

국제에너지기구(IEA) Workshop 참석 및 경제협력개발기구(OECD) 전문가 면담

1. 출장 개요

1) 출장목적

- IEA 주최 워크숍("Capturing the multiple benefits of energy efficiency: Roundtable on macroeconomic impacts") 참석 및 OECD 전문가 면담

2) 워크숍 개요

- 일시: 2013년 1월 24일~25일
- 장소: IEA 본부 (프랑스 파리)
- 참석자: 김영일, 김연수(이상 KDI), Didier Houssin, Markus Wrake(이상 IEA), Jean Chateau, Robert Dellink(이상 OECD), Terry Barker(Cambridge Center for Climate Change Research), Mikael Skou Andersen(European Environment Agency), John Appleby(Natural Resources Canada), Sam Thomas(UK Department of Energy and Climate Change) 등 관련 전문가 다수

3) 워크숍 주제

Session 1. Plenary session; modeling energy efficiency's macroeconomic benefits-recent results

Session 2. Discussion session; challenges and development needs for estimating macroeconomic benefits

Session 3. Plenary session; sectoral issues and approaches

Session 4. Discussion session; pros and cons of sectoral vs. economy-wide modeling approaches

Session 5. Plenary session; utilizing macroeconomic modeling to evaluate energy efficiency policies and programs

Session 6. Discussion session; Bringing it all together

2. 출장 일정

2013년 1월 23일(수)

- 인천 출발, 파리 도착

2013년 1월 24일(목)

- IEA workshop 참석(session 1~2)

2013년 1월 25일(금)

- IEA workshop 참석(session 3~6)

2013년 1월 28일(월)

- OECD 전문가 면담
- 파리 출발

2013년 1월 29일(화)

- 인천 도착

3. Workshop 내용 요약

Session 1. Plenary session; modeling energy efficiency's macroeconomic benefits- recent results

○ Issues for presentations and discussions

- Round tables on impacts of energy efficiency, mostly macroeconomic impacts such as impacts on GDP, trade balances, employment, disposable incomes, energy and other prices, and substitution effects across sectors, and so on

① World energy outlook 2012

- Assessing the multiple benefits of energy efficiency under the efficient world scenarios

② Macroeconomic benefits of the efficient world scenario

- Additional CGE effects are assessed using the OECD ENV-Linkages model.

③ Macroeconomic impacts of energy efficiency policies

- Assessing macroeconomic impacts of energy efficiency policies using CGE models and/or dynamic simulation models

④ Economy-wide impacts of energy efficiency in Germany

- Using PANTA RHEI model, macroeconomic-energy-environmental model based on bottom-up studies, potential for energy saving is assessed in different scenarios.

- Rebound effects in household consumption and industries are discussed.
- ⑤ Modeling the macroeconomic benefits of the energy efficiency directive
 - Using the econometric model, macroeconomic, sectoral distributional impacts are assessed.
- ⑥ Multiple benefits of investing in energy efficient renovation of buildings
 - Studies on public finances

Q&As

- The outcomes from energy efficiency may depend on whether the economy is on the production frontiers or not.
- Adaptation may affect the outcomes.
- Combined effects of policies
 - Co-benefits and co-costs of policy may make issues complicated.

Session 2. Discussion session; challenges and development needs for estimating macroeconomic benefits

- ① How to find the right models?
 - Approaches such as top-down vs. bottom-up may be considered in how to model.
 - May check important/essential aspects
 - Uncertainties are not addressed in CGE models; the weakness of CGE models
- ② What kind of outputs are needed from models?
 - Possible output of interest to policy makers
 - All models are useful for the insights that the models are intended to deliver
 - Losses in GDP and employment vs. prevention of catastrophic events
- ③ Rebound effects in energy efficiency
 - Important to understand rebound effects
 - Context matters
 - Time scale of rebound effects
- ④ Managing troublesome issues

Session 3. Plenary session; sectoral issues and approaches

- ① Options for accounting and modelling energy-economy interactions: a macroeconomic vs sectoral basis
 - Positive/negative side of increased efficiency in industrial energy
 - Positive/negative side of increased efficiency in household sector
 - Positive/negative side of rebound effects
- ② Impact of the German government's building rehabilitation program on public budgets
 - Study the impact of demand impulse (investment in construction and refurbishment) on government budgets w.r.t. taxes and social security contribution
- ③ Utilization of the three-ME (Multi-sector Macroeconomic model for the evaluation of environmental and energy policy) to model the macroeconomic benefits of Grenelle 2
 - Assess effects of carbon taxes on the economy in terms of GDP and the components
 - Recycling environmental revenues (eg. taxes) in other sectors for the reduction of labor cost for example may contribute to GDP growth
- ④ Estimating the jobs and macroeconomic benefits of a national building renovation program in Hungary
 - Assessment and quantification of additional co-benefits
 - Study impacts on net employment and non-employment areas in the short and medium term
- ⑤ Estimating the macroeconomic benefits of energy efficiency for the industrial sector
 - May raise the energy conversion efficiency

Session 4. Discussion session; pros and cons of sectoral vs. economy-wide modeling approaches

- ① To what extent energy efficiency measures(investments) crowd out other investments? Accounting for sectoral shifts, capital mobility and crowding-out
- ② If there were opportunities of gains from energy efficiency improvement, why would the government intervene in the free market system?
- ③ What makes energy efficiency investment different from other investments?
- ④ Where may sectoral models fit in better in contrast to macroeconomic

models?

- ⑤ All models are wrong but some models may be useful while some may be more useful than others

Session 5. Plenary session; utilizing macroeconomic modeling to evaluate energy efficiency policies and programs

- ① Incorporating economic modeling results into energy efficiency ex ante evaluation
 - Bottom-up models are used to assess investment needs in archetypes with household survey data used
 - Effects of public interventions are discussed.
- ② Assessing the macroeconomic benefits of a targeted energy efficiency policy
 - Impacts on GDP and employments are assessed given scenarios.
- ③ Economic analysis of residential energy efficiency improvements
 - CBA vs. macroeconomic modeling
 - Integration methods (including both CBA and macro-modeling) may be needed
- ④ Canada's integrated energy and macro economic modeling of energy efficiency gains
 - Two approaches: ENE vs. Energy 2020/Informetrica are used.
- ⑤ UK government analysis of energy efficiency policies: cost-benefits analysis, headline metrics and macroeconomic impacts
 - Macroeconomic impact of the carbon plan is studied.
 - Objectives/impact of policies/regulations are discussed.

Session 6. Discussion session; Bringing it all together

- ① Understanding the effect of assumptions and modeling approach on results
- ② Dealing with uncertainties associated with climate change and the economy
- ③ Coping with data shortfalls
- ④ Communicating results to treasuries
- ⑤ Communicating the relative significance of various macroeconomic benefits to policy makers
- ⑥ Interpreting the policy relevance of rebound effects

4. OECD 전문가 면담

① 참석자: 김영일, 김연수 (이상 KDI), Rob Dellink, Elisa Lanzi (이상 OECD)

② 회의 시간: 2013년 1월28일 오전

③ 회의 내용

□ 환경-경제모형(environment-economic model)에 대한 논의

- CGE models in three different types w.r.t to the degree of dynamics incorporated
 - Comparative statics
 - Recursive dynamics
 - (Perfect) foresight; close to Ramsey-Cass-Koopmans models
- IAM(Integrated Assessment Model)
 - DICE model by Nordhaus
- Big integrated models to be worth considering
 - PAGE model in Stern review
 - FUND model

□ 모형작업에 있어 (도전적인) 이슈

- 기후변화에 대한 적응과 기후변화의 영향과의 관련성
 - 기후변화의 영향(impact)은 기후변화에 대한 적응(adaptation)이 어떻게 일어나는가에 의존함.
 - 예를 들어, 기후변화에 대해 경제주체들의 반응(소비, 생산, 정부 등의 대응)이 어떻게 일어나는가에 따라 기후변화의 영향은 초기에 예상했던 것과 달라질 수 있음.
- Multiple layers of uncertainty
 - Uncertainties arise in linkages of emissions - climate change - economic damage
 - Systemic risk를 수량화하여 모형에 반영하기 위한 연구가 필요해 보이나 아직 제대로 다루지 못하는 상황
- What discount rates to use
 - How to discount future values may be important but hard to account for especially in modeling

- Extreme events may be important
- 기후변화, 건강, 경제적 영향과의 관련성
 - 건강과 경제적 영향과의 관련성 모델링 방향
 - 기후변화 - 건강(illness) - 노동생산성에 대한 영향 - 경제모형(CGE 모형 등)에 반영
 - The value of statistical life에 관한 문헌을 참고할 수 있음.
- 기후변화의 영향과 적응에 관한 최근 연구 동향
 - NBER research
 - Impacts of climate change on sectors
 - OECD
 - ADB has different models with climate change component
 - PNNL(Katherine Calvin)'s Asian modeling exercise (AME)
 - WHO
 - PBL
- 기후정책 연구의 기본 방향
 - Cost-benefit analysis
 - Adaptation options
 - How much damage can be reduced by adaptation
 - Costs of mitigation policies
 - Estimation of damage side
 - 국가 간 정책 협력과 개별 국가의 정책과의 관련성