



Overview of energy efficiency policies and trends at world level

Dr Didier Bosseboeuf (ADEME, France)

General secretary of the WEC energy efficiency policies Knowledge network

Practical actions for accelerating energy efficiency

Manille 7th June 2016

Content

- **The WEC-ADEME Project implementation**
- Energy efficiency policies implementation over the world
- Does it work? Energy efficiency trends at world level
- The 10 WEC recommendations: To be updated?



Project implementation

To **facilitate the exchange of information** among WEC membres, 4 activities are developed during the round 2013-2016:

- Survey on energy efficiency policies (95 countries covered))
- Management of 2 data bases : P&M and EE indicators

<http://www.worldenergy.org/data/energy-efficiency-policies-and-measures/>

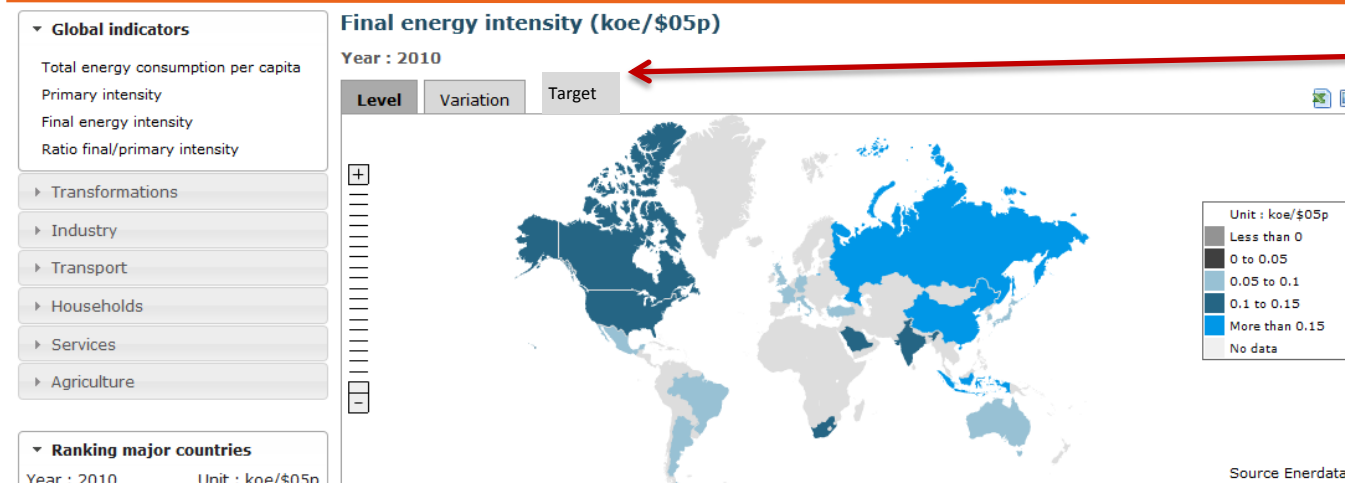
<http://www.worldenergy.org/data/efficiency-indicators/>

- In depth evaluation of 3 selected policies case studies
- Dissemination and reporting (regional workshops, final report for the world WEC congress (Istanbul Nov 2016),

Link between indicators and policies and measures

Introduction of quantitative objectives per country (targets of energy efficiency programmes or in relationship with indicators)

Summary of all programmes and targets by country in PDF format related to the selected indicator

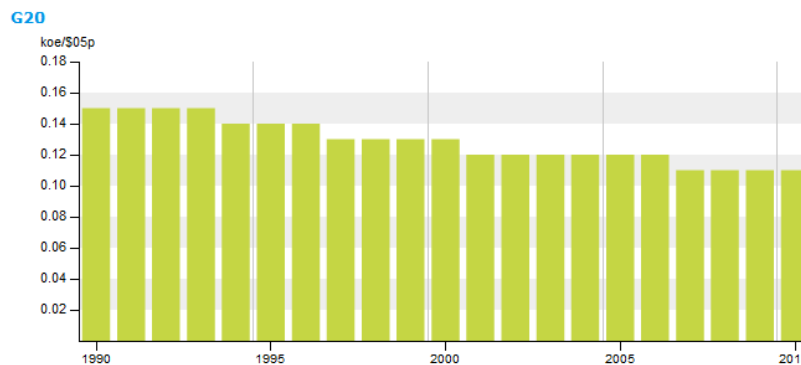


Ranking major countries

Year : 2010 Unit : koe/\$05p

Highest ten | Lowest ten

Country	Value
United Kingdom	0.07
Italy	0.07
Mexico	0.08
Japan	0.08
Turkey	0.08
France	0.08
Germany	0.08
Argentina	0.09
Australia	0.10
South Korea	0.10



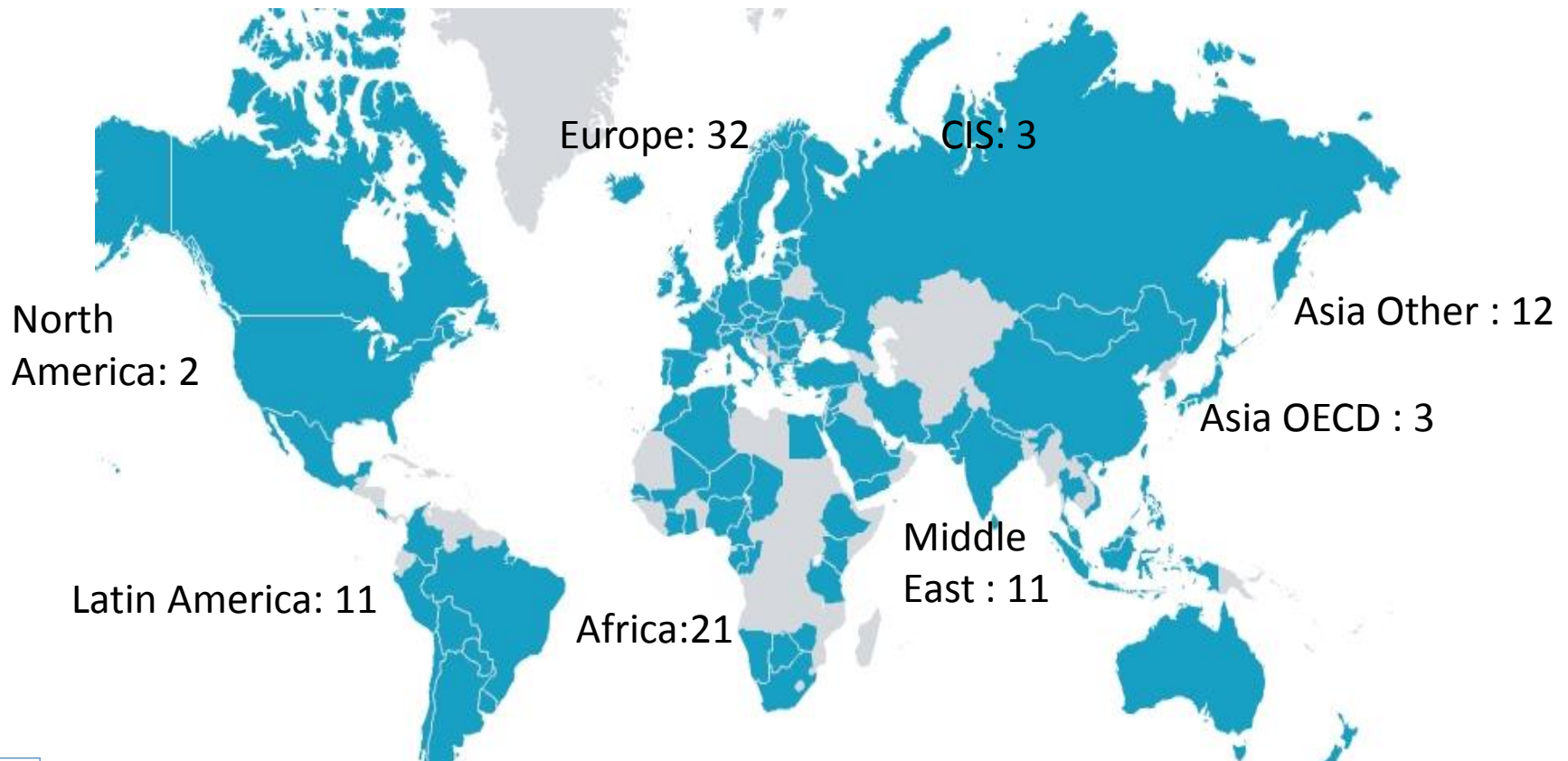
Country	Name of the programme	sector	nature of target	target value	target year
Bulgaria	National Long Term Energy Efficiency Program, 2005-2015	Final consumers	Energy intensity reduction	-6%	2015
Bulgaria	National Long Term Energy Efficiency Program, 2005-2015	Overall	Energy intensity reduction	-17%	2015
Czech Rep	State Energy Policy	Overall	Energy intensity reduction	3.22%	2020
France	Energy law (2005-781) - La POPE	Final consumers	Energy intensity reduction	-25%/year	2010
France	Energy law (2005-781) - La POPE	Final consumers	Energy intensity reduction	-25%/year	2015
Germany	Coalition agreement	Overall	Energy intensity reduction	3%/year	2020
Hungary	Energy Saving and Energy Efficiency Action Programme 1999-2010	Overall	Energy intensity reduction	3.5%/year	2010
Lithuania	National Energy Strategy	Overall	Energy intensity reduction	61 percentage intensity	2025
Romania	National Strategy for Energy Efficiency (2004-2015)	Overall	Energy intensity reduction	40%	2015
Sweden	Energy Bill	Final consumers	Energy intensity reduction	20%	2020
Russia	Energy Strategy of the Russian Federation (2009)	Overall	Energy intensity reduction	-40%	2020
Canada	ecceBENERGY	Industry	Energy intensity reduction		
China	11th Plan (2006-2010)	Overall	Energy intensity reduction	-20%	2010
China	Policies for the Development of Iron and Steel Industry (2005)	Industry	Energy intensity reduction	-6%	2020
Hong Kong (China)	APEC Sydney Joint Declaration	Overall	Energy intensity reduction	20%	2020
Indonesia	Energy conservation Plan 2005	Overall	Energy intensity reduction	11%/year	2025
Taiwan, China	Energy efficiency and conservation programme	Overall	Energy intensity reduction	20%	2015
Jordan	National Energy Strategy	Overall	Energy intensity reduction	20%	2020
Tunisia	Four Year Energy Conservation 2008-2011	Overall	Energy intensity reduction	-25%/year	2008-2011

World overview of energy efficiency policies

95 countries covered based on

- a **survey** for **53 countries** and
- a **review of** horizontal sources for **42 additional countries**.

Less than half of these countries belong to OECD



Case studies on in-depth evaluation of selected policies

Objectives : In depth analysis (based on ex-post evaluation) of good practices.

- Review of literature
- Compilation of 8 countries with half of non OECD countries.
- 30-40 pages report for each of the case studies + recommendations
- 2 pages description of each of the national policies in a common format
- Each case study summarized into the overall report
- A powerpoint presentation will be available
- Each report put in the WEC website completing the existing portfolio of around 40 case studies

1. P&Ms to accelerate the penetration of **Efficient Electric motors** (Motiva Finland)
2. Implementation of **Building codes in emerging countries** (Ecotech, Lebanon)
3. **Energy efficiency information centers** and one stop shop building (ECEEE-Sweden)

Electric motors : List of case studies



- Brazil: National Electricity Conservation Programme (PROCEL) – Industry
- China: Minimum Energy Performance Standards (MEPS)/Energy label for motors
- European Union: Ecodesign Directive sets requirements for electric motor systems
- India: Voluntary energy labels for industrial electric motors
- Indonesia: Promoting energy efficiency through system optimization and energy management standards
- Japan: Top-runner Programme
- The Netherlands: Green Deal – Efficient electric motor systems
- South Africa: Energy Efficient Motors Programme
- South Korea: Mandatory Energy Audits
- Switzerland: Competitive Tender Programme
- The United States: MotorMaster+



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Measures covered in the survey

- **Regulations:**
 - **Minimum Efficiency Performance Standards (MEPS)** and **labels** for electrical appliances, cars, buildings and electric motors;
 - Regulations for designated large consumers: **mandatory energy audits**, mandatory energy managers, mandatory energy saving plans, energy saving quotas;
 - Mandatory training for professionals,
 - **Energy saving obligations for energy utilities.**
- **Financial measures:**
 - **Subsidies for audits** by sector
 - **Low interest loans** (i.e. with subsidised interest rates) for energy efficiency investment and equipment by sector and type of equipment
- **Fiscal measures:**
 - **Tax credit for efficient equipment**, and tax on inefficient appliances
 - Accelerate depreciation by sector,
 - Tax reduction for efficiency investment by type of tax and equipment

50 countries have an energy efficiency law (+ 4 under development)

This is more than in 2012 when less than 40 countries had such a law.

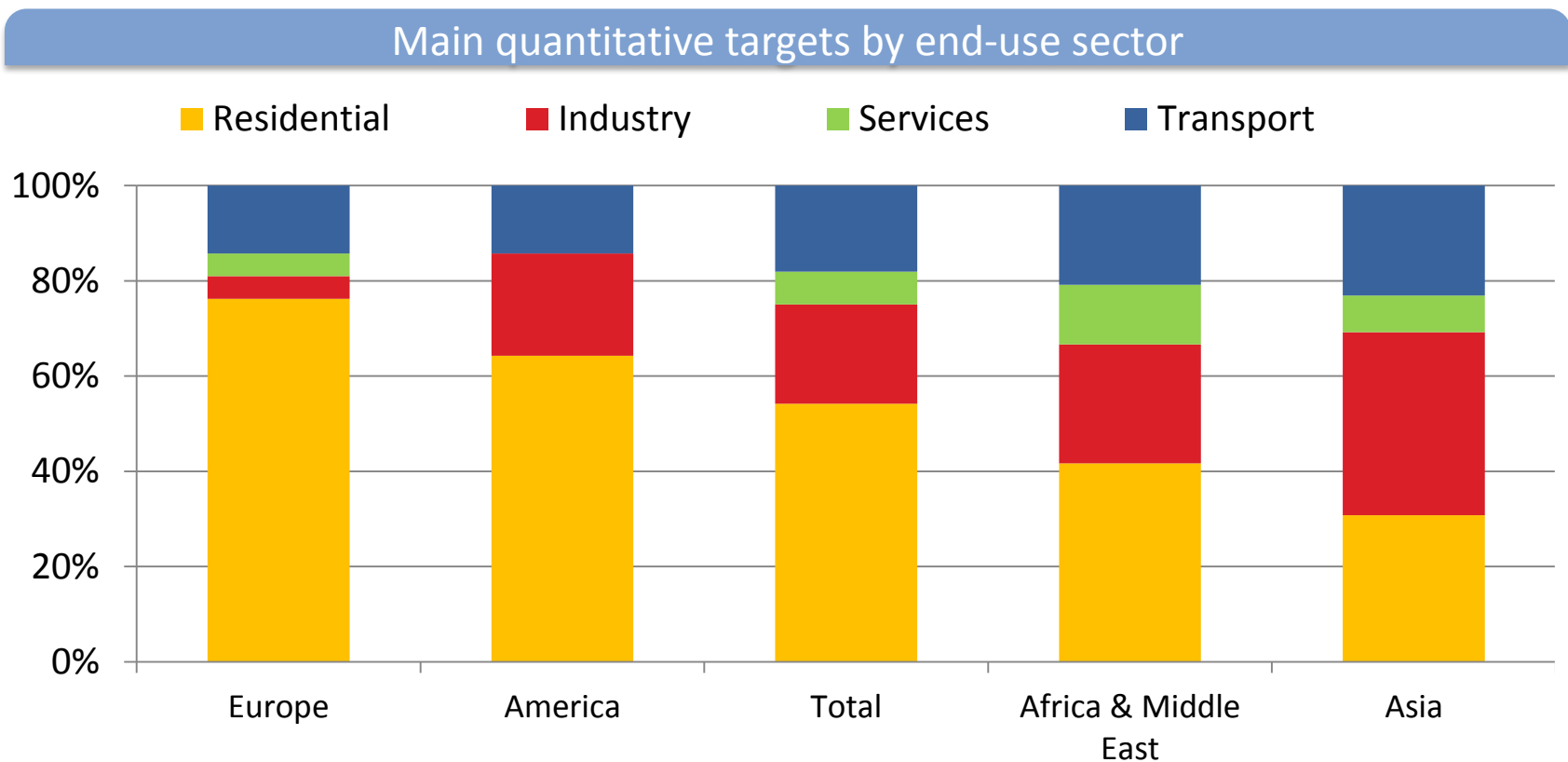
Countries with an energy efficiency law



On average more than half of sectoral targets are in the households sector, and around 21% in industry sector.

In Asia, industry is the main sector targeted (40% of sectoral targets)

There are 10 countries in Europe with sectoral targets, 6 in Africa-Middle East, 5 in Asia, and 4 in America.

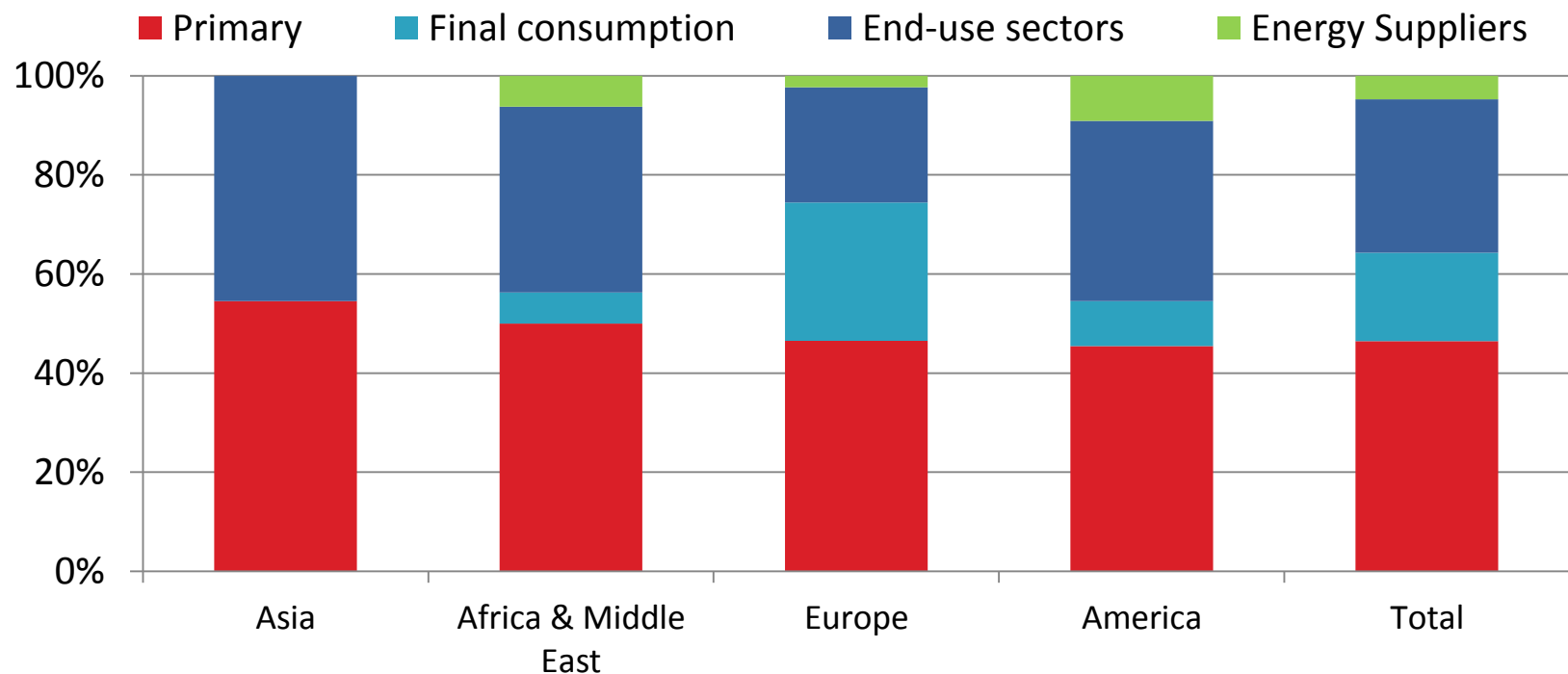


Source: WEC survey 2015

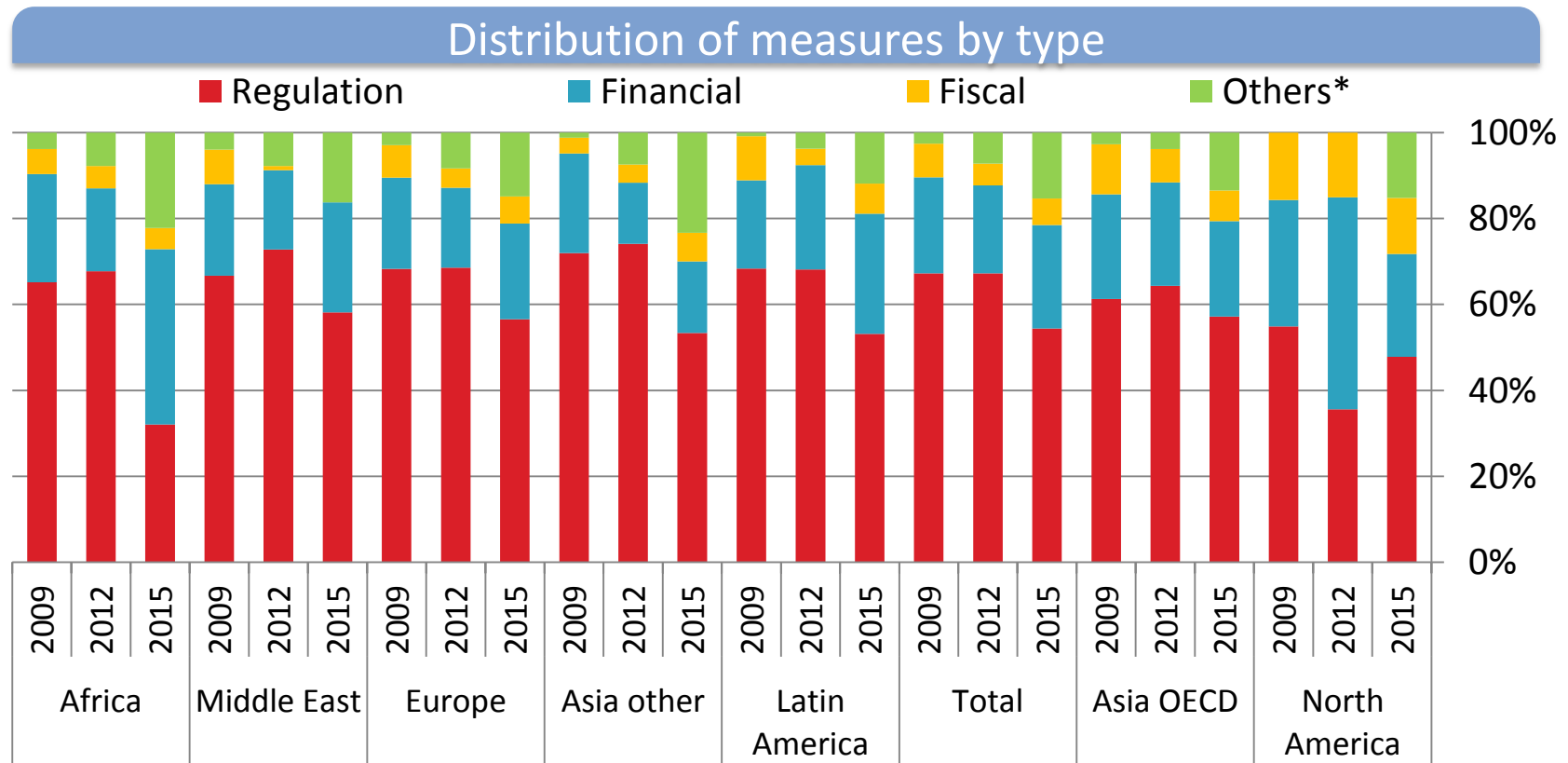
Around 90% of countries have a quantitative target

- For about 3/4 of them, the target is on the total primary energy consumption .
- Half of countries have sectoral targets on end-use sectors, and about 28% on the total final energy consumption. (more in Europe).

Quantitative targets by type



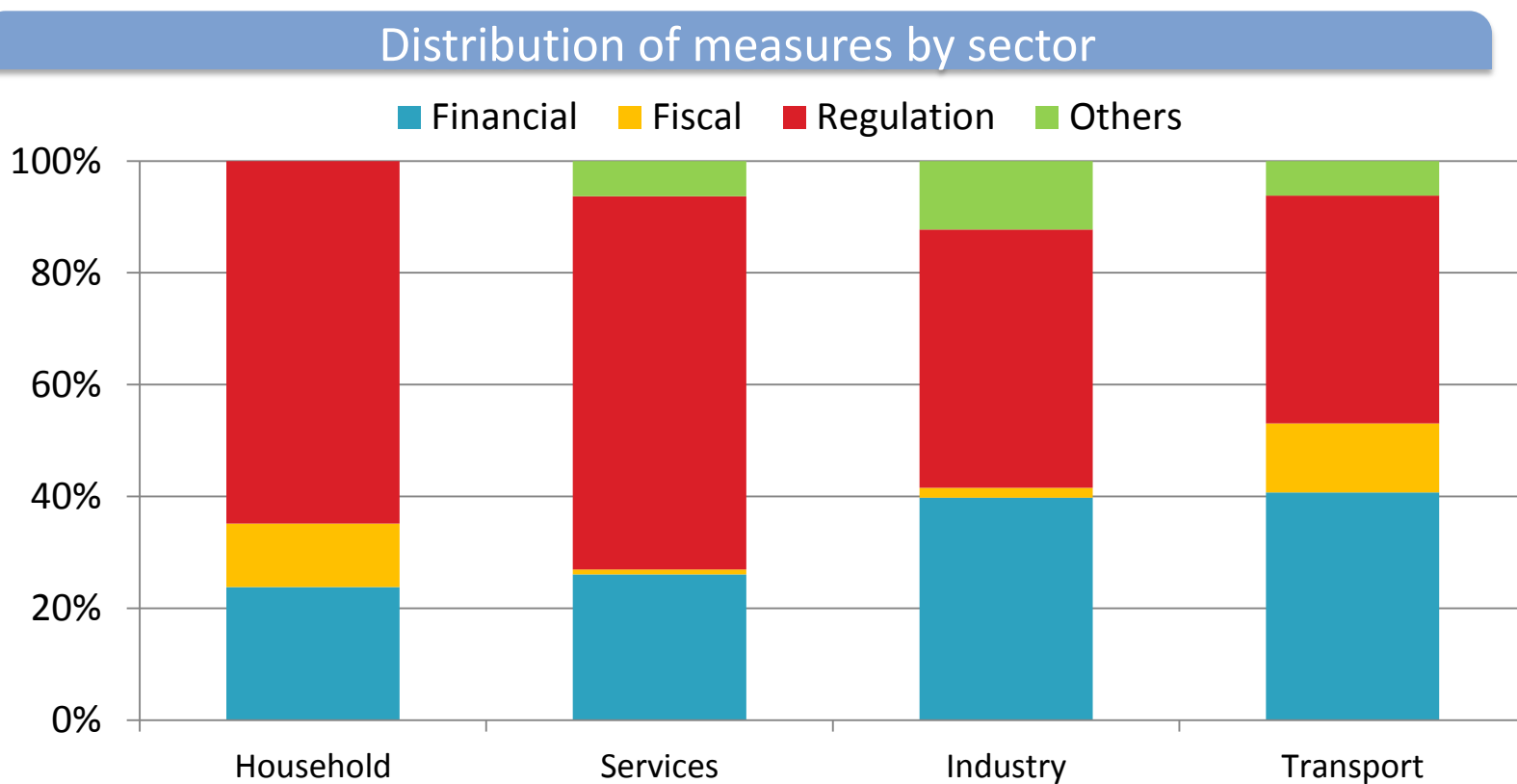
There is a dominant share of regulations in the energy efficiency measures implemented in the surveyed countries (more than 50% of measures on average in 2015) with however a declining role since the last survey. Other measures are spreading.



Regulation are important in services and for households (appliances, building codes & certificates).

Financial incentives are more important in industry and transport (e.g. grants for energy audits)

Fiscal incentives are shared between households and transport



Source: WEC survey 2015

Energy efficiency labels are important to guide consumers and motivate manufacturers on energy efficiency products

Around 80% of countries with labels (or planned)

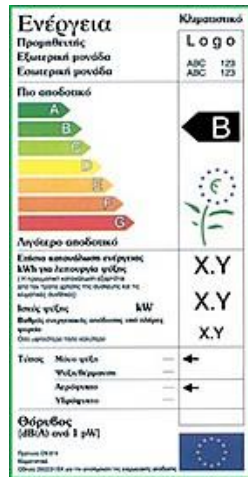
The number of mandatory labels for households equipment is above 20 in 8 countries (e.g. Brazil, Chile, Japan and and New Zealand). In total 40 countries have more than 10 labels (EU countries, China, South Korea, North America, Costa Rica).

Number of mandatory labels for households equipment

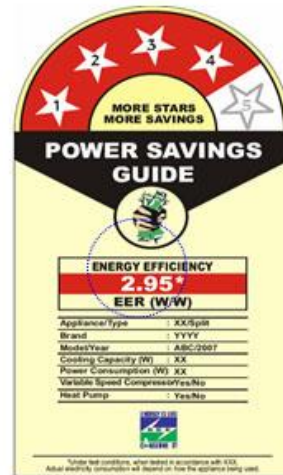


Source: WEC energy efficiency policy data base 2015: world overview

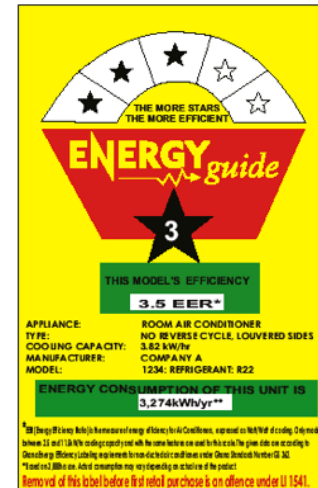
Examples of labels: case of Air Conditioning



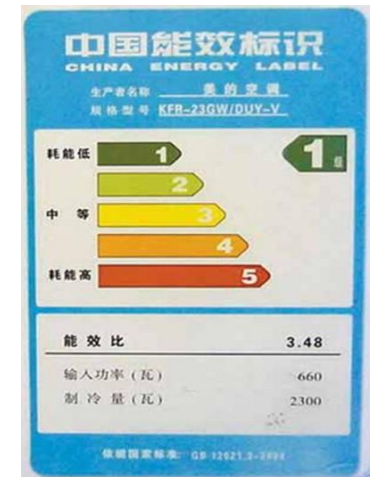
Greece



India



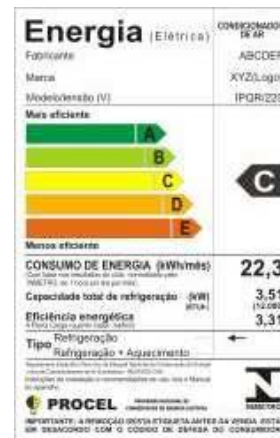
Ghana



China



Singapour



Brazil



Saudi Arabia

Labels are not sufficient to transform the market. They are the first step but need to be complemented with MEPS to remove inefficient equipment

MEPS for households refrigerators are mandatory in 51 countries and planned in 29 countries. For AC, MEPS are mandatory in 33 countries and planned in 29 countries. MEPS are often linked to label classes.

Minimum Energy Efficiency Performance Standards (MEPS) for refrigerators

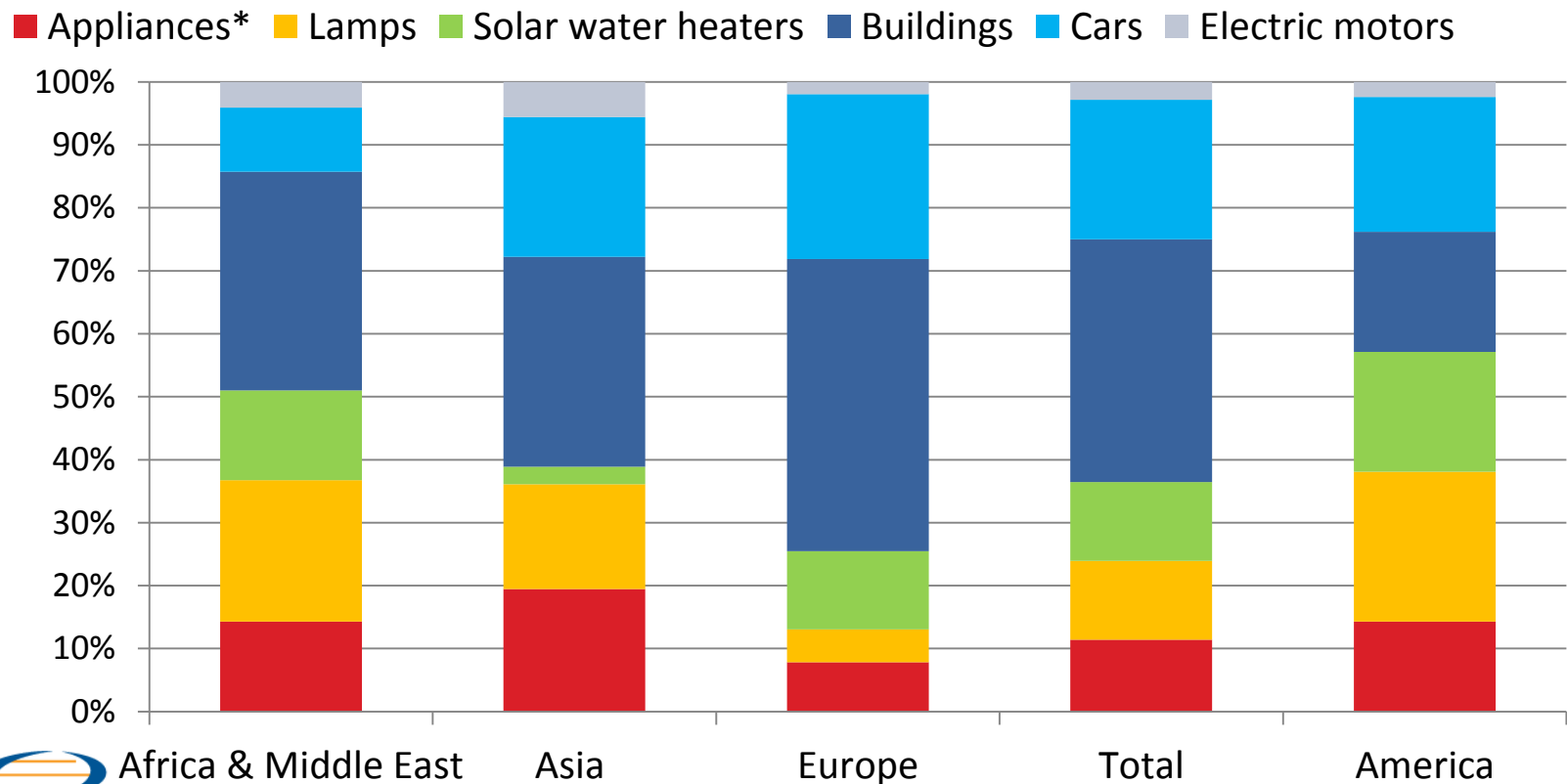


Source: WEC energy efficiency policy data base 2015: world overview

Around 40% of financial and fiscal measures target buildings and 22% cars

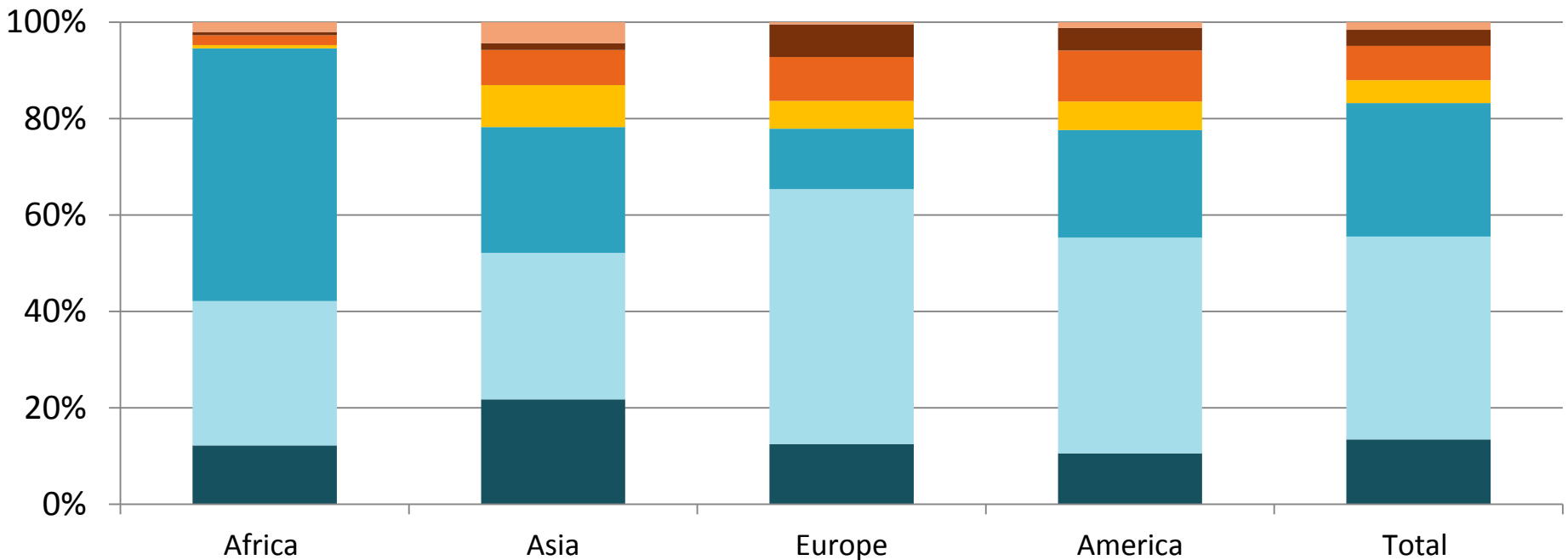
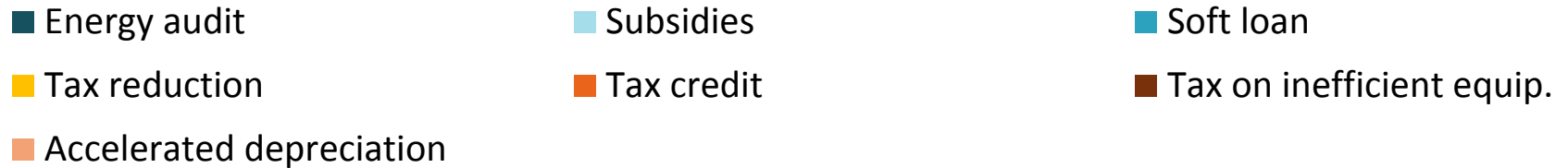
Europe and Asia have a mix of measures close to the average, while in Africa & Middle East lamps are in second position and cars have few measures. In America lighting arrive in first position. Financial measures target more often dwellings and appliances while for fiscal measures it is (45%) and dwellings (25%) especially in Europe.

Financial and fiscal measures by type of end-use



Among financial measures, subsidies are dominant, except in Africa and Asia, and represent on average 50% of financial measures, followed by soft loans (33%)

Distribution of financial measures by type and world region



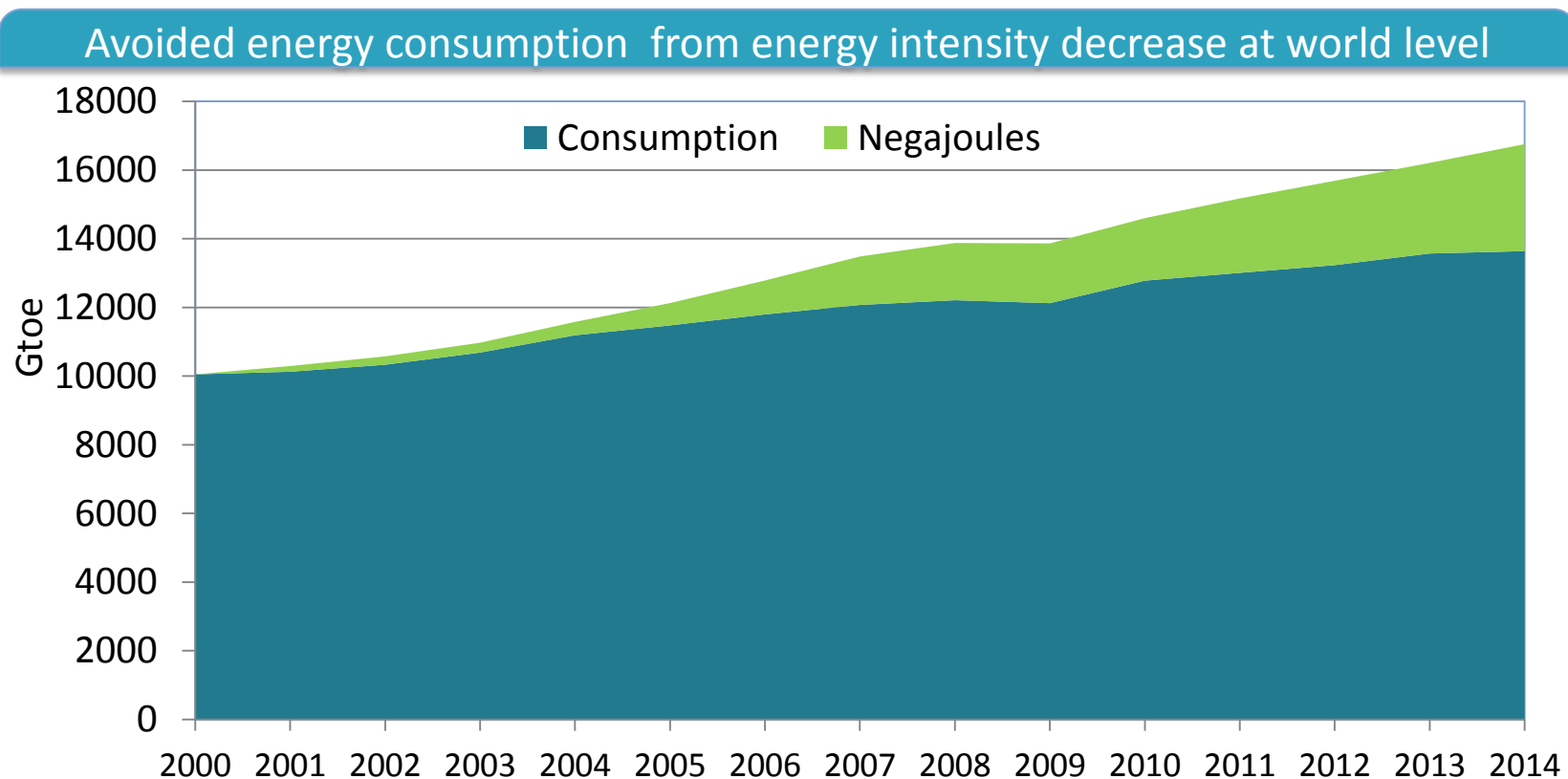
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The reduction in the world energy intensity since 2000, avoided an energy consumption of 3.1 Gtoe in 2014, with China contributing for 40%

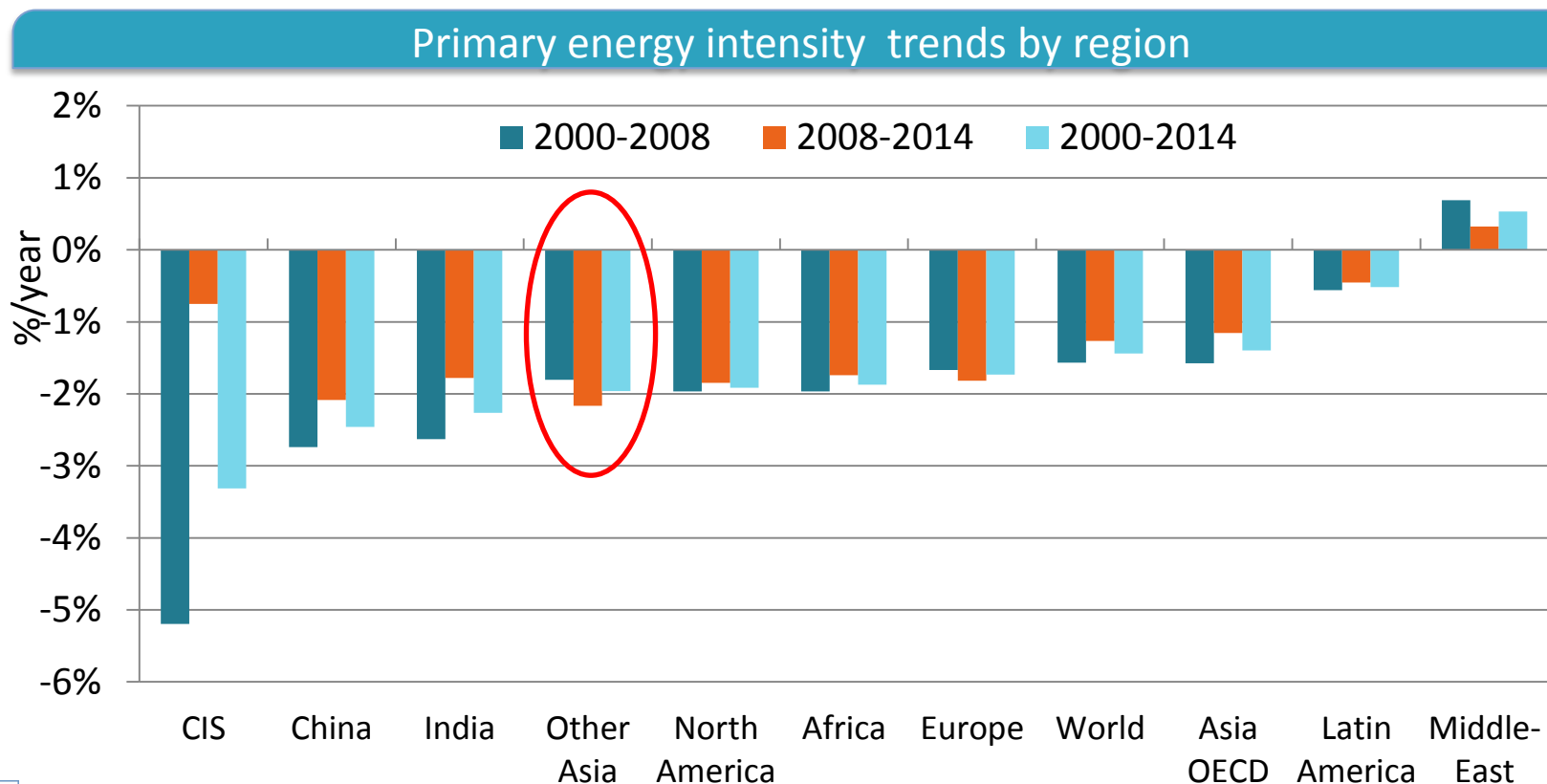
- Compared to 1990, the avoided consumption reached 6,1 Gtoe in 2014
- These energy productivity improvements since 2000 avoided 7 Gt CO₂ at world level in 2014 (13,8 Gt since 1990).



* Negajoules = avoided consumption; it is calculated as the difference between a fictive consumption at 2000 (or 1990) energy intensity and the actual energy consumption.

The world economic crisis lowered the energy productivity improvement in most regions

At world level, the energy intensity decrease slowed down from 1.6%/year between 2000 and 2008 to 1.3%/year since 2008.

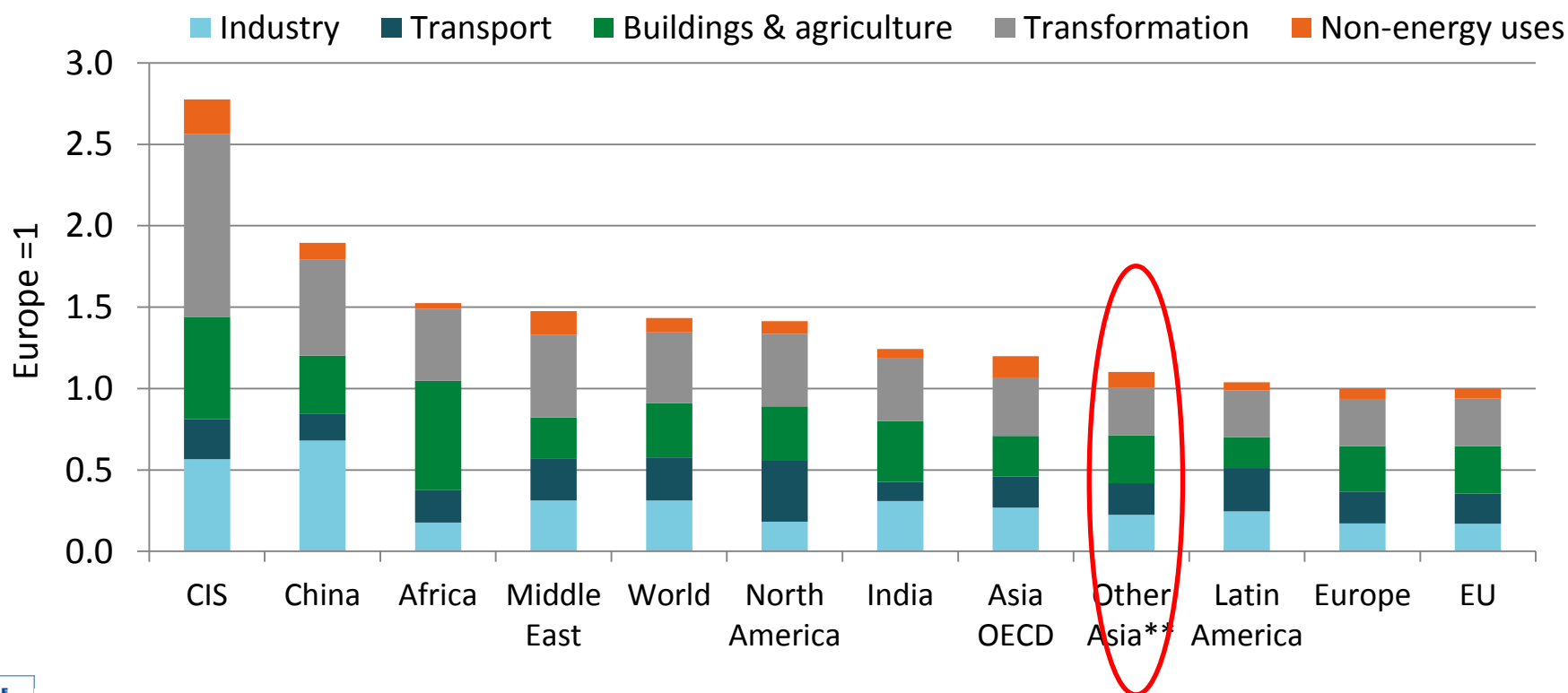


Structure of GDP explains part of discrepancies of energy intensity among countries

The high contribution of the energy transformations and industry explains part of the higher energy intensity of CIS, China and Middle-East (transformations: 40% in CIS, 35% in Middle-East & China ; industry ~ 33% in China).

In Africa, the dominant use of low efficiency biomass in the residential sector explains the dominant of the building sector and this its high intensity.

Contribution of sectors to primary energy intensity (2014)

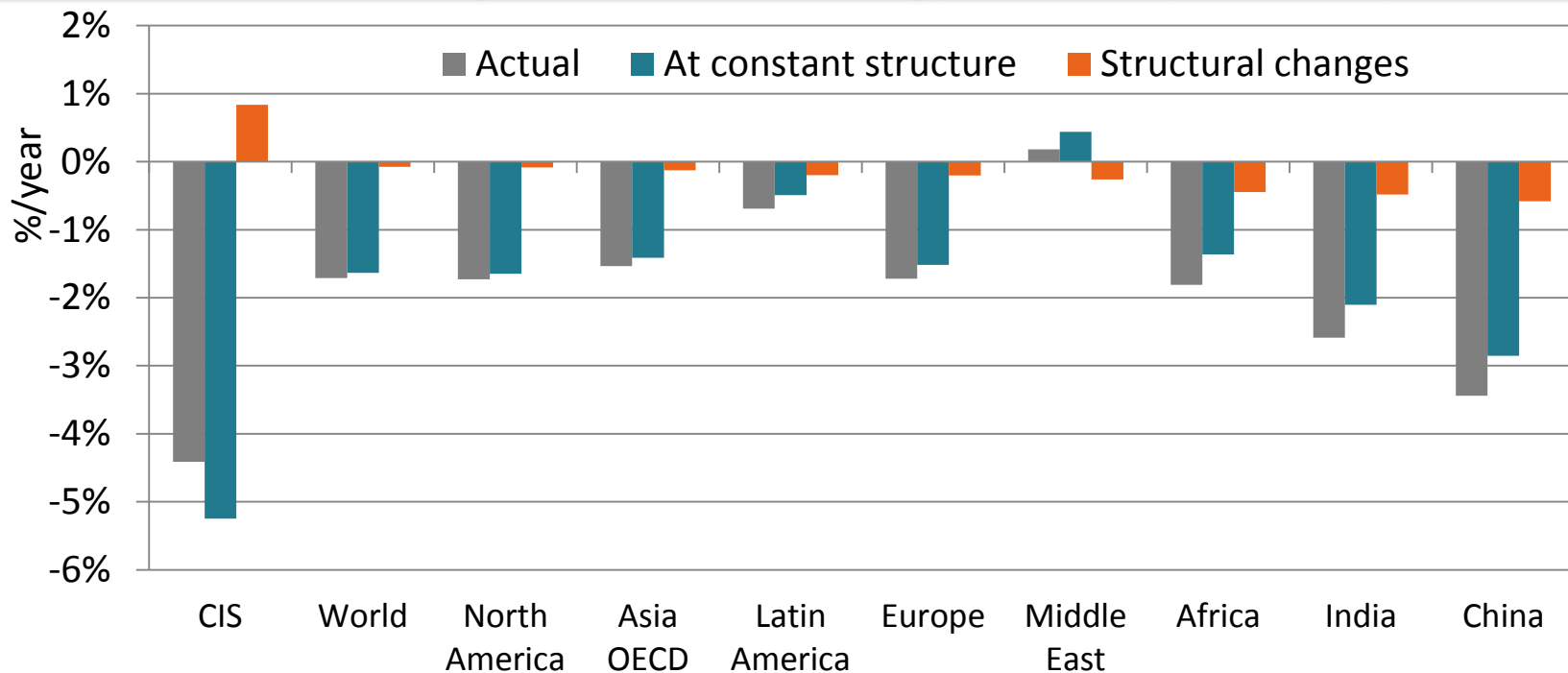


* Energy consumption per sector related to GDP measured at purchasing power parities

** data for 2013

- Changes in the GDP structure explain around 1/4 of the final energy intensity decrease in Africa and around 20% in India and China, due to an increasing importance of services in the GDP (+4 points in Africa, +12 points in India and + 5 points in China).
- In CIS, structural changes contributed to increase the final energy intensity.

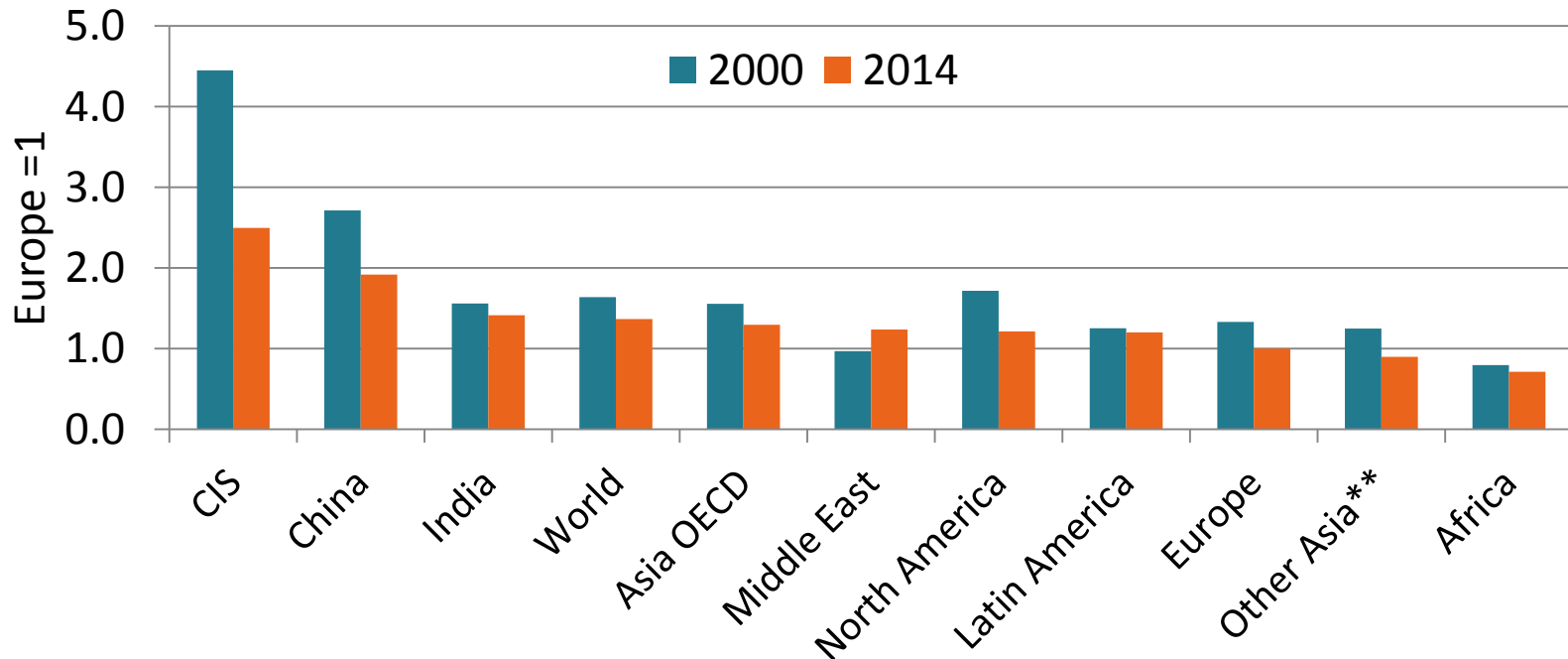
Structural changes of GDP in final energy intensities (2000-2014)



Industry outlook

Decrease in the energy intensity of industry everywhere except in Middle East (greater role of energy intensive industries) : combined effect of energy efficiency gains and structural changes. Large discrepancies among regions in trends and in value due to differences in energy efficiency and industry specialisation: intensities around 2-2.5 higher in CIS or China than Europe but stronger reduction .

Energy consumption of industry per unit of value added*



*: Based on intensities at purchasing power parities in koe/\$2005 at ppp

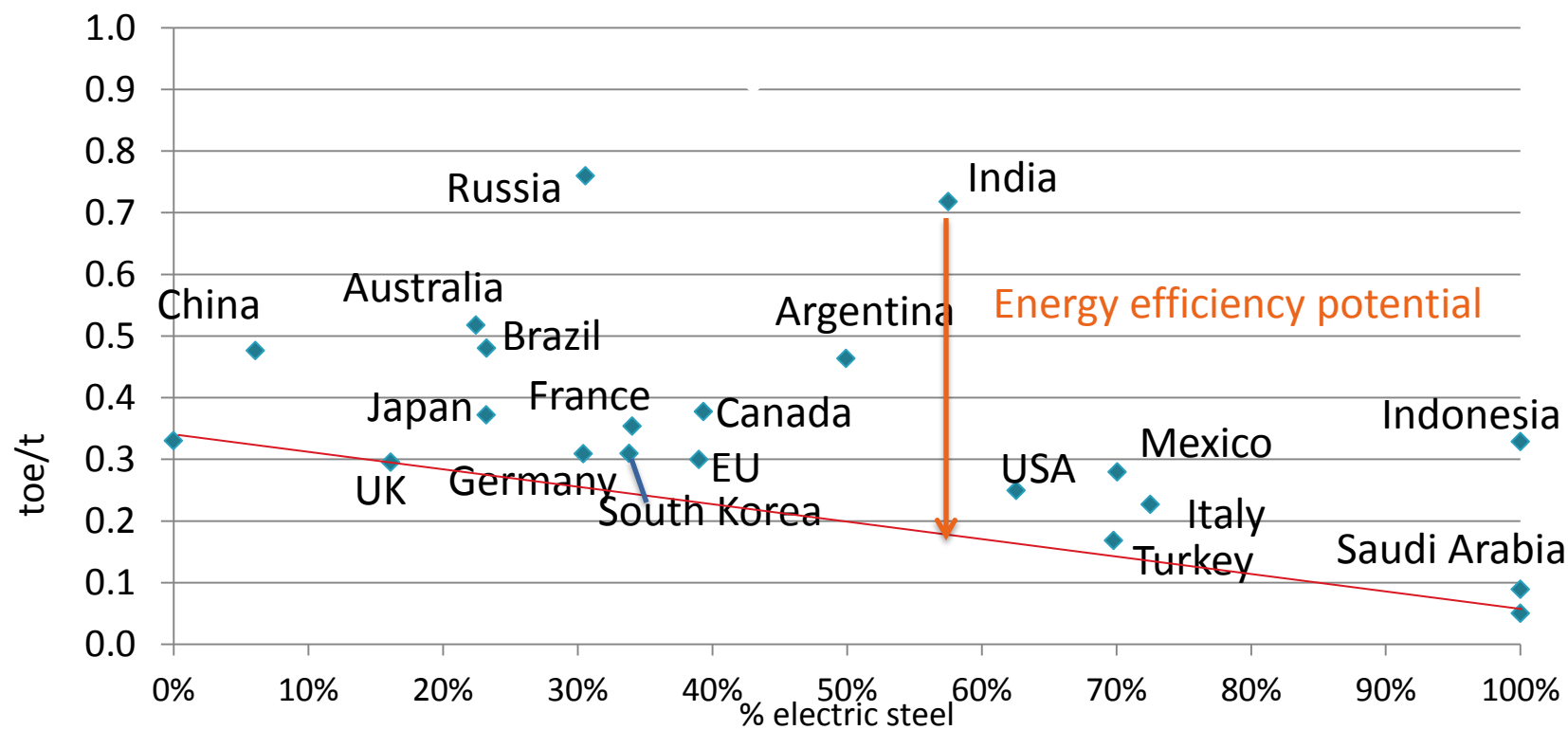
** year 2013

Benchmarking in industry should be made with comparable indicators

Despite the convergence of performance, there is still a large gap between countries at similar process mix ; the distance to the benchmark shows the potential of improvement .

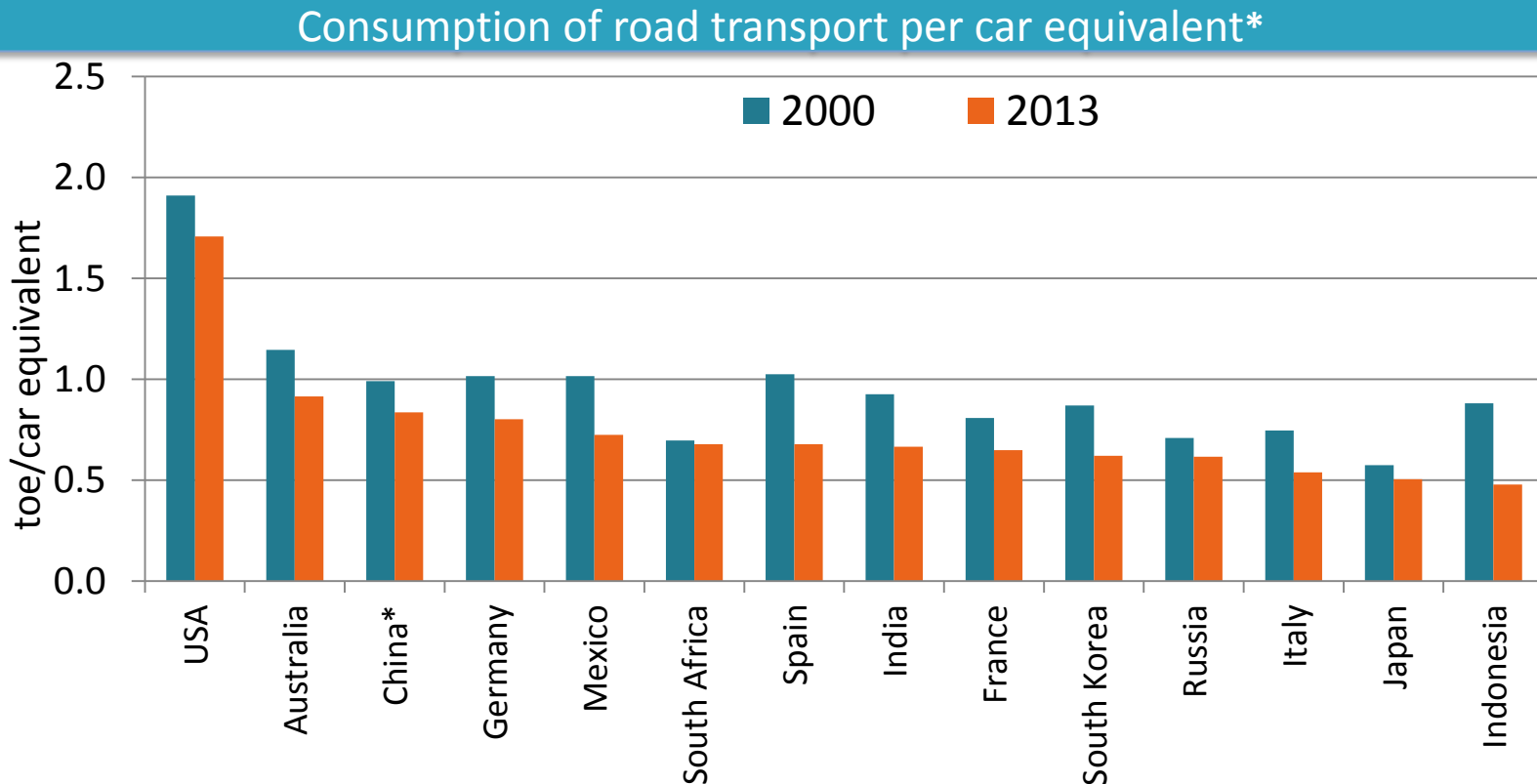
Comparisons of specific consumption should be made at similar process mix as non electric steel is roughly 3 times more energy intensive than non electric process.

Average energy consumption per ton of steel (2014)



Transport outlook

For **road transport**, decreasing trends of the unit consumption per car equivalent in most countries thanks to energy efficiency improvement of vehicles.



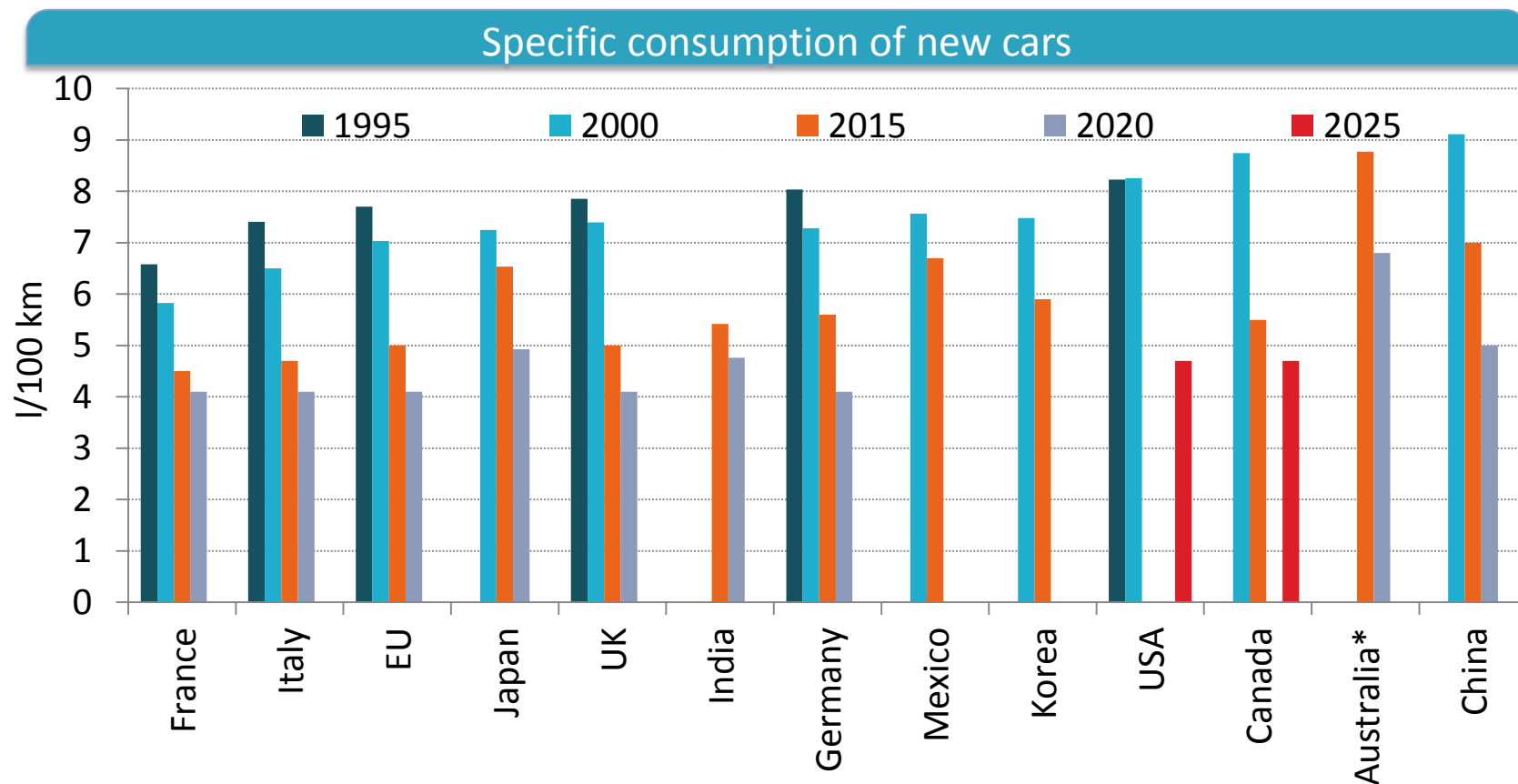
*China year 2002 and 2013

1 bus = 15 cars ; 1 truck and light veh = 4 cars; 1 two-wheelers = 0.15 car

Energy efficiency in WEC countries

Rapid decrease of the specific consumption of new cars in most countries

Due to policy measures, mainly efficiency or emission standards for new cars, as well as other tax incentives. And this trend will continue in the next decade given the existing standards.



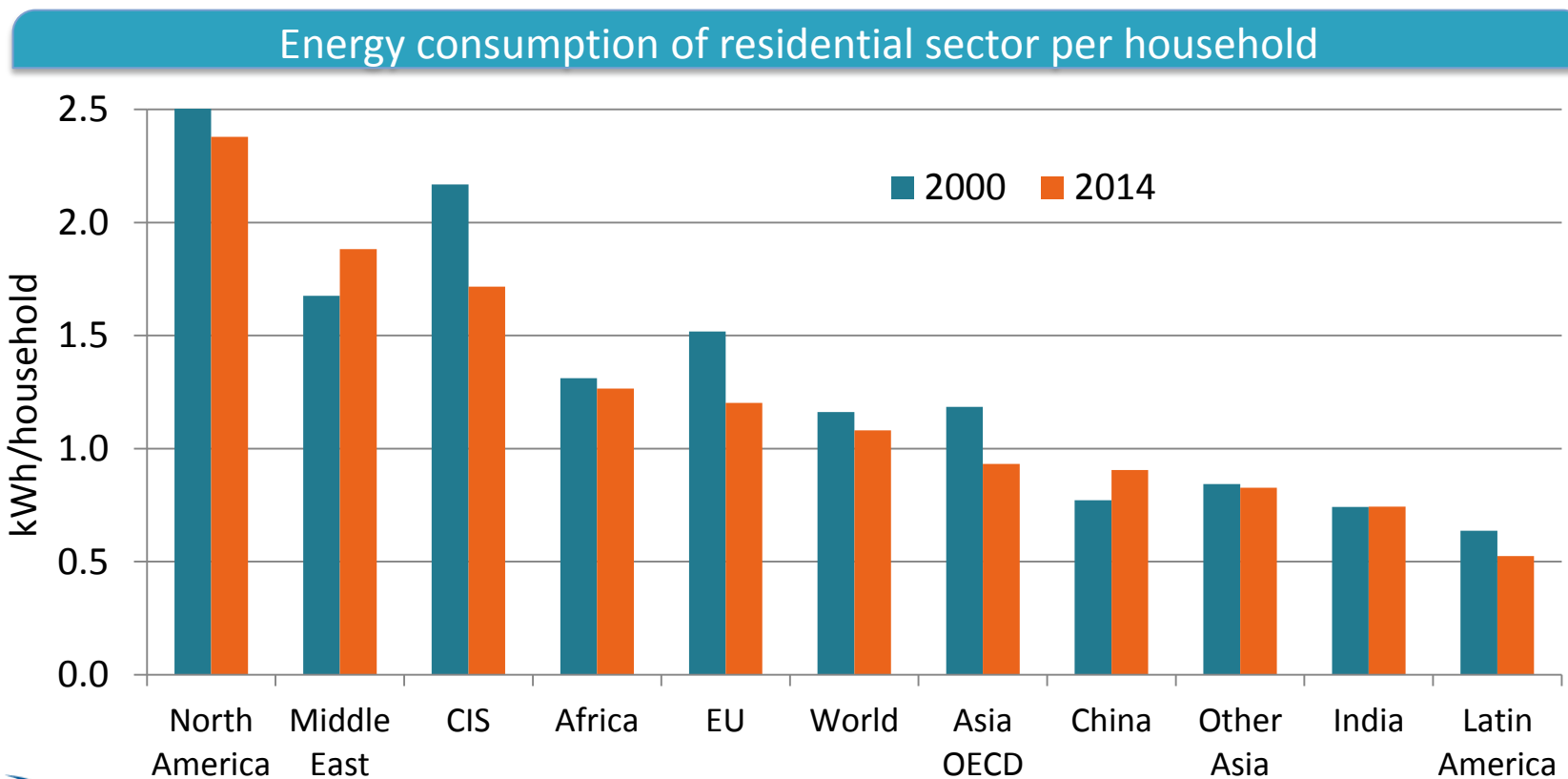
Source: ODYSSEE, EU Commission, IEA; ICCT

Residential outlook : energy consumption of households

Decreasing trends in all countries (-0.4%/year at world level) except for Middle East due to growth in air cooling, and in China due to fast growth in electrical appliances ownership and increased heating comfort.

In OECD countries, the main driver is energy efficiency improvement for space heating and appliances.

In emerging countries it is the substitution of biomass with modern fuels for cooking.

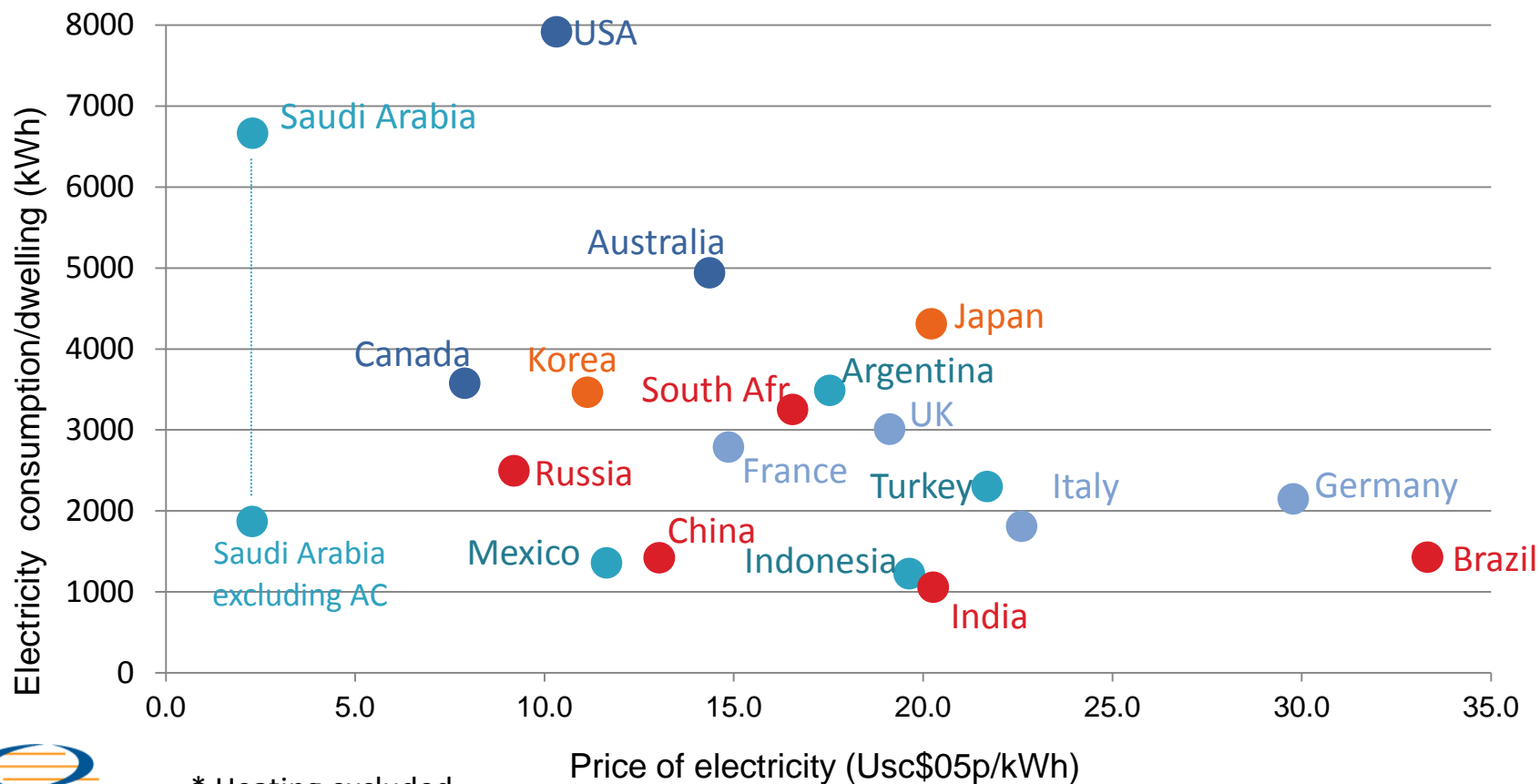


Electricity price and consumption in households

Large discrepancies among regions in the electricity consumption per electrified dwelling (excluding heating use): from 8 000 kWh in North America to 1 000 kWh for India.

There is no always correlation between electricity consumption per electrified dwelling and electricity price: for a same price level (for example 10 \$c/kWh), the range of countries is quite large, from 1 300 kWh in Mexico to 7 900 kWh in USA.

Electricity consumption per electrified dwelling* and price of electricity (2014**) in G20



* Heating excluded

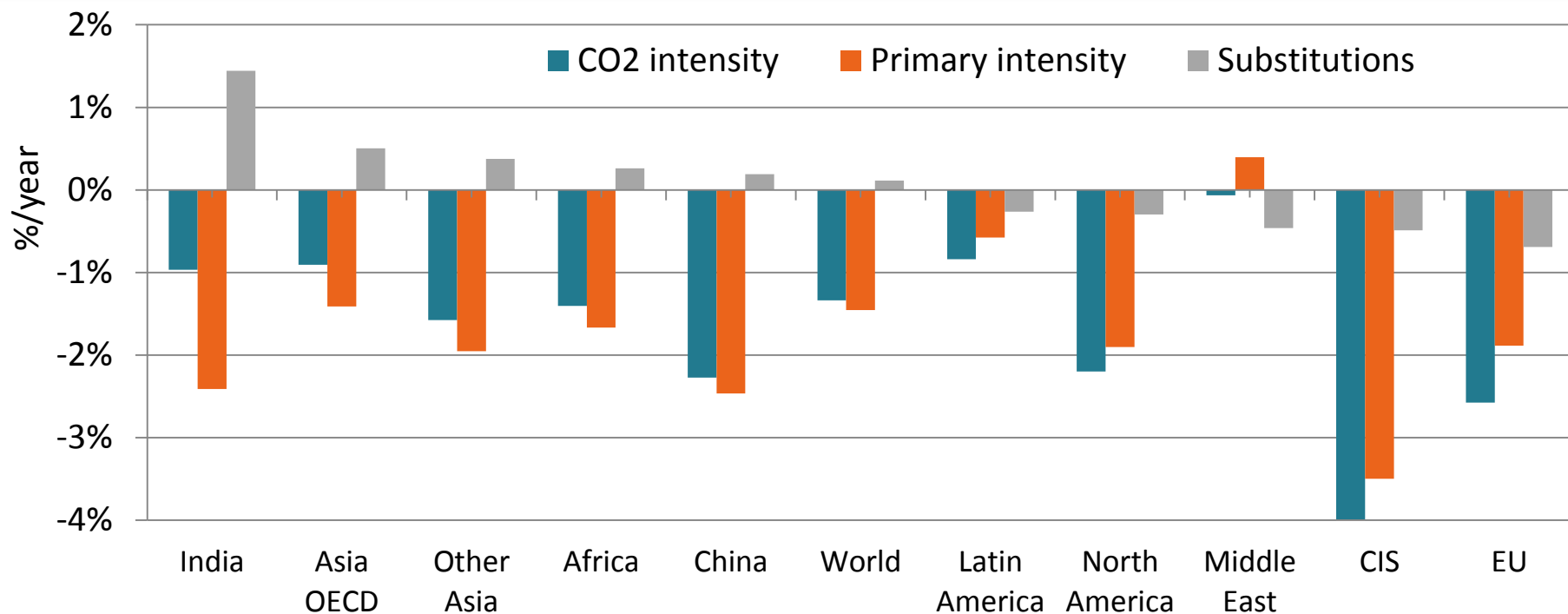
** Electricity prices in 2013 for China and Argentina

Reduction in CO₂ intensity everywhere.

Most of this reduction was driven by **energy intensity decrease** (> 100% in Africa and world level; 87% in CIS and 70% in Europe); **fuel substitutions** contributing for the remainder.

in Asia, **fuel substitutions** have offset part of the energy intensity reduction

Variation of CO₂ intensity: impact of energy efficiency and fuel substitutions (2000-2014)



The 10 WEC recommendations on EE policies (2013)

- 1. Incentive prices
- 2. **Sustainable** institutional support for policies and involvement
- 3. **Innovative financing** at a limited cost for the public budget
- 4. **Improving quality** of EE equipment, services and practices
- 5. Regulations should be regularly strengthened, enforced and expanded
- 6. **For each end-use**, address the implementation strategy with **packages of measures** rather than single measures
- 7. Better address the situation of less developed countries
- 8. Address behaviours as much as technology
- 9. Need to monitor achievements and impacts of measures
- 10. Enhance international and regional cooperation : towards regional policies and programmes



Thank you for your attention

visit us at :

<http://www.worldenergy.org/data/> for EE indicators and policies at world level

<http://www.odyssee-mure.eu/> for EE indicators and policies in Europe

<http://www.cepal.org/drni/biee/> for UN-CEPAL Latin America (BIEE project)

<http://www.ademe.fr>

