existing buildings. It is critically important that all new buildings reduce their energy demand to a level that can be met by on site renewables, limiting their consumption of national reserves to 250 dry kg of biomass at under 50 homes/ha, and 500 dry kg of biomass above this density. This is the maximum biomass reserve available without losing land already allocated to food production. We know this is possible, because we have now succeeded at meeting this target on our own home.

We are careful with technologies, believing a energy efficient passive load reduction strategy with future proofing to add active technologies is more important than fitting gadgets. We try to save electricity above all, as it is the hardest renewable to generate. We avoid heat pumps as these double the electric consumption, making carbon neutrality within a sites’ boundaries impossible for most urban densities. We have our own passive wind driven ventilation cowlis with heat recovery [and no electrical fans], we have two part stainless steel wall ties for super insulated cavity walls with thermally massive interiors, triple glazed low E windows, and spray taps and shower heads. We then configure the buildings to maximise daylight, wind driven ventilation, micro wind turbines, passive solar gain, summer cooling, solar electric generation and solar thermal collectors matched with automated biomass boilers. This strategy is the most cost effective way of achieving carbon neutrality under 50 homes/ha. Above this density we use biomass fuelled combined heat and power plants - often with trigeneration absorption cooling for hotter summers in city centres.

Is Eco-building compatible with comfort?

Yes - I am convinced we can achieve a step change reduction in carbon footprint, whilst achieving a higher overall quality of life. Thermal comfort is only one part of this life quality. It is much more comfortable to eat locally produced organic food, no longer suffer from respiratory diseases like asthma, swap overcrowded public transport for live / work convenience, enjoy sunlight in your living room banishing winter SAD syndrome. However the world as we know it may end as the Far East discovers air conditioning. 70% of the electric load for Shanghai is heat pumps and air conditioning. Coal fired power stations are built to keep the cities cool. The more air conditioning is fitted, the more hot air is dumped into the streets, and the more air conditioning units are needed to keep comfortable conditions inside buildings. We believe that China is one of the front lines on climate change, and that developing solar powered cooling strategies is one of our priority projects.

What major barriers do you meet in your work?

The biggest barriers at the moment are large landowners, whether private or public in the UK. They wrongly see adding improved energy efficiency and energy generating systems as potentially increasing construction costs. This increased cost then comes straight off their landbank value. Their normal response is to lobby the government to dump renewables and adopt nuclear as quickly as possible, and drop urban renewable energy targets.

Why is the uptake of eco-construction/eco-building so low at present? Is it due to lack of knowledge of the potential of innovative eco-building technologies or due to additional costs?

The main reason is costs. It is the old circle of blame. Zero carbon specs cost more because each project is effectively a prototype. If more buildings were to this high specification standard, costs would fall dramatically. It only costs more because nobody does it.

In your opinion, what must be done to open up the eco-building market?

For each European nation to guarantee a minimum target of 2500 ZED / passiv haus homes / workplaces / year. This would deliver economics of scale very fast, removing the extra cost barrier quickly. It would also be helpful to admit that reserves at sensible extraction densities will run out within fifteen years of an international nuclear revival, meaning that the embodied CO2 of a nuclear station may never be paid off, and that none of the international fast breeder reactors have managed to actually breed. This would focus each member state to focus on how a mixture of advanced energy efficiency and renewable energy targets could deliver security of energy supply.

"BedZed" is perhaps your most famous project, what impact do you think it has had across Europe?

I would like to think it showed how 'passiv haus' energy principles to create a higher density mixed use urban product more suitable to higher density applications. In the UK it shows how we could fit all the new 3.6 million new homes and workspaces required by 2016 without losing any agricultural land and building on brownfield land - whilst still providing everyone with winter gardens and gardens. The environmental logic was used to inform the construction aesthetic, transcending engineering and trying to move towards a new architectural 'zeitgeist'. Most people bought homes because they looked better, gave more amenity and had higher resale values. This is how we must win the argument - offer the public a better product, at the same time as remembering to give them sufficient new critical criteria to understand the difference.

As a European network of regional agencies, what advice could you give to the Regions and particularly to energy agencies to promote eco-building construction and technologies?

Be very careful about changing advice for urban density, and local climatic variation. In London, accelerating climate change means we need to plan for both the Scandinavian winter and the Mediterranean Summer with its focus on passive cooling solutions. Do not be ruled by commercial interests pedalling inappropriate technical solutions - but work out your own building physics model that accommodates cultural and regional requirements. The timber framed lightweight commercial lobby are still winning the lions’ share of the UK market, despite almost no passive cooling potential, and a high risk of requiring electrically intensive air conditioning within only a decade or two. Try to assemble local supply chains for microgeneration components, with pre negotiated volume discounts. We halved the cost of photovoltaic and solar thermal collectors for our clients last year using this bulk buying approach. Think what would happen if this took place all over Europe?
The objective of the initiative is to promote the introduction of bicycles as an integrated means of transport in Castilla y León towns. Although the bicycle has often been used as an alternative and sustainable mean of transport in some European cities, it is a new way of getting around in Castilla y León.

The first town to implement this initiative was Burgos, followed by León, Ponferrada and Avila. Other municipalities have also shown interest in setting up a system of making bicycles available free of charge, in order to integrate an environmentally friendly means of transport in their town centres.

Besides other measures are being developed such as increasing the use of public transport, encouraging the use of bio-fuels and introducing new systems of traffic management. These actions not only have an energy and environmental impact but also represent other advantages as a technological innovative system that creates employment and improves the life quality of the population.

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**Mobilising the energy saving potential of local authorities. How to put energy efficiency services into practice.**

In the context of this project, the seminar "Mobilising the energy saving potential of local authorities. How to put energy efficiency services into practice" was organised in June with the support of and at the Committee of the Regions in Brussels. Concrete examples were presented, placing the accent on energy efficiency services to be implemented by local authorities.

Significant potential for energy savings in public buildings and public lighting could easily be achieved if appropriate policies were implemented. In addition to strong political will and the availability of resources, it is necessary to improve energy management within the local authorities and to study the possibilities for the use of energy efficiency services to work towards the saving potentials identified. An important aspect for municipalities to investigate is the development of financing schemes which do not have an impact on the public investment budget.

**PU-Benefs Objectives**

PU-Benefs is supported by the Intelligent Energy - Europe programme and aimed at the development of a suitable management framework to help public bodies - and especially local authorities - to implement energy services based on energy efficiency. It is also intended to enhance the market by providing efficient tools to meet the needs of public bodies and facilitate the work of ESCOs. The major outcome of this action would be an increased number of public bodies using energy services.

**Potential impacts of the activity**

The scheme will help to improve the market conditions for energy performance contracting and third-party investment in the participating regions/countries. By providing information and tools on a large-scale, it will have the following impacts:

- better understanding of the importance of energy management by public bodies and local authorities;
- an increase in requests for energy efficiency performance in energy services contracts;
- the implementation of appropriate financing schemes.

The final step is to activate the huge energy saving potential in public buildings which, as stated in several studies, can amount to economies of between 15 and 35%.

More information on this topic can be found on www.pubenefs.org, which also presents the results of the European PU-BENEFIS project.