# Energy efficiency indicators in developing countries

Experience from ADEME/WEC

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The ADEME's experience

- **ODYSSEE-MURE : European benchmarking for 30 countries. 2OO EE indicators supported by national teams (mainly energy efficiency agencies) and the EU**

- **WEC: 20 energy efficiency indicators based on international data + experts data (enerdata data base)**

- **Bilateral cooperation with energy efficiency agencies: Tunisia; India; Turkey etc;**

- **Future perspectives (IPEEC, WB mediteranean countries, MEDENER; Maroc; Algeria, Russia**
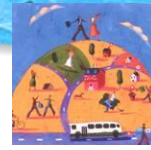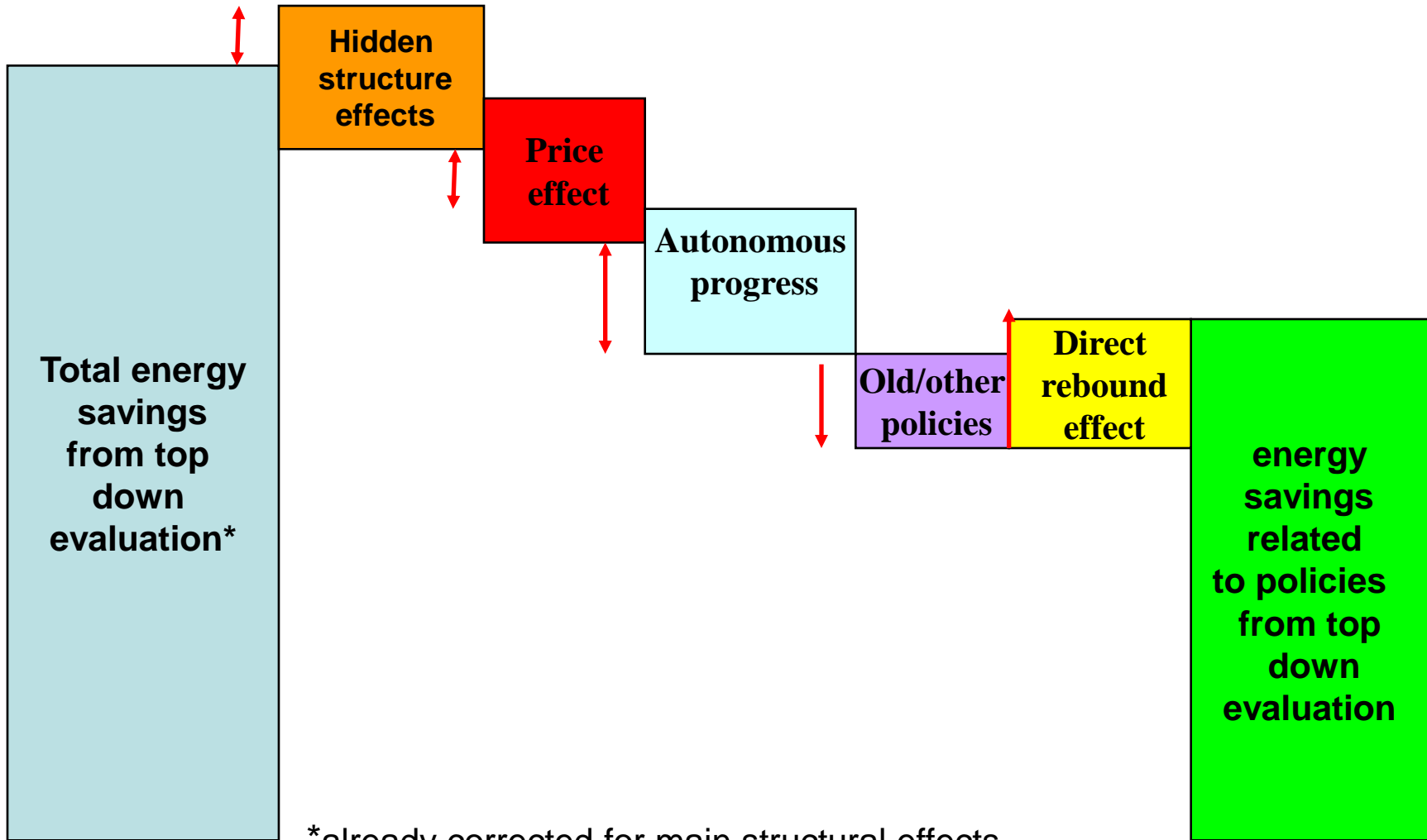
Some issues

- **More and more political comittements**
    - energy efficiency law, target, requirement from the governement of energy demand or efficiency (Algeria), improvement of the energy balance, recommandations from CEDEAO; UMA
- **But still some political issues (afraid about CC committement)**
- **More and more experiences and challengers (IEA, APERC, Plan bleu, ESCAP, LBNL…)**
- **Project implementation is a key of success:**
    - decentralised or not (more difficult but better legitimacy) ; official or had-hoc data
- **Staff:**
    - Rapid turnover, existence of a dedicated team, local consultants, analysts or statisticians, research/ministry/energy efficiency agency, international organism
- **Objectives**
    - National/international benchmarking, Industry energy intensive industries (norms)
- **Dessimination seems more difficult than in OECD countries**
- **Its works : ex Tunisia**

Explanatory factors of energy savings calculation

Total energy savings from top down evaluation*

Hidden structure effects

Price effect

Autonomous progress

Old/other policies

Direct rebound effect

energy savings related to policies from top down evaluation

*already corrected for main structural effects

Issue : Do we have and can we take into account the « famous national circunstancies » of P&Ms for EE indicators benchmarking ?

OBJECTIVE
Rather physical

SEMI-OBJECTIVE
rather technico- economic

POLITICALLY QUESTIONABLE

Geography
Size, Topology, climate

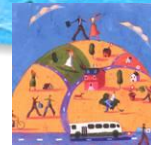**Demography**
age, decohabitation

Level and structure

Of economy, of infrastructures of energy devices for supply or Consumption

Lifestyle

Policies acceptance

energy environmental sectoral

Transfer of methodology for DCs

- **Application of advanced methodologies can work (ie ODEX, technico-economic decomposition, correction of structural effect…)**
- **Need some adaptation of indicators (ex equivalent-car)**
- **Some sectors more important (air conditioning, hotels and turism)**
- **Benchmark should be preferably regional**
- **They are often more data available than firstly expected**
- **Effort should be focused primarly on energy data rather than activity data. Lack of coherence between energy and activity data**
- **Some data can come from OECD (ex fuel consumption from cars**
- **Additional had-hoc end use surveys are needed (gasoline fuel station survey ie Tunisia, Mexico)**
- **Industry better covered, services the weakest,**
- **Few end-use data (by vehicle type, space heating)**

WEC indicators : Which types of indicators and analysis

- **Trends** 1980-2008 with a greater focus 1990-2008 and some indications for 2009 (recession)
- **Levels**
- Overall and by sectors , some end uses (cars)
- Energy and CO_2 energy related indicators
- Economic indicators (energy intensities) and technico-economic indicators (KWh/Dw: l/100km, Toe/ton of steel)
- Related to economic drivers (GDP, GDP ppp per capita, HID)
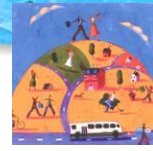
WEC indicators: Where the data come from

- **The data are taken from ENERDATA world energy database. This database relies on harmonised data from international organisations (IEA, Eurostat, WB, ADB, IMF), from industry associations (Cedigaz for gas, IISI for steel, IRF for transport, for instance), as well as from national energy ministries and utilities.**

- **It provides a consistent coverage of the world energy consumption, split by countries and main regions, and is kept up-to-date to take into account the most recent trends. Some more detailed indicators were taken for European Union (EU) countries from the ODYSSEE database.**

- **This methodology allows to perform fast updating and to provide coherent data sets among countries.**

WEC indicators : Geographical coverage

- **The world is divided into seven main regions. Because of its size and heterogeneity, Asia is split into 4 sub-regions and main countries:**
- **Europe (EU, Albania, Bosnia, Croatia, Iceland, Macedonia, Norway, Serbia, Switzerland, and Turkey)**
- **CIS (Community of Independent States**
- **North America (USA, Canada)**
- **Latin America (including Mexico)**
- **Asia**
    - **China**
    - **India**
    - **Asia and Pacific OECD[2] (Japan, Korea, Australia, New Zealand)**
    - **Other Asia (ASEAN, other South Asia)**
- **Africa**
- **Middle East**

List of the WEC indicators

- **Primary and final Energy intensities at Exchange rate and ppp (Overall, industry and transport)**
- **Final energy intensity and industry intensity corrected from GDP structure**
- **Primary energy with and without biomass**
- **Specific consumption for steel, clinker, cement, Aluminium**
- **Specific consumption (l/100 km)for new cars (OECD)**
- **Electricity consumption per household**
- **Electricity consumption per electrified household excluding heating**
- **Electricity intensity in the service sector**
- **Diffusion of solar heaters**
- **CO_2 emission per capita from energy combustion**
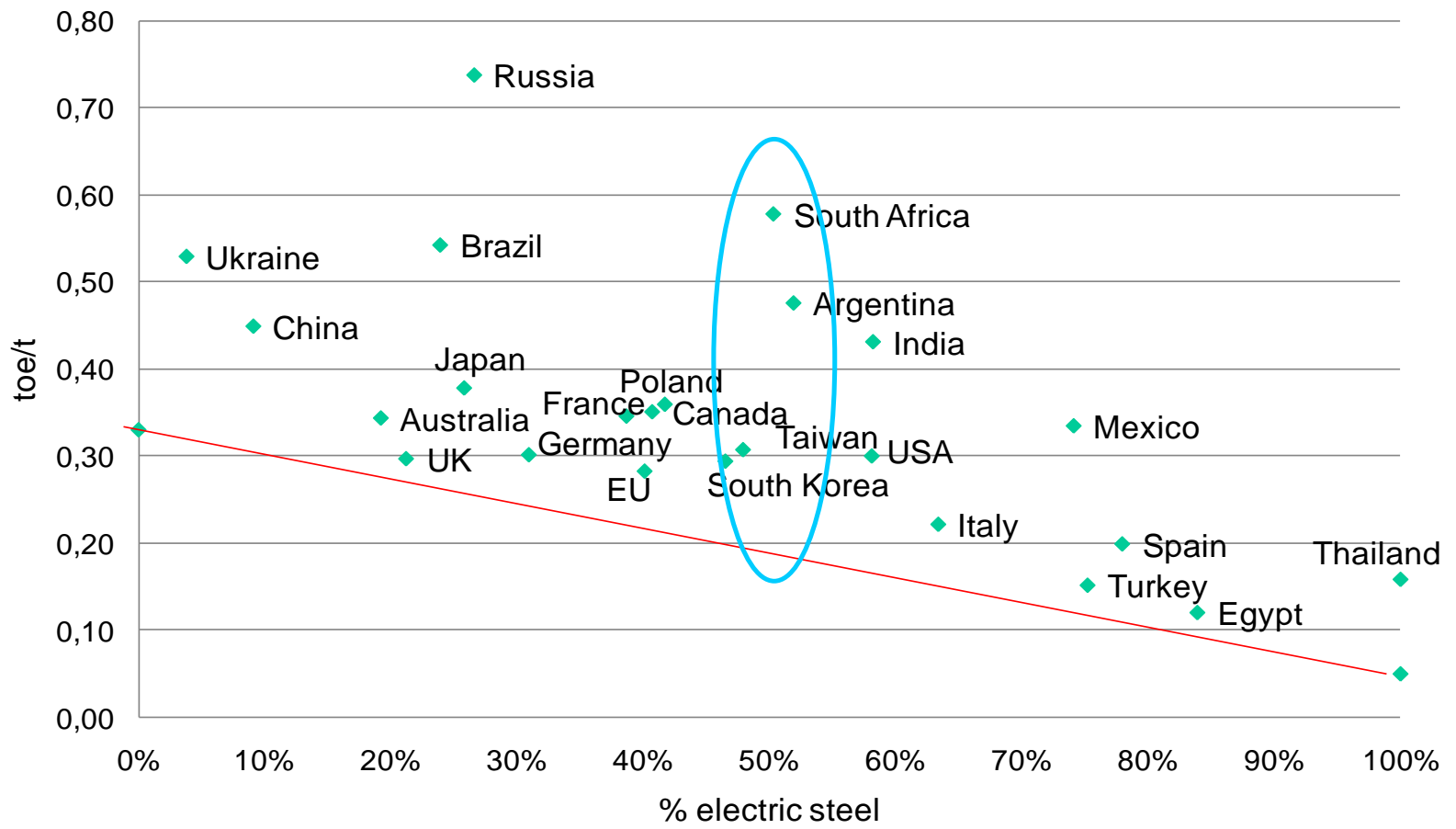- **CO_2 intensities**
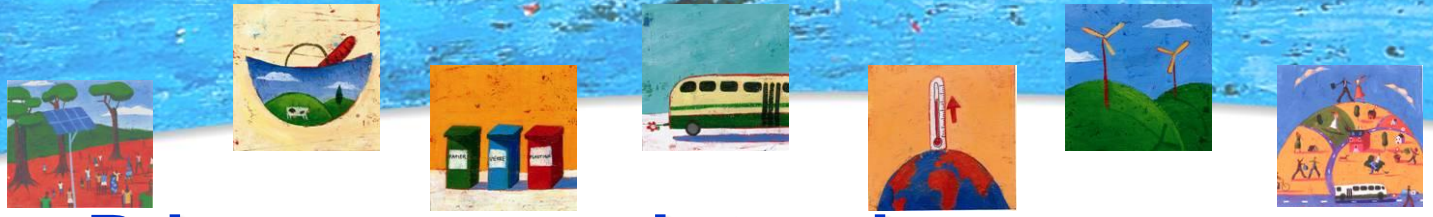
Primary energy intensity
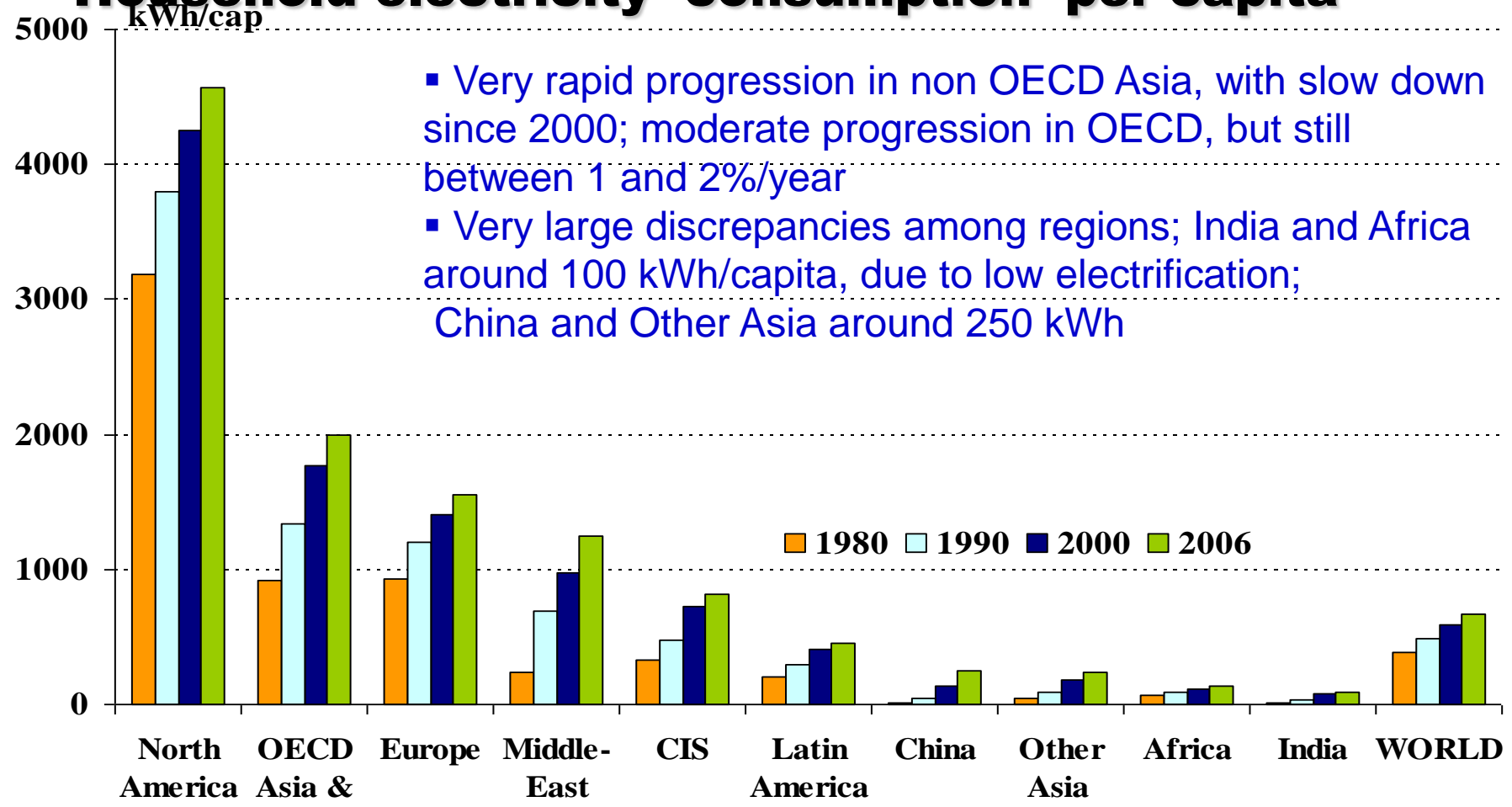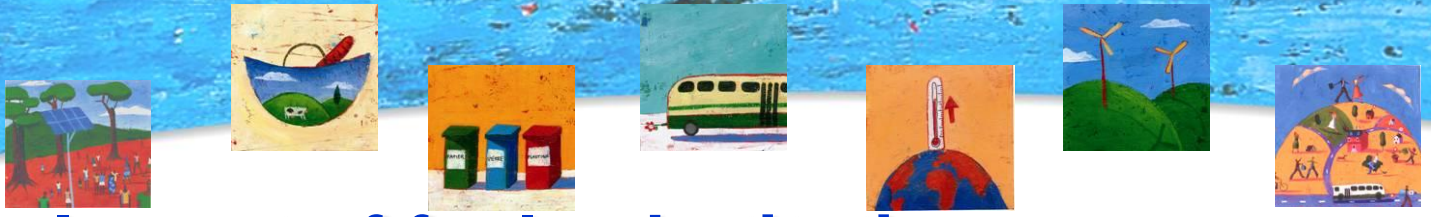# at constante GDP structure by regions
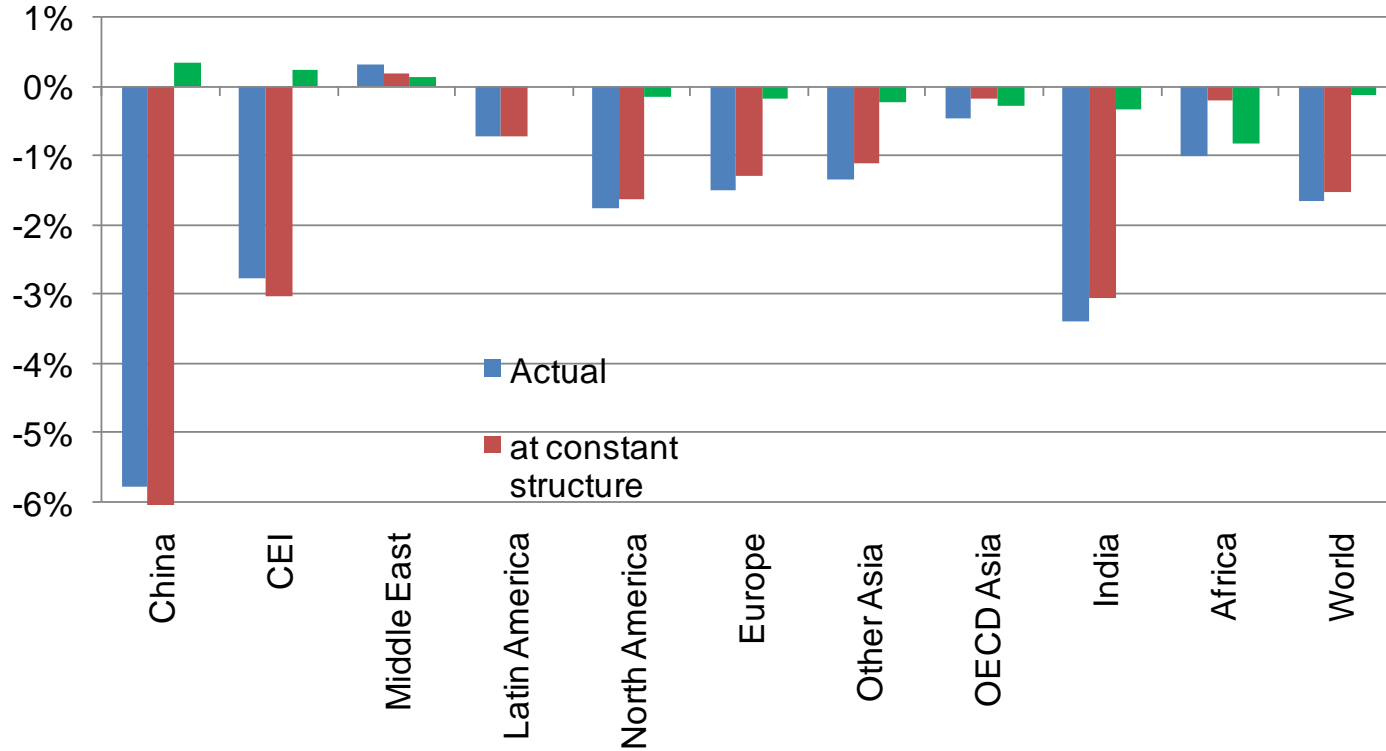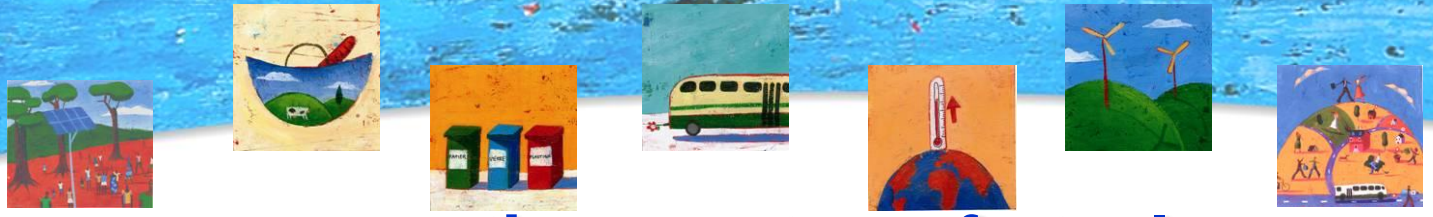
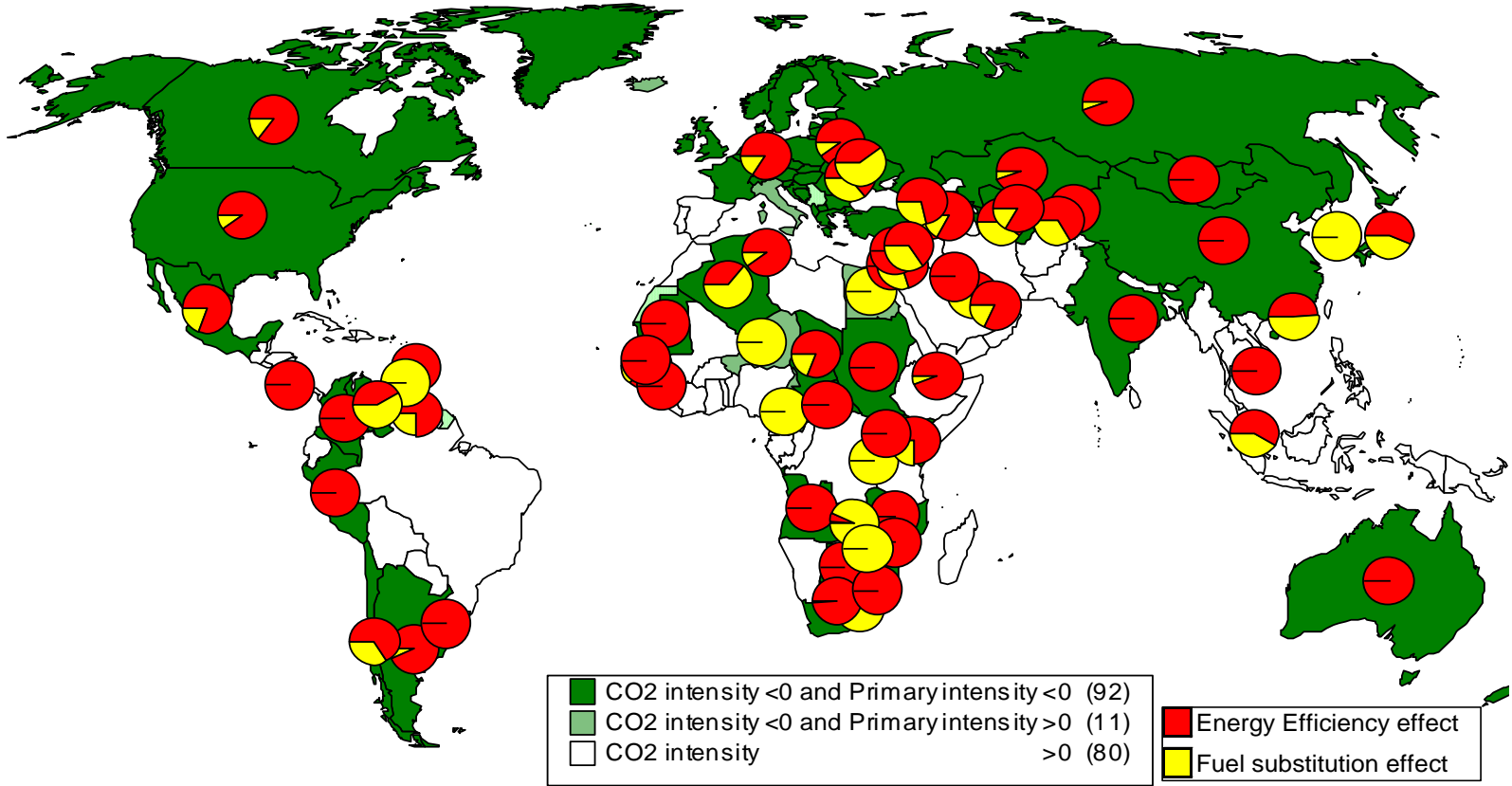# Energy consumption per ton of steel as a function of process mix

For households, effect of policies on large appliances visible but lifestyle offset part of the progress achieved

Household electricity consumption per capita

kWh/cap

- Very rapid progression in non OECD Asia, with slow down since 2000; moderate progression in OECD, but still between 1 and 2%/year
- Very large discrepancies among regions; India and Africa around 100 kWh/capita, due to low electrification; China and Other Asia around 250 kWh

Legend: ■ 1980 □ 1990 ■ 2000 ■ 2006

Categories: North America, OECD Asia & Pacific, Europe, Middle-East, CIS, Latin America, China, Other Asia, Africa, India, WORLD

Impact of fuel substitution on CO2 intensity changes

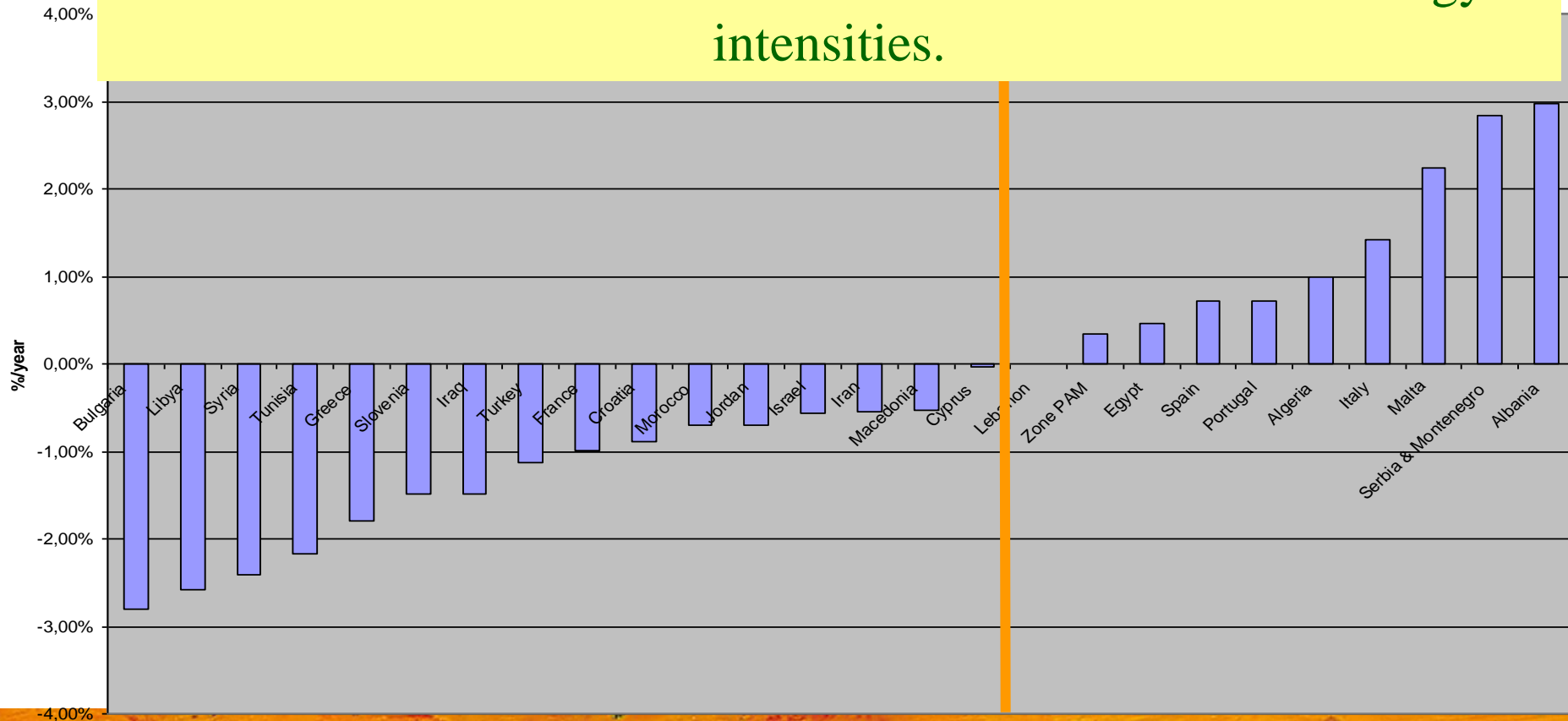| Legend	
🟩 CO2 intensity <0 and Primary intensity <0 (92)	
🟩 CO2 intensity <0 and Primary intensity >0 (11)	🟥 Energy Efficiency effect
⬜ CO2 intensity >0 (80)	🟨 Fuel substitution effect

Trends of energy intensities in the mediteranean countries
(2000-2006) (Source Enerdata)

1/3 of mediteranean countries has an increase of their energy intensities.

ODYSSEE Data Base in Brief

➢ **ODYSSEE is a comprehensive internet data base (www.odyssee-indicators.org). It now covers 29 countries (EU-27, Norway, Croatia), EU-27 and EU-15. This data base is yearly updated by 29 national teams, generally the national energy efficiency agencies.**

ODYSSEE data base includes:

➢ **Energy consumption data by sector and end-use and their drivers (about 1000 data series, of which 600 main data series)**

➔ **Half energy consumption data and half non energy data**

➔ **Importance of the consistency between the definition and coverage of energy consumption categories and drivers**

➢ **Energy efficiency and CO2 indicators at macro or sectoral levels (about 180 indicators)**

➢ **Over period 1990-2007 (from 1980 for most EU-15 countries) (1996 for some new members such as Baltic countries, Malta and Cyprus)**

The different types of energy efficiency indicators

- ➢ **Indicators to monitor trends in energy efficiency and CO2 abatement:**

  - ▪ **Monetary indicators: energy intensities, carbon intensity (toe or tCO2/€ at exchange rate and purchasing power parities)**

  - ▪ **Technico-economic ratios : unit consumption or emissions (kWh/appliance or dwelling, toe/ton, l/100km)**

  - ▪ **Rates of energy efficiency progress (%/year or by period) (ODEX)**

  - ▪ **Energy/CO2 savings (Mtoe, TWh, MtCO2)**

- ➢ **Indicators to compare the energy efficiency "performance" level of a country with other countries (intensities or unit consumption)**

- ➢ **Diffusion indicators to measure the diffusion of efficient technologies and practices**

# Despites advanced corrections, adjustment energy intensity cannot properly monitor energy efficiency (2007)

Final energy intensities adjusted for differences in prices (ppp),climate and industry & economic structures narrow difference between countries

EU-27 =100

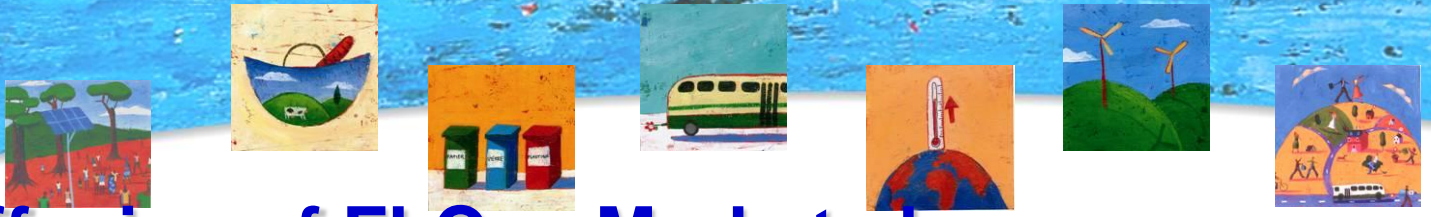Legend: ■ actual   ■ at ppp, structure and climate
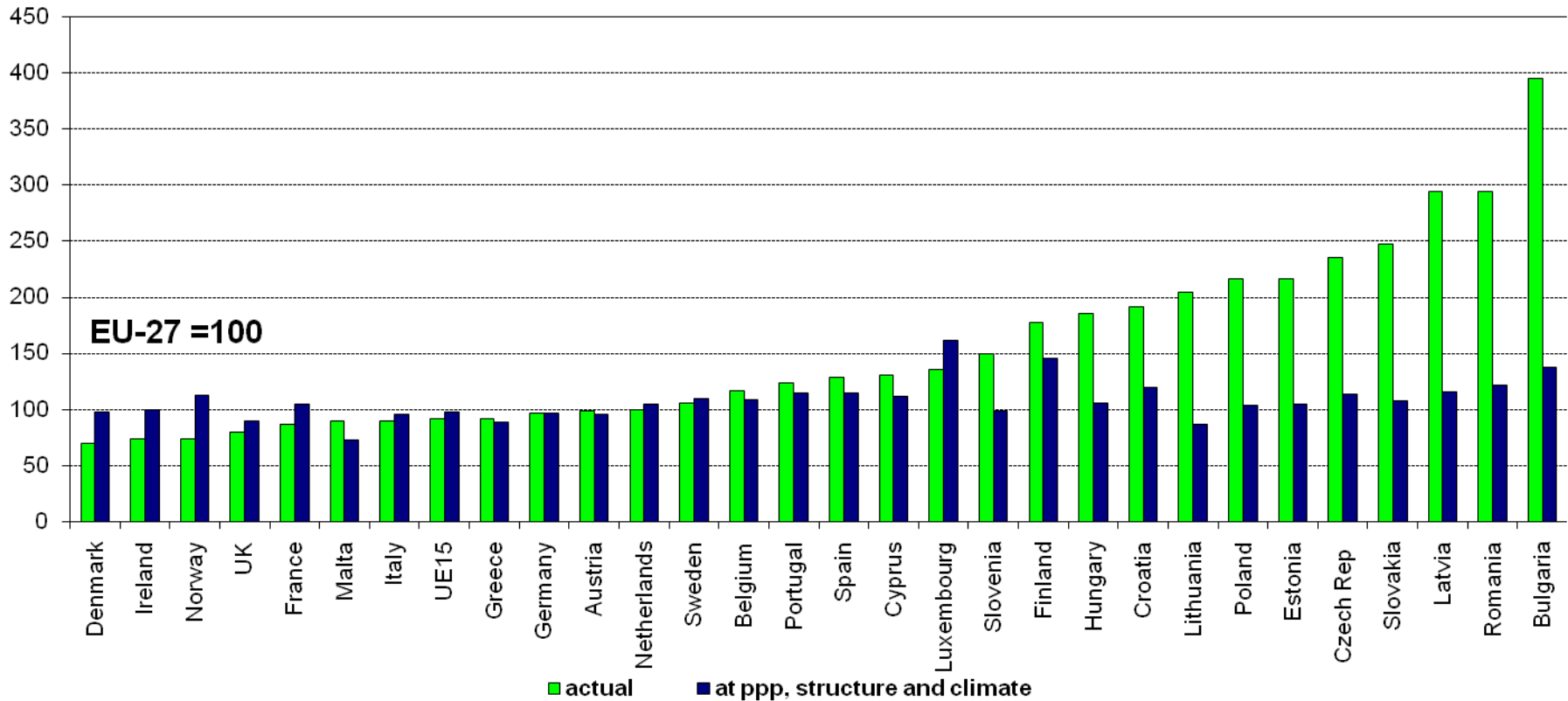
Energy efficiency progress in EU countries (ODEX)

Large discrepancies in energy efficiency progress through countries: more 2%/year for 6 New Member countries to less than 1%/year for 10 countries.
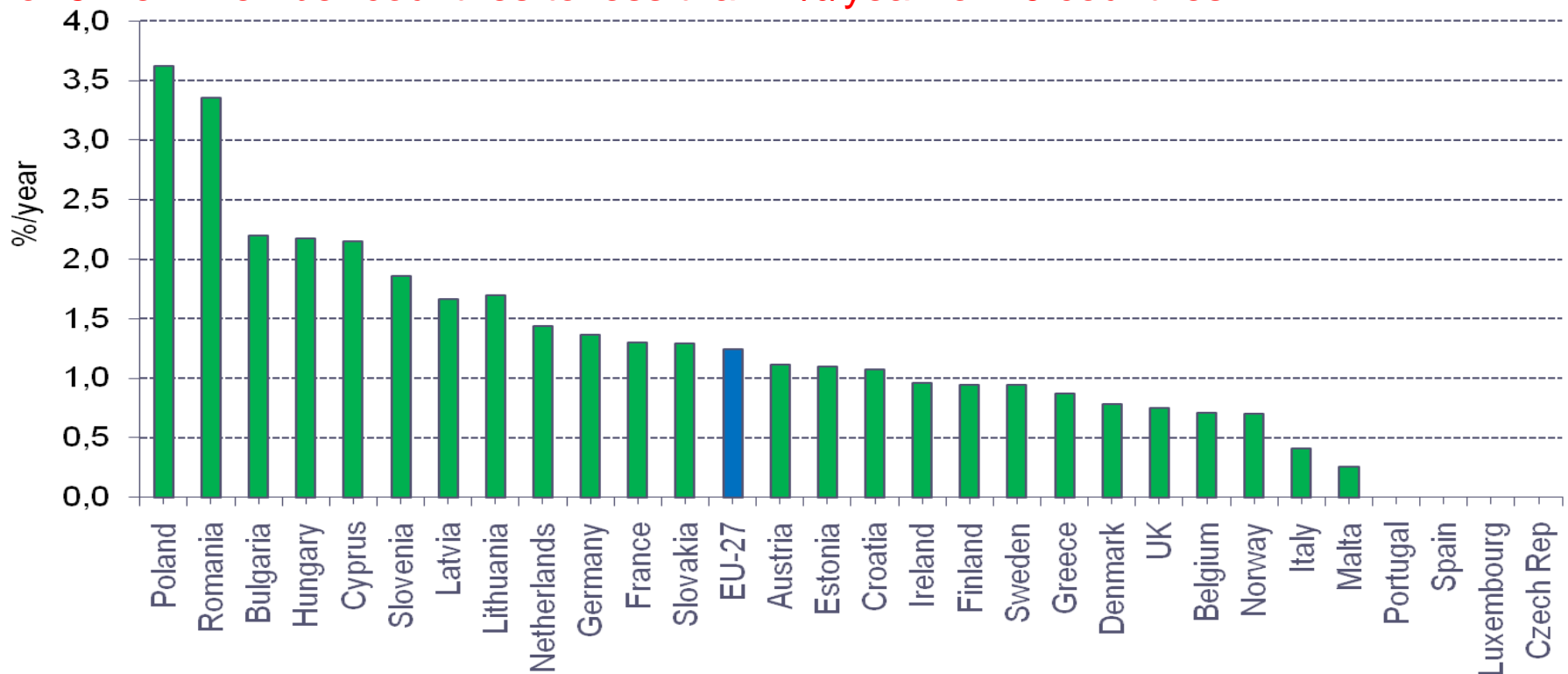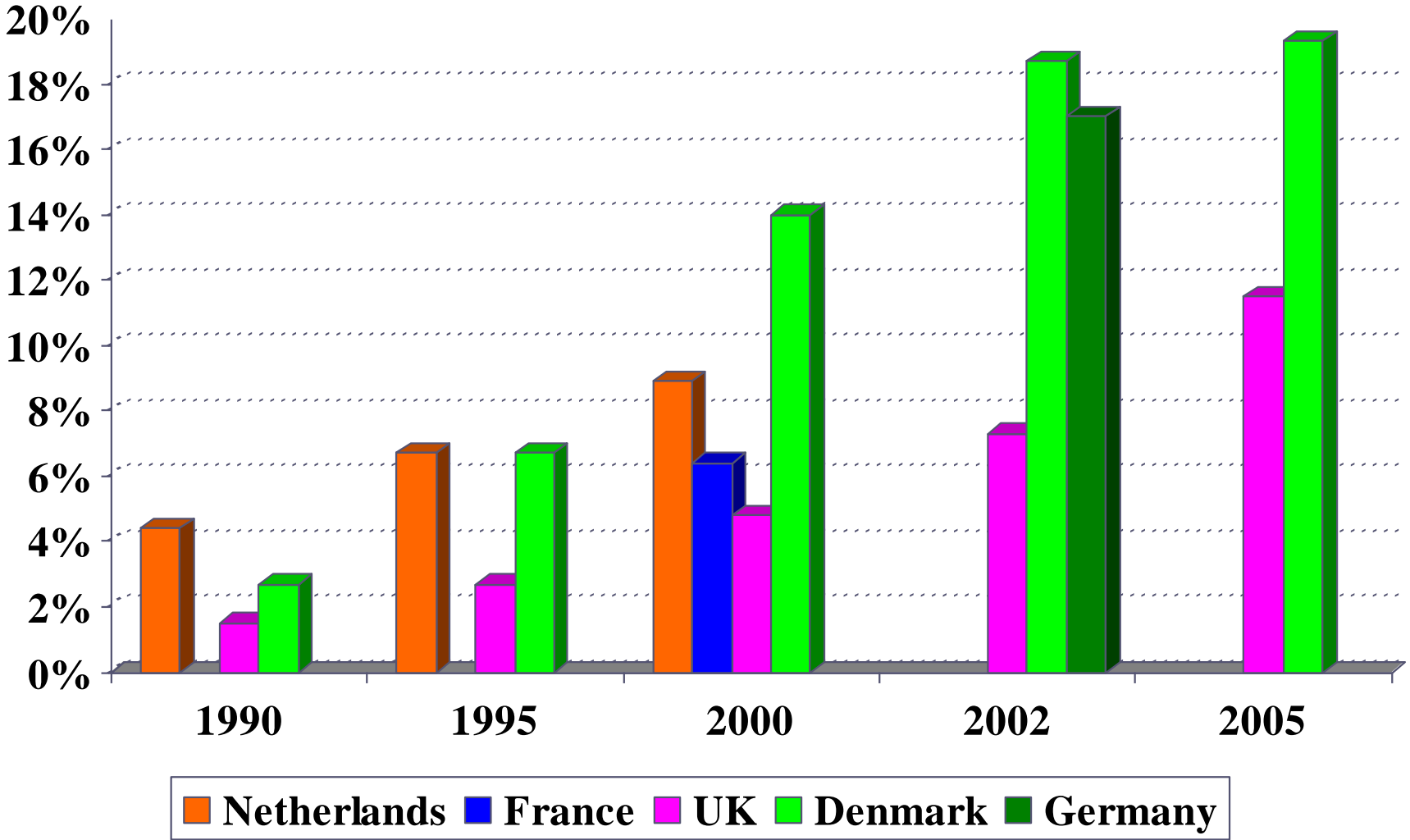

Source : ODYSSEE
Methodology: Energy efficiency improvement (ODEX) over the period 1996-2007
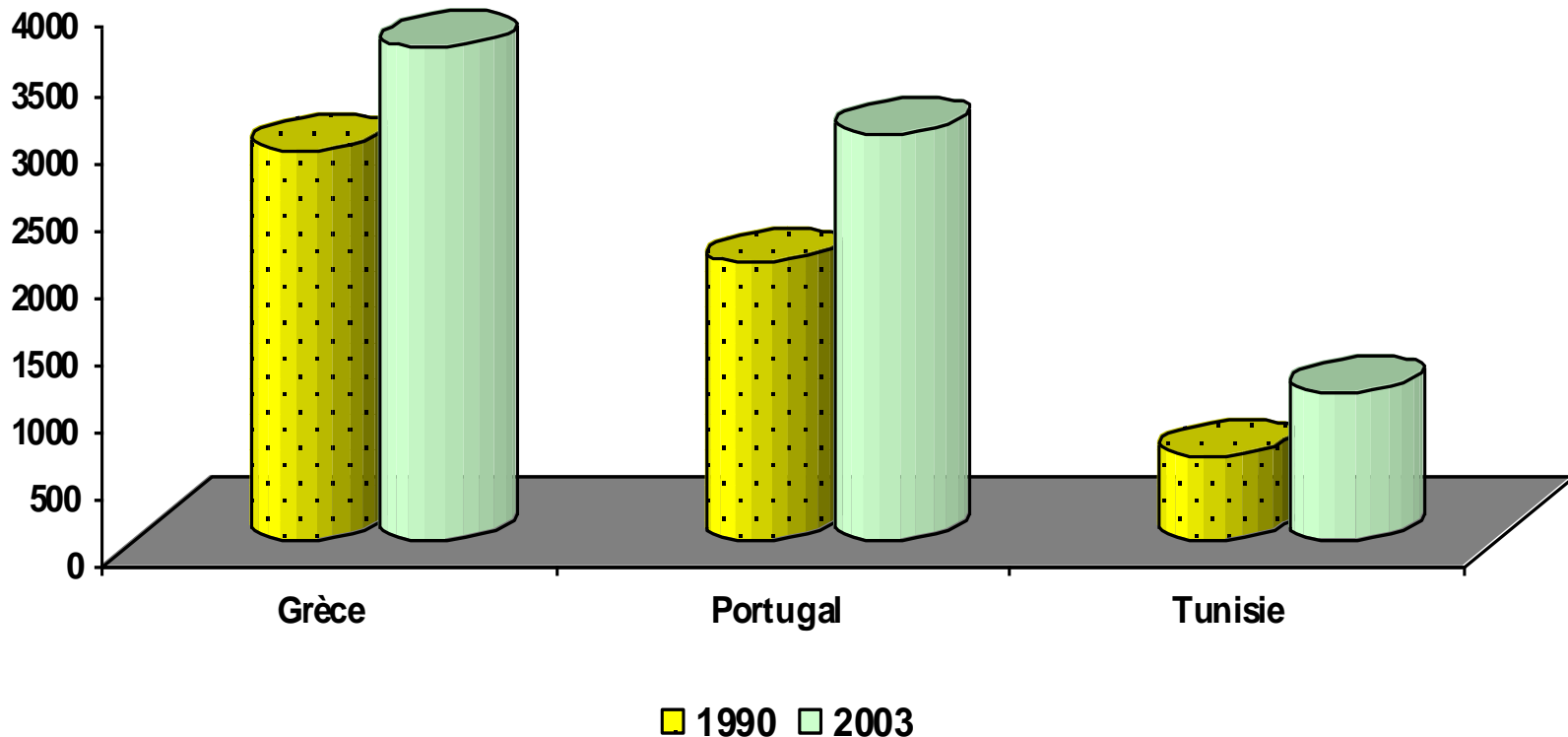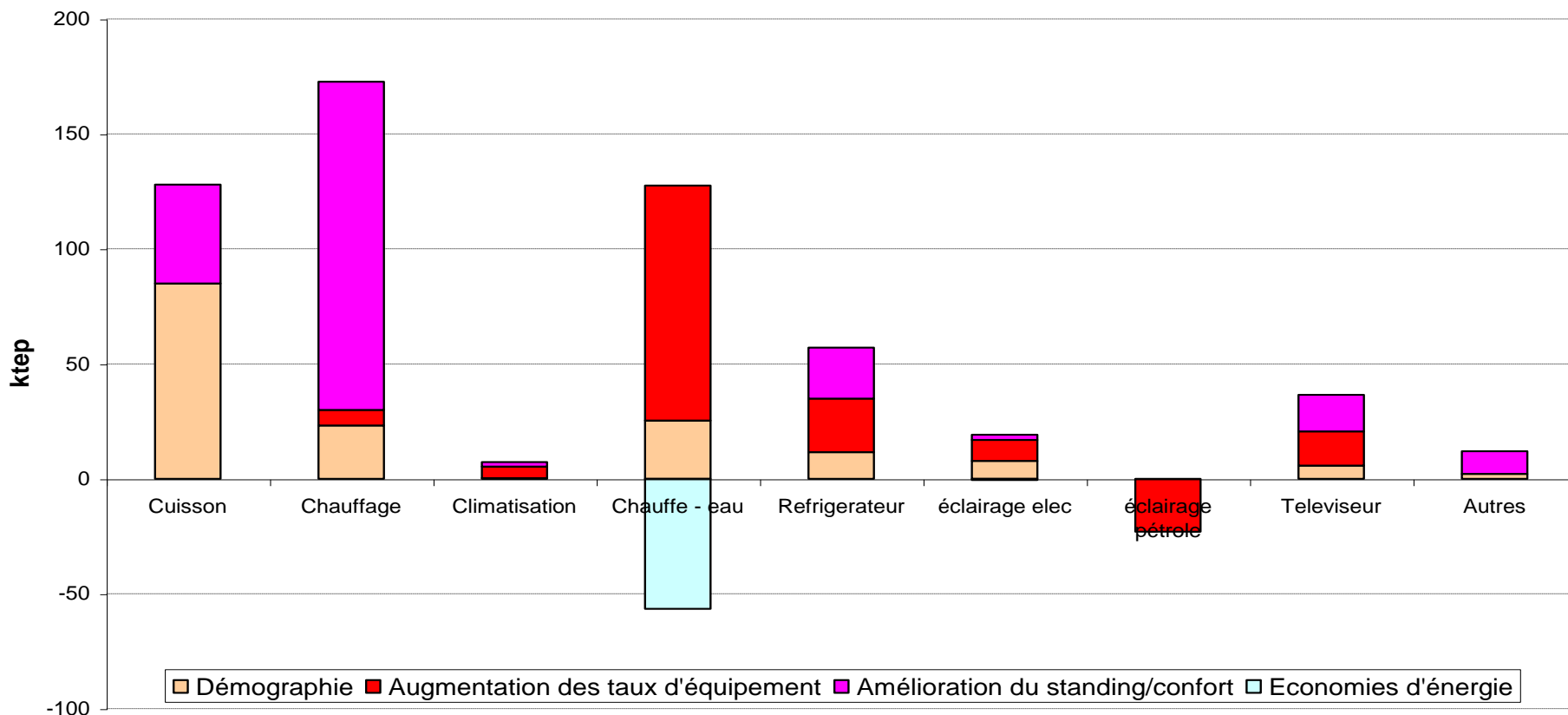
Diffusion of FLCs : Market share

Comparison of electricity consumption per dwelling (kWh/log) (source ANME-ADEME)

Explanatory factors of the household consumption in tunisia between 1990 and 2003 (source ANME)

Strategic issues

- **It take times (several years)**

- **A step by step approach**

- **A decentralised project implementation provides more legitimacy to the results but more difficult to manage**

- **Financial support by donors maybe needed, then self-financing for local consultants for instance**

- **Climate/energy demand/energy efficiency /indicators data bases?**

- **EE indicators works contribute to improve the quality of the energy balance**

- **Additional end-use surveys can be multi-sponsored**

- **Interpretation is also very important**

- **To suggest a dissemination of the report (sometimes some reluctance)**

- **International versus regional versus national monitoring**

ADEME's perspectives

- **Follow-up (Tunisia, India)**
- **IPEEC with large emerging countries**
- **Algeria, Marocco, Turkey, Russia?**
- **WB for mediteranean countries?**

Thank you for your attention

For more information

Didier.bosseboeuf @ ademe.fr

- **For energy efficiency indicator in the EE: www.odyssee-indicators.org**

- **For energy efficiency policies in the EU: www.mure2.com**

- **For energy efficiency policy and indicators at world level : WEC/CME: www.worldenergy.org**