ADEME

French Agency for
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General Directorate for Energy Resources
Surveys & Development Administration

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Dutch Agency for Innovation &
Sustainable Development

Energy savings potential assessment in Turkey

Erol YALÇIN, Ersoy METİN
(EİE)

Dr Didier BOSSEBOEUF
(ADEME)

OUTLINE

- OBJECTIVES : why do we need an energy saving potential potential assessment?
- METHODOLOGIES
  - Energy efficiency indicators
  - Surveys on energy consumption and technologies
  - The MED-PRO model : a summary description
- RESULTS
  - Energy efficiency trends in Turkey
  - The alternative scenario to 2030
- CONCLUSION

MAIN OBJECTIVES

- To monitor and evaluate energy efficiency trends, energy savings potential and performed a energy demand forecast at detailed levels by end- uses sectors (industry, building, transport etc.) through the use of appropriate methodologies

- To enhance the domestic capacity building for developing, carrying out, interpretating and disseminating the monitoring of energy efficiency

DEFINITION OF ENERGY SAVING POTENTIAL

- Estimate of the additional energy saving stock (reserves) realizable for a given period
- Technical versus economic potential (exploitation rate)
- Static or dynamic potential
- The adoption of efficient technologies or practices decrease the potential, the R&D increases it as well the economic growth

WHY DO WE NEED AN ENERGY SAVING POTENTIAL ASSESSMENT?

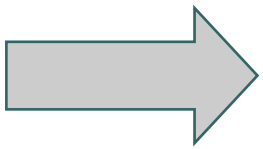
- For target setting
- For action plan and policies design
- For monitoring energy efficiency

HOW CAN WE ASSESS THE ENERGY SAVING POTENTIAL ?

- Three main methodologies ;
  - Benchmarking through energy efficiency indicators (macro analysis) at sectoral and end-uses level
  - Technologies characterization and penetration relying on field surveys and audits (micro analysis)
  - Comparison between a reference scenario and a scenario with EE measure using techno-economic modelling (MEDPRO)
- These 3 methods are chained and should be coherent
- They are based on a similar basic methodological framework called «bottom-up or techno-economic approach »

THE DEVELOPMENT OF A TECHNO-ECONOMIC DATA BASE

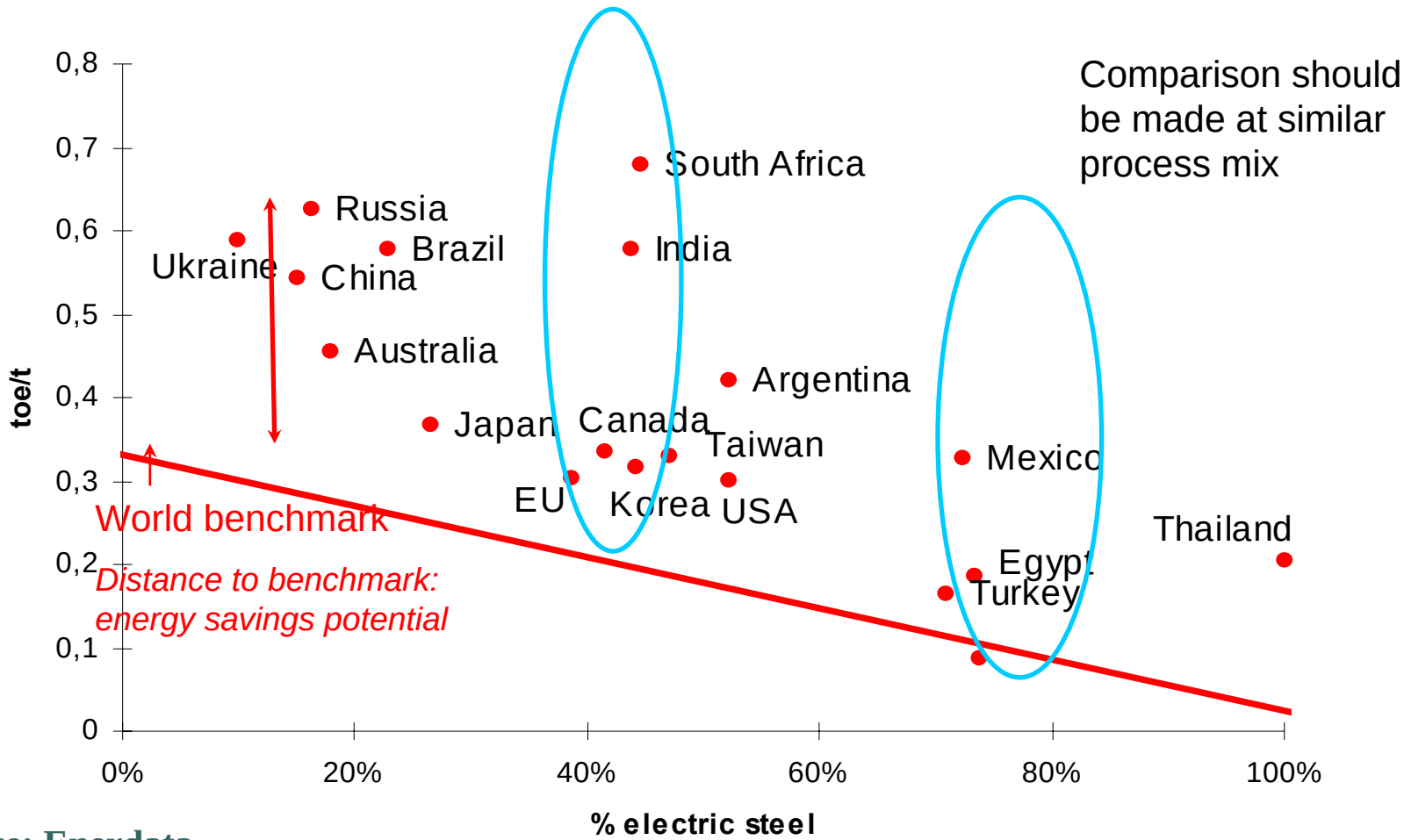
- These 3 mains steps are chained through the data collection and the interpretation of the results



Development of an energy demand techno-economic data base

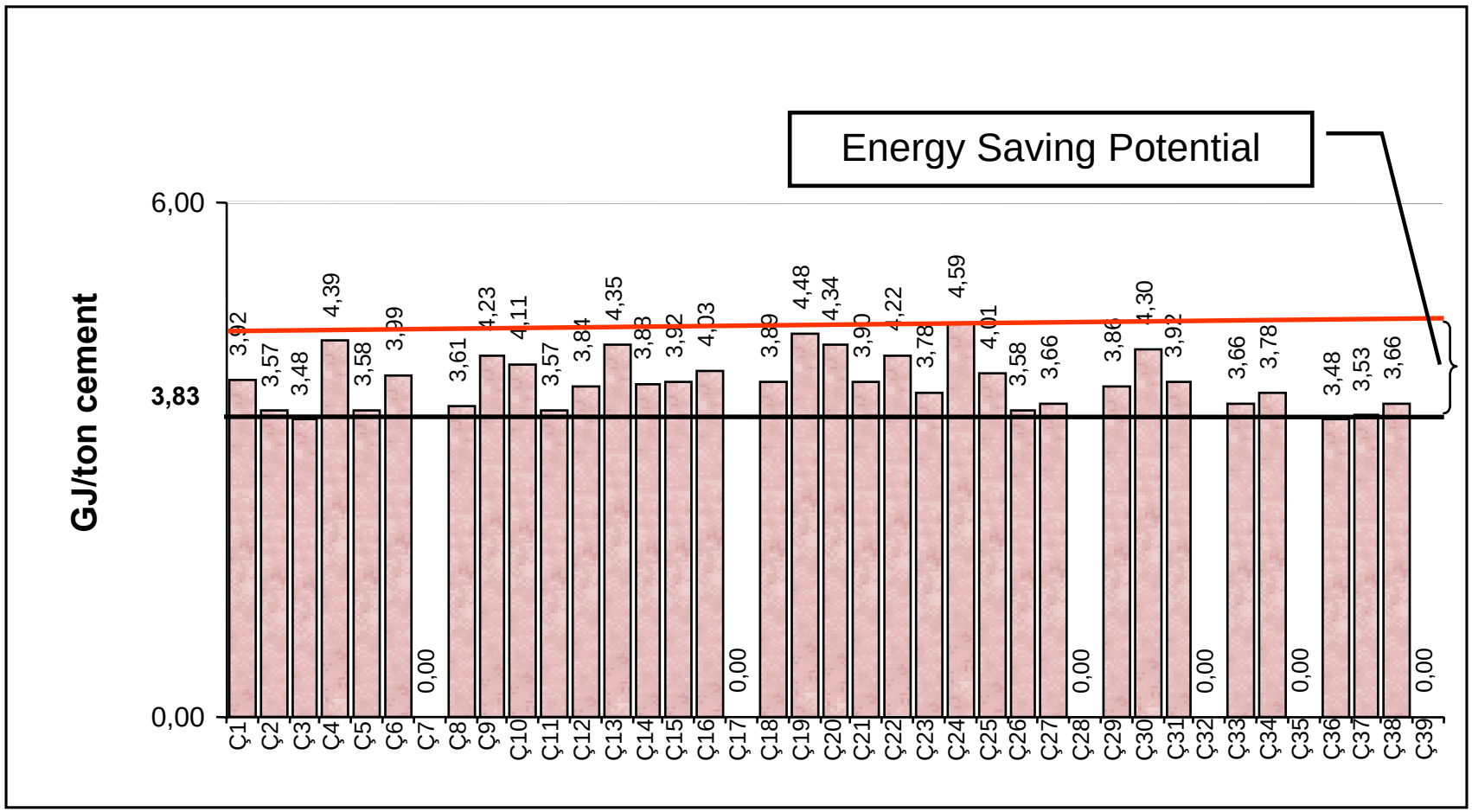
IN INDUSTRY, THE BEST WORLD PRACTICES ARE NO LONGER FOUND IN THE MOST DEVELOPED COUNTRIES

Average energy consumption per ton of steel (2004)

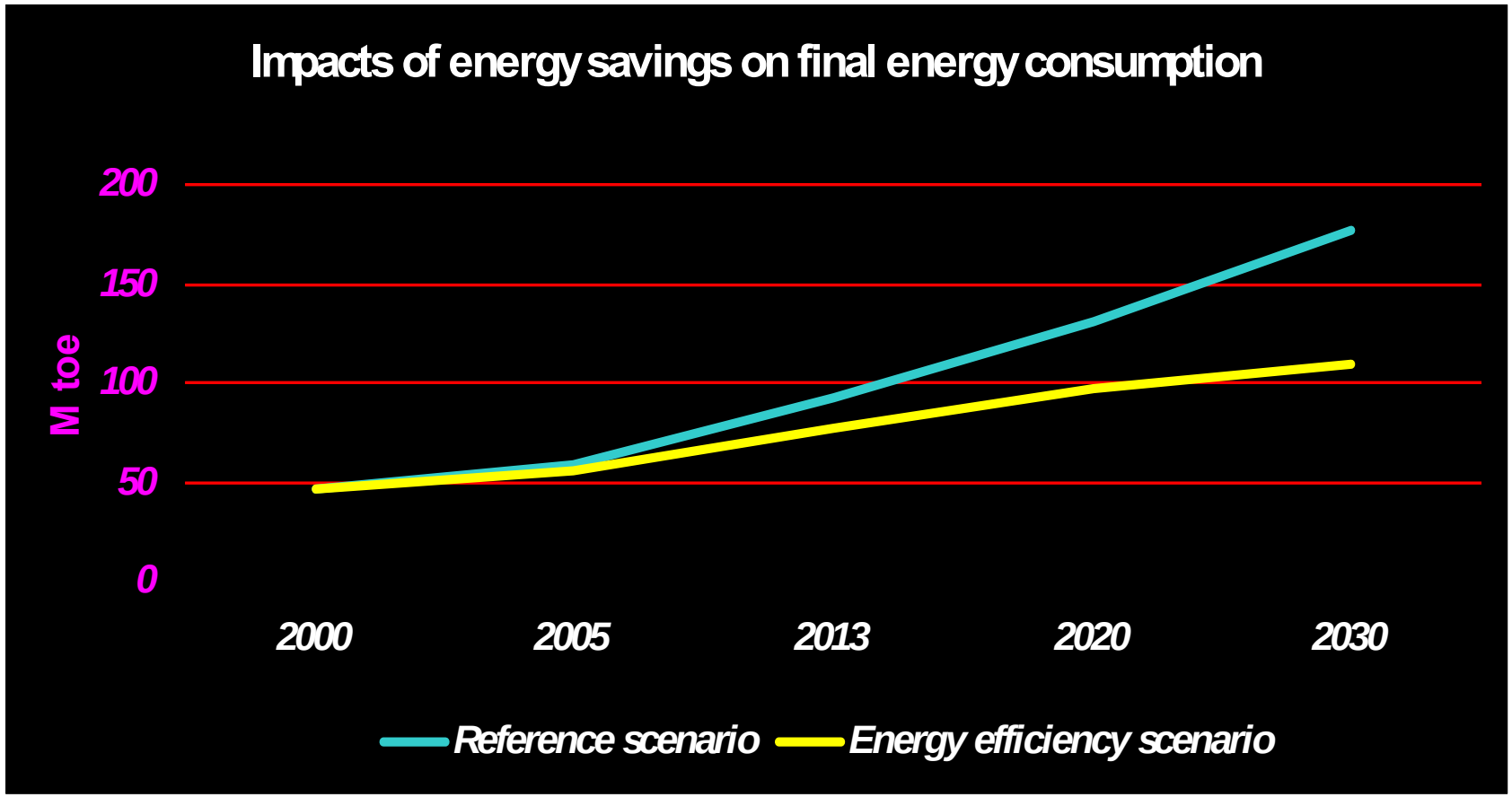


Source: Enerdata

COMPARISON OF SPECIFIC CONSUMPTION IN CEMENT INDUSTRY BY BENCHMARKING



THE POTENTIAL CAN BE ESTIMATED IN COMPARING SCENARIOS



1. The benchmark approach through the use of indicators

ENERGY EFFICIENCY INDICATORS

- PURPOSE-

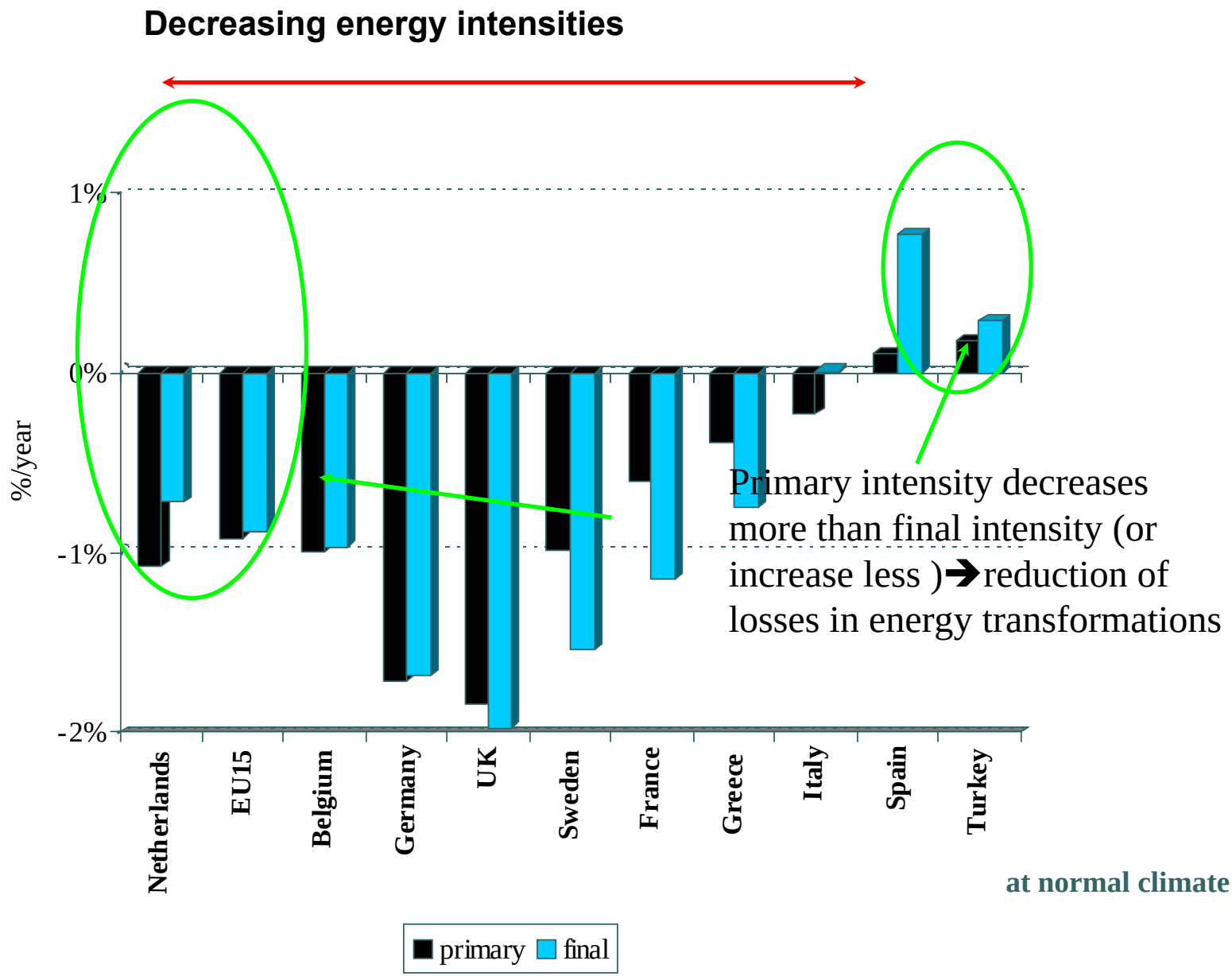
- to monitor the targets determined at national and international
- to evaluate the energy efficiency programs
- to make action plans
- to provide data for Models
- International comparison

50 EE and C02 indicators
Approximately 750 time series in the data bank

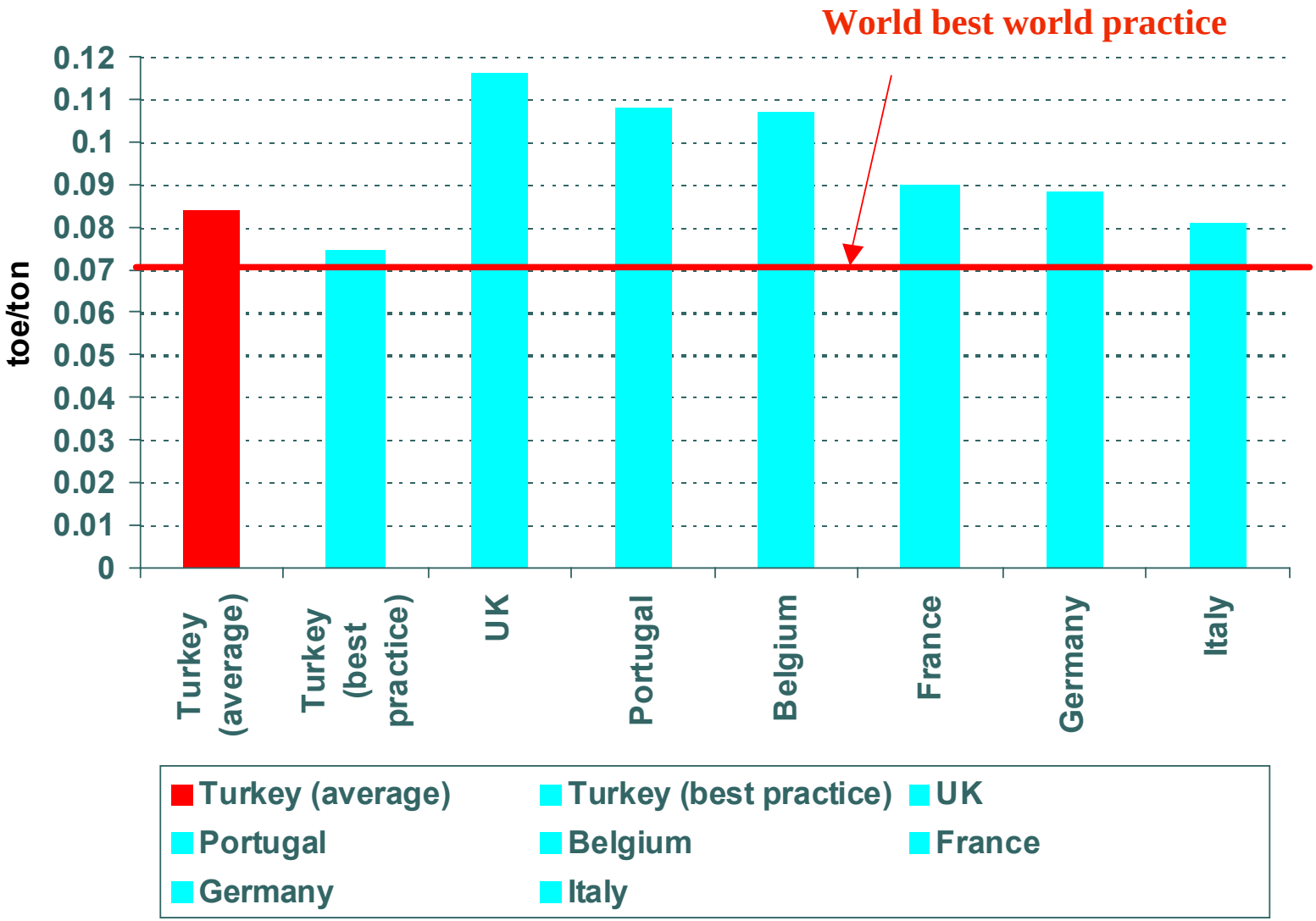
ENERGY EFFICIENCY INDICATORS

- Energy/ CO_2 intensities, that relate the energy used in the economy or a sector to macro-economic variables (GDP, value added, …)
- Unit consumption and emission, that relate the energy consumption to activity or equipment)
- Adjusted intensities to allow the comparison of indicators (adjustments for differences in climate, general price level with power purchasing parities, fuel mix, industry and economic structure…)
- Benchmark unit consumption to compare each country with reference values (best country values within the EU, best 3 values, best plant, most efficient buildings)
- Energy efficiency indices (ODEX indicators) /energy savings by sector and for the whole economy

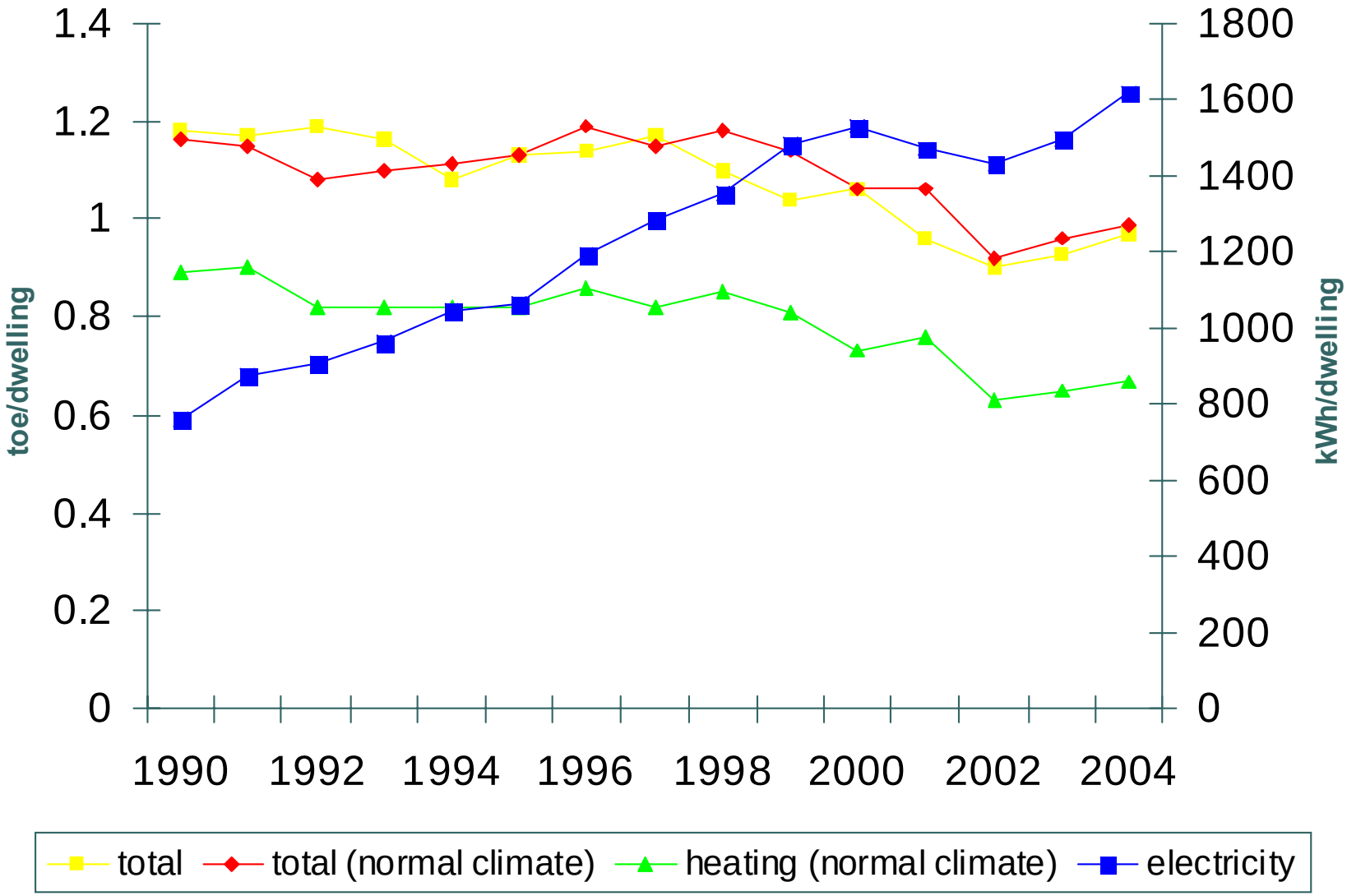
VARIATION OF PRIMARY AND FINAL ENERGY INTENSITIES IN EU-15 COUNTRİES (1990-2004)



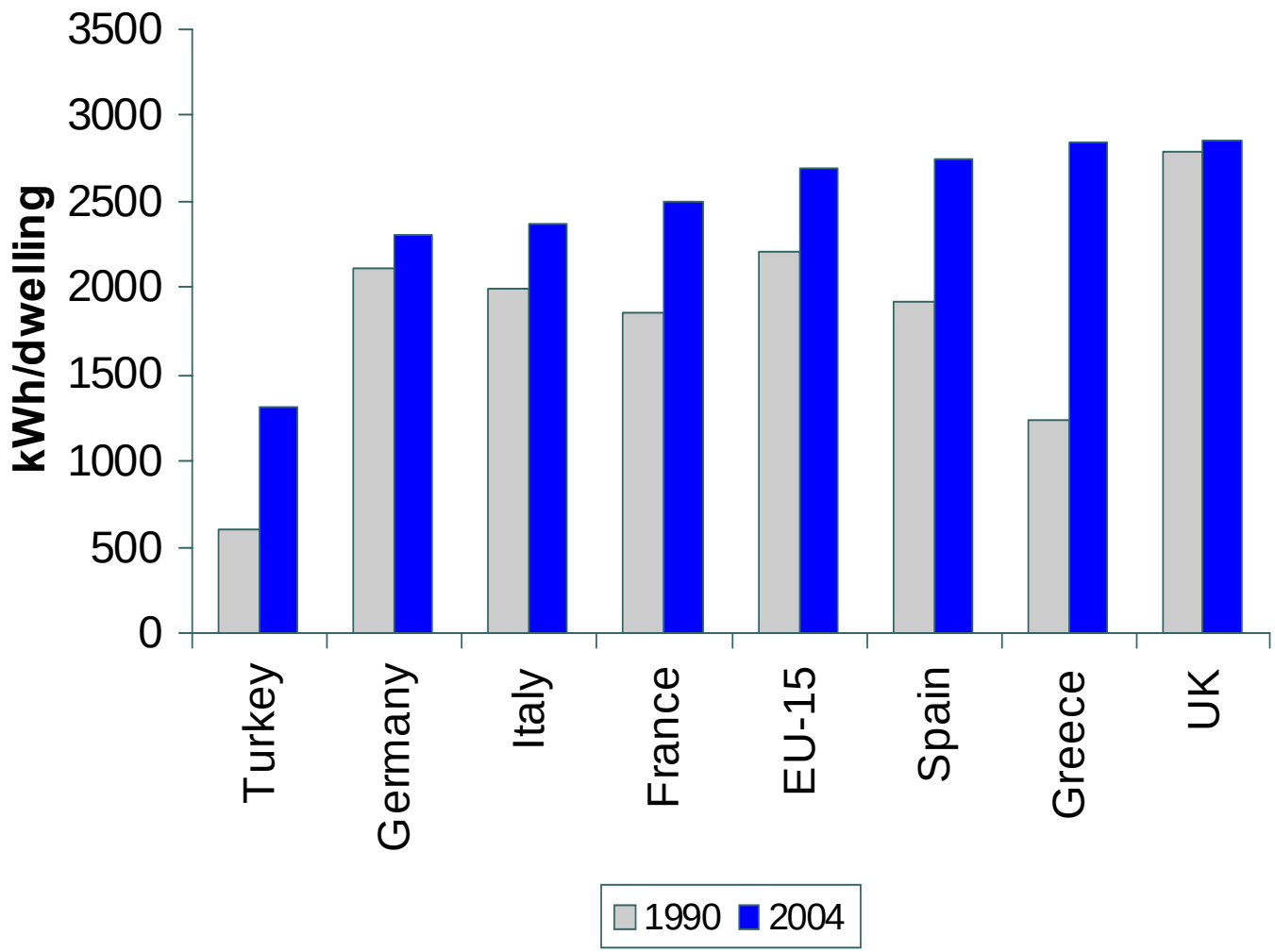
COMPARISON OF UNIT ENERGY CONSUMPTION FOR CLINKER : TURKEY VERSUS EU (2004)



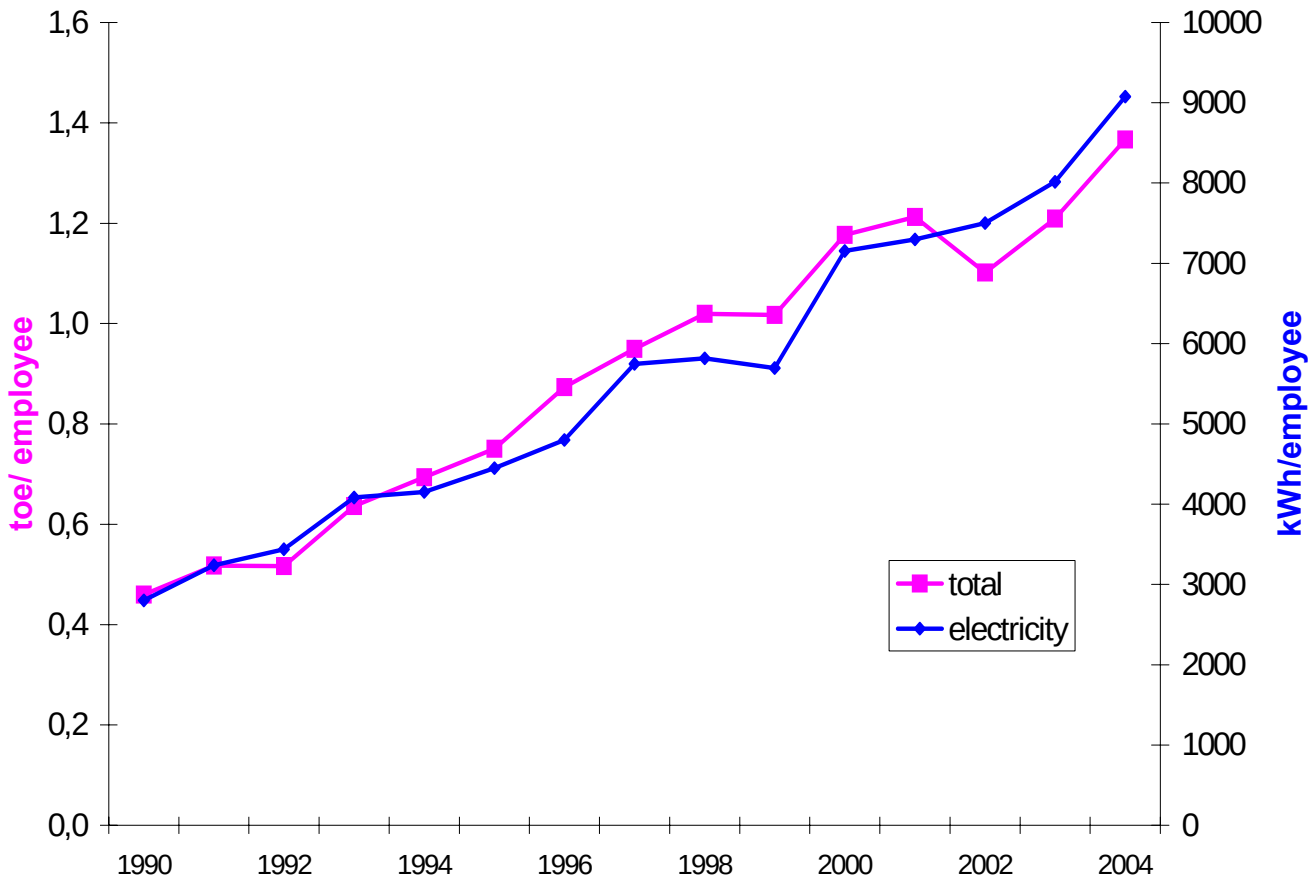
UNIT CONSUMPTION PER HOUSEHOLD



UNIT ELECTRICITY CONSUMPTION PER HOUSEHOLD FOR ELECTRICAL APPLIANCES AND LIGHTING



UNIT CONSUMPTION PER EMPLOYEE IN SERVICE SECTOR



2. The micro-economic approach using on - field surveys and audits

THE ENERGY CONSUMPTION SURVEY FOR HOUSEHOLD

- Adapted questionnaire (Survey for 500 on-site visits in dwelling with measurements in 4 cities will be done).
  - Energy consumption for households and transport by fuels,end-uses and appliances
  - Thermal performances of the envelop (level of insulations penetration of double glazing, windows to wall ratio etc.)

SURVEYS IN INDUSTRY

- Questionaire design, post-mailing and internet, data checking and first analysis to determine the energy savings potential in the sugar (32), glass (9), textile and paper (37) industries.

- On-site visits aiming at : characterising the technologies (age, performance, maintenance, monitoring etc), assessing the penetration rate and the investment strategy in 3 textile companies and 2 paper companies.

3. Comparison of long term energy demand scenarios using technico-economic modelling.

MED - PRO

- A decision-supporting tool to address medium and long term energy planning issues and related energy efficiency and GHG mitigation issues
- Sectoral/end-use model, for energy demand, load forecast and green house gases
- Relevant for impact evaluation of energy efficiency and CO2 abatement strategies and measures

MED-PRO: a summary description

The goal of the project is to deliver methodology and tools to analyse energy policy issues.

Preliminary outputs of the model built with expert from EIE and ENERDATA.

Further work has to be done by EIE in coordination with an enlarged community of Turkish experts.

INSTITUTIONS MADE COOPERATION WITH DURING PROJECT

- MENR
- SPO
- TURKSTAT
- TEDAS
- DG of PETROLEUM AFFAIRS
- DG of HIGHWAYS
- TCDD
- TURKISH HARDCOAL INSTITUTIONS
- BOTAS
- IRON-STEEL PRODUCER ASSOCIATION
- TURKISH CEMENT MANUFACTURERS ASSOCIATION
- PULP AND PAPER PRODUCER ASSOCIATION
- TURKISH SISECAM FACTORIES

MED-PRO DATA REQUIREMENTS

- Energy balances and sectoral energy consumption accounts
- Indicators for socio-economic needs and production activities are part of usual statistics
- Data on specific energy requirements are in technical documentation or provided by surveys

MAIN DRIVERS

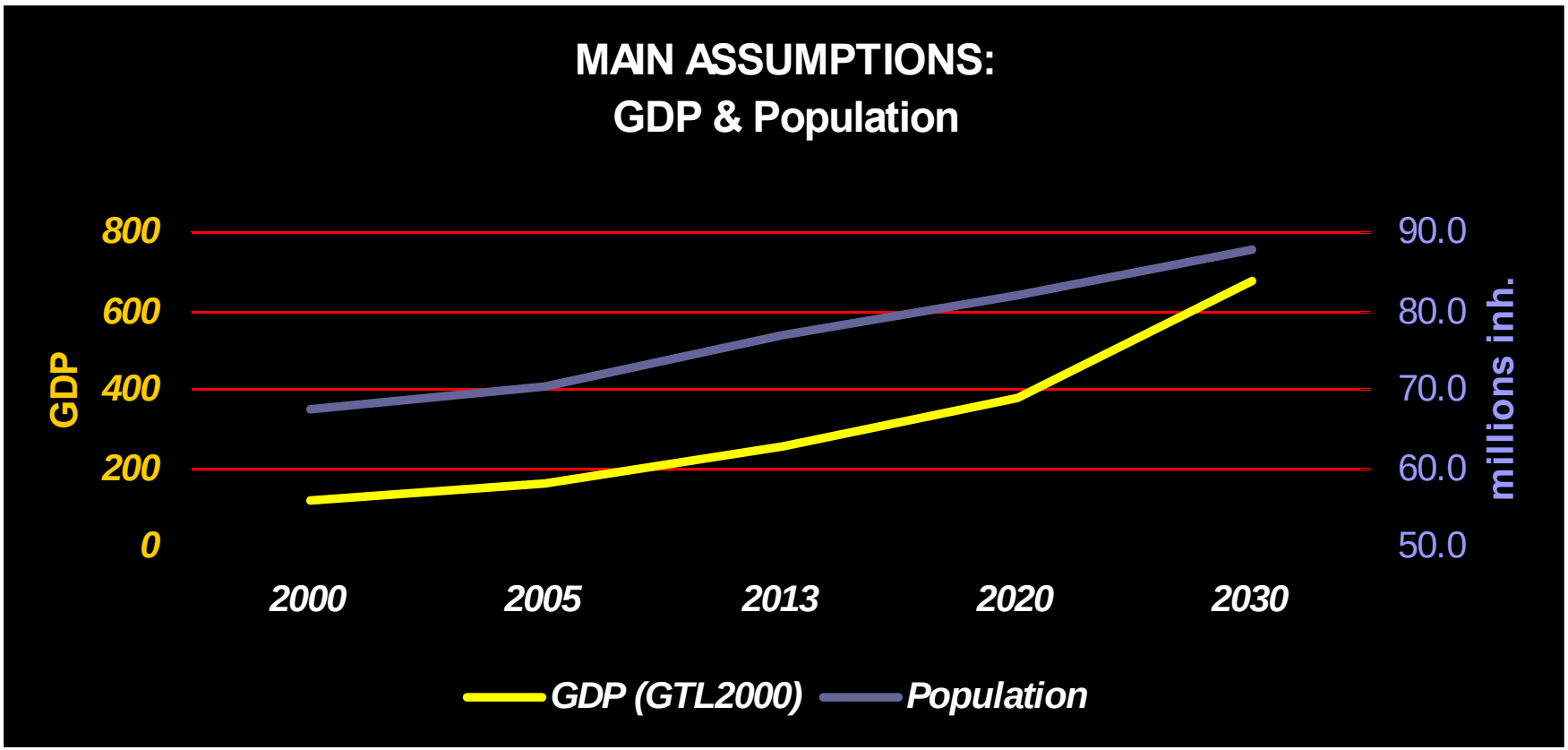
- GDP
- Population
- Production in industries
- Buildings construction
- Behaviours (heating, etc.)
- Trends in transport

In the framework of the Twinning project, European experts have complemented the set of socio economic indicators, in consistency with observations and experience gained in works done in similar countries.

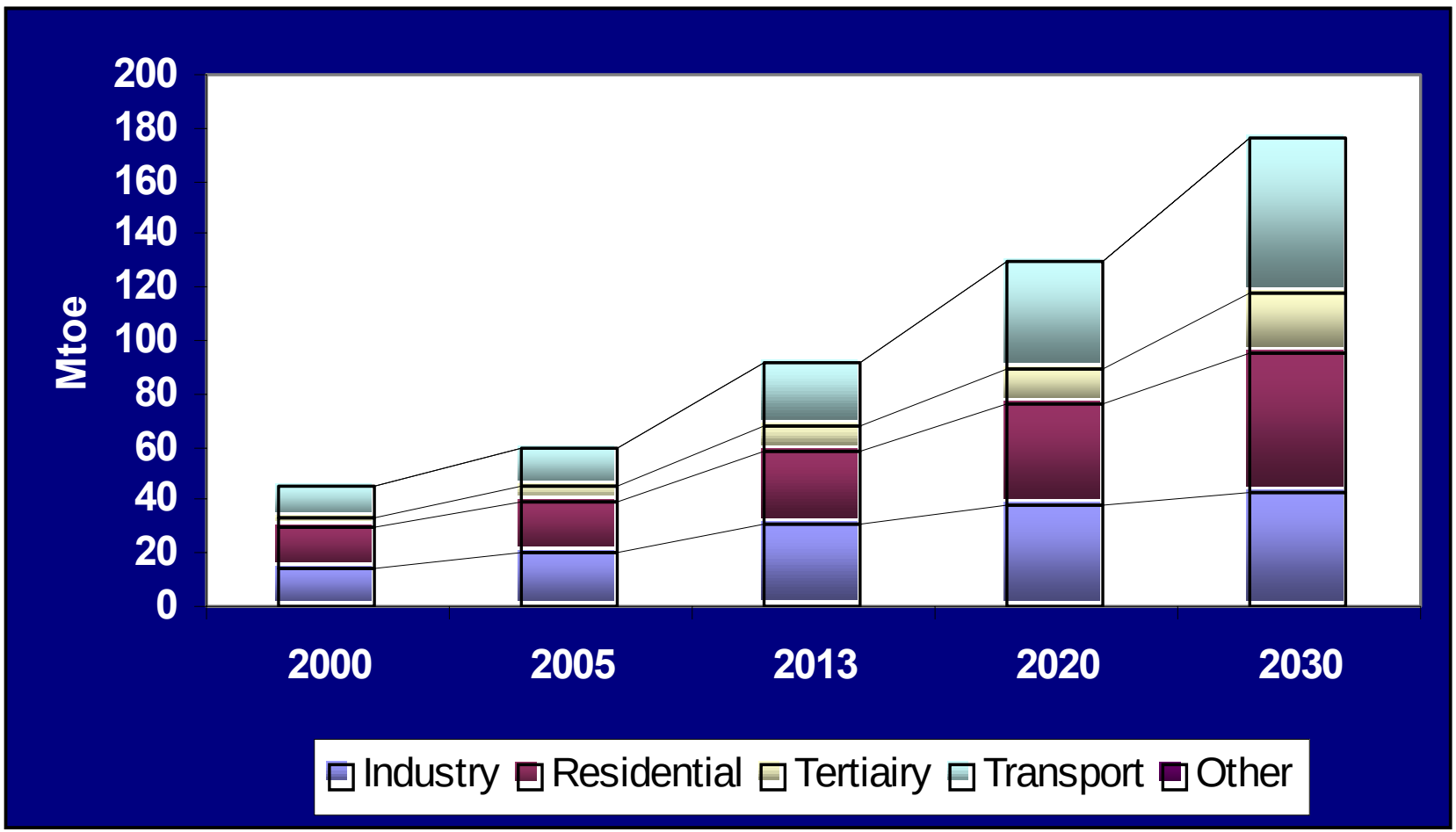
REFERENCE SCENARIO

- Projections for 2013, 2020, 2030
- Final consumption : x 3.8
- Transport, comm. sector : main drivers
- Gas and electricity : growing demand
- Energy demand = 2 toe/capita
- CO2 emissions : from 0.7 to 2.3 tC/capita
- Drivers : welfare and economic growth

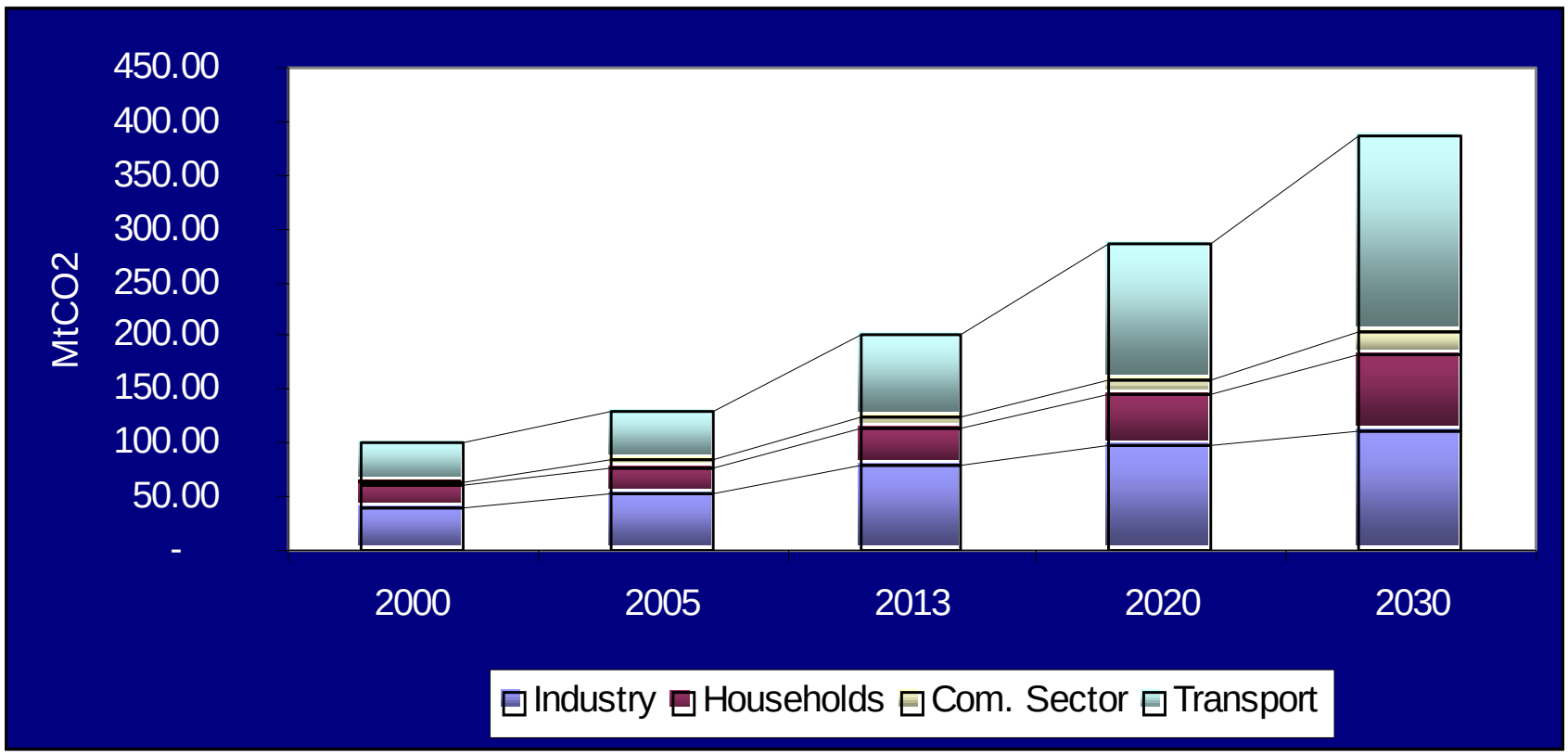
REFERENCE SCENARIO



TRENDS : FINAL ENERGY CONSUMPTION



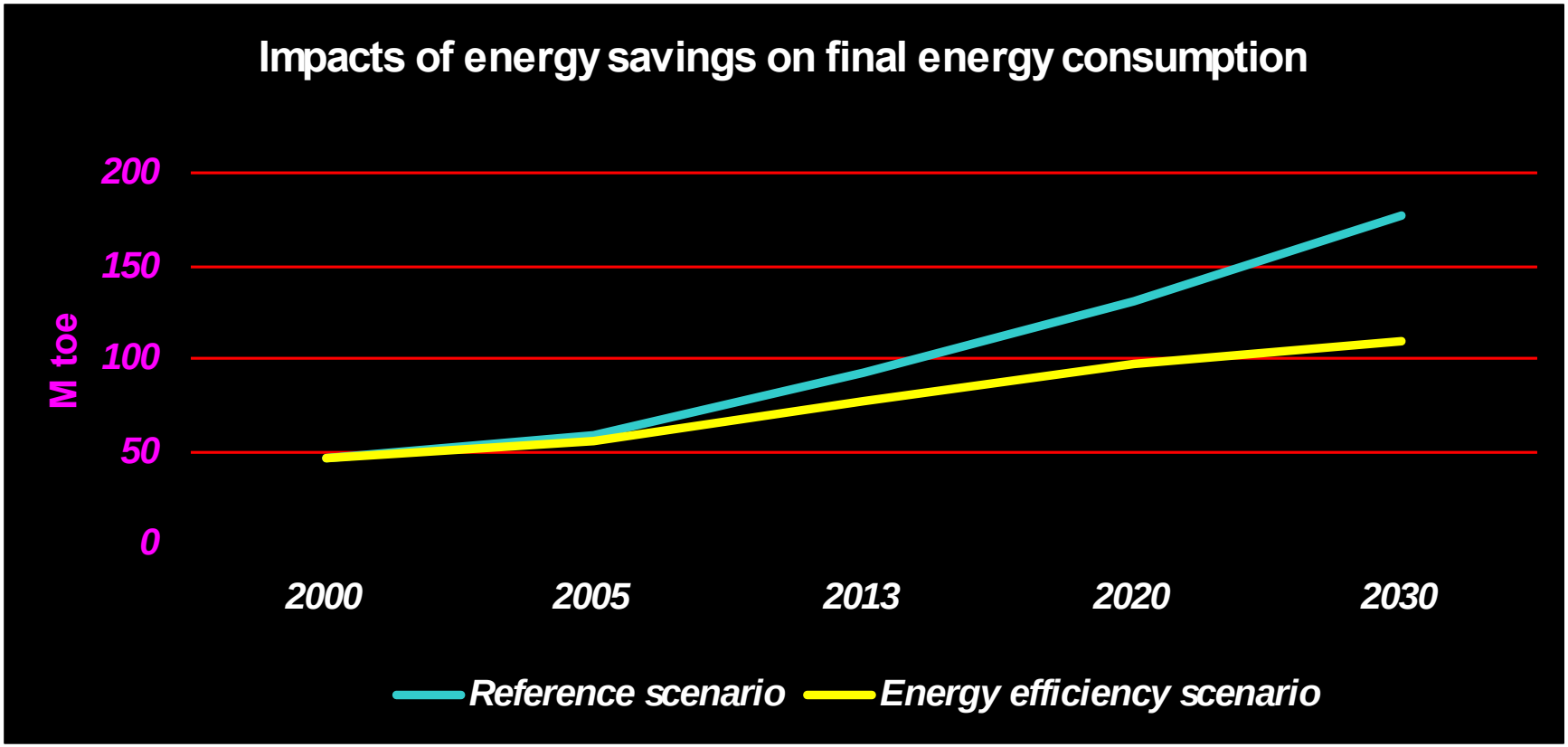
CO2 EMISSIONS (Excl. Elec. Prod.)



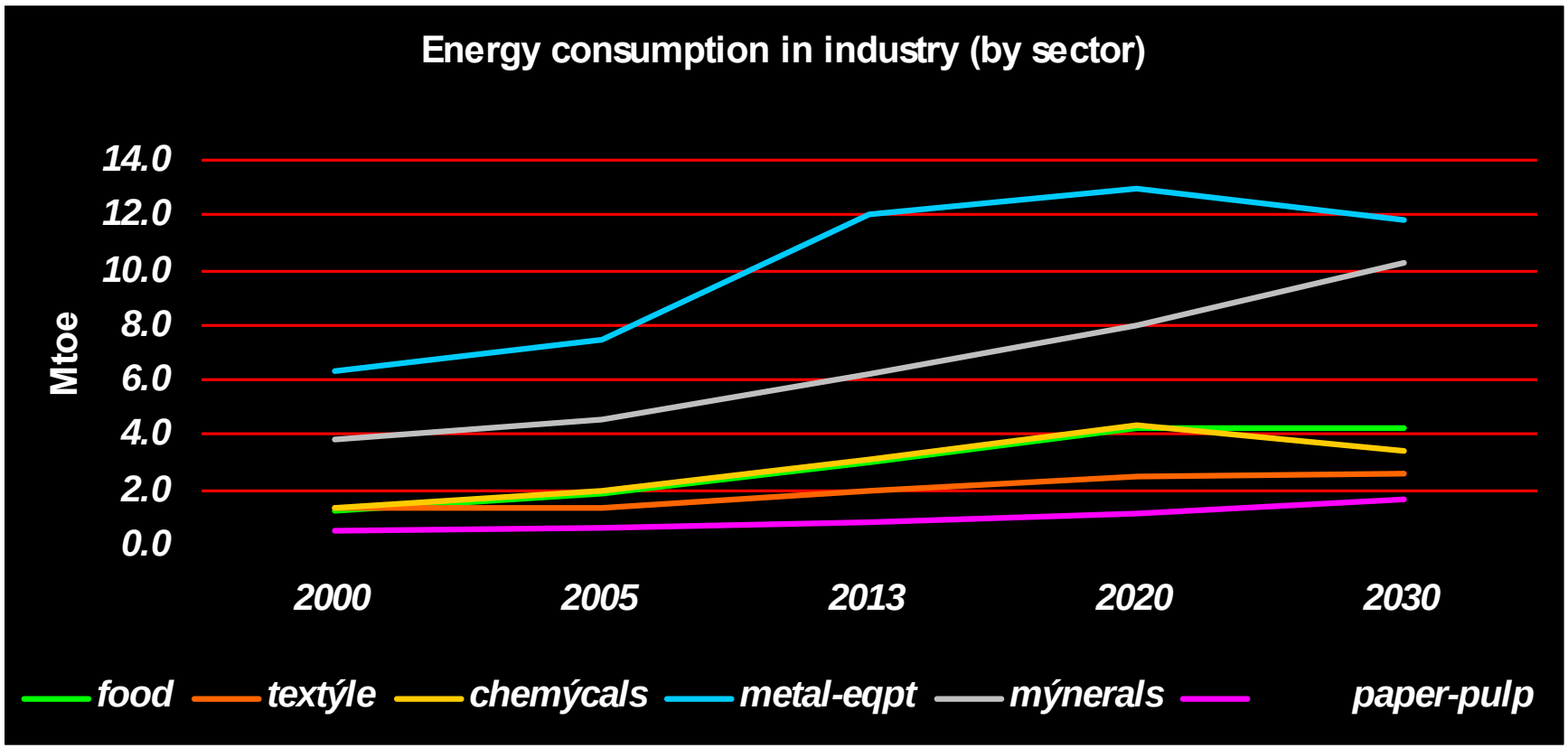
ALTERNATIVE SCENARIO: ENERGY EFFICIENCY POTENTIALS

- Industry:
  - Benchmarking with Turkish plants
  - Best practices in Europe
- Buildings:
  - 2000 building codes
    - 70 kWh/m2 as unit consumption target
    - 40% of existing buildings to be retrofitted
  - Progress in electrical appliances (EU targets)
- Transport:
  - technological progress (EU targets for road vehicles)

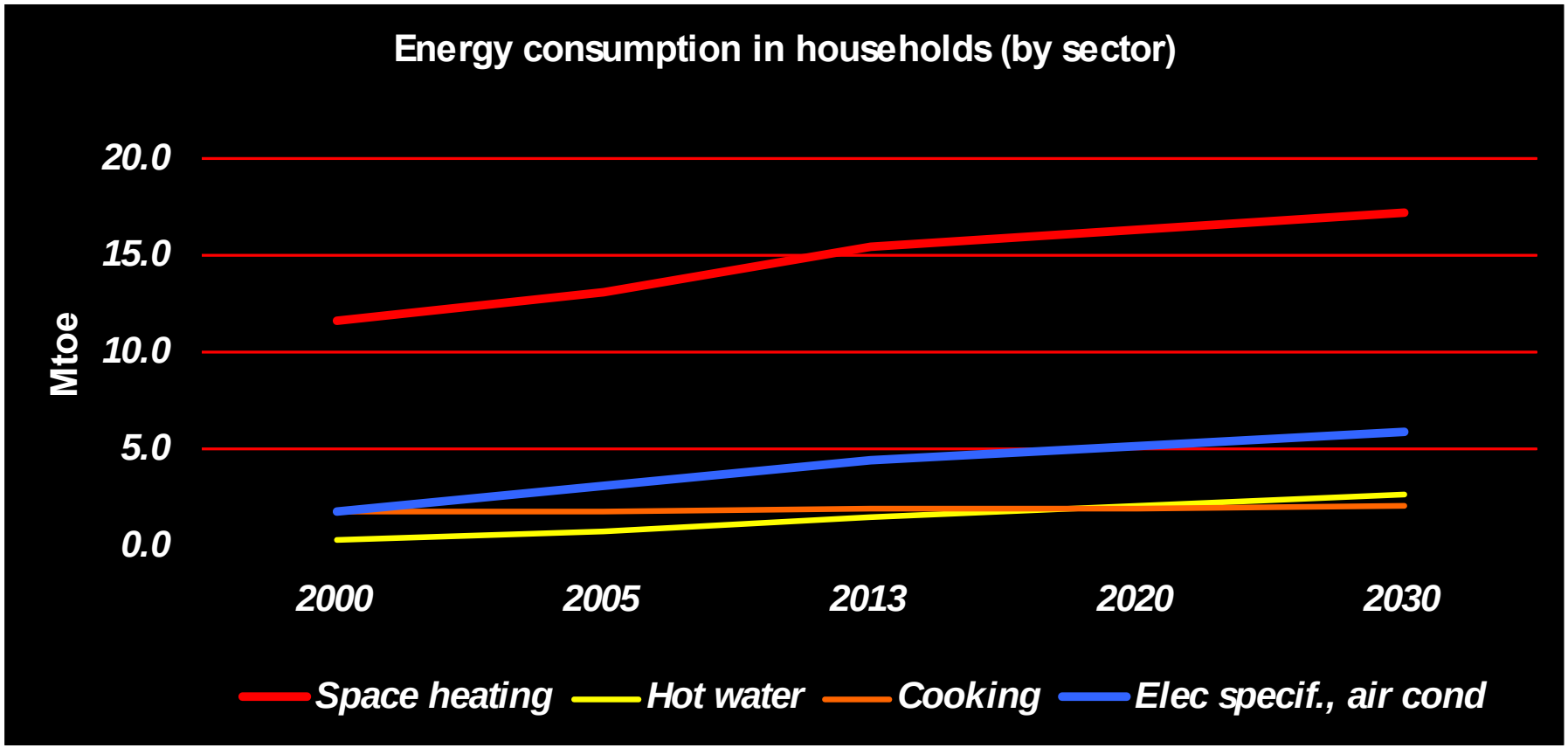
COMPARISON BETWEEN TWO SCENARIOS



TRENDS :
SUB-SECTORS ENERGY CONSUMPTION



TRENDS :
SUB-SECTORS ENERGY CONSUMPTION



DIFFICULTIES
Med-Pro

- Energy statistics to be improved:
  - Transport: stock of vehicles, consistency with en. balance
  - Buildings: stock of building, specific energy consumption, commercial buildings.

- EE policies impact assessment to be improved:
  - List of actions per sector (including non techn.)
  - Assessment of EE potentials and costs
  - Using model (such as MEDPRO) gives a comprehensive view

DIFFICULTIES

-DATA- *Industry*

- Constant price and VAD not available. Numbers calculated from production index given by TURKSTAT.
- Some production indexes not available according to NACE standard in sub-sectors have been combined.
- Fuel consumption in sub-sectors has been estimated for some years, and when inconsistency of General Energy Balance Table other sources are used

MAIN OUTPUTS

- Detailed database (1990 – 2004) ongoing for 2005-2006
- First comprehensive report on energy efficiency trends in Turkey
- Questionaire to assess energy saving potential
- Alternative energy efficiency scenario through modelling

CONCLUSIONS

- Providing of methodologies and tools
- Training of experts
- Sharing of assumptions and expertise
- Take advantage of this capacity building