Context, challenges, plans, and potential actions for tackling energy poverty in Greece

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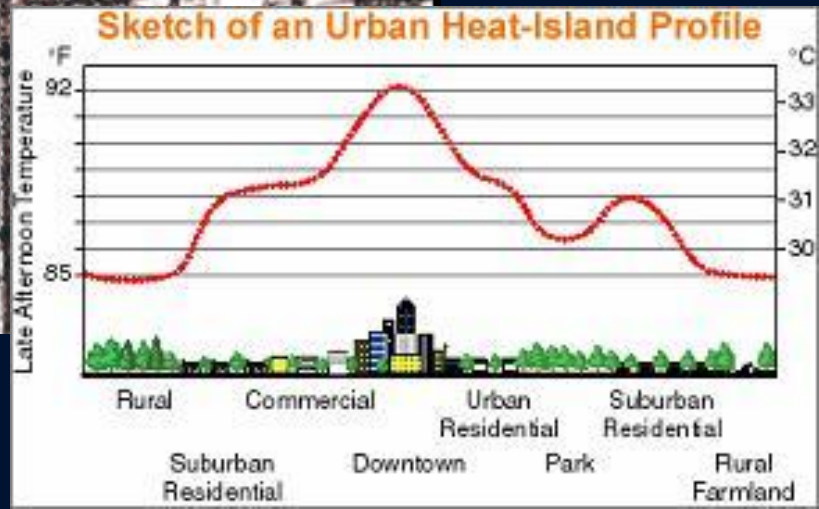
ΚΑΠΕ CRES | CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING

Context

General Picture

Urban centres

- We have succeeded in altering earth's atmopshere
  - CLIMATE change
    - Economic, social, environmental degradation
- Fuel dependency, fuel poverty
- Urban heat island effect



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Energy poverty is

- the inability to secure adequate levels of energy services (such as space heating, cooling, lighting and information technology)
- a particularly critical social issue that is directly related to the energy sector. In the current economic downturn, the phenomenon of energy poverty is becoming more and more pronounced, especially in low and middle income households.

Understanding energy poverty

CRES ROLE

- Has developed the Greek Observatory on Energy Poverty
- Has participated in the creation of the EU Energy Poverty Observatory (https://www.energypoverty.eu/)
- Is participating in the Greek Energy Poverty Action Plan

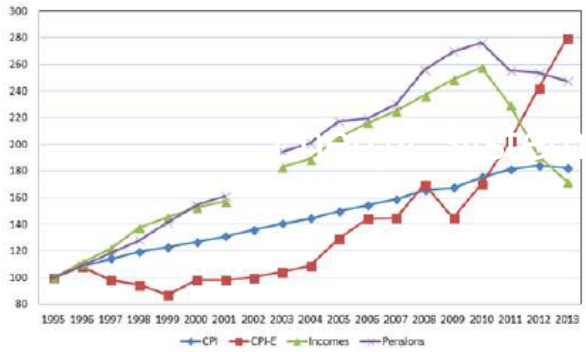
*[SOURCE: **CRES, Energy Systems Analysis Department, Market development - Marketing Department**]*

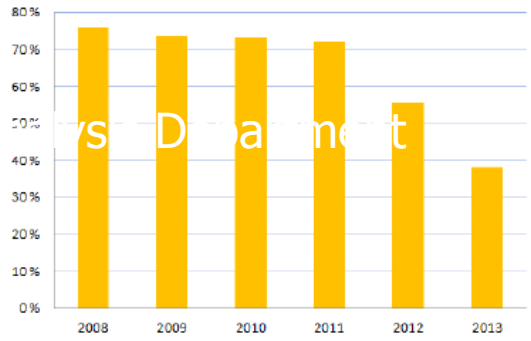
Understanding energy poverty

ΚΑΠΕ
CRES

Εξέλιξη φαινομένου ενεργειακής φτώχειας

Το φαινόμενο της ενεργειακής φτώχειας εντατικοποιείται με ταχείς ρυθμούς τα τελευταία έτη λόγω της μείωσης του διαθέσιμου εισοδήματος, της χαμηλής ενεργειακής απόδοσης των κτιρίων και των υψηλών τιμών ενέργειας.

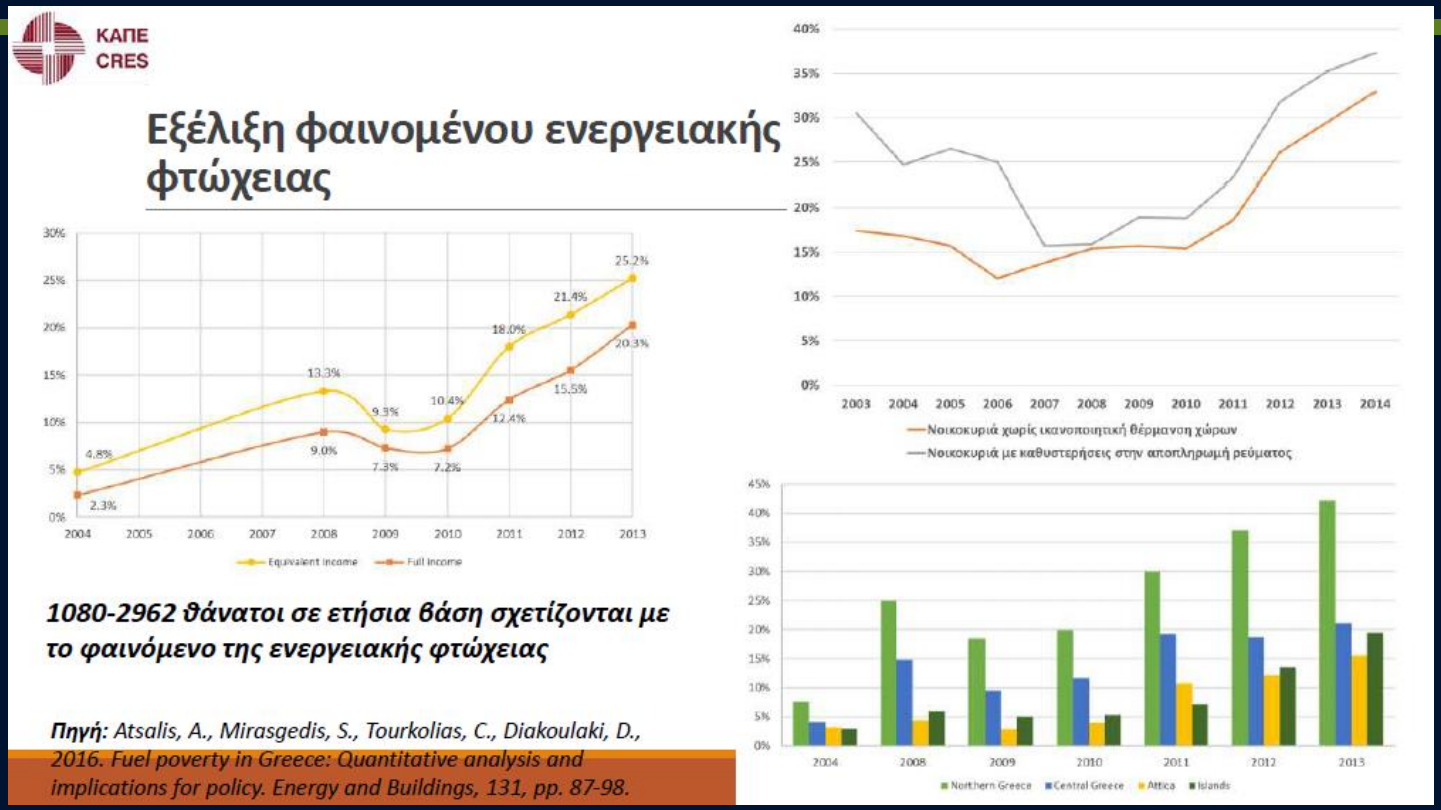




Πηγή: *Atsalis, A., Mirasgedis, S., Tourkolias, C., Diakoulaki, D., 2016. Fuel poverty in Greece: Quantitative analysis and implications for policy. Energy and Buildings, 131, pp. 87-98.*

[SOURCE: ***C. Tourkolias, CRES,*** *Energy Systems Analysis Department]*

Understanding energy poverty



*[SOURCE: **C. Tourkolias, CRES**, Energy Systems Analysis Department]*

Understanding energy poverty

Greek Energy Poverty Observatory

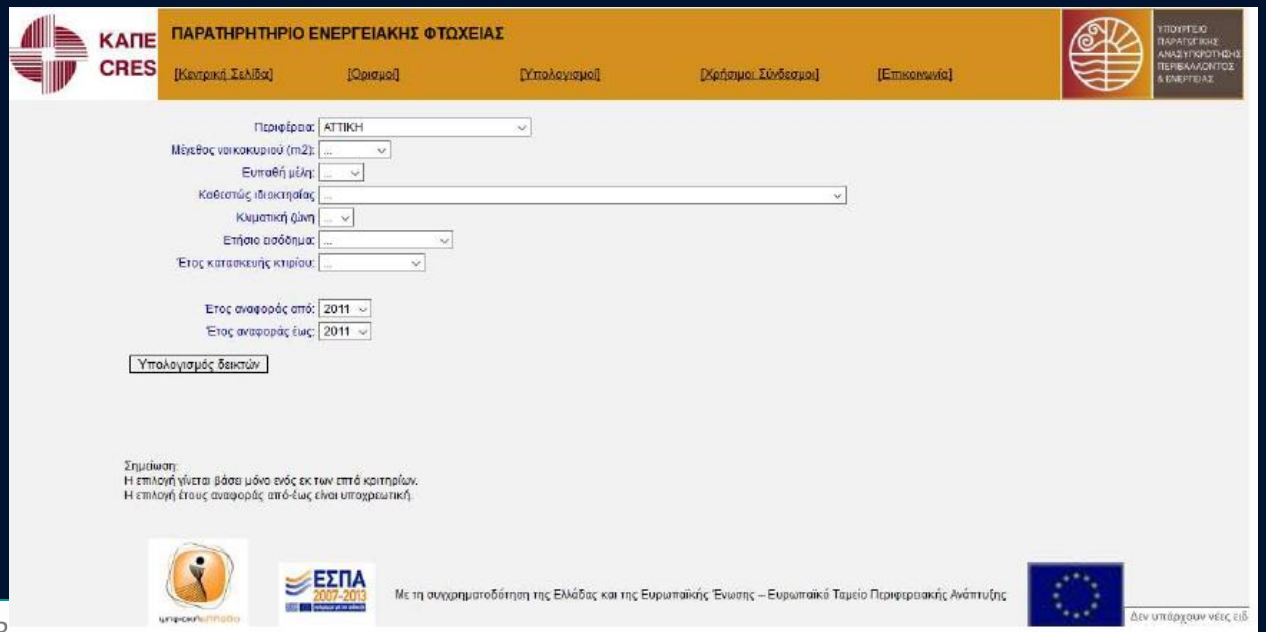
http://www.res-thermal.info/enprov/energy_poverty/energy_poverty_main.do?jsp=Energy_Poverty_home

Energy Poverty Indicators

- % coverage of basic energy needs <80%
- % real energy expenses to yearly household income 10%

Depending on:

- ✓ Region
- ✓ Household income
- ✓ Vulnerable members in household
- ✓ Size of residence
- ✓ Building age
- ✓ Climatic zone



Understanding energy poverty

- The European Energy Poverty Observatory is a 40 month project, starting from December 2016, aimed at engendering transformational change in knowledge about the extent of energy poverty in Europe, and measures to combat it.
- The EPOV project is funded by the European Commission, and is implemented by a consortium of 13 organisations, including universities, advocacy groups, think tanks, and the business sector. The University of Manchester leads the consortium.

Understanding energy poverty

Project aims

- Improve the transparency of information and policy by bringing together the disparate sources of data and knowledge that exist in varying degrees across the whole of the EU.
- Provide an easy-to-use policy-making tool available to all stakeholders at local, national and European level.
- Facilitate the networking, exchange and cognition of knowledge between Member States and the various stakeholders involved.
- Disseminate information and organization of promotional and information activities on good practices at European level among Member States.
- Provide technical support to all stakeholders to develop a holistic approach to understanding and addressing energy poverty in the EU.

Understanding energy poverty

Consortium

The main EPOV consortium members are:

- The University of Manchester
- Ecofys
- European Policy Centre
- Intrasoft International
- National Energy Action
- Wuppertal Institute

The core partners will also be supported by a range of other energy poverty organisations:

- Alphéeis
- Asociación de Ciencias Ambientales
- ECODES
- Energy Action Project (EnAct)
- Energy Action Ltd
- Housing Europe
- Centre for Renewable Energy Sources and Saving
- EU Fuel Poverty Network (EUFPN)

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Challenges

Challenges

Larger picture: built environment

for producing this energy, fossil fuel combustion is responsible for 35% of greenhouse gases

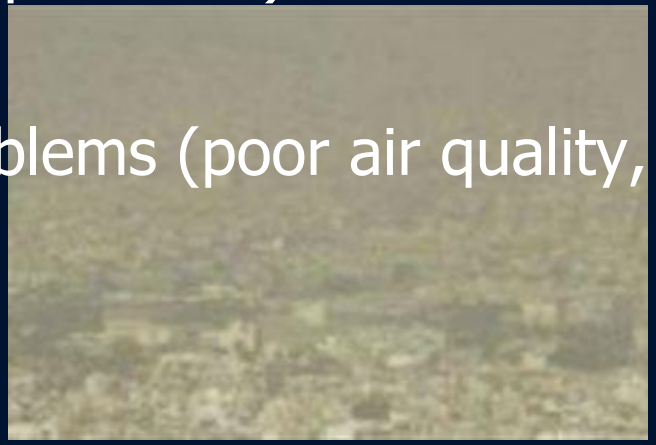
- 50% of SO_2 **emissions**, 35% of CO_2 **emissions**
- 25% of NOx **emissions** and
- 10% of emitted particles

Challenges

Larger picture: Cities

with their variations show common problems as a whole

- social cohesion
- infrastructures (particularly in the fields of energy supply and transport)
- in their development and expansion
- dysfunction of the urban fabric (with aesthetic, mobility and other functional problems)
- pollution problems
- residents' health problems (poor air quality, stressful conditions)



Opportunities
Larger picture: Cities

Objectives for sustainable living

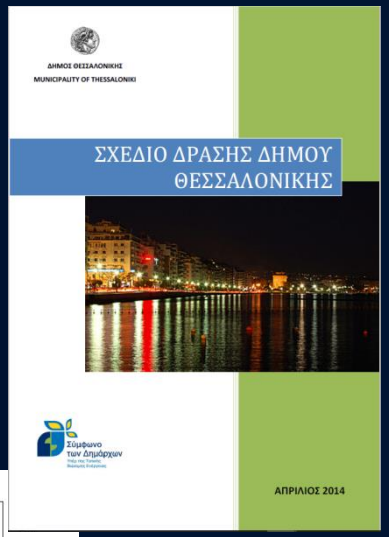
economic, environmental and social development and prosperity not only of today's but also of future generations.

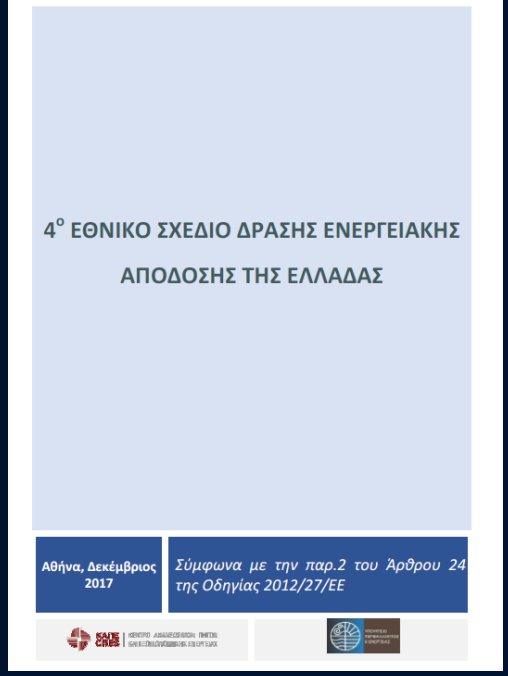
In this context we must ensure

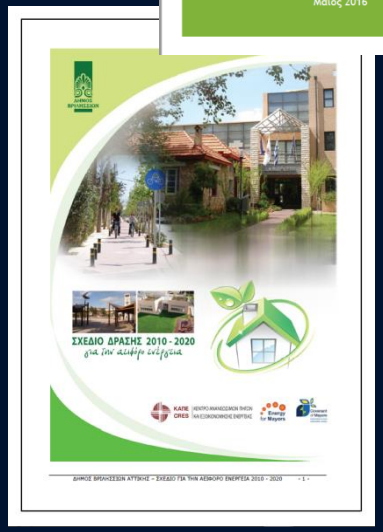
- quality of space
- local identity
- high-quality services to residents
- with the least possible impact on the environment
- possibilities for adaptation to new conditions (environmental, social, etc.).

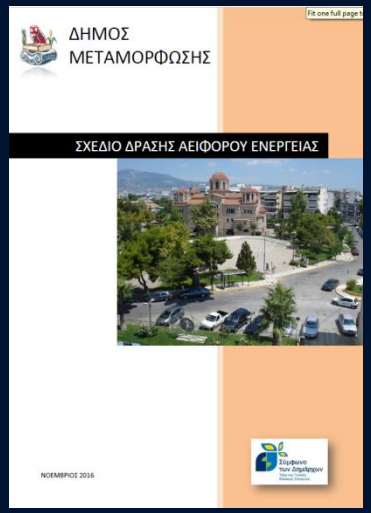
Covenant of Mayors for Climate & Energy

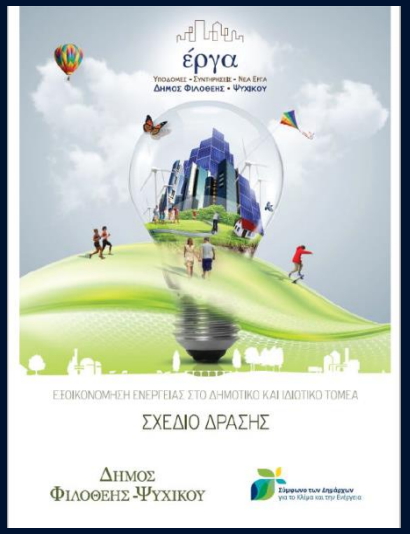
Plans











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121 Greek Sustainable Energy Action Plans

Aims

- reduce energy consumption and peak load
- reduce CO_2 emissions and limiting climate change
- create a favorable urban environment and limit the urban heat island effect
- upgrade living conditions in buildings and cities and improve people's everyday life
- support multilevel governance and strengthen the exemplary role of local authorities to implement energy saving measures
- raise awareness and change citizens' attitudes towards energy efficiency and environmental protection
- mobilize market forces and promote investment in sustainable development

Sustainable Energy Action Plans: Sectors

- public and municipal buildings and facilities
- residential buildings
- private tertiary buildings
- municipal lighting
- public and municipal transport
- private transport
- local industry
- local energy production (thermal and electrical) and management and use of renewable energy sources (RES)
- urban and environmental planning taking into account the above areas

Energy Poverty Action Plan

Action Plan for Countering Energy Poverty

provided for in the provisions of Article 25 of Law 4342/2015 (Government Gazette A ', 143-09.11.2015)

- shall develop actions related to the improvement of energy efficiency, resulting from its implementation, as well as other social policy measures or energy pricing.

Potential actions

Today... solutions for existing buildings

BUILDING ENERGY RETROFITTING: EUROPEAN OPPORTUNITY

The potential for energy savings in the building sector is extremely high.

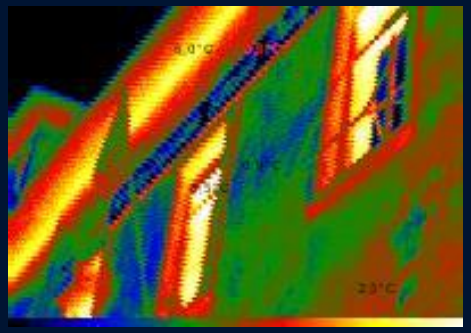
The building sector may be the field of overcoming the economic crisis

Buildings present both a very large financial and technical potential and an extraordinary need for new targeted investments.

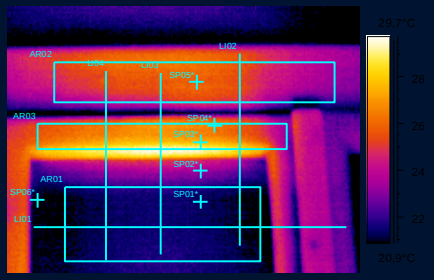
PRIORITIES:

- to upgrade the buildings of low-income citizens
- to renovate the active public sector buildings
- to persuade or force large consumers of commercial buildings to save energy
- to mobilise investments and create jobs
- to upgrade the urban environment

Today... solutions for existing buildings



Energy retrofitting of buildings



- improving energy efficiency of existing buildings through
  - energy upgrading of the building shell
  - upgrading of electromechanical (HVAC) installations
  - the use of energy-efficient devices
  - of energy management with technological/non technological means
  - integration of renewable energy sources for heat and electricity

Today... solutions for existing buildings

Estimated energy reduction by retrofitting low income apartment buildings

BUILDING ENVELOPE

- External wall insulation 29-42%
- Roof insulation 3-10%
- Floor insulation 8-10%
- Double glazing 5-19%
- Reduction of infiltration 7-20%

✓ Up to **70% total energy reduction** through **integrated interventions** (full-scale retrofitting)

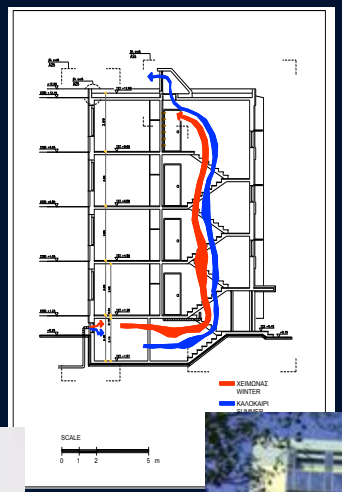
Actions: National level

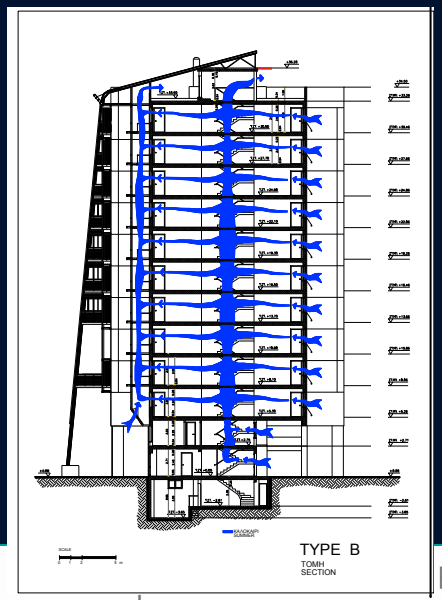
Energy Saving at Home programme of the Ministry of Environment and Energy
Subsidising energy retrofitting according to income of residents

Legislating for low-income retroffits
i.e. Energy Communities for energy efficiency retrofitting low income homes

Actions: Municipal level

Energy retrofitting of Social Housing



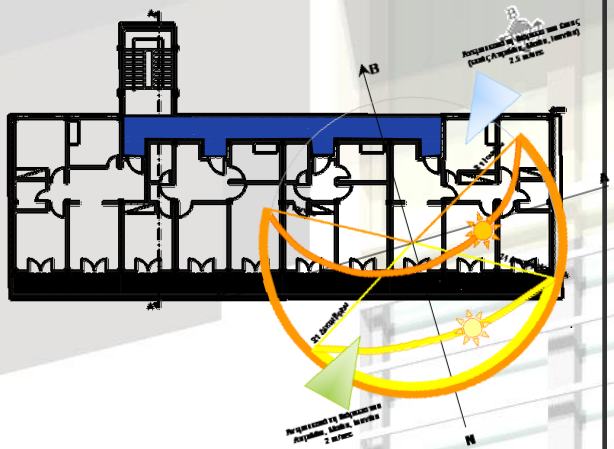


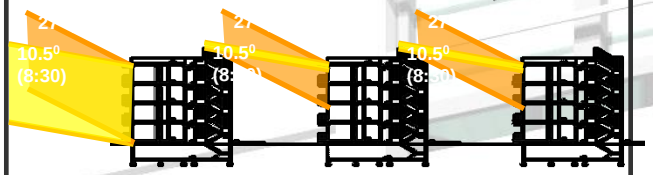
[SOURCE: ***Aikaterini Spyropoulou-Vei***]

Actions: Municipal level

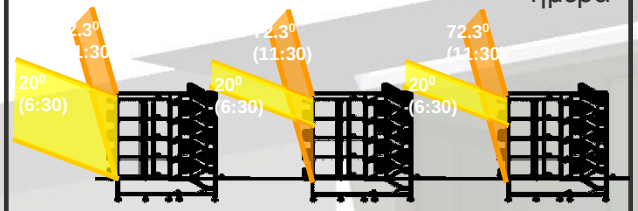
Energy retrofitting of Social Housing

*[SOURCE: **CRES, Buildings Department**]*





Τυπική χειμερινή ημέρα



Τυπική θερινή ημέρα

Energy retrofitting of Social Housing

*[SOURCE: **CRES, Buildings Department**]*

Actions: Municipal level

Green Neighborhood

Nearly Zero Energy Retroffitng of 4 Social Housing Blocks, Agia Varvara, Greece

Energy demand for heating	32 kWh/m²a
Energy demand for cooling	17,85 kWh/m²a
Energy saved	76%
Geothermal Heat Pumps contribution	0,350MWp 21,7 kWh/m²a
PV-system	0.040 MWp
Budget	7.154.194 public + 256.408 private

Funding Source	Operational Programme „Environment and Sustainable Development“ + Sponsors (technology providers)
Phase	1st block shell retrofit complete Teneder procedrues started for the remaining

*[SOURCE: **CRES, Buildings Department**]*

Potential Actions: Local/Regional level

SOURCE: MAYORS IN ACTION FOR A SUSTAINABLE FUTURE

Motivating/moderating/mobilizing energy retrofitting for households

Energy Savers (INTERLEUVEN, Belgium):
People employed by social economy and trained to implement energy saving measures. They carry out energy scans in homes of people in poverty and endeavor to bring down their power consumption. These measures can be simple - such as applying draught strips or inserting CFLs (energy saving lamps) - or more extensive - such as insulation work or guiding the way to low cost loans to enable the necessary measures.

Reading an Energy Bill (Source: INTERLEUVEN)

energiesnoeiers
BLIJ MET MINDER

Potential Actions: Local/Regional level

SOURCE: MAYORS IN ACTION FOR A SUSTAINABLE FUTURE

Motivating/moderating/mobilizing energy retrofitting for households

Since 2007 the municipality of **Bielsko-Biala** (Poland) has implemented a **Low Emission Limitation Programme** aimed at improving air quality in the suburban parts of the city. Within the programme, the municipality co-finances and organizes replacement of old and inefficient coal-fired boilers installed in residential houses with new ecological ones. Since then, over 1600 of such boilers were replaced with ecological heat sources (including solar collectors) decreasing local emissions of pollutants (including CO2) by 9200 tons per year.

bielsko.biala.pl
miasto tworzą ludzie

Potential Actions: Local/Regional level

SOURCE: MAYORS IN ACTION FOR A SUSTAINABLE FUTURE

Motivating/moderating/mobilizing energy retrofitting for households

Condomini Intelligenti® is a model for local governance inspired by local participation development principles. Its main objective is to reduce energy consumption in private buildings in urban areas. It involves all the territorial actors of the process of private refurbishment. Regional Agency, Region, Territorial Local Administrations, local enterprises, local banks, training bodies, research and innovation bodies, Universities, professional associations, consumer associations and citizens...the process is coordinated and promoted by the Local Authority. Condomini Intelligenti® is characterized by a "system approach": It achieves good information and facilitation towards residents, owners, and administrators of building;

It concretely promotes building energy audits;
It fosters the implementation of the projects;
It supports the residents in the monitoring of performances;
It promotes capacity building of local companies;

Condomini Intelligenti

Potential Actions: Local/Regional level

SOURCE:

MAYORS IN ACTION
FOR A SUSTAINABLE FUTURE

Motivating/moderating/mobilizing energy retrofitting for households

PadovaFIT is an ambitious project, funded by the Intelligent Energy Europe Programme and coordinated by the Municipality of Padova with the partnership of SOGESCA, which aims at retrofitting private houses in Padova. The main targets are **multi-dwelling houses (condominiums) with a centralized heating system**, which will benefit of the energy retrofitting process without engaging in an initial investment.

The main tools used are:

- A **facilitation methodology for supporting the decision making process** in the condominium assembly
- The **bundling of the buildings** to be retrofitted and a **public bid** for the assignment of the works
- A **general EPC model** which will be applied to all the buildings

Potential Actions: Local/Regional level

SOURCE:

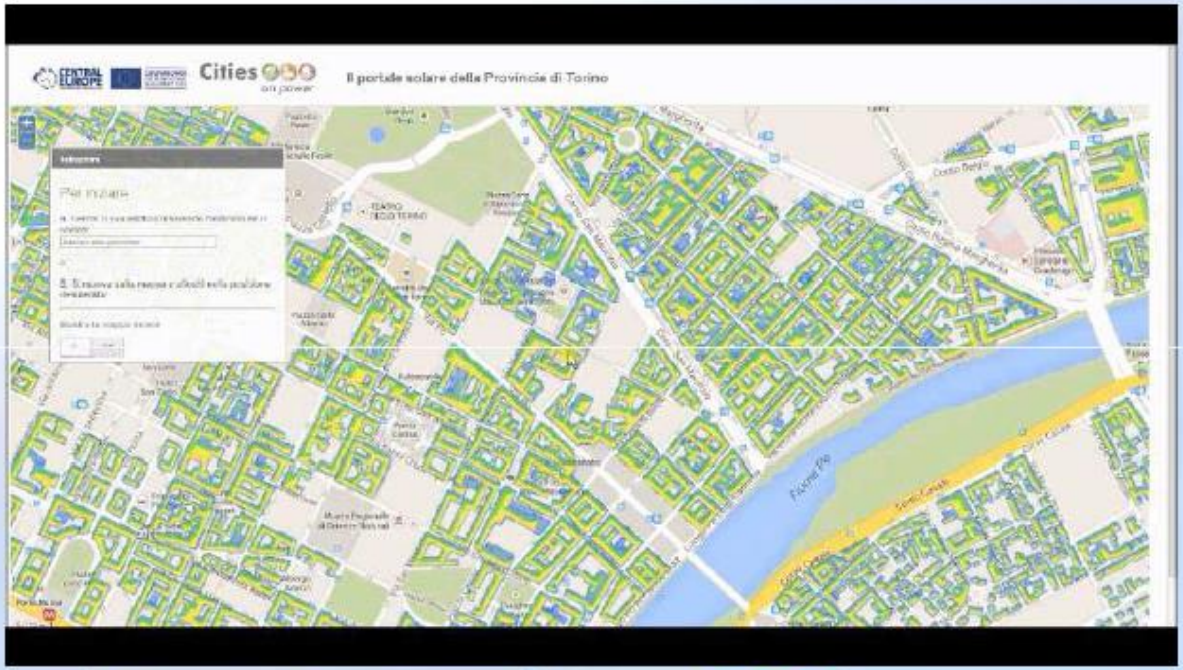
Torino Pro
Energy M

SEAPAlps Sustainable Energy Action Plans

Patto dei Sindaci

Solar and geothermal maps for citizens

PROVINCIA DI TORINO



The user can enter some information about its energy consumption, find its building, introduce renewables, make simulations on environmental-economic results

CENTRAL EUROPE COOPERATING FOR SUCCESS.
EUROPEAN UNION EUROPEAN REGIONAL DEVELOPMENT FUND
This project is implemented through the CENTRAL EUROPE Programme co-financed by the ERDF
Cities on power

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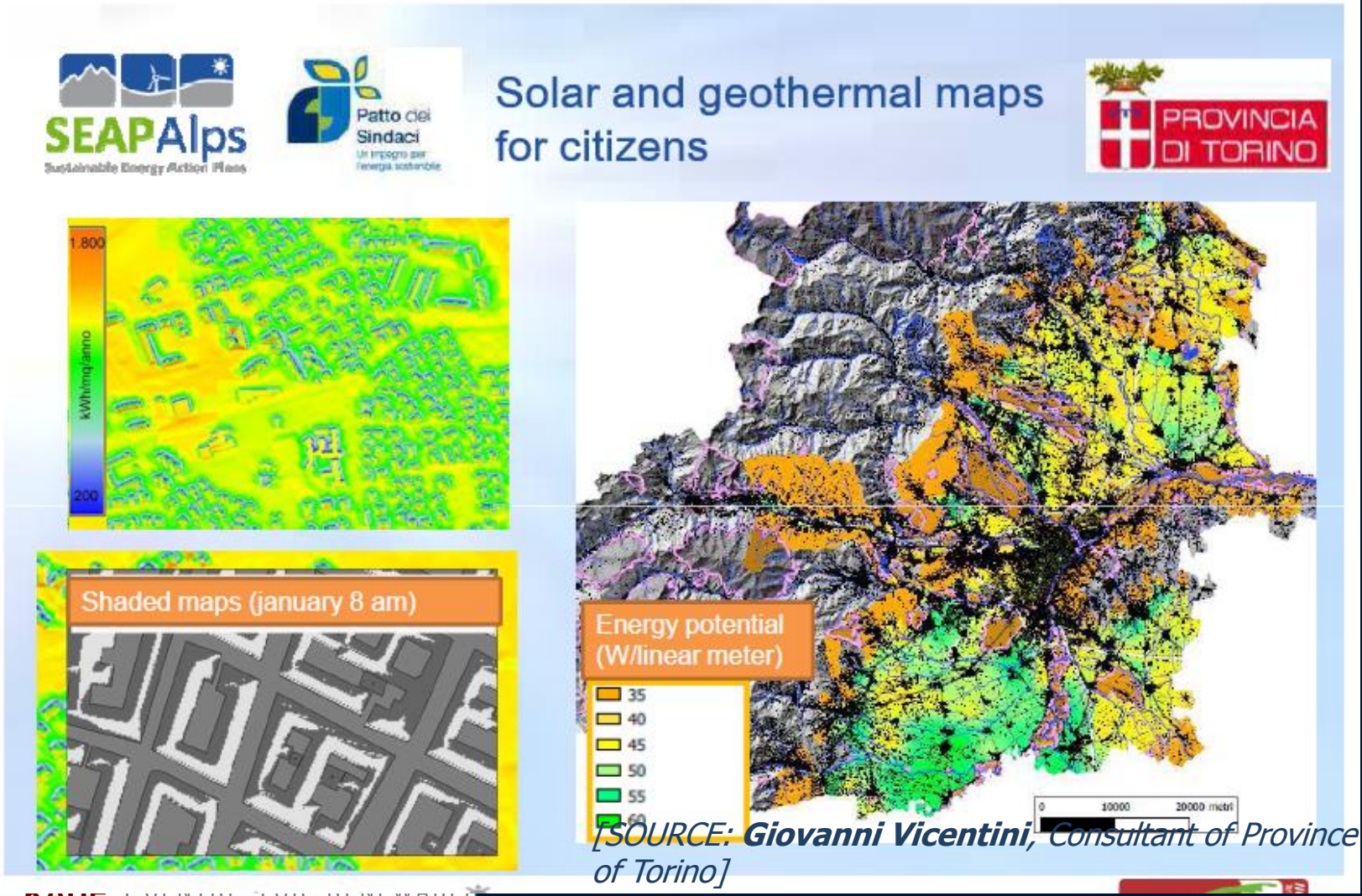
*[SOURCE: **Giovanni Vicentini,** Consultant of Province of Torino]*

Potential Actions: Local/Regional level

Torino Province, Italy
Energy Mapping



*[SOURCE: **Giovanni Vicentini**, Consultant of Province of Torino]*

Potential Actions: Local/Regional level

Torino Province, Italy
Energy Mapping

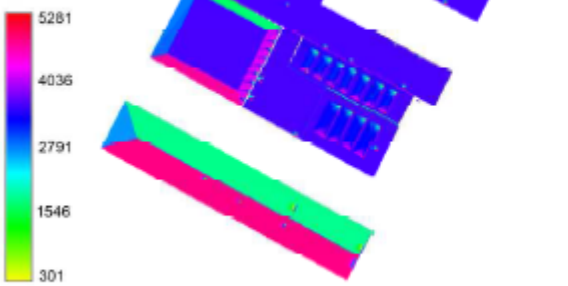
SEAPAlps
Sustainable Energy Action Plans

Patto dei Sindaci
Un impegno per l'energia sostenibile

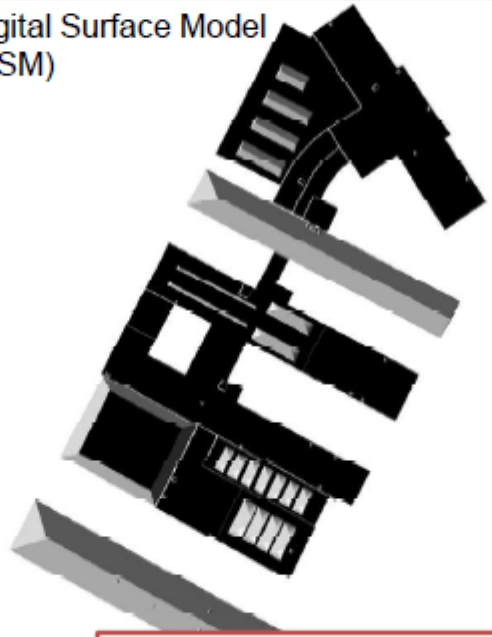
Solar analysis on public buildings

PROVINCIA DI TORINO

Monthly solar radiation (Wh/mq) – Ex: March



Digital Surface Model (DSM)



Avogadro high school (Turin)

Open source softwares:
QuantumGIS
Grass GIS

Survey on selected buildings on potential *installation of PV systems*, followed by a cost-effectiveness analysis (comparison with market conditions, incentives and energy demand of the building)

*[SOURCE: **Giovanni Vicentini**, Consultant of Province of Torino]*

Synergies… Sustainable transport

- improving the energy / environmental performance of vehicles through the use of alternative fuels, eco-driving and so on
- development of urban mobility projects
- implementation of transport studies

- ✓ changing travel/transport habits
- ✓ promoting the use of energy-efficient and environmentally-friendly types of road transport (eg traffic restrictions, speed limits, pedestrian crossings, public transport, bicycle use, etc.).

Synergies… Local RES production

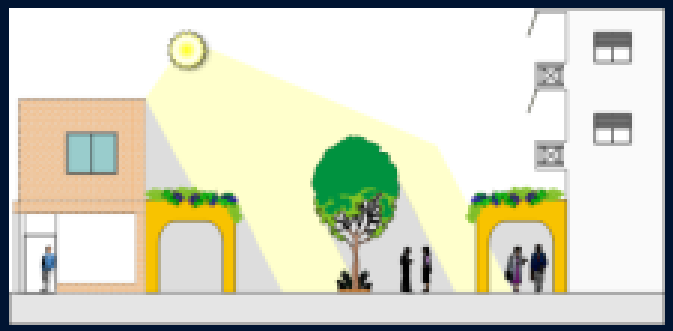
- centrally, at the agglomeration level (i.e. district heating / cooling with biomass or geothermal energy, photovoltaic, wind or other RES electricity systems)
- individually at the block or building level (i.e. passive and active solar systems, geothermal heat pumps, photovoltaic systems embedded in buildings, squares and so on)

Synergies… climate adaptation

Bioclimatic Design of Urban Spaces

Improved conditions resulting in

- ✓ reduced energy load in buildings
- ✓ improved quality of life in cities
- ✓ maximisation of use of open spaces
- ✓ enhancement of activities (recreational, sports, walking etc)
- ✓ reduced use of vehicles



Synergies… climate adaptation

Bioclimatic Design of Urban Spaces

Shading
Materials
Green

Actions: Informing-sensitising building users

Guidelines for Citizens

Conserve energy, save money, improve your living conditions!

Energy conservation tips for households and businesses

✓ Without investing any money:

USE RATIONALLY ELECTRIC APPLIANCES AND EQUIPMENT

- Keep light bulbs, lamps and luminaires free from dust.
- Place the refrigerator away from any heat sources, a a distance 5-10 cm from the wall. Defrost often, do not open the door aimlessly.
- Make sure that the electric oven is well shut and that the pots and pans have are of diameter equal to that of the electric hot plate. Turn off the stove and oven some minutes before the food is cooked.
- Turn off lights and appliances when not needed. Use low general lighting and task lighting where needed.
- Set the electric water heater thermostat up to 50°C and turn it on only when needed.
- Take showers instead of baths and thus save significant amounts of water and energy.
- Do not leave electric appliances in stand-by mode. Switch them off.

USE RATIONALLY HEATING/COOLING/VENTILATION SYSTEMS

- Set thermostat during winter to 18-20°C and in summer to 26-28°C. Make sure the thermostat is accurate and placed in the correct position of the controlled space.
- Keep windows shut when HVAC systems are in operation.
- Avoid using artificial lighting when daylighting is sufficient. Avoid glare (i.e. by using louvers instead of curtains).
- Make sure that maintenance of your systems is carried out at a regular basis.
- Keep track of your energy and fuel consumption (electirity, oil, gas, other fuels).

USE WINDOWS AND BUILDING OPENINGS APPROPRIATELY FOR WINTER SOLAR ACCESS (INSOLATION), SUMMER NIGHT VENTILATION, YEARLY AIR QUALITY

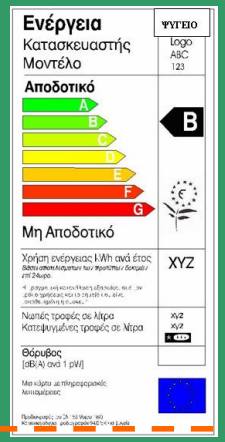
- Provide unobstructed south-facing apertures during winter.
- Moderate ventilation during winter.
- In summertime open windows, vents, and roof openings during the night for natural cooling, ensure adequate air flow through the building interior.

USE SOLAR CONTROL SYSTEMS FOR GLARE CONTROL AND SUMMER SHADING

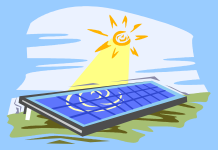
- Operate louvers and shading devices appropriately.

✓ With a low cost investment:

- Seal cracks for control of infiltration heat losses
- Install and/or replace lamps with compact fluorescent lamps (CFL – efficient lighting)
- Install and/or replace domestic appliances with energy efficient ones (using energy labelling – grade A white goods)
- Install ceiling fans
- Install supply/exhaust fans wherever natural ventilation is limited
- Add internal shading systems (i.e. venetian blinds) on south, east and west orientations for glare control and shading
- Plant/use vegetation for climate control (thermal protection, shading/cooling, microclimate moderation)
- Install solar collectors on building roofs for domestic hot water in existing or new buildings
- In your new building, in cooperation with your architect and mechanical engineer apply
  - ✓ bioclimatic architecture, integrating passive heating and cooling components
  - ✓ energy conservation measures and techniques (i.e. heat pumps, earth-to-air-heat exchangers)



Show energy label in your language!



✓ If you are willing to make a significant investment in sustainable energy measures

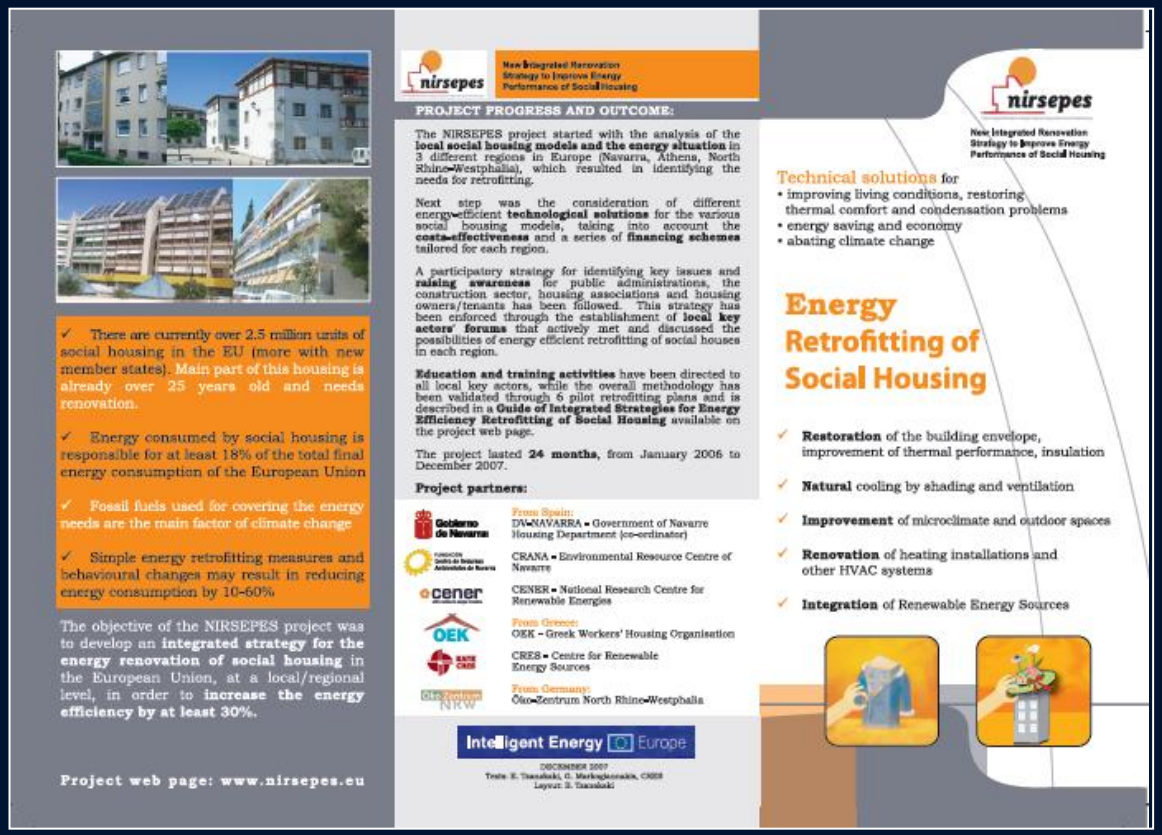
- Apply an integrated energy design for life cycle savings in new or retrofit buildings
- Replace luminaires with energy efficient ones
- Use and/or install control systems (i.e. programmer, room thermostats and TVRs for regulating the heating of building spaces)
- Replace hot water boilers fired with liquid fuels by gas condensing boilers with radiators
- Replace window systems with energy efficient ones (including double glazing and insulating frames)
- Use special glazing (i.e. low-e) wherever appropriate, mostly in tertiary sector buildings
- Install appropriate external shading devices
  - ✓ horizontal devices on south apertures
  - ✓ vertical shading devices (blinds, awnings, louvers) on east and west apertures
- Re-design window systems, install glare-control and other daylighting systems (i.e. light shelves), design spaces for improved daylighting conditions
- Add insulation to the building shell
- Redesign exterior spaces with bioclimatic criteria, control microclimate
- In offices and other tertiary buildings install energy management systems
- Install hybrid cooling systems
- Use district heating for apartment blocks or building complexes
- Use and/or install photovoltaic systems integrated on building roofs, walls, exterior spaces, etc.
- Add/integrate passive solar systems onto existing buildings (sunspaces, Trombe walls, etc.)
- Apply urban planning for energy conservation and RES integration

FOR MORE INFORMATION VISIT..... OR CONTACT (If you have a relevant site or a service for providing guideance to the public)

Actions: Informing-sensitising building users

- Raising awareness and motivating citizens about sustainability issues through:
  - Local **campaigns/ events**
  - Activation of **citizens' groups**
  - Distribution of **targeted questionnaires** related to energy efficiency and renewable energy issues
  - **On-line communication** with citizens and feedback
  - **Informative leaflets** about savings (and sustainability issues)
  - **Press articles** with respect to sustainability applications and projects at local and international level

Actions: Informing-sensitising building users



✓ There are currently over 2.5 million units of social housing in the EU (more with new member states). Main part of this housing is already over 25 years old and needs renovation.

✓ Energy consumed by social housing is responsible for at least 18% of the total final energy consumption of the European Union

✓ Fossil fuels used for covering the energy needs are the main factor of climate change

✓ Simple energy retrofitting measures and behavioural changes may result in reducing energy consumption by 10-60%

The objective of the NIRSEPES project was to develop an **integrated strategy for the energy renovation of social housing** in the European Union, at a local/regional level, in order to **increase the energy efficiency by at least 30%.**

Project web page: www.nirsepes.eu

nirsepes

New Integrated Renovation Strategy to Improve Energy Performance of Social Housing

PROJECT PROGRESS AND OUTCOME:

The NIRSEPES project started with the analysis of the **local social housing models and the energy situation** in 3 different regions in Europe (Navarra, Athens, North Rhine-Westphalia), which resulted in identifying the needs for retrofitting.

Next step was the consideration of different energy-efficient **technological solutions** for the various social housing models, taking into account the **costs-effectiveness** and a series of **financing schemes** tailored for each region.

A participatory strategy for identifying key issues and **raising awareness** for public administrations, the construction sector, housing associations and housing owners/tenants has been followed. This strategy has been enforced through the establishment of **local key actors' forums** that actively met and discussed the possibilities of energy efficient retrofitting of social houses in each region.

Education and training activities have been directed to all local key actors, while the overall methodology has been validated through 6 pilot retrofitting plans and is described in a **Guide of Integrated Strategies for Energy Efficiency Retrofitting of Social Housing** available on the project web page.

The project lasted **24 months**, from January 2006 to December 2007.

Project partners:

From Spain:
DA-NAVARRA - Government of Navarre Housing Department (co-ordinator)
CRANA - Environmental Resource Centre of Navarre
CENER - National Research Centre for Renewable Energies

From Greece:
OEK - Greek Workers' Housing Organisation
CRES - Centre for Renewable Energy Sources

From Germany:
Öko-Zentrum North Rhine-Westphalia

Intelligent Energy Europe

DECEMBER 2007
Texts: E. Tsanaklaki, G. Markogiannaki, CRES
Layout: E. Tsanaklaki

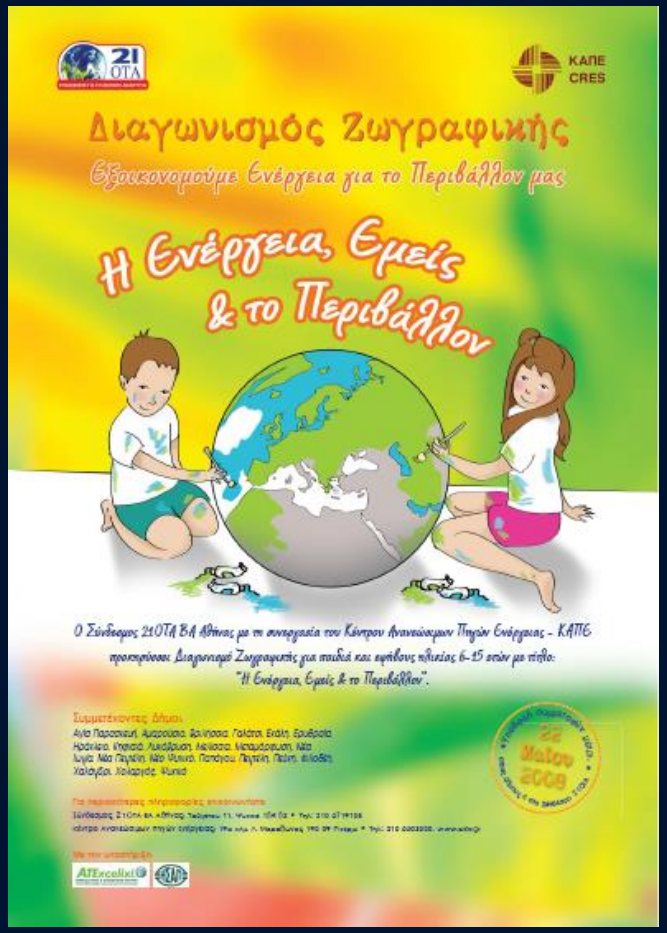
nirsepes

New Integrated Renovation Strategy to Improve Energy Performance of Social Housing

Technical solutions for
- improving living conditions, restoring thermal comfort and condensation problems
- energy saving and economy
- abating climate change

Energy Retrofitting of Social Housing

- **Restoration** of the building envelope, improvement of thermal performance, insulation
- **Natural** cooling by shading and ventilation
- **Improvement** of microclimate and outdoor spaces
- **Renovation** of heating installations and other HVAC systems
- **Integration** of Renewable Energy Sources



- Promotional activities

Brochures, events, competitions….

Actions: Informing-sensitising building users

- Participation Events, discussions….

some conclusions…

Multi-level and multi-sector approach

- Local/regional/national/international
- Mobilise all communtiy actors
- Build on experiences from others
- Talk/listen/integrate
- Be creative

Thank you for your attention!

Evi Tzanakaki

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