Efficient buildings, the energy evolution

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Hosted by Silvia-Adriana Ţicău,
Member of the European Parliament

The houses where we live, the offices we work in, the schools, hospitals, shops and all our everyday buildings are major energy consumers and contributors to climate change. But the **evolution from energy wasters to climate savers** can turn them into the largest energy reserve in Europe. Making buildings produce and save energy – rather than only consume – is a structural change within reach. It is up to political will to make it happen.

For WWF, energy efficiency is a pillar of the climate and energy strategy for Europe. Energy efficiency, together with the use of renewable energy sources, can create hundreds of thousands of new jobs, encourage technology development, reduce the energy bill for households and contribute to energy security in Europe. On top of that, it can contribute to keeping global average temperature increases below 2 degrees Celsius.

The EU is currently revising an existing directive that aims at maximising energy performance of buildings. Buildings absorb 40% of all the energy used in Europe and cause 36% of EU's greenhouse gases. Much of that energy and CO_2 could be saved with better insulation, improved heating and cooling systems, double glazing, efficient lighting and smart meters.

WWF says that the new directive should:

- set construction standards so that, from 2015, all new buildings produce the same amount of energy they consume, or more, over a year
- improve energy performance of existing buildings
- promote fiscal and financial incentives for owners so they can face up-front investments to improve efficiency
- make sure the public sector sets the example with mandatory renovation standards and earlier compliance for construction of new buildings.

An ambitious EU directive to maximise energy savings in buildings could cut 460 million tonnes of CO_2 per year, which is equivalent to 9% of the EU's annual greenhouse gas emissions.

This leaflet was published on the occasion of a WWF exhibition at the European Parliament on energy efficient buildings. It presents innovative projects in France, Germany, Greece, the Netherlands, Romania and the United Kingdom. We are proud that one of these buildings hosts a WWF office – the WWF Netherlands' headquarters.

"In the middle of difficulty lies opportunity."
Albert Einstein

Energy conservation for a living planet

WWF Netherlands headquarters, Zeist, Netherlands
Architect: RAU, Amsterdam

> Date of construction: 1954
> Date of renovation: 2006
> Square meters: 3800
> Function: office
> CO_2 emissions: carbon neutral

The WWF Netherlands' building symbolizes what WWF stands for – a future in which people live in harmony with nature. With a visionary renovation, an old laboratory was transformed into a super-efficient and carbon neutral office.

Efficiency is maximised through high insulation standards, light reflection and triple glazing. The WWF building produces solar energy, combined heat and power based on sustainable biofuels and geothermal heat. Ambient heat, produced by people and equipment in the office, is captured and re-used. When production exceeds consumption, renewable electricity is channelled to the grid. All materials are sustainable or recycled. Bricks on the façade have nesting boxes for bats and birds.

Cool the planet with the sun

Promitheus building, Athens, Greece
Architect: Sol Energy Hellas

> Date of construction: 2006
> Square meters: 1200
> Function: offices and apartments
> CO_2 emissions: low energy building

Promitheus features highly efficient solar panels which supply heating and air conditioning, complemented by a geothermal heat pump. Both heating and cooling are provided at zero cost throughout the year.

There is a centralised automated system programmed for an optimal energy management. Other elements to improve efficiency include highly reflecting double-glazing, efficient lighting, thermal break aluminium frames and external insulation.

Efficiency on the move

Star Dome One, modular housing unit, Rucar, Romania
Architect: Florin Dobrescu, Star Dome srl

> Date of construction: 2008
> Square meters: 30/module
> Use: temporary constructions, housing, housing unit for emergency situations, mountain shelter, bungalow, conference hall, kindergarten, campus, museum, fitness room, meditation hall, temple, winter garden, tree house.
> CO_2 emissions: 12-16 times lower than existing buildings

Star Dome is a modular building. Whether used for temporary emergencies, housing, shelter or cultural activities, it guarantees low energy consumption with minimal investments.

Rational use of space is combined with new technology and materials, including highly insulated external surfaces, energy and heat recovery ventilation and maximum use of natural light. Each module has a “solar cylinder”, i.e. an area of constant solar input throughout the day as it follows the celestial equator. The building consists of modules that can be constructed and deconstructed allowing repeated use, fast repairs, and re-use of components with reduced environmental impact.

City of renewables

ruralZED, Grande Synthe, France
Architect: ruralZEDTM by ZEDfactory Ltd

> Date of construction: 2008
> Square meters: 105
> Function: prototype for eco-village
> CO_2 emissions: carbon neutral

Inspired by BedZED, an environmentally-friendly housing development nearby London, ruralZED was created as a prototype house for the construction of an eco-village in France.

The total energy supply is produced from renewable sources within the house. These include sustainable biomass, solar panels and photovoltaic panels. Natural lighting and ventilation are optimised. Heating loss is minimised thanks to high insulation. Excess electricity produced on site is sold to the grid. The house is open to visitors.

Power to the eco-house

Kingspan Lighthouse, Garston, England, UK
Architect and Engineering: Sheppard Robson, Arup, CCB Evolution Ltd

> Date of construction: 2007
> Square meters: 93
> Use: demonstration house
> CO_2 emissions: carbon neutral

Built as a demonstration project to achieve the highest rating under the UK Code for Sustainable Homes, Kingspan Lighthouse has optimum energy and water efficiency. It is insulated to lose 60% less heat than a standard new home. All energy needs are covered with renewable sources on site.

Features include maximum use of natural light, super-efficient appliances, selected room surfaces to absorb heating, heavily insulated walls and external doors, triple-glazed windows and intelligent energy meters. The hot water system is designed to avoid the need for a circulation pump.

Enlightened thinking

Artur Woll Haus, Siegen, Germany
Architect: RAU, Amsterdam

> Date of construction: 2001-2002
> Square meters: 4100
> Function: university building
> CO_2 emissions: low energy building

The Artur Woll Haus hosts the offices, laboratory, guest room and exhibition hall of the University of Siegen. All materials were chosen for their energy features. Like crystals, the three sections of the building are designed to allow maximum use of sun light and balconies are intended for solar protection.

The building has a ceiling screen for ventilation, heating, cooling, acoustic regulation, and lighting. It is highly insulated and equipped with a light sensor system. The Arthur Woll Haus uses approximately 33 kWh/m^2 per year, while a standard office would consume around 100-120 kWh/m^2 per year.

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WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- promoting the reduction of pollution and wasteful consumption