**Project overview**

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The overall environmental impact of energy used in the building sector is considerable. Buildings are responsible for 40% of energy consumption and 36% of EU CO2 emissions. Energy performance of buildings is a key to achieve the EU Climate & Energy objectives, namely the reduction of a 20% of the Greenhouse gases emissions by 2020 and a 20% energy savings by 2020.

Energy consumption in buildings varies a lot in the European countries due to climate, socio-economic factors, building techniques etc. Environmental impact from energy use in buildings varies also due to carbon intensity in the energy system.

The Directive on energy performance of buildings (EPBD) is the main legislative instrument at EU level to achieve energy performance in buildings. Under this Directive, the Member States must apply minimum requirements as regards the energy performance of new and mayor renovation of existing buildings. According to the recast of the EPBD, as from 2021 all new construction should be nearly zero energy buildings. But there are also a number of other directives and legislative instruments that apply for the building sector, which also is a driver for more energy efficient solutions, e.g. the Eco-design Directive.

Thus the implementation of the directive will be a tremendous challenge for the society and the construction industry in all member countries. In colder climate cost efficient techniques for more airtight building envelopes must be developed and become mainstream. The same applies for installations and appliances for heat recovery, integration of renewable energy sources etc. For buildings in warmer climate minimized need for cooling is most important, including effective shading and cooling technologies that can cut the electricity peek.

There is a tremendous gap between the average energy use in current new buildings standard and regulations for buildings and what is needed to be met when the EPBD-directive that will be implemented in a near future. Examples of very low energy buildings on a larger scale needs to show the way and the Buildsmart-project have this possibility to act as an important showcases and show the authorities and the construction companies that new standards for energy efficiency and integration of renewable energy sources in the built environment can be realized in a near future in three quite different climatic zones in Europe, Sweden, Ireland and Spain.

The Objective of the Builtsmart-project is to demonstrate and mainstream cost effective techniques and methods for constructing very low energy buildings in various climates: north, central and south. A large scale deployment of the used method should be possible to practice 2020 in order to facilitate the implementation of the recast of the EPBD.

A number of very low energy residential and non residential buildings in Sweden, Ireland and Spain will be demonstrated, hence representing different climate situations, different cultural aspects and different technologies. Therefore represents good example for similar areas in EU for the actual climatic zones and facilitate deployment and exploitation with increased added value for this project.

A systematic approach is taken in the measures to reduce energy use and environmental impact from the demonstrated buildings. Techniques for creating airtight building envelops will be combined with installation of different kinds of energy efficient installations. The systematic approach is applied on the building scale as well on the relationship between the building and the surrounding infrastructures.

The interaction between the building and its inhabitants is crucial for the total energy use of the life span of the building. New forms of incentives will be developed and implemented in the Buildsmart-project to secure that inhabitants will deploy energy smart habits.

Buildings demonstrated will meet energy- and environmental standards far from business as usual in the countries where they will be erected as well as other parts of the European Union. They will have energy performances in line with the new norms applied in the recasted EPBD year 2021. They will therefore act as important showcases and with considerable replication potential in the measures undertaken and the techniques used.

Monitoring and result evaluation is necessary in order to give inhabitants, developers and building companies etc feedback. It is also important when the outcomes of the project will be disseminated and techniques and ways of working will be replicated.

The structural monitoring and performance evaluation in all the included buildings makes it possible to compare the effect of different energy saving techniques on different locations. Similar energy saving actions implemented in different countries will be compared from an environmental and financial perspective. A monitoring and evaluation strategy will be implemented in order to secure accurate and relevant measurements and monitoring throughout the project.

The evaluation will create important knowledge on the feasibility of different kinds of actions in European countries with different conditions. The monitoring within the project will be coordinated with the monitoring between similar projects initiated by the European commission.

New built very low energy buildings from three different countries will be demonstrated in Buildsmart-project. The included Buildings are:

A hotel and a residential building in the concert, congress and hotel area in the city center of Malmö

A number of residential and non- residential buildings in The Hyllie area, Malmö

A number of residential and non- residential in Dominick Street Lower Development, Dublin

A residential building in Portugalete, Country of Basque

The total gross floor space of the buildings demonstrated in the Buildsmart will be 81 300m2, divided in to 31 500 m2 residential and 49 800 m2 non residential buildings.

The included buildings are characterized by:

A total very low energy consumption.

Dense envelopes in order to create a high air tightness and low energy losses

Energy efficient installations creating a minimized energy use

Heat recovery systems

A high degree of the energy used is produced either by renewable energy sources placed on the building or in the vicinity.

Close connections to surrounding infrastructures as energy systems optimizing energy use and reducing peak loads

Waste management system created for maximum recycling and energy recovery.

Existing and tested technology will be used in new combinations to be able to show cost effectiveness and highly replication potential.

A number of different techniques will demonstrated to create very low energy buildings. The participating developers are commercial actors with demands on return on investments. Proposed actions are chosen carefully out of a financial perspective. The different energy saving techniques are chosen with the intent that they will be economically competitive. Some buildings will use emerging technologies with high initial costs but when combined with more cost effective ones, giving a relative short pay off time on the investment.

All actions implemented need also to be analyzed out of a system perspective, where the whole energy system is included, thus calculation the primary energy need for different technology choices as well as its life cycle costs. Actions in the different buildings are also made based out of the local conditions, especially for the differences in climatic conditions. But the systematic approach in monitoring and evaluation will create a sound scientific and comparative analysis of energy saving actions and it´s cost effectiveness for different kind of building types. Actions implemented will, as a part of the project, be evaluated and compared.

Building Information Modeling (BIM) will be used as a design tool for generating and managing data during life cycles of participating buildings. It will be used to increase productivity in building design and construction. BIM will be, in one way or another, used in the design and construction processes of all the participating buildings. The more complex building process the bigger need for 3D modeling and other design tools. The degree of which BIM will be used in the design of the different buildings will therefore vary.

The consortium behind the project consists of:

Local and regional authorities,

leading research institutes,

a number of construction companies, some of them working on an international arena

The participating authorities have a crucial role to play in the future development of the building industry within their boundaries. A development towards a more energy efficient building stock could be promoted trough a number of instruments by the local and regional authorities. The demonstrated buildings have a potential to set standard and become mainstream in the areas where they are erected.

A number of the partners in the consortium are active on a European and an international scale. That comes for the research institutes, construction companies and the international consultant group. The methods and the results from the project have therefore a potential to be replicated on a big scale trough the participating actors.

There will be a strong focus on dissemination and market exploitation in the project. The **Buildsmart project** aims at facilitating the exploitation and deployment of the energy efficient technologies and methods demonstrated already during the project. They should be considered as preferred choices in other building projects, in various countries, within and beyond the project.

**Dissemination strategies, deliverables, instruments and tools for the promotion and the transfer of results will be developed at national and European level within the project. Dissemination of the project’s findings and promotion of the results will be made at national and European level. Exchange of information, knowledge and experience with other institutions and multipliers that are not part of the project in other European regions will be established to enable other players in different European countries to benefit from the results of this project.**