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Towards the incorporation of the energy spot of buildings in the property market The case of Greece

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Introduction

Greece has repeatedly delayed the implementation of the European energy regulations and today is one of the last countries concerning the harmonization with the European legislation.

Starting from the enactment of the Energy Performance of Buildings Regulations (KENAK), the concept of the energy of the buildings of the residential and the tertiary sector changed:

- New technical specifications harmonized with the European legislations were established for the old and the new buildings.
- Energy inspections and studies
- Subsidized programs

Introduction

This study aims to:

- Describe the state-of-the-art of regulation reforms and the corresponding applied steps concerning the energy issue of buildings
- Describe the technical specifications and the target of the training energy seminars
- Propose improvements and motivations for the optimal application of the relevant regulations in accordance with the international policies
- Discuss the impact of the energy spot of each building in the broader property market

State-of-the-art of regulation reforms

The main historic phases up to the enactment of the Energy Performance of Buildings Regulations (KENAK) are three:

1. **Prior to 1979**
   - No regulation about the thermal insulation of buildings
2. **1979 - 2010**
   - Building thermal insulation regulation (incomplete implementation) → significant energy losses
   - Delayed implementation of the European Directive EPBD 2002/91
3. **2010 - today**
   - The KENAK was legislated (law 3661/2008)
   - Revision of the European directive 31/2010 → Incorporation of the energy performance through the law 4122/2013:
     - Minimum energy performance requirements to achieve optimal levels of costs
     - "Nearly zero energy" for the new public buildings by the end of 2020

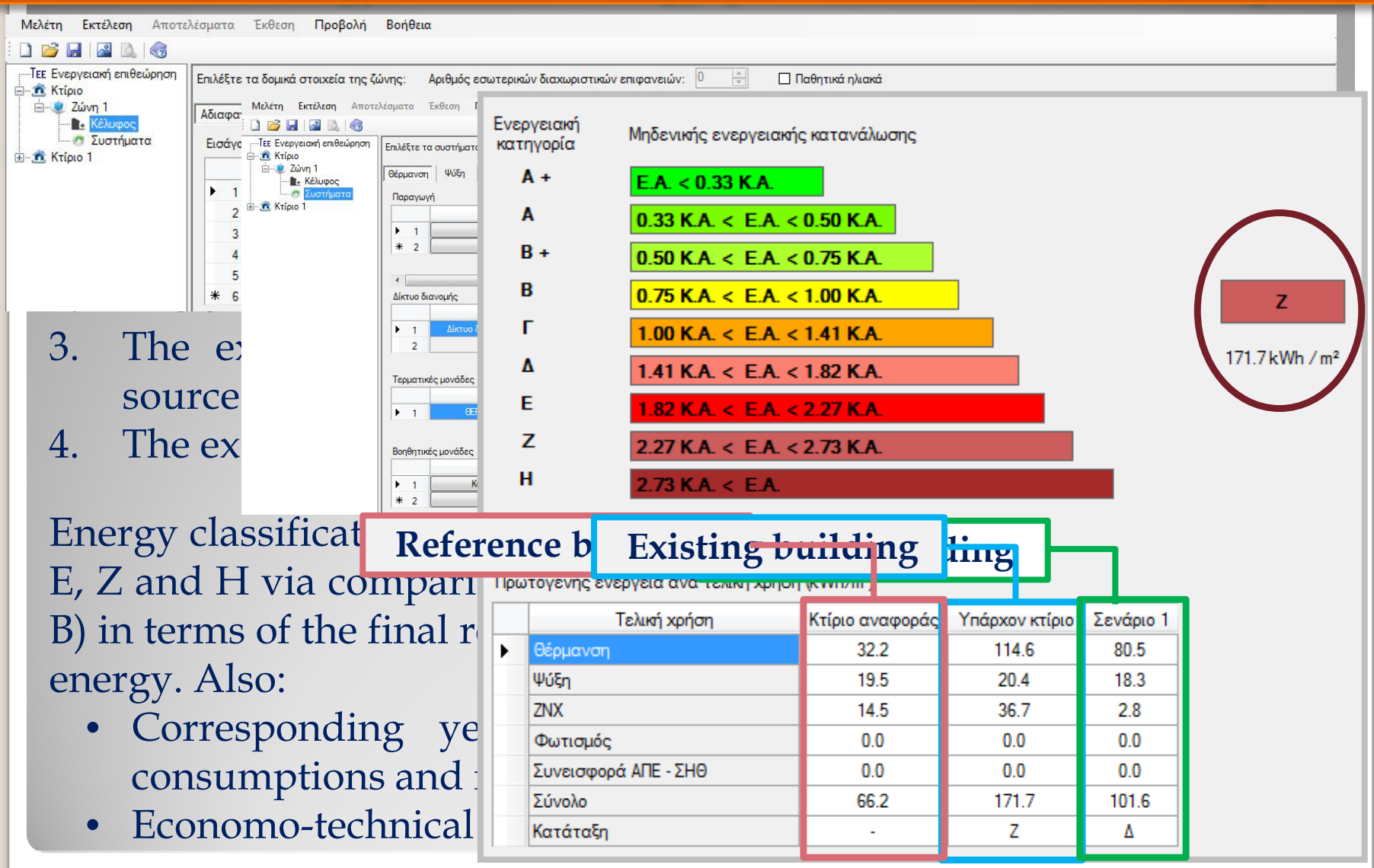
In the study process

Technical Specifications

For the full implementation of the KENAK, the corresponding writing group of the Technical Chamber of Greece (TEE) wrote four technical instructions TOTEE:

1. **TEE, 2010a**: Detailed national specifications for calculating the energy performance of buildings and the issuing of energy performance certificates (EPCs)
2. **TEE, 2010b**: Thermophysical properties of building materials and the necessary check of the thermal efficiency of buildings
3. **TEE, 2010c**: Climatic data of four divided zones of Greece
4. **TEE, 2010d**: Instructions and forms for the energy inspections of buildings, boilers and heating and air conditioning systems

Methodology for the energy performance of buildings



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- Corresponding ye
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- Economo-technical

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Education – Training seminars

- Energy inspectors are able to implement energy inspections and studies based on the presidential decree 100/6/10/2010
- In early 2011, the first building energy inspections and studies were carried out for the first time in Greece
- At the October, 2011 the training seminars of the energy inspectors, (implemented by approved operators), were established for all the specialties of engineering (and not only) → The recent legislation (4409/2016) redefines the required qualifications for the energy inspectors of buildings
- The training seminars aim to:
  - The familiarity and then to the in-depth investigation of the energy issue for the buildings and the heating and a/c systems
  - Introduce the energy inspectors at the existing legislation on energy studies and KENAK and to the corresponding European energy policies

Energy mapping of the Greek residential sector

During the 1990s, the final energy demand increased by 27.4% in the Greek residential and tertiary sector buildings

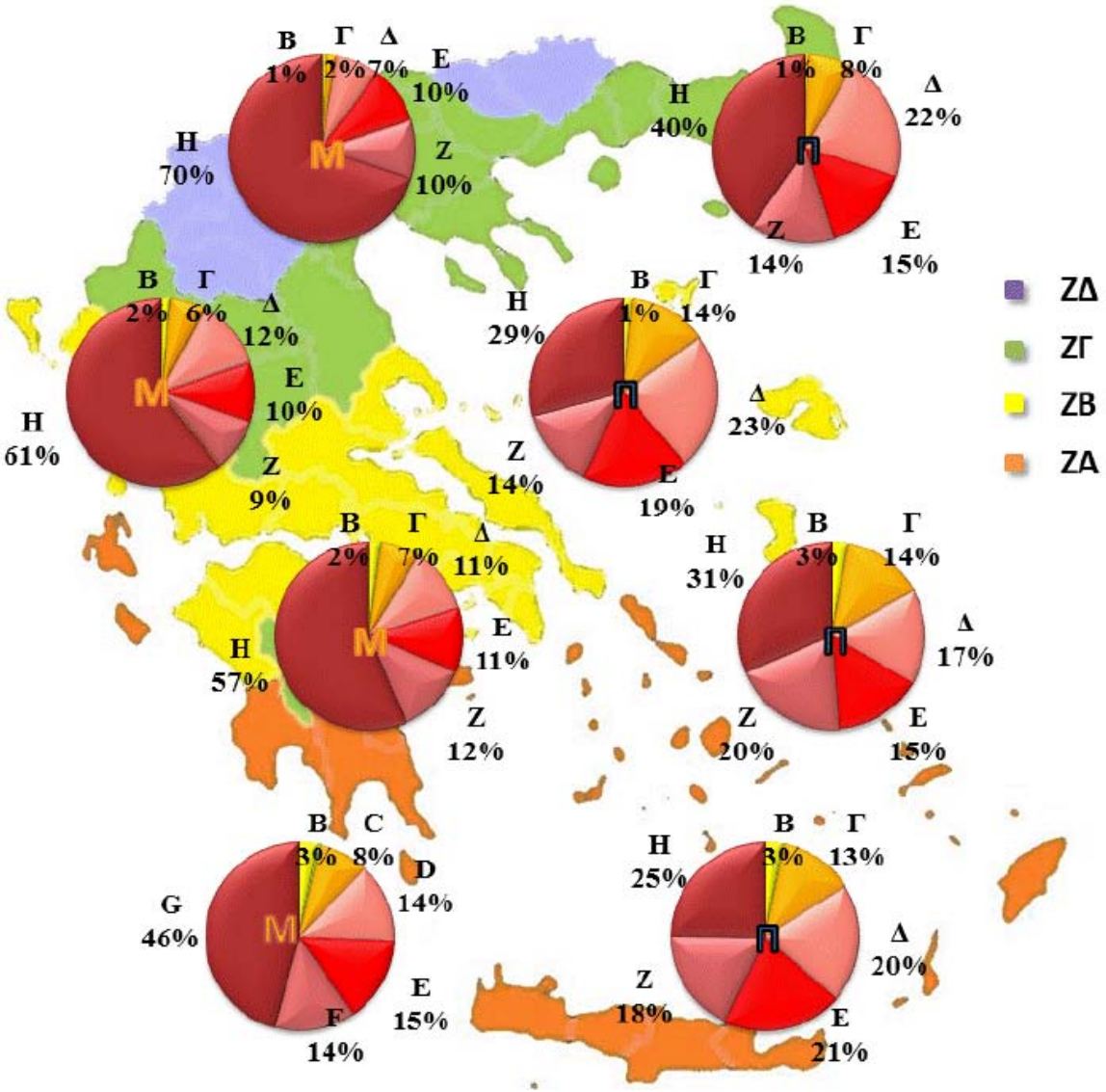
For the period up to 2020, the European energy policy is focused on achieving specific individual targets for all the Member-States. For Greece:

- Decrease by 4% of the greenhouse gas emissions for all the sectors except the commercial compared to the corresponding of 2005
- Exploitation by 18% of the renewable energy sources to the gross final consumption → Through the law 3581/2010, 20% was achieved

Based on the European directive 2012/27/EE, Greece harmonized its energy policy setting as target the reducing of its energy consumption in the period of 2014-2020 → **Energy conservation in the building sector**

- Energy service companies (ESCO),
- Energy efficiency and financing agreements from third parties (TPF),
- "Green Loans" from banks

Energy mapping of the Greek residential sector



Distribution of the energy classes of the detached houses (M) and block of flats (Π) in Greece per climatic zone (2015)

Dominant classes Z and H

- 60% of Greek buildings constructed at 1st phase
- Old electromechanical systems
- 60% oil for the thermal energy needs while gas only 7.4%.
- 74.5% electric water heaters for the hot water for use while solar water heaters 37.6%

Potential to reduce the energy consumption via energy interventions

Motivation for the implementation of KENAK

Policy measures of National Energy Efficiency Action Plan/2014 Policy:

Policy measure	Duration of implementation	Calculated final energy conservation (ktoe)
M1 - Program "Conservation at Home"	2011-2015	83.8
M4 - Energy upgrading of buildings	2015-2020	239.5
M5 - Energy upgrading of public buildings	2015-2020	12.8
M9 - Education and training schemes to managers in the tertiary sector	2015-2020	76.8
M17 - Netting of fines of illegal buildings with energy interventions	2014-2020	107.8

The subsidized programs (e.g. “Conservation at home”) were an important movement through which incentives for homeowners, prospective buyers or investors were provided

The motive of the “Special Photovoltaic Development Program Power Systems to 10 kWp in buildings” was the high price of electricity produced by the P/V systems

Motivation for the implementation of KENAK

Enhancements and motivations for the further improvement of this effort under a unified policy framework and structural reforms are proposed. Some of these improvements are:

- ✓ The fully mandatory energy audit of consumption and devises during the energy inspections → Reliable policies and interventions and comparisons in terms of cost-benefit
- ✓ Establishment of the training of the energy inspectors of heating and air conditioning systems
- ✓ Creation of new specialties in the secondary and post-secondary education as technical assistants
- ✓ Intergraded solutions utilizing alternative forms of energy such as district heating or biomass in entire city blocks or cities
    - Intergraded active solar systems based on renewable energy sources
    - Use of cogeneration systems of electricity and heat
    - Exploitation of the daylight

Incorporation of the energy spot of buildings in the property market and conclusions

All over Europe, the buildings account for the largest proportion of energy consumption and carbon emissions. Greece seems that goes in this direction and is synchronized with this European energy policy

Having already this background, a further step may be done incorporating the energy spot of buildings in the property market as an additional indicator to the various properties such property price, area, geospatial position, etc

- ✓ Most complete and representative overview of each building → Reliable conclusions by homeowners, potential buyers or tenants
- ✓ Cadastral and urban planning offices or other national or local institutions may exploit this integrated information
- ✓ Incorporation to sophisticated 4D and 5D multi-dimensional land information systems
- ✓ Attractive financing programs or "green" investment funds may:
  - **Mobilize the market** e.g. activation of the technical professions, creation of new jobs, reinforcing of the commercial sector, raising interest of the investors, etc
  - **Bring significant social and economic benefits** to the state

Thank you for your attention !