ADEME
French Environment & Energy Management Agency

Energy Efficiency Indicators and Target Setting in South Africa

Government Experiences Using E.E. Indicators

ipeec International Partnership for Energy Efficiency Cooperation

Odyssee MURE II

MED ENER

World Energy Council
CONSEIL MONDIAL DE L'ENERGIE

Dr Didier Bosseboeuf, ADEME, France

Pretoria, January 28-29th 2015

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   - The Latin American experience IPEEC/IPEEI project
   - WEC energy efficiency knowledge
   - ISO TC 257 energy saving calculations

Conclusion

Why we need indicators?

- To monitor overall or sectoral **targets expressed in energy savings** instead of energy intensity which encompasses more than energy efficiency.
- To provide single and **simple (aggregated) results for decisions makers.**
- To express results both in terms of **level and improvement rate** (energy efficiency index)
- To **compare/benchmark** the countries progress and performance with respect to energy efficiency performances and assess potential for improvement.
- To assess the contribution of **energy efficiency on CO2 improvements** and provide detailed information for C02 inventory
- To assess the contribution of **energy efficiency on strategic macroeconomic indicators**

The tracking of the energy saving target for France (from the ODYSSEE-MURE facility)

Country:

France

Item:

Final savings

NEEAP Savings

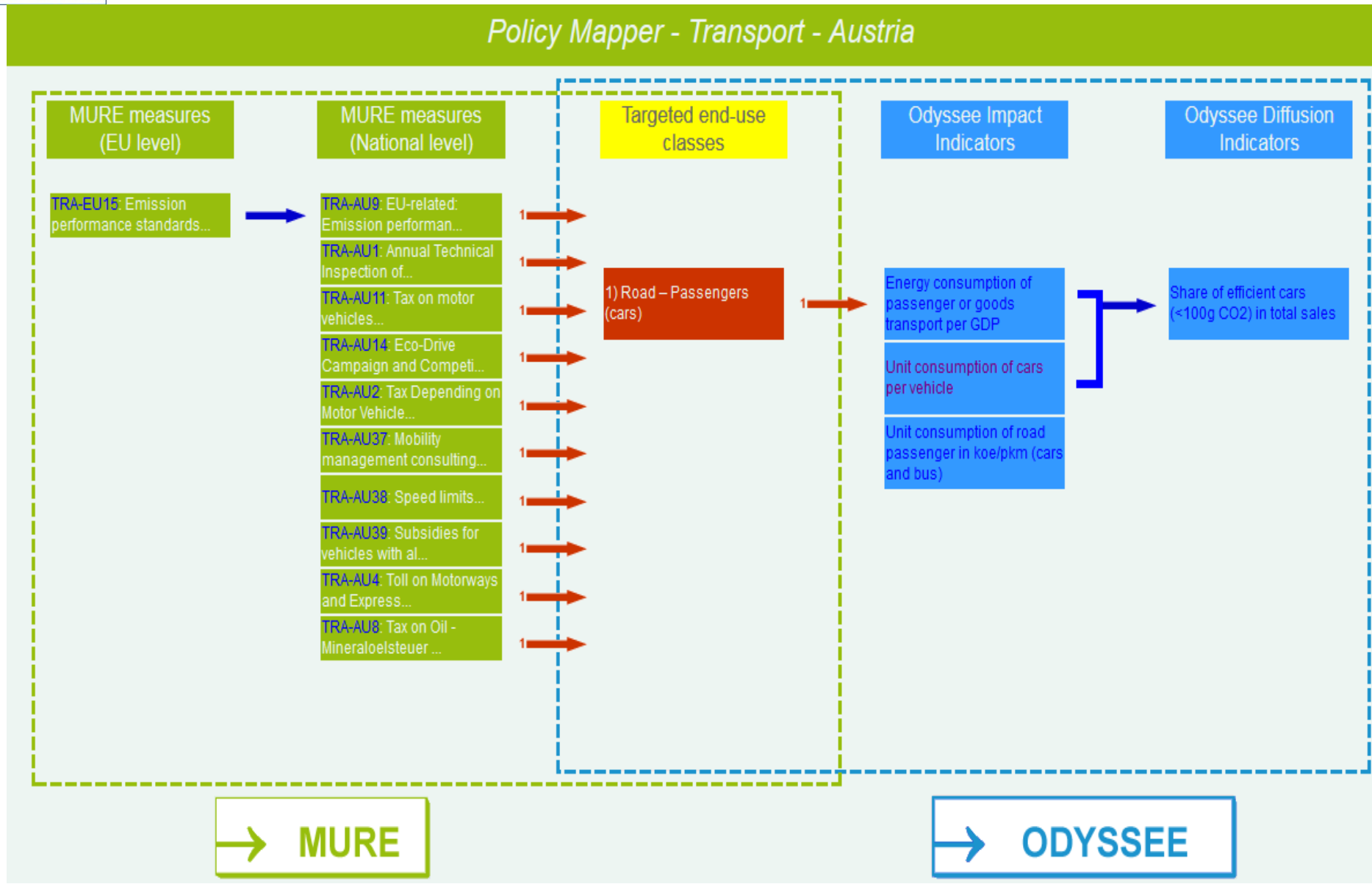
Glossary

ODYSSEE savings: In ODYSSEE, energy savings represent the effect of a reduction in unit consumption at the level of up to 30 sub-sectors or end-use. Savings from international air transport and ETS sector in industry are included. In industry and freight transport savings may be negative for some years due to a deterioration of energy efficiency; this is in particular the case in periods of recession when factories and trucks do not operate at full capacity and are thus less efficient than in a normal year. They are derived from ODEX, an indicator that measures the energy efficiency progress by sector . More information about ODEX.

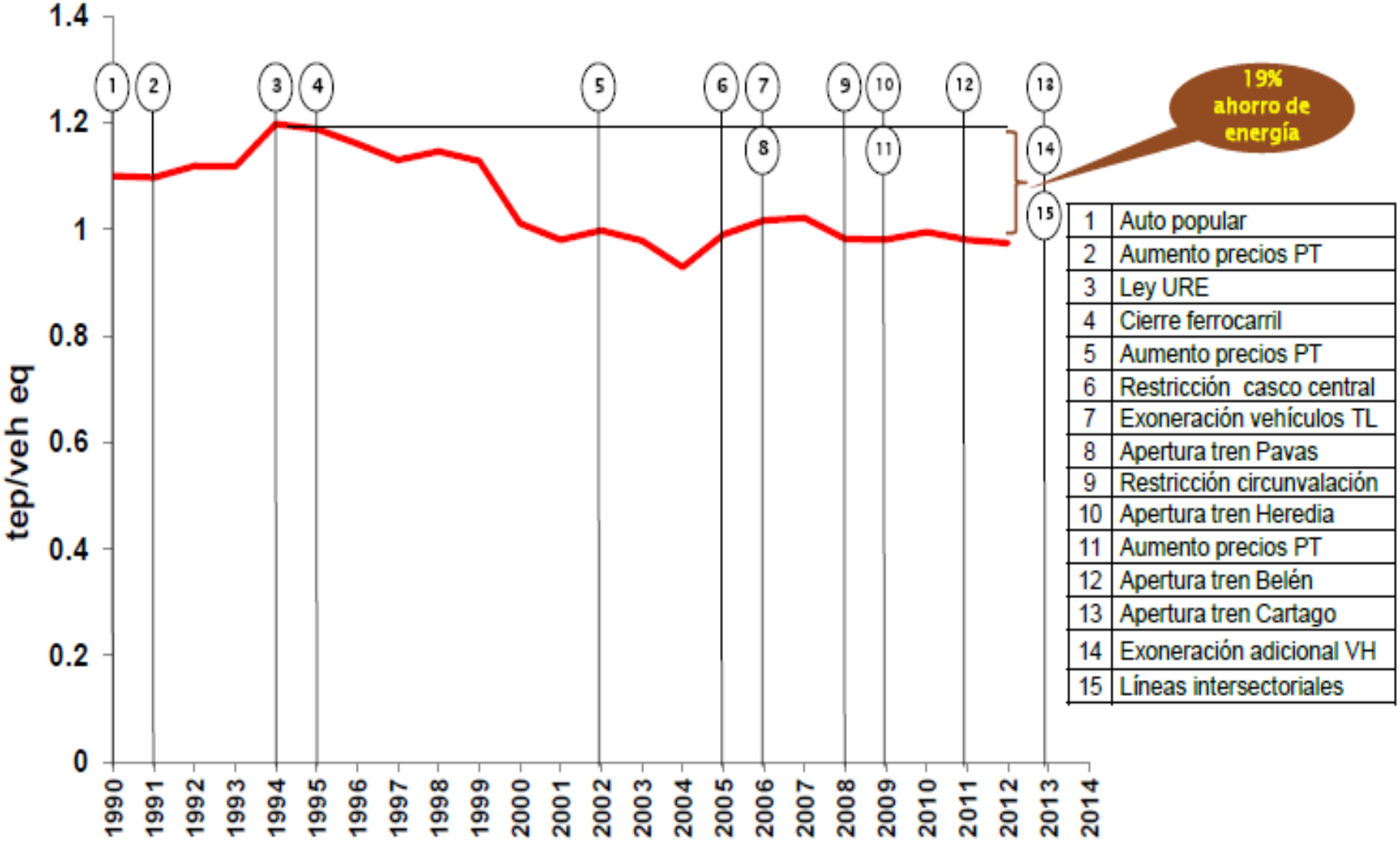
NEEAP savings: Energy savings as reported in the third National Energy Efficiency Action Plan (NEEAP) for buildings, transport and small industries (excluding sectors under ETS). Such savings often combine bottom-up (BU) and top-down (TD) savings depending on the countries.

Energy efficiency targets: Indicative energy savings target for the Member States for the period between the beginning of 2008 and the end of 2016.

The relationship with indicators and policies
Case se of Austria for cars from the ODYSSEE-MURE facilities



Costa Rica: Consumption of road transport per car equivalent and related policies



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Conclusion

From simple to more complex indicators
Concrete applications exist worldwide

Type	Level
1. Energy intensities	by sector & sub sector
2. Adjusted intensities	final and industry
3. Specific energy consumption	by sub sector & end-use
4. Benchmarked specific energy consumption	steel, cement, paper, heating, cooling
5. Energy efficiency indices	final and by sector
6. Energy savings	final, by sector and sub sectors
7. Indicators of diffusion	by sector
8. CO_2 intensities and specific emissions	by sector & sub sector
9. Financial/strategic indicators	Macro level
10. Indicators for NEEAP	By measure type

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Some activities of the French authorities on EEI

- The French government has defined several national and sectoral targets included in the new French law on energy transition;

- As each of the European Members State, the French government has several mandatory commitment to cope with the EU legislation
  - Achieved energy savings since 2008 to be reported in the NEEAP-ESD
  - To report on energy efficiency target (Art 7 of the EED)

- Since the 90's, ADEME developed an energy efficiency indicators database for the monitoring of EE trends and P&Ms for France (around 200 indicators) (interactive internet data base DATAMED);

- ADEME extensively uses EEI benchmarks for internal strategy and policy design between France and the European best practices :
  - Specific consumption for space heating (FR, NL)
  - Electrical appliance (FR-DE)

French official targets in the field of energy efficiency, as included in Energy Laws

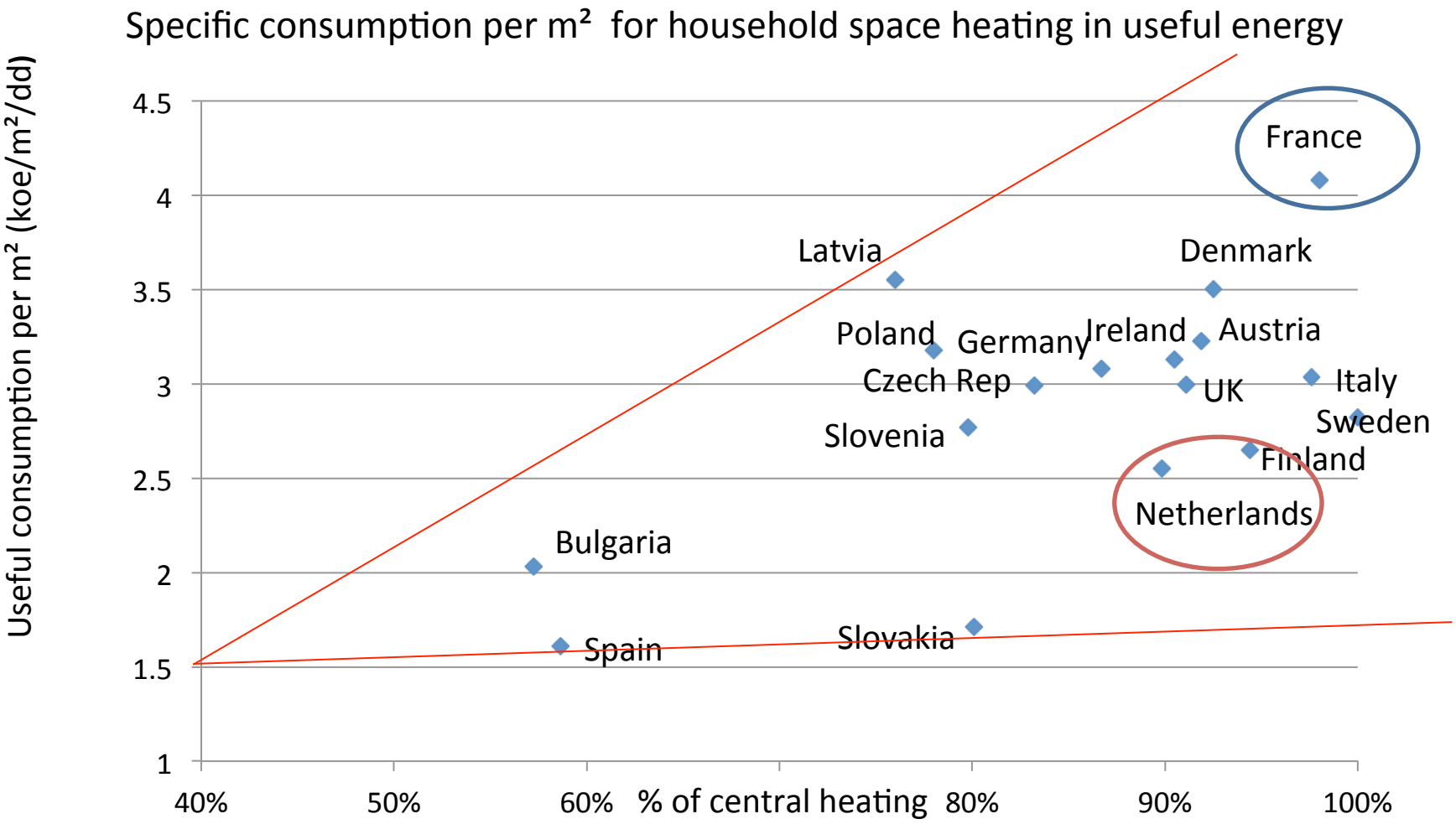
- Raise the annual energy intensity reduction of the GDP to
  - -2%/year by 2015 and
  - –2.5%/year by 2030
- Obligation of energy savings for suppliers of electricity, gas, heating oil, and district heat to be made in consumer premises.
  - imposed on (54 TWh* for 2006-2008 and 345 TWh* over 2010-2013, 700Twh 2014-2016) (with possibilities of buying energy savings certificates from other actors) ("White certificates");
- Energy uses of new buildings below 15 kWh/m2/year in 2020
  - (heating, water heating and ventilation)
- Thermal retroffiting of:
  - 400, 000 dwellings per year until 2020 with an objective of 38% total savings in in 2020 for all dwellings built before 2008;
  - 120 Mm2 of public buildings by 2020 with an objective of 40% savings for all public buildings
- 139.5 TWh total energy savings in 2016 with final consumers according to National Energy Efficiency Action Plan as required by EU ESD Directive
- Art 7 EED 30,6 Mtoe 20020 comared to 2005

**lifetime discounted energy savings"*

Example of sectoral targets to be tracked trough EEI the case of France for buildings

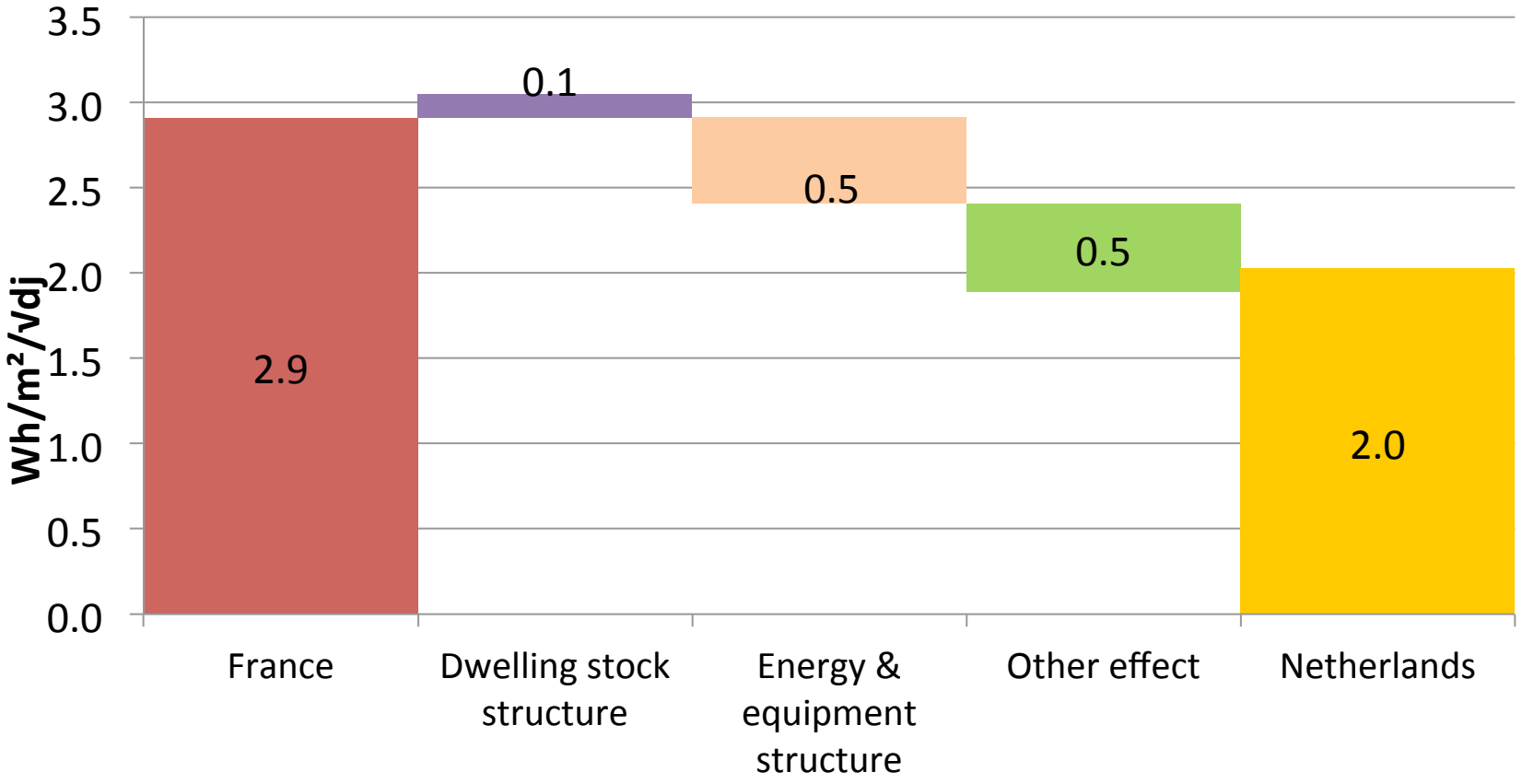
- **Measures on new dwellings**
  - **Overall objective**: 350 000 new dwellings/year (with 50% of collective dwellings) + 35 000 deconstruction/year in residential; 17 Mm2/year new construction for services
  - **Building codes:**
    - Implementation of 2012 Building code (RT 2012~max consumption of 50 kWh/m²/year in residential and non-residential)
    - Implementation of 2020 building code: New buildings should be energy positive (BEPOS, primary energy average consumption lower or equal to 0 kWhep/m2/year), or 12 kWhep/ m²/year of space heating consumption.
- **Measures on existing dwellings**
  - **Overall objective:** 500,000 dwellings retrofitted per year in 2017 (among which 120 000 social dwellings): in 2030 all social building stock built before 1990 would be retrofitted, and 5 millions of individual dwellings (i.e. 70% of total individual dwelling stock, or 50% of them built before 1975).
  - **Building code:** For major renovation of buildings > 1000 m², RT 2012 sets a global energy performance target for renovated buildings, built after 1948.
- **Global commitment in building sector: 38%reduction in energy consumption in 2020**

A French dwelling consumes 60% more than a Dutch one per m2 for space heating (useful energy). Why?

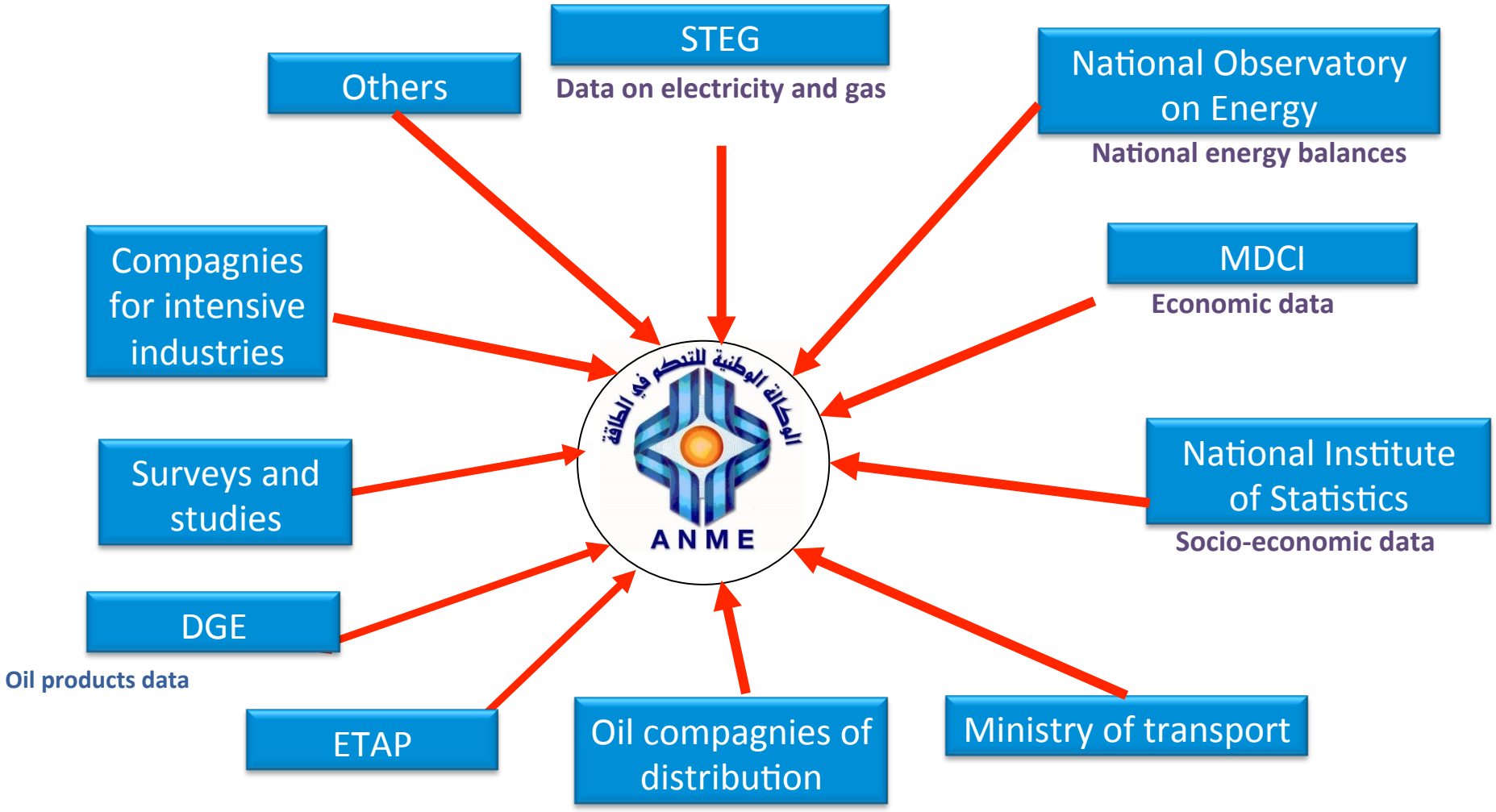


Central heating, which includes district heating, block heating, individual boiler heating and electric heating, implies that all the rooms are well heated, as opposed to room heating, where generally a stove provides heat to the main room only.

Specific consumption difference between France and Netherlands for space heating



Data source mapping for the elaboration of EEI (Tunisia)



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International initiatives on EEI involving public authorities

- **ODYSSEE-MURE:** Energy efficiency Monitoring tools in EU 28 (since 1992) supported by EU funding and 203 national energy efficiency agencies
- **MEDENER:** Regional project on energy efficiency indicators for Mediterranean countries (Algeria, Lebanon, Morocco, Tunisia) (Phase 2 June 2014) with possible extension on countries coverage
- **IPEEC/IPEEI French initiative**
  - Report on energy efficiency trends in G20 countries report (June 2014)
  - ADEME-CEPAL(UN) regional project on EEI indicators for Latin American countries (16 countries) (BIEE project) : second phase (April 2014)
  - Bilateral assistance on capacity building on NEEAP monitoring
- **WEC:** data base on EEI for all countries, yearly report on EE trends (Mai 2014)
- **ISO TC 257** on energy saving calculation

ODYSSEE-MURE: The European Experience

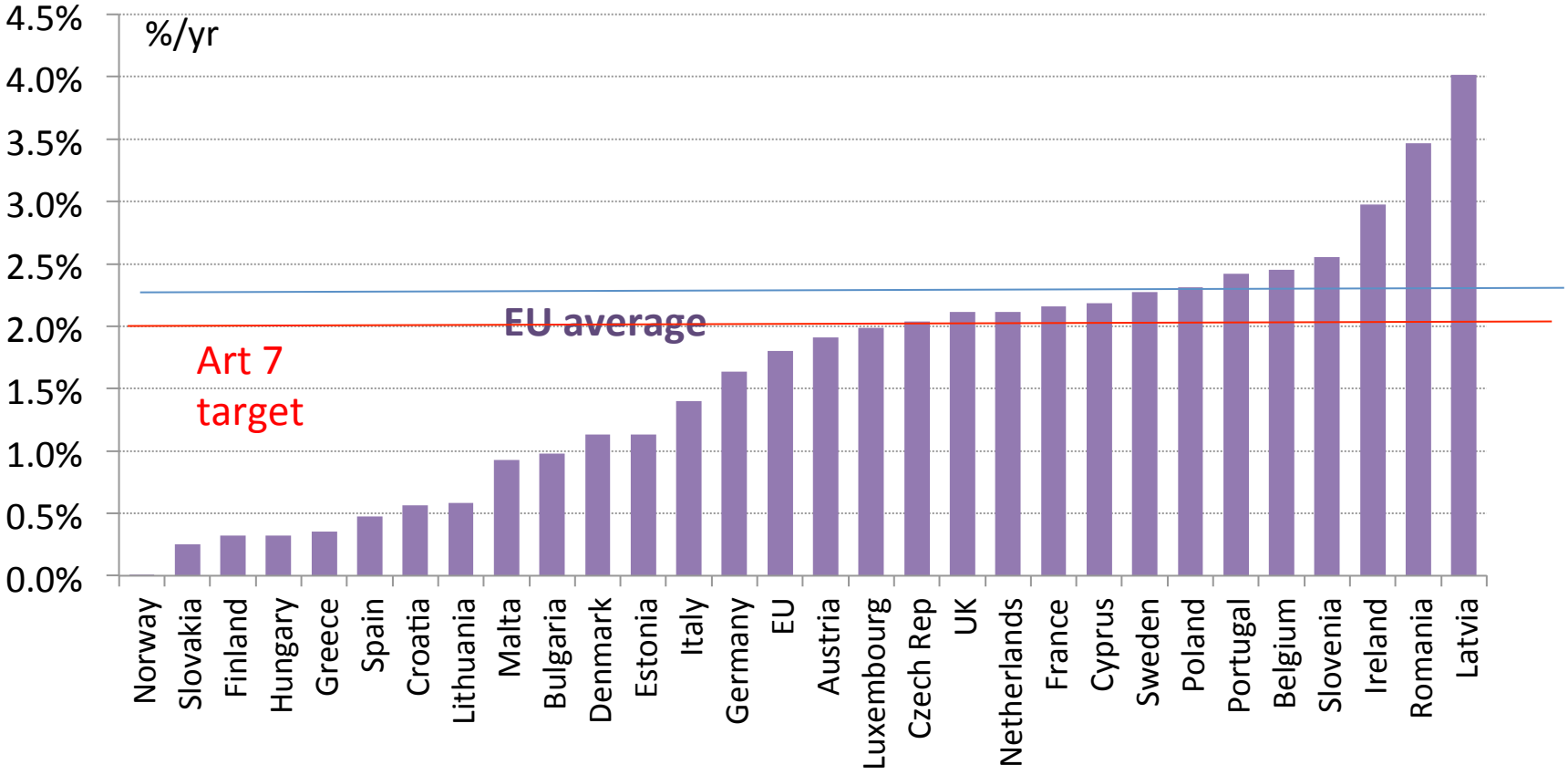
- Project supported by the EU since 1992 and co-financed by EE agencies and governments;
- 28 EU countries+ Norway with national teams usually belonging to E.E. agencies;
- 200 detailed end-uses EEI and CO2 related indicators by country and for the EU28.
- A routine of 2 yearly workshops since 20 years for exchange of methodologies, informations and dissemination
- Used to develop the EU recommandations on energy savings calculation
- Used by some EU governments to report Top-Down energy savings in the NEAAPs
- Exchange of data with IEA
- Towards a free access of ODYSSEE data base for non profit organisations
- A single website indicators and P&Ms databases : http://www.odyssee-mure.eu/.

ODYSSEE-MURE: The European Experience

The European energy efficiency indice ODEX

E.E improvement can be expressed in %/year to assess the average annual rate of EE improvements

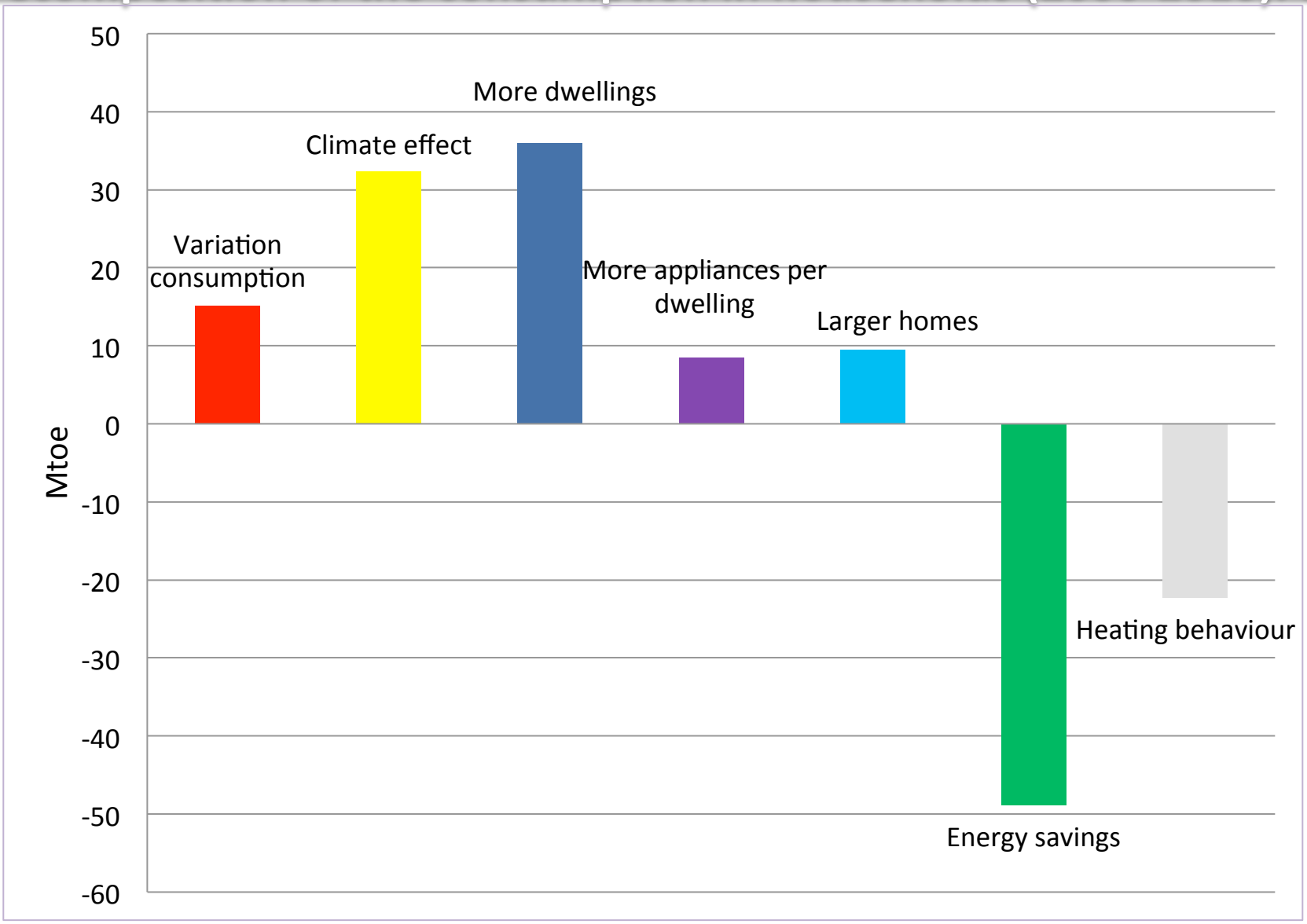
Energy efficiency improvements by country in the household sector



Period of analysis: 2000-2010 for Estonia, Hungary and Malta

ODYSSEE-MURE: The European Experience

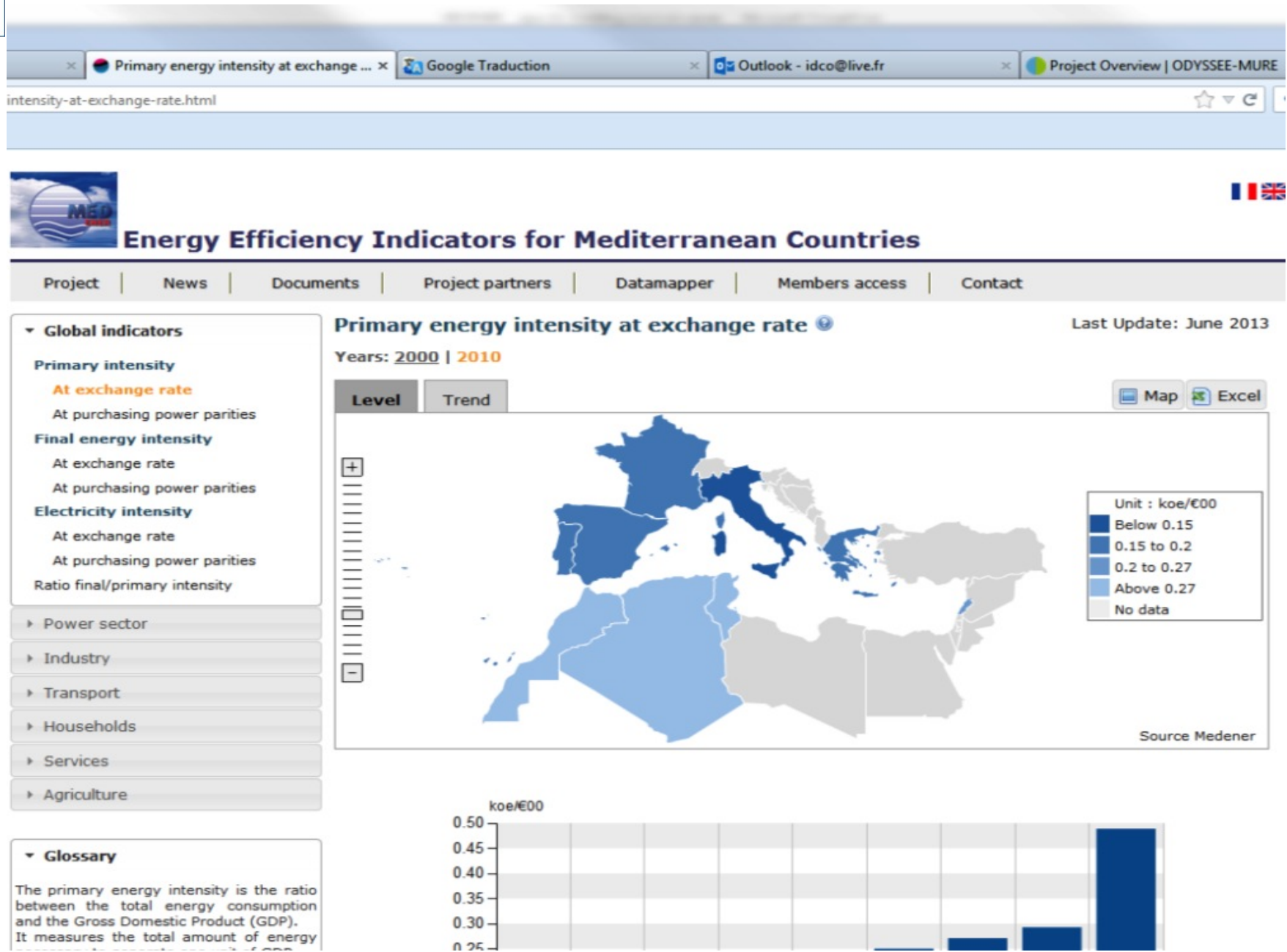
Decomposition of the consumption in households (2000-2010): EU



MEDENER: Network of EE agencies in mediteranean

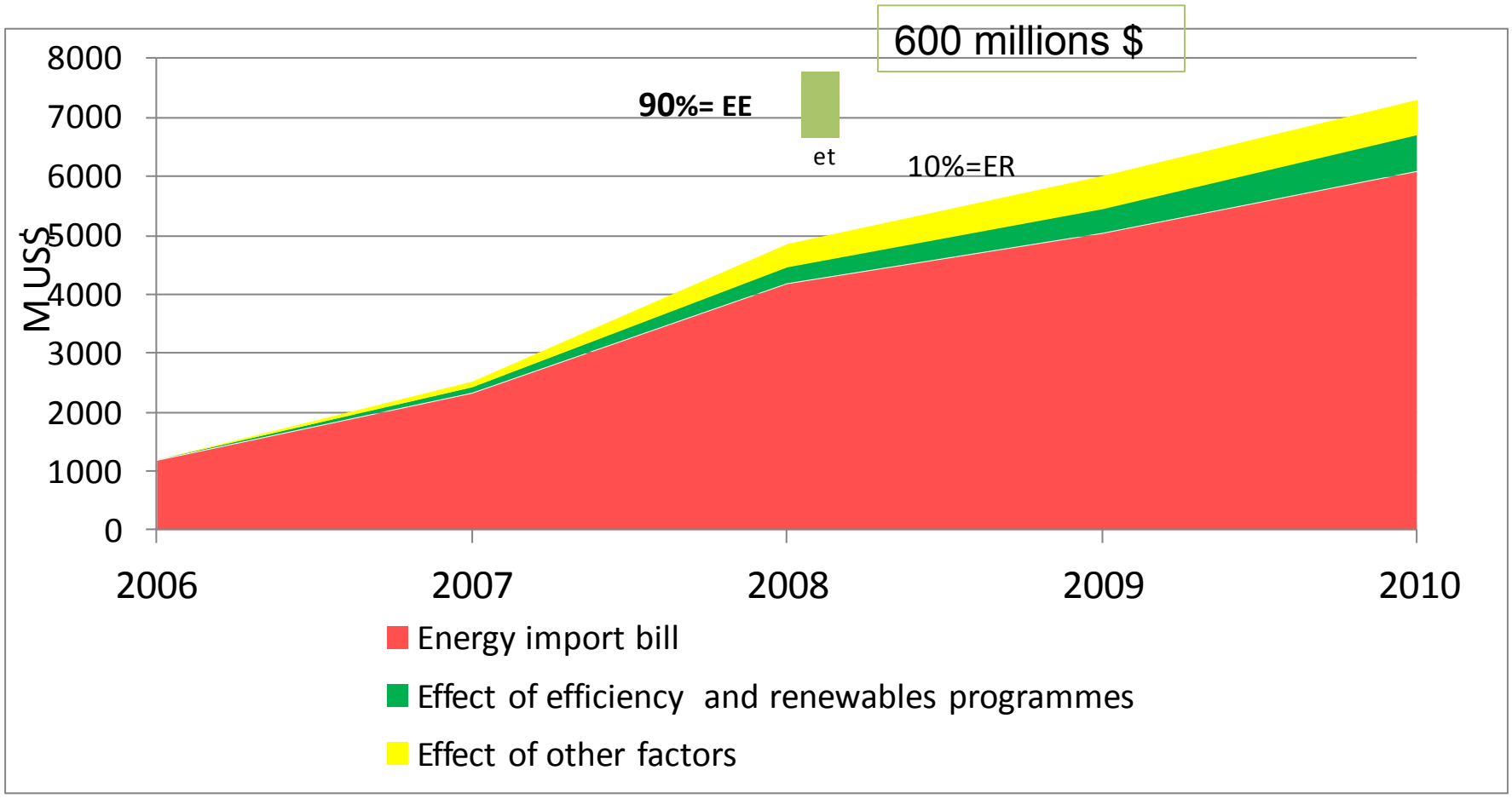
- **Adaptation** of the Odyssee-Mure methodology to the mediteranean context
- **Training** to experts of agencies to be autonomous on evaluation of EE
- **Creation** of national databases
  - Assistance on data collection, interpretation of EEI, reporting, database structure

MEDENER: Network of EE agencies in mediteranean



Justification of the public budget spent (Tunisia)

Impact of energy efficiency (EE) and renewables (ER) on import bill in Tunisia



Source ANME, 2012

The IPEEC/EPEEI initiative

Improving Policies through EE Indicators

1. Exhaustive **cross country comparison** on recent energy efficiency trends of G20 countries, based on a centralised data collection system (30 EEI);

2. Extensive in-country or regional **trainings on energy efficiency indicators** for G20/IPEEC countries;

3. **EEI** methodologies **implementation for IPEEC countries**, based on voluntary basis and through a decentralized data collection system. (Brazil, India, Mexico?, Indonesia?)

4. **Regional program** on energy efficiency indicators in Latin America and Caribbean countries: The BEEI project (CEPAL-UN/ADEME)

The IPEEC/EPEEI initiative

BIEE Project in Latin America

- Project co-managed between UN-ECLAC and ADEME and funded by UN-ECLAC/GIZ/ADEME since 2012;
- 16 Latin American and Caribbean countries represented by NT belonging to the governments;
- Methodology similar to ODYSSEE (70 EEI)
- Develop a database to assess policies and programs on EE in the participant countries;
- Promote the regional comparability (at the aggregate as well as the sectoral level)
- Encourage capacity building on EE indicators
- Promote regional coordination on EE issues in energetic forums (ie EE dialogo among LAC countries)
- www.cepal.org/drni/biee/

The IPEEC/EPEEI initiative

UN-CEPAL/IPEEC/ADEME data mapper: unit consumption of road transport

BIEE - *Base de Indicadores de Eficiencia Energética*

- Global indicators
- Power sector
- Industry
- **Transport**
  - **Energy intensity**
    - At exchange rate
    - At purchasing power parities
  - Energy use per capita
  - **Unit consumption of road transport**
  - Car fuel efficiency
  - Energy use per car
  - Energy use per passenger for air
  - Mobility in public transport
- Households
- Services
- Agriculture

Enerdata

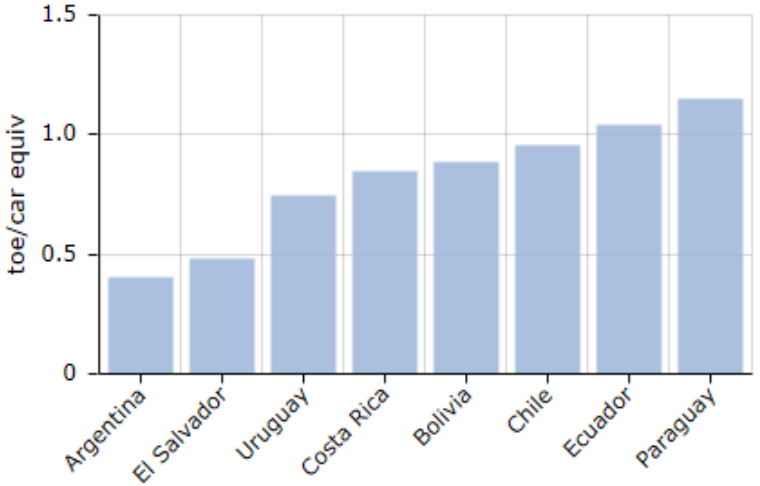
Unit consumption of road transport

2012 | 2000/2012

Map | Excel

Large differences in unit consumption of road transport among countries

2012 *



The consumption of road transport per equivalent car enables to have an overview of energy efficiency performance for road transport. This indicator relates the total consumption of motor fuels to a fictitious stock of road vehicles, measured in terms of a number of equivalent cars. The stock of road vehicles is converted into a stock of equivalent cars on the basis of coefficients reflecting the difference in average yearly consumption between each type of vehicle and a car.

Source BIEE

WEC/ADEME

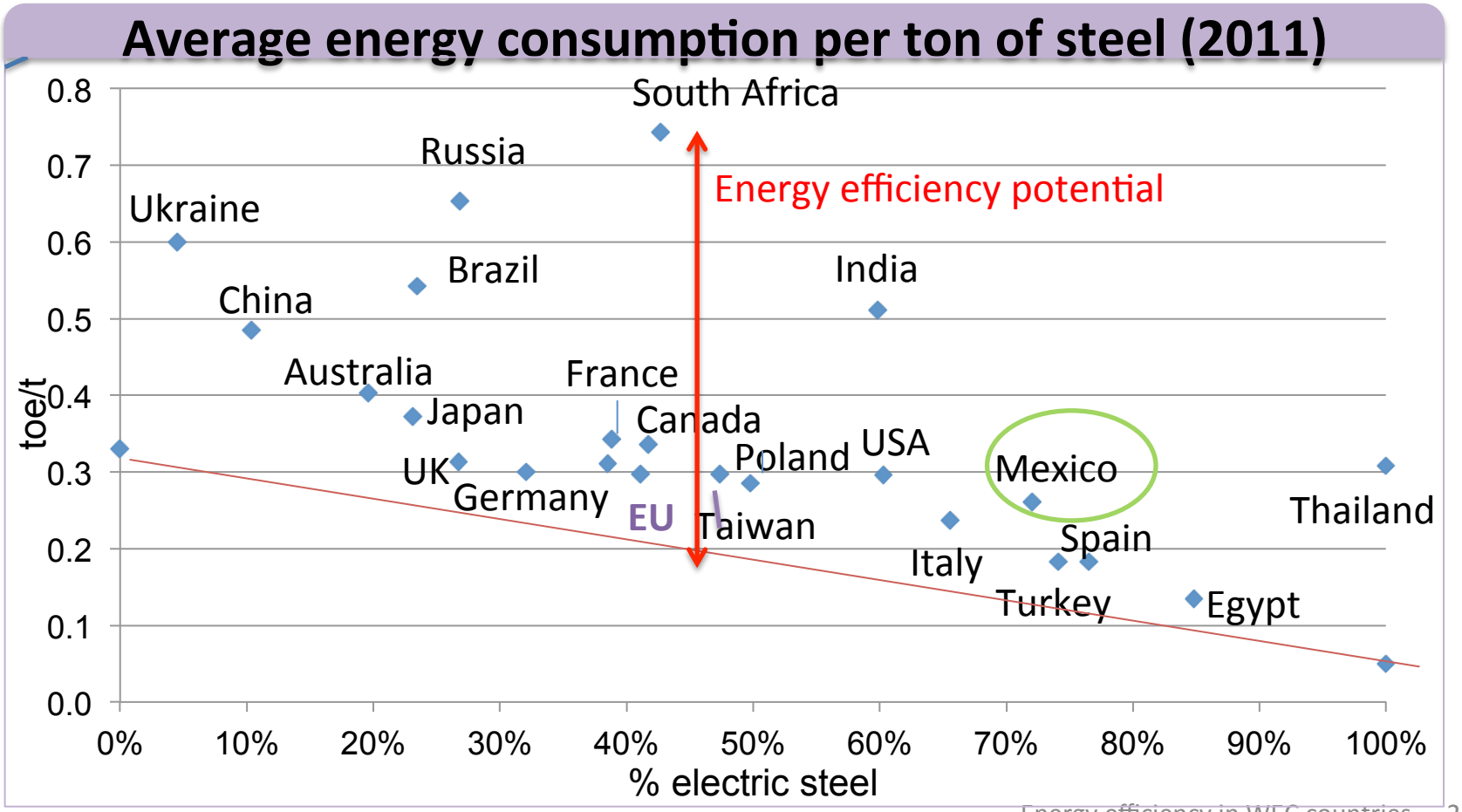
Database on energy efficiency and CO2 indicators

Interactive database for all WEC Member countries **plus ten world regions**

- **Query by indicator**
- **Years covered:** 1990, 2000, 2013
- In complement to the Key 30 EEI, benchmark indicators, indicators of diffusion of energy efficiency technologies and practices
- **Improvements**:
  - More user-friendly interface
  - Clearer menu for selecting indicators
  - Possibility to choose the years on the map
  - Production of tables of **indicators by country and region**
  - Improvement of graphs with **regional benchmark indicators**
  - Additional **indicators by sector** (mainly for EU and large countries such as USA, Japan, China, India...) in transport and households (i.e. consumption per end use, transport mode...)
  - Introduction of **quantitative targets by country** linked to indicators

WEC/ADEME
Database on energy efficiency and CO2 indicators

For steel, specific consumption should be compared at similar process mix;
Large gap between countries for a given process mix, especially for oxygen process ;
Best practice are not always OECD countries because of globalisation.



Red line: world best practice

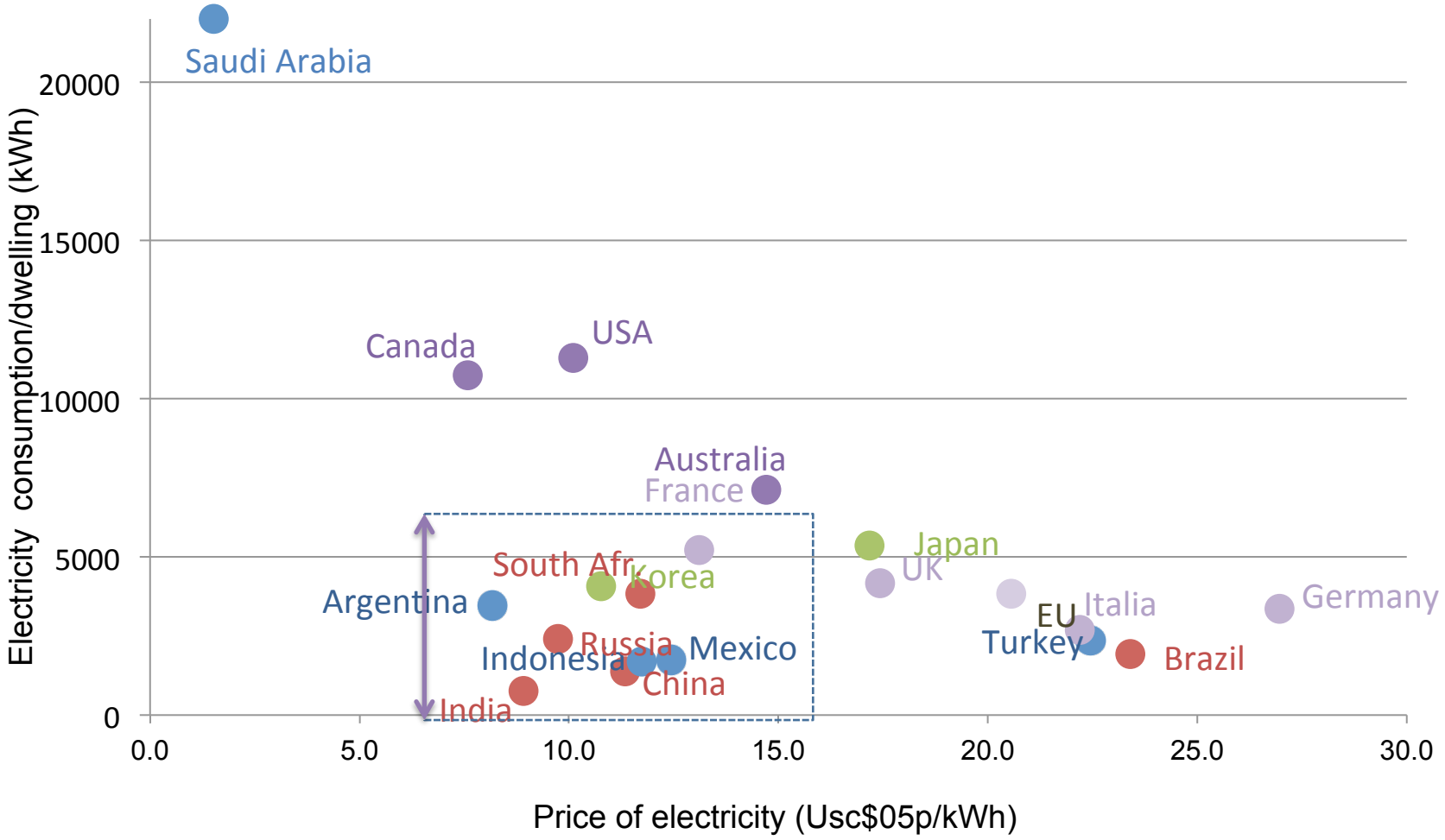
WEC/ADEME

Database on energy efficiency and CO2 indicators

The higher the prices, the lower the electricity consumption per dwelling

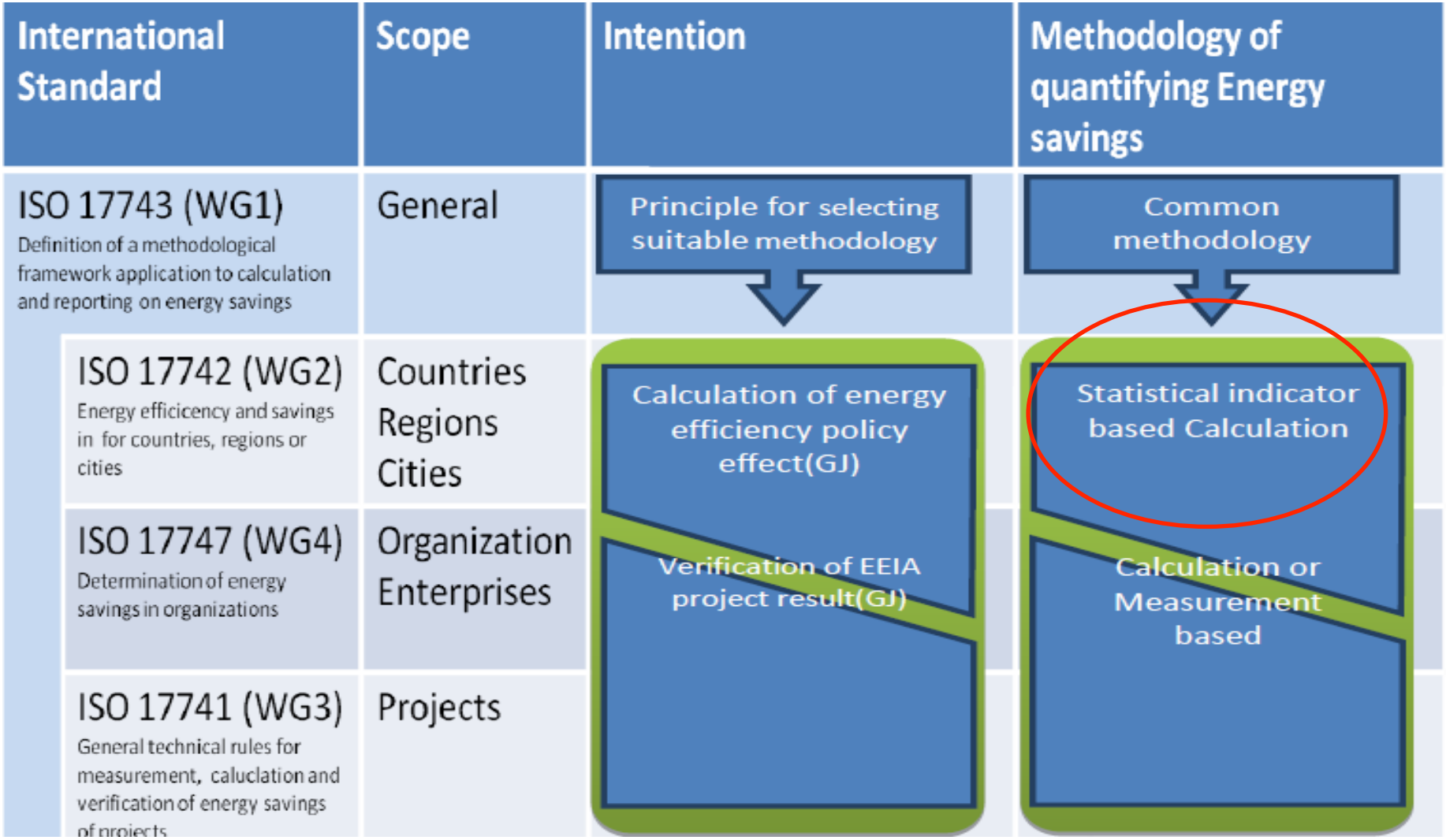
Large range of electricity consumption per dwelling for a quite similar level of prices

Electricity consumption per electrified dwelling and price of electricity (2012)



ISO TC 257

National governmental standardization bodies are negotiating a set of ISO standards on energy saving calculation (TC 257)



Conclusions

- Many governments or implementers such as energy efficiency agencies over the world are embarked on monitoring energy efficiency policies through indicators (top-down) in complement to measure by measure evaluation (bottom-up method) ,
- At national level, many countries dispose of a database on energy demand and EEI which allows to monitor energy efficiency trends and can feeds forecasting models.
- This database provides coherence of the data collection, data recording, provides transparency to the users and allows dissemination of the EE results “à la carte”.
- Participation to regional initiative provides to the country “a plus” in sharing information and allowing benchmark.
- Among several uses, EEIs are one element of the target design (with potential assessment) and are needed to track progress towards overall and sectoral targets achievement.

ADEME
French Environment & Energy Management Agency

Thank you for your attention

For more information

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www.odyssee-mure.eu

www.worldenergy.com

www.cepal.org/drni/biee/

Energy saving calculation in transport using EEI (The French NEEAP) Top-down approach

CODE ESD	Energy Savings (2007 as a reference)		Units		2008	2009	2010	2011	2012
M5	Road vehicles		ktoe		1469,14044	2264,36749	1871,88757	2300,85556	3242,51552
M6	Rail transport		ktoe		-138	-189	-199	-120	-167
M7	Domestic water transport		ktoe		-13	-22	0	-11	-26
	Total 1 energy savings (Minimum)		ktoe		1469,14044	2264,36749	1871,88757	2300,85556	3242,51552
			GWh		17083,0284	26329,8545	21766,1345	26754,1345	37703,6688
P8	Cars (based on passenger km)		ktoe		-93	-66	-7	418,343643	682,437962
A1 FOR P8	*Cars (based on l/100 km)*		ktoe		5,01381346	103,034373	147,669215	663,409628	884,570978
P9	Trucks only (based on ton-km)		ktoe		586,001901	367,994435	418,29906	364,312909	493,113023
A2 FOR P9	*Trucks and light vehicles (based on vehicle)*		ktoe		1100,59705	1806,46388	1409,80584	1279,90352	1915,36736
P10	Passenger rail transport		ktoe		-82	-122	-132	-77	-109
P11	Rail transport of goods		ktoe		-346	-473	-498	-300	-418
P12	Modal shift for passenger transport		ktoe		-72	-81	-85	-31	-27
P13	Modal shift for freight transport		ktoe		18,0516978	-52	-184	-68	-49
	Total 2 with preferred indicators		ktoe		604,053599	367,994435	418,29906	782,656552	1175,55098
			GWh		7023,87906	4279,00505	4863,94256	9100,65758	13669,1975

Energy saving calculation
The French NEEAP (bottom-up method by type of P&Ms)

Mesure		Partie	Economies d'énergie finale			
			2010	2013	2016	2020
RT 2012		Résidentiel-Tertiaire	-	-	0,41 Mtep	1,15 Mtep
CIDD		Résidentiel-Tertiaire	-	0,78 Mtep	0,93 Mtep	1,08 Mtep
Eco-PTZ		Résidentiel-Tertiaire	-	0,18 Mtep	0,19 Mtep	0,19 Mtep
Eco-PLS		Résidentiel-Tertiaire	-	0,35 Mtep	0,65 Mtep	1,03 Mtep
Eco-taxe poids lourds		Transports	-	-	0,165 Mtep	0,168 Mtep
Amélioration de la performance des véhicules neufs		Transports	0,1 Mtep	-	1,1 Mtep	2,2 Mtep
Bancs d'essais moteur mobiles		Agriculture	3,5 ktep	-	23,2 ktep	36 ktep
CEE		Energie	-	2,5 Mtep	5,17 Mtep	9,29 Mtep
Ecoconception (ampoules)		Energie	-	0,46 Mtep	0,76 Mtep	0,75 Mtep
Ecoconception (téléviseurs)		Energie	-	-	-	0,3 Mtep
Prévention des déchets		Energie	2,53 Mtep	-	-	-
TICPE	Gazole	Energie	-	4,9 Mtep	4,3 Mtep	4,1 Mtep
	Essence		-	0,5 Mtep	0,4 Mtep	0,3 Mtep

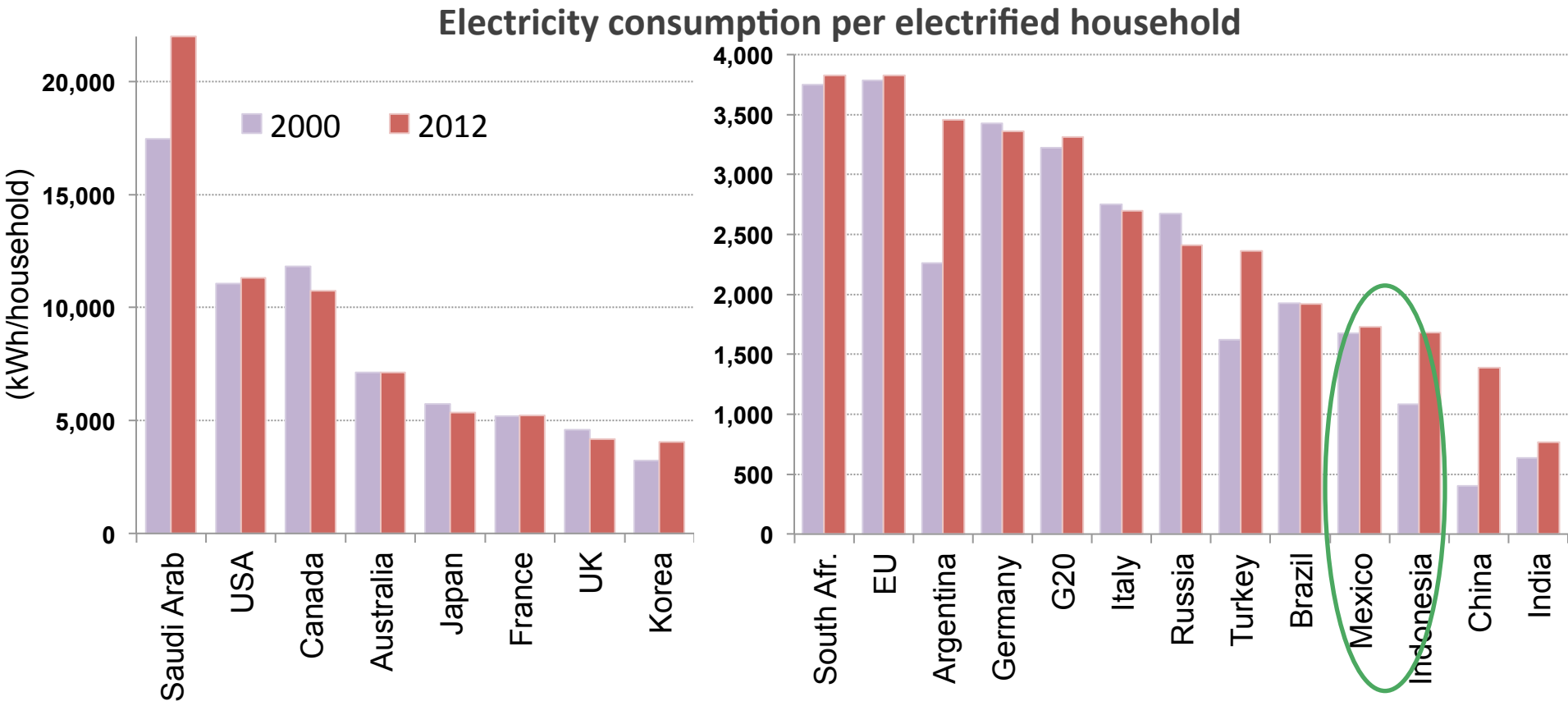
A mandatory requirement from the E.C.
Energy saving calculation for the NEEAP (France)

Mesure		Partie	Economies d'énergie finale			
			2010	2013	2016	2020
RT 2012		Résidentiel-Tertiaire	-	-	0,41 Mtep	1,15 Mtep
CIDD		Résidentiel-Tertiaire	-	0,78 Mtep	0,93 Mtep	1,08 Mtep
Eco-PTZ		Résidentiel-Tertiaire	-	0,18 Mtep	0,19 Mtep	0,19 Mtep
Eco-PLS		Résidentiel-Tertiaire	-	0,35 Mtep	0,65 Mtep	1,03 Mtep
Eco-taxe poids lourds		Transports	-	-	0,165 Mtep	0,168 Mtep
Amélioration de la performance des véhicules neufs		Transports	0,1 Mtep	-	1,1 Mtep	2,2 Mtep
Bancs d'essais moteur mobiles		Agriculture	3,5 ktep	-	23,2 ktep	36 ktep
CEE		Energie	-	2,5 Mtep	5,17 Mtep	9,29 Mtep
Ecoconception (ampoules)		Energie	-	0,46 Mtep	0,76 Mtep	0,75 Mtep
Ecoconception (téléviseurs)		Energie	-	-	-	0,3 Mtep
Prévention des déchets		Energie	2,53 Mtep	-	-	-
TICPE	Gazole	Energie	-	4,9 Mtep	4,3 Mtep	4,1 Mtep
	Essence		-	0,5 Mtep	0,4 Mtep	0,3 Mtep

The WEC/ADEME project on EE policies evaluation

1. **Database on energy efficiency indicators**
2. **Database on policies and measures (P&M)** updated through a survey in WEC Member countries, case studies of selected Policies & Measures
3. **Set of case studies on EE policy evaluation**
4. **Report to the WEC congress,** including two parts:
   - An analysis of the energy efficiency performance at macro and sectoral levels in selected countries and regions of the world.
   - An evaluation of the policies and measures
5. **Data mapper on EEI and P&Ms**

- Big discrepancies among countries in electricity consumption per electrified household: Saudi Arabia and North America consume at least 3 times more than G20 as a whole.
- Increasing trends for almost all the countries due to the penetration of new equipment (air conditioning ,office equipment), more and larger equipment per households. However there is a decreasing trend in Japan (recently because of Fukushima accident), and some European countries (Italy, UK, and Germany) thanks to energy efficiency measures and effort.



Rapid decrease of the specific consumption of new cars due to agreement between the cars manufacturers (ACEA, JAMA, KAMA), targets set in European Commission, the top-runner programme in Japan and mandatory standards in Korea and China