Overview of the Turkish Energy Sector

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Context

- Energy Outlook of Turkey
- Renewable Energy
- Energy Efficiency
- Conclusion

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Energy Outlook of Turkey

- Sixth biggest economy in Europe.
- Fast recovery after the global financial crisis: **8,9% GDP growth in 2010**
- Import dependency : **74 %**

- Sixth biggest electricity market in Europe.
- Annual demand increase of Turkey : **4,6% since 1990**

  (Annual demand increase of the EU: **1,6%**)
- Annual primary energy demand of Turkey is expected to increase around **5%.**
- **Electricity demand to increase annually 6,7% (low case scenario) or 7,5% (high case scenario) untill 2020**
- Investment required more than **$ 130 bl.** Up to **2023.**

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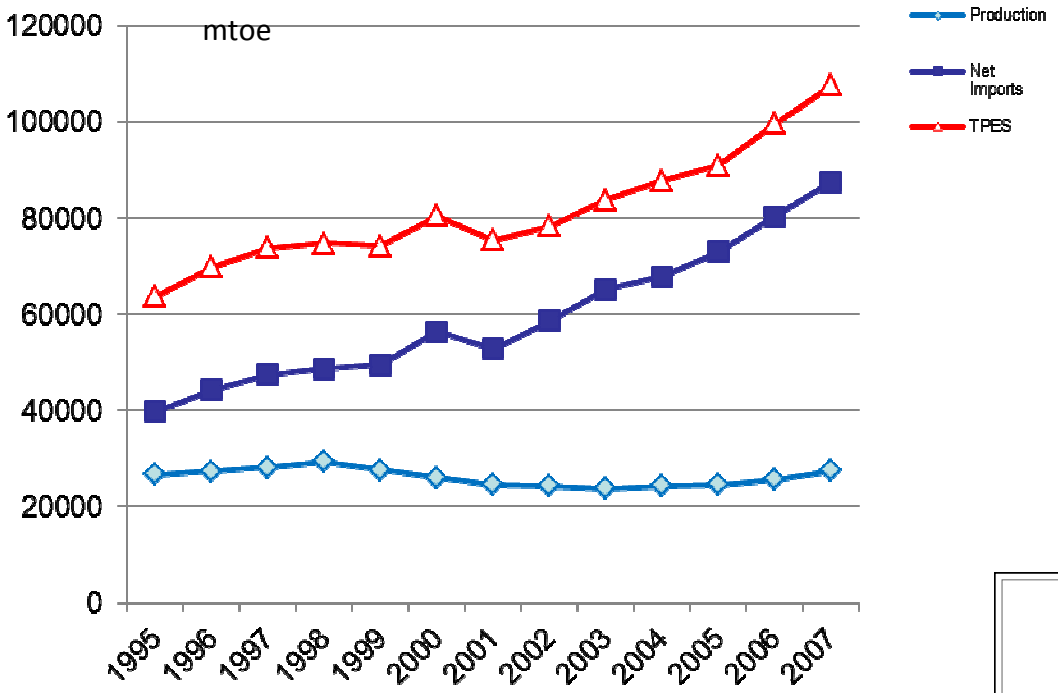
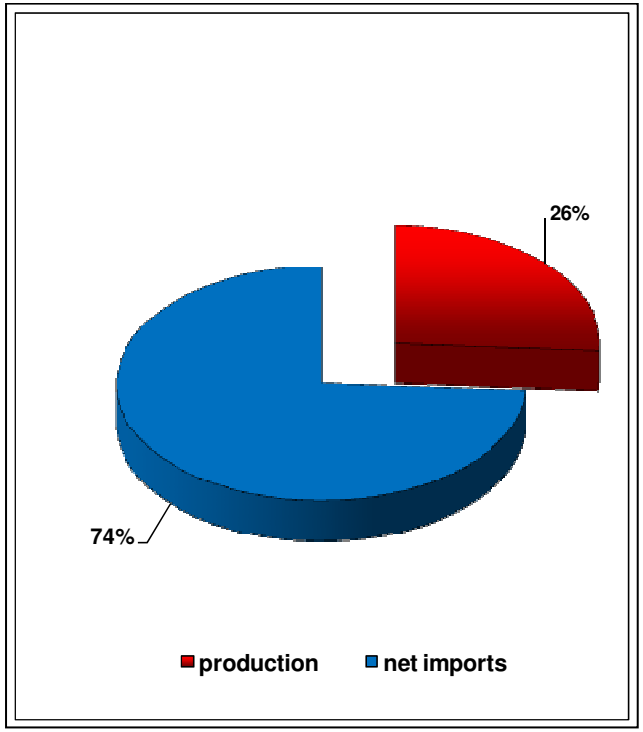
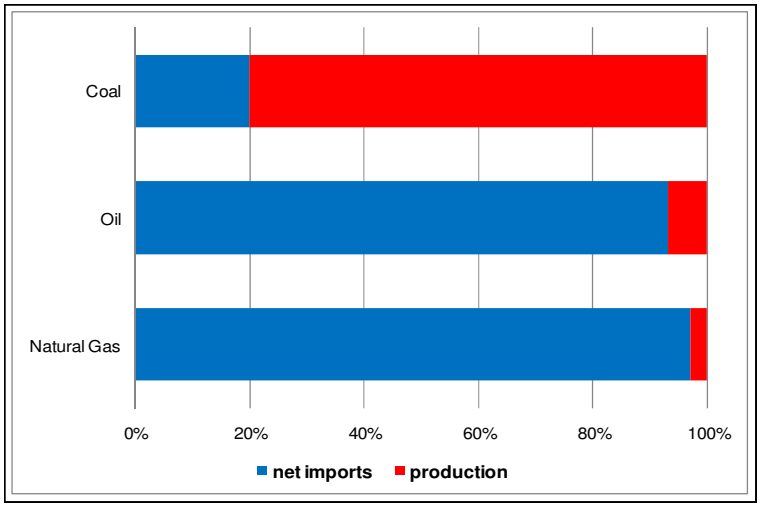
Import Dependency







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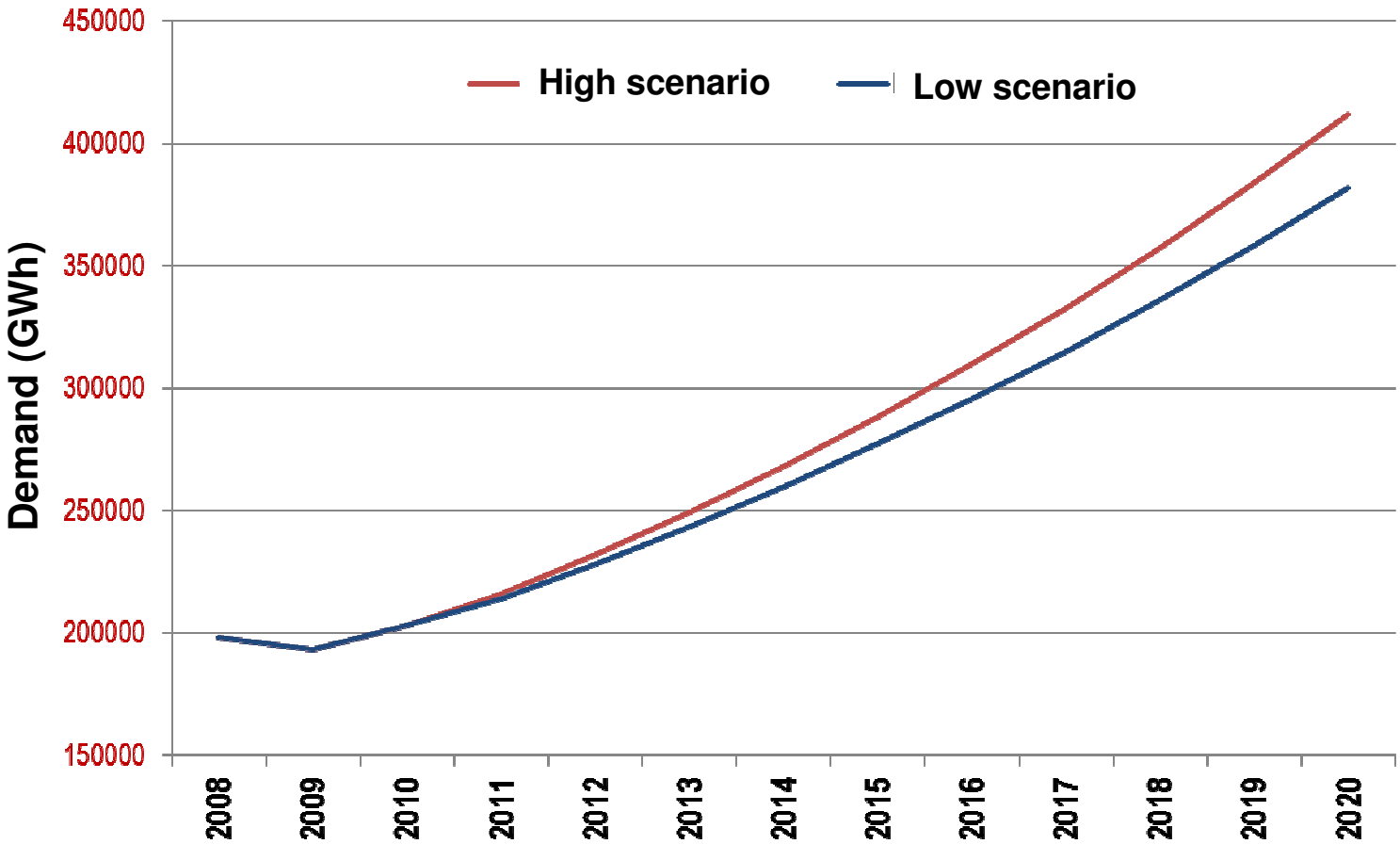
Electricity Demand Projections



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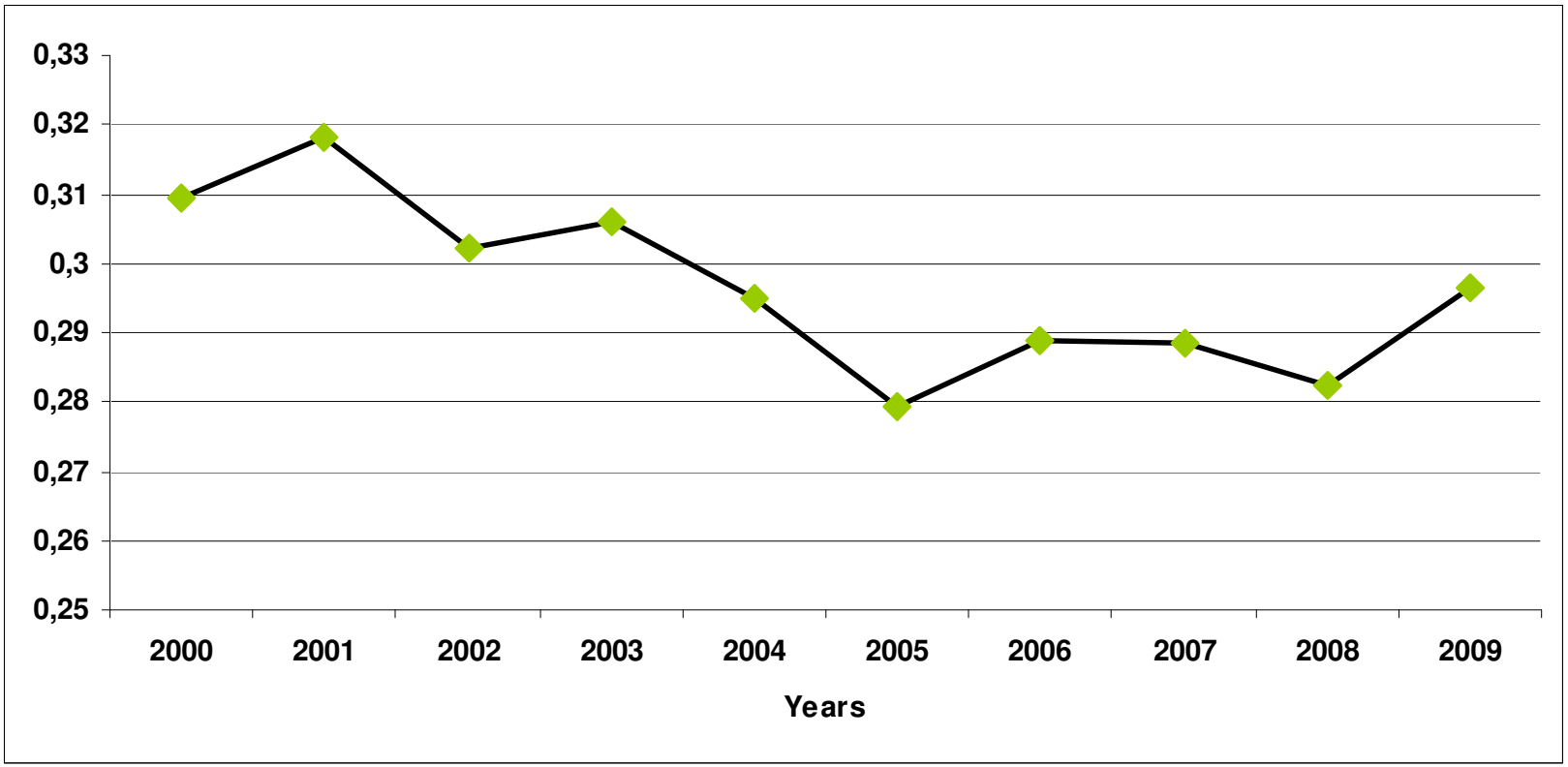
Primary Energy Intensity



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Turkish Energy Sector
"Main Characteristics"

- Rapid growth in demand :
  - investment challenges and opportunities
  - the role for competitive markets
- High level of import dependency:
  - further role for development of indigenous resources, in particular the renewables, and diversification
- Relatively high figures for energy intensity :
  - potential for improvement of energy efficiency

  (but also linked to the structural issues related to economy)

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Turkey's Energy Resource Potential

Resource	Potantial
Lignite	11,45 billion ton (poor calorific value: 1200 k/kg, high ash contet, humidity, CO2)
Hard coal	1,34 billion ton
Asphaltite	82 million ton
Petroleum	6,72 billion barrel
Natural Gas	21,86 billion m3
Hydraulic	160 000 GWh/y, about 17.000 MW operational, another 15.000 under construction
Wind	48.000 MW; 1700 MW operational, about 2500 under construction
Geothermal	31.500 MWt (600 MWe sutitable for electricity generation) 99,6 MW operational, 127,5 MW under construction, 66,9 to be licensed
Biomass	8.6 MTOE, 15,6 MW opetational
Solar	35 MTOE (380 billionr kWh/y tehnically equal to 56.000 MW thermal PP)

Major Policy Developments
"Legislative Framework"

- 2001
  - Electricity Market Law (No:4628)
  - Natural Gas Market Law (No:4646)
- 2003
  - Petroleum Market Law (No:5015)
- 2004
  - Strategy Paper as Road Map of the Electricity Market Reform & Transition
- 2005
  - LPG Market Law (No: 5307)
- 2005
  - Law on Utilization of Renewables in Electricity Generation
- 2007
  - Energy Efficiency Law (No:5627)
- 2007
  - Geothermal Law (No:5686)
- 2007
  - Nuclear Investments Law (No:5710)
- 2008
  - Significant Amendments to the Electricity Market Law (No:5784)
- 2010
  - Amendments to the Law on Utilization of Renewables in Electricity Generation
- 2009
  - Strategy Paper on Electricity Market & Security of Supply
- 2012
  - Strategy Paper on Energy Efficiency

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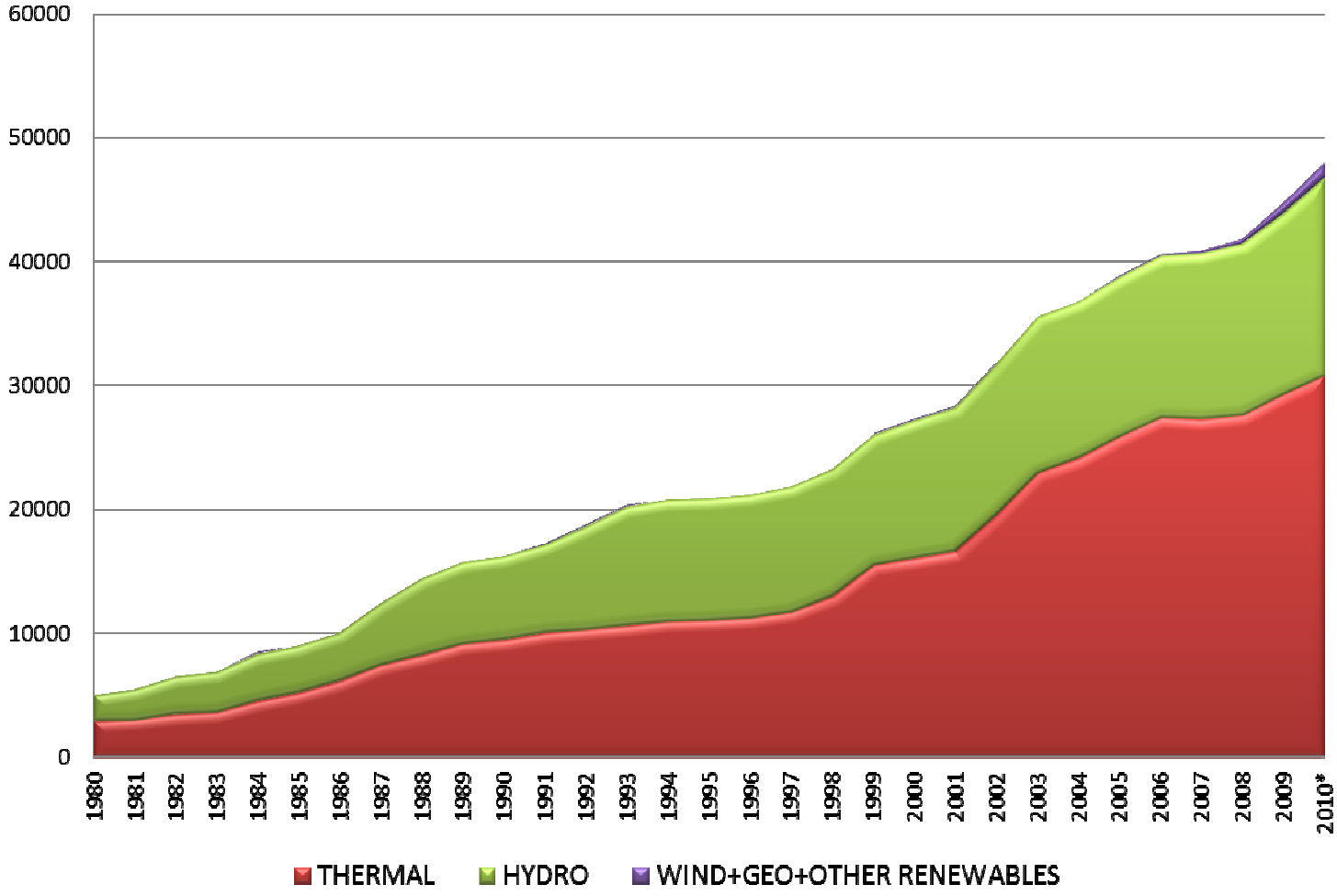
EVALUTION OF INSTALLED POWER 1980-2010



Electricity Market & Security of Supply Strategy Paper (1)

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"Main Objectives"

- **Security of Supply and Market design**
  - the new balancing and settlement regime
  - day ahead market
  - capacity mechanisms
  - optional tendering mechanisms
- Program for **distribution and generation privatisation**
  - Distribution ➔ almost completed by the end of 2010
  - Generation ➔ commencement in 2009
- Targets for the **electricity generation mix by 2023**
- **Interconnections**

Electricity Market & Security of Supply Strategy Paper (2)

MINISTRY OF ENERGY AND NATURAL RESOURCES REPUBLIC OF TURKEY

Targets for the electricity generation mix by 2023:

- renewables in electricity generation ➔ at least %30
  - wind installed capacity ➔ 20.000 MW
  - geothermal installed capacity ➔600 MW
- introduction of nuclear power by 2020 ➔ at least %5
- utilization of the remaining hydro and lignite reserves

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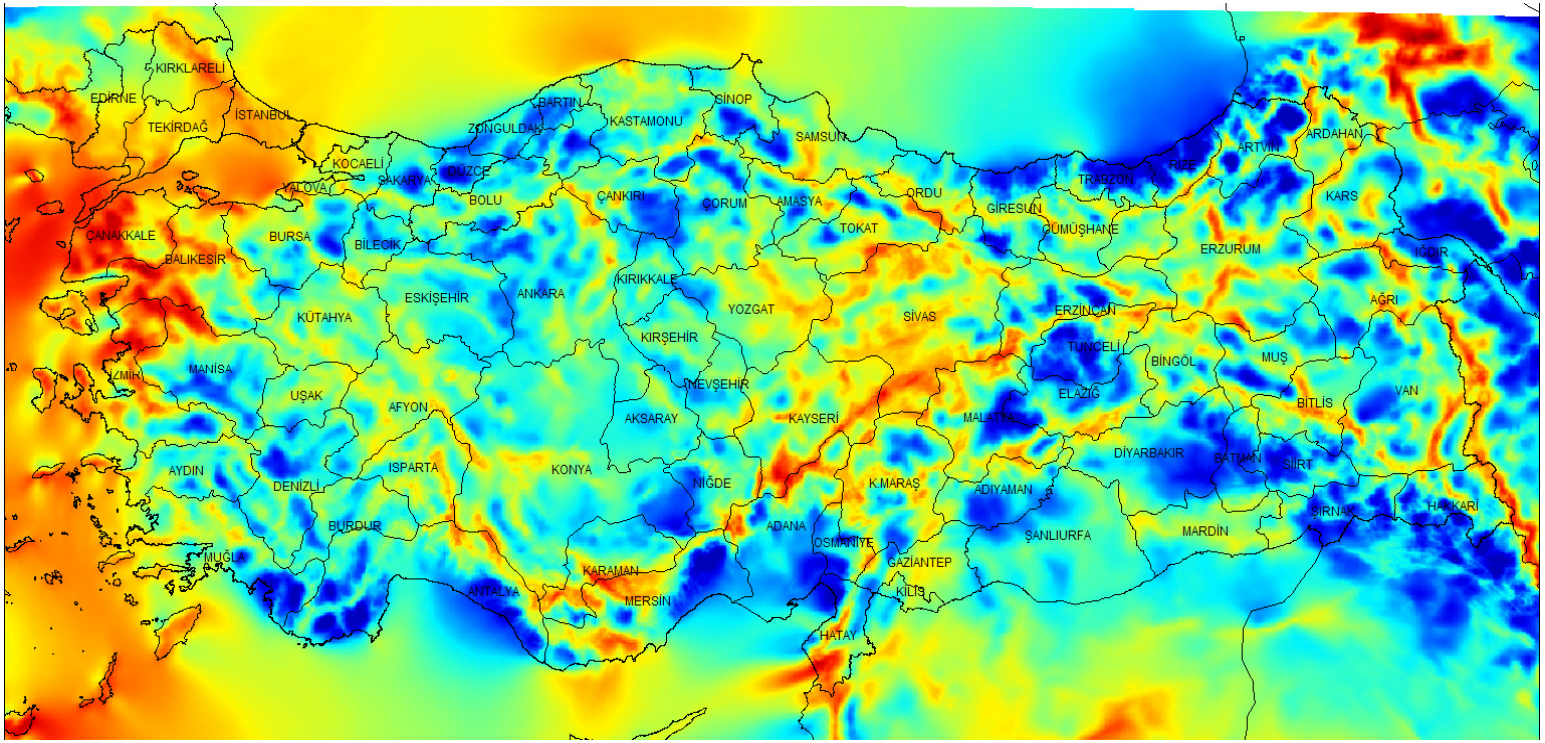
Wind Speed Distribution



Wind Atlas by EiE

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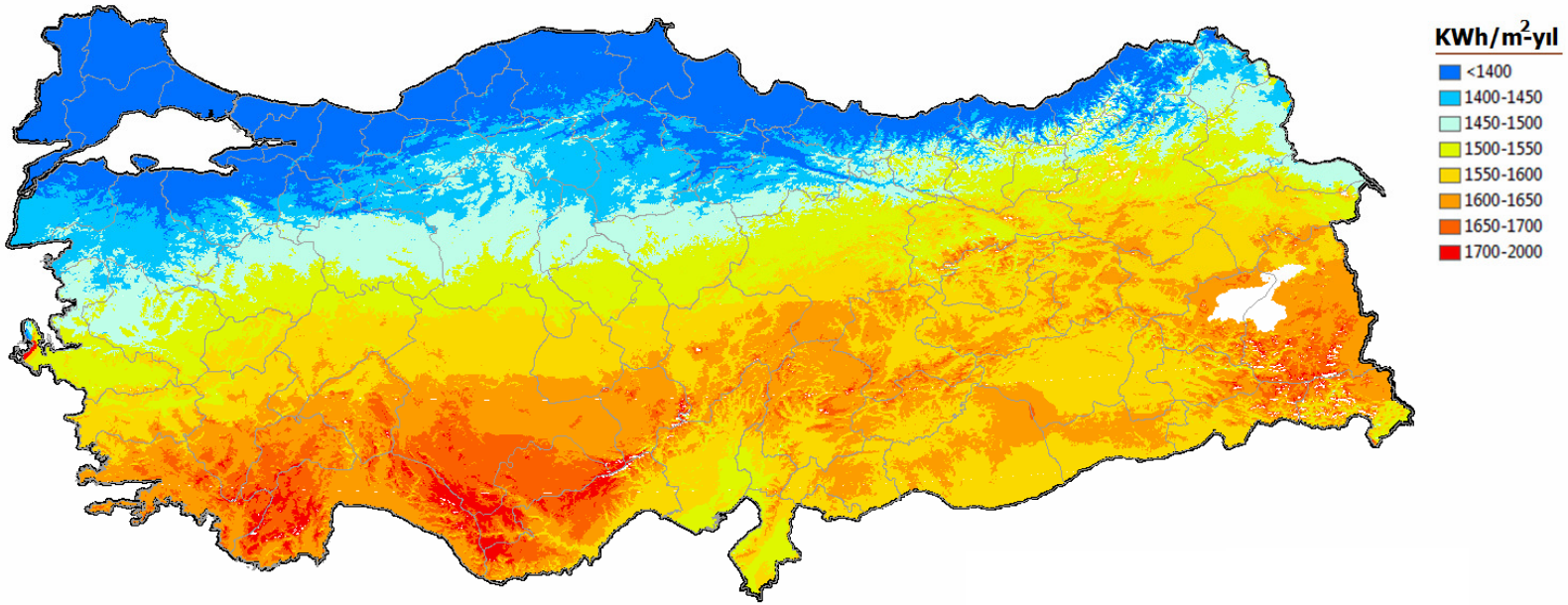
GLOBAL SOLAR RADIATION in TURKEY



Solar Atlas by EiE

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GEOTHERMAL ENERGY in TURKEY

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Renewables-Incentive & Support Scheme

- Feed-in-Tariffs,
- Purchase guarantees,
- Connection priorities,
- Lower license fees,
- License exemptions in exceptional circumstances, and
- Various practical conveniences in project preparation and land acquisition.

Legislative infrustructure has been also improved to renewable based electricity facilities developed by the real persons and legal entities up to 500 kW installed capacity is free of license

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10-year guaranteed price has been given for renewable energy sources as follows:

- Hydroelectric and wind power :7.3 US cents/kWh
- Geothermal power :10.5 US cents/kWh
- Biomass power (including landfill gas) :13.3 US cents/kWh
- Solar power :13.3 US cents/kWh

In addition, a certain support of 0.4 to 3.5 US cents per kWh is also given to the plants for the utilisation of domestically manufactured technical equipments.

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Developing of legislative infrustructure in Turkey since 2005 for renewable caused positive acceleration to the renewable energy investments in Turkey.

- Installed wind power capacity of 20MW at 2005 increased to 1,700 MW today.
- Hydro power installed capacity of 12,906 MW at 2005 increased to 17,130 MW.
- A total capacity of 600 MW solar power plants will be developed by the end of 2013 by private sector. Licensing prosedure has already been started for power generation by solar.

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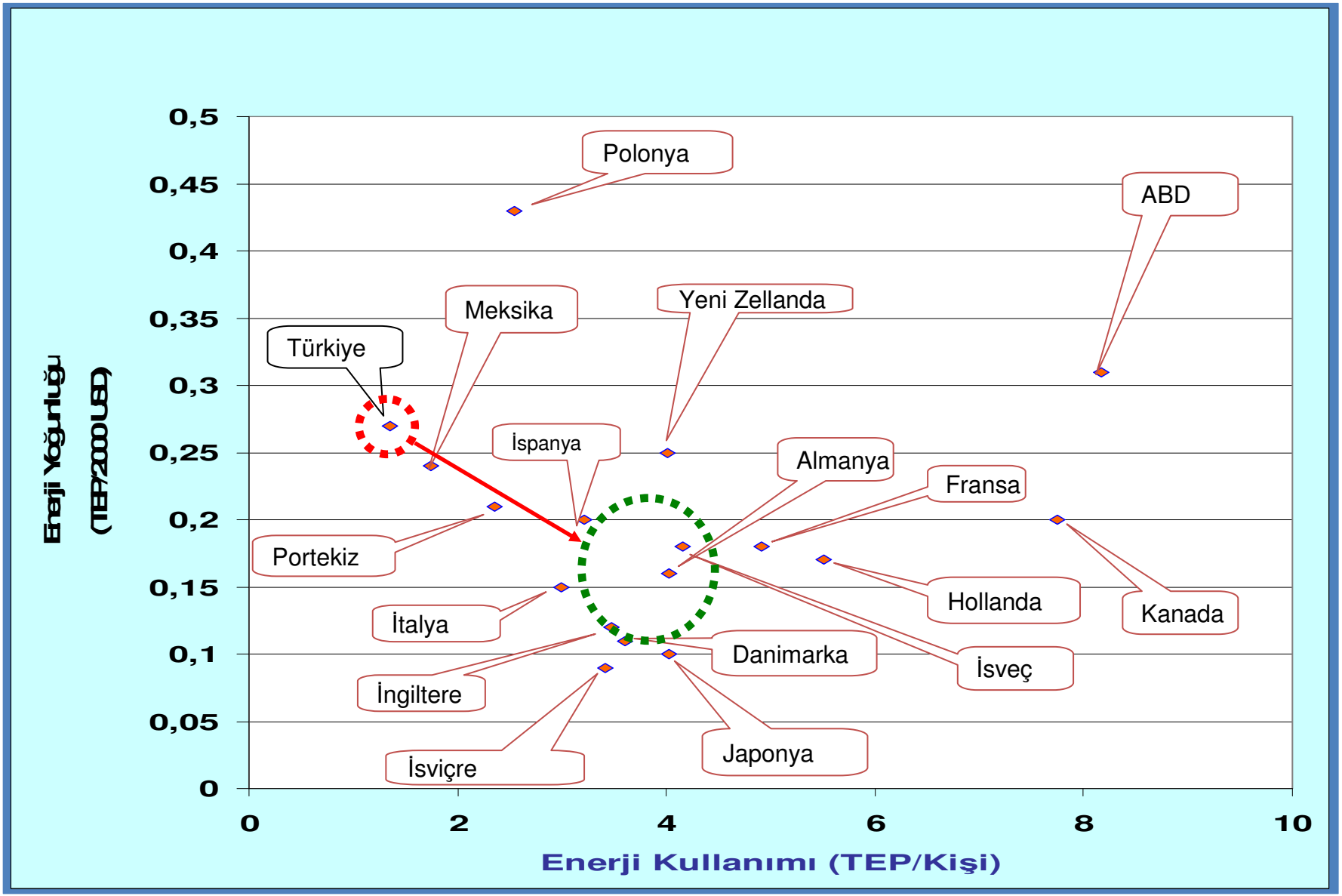
Energy Efficiency

Fundamental Transformation: Legislation & National Movement

- Law on EE and it's secondary legislation put in to force at 2007 and 2008.
- National EE Movement has been initiated by prime minister in 2008.
- EE Strategy Paper at 2012

Our Vision

- to make Turkey a country having low energy intensity and high energy consumption per capita
- to get maximum benefit from energy


Enerji Yoğunluğu
(TEP/2000 US$)
0,5
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
0
2
4
6
8
10
Enerji Kullanımı (TEP/Kişi)
Polonya
ABD
Meksika
Yeni Zellanda
Türkiye
İspanya
Almanya
Fransa
Portekiz
Hollanda
Kanada
İtalya
Danimarka
İsveç
İngiltere
İsviçre
Japonya

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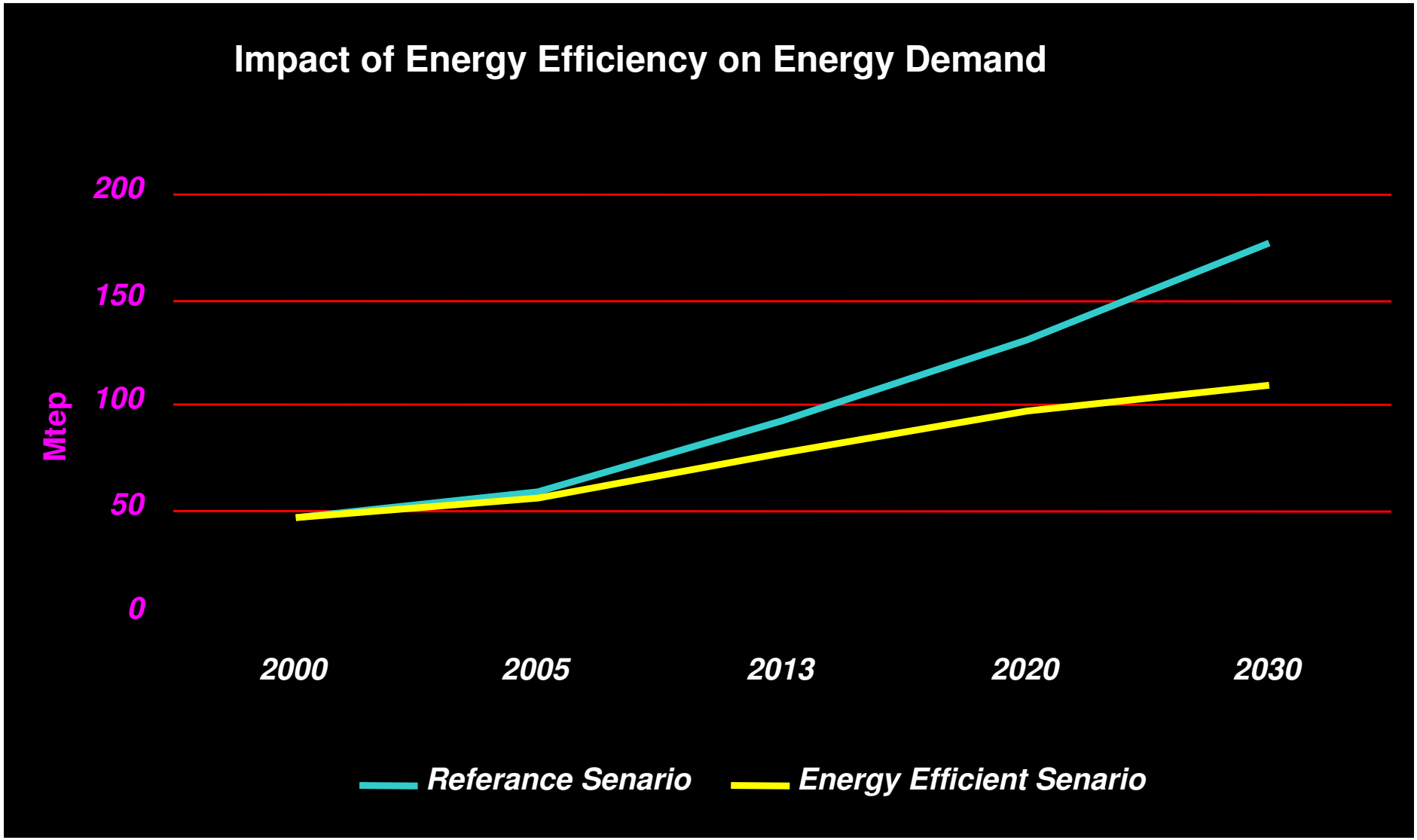

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Main Policy Measures

- ESCO Business; EVD Companies
- Energy Management
- Training & Certification
- Incentives & Supports
- Monitoring
- Awareness
- Energy Performance for Buildings
- Minimum Energy Efficiency Requirements
- Renewable Energy
- Cogeneration

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Opportunities for EVD companies

- High energy saving and investment potential
- Incentive schemes for industry
  - ✓ Project should be prepared by EVD
  - ✓ EVD services are eligbe for incentive as a component of projects
  - ✓ EE services are supported for SME's
- Compulsory measures
  - ✓ Energy management
  - ✓ Energy audits
    - – Regular energy saving potential assessment studies by public authority on public facilities, industrial plants and buildings
    - – Large scale industrial plants and buildings

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Energy Management

	Energy Manager	Energy Management Unit
Industry	≥ 1.000 TOE	≥ 50.000 TOE
Public Buildings	≥ 10.000 m^2 or ≥ 250 TOE	
Commercial and Service Buildings	≥ 20.000 m^2 or ≥ 500 TOE	

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Incentive Schemes for Industry

Energy efficiency projects for industry

- Applications — January
- Maximum pay-back period — 5 years,
- Maximum investment — 1.000.000 TL
- Maximum incentive — %30 of investment
  300.000 TL
- Project components
  - ✓ Rehabilitation of existing system
  - ✓ On site power generation (Co-generetion, micro co-generation and, renewable)
  - ✓ Energy efficiency services by EVD which expertized in sub-sector

By 1/1/2014, to get incentive it is necessary to have ISO 50001.

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Incentive Schemes for Industry

Voluntary Agreements for industry

- Applications — October
- Period — 3 years
- Commitment — %10 reduction of energy intensity
- Maximum ratio of incentive — %20 of energy consumption costs
- Maximum amount of incentive — 200.000 TL

- In-direct support mechanisms by voluntary agreement
  - ✓ Co-generation
  - ✓ Renewable energy
  - ✓ Waste utilization

By 1/1/2014, to make voluntary agreement it is necessary to have ISO 50001.

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Incentive Schemes for Industry

Energy Efficiency Services for SME's

- Certification of energy managers (Training fees)
- Pre-Audits & Audits
- Consultancy

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Progress on Incentive Schemes for Industry

- Energy efficiency projects for industry
  - ✓ 32 of energy efficiency projects to improve EE at existing plant for 25 industrial plants
  - ✓ 20 projects have been implemented

- Voluntary agreements for industry
  - ✓ 22 voluntary agreements with 22 industrial establishments so as to reduce their energy intensity.

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Energy Performance Performance of buildings

- Heat Insulation
- Individual Metering
- Heat & Temperature Control
- Cogeneration & Micro cogeneration
- Renewable energy
- Heat Pumps
- Energy Performance Certificate
- Otomation
- Central Heating

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Road Map for 2023 on Energy Efficiency

Energy Efficiency Strategy Paper have been adopted by High Executive Commettee by February 20, 2012 and issued on Official Gazette on January 25, 2012

To give impulse to energy efficiency activities via close cooperation between public, private and civil sectors; Energy Efficiency Strategy Paper has been drafted to get future planning as a road map and relevant targets with the consensus of all stakeholders.

Overall Target is to reduce energy intensity of Turkey %20 by 2023.

Strategical Purposes

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- Reducing energy intensity and energy losses in the industry and services sectors,
- Decreasing energy demand and carbon emissions of the buildings having low energy efficiency and to promote sustainable and environment friendly buildings using renewable energy sources,
- Providing market transformation of energy efficient products,
- Increasing efficiency in power generation, transmission and distribution of electricity; to decrease energy losses and harmful environment emissions,
- Reducing fossil fuel consumption of motorized vehicles, to increase share of public transportation in highway, sea road and railroad and to prevent unnecessary fuel consumption in urban transportation,
- Increasing energy effeciency in public sector,
- Strengtening of institutional capacities and colloborations; to increase use of state of the art technology and awareness activities and to develop sustainable financing mechanisms.

Important Actions

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- Strengthening of institutional capacities
- Strengthening of national and international cooperation
- Expanding of scope of incentives and supports
- Development of sustainable financial mechanisms
- Rehabilitation of existing buildings (Improving heat insulation)
- Introducing and promoting of eco buildings
- Promoting of investment for small scale renewable
- More comprehensive campaign to raise public awareness

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Conclusion

- High energy saving and renewable energy source potentials.
- Attractive opportunities for the foreign investors for local cooperations.
- Government side open for any kind of cooperations

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THANK YOU

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