WISIONS: Fostering sustainable energy projects and spreading good-practice-examples of resource-efficiency

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Abstract

WISIONS of sustainability (www.wisions.net), an initiative of the Wuppertal Institute for Climate, Environment, Energy with the support of the Swiss-based foundation ProEvolution, has the purpose of fostering practical sustainable energy projects. The initiative's objective is to identify promising sustainable projects and to combine spreading knowledge of existing projects with promoting and furthering new project ideas. Two fields of action support realisation of new project ideas (SEPS) and spread successful examples (PREP).

One action field of WISIONS, the Promotion of Resource Efficiency Projects (PREP), primarily focuses on detecting and promoting existing replicable good practice projects in energy and resource efficiency. The most convincing examples are disseminated to different target groups, multipliers and decision-makers through a brochure and the internet. The first topic was focussed on "Resource Efficient Construction" and the according brochure gained positive recognition from stakeholders all over the world.

The other action field of WISIONS, the Sustainable Energy Project Support (SEPS), aims at supporting promising ideas in the field of renewable energy and energy efficiency, e.g. in the construction sector. SEPS seeks to overcome the existing barriers by providing financial support or support for obtaining additional funding. The projects have to be in a stage prior to implementation and will be judged according to a set of ambitious criteria and the quality of a consistent implementation strategy.

Finally, with the combination of supporting not yet realised project ideas and already implemented successful projects, WISIONS enhances opportunity of knowledge transfer from practical experience to replicable actions.

Introduction

Sustainable development is possible. Numerous innovative and valuable contributions, from different countries, fields and institutions, have shown that an appropriate reconciliation of economic, ecological and social factors is not unrealistic utopia. A promising start is made, but the greatest challenge facing humanity in the 21st century is to learn how to use the world's resources more efficiently, and in an ecologically sound and socially balanced way.

Progress is being made; however, a dozen years after the UN Conference on Environment and Development in Rio de Janeiro, many people, especially in developing countries, still lack access to resources, clean technologies and education. At the same time, people's level of resource consumption and means of production remains unsustainable.

The most important challenges of sustainable development are the maintenance of social security and justice, sustainable economic development, and the preservation and creation of an intact environment. Looking at industrial sectors, the construction sector is of particular importance. On one hand, the construction sector makes a vital contribution to the social and economic development of every country by providing housing and infrastructure; on the other hand, this sector is an important consumer of non-renewable resourc-

es, a substantial source of waste, a polluter of air and water, and an important contributor to land dereliction.

WISION of sustainability, an initiative of the Wuppertal Institute for Climate, Environment and Energy and on behalf of the Swiss-based foundation ProEvolution, has the purpose of fostering sustainable energy projects. One action field, SEPS, the Sustainable Energy Project Support, supports renewable energy and energy efficiency projects so that they can be implemented locally. The other action field PREP, the Promotion of Resource Efficiency Projects, promotes good practice in energy and resource efficiency through its publication of relevant successful projects. PREP focuses on one important topic in resource efficiency over a selected number of months and the 2004 first issue of PREP-brochures concentrates on 'Resource Efficient Construction'.

More information about WISIONS and application criteria for PREP and SEPS can be found at www.wisions.net

Sustainable Development and the Construction Sector

In many cases buildings are harmful to workers during the construction period, as well as to occupants due to unhealthy air and indoor climate. Longer-term environmental impacts also result from buildings' use and maintenance. In Germany about one-third of total primary energy is used just to maintain existing structures and keep them running. Moreover, demolition generates enormous amounts of waste to be deposed of.

A core instrument for determining the environmental impact of materials in the construction industry is the "ecological rucksack", which describes the total quantity of material that must be extracted to obtain a unit of pure (and thus usable) material. For example, for iron ore extraction the ecological rucksack can be expressed as a ratio of 14:1 – that is, 14 metric tonnes of waste in the form of tailings or mine waste are created in the production of one metric tonne of iron. In the case of rarer materials such as gold and platinum, the ratio can range up to 350 000:1.

With their knowledge of these impacts and the extent of material consumption in today's societies, senior governmental, non-governmental, industry and academic leaders argue the following: to redirect the course towards that of a sustainable economy, each country's total resource productivity should be increased by a factor of 2; and in industrialised countries it should be increased by a factor of 4 within the next decade and by a factor of 10 overall within one generation. To achieve these increases, every actor within the economy must optimise resource use from the national (macro) level, through the sectoral and regional (meso) levels and on down to the single firm and household level (micro) levels.

REHABILITATION VERSUS NEW BUILDINGS

Unlike existing buildings, new buildings show a relatively small importance of the "use phase". The rehabilitation and construction phases dominate the entire life cycle in terms of material requirements. Consequently, in order to achieve an improved MIPS (Material Input Per Service unit) value, true dematerialisation must focus on virgin resource extraction and not just intensity of use. The environmental impacts of the technologies and substitutions that lead to dematerialisation therefore need to be scrutinised carefully. Dematerialisation must also focus on a shift to reuse, recycling and remanufacturing – in short, all the important aspects of closing materials loops. Additionally, de-energisation, decarbonisation and detoxification of the industrial system should accompany dematerialisation if significant resource and environmental benefits are to be achieved. Further dematerialisation can be achieved through technological progress.

Comparing the potential of existing and new buildings, we can conclude that on the German and similar European markets the (energy related) rehabilitation of existing buildings offers a far more promising contribution to sustainable construction than construction of new ones. Furthermore, economic and social benefits as well as land savings should lead to direct efforts towards the rehabilitation of existing buildings. It goes without saying that where new construction is necessary, the utmost resource productivity and eco-efficiency must be targeted. It is important for companies and sectors to know what kind of targets and actions will lead them towards sustainability. Resource productivity is only one important path; in the broader context of sustainable development there are also numerous other economic targets (e.g. high profits, high competitiveness, low rate of investment payback), environmental targets (e.g. low toxicity, high biodiversity, low erosion) and social targets (e.g. employee satisfaction over low unemployment rate, overall stability in society) that have to be addressed.

A STAKEHOLDER-BASED APPROACH

Protection from the elements, a place to recover, relax, to live, or a place where governments are housed, buildings have many differing and essential functions in society. How these buildings are constructed also plays a critical role for society. The impact of building on natural resources, the effect on the landscape and climate change, amongst other factors, can be extreme or minimal. Before a building is even constructed, numerous varying raw materials have to be mined, worked and transported. Often unnecessary large amounts of energy to heat, cool and light a building are consumed. To demolish a building, it is also necessary to process different types and forms of construction materials, some of which may also leave toxic waste. In industrialised countries about 60 tons of non-renewable natural resources are used per person per year. Approximately one third of this is used in the construction and use of buildings. For example, in Germany 40% of national energy use is consumed for the

use of buildings. The continually growing per capita use of space is also leading to increased use of heating and cooling.

The construction sector involves a multitude of actors and stakeholders, including building material manufacturers, building and construction companies, small and medium-sized enterprises (above all those engaged in trade), unions, planners, environmental NGOs, users, governmental institutions, financial institutions and research institutes. Stakeholder-based approaches are widely seen as a promising way to use on an equal basis the expertise and experience of all those involved and affected. With a view to finding quality sustainable development solutions, such an approach is opposed to the concept of negotiation, which favours the solution proposed by the strongest rather than the best and most sustainable solution.

PREP-brochure on 'Resource Efficient Construction'

The facts mentioned above make efficient and renewable energy use a critical issue. In its 2004 first issue brochure 'Resource Efficient Construction' WISIONS focused on the significance of the construction sector. People around the world were asked to send in good practice examples. All incoming projects were independently reviewed, and the ones with the potential to have the greatest impact on global resource efficiency were published in the PREP-brochure.

The assessment of the projects included consideration of regional factors. This means, that in a developing country with rapidly increasing population, the most efficient use of resources and energy provision has to be made to satisfy quickly the urgent need for new buildings. On the other hand, a planned green-field site construction was not viewed as favourably, as there were also more appropriate available building areas, such as the inner city, or former military facilities.

The brochure is available in printed form as well as on WISIONS' homepage. PREP seeks to overcome potential barriers by promoting projects where resources, and especially renewable energies, have been used to provide an economically, socially and environmentally sound future. It is probable that a successful project in one part of the globe can lead to new ideas and improved ways of developing and implementing similar projects in other areas of the world.

In the following an overview of the selected projects, coming from Germany, Brazil, Slovenia and South Africa, is given:

RECONSTRUCTION OF THE OLD BUILDING COMPLEX "BREMER HÖHE" AND PROVISION OF MODERN CENTRAL ENERGY STATIONS

Bremer Höhe is the name of three building complexes, completed in 1913 and located in Prenzlauer Berg, Berlin. In the beginning of the year 2000, the residents of the 455 residential units and 12 business units founded a cooperative that reconstructed the building blocks in own responsibility. Not only is the involvement of tenants exemplary but also the energy supply of the buildings. In a nation-wide invitation to tender, the Berliner Energieagentur was awarded the contract for the energy supply of "Bremer Höhe". The Berliner Energieagentur supplies the 455 residential units and 12 business units on a total floor area of 32 400 m², divided into three phases of construction, with heat and power. Three roof heating stations with boiler systems and Combined Heat and Power (CHP) modules provide heat and power. They are installed directly above the flats (bedrooms) and comply with the most exacting sound insulation standards.

THE FLYING CIRCUS –LOW-COST BUT HIGH-TECH BIO-CLIMATIC ARCHITECTURE IN THE TROPICS

The Flying Circus - Circo Voador - is a famous stage in Rio de Janeiro, Brazil. The main pavilion can hold up to 1 400 people and is equipped with professional stage lighting systems, both of which cause a high thermal load. High external

temperatures and a semiopen pavilion created a very challenging situation for any air conditioning system. Comfortable temperatures for the audience under varying conditions had to be achieved: from classical concerts to rock concerts, from the high temperatures and high relative humidity of tropical summer nights to relatively low temperatures in winter nights. The solution was a combination of an architecturally well-designed building for public use (project by DDG Arquitetura) and an intelligent low cost air conditioning system, based on a bio-climatic approach.

REDUCING ENERGY DEMAND IN PUBLIC BUILDINGS BY IMPLEMENTING ENERGY PERFORMANCE CONTRACTING

Like in many other economies in transition, Slovenia has a considerable energy saving potential but lacks the money for investment and also skilled people. In 1999 the project "Support for the Promotion of Third Party Financing of En-

ergy Efficiency Investments in Slovenia" within the TRANSFORM programme supported by the German Reconstruction Loan Cooperation was launched. The project was coordinated by the Slovenian Agency for Efficient Use of Energy (AURE) and the Berliner Energieagentur. The project included the identification of possible pilot projects in municipalities, the realisation of a pilot project in the municipality of Kranj and the qualification of local competence centres. Within the project a model contract for performance contracting under Slovenian framework conditions was developed. A project for performance contracting was realised with a building pool in the municipality of Kranj. A tendering process was carried out and the Steirische Fernwärme GmbH (District Heating Company) in cooperation with its Slovenian partner EL-TEC MULEJ was awarded the assignment to carry out the project.

RETROFITTING OF LOW-COST URBAN HOUSING – MANY BENEFITS FOR LOCAL POPULATION

Kuyasa is a low-income housing settlement in Khayelitsha, which is a township located in the southeastern side of the City of Cape Town. This township settlement consists of 30 sqm housing units which have been state subsidised by the governmental Reconstruction and Development Programme (RDP). The Kuyasa project is a retrofit project, to improve energy efficiency as well as to use renewable energy in existing RDP houses. The project is initiated by a partnership of the City of Cape Town and SouthSouthNorth, a non-profit developmental organisation. The project is designed as a Clean Development Mechanism (CDM) activity

and aims to be certified with the high quality Gold Standard that guarantees benefits for local population together with to emission reductions. The demonstration phase of the project has been finished with ten successfully retrofitted houses.