



Energy Efficiency Activities World Bank

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www.worldbank.org/energy



Structure of the Presentation

- **The Evolving Context for Energy Efficiency (EE).**
- **Continued Challenges for Implementing EE.**
- **Opportunities and Strategies**
- **Mainstreaming EE in WBG Work.**



Energy Sector - Challenges

– Energy Security and Economic Crisis

- Increased stress on utilities for addressing supply-demand gaps
- Increased demand for low cost fossil-fuel resources
- Volatility of energy prices
- Economic crisis resulting in significant reduction of investments and severe limitations on flow of liquidity.
- Indications of effects on infrastructure investments as severe and long-lasting.

– Access and Energy Poverty

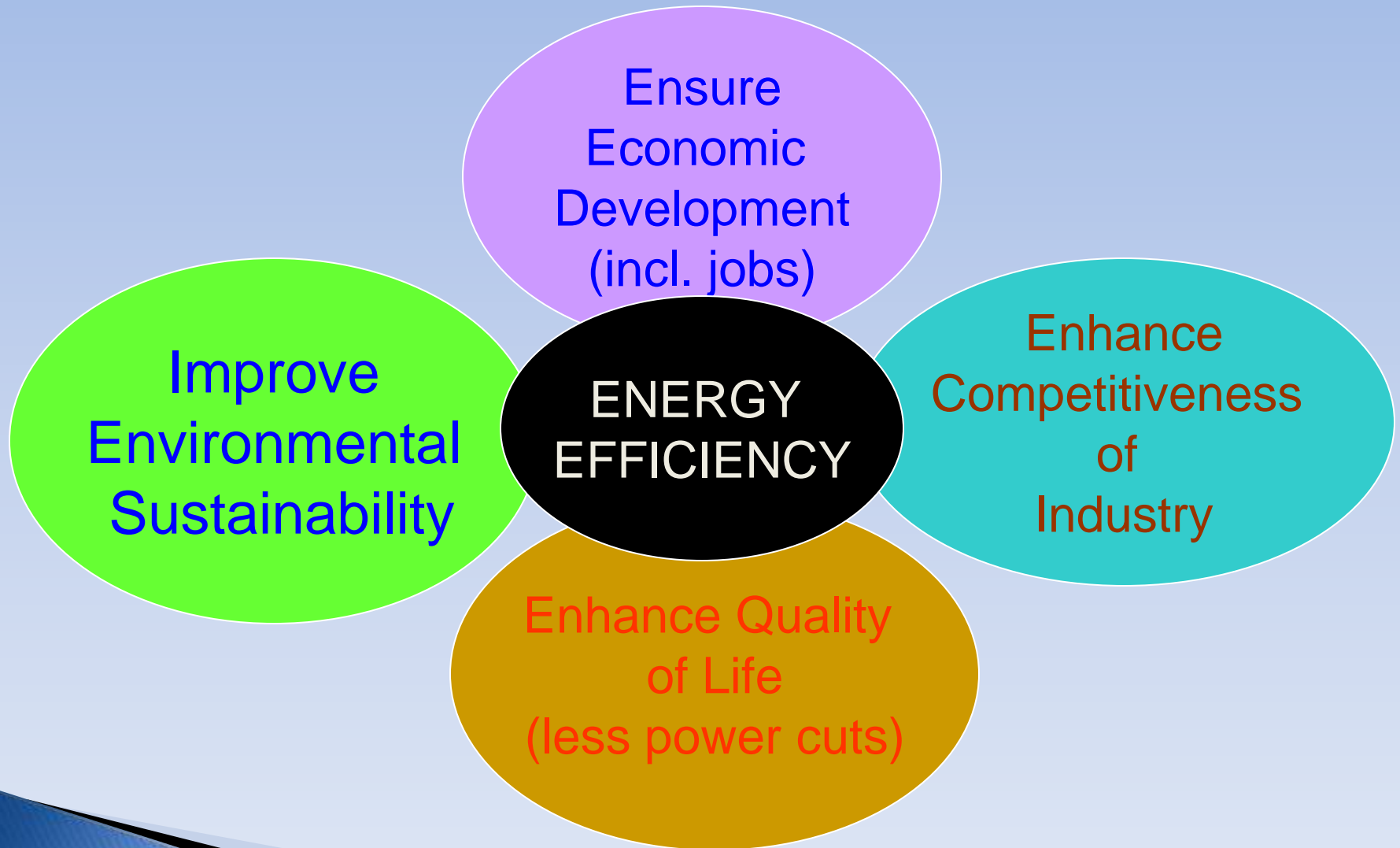
- Increasing access to improved energy services remains a global challenge for poverty alleviation.

– Climate Change

- Importance of provision of clean energy and emerging emphasis on clean energy technologies
- Worldwide, stimulus packages included large components to support clean energy.
- Uncertainties in regulatory regime ...Copenhagen to Durban and beyond... (CDM, NAMAs....)
- Energy-saving policies and energy with low lifecycle greenhouse gas emissions are necessary to meet future energy needs in a sustainable manner.

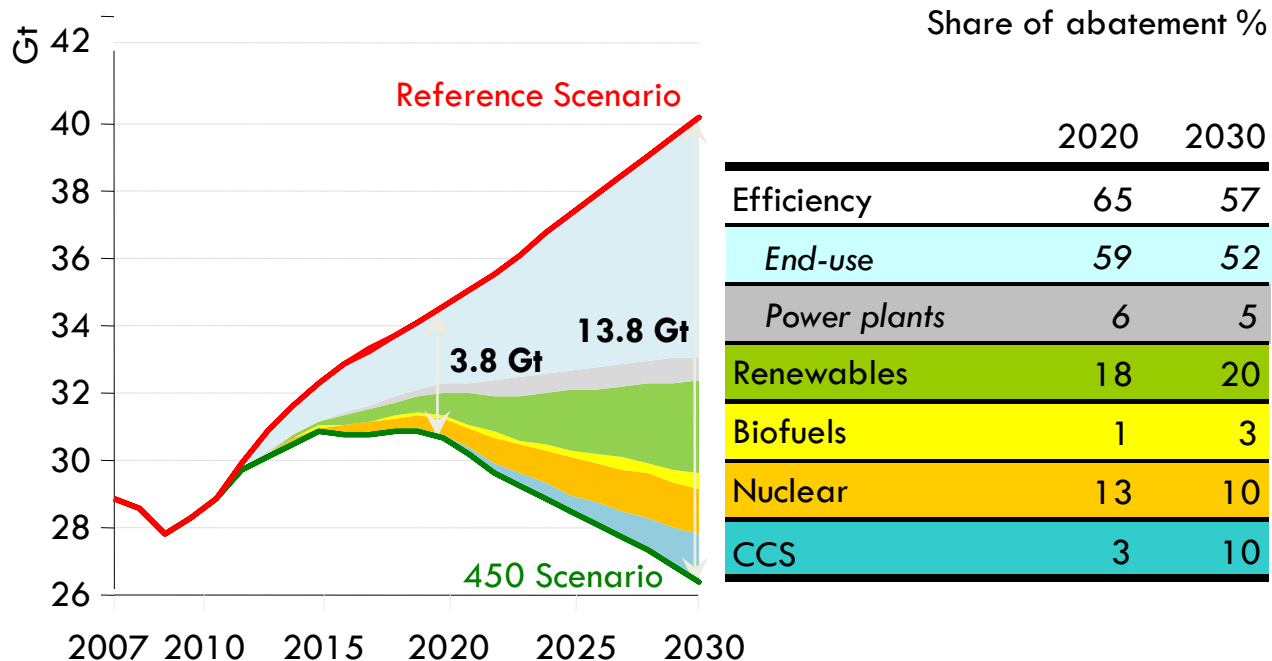
Rationale for Energy Efficiency is Clear

EE- “Public Good” with “Private Benefit”



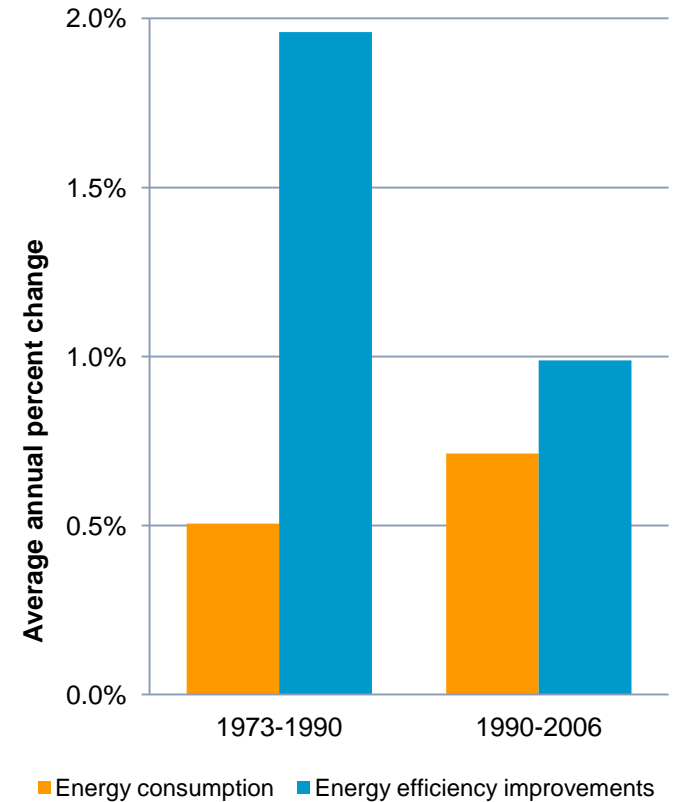
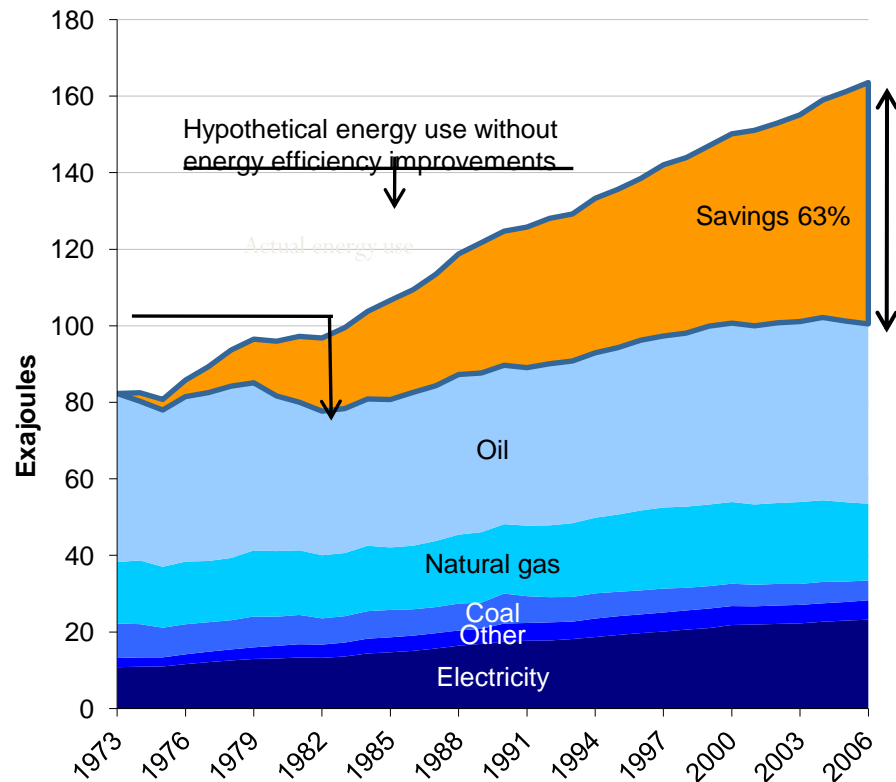
Source: World Bank (2009)

Global Abatement of Energy-Related CO₂ Emissions: 450 ppm Scenario (2 deg C)



Efficiency measures account for two-thirds of the 3.8 Gt of abatement in 2020, with renewables contributing close to one-fifth

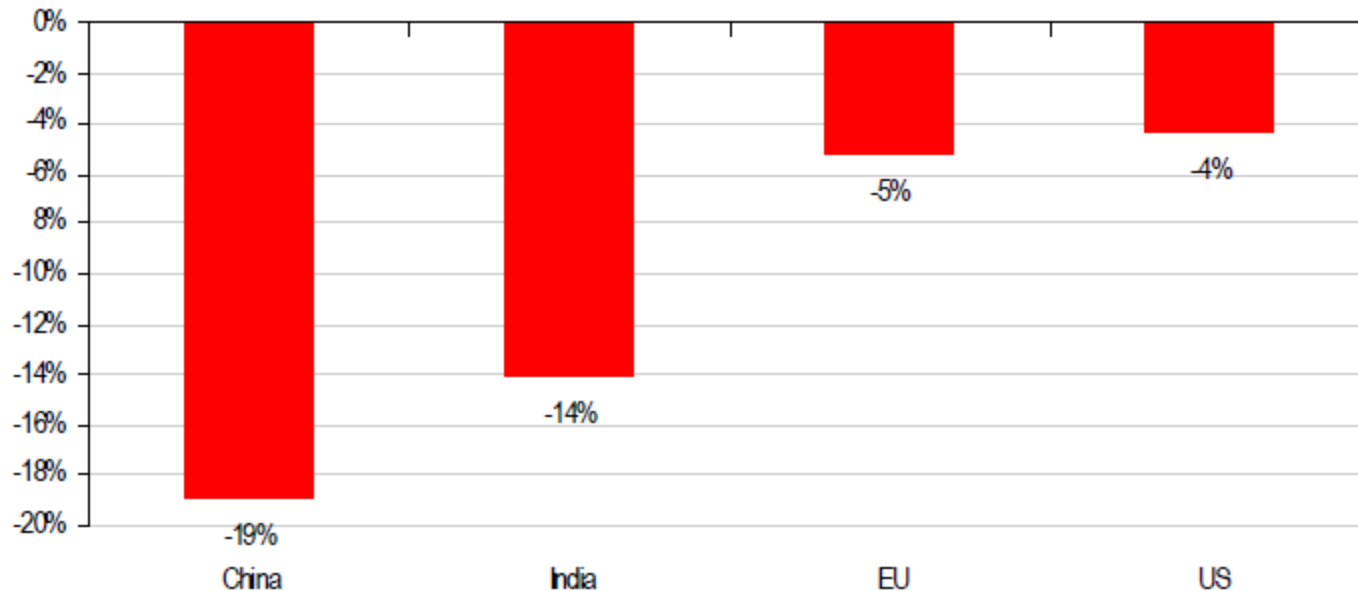
Energy Efficiency Gains in IEA-OECD Countries-



Source: IEA 2010

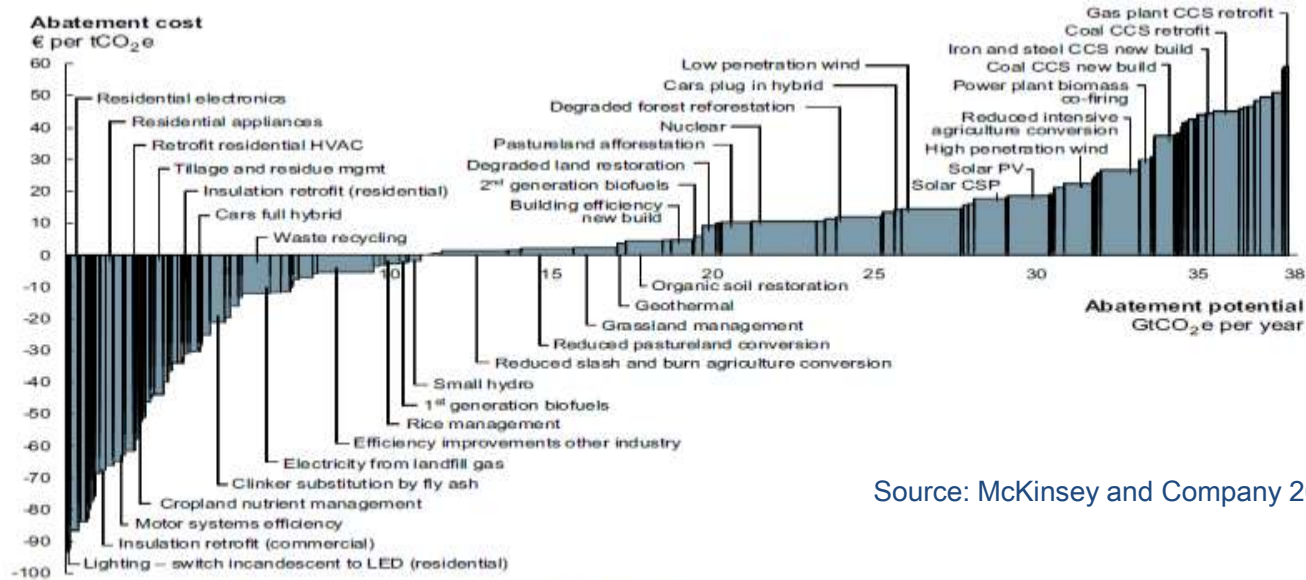
Emerging Market Progress on EE

Percentage change in energy intensity (consumption/GDP) 2006-2010



Source: Nick Robins (HSBC) presentation @ World Bank, 2011

Global GHG Marginal Abatement Cost Curve



Source: McKinsey and Company 2009

Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO₂e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play. Source: Global GHG Abatement Cost Curve v2.0 McKinsey & Company | 0

EE Looks Attractive ... But.....

- EE Technologies are relatively cheaper on a per MWh saved basis
- EE Technologies are the most difficult to deploy and implement
- For EE – several steps and actions required to achieve actual savings
- For EE – associated transaction costs (and time) could be high

But many realities haven't changed much...

- ▶ Much of the energy efficiency potential , particularly in the developed world, remains to be tapped and converted into investments
- ▶ Even developed world continues to have significant EE improvement potential (e.g., the EU 20% target)
- ▶ Estimates of potential keep increasing instead of decreasing over the years in many countries
- ▶ Money remains lying on the ground
- ▶ “Low hanging” fruits remains hanging!

Barriers - Low Carbon Technologies

Identified Barriers

- ▶ Inadequate information/awareness
- ▶ Lack of technical expertise
- ▶ High upfront capital investment cost
- ▶ High project development costs
- ▶ Lack of appropriate/affordable financing
- ▶ Poor customer creditworthiness, project equity
- ▶ Low significance of EE to end user
- ▶ Underdeveloped markets (supply vs. demand)
- ▶ High perceived risks
- ▶ High applied discount rates
- ▶ High transaction costs (small projects)
- ▶ International models unproven in local markets
- ▶ Perception by end user of extra hassle for EE
- ▶ Bias towards conventional practices
- ▶ Low energy pricing/collections
- ▶ Limited ability to identify quality EE products
- ▶ Limited financial products for EE
- ▶ Split incentives (owner-tenant, supplier-user)
- ▶ Poor power quality
- ▶ Prevalence of cheap, second-hand equipment
- ▶ Uncertainty of energy savings materializing
- ▶ Inability to collateralize future energy savings
- ▶ Lack of technical intermediaries (e.g., ESCOs)
- ▶ Lack of energy consumption data

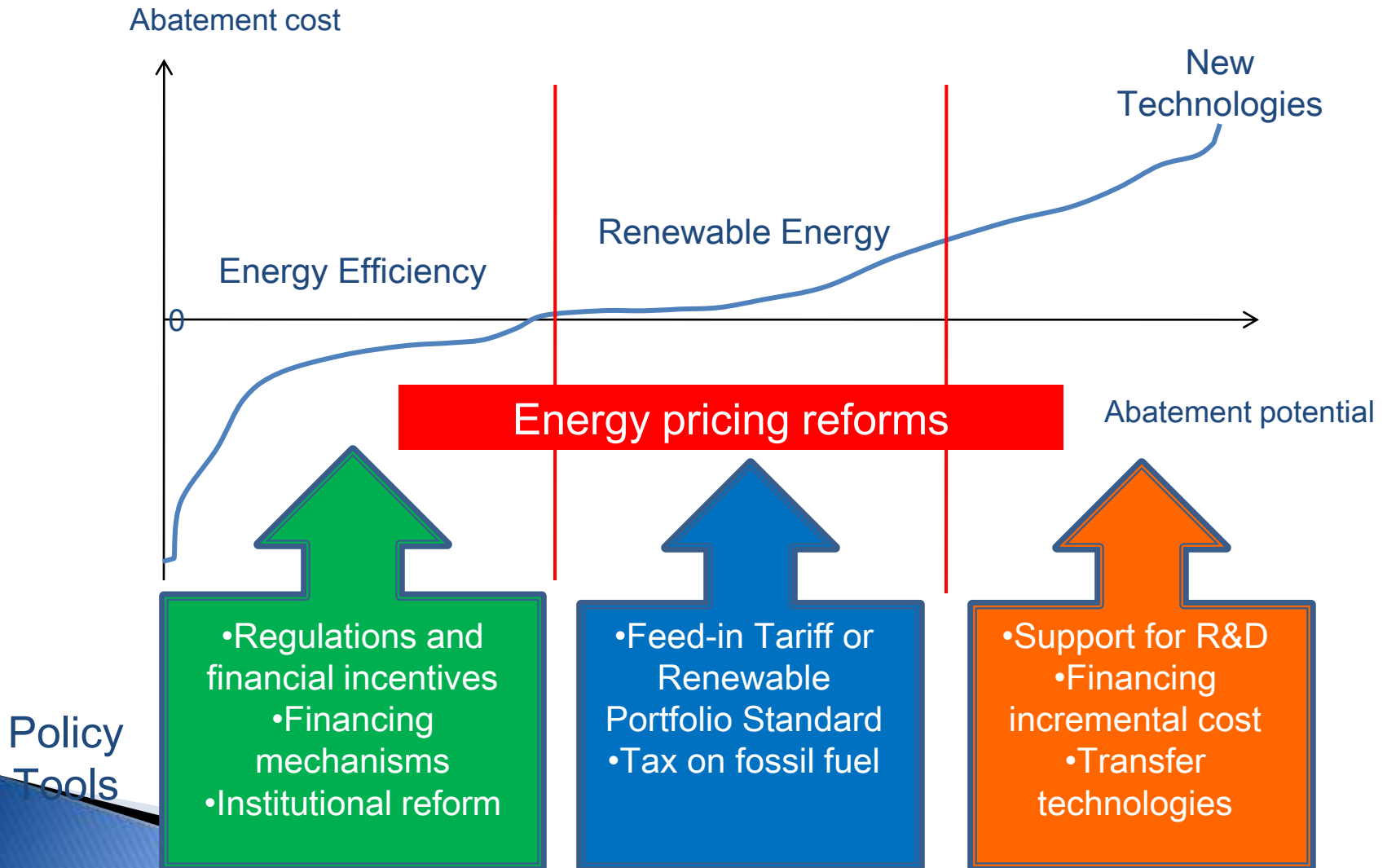
Some barriers apply to all low carbon technologies

Some barriers apply specifically to small, distributed low carbon technologies only

Some barriers apply specifically to demand side EE technologies only

Source: Barrier Removal Costs of EE, World Bank (forthcoming, 2011)

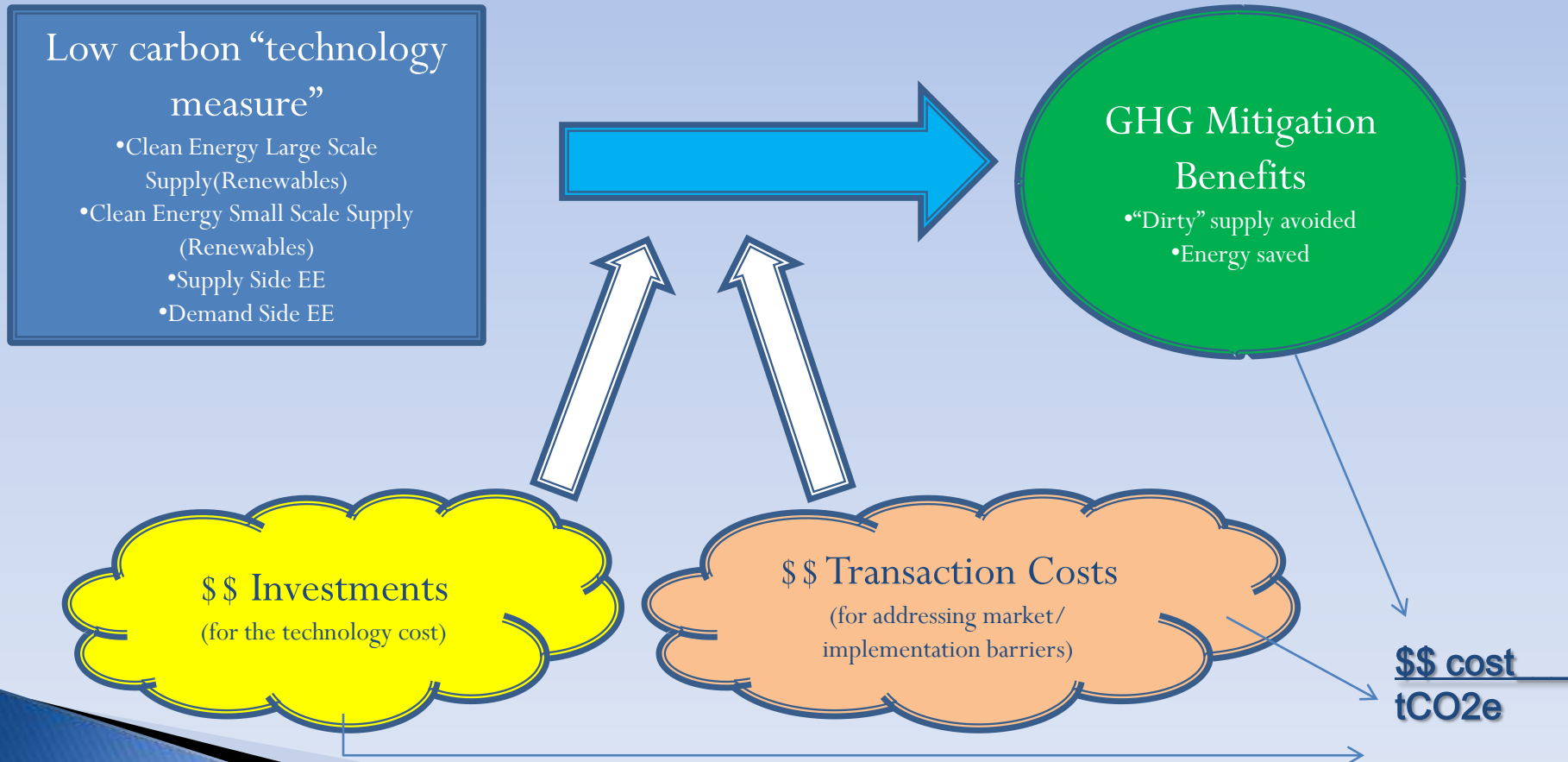
Sustainable Energy Development – Requires policy and institutional reforms ...



Source: Winds of Change, World Bank (2010)

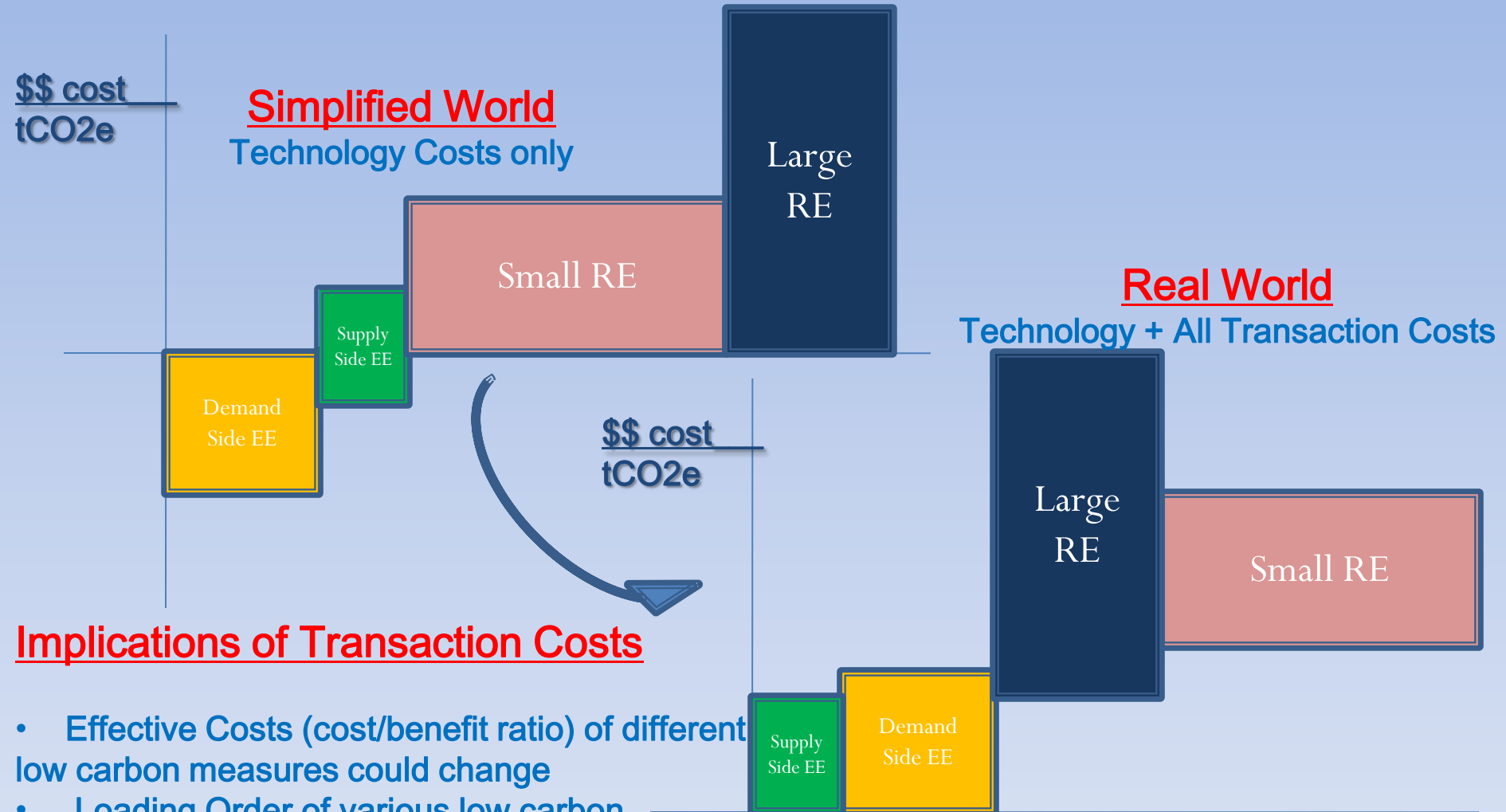
Real World of GHG Mitigation Costs

Market/Implementation Barriers Prevail



Source: Barrier Removal Costs of EE, World Bank (forthcoming, 2011)

From Simplified World to Real World



Implications of Transaction Costs

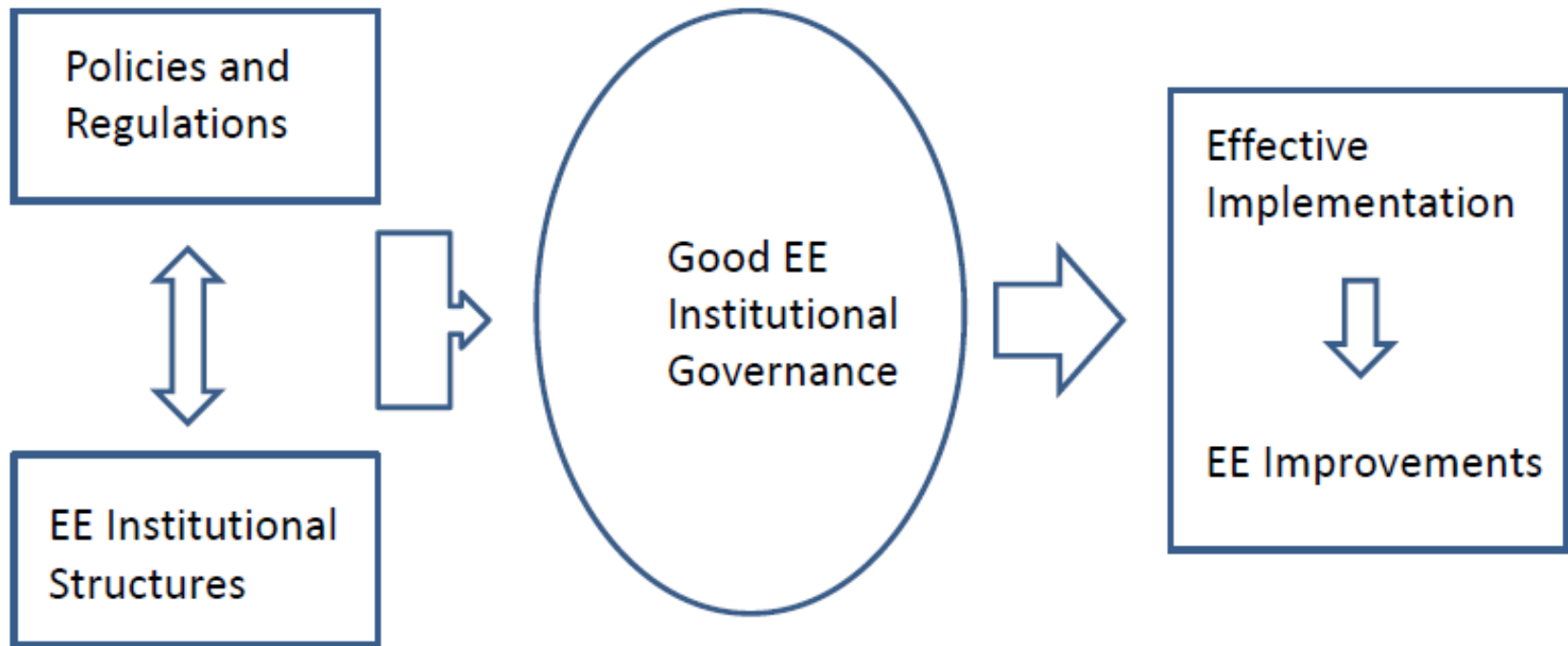
- Effective Costs (cost/benefit ratio) of different low carbon measures could change
- Loading Order of various low carbon technologies (along the MAC curve) could change

Effective Policies, Institutional Framework and Governance can reduce transaction costs in the long run

Source: Barrier Removal Costs of EE, World Bank (forthcoming, 2011)

Critical Factors for Successful EE Delivery :

Combination of Institutional Frameworks, Structures and Governance

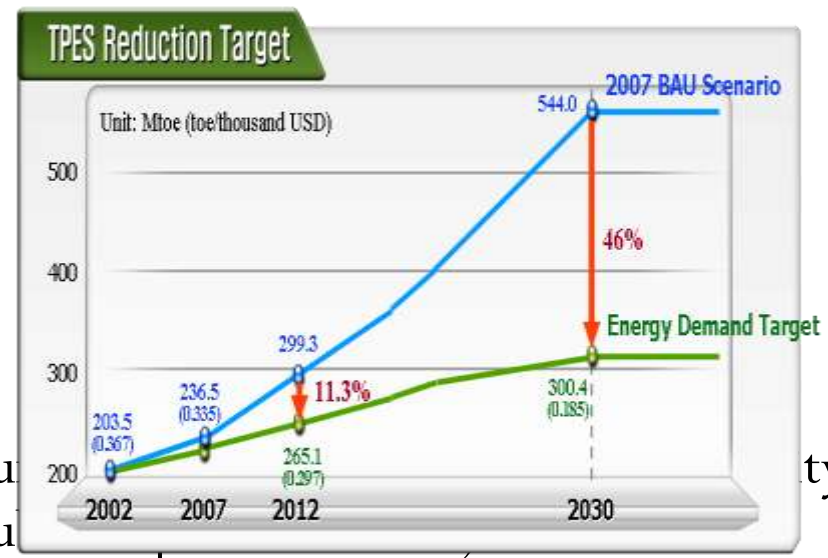


Source: Enhancing Institutional Governance for Demand Side Energy Efficiency Implementation in Developing Countries, World Bank, 2011 (forthcoming)

EE Implementation Experience:

Illustration # 1: South Korea

- ▶ **Robust EE Framework:** Multiple strategies but well coordinated (eg., supply and demand side), plans, targets and regulations (including Rational Energy Utilization Act since 1979)
- ▶ Energy intensity declining (0.335 toe/1000\$ (in 2007) → 0.297 (2012) → 0.185 (2030), oil share down, energy/GDP elasticity << 1
- ▶ **Institutional Structure** is solidly anchored around single institution (KEMCO) with adequate funding and staffing
- ▶ **Key Elements of Successful EE Governance** (Good Funding, \$18.3B in 2008-2012; Leadership, accountability; Transparent, effective coordination with public

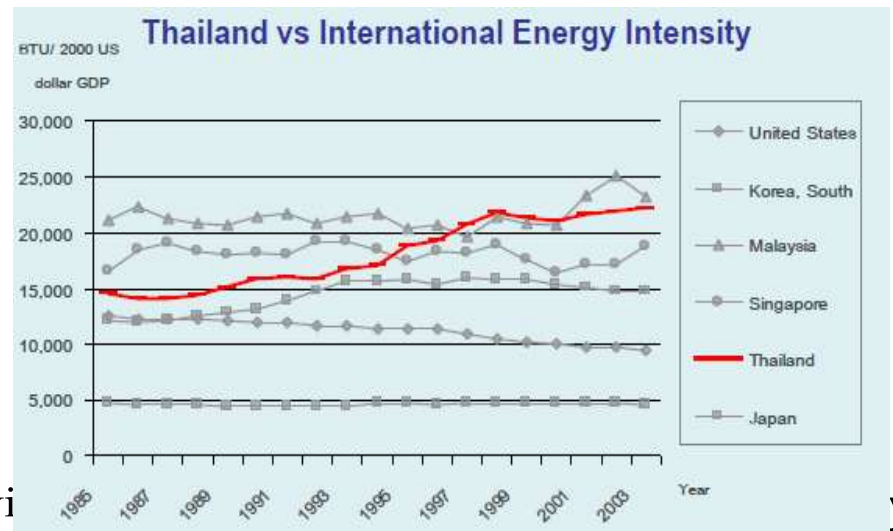


Sources: Enhancing Institutional Governance for Demand Side Energy Efficiency Implementation in Developing Countries, World Bank, 2010; KEMCO 2010.

EE Implementation Experience:

Illustration # 2: Thailand

- ▶ **Good EE Framework:** Multiple strategies, plans, targets and regulations (including EE law from 1992 onwards)
- ▶ High and growing energy intensity, high dependence on oil and energy-GDP elasticity of ~ 1.4 in 2005 (one of the highest in region)
- ▶ **Institutional Structure** is distributed into multiple agencies and funds
- ▶ **Weak EE Governance Elements** (poor stakeholder coordination/ collaboration, dispersed accountability, inadequate decision making authority with not consistent across all institutions)

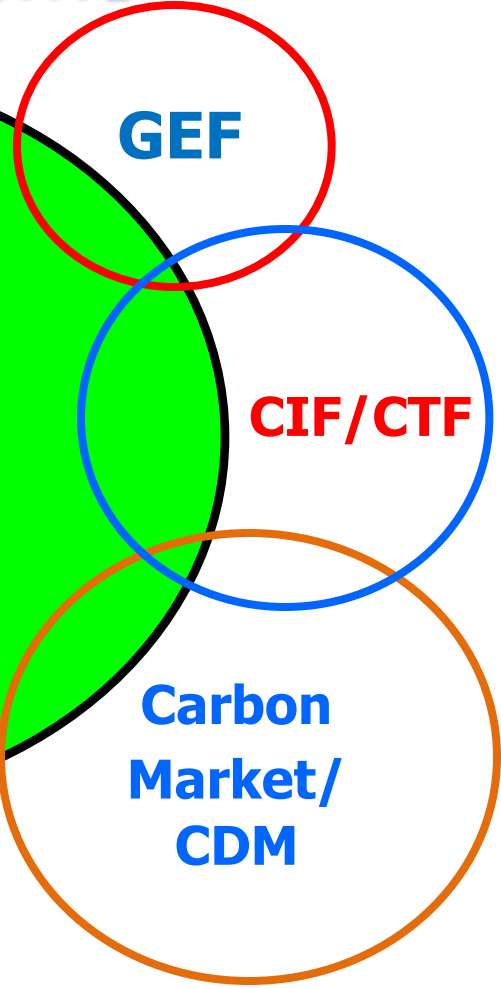
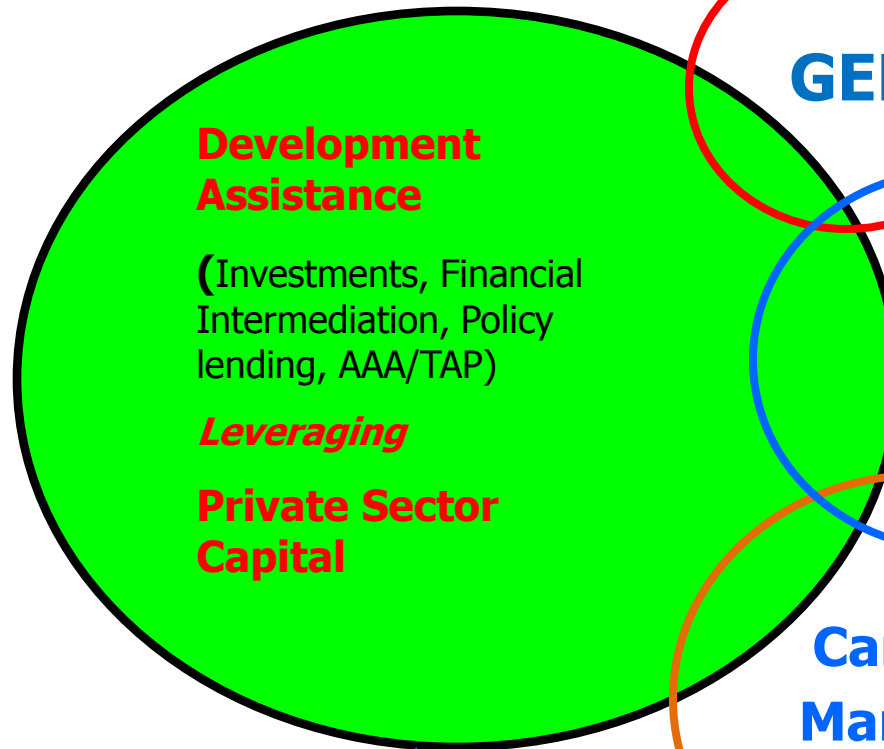


Sources: Enhancing Institutional Governance for Demand Side Energy Efficiency Implementation in Developing Countries, World Bank, 2010; NESDB 2006.

Energy Efficiency Implementation and Financing Mechanisms

Regulatory, Policy & Market Interventions

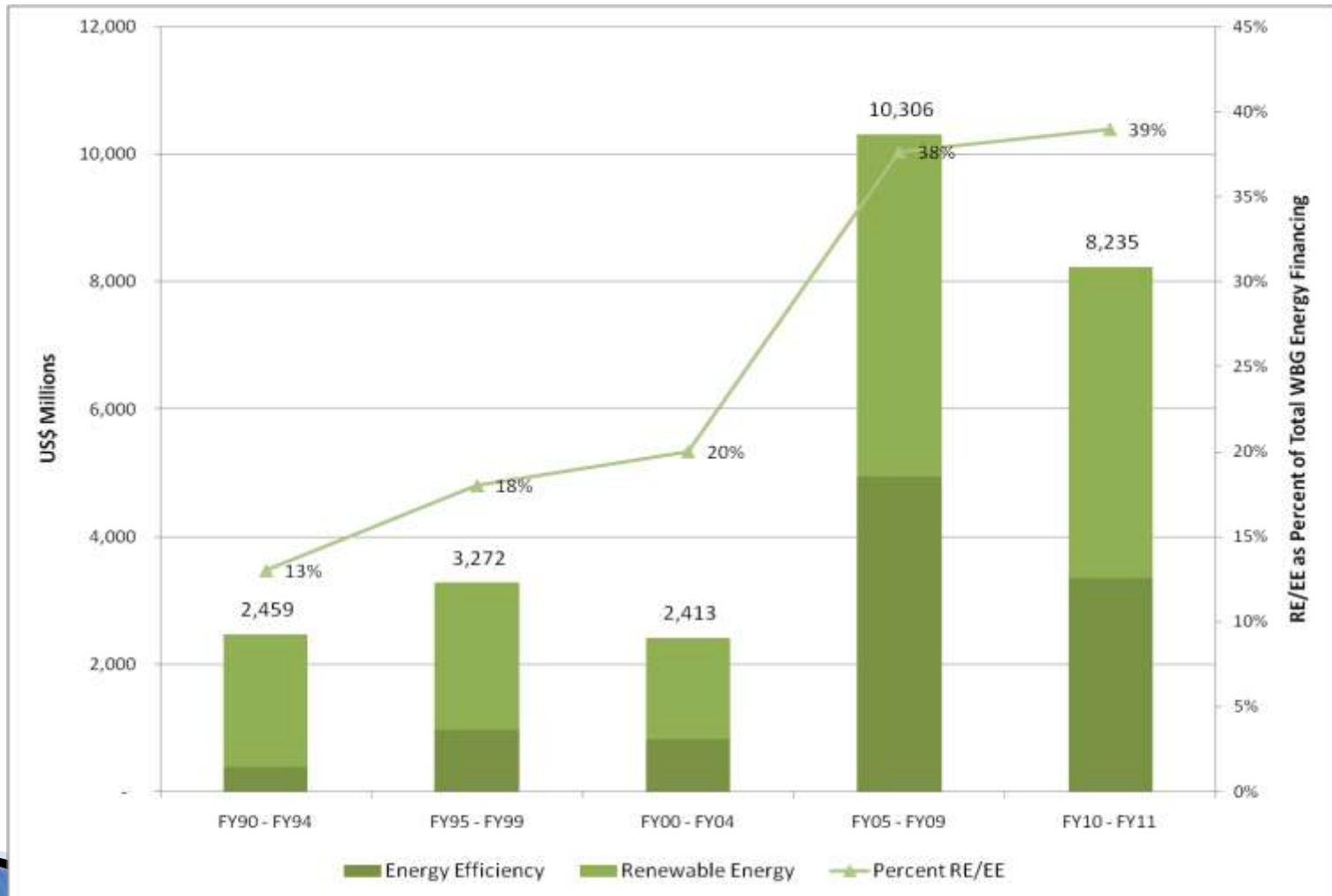
- **Rational Tariffs/Subsidies' Removal**
- **Life cycle costing Procedures**
- **EE Standards & Labels**
- **Building EE Codes**
- **Mandatory EE Audits**
- **ESCO Development**
- **Utility DSM**
- **Credit enhancement (Financial) mechanisms**
- **Energy Savings Certificates**



Institutions, Strategies, Targets



WB Group RE-EE Financing (FY 1990-2011)



EE Financing and Implementation: Delivery Models

- ▶ Utility demand-side management (DSM)
- ▶ Energy service companies (ESCOs)
- ▶ Innovative Financing Structures
- ▶ Market transformation
- ▶ Incentives, subsidies and grants
- ▶ AAA

New World Bank Group Energy Sector Strategy: Key Linkages

- Focused on twin objectives:
 - improving access and reliability of energy supply, and
 - facilitating a shift to a more environmentally sustainable energy sector development
- Prioritizing the synergies between the two objectives and Energy Efficiency and Renewable Energy.
- Tailored approaches and emphasis to different country circumstances
- Effective use of climate finance, with complementary roles of public and private sectors, and innovative blending of various financial products and instruments
- World Bank Group's Board Committee on Development Effectiveness is now reviewing a draft energy sector strategy
- <http://www.worldbank.org/energyconsultations>

Evolving Global Context

From Bonn Commitments to Rio+20

- ▶ 2004 Bonn Commitments triggered actions, targets
- ▶ Clean Energy Investment Framework and Strategic Framework for Development and Climate Change → Boost to RE and EE
- ▶ In September 2011, UN Secretary-General designated 2012 as the year of “Sustainable Energy for All”, establishing three goals for 2030 that the WBG has pledged to support.
- ▶ The 30/30/30 goals of “SE4ALL” - considered as par with “MDGs”:
 - 1. Ensure universal access to modern energy services.
 - 2. Double the rate of improvement in energy efficiency.
 - 3. Double the share of renewable energy in the global energy mix.
- ▶ Emergence of Green Growth and Green Economy Principles
- ▶ Importance of Private Sector and of South-South leverages
- ▶ Required incremental finance missing!

Global Energy Investments- Status

Annual Energy Investments	Innovation RD&D [billion US\$2005] 2010	Markets Formation [billion US\$2005] 2010	Present Investments [billion US\$2005] 2010	Investment for SE4All [billion US\$2005] 2010 - 2030
Efficiency	>> 8	~ 5	200	258 - 365
Renewables	> 12	~ 20	200	259 - 406
Access	< 1	< 1	~ 9	36 - 41
Total	> 50	< 150	1250	1260 - 1680

Source: Grubler et al 2011 (adapted from Messner and Nakicenovic presentation @ World Bank 2011)

Support through Innovative Climate Finance

Jointly run by MDBs to provide grants and concessional financing to developing countries to address urgent CC challenges

Clean Technology Fund (CTF) ~ \$5.2 b

Strategic Climate Fund ~ \$1 b
— Scaling up RE in Low Income Countries

⇒ SREP — Access Issues

Carbon Finance

10 Carbon Funds ~ \$2.2 b (200 projects)

Carbon Partnership Facility (CPF)

Climate Investment Funds- Status

Clean Technology Fund (CTF)

- Finances scaled-up demonstration, deployment and transfer of low carbon technologies in energy and transport
- \$4.5 billion committed, leveraging \$36 billion

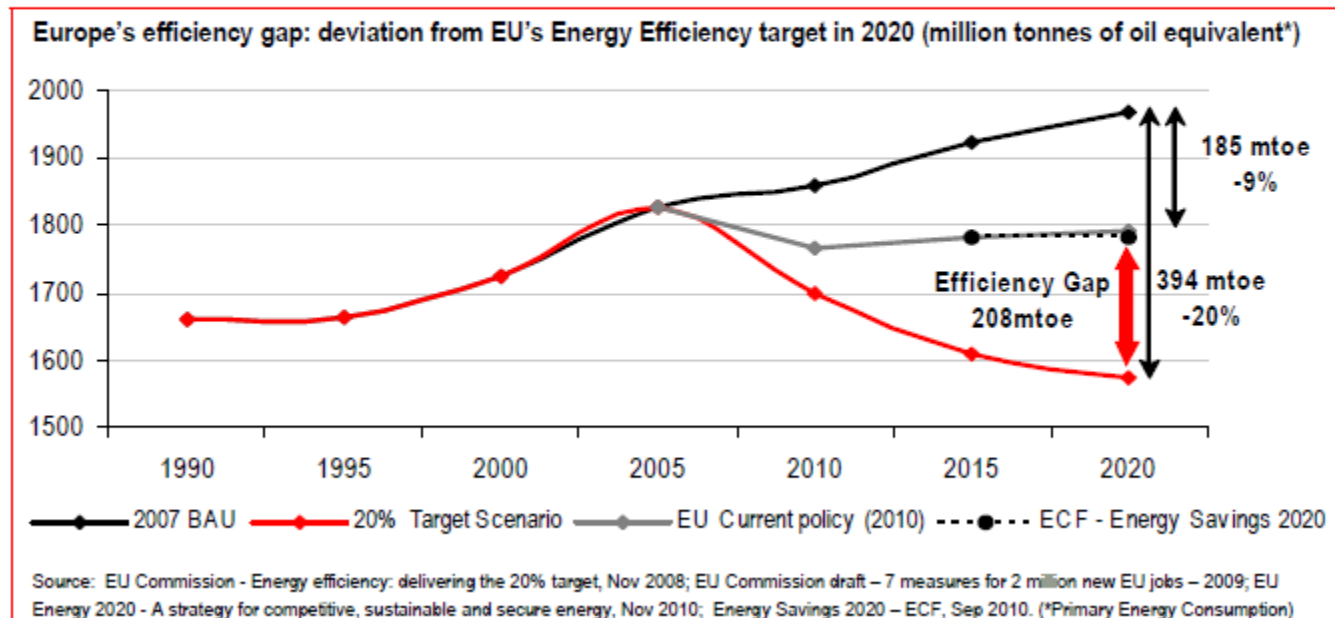
Program for Scaling Up Renewable Energy in Low Income Countries (SREP)

- Stimulates economic growth through the scaled-up development of renewable energy solutions
- Fully funded at \$240 million, leveraging an additional \$960 million, with six countries selected for first round

EE is not just a developing country issue

...and considerable efficiency potential remains in the EU

Post-Fukushima nuclear phase-out in Germany will driver demand side action



Source: Nick Robins (HSBC) Presentation@ World Bank, 2011



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