Invitation to KIPF · UNESCAP · PCGG Joint Conference

Environmental Tax Reform & Environmental Fiscal Reform for Green Growth

환경친화적 조세 · 재정정책과 녹색성장

2011. 4

한국조세연구원 KOREA INSTITUTE OF PUBLIC FINANCE
UNITED NATIONS ESCAP Economic and Social Commission for Asia and the Pacific
GREEN GROWTH KOREA 대통령직속 녹색성장위원회

프로그램 개요

○ 09:00~09:30 환영사 및 축사

▪ 환영사 **원윤희** 한국조세연구원 원장
정래권 Director, Environment and Development Division, UNESCAP

▪ 축 사 **유일호** 국회의원
이용섭 국회의원
양수길 대통령직속 녹색성장위원회 위원장

○ 09:30~10:20 기조 연설

▪ 기조연설 **김상협** 대통령실 녹색성장환경비서관
「한국의 녹색성장: 현황과 과제」
Paul Ekins Professor, University College London Energy Institute
「환경친화적 세제개편: 녹색성장을 위한 정책」

○ 10:20~12:20 세션 Ⅰ『녹색성장과 조세정책』

▪ 사회자 **구정모** 강원대학교 경제학과 교수

▪ 발표자 **Stefan Speck** Project Manager, European Environment Agency
「녹색경제와 환경친화적 재정개혁: 세계 각국들의 경험」
정태용 글로벌녹색성장연구소 부소장
「개발도상국을 위한 녹색재정정책」
홍종호 서울대학교 환경대학원 교수
「한국의 녹색성장 전략: 과거와 미래」

▪ 토론자 **Kai Schlegelmilch** Vice President, Green Budget Germany
조영탁 한밭대학교 경제학과 교수

○ 12:20~13:40 오찬

○ **13:40~15:10 세션 Ⅱ 「환경친화적 조세·재정정책 방안」**

▪ 사회자 **안종석** 한국조세연구원 조세연구본부장

▪ 발표자 **Kai Schlegelmilch** Vice President, Green Budget Germany
「환경친화적 세제 및 지출개혁: 재정 및 경제에의 영향」
오진규 에너지경제연구원 연구위원
「한국의 기후변화 대응과 녹색성장정책」

▪ 토론자 **Anselm Gorres President**, Green Budget Germany
Stefan Speck Project Manager, European Environment Agency

○ **15:10~15:30 휴식**

○ **15:30~17:00 세션 Ⅲ 「탄소세 도입방안과 기대효과」**

▪ 사회자 **신동천** 연세대학교 경제학과 교수

▪ 발표자 **김승래** 한림대학교 경제학과 교수
「녹색성장을 위한 탄소세 도입방안」
Anselm Gorres President, Green Budget Germany
「녹색예산과 국민 수용성」

▪ 토론자 **전병목** 한국조세연구원 기획조정실장
Paul Ekins Professor, University College London Energy Institute

○ **17:00-18:00 종합토론**

▪ 사회자	**김동건**	한국조세연구원 초빙연구위원
▪ 토론자	**구정모**	강원대학교 경제학과 교수
	김승래	한림대학교 경제학과 교수
	전병목	한국조세연구원 기획조정실장
	정래권	Director, Environment and Development Division, UNESCAP
	Anselm Gorres	President, Green Budget Germany
	Kai Schlegelmilch	Vice President, Green Budget Germany
	Paul Ekins	Professor, University College London Energy Institute
	Stefan Speck	Project Manager, European Environment Agency

PROGRAMME

○ 09:00-09:30 Welcome Sessions

▪ Opening remarks;

Yun Hi Won	President, Korea Institute of Public Finance
Rae Kwon Chung	Director, Environment and Development Division, UNESCAP

▪ Congratulatory remarks;

Il Ho Yoo	Congressman
Yongsup Lee	Congressman
Soogil Young	Chairman, Presidential Committee on Green Growth

○ 09:30~10:20 Keynote Address

▪ Keynote speech;

Sang Hyup Kim	Secretary to the President for Green Growth and Environment, Office of the President Republic of Korea *Korea's green growth: where we are and where to go*
Paul Ekins	Professor, University College London Energy Institute *Environmental Tax Reform: A Policy for Green Growth*

○ 10:20~12:20 Session Ⅰ 「Green Growth & Taxation」

▪ Moderator;

Chung Mo Koo	Professor, Dept. of Economics, Kangwon National University

▪ Speaker;

Stefan Speck	Project Manager, European Environment Agency *Environmental Fiscal Reform in the context of Green Economy*

Tae Yong Jung	Deputy Executive Director, Global Green Growth Institute *Green Fiscal Policy and Developing Countries*
Jong Ho Hong	Professor, The Graduate School of Environmental Studies, Seoul National University *Green Growth Strategy of Korea : Past and Future*

▪ Discussants;

Kai Schlegelmilch	Vice President, Green Budget Germany
Young Tak Cho	Professor, Dept. of Economics, Hanbat National University

○ **12:20~13:40 Lunch**

○ **13:40~15:10 Session Ⅱ *Environmental Tax and Fiscal Reforms***

▪ Moderator;

Jong-seok An	Director, Research Group for Taxation, Korea Institute of Public Finance

▪ Speaker;

Kai Schlegelmilch	Vice President, Green Budget Germany *Environmental Tax and Fiscal Reforms: How they contribute to greening the economy and fiscal consolidation in Germany and Europe*
Jin-Gyu Oh	Fellow, Korea Energy Economics Institute *Climate Mitigation and Green Growth in Korea*

▪ Discussants;

Anselm Gorres	President, Green Budget Germany
Stefan Speck	Project Manager, European Environment Agency

○ **15:10~15:30 Coffee Break**

○ **15:30-17:00 Session Ⅲ** ***Carbon Tax & Economic Implications***

▪ Moderator;

Dong-Cheon Shin	Professor, Dept. of Economics, Yonsei University

▪ Speaker;

Seung-Rae Kim	Professor, Dept. of Economics, Hallym University *Carbon Taxation for Green Growth in Korea: The Design of Carbon Tax Scheme*
Anselm Gorres	President, Green Budget Germany *How to sell Greener Budgets to a critical public and the business community*

▪ Discussants;

Byung Mok Jeon	Director, Office of Planning & Coordination, Korea Institute of Public Finance
Paul Ekins	Professor, University College London Energy Institute

○ **17:00-18:00 Wrap-up Session**

▪ Moderator;

Dong-Kun Kim	Visiting Fellow, Korea Institute of Public Finance

▪ Panelists;

Anselm Gorres	President, Green Budget Germany
Byung Mok Jeon	Director, Office of Planning & Coordination, Korea Institute of Public Finance
Chung Mo Koo	Professor, Dept. of Economics, Kangwon National University
Kai Schlegelmilch	Vice President, Green Budget Germany
Paul Ekins	Professor, University College London Energy Institute
Rae Kwon Chung	Director, Environment and Development Division, UNESCAP
Seung-Rae Kim	Professor, Dept. of Economics, Hallym University
Stefan Speck	Project Manager, European Environment Agency

Keynote Address

Environmental Tax Reform: A Policy for Green Growth

Environmental Tax Reform: A Policy for Green Growth

By

Professor Paul Ekins
Professor of Energy and Environmental Policy
UCL Energy Institute, University College London

A presentation to the Conference
ETR/EFR for Green Growth

Seoul, Korea, April 27th, 2011

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Environmental sustainability/climate change mitigation: An unprecedented policy challenge

- Stern Review Policy Prescription for climate change
  - Carbon pricing: carbon taxes; emission trading
  - Technology policy: low-carbon energy sources; high-efficiency end-use appliances/buildings; incentivisation of a huge investment programme
  - Remove other barriers and promote behaviour change: take-up of new technologies and high-efficiency end-use options; low-energy (carbon) behaviours (i.e. less driving/flying/meat-eating/lower building temperatures in winter, higher in summer)
- The basic insights from the Stern Review need to be applied to the use of other environmental resources (water, materials, biodiversity [space])

Structure of presentation

- Why environmental taxes?
- Why environmental tax reform?
- Implications for economic growth

Why environmental taxes? (1)

For environmental taxation

- Market failure leading to excessive pollution and environmental destruction
- More efficient than regulation; more effective than voluntary agreements and information

For energy taxation

- Energy demand increases with income (income elasticity +0.5)
- Energy demand decreases with price (industry elasticity -0.6)
- Market failures for some energy efficiency technologies
- Improvements in energy efficiency lead to a rebound effect, and therefore save less energy than anticipated (up to 70%)
- Humans are extremely ingenious at finding new ways to use energy (heating drives, gardens, making artificial snow etc.)

Why environmental taxes? (2)

For carbon taxation

- Rich countries must achieve a minimum of 80% decarbonisation by 2050
- Only carbon pricing (taxing or trading) will stimulate the uptake and development of existing low-carbon and efficiency technologies, **and** reduction in the demand for carbon-based fuels

Conclusions from the literature

- Without environmental taxation, the (macro-economic) cost of environmental improvement will be higher than it needs to be
- Without significant increases in energy prices, energy consumption will go on rising
- Where the energy is carbon-based this will lead to increased carbon emissions and a failure to stabilise the climate

What is the potential of environmental tax reform (ETR)/ green fiscal reform (GFR)?

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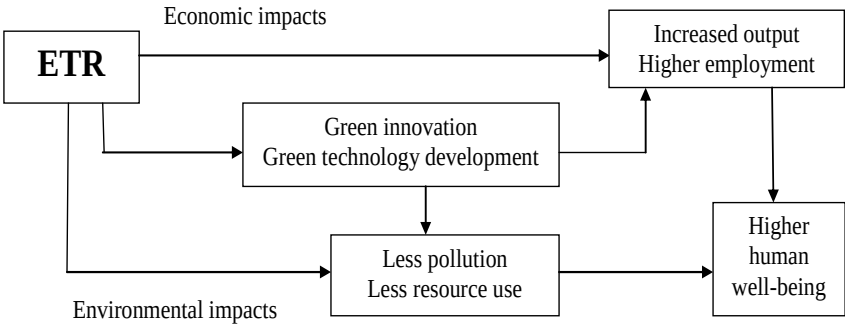
The definition of ETR/GFR

- ETR/GFR is the shifting of taxation from ‘goods’ (like income, profits) to ‘bads’ (like resource use and pollution)
- It may be implemented through a revenue-neutral ‘tax shift’
- It may be inferred by a rising proportion of environmental taxes in tax revenues

The potential of ETR/GFR:

ETR/GFR is the shifting of taxation from 'goods' (like income, profits) to 'bads' (like resource use and pollution)



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Relevant projects on environmental tax reform (ETR) or green fiscal reform (GFR)

- COMETR: Competitiveness effects of environmental tax reforms, 2007. http://www2.dmu.dk/cometr/
- petrE: 'Resource productivity, environmental tax reform (ETR) and sustainable growth in Europe'. One of four final projects of the Anglo-German Foundation under the collective title 'Creating Sustainable Growth in Europe'. Final report published October 29, Berlin, November 25, London. www.petre.org.uk
- UK Green Fiscal Commission. Final report published October 26, London. www.greenfiscalcommission.org.uk

What is the experience to date of ETR in Europe?

- Six EU countries have implemented ETRs: Denmark, Finland, Germany, Netherlands, Sweden, UK
- The outcomes – environmental and economic – have been broadly positive: energy demand and emissions are reduced; employment is increased; effects on GDP are very small
- Effects on industrial competitiveness have been minimal

- See Andersen, M.S. & Ekins, P. (Eds.) *Carbon Taxation: Lessons from Europe*, Oxford University Press, Oxford/New York, 2009

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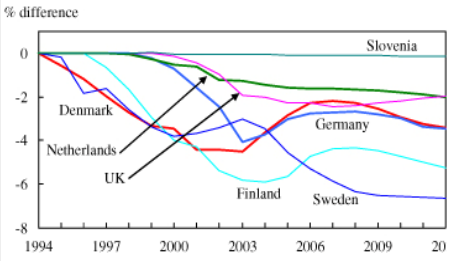
Factors that reduce impacts on competitiveness

- Not energy intensive
- Ability of relatively untraded sectors to pass on price increases
- Increased energy efficiency
- Increased innovation: Porter hypothesis; low-carbon industrial transition
- GFR and revenue-recycling

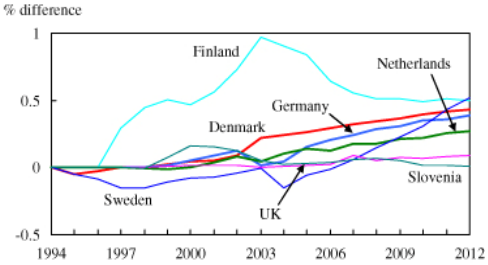
Environmental and economic impacts of ETR, from COMETR study, 2007

CHART 2: THE EFFECT OF ETR ON GHG EMISSIONS



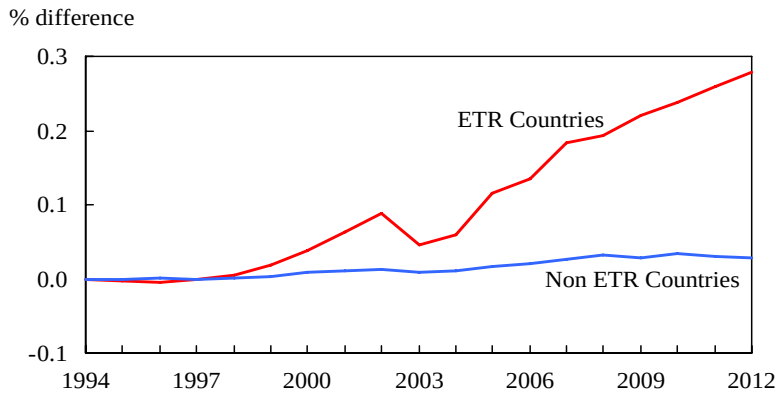
Note(s) : % difference is the difference between the base case and the counterfactual reference case.
Source(s) : CE.

CHART 3: THE EFFECT OF ETR ON GDP



Note(s) : % difference is the difference between the base case and the counterfactual reference case.
Source(s) : CE.

CHART 7.28: THE EFFECTS OF ETR: GDP IN ETR AND NON ETR COUNTRIES



Note(s) : % difference is the difference between the base case and the counterfactual reference case.
Source(s) : CE.

Insights from PETRE (Resource productivity and ETR in Europe)

- What opportunities are presented by ETR in Europe?
- What might a large-scale ETR in Europe look like and what would be its implications for the rest of the world?
- What are the obstacles to ETR in Europe?
- What might be a way forward for ETR in Europe?
- How can single European countries like Germany seek to implement their own ETRs?
- What are the implications of ETR for 'sustainable growth' in Europe?

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What might a large-scale ETR in Europe look like.....? (1)

- Two European macro-econometric models: E3ME, GINFORS.
- Models deliver insights, not forecasts or 'truth'
- Six scenarios:
  - Baseline with low energy price (LEP)
  - Baseline sensitivity with high energy price (HEP, reference case)
  - S1: ETR with revenue recycling designed to meet 20% EU 2020 GHG target (scenario compared with LEP Baseline) S1(L)
  - S2: ETR with revenue recycling designed to meet 20% EU 2020 GHG target (scenario compared with HEP Baseline) S1(H)
  - S3: ETR with revenue recycling designed to meet 20% EU 2020 GHG target (scenario compared with HEP Baseline) S2(H)
    - proportion of revenues spent on eco-innovation measures
  - S4: ETR with revenue recycling designed to meet 30% 'international cooperation' EU 2020 GHG target (scenario compared with Baseline with HEP) S3(H)

What might a large-scale ETR in Europe look like.....? (2)

Scenario	CO_2 price Euro2008/t	GDP % change from baseline	Employment % change from baseline	Labour productivity % change from baseline
S1(L)				
E3ME	142	0.6	2.2	-1.6
GINFORS	120	-3.0	0.0	-3.0
S1(H)				
E3ME	59	0.2	1.1	-0.9
GINFORS	68	-0.6	0.4	-1.0
S2(H)				
E3ME	53	0.8	1.1	-0.3
GINFORS	61	-0.3	0.4	-0.7
S3(H)				
E3ME	204	0.5	2.7	-2.1
GINFORS	184	-1.9	0.8	-2.6

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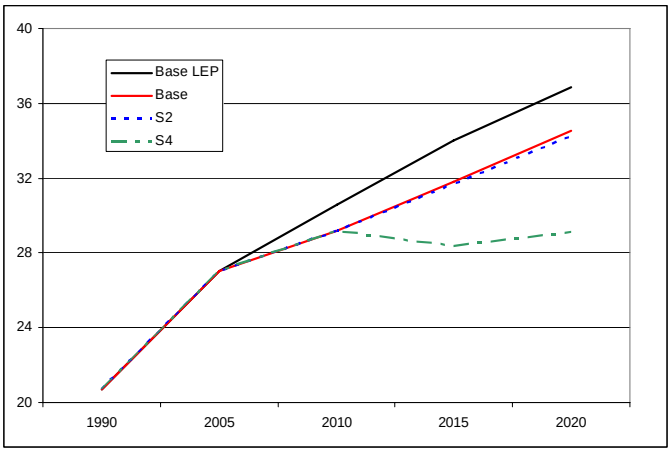
... and what would be its implications for the rest of the world?

CO_2 emissions- GINFORS



What might be a way forward for ETR in Europe (in a time of financial crisis)?

- Need for substantial new sources of tax revenue (tax pollution)
- Need for substantial new sources of employment (make employment cheaper)
- Carbon tax very similar to permit auction
- Energy Tax Directive in place – proposal to split between energy and carbon
- Carbon tax would put floor on permit price
- EU-wide carbon tax would dilute concerns about competitiveness (cf China)

Ekins, P. & Speck S. Eds. 2011 *Environmental Tax Reform: A Policy for Green Growth*, Oxford University Press, Oxford

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UK Green Fiscal Commission (1)

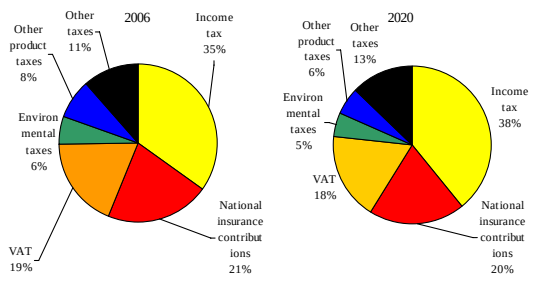
- Formed May 2007
- Ran to October 2009
- Independent of government (funded by Esmée Fairbairn Foundation and Ashden Trust)
- 22 Commissioners – to review and advise on work
  - 4 MPs, 3 Lords – politically balanced, senior political representation, shadow ministers
  - business, academic, NGOs (social and environmental)
  - FSA, MPC members
  - government observers – Defra and Treasury
- Paul Ekins, Director and Secretariat provided by Policy Studies Institute (PSI)

UK Green Fiscal Commission (2)

- Investigation of
  - Enonomic, social and environmental implications of major green fiscal reform (GFR) (share of environmental taxes in total revenues from 5% to 15-20% by 2020)
  - Public attitudes to GFR
- Modelling of scenarios
  - Three baselines (B1, B2, B3) – low, medium, high world market fossil fuel prices
  - Two GFR scenarios (S1, S2) – increase in transport, household and industrial energy taxes, and taxes on water and materials, reductions in income taxes (households) and social security contributions (business)
  - Two 'eco-innovation' scenarios (E1, E2) – spending 10% of green tax revenues on energy-efficient buildings, renewable energy and hybrid vehicles

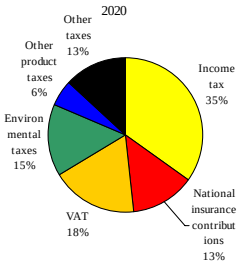
Green Fiscal Commission – revenues

COMPOSITION OF TAX REVENUE IN B1

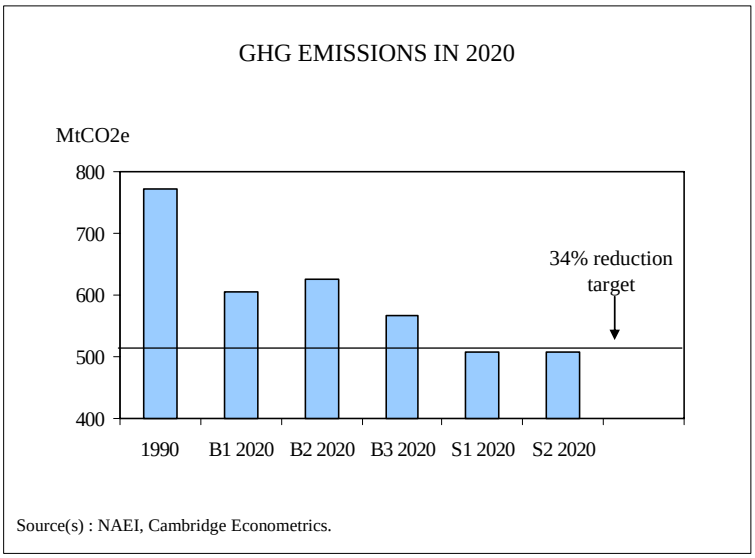


Source(s) : ONS and Cambridge Econometrics.

COMPOSITION OF TAX REVENUE IN S1

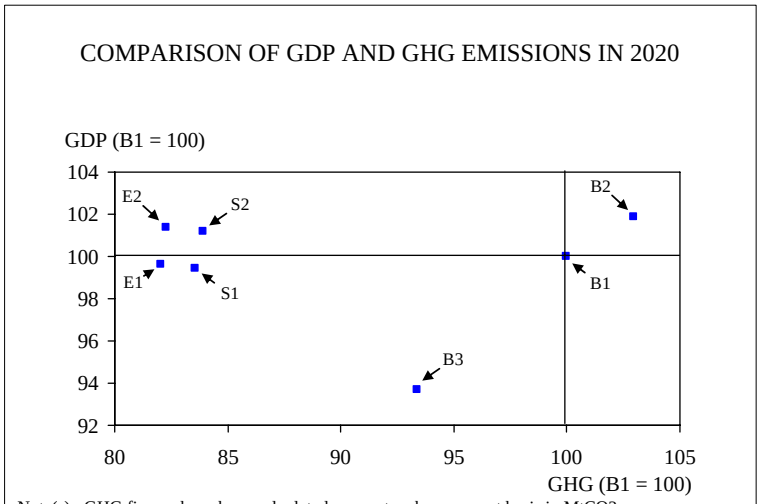


Green Fiscal Commission – GHGs



Source(s) : NAEI, Cambridge Econometrics.

Green Fiscal Commission – GDP/GHGs



Note(s) : GHG figures have been calculated on a net carbon account basis in MtCO2e.

Source(s) : ONS, NAEI, Cambridge Econometrics.

Green Fiscal Commission – Summary of Findings

- Environmental taxes work: they reduce environmental impacts
- Environmental taxes are efficient: they improve the environment at least cost
- Environmental taxes can raise stable revenues
- The public can be won round to Green Fiscal Reform (GFR)
- The UK's 2020 greenhouse gas targets could be met through GFR: small effects on output; positive effects on employment (450k in 2020)
- GFR would stimulate investment in the low-carbon industries of the future
- GFR can mitigate the impact of high world energy prices: unlike GFR, high world energy prices are bad for the UK economy
- The impacts of GFR on competitiveness can be mitigated: concerns of relatively few economic sectors can be addressed.
- Low-income households would need special arrangements
- **GFR emerges as a crucial policy to get the UK on a low-carbon trajectory; help develop the new industries that will both keep it there and provide competitive advantage for the UK in the future; and contribute to restoring UK fiscal stability after the recession. It is a key to future environmental sustainability and low-carbon prosperity.**

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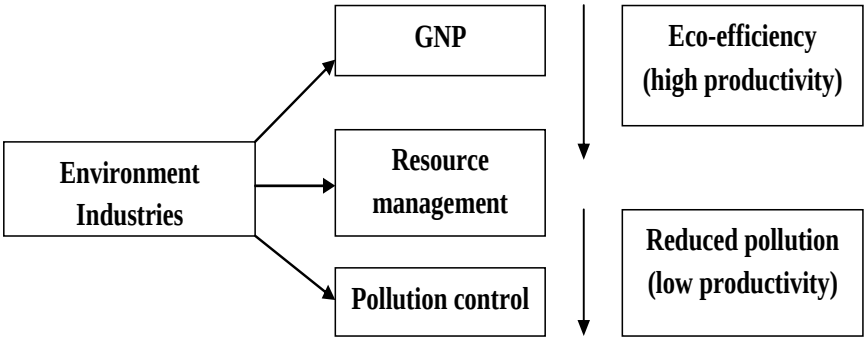
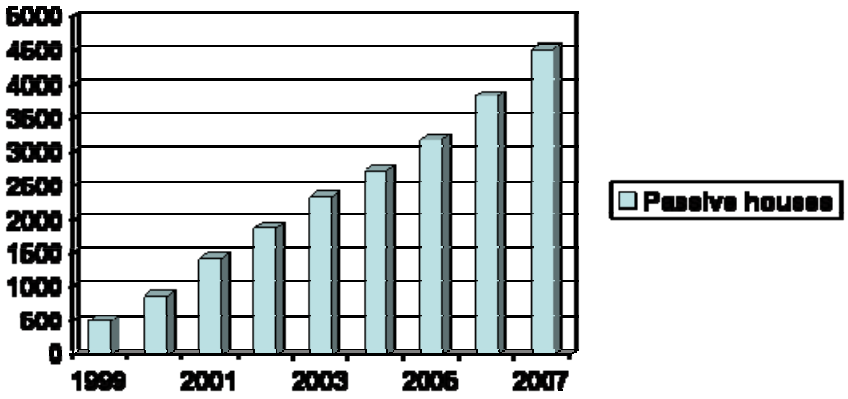
How could single countries implement ETR?

- ETR has a minimal effect on national competitiveness and economic growth
- ETR will stimulate resource-efficient innovation – need to support this with complementary policies
- Germany has demonstrated this (low-carbon vehicles, energy-efficient houses, renewable energy, waste management technologies)
- If all countries were committed to low-resource development, the leading countries would be those with strongly developed resource-efficient technologies and industries
- Germany is one of those

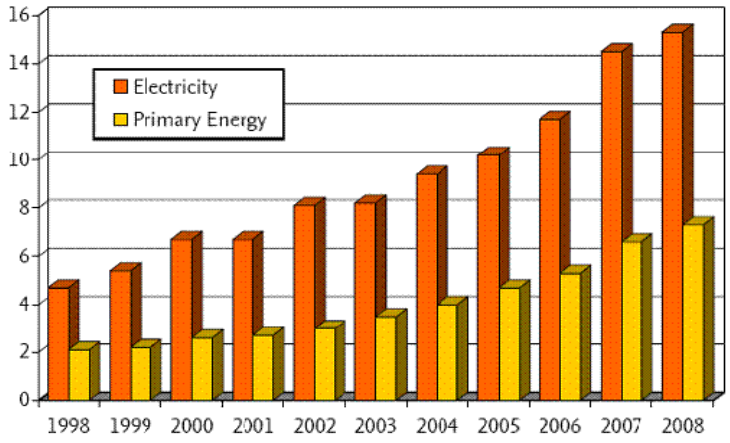
The environment industries



Passive Houses in Germany



Share of Renewable Energy in Germany 1998-2008 (per cent)



Source: BMU / BEE 2008

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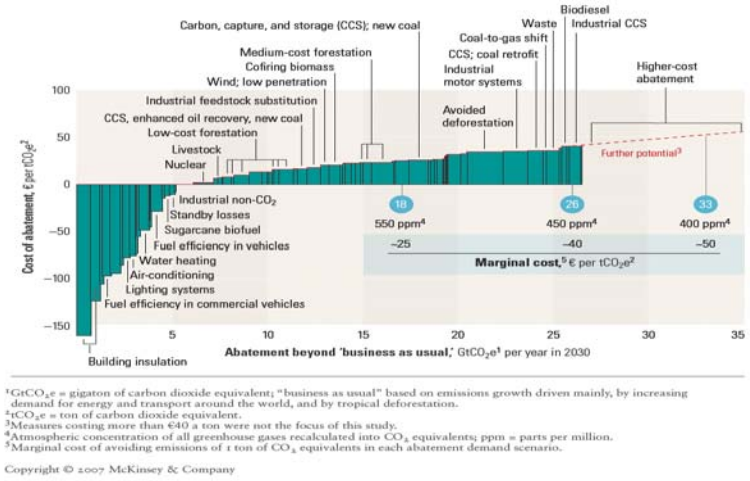
Conditions for ETR to stimulate economic growth

- Widespread negative net cost opportunities for increased resource efficiency: e.g. negative costs in MAC curves (McKinsey 2007); low/no cost opportunities for resource efficiency in UK of £23 billion, (Oakdene Hollins for DEFRA, 2011); numerous case studies where 'pollution prevention pays' (Ekins 2000, pp.170ff.)
- Environmental improvement gives net benefits to monetary output (e.g. pollination, reduces air pollution, climate change)
- Costs of environmental technologies fall (fossil fuel prices rise)
- Growth of export markets (e.g. Danish/German wind industry).
- Stimulate innovation in the economy – new industries that would produce greater monetary output than would have been produced in its absence

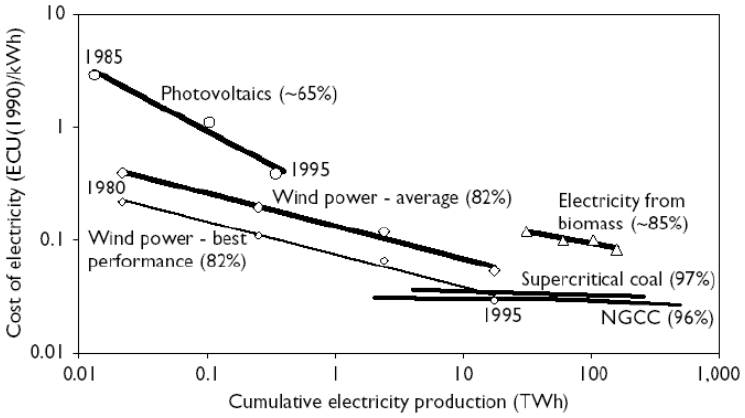
Global cost curve for greenhouse gas abatement



[1]$GtCO_2e$ = gigaton of carbon dioxide equivalent; "business as usual" based on emissions growth driven mainly, by increasing demand for energy and transport around the world, and by tropical deforestation.
[2]tCO_2e = ton of carbon dioxide equivalent.
[3]Measures costing more than €40 a ton were not the focus of this study.
[4]Atmospheric concentration of all greenhouse gases recalculated into CO_2 equivalents; ppm = parts per million.
[5]Marginal cost of avoiding emissions of 1 ton of CO_2 equivalents in each abatement demand scenario.

Source: A cost curve for greenhouse gas reductions, The Mckinsey Quarterly, February 2007

Cost evolution and learning rates for selected technologies



Source: IEA, 2000, Stern Review, Chapter 9

Conditions for ETR to stimulate employment

- In conditions of widespread unemployment, environmental policy gives skills and training to people who would otherwise have remained unproductive, but who subsequently found jobs in environmental or other industries (generates jobs *and* environmental improvement).
- Again in conditions of unemployment, environmental policy such as ETR makes labour cheaper (by reducing labour taxes) which encourages businesses to increase employment (while reducing pollution and resource use).
- The new environmental industries stimulated by environmental policy are more labour-intensive than the industries they replace. For example, installing home energy-saving measures is more labour-intensive than supplying energy to homes, so that even if such measures were not strictly cost effective in terms of their energy saving, they could end up increasing employment.

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Conclusion: Will ETR lead to 'sustainable growth'?

- 'Unsustainable' growth will not last beyond this century, and could lead to environmental collapse well before 2100 ("there is no low-cost, high-carbon future")
- ETR is a key policy for fostering sustainable growth, which will be resource-efficient and may in time turn out to be slower growth than in the past, with higher employment (lower productivity and incomes); depends on innovation - ETR would stimulate such innovation, supported by other policies. There is no evidence that ETR or other policies for environmental sustainability would have a substantial negative effect on economic growth
- Relatively high-growth countries in a sustainable future will be those that have developed, and can export, resource-efficient technologies and industries
- The choice is clear from a cost-benefit angle at any but the highest discount rates (cf Stern Report).
- That will not make implementing the choice politically easy


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Session Ⅰ

녹색성장과 조세정책
Green Growth & Taxation

Environmental Fiscal Reform in the context of Green Economy – Experiences from around the world

Stefan Speck

International Conference: ETR/EFR for Green Growth
Organised by Korea Institute of Public Finance
April 27,2011
Seoul, Korea

Content

EEA: European Environment Agency

- *"The EEA aims to support sustainable development and to help achieve significant and measurable improvement in Europe's environment…*
- *… through the provision of timely, targeted, relevant and reliable information to policy making agents and the public."*
- EEA is an independent EU institution with 32 member countries incl. Turkey, Switzerland and Norway

- 200 staff in Copenhagen headquarters - and 5-6 Topic Centres with wide network throughout Europe

What is understood under green economy?

In 2009, UNEP called for a Global Green New Deal in response to the financial and economic crisis → fiscal stimulus packages implemented around the world

"*Green economy is an economy that results in improved human well-being and reduced inequalities over the long term, while not exposing future generations to significant environmental risks and ecological scarcities"* (UNEP, 2011)

Not a new concept and used before; for example *Blueprint for a Green Economy* (Pearce *et al*, 1989) - economic underpinnings of sustainable development!

What is understood under green economy?

2005: Fifth Ministerial Conference on Environment and Development (MCED), Seoul, Korea:

Achieving Environmentally Sustainable Economic Growth (Seoul Initiative):

"Green Growth" is a paradigm that focuses on reducing the increasing environmental pressure arising from economic growth, thus enabling economic growth to reduce the poverty of the current generation while maintaining the carrying capacity for future generations (UNESCAP, 2005)

Green economy in the policy context

"The concept of a "green economy" does not replace sustainable development, but there is now a growing recognition that achieving sustainability rests almost entirely on getting the economy right" (UNEP, 2011)

Increased attention following the publication of UNEP's 'Green Economy Report': a 2% injection of global GDP into ten key economic sectors would kick-start a transition towards a low carbon, resource efficient green economy

Concepts of *green economy* stress the importance of integrating economic and environmental policies in a way that highlights the opportunities for new sources of economic growth

Green economy as a new paradigm for economic growth

Green economy is regularly seen as a concept realising growth and employment opportunities from less polluting and more resource efficient activities

The transition to a green economy is one of the priorities for governments worldwide requiring a broad range of policies and structural reforms

Fiscal policy and public finance are playing a critical role in the transition process towards a green economy (→ part of the broad sets of policies which are essential to any transition towards a green economy)

Fiscal policy/public finance and green economy

Issues at stake:

- how are tax revenues generated - structure of incentives facing businesses and households, in both consumption and investment decisions; fair and efficient tax system
- how governments spend revenues – budget consolidation, investments in public infrastructure or supporting technology development: a critical role in shaping the path of economic development / green economy

Green economy and environmental taxes

A green economy *needs to be based on a broader and more robust implementation including, for example, through more systematic taxation of fossil-fuel-based energy and other natural resources* (UNEP, 2011)

Opportunities offered by environmental taxes are accessible to all countries – developed and developing countries; equally a reform of environmental subsidies is decisive!

These policy instruments tend to minimise the costs of achieving a given objective and provide incentives for further efficiency gains and innovation

The underlying concept of ETR/EFR

Concept of an environmental tax reform (ETR) – reform of the tax system by shifting the burden from conventional taxes, for example on labour, to environmentally damaging activities, such as resource use or pollution

"*Environmental fiscal reform" (EFR) refers to a range of taxation and pricing measures which can raise fiscal revenues while furthering environmental goals. ... EFR can also free up economic resources or generate revenues that can help to finance access of the poor to water, sanitation and electricity services* (OECD, 2005).

EFR includes reforming / removal of subsidies and other market-based instruments (emission trading schemes, etc)

The underlying concept of ETR/EFR

Fiscal neutrality has been an important component of environmental tax / fiscal reform processes. But this may be less feasible given the currently weak fiscal circumstances making greater emphasis on contributing to fiscal consolidation potentially appropriate – depending on country specific characteristics!

Distributional implications may impair the implementation of environment taxes/EFR. But the distributional consequences of environmental (and other) tax reforms must be assessed against alternative means of meeting public revenue needs in the consolidation process!

ETR/EFR – a backbone of green economy

Search for growth-enhancing policies in the context of the discussion of green economy

Public finances deteriorated during the financial and economic crisis due to massive and unprecedented fiscal interventions and fiscal stimulus packages → fiscal consolidation is decisive: austerity programmes - reduction in expenditures - but also increase in tax revenues are to the fore

Taxes on income are usually associated with lower economic growth – in contrast property and consumption taxes (including environmental taxes) are the least detrimental to growth

ETR/EFR – a backbone of green economy

Stiglitz (2010) in his paper 'Principles and Guidelines for Deficit Reduction' lays out some guiding principles:

"proposals for deficit reduction as we strive for equity as well as efficiency and growth: ...

- *It is better to tax bad things (like pollution) than good things (like work). ...*
- *Economic sustainability requires environmental sustainability. The polluter pay principle—making polluters pay for the costs they impose on others—is good both for efficiency and for equity".*

ETR/EFR – a backbone of green economy

Environmental taxes addressing inefficiencies (external effects)

→ leading to a more efficient tax system; generating needed tax revenues and spur eco-innovation (OECD, 2010);

→ kick-start the transition to a green economy

Europe 2020 strategy '**A European strategy for smart, sustainable and inclusive growth**':

Where taxes may have to rise, this should, where possible, be done in conjunction with making the tax systems more "growth-friendly". For example, raising taxes on labour, as has occurred in the past at great costs to jobs, should be avoided. Rather Member States should seek to shift the tax burden from labour to energy and environmental taxes as part of a "greening" of taxation systems

Current status of EFR in countries around the world

- South Africa – budget 2009/2010 (in million Rand); shifting of the tax burden from labour to environment

	Effects of tax proposals	
	Individual	**Net / overall**
Personal income tax	**-13,550**	
▪ Adjust personal income tax rate structure	-13,000	
▪ Adjustment in monetary thresholds (medical scheme contributions and savings)	-550	
Business taxes	**-1,000**	
▪ Industrial policy	-1,000	
Indirect taxes	**9,975**	
▪ Increase in general fuel levy	4,890	
▪ Electricity tax	2,780	
▪ Incandescent light bulb levy	20	
▪ Air passenger departure tax	120	
▪ Plastic bag levy	15	
▪ Diamond export levy	50	
▪ Increase in excise duties on tobacco products and alcoholic beverages	2,100	
Budget 2009/10 proposal		**- 4,575**

Source: SARS, 2009

Current status of EFR in countries around the world

Ireland

- Increase in excise taxes levied on transport fuels
- Introduction of a CO2 tax (15 Euro/ton CO2) on all energy products and further increases (doubling) as part of the National Recovery Plan 2011-2014 (part of the fiscal consolidation process)

Greece

- The growing size of public finance imbalances has led the government to introduce substantial amendments to the tax system in order to restore fiscal sustainability – among the measures was an increase in excise taxes on transport fuels

Current status of EFR in countries around the world

Overview of excise taxes on petrol and diesel (source: EC, OECD – Note: Korea 2008 and Quarter III/2010)

	Petrol (2008)	Petrol (2011)	Petrol	Diesel / gas oil (2008)	Diesel / gas oil (2011)	Diesel / gas oil
	€ per 1,000l	€ per 1,000l	% increase	€ per 1,000l	€ per 1,000l	% increase
Ireland	443	576	30.2	368	466	26.5
Greece	350	670	91.4	293	412	40.6
South Africa	143	251	77 (37)	130	236	82 (41)
Korea	448	496	10.5	315	345	9.3

Current status of EFR in countries around the world

Denmark

- A major tax reform is being phased in from 2010 to 2019 with the aim of reducing the fiscal burden on personal income in order to stimulate labour supply in the long term
- In line with the other energy and climate policy objectives of the government, financing of the tax reform is partly provided by higher energy, transport and environmental taxes; energy taxes on business and households – except for petrol and diesel - are increased by 15%
- To minimize the negative effect on household disposable income, a lump-sum transfer ('green check') will be granted to adults and children

Current status of EFR in countries around the world

Finland

- Changes of the structure of energy taxes on fuel for transport and heat and power plants (January 2011). The tax structure is now based on the energy content, carbon dioxide emissions and local/particle emissions that have adverse health effects.
- In 2011, additional Euro 730 million will be collected in taxes on fuel for heat and power plants and energy taxes on electricity. This increase is part of the structural reforms of the tax system, helping to offset the tax revenue losses incurred by the abolition of the national pension contribution for employers.

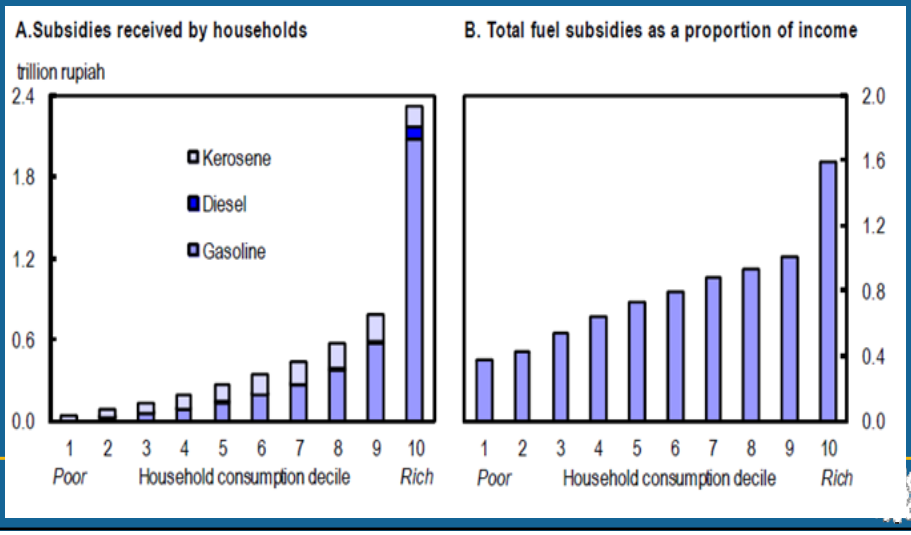
Current status of EFR in countries around the world

Indonesia

- Subsidy reform: energy subsidies amounted to 4.5% of GDP in 2008. By comparison, public capital expenditure and spending on social programmes amounted to only 1.5% and 1.2% of GDP respectively that year. Energy subsidies declined to 1.7% of GDP in 2009 and were expected to cost the government a total of USD 15.7 billion in 2010, corresponding to 2.3% of GDP
- In the Medium Term Development Plan, the government announced its objective to remove fossil-fuel subsidies by 2014

Current status of EFR in countries around the world

Indonesia – subsidy reform: a progressive policy tool
(source: Mourougane, A. (2010))



Summary

- Transition to a green economy requires a broad range of policies as well as structural reforms, for example energy markets – fiscal measures are of particular importance
- Current tax structure remains often too favourable to environmentally harmful production and consumption patterns and investment decisions

  → revision of environmental taxation schemes should therefore be a key objective during the transition process towards a green economy

Summary

- Several European countries implemented ETR with success in economic and environmental terms – but experiences gained reveal that distributional and competitiveness issues (obstacles) have to be taken serious and it can be dealt with these challenges (a question of tax design, compensation measures, etc)
- The principle of 'getting the economy right' (as a cornerstone of the green economy) requires 'getting the prices right'
- There is NO 'one-size-fits all' prescription for implementing ETR/EFR as part of a green economy strategy (as well as for the green economy itself)

Summary

OECD summarises in the report 'Taxation and Green Growth' (OECD, 2011):

Therefore, embedding the introduction of environmentally related taxes in wider tax reform, channelling the extra revenue raised by environmental taxes towards cuts of the most distorting elements of taxes on income from labour and capital – or using environmental tax revenues to avoid hikes of these taxes in a context of fiscal consolidation – is advantageous from a growth perspective

Thank you for your attention!

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ETC/EFR for Green Growth
27 April 2011
Seoul, Korea

Green Growth & Taxation: Korea and Developing Countries

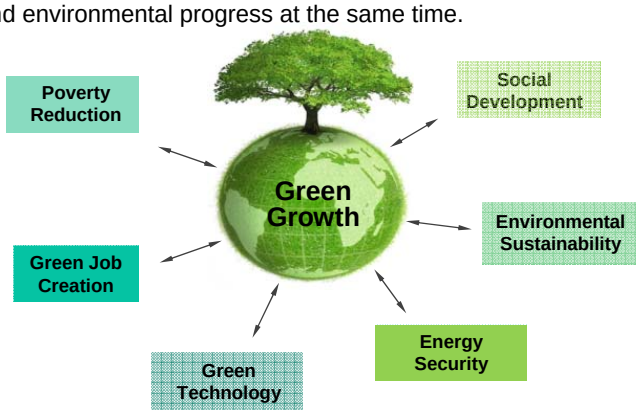
Taeyong JUNG
Deputy Executive Director
Global Green Growth Institute

Table of Contents

I. Defining Green Growth

The concept of **green growth** suggests that ***"Growth and climatic and environmental sustainability are not merely compatible objectives, but can be made mutually reinforcing for the future of humankind."***

Green Growth provides a set of strategies that aims for continued economic growth and environmental progress at the same time.



II. Korea's National Strategy for Green Growth

- ***"Low Carbon, Green Growth"*** **- A new development paradigm**

Past 60 Years

Quantitative, Fossil-Fuel Dependent Economic Growth

Coming 60 Years

Qualitative Economic Growth through Green Innovation, Technology, Knowledge, etc.

- **Solving the Triple Crunch: Energy, Climate & Economy**

Energy Challenge + Climate Challenge + Economic slow Down = A New Path is needed!

- $140 billion energy bill
- 97% of energy imported
- 83% of energy derived from fossil fuels

- Average temperature rise 1.7℃ (2 times more than world average)

- Declining growth rates since the late 1990s & growth without employment

II. Korea's National Strategy for Green Growth

Strong Leadership

- Presidential Committee on Green Growth
- Active advocacy and role on the international stage

Fast Integration of the Vision in All Sectors

- Strong partnership with public, private and civil sector (businesses, financial sector, academia, local governments, social groups)

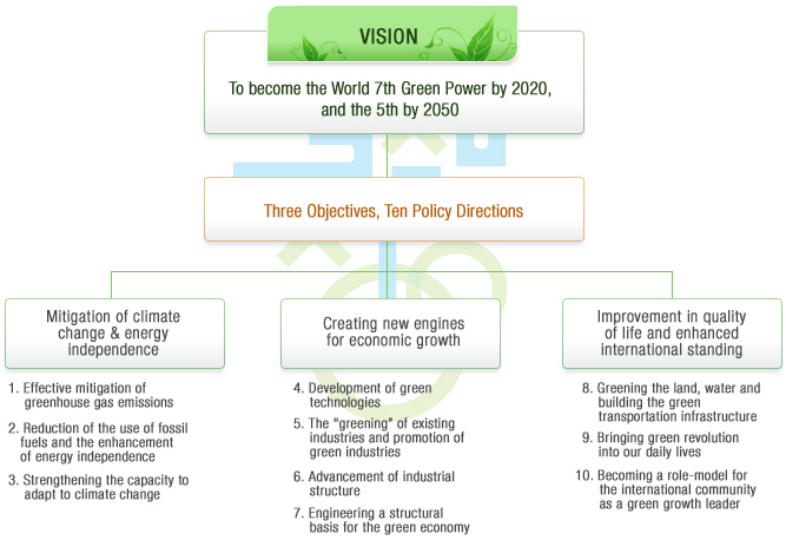
Competitive Industrial Base in Relevant Areas

- Large, competent players

Action - Oriented Strategy

- Secure green budget: Investing 2% of GDP (2009-2013)
- GHG emissions reduction of 30% from BAU by 2020
- 20% of green funds already disbursed by first half of 2009

II. Korea's National Strategy for Green Growth



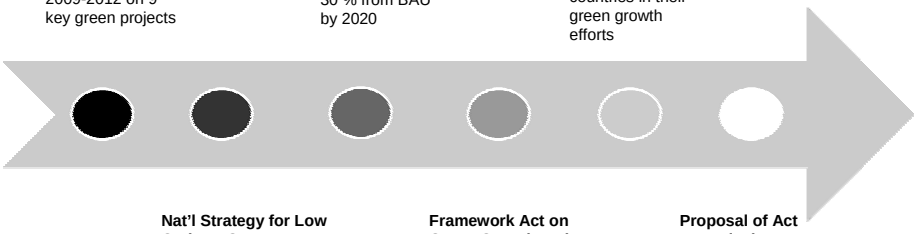
Source: Presidential Committee on Green Growth, Republic of Korea

II. Korea's National Strategy for Green Growth

Green New Deal ('09.1)
Recovery package of $38.5 billion for 2009-2012 on 9 key green projects

Nat'l GHG Emissions Reduction Target('09.11)
30 % from BAU by 2020

Launch of GGGI ('10.6)
Support developing countries in their green growth efforts



Nat'l Strategy for Low Carbon, Green Growth & its 5 Year Implementation Plan ('09.7)
Public Investment of $86 billion for 2009-2012

Framework Act on Green Growth and its Enforcement Decree ('10.4)
GHG Target Management System & Green Certificate Program

Proposal of Act on Emissions Trading System ('10.11)
Mandatory ETS by 2015

II. Korea's National Strategy for Green Growth

Major Achievements in 2010

Market Creation for Green Growth

❖ **Increase Green R&D investment**:
1.8 billion USD (2009)
→ 2.1 billion USD (2010)

❖ **Create favorable investment environment for green industries**
- •Green loans: 6.3 billion USD (2010.12)
- •Guaranty support for green industries: 4.8 billion USD (2010.12)
- •Tax benefits

Global Green Leadership

❖ **COP16**
- NAMA(Nationally Appropriate Mitigation Action) Registry
- Korea proposed to host COP18

❖ **East Asia Climate Partnership**
- 2nd East Asia Climate Forum (2010.06)
- Three new bilateral projects in Mongolia, Sri Lanka and Philippines
- Three new multilateral projects with UNIDO, WB, WHO

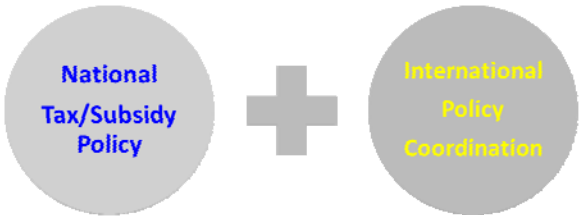
III. Green Growth & Taxation

Background

Taxes are..

- The most influential market-based policy instruments for green growth
- Economic instruments to internalize environmental external costs
- Not fully exercised yet → great potential to be key policy tools

Greening the tax system successfully requires both **national-level policy mix** and **international policy cooperation** with **special attention on developing countries.**



III. Green Growth & Taxation

National-level Policy Direction: Korea's Case

- Dual objectives of tax reform for Green Growth:
  Environmental pollution reduction + Economic growth & Job creation
- Principles: Greening the tax system through "**Incentives**" + "**Penalty**"

Future Policy tools (Examples)		
Energy		Greening existing energy taxes Including social cost accrued through CO2 emission per unit of energy in the pricing structure → Carbon Tax
Automobile		Tax benefits for technology development of eco-friendly motor vehicles Tax base: Engine displacement → CO2 emission & fuel efficiency
Others		Value Added Tax cut for eco-friendly products Acquisition/Holding Tax cut for eco-friendly properties Tax credit for renewable energy R&D

Source: Presidential Committee on Green Growth, Republic of Korea

III. Green Growth and Taxation

International Policy Coordination: Support for Developing Countries

Preconditions

Based on strong institutional framework & comprehensive green growth strategies:

•Transparent and effective tax system

•Efficient use/management use of tax revenues e.g. investment on green technology

•Safeguards for economically vulnerable groups

Benefits of Green Tax

- **Promote energy conservation and efficient use of energy**
- **Promote the use of clean energy**
- **Change production and consumption structure**
- **Promote R&D**

III. Green Growth and Taxation

GGGI supports developing countries to develop:

•Green Growth Strategies
•Institutional foundation for implementation
•Capacity to sustain the green growth with their own means

Example: Cambodia

1. **Green Growth Master Plans for Cambodia**
   - E.g. Green city models for Cambodia's urbanization process
2. **Institutional Set-up for the Cambodian Government**
   - E.g. Korea's Presidential Committee on Green Growth
3. **Capacity-Building Programs**
   - Training programs for Cambodian officials to implement Green Growth Roadmap adopted by the Cambodian Government in 2010

Ⅳ. GGGI

GGGI is an independent, international non-profit organization dedicated to supporting the new model of economic development, **'Green Growth.'**

History

"I will ensure that GGGI will evolve into a permanent common asset of the international community by 2012"
- Lee Myung-bak, President of Republic of Korea, June 2010

"GGGI will significantly contribute to a variety of UN's activities regarding climate change"
- Ban Ki Moon, UN Secretary-General, June 2010

Creation of GGGI announced by President Lee Myung-bak at UNFCCC COP-15
Copenhagen, Denmark December, 2009

GGGI launched at East Asia Climate Forum
Seoul, Korea June, 2010

GGGI Side Event at UNFCCC COP-16
Cancun, Mexico December, 2010

GGGI-WEF MOU at World Economic Forum 2011
Davos, Switzerland January, 2011

2011 onwards

Ⅳ. GGGI

Activity: 1. Green Growth Plans (GGPs)

Through Country Projects, GGGI provides supports to developing countries in their endeavors to develop Green Growth Plans
To design GGPs, GGGI works in an 'Open Architecture' that embraces public/private partners both in donor and recipient sides

Activity: 2. Research

Develop Green Growth theory & models for the new development paradigm

Activity: 3. Knowledge Sharing

Focus on the "Power of Example" by accumulating and disseminating world's best practices on Green Growth

Activity: 4. Capacity Building

Support enhancement of developing countries' capacity to sustain their drive for Green Growth

Activity: 5. Public-Private Partnership

GGGI partners with all relevant groups from public & private, global & local arenas and connects them with one another for increased collaboration and efficiency.

Thank you!

GREEN GROWTH STRATEGY of KOREA: PAST and FUTURE[1]

HONG, JONG HO[2]

[1] This work was supported by National Research Council for Economics, Humanities, and Social Sciences of Korea. The paper will be published as a book chapter edited by Lee, Jisoon and Kang, Sang In, *Green Growth: Issues and Policies*, Random House Korea, 2011.

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1. INTRODUCTION

The major threats facing today's global economy include the continuation of compounded economic and financial crises, the acceleration of climate change, and unstable world energy prices. To address these issues, countries around the world are proposing solutions for both environmental and economic problems. Such efforts have resulted in specific policies, including the Green New Deal, and the creation of green jobs through green growth.

Proposed by the UK's New Economics Foundation (NEF) in July 2008, the Green New Deal is a set of policies for creating jobs and overcoming environmental problems, such as climate change, amidst the global economic crisis. The major resolutions suggested by NEF include the implementation of low-carbon energy systems, the creation of green jobs, the provision of training to green workers, and the establishment of large-scale funds for low-carbon economies and realistic energy prices with due consideration of environmental costs.

In the academic arena, Paul Ekins is believed to be the first to use the term 'green growth' (Ekins, 2000). He defined green growth as environmentally sustainable economic growth, and more specifically, an *increase in GDP that maintains or reinforces ecosystems and their contribution to health, well-being, and quality of life* (Ekins, 2005). His explanation implies that a growth trajectory at the expense of the environment and ecosystem cannot be called 'green' growth.

Meanwhile, the concept of green growth was also proposed by the United Nations Economic and Social Commission for Asia Pacific (UNESCAP) and the government of the Republic of Korea. At the 5th Asia Pacific Ministers' Meeting in May 2005, UNESCAP proposed green growth as a new growth strategy for developing nations in Asia. Green growth was defined as *the reduction of poverty through growth and the achievement of environmental preservation by enhancing eco-efficiency* (UNESCAP, 2005). As specific measures, UNESCAP proposed green tax reforms, the development of environment-friendly social overhead capital,

policies for managing energy demand, and the development of green markets and green businesses.

During the Korean Independence Day commemoration address in August 2008, President Lee Myung Bak declared *Low-Carbon, Green Growth* as the new paradigm for national progress and the driving engine for creating jobs based on green technology and clean energy. In January 2009, the Korean government announced plans for a Green New Deal project for creating jobs with a budget of 50 trillion Korean won as a specific means of achieving green growth. The goal of the Korean government is to invest 50.492 trillion won in the Green New Deal project for four years until 2012 and create 956,420 new jobs. Among the nine key projects, the largest is the Four Major Rivers Restoration project, which accounts for approximately 30% of the entire budget.

As growth without employment, the absence of new growth engines, and environmental threats such as climate change become prevalent throughout the world, there is increasing interest in green growth and green jobs. Many governments and companies are looking for ways to create jobs and simultaneously preserve the environment by developing new growth engines based on highly efficient energy sources and environment-friendly technologies (Worldwatch Institute, 2009).

However, there are significant arguments against such efforts. According to a report recently issued by the consulting firm McKinsey, green energies such as wind and solar simply do not have what it takes to act as new growth engines that create enough jobs and yield sufficient economic growth (McKinsey, 2010). In other words, the green industry lacks the scale to lead the overall economy. McKinsey also claims that it is too early for other industries to expect much in the way of positive ripple effects from green growth. This implies that the green market is not mature enough to attract active investments from other industries. McKinsey expects green growth and green jobs to help economic development only at regional levels in specific cities and small towns.

It is too early to predict whether policies for green industries and green jobs can successfully act as a new driving engine. No country has implemented such policies for a sufficient amount of time to facilitate an objective evaluation. It should also be taken into consideration that in addition to efforts made by individual countries, international alliances are needed to address climate-change issues and global green growth strategies to realize synergic effects. Furthermore, governments must implement strong and consistent policies to create sufficient demand for the green industry, which is the essence of green growth strategies.

The purpose of this paper is to evaluate through a theoretical and historical perspective the potential of green growth in the Korean economy. This effort hopefully can provide meaningful insights for the future prospects of Korea's green growth, while providing valuable lessons for many developing countries in the Asia Pacific region, where sustained economic growth and environmental preservation are the most important goals being faced today.

2. THEORETICAL BACKGROUND ON GREEN GROWTH

2.1 Inverted-U Curve and the Environmental Kuznets Hypothesis

Professor Simon Kuznets, who won a Nobel Prize in Economic Sciences, published the Kuznets Hypothesis in the 1950s. According to the hypothesis, economic inequality increases in the initial stage of economic development, but income distribution begins to improve as the national income approaches and exceeds a certain level.

In the 1990s, a new concept referred to as the 'environmental Kuznets curve hypothesis' was introduced to prove that there is a consistent relationship between environmental contamination and economic growth. In other words, environmental pollution increases during the initial phase of economic development, but the

problems decrease as the average income level surpasses a certain point. This can be illustrated with an inverted U-shaped curve which is shown in Figure 1. A number of studies substantiate this hypothesis, as in such major pollutants as sulfur oxides, lead, DDT, and water waste. In general, per capita income range between 5,000 and 8,000 USD is regarded as the turning point where environmental problems begin to improve (Dasgupta et al., 2002).

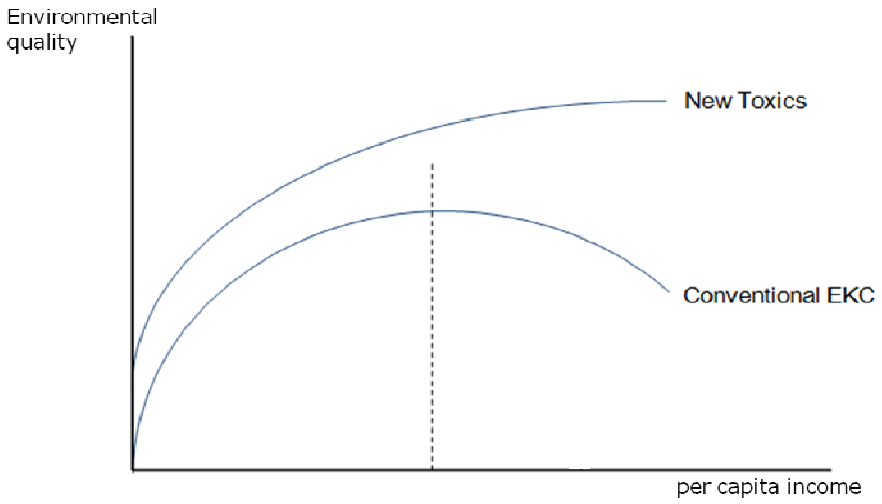

Figure 1. The Environmental Kuznets Curve

However, the environmental Kuznets hypothesis must be interpreted with caution. First, we must be careful not to assume that an increase in national income will automatically reduce environmental pollution. Such a misconception might lead us to believe that environmental problems will be routinely resolved by the positive effects of economic growth. Improving the environment requires specific and conscious effort from the government, corporations, and consumers.

Second, not all environmental issues follow the Kuznets hypothesis. Variables such as the carbon dioxide emission, energy consumption, usage of harmful chemicals, and the

undermining of the ecosystem display increasing or uncertain trends as the national income level increases (see new toxics in Figure 1). Some advanced countries with high GDP levels still struggle with environmental problems.

Once we pass the turning point, decoupling can be observed between economic growth and environmental pollution and serves as a theoretical foundation for green growth, where an economy grows while achieving environmental improvements. The jobs that are created while the national income is rising and the amount of environmental pollution is declining can be referred to as green jobs. Some jobs will be lost while new ones will be created when a government pursues green growth. Typical jobs in traditional industries will be transformed into green jobs. The important point is that in addition to an increase in the overall number of jobs, the nature of the new jobs must become green. While the level of benefits will vary according to the types of existing industries and the labor structure, the most important factors are the effectiveness of the policies implemented by the government to create the supply and demand for green jobs and the reaction from the market.

2.2 Environmental Tax and the Double Dividend Hypothesis

The underlying principle of the double-dividend hypothesis is: “Tax where there is pollution, not where there is income.” In other words, energy consumption and pollution are reduced through environmental and carbon taxes, while income and corporate taxes are lowered in productive sectors. Consequently, distortion in tax systems is reduced, growth is promoted, new jobs are created, and the welfare of general citizens is enhanced.

The hypothesis can be divided into two aspects. The first is the weak dividend. Revenue-neutral environmental taxes can improve the environment and at the same time reduce distortionary taxes. The public is rewarded with two dividends – environmental improvements and the reduction in distortionary taxes. In the 1990s, based on the general equilibrium approach, claims were made that environmental taxes can deteriorate market distortion. For example, introducing environmental

taxes can increase the prices of goods, thereby reducing real wages and labor supply. This implies that environmental taxes can ultimately distort the decision-making process of market participants. However, a number of studies have argued that such claims do not provide sufficient evidence against the double-dividend hypothesis since they are based upon a set of specific assumptions.

The second aspect of the double dividend hypothesis is the strong dividend. By lowering the existing taxes and increasing environmental taxes, the quality of the environment can be improved and energy consumption can be reduced, while the GDP is increased and new jobs are created. If this hypothesis proves to be correct, green tax reform can serve as very effective policy alternative for achieving green growth and creating green jobs. Many studies have demonstrated that revenue-neutral environmental taxes can help to create new jobs when involuntary unemployment exists in the economy. Some studies specifically suggest that investing the revenue from environmental taxes in environment-friendly technologies will effectively improve the environment and create new jobs.

2.3 Environmental Regulation and the Porter Hypothesis

There are two conflicting views regarding how environmental regulation effects corporate competitiveness. First, from a traditional perspective, environmental regulation will increase companies' production costs, which undermines their financial performance and market competitiveness. In other words, the cost required to prevent environmental pollution increases the financial burden for corporations and cuts into their profits, provided other conditions remain unchanged.

Second, environmental regulation can offer business opportunities for creating new values, thus eventually raising competitiveness. According to Professor Michael Porter, in response to government regulation, companies can enhance productivity by developing pollution-abatement technologies, increase the efficiency

of resource utilization, and create environment-friendly products and services (Porter and van der Linde, 1995). Such diverse innovative activities increase competitiveness for companies; this suggests that environmental regulation can serve as a means of enhancing corporate productivity and efficiency.

Recent market trends also are leaning towards this view. For example, an increasing number of consumers are opting for products that tout green consumerism, providing incentives for companies to produce more environment-friendly products and services. In turn, the demand for production processes and technologies that yield higher energy efficiency is increasing, and the market for environment-friendly and safe products is expanding, thus creating new green jobs. This whole cycle can be considered as green growth in the business sector. A wide range of cases substantiate the positive cycle that consists of environmental regulations that lead to green corporate competitiveness and the creation of green jobs.

3. Korean Economy from the Perspectives of Green Growth

3.1 The Age of Black Smoke

Over the past forty years, Korea has risen out of the depths of poverty as it has embarked on aggressive economic development. Throughout the 60's and 70's, the Korean government adopted a series of growth-oriented economic policies including the establishment of industrial complexes and promotion of heavy and chemical industries. Over the period 1960 through 1980, the per capita income increased from 380 USD to 2,740 USD. It continued to increase to reach 6,160 USD in 1990 (Song, 1997). Over the same period of time, industry increased its share of overall economic activity from approximately 12% to more than 30%. This was accompanied with a rapid rate of urbanization from 28% in 1960 to more than 70% by the mid 1980s. As a result, a

country whose per capita income level was 119th out of 120 UN countries in 1960 has emerged from poverty at an unprecedented pace in the history of economic development.

However, the success of the Korean economy has entailed a huge cost. Rapid industrialization, urbanization, and mass production gave rise to large-scale environmental degradation with ambient air and water quality standards being repeatedly violated. Until the 80s however, the Korean government did not place a high priority on environmental conservation policy. Environmental problems, which were already becoming prevalent in many parts of Korea, were still something the government did not want to talk about, let alone act upon.

President Park Chung Hee, who had demonstrated strong leadership in the industrialization of the Korean economy, declared that "when we witness industry-produced black smoke dissipating into the air…the hope and development of our homeland will be realized."[3] At that time, pollution-heavy 'black' smoke symbolized the escape from hunger and poverty into the economic growth and modernization of Korea. Given that a majority of people were living at a subsistence level, Korea might have had no other choice but to sacrifice the environment for economic growth. We will call this stage the *Age of black smoke*. During this period, which ran roughly from the early 1960s to the late 80s, environmental concerns were largely suppressed in the pursuit of rapid economic growth.

In vivid contrast, now Korea has already entered the *Age of white smoke* and is trying to embrace a quick transition to the *Age of no smoke*. During the second stage, which extends roughly from the early 1990s to the mid 2000s, Koreans tried to reduce pollution and enhance environmental preservation because they began to understand the devastating effects of environmental harm. The goal in the final stage, which is still in the process of being, is to drastically cut down pollution from the very first stage of the production chain and move toward the sustainable coexistence of humankind and the natural ecosystem. Relevant policies will include reducing the reliance on fossil fuels,

[3] A celebratory remark made by Mr. Park at the construction of the Ulsan Industrial Center in 1962; the remark was inscribed on the Ulsan Industrial Tower built in 1967.

developing renewable energy sources, and promoting clean, energy-efficient technologies.

The development path that Korea decided to follow during the age of black smoke, which can be summarized as a government-driven, growth-oriented economic strategy without environmental considerations, cannot be categorized as green growth or sustainable development. Several limits and constraints made it extremely difficult for Korea to pursue a green-growth strategy in its early stage of development. Not only for Korea but the world economy in general, there were deficiencies in knowledge, technologies, and financial resources for harmonizing economic growth and environmental preservation.

Does Korea's past experience imply that the currently developing countries in Asia, which are trying to overcome economic poverty and increase the standard of living, also cannot adopt green growth policies? The answer, we believe, is no.

Internal and external circumstances have changed since then. Many developing countries in Asia are already suffering from a vicious cycle of economic poverty and environmental degradation. Low-income people in these countries are more exposed to environmental threats and pollution. The world, however, is now more aware of the seriousness of environmental problems encompassing both local pollution and global climate change. Technological developments to deal with environmental harm and energy efficiency have been accelerating over the last two to three decades, and the financial resources necessary for foreign assistance and international cooperation are more available than ever before. It is our recommendation that developing countries in Asia recognize that under such internal and external conditions, it is to their advantage to pursue a green-growth economic development path. It will eventually turn out to be a highly effective and smart policy with low cost in the long run for the populace and the environment.

The Korean experience shows that the age of black smoke cannot last. More than twenty years of rapid economic growth have slowly allowed the Korean people to understand the importance of the quality of life in terms of a better environment. In 1980,

the Environment Administration was established by expanding and reorganizing the Environmental Affairs Bureau within the Ministry of Health and Social Affairs. Furthermore, in 1980, the revised Constitution proclaimed environmental rights as a basic human right. The Korean people have started to express the opinion that a clean environment is as important as economic development and that it will contribute to long-term economic development. They have also expressed opinions that individuals and citizens' groups have a large role to play on matters of environmental protection. This has led to the next stage, the age of 'white' smoke, which can be said to have begun in the early 1990s.

3.2 The Age of White Smoke

Korea has had one of the fastest growing economies in the latter half of the 20th century. However, owing to a lack of proper environmental regulatory measures, historically there has been a trade-off between economic growth and environmental degradation. Environmental regulatory bodies in the government did not exert much by way of authority or appropriate policy measures over the polluting behaviors of economic agents. The natural environment was considered dispensable in the relentless pursuit of economic growth.

Since the 1990s, however, there have been visible changes in the environmental policies of Korea. The National Assembly passed several environmental laws that maintain higher environmental standards and broader regulatory measures. In 1990, the Environment Administration was upgraded to the cabinet level as the Ministry of the Environment, thereby being able to take greater charge over environmental policies and affairs within the government. Again, in 1994, local water supply and sewage systems and potable water management, which previously had been the responsibilities respectively of the Ministry of Construction and Transportation and the Ministry of Health and Social Affairs, were integrated under the control of the Ministry of

Environment. In the same year, the Ministry of Environment was granted greater authority following a major structural overhaul in the Korean government.

Among the reasons for this visible change in the direction of environmental policies, it can be pointed out that severe environmental accidents in the 90s have had a major impact on the general awareness of the importance of environmental quality. For instance, the phenol leakage accident that occurred in 1991 caused a nationwide boycott of the products manufactured by the specific company that caused the accident. The government enacted stricter regulatory measures through the Water Quality Conservation Act following the accident. The President was even forced to dismiss the Head of the Ministry of Environment because of the accident.

The Phenol Leakage, which occurred in 1991, forever changed the Korean people's general perception of environmental accidents and their devastating consequences.[4] It had much influence on the realization of the importance of effective environmental measures and policy implementation at both the national and local levels. The civil environmental movement has gained in popularity and influence in Korean society. One of the major conglomerates in Korea, Doosan, which was responsible for the leakage, suffered from massive protests from civilians all over the country and huge damage in terms of its public image.

On March 14, 1991, thirty tons of phenol, which is a toxic chemical, leaked into the upper Naktong River of Kumi. Five days later, after a thorough investigation, the local police announced that Doosan Electro-Materials Co. in Kumi, Kyongsang-pukdo, a subsidiary of the Doosan Group, was responsible for polluting the tap water source by discharging wastewater containing phenol into a tributary of the Naktong River. Police also announced that since November 1990, Doosan Electro-Materials Co. had illegally dumped a total amount of 325 tons of phenol into the Naktong River. This river was the source of piped water in Taegu, Pusan, and other cities with a combined population of over 5 million at the time.

[4] The outline and the aftermath of the phenol leakage accident presented in this section are taken from Hong and Whang (2001).

As soon as the accident became public, President Roh Tae Woo condemned the contamination of tap water as an "anti-social and immoral" act, and ordered the administration to probe thoroughly the reported pollution of piped water. The police, after investigating the offender, arrested six staff members of the major electronic materials company. As an initial punitive action against Doosan, the Environment Ministry imposed a 10-day suspension of all manufacturing operations at the facility in accordance with the pertinent laws on environmental protection. The Ministry placed the company under a priority watch.

Public protests spread to the nation's major cities to condemn the company that was accused of polluting tap-water sources. Some consumer groups boycotted all products manufactured by the Doosan Group and its subsidiaries including OB Beer and Coca-Cola. Panic and outrage ensued once it was announced that Doosan was responsible for the leakage. The collective movement was spearheaded by social organizations in Taegu, the nation's third largest city, where millions of citizens suffered from offensive odor in their tap-water for nearly 10 days.

In Taegu, a private watchdog body dedicated to ensuring the safety of tap water was formed for the first time in the nation. The YMCA and YWCA as well as the district consumer protection agency inaugurated the organization. The committee, which comprised twenty representatives, vowed to maintain a close check on the quality of water in the city and keep citizens well posted on its status.

The phenol accident had tremendous effects on many aspects of Korean society as far as environmental issues were concerned. People understood vividly the devastating consequences of an environmental accident. The company realized how severe public resistance and protests could be against polluting behavior. Doosan, which in OB Beer had the largest share in the Korean beer market, actually lost a certain proportion of its share in the year 1991 when the accident occurred.

The government realized the importance of tighter environmental policies and stricter monitoring, which are required to reduce the possibility of such a devastating accident. Stricter regulatory measures followed through the Water Quality Conservation

Act. By the mid 1990s, incentive-based environmental regulatory policy measures were fully introduced including a producer-based deposit refund system, environmental improvement charge system, and volume-based fee system for domestic waste. At this stage, efforts were seen to balance economic growth and environmental quality, which is exactly what green growth tries to attain.

4. POLICY CASE STUDIES FOR GREEN GROWTH IN KOREA

4.1 Reforestation[5]

In the 1950s, for several years immediately after the Korean War, forests were left in a state of extreme devastation as a result of excessive cutting during the Japanese occupation and the Second World War. The growing stock volume per hectare then was merely 5.7 m3, 7% of the current figure. Half the mountain area in the Korean peninsula was classified as unstocked forest. The devastated forests caused serious social and economic problems such as lack of fuel, severe flooding, and drought.

In less than 50 years, however, a miracle occurred. The 2005 forest statistics showed that the Republic of Korea had 6.39 million ha of forest covering about 64.2% of the total land area. The total growing stock was 506 million m3, and the volume per ha was estimated at 79.2 m3, which further increased to 109 m3 per hectare in 2009. The reforestation technology of Korea is recognized internationally for successfully restoring devastated forest land in the shortest period of time for a developing country. International organizations such as the Food and Agriculture Organization (FAO) highly recognize the reforestation experience of Korea and expects to showcase Korea as a model country. Lester Brown, a famous American environmentalist, introduced Korea as a successful model of international reforestation:

[5] This case study is based on a summary and update of the information provided by the website of the Korea Forest Service (KFS) (www.forest.go.kr).

"South Korea is in many ways a reforestation model for the rest of the world. When the Korean War ended half a century ago, the mountainous country was largely deforested. Beginning around 1960, under the dedicated leadership of President Park Chung Hee, the South Korean government launched a national reforestation effort. Relying on the formation of village cooperatives, hundreds of thousands of people were mobilized to dig trenches and create terraces for supporting trees on barren mountains. Today, forests cover 65 percent of the country, an area of roughly 6 million hectares….While driving across South Korea in November 2000, it was gratifying to see the luxuriant stands of trees on mountains that a generation ago were bare. We can reforest the earth!" (Brown, 2008, p.157)

Forestation provides direct environmental benefits such as the provision of fresh air and clean water, mitigation of greenhouse gases, and protection of biodiversity and wild life. Moreover, reforestation in Korea has contributed to important economic benefits including the control of flooding, preservation of agricultural land, and creation of hundreds and thousands of jobs when the unemployment rate was over 30% in the late 50s and early 60s. From today's perspective, forestation is a prototypical example of green growth, where both environmental and ecosystem improvement and job supply and GDP growth are achieved at the same time.

The following is a brief summary of the history of Korea's national forest plan. After legal and institutional preparation in the 1960s, the Forest Rehabilitation Project was finally launched in 1973. Its main goal was to restore one million ha of denuded forest with fast-growing tree species through public participation. The government declared the Nationwide Tree Planting Period and Silviculture Day to attract active participation from the public. This 10-year project was completed four years in advance of its target.

The second 10-year National Forest Plan was devised to establish large-scale commercial forests that could develop into sustainable timber resources to meet the

domestic demand for timber products. To achieve this objective, various forest policies were initiated by the government, including the improvement of the Rehabilitation Project, enhancement of forest protection, and foundation of a forest development fund to support private and national forests. The Second National Forest Plan built some 80 large-scale commercial forests and successfully reforested 325,000 ha; it focused on the management of natural forests and young plantations. Along with reforestation projects, erosion control was also actively undertaken to prevent natural disasters, and advanced biotechnology was adopted to control forest diseases and pests as well.

The Third 10-year National Forest Plan, which was launched in 1988, focused on harmonizing the economic functions and public benefits of forests. After extensive nationwide tree planting efforts, Korea succeeded in restoring the forest cover. However, despite the successful tree planting during the first and second forest plans, the trees were still too young to be used for commercial purposes, while public demands for outdoor recreation increased. Therefore, a number of initiatives were made to optimize forest use and increase forest income for mountain villages. There was also significant growth in forest mechanization and public awareness of the importance of forests and their conservation. To promote more effective forest management practices, the sustainable forest management paradigm was reflected in the 1994 amendment of the Forest Law, and the Act on Promotion of Forestry and Mountain Villages was enacted in 1997.

The Fourth National Forest Plan, which lasted until 2007, was the final phase of the government-led reforestation program. The succeeding forest management policies will address diverse social needs and international trends. The primary objective of the Fourth Plan was to establish and develop a foundation for sustainable forest management. Under this objective, the government put special emphasis on developing valuable forest resources, fostering a competitive forest industry, and enhancing forest health and vitality for the people. The five key policy goals are forest resources development, expansion of forest services, prevention of

forest calamities, rational management of forest land, and reinforcement of the forest industry.

Having completing the four-fold national forest plan, the Korea Forest Service (KFS) has drawn up the fifth National Forest Plan from 2008 through 2017. Its main objective is to practice sustainable forest management, which will allow forest resources to be the basis for the quality of Korean people's lives, land conservation, and economic development – thus enabling the pursuit of a sustainable green welfare nation.

The Fifth National Forest Plan aims at several key strategies. The first strategy, integrated management and development of multi-functional forest resources, is to manage forests in an integrated way in order to enhance economic, environmental, and social values. The second strategy is to promote the forest industry for the sustainable use of renewable forest resources and contribute to the nation's economy. Thirdly, the conservation and management of forests as national terrestrial resources is for well-balanced land development and ecosystem vitality. For the fourth strategy, viz., the improvement of living conditions and the quality of people's lives, the development of green space and environmental services is emphasized.

Furthermore, as part of greenhouse-gas mitigation efforts, the government targets voluntary emission reductions by strengthening the function of forests as carbon sinks. KFS, with its rich knowledge and experience of reforestation, is also aware that international cooperation is very important for overseas plantation and global forest conservation. The Korean government is trying especially to build up closer inter-Korea cooperation for forest rehabilitation in North Korea.

4.2 Public Disclosure of Company Level Environmental Performance[6]

It has long been recognized that the implementation of environmental laws, regulations, and standards has suffered from a lack of resources to undertake the

[6] This case study is based on Hong et al. (2006) and Susmita et al. (2006).

appropriate monitoring activities and reluctance to use stringent enforcement actions against recalcitrant polluters. In view of those difficulties, an increasing number of environmental regulators around the world have sought to complement or supplement traditional enforcement actions (fines and penalties) with the adoption of structured information programs (or public disclosure programs) by which the environmental performance of industrial facilities is revealed. This type of policy measures is sometimes termed information-based incentives in contrast to economic incentives. Programs such as the Toxics Release Inventory (TRI) in the US (also implemented in Canada and the UK) or the Proper Prokasih program in Indonesia and the EcoWatch program in the Philippines are examples of structured information programs that rely on non-regulatory forces to create incentives for (mainly industrial) facilities to improve their environmental performance.

Traditionally, it is assumed that the environmental regulator is the only agent that can effectively penalize firms that are non-compliant. More recently, it is observed that local communities may exercise considerable leverage to pressure firms to improve their environmental performance. The argument also ignores that capital markets may react negatively to the announcement of adverse environmental incidents (such as violation of permits, spills, court actions, complaints, etc.) or positively to the announcement of superior environmental performance. Hence, when accounting solely for regulators' fines and penalties and ignoring the pressure that communities and markets may bear, the expected costs associated with poor environmental performance may be significantly underestimated. The inability of formal institutions especially in developing countries to provide incentives for pollution control efforts via the traditional channel of fines and penalties may not be as serious an impediment to pollution control as is generally argued. That is, communities and capital markets, if properly informed, may in specific circumstances provide appropriate incentives.

The Republic of Korea has acquired its own extensive experience with the public disclosure of the environmental performance of regulated facilities. Since

1989, Korea has published on a monthly basis a list of facilities that are in violation of existing Korean environmental laws and regulations. Over the period 1992 through 2002, more than 7,000 violations were reported on those lists, involving in excess of 3,400 facilities. As such, the Korean experience with the structured disclosure of company-level environmental information may very well be one of the most extensive experiences of this nature in the world.

In the course of the rapid economic expansion of the 60s and 70s, the government expressed a reluctance to strictly enforce environmental regulations against companies at that time, worrying that they might damage companies' economic performance and competitiveness. As a result, the Environment Administration resorted to publishing the names of companies that did not comply with the erstwhile Korean environmental laws. It is in this context that the Monthly Violations Report (MVR) was first published in 1989 by the Environment Administration as news material distributed to media reporters. Korea's MVR is rather unique in the sense that it lists the names of companies that have violated existing environmental laws and regulations. Furthermore, it provides useful information such as the sector, location, nature of the violation, and government action against the violation.

The government's rationale behind the disclosure of the MVR has been to provide disincentives for companies not to practice illegal polluting activities without necessarily resorting to legal fines and penalties. The MVR then describes a list of facilities that are in violation of the existing Korean environmental laws and regulations. The violations include emission standard violations and the failure of pollution abatement equipment, among others. At first, given the limited monitoring capacity in terms of both financial and human resources, the MVR had very limited coverage.

The release of the MVR continued throughout the 1990s under the Ministry of Environment. Under the Ministry, efforts regarding the MVR have expanded considerably in terms of human and financial resources. A typical MVR in this

period included monthly government inspections of about 10,000 air and water polluting facilities, using a total of approximately 15,000 man-days from local governments and Regional Environmental Offices. Since November 2000, the Reports are also disclosed through the official website of the Ministry of Environment, which certainly makes the environmental information much more accessible to the general public.

Not all enterprises are subject to the MVR. The Ministry of Environment classifies emitting facilities into five categories, as shown in Table 1. Even though the Ministry does inspect all the facilities from Categories 1 through 5, it discloses the names of only those companies that belong to Categories 1 through 3, even though most facilities belong to Categories 4 and 5. This may be explained by the belief that the public disclosure of environmental information may be more effective if larger facilities are targeted.

<Table 1>

Ministry of Environment's classification of emitting facilities.

	Air pollution Facilities with annual fuel use of (coal equivalent):	Water pollution Facilities with wastewater discharge of:
Category 1	Over 10,000 tons	Over 2,000 m^3 per day
Category 2	Between 2,000 and 10,000 tons	Between 700 and 2,000 m^3 per day
Category 3	Between 1,000 and 2,000 tons	Between 200 and 700 m^3 per day
Category 4	Between 200 and 1,000 tons	Between 50 and 200 m^3 per day
Category 5	Less than 200 tons	Less than 50 m^3 per day

While similar in spirit to the US EPA's Toxics Release Inventory (TRI), Korea's MVR differs significantly from TRI in that it reports the names of companies that are actually in violation of Korean environmental laws, as well as the nature of enforcement actions undertaken by the Ministry. In contrast, TRI is limited to reporting the quantities of toxic wastes produced, imported, or processed by a set of facilities. To this extent, the MVR is considerably more akin to the lists published since July 1990 by the Ministry of Environment, Lands and Parks of British Columbia (Canada), which aims to publicize the names of firms that either do not comply with the existing regulations or whose environmental performance is of concern to the ministry.

An interesting hypothesis arises: Will capital markets respond to company-level environmental information released to the public? The impact of firm-specific environmental news on market value may work its way through various channels thus: a high level of pollution intensity may signal to investors the inefficiency of the firm's production process; it may invite stricter scrutiny by environmental groups and/or facility neighbors; and it may result in the loss of reputation, goodwill, etc. On the other hand, the announcement of good environmental performance or investment in cleaner technologies may have the opposite effect: lesser scrutiny by regulators and communities (including the financial community) and greater access to international markets, among other benefits.

A study has been conducted to examine whether the Korean stock market responds to the MVR released by the MOE. The event-study methodology is used to examine the extent to which investors react to environmental news (also called events). The key assumption of the methodology is that capital markets are sufficiently efficient for evaluating the impact of new information (events) on the expected future profits of firms. The results indicate that 52 of the 87 events (60%) included in the dataset show a statistically significant market reaction, while the average percentage reduction in the market value has been estimated as 9.7%. This average reduction in the market value is much higher than the results obtained in

Canada and the US, but is of a similar order of magnitude as the results obtained in Argentina, Chile, Mexico, and the Philippines (Dasgupta et al., 2001)). This would tend to re-enforce the hypothesis that capital markets in developing countries may attach greater premium to information that otherwise may generally not be as readily available as in more developed markets.

Perhaps contrary to expectations that capital markets in developing countries may not reach to such news, it can be shown that investors in the Korean Stock Exchange do in fact react strongly to the disclosure of such news. It further has been shown that the larger is the extent of coverage by newspapers, the larger is the reduction in market value, exceeding 35% for those events covered by five or more newspapers.

4.3 Volume-based Fee System for Domestic Waste[7]

The volume-based waste fee system of Korea is a system that was introduced country-wide in January 1995 to achieve a cleaner environment by producing less waste. The system introduces the concept of imposing a charge for domestic waste on the general population by applying the polluter-pays principle, which provides an economic disincentive to the person who discharges waste by imposing a proper disposal cost based on the quantity of waste s/he produces.

The adoption of market-based instruments is to establish sustainable consumption patterns and waste disposal practices. It is intended to reduce waste from the stage of production by charging fees according to the quantity of waste produced. The system can provide incentives to recycle as much waste as possible, since a volume-based waste fee system is not applied to recyclable waste.

The volume-based waste fee system was introduced with the underlying policy principles as follows.

[7] This case study summarizes and supplements information from the website of the Ministry of Environment of Korea (www.me.go.kr).

- The Polluter-Pays Principle: The principle that requires that the costs of pollution be borne by those who cause it.
- The User-Pays Principle: The principle that requires those who benefit from the use of a resource to pay the costs associated with the loss of the resource, and the full costs for the use of the resource and the services associated with it.
- The Prevention Principle: The principle that prevention takes precedence over disposal, which shifts the direction of waste policy from supply-oriented to demand-control approaches.
- The Economic-Incentive Principle: The principle by which waste discharge dues, fees, and taxes are charged based on the quantity and quality of waste discharged into the environment.

This is how the system works. The costs involved in collecting, transporting, and disposing of waste are included in the price of the standard plastic garbage bag. The standard plastic garbage bag is manufactured according to the standards that are appropriate for waste discharge, such as the size, capacity, and quality requirements. In addition, in the case of over-sized waste (such as furniture and electric home appliances), discharge stickers must be purchased and attached to the waste when it is thrown out.

Owing to the active cooperation of citizens, the amount of waste following the implementation of the volume-based waste fee system has been reduced to a level equivalent to that of the developed world, while the amount of recyclable waste collected has doubled. The amount of waste produced per person was reduced by 26% from 1.33kg per day in 1994 (the year before the system was in operation) to 0.99kg per day in 2006. The amount for recycling also significantly increased by 213% to 27,900 tons per day from 8,927 tons per day.

As the collection of recyclable waste such as paper, cans, and plastics has increased, the supply of recycled materials has increased. In turn, the number of

companies that use recycled materials has increased, and numerous technologies have been developed for the recycling of materials. The manufacturing and distribution industries have also changed their production and sales systems in order to reduce waste by avoiding over-packaging and developing packaging technologies that enable the recycling of packaging materials. Consequently, a chain effect, viz., waste reduction → increase in recycled materials → technological developments → growth in the waste and recycling industry → industry-wide waste reduction practices, has taken place.

Green consumption patterns have become ingrained in the general population to the point that people prefer products that produce less waste such as refillable products; they also prefer to use personal cloth shopping bags over disposable paper or plastic bags. Also, the exchange of used products has become popular, and recycling centers that deal with electronic products and furniture have been established in a number of places. Since the introduction of the volume-based fee system for domestic waste, a more sustainable lifestyle has been accepted gradually in Korean society.

5. GREEN-GROWTH STRATEGY FOR THE FUTURE

5.1 Greening of Economic Policies

Key to successful green growth is greening such economic realms as industry, taxation, energy, transportation, and public projects. It has been proven that the “Grow first, clean up later” type of economic development is an inefficient approach that entails higher costs. Now is the time to implement an economic development strategy that preserves the environment and simultaneously achieves economic growth.

In order to do so, every economic policy introduced by the government must

take into account the environmental aspects associated with that policy. The engagement of economic and environmental government agencies in power struggles over policy directions is outdated, and does not conform to the spirit of green growth. Unfortunately, the *compressed growth* that we have pursued since the 1960s has brought about *compressed environmental degradation* on a grand scale.

Korea has a long way to go to achieve green growth. Due to the historical development of our industrial structure, the Korean economy relies heavily on energy-intensive industries such as steel, petrochemicals, and cement, which means that there are limitations in reducing energy consumption and carbon dioxide output. We must make continual efforts to transform the industrial structure to a cutting-edge knowledge-based economy that is energy-efficient and environment-friendly.

Many changes are also required in the transportation sector. Koreans have an exceptional liking for large cars. In 2008, the average engine displacement of new passenger cars sold in Korea was 1,944 cc. Excepting the US, this is one of the highest in the world along with Sweden. As cars with large engines generally have low fuel efficiencies, this is not advisable consumer behavior for a country that imports 97% of its primary energy resources and 100% of its petroleum. In Japan, a country whose per capita GDP is twice that of Korea, more than 30% of the cars sold are small cars with engines that are 660 cc or smaller and that yield very high fuel efficiencies(Hong, 2006).

There has been active debate around the world on carbon taxes. A number of European countries have already introduced carbon taxes or similar measures to increase energy prices and decrease energy consumption while producing economic incentives for reducing carbon outputs. Although there have been discussions about introducing a carbon tax in Korea, many stakeholders including the industrial sector remain apprehensive over concerns that it will have negative effects on the economy. However, a carbon tax has substantial positive benefits for the environment and the economy, including the reduction of greenhouse gases, the promotion of green technology and green industries, decreased social costs from the alleviation of heavy

traffic in large metropolitan areas, reduction of air pollutants such as ozone and particulate matter, and less dependency on foreign energy. Therefore, the government needs to shift its position regarding the introduction of a carbon tax and relentlessly impress upon industry and consumers why such a tax is necessary.

The ‘green’ principle also should be incorporated in the allocation of the national budget. Specifically, there is a need for implementing an integrated economic and environmental feasibility study system to evaluate major development projects that are led by the government. Decision making on budget allocation has shown that large-scale government projects, such as the Shihwa Lake, Saemangeum Project, and Seoul-Incheon Kyung-In Canal, lacked comprehensive and transparent economic evaluations and environmental impact assessments, resulting in regional conflicts and social costs from debates over conservation and development.

In order to proactively respond to the paradigm shift from the growth-oriented economy of the past to today’s trend toward green and sustainable development, large-scale projects should be objectively evaluated based upon an integrated perspective that embraces environmental values as well as economic gains, and not merely on political interests. The current Four Rivers Project, for example, which has stirred national controversy and faced strong opposition from the Korean people, also follows the same path of past practices in the sense that the whole process generally lacks a proper decision-making procedure of carrying out economic and environmental feasibility studies. Green growth, in its associated decision-making process, has more to do with comprehensive and sufficient communication among various stakeholders and experts than with the relentless push forward to attain its goals.

5.2 Advancement of Environmental Policies

Whenever the Ministry of Environment has tried to introduce new regulatory measures, there have been strong objections from the corporate sector and

economic agencies within the government because of the widespread belief that environmental regulations entail additional costs and dampen industrial competitiveness.

Strictly speaking, however, it cannot be denied that the Ministry of Environment has not exerted sufficient effort to evaluate the general efficacy of new regulations in terms of the overall social welfare. Also, they have not examined whether there are more efficient and effective alternatives in light of the costs associated with the introduction of new regulatory policies. Regulations that are proven to yield environmental preservation and enhance social welfare will certainly gain public support and be highly effective in persuading businesses and government organizations that deal with economic policies.

The economic evaluation of environmental policies is necessary for the effective distribution of resources because there is a limited amount of resources that can be deployed for regulatory purposes and environmental investment projects. Cost-benefit analysis provides critical data for determining how much regulation is necessary and how much resources should be invested to realize the maximum social welfare. Accordingly, the economic evaluation of environmental policies not only provides the means to minimize the social costs associated with the execution of environmental regulation and investments, but also allows the government to prepare for objections from those who will be economically affected by the new policies. In particular, accurate economic feasibility tests of environmental policies is important for coordinating the interests of the affected parties, providing adequate compensation to those who will incur financial losses, and requesting appropriate cost-sharing among the beneficiaries.

As an alternative to traditional environmental policies such as command-and-control types of regulation and economic incentives, we must seek new measures to improve the effectiveness of environmental policies. The government needs to exert efforts to encourage corporations to develop new pollution reduction technologies, restructure organizations, and introduce effective management practices, rather than

view environmental regulation as something that merely increases the costs of corporations.

A good example would be a mandatory information disclosure policy, i.e., an information-based regulatory measure where the government compiles and discloses a wide range of information pertaining to corporations' environmental performance, including their emission levels (World Bank, 1999). By providing relevant information to diverse stakeholders, this policy would allow consumers and financial institutions to demand greater environmental performance from corporations. It is a smart policy that can maximize the effects of autonomous regulatory functions and adequate pressure from the market and the community. The most significant aspect of such an approach is that it provides a perspective that extends beyond the traditional role of government as the sole environmental regulator and allows the market and the community to act as complementary regulatory entities.

As environmental issues attract global attention, various international environmental agreements that contain trade regulations have been signed. Each country has introduced various trade regulations related to the environment, and international organizations such as the WTO and OECD are engaged in discussions regarding environment-related trade regulations. These global movements engender the positive benefits of protecting the earth's environment, while affecting national competitiveness in international trade. Therefore, we need to provide in-depth analyses of various international environmental agreements and the economic ripple effects of environment-related trade regulations in order for Korea to respond to pressure from other countries. Such efforts will significantly help Korea make policy decisions that will lead to favorable positions at international negotiation tables.

5.3 Pursuit of Corporate Sustainability

Terms such as *corporate sustainability* and *corporate social responsibility* have been introduced recently. Hazel Henderson, author of *Ethical Markets*, emphasizes the importance of more environment-friendly and ethical companies.

The word sustainability originated from the concept of sustainable development. According to *Our Common Future* published by the UN in 1987, sustainable development is defined as *development which meets the needs of the present without compromising the ability of future generations to meet their own needs*. It is a development strategy pursuing not only the efficient use of resources but also equity in resource allocation between the current and future generations.

Corporate sustainability should be understood as the sustainable development concept applied in a corporate environment. While sustainable development requires cooperation among individuals, companies, and nations around the world, corporate sustainability emphasizes the role of corporations as the key player to attain sustainability.

Corporate sustainability consists of three elements – economic profitability, environmental responsibility, and social responsibility – which generally are referred to as the triple bottom line (TBL) of corporate sustainability. TBL is typically used to evaluate how long a company can successfully sustain its corporate activities.

If a company fails to create profits and cannot continue doing business, it creates significant social costs for the community, including the loss of jobs. Even the most environmentally friendly and socially responsible company cannot survive in the market, let alone succeed, if it is not able to make economic profits. However, some recent studies provide different implications. There have been academic studies suggesting that companies that practice good environmental management also realize high financial achievement. On the other hand, companies that are mired in environment-related lawsuits and involved in environmental accidents are struggling in the stock market. These developments indicate that investors are taking environmental risks into consideration when making investment decisions.

Accordingly, corporations are trying to convince the public that they are good companies, contributing towards environmental preservation and fulfilling social responsibilities. Companies are sending messages to investors and consumers, promoting their distinguishing traits and competitive edge. Against this backdrop, companies began issuing sustainability reports since the late 1990s.

More than 2,500 companies around the world routinely publish sustainability reports to evaluate and disclose their economic, environmental, and social activities, thereby protecting their brands and securing their competitive edge. In Korea, however, only some 60 companies are issuing sustainability reports as of 2008, indicating a general lack of effort in this regard. It is unfortunate that few reports have been issued from the construction sector in particular, an industry in Korea that many believe is responsible for substantial negative effects on the environment.

5.4 Practicing Environmental Justice and Social Inclusiveness

In the initial stage of environmental policy, the focus is generally geared toward pollution management because of the prevailing belief that the solution of environmental problems should center on the reduction of pollutants. However, a closer look at environmental problems allows us to realize that in making policy decisions, it is essential to understand who will be most affected by environmental contamination, and the potential beneficiaries of environmental policies.

Environmental justice is an important concept that needs to be addressed when discussing these issues. In the 1980s, there was a major debate on racial discrimination in the US when the government tried to build a large waste processing plant where the residents were predominantly African-American. In 1994, President Bill Clinton issued a presidential order to incorporate environmental justice in decision-making processes at all federal government agencies, including the Environmental Protection Agency (EPA), emphasizing the importance of environmental justice for minorities and low-income households.

Korea also needs to introduce policies to protect environmentally disadvantaged citizens such as children and the elderly. In particular, the children of low-income families are likely to be exposed to environmental threats because they do not have the financial means or access to information to shield themselves from harmful chemicals and other contaminants.

On a positive note, several Korean environmental agencies have shifted their interest from medium-oriented policies to environmental receptors such as people and the ecosystem, demonstrating their intention to introduce policies on environmental health. In order for such policies to succeed, the relationship between environmental pollution and health effects must be analyzed, and administrative systems for preventing environmental-related health problems must be implemented. What is important, however, is that environmental health issues should be approached from an environmental justice perspective. The decision-making process should reflect equity and social inclusiveness within and among generations when new environmental and economic policies are implemented. In particular, since the issue of climate change involves long-term effects, environmental consequences for the current and future generations must be evaluated for fair and just cost sharing. Moreover, the government needs to examine the potential ripple effects from specific environmental regulations on various regions and citizen groups.

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Session Ⅱ

환경친화적 조세·재정정책 방안
Environmental Tax and Fiscal Reforms

Environmental Tax and Fiscal Reforms: Progress towards contributing to greening the economy and fiscal consolidation in Germany, Europe and Asia

Kai Schlegelmilch
Vice President, Green Budget Germany/Europe

KIPF-UNESCAP-PCGG Joint Conference
South-Korea, Seoul, 27th April 2011

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Structure of presentation

1) Introduction of Green Budget Germany/Europe (GBG/GBE)
2) Need for an Environmental Fiscal Reform (EFR)
3) EFR Reform Elements in Germany
4) EFR Approaches in Europe
5) EFR Approaches Globally
6) Impacts of EFR and its Communication
7) Conclusions

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1. Green Budget Germany/Europe (GBG/GBE) – Forum Ökologisch-Soziale Marktwirtschaft (FÖS)

- **Non-Profit Non-Governmental Organization**
  - founded in 1994, now 5 employees and 5+ interns
  - >90% of funding through studies, lobbying, conference organisations, trainings
    → hence depending on 3rd party financing
- **Fields of expertise**
  Commitment to Market-Based Instruments in environmental policy such as:
  - Environmental Fiscal/Tax Reform: Taxes/Charges on energy and resources
  - Cutting of environmentally harmful subsidies
- **Main activities**
  - Studies and Newsletters, Conferences and Trainings
  - Green Budget Europe (GBE) since 2008 = European network on these topics
  - Next GBE-Conference at EEA/Copenhagen on 15th/16th September 2011
  - Organisation of the Global Conference on Environmental Taxation in 2007
  - Several studies on environmentally harmful subsidies

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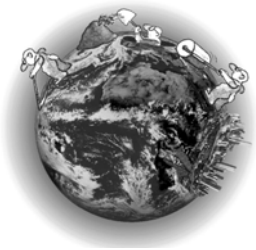
2. Need for Environmental Fiscal Reform (EFR)

„Perverse“ incentives dominate

- Market prices are THE signal in an economy, hence they should work for and not against environmental protection
- Penalties for “green behavior” (trains – airplanes / electricity generated by coal power – green electricity)
- Subsidies for non-environmentally friendly behavior
- Taxes and levies system heads to the wrong direction: “Goods” are taxed instead of “bads”



Policy results

Inefficient use of energy, unemployment,
budget deficits/Waste of taxpayers money,
climate and environmental protection is not profitable

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2. Need for EFR Reform – Implemented in Germany

- Debate started 20+ years ago in the late 1980ies
- In Europe several countries then started with first tax shifts, still ongoing until today.
- GBG made several proposals since 1994, Germany was a late-comer:
- Left-/green-wing government introduced the first tax shift in 1999-2003
- Conservative government continued with several elements in 2011
- Hence, there is a cross-party consensus that fiscal elements help both the environment and the fiscal needs of the state

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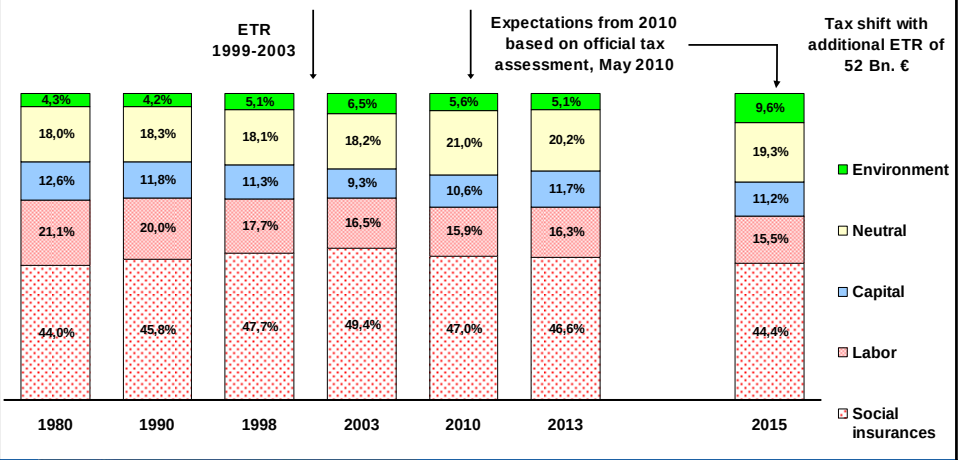
2. Need for EFR – Changing the tax structure

- Tax structure: diminishing part of environmental taxes



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2. Need for Environmental Fiscal Reform (EFR)

- **Climate Crunch**
  - Need to tackle climate change and environmental pollution
  - Need to trigger innovations and jobs
- **Energy Crunch**
  - Need to secure energy supply, energy efficiency and renewable energies
  - Need to reduce our energy imports and bill
- **Budget Crunch**
  - Lived beyond one's needs for decades
  - Deepened due to the financial crunch

In a market economy the polluter pays principle has to be applied all over: All have to pay for the full costs!

2. Need for Environmental Fiscal Reform (EFR)

- **1999-2004:**
  18 billion € p.a. = 1.6% of total tax revenues
- **2005-2009:**
  additional
  13 billion € p.a. = 1.0% of total tax revenues
- **2011:**
  additional
  4 billion € p.a. = 0.3% of total tax revenues

Adding all up: 1999-2011: + 2.9% of total tax revenues

3. EFR Reform elements – Implemented in Germany

1999-2003

- **Social security contributions were reduced**
- **Transport/heating fuel taxes were increased**
- **An electricity tax was introduced between**
- **Impacts: 250,000 additional jobs created,-2-3% CO_2-emissions; first time ever lasting reduction of fuel sales (-17% incl. oil price impact),**

2011

- **Ticket fees on air transport**
- **Charge on nuclear fuel**
- **Heavy goods vehicle toll extended**
- **Reduction of industrial exemptions from the energy tax**
- **Financial transaction tax (generally adopted, started as a banking charge)**

- **GBG proposed all these elements in a study 2010 (http://www.foes.de/pdf/2010-10-HBF_GreeningTheBudget.pdf): Most were implemented! A great success story of the combination of providing timely information with lobbying activities.**

3. EFR Reform elements – Recently implemented in Germany

1. Example:

Transport sector: Air traffic

- **fastest-growing traffic sector**
- **numerous financial privileges**
- **Inclusion of air traffic in European emissions trading as of 2012 has been decided**
  - taxation and steering effects of that inclusion will be comparatively weak, in addition to taking time to manifest
- **difficult to implement EU-wide kerosene tax due to veto right of each of the 27 EU member states in matters concerning taxation**

3. EFR Reform elements – Recently implemented in Germany

Transport sector: Air traffic

- **GBG claimed**
  - Introduction of a per-flight fee or an airplane tax
    - France and Kingdom, the main competitors, already had a ticket tax in place. Mainly Germany still served as a tax heaven P11
- **Introduction of a per-flight fee by January 1st 2011**
  - < 2500 km: 8 Euro, < 6000 km: 25 Euro, > 6000 km: 45 Euro
- ➢ **Additional revenue of 1 bn. Euro p.a.**
- **GBG recommends**
  - Differentiating of the fees (Economy and Business Class)
  - Including freight transport

3. EFR Reform elements – Recently implemented in Germany

2. Example:

Non-internalised costs of nuclear fuels

- Health and environmental (incl. CO_2) impacts during extraction of uranium
- Environmental risks during transportation
- No final deposit of nuclear waste available or in sight
- Danger of severe accidents (Tchernobyl, Fukushima)
- Possible military use
- Possible abuse by terrorists
- ➢ External costs in Germany alone for the period 1950-2008 amount to 4.2 and 11,413.4 billion €

P11 the Netherlands had a fee in place from July 2008 to July 2009 (abolished); Austria introduced a fee by January 1st 2011 (compared to the Austrian one the German one is ambitious but.. (see next slide)

PraktikantIn1, 2011-02-03

3. EFR Reform elements – Recently implemented in Germany

Energy sector: nuclear energy

- **GBG claimed**
  - Internalising external costs for nuclear fuels
- **Introduction of a tax on nuclear fuel: 145 Euro/ g Plutonium and Uranium = 1.0 – 1.5 €-Cent/kWh**
- **Limited until the end of 2016**
- **GBG recommends**
  - Further internalisation of environmental damage costs
  - Compensation of all profits resulting from the exclusion from emissions trading and thus wind fall profits
  - Increase rates to 350 Euro/ g Plutonium and Uranium = 2,5 €-Cent/ kWh, from 2013 on: 3,5 €-Cent/ kWh
  - Delimiting the tax

3. EFR reform elements – Further suggestions

1. **Extend heavy vehicle charge to all roads (partly implemented in 2011)**

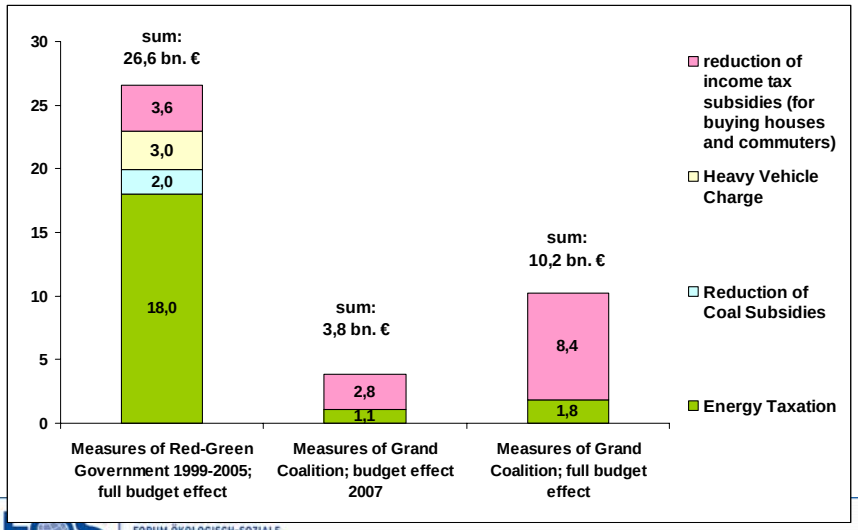
2. **Energy tax on transport fuels**

- **Status Quo: Transport fuels are relatively expensive in Germany compared with the rest of Europe**
- **But: Fuel taxes — like other environmental taxes — are quantity-based which means:**

➢ **Their revenue is automatically devalued by inflation: since 2003 alone, by 0.07 Euro/ liter (0.10 U$/ liter)**

- **GBG recommends**
  - Offsetting inflationary impact by increase of fuel taxes by at least 0.05 Euro/ liter

3. Comparison of EFR measures between 1999-2005 and 2005-2009



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3. Overview of EFR reform elements in 1998-2005

Realised measures in income tax / others / energy taxation (in bn €)	Initial fiscal impulse	Revenue long run
Reduction of support of housing (for private buyers) (subsidy reduction of 2.5 bn € after 8 years)		2.5
Reduction of commuters lump sum (deductability from income tax) from 40.9 ct/km to 35 ct/km		1.1
Reduction of coal subsidies		2.0
Introduction of heavy vehicle charge		3.0
Introduction of emission trading (market value 5-15 €/EUA)	2.5-7.5	
Introduction of deposit refund system on one-way packaging	2.5-4	
Ecological Tax Reform (energy taxation)		18.0
Total volume of initiated measures (in bn €)	5-11.5	26.6

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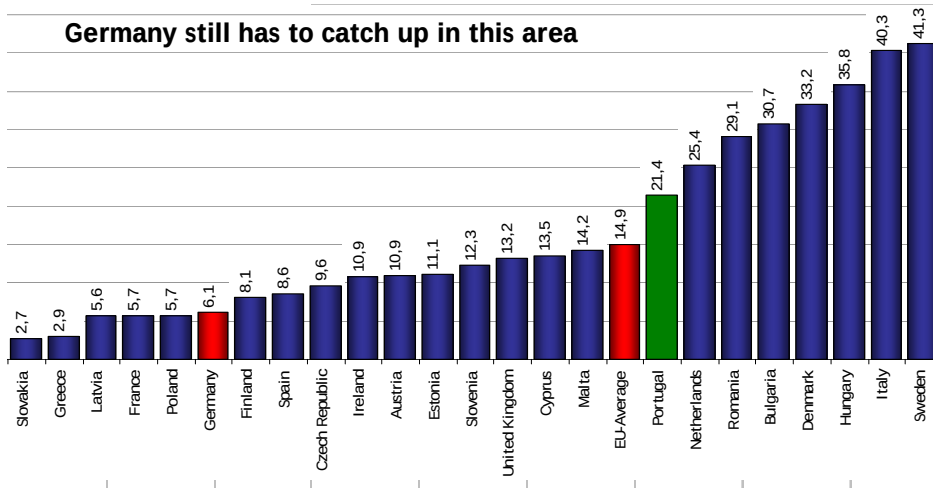
3. Overview of EFR reform elements in 2005-2009

Initiated/realised measures in income tax / energy tax in bn Euros	Revenue 2007	Revenue long run
Abolition of support of housing (for private buyers) from 1.1.2006 (subsidy reduction by 5.9 bn € after 8 years)	1.5	5.9
Commuters lump sum (deductability from income tax) from 1.1. 2007 only from 21. kilometer	1.3	2.5
Taxation of biofuels from 1.8.2006; 1.1.2007 introduction of a quota system with full taxation of biofuels within quota	1.4	2.1
Abolition of taxes on energy inputs in electricity sector	- 0.08	- 0.08
Introduction of taxes on coal for heating purposes	0.03	0.03
Additional tax allowances (e.g. tax exemption of certain industry processes, sea ports)	- 0.23	- 0.23
Total volume of initiated measures (in bn €)	3.8	10.2

3. EFR-Elements: Taxes on light heating fuels in Europe (€-Cent/liter)



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4. Energy taxation on EU-level

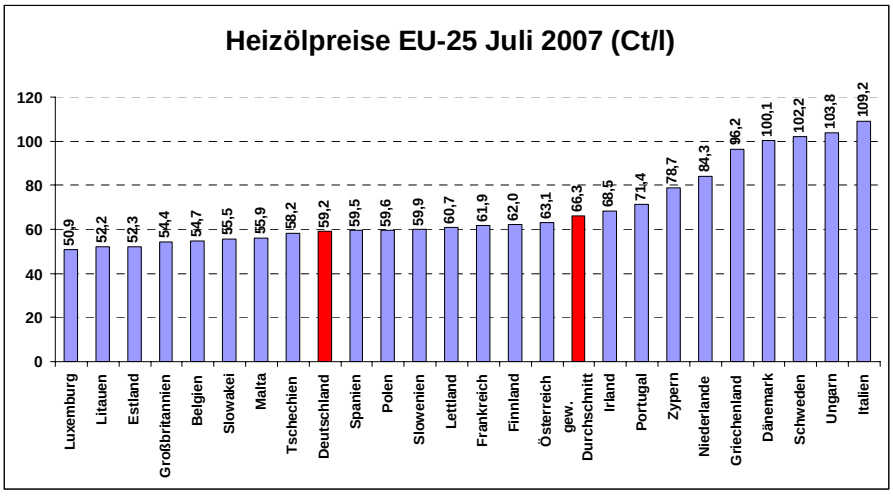
On the one hand:

- Legal requirement for unanimity voting makes progress very difficult.

On the other hand:

- Steps so far:
  - 1993: Minimum tax rates for all oil products when the internal market was introduced
  - 2004: Broadening this principle of minimum tax rates to all other energy products whilst increasing the minimum rate for mineral oil taxes (EU-energy tax directive)
- The EU is the first and only region which requires an energy taxation from all Member States. Member States made positive experiences.
- Since 13.04.2011, a revision of the Energy Tax Directive is proposed.

4. Energy taxation on EU-level: Comparison of prices on light heating oil prices in EU 25



4. All EU countries have some kind of green taxes

	Belgium	Denmark	Finland	France	Germany	Italy	Holland	Norway	Sweden	UK
Taxes										
CO2										
SO2										
NOx										
Fuels										
S in fuels										
Car sales and use										
Diff. annual car tax										
Water effluents										
Waste-end										
Dangerous waste										
Aviation noise										
Tyres										
Beverage cont.										
Packaging										
Bags										
Pesticides										
CFCs										
Batteries										
Light bulbs										
PVC/phtalates										
Lubrication oil										
Fertilisers										
Paper, board										
Solvents										
Raw materials										
INTRODUCED:	1996		2000		2004					

1. Witness of EU-Creativity!
2. Many roads to Rome and for Seoul!
3. Autonomy from neighbours!
4. Similar situation in new MS

Examples from EEA 2005

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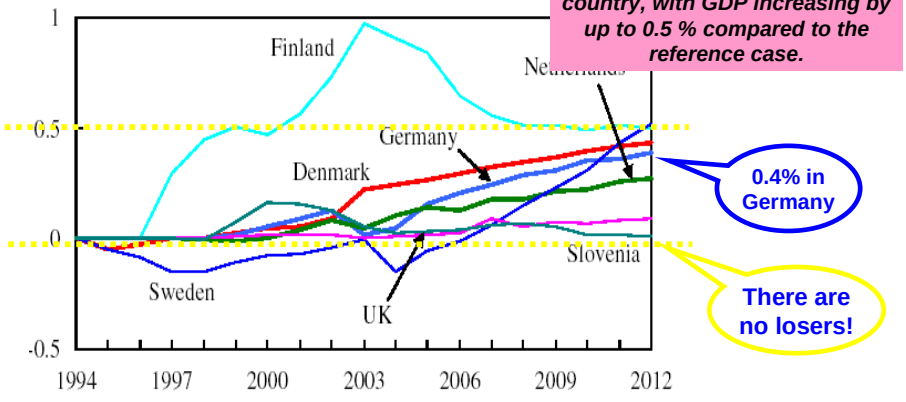
4. Positive GDP-effects of ETR go up to 0.5 percent

GDP-EFFECT OF ETR (DIFFERENCE TO BASE CASE IN %)

COMETR: ***ETR produces a small 'double dividend' effect in every country, with GDP increasing by up to 0.5 % compared to the reference case.***



Source: COMETR 2007

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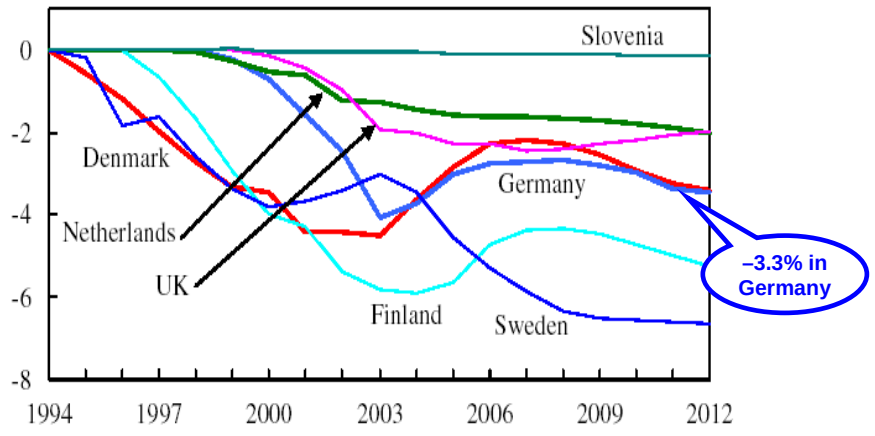
EFFECT OF ETR ON GHG EMISSIONS (DIFFERENCE TO BASE CASE IN %)

4. Ecotaxes reduced GHG emissions by 2-6 percent



4. Despite all problems and setbacks, Europe can be proud of its progress

- EU-Energy-Tax-Directive (one pen stroke makes ecotaxes law for 10 new members)
- Effort Sharing of Kyoto-Targets; intro-duction of Emissions Trading 2005
- Many excellent command and control measures (bio-fuel mix, particulates, REACH..)
- Promotion of Renewable Energies
- Positive role in Post-Kyoto-Agreements

➢ **A multitude of instruments and a wealth of experience, both on EU as on member states level**

➢ **Combined with clear priority for market-based tools**

5. Energy taxation on International level

GBG has been contributing to many international conferences.

GBG has carried out further consultations of governments, NGOs and other stakeholders in countries such as Morocco, China (http://www.cciced.org/node_7040746.htm), Vietnam.

For Barbados, Burkina Faso, South Africa, Uganda and Vanuata studies on their EFR potentials were carried out on behalf of the European Commission.

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5. EFR Activities in 5 ACP countries

(Excerpt from a study for the European Commission, (Table 2, p. 22))

	Barbados	Burkina Faso	South Africa	Uganda	Vanuatu
Energy products	Yes	Yes	Yes	Yes	Yes
Transport / vehicles	Mainly related to energy/vehicle fuels	Mainly related to energy/vehicle fuels	Yes	Yes	Yes
Other environ. taxes	Yes		Yes	Yes	Yes
User charges Water / sanitation / waste		Yes	Yes	Yes	
Feed-in-tariff (renewable electricity)			Yes	Yes	

Source: http://www.foes.de/publikationen/studien/?lang=en/#franz3

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5. ETR in Vietnam

- In 2004, the Vietnamese Prime Minister, Nguyen Tan Dung, asked for an ETR to be introduced by 2011.
- GTZ supported the MoF to design it.
- A framework environmental tax law was adopted by the Government in April 2010
- It is now under discussion at the National Assembly which is due to decide in November 2010
- In 2012 it shall enter into force
- In addition, an air emission charge decree shall be adopted in 2011 entering into force in 2012, too.

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5. ETR in China

- China Council for International Development on Environment and Development proposes to introduce a long-term oriented carbon/energy tax in predictable and small steps and a comprehensive environmentally-related tax reform – in the Annual General Meeting in November 2009.
- A carbon tax (instead of an energy tax) is thus now generally decided in the next 5-Year-Plan (2011-2015).
- However, the earliest date of its introduction could be 2012.
- It may be rather a carbon than an energy tax not least given the „threats“ of a border tax adjustment from the USA, the EU and France.
- The German development agency GTZ supported this process
- http://www.foes.de/publikationen/studien/?lang=en/#franz3

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5. Why is EFR not yet mainstream?

- poor integration of environment into other policies such as economic policy, national budget plans, development policy, poverty-reduction and sustainable development
- Lacking of functioning legal and institutional frameworks (e.g. weak fragmented environmental policy and Ministries)
- inadequate human capital to carry-out policy enforcements
- inadequate knowledge of the economic value of environmental resources or services and social costs of environmental damages
- poor coordination of national initiatives
- Lacking proper and early communication with the public

5. Environmental Fiscal Reform – GIZ-Training

Capacity Development for Environmental Fiscal Reform

- GBG has designed an **interactive training seminar** that focuses on the different conceptual and thematic dimensions of EFR. The training is based on the OECD Development Assistance Committee (DAC) Guidelines on "EFR for Poverty Reduction".
- It has already been applied in Burkina Faso, Mexico, Indonesia, Vietnam and Thailand, UNEP/UNDP are considering its application

Objectives of the EFR Training:

- Understanding of EFR basic
- In-depth knowledge of EFR approaches in sectors and countries
- Detailed knowledge of the potential benefits and limits of EFR
- Increased capacity to discuss and design appropriate EFR strategies

Details: http://www.foes.de/pdf/GTZ_EFR_Training_Description2.pdf

6. Impacts of the ETR 1999-2003
In Germany, the Red-Green budget reform (plus oil prices) produced the desired environmental effects

Less

- **Fuel consumption** (-17%)
- **CO_2-emissions** (2-2,5%)
- **Pension costs** (-16 bn €)
- **Costs for industry** (-1 bn €)
- **Empty truck travel**
- **Imported fossil fuels** (-13%)
- **Overall tax burden** (-4 %)

More

- **Tax share of Nature**
- **Car sharing** (+70 %)
- **Public transport** (+5 %)
- **Energy saving technologies**
- **Energy efficiency**
- **Gas-powered cars** (x10)
- **Bio-fuelled cars** (x2)
- **Job creation** (≈ 250.000)
- **Renewable energies**

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6. Impacts of the ETR 1999-2003 and some communication

Further positive impacts...

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Sorry?

for those who turn off the lights.

They are rewarded…

one way or another

Confusion!

German Parliament: MP‘s request

“Which cognitions influenced the Federal Government to answer the question “what‘s the ecotax good for?“ with “more sex“ and will there be further sexist advertising?“

German Government on MP‘s request

“...the motive “more sex“ is just one out of four motives of a poster-campaign showing the advantages of the ecotax:

- more climate protection **through efficient use of energy,**
- more jobs **through lower pension fund contributions,**
- more money **due to reducing ancillary wage costs**

„…the motive „more sex“ must be interpreted along with the following statement:

who turns off the lights gets rewarded

one way or another “

7. Overall Conclusions (I/II)

Increasingly more, also transition economies and developing countries see environmental fiscal reforms (EFR) as crucial policy to

- make the market work for environmental protection
- get a society on a low-carbon trajectory;
- help develop new industries that will provide sustainable jobs
- provide competitive advantages for the industry;
- contribute to restoring fiscal stability after the recession, the current window of opportunity as it pays off for environment and fiscal policy

However:

- It needs a long-term effort to change the tax and fiscal structure
- It needs intensive trainings for policy makers and staff
- It needs comprehensive and easy-going communications and marketing
- Inflation problem: Fuel taxes – like other environmental taxes – are quantity-based which means: Their revenue is automatically devalued by inflation: In Germany since 2003 alone, by 0.07 Euro/liter (0.10 U$/liter). Recommendation: Adjustment for inflation, if not income

7. Overall Conclusions (II/II)

- Instead of binding caps, many countries might rather go for environmental fiscal instruments (or do both).
- After European countries had led for many years, Asian countries are now showing strong interest, though implementation is still to be done.
- While Indonesia and Thailand are still in an exploratory phase, China and Viet Nam are more advanced. Australia (in your „neighbourhood“) announced a carbon tax for 2012.
- Vietnam is very likely to be the first Asian country to introduce a comprehensive environmental taxation.
- Much appreciation that Asian countries move
- Asian countries becoming a driver for Europe to accelerate its efforts again.
  But will Korea be part of the driver?

Thank you for your attention!

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Climate Mitigation Measures and Green Growth in Korea

27 April 2011

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Contents

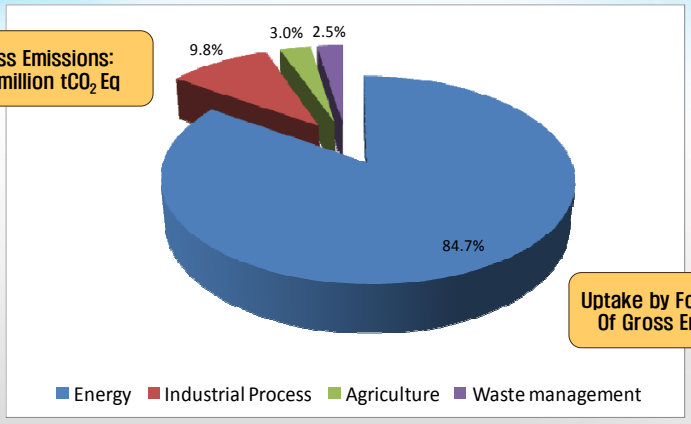
- GHG emissions
- Institutional framework
- Energy policies for climate mitigation
  - Energy efficiency
  - Low carbon energy mix
- Market mechanism: carbon tax

Korea at a Glance (2009, 2010)

- **Land Area** (2010)
  - 100,210㎢ (S.Korea)
- **Population** (2010)
  - 48.219 million persons
- **Economy** (2010)
  - GDP : US$ 1014 billion
  - US$ 20,759 per capita
  - Trade : US$ 898 billion
- **Energy Use** (2009)
  - 243.3 million TOE
  - 96.4 % imported (83.4%)
  - Energy import bill: US$ 91.2 billion (28.2%)
  - CO_2: 555 million tCO_2 (07)
- **Korea ranks** (2009)
  - No. 10 in energy consumption
  - No. 11 in oil consumption
  - No. 5 in oil imports
  - No. 2 in coal and LNG imports
  - No. 9 in CO_2

GHG emissions by sector (2007)

Gross Emissions: 620 million tCO_2 Eq



Uptake by Forest: 5.9% Of Gross Emissions

Source : Korea Energy Statistics Information System

Energy: Source of problem, but Solution

GHG Emissions by Gases (90-07)

Unit: million tCO_2

	1990	2000	2005	2007	'90~07 (%)
CO_2	257.7 (84.4)	466.1 (87.2)	526.0 (88.2)	554.6 (89.4)	4.6
CH_4	43.8 (14.3)	29.1 (5.4)	23.8 (4.0)	24.4 (3.9)	-3.4
N_2O	2.9 (1.0)	16.9 (3.2)	20.8 (3.5)	11.7 (1.9)	8.3
HFCs	1.0 (0.3)	8.4 (1.6)	6.6 (1.1)	7.3 (1.2)	12.4
PFCs	n.a.	2.3 (0.4)	2.8 (0.5)	2.9 (0.5)	10.7
SF_6	n.a.	11.7 (2.2)	16.7 (2.8)	19.2 (3.1)	11.2
Total	305.5 (100.0)	534.5 (100.0)	596.7 (100.0)	620.1 (100.0)	4.3

Source : Korea Energy Statistics Information System

- CO_2: Most important
- CH_4: ↓: 14.3 → 5.4 → 3.9%
- New gases: 4.8%, increase in share

Energy related CO_2 Emissions (90-07)

Unit: million tCO_2

	1990	2000	2005	2007	'90~07 (%)
CO_2 (A) (mil. tCO_2)	242.8	434.4	493.0	518.7	4.6
Population (mil)	43.4	46.1	47.3	48.456	0.6
Energy (B) (mil. toe)	93.2	192.9	228.6	236.5	5.6
GDP (C) (2005, trillion KRW)	369	695	865	957	5.8
Per capita CO_2 emissions (ton)	5.65	9.37	10.29	10.43	3.7
Carbon intensity over Energy (ton/toe) (A/B)	2.60	2.25	2.16	2.19	-1.0
Energy intensity over GDP (toe/m. KRW) (B/C)	0.25	0.28	0.26	0.25	-0.1

Source : Korea Energy Statistics Information System

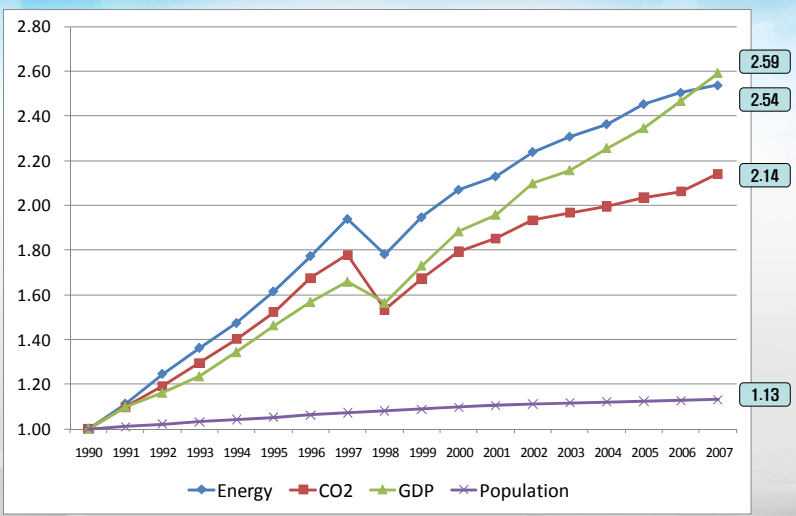
- Energy related CO_2: 519 $mtCO_2$, 93.5% CO_2, 83.7% of total GHG ('07)

Indicators of Energy related CO_2 (90-07)

- Energy consumption grows fast (5.6%p.a)
  - Energy intensity over GDP: a measure of efficiency of using energy for entire economy almost no change. (-0.1% pa)
  - implying energy efficiency not improved.
  - Poses challenges

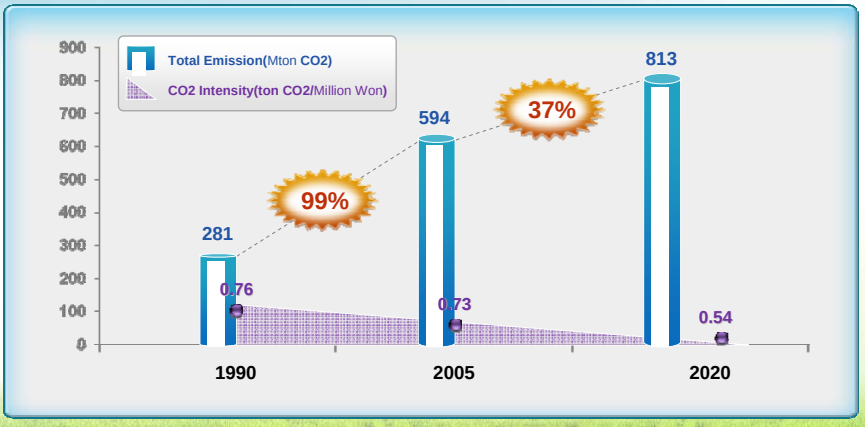
- CO_2 slower than energy (4.6%: 5.6% p.a. over 17 years)
  - Carbon intensities keep dropping (2.60 → 2.19) (-1.0% pa)
  - Encouraging

Indicators of Energy related CO_2 (90-07)



GHGs Emission Projection

- ✔ Continual Decrease in Annual Emission Growth Rate
- ✔ Decrease in CO_2 Intensity(ton CO_2/Million Korean Won)



Framework for Green Growth

Institutional Framework for Climate Mitigation Energy Policy

- Vision for low carbon green growth (8.15, '08)
- Establishment of Presidential Committee on Green Growth (2.16, '09)
  - Tackle climate change, sustainable development, energy, green growth
- Framework Law on Low Carbon Green Growth enacted (12.'09)

- Before 2008: Inter-Ministerial Committee on UNFCCC
  - Adopted 1 (1999), 2, 3 (2005),4th (2007)'Comprehensive National Action Plan on Climate Change'

Framework: Low carbon, Green growth

- Presidential Committee on Green Growth adopted (6 July, 2009)
  - National Strategies for Low carbon, Green growth
  - The Five year National Plan for Low carbon, Green growth
  - 3 Themes, 10 actions

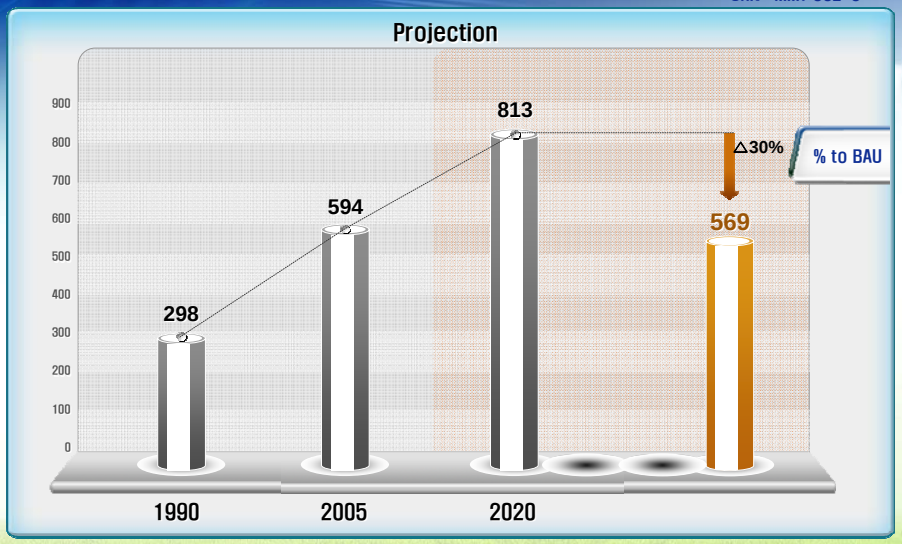
Low Carbon Society / Energy Security	New Engine for Growth	Enhanced Quality of Life & International Leadership
• Build a low carbon society • Greater energy security • Addressing climate change	• R&D for green technology • Foster green industry • Greening industry • Laying foundation such as tax system	• Green transportation / land management • Green lifestyle • Fostering international leadership

Energy Policies for

Climate Mitigation

Setting National Mid-term Reduction Goal (2009.11.17)

Unit : MMT CO2-e



Energy Policies for Low carbon, Green growth

❖ Development of green technologies

- **Regard technology as key to Low Carbon, Green Growth**
- **Applying IT, NT to current energy use technology**
  - Building energy management system
  - Efficiency of power: 38% to 40% (2012)
  - Improve energy storage technology for hybrid cars, elec vehicle
  - LED (light emitting diode)
  - Hybrid cars
  - Energy efficiency in 7 energy consuming facilities
    - Boiler, motor, furnace, drying machine, lighting appliance
  - Energy efficiency in 6 home appliances
    - TV, refrigerator, air conditioner, computer, and set-top box
  - Standby electricity

Establishment & implementation of green tech. plan

Leading green energy technology nation

- By selection & concentration, bridging the technology gap
- Establish an assistance program for R&D

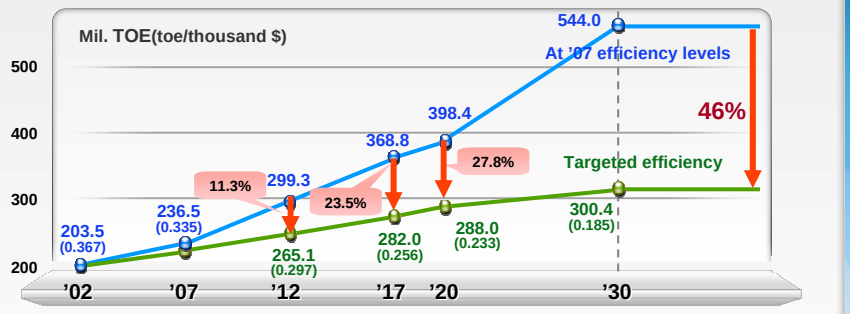
Strategy 1	Strategy 2	Strategy 3	Strategy 4
Mapping out 15 potential sectors	Market-oriented technology development	Create new demand & enhance exports	Construct infrastructure
• Consider marketability, technical feasibility and urgency • Classify early & next-generation growth engine sectors	• Set-up objective & roadmap for technology development • Diversify technology acquisition methods • Link R&D and actual demand	• Lead creation of new demand by the public sector • Assist in exploiting new foreign markets	• Establish a public-private implementation system • Secure stabilized funds • Train experts

Energy Policies for Climate Mitigation

- 4th National Basic Plan for rational use of energy
  - Runs from 2008-2012
  - Embodied in National Strategies, 5 Year Plan
  - Setting target for energy efficiency improvement
    - E/GDP decrease by 11.3% for 5 years, 23.5%(07-17), 44.8%(07-30)
  - Low carbon Energy Mix
    - New and renewable energy
    - Nuclear
  - Growth of New green industry

Target : Energy efficiency & energy reduction

Drastic energy efficiency improvement of 28% by 2020, 46% by 2030



- Higher standard than Germany(Annual Rate 1.8%), which has improved the most over the past 15 years('90~'05)
- For the past 8 years('98~'06), energy efficiency has improved at an annual rate of 1.3%

Improvement of fuel standards of 30% by 2020

Improvement of energy efficiency of 20% by 2020

Improvement of energy efficiency of 28% by 2020

Energy Policies for Climate Mitigation

❖ industry sector

- *VA for general industry:* partnership program between the government and industry, provided with low-interest loans, tax credits, and technical support. 74 percent (1,383 firms). will expand VA to NA (negotiated agreement).
- *Industrial energy audit*: manufacturers consuming more than 2,000 TOE are mandated
- *Promotion of Energy Service Company (ESCO)*: investment in lighting -> process improvements and waste heat utilization. third-party financing.
- *Demand Side Management (DSM) program*: electricity companies, gas companies, and district heating companies

Energy Policies for Climate Mitigation

❖ transportation sector

- *Improvement of fuel economy of vehicles*: fuel-efficiency rating and labeling program, expand coverage
  - 12.4 km/liter to 14.5 km by 2012 (small automobiles)
  - 9.6 km to 11.2 km (16.5 % increase) (larger cars)
- *Promotion of small car use*: 800cc, tax exemptions, tax deductions, and parking and toll fee discounts
- *Promotion of hybrid car*: strong promotion, excise tax deduction and registration fee exemptions
- *Promotion of bicycle use*: build a 9,170 km bicycle-only road
- *Promotion of mass transit system*: bus-only lanes in the major metropolitan areas

Energy Policies for Climate Mitigation

❖ commercial and residential sector

- *Management of energy-intensive buildings*: 148 buildings
- *Promotion of high-efficiency household appliances*: CO_2 emission labeling for 17 home appliances in addition to energy efficiency labeling, minimum energy performance standards

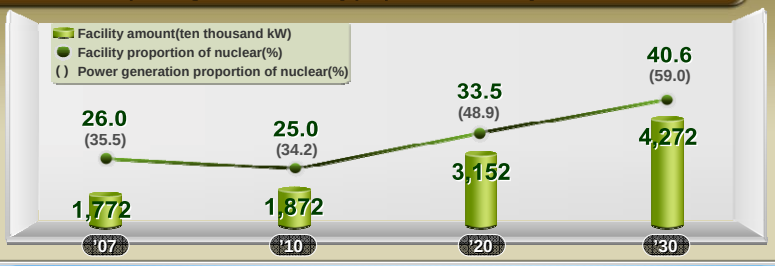
Energy Policies for Climate Mitigation

❖ Low carbon program in the electricity sector

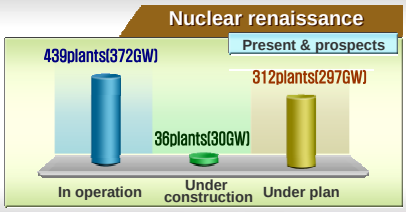
- **installed capacity of 73 gigawatts (GW)**
- **Generation currently**
  - nuclear power (39%), coal (37%), LNG (18%), oil (4%), hydro (1.4%) in 2006
  - Coal (39%), nuclear power (34%), LNG (22%), oil (2%) in 2008
- **Future expansion from 71.4 GW in 2008 to 100.9 GW by 2022 (additional generation capacity of 29.5 GW)**
  - Electiricity demand increase 2.1% per annum to 2022 (15 years)

Achieve optimal energy mix : Nuclear power

Increase nuclear power generation facility proportion to 41% by 2030



Create new growth engine by promoting nuclear plant exportation



- Enhance competitiveness by strategic alliance with major players
- Strengthen diplomatic ties with potential buyers
- Early development on next-generation nuclear plants (APR+) (2015 ➡ 2012)

Energy Policies for Climate Mitigation

❖ **Low carbon program in the electricity sector**

- **increase the share of nuclear, decrease coal power**
- **12 new nuclear power plants (currently, 20 units with 17.72 GW), 11 units of LNG power plants (currently, 46 units), 7 units of coal power (currently, 49 units)**
  - nuclear, coal, and LNG power plants: 24.8%, 33.2%, 25.2% (2008)
  - nuclear, coal, and LNG power plants: 32.6%, 29.2%, 22.9% (2022)
  - power generation, nuclear power increase: 34%(08) to 48% (2022)
- **demand side management programs: reduce peak load by 11.2 percent in 2022**

Achieve optimal energy mix : New & Renewable Energy

Achieve 11% of NRE portion by 2030

Increase mandatory supply and create demand

- **Introduce RPS(RPS: Renewable Portfolio Standard) to energy suppliers**
  - 3% of total electricity production
  - Use 3% biodiesel for transportation fuel
- **Strengthen mandatory NRE use in public buildings**
  - Mandatory use of over 5% of total energy
- **Deploy 1 million 'Green Homes'**
  - Utilize photovoltaic, geothermal, small-scale wind power

Development and deployment of NRE

- **(Wind) Develop and deploy ocean wind**
  - Implement precise investigation and build a commercialization complex
- **(Tidal) Increase deployment of tidal power**
  - Siwha Lake, Garorim Bay, Uldolmok, etc.
- **(Bio) Assist development of domestic and international resources**

Energy Policies for Climate Mitigation

❖ **Low carbon program in new/ renewable energy**

- **Currently very low 2.4% (2007) including large hydro**
- **Ambitious target: 4.3% (2015), 6.1% (2020), 11%(2030)**
- **FIT (feed-in tariff)**
- **RPS (renewable portfolio standard), 2012**
  - 3% of electricity production
  - 3% biodiesel for transportation fuel
- **Deployment of 1million 'Green Homes'**
  - Utilize Photovoltaic, Geothermal, Wood pellet, Small-scale Wind Power
- **mandatory NRE use in Public Buildings newly constructed: 5% of Total Energy**

Energy Policies for Climate Mitigation

❖ Low carbon program in new/ renewable energy

- (Wind) Develop and Deploy Ocean Wind
- (Tidal) Increase Deployment of Tidal /Tidal current Power
  - Siwha Lake, Garorim Bay, Uldolmok, etc.
- (Bio) Assist Development of Domestic, International Resources

New/ renewable energy

❖ Low carbon program in new/ renewable energy

	2008	2015	2020	2030	%
Solar thermal	33 (0.5)	63 (0.5)	342 (2.0)	1,882 (5.7)	20.2
Photovoltaic	59 (0.9)	313 (2.7)	552 (3.2)	1,364 (4.1)	15.3
Wind	106 (1.7)	1,084 (9.2)	2,035 (11.6)	4,155 (12.6)	18.1
Biomass	518 (8.1)	2,210 (18.8)	4,211 (24.0)	10,357 (31.4)	14.6
Hydro	946 (14.9)	1,071 (9.1)	1,165 (6.6)	1,447 (4.4)	1.9
Geothermal	9 (0.1)	280 (2.4)	544 (3.1)	1,261 (3.8)	25.5
Ocean	0 (0.0)	393 (3.3)	907 (5.2)	1,540 (4.7)	49.6
Waste	4,688 (73.7)	6,316 (53.8)	7,764 (44.3)	11,021 (33.4)	4.0
Total	6,360	11,731	17,520	33,027	7.8
Target in primary energy	2.58%	4.33%	6.08%	11.0%	

Market mechanism: Carbon Tax

What's left: market mechanism

- **Measures utilizing market forces**
  - **Carbon tax and emissions trading system**
  - **Fundamental vehicle for carbon pricing**
    - Internalize carbon externality(damage caused by climate change)
    - Cost effective (low administrative and information costs)
    - Incentivise low carbon investment
    - Impacts on all sectors
    - Generate revenue (ET with auction)
- **General Pros/Cons: CT vs ET**
  - **Cost certainty: Carbon tax**
  - **Environmental certainty: Cap and trade (ET)**

Climate Convention, Kyoto Protocol

❖ Provision in Climate Convention (adopted in 1992)

- 4.2(e)(i) The developed country Parties shall *coordinate* with other such Parties, relevant *economic* and administrative instruments developed to achieve the objective of the Convention;
- EU: proposed Global carbon tax due to competitiveness and carbon leakage among developed countries when mitigating individually

❖ Provisions in Kyoto Protocol (adopted in 1997)

- 2.1(b) Cooperate with other such Parties to enhance the individual and combined effectiveness of their policies and measures adopted under this Article, pursuant to Article **4, paragraph 2 (e) (i), of the Convention.**
- 의정서 2.1(a)(v) Progressive reduction or phasing out of market imperfections, *fiscal incentives, tax and duty exemptions and subsidies* in all greenhouse gas emitting sectors that run counter to the objective of the Convention and application of market instruments;
- 17, The Conference of the Parties shall define the relevant principles, modalities, rules and guidelines, in particular for verification, reporting and accountability for emissions trading. The Parties included in Annex B may participate in **emissions trading** for the purposes of fulfilling their commitments under Article 3. Any such trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under that Article.

Climate Convention, Kyoto Protocol

❖ Provisions in Kyoto Protocol

- Article 4, Any Parties included in Annex I that have reached an agreement to fulfil their commitments under Article 3 *jointly*, shall be deemed to have met those commitments provided that … (EU bubble)

- EU: call for global carbon tax
- U.S.: oppose global carbon tax. Proposed emissions trading instead.

- 1992 – 1997, research community endeavor to analyze *carbon tax* used to reduce carbon
- 1997 – onward, research focus shifted to *emissions trading* worldwide
- Depending national circumstance, carbon tax or environmentally sound fiscal system analyzed
- EU, introduced emissions trading

Market forces: Carbon Tax

❖ Carbon tax and Double dividend

- **Double dividend: important policy issues for green growth**
  - First dividend: reduction in carbon, improved climate stability
  - Second dividend: Through revenue neutral, carbon tax revenue used to reduce distortion caused by existing tax (capital or labor tax), thus improve welfare

- **Mixed results in literature**
  - Revenue - recycling effect > or < Tax-interaction effect

Market forces: Carbon Tax

❖ Carbon tax and R&D expenditure

- **Endogenous growth model, Induced technology model**
  - Carbon pricing makes carbon saving technology more profitable, leading to increased R&D on technology
  - Carbon tax revenue to be expended in R&D on less carbon technology or energy efficient technology
  - Will cause reduce mitigation costs, could eventually reverse trend and result in increased GDP though technological advancement in the long run

Conclusion

❖ Aggressive policies for Low Carbon Green Growth

- Consistent long term signal to the market, firm, household
- Measures with effects pervasive to whole society including transportation, land use pattern, urban planning, consumption pattern, industrial structure
- Cost-effective measures
- Carbon tax, emissions trading, regulation, technology policy, R&D

❖ Leading role of the government essential to create growth momentum and growth engine far into the future

- Innovation
- Carbon pricing
- Carbon visibility
- Bottom-up type of stakeholder participation in green consumption

Thank you for attention

Session Ⅲ

탄소세 도입방안과 기대효과
Carbon Tax & Economic Implications

Carbon Taxation for Green Growth in Korea : The Design of Carbon Tax Scheme*

by

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Department of Economics
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April 27, 2011

* This work is prepared for the International Conference on *ETR/EFR for Green Growth*, April 27, 2011, Seoul, Korea (held at Korea Chamber of Commerce and Industry). It is partly based on my previous related works, Kim(2005, 2007, 2009) and Kim et al.(2008, 2010) which has been also benefited from support from the Korea Institute of Public Finance(KIPF), a fellowship at Resources for the Future(RFF), and CMI at Princeton University. I would like to thank Don Fullerton, David Bradford, David Kendrick, Sjak Smulders, Pete Wilcoxen, Rob Williams, and Anastasios Xepapadeas, and conference participants at the NBER, SCE, IIPF, and UNESCAP annual meetings, for their comments on my previous related works.

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<Executive Summary>

Korea's New Growth Strategy

☐ Established a legal act on Green Growth (GG) to meet emission target and promote eco-friendly investment and development
  - e.g., set a national goal of cutting emissions by 30 % below 2020 BAU in 2009
- Prepared for a variety of green growth measures in 2009, and will put those plans into action (Green Tax and Budget Reform; GTBR) in a few years
  - e.g., Plans to use property, automobile, and energy-carbon taxes to reduce CO_2 emissions and promote green growth
- Establish the Global Green Growth Institute (GGGI) in Seoul in 2010

Current Issues and Performance

☐ Low performance of Market Based Instruments (MBIs) for environmental protection in Korea
- Need to target environmentally related taxes into energy, transport (cars), other pollution and resource use more directly and accurately according to externalities
- Erode seriously their environmental effectiveness so far, though environmentally related taxes in Korea is not small (almost 3% of GDP), since i) earmarked *mostly* for transportation infrastructure and ii) allowed for tax reductions, refunds or exemptions for most energy-intensive sectors/activities

Challenges and Obstacles

☐ Earmark more for environmental purposes rather than for transport infrastructure funding

☐ Enhance other direct/accurate MBIs for road infrastructure funding such as other transport taxes (*km* charge), road use/vehicle fees and charges (so as to discourage both car ownership and to use/encourage public transport)

☐ Use direct ex-post 'compensation' options rather than ex-ante 'mitigation' options for internationally-competing sectors and low-income groups

☐ Need more subsidies and public investments since renewable portion is so small, while reducing environmentally harmful subsidies

A Suggestion for International Policy Coordination : Founding ICF (like IMF)

☐ Found an international authority (namely, International Carbon Fund, ICF) to deal *only with* the global externality that cross borders:

- *Supranational* governance over the common integrated unit (e.g., at the EU, UN, or UNESCAP level etc)

☐ Design the *common* minimum level of carbon tax, and collect the *revenues* to be recycled back to the unit (e.g., EU Directive)

☐ Implement various GTBR-related MBIs and fund-raising to deal with competitiveness and equity concerns (so as to minimize socio-political barriers)

☐ Finance clean technology investments, renewables, and spillover R&D, e.g., CDM

Objectives of Green Tax Policies

How will we meet the difficult global challenges before us, while simultaneously improving people's lives and conserving the environment?

☐ There is a widespread agreement on globally based efforts to investigate how to help the environment economically, with ultimate objective of stabilizing climate change. For practical purpose, Eco Tax Reform (ETR)

becomes a credible choice in the ongoing policy discussion over how best to address global warming and to comply with implementing the President Lee's 'Low-Carbon, Green Growth' project.

☐ Green Growth purports to achieve economic growth with generating enough jobs while preserving the limited ecological carrying capacity of the environment.

☐ Eco Tax Reform (ETR) is the term used for changes in the national tax system where the burden of taxes shifts from 'goods', such as labor, capital or clean consumption to 'bads' such as activities that lead to environmental pressures.

- It is one of the key instruments to achieve the plan which would be both fiscally prudent and environmentally sound.

☐ Taxes on motor fuels and motor vehicles have been rather stable as portion of total tax revenues generated about 90% of the revenue from environmentally related taxes in the European Union.

- They have designed taxes that target a broader array of tax bases, not only to reduce CO_2 emissions but also to cope with air pollution, noise levels and traffic congestion, including plastic bags, landfill waste, aggregates, batteries and pesticides.

☐ There are proven cases of eco benefits for each type of instruments. Taxes and charges have proved effective as shown by congestion charging in London, road-user charging for heavy goods vehicles in Switzerland, NOx (Nitrogen Oxides) taxes on air pollution in Sweden, and plastic bag levies in Ireland. Tax differentials were of major importance for unleaded fuel.

☐ Some policy instruments are not feasible without suitable monitoring or administrative capacity. And there is no single recipe for a successful and effective tax scheme. Different factors determine the functioning of the specific schemes, each in their own context.

☐ Examples include the Danish waste-disposal tax (high tax rates), the Norwegian pesticide tax (tax rates differentiated according to toxicity), the London congestion charge (strong champion; rather high charge), and Irish plastic bag tax (awareness of the advantage and simplicity of alternative behavior).

Effects of Eco Tax Reform

☐ The positive effects of eco tax reform are the reduction of energy consumption both at national and households' level, the decrease of CO_2 emissions, the diversification of energy sources, the creation of specialized employment, and the promotion of sustainable production and consumption models.

☐ One negative short-term impact is on heavy energy users such as fossil fuel electricity and steel industry.

- Undoubtedly, the eco tax reform would be more effective and the impact on international competitiveness would be smaller if more countries participate or take equivalent measures.

☐ My own analysis of the 'green-growth potential indicator' shows that green growth relies crucially on the degree of prior tax distortions and eco-efficiency.

- This result indicate that Korea's "win-win" potential index is ranked to 18th in 30 OECD countries. (Here the "win-win" potential index is defined as the ratio of eco-efficiency to prior tax distortion.)
- The Korea's "win-win" potential index is 5.74 that is lower than 7.02, the OECD average of "win-win" potential index and it is well behind to some cases of Switzerland(21.25), Japan(16.64), Norway(12.97), United Kingdom(8.70) and US(7.16).
- This is mainly due to industrial production structures and people's consumption patterns that are still not energy-efficient and environmentally unfriendly.

Carbon Taxation: *When*-questions?

☐ The implementation of a CO_2 tax has to be met by increasing energy efficiency and using low-carbon energy sources

- which would reduce CO_2 emissions, and it could provide more explicit price signal for firms to promote the development of new emission-reduction technologies.

The more we delay, the more we pay. How much we lose if we delay optimal fiscal policies for ecologically sustainable development?

☐ In case with a climate sensitivity of 3.4 (i.e., 3.4^0C temperature increase of doubling CO_2 concentration), my own calculation indicates that :

- The cost of regrets by 10-years delay amounts to about 4% of Gross World Product, which wipes out South Korea's GDP in 2000. (or World average = 0.6% of GDP in each country).
- Here, the "regrets," as a social cost of procrastination, is approximated by the net-present value of the future consumption losses of optimal policies "with each specific procrastination constraint" relative to "without procrastination activities".

☐ This result reveals that, even with uncertainty, the "regrets" are not negligible but significant.

- implies that the endogenously calculated possibility and risk of probabilistic regrets can increase substantially with the years of procrastination.

Carbon Taxation: *How*-questions?

☐ Not only developed countries but also developing countries and economies in transition need to actively take part in shifting to more eco-efficient production and consumption patterns.

☐ Compared with other countries, Korea's ecological footprint was short as calculated by the UN Environment Program. The increasing rate of carbon emission in Korea is one of the highest around the world due to the high degree of dependence on heavy and chemistry-based industrial structure. Also, lack of understanding of energy savings makes our energy efficiency less competitive.

The Korean government is now mulling the introduction of a carbon tax, which taxes the combustion of fossil fuels according to their carbon contents.

☐ The taxation of energy in Korea has been earmarked mostly for transportation infrastructure and still allowed for tax reductions and exemptions for most energy-intensive sectors, undermining seriously its environmental effectiveness.

- e.g., the earmarked "transportation-energy-environment tax" (which is subject to a 2012 clause) would need to be converted an individual consumption tax so as to increase the allocative efficiency and the flexibility of government spendings.

☐ Based on experience in OECD countries, Korea could gradually shift more some of tax burdens from income to energy, while addressing properly their potential impact on international competitiveness and distributional concerns.

- To do this, the Korean government needs to consider further the full environmental costs and other external costs in setting tax rates on energy, phasing out various exemptions and environmentally harmful subsidies, and introduce a carbon tax to curb CO_2 emissions in the near future.

☐ According to the analysis of McKinsey's Antonio Volpin and Cambridge Econometrics in UK, the average price of CO_2 emission trading is estimated to 25 EUR (= 31,828 won in 2007) from 2008 to 2012.

- e.g., by this way, Kim et al.(2008) suggest that, as a carbon tax in Korea, the appropriate size of carbon tax revenue would be about 10 tril. KRW (= 1% of GDP in Korea).
  - However, Cutting CO_2 emissions would involve costs that are uncertain but could be substantial.
- And a gradually rising tax, starting with a "low-rate" carbon tax, e.g., 1 tril. KRW tax revenue (= 0.1% of GDP), would allow for a smoother transition to a less carbon-intensive economy and would increase a political feasibility of the tax plan in Korea.
  - Businesses and households would have more time to replace their equipment and energy-use practices with more efficient

alternatives.

☐ The government could introduce a new energy-carbon tax in 2013 to partly offset the public budget deficits from planned corporate income tax cuts(*e.g.*, the size of carbon tax revenue, 0.1 – 0.3% of GDP). Introducing carbon tax would help cut emissions and stimulate clean technology investment.

- Implement a new carbon tax to have scope for reducing more distortive prior taxes in Korea such as corporate income taxes.
- Also could increase tax benefits for corporate investment and R&D efforts in carbon reduction and energy-saving activities.
- Kim et al.(2010) show that the overall "positive" effect on economic efficiency(GDP) of implementing a new carbon tax scheme from 2013 together with corporate income tax(CIT) cuts and eco R&D subsidies in Korea would be significant.

☐ This is time for setting up the Korea's Eco Tax Reform with a view to our future development and it should also reflect more closely the sustainable issue being addressed.

- Introducing carbon tax would help cut emissions and stimulate clean technology investment while raising much-needed revenue for the government (or enhancing fiscal soundness).
- To implement a carbon tax realistically, we have many challenges to address, like setting a detailed tax rate (in a realistic way), linking it with other prior tax system and with other instruments such as ETS and NA program, tackling the income redistribution issue, and reaching a political agreement.
- Recently many countries are paying higher attention to a carbon tax rather than sticking to existing measures of direct regulation**.**

Political Barriers and Check Points

1. Sectoral Competitiveness Issues

☐ On the early stage of implementing eco tax reform in many countries, there were concerns about losing international competitiveness of industries and business association.

☐ However, as regards of impact of the scheme has been successful through performing with clear goal and collecting public opinions.

- In German case, it could achieve by differentiating tax rates and making special provisions for vulnerable groups. So that private households and small businesses are those who are unlikely to pay high rates.
- In UK, there has been extensive consultation with business and designed in a way that protects the competitiveness of UK firms. For example, UK industries and businesses receive a 80% discount to Climate Change Levy(CCL) in return for Climate Change Agreements(CCA) to meet energy efficiency and/or carbon emission targets.

☐ In fact, eco tax reform would lead to increased competitiveness as a result of fiscally neutral and net positive effects on employment due to the decrease of more distortive taxes on income and the promotion of innovation of new green R&D technologies.

2. Equity concerns

☐ It is also important to devise appropriate compensation fiscal schemes for the poor households group.

- Applying new environmental taxes in full, combined with compensation schemes for the poor, would be the role of environmental taxation.
- OECD recommend to use ex post direct compensations rather than ex ante tax exemptions of this purpose.

3. Gradual Phase-In

☐ From experience in countries that have already implemented eco tax reform in Europe, we may need a gradual phasing-in of the reforms and

the use of a public information campaign for stronger incentives later on.

- UK's fuel duty escalator can be a good example as a slow but sure way of making policy instruments more demanding and effective.

4. Public Acceptance and Compliance (Political Feasibility)

☐ It is also important to maintain transparency in the planning and use of the tax revenue which can defuse potential opposition to a new environmental tax charge.

- It is necessary to weigh partly conflicting demands against each other for energy-intensive sectors, and compatibility with market principles and issues of administrative feasibility.

☐ 'Green tax commissions' or 'inter-ministerial committees' for eco tax reform should be emphasized.

☐ For Korea, the carbon tax scheme would need to designed alongside a broader fiscal package of measures (notionally funded from carbon tax revenues) in order to protect the international competitiveness of firms and/or low-income families.

- For instance, energy-intensive industries could receive a discount to the proposed carbon tax rates in return for joining a successful NA programs to improve energy efficiency and/or reduce emissions to specific levels.
- Hypothecation of part of carbon tax revenue to subsidize green projects in industries and/or low-income families could also raise public acceptability of new carbon taxation.

5. Administration and Governance

☐ 'Green tax commissions' or 'inter-ministerial committees' for eco tax reform should be emphasized.

- They make proposals for environmental tax reform and act as a forum for discussion on topics that include design, rates and the likely impacts.
- Analyzing and recommending to reform by political parties and

academic and institute circles can be available.

6. International Cooperation

☐ Knowledge transfer between countries (e.g., via GGGI`) about the use of economic instruments in environmental policy would be desirable, whereby country-specific conditions are being considered when such a transfer is done.

Ways Forward for Korea

☐ There are still ways to go, even though government got off to a first step to eco-sound fiscal policies.

- Compared with other OECD countries, Korea has less energy-efficient industrial structures with complicated fiscal policies and large differences of tax burdens on each energy sectors.
- Therefore, Korea is now facing to prepare for the post-Kyoto scheme which would enforce to find a new paradigm for dealing with environmental sustainability and economic growth.
- In order to implement the Korea's new scheme successfully, a key theme "green taxes" would be essential to provide greater efficiency gain through helping to 'get the prices right' associated with their environmental externalities.
- It is time to reform the current tax system to promote a new growth engine, Green Growth in Korea.

☐ Further, it is required to devise secondary instruments such as direct compensation payments, price support and tax exemptions for unfair burdens of low-income households and more energy-vulnerable sectors.

- All those approaches might be offset of distributional consequences as mitigating the harmfulness of eco-motivated fiscal policies.

☐ It's pretty obvious that the more we delay action, the more cost we pay. If we invest green technology in recent economic slowdown, we will have a

global initiative that would make our economy more competitive in the long run.

I. INTRODUCTION

The Copenhagen Accord in 2009 is meant to represent a broad political agreement between countries, including G20, accounting for about 80% of global carbon emissions. It requires for developed countries to submit pledges for emissions cuts and climate financial aid by 2020 (as an extension of the Kyoto protocol), and for developing countries to indicate their voluntary actions including targets to cut carbon/energy intensity, to increase renewable energy portion, and/or to reduce deforestation.

Recently fifty-five countries have pledged emission cuts to the UN under the Copenhagen accord.[1] These countries account for 78 per cent of global emissions from energy use, according to a UNFCCC release.

Asia's fourth-largest energy consumer set an ambitious goal of cutting greenhouse gas emissions by 30 percent below expected levels in 2020 (November, 2009). This is one of the most aggressive targets in the non-Annex I countries. It also promotes environment-friendly investment and development (see Table 1).

Korea's announcement was made immediately ahead of the much anticipated climate talks in Copenhagen in 2009. The Korea's target setting is a voluntary and unilateral action, and Korea hopes its efforts will create a more conducive atmosphere for other developing countries' engagement as well as further commitments from developed countries.

The Korea's national strategy of Green Growth is a comprehensive long-term master plan. It envisages three main objectives as follows: (i) to deal effectively with climate change and energy independence, (ii) create new growth engines on multiple fronts, and (iii) to raise overall quality of life for the people and to enhance contribution to the international community through strong advocacy for green growth(PCGG, 2008).

[1] It represents the first time that large emerging economies such as China and India have made written commitments to the international community that they will curb their carbon emissions.

Korea recently established a Comprehensive Act on Green Growth to meet the emission target and promote environmentally-friendly investment and development (January, 2010). The government review is now under way to assess the feasibility of a levy on carbon. It is considering using property, automobile, and energy-carbon taxes to reduce greenhouse gas emissions and promote green growth. It is also pushing for a new Negotiated Agreement(NA) system in 2013 and a national cap-and-trade system legislation in 2015 and for providing support for 10 key green technologies including carbon capture and storage, a smart grid and next-generation batteries.[2]

The Korean government prepared for a variety of measures of the green growth in 2009 and will put those plans into action (Green Tax & Budget Reform[3]; GTBR in Figure 1). Although some companies voiced their worries on the policy direction and many of the Korean companies are newcomers to green industries, Korean companies have been quite supportive of the Green Growth initiative. 640 Korean companies would start participating in a voluntary pilot carbon emissions trading system from 2010.

The government also established the Global Green Growth Institute(GGGI) in Seoul (June, 2010) to help countries share their policy experiences on climate change and to enhance their world-wide green growth strategies.

[2] A smart grid system enables homes and factories to use electricity during off-peak hours through a two-way communication between power suppliers and consumers. Korea established a major test bed facility for the smart grid system on Jeju Island in 2009, which will be completed by 2013.

[3] In this paper we will use GTBR and ETR(eco tax reform interchangeably where the former has a broader concept than the latter.

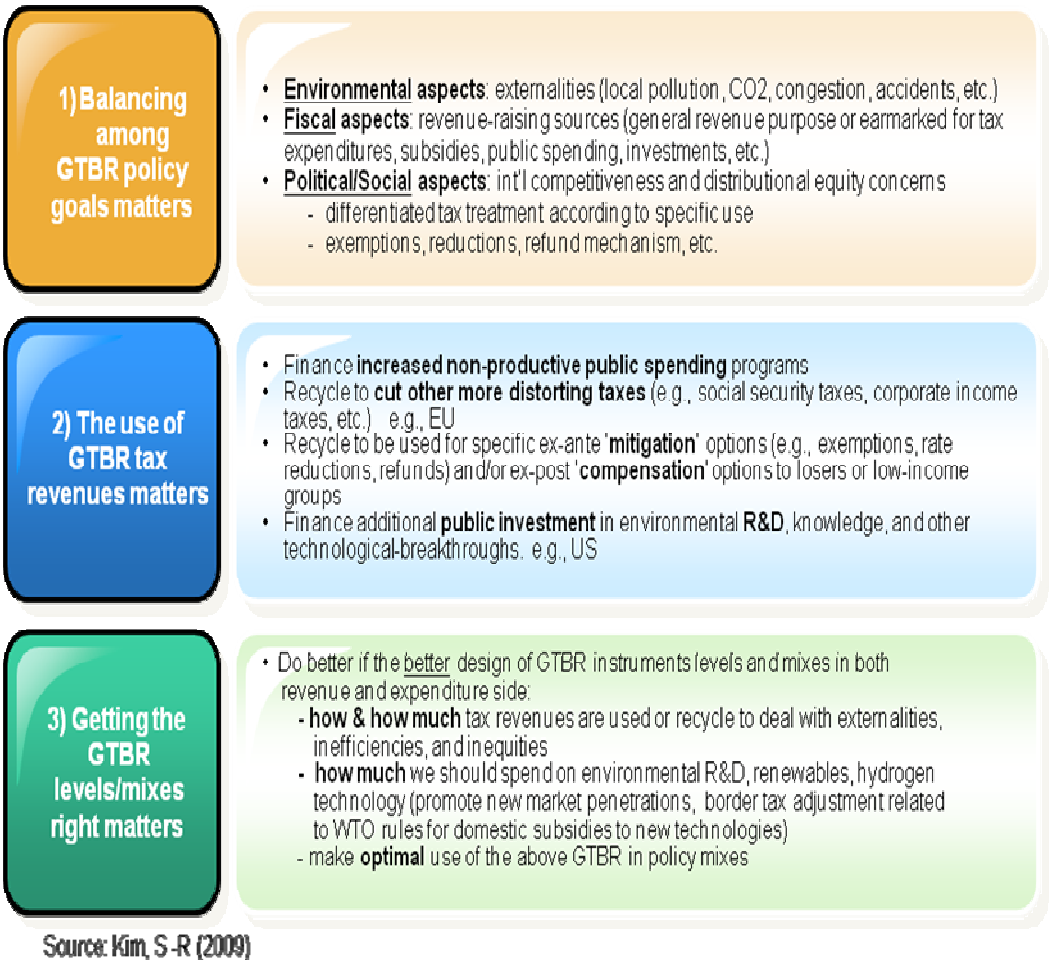
Table 1. The Copenhagen-Accord Emissions Reduction Targets by 2020

(Unit : %)

	CO2 emissions relative to				Carbon Intensity relative to
	1990 level	2000 level	2005 level	2020 BAU*	2005 level
EU states	20				
Norway	40				
Croatia	5				
US			17		
Canada			17		
Moldova	25				
South Africa				34	
Brazil				38.9	
Russia	25				
Japan	25				
Australia		25			
New Zealand	20				
South Korea				30	
Indonesia				26	
Singapore				16	
China					45
India					25

Note: BAU represents Business as usual case with no climate policy
Source: UNFCCC, 2010; Boao Report, 2010

Figure 1. Objectives of Green Tax and Budget Reform (GTBR)



Source: Kim, S-R (2009)

II. MECHANISMS FOR GREEN GROWTH

When can environmental fiscal reform boost both economic growth and social welfare? To ensure that economic growth and the preservation of environmental quality are compatible and socially optimal, it is crucial to understand the interactions among economic activities, technological progress, and ecological processes over time. Policies for ecologically sustainable economic growth (green growth) may be more effective if technological progress in abatement knowledge responds to economic incentives. If so, how can environmental investment and taxation contribute to the productivity of private factors of

production and to green growth, and how much sustainable development can we expect from these policies?

This section discusses environmental fiscal policies, using Fullerton and Kim (2008)'s model, within an endogenous growth model with pollution, distortionary income taxes, and three assets: natural capital, abatement knowledge, and private capital (both physical and human capital).[4] Fig. A1 in Appendix depicts a schematic diagram for greening the tax and budget system towards ecologically sustainable economic growth.

Here, individual household utility (U) depends on consumption (C) of the final good and on the quality of the environment (N). This environmental quality is a stock that acts as a nonrival consumption good but also as a productive public input to production. The economy has three types of assets. The first is private capital (K, including both physical and human capital), and the second is public abatement knowledge capital (H, a nonrival environmental R&D good). Either of these first two types of asset can be accumulated by devoting to it some fraction of output. The third type of asset is environmental quality (natural capital), which is modeled as a stock of a renewable resource. Pollution (P) is inevitable from production activities, but it can be reduced by increasing the stock of pollution abatement knowledge (e.g., clean technology) and by imposing environmental regulations on production activities (e.g., pollution standards, permit, or taxes).

Also, 'effective pollution (Z),' is an input that can be provided either by actual pollution (P) or through the stock of available public abatement knowledge (H). Thus, the same output can be achieved with less actual pollution if the firm has access to more abatement knowledge. The parameter ε denotes a pollution-conversion factor (or relative productivity of P relative to H): a higher ε makes

[4] Recent advances in endogenous growth theories have opened up the possibility of analyzing the growth effects of various policy changes in the long-run (Fig. A8). In particular, models with the environment along this line argue that a tighter environmental policy may boost growth, at least in the long-run. They derive optimal environmental policies for internalizing environmental externalities in a sustainable growth framework. However, most of these previous models simply assume that the public sector's environmental R&D activities to generate pollution abatement knowledge are financed through lump-sum taxation rather than through other distortionary taxes.

pollution more effective, or equivalently, makes abatement relatively less effective.[5]

Following Tahvonen and Kuuluvainen (1991), Fig. A2 depicts growth and depletion of the renewable natural resource, which is modeled according to the following accumulation equation:

$$\dot{N} = E(N) - P, \quad \text{where } E' \equiv \partial E/\partial N \lesseqgtr 0 \quad \text{and} \quad E'' \equiv \partial^2 E/\partial N^2 < 0, \qquad (1)$$

where N denotes the stock of natural capital (environmental quality), P is pollution, and where a dot over any variable represents the change over time. *E(N)* represents ecological growth through regeneration processes. This regeneration might initially increase with a larger N (that is, $E' > 0$), but it eventually peaks and declines ($E' < 0$) as the environment approaches its natural state. Thus, natural capital accumulation features diminishing returns ($E'' < 0$). The second term, pollution P, indicates the deterioration of environmental quality through the extractive use of natural resources in production (e.g., using up clean air or water). On a sustainable steady-state path where $\dot{N} = 0$, eq. (1) implies that $P = E(N)$. Thus, $E(N)$ represents the absorption capacity of the environment.

Here, we have three main tensions or sets of opposing forces that affect welfare and growth. First, a cut in pollution has a direct effect that reduces output, but it has an indirect effect that raises output through the increase in environmental quality. A second tension is that growth may cause pollution, but it also generates resources for abatement knowledge that may reduce pollution. The improved quality of the environment or the increased stock of abatement knowledge can allow the economy to absorb a larger flow of effective pollution in the steady state. Finally, the economy also has a tension between the positive effects of investment in abatement knowledge and the negative effects from distortionary

[5] Unlike the literature, we here generalize the treatment of pollution and abatement in production so that they are not equally effective. The addition of this one parameter has important implications, however, as environmental policy no longer must have the same effect on growth as on welfare. This pollution-conversion parameter (ε) reflects mainly "eco-efficiency" related to country-specific production structures or endowment conditions, and so we do not impose any prior restrictions on it. Indeed, we show how the difference between the productivities of man-made input H and natural input P plays a crucial role in determining optimal environmental and fiscal policy. The studies by Bovenberg and Smulders (1995, 1996) do not consider this possibility but just assume $Z = HP$ and $\varepsilon = 1$.

income taxes made necessary by that increase in non-productive government spending.

As in Fig. A1, the government here is assumed to raise revenues by adopting a positive income tax rate, τ_K, and a positive pollution tax, τ_P. Tax revenues are used to finance "government expenditures on public investment" ($q_H \dot{H} + q_H \delta_H H$) and lump-sum transfers to households (G). Further, we suppose that government fixes the ratio of the lump-sum transfer payments relative to private income, $\varphi \equiv G/rK$. This parameter is used below as a measure of the extent to which distorting taxes are necessary. Assuming a balanced budget at any moment, the budget constraint of government can be written as:

$$\tau_K rK + \tau_P P = q_H \dot{H} + q_H \delta_H H + G, \quad \text{or (dividing by } rK\text{)}, \tag{2a}$$

$$\tau_K + \tau_P P/rK = \zeta + \varphi, \tag{2b}$$

where $\tau_P P/rK$ represents the ratio of pollution tax revenue to private capital income,[6] and where $\zeta \equiv \left(q_H \dot{H} + q_H \delta_H H\right)/rK$ is the ratio of gross public investment in abatement knowledge to private capital income.[7]

For the market economy described above, a benevolent government needs to intervene to ensure the optimal provision of the two public goods N and H. In this case, where lump-sum taxation is not available, it is important to know how the public investment in abatement knowledge is financed and what becomes of the taxes collected. Government must take as given the decentralized optimizing behavior of firms and households, the ecological constraint, and government budget constraint, while affecting the allocation of resources among the three type of capital (K, H, and N) through its policy variables (τ_K, τ_P, and $\dot{H}$). Then, in this second-best world, it must act to satisfy the following 'arbitrage condition':

[6] From the firm's first-order conditions, we know that the ratio of pollution tax revenue to private capital income is $\tau_P P/rK = \alpha\varepsilon/(1-\alpha)$, which is always constant in our economy.

[7] For environmental and non-environmental taxes in OECD countries, see Fig. A13 in Appendix. In particular, this shows environmental tax burden relative to other taxes in 2002.

$$\underbrace{(1-\tau_K)r-\delta_K}_{\text{rate of return on private capital}} = \underbrace{\frac{1}{q_H}A\frac{\partial F}{\partial Z}P^{\varepsilon}+\frac{\dot{q}_H}{q_H}-\delta_H}_{\text{rate of return on abatement knowledge}} = \underbrace{\frac{1}{\tau_P}\left[\frac{\partial U}{\partial N}/\frac{\partial U}{\partial C}+F\frac{\partial A}{\partial N}\right]+\frac{\partial E}{\partial N}+\frac{\dot{\tau}_P}{\tau_P}}_{\text{rate of return on natural capital}}, \quad (3)$$

which says that investments in the three types of capital are traded off against each other and also against household savings. The first equality in eq. (3) says that the net return on private investments [$(1-\tau_K)r-\delta_K$] should match the return on investment in abatement knowledge (consisting of the current return in production and a capital gain), given the economy-wide pollution level, P. The second equality in eq. (3) says that environmental quality N should also earn the same rate of return as public abatement knowledge. The return on environmental quality in eq. (3) consists of (i) its contribution to utility (the consumption externality), (ii) its contribution to total factor productivity (the production externality), (iii) its contribution to ecological processes (marginal absorption capacity), and (iv) a scarcity rent (capital gain). The Hotelling rule states that if the natural resource is exhaustible, the rate of its price increase ($\dot{\tau}_P/\tau_P$) should equal the rate of return on private capital. Hence, eq. (3) can be interpreted as a generalized Hotelling rule for renewable natural resource (in the presence of distortionary taxation).

Optimal corrective policy rules in our economy induce the market equilibrium path to match the socially-efficient path. What level of policy rules should then be adopted to maximize social welfare, including concerns about global warming, and how do the resulting long-run growth outcomes react to changes in the set of economic and natural parameters in the economy? These questions often arise in environmental fiscal policy debates over greenhouse gas (GHG) abatement.

How are growth and welfare affected by a tighter environmental policy in the presence of the externalities and distortionary taxation? It is typically argued that pollution control hurts growth by raising abatement costs.[8] With endogenous growth, however, environmental policy may have permanent effects on the productivity of the economy. If pollution taxes are sub-optimally low, for

[8] Most of the early literature assumes exogenous technological progress that is independent of environmental policy as in Fig. A8. See Jorgenson and Wilcoxen (1990), Nordhaus (1994), and Goulder (1995) among many others. In these models, environmental protection has costs that reduce growth (see Fig. A9).

example, then pollution is excessive. Natural capital is then under-accumulated, which affects production.

To investigate the growth effects of tighter environmental policy, we can see the long-run growth rate then reacts to changes in pollution taxation as:

$$\frac{dg}{d\tau} = -\sigma\underbrace{\left(\frac{d\tau_K}{d\tau}\right)r}_{\text{tax replacement effect}} + \underbrace{\sigma(1-\tau_K)\frac{1-\alpha}{\alpha\varepsilon}E(N)\left(1-\eta_{EN}\eta_{N\tau}\right)}_{\text{improved productivity effect for private capital}}, \tag{4}$$

where $\eta_{N\tau}\left(\equiv (dN/d\tau)(\tau/N)\right)$ is the elasticity of natural capital with respect to the pollution tax and $\eta_{EN}\left(\equiv -(dE/dN)(N/E)\right)$ is the elasticity of the absorption capacity of the environment with respect to natural capital. In our model, the curve that relates environmental tax rates and their growth (or welfare) effects can now be in an *inverted* U-shape function. Also, we can have the relationship between the growth-maximizing pollution tax and the welfare-maximizing pollution tax.

$$\underbrace{\frac{dW}{d\tau}}_{\text{welfare effect}} = \frac{K(0)\left(C(0)N^{\phi}\right)^{-1/\sigma}}{\theta - g(1-1/\sigma)}\frac{1-\alpha}{\alpha\varepsilon}E(N)N^{\phi}\left(\frac{\alpha(1-\varepsilon)}{1-\alpha}+\varphi\right)\left\{1+(\phi-\eta_{EN})\eta_{N\tau}\right\} + \frac{\partial W}{\partial g}\underbrace{\frac{dg}{d\tau}}_{\text{growth effect}} \tag{5}$$

As illustrated in Fig. A11, note that maximizing growth is not equivalent to maximizing welfare, and the first term in eq. (5) reveals the difference. The key parameters affecting this difference are the size of tax distortions (φ), the productivity of pollution (ε), and the differentiated additional effects of τ on welfare and environmental sustainability by $(\phi-\eta_{EN})\eta_{N\tau}$.

III. CARBON TAX SCHEME FOR GREEN GROWTH IN KOREA

How will we meet the difficult global challenges before us, while simultaneously improving people's lives and conserving the environment?

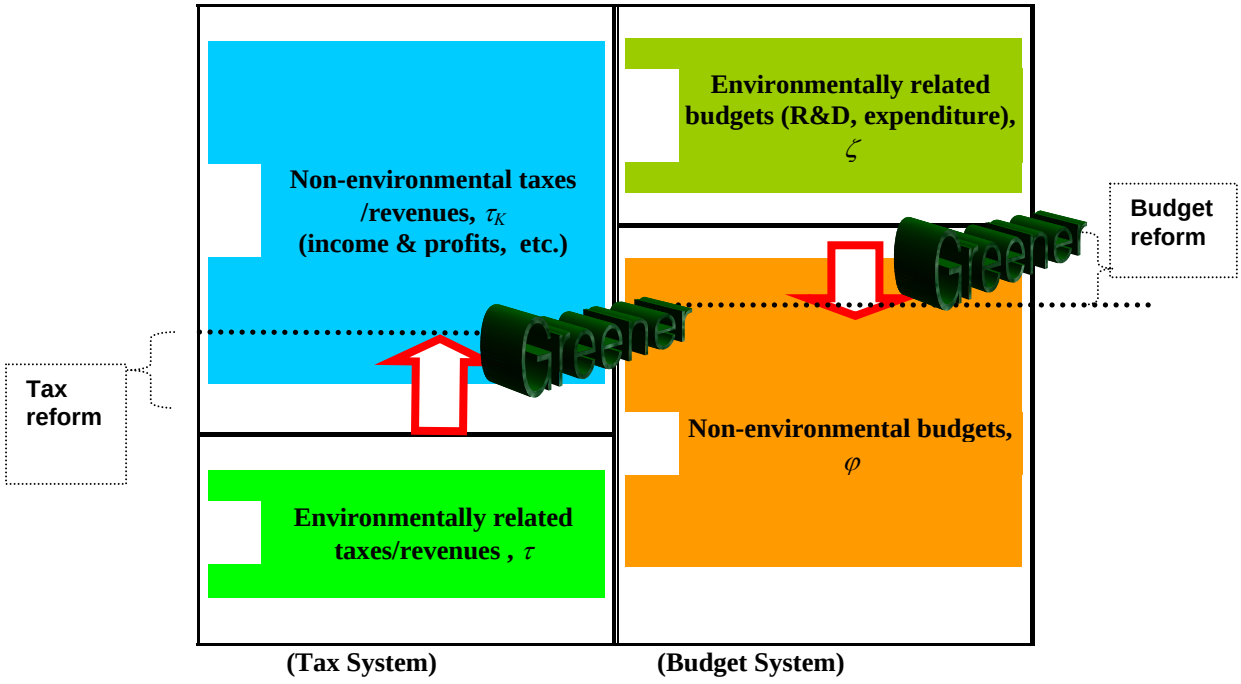
There is a widespread agreement on globally based efforts to investigate how to help the environment economically, with ultimate objective of stabilizing climate change. For practical purpose, Eco Tax Reform (ETR) becomes a credible choice in the ongoing policy discussion over how best to address global warming and to comply with implementing the President Lee's 'Low Carbon, Green Growth' project.

Green Growth purports to achieve economic growth with generating enough jobs while preserving the limited ecological carrying capacity of the environment. Eco Tax Reform (ETR), as partly illustrated in Figure 2, is the term used for changes in the national tax system where the burden of taxes shifts from 'goods', such as labor, capital or clean consumption to 'bads' such as activities that lead to environmental pressures. It is one of the key instruments to achieve the plan which would be both fiscally prudent and environmentally sound.

OECD countries have continued to increase and refine their use of environmental tax instruments for the Green Tax and Budget Reform since early 1990s. Countries in Nordic region including Finland (1990), then Sweden (1991) and Denmark (1993) were the first to launch such reforms, followed by the Netherlands (1996, 2001), Germany (1999) and the United Kingdom (1996, 2001 and 2002)

With its current draft, economic and environmental effects of ETR are quite positive. And some countries have shown considerable efforts in developing ETR in recent years. For example, environmental tax revenues have increased by about 36% since the launch of the German ETR in 1999. As part of the German program, about an additional EUR 20 billion was raised by energy taxed in 2003. The Swedish ETR contributes about 0.1% of GDP.

Figure 2. The Concept of Greening the Tax and Budget System



Taxes on motor fuels and motor vehicles have been rather stable as portion of total tax revenues generated about 90% of the revenue from environmentally related taxes in the European Union. They have designed taxes that target a broader array of tax bases, not only to reduce CO_2 emissions but also to cope with air pollution, noise levels and traffic congestion, including plastic bags, landfill waste, aggregates, batteries and pesticides.

For example, Table 2 provides an overview of the use of environmental taxes and charges in OECD countries.

There are proven cases of eco benefits for each type of instruments. Taxes and charges have proved effective as shown by congestion charging in London, road-user charging for heavy goods vehicles in Switzerland, NOx (Nitrogen Oxides) taxes on air pollution in Sweden, and plastic bag levies in Ireland. Tax differentials were of major importance for unleaded fuel.

Some policy instruments are not feasible without suitable monitoring or administrative capacity. And there is no single recipe for a successful and

effective tax scheme. Different factors determine the functioning of the specific schemes, each in their own context.

Examples include the Danish waste-disposal tax (high tax rates), the Norwegian pesticide tax (tax rates differentiated according to toxicity), the London congestion charge (strong champion; rather high charge), and Irish plastic bag tax (awareness of the advantage and simplicity of alternative behavior).

Table 2. Examples of Environmental Taxes

Eco Tax	Country	Remarks
Energy and CO_2	-Norway : CO_2 tax -Germany: Energy tax	-2% reduction in CO_2 emission -Increase in the world price of oil
Air Pollution	-Sweden: NOx charge	Unique example
Agricultural input	-Norway: Tax on pesticides	
Product	-Ireland: Plastic bag levy	Reduction around 90% of carrier bags
Waste	-Denmark:: Waste tax -UK: Landfill tax	-Reduction in waste
Water	-Netherlands: Wastewater effluent chares -Denmark: Tax on tap water	-Water Pollution decrease 90 % -26% reduction in total water consumption
Transport	-London, UK: Congestion charge -Switzerland: Road-user charges	-Reduced congestion in zone / Increased interest from other countries

Sources: OECD/EEA database on environment-related taxes, Ministries of Finance and Environment of the European countries

The positive effects of eco tax reform are the reduction of energy consumption both at national and households' level, the decrease of CO_2 emissions, the diversification of energy sources, the creation of specialized employment, and the promotion of sustainable production and consumption models.

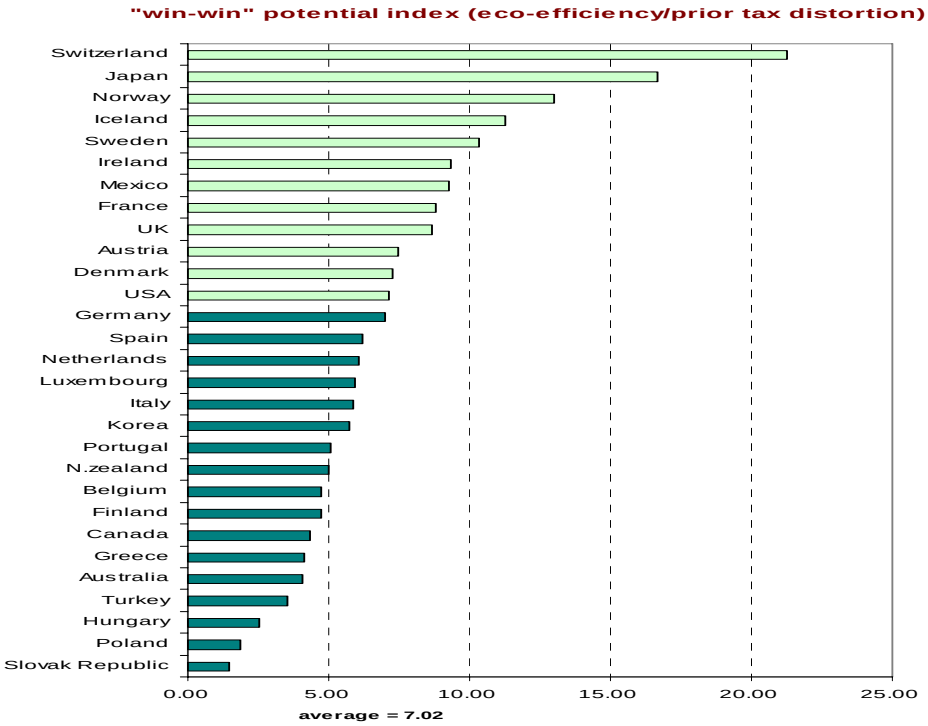
One negative short-term impact is on heavy energy users such as fossil fuel electricity and steel industry. Undoubtedly, the eco tax reform would be more

effective and the impact on international competitiveness would be smaller if more countries participate or take equivalent measures.

My own analysis of the 'green-growth potential indicator'(or "win-win" potential index) shows that green growth relies crucially on the degree of prior tax distortions and eco-efficiency. The results in Figure 3 indicate that Korea's "win-win" potential index is ranked to 18th in 30 OECD countries. Here the "win-win" potential index is defined as the ratio of eco-efficiency to prior tax distortion.

The Korea's "win-win" potential index is 5.74 that is lower than 7.02, the OECD average of "win-win" potential index and it is well behind to some cases of Switzerland(21.25), Japan(16.64), Norway(12.97), United Kingdom(8.70) and US(7.16). This is mainly due to industrial production structures and people's consumption patterns that are still not energy-efficient and environmentally unfriendly.

Figure 3. The "Win-Win" Potential Index : The case of Global Warming

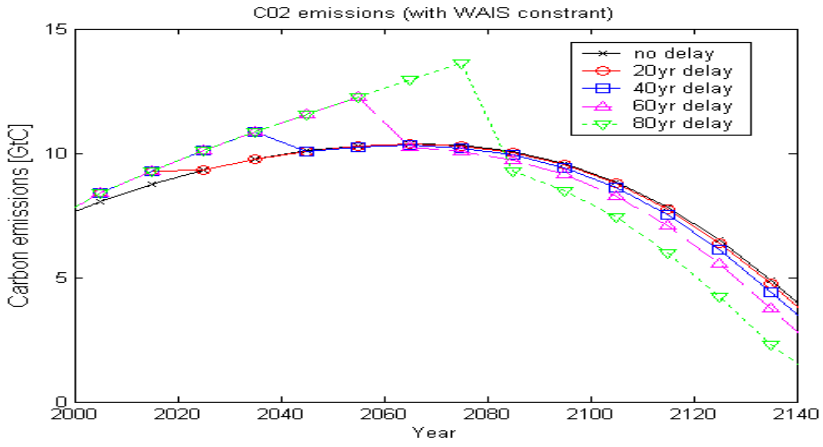


Source: Kim, S.-R. (2005), First Regional Policy Dialogue, UNESCAP International Conference, p.157.

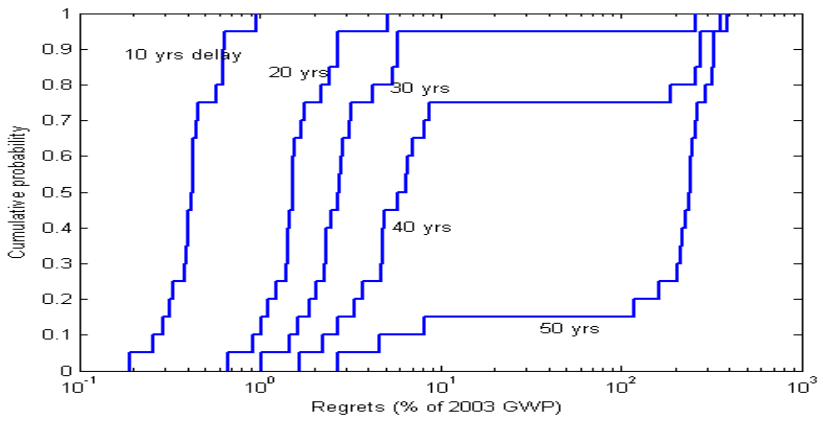
The more we delay, the more we pay.

How much we lose if we delay optimal fiscal policies for ecologically sustainable development? In case with a climate sensitivity of 3.4 (i.e., the degree of 3.4 ^{0}C temperature increase of doubling CO_2 concentration), my own calculation, using Nordhaus-Boyer DICE model, indicates that the cost of regrets by 10-years delay amounts to about 4% of Gross World Product, which wipes out South Korea's GDP in 2000.

Figure 4. Distribution of "Regrets" as a function of Procrastination



(a) Carbon reduction schedule



(b) Regrets of prograstination

Source: Kim, S.-R. (2005)

Here, the “regrets,” as a social cost of procrastination, is approximated by the net-present value of the future consumption losses of optimal policies “with each specific procrastination constraint” relative to “without procrastination activities”.

This result reveals that, even with uncertainty, the “regrets” are not negligible but significant. Figure 4 implies that the endogenously calculated possibility and risk of probabilistic regrets can increase substantially with the years of procrastination.

Not only developed countries but also developing countries and economies in transition need to actively take part in shifting to more eco-efficient production and consumption patterns.

Compared with other countries, Korea’s ecological footprint was short as calculated by the UN Environment Program. The increasing rate of carbon emission in Korea is one of the highest around the world due to the high degree of dependence on heavy and chemistry-based industrial structure. Also, lack of understanding of energy savings makes our energy efficiency less competitive.

The Korean government is now considering the introduction of a carbon tax, which taxes the combustion of fossil fuels according to their carbon contents.

The implementation of a CO_2 tax has to be met by increasing energy efficiency and using low-carbon energy sources which would reduce CO_2 emissions, and it could provide more explicit price signal for firms to promote the development of new emission-reduction technologies.

The taxation of energy in Korea has been earmarked mostly for transportation infrastructure and still allowed for tax reductions and exemptions for most energy-intensive sectors, undermining seriously its environmental effectiveness. For example, the earmarked "transportation-energy-environment tax" (which is subject to a 2009 clause) would need to be converted an individual consumption tax so as to increase the allocative efficiency and the flexibility of government spendings.

Table 3. Energy Taxation in Korea (2010. 1)

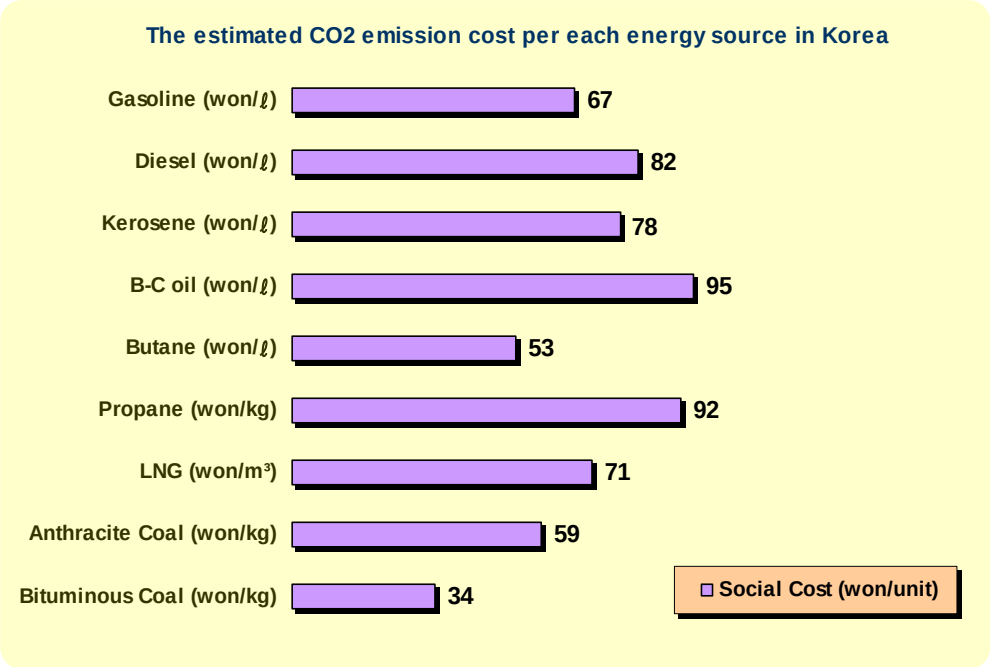
		Gasoline (won/ℓ)	Kerosene (won/ℓ)	Light oil (won/ℓ)	Heavy oil (won/ℓ)	LPG (won//kg)		LNG[1] (won/m^3)
						propane	Butane	
Customs Tax	General	5%				3%		3%
	Quota (Provisional)	3%				2%		2%
Individual Cons. Tax	General	-	90	-	17	20	252	48
	Flexibility	-	63	-	-	14	275 (161 won/ℓ)	
Trans. Energy Environ. Tax	General	475	-	340	-	-	-	-
	Flexibility	529	-	375	-	-	-	-
Education Tax[3]		79	14	56	3	-	41 (24 won/ℓ)	-
Local Drive Tax[4]		138	-	98	-	-	-	-
VAT		10%						
Import Fee		16				-		19.58
Quality Examination Fee		0.430				0.027		-
Safety Management Levy		-	-	-	-	4.5		3.9
Sales Levy		36 (High)	-	-	-	-	62.283 (36.42 won/ℓ)	-
Total Tax Amount	Amount	897	198	661	87	184	527 (308 won/ℓ)	120
	Price Share Ration	54%	19%	46%	12%	10%	32%	15%
Consumption Price		1,661	1,040	1,450	744	1,808	1,636 (957 won/ℓ)	783

Source: Ministry of Strategy and Finance(2010), Kim, S.-R. et al.(2010)

Based on experience in OECD countries, Korea should shift more some of tax burdens from income to energy, while addressing properly their potential impact on international competitiveness and distributional concerns. To do this, the Korean government needs to consider further the full environmental costs and other external costs in setting tax rates on energy, phasing out various exemptions and environmentally harmful subsidies, and introduce a carbon tax to curb CO2 emissions in the near future.

According to the analysis of McKinsey's Antonio Volpin and Cambridge Econometrics in UK, the average price of CO_2 emission trading is estimated to 25 EUR (= 31,828 won in 2007) from 2008 to 2012. Following this, Kim et al.(2008) suggest a carbon tax scheme in Korea, as the rate of emission cost per each energy source can be measured by multiplying the price 31,828 won and the unit amount of CO_2 emissions in Figure 5.

Figure 5. The Estimated CO_2 emission Cost per Each Energy Source in Korea



Source: Kim, S.-R. et al.(2008).

Table 4. Proposed Carbon Tax Schemes on Energy Consumption in Korea

Energy sources		Gasoline (won/ℓ)	Diesel (won/ℓ)	Kerosene (won/ℓ)	B-C oil (won/ℓ)	Butane (won/ℓ)	Propane (won/kg)	LNG (won/kg)	Bituminous. coal (won/kg)
Energy taxation (excl. VAT)		745	528	104	20	185	20	60	Exempted
Carbon taxation	Social Cost (ideal)	67.5 (4.4%)	82.4 (6.5%)	**77.7** (8.29%)	95.5 (19.4%)	**53.2** (6.9%)	**92.0** (6.9%)	**71.0** (11.1%)	**33.7** (45.6%)
	Low-Rate (realistic)	**8** (0.5%)	**10** (0.8%)	**9** (1.0%)	**11** (2.3%)	**6** (0.8%)	**11** (0.8%)	**10** (1.3%)	**4** (5.3%)

Note: 1) Numbers in parenthesis represents increase in prices for each energy producs by carbon taxation
2) Scenarios for carbon taxation of 'Social Cost' and 'Low-Rate' are assumed to raise 8.9 tril. KRW and 1.0 tril. KRW of tax revenues respectively'

Source: Kim S.-R. et al.(2010)

Cutting CO_2 emissions would involve costs that are uncertain but could be substantial. As in Table 4, a "gradually rising" tax, starting with a "low-rate" carbon tax, *e.g.*, 1 trillion won tax revenue (= 0.1% of GDP), would allow for a smoother transition to a less carbon-intensive economy and could be more politically-feasible. Businesses and households would have more time to replace their equipment and energy-use practices with more efficient alternatives.[9]

From experience in countries that have already implemented eco tax reform in Europe, we may need a gradual phasing-in of the reforms and the use of a public information campaign for stronger incentives. UK's fuel duty escalator can be a good example as a slow but sure way of making policy instruments more demanding and effective.

Moreover, implementing a new carbon tax system (energy-carbon tax or elements of carbon tax in a broader tax system) would have scope for reducing more distortive other prior taxes in Korea such as corporate income taxes. It could be

[9] The proposed carbon tax rates need to be raised in line with inflation (or GDP growth rate) every year to maintain the environmental incentives of the tax.

also used to increase tax benefits for various corporate investment and R&D efforts in carbon reduction activities.

The Korean government could introduce a new energy-carbon tax in 2013 to partly offset public budget deficits from its scheduled, consecutive corporate income tax cuts (*e.g.*, the size of carbon tax revenue, 0.1 – 0.3% of GDP). Introducing carbon tax would help cut emissions and stimulate clean technology investment**.**

In fact, eco tax reform would lead to increased competitiveness as a result of fiscally neutral and net positive effects on employment due to the decrease of more distortive taxes on income and the promotion of innovation of new green R&D technologies.

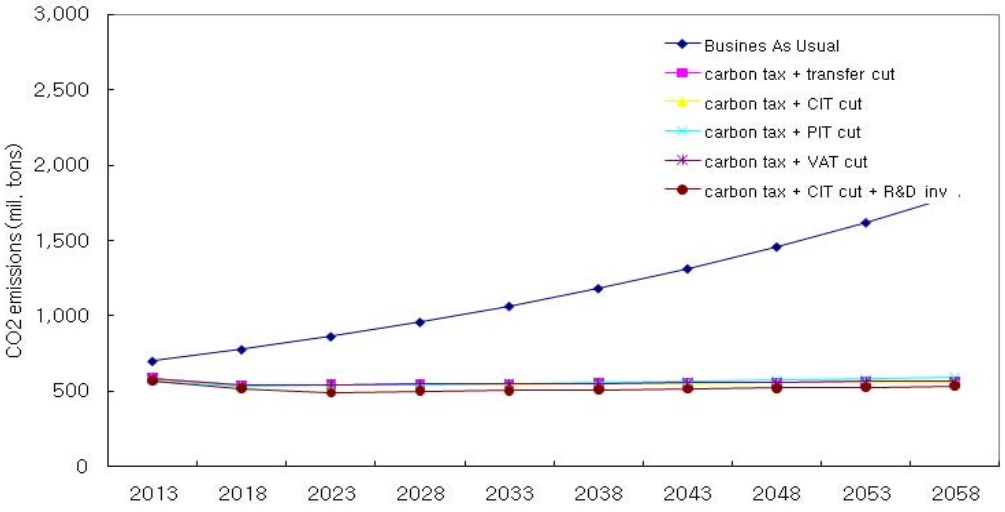
For example, using a dynamic computable general equilibrium model(DCGE), Kim et al.(2010) shows that the overall "positive" effect on economic efficiency(GDP) of implementing a new carbon tax scheme from 2013 together with corporate income tax(CIT) cuts and eco R&D subsidies in Korea would be significant. (see Figure 6).

The Korean government is also pushing for other policy instruments such as Negotiated Agreement (NA) system and Cap-and-Trade system. Under the new NA system in 2013, companies will negotiate binding agreement with the government on energy use and greenhouse gas reduction targets. If businesses fail to meet the targets, they should pay penalties such as correcting mandates and fines. Also, based on the Comprehensive Act on Green Growth, the government is planning to introduce a Cap-and-Trade system for CO_2 tradable permits in 2015.

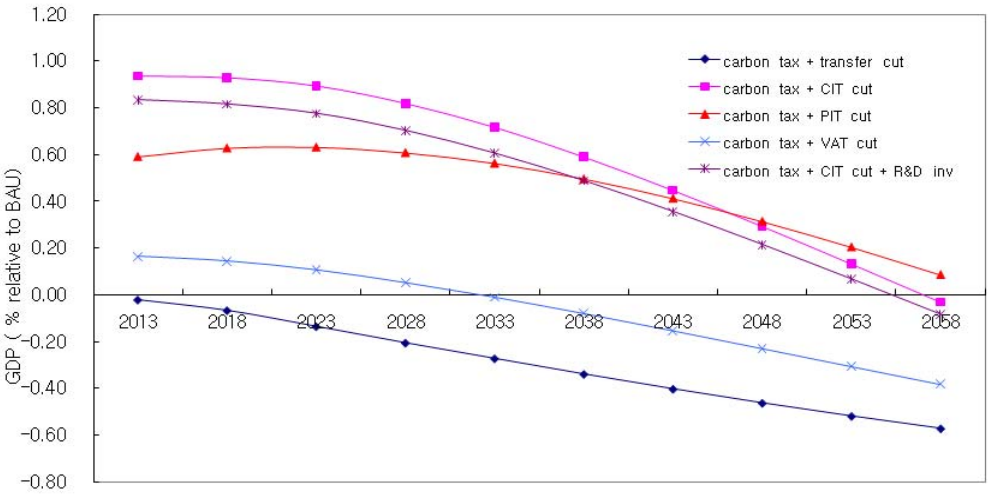
This is time for setting up the Korea's Eco Tax Reform with a view to our future development and it should also reflect more closely the sustainable issue being addressed.

On the early stage of implementing eco tax reform in many countries, there were concerns about losing international competitiveness of industries and business association.

Figure 6. The Effects of Alternative Revenue-recycling Schemes `from Carbon Taxation in Korea : 25 EUR Case



(a) CO_2 emissions



(b) GDP

Source: Kim S.-R. et al.(2010)

However, as regards of impact of the scheme has been successful through performing with clear goal and collecting public opinions. In Germany it could achieve by differentiating tax rates and making special provisions for vulnerable groups. So that private households and small businesses are those who are unlikely to pay high rates. In UK, there has been extensive consultation with business and designed in a way that protects the competitiveness of UK firms. UK industries and businesses receive a 80% discount to Climate Change Levy (CCL) in return for Climate Change Agreements (CCA) to meet energy efficiency and/or carbon emission targets .

It is important to maintain transparency and ensure the participation of businesses and local people in the planning and use of the tax which can defuse potential opposition to a new environmental tax charge.

Public would be more inclined to support new carbon taxes if the tax revenues are used to fund a broader package of measures such as environmental projects and/or enhanced capital allowances for investment certain energy-saving /green technologies. It could help gain industry buy-in and reduce the cost of business arising from carbon taxation.

For Korea, the carbon tax scheme would need to designed alongside a broader fiscal package of measures (notionally funded from carbon tax revenues) in order to protect the international competitiveness of firms. For instance, energy-intensive industries could receive a discount to the proposed carbon tax rates in return for joining a successful NA programs to improve energy efficiency and/or reduce emissions to specific levels.

Hypothecation of part of carbon tax revenue to subsidize green projects in industries and/or low-income families could also raise public acceptability of new carbon taxation.

Knowledge transfer between countries (e.g., via GGGI) about the use of economic instruments in environmental policy would be desirable, whereby country-specific conditions are being considered when such a transfer is done.

IV. CONCLUDING REMARKS

Current energy tax system in Korea is not sufficient for fostering low-carbon, green growth. In some parts, the government is subsidising environmentally harmful behaviors such as fossil fuel consumption, while considering imposing carbon taxes on those same behaviors later on.

It is time to take concrete measures to implement the national green growth strategy. One of such measures will be to introduce a carbon tax in the near future. It is also important to invent “smart” ways of recycling the carbon tax revenues to achieve its voluntary CO_2 reduction target and provide technological momentum for “green growth” development. The introduction of the tax scheme would be a starting point for the nation's campaign to increase energy-efficiency, combat climate change and promote nation-wide green technologies.

The government needs to formulate “smart” taxation and fiscal policies to promote, rather than thwart, innovation for low-carbon, green growth. So, green tax commissions’ or ‘inter-ministerial committees’ for national eco-tax reform should also be emphasized. They can make detailed and more realistic proposals for mid- and long-term environmental tax reform in Korea and act as a forum for discussion on topics that include design, rates and the likely impacts. Analyzing and recommending to reform by political parties and academic and institute circles can be available.

More attention needs to be paid to increase the knowledge of designing environmental tax schemes with continued research and development.

In implementing the appropriate eco tax reform, it is necessary to weigh partly conflicting demands against each other for energy-intensive sectors, ecological effectiveness, economic efficiency, compatibility with market principles and issues of administrative feasibility. Such a balance must be determined politically in order to reduce uncertainty about future development.

There are still ways to go, even though government got off to a first step to eco-sound fiscal policies. Compared with other OECD countries, Korea has less

energy-efficient industrial structures with complicated fiscal policies and large differences of tax burdens on each energy-demanding sectors.

Table 5. Example Roadmap for Eco Tax Reform in Korea (2010-)

Policy Instruments	Plans						
	2010	2011	2012	2013	2014	2015	2020
Eco tax Reform (including energy-carbon taxes and elements of carbon tax)	Prepare/ Phase-In			Full			
Cap and trade	Prepare/ Phase-In					Full	
V.A or N.A.	Prepare/ Phase-In	Phase I		Phase II			
Compensation for Key Industries' competitiveness	Prepare/ Phase-In			Full			
Pro-poor policies (redistribution)	Prepare/ Phase-In			Full			

Therefore, Korea is now facing to prepare for the post-Kyoto scheme which would enforce to find a new paradigm for dealing with environmental sustainability and economic growth. In order to implement the Korea's new

scheme successfully, a key theme “green taxes” would be essential to provide greater efficiency gain through helping to ‘get the prices right’ associated with their environmental externalities.

Further, it is required to consider secondary instruments such as direct compensation payments, price support and tax exemptions for unfair burdens of low-income households and more energy-vulnerable sectors. All those approaches might be offset of distributional consequences as mitigating the harmfulness of eco-motivated fiscal policies.

It’s pretty obvious that the more we delay action, the more cost we pay. If we invest green technology in recent economic slowdown, we will have a global initiative that would make our economy more competitive in the long run.

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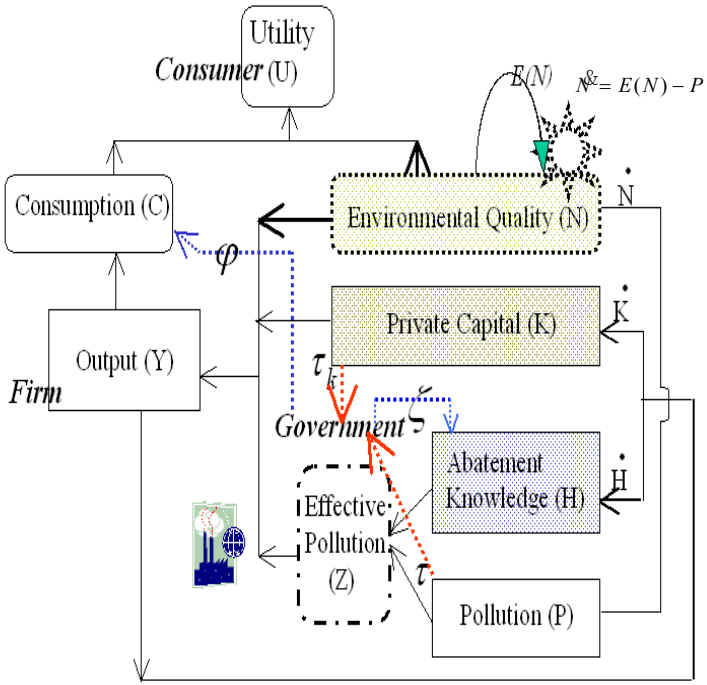
APPENDIX

The "Green" Growth Model (Fullerton and Kim, 2008)



Endogenous Variables

- Utility (U)
- Consumption (C)
- Output (Y)
- Environmental Quality (N)
- Private Capital (K)
- Abatement Knowledge (H)
- Pollution (P)
- Effective Pollution (Z)

Key parameters

- Environmental preference (ϕ) — Preferences
- Elasticity of intertemporal substitution (σ) — Preferences
- Time preference rate (θ) — Preferences
- Environmental productivity (γ) — Technology
- Pollution-conversion factor (ε) — Technology
- Output elasticity of abatement knowledge (á) — Technology
- Ecological capacity factor (β) — Ecology
- Degree of prior tax distortion (φ) — Others (tax system, etc.)

Policy instruments

- Pollution tax (τ_p) — Policies
- Private capital income tax (τ_K) — Policies
- Public investment in environmental R&D ($\dot{H}$) — Policies

Fig. A1. Diagram of Greening the Tax and Budget System Towards Sustainable Economic Growth

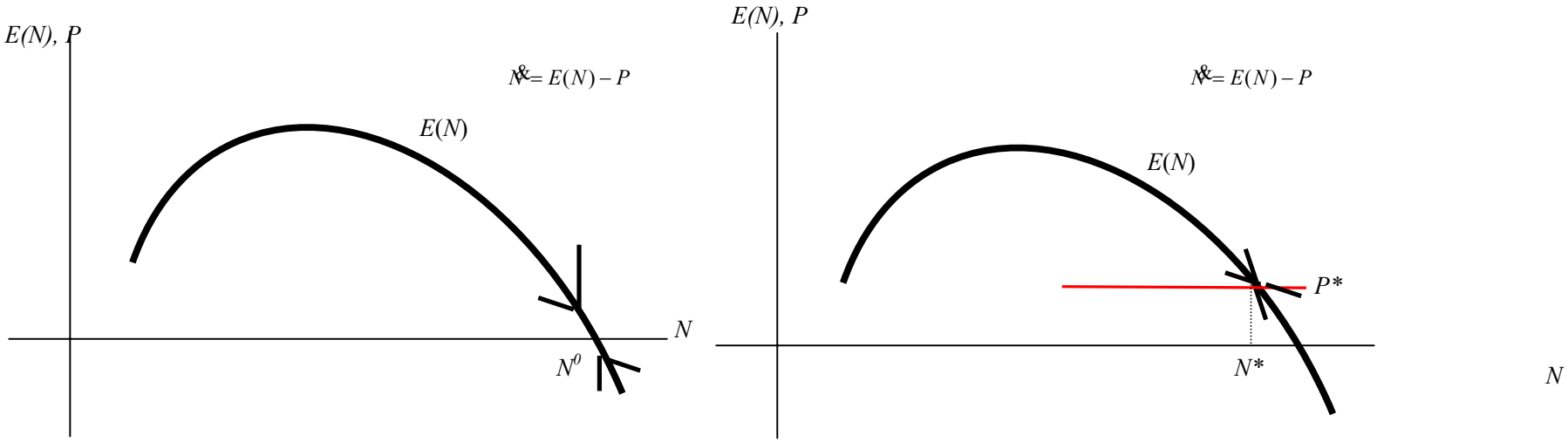


Fig. A2. The Regeneration of the Environment. 'Sustainable development' ($\dot{N} = 0$) requires that pollution P is constant in the long run and does not exceed the maximum absorption capacity. Due to the concavity of $E(N)$, two levels of N may have $\dot{N} = 0$. One has low N with $E' > 0$, and the other has high N with $E' < 0$. With a constant level of pollution P, only the latter equilibrium is stable, so this study focuses on that case. For more details, see Neher (1990), Tahvonen and Kuuluvainen (1991), and Bovenberg and Smulders (1995, 1996).

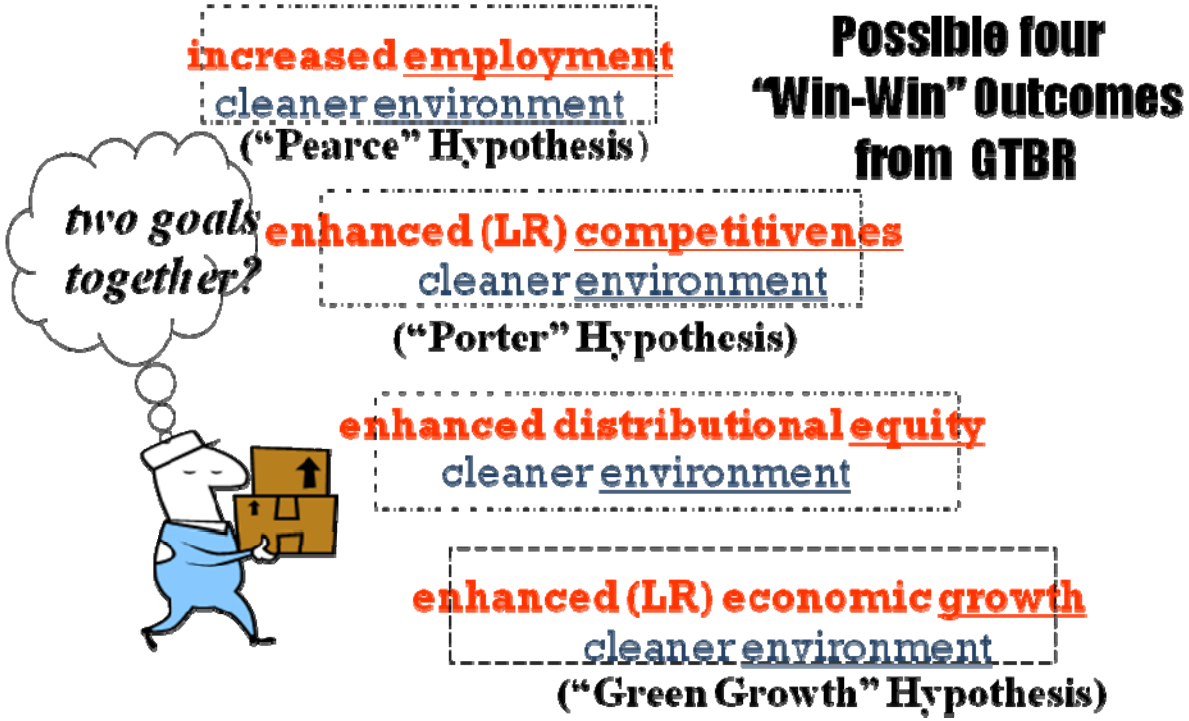


Fig. A3. Possible Win-Win Outcomes from Green Tax and Budget Reform (GTBR)

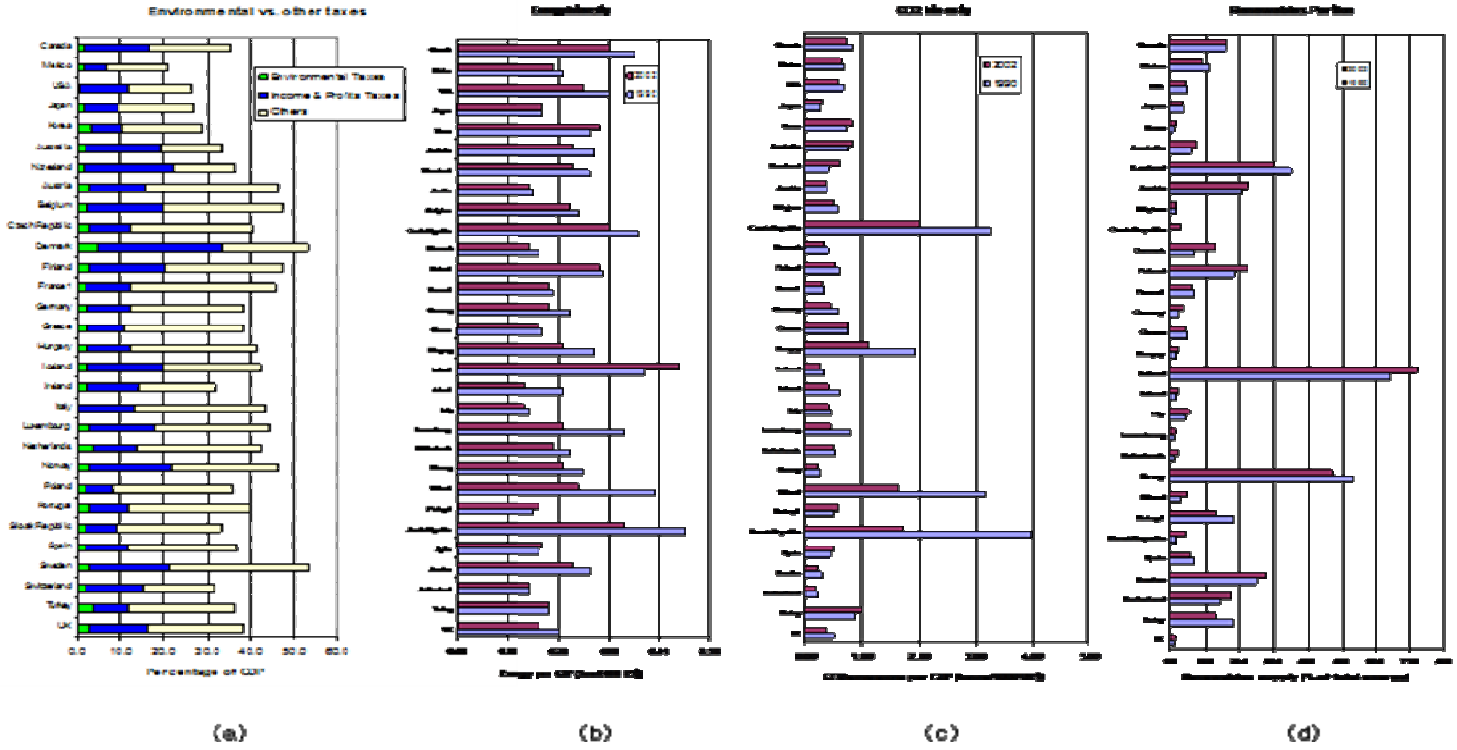
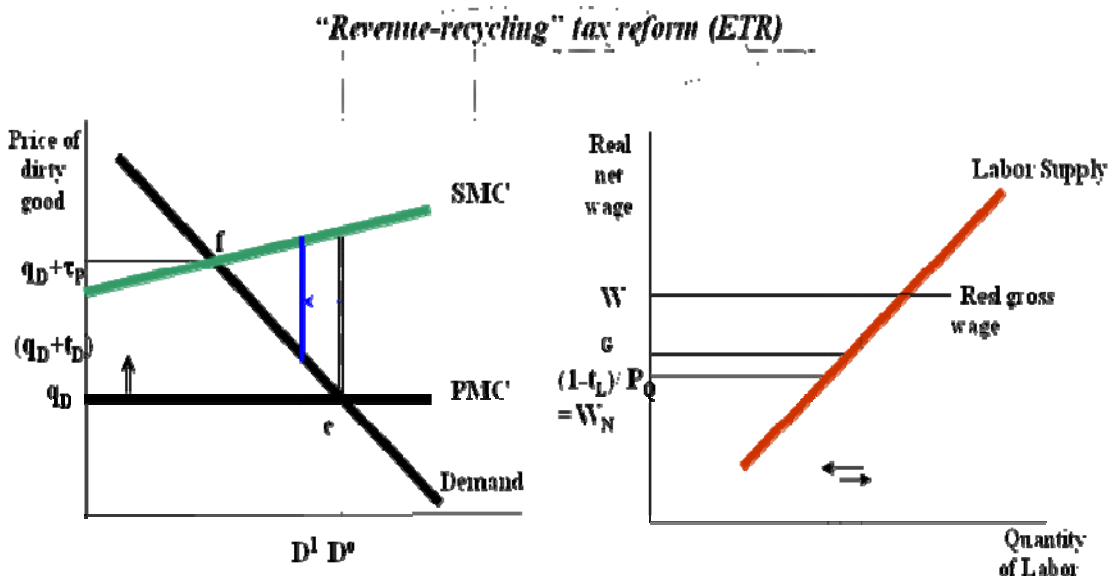


Fig. A4. Comparison of OECD countries: Tax Structure, Energy Intensity, CO2 Intensity, and Renewables Portion



where environmental tax rate = $t_D M = \left[1 - \left[t_L/(1-t_L)\varepsilon^U\right]^{-1} - 1\right.$

labor tax rate $= t_L$

marginal environmental damage = $\tau_P (\equiv MED)$

uncompensated labor supply elasticity = ε^U

Fig. A5. Graphical Illustration of Eco Tax Reform (ETR) from Income Tax to Energy Tax

- Pearce (1991): Environmental taxes might offer a so-called "double dividend (DD)" (*i.e.,* these taxes not only **improve the environment** but might also **reduce welfare costs** of the overall tax system).

  => Related question: "*Whether the optimal environmental tax in a second-best world* ***lies above or below*** *the social marginal damages(MED)*?" is the cornerstone of much recent literature.

- **Earlier view (optimistic DD):** The second-best optimal pollution tax would be *higher than* necessary just to correct the externality(=*MED*).

  e.g., Tullock (1967), Terkla (1984), Lee & Misiolek (1986), ***Pearce (1991),*** *Repetto et al (1992), Nordhaus (1993)*

- **Recent studies (pessimistic DD):** Environmental taxes typically *exacerbates* pre-existing tax distortions and, therefore, the optimal pollution tax should lie *below* the Pigouvian level (≡ social marginal damages) – the critical role of "***pre-existing tax distortions"*** and negative "***tax interaction" effects***

  e.g., ***Bovenberg and de Mooij (1994)****, Goulder(1995), Parry(1995), Oats(1995), Fullerton(1997), etc.*

- **More recent studies (mixed DD, but generally optimistic):**

  The prospects of DD depends on various parameters on the structure of preferences and technology (e.g., degree of relative complementarity of taxed dirty good w.r.t. leisure, ϕ ; demand elasticity of taxed dirty good, ε_D etc.) or "Whether the second-best pollution tax (t_D*) should be greater (or less) than the first-best pollution tax ($\tau_P \equiv$ MED)" depends on the following many factors (e.g., MED, prior income tax rates (t_L), tax rate on scarcity rents by non-auctioned permits((t_Π) , and some key elasticities in related markets, etc.)

  e.g., ***Kim (2002), Bovenberg and Goulder(2002), West and Williams(2004)****,Ballard et al.(2005), etc.*

  => *Generalized second-best environmental tax rules (Kim, 2002)*

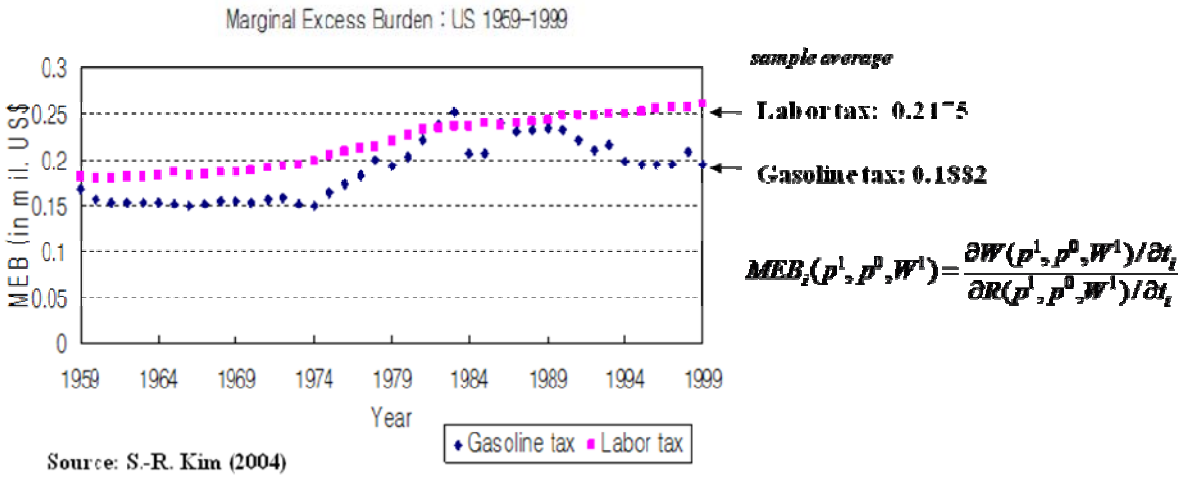
$$t_D^* = \frac{\tau_P(or\ MED)}{\left[1-\left[t_L/(1-t_L)\varepsilon^U\right]^{-1}\left(\frac{\varepsilon_D-\phi}{\varepsilon_D}\right)\right.}, \text{ or } \quad t_D^* = \frac{\tau_P(or\ MED)}{(1+t_\Pi M)\left(1+\frac{M(\phi-t_\Pi)}{1+t_\Pi M}\right)\frac{1}{\varepsilon_D}} \text{ with non-auctioned permits}$$

where $M = \left[1-\left[t_L/(1-t_L)\varepsilon^U\right]^{-1}-1\right.$ is marginal excess burden of prior income taxes.

Fig. A6. The Literature on ETR and employment: "Weak" form of Green Growth (I)

Example: Comparing Marginal Excess Burden (MEB)

Gasoline vs. *Labor*



Source: S.-R. Kim (2004)

" This implies the modest possibility of social welfare gains from tax reforms that that shift some of the burden of taxation off labor onto energy (e.g. gasoline)"

Fig. A7. Comparison of Marginal Excess Burden : Energy vs. Labor Taxes

Can tighter environmental regulation or taxes boost economic growth (*i.e.*, Green Growth, GG)? If so, when?

<***Two contrasting views***>

- **<u>Exogenous</u> Growth Models (Ramsey-style, Solow): pessimistic GG**
  - Technical change is modeled as "exogenous" parameter.
  - Optimal Pollution control <u>hurts</u> growth by raising abatement costs.

  e.g., Jorgenson & Wilcoxen(1990), Xepapadeas(1993), Tahvonen & Kuuluvainen(1993), Nordhaus(1994), Goulder(1995), Nordhaus & Boyer(1999), etc.

- **<u>Endogenous</u> (or New) Growth Models (Romer, Lucas, Barro, Rebelo, etc.): optimistic GG**
  - Technical change becomes additional "endogenous" variable (additional factor of production via investment in knowledge or technology)
  - Optimistic view on the growth-environment relationship (a tighter environmental policy may <u>boost</u> economic growth, at least in the long-run).

  e.g., Bovenberg and Smulders(1995, 1996), Elbasha and Roe(1996), Stokey(1996), Bovenberg and de Mooij(1997), Hettich(2000), Fullerton and Kim(2008), etc.

Fig. A8. The Literature on ETR and growth: "Strong" form of Green Growth (II)

- **Case 1: Conventional growth model (with *no* endogenous R&D accumulation)**

  - Tighter environmental taxes always hurt growth, since $\tau(g^{max}) \leq 0$

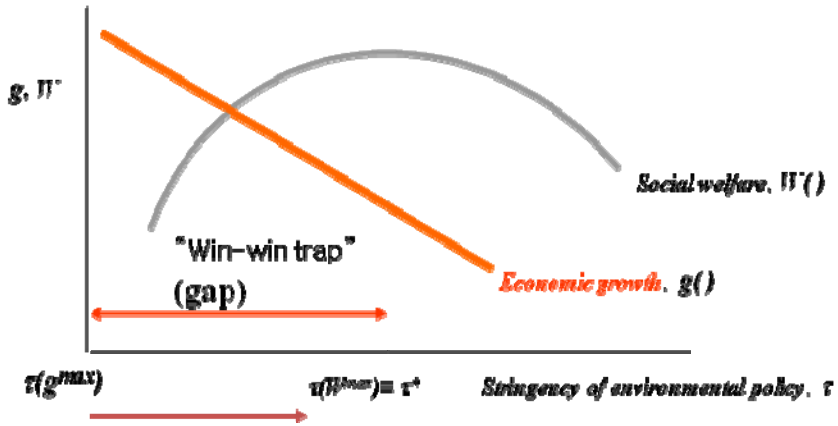
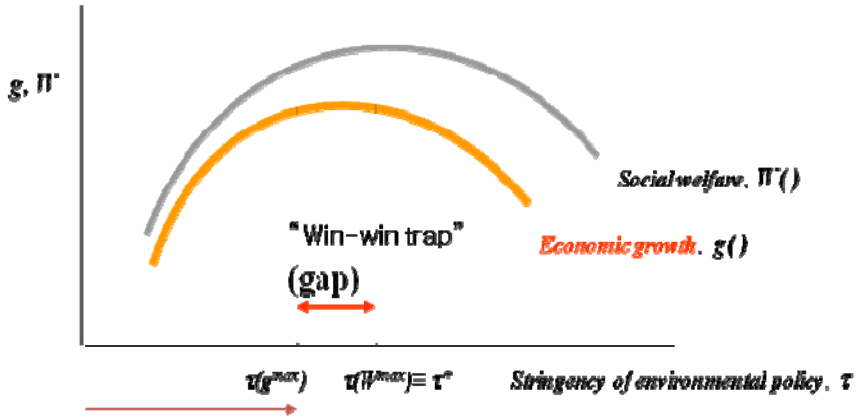


Fig. A9. Conventional View on ETR and growth

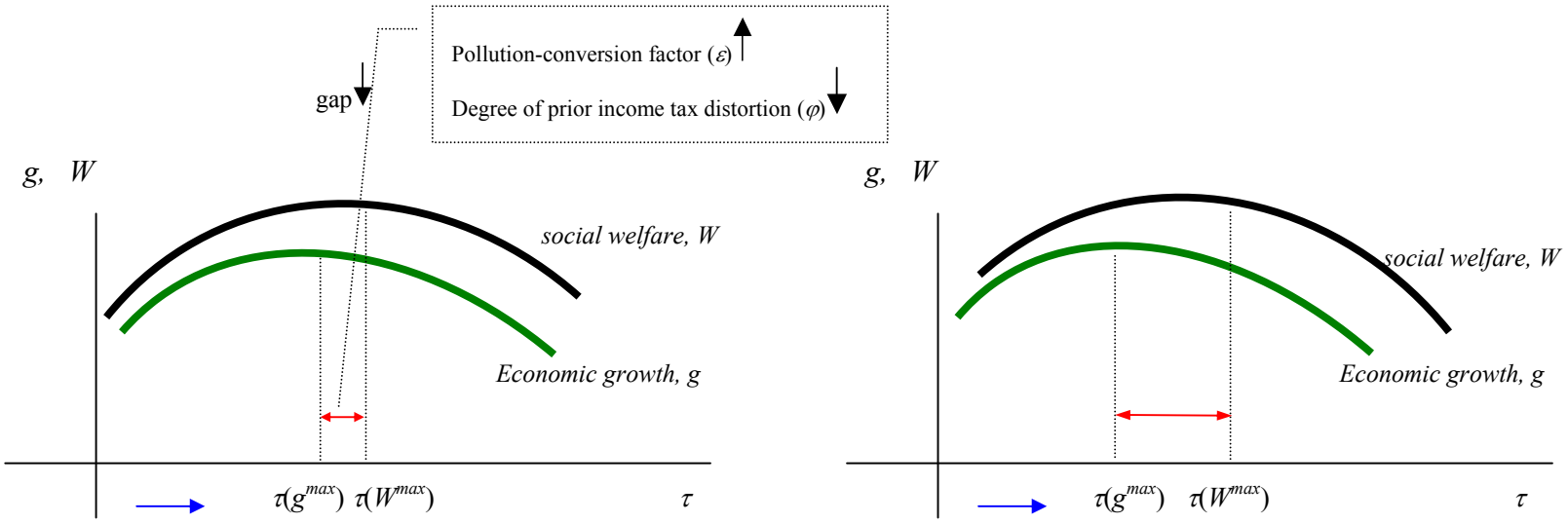
• Case 2: a new GTBR framework (with *endogenous* R&D accumulation)

- Tighter environmental taxes may boost growth until a positive $\tau(g^{max})$



Source: Fullerton and Kim (2006), p.21.

Fig. A10. New View on ETR and growth



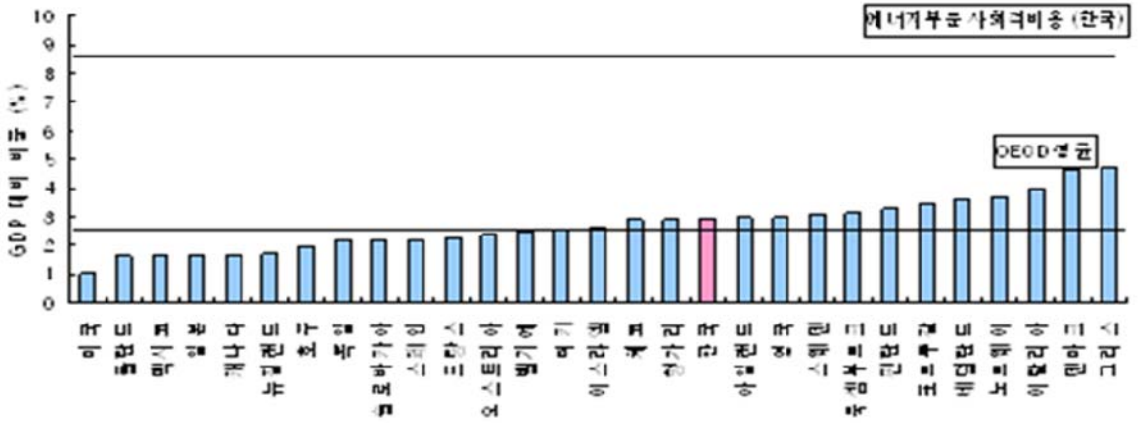
(a). Small gap: "win-win" is *highly likely*

(b). large gap: "win-win"is *modest*

Fig. A11. Optimal Environmental Policy for Green Growth

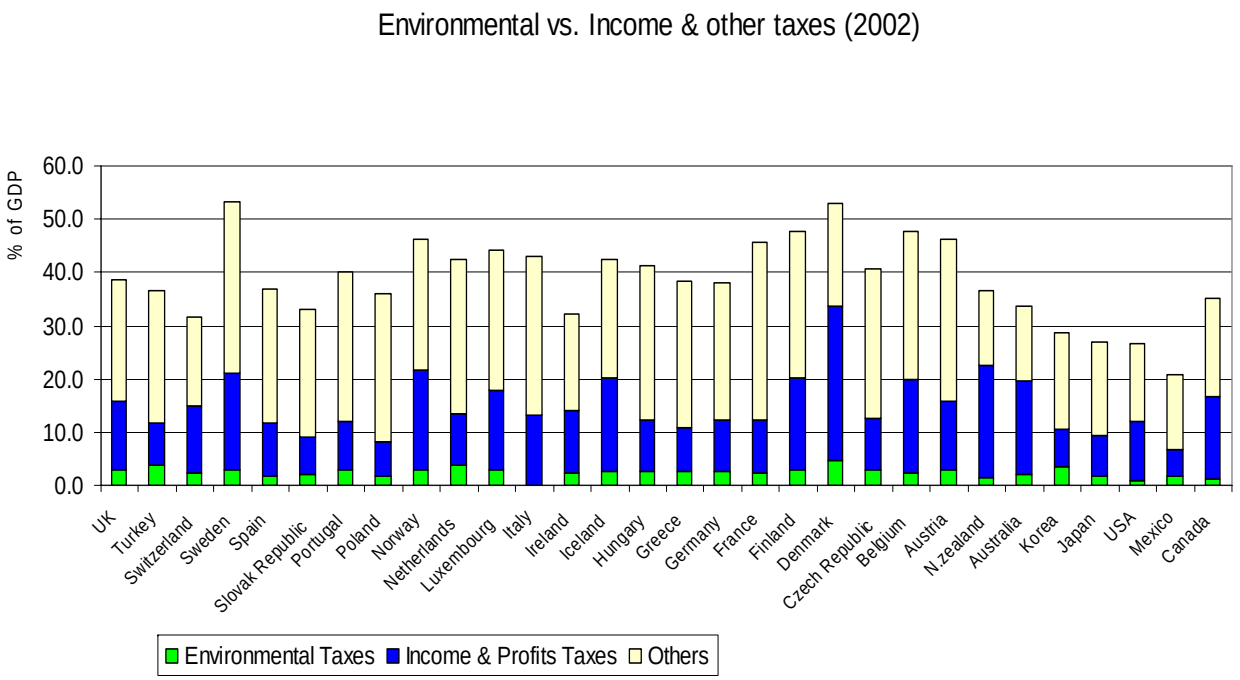
Denmark 4.65%, Norway 3.67%, Netherlands 3.63%, Filand 3.27%

> Korea 2.92% > OECD avg. 2.71%



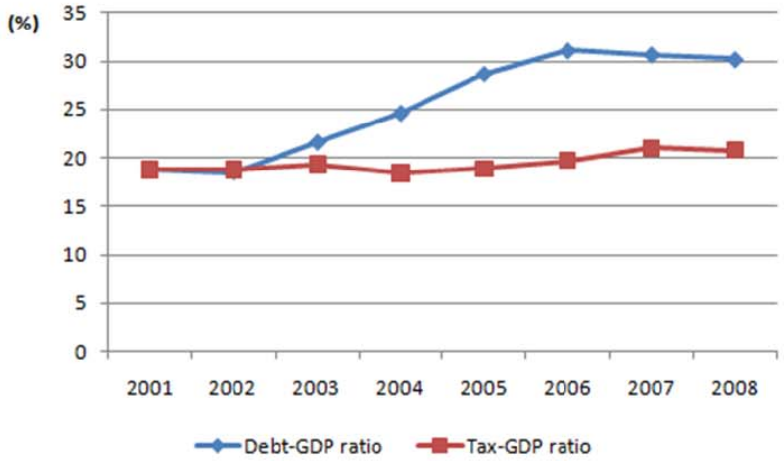
Source: Kim, S.-R.(2009)

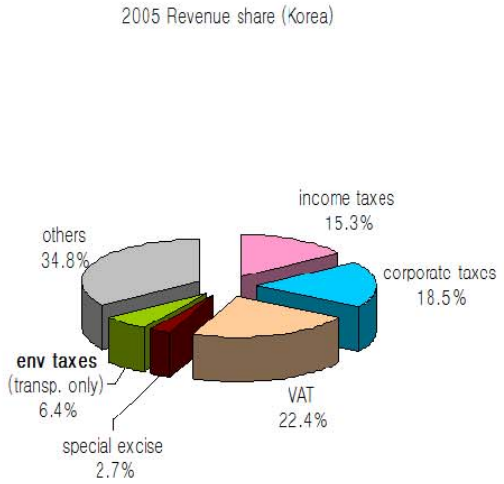
Fig. A12. Environmentally related taxes as percent of GDP (2005)



Source: OECD Revenue Statistics, 2007

Fig. A13. Environmentally related taxes vs. Other income taxes: International comparison

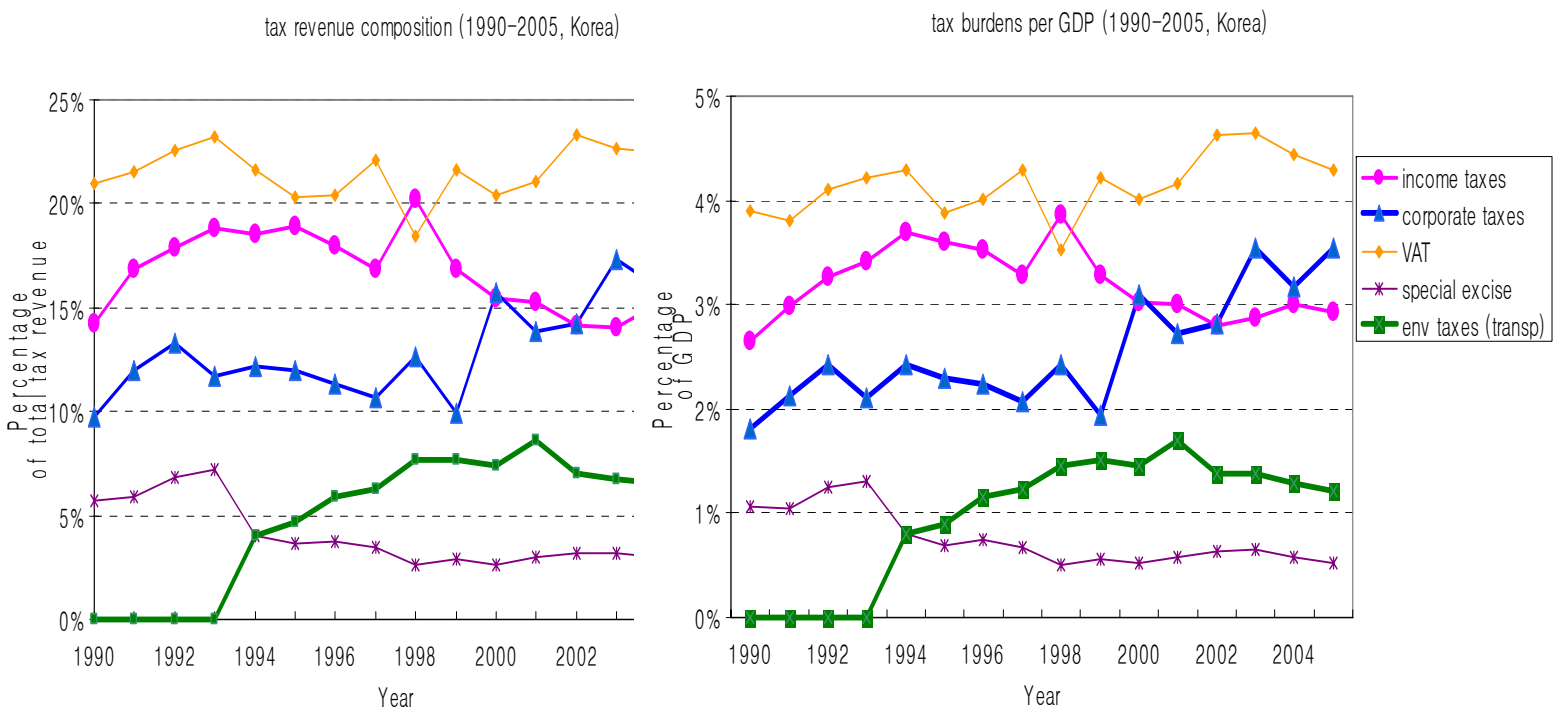




	2001	2002	2003	2004	2005	2006	2007	2008
National Debt (tril. Won)	122.1	133.6	165.7	203.1	248	282.8	298.9	309
Debt-GDP ratio (%)	18.7	18.5	21.6	24.6	28.7	31.1	30.7	30.2
Tax Revenue (tril. Won)	122.5	135.5	147.8	152	163.4	179.3	205	212.8
Tax-GDP ratio (%)	18.8	18.8	19.3	18.4	18.9	19.7	21	20.8

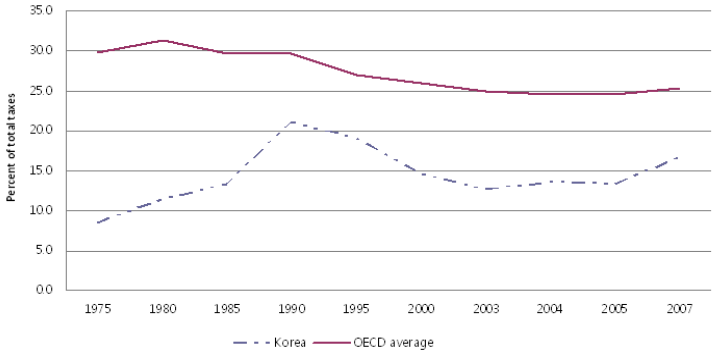
Source: MOSF(2009)

Fig. A14. National Debt, Tax Revenue, and Tax Structure in Korea

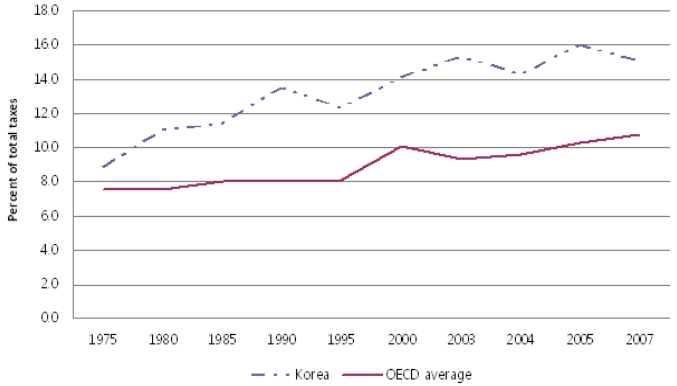


Source: NTS(2009), MOSF(2009)

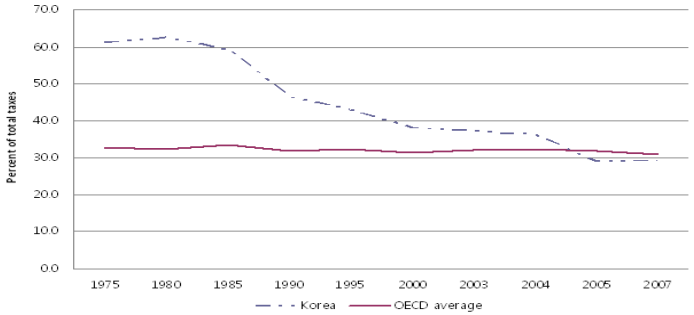
Fig. A15. Environmentally related taxes vs. Other taxes in Korea



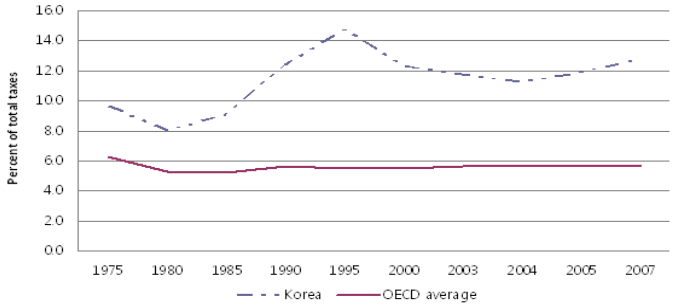
(a) Personal Income Taxes



(b) Corporate Income Taxes



(c) Consumption Taxes



(d) Property Taxes

Source: OECD Revenue Statistics, 2009

Fig. A16. Trends of Tax Structure : Korea vs. OECD average

GreenBudgetEurope

European expert platform on environmental taxation and green fiscal reform

FIRST DRAFT PRELIMINARY
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Sustainable prosperity demands a new role for business in society

We must overcome the infertile confrontation between government and business

Dr. Anselm Görres, President GBE

CONTENT **(Version of 26 April, 2011)** **PAGE**

Das „FÖS" wurde 1994 als gemeinnütziger Verein gegründet – damals unter dem Namen „Förderverein Ökologische Steuerreform". Seinerzeit lag der Schwerpunkt auf der Einführung einer Ökologischen Steuerreform in Deutschland, die 1998 erfolgreich eingeführt wurde. Heute sind wir über Deutschland und Europa hinaus in der weltweiten Debatte um sämtliche marktwirtschaftlichen Klimainstrumente zu einer wichtigen und geachteten Stimme geworden.

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Dr. Anselm Görres, Jahrgang 1952, Volkswirt und Unternehmer in München, war 1994 Mitgründer des FÖS e.V. (damals Förderverein Ökologische Steuerreform) und Hauptautor des FÖS-Memorandums '94 (Der Weg zur Ökologischen Steuerreform). Heute ist er Vorsitzender des FÖS (seit 2008: Forum Ökologisch-Soziale Marktwirtschaft). Der frühere McKinsey-Berater ist seit 1996 Gründer und Inhaber der ZMM Zeitmanager München GmbH. ZMM ist führender Vollsortimenter im deutschsprachigen Interim Management (**www.zmm.de**).

Short Summary:

1. Wrong person, wrong time, wrong message?

In their wisdom, the gentle organizers have asked me to speak about how to sell our Road Map for Green Prosperity to the business community. Probably because I happen to be a businessman and entrepreneur. But I may not be the ideal choice. When I finish this paper, you may all decide whether I am the wrong person for the subject, and whether perhaps, it is also the wrong time for a business-friendly message.

I could be the wrong person for three reasons:

1. I happen to be a business man, but a rather untypical one. I don't share most of the political preferences and prejudices of my sociological peer group.

2. If **Green Budget Europe** didn't already have a very nice name, it could also be called **Green Solutions for Governments**. Because that basically is what we search to provide. There are many others offering Green Solutions for Companies. But that is not really our focus. As fervent advocates of markets, we are not at all worried that markets will miss Green Opportunities. We are much more worried for Governments not to realize them!

3. Unlike we had hoped in the beginning, three or for decades ago, the solutions we offer are not always popular to the business world. Business organisations and trade bodies did not become allies of our quest for a Greener Capitalism. **In fact, most of the time they have opposed the very things we proposed.** Not only the typical lobbyists, but also parts of the academic profession believe what we say is not in the interest of business.

➔ **Now please don't misunderstand me. I am totally convinced that all the things we are promoting and have been fighting for the last thirty years or so are absolutely in the interest of the business world. It's only that the business world doesn't always seem to share that view. Perhaps it has to do with the difference between short and long term view.**

➔ **It also has to do with talking to an average business person and talking to their representatives in trade bodies and industry associations. As a rule, business people are pragmatic and take facts into consideration. But the people they vote to represent their interest on the political level are usually much more radical,**

sometimes even fundamentalists. Believe me, we've tried over and over again to get these people into enlightened dialogues. Most of the time it was a rather frustrating exercise. Since Fukushima, it's becoming a lot easier.

I also believe this is the wrong time for a soothing messages to the business sector. The last years have seen the evolution of a number of crisis, all of which are far from being over.

- What first started as a US housing crisis quickly evolved into an international banking and finance crises and became the biggest world economic crises since the 1930ies.
- Last summer, the deep horizon incident underlined the dangers of deep sea drilling. This spring and summer, the democratic uprising in several Arab countries may again should the limited reliability of many important oil sources.
- Shortly later, what then started as a fiscal crisis of Ireland and some Mediterranean countries soon developed into a veritable Euro crisis and now seems to have become also a Dollar crisis.
- Within a few weeks, a sea quake combined with a tsunami off the pacific coast of Japan turned into a major crisis of nuclear energy. A number of European countries have stopped their plans to build atomic plants, not only Germany.

So we are talking about an number of crises, partly interrelated directly, partly not. But in all of them, business actors were much more often part of the problem than part of the solution.

- The US bank behaved grossly irresponsible, copied by banks in many other countries. The banks were also involved in overgenerous lending to the PIGS-states and other debt-ridden countries.
- BP is just one example of an energy company underestimating the dangers of its activities. Tepco is showing similar behaviour.

➔ **So basically, we have seen banks and business companies playing with risks at the detriment of society. We are witnessing awesome examples of market failure.**

➔ **This is not to say the governments were flawless, quite to the country. Every market failure only reflects a failure of governments to control that market failure.**

But I think over the last thirty years, we've seen government exercising less control over the business sector where more control was needed.

The environment is certainly a prime area where uncontrolled markets are a cause of the problem, not government.

➔ **In the seventies and eighties, all the over the world there was a better understanding and recognition both of the causes and the remedies for environmental problems.**

➔ **Before the seventies, there had been no real environmental policy, nowhere in the world. And it is due to this absence of state intervention that environmental problems could become so pressing.**

➔ **Later generations will perhaps see a tragic paradox in the fact, that in the very historiical moment, when humanity recognized the need for more environmental regulation, in the UK and the US, Maggie Thatcher and Ronald Reagan started their so-called revolutions which I think were rather counterrevolutions.**

➔ **They were not successful all over they world. But where their ideologies dominated, they established a new order of priorities: MARKET – SOCIETY – PLANET**

➔ **Actually what we need today is just the opposite: PLANET – SOCIETY – MARKET.**

This implies a different ranking order between government and business.

- In a democratic society, the only agent justified to define what is necessary in the interest in the planet and the interest of society is the government.
- Markets are an element of freedom, but basically they are nothing but a tool to organize and coordinate the economic activities of the members of society.
- In a global society, we also need international coordination and multilateralism to best serve the preservation of global interests.

➔ **Never forget: Good planets are hard to find!**

2. This re-ranking of priorities may be difficult to swallow for the business world

Let me give you just a few examples for what would I call the intellectual aberrations of the so-called Reagan Revolution or supply-side economics which were naturally popular with business people.

- The trickle-down theory basically said: Just care for the rich, than everybody will profit. One cannot blame the rich for preferring that theory over redistribution politics.
- There's also a larger sense of the trickle-down theory. In neo-lib thinking, not only incomes for the poor, but many public goods come as a reward. Take development spending, take environmental action, take education. There was always the same promise. Let's first support the business sector, then this will create enough wealth that perhaps we can even finance some government programs for beneficial purposes.

➔ **There were only two problems with that path to the promised land. First, the promises never materialized. There was always a delay. And there never seemed to be the right time to spend more for other public goods.**

➔ **Second, it is too late to correct wrong development paths if you don't do it right from the start. If all the money goes into auto traffic, for instance, you won't find political majorities for public transportation. Too many people are used to do everything by car, or dependent on the car industry.**

- In the eyes of the supply-siders, it is hard to say what is worse: taxes or regulation. Unfortunately, these are the most important instruments for environmental improvement.

The problem is, the supply-siders are showing the picture of a pain-free development, where all a government needs to do is pamper the business sector and the energy industry. They have an easy answer for every problem, and strangely, all the easy answers serve the interests of the people of have most of the money. Let me give some more examples:

- We're running out of oil? – oh, no problem, let's drill baby drill, simply in regions we haven't drilled before.
- The government is running out of funds? No problem, let's lower taxes. Lowering taxes works under any circumstances to increase wealth production.

➔ **Why am a recounting these stories? Well, they are not over. They have never been accepted in Europe, only with a small radical minority. But they are still very strong in the United States.**

➔ **And all over the world they are still popular with many business people.**

➔ **But we cannot solve the problems of the future unless we make it clear to business people that Green Prosperity means to say goodbye to Voodoo economics.**

3. Green Prosperity means a new role for governments and global cooperation

Let me mention very quickly the most important elements of the new growth vision.

1. To solve global problems is not possibly without globally agreed targets and obligations. So part of the decision process must be top-down as a result of international cooperation and not bottom-up as a result of market spontaneity.

2. As we all now, wrong market behaviour is a consequence of wrong prices. Without a corrections of wrong prices, we will not see responsible use of energy. So we need higher prices.

3. As we should know both from economics as well from history, perhaps also from educating ourselves and our kids, pampering is not the best basis for development, quite to the contrary. There are numerous examples, not only the so-called Dutch Disease, that abundance of resources may create more problems than it solves. Countries like Germany, Japan, and the Republic of Korea demonstrate that discipline and good economic policy do much more for wealth creation than a huge stock of natural resources.

➔ **So governments, just like parents to children, should never make the mistake of being overindulgent to business lobbies. Capitalist economies develop their best potential if they are challenged.**

4. If we look at different ball games, we see the importance of rules. The rules in tennis are totally different from those in gulf. Or those in soccer totally different from those in American football, baseball or basket ball. But all these games are based on a ball.

➔ **Regulation is just another word for rules. Rules are not bad – they are perhaps the most important part of human civilisation.**

4. So where's the promise for open minded and enlightened business leaders?

1. Government and Business must realize the Cold War is over. There's not point in a having an ideological confrontation between both sectors. Both are just different ways to organize human activities. The most successful and prosperous societies show harmonious cooperation between State and Market. I believe that this is both a tradition in Europe as well as in Asia.

2. The Eco-Challenge is perhaps not the biggest in the history of mankind, but certainly the biggest task for the 21st century. How can anybody even think to solve these problems without the creativity, the energy, and the efficiency of markets and competition. But how can anybody even dream of solving the without the power of governments, legislation, rules, and the tax system! Only if governments and businesses reach hands they will be able to overcome the gigantic difficulties we are still facing!

3. It is painful if governments no longer of short-term pampering. But isn't the experience of most managers, entrepreneurs, and founders, that long-term success is not achieved without hardships and suffering? Governments should never listen to lobbies urging them to make their life to easy.

➔ **Let me give you an example. After the war, Germany had profited from a cheap Deutschmark. In the sixties and seventies, far-sighted politicians demanded a revaluation, more in line with actual competitive powers. Many feared a loss in competitiveness. But when the Mark actually was revaluated through freeing the exchange rate, German industry simply had to work a little hard and after some time, evolved even more competitive.**

➔ **I believe this could be an interesting example to our friends in China too.**

4. What we need today, is a Capitalism for the long term, as Dominic Barton said recently. He's the worldwide Managing Director of McKinsey. Markets do not think long term. The long term orientation can only come in through clever guidance from the government.

5. We must switch our energy strategy from high risk to low risk. High risk energies are oil, nuclear, and gas, even if you ignore the carbon emissions. Low risk energies are renewables, perhaps not always and everyone, but in general. I believe recklessness is no virtue for responsible business leaders. Nor is it a good base for national energy strategies.
6. Green Growth means to reconstruct the entire economy. How is that going to work without excellent cooperation between business and government? But if it will work – how can you be afraid that there are no splendid opportunities for the entire business sector?

➔ **After all, Green Growth means we have to reinvent our whole economy. New houses. New factories. New roads and new cars, new airports and new airplanes, new railways, new public transport.**