







# POLICY BRIEF

October 2011

Number 15

## Energy Market Integration in East Asia: What an Economic Analysis Tells Us?

### Key Policy Messages

-  The East Asia Summit region needs an affordable, reliable, efficient and robust energy system for uninterrupted economic and social development.
-  Trade liberalisation of energy commodities will support regional economic development by increasing net regional GDP but this will be achieved at the cost of increasing CO<sub>2</sub> emissions.
-  Energy pricing reform, especially reduction and removal of energy subsidies, will help improve environmental conditions by reducing CO<sub>2</sub> emissions across the EAS region.
-  Regional cooperation is required in the context of holistic development following the path of energy market integration.



Anindya Bhattacharya

Senior Policy Researcher  
IGES Economy and  
Environment Group  
bhattacharya@iges.or.jp



Satoshi Kojima

Director  
IGES Economy and  
Environment Group  
kojima@iges.or.jp

## Introduction

The East Asia region has been a hot spot of economic growth, and a substantial amount of energy input is essential to fuel this growth. Given the diverse conditions of economic, demographic, physical and natural resources in this region, a harmonised and integrated energy market will be beneficial to secure an affordable and reliable energy supply for the region. Towards this goal, the Energy Cooperation Task Force (ECTF) of the East Asia Summit (EAS), which was established by EAS in 2007, launched a study on Energy Market Integration in East Asia. This study reviews trade and investment barriers of energy commodities in the EAS region and assesses the potential

impacts of energy market integration in this region. In this study IGES conducted an economic analysis of energy market integration scenarios including trade liberalisation of energy commodities and energy subsidy reduction in the EAS region. Our analysis indicates that an integrated energy market will promote the economic growth of this region as a whole, but some EAS member countries will see a reduction in their national gross domestic product. This means that appropriate regional cooperation including some compensating schemes for potential losers is necessary to realise the potential benefit of energy market integration in this region.

## I The EAS region needs a robust energy system for uninterrupted development

Over the last couple of decades, the East Asian Summit (EAS) region consisting of 16 member countries including China and India, attained the highest level of economic growth in the world.<sup>1</sup> As a consequence, energy demands in this region have also grown at the fastest rate in the world. The International Energy Agency (IEA) estimated that by 2030 the cumulative energy demand of the whole EAS region will be around 7-8 Billion tons of oil equivalent (Btoe) to maintain the same rate of economic growth (IEA,2008). At the same time, the EAS region has huge untapped potential energy sources with relatively cheaper production costs.

Currently, except for a few bilateral and multilateral initiatives, the EAS member countries are independently trying to secure their respective energy supply chains. Under increasing threat of resource and environmental constraints, along with ongoing market structural changes, it has become risky, expensive and unreliable to depend too heavily on domestic actions. Moreover, energy resources are geographically widely spread out with varied potentials of extraction in this region, and the geographical variability is also large in the technical and financial capacities of

the governments to use them. This is further hindering rational extraction of those resources, and preventing the efficient and effective processing and utilisation. The region's energy demand pattern and future prospects are also varied in nature from country to country. There is extreme variability in energy market conditions which is a stumbling block for narrowing down the current development gap of this region. Table 1 shows the widely varied ratios of energy production to supply (energy self-sufficiency) of the major countries in this region.

**Table 1** Ratios of domestic energy production to supply (descending order in 2008)

Country	2000	2008
Australia	2.16	2.30
Indonesia	1.55	1.75
Myanmar	1.23	1.47
Malaysia	1.61	1.28
Vietnam	1.30	1.20
China	0.97	0.94
New Zealand	0.85	0.87
India	0.80	0.75
Cambodia	0.81	0.70
Thailand	0.61	0.60
Philippines	0.49	0.57
Korea	0.17	0.19
Japan	0.20	0.17

Source: IEA, 2010. Nuclear energy is counted as domestic energy production.

<sup>1</sup> EAS member countries are; Australia, Brunei Darussalam, Cambodia, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Myanmar, New Zealand, Philippines, Singapore, Thailand, and Viet Nam.

Except for Australia, Indonesia, Malaysia, Vietnam and Myanmar, most EAS member countries are below 1, which means they depend on energy supplies from external sources. Countries like Japan, Korea, India and the Philippines need a robust energy supply chain for the future in order to secure their growth prospect. These facts set the rationale for regional cooperation on energy issues.

Against this background the Energy Cooperation Task Force of EAS asked the Economic Research Institute for ASEAN and East Asia (ERIA) to conduct a study on energy market integration, and IGES was commissioned to conduct economic analysis to quantitatively assess energy market integration scenarios (see Box 1). Among various bottlenecks for realising an integrated energy market, we focus on the potential impacts of addressing the following two major barriers for market integration in the East Asia region:

1. Existence of a non-uniform energy trading market in the region which causes difficulties in unification. Countries have different levels of domestic and export/import taxes, and varying subsidies on energy commodities and products. As a result, the FOB/CIF prices vary widely across the region preventing the creation of a level playing field in the market for energy trade and exchange.

2. A non-uniform energy pricing mechanism is also a potential threat for market integration especially when the energy subsidies play a key role to determine the market price in certain countries in the region. Every country has its own pricing mechanism starting from administered pricing to free market pricing, and also has various levels of government regulation. An individual country's currency strength also plays a crucial role in this context. Furthermore, financial and policy risks are high and dispersed.

**Box 1 Analytical tool of this study: REPA model**

The REPA model is a multi-regional computable general equilibrium (CGE) model developed for conducting policy impact assessment in East Asia (Kojima 2008). General equilibrium models can take into account interactions among all sectors in the economy and are suitable to conduct impact assessment of policies which affect various sectors such as energy policies. Please note that this model assumes a perfectly competitive market where all factors are fully employed. To conduct this study, we employ a 22-region 32-sector aggregation of the GTAP database Version 7. The REPA model employs a recursive dynamic approach to conduct policy impact assessment up to 2020, in which the base datasets corresponding to the year 2004 are updated by giving exogenous macroeconomic shocks. It means that this model assumes fixed saving ratios of the households.

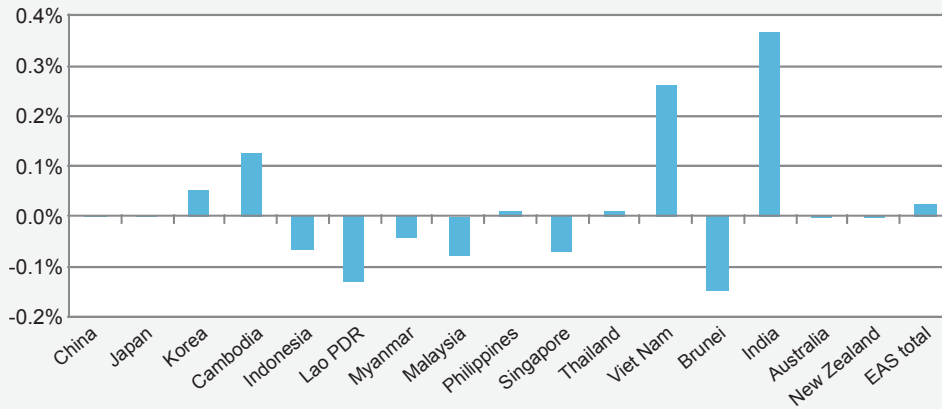
**2 Trade liberalisation of energy commodities will increase regional GDP in the EAS region as a whole, with increased CO<sub>2</sub> emissions**

To address these bottlenecks, the first step would be to remove the trade barriers among the member countries. Quite often this is seen as a risk to domestic producers and also to international market competitiveness due to the increased chance of higher energy prices. Our analysis shows that if the East Asia region fully removed its energy commodity trade barriers in terms of export and import tariffs, the regional GDP will slightly increase compared to the business as usual scenario. However, country-specific economic impacts vary widely, and some countries may see a reduction in their GDP (Figure 1).

These mixed results indicate that some compensation schemes may be necessary to convince all member countries to remove energy commodity trade barriers.

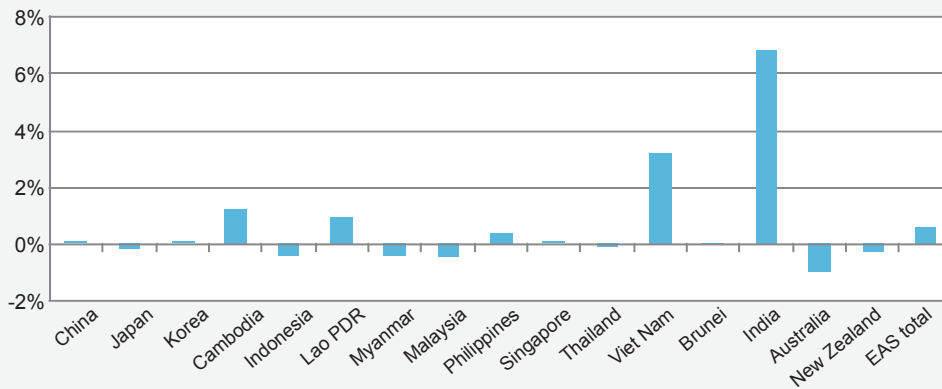
The accelerated economic growth in the region as a whole will result in increased CO<sub>2</sub> emissions as shown in Figure 2.

There is a clear correlation between the impacts on real GDP change and on CO<sub>2</sub> emissions, but there are some exception such as Thailand which will enjoy a win-win scenario in terms of increased real GDP with reducing



Source: Bhattacharya and Kojima, 2010

**Figure 1** Impact of energy commodity trade liberalisation on real GDP



Source: Bhattacharya and Kojima, 2010

**Figure 2** Impact of energy commodity trade liberalisation on CO<sub>2</sub> emission

CO<sub>2</sub> emissions. On the other hand, Lao PDR will be the exact opposite, losing GDP but increasing CO<sub>2</sub> emission.

Another important aspect of market integration is the domestic prices of energy commodities and their impact on trade competitiveness. Figure 3 shows

that energy prices will have a mixed impact with both increase and decrease after the trade liberalisation. Nevertheless, the range of changes, in particular those of price increases, is not very high. The exceptions are for the price of coal in India, and Vietnamese gas and petroleum prices, all of which will fall significantly.

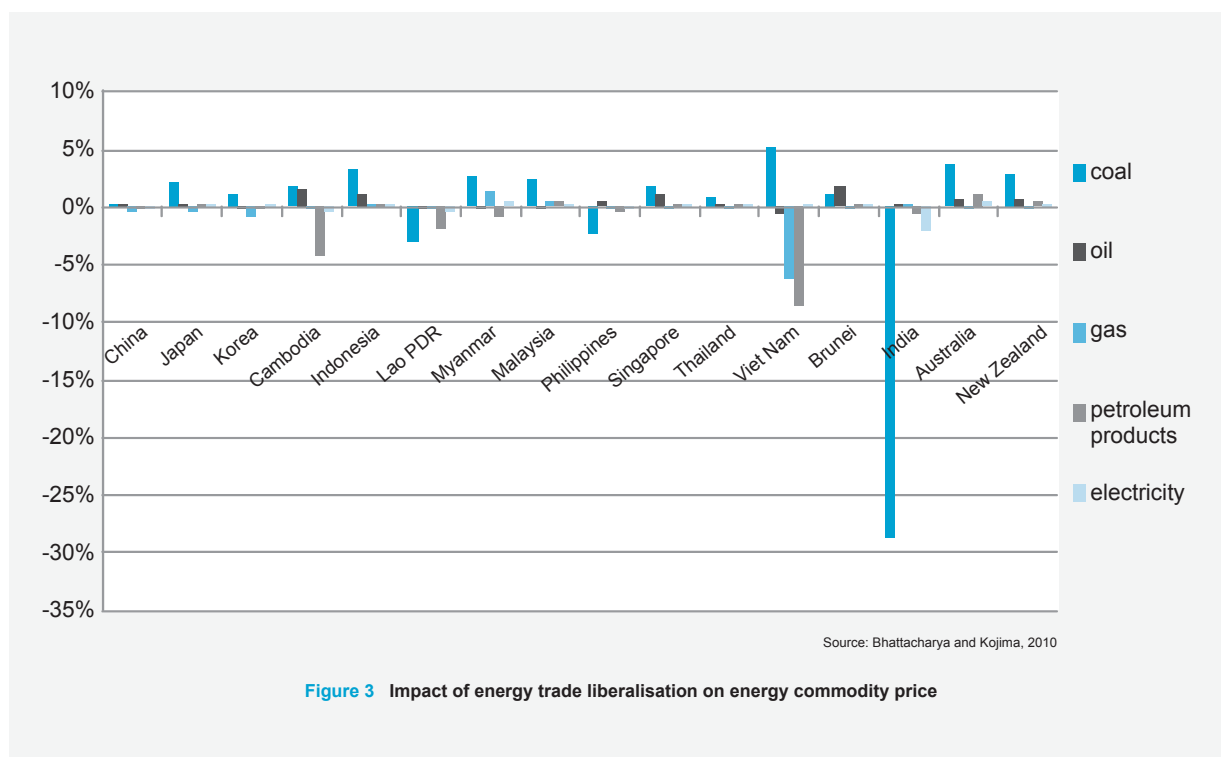


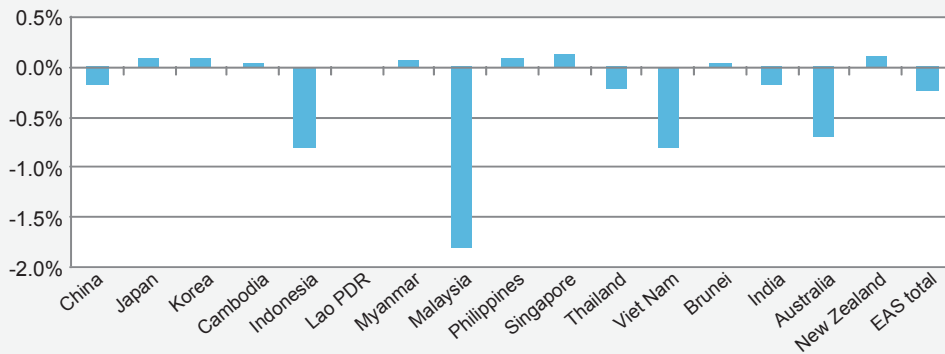
Figure 3 Impact of energy trade liberalisation on energy commodity price

### 3 Energy pricing reform will reduce CO<sub>2</sub> emissions across the whole EAS region

In the context of the second bottleneck of non-uniform energy pricing, energy subsidies play a vital role. It has been observed that there is a range of subsidies in the energy sector given by respective governments to meet their different economic and political agendas. On the other hand, subsidies can have negative effects such as distorting the energy market and creating a huge financial burden for the governments. The lawmakers of the EAS region have acknowledged that the energy subsidies do in fact hinder the national development and energy market integration process (EMM, 2010). However, it is very unpopular and difficult to remove these energy subsidies, as such action results in an energy price increase. It is important to demonstrate its benefits both in economic and environmental terms, and to design the policy with appropriate compensation schemes for potential losers, in particular poorer segments of the society. Our analysis tries to shed light on this issue, but due to the technical limitations of the database in which the sector disaggregation is not sufficiently detailed,

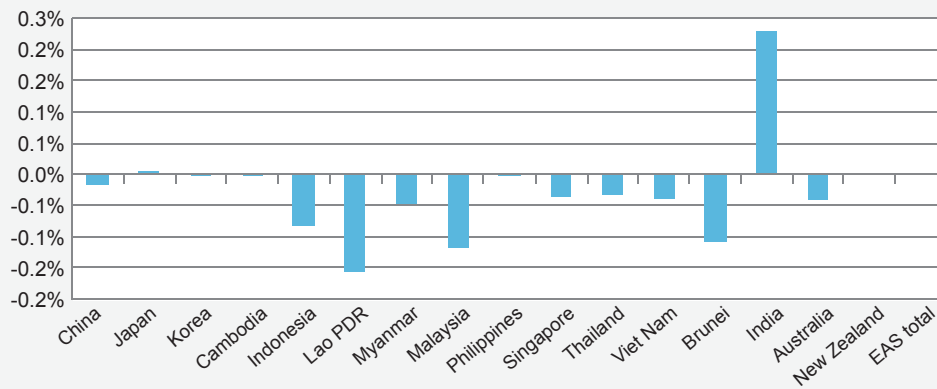
we could not single out subsidised energy commodities. For example, kerosene is often heavily subsidised but in the database, kerosene is combined with other taxed petroleum products such as gasoline, and consequently petroleum products as a whole are net taxed. In our analysis, subsidy removal is modelled as an equivalent tax increase. It means that our analysis captures only the energy efficiency improvement effect of subsidy removal but not the market distortion reduction effect. Our analysis shows that 10% of subsidy reduction for energy commodities will slightly reduce CO<sub>2</sub> emissions of the EAS region as a whole by 0.23%. As shown in Figure 4, countries associated with heavier energy subsidy such as Indonesia and Malaysia CO<sub>2</sub> the emission reduction effects are larger.

In terms of economic impacts, our analysis shows that the regional real GDP will not reduce across the whole EAS, but some countries will suffer negative impacts, as shown in Figure 5.



Source: Bhattacharya and Kojima, 2010

**Figure 4** Impact of energy subsidy reduction by 10% on CO<sub>2</sub> emissions



Source: Bhattacharya and Kojima, 2010

**Figure 5** Impact of energy subsidy reduction by 10% on real GDP

Here we would like to emphasise again that our analysis does not capture market distortion reduction effects of energy subsidy removal, from which we

expect positive impacts on GDP of the region as a whole.

## 4 Regional cooperation will enable energy market integration to benefit EAS members

Given the complexity of the energy market in the East Asia region especially due to rapid changes in the political, economic and environmental situation, it is important to have a long-term vision of energy supply and demand from the angle of an integrated market. The major benefits of integration could be a secure, affordable and reliable energy supply for the region in the future. This could further act as a risk-hedging strategy to counter the unforeseen risks of energy supply for uninterrupted economic development. Standard instruments of market integration include removal of trade and non-trade barriers for energy commodities, uniform energy pricing mechanisms, cross-border investments for energy infrastructure developments. These instruments all seem capable of supporting an integrated market structure in the region provided certain post integration measures are taken. The major concerns of governments with regard to market integration are loss of market competitiveness of their products in international trade,

loss to domestic energy markets and loss of domestic employments etc. However, this study is very indicative with plenty of strong and uncommon assumptions, and it demonstrates that the conventional perception of the lawmakers regarding energy market integration, is not necessarily true. Potential benefits of energy market integration can be seen, in terms of removal of trade barriers for energy commodities and energy subsidy reform. The integrated energy market is not generally an impediment to domestic economic growth; rather it can act as an economic booster for the region. Appropriate regional cooperation including some compensating schemes for potential losers will provide the enabling conditions for promoting it. This result is consistent with the current effort of EAS members to strengthen regional cooperation on energy issues. There is plenty of scope to use such mechanisms to protect, develop and secure the domestic market and economic development of the individual country while staying integrated.

---

• **Acknowledgement**

This policy brief is based on part of the research project “Energy Market Integration in the East Asia Summit Region Phase 2” funded by the Economic Research Institute for ASEAN and East Asia (ERIA). We are grateful for ERIA’s kind financial support. The expressed views and opinions as well as any remaining errors are our own.

• **Bibliography**

APERC. 2006. *APEC Energy Demand and Supply Outlook*. Tokyo: Asia Pacific Energy Research Centre  
Bhattacharya, Anindya, and Satoshi Kojima. 2008. Impact of Cross Border Energy Infrastructure Investment on Regional Environment, Society and Climate Change. Background paper to Infrastructure for Seamless Asia. Tokyo: Asian Development Bank Institute.  
Bhattacharya, Anindya, and Satoshi Kojima. 2010. Economic Impact Analysis of East Asia Energy Market Integration. Final Report Submitted to Economic Research Institute for ASEAN and East Asia. Hayama.  
IEA. 2008. *World Energy Outlook*. Paris: International Energy Agency.  
Kojima, Satoshi. 2008. REPA Model for Impact Assessment of Environmental Policies under Regional Economic Integration in East Asia. IGES-EA Working Paper 2008-001.

---

**Institute for Global Environmental Strategies**

2108-11 Kamiyamaguchi, Hayama, Kanagawa, 240-0115 Japan  
TEL : +81-(0)46-855-3700 FAX : +81-(0)46-855-3709 E-mail: [iges@iges.or.jp](mailto:iges@iges.or.jp) <http://www.iges.or.jp>

Copyright © 2011 Institute for Global Environmental Strategies. All rights reserved.

Although every effort is made to ensure objectivity and balance, the publication of research results or their translation does not imply IGES endorsement or acquiescence with their conclusions or the endorsement of IGES financiers. IGES maintains a position of neutrality at all times on issues concerning public policy. Hence conclusions that are reached in IGES publications should be understood to be those of the authors and not attributed to staff-members, officers, directors, trustees, funders, or to IGES itself.