

An Overview of the Energy- Environment-Economic Modeling in Korea

- Focusing Research Efforts at KEEI

1st Korea Economic and Environmental Modeling Workshop in 2000(1)

Korea's Effort to Harmonize Three E's

- Energy and CO2 Emissions in Korea
- Korea's Efforts to Mitigate Global Warming
 - Measures and Investments for Energy Conservation and Efficiency Improvement
 - Voluntary Agreement and Development of New and Renewable Energy Source
- Discussion on the Challenges for the Future
 - Establishing a less Energy Intensive Industrial Structure
 - New Technology Development
 - Active Participation in International Cooperation related to the UNFCCC

1st Korea Economic and Environmental Modeling Workshop in 2000(2)

Bottum-up Approach

- Long-term Energy and Emission Forecasting Model
 - Disaggregated Sectoral Model
 - Final Energy Demand from Energy Intensity and fuel share
- EFOM_ENV Model
 - Structure of EFOM_ENV(4 sub's for energy use and 9 sub's for primary energy supply and transformation)
 - An application to find "Least-cost GHG abatement strategies and potentials based upon BAU and 10% GHG abatement
 - Limitation and future developments are presented such as data improvements and more refinement of policy vehicles, etc.

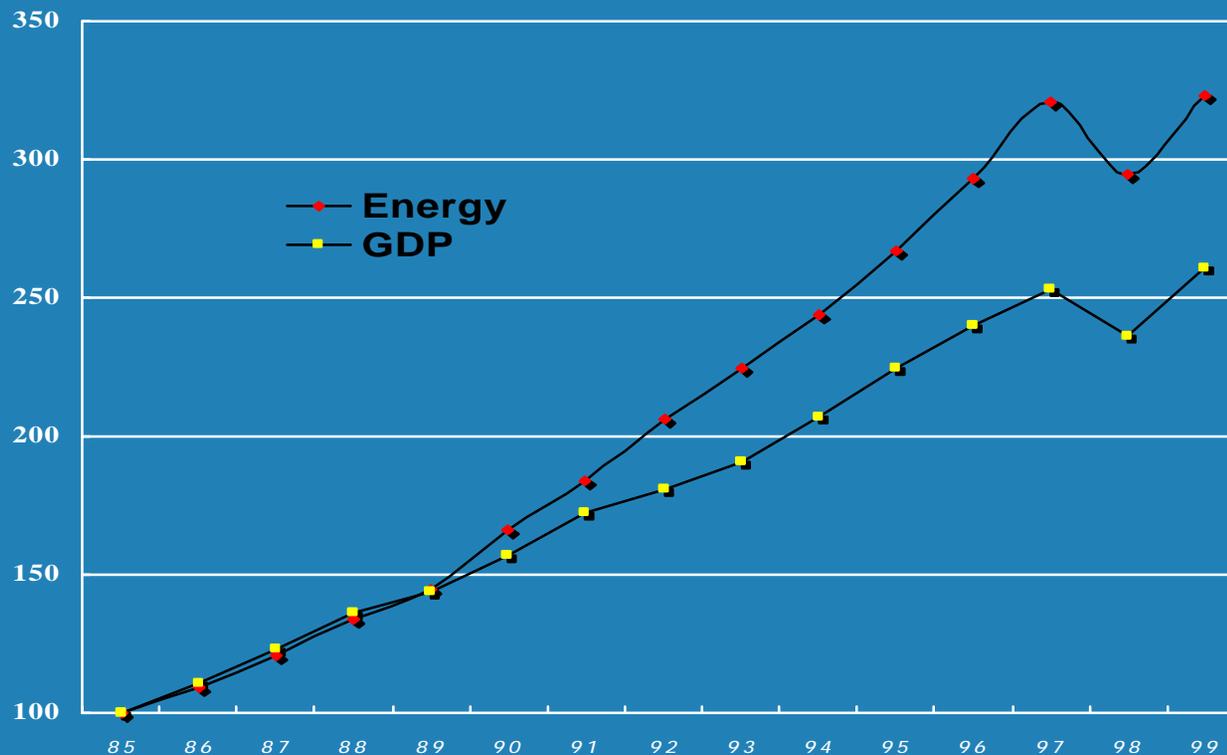
1st Korea Economic and Environmental Modeling Workshop in 2000(3)

Top-down Approach

- National CGE Model
 - Multi-sector, recursive dynamic model
 - Policy simulations for different GHG's abatement levels and policy tools such as carbon tax and emission tradings
- Global CGE Model
 - Based upon the benchmark dataset and economy structure of GREEN and EPPA
 - Impacts of Annex I countries' commitments and policies adopted on Korean Economy as well as the participation of Korea in GHG reduction commitment

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Energy Consumption and GDP Growth



Energy/GDP elasticity

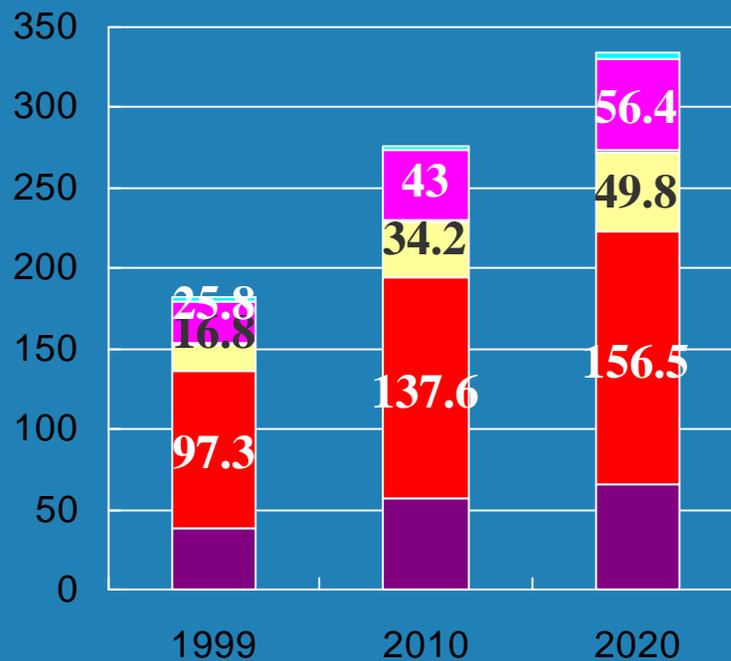
- 85 - 90 : 1.16
- 91 - 99 : 1.46

Growths (1985 - 1999)

- Steel: 9 → 23 MMT
- Cement: 21 → 49 MMT
- Ethylene: 0.6 → 5.2 MMT
- Cars: 1.1 → 11.2 mill

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Energy Outlook(MMTOE)



■ Coal ■ Oil ■ N. Gas
□ Hydro ■ Nuclear ■ NRE

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Futures of Korea Energy

- Energy Market Reform
 - Privatization of Energy Utility Industries(Electricity, District heating, Gas Industries)
 - Remove Price Control
 - Reform the tax structure for the fair competition among energy sources
- Environment improving Energy Consumption
 - Policies and measures to improve energy efficiency and conservation
 - Development of New and Renewable Energy Sources
 - tax reform to encourage to switch to low polluting energy sources

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Bottom Up Approach

- Revision of the Previous Energy Forecasting Model
 - Description of the revision efforts in KEEI
 - Pros and Cons of Revised Version
- Results
 - Energy and CO₂ Emission
 - Base year: 1999
 - Projected years: 2005, 2010, 2015, 2020

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Top Down Approach

- Two Different but supplementary National and Global Models
- KEEICGE V. 2.0
 - Fully dynamic national and global (from Sequential Dynamic Model)
 - Time varying elasticity of substitution
 - Based on GTAP-EG Data
 - Applied to Kyoto Mechanisms

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Top Down Approach

- GTEM-KOR / KORTEM
 - Dynamic components on debt, capital and population
 - Carbon dioxide, methane and nitrous oxide emission considered
 - Detailed representation of technologies used for electricity and iron and steel production
 - Based on GTAP-EG Data
 - Application to analyse climate change policy and trade policy.
- Continuing Efforts to compare the simulation results between two models

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For the future Collaborations

- Extends modeling efforts in depth and in scope
- Improve the mutual understanding of the outcome of researchers from different institutes
 - EMF type collaboration
 - Access the critical aspects of the differences in the outcomes

↙ Effective and Efficient International Cooperation for the sustainable Economic Growth ↘