Intelligent Energy Europe

ILETE

INITIATIVE FOR LOW-ENERGY TRAINING IN EUROPE

ILETE
Initiative for Low-Energy Training in Europe

ing. Daniele Biasioni
Project Assistant

PROVINCIA AUTONOMA DI TRENTO

LE ESIGENZE

ILETE
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INFORMAZIONE

Opinione pubblica
Persone interessate
Mass media

FORMAZIONE

Artigiani
Progettisti
Tecnici del settore

I PARTNERS COINVOLTI

- Regione Alsazia, Francia (partner capofila)
- Kea, Germania
- Umweltzentrum, Germania
- Provincia Autonoma di Trento, Italia
- Labein, Spagna
- Energie Tirol, Austria
- Economic Development Agency of Timis County, Romania
- WFOSIGW, Polonia

ATTIVITA' PREVISTE

1. la preparazione di materiale didattico e l'organizzazione di corsi per tecnici e professionisti;
2. la preparazione di materiale didattico l'organizzazione di seminari per studenti;
3. la realizzazione di un sito web con i materiali prodotti dal progetto;
4. l'elaborazione di una Guida sullo stato della normativa a livello europeo, nazionale e regionale;
5. la diffusione di materiale informativo;
6. l'organizzazione di convegni ed eventi sul tema;
7. l'organizzazione di un premio a livello locale ed europeo;

CORSI E SEMINARI

- Nel mese di novembre 2009 verrà svolto un seminario per gli studenti universitari di ingegneria dal titolo:

  “Planning high performance buildings and dynamic energy simulation”

- l’anno prossimo verrà svolto un secondo seminario, invitando un esperto estero, dal titolo:

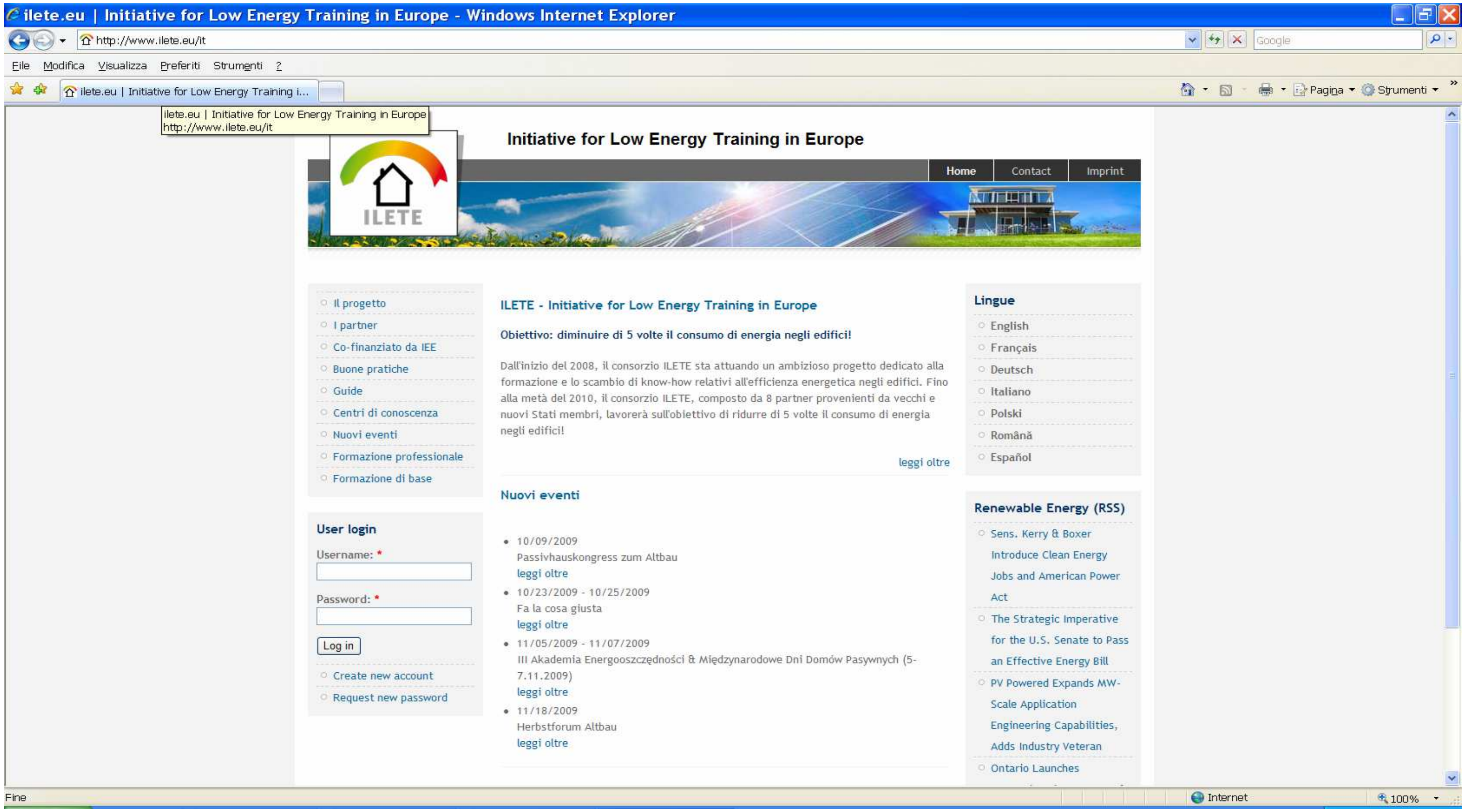
  “Principles of buildings services”

CORSI E SEMINARI

- È in preparazione un Kit di formazione sulle "case passive" che dovrà aiutare gli esperti formatori a divulgare correttamente le loro conoscenze a tecnici e professionisti

- Verrà svolta una presentazione del Kit di formazione coinvolgendo un pool di esperti formatori

PIATTAFORMA WEB



http://www.ilete.eu/it

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GUIDA

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- PARTE EUROPEA

  sommario delle normative europee sull'efficienza energetica degli edifici con esempi di buone pratiche di edifici realizzati

- PARTE LOCALE

  disamina dettagliata delle normative e dei regolamenti nazionali e regionali in ogni regione partner

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GUIDA

BUONE PRATICHE

6. SOME EXAMPLES OF BEST PRACTICES

BEST PRACTICES EXAMPLE IN FRANCE

6.1. BUILDING NAME AND IDENTIFICATION: "THE PARK OF MUEHLMATTEN" IN BOLWILLER

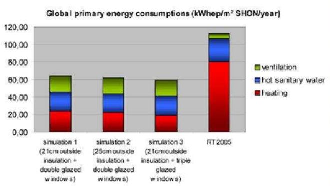
The housing building "The Park of Muehlmatten" is a multigenerational residence of 15 flats based on a low energy conception. It is located in Bollwiller in Alsace (continental climate). This building, with an area of 1.338 m^2, is classified as a level A according to the energy scale and answers at the BBC-effinergie label criteria.
Pictures of the whole building

Picture of the whole building

6.2 OUTLINE OF THE APPLIED BEST PRACTICES

It is a traditional French structure based on brick. Its insulation is an external envelope made of polystyrene, 20cm thick. Its double glazed windows are low-e filled with argon. Terraces are isolated from the building thanks to rupture of thermal bridges systems. The ventilation system is composed of a mechanical ventilation with heat recovery. The airtightness of the building is optimized and is 0,6 m3/h/m^2, with a pressure difference of 4 Pa. The heating system is based on a high performance gas fired condensing boiler with floor embedded heating system. Hot sanitary water is produced by a collective solar heating system. The summer comfort is ensured by a solar shading system. Thus, there is no need of a cooling system in the building.

6.3 BEST PRACTICE 1: EFFICIENT INSULATION



Designation	Type	U (W/m².K)	Umax value (RT2005)	Information
Exterior wall	exterior wall	0,14	0,45	OK
Basement wall	interior wall	0,285	0,45	OK
Interior wall on common property	interior wall	0,421	0,45	OK
Base floor on basement	interior floor	0,173	0,4	OK
Upper floor on attic	exterior wall	0,123	0,28	OK
Terrace roof	roof	0,143	0,34	OK
Windows	windows	1,1	2,6	OK

6.4 BEST PRACTICE 2: RATIONALISATION OF THE CONSTRUCTION

The construction program has been conceptualized in order to be transposable, with utilization of tested building materials. It permits easy implementation and satisfies French standards. This low energy building costs 15% more than the same standard building. The extra investment cost will be balanced by lower operating costs.

BEST PRACTICES EXAMPLE IN ITALY

6.5 BUILDING NAME AND IDENTIFICATION

The building, designed by Architect Pierpaolo Botteon, is a two-family house located in Pergine Valsugana (TRENTO – Italy), town with 20 000 inhabitants, elevation 490 m ASL. Each unit has a floor area equal to approximately 200 m^2, and a volume equal to approximately 500 m^3. The internal climate is controlled through a low temperature hydronic radiant floor heating system, and the

Views of the finished "casa a Susà" building.

heat source is a wood pellet boiler integrated with solar heat panels. The energy use for heating is less than 50 kWh/m^2 per year. The maximum value permitted by the Italian regulation for the considered climate (3147 degree days) is equal to about 100 kWh/m^2.

6.6 OUTLINE OF THE APPLIED BEST PRACTICES

Several measures have been applied in order to achieve high energy performance in this building, including a highly insulated envelope (exp. roof and exterior walls), care to avoid thermal bridges, and efficient low temperature heating systems using renewable heat sources such as wood pellets and solar panels. In addition, great attention has been paid to the global sustainability of the building, using wood for the main structure and low impact insulating materials whenever possible.

Views of the construction yard, showing the wood frame structure.

6.7 BEST PRACTICE 1: WELL INSULATED EXTERNAL WALLS

The external walls have been insulated using, on the outer side, 12 cm (6+6) of wood fiber with a certified thermal conductivity λ= 0,45 W / (m K) and, on the inside, 5 cm of linen fiber with a thermal conductivity λ= 0,40 W / (m K). The resulting wall has a total thickness of 22,1 cm and a U value lower than 0,2 W / (m^2 K). The maximum value permitted by the Italian regulations for this climate is U = 0,35 W / (m^2 K).

View of the external wood fiber insulation (left), and of the internal linen fiber insulation (right) during the laying in place

6.8 BEST PRACTICE 2: WELL INSULATED ROOF

The roof has been insulated using 14 cm (10+4) of wood fiber with a certified thermal conductivity λ= 0,40 W / (m K) and density equal to 160 kg/m^3. This not only ensures protection during the winter season, but also, due to the high thermal mass, provides protection against overheating in summer. The material has been laid in place with adequate protection against rain water and moisture migration. The resulting structure has a U value lower than 0,2 W/(m^2 K). The maximum value permitted by the Italian regulations for this climate is U = 0,31 W/(m^2 K).

View of the wood fiber insulation during laying in place on the roof structure

6.9 BEST PRACTICE 3: AVOIDANCE OF THERMAL BRIDGES

Great care has been taken to avoid the formation of thermal bridges. Some of the adopted measures are shown in the following pictures.

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Balcony beam frame, avoiding cantilevered concrete beams protruding from the heated space

Additional insulation to avoid the thermal bridge due to the joint between the wood frame and the concrete basement.

Floor slab and beams for balcony.

Figure 1. The first certified passive house in Poland carried out in 2006 in Smolec near Wrocław. Detached building, design: Dr Ludwika Juchniewicz-Lipińska, Dr. Miłosz Lipiński. Below – the view: ground floor and garret. (LJ.L.)

BEST PRACTICES EXAMPLE IN POLAND

6.10 BUILDING NAME AND IDENTIFICATION

PASSIVE HOUSE is located in Smolec, near Wroclaw (Poland) between marine and continental climates. It is a residential house, however, it is used for conferences, training purposes, and promotion of low energy buildings. It was designed and built in 2007 by Design Office Lipinski Domy. It is the first building with a certificate of Passive House of Darmstadt Institute.

6.11 OUTLINE OF THE APPLIED BEST PRACTICES

The architecture of the building is based on a single family house. It is created strictly with passive house requirements keeping its simple construction, innovative technology, building materials of good quality, and moderate prices. The design, as well as construction, guarantees maximum reduction of thermal heat losses while gaining as much solar energy as possible at the same time. The best structural solutions applied in the house are window openings, insulation system, and ventilation system with heat recovery. The building is equipped with a renewable energy generator, such as solar collectors. It is centrally situated on the steep, two-sided roof. The kitchen with dining room has a storage room located behind. In this storage room, there is equipment replacing the traditional heating system. This is the main heat exchanger - electric device - designed only for passive houses only. This heat exchanger is called Vitotres 343 and is 60 cm wide. In this particular housing equipment there are other essential heating and ventilating devices which are well-fitted, manufactured mounted and tested. Inside there are: air heat pump, ventilating and heat exchange centre, water heater with a capacity of 250 l with a pipe, that is integrated with the solar installation, electric thermal input, and a weather regulator. The weather regulator controls all of these devices.

6.12 BEST PRACTICE 1: WINDOWS OPENING

The window openings are arranged in such a way so as to guarantee a good amount of natural light (according to polish norms). The size of the windows minimizes heat losses. The innovative element, such as large glazed planes in the kitchen and living room, magnify the house area (131,4 m2) making it more spacious. Large triple windows are oriented towards the south to maximize passive solar gain. The solar collector in the building roof, apart from the innovative character of the house, guarantees solar gains. The annual of requirement for heat demand of the building is 13,7 kWh/m2.

Figure 2. The south elevation of the building. (LJ.L.)

6.13 BEST PRACTICE 2: THERMAL INSULATION

The most relevant technology applied in the building is the elimination of thermal bridges from the whole construction (external partition, partition bonding etc). It is substituted with a continuous thermal insulation layer of 30-44 cm thick, with the objective of achieving passive house standards. Although foundation walls have got thermal bricks, applying insulating plinth hollow bricks reduces cooling discomfort. The thermal transmittance of the external walls, roof, ceiling, and floor is $U=0,1\ W/m^2K$, and the foundation and floor plate is $U=0,12\ W/m^2K$.

The walls are made from prefabricated elements consisting of a mixture of concrete and expanded clay (pallets). The insulating material is a silver-grey foam polystyrene. It contains graphite (lower density $q=15\ kg/m^3$ means better insulation properties). The foamed polystyrene is based on an innovative raw material (Neopor) with thermal conductivity $\lambda \leq 0,031\ W/m^2K$.

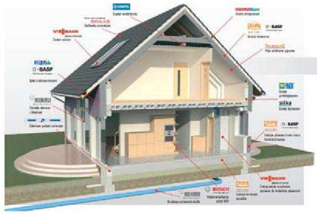

Figure 3. Axonometric section through passive house. Innovative technology, simple and economically effective solution elaborated to traditional design. Design Office Lipiński Domy, Wrocław 2005. (LJ.L.)

6.14 BEST PRACTICE 3: VENTILATION SYSTEM

The building is equipped with mechanical ventilation with a heat recovery device. It is a compact device which maintains air quality in the passive house. It has an integrated supply-exhaust ventilator with heat exchanger. In addition, a ground heat exchanger is included.

EXAMPLES OF LOW-ENERGY BUILDINGS IN SPAIN

6.15 BUILDING NAME AND IDENTIFICATION

CENIFER building it is located in Pamplona (Spain) in a Southern European climate. It is a non residential building devoted to conferences and training. The building renovation was carried out in the year 2000 with bioclimatic criteria.

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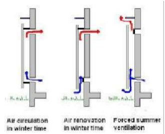
Views of the CENIFER building.

6.16 OUTLINE OF THE APPLIED BEST PRACTICES

The most relevant architectural solutions applied in the building are floor radiant heating, Trombe walls and a greenhouse to minimize heating consumption. The building includes renewable energy generation capabilities, such as photovoltaic panels, solar thermal panels with heat storage system, and geothermal cooling system. The Cenifer building incorporates ICT-s solutions to achieve an energy efficient performance. The building is equipped with a presence sensor, temperature sensors, humidity sensors and light sensor with a centralized monitoring system that tracks data coming from sensors, energy generation and storing systems.

6.17 BEST PRACTICE 1: TROMBE WALL

The Trombe wall is a sun-facing glass wall attached to a solid wall that contains a small internal ventilated chamber. During winter time, sunlight shines through the insulated glazing and warms the surface of the thermal mass. The cold air coming from inside or outside (to guarantee air renovation) is heated and it is introduced inside from the upper side of the wall. During summer periods, the exhaust vent near the top is opened to vent the hot air to the outside. Such venting makes the Trombe wall act as a solar chimney pumping fresh air through the house during the day, even if there is no breeze.



The annual thermal production is 17.970 KWh. The emissions savings per year are 30Kg SO, 10 Kg NO and 2.640 Kg CO_2.

6.18 BEST PRACTICE 2: GROUND WATER COOLING

For heating and cooling systems, the building has a radiant floor installed. It consists of reticulated polyethylene pipes embedded in the floor, through which water is circulated. The subsoil water circulates through the system in the summer period providing summer cooling.

Annual thermal production 12.558 KWh. Emission savings per year are 3Kg SO, 1 Kg NO_2 and 248 Kg CO_2

6.19 BEST PRACTICE 3: SOLAR THERMAL INSTALLATION

The building obtains hot water and heating from flat solar collectors located in the building roof. The building has a storage system for hot water. The objective is to store the exceeding energy from thermal collectors using it for heating during low solar radiation days. It can provide 22 days of heating without solar radiation.

Annual thermal production is 61.220 KWh. Emission savings per year are 102Kg SO, 32 Kg NO_2 and 8.251 Kg CO_2.

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6.27 BEST PRACTICE 1: EXTERIOR WALLS

The exterior wall is realized as a facing with air space. The ground floor is a massive construction with 25 cm of armored concrete and an EPS insulation of 28 cm with a thermal conductivity of $\lambda = 0.40$ W / (m K). In the upper floors, 20 cm of mineral rock wool between the wooden standard construction and additional 20 cm of wood fiber (thermal conductivity of both materials $\lambda = 0.40$ W / (m K)) in the outer part result in a thermal transmittance value of 0.114 W/(m^2K). The wall has a total thickness of 43.8 cm.

Wooden standard construction with wood fiber insulation on the outer part

Massive construction with EPS insulation

6.28 BEST PRACTICE 2: WINDOWS IN WOOD-ALUMINIUM CONSTRUCTION

The high energy efficiency of all windows is achieved through heat-absorbing glass with a thermal transmittance value of 0.72 W/(m^2K). The windows are realized in wood-aluminum construction The total thermal transmittance value is 0.85 W/(m^2K).

Fitting of wood-aluminum windows

6.29 BEST PRACTICE 3: CENTRAL VENTILATION SYSTEM WITH HEAT RECOVERY

A ventilation system with air-to-air heat recovery provides, apart from good insulation, the main characteristics of the passive house. The central ventilation system is equipped with a heat recovery system (up to 84%) to minimize the energy losses related to ventilation. The main criteria for ventilation systems in schools, which have been developed by Energie Tirol are widely fulfilled.

Central unit of the ventilation system with air ducts

BEST PRACTICES EXAMPLE IN GERMANY

6.30 BUILDING NAME AND IDENTIFICATION

The PassivPLUS house is located in Trier (Germany) in a central European climate. It is a residential building and was built in connection with the horticultural show of Rhine-land Palatinate which took place in the year 2004.

This is a three-story passive plus house that has an attractive winter garden besides. The total capacity of the house is 2.620m³. The living space is extended over an area of 433m² and complimented by 174m² of useful area around the house.

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OBIETTIVI

- L'obiettivo è la divulgazione delle buone pratiche progettuali e realizzative degli edifici costruiti in provincia di Trento che presentino le migliori prestazioni di tipo energetico, unitamente a caratteri formali coerenti con le architetture del territorio.

- Sono ammessi a concorrere tutti gli edifici, costruiti o in corso di completamento, destinati ad uso civile e residenziale

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SOGGETTI PARTECIPANTI

- il Committente;
- il Progettista delle opere;
- la/le Impresa/e esecutrice/i dei lavori ritenuti dal proponente maggiormente significativi ed/od innovativi;

L’esposizione del progetto potrà essere indistintamente eseguita da uno qualsiasi di questi soggetti.

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ELABORATI

Saranno oggetto di valutazione,gli elaborati progettuali illustrativi del progetto ed ogni supporto esplicativo :

- ✓ 1 tavola di progetto formato max A1 per l'esposizione del progetto edilizio;
- ✓ 1 tavola di progetto formato max A1 con eventuali particolari costruttivi edilizi/impiantistici, schemi di calcolo, simulazioni;
- ✓ presentazione del progetto su supporto digitale (per es. in Power-point), corredato da eventuali schemi, plastici, fotografie, filmati, ecc.;
- ✓ relazione sommaria del progetto e delle opere realizzate (max. 3 pagine A4).

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CONSEGNA ELABORATI

La consegna degli elaborati, in forma libera, dovrà avvenire nel periodo

dal 01 dicembre 2009 al 31 gennaio 2010

presso l'Agenzia Provinciale per l'Energia. Gli elaborati presentati resteranno di proprietà della Provincia Autonoma di Trento.

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CRITERI DI VALUTAZIONE

Nr.	Criterio	Punti max.
1	Prestazione energetica;	20
2	Soluzioni tecniche innovative, integrazione progettisti e imprese	30
3	Coerenza dei caratteri formali e ambientali con l'architettura locale	20
4	Comunicazione del progetto, aspetti formativi, media utilizzati	30

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RICONOSCIMENTI

- Durante la Fiera Domo a Trento nel mese di marzo 2010, sarà tenuto un Convegno dove verrà illustrato il progetto vincitore ed i progetti maggiormente significativi.

- I rappresentanti del progetto vincitore saranno invitati a presentare la propria opera durante la fase europea del concorso che si terrà a Strasburgo nei giorni 10 ed 11 giugno 2010, concorrendo per il Premio finale del Progetto ILETE.

PREMIO ILETE

INIZIATIVE ULTERIORI

- I progetti ritenuti più significativi potranno essere esposti all'interno di una serie di mostre che si terranno sul territorio provinciale.

- Inoltre tutto il materiale raccolto verrà utilizzato come fonte documentale ed esemplificativa per le buone pratiche progettuali e costruttive durante corsi e seminari che verranno successivamente attivati.

Grazie per l'attenzione!