**2014**REEPS(<http://www.reeps.org/index.html>)

**Proposal to E3 Modeling for a Sustainable Low Carbon Economy in East Asia**

**Introduction:　Background and Purpose of the Proposal**

**Introduction**

This study examines policies aimed at the development of sustainable, low-carbon economies; the current status and remaining issues are discussed for Japan, China, South Korea, Taiwan, and other East Asian countries and regions.[[1]](#footnote-1) We consider how the policies in the countries of this increasingly environmentally and economically interdependent region compare with those of the rest of the world. To this end, we employ advanced economic, environmental, and energy (E3) models, mainly Cambridge Econometrics E3 global econometric model (E3ME), and a set of applied general equilibrium models for quantifying the effects of the energy- and environment-related reforms pursued by each country. We evaluate the effect that each policy has on the legislating country and on other countries. In addition to quantitative effects, we consider in detail the qualitative effects of such policies to discern trends in areas such as sustainable energy utilization, elimination or reduction of greenhouse gases, and the promotion of green growth.

Most previous E3 model analysis of East Asian policies has concerned single countries; very few have comprehensively analyzed the interdependent East Asian economies. As a result, the trend and spillover in related policy reform in East Asia is not very well understood.

Economic interdependence between the countries of East Asia has been increasing recently, which has also resulted in increased international competition between the corporate and industrial sectors of these countries. This trend may be accelerated by Further development of international free-trade agreements for finance and services, such as the Trans-Pacific Partnership and the Japan–China–South Korea Free Trade Agreements, which are currently controversially discussed.

This has made it increasingly difficult for governments to introduce policies that might burden domestic industries, even for environmental and energy measures that have been demonstrated to be effective at the macroeconomic level.

One significant problem that East Asian countries face is a reliance on imported resources, fossil fuels in particular, that are subject to extreme market volatility. Whether or not they are intended to address climate change, improvements to renewable energy technology and energy-use efficiency are expected to make positive economic contributions to countries in the region through a reduction in fossil fuel imports. The effect of policies and measures to promote this tends spread beyond borders through technology transfer and trade of related products.

Consideration of future energy and environmental reforms in East Asia therefore requires more than a single-country framework: it requires a simultaneous and comprehensive examination that considers the effects of policy, both positive and negative, on all the economies in the region.

This study aims to improve the fundamental understanding of energy and environmental initiatives that strongly affect economic and industrial policy and thus to facilitate improved policy coordination among the countries of East Asia.

**Environmental policy in East Asia**

Two economic methods of environmental policy reform are typically recommended by environmental economists as effective and desirable from economic, environmental, and energy viewpoints: emissions trading schemes (ETS) and environmental tax reform (ETR). A representative example of ETS is the large-scale European Union cap-and-trade system (EU-ETS), which was implemented in 2005 and for which various effects have been reported. ETR entails increased taxation of energy and those goods that increase environmental load, thereby allowing decreased tax burdens in other areas such as labor taxes. Such policies have been implemented in Germany and several Northern European countries, and there are indications that they may materialize “double dividend” of improved environmental and economic outcomes (through increases in GDP and employment, etc.). Movement toward introducing such measures in advanced industrial countries of East Asia, such as Japan and South Korea, has begun in recent years.

In 2012, Japan became the first Asian country to introduce a carbon tax in the form of an additional tax on oil, coal, and natural gas. The tax is quite low, however, at only 289 yen(about 3 US$) yen per ton of emitted carbon dioxide and, because revenue from this tax is not explicitly slated for application to lowering other taxes, this cannot be regarded environmental tax reform and has no prospect for a double dividend.

South Korea will implement an emissions trading scheme in 2015. Due to industry opposition, however, this will be implemented in a weakened form. Taiwan, too, has continued efforts at implementing policies to effectively combat climate change despite strong political opposition. Following the 2011 Fukushima nuclear accident, there has also been increased interest in renewable energy sources as an alternative to nuclear power in Japan.

In China as well, there has been at least some progress toward implementing international climate change policies. For several years now, the government has been considering implementation of a carbon tax. A CO2 emissions trading market has already been established in Shenzhen, and occasional pilot markets can be seen in other cities. There are plans in place for nationwide emissions trading to begin around 2020.

With the exception of Vietnam’s introduction of an environmental protection tax in 2012, there has been little movement among ASEAN countries toward policy reform for the establishment of low-carbon economies. Indeed, subsidies that encourage fossil energy consumption continue.

**Emission targets and the power sector**

In relation to the sustainability of energy supply in East Asia, the use of nuclear power and renewable energy sources that do not emit CO2 during power generation remain as important issues.

Japan has set a goal of reducing greenhouse gas emissions to 75% of 1990 levels by 2020, and further expansion of nuclear power remains the primary means for doing so. The 2011 accident at the Fukushima Daiichi nuclear power plant has hampered such policies, however, causing the Japanese government to show indications of significantly easing its greenhouse gas reduction targets. In contrast, China and South Korea still position nuclear power as the centerpiece of their low-carbon policies, and have maintained their plans for nuclear power expansion. Nonetheless, increased use of nuclear power will not necessarily be sufficient for greenhouse gas emission reduction in the face of increased energy demands, and nuclear power poses significant potential risks to neighboring countries.

Policies for promoting renewable energy in Japan and South Korea shifted significantly in 2012. Japan moved from its previous renewable portfolio standard (RPS) to a feed-in tariff (FIT) system; South Korea moved in the opposite direction, from a FIT system to an RPS. Interest in the widespread use of renewable energy is increasing worldwide, and East Asia is no exception. FIT systems and RPSs play major roles in promoting such interest, and these methods are being adopted not only in Western countries but also in many other nations throughout the world. Discussions continue regarding which measures best promote renewable energy adoption and economic growth. Countries, such as Germany and Spain, that have adopted FIT programs have seen rapid adoption of renewable energy sources, whereas countries adopting RPS schemes have seen little. This provides evidence that FIT is the better method. However, both Germany and Spain have recently been reevaluating FIT in response to claims that such programs increase the economic burden related to the expansion of renewable energy on economic agents such as individual households.

Many states in the United States have adopted RPS programs. At the present time, when the measures to disseminate these technologies are not market competitive, it is impossible in the short term to avoid incurring policy-related costs. FIT in particular involves explicit systemic costs; this is both an advantage and a disadvantage. Given these circumstances, the meaning behind the above-mentioned policy changes in Japan and South Korea, and the means by which China and other countries will realize expansion of renewable energy utilization, are of particular interest. The effects of measures taken by one country affect other countries in turn through import of related equipment. This helps to foster related industries. Effective policy coordination is therefore significant and should be preceded by a thorough policy analysis to determine those effects that extend over international borders, both in terms of renewable energy-related policies and their cross-national and cross-industry effects.

**Objectives of this study**

This study uses advanced E3 models for quantitative analysis and appraisal of the effects and interactions of systems reform in East Asia. Our research is characterized by reconstructing the E3ME model, which has been successfully applied to various analyses of environmental tax reforms and climate change policies of European and international organizations. We use this as a base for a new E3ME(-ASIA ), being developed in cooperation with Cambridge Econometrics.

The main tool for E3 model analysis in Asia has been computable general equilibrium (CGE) model. The CGE model is characterized by theoretical consistency and its ability to comprehensively model the relation between economic activity and energy consumption; this makes it a highly useful tool for policy simulation analysis. However, typical CGE supposes stringent theoretical premises—total market equilibrium and full employment—limiting its application for analysis under the poor international economic conditions seen today. It is thus important to compare the model’s results with those of simulations developed using statistical methods that rely on actual past data, by employing macro-econometric models that allow for less-than-full employment. E3ME is a multi-sector macro-econometric model of unparalleled scale, encompassing 48 major countries and regions, predominantly Western countries. Most Asian countries have not been explicitly modeled by current model versions, so as-is application in analysis is not possible. We therefore supplement E3ME using Cambridge Econometrics and Asian nation datasets to develop the E3ME-ASIA model. We then use the developed model for analysis.

In addition to CGE and macro-econometric models, other E3 models arising from completely different theoretical backgrounds also exist. In this study, we use bottom-up technology models to examine the other methods of analyzing similar energy- and environment-related systems, and we compare the results from those systems to the results from E3ME.

**Ⅱ　Contents**

The present research is divided into the following three themes, and results are given for each theme.

**Introduction**

*Soocheol Lee/Pollitt Hector/Seung-Joon park*

**PART 1: The sustainability of energy usage in East Asia**

**Brief Introduction**

In this section, we examine the latest information regarding East Asian policy reform related to energy supply and demand (particularly those regarding the promotion or abandonment of nuclear power), promotion of renewable energy, and power supply systems. The information is compiled and analyzed with the cooperation of local researchers.

In particular, there are numerous indications of desirable policy measures for renewable energy proliferation in East Asia; these can be learned from the results of the FIT and RPS implementations that were part of recent system reforms in Japan and South Korea. There is also an urgent need to review low-energy-cost policies (low energy taxation rates, low electricity rate through state-owned power companies) given the continued reliance on nuclear power as the central pillar of low-carbon energy policies in China and South Korea, policies that continue today despite the Fukushima accident.

The public is likely to react strongly to reform of energy prices. The results of policy simulations from macroeconomic models to examine the economic and environmental effects of implementing price optimization as a part of power and energy system reform are therefore especially important.

**PART 2: Environmental tax reform for environmental and economic balance**

**Brief Outline**

This section is a proposal for desirable ETR in light of current economic developments and the political situation in East Asian nations. On the basis of taxation systems of East Asia, we propose reforms that are most likely to lead to double dividend effects. We do so by applying the results of model analysis of ETR’s economic and environmental effects on both the implementing country and its neighbors.

From the results of E3ME-ASIA and other modeling, we propose methods for optimal balancing of environmental and economic/social concerns for each country through tax recycling, in which tax revenue is returned to the economy through reduced corporate and income taxes.

**PART 3: Trade and Interdependency of Economy and Environment in East Asia.**

**Brief Outline**

This section provides a quantitative appraisal of the economic effects (in terms of GDP, employment, etc.) and environmental effects (in terms of CO2 emissions, release of harmful pollutants, etc.) of participation in the Japan–China–South Korea Free Trade Agreement and the Trans-Pacific Partnership for both the participating nations and other nations. From this appraisal, we describe the trend of increased greenhouse gas emissions brought about by the economic stimulus resulting from participation in such economic agreements and describe energy and environmental policy reforms designed to combat such effects.

**CONCLUSION**

*Towards Desirable Energy and Environmental Policy Design(differences, recommendations for improvement, etc) and Cooperation in East Asia for the Sustainable Low Carbon Economies*

**APPENDIX**

*Structure and Prospects of E3ME-ASIA*

On the basis of the research described above, we discuss problems of energy and environmental policy reform for the development of low-carbon economies and give specific proposals for sustainable reform. Such reform will help balance the need for economic stimulus with the transition to a low-carbon economy. We also make recommendations for policy coordination among the countries of East Asia.

**Ⅲ　Schedule of Call for Papers**

**\*Note: First authors(not coordinators) have a responsibility to submit abstract and papers by dead line.**

1. Title and abstract deadline(A4, 1 page)

January 7 , 2013

1. Title and Abstract reviewed by editors and send a list of chapters and proposal to Routledge)

January 1, 2014~January 30, 2014

1. Proposal and a list of chapters reviewed by the Routledge

February ,2014

1. Submit the first draft of paper

August 31, 2014

1. Workshop at Tokyo or Nagoya or ? for discussing the first draft of paper

Around September

1. Full paper dead line

December 31, 2014

1. Full paper reviewed by editors

January 1, 2015~January 31, 2015

1. Full paper revised by authors

February 1,2015~February 30, 2015

Native check(if needed and possible)March 1, 2015~March 30, 2015

1. Submit to Routledge

April 1, 2015

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1. The term “countries and regions” is used here to accommodate for the China–Taiwan issue, which makes it problematic to simply call Taiwan a country. In the remainder of this paper ‘countries and regions’ will be abbreviated to just “countries” for the sake of simplicity. The authors and editors would like to clearly state that we understand the complexity of this issue, and we are by no means making any statement about the statehood of Taiwan by our use of the word “countries.” [↑](#footnote-ref-1)