

Financing Sustainable Urbanization: Case of Korea

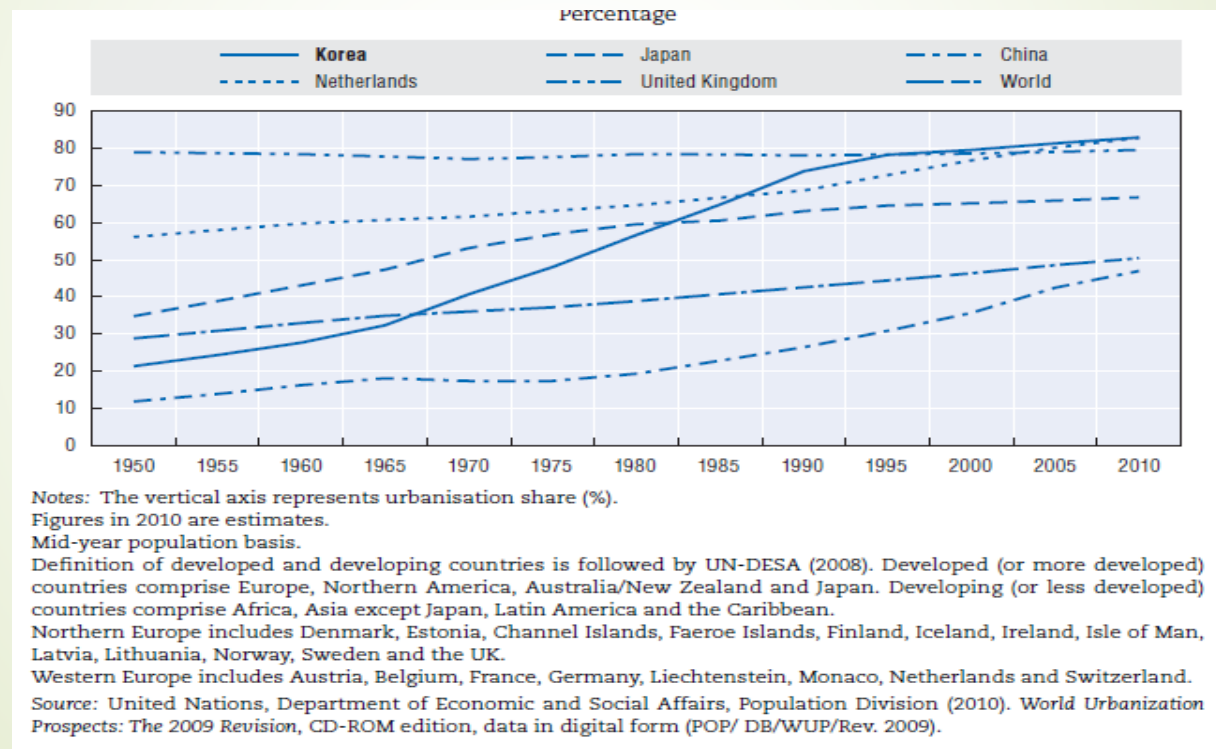
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1. Korea's rapid urbanization and Consequent Effects on Environment

Urbanization Rates of Selected Countries (OECD, 2011)



Energy intensive growth and energy consumption

Table 1.18. Total final energy consumption in Korea, by sector (1980-2009)

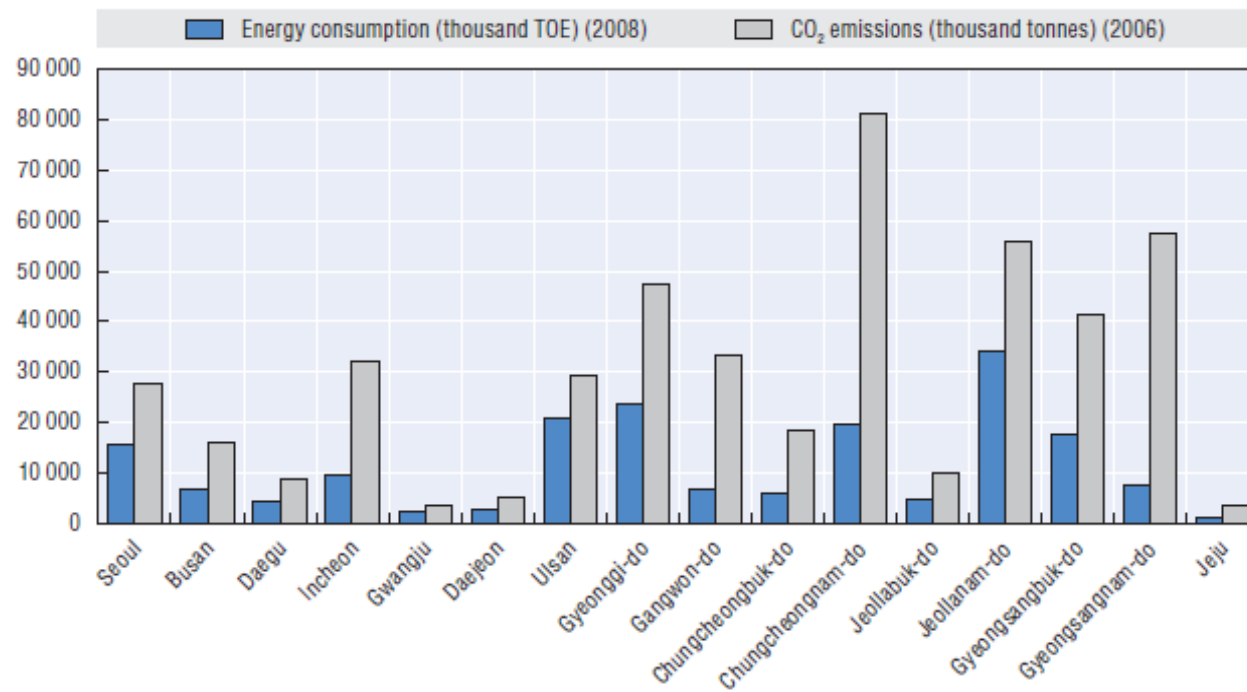
Thousand tonnes (TOE)

	1980	1990	2000	2005	2009	% change
Transport	3 721	14 173	30 945	35 559	35 930	866
(% of total)	9.60	18.90	20.70	20.60	19.70	
Industrial	17 506	36 150	83 912	94 366	106 118	506
(% of total)	44.90	48.10	56.00	54.60	58.30	
Residential/commercial	15 836	21 971	32 370	36 861	35 722	126
(% of total)	40.70	29.20	21.60	21.30	19.60	
Public sector	1 889	2 813	2 625	6 068	4 295	127
(% of total)	4.90	3.80	1.80	3.50	2.40	
Total	38 952	75 107	149 852	172 854	182 065	367

Source: Korea Energy Economics Institute (KEEI) (2011), Korean Energy Statistics Information, www.kees.net, accessed 11 May 2011.

High energy consumption resulted in high level of GHG emissions

Figure 1.31. Total energy consumption (2008) and CO₂ emissions (2006), by region



Source: Ministry of Knowledge Economy (2009), 2009 Yearbook of Regional Energy Statistics, Ministry of Knowledge Economy, Gyeonggi-do.

2. "Low Carbon, Green Growth" Strategy of 2007

Three Pillars:

- Mitigate climate change and promote energy independence by reducing greenhouse gas emissions, creating domestic carbon market and promoting sustainable management and restoration of forests (strengthening the adaptation capacity of climate change)
- Create new engines for economic growth by promoting green technologies, green industries, industrial restructuring and structural basis for green economy
- Improve the quality of life by greening land, water, air and urban landscape as well as facilitating green transport infrastructure and green buildings

Industries favored by the Low Carbon – Green Growth Strategy

Table 3.5. Industries identified as new growth engines for the Korean economy

Green technology	State-of-the-art fusion industries	High value-added industries
Renewable energy	IT fusion industry	Health care
Low-carbon energies	IT fusion system	Education services
Water management	Robot applications	Green finance
LED applications	New material and nano-fusion	Contents and software
Green transportation	Biomedicines	Meetings, incentives, conferences and exhibits (MICE) and tourism
State-of-the-art green cities	High value-added food industry	

Source: Cho, W.D. (2009), "Green Growth National Strategy and Five-Year Plan", presentation to the OECD, Paris, 9 September 2009.

3. Urban Infrastructure Financing Schemes under Green Growth Strategy

- ▶ Inter-governmental grants and subsidies
- ▶ Taxes, both central and local
- ▶ Loans and borrowings
- ▶ User charges and fees
- ▶ Public Private Partnership (PPPs)
- ▶ Carbon finance

Potentials and Limitations of each instrument as a means to improve sustainability and resilience in cities

- ▶ Grants – both general and matching - and subsidies:
 - There were large amounts of budgetary contribution in the form of grants and subsidies up until 2012, intended for promoting greening activities of local governments, R/D institutions, public and private corporations alike
 - Such contribution decreased drastically since 2013 due to substantial increase in welfare budget although total government budget increased by 9% on average; infrastructure budget has been continuously cut to 5% level in 2017.
 - Mostly made as general grants; matching grants with revenue sharing strongly recommended for “tax efforts”
- ▶ Taxes:
 - Corporate tax was either reduced or temporally exempted when firms invested in new environmentally sustainable technologies and resources-conserving production processes
 - Property tax and property transfer income tax were exempted or temporally reduced when venture firms used properties – land and buildings - for environmentally sustainable businesses
 - Value added tax was normally exempted when machinery and equipment were transacted for low carbon and green businesses

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- Tax measures seem to be inadequate as incentives in promoting sustainable infrastructure developments; more tax revenues should be collected and a large part of them ought to be earmarked to subsidize private sectors' greening activities
- Tax on pollution or other negative externalities should be instituted to prevent environmentally undesirable and morally hazardous behaviors of the firms
- More tax revenues are needed and a large part of the money be earmarked to directly subsidize greening activities of the firms
- ▶ Loans/borrowings:
 - The government is heavily in debt to the extent that it can't stretch bond financing too far, but it can allow local governments to issue bonds for financing locally initiated sustainable infrastructure projects and programs – local roads, recycling wastes and water, reforestation, flood and draught prevention devices, etc.
 - But the bond market is not fully developed to deal with debt financing by and large; more efforts should be made to expand and effectuate the market
 - Monies so mobilized can be used as low cost loans for private sector; private firms may borrow them to upgrade buildings and factories in sustainable way, e.g. "intelligent/smart buildings and factories"

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■ User charges/fees:

- The user charge system has just started in such areas as road, bridge, parking, park and recreation, as well as congestion and pollution abatement fee, etc.
- The revenues so collected are not large enough even to cover the operating costs of the facilities. The system requires theoretical base, clarifying what services are subject to user charge. The concept could be applicable to most of the semi-public goods and merit goods.

■ PPPs:

- PPPs have worked relatively well up to now; in the early 2000s large scale infrastructure facilities such as expressways, subways, bridges, even solid waste disposal and sewage facilities were installed under PPPs.
- But recently, most PPP projects are in the form of small scale BTL type, largely associated with social and welfare programs. PPPs are less likely to expand unless more risk-reducing incentives, such as MRG, are provided
- Relative success of PPPs may depend on the degree to which the capital market has developed; financial liberalization of the early 1990s was very helpful in introducing PPPs

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- ▶ Carbon finance:
 - The government recently approved new GHG emission up to one million tons, so that the massive emission producing firms must purchase an appropriate amount of the Korean Allowance Units (KAU). The government acknowledged KAU amounts up to 1.38 million tones being generated from 72 projects, out of which 1 million tones were approved.
 - The GHG emissions as approved by the government are worth as much as 17.5 billion won, which is equivalent to 17,500 won per ton of purchase price; who purchases and how much are not yet known.
 - The emission trading system started late last year, and so it is not quite socially receptive as yet; people must be convinced that it allows firms to reduce their emissions of GHG in most economically efficient way.
 - We have to wait and see how it will work In the future in providing sustainable urban infrastructure

4. Achievements at a Glance

- ▶ Green buildings
 - Revised building codes to improve energy efficiency including insulation and cooling standards
 - Constructed green homes and greening the building stock – offices, factories and public buildings in particular via. LED, geothermal energy, solar heating, and photovoltaic energy
 - Reduced residential energy by 30%
- ▶ Green transportation
 - Switched to railway from highways/expressways, with its share from 29% 1990 to 50% by 2020 while reducing road investment from 60% to 40% during the same period
 - Tax and gasoline incentives for small energy efficient and electricity operated cars
 - Expanded congestion charges in major cities via ITS
 - Built both pedestrian and bike roads (completed 3,000 Km in length)
 - Promoted public transits by expanding BRT lanes, diamond lanes, subways, and building 2nd and 3rd bullet train lines
 - TODs and green transportation by installing multi-modal transfer centers

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- ▶ Raised the level of sanitation facilities as of 2009
 - The supply ratio of sewage system almost 99%
 - Most cities are being equipped with water recycling facilities
 - 85% of the total waste materials are being recycled
 - Reduced land-fill to 11% and incineration to 5%
 - All cities implemented water conservation programs in accordance with water efficiency codes and pollution standards
- ▶ Reduced fossil fuel dependency
 - Increased the share of renewable energy from 3% in 2007 to 12% in 2015
 - Manufacturing sector's share of employment declined from 59.2% in 1990 to 20.3% in 2007
 - Committed to cut GHG emissions by 30% relative to the projected level by 2020

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- ▶ Other actions
 - Introduced smart grid network: being tested in Jeju Island and soon be expanded nation-widely
 - Reforested poorly forested areas and non-farming hills
 - Smart grid system introduced at the New Ports in Busan and Incheon
 - Most newly built cities and towns are being equipped with integrated Smart and Ubiquitous systems to facilitate security, safety, energy savings, and recycling (water and solid waste), and improve amenities and even ambiances by controlling noise, dust and odor

5. Implications for Rapidly Urbanizing Countries

- No quick solutions! Careful planning at different stage of economic development may be necessary to identify and strategically develop “stage proper” infrastructure facilities, and to allocate government resources for sustainable urbanization accordingly.
- At the early stage of industrialization, focus on those infrastructure facilities that facilitate industrialization and economic development; such as energy, water, irrigation, ports, airports, highways, railroads, low cost housing, schools, flood control, etc.
- At the economic “take-off” stage, invest in those facilities that meet the basic human needs, such as urban transit system, telecommunication, hospitals, sanitation, sewage, middle income housing, renewable energy, reforestation and other devises for environmental protection and resilience
- When a country reaches mature stage of development, focus on urban amenity-improvement infrastructure facilities; such as housing, parks and recreation, various types of renewable energy, cultural facilities, IT-integrated SMART city, urban resilience devices as flood control, soil conservation, social and welfare facilities at large

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- Prepare legal and institutional framework for sustainable growth early on
 - Initiate legislative actions for green growth strategy
 - Authorize key government offices to manage and coordinate relevant issues and concerns, such as reduction of GHG emissions
 - Mandate subnational governments to support the strategy through revising urban planning and modifying infrastructure development schemes; such as more compact and green urban development via integrated land use and transportation to minimize urban sprawl
- Establish environment improvement funds early on if feasible, and build administrative and R/D capacity to deal with the issues comprehensively
- Increase people's awareness of sustainable consumption, dangers of moral hazards and adverse selection, the necessity of eco-tourism and eco-life style, etc.