

Environmentally Sustainable Transport (EST) Promotion Policies in Korea

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Outline

- Background and introduction
- EST in general
- Trends in transport demand
- Policy measures for reducing energy and GHG in transport
- Effectiveness of policy measures
- Special legislation for EST in Korea

Background and Introduction

- Recently, greenhouse gas emission and the possibility of global warming have become the main environmental concern in the transport sector.
- Transport sector is the dominant source of urban air pollution and noise disturbance in most cities in the world.
 - 20 – 30% of total energy consumption
 - More than 90% of air pollutant emission in urban areas
- Controlling transport activity and thus energy consumption in the transport sector has been regarded as very difficult

EST in General

- Transportation demand is a Derived Demand
- Reduction is extremely difficult
- Rapid Motorization Everywhere
- Definition of EST: EST is: Transportation that does not endanger public health or ecosystem and meets needs for access consistent with (a) use of renewable resources at below their rate of regeneration, and (b) use of non-renewable resources at below their rate of development of renewable substitute (OECD)

Trends in Transportation Demand

- Transport Sector: 20% of total energy consumption
 - Rapid increase in developing countries
- Second largest source of GHG and most rapidly increasing sector
- Road transport is responsible for more than 80% of social cost, more than 90% of urban air pollution
- Air transport: Rapidly increasing air transport demand
- Air transport sector is responsible for more than proportional impact on global warming
- Maritime sector is the major emitter of NO_x and SO_x

Policy Measures for Reducing Energy and GHG in Transport

- **Technological innovations**
 - **Engine efficiency**
 - **Aerodynamics**
 - **Transmission efficiency**
- **Vehicle mileage standards and emission standards**
 - **Fuel efficiency standards**
 - **Emissions standards**
- **Fuels policy**
 - **Lowering sulfur contents in diesel**
 - **Improving gasoline, additives, benzene or toluene levels**
- **Alternative fuels**
 - **Electric and hybrid vehicles**
 - **Fuel cells**
 - **Hydrogen and CNG**
- **Infrastructure for environmental sustainability**

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 - **Rail and water transport related infrastructure**
 - **Bicycle roads**
 - **Infrastructure for intermodal transport**
- **Inspections and maintenance**
 - **In-use vehicle management**
- **Travel demand management(TDM)**
 - **Fuel and road pricing**
 - **Parking policy**
 - **Public transport promotion**
- **Traffic flow management**
 - **Signal synchronization**
 - **ITS**
- **Educational campaigns and information**
- **Controlling travel demand**
 - **Land use planning**
 - **Telecommuting and teleconferencing**

Effectiveness of Policy Measures

Table 1 Macro-economy and energy consumption, reference case

Economic and environmental indicators	1995	2000	2010	2020	Growth rate *		
					1996-2000	2001-2010	2011-2020
Real GDP (1000 billion won)	377.4	442.4	729.6	1,067.6	3.23	5.13	3.88
Population (million)	45.0	47.2	50.8	52.4	0.96	0.74	0.30
GHG emissions (million TC)	120.0	138.1	215.1	313.5	2.85	4.53	3.84
Final energy consumption (million TOE)	120.9	149.6	253.1	380.9	4.35	5.40	4.17
Energy intensity (mil. TOE/1000 billion won)	0.320	0.338	0.347	0.357	1.08	0.26	0.28
Emission intensity (TC/million won)	0.318	0.312	0.295	0.294	-0.37	-0.57	-0.04

* Annual average growth rate

Table 2 Public transport policy scenario

Scenario	Assumptions
BAU Scenario	Current trends scenario: Declining public transport modal share
Public transport scenario	Bus: Maintaining current modal share (9.96%) up to 2020. Subway: Maintaining current modal share (9.49%) up to year 2020.

Table 3 Passenger transport demand forecast by public transport policy scenario

Unit: million person km

		2000	2005	2010	2015	2020
BAU Scenario	Passenger car	168,126	217,043	280,194	361,718	466,963
	Bus	27,695	25,917	24,253	22,695	21,238
	Subway	28,365	34,445	38,899	51,541	61,170
	Total	224,186	277,405	343,345	435,954	549,371
Maintaining public transport modal share	Passenger car	168,126	207,477	258,367	330,241	418,397
	Bus	27,695	35,254	42,842	53,297	66,032
	Subway	28,365	34,673	42,136	52,417	64,942
	Total	224,186	277,405	343,345	435,954	549,371

Table 4 Estimation of CO₂ emission under public transport policy

		Unit: thousand TC				
		2000	2005	2010	2015	2020
BAU Scenario	Passenger car	6,853	8,847	11,421	14,745	19,035
	Bus	417	390	365	342	320
	Subway	85	103	117	155	184
	Sub-total	7,355	9,341	11,903	15,241	19,538
	Total Emission¹⁾	18,681	22,176	26,565	31,044	34,748
Maintaining public transport modal share	Passenger car	6,853	8,457	10,532	13,461	17,055
	Bus	417	531	645	803	994
	Subway	85	104	126	157	195
	Sub-total	7,355	9,092	11,303	14,421	18,244
	Estimated reduction compared with the total²⁾	-	249 (1.12%)	600 (2.26%)	820 (2.64%)	1,294 (3.72%)

1) Total emission in the transport sector
 2) The estimated reduction is in comparison with the total transport emission.

Table 5 CO₂ emission units by freight transport modes (1999)

	Private freight vehicle	Commercial freight vehicle	Rail	Water	Air
Freight ton km (million ton-km)	33,376	9,227	10,072	33,699	151
Share (%)	38.6	14.6	11.6	38.9	0.2
CO₂ emission (thousand TC)	5,251.3	1,167.7	-	-	-
CO₂ emission unit (g-C/ton· km)	157.3	126.6	7.1	10.0	402.0

Table 6 Proposed freight modal share change

	1997	2010	2020
Road	56.6	48.2	41.2
Rail	14.2	15.5	20.3
Water	35.8	36.0	38.1
Air	0.1	0.3	0.4

Unit: %

Table 7 Freight modal shift policy scenario

BAU Scenario	Current trend and no infrastructure investment
Modal shift scenario	Government infrastructure investment and modal shift plan

Table 8 Freight modal demand forecasting by scenario

Unit: million ton· km

		2000	2005	2010	2015	2020
BAU Scenario	Road Private	34,379	40,006	46,841	55,201	65,491
	Road Commercial	9,504	11,060	12,950	15,261	18,106
	Rail	10,375	12,073	14,136	16,659	19,764
	Water	34,712	40,394	47,295	55,736	66,125
	Air	156	182	213	251	298
	Total	89,126	103,715	121,435	143,108	169,784
Infrastructure & modal shift policy scenario	Road Private	34,379	38,448	40,972	41,468	41,971
	Road Commercial	9,504	10,417	17,560	22,494	27,980
	Rail	10,375	14,592	18,822	25,477	34,483
	Water	34,712	40,007	43,717	53,178	64,688
	Air	156	252	364	491	662
	Total	89,126	103,715	121,435	143,108	169,784

Table 9 CO₂ emission forecasting and reduction potential under the infrastructure and modal shift policy

Unit: thousand TC

		2000	2005	2010	2015	2020
BAU Scenario	Road Private	5,409	6,294	7,370	8,685	10,304
	Road Commercial	1,203	1,400	1,639	1,931	2,291
	Rail	74	86	101	119	141
	Water	347	404	473	557	661
	Air	63	73	86	101	120
	Sub total	7,096	8,257	9,668	11,394	13,518
	Total	18,681	22,056	26,565	30,855	33,869
Infrastructure & modal shift policy Scenario	Road Private	5,409	6,049	6,446	6,525	6,604
	Road Commercial	1,203	1,318	2,222	2,847	3,541
	Rail	74	104	134	182	246
	Water	347	400	437	532	647
	Air	63	101	146	197	266
	Sub total	7,096	7,973	9,387	10,282	11,304
	Reduction potential	-	284 (1.29%)	282 (1.06%)	1,111 (3.60%)	2,214 (6.54%)

Summary and policy implications

- Public transit related policies would bring only mild improvements but they are more easily implementable politically.
- Freight modal shift could bring greater GHG emission. However this could imply substantial investments in related infrastructure.

Special Legislation for EST in Korea

EST Law in Korea

- EST Law in Korea is now in legislation process
- “Environmentally Sustainable Transport and Logistics Law”
- Motivated by UNFCCC and Kyoto protocol
- Empowers MLTM to exercise diverse regulatory measures

Important Provisions in the EST Law

- EST planning by MLTM and Provinces
 - Long term planning by MLTM
 - Regional planning by Provinces
- Regional planning requires long term land use and transportation planning consistent with EST

- EST zoning and EST indicator based management
 - Arterial transportation zone
 - Urban transportation zone
 - Regional transportation zone
- EST related indicators
 - Environmental indicators
 - Economic indicators
 - Social indicators

- Special EST planning
 - Modal shift policies
 - TDM management
 - Environmentally friendly infrastructure
- Regulatory measures
 - Heavy duty freight regulation
- Public transport promotion
 - Economic incentives

- Transport related price control
 - Economic incentives, taxation and subsidy
- Infrastructure development
 - Environmental benefits must be included in the evaluation
- Economic incentives for low polluting vehicles

- Integrated urban planning
 - Urban planning must consider EST
- Green transport promotion
 - Walking and bicycles
 - Walking related infrastructure and survey
 - Bicycle related infrastructure and safety plan

- Funding for EST
 - Special fund for EST development
- Capacity building for EST
 - Special higher education institute for EST
- International collaboration
 - Exchange of information and expertise
 - Collaborative researches

Transport Policies for EST

- Diverse measures required for reduction in GHG in transport sector
- Technological innovation and economic incentives
- Limitations in policy options and secondary impacts
- No Panacea
- A comprehensive approach is required

Thank you!