Twinning « Improvement of the Energy Efficiency in Turkey »

CLOSING EVENT on Tuesday, 20th Nov. 2007

Building sector:
Situation, Challenges and New Ways for Action

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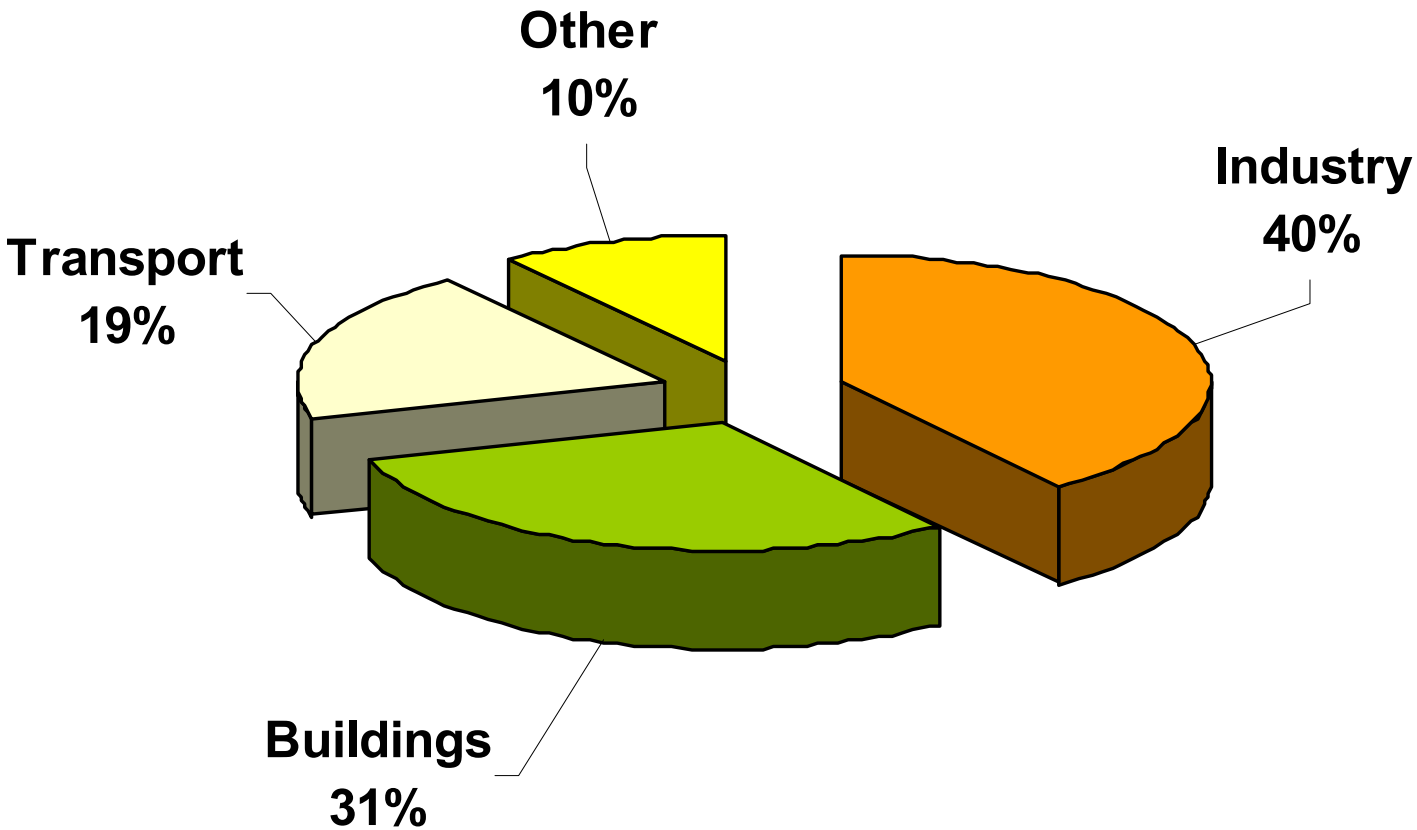
Situation

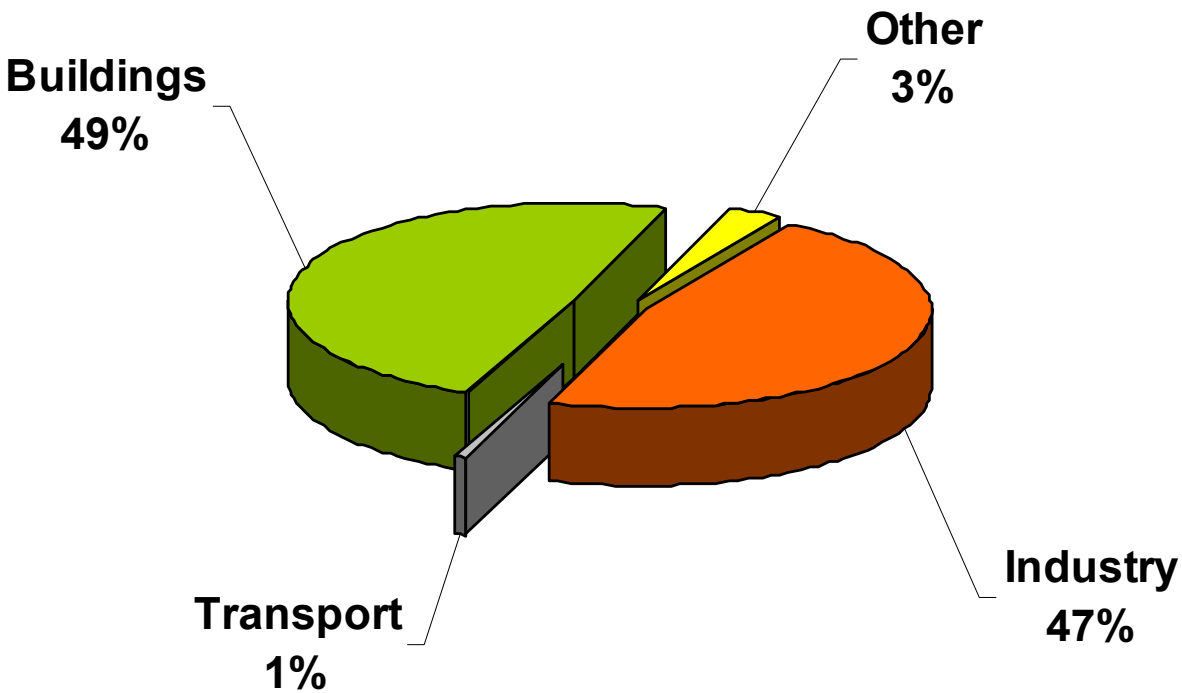
Final Consumption by Sectors (2006)



77,6 million toe

Situation

Electric Consumption by Sectors (2006)



142216 GWh

Situation

Key Figures, Buildings, Energy, Households

- 8,7 Millions Buildings, 86% Residential
- 17 millions households, 64% urban (2005)
- 400 000 m^2 new dwellings in year 2005
- Mean area of Urban Dwelling 82 to 113 m2
- Energy 16% of household budget (2002)
- Gas networks expanding fast to more cities
- Uncertainity about energy pricing after 2010-3
- Privatization of Regional Electricity Distribution networks launced

Situation

Sustainable Construction

- Today oil at 100$/barrel….
- Gas price & electricity prices will increase
- Life of a building is 50 – 100 years
- Comfort expectations are increasing
- Innovation and anticipation is a must
- For less cost, less pollutions, more local jobs

Energy saving potential:
in new buildings: 300 million US $ (~11,2 GWh)
in existing buildings: 2 billion US $ (~138 GWh)

Energy Efficiency Law
May 2, 2007

Article 7, paragraph a, item 2

The management, or in its absence the owners, of commercial buildings, service buildings and public sector buildings with at least **twenty thousand square meters of construction area** or **with annual energy consumption at five hundred toe** or more shall appoint an energy manager or procure service from energy managers.

Energy Efficiency Law
May 2, 2007

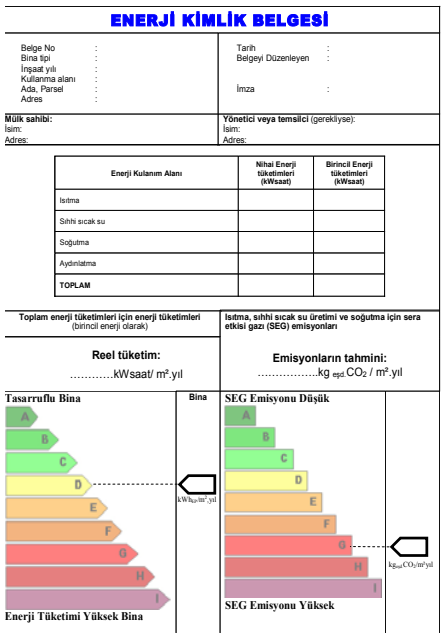
Article 7, paragraph d

A regulation to be jointly prepared by theTurkish Standards Institute and the General Directorate and issued by the Ministry of Public Works and Housing shall lay down **the principles and procedures for the energy performance criteria,** data collection and control procedures on architectural design, heating, cooling, heat insulation, hot water, electrical installation and lighting to be used in buildings used for residential purposes with total construction surface areas as indicated in the regulation, commercial buildings and service buildings.

In case of acts contrary to the provisions of the regulation, the **relevant administration shall not permit the utilization of such buildings**.

Concept for Standardization related to Energy Performance Regulation

Annual Primary Energy and CO_2 Emission



ENERJİ KİMLİK BELGESİ

Belge No :
Bina tipi :
İnşaat yılı :
Kullanma alanı :
Ada, Parsel :
Adres :

Tarih :
Belgeyi Düzenleyen :
İmza :

Mülk sahibi:
İsim:
Adres:

Yönetici veya temsilci (gerekliyse):
İsim:
Adres:

Enerji Kullanım Alanı	Nihai Enerji tüketimleri (kWsaat)	Birincil Enerji tüketimleri (kWsaat)
Isıtma		
Sıhhi sıcak su		
Soğutma		
Aydınlatma		
TOPLAM		

Toplam enerji tüketimleri için enerji tüketimleri (birincil enerji olarak)

Reel tüketim:
.....kWsaat/ m².yıl

Isıtma, sıhhi sıcak su üretimi ve soğutma için sera etkisi gazı (SEG) emisyonları

Emisyonların tahmini:
.....kg $_{eşd}CO_2$ / m².yıl

Tasarruflu Bina
A
B
C
D
E
F
G
H
I
Enerji Tüketimi Yüksek Bina

Bina
$kWh_{EP}/m^2.yıl$

SEG Emisyonu Düşük
A
B
C
D
E
F
G
H
I
SEG Emisyonu Yüksek

$kg_{eşd}CO_2/m^2.yıl$

- **Heating Needs**
- **Ventilation, Cooling Demand**
- **Hot Water Needs**
- **Lighting Needs**

Energy Performance Certificate

Challenges

Energy Policy: Major Driving Forces

- Security of supply
- Climate change
- Price of energy
- Competitiveness

Construction costs:

- new construction
- renovation
  +
  retrofitting
- Renewables

Identified barriers

- ✓ **Lack of interest, lack of awareness of the advantages,**
- ✓ **Lack of knowledge / technical competence of the decision-maker,**
- ✓ **Lack of technical solution**
- ✓ **Financial issues**
  - No (or too limited) direct financial advantage for the considered actor

    (e.g. energy bill not paid by the considered decision-maker, not possible to increase the asked rent of the considered building),
  - No (or too limited) indirect financial advantage for the considered actor

    (e.g. increase of the building value)
  - No budget to realize the works,
  - Limited or no added value for the building.

- ✓ **Limitation related to the decision mechanism**
  - Impossibility to obtain a common agreement on an investment in case of different decision-makers – decision mechanism.

Motivations of the actors

- Identified positive motivations
  - Financial issues
    - Reduction of the heating costs
    - Increase of the building value
    - Possibility to ask for a higher rent for the building
    - Benefit of subsidies (possible in the future)
  - Getting a better certificate for the building
  - Obtaining a better comfort in the building
  - ...

Actions to be accomplished

Main features

Implementation of EPBD

To develop :

- Energy Performance **calculation procedure**(s)
- Requirements for all **new buildings**
- Requirements for (major) **renovations**
- Energy Performance **certification** of all buildings
- Mandatory **inspection** of boilers & AC systems

Actions to be accomplished

- The implementation of the EPBD-measures on inspection and certification will influence the ESCO business!
  - More building audits will made
  - Higher degree of information on energy issues in buildings
  - NOT necessarily: Improvement of buildings

Actions to be accomplished

sing substantial energy savings in buildings

- It is necessary to elaborate supporting measures in the existing building stock

  The supporting measures aims to

  - overcome barriers
  - create incentives

- Identify the measures require to consider:
  - The building type
  - Climate zone, heating&cooling degree days, solar irradiations
  - The concerned actors and their motivations
  - The cost of implementation

Actions to be accomplished

Making decision to improve…

- Individual decision for changing windows to double glazing, new fridge class A, dual water washing machine…..
- Joint Ownership for thermal rehabilitation, collective solar water heater
- Municipality or association for district heating, urban renovation programmes...

Actions to be accomplished

Thermal Standard for Buildings TS 825

⇒ Extend in a short term, the thermal standard to the limitation of cooling loads.

⇒ Review the existing climatic zones by taking into considerations the climatic conditions for summer.

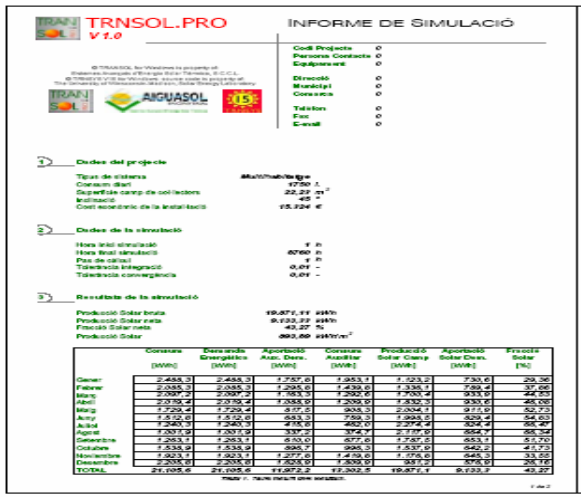
⇒ Update outdoor design conditions (winter and summer) for the most important of the 270 meteorological stations in Turkey.

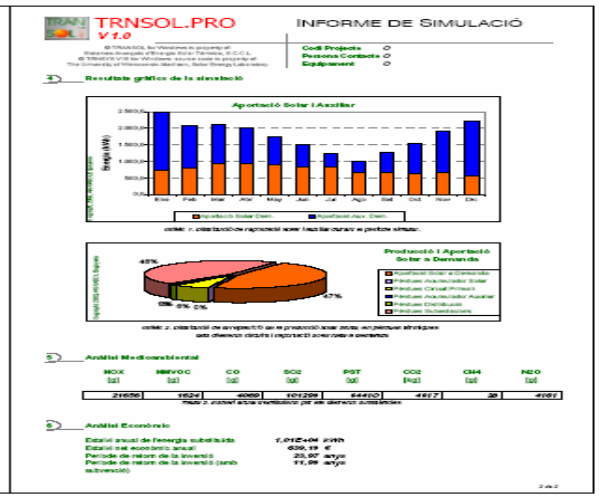
⇒ in the medium term, Energy Efficiency Building Code (EEBC) should be developed to cover all energy uses in the building (related lighting, heating, ventilation, cooling systems, heating water service and energy management).

Actions to be accomplished

iciency Design and New Technologies

- Capacity Building and R&D
  - Design Tools, Guides
  - Software, Algorithms
  - Guidelines, Evaluation, Monitoring/Benchmarking





- Introduce new technologies in:
  - Building Envelope (window, walls)
  - HVAC, Lighting
  - Building Management System
  - Efficient Appliances

Recommendations

Types of Data Sought for Further Analysis

- **Survey** for a sample of households (income level stratified)
- **Actual** annual household expenditures for energy
- **Estimate** of rehabilitation costs for buildings
- Households survey of **Willingness to Pay & to Borrow** in relation to incomes, costs and expected savings from energy efficiency improvements.

EVALUATION of RECOMMENDED EE MEASURES
AVERAGE APARTEMENT 94 m_2 ANKARA in a 5 levels Building

Measures to be applied	Cost estimate	Savings	*Existing heating system* ***Annual cost in TRY***		
			Fuel		*Gas*
Pay back in years if			3140		**908**
Double-glazing	1755 TRY/flat	12%	*4,7*		***16,1***
Insulation of walls	2940 TRY/flat	28%	*3,3*		***11,6***
Insulation of roof	2444 TRY/5flats	21 % top	*3,7*		***12,8***
Insulation of floor	1598 TRY/5flats	14 %floor	*3.6*		***12.6***
Thermostatic w. valves	240 TRY/flat	3%	*2,5*		***8,8***
Interior temperature lower if insulation: 22C > 20C	No cost	14 %			
Total all measures combined	**5743** TRY/flat	50,5 %	*3,6*		***12,5***
Solar Water Heater for 200 l/day	1200 TRY/flat	2760 kWh/y	*3,2*		*9.1*

Summing up: Recommendations

- Demonstration project(s) in existing buildings.
- Decentralized financing mechanisms, at municipal level and with cooperation of banks hopefully, as required especially for poor people in thermal rehabilitation of buildings
- Market survey “Availability and Cost of Energy Efficiency Technologies for thermal rehabilitation”.
- Monitoring campaign in dwellings.
- Energy saving potentials in residential and tertiary buildings.

Summing up: Recommendations

- New structure of tariffs, power term for commercial and residential buildings to mitigate peak load due to AC,
- Joint training for architechts & engineers about EE design and thermal rehabilitation,
- Advisory offices for RE&EE in buildings (Municipalities etc.)
- Energy saving contracting by ESCOs for public buildings,
- Mandated targets for realising EE potential in public buildings and rehabilitation programs.

Thank you for your attention…