

REEPS

September 20~21,2014 Nagoya

**Introduction : E3 Modeling for a
Sustainable Low Carbon Economy
in East Asia**

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1. In recent decades East Asia has become established as a key part of the global economy. The region now includes both the second and third largest global economies and it seems only a matter of time before China passes the US to become the world's largest economy.

2. The rapid growth in living standards in China and the number of people removed from poverty is almost unprecedented in history and has undoubtedly improved the lives of hundreds of millions of people. Such rapid growth has brought new social and environmental challenges that are increasingly becoming the focus of new policy in China.

3. At the same time the other major economy in the region, Japan, has gone through a period of economic stagnation that is in part due to a declining and ageing population. Although there are now some signs of recovery, Japan faces its own unique challenges which, after the nuclear disaster in 2011, include determining its future energy supply.

4. In this book we focus on four countries or regions in East Asia, including also Korea and Taiwan (the world's 15th and 25th largest economies in 2013, respectively, according to IMF statistics). Current estimates show that in total the four countries or regions are home to 21-22% of the world's population and economic production.

5. This book describes the current situation and assesses policies that are aimed at the development of sustainable, low-carbon economies in East Asia. We consider how existing policies in the countries of this increasingly environmentally and economically interdependent region compare with those of the rest of the world, and how they could be improved upon.

6. In our assessments, we employ a range of analytical approaches, including the application of advanced energy-environment-economy (E3) models. Two distinct types of modelling are introduced in Chapter 2 and used throughout this book:

- A macro-econometric approach, using the global E3ME model
- Computable General Equilibrium (CGE) modelling

7. However, the analysis is not limited to macroeconomic modelling. Throughout the book other quantitative approaches are applied, including data analysis, input-output techniques and a separate simulation of the energy system. And not all impacts may be quantified; at various points we consider also in detail the qualitative effects of policies that are designed to promote low-carbon development and 'green' growth.

8. The book identifies three policy issues that will be critical in ensuring that the future East Asian economy is environmentally sustainable; each is allocated its own section

9. First we discuss the energy system, as overall decarbonisation will not be possible without a substantial reduction in emissions from the energy supply sector. As we shall explore, at present there are a range of policy measures in place to promote the use of renewables in East Asia that could be expanded (Chapters 3-5) but the possible role for nuclear power (Chapter 7) remains controversial.

10. In this section we also discuss the often-neglected issue of energy efficiency (Chapter 8) and also cover the related issue of energy security (Chapter 9).

11. The second part of the book assesses the potential for Environmental Tax Reform (ETR) and carbon pricing in East Asia. The use of market-based instruments in climate policy is becoming more common worldwide but is still in its development phase in East Asia.

12. Several different scenarios of possible future policy are explored in Chapters 10-12 and this section of the book also considers related issues such as fiscal deficits (Chapter 13), social distributional impacts (Chapter 14), human development by increasing human capital (Chapter 15) and international competition between neighbourhood countries (Chapter 16).

13. The final section in the book considers the relationship between energy/climate policy and international trade.

Recent growth in prosperity in East Asia has in part been due to increases in trade between member countries and several new deals are now on the table (Chapter 17, 18, 19).

14. As we shall see in this section, the interactions through trade are both complex and growing in importance, with the need for coordination of policy between countries becoming more pressing (Chapter 22, 23).

Issues that will be covered include competitiveness effects (Chapter 20), carbon leakage and border tax adjustments (Chapter 21).

We shall show that increased trade presents both opportunities and threats to developing sustainable and prosperous economies in East Asia.

15. While each of the three issues is allocated its own section in the book, the analysis shows that the interactions between them are strong and that they cannot be addressed in isolation. The concluding chapter therefore considers possible future policy options for East Asia across all three areas.

16. The ultimate aim of the book is to improve the fundamental understanding of possible future energy and environmental initiatives and thus to facilitate improved policy coordination between the countries in East Asia.