Session : POLICY EVALUATION #6
**Views from the top : what can energy efficiency indicators and
trends tell us about policies?**
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Recent energy efficiency trends in Southern and Eastern Mediterranean countries

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The meetMED project

- **Mitigation Enabling Energy Transition in the MEDiterranean region (meetMED) :** an EU project co-developed by the MEDENER[1] and the RCREEE[2]. In this framework:
  - a regional observatory of energy efficiency trends Algeria, Lebanon, Morocco and Tunisia has been set up (follow-up of another project started in 2014)
  - detailed databases on final energy consumption by sector and end-uses have been implemented.

- This paper :
  - presents the techno-economic database (called MedObservEER).
  - compares energy efficiency trends between the four countries (and in some cases with some Mediterranean EU countries- the sources are MedObservEER and Odyssee databases).
  - illustrates a possible application for the monitoring and evaluation of NEEAPs (case of Tunisia) /NECPs.

[1] Mediterranean Association of National Agencies for Energy Management
[2] Regional Centre for Renewable Energy and Energy Efficiency

MedObservEER, the Medener database

- Data collected[1] from energy companies, national observatories, Ministries, institutes of statistics, companies directorates, energy intensive industries , surveys and studies…

- The database covers the years 2000-2017 with ~500 data series (detailed energy consumption by sector and end-use, data on economic activity and equipments…)

- ~ 100 energy efficiency indicators :
  - specific energy consumptions (kWh/employee, toe/tons of steel or cement, kWh/dwellings, L/100 km for passenger transport…)
  - energy intensities (energy consumption/unit of GDP)
  - energy savings by sector and end-use
  - MEDEX : ratio between the energy consumption at year and a fictive consumption that would have happened without energy savings (see the ODEX methodology[2]).

➜ MedObservEER can be used to compare energy efficiency trends between countries or conduct energy efficiency trend analysis at a national level.

[1] by the national partners : Algerian National Agency for the Promotion and Rationalization of the Use of Energy (APRUE), the Lebanese Association for Energy Conservation and Environment (ALMEE), the Moroccan National Agency for the Development of Renewable Energy (ADEREE); and the Tunisian National Agency for Energy Management (ANME).
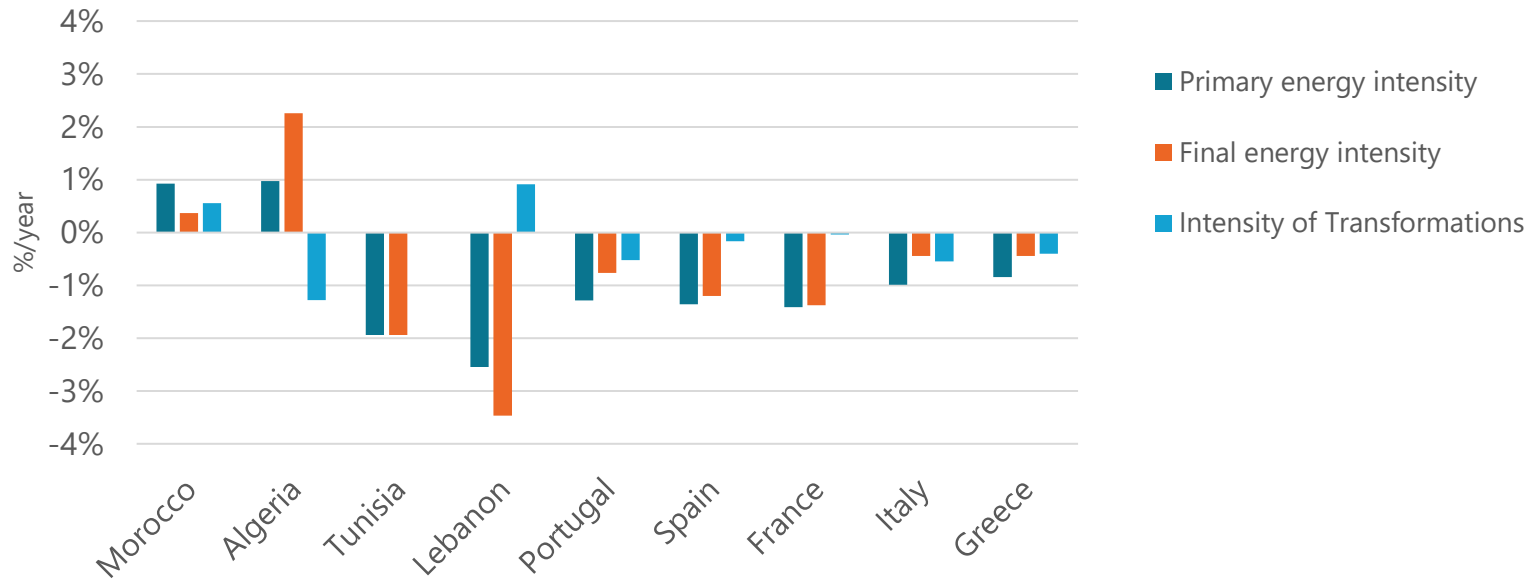
[2] ODEX (or here, MEDEX) is the indicator used to measure energy efficiency progress by sector. Its value is 100 for the base year; a value of 80 in year t means an improvement of 20%. The detailed calculation of ODEX is explained in http://www.odyssee-mure.eu/publications/other/odex-indicators-database-definition.html

Comparison of EE trends between countries
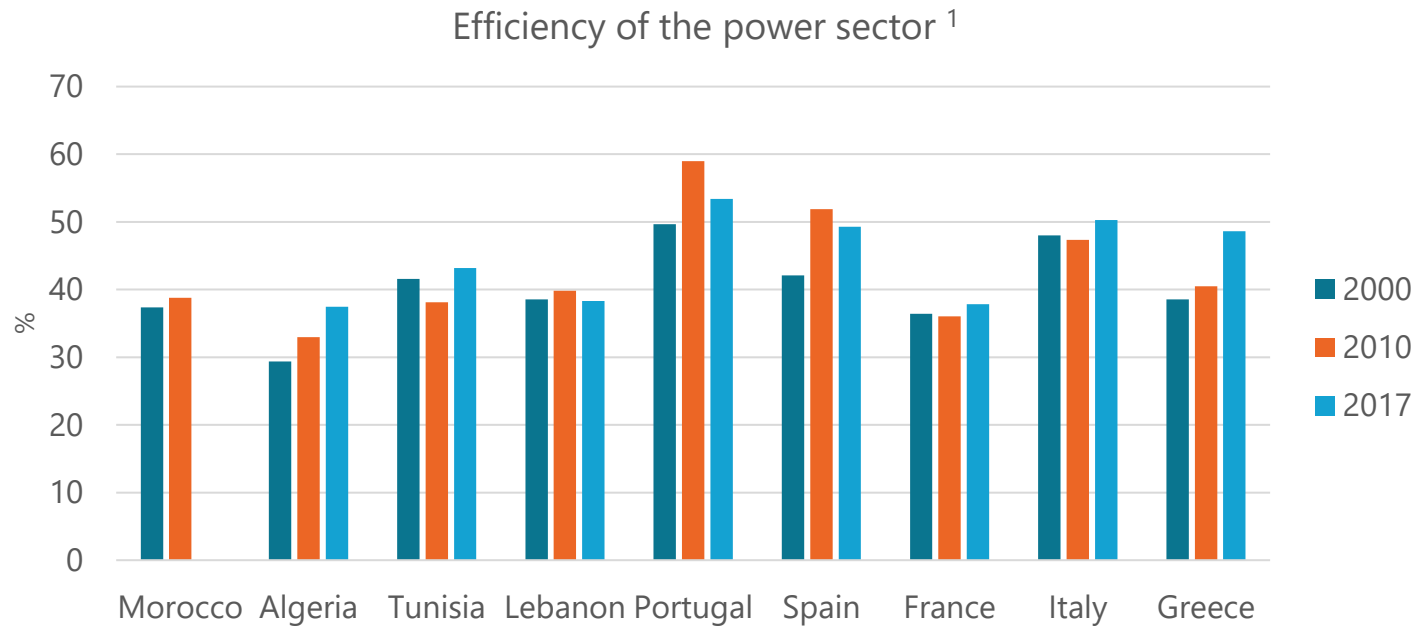
- **General EE trends**

Trends in primary and final energy intensities at normal climate for 2000-2017

Legend:
- Primary energy intensity
- Final energy intensity
- Intensity of Transformations

Countries (x-axis): Morocco, Algeria, Tunisia, Lebanon, Portugal, Spain, France, Italy, Greece

Y-axis: %/year (from -4% to 4%)

o Decrease of the primary intensity in Tunisia and Lebanon.

o Faster decrease of the primary intensity than the final intensity (except Morocco and Lebanon)

➔ the energy sector ("transformations") contributed to the reduction of the primary intensity in most countries.

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Comparison of EE trends between countries

- **Efficiency of the power sector**
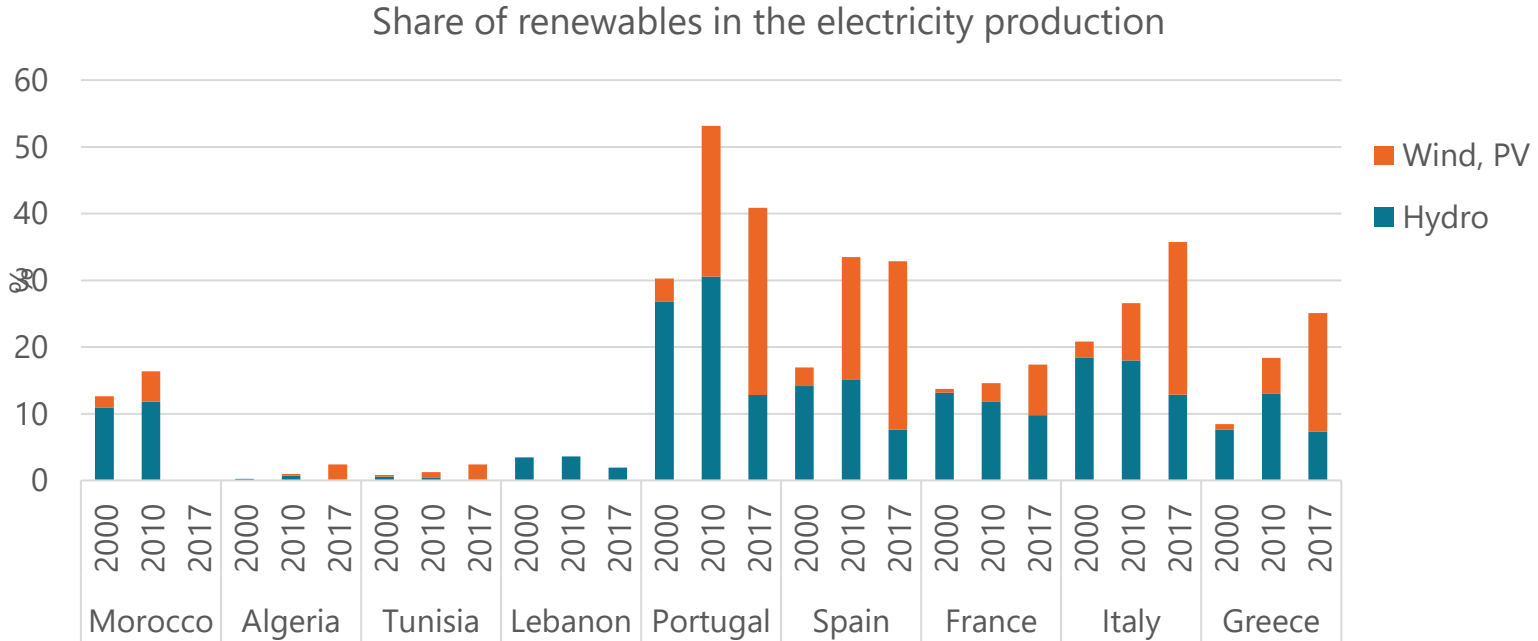
Efficiency of the power sector [1]

- In the Medener countries, the efficiency of the power sector is generally lower than in European countries.

[1] ratio of the energy value produced to the energy value consumed

Comparison of EE trends between countries

- **Efficiency of the power sector**

Share of renewables in the electricity production

- There is a low share of renewables in the MEDENER countries (except Morocco) compared to the European countries.

➜ for Algeria, Tunisia and Lebanon, the efficiency of the power sector is mainly influenced by the performance of the thermal power plants.

Comparison of EE trends between countries

- **Efficiency of the power sector**

Efficiency of the thermal power plants
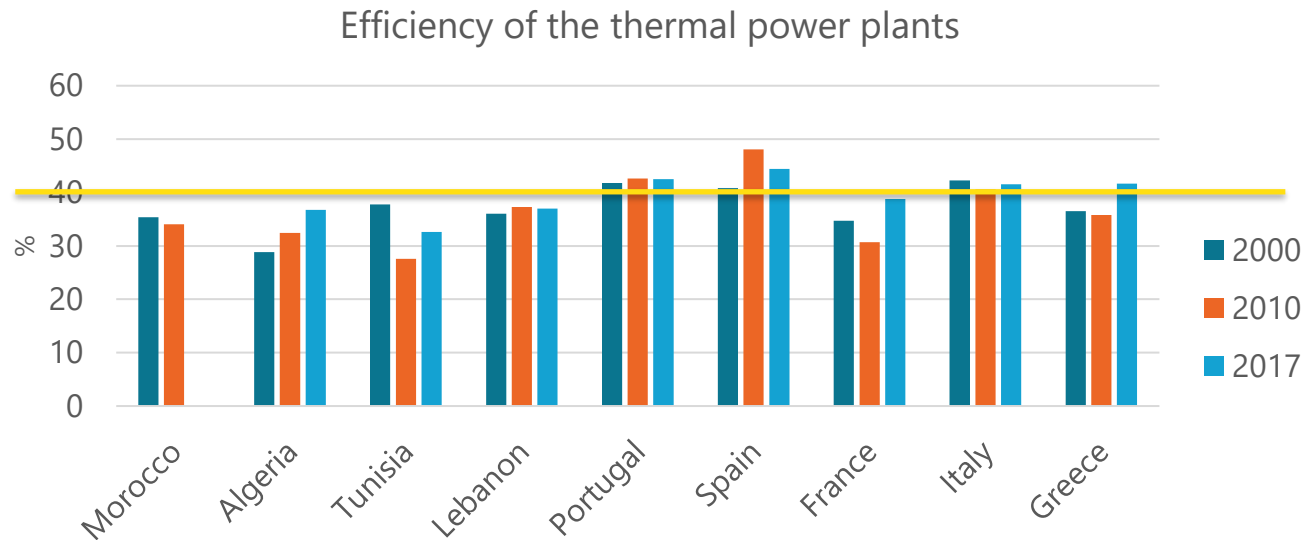
- There is a general trend of an increasing efficiency of thermal power plants both in Medener and European countries (except in Italy were it is almost stable).

- Efficiency over 40% can be explained by the diffusion of gas combined cycles.

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# Comparison of EE trends between countries

- **Energy efficiency for households**

  - Levels : households represent on average 26% of final energy consumption, with large disparities (15%-20% in Portugal and Spain ; ~30% for France, Italy, Lebanon and Algeria) related to contrasting energy uses and rates of equipment ownership, differences in energy prices and income level.

Annual growth rate of energy consumption of households
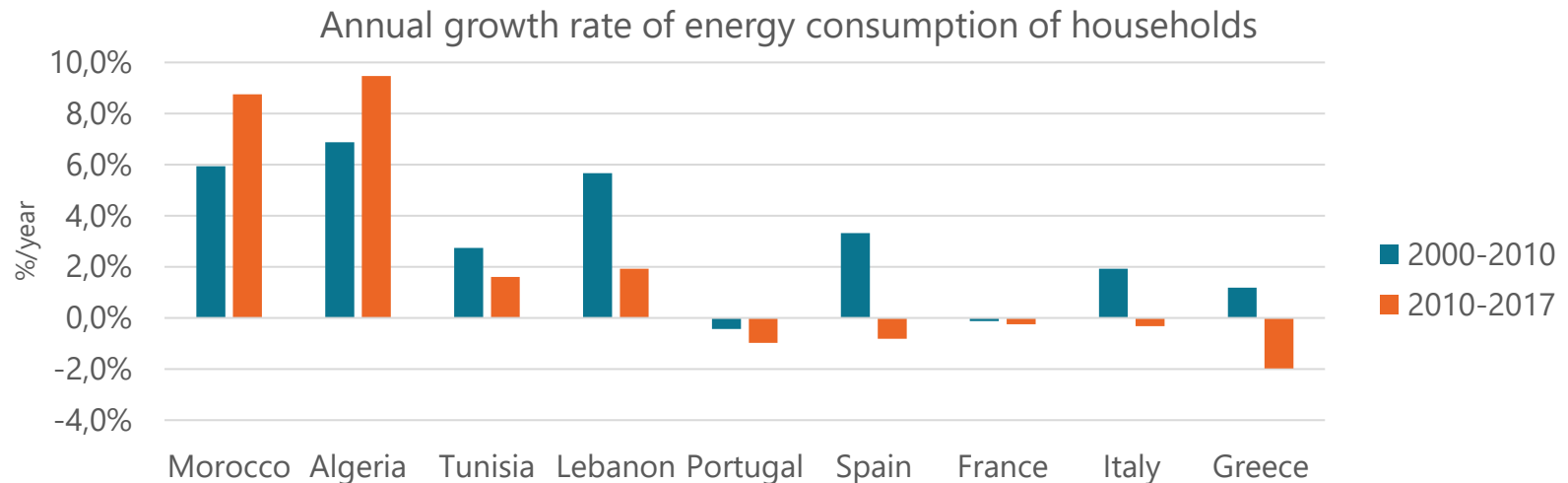
  - Contrasting trends can be explained by: change in the number and size of households, the progression in the equipment ownership (and electrification rate for Morocco), and change in the specific energy consumption of dwellings.

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Comparison of EE trends between countries

- **Energy efficiency for households**


Specific energy consumption of households
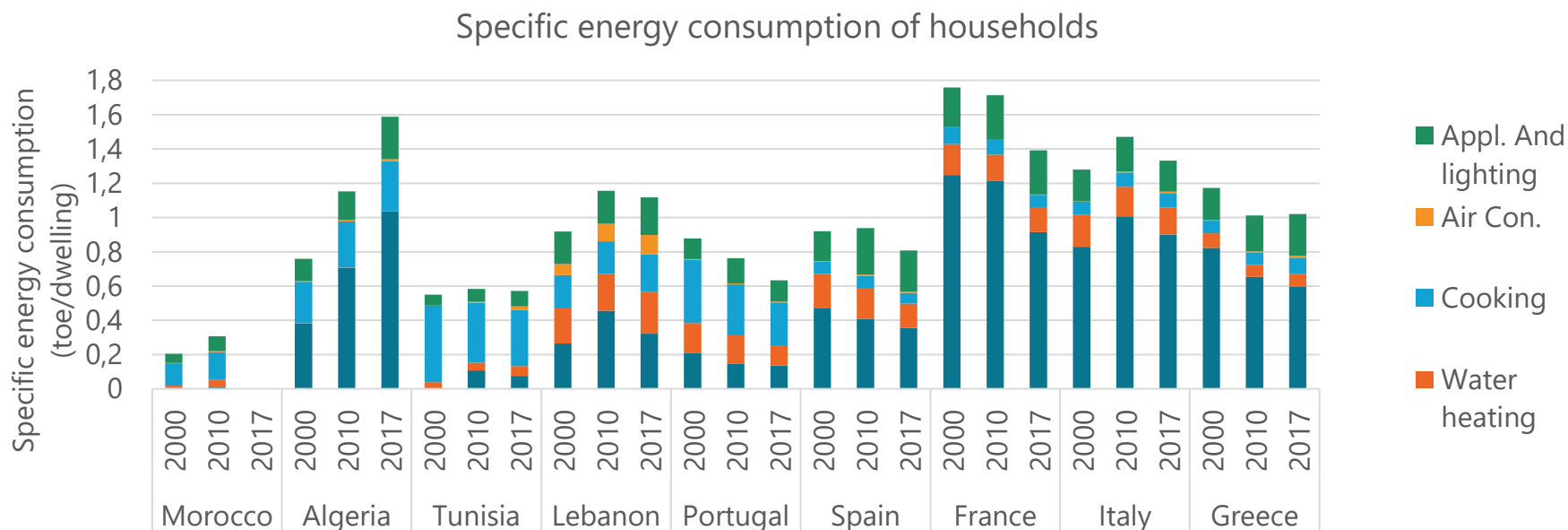
- In EU countries (except Italy), the specific consumption decreased between 2000 and 2017: more efficient electrical equipment, better home insulation, economic recession (Greece, Portugal, Spain).
- Lack of data for Morocco (no data after 2010) and Tunisia (not all end-uses covered in 2000)
- ➔ need of improvements of the MedObserveer coverage.

Analysis at national level : transport sector, Lebanon

- **Illustration of a decomposition analysis to assess the drivers of energy demand of the transport sector in Lebanon for 2 periods**
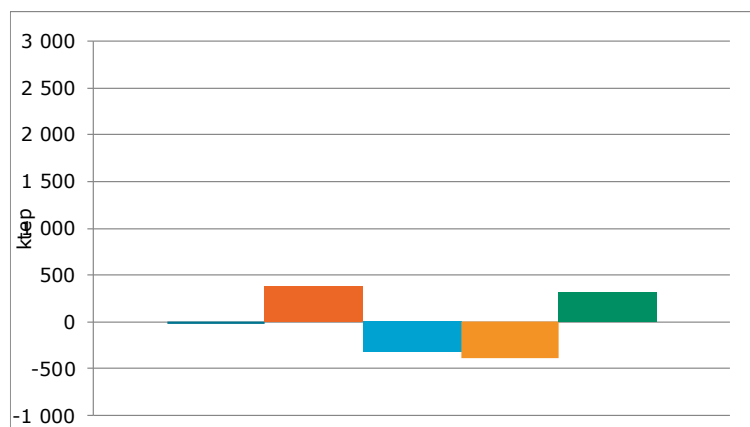
2000 - 2006
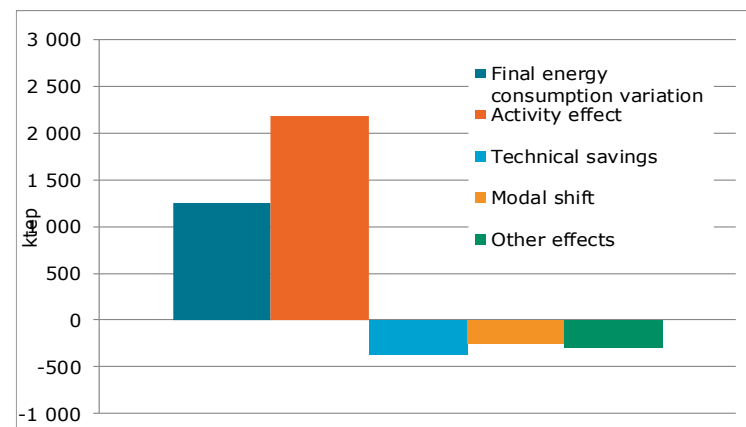
2006 - 2017

- **Transport : ~50% of the final energy consumption** in 2017 in Lebanon (91% of road transport).

- 2000- 2006 : **no change** in total consumption of sectors ➔ energy savings due to a better efficiency of cars, trucks and airplanes and modal shift have been compensated by an increase in traffic (activity) and other effects (behaviors, low capacity utilization of freight transport)

- 2006-2017: **+ 1258 ktoe** of the sector consumption ➔ large increase in traffic only partly compensated by technical savings , modal shift (-255ktoe) and other effects.

Analysis at national level : PAMs monitoring and evaluation, Tunisia

- **Example of PAMs and evaluation indicaors for the residential sector in Tunisia**

  o The database indicators can be used to monitor and evaluate (preliminary step) the implemented Policies and Measures (PaMs).

End-use	Measure	Impact indicator	Diffusion indicator
Lighting	Compact Fluorescent lamp distribution program and ban on incandescent lamps	Unit consumption per household for lighting	Share of efficient lamps Sales of efficient lamps
Appliances	Replacement of refrigerators over 10 years old with class 1 refrigerators	Unit consumption of refrigerators	Stock / sales of class 1 refrigerators
Hot water	Development of solar water heaters	Unit consumption for hot water	Total solar water heating surface Solar water heating surface installed per year Solar water heating surface for 1000 inhabitants

Indicator availability in the database ➔ *green: available; orange: unavailable.*

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Conclusion …

• **MedObservEEER: a useful tool for assessing progress in energy efficiency and renewable energy development, as well as for monitoring and evaluating policies and measures**

  o The data gathered in the MedObervEER database are crucial:

  • To evaluate and compare progress in energy efficiency by sector and end-use and relate it to the observed trends in energy consumption.

  • To report on energy efficiency and energy savings.

  • As a support for monitoring national targets on energy efficiency.

…and outlook

- Data quality can be improved :
  - Extend existing surveys, launch new ones

- This project was a pilot operation. It aims to be extended in a second phase to other Mediterranean countries, namely Jordan, Palestine and Egypt.

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About Enerdata:

Enerdata is an energy intelligence and consulting company established in 1991.
Our experts will help you tackle key energy and climate issues and make sound strategic and business decisions.
We provide research, solutions, consulting and training to key energy players worldwide.

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Comparison of EE trends between countries

- **Context**

  o Energy efficiency : a major policy issue in most of the countries (NEEAPs).

  o Tunisia : the most ambitious targets, as it seeks to reduce its primary energy consumption by 30% in 2030 compared with a baseline scenario.

  o Algeria and Morocco have set lower targets for 2030: -20% for Morocco and -9% of primary energy consumption for Algeria compared with a baseline scenario.

  o In Lebanon, the national energy efficiency action plan aims at a level of 5% savings in the total Lebanese electric power demand in 2020 compared with a baseline scenario established in 2010.