East Asia's Energy Outlook and Challenges

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Outline

- Current Energy Situation in East Asia
- Triple Challenges in Securing Energy Future
- Economics of Energy Policy Options
- Implications for Japan – ASEAN Cooperation

- **Current Energy Situation in East Asia**
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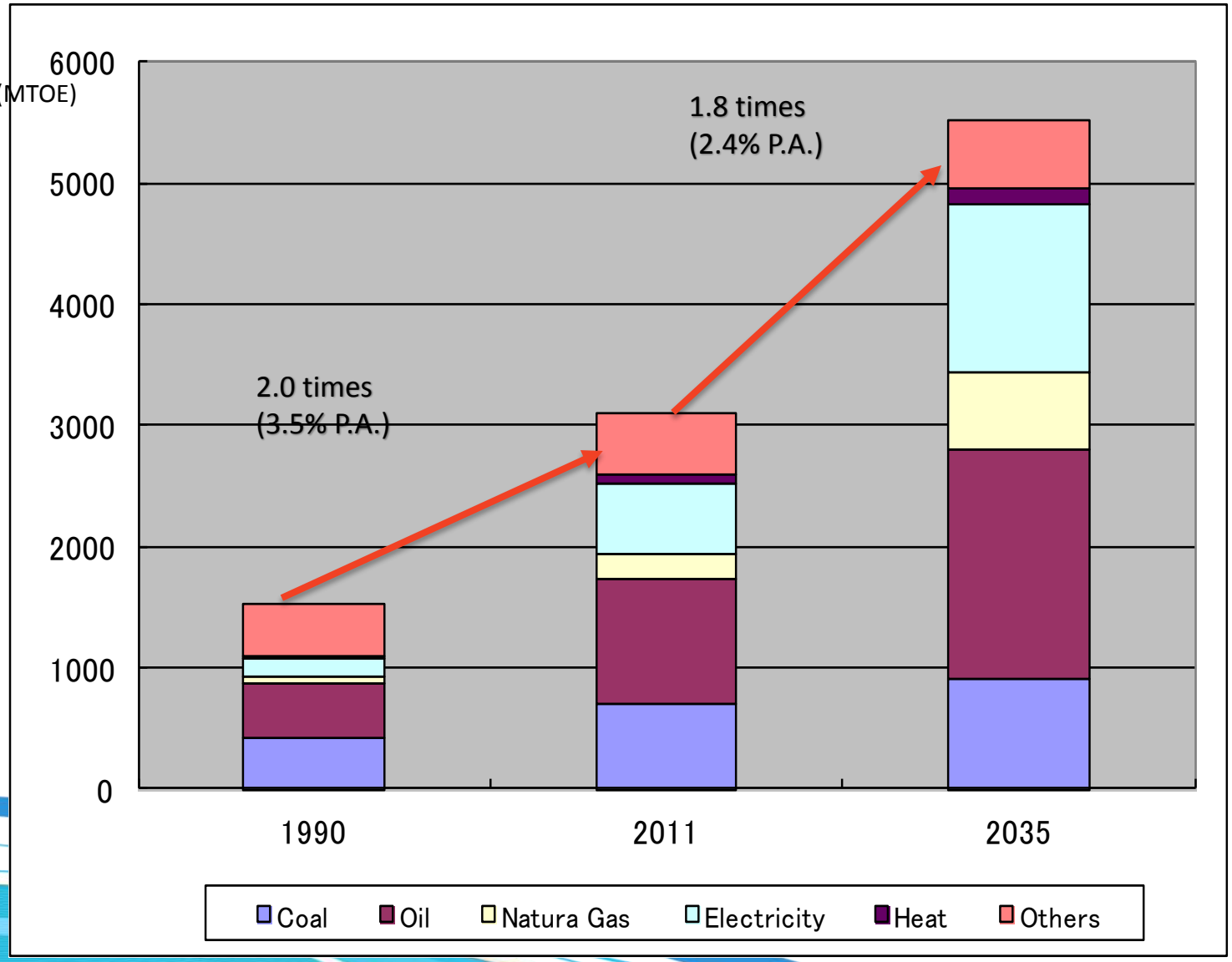
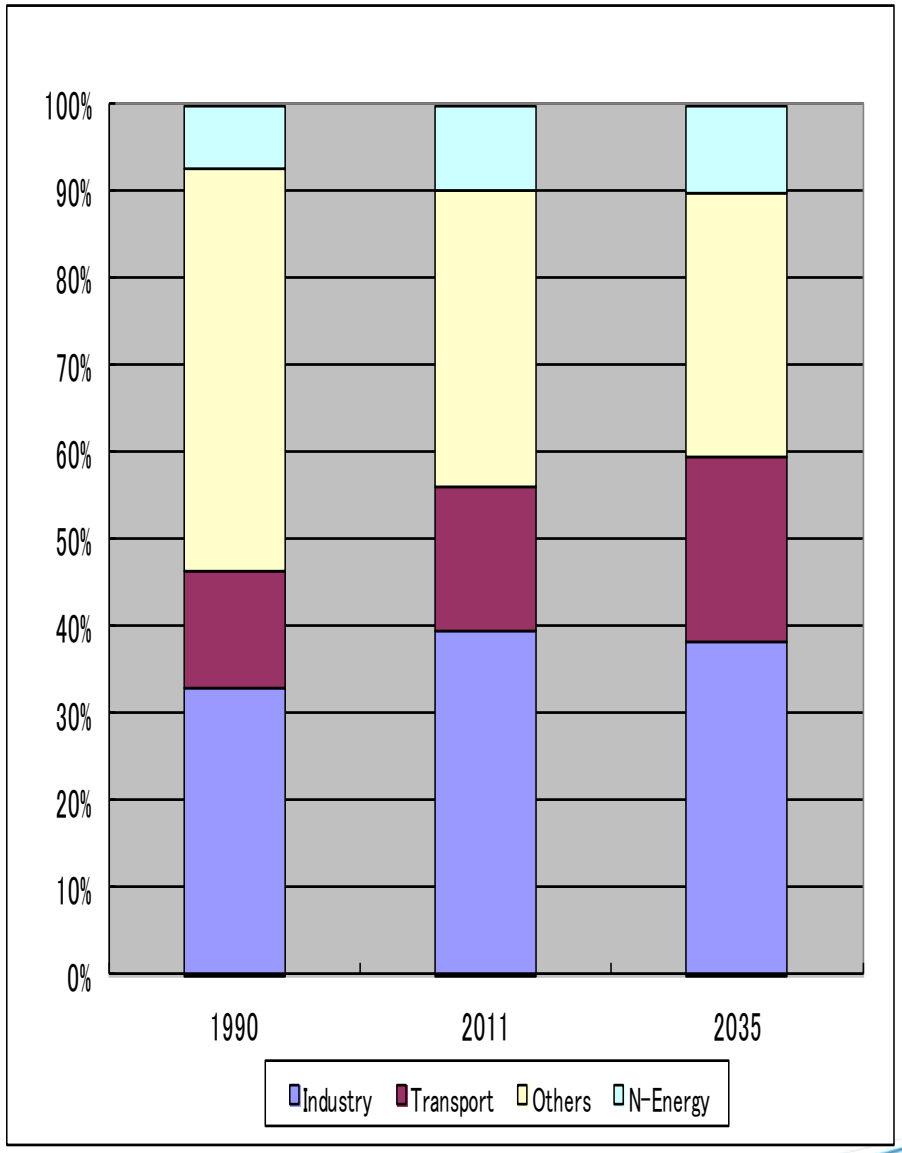
East Asia Today: Economic and Energy Landscape

	GDP (Billion 2005US$)	Share of Industry In GDP, %[1]	Share of Services in GDP, %[1]	Share of Agriculture in GDP, %[1]	Primary Energy Consumption (Mtoe)	Energy Consumption per Capita (toe/person)
Australia	818.3	28.5	69.0	2.5	135.8	6.1
Brunei Darussalam	10.1	71.7	27.7	0.6	3.4	8.3
Cambodia	9.3	23.5	39.8	36.7	5.3	0.4
China	4,194.9	46.6	43.4	10.0	2,727.7	2.0
India	1,326.2	27.2	54.9	17.9	749.5	0.6
Indonesia	402.4	47.1	38.2	14.7	227.5	0.9
Japan	4,622.0	26.2	72.7	1.2	461.5	3.6
Korea, Rep.	1,056.6	39.3	58.0	2.7	260.4	5.2
Lao PDR	4.3	34.8	35.7	29.5	2.4	0.4
Malaysia	187.8	40.4	47.8	11.8	64.3	2.2
Myanmar	21.5	40.1	37.5	39.8	14.1	0.3
New Zealand	122.2	24.1	69.3	6.6	18.2	4.1
Philippines	135.9	31.3	55.9	12.7	40.5	0.4
Singapore	178.2	26.7	73.3	0.0	29.8	5.7
Thailand	210.3	43.0	43.7	13.3	115.9	1.7
Vietnam	83.2	37.9	42.0	20.1	53.5	0.6

Source: ERIA, 2014

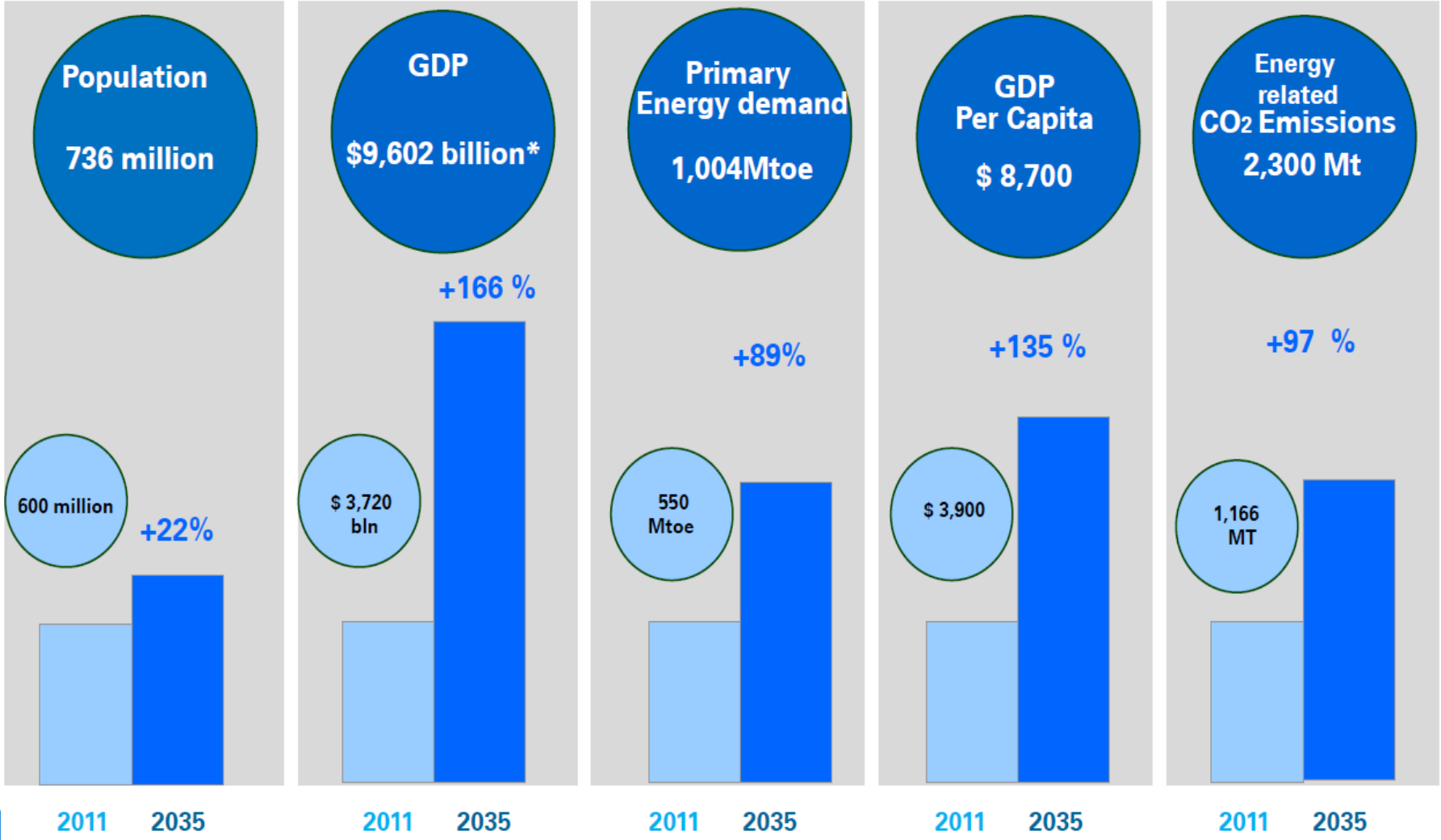
East Asia in 2035: Final Energy Demand





Source: ERIA, 2014

ASEAN in 2035: Economy and Energy Landscape



Source: ERIA (2014); ADB (2013); IEA (2013), UN (2012)

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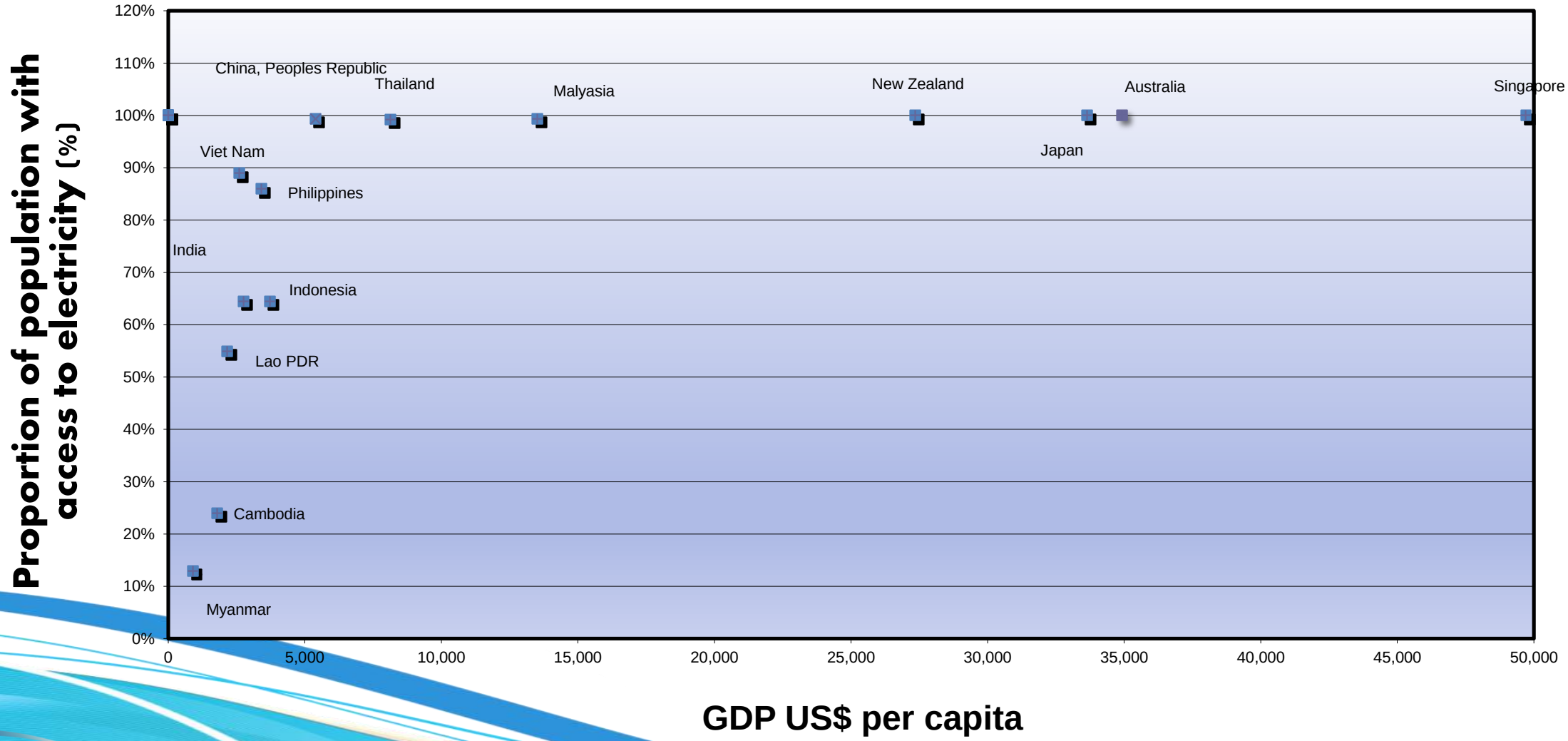
Challenge #1: Meeting the Human Developmental Needs



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Challenge # 2: Achieving Energy Security

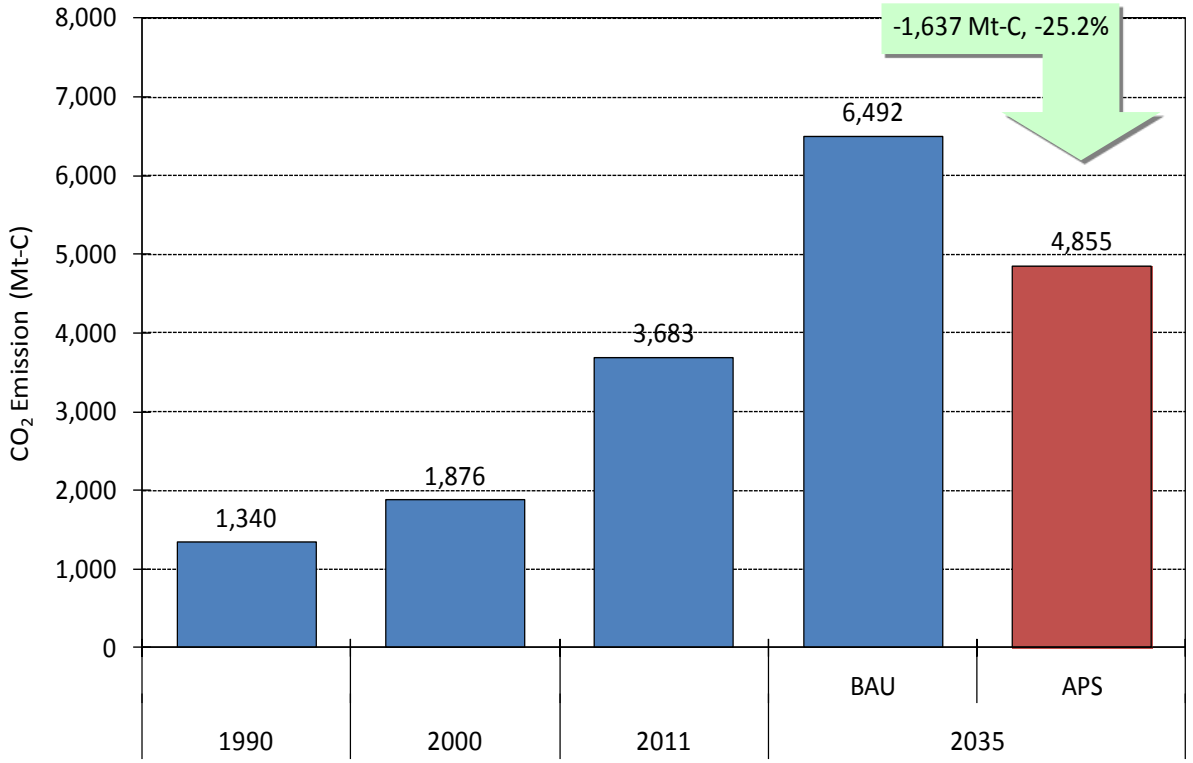
	China	India	Brunei	Indonesia	Malaysia	Singapore	Philippines	Thailand	Viet Nam
Dependence on imported oil	74.75	86.60	0.00	60.50	44.70	100.00	100.00	72.50	72.80
Dependence on imported gas	72.47	31.40	0.00	0.00	0.00	100.00	91.50	100.00	1.30
Dependence on imported coal	21.42	32.40	NA	0.00	95.70	NA	73.90	82.03	0.00
Energy self-sufficiency	62.70	49.70	270.60	148.10	86.30	1.70	34.90	26.80	75.60

Dependency on Imported energy = Energy net import/energy consumption

Energy self-sufficiency = Domestic production/total consumption

ERIA, 2012

Challenge # 3: Tackling climate Change and INDCs



Carbon Abatement Option	Potential (%)
Energy Efficiency	57
Renewables	20
Biofuels	3
Nuclear	10
Carbon Capturing	10

Country	Voluntary Pledges to cut carbon emissions
China	Cut in carbon emissions/GDP by 40–45% below 2005 levels by 2020
India	Cut in emission intensity by 20–25% below 2005 levels by 2020
Indonesia	26% below BAU projection for 2020

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ERIA is working on Sustainable Energy Pathways

Energy Efficiency and Conservation

- Energy Security Index and Saving potential
- Smart Urban Traffic
- Demand side management

Renewables and New Energy Sources

- Standardization of biodiesel specification
- Sustainable Geothermal Use
- New Financing renewable energy

Sustainable Fossil Fuel Use

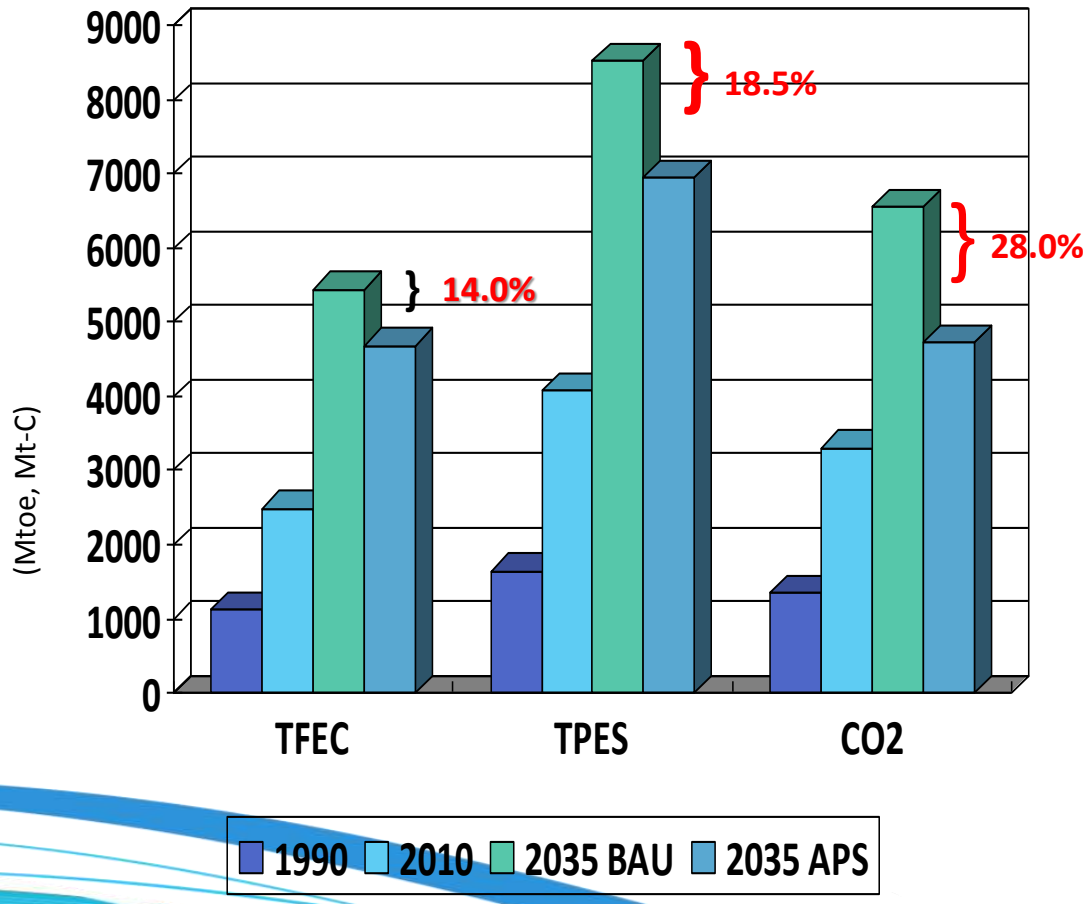
- Clean Coal Technology
- Natural Gas Market development
- Special country studies

Regional Cooperation and Integration

- Power grid integration and low carbon energy systems
- Oil stockpiling and operatialization of APSA
- Nuclear safety management

Energy Outlook on East Asia

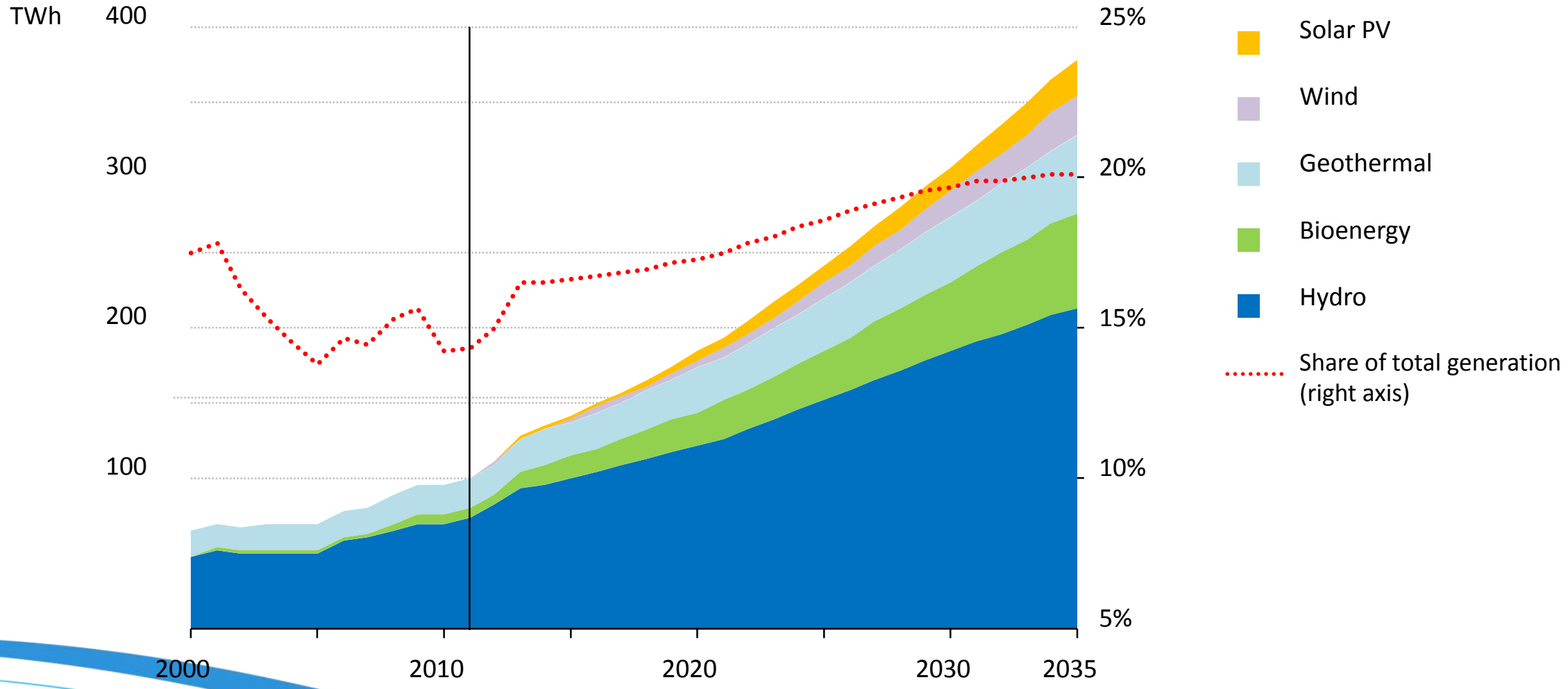
Potentials of Energy Efficiency Improvement in East Asia



Estimated Energy Saving Potential in 2035
(Source: ERIA, 2014)

- *Under Alternative Policy Scenario (APS) that include the voluntary energy saving targets, the region can reduce 1,581 Mtoe in 2035 or 28.0% of carbon emissions.*
- *Power sector has the highest potential for energy efficiency improvement followed by industry, residential & commercial and transport sectors.*
- *Additional US$ 12.7 trillion will be needed to achieve this potential.*

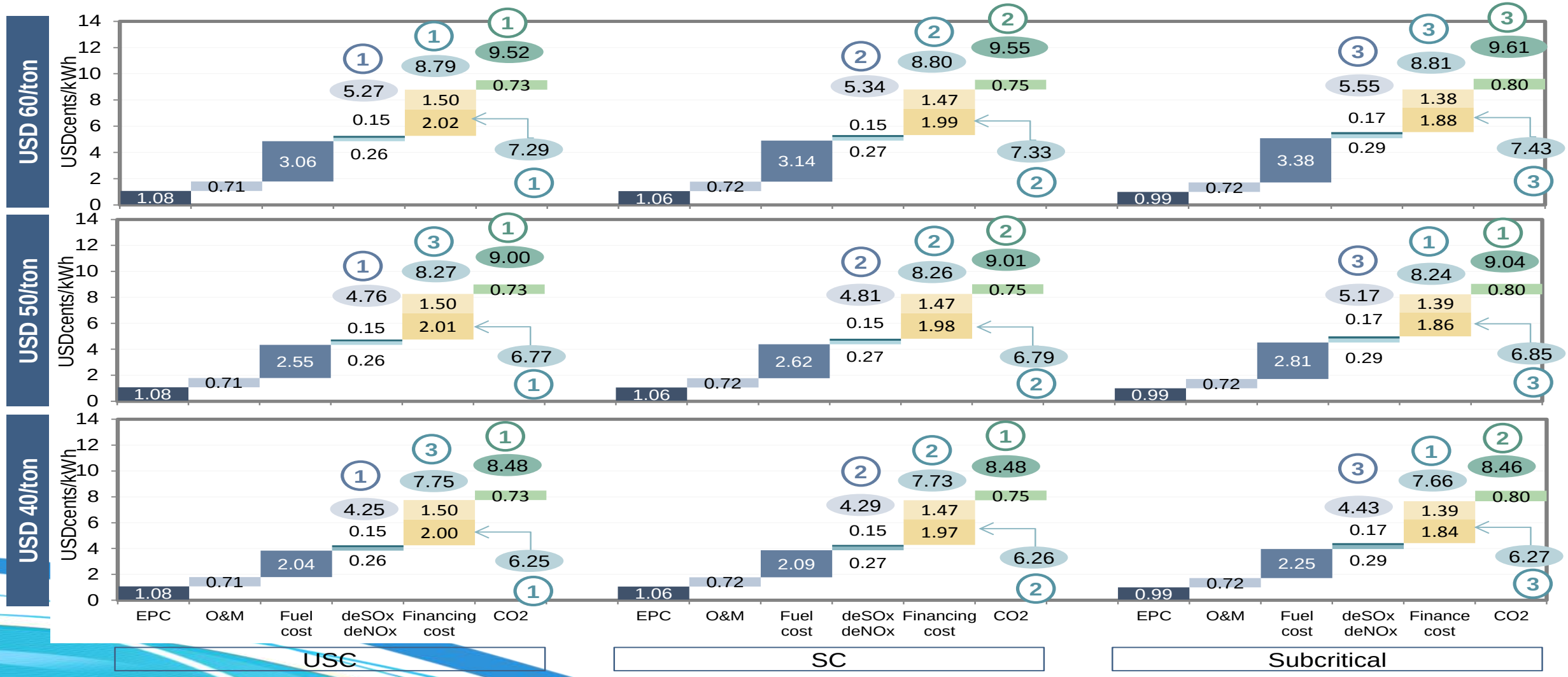
Renewable Energy Uptake in ASEAN has Potentials and Barriers



Estimated RE uptake in 2035

Source: IEA -ERIA, 2013

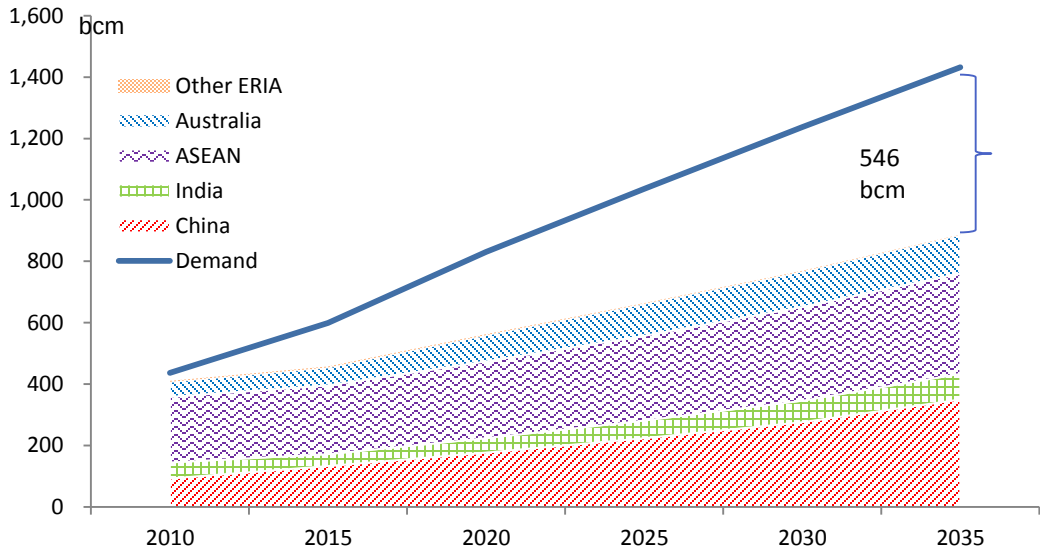
Clean Coal Technologies Offer Energy Security and Carbon Reduction Options



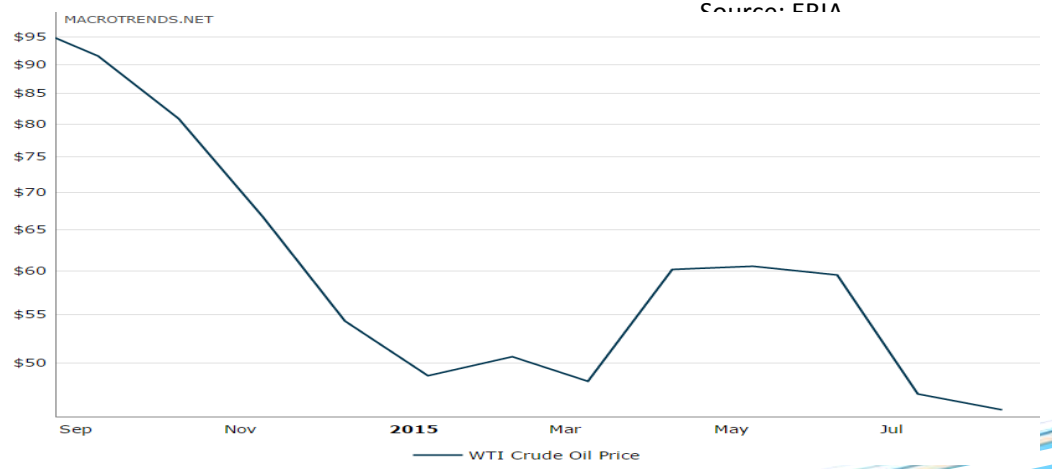
Natural Gas Supply Calls for Market Flexibility

- Need to source 546 bcm of natural gas from outside in 2035.
- A majority of the imports will be in the form of LNG.
- How to secure the supply through sufficient infrastructure investment?
- What “price discovery mechanism” could deliver proper price signals to incentivize investment and ensure affordable supply to this region?

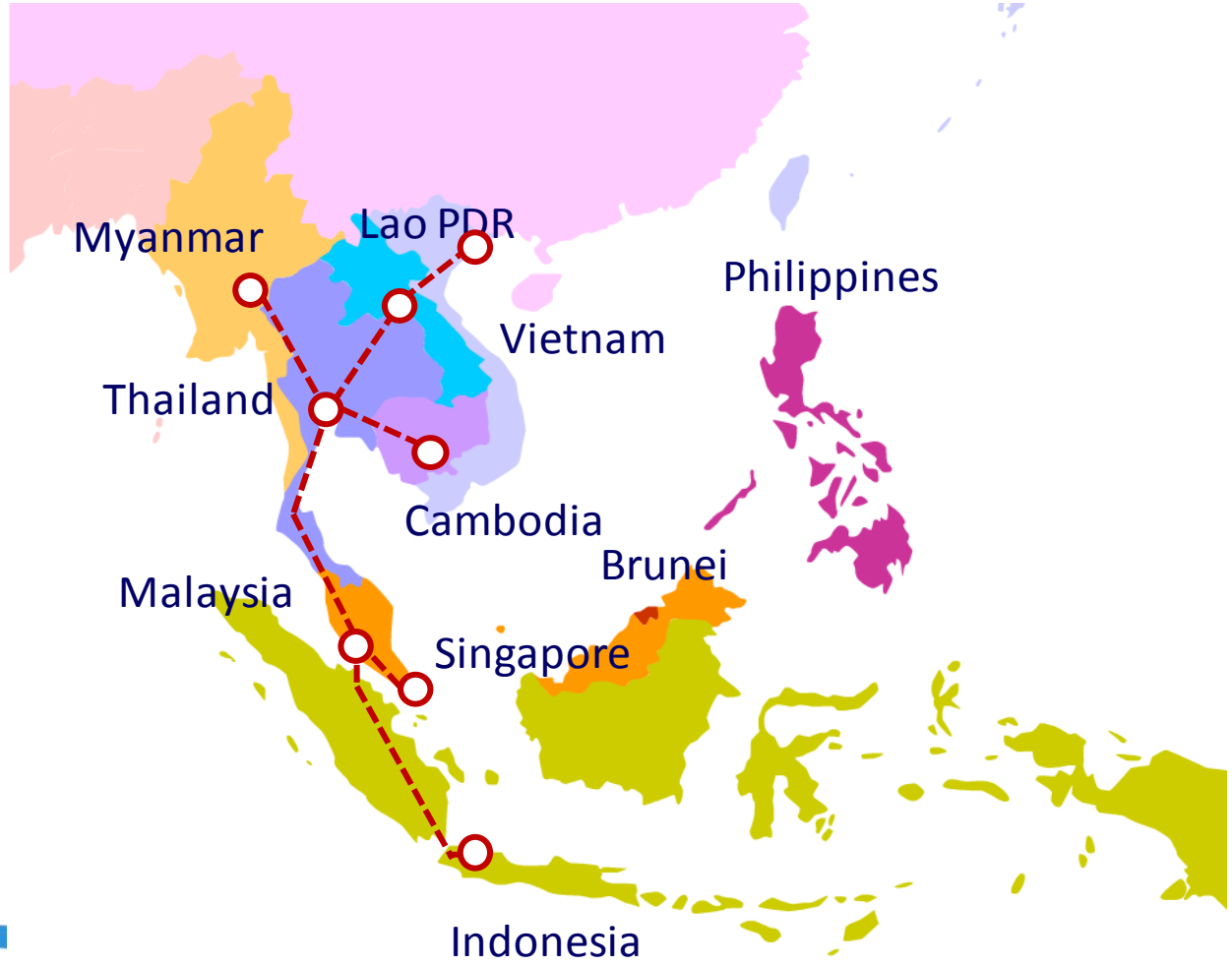
The Gap between Projected Demand vs. Supply from within the Region



Source: ERIA



ASEAN Power Grid Interconnection



Possible Power Infrastructure interconnections

- Grid interconnection seems to provide enough economic benefit, energy security and carbon reductions to rationalize large investment amount for interconnection.

Route	Interconnection line construction cost		Net benefit (gross benefit - line cost)		Benefit/Cost ratio
	Mil. USD	US¢/kWh	Mil. USD	US¢/kWh	
THA-LAO	1,400	0.25	19,881	3.51	14.2
VNM-LAO-THA	1,950	0.29	22,610	3.36	11.6
LAO-THA-MYS-SGP	1,860	0.26	25,490	3.60	13.7

- Challenge: Create a regionally coordinated investment mechanism that optimizes the future investment plan of power station and grid.

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Cooperation Framework for Oil Stockpiling

Country Specific and Common Challenges in oil stockpiling

	Common challenge				Country specific challenges		
	Developing accurate and timely statistics	Enhancing regional cooperation (APSA)	Securing finance	Expanding stockpiling capability and volume	Developing oil stockpiling plan	Conducting emergency exercise	Arranging interim measures
Cambodia	✓	✓	✓	✓	✓	✓	✓
Indonesia	✓	✓	✓	✓		✓	
Lao	✓	✓	✓	✓	✓	✓	✓
Myanmar	✓	✓	✓	✓		✓	✓
Philippines	✓	✓	✓	✓	✓	✓	✓
Thailamd	✓	✓	✓	✓	✓		
Vietnam	✓	✓	✓	✓		✓	✓
*Net exporters							
Brunei	N/A						
Malaysia	N/A						
**Large storage capacity and inventory							
Singapore	N/A						

Cooperation items should be designed to "fit" the needs of each ASEAN countries

Potential cooperative items by Partnering Countries

Japan

- **Administration experience to introduce stockpiling system**
- **Bilateral emergency response cooperative agreement**
- **Ticket stockpiling system**

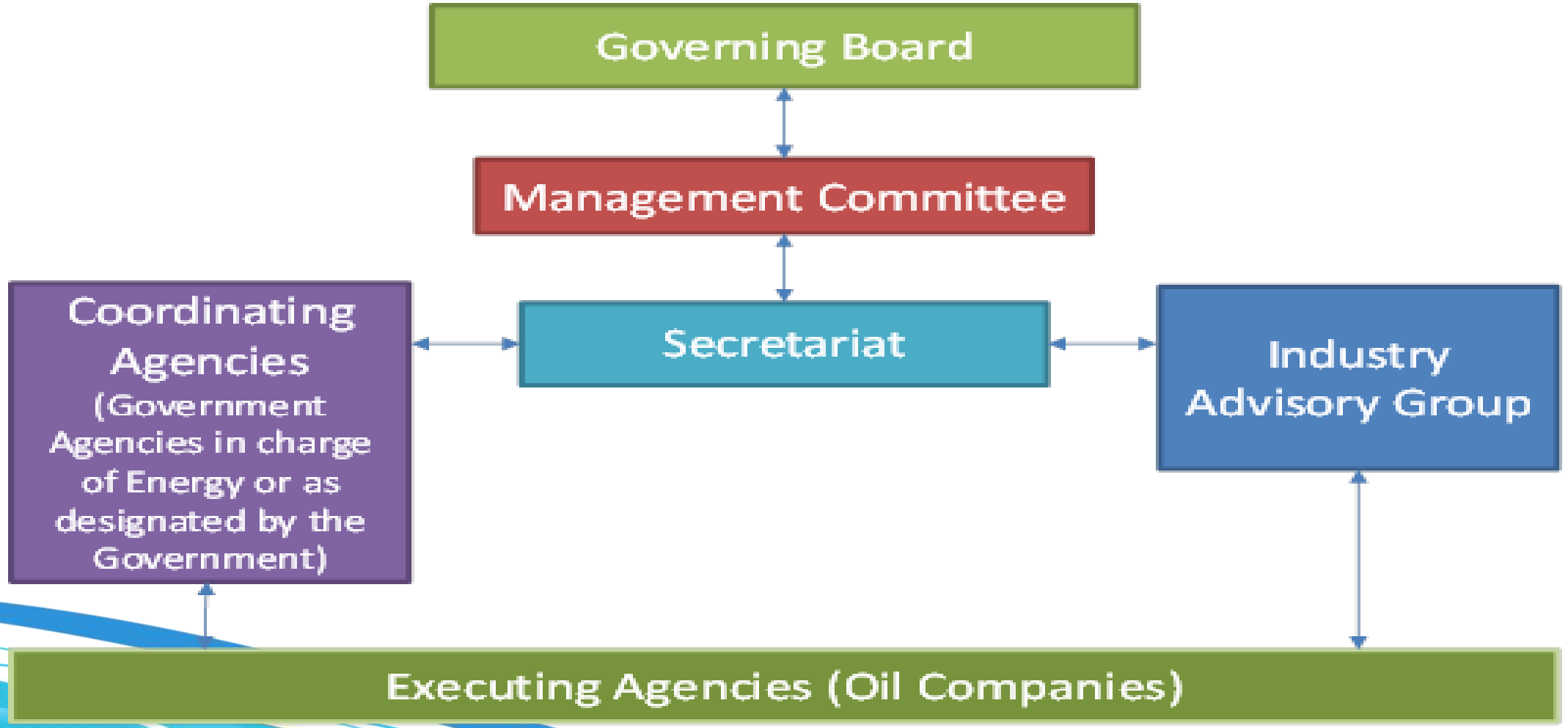
United States

- **Concept development for emergency response measures**
- **Organizational design development**

Korea

- **Expertise and experience of "dynamic stockpiling"**
- **Utilization of Northeast Asian Oil Hub**

ASEAN Petroleum Security Agreement (APSA)



Cooperation in Nuclear Safety - Guidelines

Key Issues of a Regional Cooperative Framework

- Membership
- Language
- Information and communication tool in emergency
- Timing to inform
- Maintenance of 24-hour contact system
- What kind of information to be shared in usual situation
  - Information exchange by using data server or email
- Frequency of training and drills
- Resources
- Revision and update of the "guideline"
- Ad hoc groups and etc.

Sample Structure from the Nordic Manual

1. Scope
2. Co-operation in emergency preparedness
2.1 Nordic Working Group of Emergency Preparedness (NEP)
2.2 Exercises and drills
2.3 Nordic contribution to international work
2.4 Exchange of background information regarding emergency arrangements
2.5 Public information
3. Response arrangements
3.1 Communication policy between the Nordic authorities during emergencies
3.2 Notification and exchange of information
3.2.1 Threshold of dissemination of information
3.2.2 Communication means
3.2.3 Public information issues
3.3 Co-operation and co-ordination during response phase
3.3.1 Co-operation regarding safety assessments and protective measures
3.3.2 Additional exchange of information of urgent nature between the Nordic authorities and Russian or Lithuanian nuclear installations
3.4 Assistance
4. Revision of this document

Estimated Investment Needs: Case of Myanmar

Bottom-up Approach:
Fieldwork, Zoning (Off-grid zone and Boarder zone), HRD

Off-grid Zone	
Parameter	Key Findings
Electricity Demand (Off-Grid)	By 2030, “127MW～926MW” of off-grid power is required where grid supply may not be extended
Cost to Develop mini-grids	1.006bUSD～8.859 bUSD

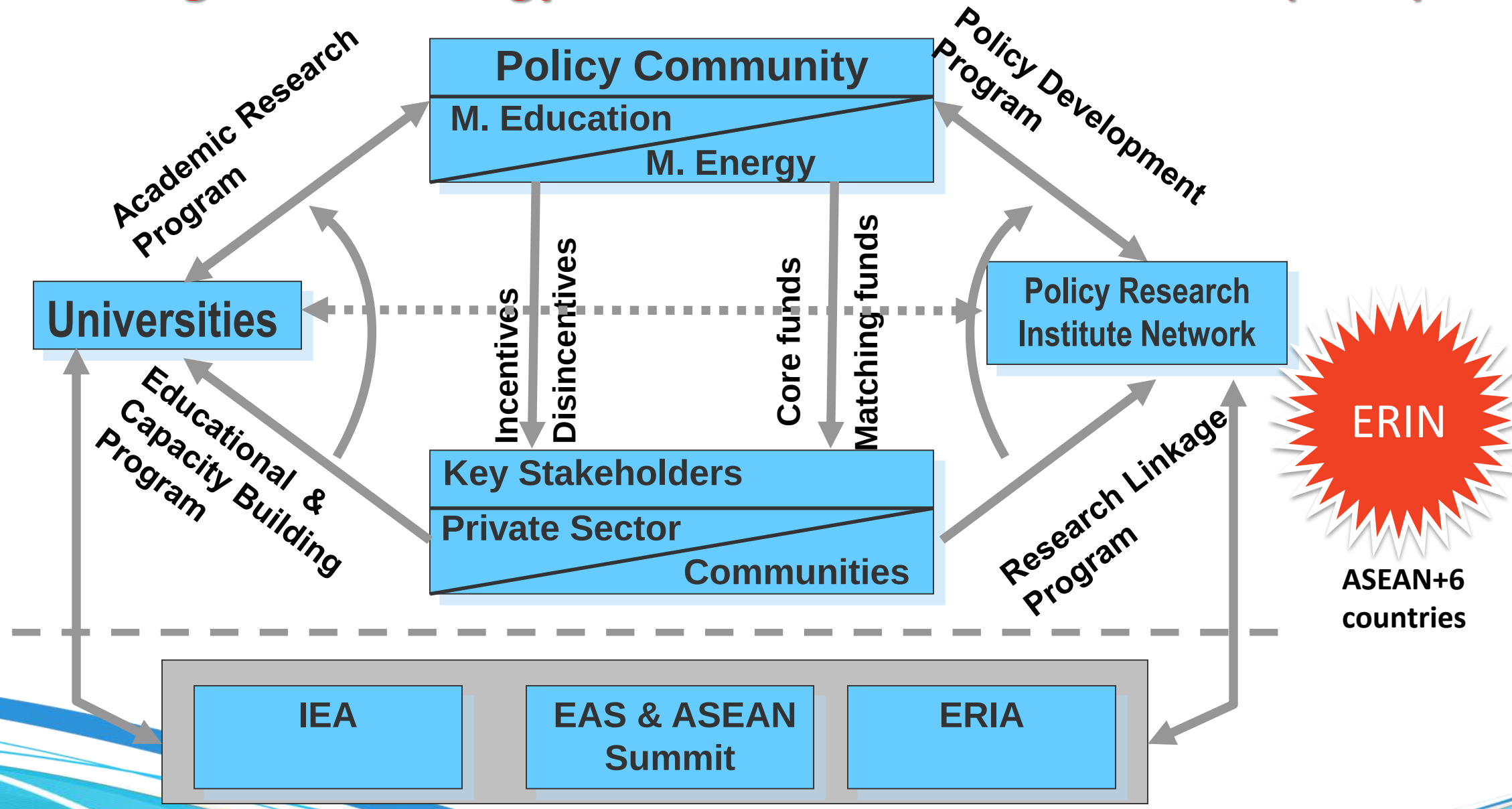
Border Zone	
Case	Cross-border IPPs (eg. Salween)
Stakeholder-meeting	With ERI (Chulalongkorn University,), risk perceptions among Thai investors are examined
Barrier	“Public Acceptance” is one of the critical aspects.

Integrated Energy Strategy

HRD/Capacity Building

“National Energy Management Committee” has already been formed under the Vice President. Through HRD activities toward the officers, we will conduct “scenario-making” and prepare policy recommendations for an “integrated longer-term energy strategy” of Myanmar.

Evolving Role of Energy Research Institutes Networks (ERIN)



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Securing East Asia's Energy Future

- **Challenges of East Asia**
  - Wiser use of fossil fuel energy
    - Oil stockpiling, natural gas market, clean coal technology
  - Investment in regional energy infrastructure
    - ASEAN Power Grid (APG), Tran ASEAN Grid Pipeline (TAGP), Petroleum fefinery, LNG plants, Efficient Power Generation Plants
  - Deployment of energy efficiency technologies and renewable energy sources
- **Challenges of Japan**
  - Best energy mix including nuclear power generation
  - Reforms in FIT policy
  - Matured gas market in Asia
  - Diffusion of high quality energy efficient technologies and infrastructure
  - There is significant potential between East Asia especially **ASEAN and Japan in term of win-win energy cooperation.**

Thank You for Your Kind Attention!