THEME

INVOLUCRE

Project cofinanced by
European Regional Development Fund

Lead Partner
Provincia di savona

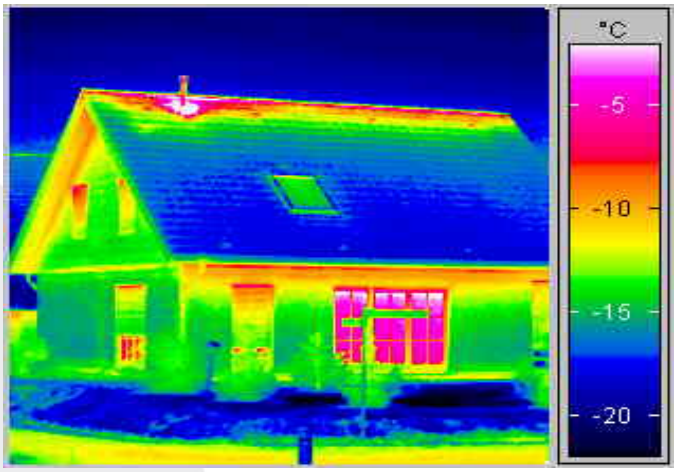
Sustainable Construction in Rural and Fragile Areas for Energy efficiency

THEME

INVOLUCRE

DECLINATIONS

- ✓ new constructions
- ❑ requalifications of recent buildings
- ❑ renovation and refit works of historical buildings
- ❑ works "ex novo" in historical contexts



Insulation is the most effective way to improve the energy efficiency of a home. Insulation of the building envelope helps keep heat in during the winter, but keeps heat out during summer to improve comfort and save energy. Insulating a home can save 45–55% of heating and cooling energy. All materials allow an amount of heat to pass through them. Some, such as metal, glass or air allow heat to pass through more easily. Others, including animal fur or wool, thick clothing and still air, are much more resistant to heat flow, and are referred to as insulators. The term 'insulation' refers to materials which provide substantial resistance to heat flow. When these materials are installed in the ceiling, walls and floors of a building, heat flow into and out of the building is reduced, and the need for heating and cooling is minimized. Although ceilings and walls may be insulated, heat loss will still occur in winter if there are large areas of unprotected glass or through fixed wall vents and gaps and cracks around external doors and windows. Appropriate internal window coverings (e.g. lined drapes with pelmets) and draught proofing are vital to complement insulation. Insulation should always be coupled with appropriate shading of windows and adequate ventilation in summer. Without shading, heat entering the home through the windows will be trapped inside by the insulation and cause discomfort.

CASE STUDIES

Showroom GEVO – Limassol: The exhibition centre of GEVO is an environmentally friendly building, since it combines perfectly the rational use and the implementation of several new technological systems utilizing renewable energy sources

Ayii Anargyri Natural Healing Spa Resort : The idea/concept was to design a spa resort with the following criteria: to respect the environment and the existing old trees, to keep the original monastery architecture an the exterior of the buildings using stone, wood, roof, tiles etc. and modern design on the interior, to use the natural sulfur water through modern machinery and technologies and to use renewable energies to cover part of the final energy consumption.

LEGAL AND REGULATORY ASPECTS

❑ EU directives reference:

DIRECTIVE 2002/91/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2002 on the energy performance of buildings
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:001:0065:0065:EN:PDF

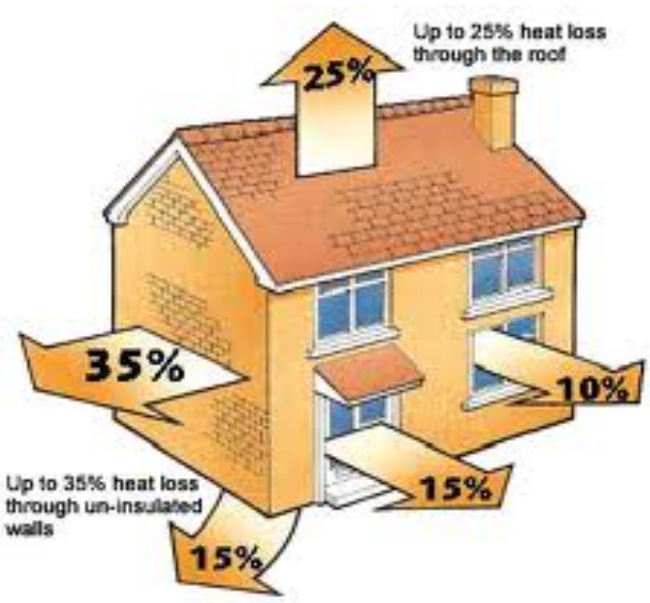
❑ National laws and decrees reference:

• energy efficiency of buildings law N142(i) 2006
http://www.mcit.gov.cy/mcit/mcit.nsf/All/DF8E187B6AF21A89C22575AD002C6160/$file/N142(i)2006%20peri%20Rithmisis%20Energiakis%20Apodosis%20Ktirion%20Nomos.pdf

• energy efficiency of buildings law N30(i) 2009
http://www.mcit.gov.cy/mcit/mcit.nsf/All/DF8E187B6AF21A89C22575AD002C6160/$file/KDP429_2006%20peri%20Rythmisis%20Odon%20kai%20Oikodomon%20(Energeiaki%20Apodosi%20ton%20Ktirion)%20Kanonismoi.pdf

• Calculation methodology on energy efficiency building ordinance of 2007 (ΚΔΠ 414/2009)
http://www.mcit.gov.cy/mcit/mcit.nsf/All/DF8E187B6AF21A89C22575AD002C6160/$file/KDP414_2009%20peri%20Rythmisis%20Energeiakis%20Apodosis%20Ktirion(Methodologia%20Ypologismou%20Energeiakis%20Apodosis%20Ktiriou)%20Diatagma.pdf

• Regulation 429/2006 on Roads and Buildings (Energy Performance of Buildings) ΚΔΠ 429/2006)
http://www.mcit.gov.cy/mcit/mcit.nsf/All/DF8E187B6AF21A89C22575AD002C6160/$file/KDP429_2006%20peri%20Rythmisis%20Odon%20kai%20Oikodomon%20(Energeiaki%20Apodosi%20ton%20Ktirion)%20Kanonismoi.pdf



STRENGTHS/BENEFITS

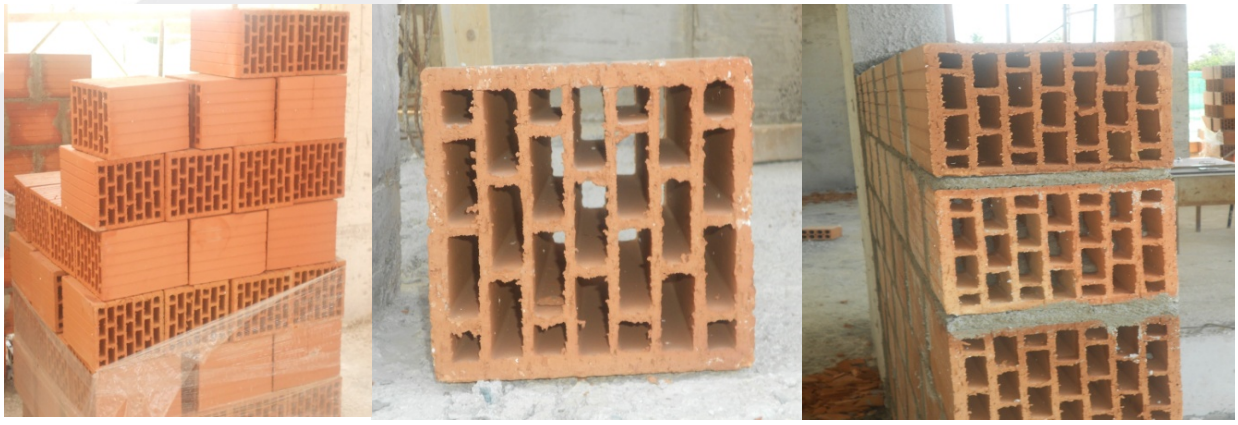
❑ reduction of resources consumption: In the hierarchy of energy saving measures insulation ranks very high and it reduces unnecessary energy gains or losses which then require more resource consuming measure to secure a comfortable environment. So there is no doubt that insulation and other means to control losses or gains is a prerequisite to a good building design.

❑ reduction of environmental impacts: The reduction of environmental impacts is intuitivly obvious. When energy needs are reduced then less energy needs to be produced and consequently less pollution is created.

❑ improving the quality of the indoor environment:
Improved comfort. A tighter building envelope reduces the amount of unconditioned air, drafts, noise, and moisture that enter the house. Proper air sealing will also minimize temperature differences between rooms. As a result, tight envelopes can maintain a more consistent level of comfort throughout a house.
Improved indoor air quality. A tighter building envelope reduces the infiltration of outdoor air pollutants, dust and radon as well as eliminating paths for insect infestation. Properly sealing the building envelope will also reduce moisture infiltration from outdoor air in humid climates.

❑ other :
Lower energy bills. Air leakage accounts for 25 percent to 40 percent of the energy used for heating and cooling and also reduces the effectiveness of other energy-efficiency measures such as increased insulation and high-performance windows. Thus air sealing results in lower energy bills.

Fewer condensation problems. Condensation can lead to mold and mildew problems. In hot, humid climates, moisture can enter into wall cavities through exterior cracks and result in costly damage to framing and insulation. In cold climates, gaps in the interior walls allow moisture from warm indoor air to enter wall cavities and attics. This moisture can condense on cold surfaces and lead to structural damage. By significantly reducing air leakage one can reduce or eliminate these problems.



Bricks to construct thicker walls in order to satisfy the required U-value prescribed by law

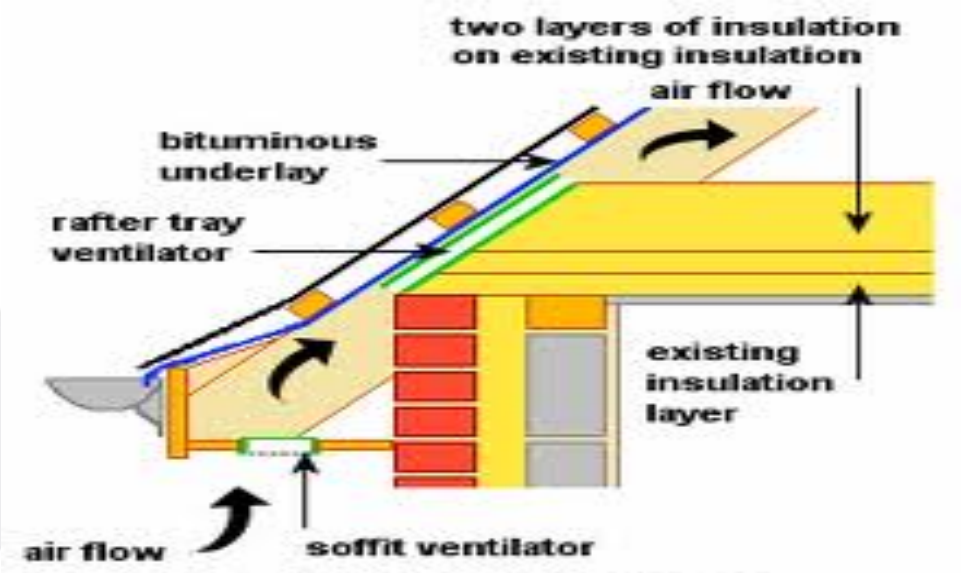
WEAKNESSES/DISADVANTAGES

❑ difficulty of building integration: Moisture control problems account for a high percentage of all premature wear expenditures made on built facilities. Although proper commissioning procedures have been noted to reduce the potential of these claims, no standards seem to exist for the control of moisture migration in building commissioning guidelines. The development of commissioning guidelines for the control of moisture migration involves quantifying, with a risk management approach, the performance thresholds that distinguish acceptable from unacceptable design. These criteria should define allowable threshold values regarding mold growth, corrosion, loss of structural strength, and indoor air quality.

❑ cultural: Proper insulation has traditionally been ignored by building designers in Cyprus. New legislation on the Energy Efficiency of Buildings is changing this mindset. Operating cost rarely entered the criteria when making choices at any stage of the design process. The sole criterion was the building cost and there are are many anectodal examples of very silly choices of materials, orientation of openings etc.

❑ normative: The new insulation requirements and the energy certification of buildings has spurred increased activity in the retrofitting of insulation on the outside of buildings. There may be difficulties to retofit multi-ownership buildings.

❑ other: There a cost in rectifying the arrogant choices of the past and in times of financial crisis one has to spend time to think through the various optionsand choices.



Loft Floor with Top-Up Insulation

❑ technical difficulties of installation / assembly:
Before construction begins, a thorough evaluation of the plans should be performed. This is when all envelope related components can be assessed for proper placement. Air barriers, water and vapour barriers can be evaluated for proper placement and continuity. It is the misunderstanding of these three barriers which has led to a significant number of building moisture issues. Evaluating air, water and vapour barriers, the insulation, flashing, sealants and other components which are critical to the performance of the envelope can be extremely important. One issue which requires careful consideration at this time is who will be responsible for installation of each component. When dealing with issues such as air barriers, there may be numerous sub-contractors that install different components of the system (e.g. roofers, sheet metal workers, ironworkers, carpenters, masons, etc.) These sub-trades often install their components without much thought to the system as a whole. It is here that the architect must be conversant on all materials and techniques.
Thermal bridging is related to many comfort complaints, moisture issues, mold, structural degradation and other issues in buildings. However, it is often overlooked in the design phase. This can end up costing owners a lot of money for unsuccessful repairs. This issue is again related to "holistic" building evaluations when problems arise

❑ difficulties in the context of local production: All insulation and sealing materials are imported into Cyprus. There is very little pruduction which also uses mostly imported raw materials. Availability however is high at least for ordinarily used materials

❑ other: There are communication difficulties, as with most environmental and safety issues, in passing massages to the general public. While there may not be such difficulties for new buildings and major renovations because the licencing process ensures compliance, the same cannot be said for retrofits when they are voluntary.

SUGGESTIONS TO OVERCOME THE WEAKNESSES

It is difficult to make suggestions when the competent authorities are already doing so much to create public awareness. The effectiveness of the campaigns may be increased now that there is an economic crisis with no end in sight and attention is on cost cutting economizing and resource conservation. There needs to be considerable effort made to get people out of the “subsidy” mindset.

SCORE

Sustainable
Construction
in Rural and Fragile Areas
for Energy efficiency

Project cofinanced by

European Regional Development Fund

med
L'Europe en Méditerranée
Europe in the Mediterranean

Lead Partner

- Province of Savona (ITALY)

Provincia di savona

Project Partner

- READ S.A.-South Aegean Region (GREECE)
- Local Energy Agency Pomurje (SLOVENIA)

LEA Pomurje
Lokalna energetska agencija za Pomurje
Local Energy Agency Pomurje

- Agência Regional de Energia do Centro e Baixo - Alentejo (PORTUGAL)

ARECBA

- Official Chamber of Commerce, Industry and Navigation of Seville (SPAIN)

Cámara Sevilla

- Chamber of Commerce and Industry - Drôme (FRANCE)

Chambre de Métiers et de l'Artisanat
Rhône

- Development Company of Kefalonia & Ithaki S.A. - Ionia Nisia (GREECE)

DEVELOPMENT COMPANY OF KEFALONIA & ITHAKI S.A.
DEV.C.KE.I. S.A.

- Rhône Chamber of Crafts (FRANCE)

CHAMBRE DE COMMERCE ET D'INDUSTRIE DE LA DRÔME

NÉOPOLIS

- Cyprus Chamber Of Commerce and Industry - Kibris (CYPRUS)

CYPRUS CHAMBER OF COMMERCE AND INDUSTRY

- Marseille Chamber of Commerce (FRANCE)

MARSEILLE PROVENCE
CHAMBRE COMMERCE et INDUSTRIE