

Promoting Energy Efficiency and Conservation in the Philippines

Benjamin S Austria, PhD

**2008 Philippine Energy Summit
Workshop 5**

**Day 3 – 31 January 2008
SMX Convention Center, Mall of Asia
Roxas Blvd, Manila, Philippines**

Energy – A Basic Commodity!

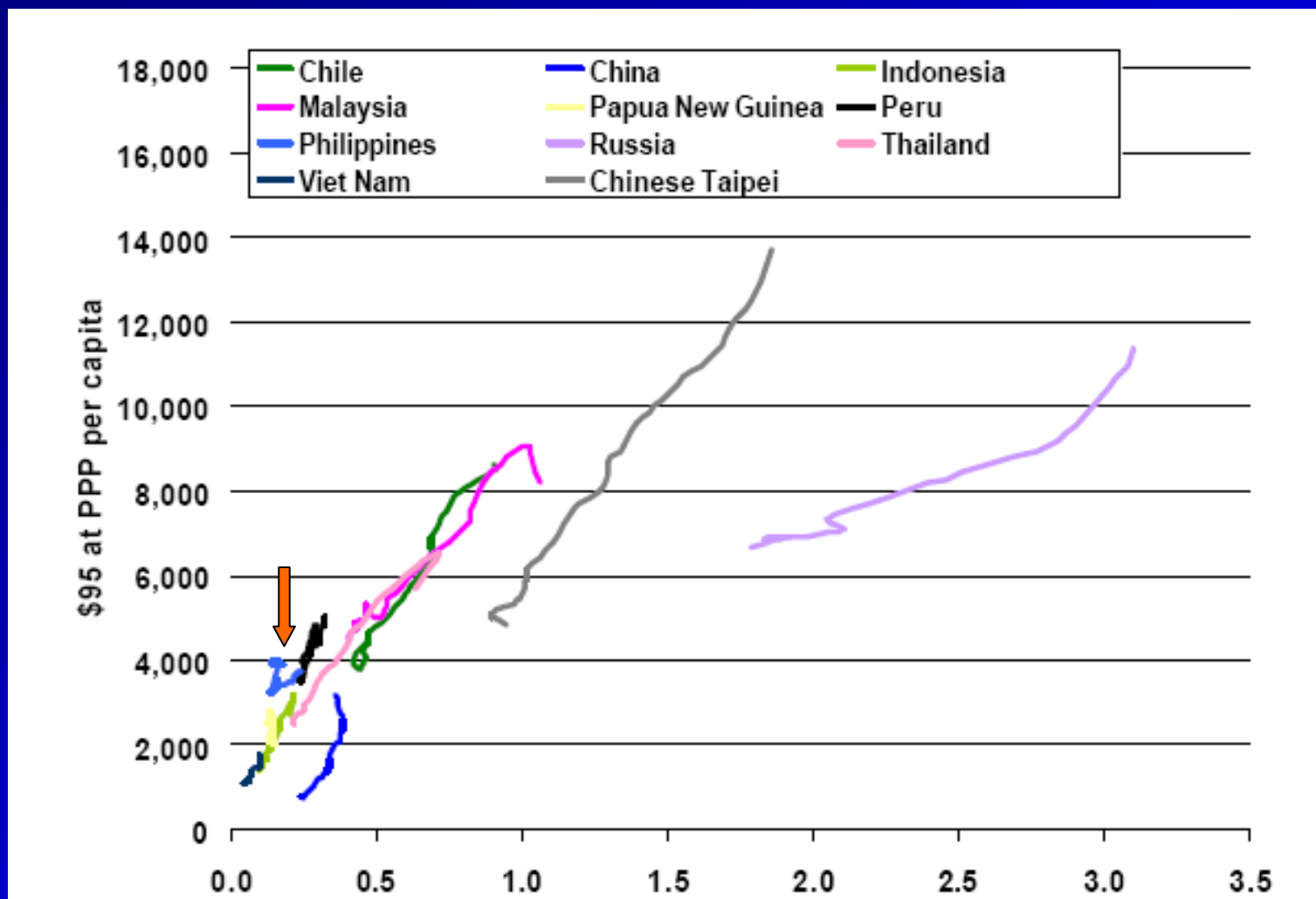
- Energy is essential to our general welfare
- Energy consumption is correlated with economic growth and development.
- Sustainable energy needs to be:
 - *available (ie adequate supply)*
 - *accessible & affordable*
 - *acceptable*
- High energy prices pose a serious threat to sustained economic growth
- Energy Efficiency and Conservation - important tools for meeting the challenge of high energy prices and for enhancing global competitiveness

2003 Values of per capita GDP & TPES

Country	GDP(\$)/Capita	TPES(kgoe)/Capita
Vietnam	470.4	540
India	510.7	1064
Philippines	1046.6	520
China	1067.9	1090
Thailand	2276.2	1430
South Africa	3025.5	2590
Brazil	3509.0	1090
Malaysia	4012.1	2290
Mexico	5765.1	1560
South Korea	12179.4	4280
Taiwan	13558.6	4360
Australia	21547.0	5630
Singapore	21941.1	5280

Source: WEC GEIS

GDP per Capita vs Energy per Capita



Source: APERC 2001

Why Energy Efficiency & Conservation ?

- **Helps alleviate the financial burden of high energy prices**
- **Reduces the investment requirements for energy infrastructure**
- **Extends the supply of limited energy resources**
- **Enhances competitiveness and viability of domestic enterprises**
- **Mitigates emissions of greenhouse gases**

What is Energy Efficiency?

“Energy efficiency improvements refer to a reduction in the energy used for a given service (heating, lighting, etc.) or level of activity. The reduction in the energy consumption is usually associated with technological changes, but not always since it can also result from better organisation and management or improved economic conditions in the sector (“non-technical factors”).”

(WEC 2008 Report on Energy Efficiency)

Indicators of Energy Utilization

A common indicator used to measure energy utilization and efficiency is *energy intensity*.

Energy Intensity for activity i (El_i) is:

$$El_i = E_i / PE_i$$

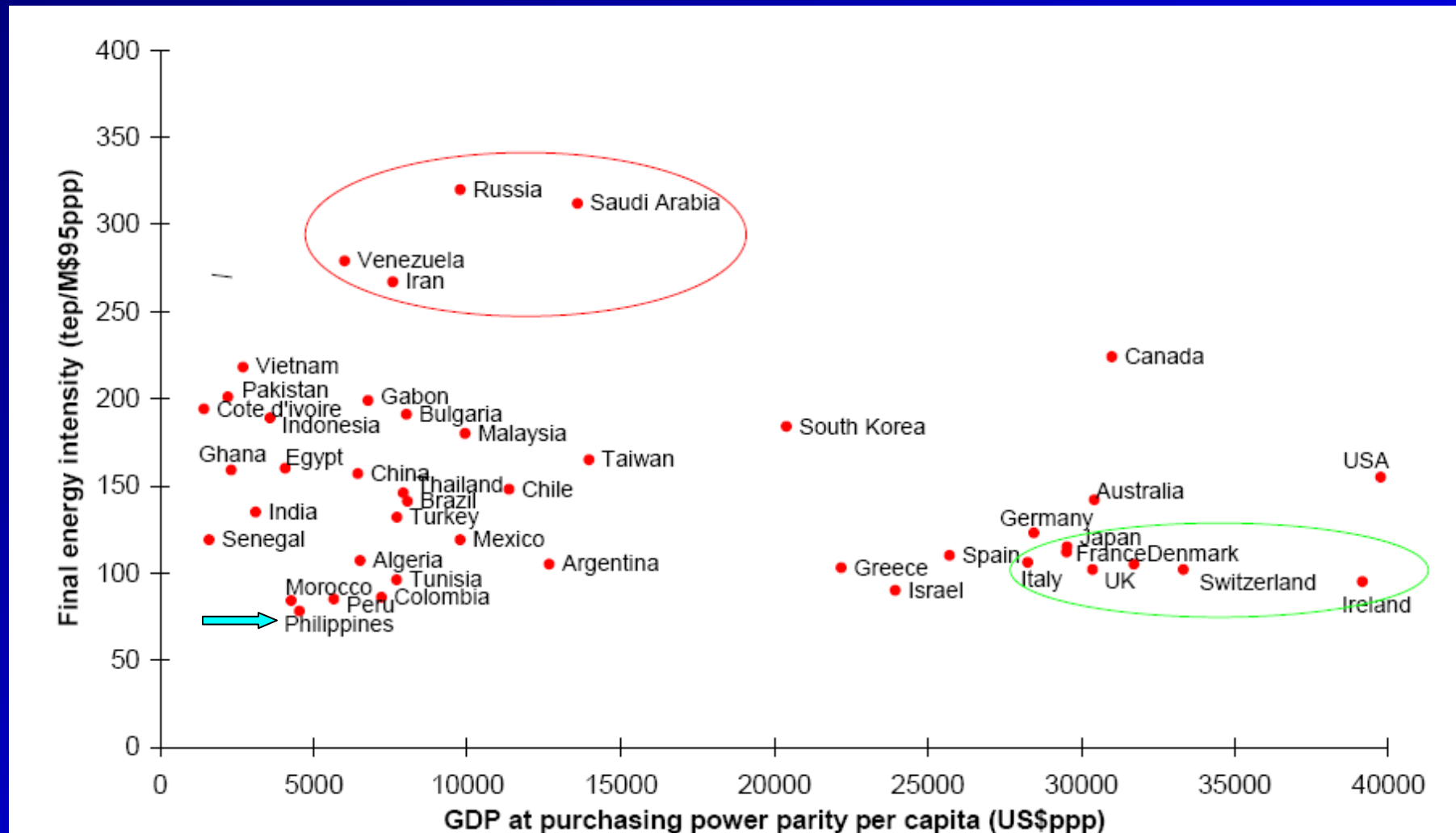
where, E_i , is the energy consumption of activity i ;
 PE_i , is the measure of the activity i in monetary units

A related indicator is the *specific energy consumption*:

$$SEC_i = E_i / P_i$$

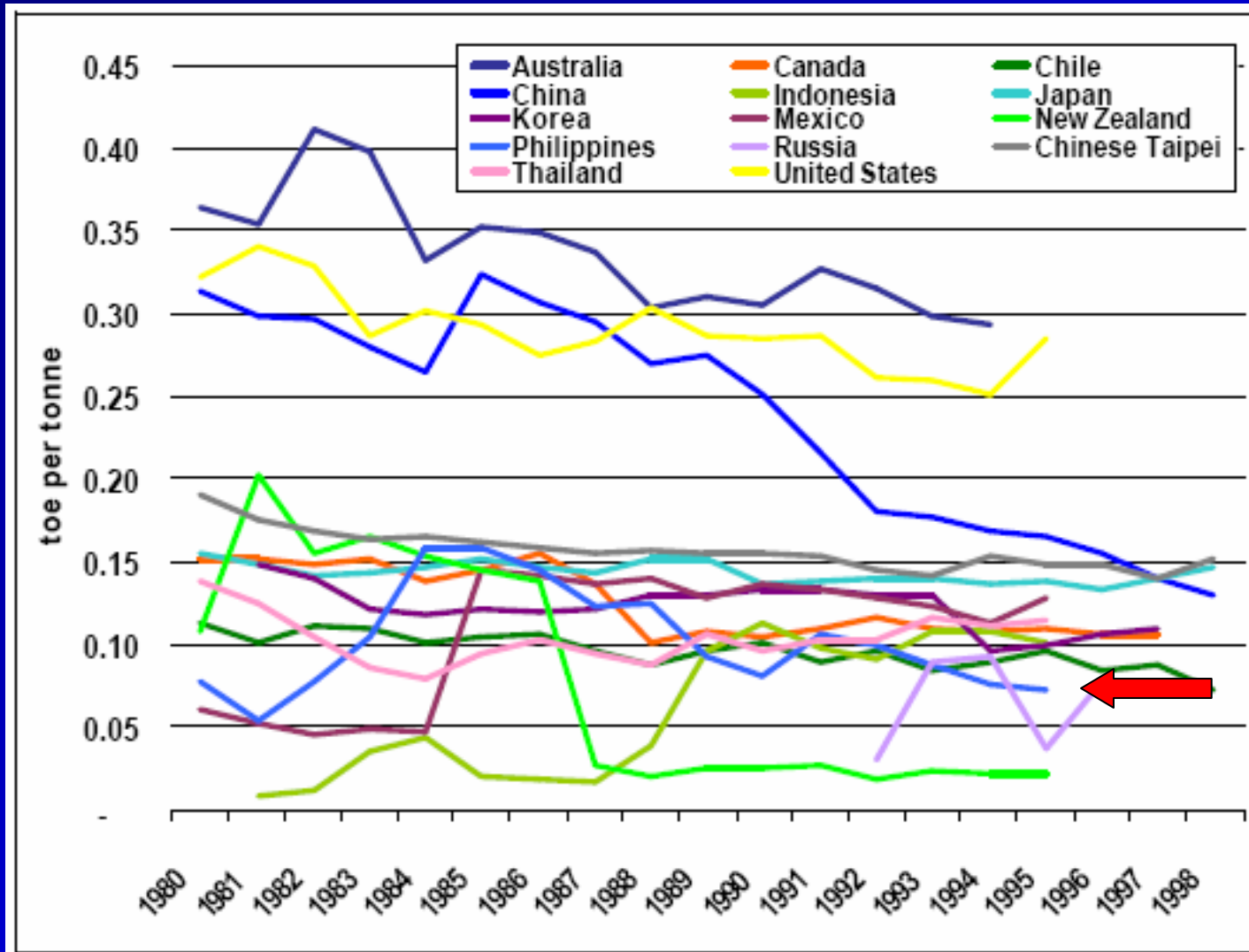
where, SEC_i , is the specific energy consumption of industrial activity i ;
 E_i , is the energy consumption of activity i ;
 P_i , is a measure of physical production of industrial activity i

Final energy intensity and GDP per capita (2006)



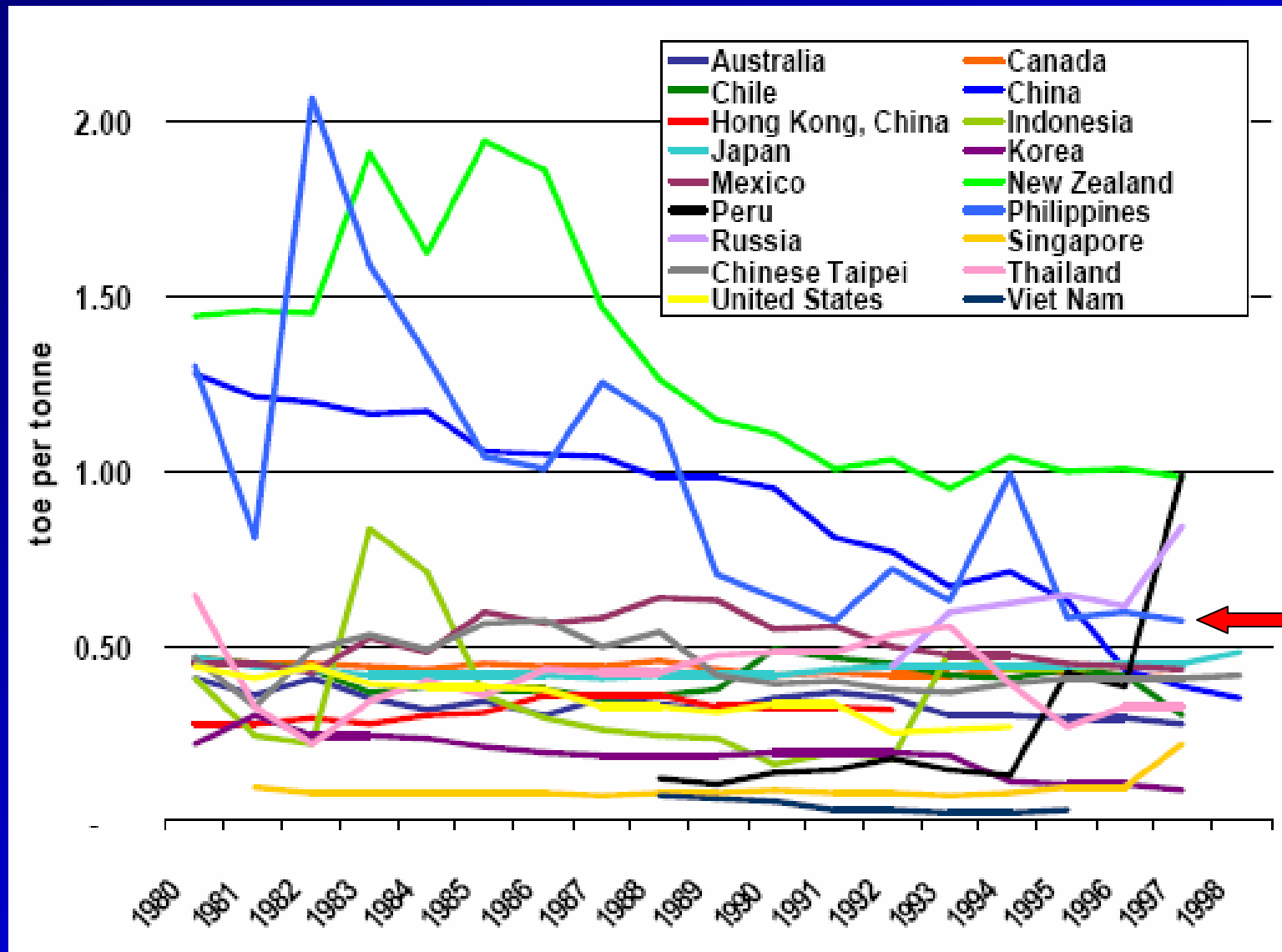
(WEC 2008 Report on Energy Efficiency)

Energy Consumption Trends for Cement



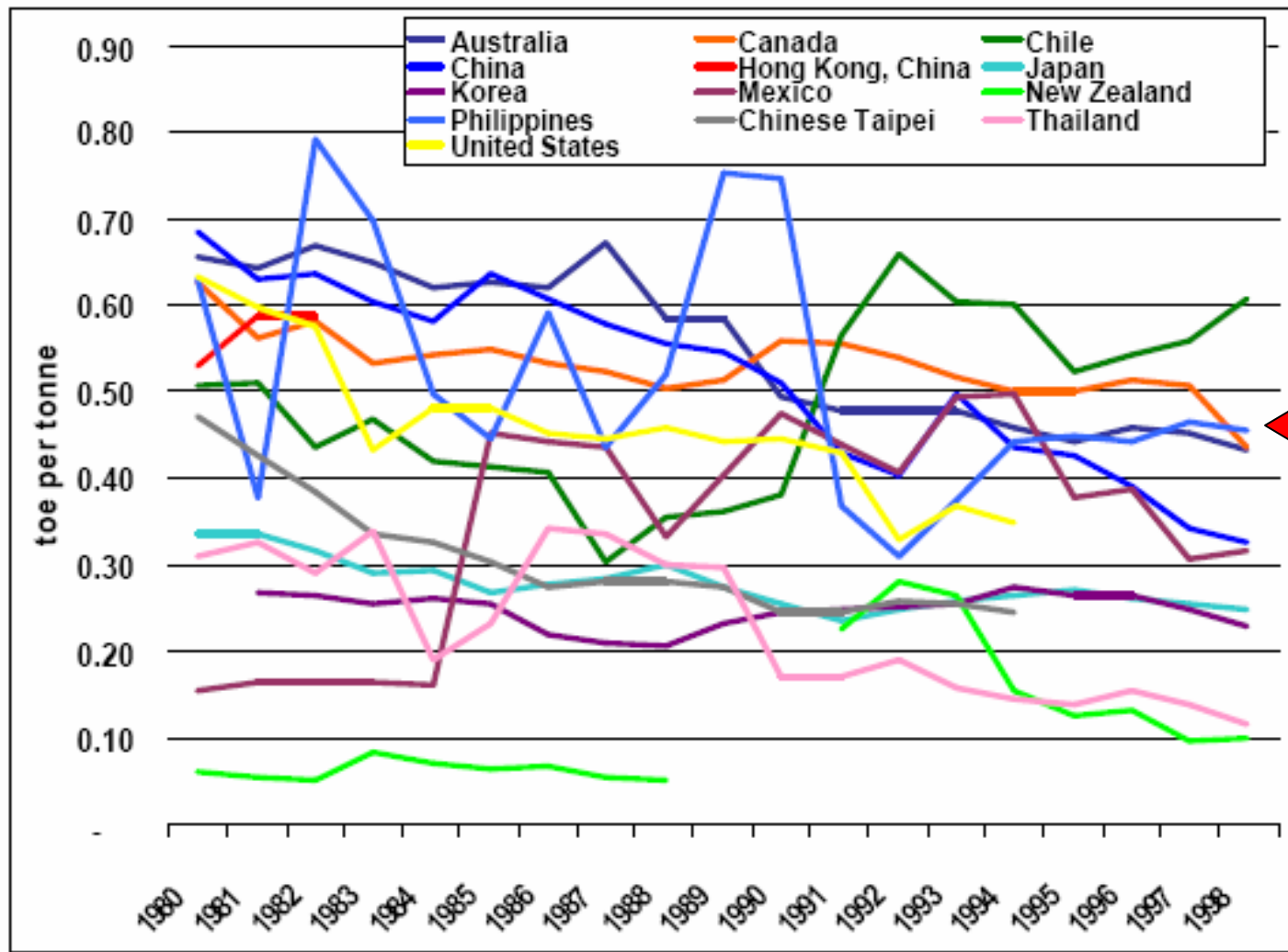
Source: APERC 2001

Specific Energy Consumption for Iron and Steel



Source: APERC 2001

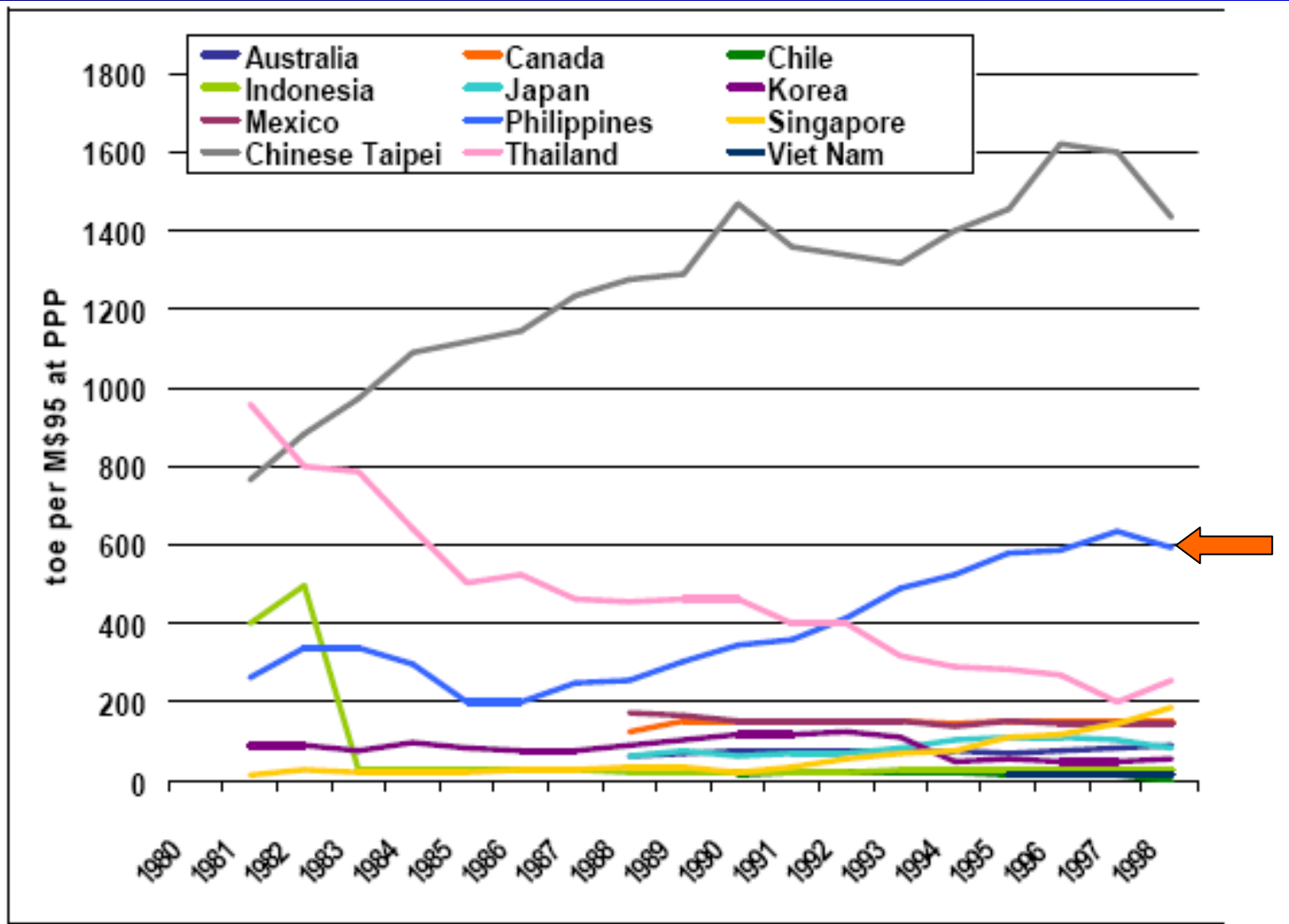
Energy Consumption Trends: Pulp & Paper Sector



Source APERC, 2000a

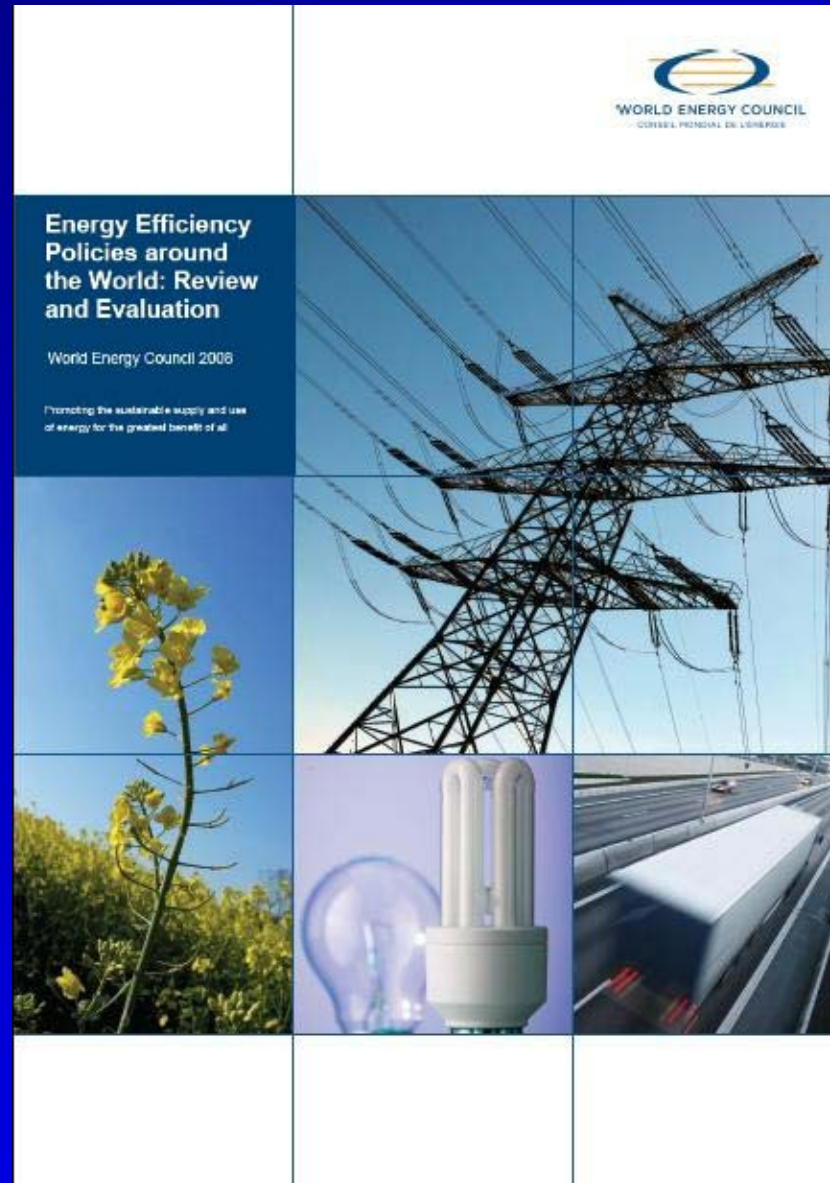
Source: APERC 2001

Mining & Quarrying: Energy Intensity



Source: APERC 2001

WEC 2008 Report on Energy Efficiency



Widespread Effective Measures

The 2008 WEC Report cites the following:

- Mandatory energy audits**
- Energy Service Companies (ESCO's)**
- Energy incentives for cars**
- Energy efficiency obligation for energy utilities, and**
- Package of measures for solar water heaters.**

Possible Regulatory Measures

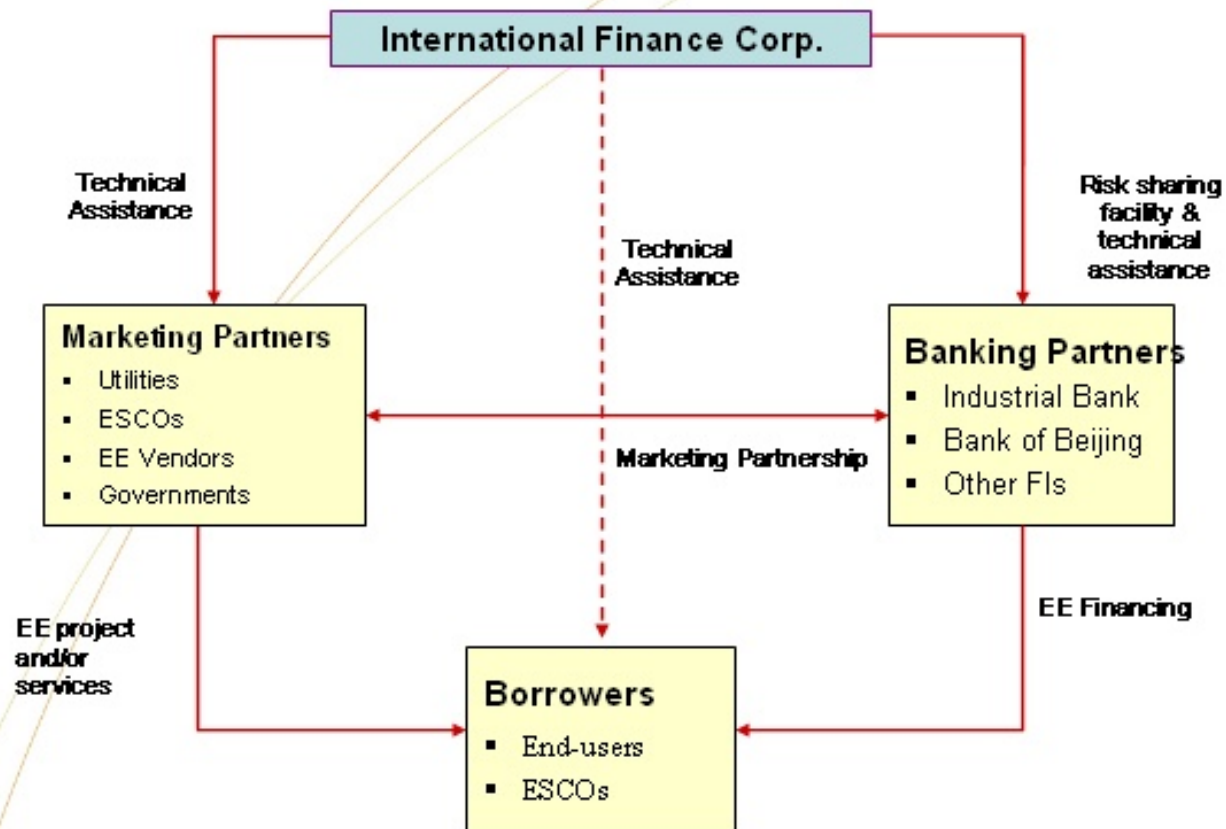
Sector	Possible mandatory elements
Residential/ Tertiary Sector	<p>Obligation to carry out audits at regular intervals (generally buildings above a certain living space/working area) or when sold or rented out</p> <p>Obligation to carry out audits to obtain a building certificate (e.g. Green Buildings-Label of the EU)</p> <p>Obligation to inform about the outcome of audits (e.g. building certificates)</p>
Industry	<p>Obligation to carry out audits at regular intervals (generally companies above certain threshold of energy consumption)</p> <p>Reporting obligations to governmental organisations and communication of audit results to the public (energy consumption reporting, reporting on saving measures, reporting on implemented measures)</p> <p>Obligation to propose action plans to implement the energy savings measures identified in audits</p> <p>Obligation to carry out certain types of measures</p> <p>Obligation to appoint an energy manager</p> <p>Mandatory certification of auditors</p> <p>Mandatory comparison to reference values (benchmarking)</p>
Transport	Mandatory obligation to audit vehicle fleets

Source: WEC 2008 Report on Energy Efficiency

Financial Incentives

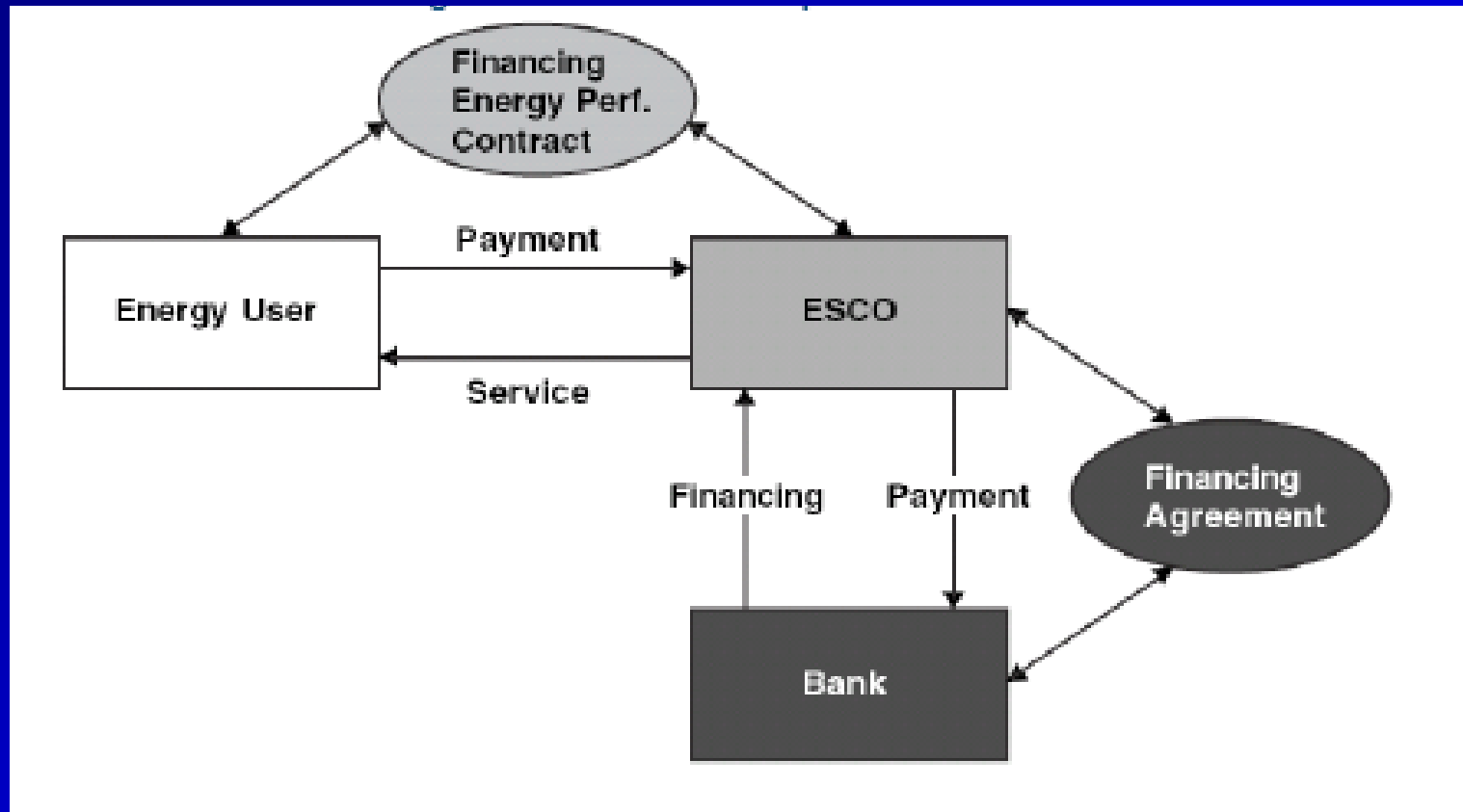
- **Subsidies for investments and audits, soft loans**
- **Fiscal measures: tax credit, accelerate depreciation, tax reduction on energy saving equipment**

CHUEE Program Structure



(Source: Xu, 2007)

Mode of Operation of ESCO

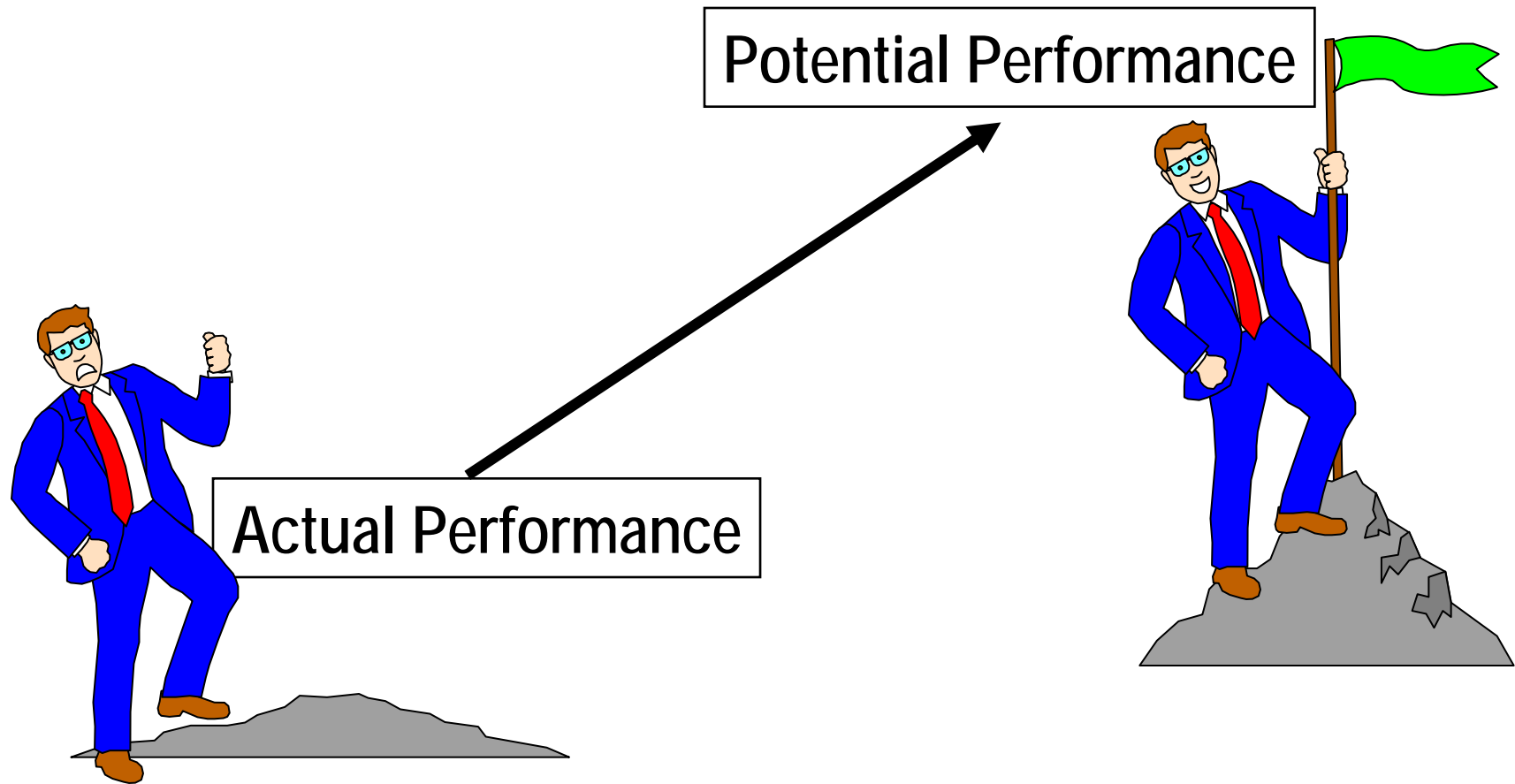


(WEC 2008 Report on Energy Efficiency)



World Energy Council
CONSEIL MONDIAL DE L'ENERGIE

The Gap



Primary Causes of the Gap

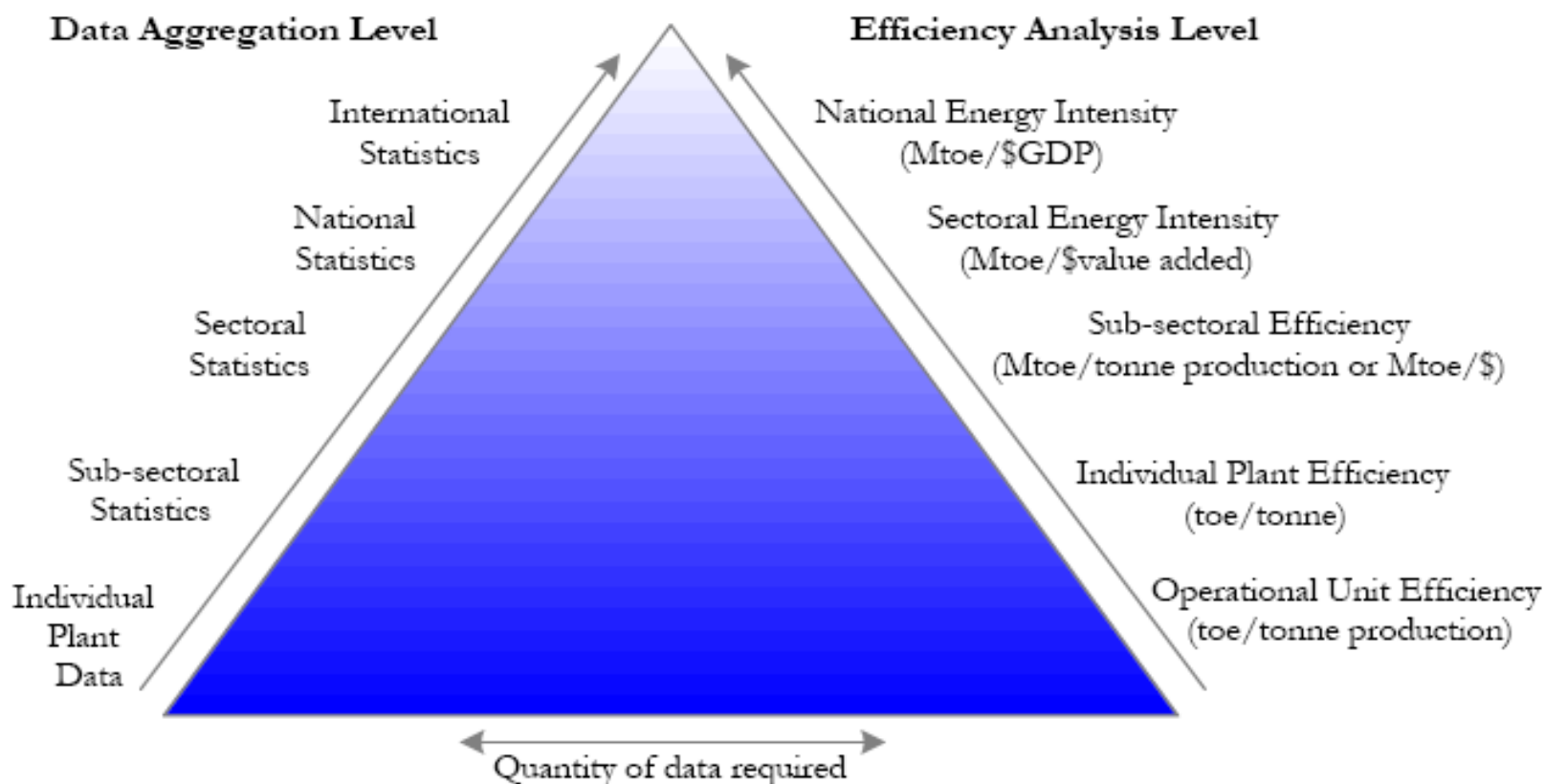
- **From Analytical Studies and Practical Experiences:**
 - Only 20% - 25% of the Gap is Due to *“Technology”* Issues
 - 75% - 80% is Due to Management Practices
 - Case Study – May 2002

Availability Improvement at Other Utilities

PREPA – Puerto Rico	+25%
NEES – USA	+13%
ESB – Ireland	+10%
ESKOM – South Africa	+20%

Majority of the improvements at these utilities were due to human factors and management improvement

Energy Efficiency Indicator Pyramid



Source: Philipsen *et al*, 1998.

Source: APERC 2000

Definitions of Aggregate Energy Efficiency Indicators

Level of aggregation	Energy Efficiency Indicators
National Economy	Economic. Energy Intensity of Gross Domestic Product (GDP): energy consumption per unit of GDP Physical. Non-available
Macroeconomic Sectors. Industry	Economic. Energy Intensity in Industry: energy consumption per unit of value added in industry Physical. Non-available
Industrial Sectors	Economic. Energy Intensity in Industrial Sectors: energy consumption per unit of value added in industrial sector Physical. Specific Energy Consumption: energy consumption per unit of physical production in industrial sector
Industrial Sub-Sectors	Economic. Sub-Sectoral Energy Intensity: energy consumption per unit of value added in industrial sub-sector Physical. Specific Energy Consumption: energy consumption per unit of physical production in industrial sub-sector
Individual Plant	Economic. Plant Energy Intensity: energy consumption per unit of economic output Physical. Specific Energy Intensity: energy consumption per unit of physical output
Technological Process	Economic. Non-available Physical. Specific Energy Consumption: energy consumption per unit of physical output

Institutionalizing Energy Efficiency

International/Regional

World Energy Council

Asia Pacific Energy Research Center

ASEAN Centre for Energy

Centre of Excellence for Sustainable Energy in SE Asia

National

**Department of Energy - Energy Efficiency and Conservation
Division (EECD)**

Energy Council of the Philippines

Energy Practitioners Association of the Philippines

Energy Development and Utilization Foundation, Inc.

Philippine Chamber of Commerce & Industry

Power Patrol

Don Emilio Abello Awards for Energy Efficiency

General : Status / Targets Policy Instruments / Legislations to Promote EE&C

TARGETS	Brunei	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
Building	Voluntary	Voluntary	Voluntary	Voluntary	Mandatory	Mandatory	Mandatory
Appliance	-	Under preparation	Voluntary	Mandatory	Voluntary	Mandatory	Voluntary
Industrial Equipment	-	Under preparation	Under preparation	Under preparation	Voluntary	Under preparation	Mandatory
Road Transport	-	-	-	Under preparation	Voluntary	-	-

TARGETS :

Building - takes into account the Overall Thermal Transfer Value (OTTV), Roof Thermal Transfer Value (RTTV), Daylighting, Heating, Ventilation and Air-conditioning (HVAC).

Appliance - includes energy utilisation in households and offices. Emphasizes output capacities such as power ratings and energy efficiency ratio, mainly for refrigerators and room air-conditioners.

Industrial equipment - relates to the productivity of equipment used, for example, boiler and motor as well as performances of variable speed controller.

Road transport - focuses on technical performance of road vehicles (e.g. fuel consumption per ton or passenger kilometre), vehicle population control and/or traffic management.

(Source: G Balce & C Zamora, 2003)

Policy Instruments to Promote EE&C: SPECIFIC MEASURES FOR EE&C

MEASURES	SECTORS	INDONESIA	MALAYSIA	PHILIPPINES	SINGAPORE	THAILAND	VIETNAM	ACE
EQUIPMENT / APPLIANCE LABELLING	Industrial	Voluntary ^a	Voluntary ^a	Mandatory	Voluntary	Mandatory	Mandatory	ASEAN Labelling System
	Commercial	Voluntary ^a	Voluntary ^a	Mandatory	Voluntary	Mandatory	Mandatory	
	Residential	Voluntary ^a	Voluntary ^a	Mandatory	Voluntary	Mandatory	Mandatory	
EQUIPMENT / APPLIANCE STANDARDS	Industrial	-	Voluntary ^a	Mandatory	Voluntary	Partly Mand.	Mandatory	
	Commercial	-	Voluntary ^a	Mandatory	Voluntary	Partly Mand.	Voluntary	
	Residential	-	Voluntary ^a	Mandatory	Voluntary	Partly Mand.	Voluntary	
BUILDING STANDARDS	Industrial	Voluntary	Voluntary	-	Mandatory	Partly Mand.	Mandatory	
	Commercial	Voluntary	Voluntary	Mandatory	Mandatory	Partly Mand.	Voluntary	
	Residential	-	Voluntary	-	Mandatory	Partly Mand.	Voluntary	
ENERGY AUDITS	Industrial	Voluntary	-	Voluntary	Voluntary	Voluntary	Mandatory	
	Commercial	Voluntary	Voluntary	Voluntary	Voluntary	Voluntary	Mandatory	
	Residential	-	-	-	-	-	Mandatory	
FINANCIAL INCENTIVES / DISINCENTIVES	Industrial	-	N.A.	Loan Prog.	Incentives	Available	Available	
	Commercial	-	N.A.	Loan Prog.	Incentives	Available	Available	
	Residential	-	N.A.	-	-	-	Available	
PRIVATE SECTOR PARTICIPATION		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: G Balce & C Zamora, 2003)

Policy Instruments to Promote EE&C

Con't ... SPECIFIC MEASURES

MEASURES	SECTORS	INDONESIA	MALAYSIA	PHILIPPINES	SINGAPORE	THAILAND	VIETNAM	ACE
PENALTIES & AWARDS	Industrial	Available	Awards Only	Awards Only	Available	Awards Only	Available	ASEAN Energy Awards (AEA)
	Commercial	Available	Awards Only	Awards Only	Available	Awards Only	Available	AEA
	Residential	-	N.A.	-	-	-	Available	AEA
CAMPAIGN PROGRAMMES	Industrial	S-Ws Exhibits	Seminars Trainings Exhibits	Power Patrol S-W	S-Ws Exhibits	Electronic & Print Media	S-Ws Exhibits	Networking and Homepage
	Commercial	S-Ws Exhibits	Seminars Trainings	Power Patrol S-W	S-Ws Exhibits	Electronic & Print Media	S-Ws Exhibits	
	Residential	Tri-Media	Tri-Media	Power Patrol	Tri-Media	Electronic & Print Media	Tri-Media	

Source: G Balce & C Zamora, 2003)

Policy Instruments to Promote EE&C: Specific Measures in Transport Sector (Land Transport)

Measures	Indonesia	Malaysia	Philippines	Singapore	Vietnam
Fuel Consumption Rating	Voluntary	Voluntary	Voluntary	Mandatory	Voluntary
Fuel Consumption Standard	-	Voluntary	Voluntary	Mandatory (public) Voluntary (private)	Voluntary
Fuel Efficiency Standards	-	-	Voluntary	Voluntary	Voluntary
Vehicle Taxation	Mandatory	Compulsory	Mandatory	Mandatory	Voluntary
Vehicle Inspection	Mandatory	Compulsory	Mandatory	Mandatory	Voluntary
Vehicle Quota System	Mandatory	-	Voluntary	Mandatory	Mandatory
Basis for Incentives/ Discentives	Vehicle Functional Type	Higher road tax for diesel driven cars	Voluntary	Not available	Vehicle functional type (voluntary)
Route Schemes	Mandatory	Compulsory	Mandatory	Mandatory	Voluntary
Emission Standards	Mandatory (public transport in specific areas) Voluntary (private cars using CNG fuel)	Compulsory	Mandatory	Mandatory	Mandatory

Source: G Balce & C Zamora, 2003)

Conclusions

- **There is a positive correlation between economic growth and energy consumption**
- **Energy efficiency and conservation are viable responses to the challenge of high energy prices**
- **There is a wealth of experience and expertise on energy efficiency measures and practices in the Philippines and in the international arena**
- **The human factor is important in promoting widespread implementation of energy efficiency and conservation**
- **Institutions, policies and financing are essential ingredients in the successful promotion of energy efficiency and conservation**

The Way Forward

- **Continue and expand energy efficiency and demand side management programs**
 - data gathering and analysis at different levels
 - government to lead by example
 - adapt effective measures to the local situation
- **Establish policy and regulatory framework**
 - financial incentives
- **Strengthen and support institutions involved in the promotion and implementation of energy efficiency programs**
 - private-public sector partnerships
- **Provide adequate information to various sectors**

THANK YOU