



renewable
energy
& energy
efficiency
partnership

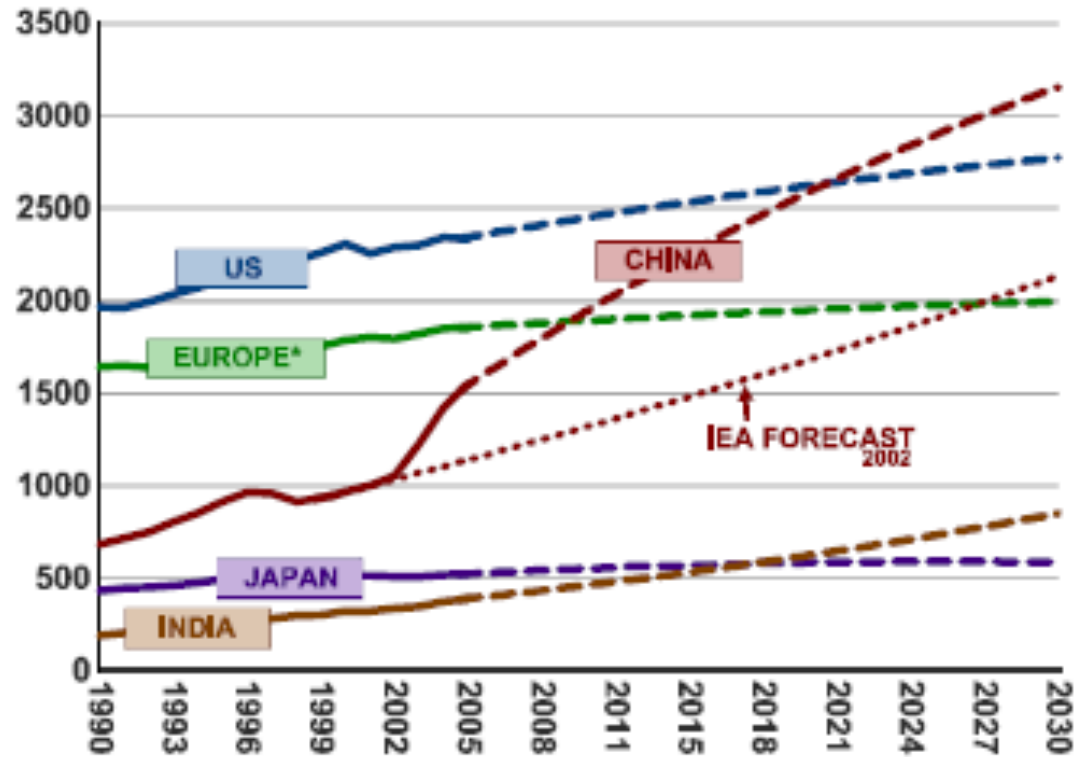


Energy Efficiency Efforts on an International Scale

**ECEEE Summer Study
Toulon, 9 June 2011**

**Dr. Marianne Moscoso-Osterkorn
REEEP Director General**

The future rise in energy demand will be driven by emerging markets

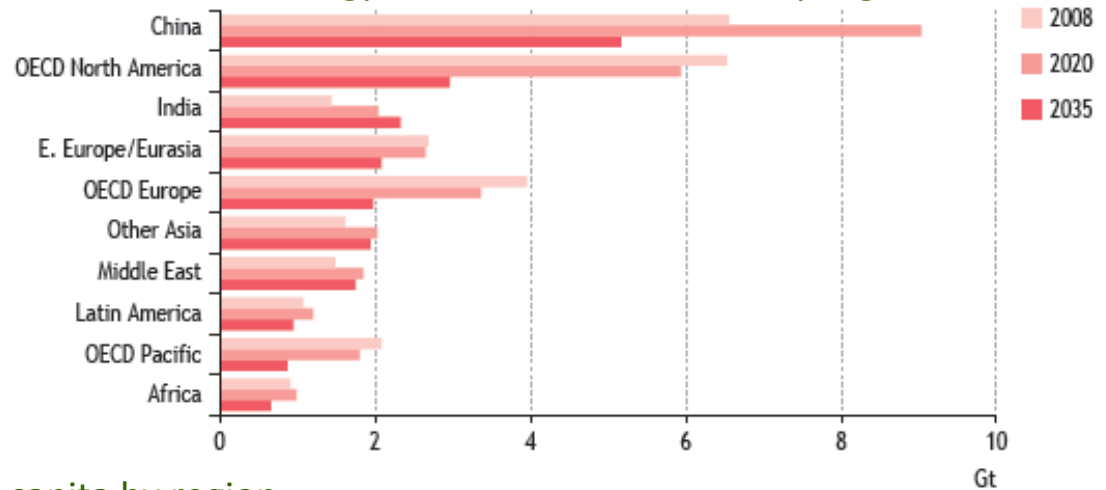


Today China accounts for 15% of world energy demand, with 19% of the world's population.

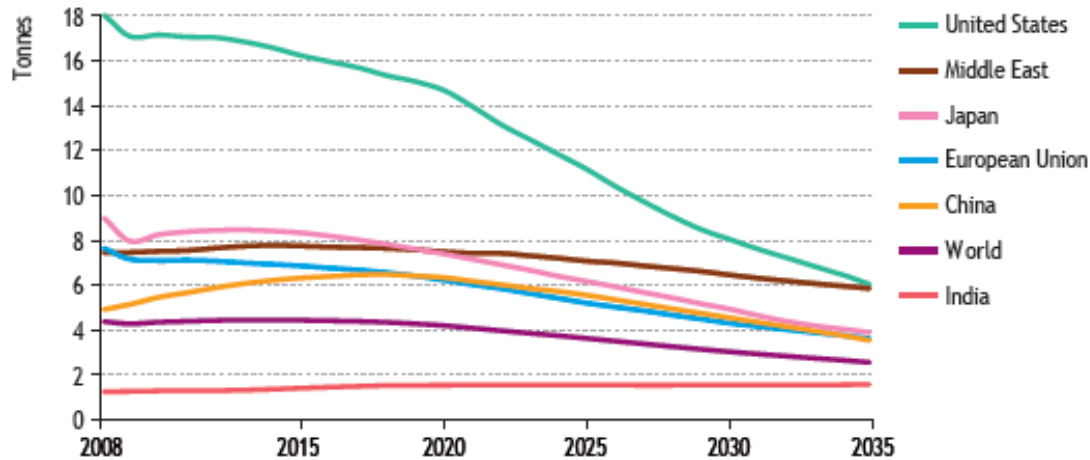
Source: BP Yearbook, IEA

The energy sector causes a major share of emissions – the transition to low carbon energy systems is therefore most critical for tackling climate change

Energy related CO2 emissions by region



Energy related CO2 emissions per capita by region

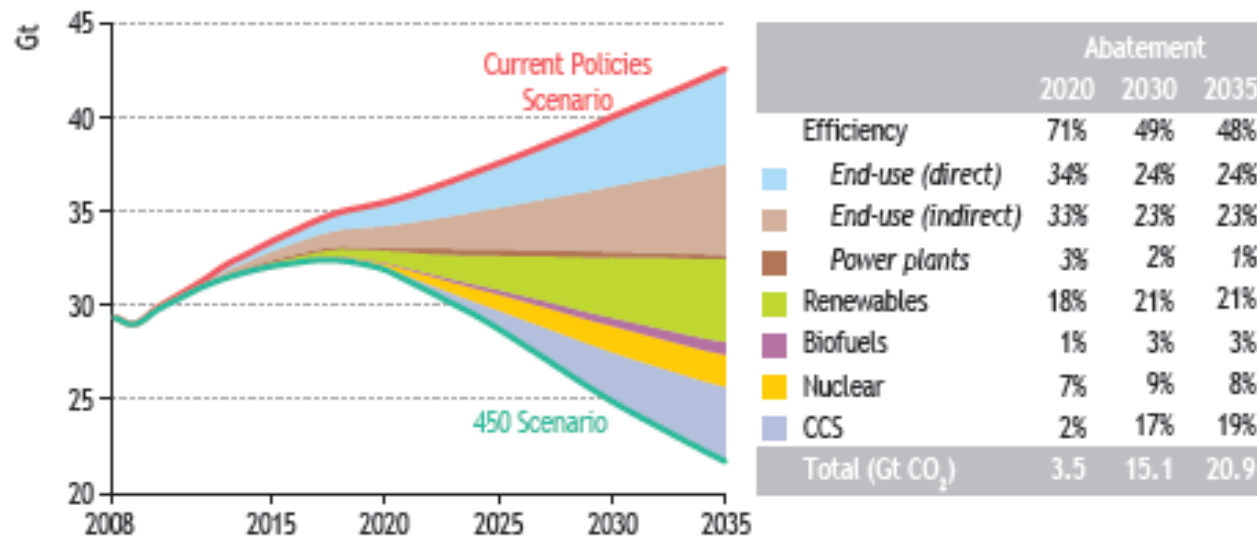


With 58t Qatar is the world leader on per capita CO2 emissions

Source: IEA, WEO 2010

Global efficient use of energy could help to reduce more than 70 % of current emissions

Global energy-related CO2 emission savings by policy measures in the 450 scenario



It is a proven fact that the interest in energy efficiency significantly increases if energy prices rise

Source: IEA, WEO 2010

Today's leaders are aware of the importance of saving energy



"China attaches great importance to energy conservation. We ... give top priority to conservation."

**President
Hu Jintao**



"We recognise that we have to act on climate change in our own interest ... we have adopted an ambitious National Action Plan ... We are committed to ambitious time-bound outcomes that will increase the energy efficiency of our economy ... "

**Prime Minister
Manmohan Singh**



"If I were emperor of the world, I would put the pedal to the floor on energy efficiency and conservation ..."

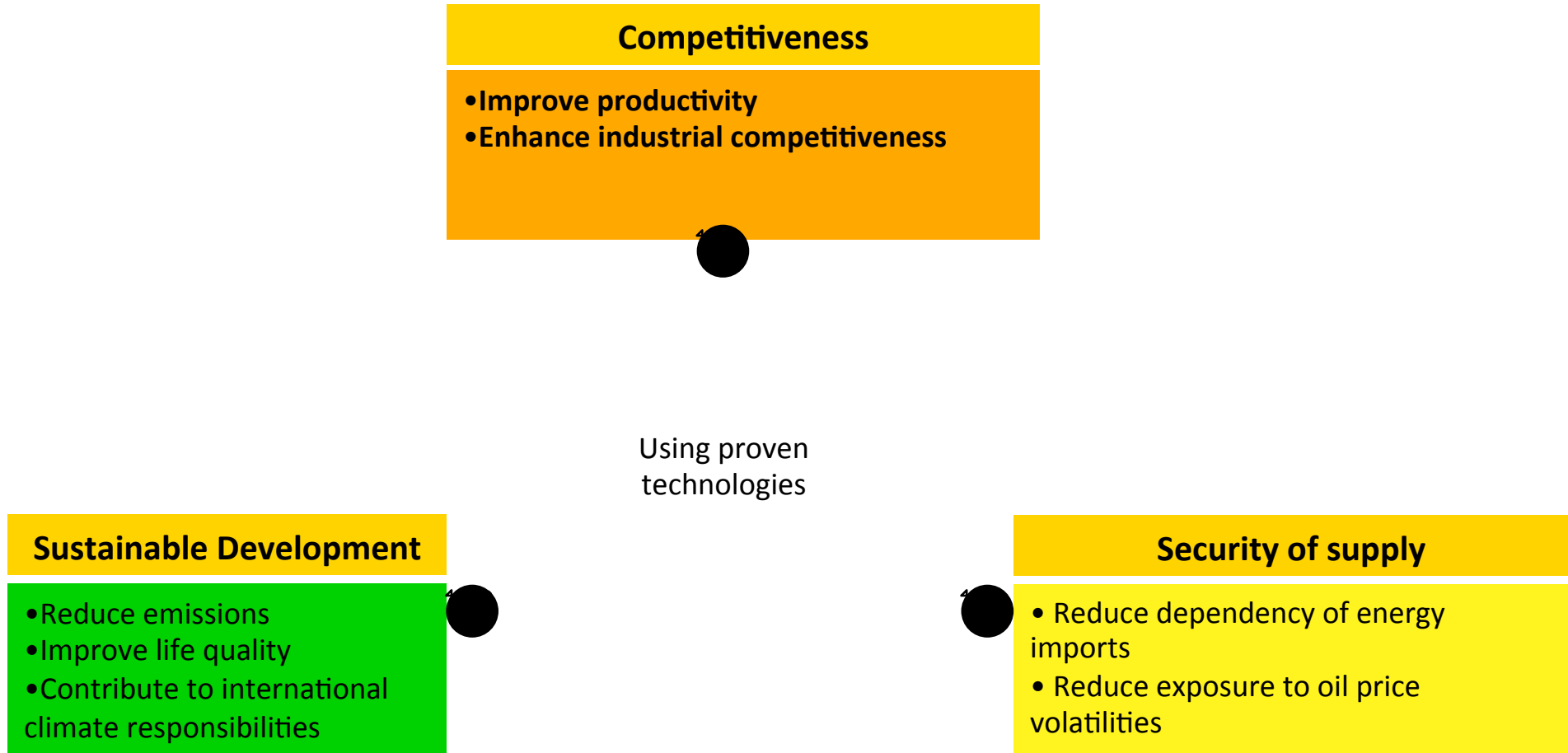
**US Secretary of
Energy
Steven Chu**



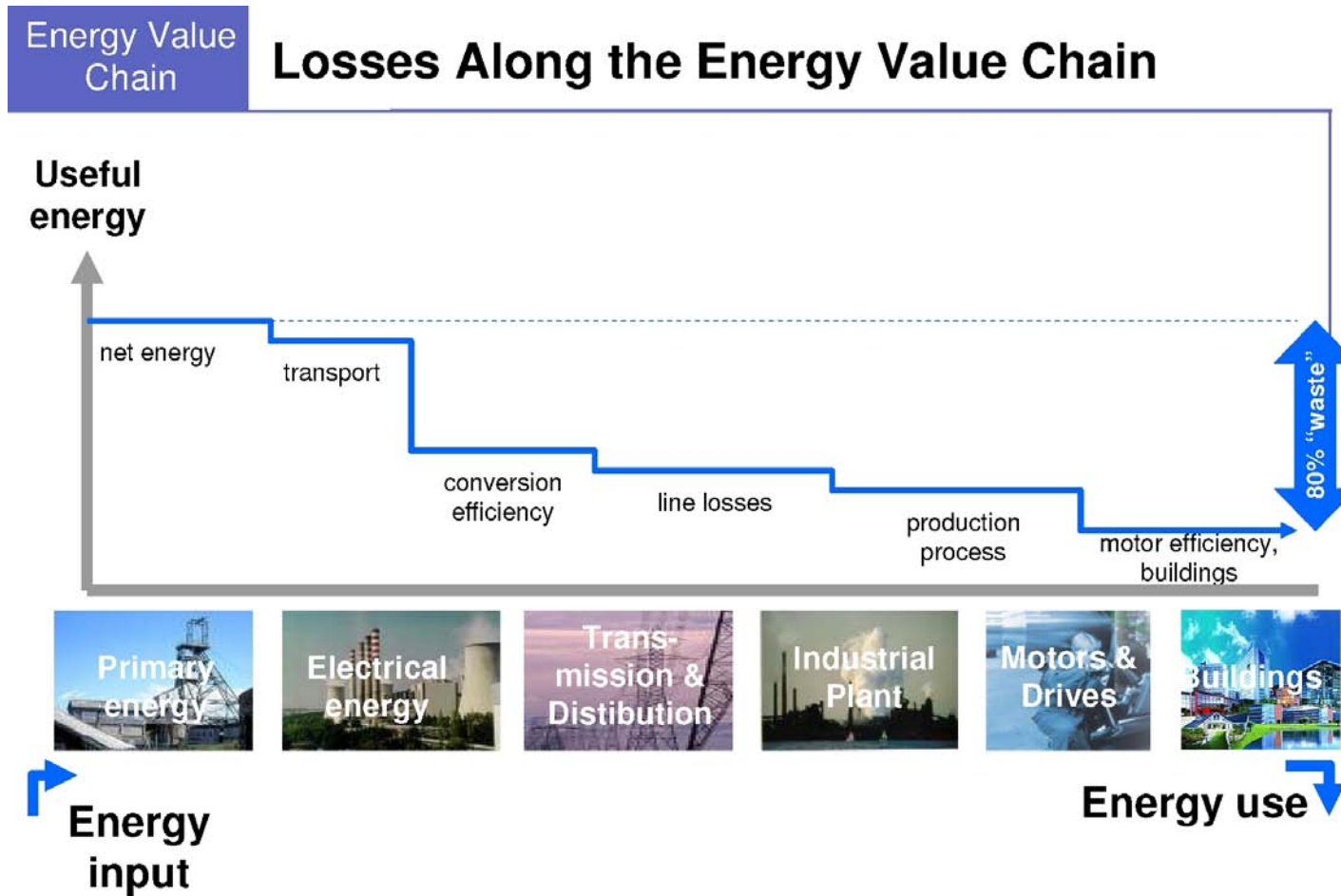
"Recognizing that the cleanest source of energy is more efficient energy use, the Presidents committed the relevant agencies ... to accelerate energy efficiency improvements"

**President
Barack Obama
and
President
Felipe Calderón**

There are 3 main reasons for modern economies to focus on energy efficiency

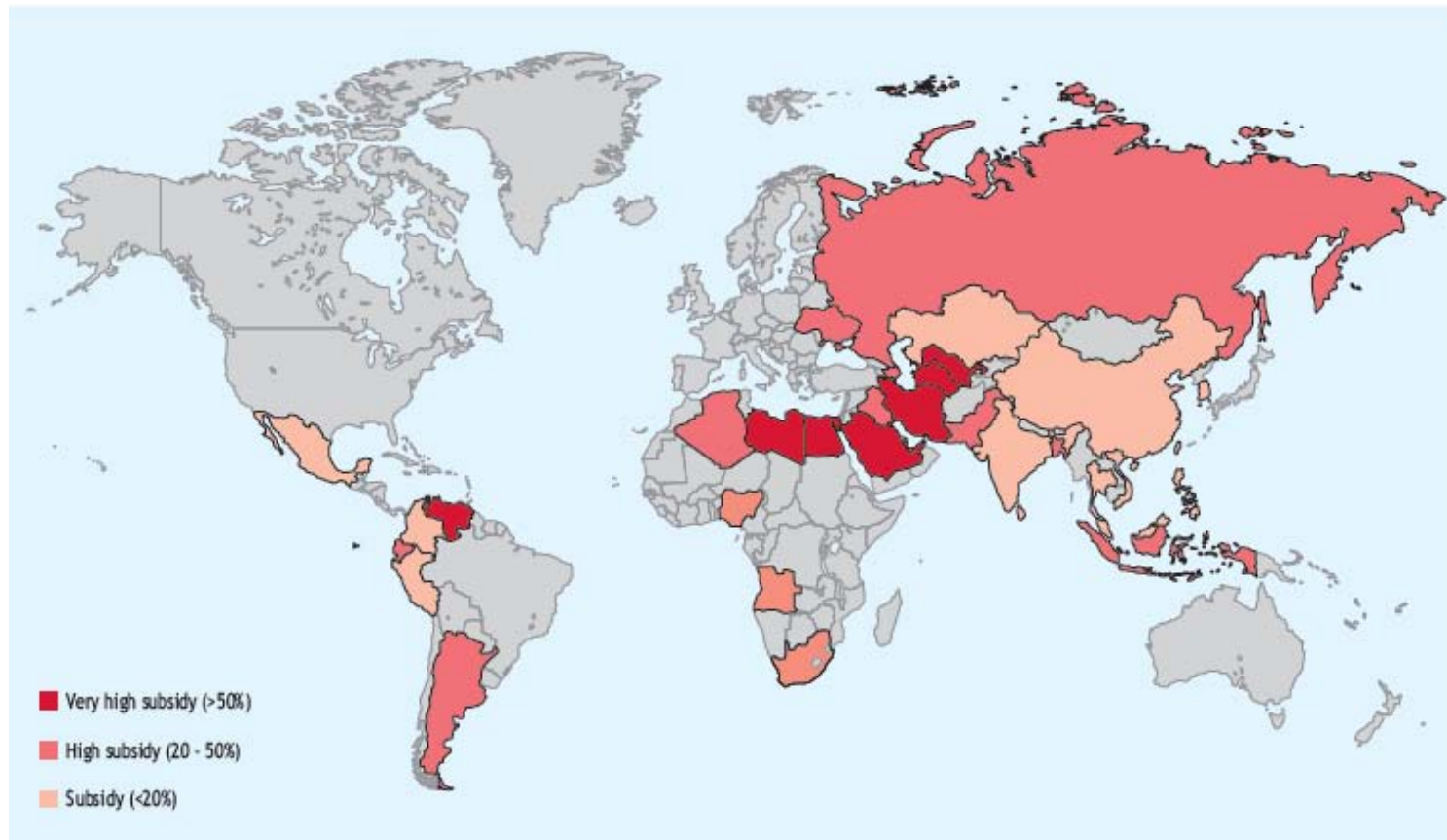


There is a huge untapped savings potential in the entire energy value chain: today 80% of primary energy is wasted



Source: ABB 2007

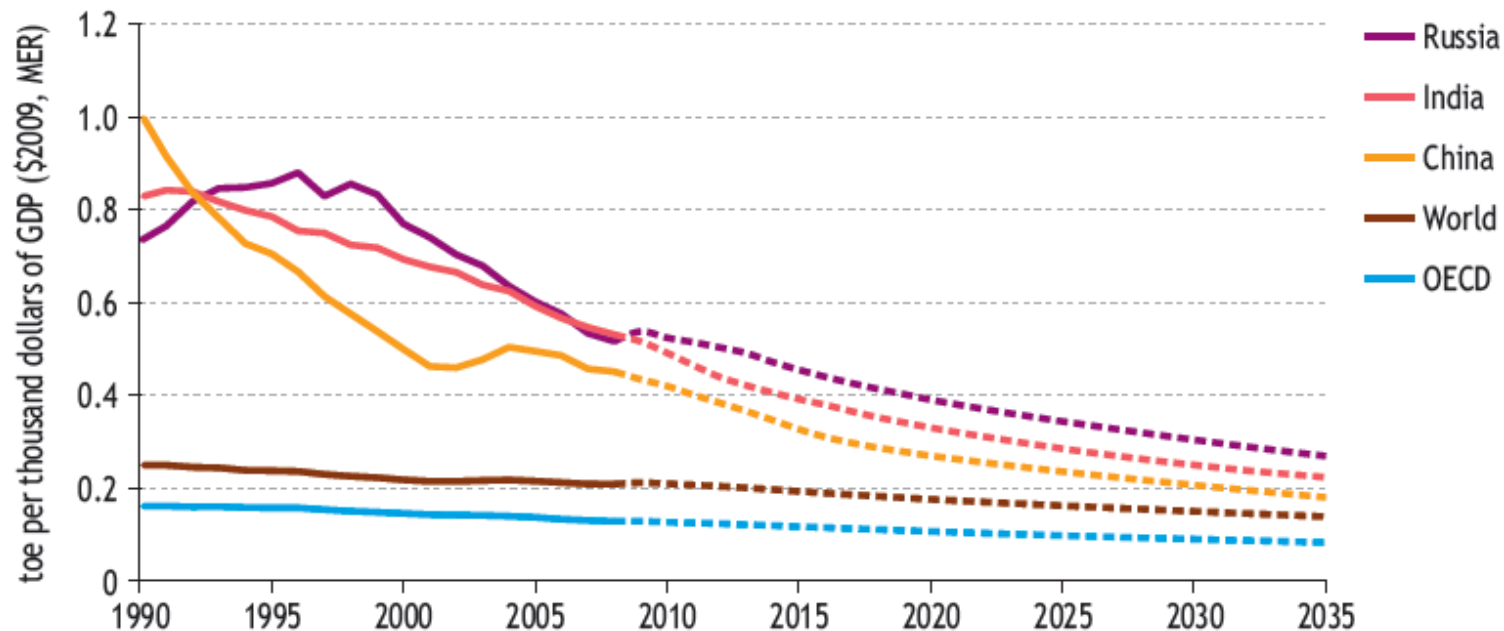
Fossil fuel subsidies distort the market for renewables and energy efficiency



Globally, fossil fuel consumption subsidies amounted to USD 312 billion in 2009, with oil products accounting for almost half of the total.

Source: IEA World Energy Outlook 2010, p. 581

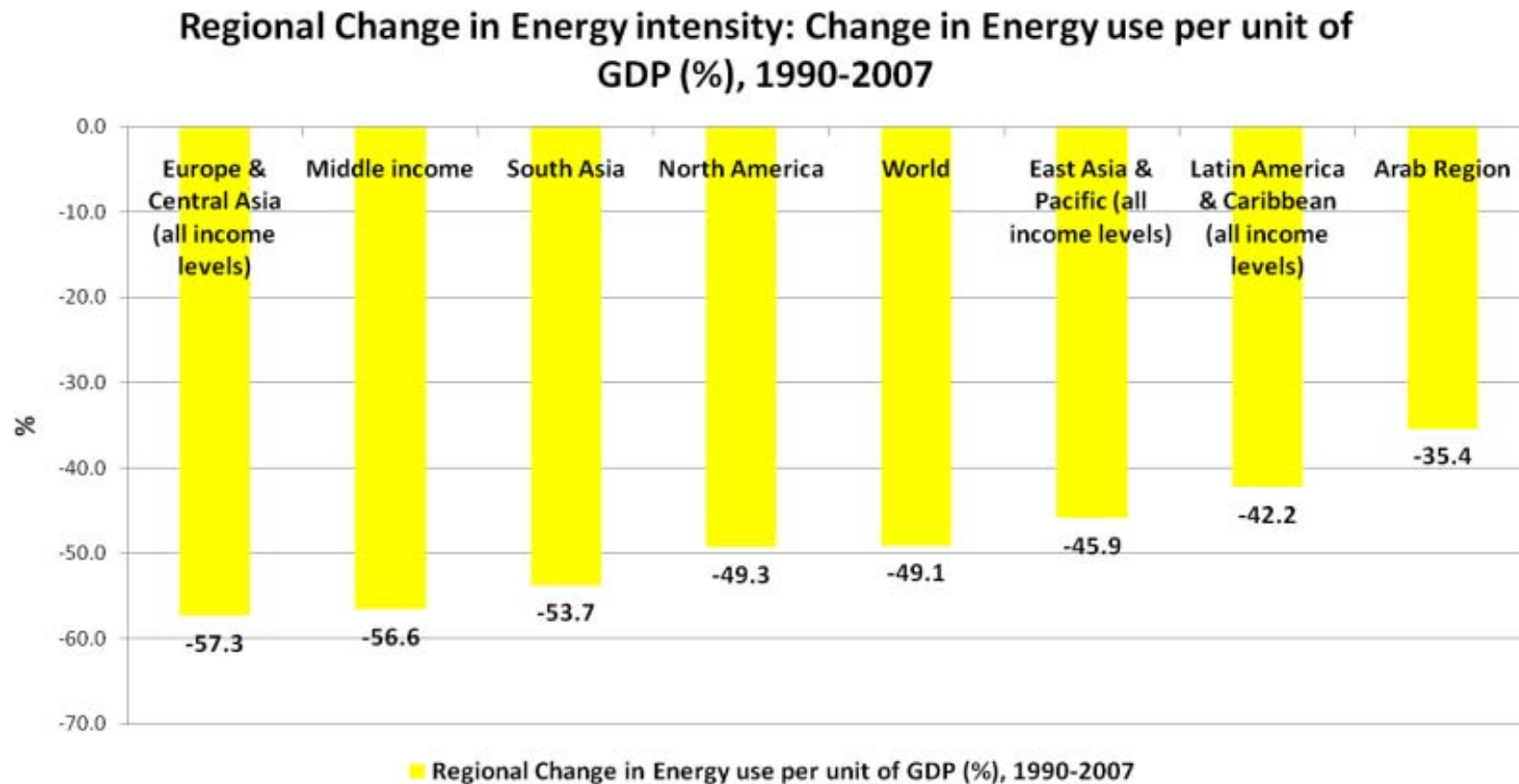
Positive Trend: Energy intensity decreases globally and it is expected that by 2030 energy intensity will be 50 % lower than today



In China, the ratio of energy demand to GDP is currently 1.5 times above the world average, but with a targeted energy efficiency increase of 3.3% per year, China will achieve the strongest improvements

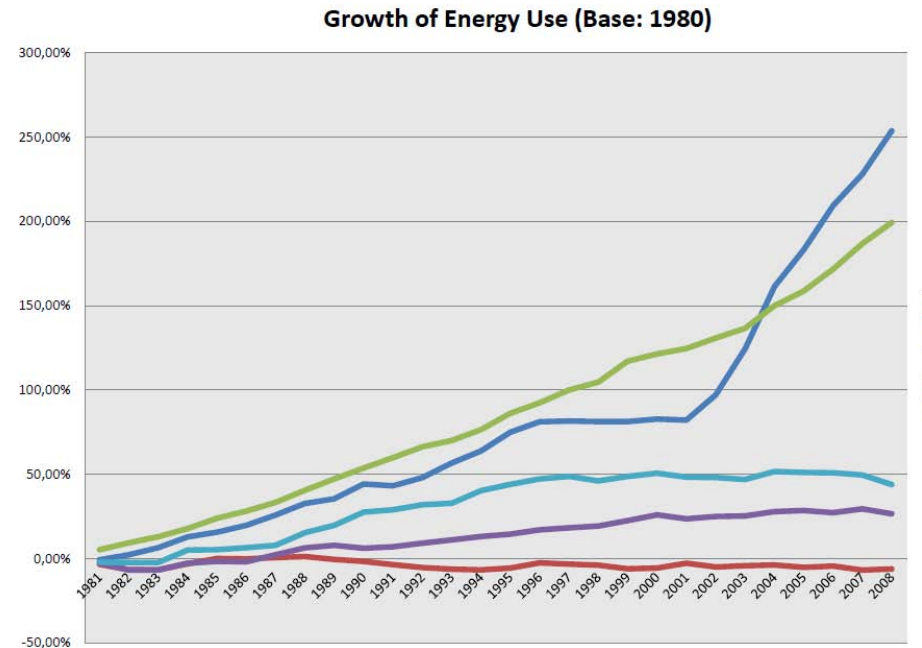
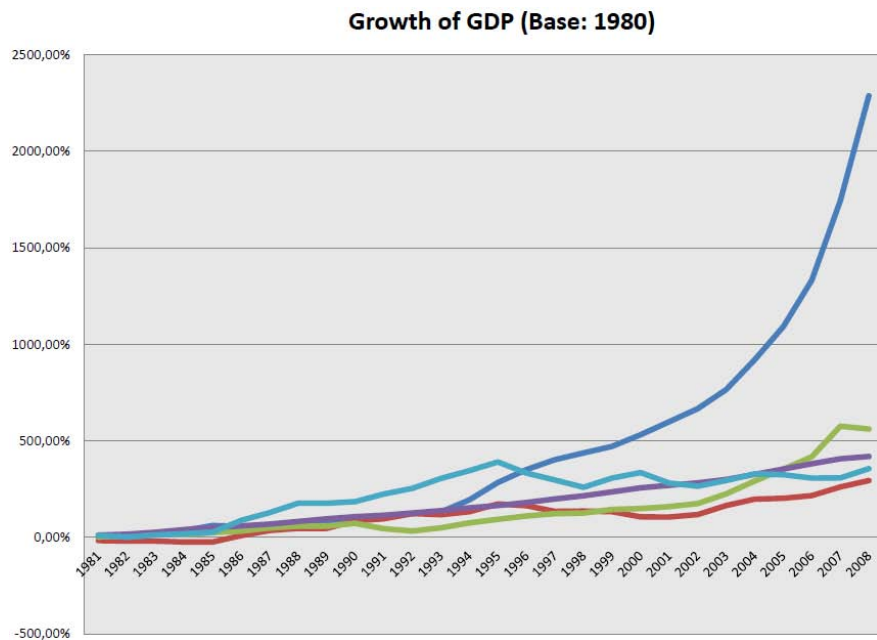
Source: IEA World Energy Outlook 2010, p. 85

Europe, Central and South Asia have shown most significant improvements in energy efficiency over the last 20 years



Source: UNEP

Decoupling growth and energy consumption is in particular challenging for emerging markets and developing countries



- China
- Germany
- India
- United States
- Japan

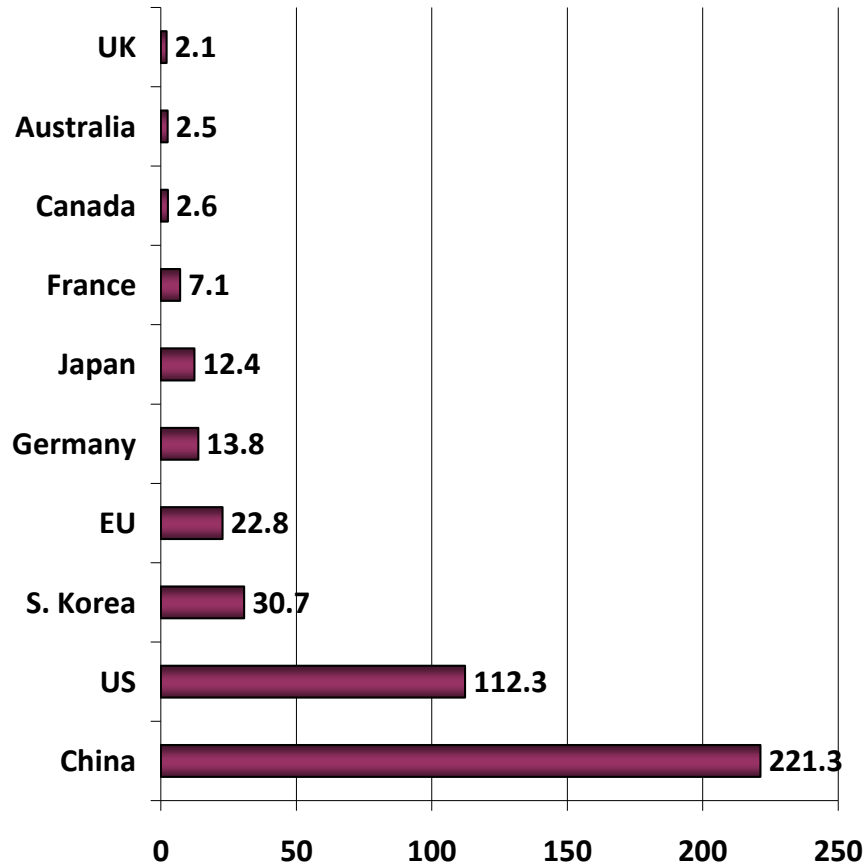
Still more than 1.6 billion people are without access to electricity, increased urbanization and growing service demand of mid income households

Source: EIA, World Bank 2010

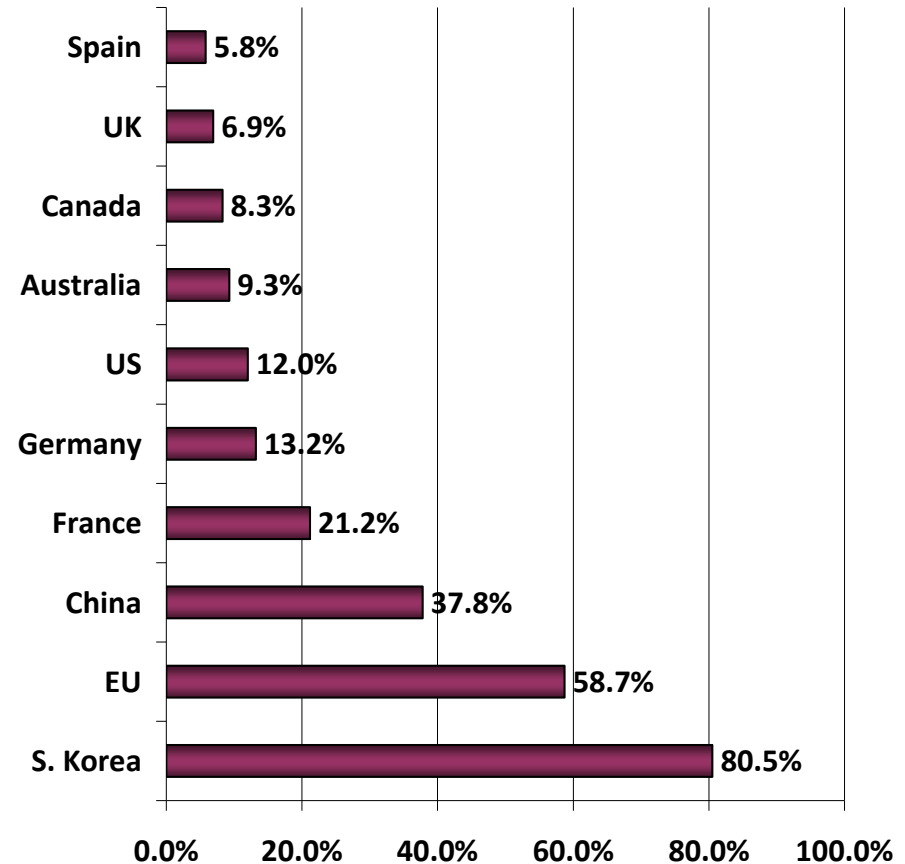


In many countries, green stimulus packages were used to target energy efficiency and green growth

Green stimulus regional ranking in USD bn

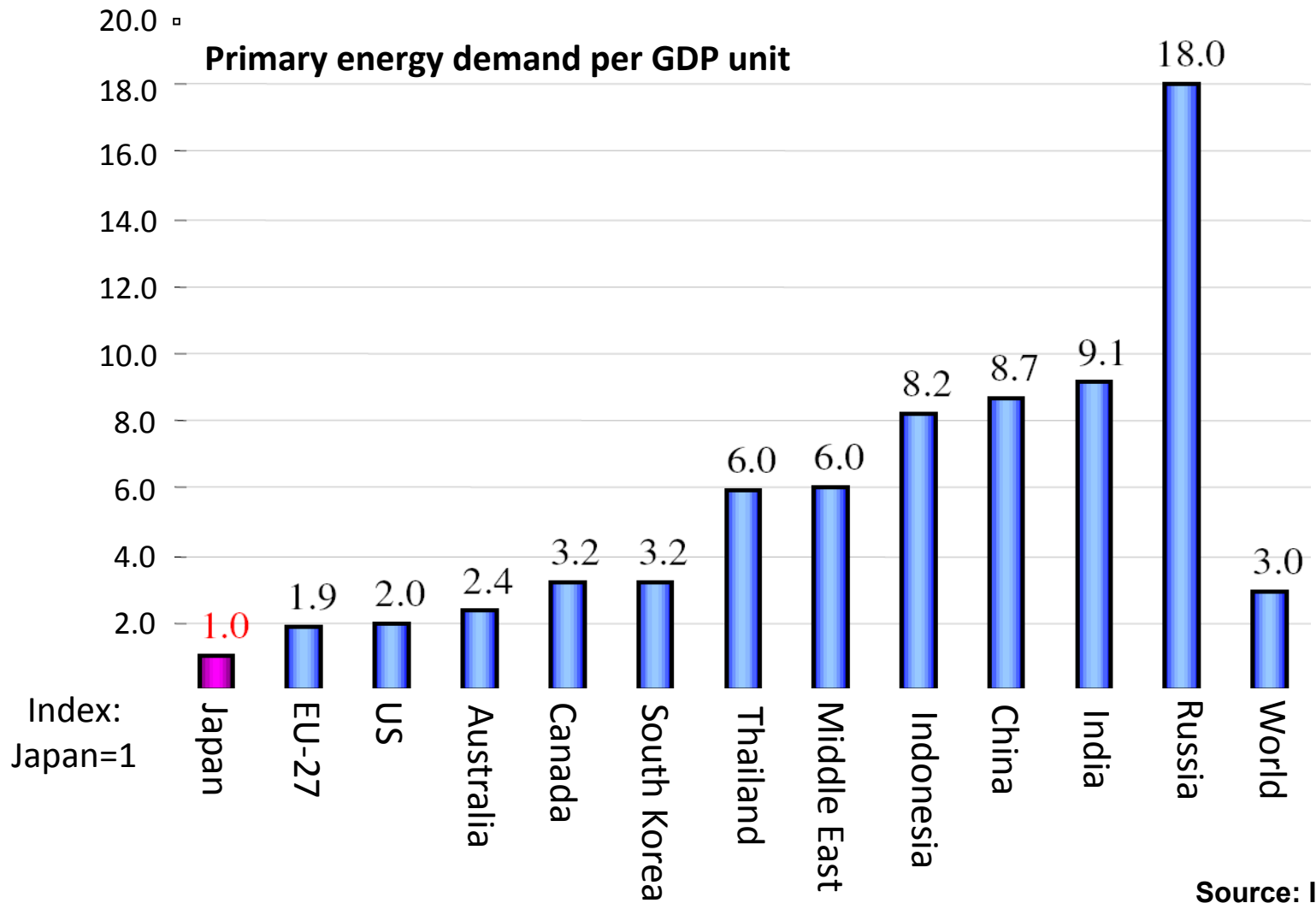


Green stimulus ranking as a % of total stimulus



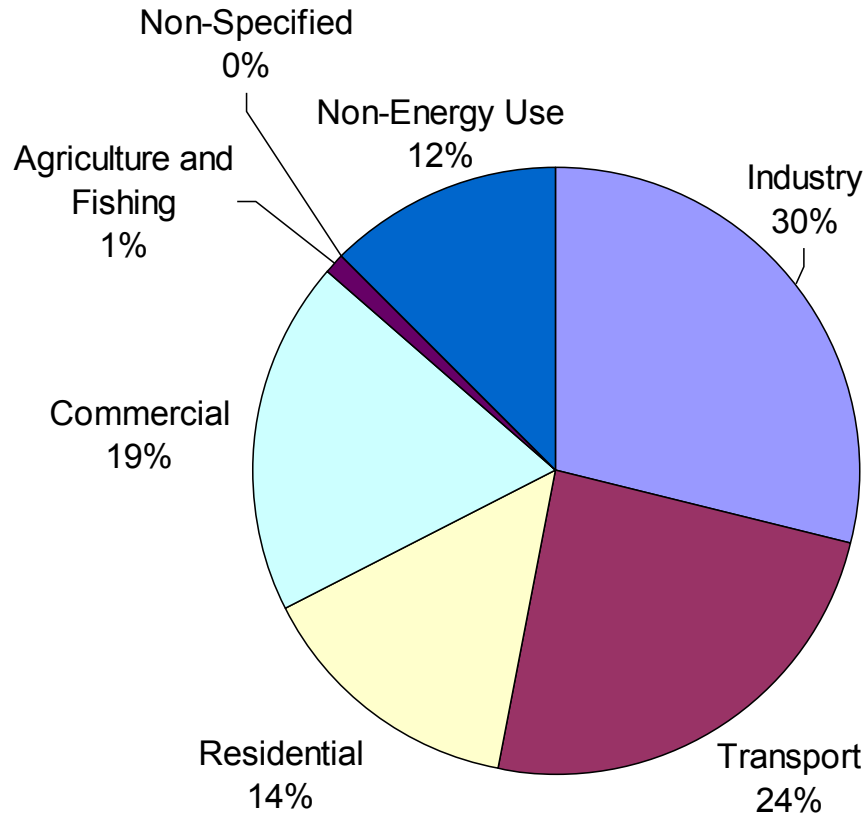
Source: HSBC 2009

World leader in energy efficiency: Japan scores best on energy consumption per GDP



Japan was an early mover in implementing strong policies to stimulate energy efficiency

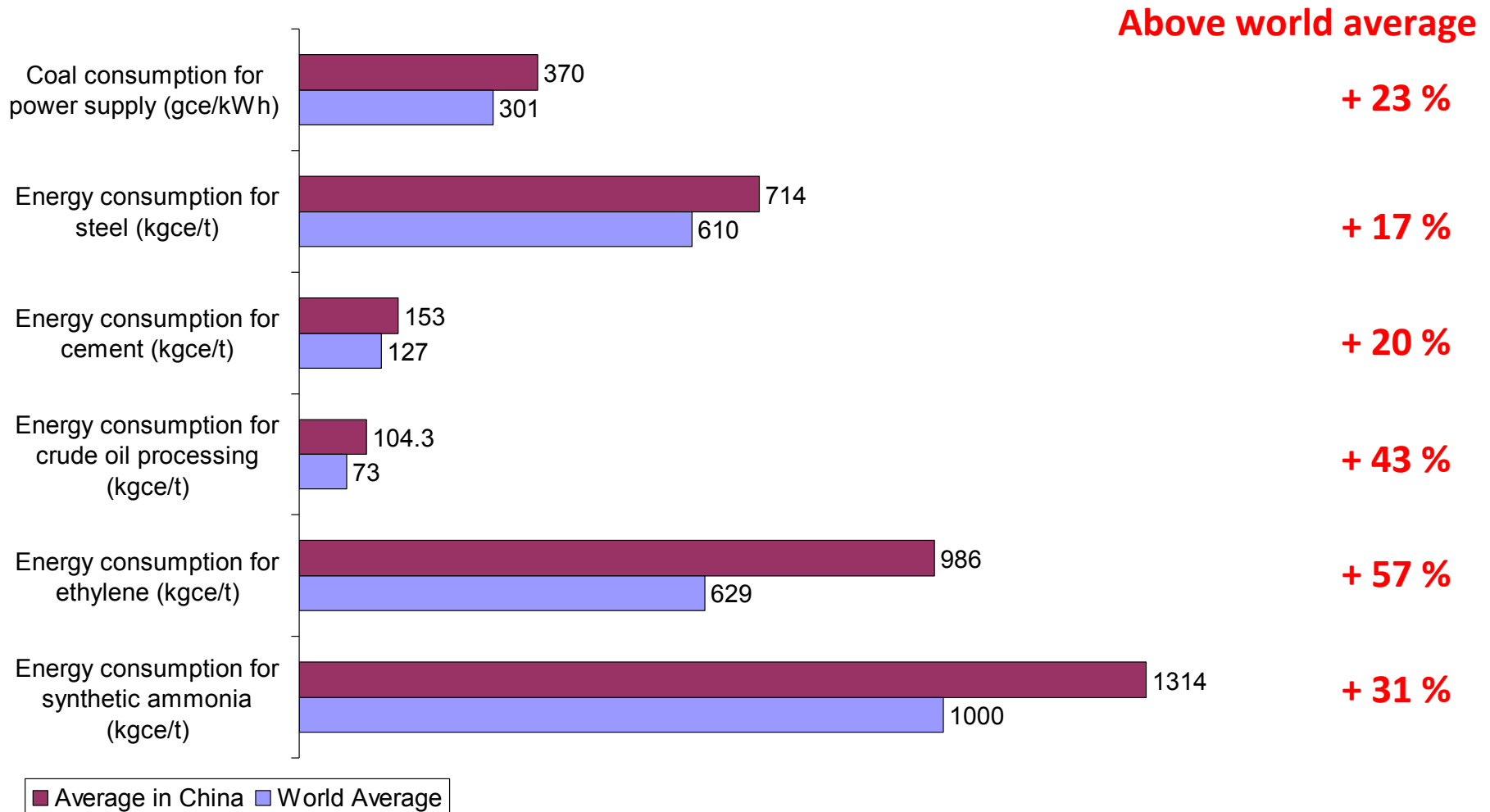
Total Final Consumption: 342 Mtoe



Source: METI, IEA 2007

Industry	<ul style="list-style-type: none"> Improve EE by 1% annually in 13000 factories, annual reports 30000 energy managers currently certified Tax reductions and subsidies Petroleum and coal tax (accounts for 533 billion Yen per year)
Transport	<ul style="list-style-type: none"> EE program for large carriers Top-Runner-Program for vehicles Green taxation for vehicles
Residential	<ul style="list-style-type: none"> EE housing standards and annual reporting on efficiency measures Top-Runner-Program (includes 21 products) EE labeling, includes TRP, another 16 products
Public	<ul style="list-style-type: none"> Nationwide institutional system for EE promotion (Energy Conservation Centre, NEDO) Intensive education and information program at all levels of society

The energy intensity of Chinese industry - which makes up 50% of the country's energy demand – is still far above world average



Source: National Energy Bureau

China is one of the largest construction markets in the world and consumes more than half of cement produced worldwide

The construction sector's values:

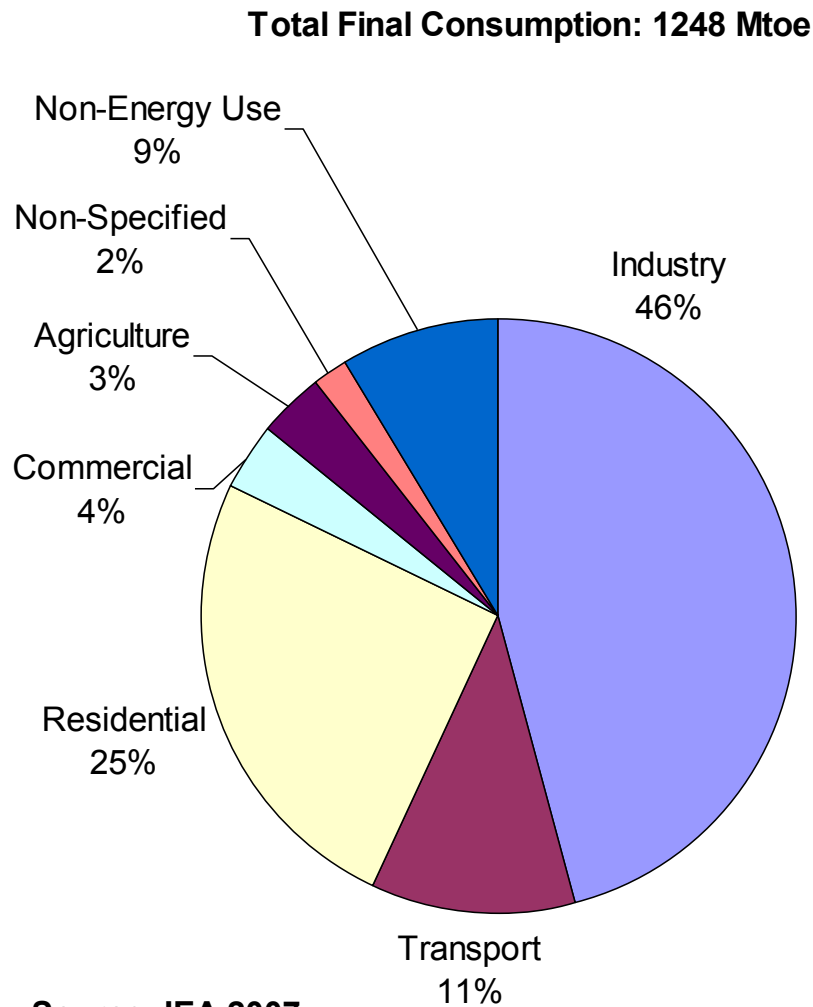
- **India**
2007: USD 65 billion
Accounting for 6.9% of GDP
- **China**
2007: USD 165 billion
Accounting for 5.6% of GDP
- **US (Before the crisis)**
2007: USD 1200 billion
Accounting for 8.7% of GDP



The chart compares the growth of the construction market in India and China (this compares to growth in the USA of <1%).

Source: Asia Development Bank, Solidiance

Over the last years China has introduced strong measures to boost energy efficiency - 3.3% decrease of energy intensity per year



Source: IEA 2007



Industry	<ul style="list-style-type: none"> Export taxes for energy intensive products (up to 15%) Top-1000-Enterprise-Program Introduction of energy management systems, audits, capacity building, and rewards Mandatory national standards
Utilities	<ul style="list-style-type: none"> Higher taxes on fossil fuel and differentiated electricity pricing policy About 87 GW small-scale coal-fired power plants (less than 125 MW) are being phased out or shut down.
Transport	<ul style="list-style-type: none"> High vehicle emission standards (40% above US) and taxes
Residential	<ul style="list-style-type: none"> Building codes aiming at up to 65% reductions of consumption, regulations on energy savings in civil buildings and energy conservation by public institutions Mandatory standards and labels for appliances, lighting products, Green Lighting Initiative
Public	<ul style="list-style-type: none"> Energy efficient products for public procurement Voluntary agreement between communities and private sector Ten key energy-saving projects Energy Conservation Law The Medium and Long-Term Energy Conservation Plan

Importance of energy efficient standards: REEEP supports LED standards in China



Aim:

Support the inclusion of Light Emitting Diodes (LEDs) in the Chinese government's promotion of energy efficient lighting solutions by developing standardized test methods and evaluation criteria for LED lighting products

Objectives:

Market assessment of current LED industry in China, including existing national and international testing methods and evaluation criteria for LED lighting products

Develop appropriate LED testing methods and evaluation criteria for meeting current needs in China

Test the feasibility of the newly developed LED testing methods and evaluation criteria within China

Implementing Partner: National Lighting Test Center

China's top priority – decoupling economic growth from energy use

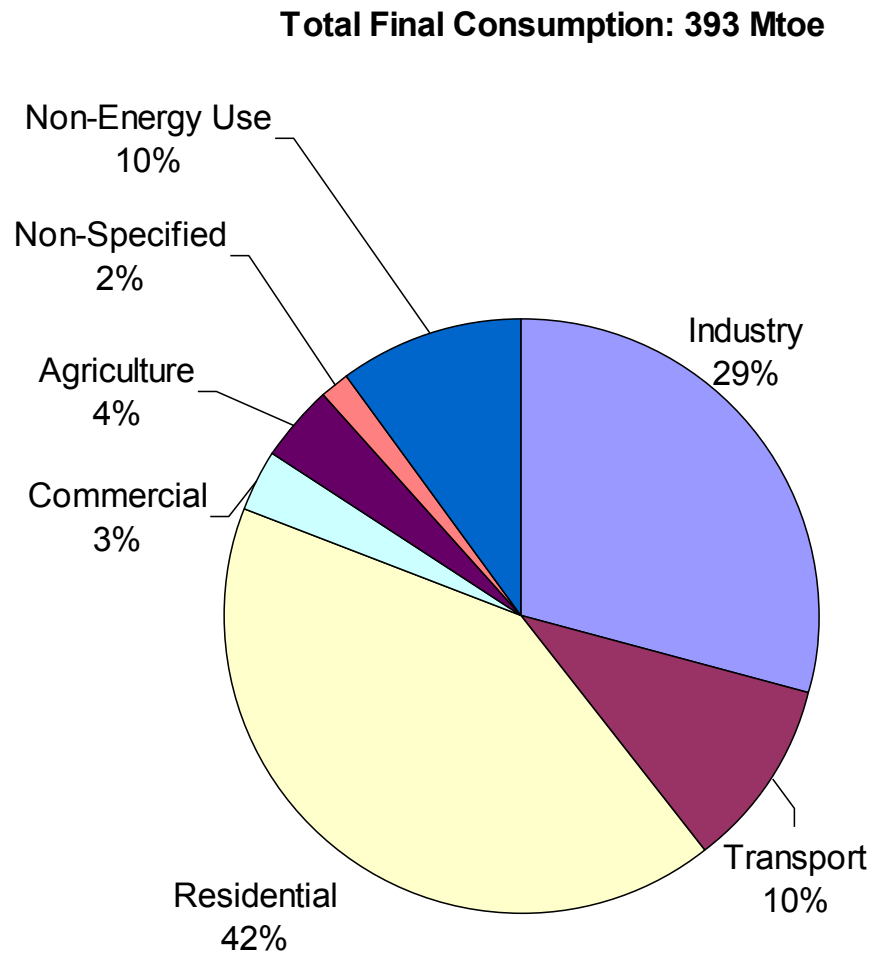
Between 2005 – 2010

- **In 2010 China reached its energy efficiency target of 20%** : an annual average GDP growth of 10%, was achieved with only 6% annual growth in energy demand over the last 5 years that accounts for an accumulated reduction on energy intensity by 19.2.% in 2010
 - coal consumption for thermal power was reduced by 8.11%.
 - energy consumption per ton of steel produced decreased by about 11.4%,
 - energy consumption per ton of cement produced decreased by 16.77%
- **China has reduced its emissions by 1.3 Gt of GHG**

Between 2010 – 2015

- **Planned energy efficiency target of 16%** : different regions will follow different targets ranging from 10% (Hainan, Tibet Xinjiang, Qinghai) to 18% (such as in Tianjin, Shanghai, Jiangsu, Guangdong)
 - regional conservation plans
 - intensive promotion of ESCOs, DSM, and activities in customer awareness (family program)
 - resulting in conducting 5 major energy saving program
- **China will endeavor to lower its CO₂ emissions by 40-45% per unit of GDP in the coming decade**

India's Efficiency Bureau provides a strong and unique institutional basis for most of its national energy efficiency programs



Source: IEA 2007



Industry	<ul style="list-style-type: none"> ▪ National Energy Conservation Awards ▪ Strong DSM programs in particular for energy intensive SME clusters ▪ Introduction of PAT system for 9 industrial sectors – EE certificates trading scheme ▪ Certification of energy managers and auditors
Utilities	<ul style="list-style-type: none"> ▪ Promotion of ESCOs ▪ Pre-payment electricity metering
Residential	<ul style="list-style-type: none"> ▪ Mandatory building codes for new commercial buildings from 2010 onwards ▪ Mandatory standards and labels for appliances (vans 27% of energy savings) ▪ EE in municipalities through ESCOs ▪ CFL program (replacement of 400 million light bulbs)
Public	<ul style="list-style-type: none"> ▪ Conservation in school education ▪ Mandatory public EE procurement ▪ DSM programs for municipalities and agriculture ▪ Energy Conservation Act 2001

REEEP support of SMEs: There are more than 380 clusters of SMEs in India which account for more than a third of the country's electricity consumption



Aim:

Improve energy efficiency of small and medium enterprise (SME) industrial clusters through carbon trading

Objectives:

Conduct pilot energy audits on 3-5 industries within a selected, energy-intensive SME cluster

Design mechanisms that enable affordable, bulk purchasing of EE equipment

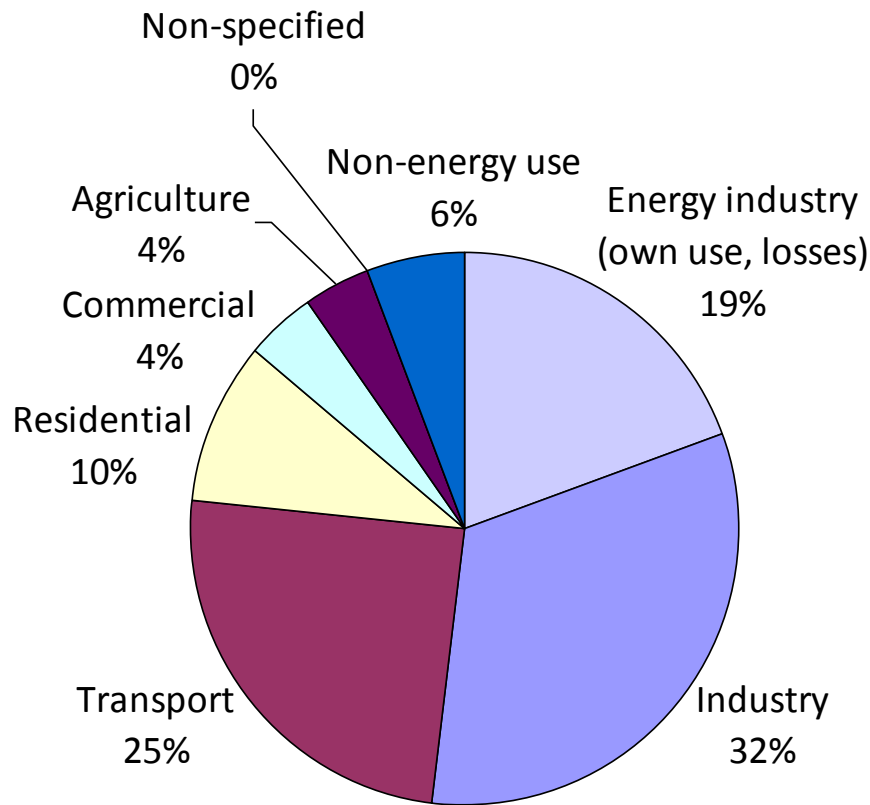
Build a liaison with a carbon trading mechanism, e.g. CDM, to trade collective carbon emissions

Disseminate model to other SME clusters through publications and local workshops

Implementing Partner: Alliance to Save Energy

Brazil's National Energy Plan 2030 assumes impacts of between 4.0 and 15.5 GW of savings in electrical generation as a result of EE programs

Total primary energy supply: 236 Mtoe



Source: IEA 2007 data

Industry	<ul style="list-style-type: none"> ▪ Tax incentives, guarantee funds ▪ EE in industries through ESCOs ▪ Energy management standards
Utilities	<ul style="list-style-type: none"> ▪ Utility Energy Efficiency Obligation requiring EE investments (“wire-charge”) ▪ ESCO accreditation program
Transport	<ul style="list-style-type: none"> ▪ Voluntary fuel economy labeling
Residential	<ul style="list-style-type: none"> ▪ voluntary minimum energy efficiency standards and labeling ▪ Smart Metering: Replacing the 65 million energy meters in 6 to 10 years ▪ Credit guarantees for EE projects in buildings promoted by local ESCOs
Public	<ul style="list-style-type: none"> ▪ Educational campaigns to consumers to become legitimate bill-paying customers ▪ Increasing public lighting efficiency ▪ National Program of Energy Conservation ▪ National Plan for Energy Efficiency (projected) to gradually decrease present electricity consumption by 25% until 2030

REEEP initiated the establishing of an ESCO in the commercial and industrial sector in Brazil



Aim:

Reduce energy intensity of big energy industrial and commercial customers of PETROBRAS by up to 10%

Main activities and outputs:

Undertake a business analysis of customer consumption data and establish feasibility of an ESCO operation

Establish an independent ESCO and a business plan to capitalize the identified market (attracting equity and debt financing, app. 5 mio €)

Establish a model for big energy utilities to diversify into the sustainable sector (not core business)

Implementing partner: Econoler

Some learning's of REEEP's international work - 130 projects in 60 countries

- Increased political understanding that future energy needs requires changes on demand and supply side. Often there is a gap between policies/ regulations and actual implementation on the ground
- Frequently distorting subsidies make it difficult to create a positive business case for energy efficiency
- There is a strong demand for European best practices, Europe is not only seen as a political driving force in in the climate discussions, there is a strong interest in European solutions and technologies
- The increased integration of RES to energy systems will lead to a paradigm change of system operation and will help to increase system performance and end use efficiency – smart grids!
- **Market forces will not boost energy efficiency to the extent needed – strong governmental policies and regulations are critical**

Energy saving programs are most effective if they provide enabling frameworks for several sectors and are enforced by institutions with a specific EE mandate

Standards and Labels

- Industry processes & equipment / household appliances
- Building codes
- Vehicles & fuel standards

Mandatory and/or voluntary

- tax incentives or penalties (such as export tax), direct subsidies/rebates
- Financial support through public funds

Education and Management

- Special education programs at all levels
- Introduction of management procedures (DSM, KAIZEN)
- Certification of energy managers and auditors

Public and sectoral programs

- Special incentives for training and capacity building
- Publicly accepted certification

Power industry programs

- Targeted EE improvements in generation and transport
- Improved metering (smart meters)
- Increase renewables and CHP

Mandatory and/or voluntary

- Regulatory measures, quotas/certificates (white certificates)
- Fiscal incentives

Public sector energy efficiency programs

- Green public procurement and investments
- DSM programs for municipalities and public sector
- Data collection and provision
- Institutional arrangements

Mandatory and/or voluntary

- Special budget positions
- Public reporting

The UN climate negotiations have not yet achieved a global agreement – but they have raised awareness for sustainability and efficient use of resources

- UN Energy Report 2010 gives energy efficiency top priority in order to meet future energy needs and improve access to energy for the poor
- The G8 and the G20 agreed to that a reduction of fossil fuel subsidies should be considered
- As an outcome of the G 20 process the International Partnership for Energy Efficiency Cooperation –IPEEC- was established, with nine task forces focusing on different areas of energy efficiency
- In addition many initiatives, networks and partnerships driven by private sector or civil society are emerging - all aiming to push forward specific aspects of energy efficiency

Increasing need for collaboration to optimize efforts – important role of eceee



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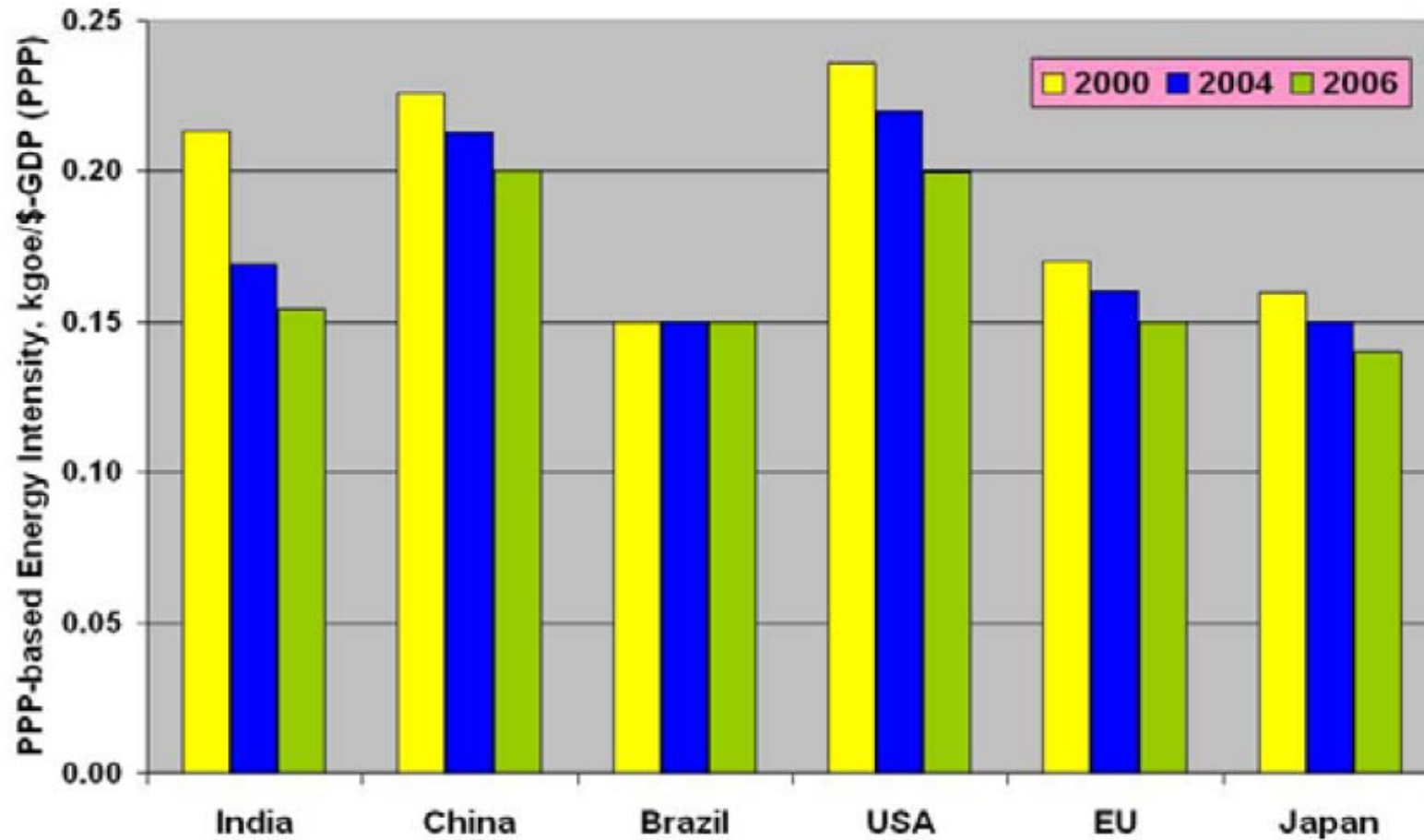
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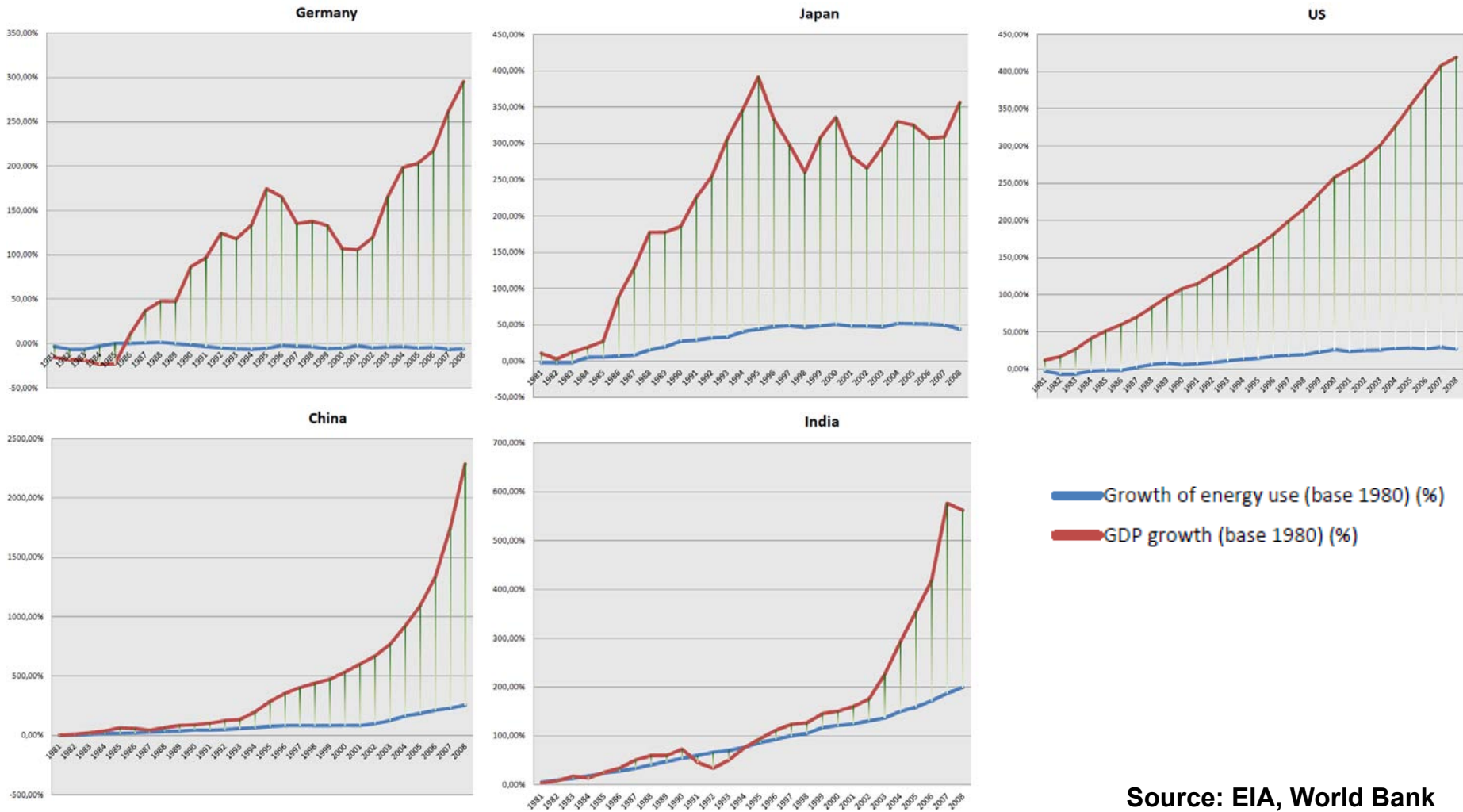
www.reeep.org
www.reegle.info

Energy intensity continues to decline around the world



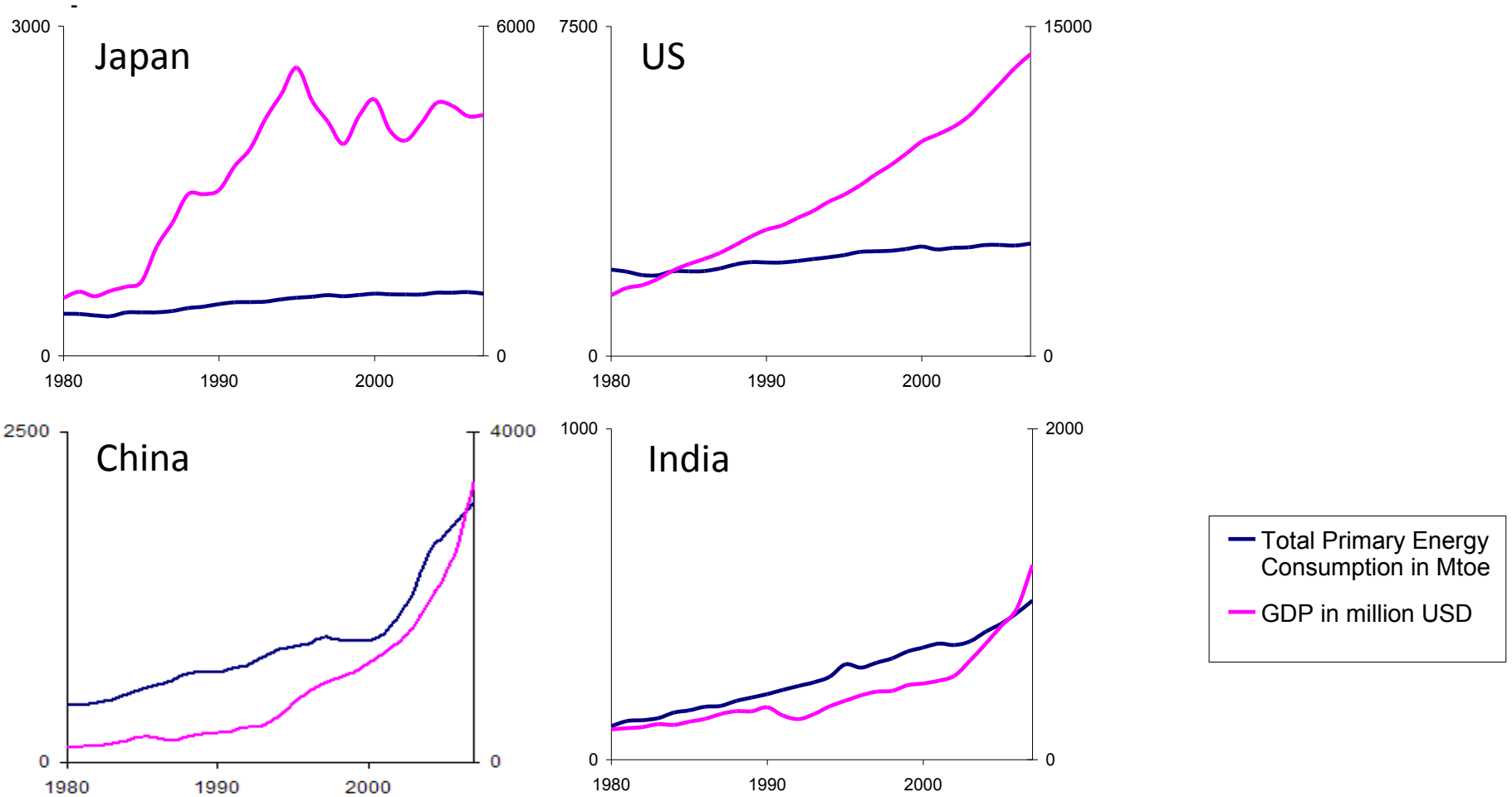
Source: IEA

Decoupling growth and energy consumption is challenging for emerging markets



Source: EIA, World Bank

Decoupling growth and energy consumption is challenging for emerging markets



Source: EIA, World Bank

Some international networks play increasing role in promoting energy efficiency

Independent organization based at the IEA with nine task groups focusing on different areas of efficient energy use and publishing data and reports on imminent issues.



World Business Council for Sustainable Development

CEO-led, global association of some 200 companies dealing exclusively with business and sustainable development.

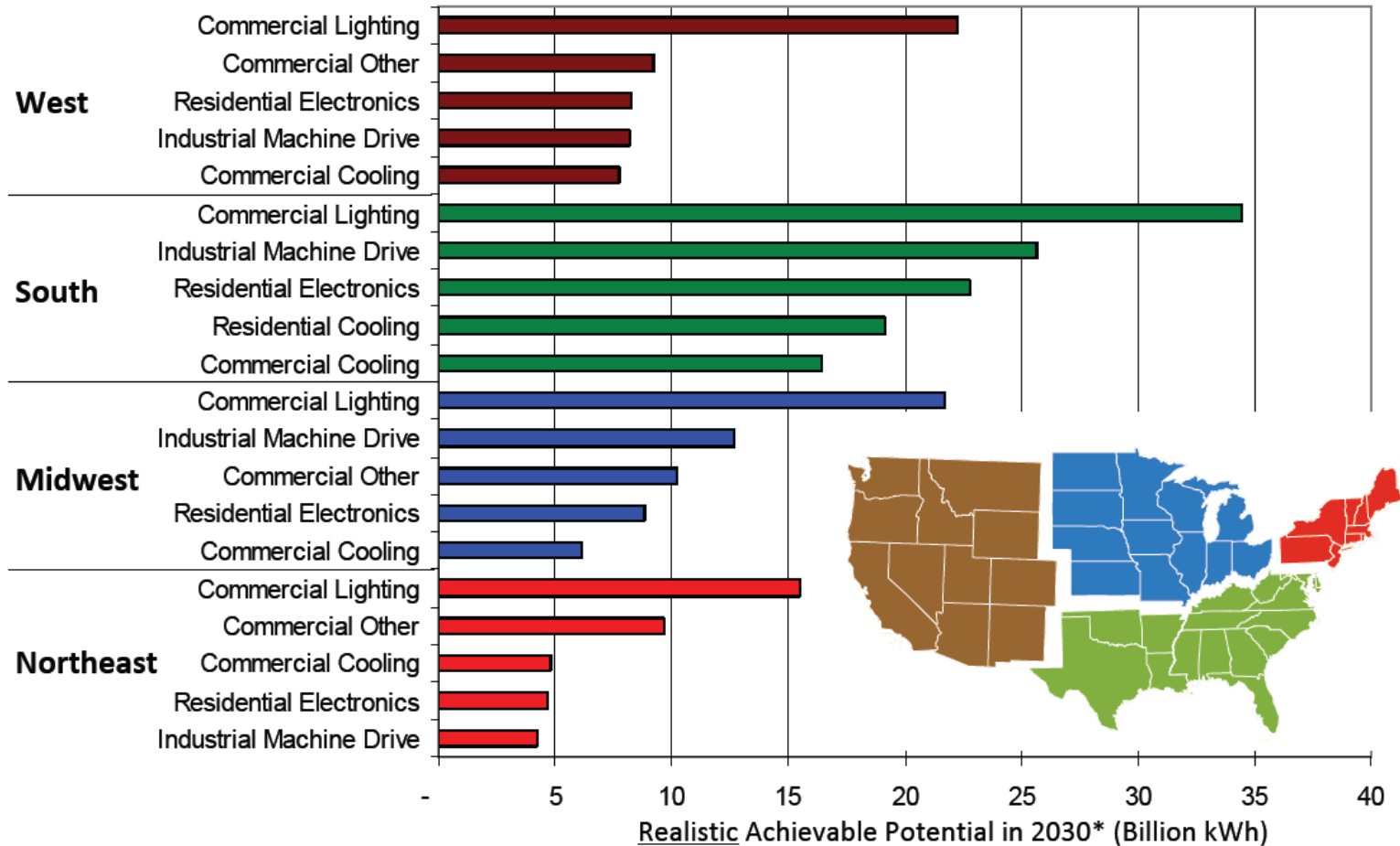
International initiative uniting global stakeholders to promote energy efficiency by organizing outreach activities, capacity building and networking opportunities.



Nonprofit organization that promotes energy efficiency worldwide through research, education and advocacy with strong linkages to private sector partners.



Opportunities for end use energy savings varies throughout the US



Source: EPRI

The US has implemented strong programs to support research, development, and deployment projects that increase energy efficiency nationwide

- **Buildings:**
 - Building Technologies Program
 - Programs promoting residential, commercial, new and retrofit buildings
 - Building Energy Codes Program
 - Weatherization Assistance Program
 - Appliances and Commercial Equipment Standards
- **Vehicles:**
 - Vehicles Technologies Program
 - Clean Cities
 - EcoCAR Competition
- **Industry:**
 - Industrial Technologies Program
 - Save Energy Now

This programs are in addition to specific state programs

EU 27 20-20-20 target by 2020 – 20% energy savings could result in large environmental and economic benefits

Expected results

- **Reduction of 780 Mt CO₂** (more than twice the reduction needed under the KP by 2012)
- **100 million € fuel saving per year**

Some Actions:

- **Energy Efficiency Plan - Different Action Plans per country**
- **ETS for industry and large consumers**
- **Energy performance requirements for energy using products, building and services - Directives on Eco Design, Energy Performance of Buildings, End Use efficiency and energy Services**
- **Energy Star program**
- **Promotion of cogeneration**
- **Fuel efficiency in cars – 120gCO₂/km (in 2012) European norms and labels**
- **Promotion of ESCO' s**
- **Public awareness programs, research and development initiatives**

A wide range of mechanisms are implement by the different EU member states to support specific energy efficiency actions