

## Eco buildings and neighbourhoods

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#### HOCHSCHULE LUZERN

Technik & Architektur

#### Content of the workshop

- NENA network as transnational co-ordinator
- Focus on eco-buildings and neighbourhoods
- Results of Alpine Space project ENERBUILD
- Perspectives on Alpine Space project CABEE





#### **NENA – non profit association**



## Focus on eco-buildings and neighbourhoods

NENA Network Enterprise Alps Hochschule Luzern – Technik & Architektur

#### Eco Buildings and Neighborhoods

- Basis: New quality standards for buildings are developing. The EU demands nearly zero energy buildings until 2020.
- Expectations:
  - => Extending the approach towards neighborhoods.
  - => Extending the approach towards nearly zero emission.
  - => Extending the approach towards definition, procurement, production, assessment and promotion of nearly zero emission buildings and neighborhoods.
  - $\Rightarrow$  Extending the approach towards open source and mass involvement
  - $\Rightarrow$  Harmonization on European level

# ENERBUILN

## Results of Alpine Space project ENERBUILD

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## **ENERBUILD - ENERgy Efficiency and Renewable Energies in the BUILDing Sector in the Alpine Space**

Promotion of energy-efficient building in the Alpine Space and dissemination of relevant knowledge, innovation, and technology

Project from the Alpine Space Program focused on "Competitiveness and Attractiveness of the Alpine Space"

Content of the project:

- / Facilitating the knowledge transfer
- / Analyzing energy saving buildings
- / Comparison of different energy standards
- ✓ Evaluation of chances for local energy production
- Support of innovative pilot projects

#### **Project Partners**

- / Regionalentwicklung Vorarlberg VLBG (Lead)
- / Techno Innovation South Tyrol TIS
- / Rhônalpénergie-Environnement RAEE
- / Regione Piemonte Direzione Programmazione strategica, Politiche territoriali ed Edilizia
- / Fachhochschule Rosenheim
- / Posoški razvojni center PRC
- / Energieagentur Obersteiermark EAO
- / Tiroler Zukunftsstiftung ZS
- / Autonomous Province of Trento, Department for energy planning and incentives
- / Province of Alessandria
- / Accademia Europea Bolzano EURAC
- / Network Enterprise Alps NENA
- Lucerne University of Applied Sciences and Arts Engineering & Architecture on behalf of ZVDK (Zentralschweizer Volkswirtschaftsdirektorenkonferenz)

#### Workpackage Education

- Assessment of training needs and the potentials for transnational know-how transfer
- / Preparation and realization of trainings for apprentices basic education
- ✓ Education modules for handcrafts and high technical school levels
- / Education modules for academics and graduated education



#### Workpackage Examination

- Comparison of existing energy efficient labels, collection of studies, experiences and literature – a comparative overview of certification systems in the Alpine Space
- / Healthy dwelling and customer information survey on existing buildings for final user
- / Research concerning killer arguments in different climate zones killer arguments and opportunities
- Examination of performance of existing building, impulses for innovation and training – scientific evidence and user behaviour on passive houses



#### Workpackage ENERBUILD Tool

- Transnational comparison of certification instruments according to ecological evaluation of public buildings
- Improvement and promotion of instruments for the construction of ecological end energy efficient buildings
- / Pilot testing of instruments and methods for evaluation of selected public buildings
- Establishment of an advisory service for certification of ecological public buildings



#### Workpackage E-Producing

- Assessing regional needs and potentials for transnational cooperation for ESAP buildings
- Analysis of the energy producing potential of buildings (e.g. scanning of rooftops, mini scaled heating solutions)
- ✓ Develop and establish monitoring systems to stabilise the efficiency of small energy production plants
- Developing financing instruments for energy producing components on buildings, e.g sun loan



#### Workpackage Innovation

- Creation of an online directory of SMEs, institutions and other important players in the field of energy
- ✓ Stimulating innovation by environmentally friendly technology transfer through innovation workshops, installation of regional innovation labs, etc.
- / Pilot initiatives, pilot engineering for innovative solutions for ESAP buildings



#### **Methods Examination**

#### First level: survey and energy analysis

Analysis of 33 residential buildings with energy label by means of questionnaires for inhabitants (2 buildings in CH)

- / Identification of building construction and technological plant features by means of project plans
- ✓ Documentation of planned and actual energy consumption from the energy calculations and energy bills
- ✓ Specific heating demand was calculated with the Passive House Planning Package (PHPP) to compare the buildings with different energy labels
- ✓ Questionnaires for inhabitants helped to collect data about the general satisfaction of the inhabitant and the use of the building (user behavior)



#### **Methods Examination**

#### Second level: instrumental monitoring

Analysis of 18 buildings by means of long-term monitoring regarding the thermal comfort and energy consumption to evaluate the influence of the user behavior to the energy consumption (1 building in CH)

- / Developing two different monitoring layouts ("Simple" and "Detailed")
- Individually decision how many zones per building were measured according to the dimensions and subdivision of each apartment



#### **Results Examination**

Calculated and measured thermal energy of examined buildings in Austria, Germany and Switzerland

#### → In most buildings, the measured thermal energy was higher than the calculated one, mostly because of the user behavior

Calculated Specific Heating Demand PHPP [kWh/(m2a)]

Thermal Energy Consumption [kWh/(m2a)]



Examination - Calculated Specific Heating Demand and Thermal Energy Consumption (a)

#### **Results Examination**

Calculated and measured thermal energy of examined buildings in Italy

→ In most buildings, the measured thermal energy was higher than the calculated one, mostly because of the user behavior

 Calculated Specific Heating Demand PHPP [kWh/(m2a)]

Thermal Energy Consumption [kWh/(m2a)]



#### Examination - Calculated Specific Heating Demand and Thermal Energy Consumption (b)

#### **Discussion Examination**

- / For energy calculations it is recommended to use a reference weather file which is up to date (regarding the increasing temperatures)
- / During winter time the measured indoor air temperature (up to 24°C) corresponds not to the indoor air temperature used in the calculation (20°C)
- ✓ Building services should be designed so that their use has a positive affect energy performance
- / The heating energy demand per square meter, calculated as reference for energy certification, does not refer to the energy consumption per person
- / The amount of electric energy demand should also be included to the energy certification systems to force the reduction of it
- / Due to a high ventilation rates the measurement showed low CO<sub>2</sub> levels which means a good air quality =>determination of the right ventilation rate
- → In the future, the leading argument for passive houses will probably not to be the energy saving or the environmental aspect but the indoor comfort and the high user satisfaction

#### Methods ENERBUILD Tool

- / Transnational comparison of instruments according to ecological evaluation of public buildings
- 46 pilot assessments of new public buildings in different regions (3 building in CH)
- / The assessment tool consists of 16 criteria in 5 categories and permits the compensation of deficits across its categories
- ✓ Buildings are evaluated in the planning phase and after construction to compare set goals and achieved results
- / The criteria are distinguished in mandatory ("M") and auxiliary criteria
- / A higher sustainability standard equals higher scores



#### **ENERBUILD Tool**

Category A and B

Nr.		Title	Must criterias (M); Minimum standard	max. Points
Α		Quality of location and facilities		max. 100
A	1	Access to public transport network		50
Α	2	Ecological quality of site		50
В		Process and planning quality		max. 200
В	1	Decision making and determination of goals		25
В	2	Formulation of verifiable objectives for energetic and ecological measures	М	20
В	3	Standardized calculation of the economic efficiency	Μ	40
В	4	Product-management - Use of low-emission products		60
В	5	Planning support ofr energetic optimization		60
В	6	Information of users		25

#### **ENERBUILD** Tool

Category C, D and E

С		Energy & Utilities		max. 350
С	1	Specific heating demand (PHPP)	Μ	100
С	2	Specific cooling demand (PHPP)	Μ	100
С	3	Primary energy demand (PHPP)	Μ	125
С	4	CO <sub>2</sub> -emissions (PHPP)		50

D		Health and Comfort	max. 250
D	1	Thermal comfort in summer	150
D	2	Ventilation - non energetic aspects	50
D	3	Daylight optimized (+ lightening optimized)	50

E		Building materials and construction		max. 200
E	1	OI3 <sub>TGH-Ic</sub> ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200
			Sum	max. 1.000

#### **Results ENERBUILD Tool**

ENERBUILD Tool – results of the pilot-testing of the energy efficient public buildings in Austria, France, Switzerland and averages







#### **Results ENERBUILD Tool**

ENERBUILD Tool – results of the pilot-testing of the energy efficient public buildings in Italy and averages





#### ENERBUILD Tool - Comparison of Pilot-Assessed Buildings (b)

#### **Discussion ENERBUILD Tool**

Tool is operable in different regions:

/ Comprehensive

/ High Usability

/ Cost effective

/ Regional adaptable

Suggestions for Improvement:

- / Adding criteria Water-consumption
- / Adding criteria neighbourhood
- Adaptation of criteria energy

### **Discussion ENERBUILD Tool**



### All the ENREBUILD Result Booklets can be downloaded.

http://www.enerbuild.eu/publications



CABEE Capitalizing Alpine Building Evaluation Experiences

## Perspectives on Alpine Space project CABEE

NENA Network Enterprise Alps Hochschule Luzern – Technik & Architektur

#### Alpine space project CABEE

- Development of an Alpine wide common guideline on buildings on the whole building process and for neighborhoods
- Online open source platform "Knowledge Hub" managed by NENA
- Testing the assessing 100 % of public buildings, public tendering and solutions for user behavior on eco-buildings
- Developing solutions for smart energy grids
- Workshops for public authorities and SMEs

### CEC5 and CABEE pushes NENA. NENA supports the development of the Alpine area.

www.nena-network.eu