Reshaping the Transport System for Green Growth in Korea[1]

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Abstract

Recently the Korean government announced its National Green Growth Strategy, which includes some important measures for sustainable transport. This paper explains the background of this strategy and shows government efforts to realise this vision. Firstly, it summarises how much energy is consumed and how much greenhouse gas is emitted from the transport sector. Then it explains the main contents of the new laws which aim at green growth and sustainable transport. Particularly, it details what is included for transport in the nNational gGreen Ggrowth Sstrategy. This is summarised in terms of four categories as: conversion to energy-efficient transport modes, encouragement of walking and cycling, promotion and dissemination of green transport technology, and provision of supporting measures for low-carbon green transport. Finally, it the paper suggests some points that need to be considered to realise a sustainable transport system.

1. Introduction

Korea is now positioning itself as a leading country for gGreen Ggrowth after the president pledged lLow cCarbon Ggreen Ggrowth as a new vision of Korea in 2008. In line with this, recently the government announced its National Green Growth Strategy which includes some important measures for sustainable transport. The transport sector needs special care in terms of greenhouse gas emissions reduction or energy consumption. Transport alone explains 19 per cent of total CO_2 emissions and consumes 37 per cent of total oils imported from abroad.

This paper explains the background of lLow Ccarbon Ggreen Ggrowth and shows government efforts to realise this vision. Firstly, it summarises how much energy is

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Total Primary Energy Supply

consumed and how much greenhouse gas is emitted in the transport sector. Then it explains the main contents of the new laws which aimed at Ggreen gGrowth and sustainable transport. Particularly, it details what is included for transport in the National Green Growth Strategy. This is summarised in terms of four categories as: conversion to energy-efficient transport modesd, encouragement of walking and cycling, promotion and dissemination of green transport technology, and provision of supporting measures for low-carbon green transport. Finally, it the paper suggests some points of consideration points that are necessary to realise a sustainable transport system.

2. Energy Uuse and GHG Eemissions in Transport

In 2005, Korea spent 216.50 million Tons of Oil Equivalent (TOE) (Tone of Oil Equivalent)of energy, among them; 86 per cent (185.92 million TOE) is imported from abroad, and it has produced CO2 emission as much as 476.10 million tons of CO_2 emissions. This energy consumption and CO_2 production seems to be relatively higher than on a per capita and per GDP basis compared to other countries (Table 1)ison countries considering its population and gross domestic production. Energy consumption per capita was 4.48 TOE in Korea and CO_2 production per capita was 9.86 tons. These numbers are higher than comparison countries such as Japan in and in Europe and Japan. This implies Korea has good potential to reduce energy use and CO_2 emissions.

Table 1 Energy use and CO_2 emissions in selected countries

	Population (million)	GDP (billion 2000$)	Energy prod. (MTOEtoe[2])	Net imports (MTOEtoe[2])	TPES[2] (MTOEtoe[3])	CO_2 Emissions(b) (MTt of CO_2)	TPES/pop (TOEtoe/capital)	TPES/GDP (toe/0002000$)	CO_2/pop (t CO_2/capital)	CO_2/GDP (kg CO_2/2000$)
UK	60.53	1,684.7	186.62	49.15	231.13	536.48	3.82	0.14	8.86	0.32
France	63.20	1,468.3	137.02	140.22	272.67	377.49	4.31	0.19	5.97	0.26
Germany	82.37	2,011.2	136.76	215.56	348.56	823.46	4.23	0.17	10.00	0.41
USA	299.83	11,265.2	1,654.23	730.44	2,320.70	5,696.77	7.74	0.21	19.00	0.51
Japan	127.76	5,087.1	101.07	431.11	527.56	1,212.70	4.13	0.10	9.49	0.24
Korea	48.30	671.30	43.73	185.92	216.50	476.10	4.48	0.32	9.86	0.71

Source: Key World Energy Statistics (IEA, 2008)

[2] [2]Total Primary Energy Supply
[3] Million Ton of Oil Equivalent

Though most CO_2 emissions are produced while generating electricity (45%) in Korea, transport explains 19 per cent of total CO_2 emissions (Figure 1). Among thatem about 80 per cent comes from road transport.

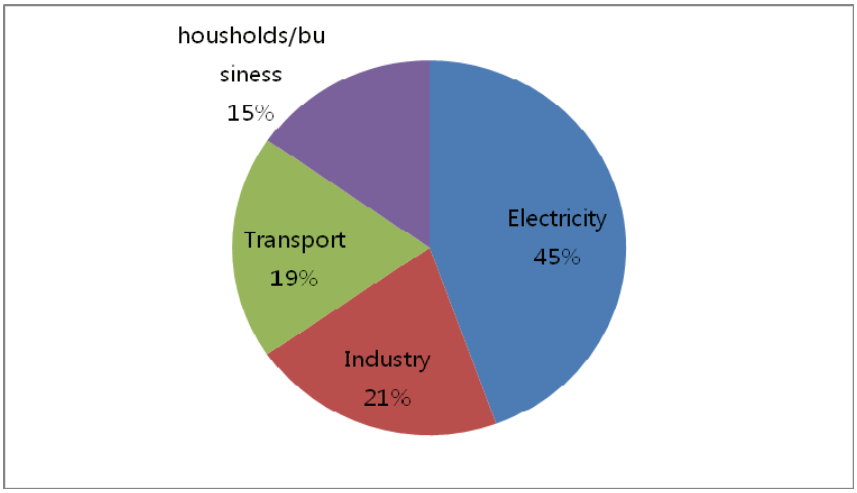

Figure 1 CO_2 emissions by sectors in Korea

3. Government's Pledge for Green Growth

Sustainable transport in Korea is being recognized ever moreas increasingly important after the President's memorandum speech to praise the 60th anniversary of the foundation of the Republic of Korea. In this statement, the President Lee proclaimed 'Low-Carbon, Green Growth' as a new national vision, and explained it as sustainable growth which helps reduce greenhouse gas emissions as well as environmental pollution. He also promotednoted it as a new national development paradigm that creates new growth engines and jobs with green technology and clean energy. In this respect, it is also necessary to reshape the structure of transport is also need to reshape its structure to meet requirements set by this gGreen gGrowth paradigm.

The concept of gGreen gGrowth meansns to decouple economic growth and environmental side effects. In other words, it aims at developing an economy that promises environmental sustainability. This terminology was first used in the Economist, a leading international journal in January 2001, and widely used after the Davos Forum. The importance of Ggreen Ggrowth has now been recognized worldwide, and even resulted in the foundation of the Green Growth Centre in UNESCAP (United Nations for Economic and Social Commission for Asia and the Pacific (UNESCAP)

The GGreen gGrowth in Korea is targeteding at setting up a positive development circle which produces more national income and more jobs in green technology, thereby which contributinge toon reducing greenhouse gas emissions and negative effects on climate change (Figure 2). It also aims at encouraging arenovating green life style through eco-friendly land and transport development. The Green gGrowth will then give an opportunity forthat Korea tocan take a leading role in responding toon global climate change.

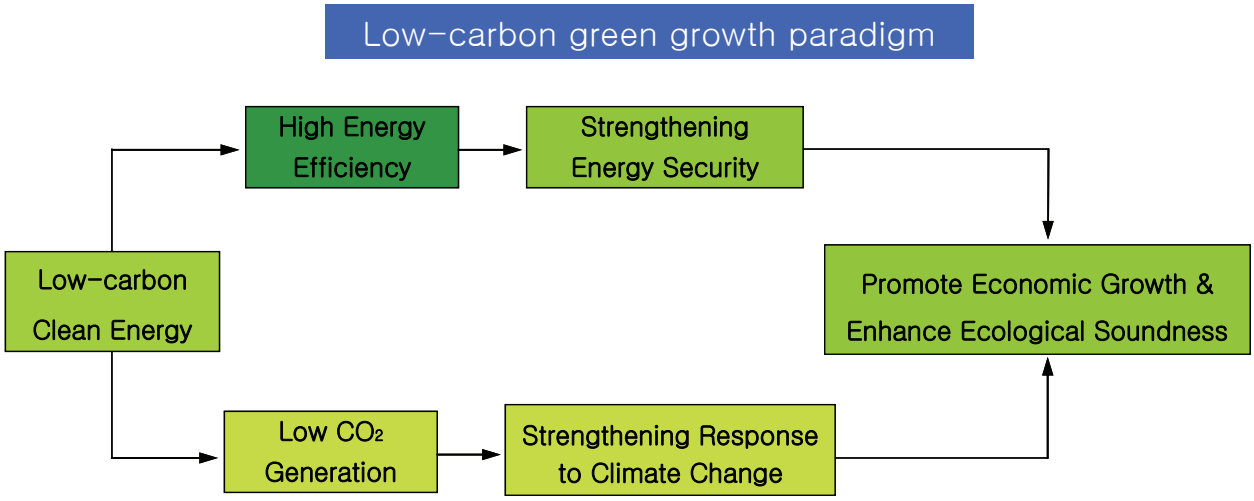

Figure 1 2 Positive development circle

The GGreen gGrowth is an unavoidable national vision in Korea in terms of three aspects. Firstly, Korea is vulnerable to global climate change than like any other country oin the globe. The winter season is getting shorter, and precipitation with higher temperatures is getting more severe in the summer season. Secondly, without escaping from energy dependency on fossil fuels, which will be depleted someday, Korea cannot maintain its economic growth any further. Korea imports 97 % percent of its total energy from abroad and spendst 141.5 billion USD for energy purchase, which accounts for 32.5 percent% of total expenditures for imports. Thirdly, Korea needs a new growth engine to boost its economy. Although Korea has shown fast economic growth by means of investment ion electronic devices and heavy industries, it is now confronted with the dead end limitations to growth in those industriess. To secure jobs and to maintain stable economic growth there should be a new breakthrough:, called gGreen gGrowth.

To fulfil the vision of gGreen gGrowth, the Korean government established the Presidential Committee on Green Growth in February 2009. The committee is made up of three divisions

and is leading the national gGreen gGrowth policy while coordinating interests of various ministries in the central governments.

This Ppresidential Ccommittee is also supposed to execute the Basic Law for Low-Carbon Green Growth (Basic Law). which is now under review in the Parliament. This draft law guides policy orientations for gGreen gGrowth in national scope and deals with issues related to the creation of green industriesy and technology, management of climate change and energy, introduction of a carbon trade market, development of green land development and a green transport system, and so forth. It consists of 65 articles and annexes.

From theIn transport perspectiveaspect, the Basic Law stresses management of greenhouse gas emissions from the transport sector through development and dissemination of environmentally friendly vehicles (Article 47), promotion of an eco-friendly transport system in national scope (Article 52), and formation of a low-carbon transport system (Article 54). Article 54 particularly specifiesy that the government should set a target for greenhouse gas emissions in the transport sector, promote a railway- oriented national trunk transport network, extend public transport provisions, set up a modal split target, facilitate domestic maritime transport, and devise transport demand management measures including congestion charges, exclusive bus lanes, and Iintelligent Ttransport Ssystem (ITS) measures.

To prepare for implementation of the Basic Law for low-carbon green growth, the committee has published the National Green Growth Strategy in July 2009. The strategies are suggested in 10 areas. TheyIt includes reduction of greenhouse gas emissions, achieving energy independence, capacity building for climate change, development of green technology as a new growth engine, encouragement of green industriesy, promotion of high value industriesy, laying the foundation for a green economy, development of green land use and transport, conversion to a green renovation in daily life, and leading green growth aroundin the globe.

This strategy seems to overlook the importance of transport in achieving gGreen gGrowth. Transport is regarded as a subordinate sector of land development, and interaction between transport and land use is not fully addressed in the strategy. However, promotion of bicycles is dealt with in separately. It seems to stress the government’s strong willingness to make the most of bicyclinges.

4. The Law for Sustainable Transport and Logistics Development

Long before devising the Basic Law, the Ministry of Land, Transport, and Maritime (MLTM) hads independently prepared for a rather innovative law that sets up the direction of sustainable development in the field of transport. Named the Law for Sustainable Transport and Logistics Development (Law for STLD), it suggests comprehensive measures to promote sustainable transport in 52 Articles, and will be in force from December 2009. It seems that the concept of gGreen gGrowth is already embedded in the sustainable transport measures, and most core ideas in the Basic Law can be realised according to the Law for STLD. The main contents of this law can be summarised as follows:

Establishment of national sustainable transport and logistics development plan (Article 7)

Establishment of local sustainable transport and logistics development plan (Article 9)

Classification and designation of sustainable transport and logistics areas (Article 12)

Evaluation of sustainable transport performance measures (Article 14)

Monitoring reduction in greenhouse gas emissions (Article 16)

Restriction on total amount of car traffic (Article 18)

Setting up reasonable modal split target (Article 19)

Management of heavy goods vehicles (Article 20)

Assistance of modal shift (Articles 21, 22)

Promotion of public transport use (Article 23)

Adjustment of transport and logistics charges (Article 25)

Promotion of environmentally-friendly transport and logistics facilities (Article 26)

Promotion of environmentally-friendly transport technology (Article 27)

Encouragement of environmentally-friendly transport modes (Article 28)

Integration of transport and land use planning (Article 29)

Restriction of car use (Article 30)

Establishment of comprehensive plan for promotion of non-motorized transport modes (Articles 31, 32, 33)

Assistance of inter-modal transport facilities (Article 34)

Establishment of walking environment improvement plan (Articles 37, 38, 39, and 40)

Designation of special management areas (Articles 41, 42, 43, 44, 45)

Education and training (Article 46)

Promotion of international cooperation (Article 47)

Promotion of eco-driving (Article 48)

5. Reshaping Transport System

The amount of CO_2 emissions from the transport sector accounts for about 19 per cent of total CO_2 emissions. Among these CO_2 emissions from the transport field, more than 80 per cent stems from road transport. It implies that morest effort needs to be focused on road transport than on any other mode to realize Ggreen Ggrowth. It wouldill be the most effective way of minimizing environmental detriments while maintaining economic growth in the transport fields. In other words, it is necessary we need to reshape athe transport system so that it can reduce car traffics that causes harmful emissions while maintaining safe, fast, and convenient transport services needed for stable economic growth. Some effective and efficient measures under consideration can be grouped into four categories: conversion to energy-efficient transport modes, encouragement of walking and cycling, promotion and dissemination of green transport technology, and provision of supporting measures for low-carbon green transport. Most transport policies suggested in the National Green Growth Strategy in 2009 and the subsequent five5 -year implementation plan, as well asnd the Law for Sustainable Transport and Logistics Development, will be explained within these categories.

Conversion to energy-efficient transport modes

The most effective way ofr reducing greenhouse gas emissions from transport is to shift car traffic ointo public transport including railway, light rail transit, trams, and buses. In this respect, the expansion of the railway network, the increase of cruise speed and frequency, and the electrification of railways are encouraged. In pParticularly, high speed railways in Korea will be extended from 238km of route-miles to 363km by 2012. Alignment of existing railways will also be upgraded so that they can accommodate a cruise speed of 200 to -230 km/h. Electrification of existing lines, and conversion of diesel locomotives into electric ones will be promoted. Light rRail isTransits are also expected to be introduced in some cities.

Bus systems are will also be upgraded so that they can provide faster service than private cars. Bus Rapid Transit, which has been successful in Seoul, will be extended nationwide. Some

regional express buses will be introduced in the Seoul metropolitan areas. These buses will have less than 8 stops along routes and may use urban motorways to increase cruise speed. Interoperability of transport cards will be enhanced to realize 'One Card All Pass': that means any transport card issued in any city can be used in nationwide.

To increase connectivityion and transferability between transport modes, transit centerres will be developed and more urban activities including business, culture, shops, and restaurants will be provided within the centerres. Connecting railways and highways to/from seaports, airports, and industrial complexes will be improved to increase the efficient movements of freights.

There will be economic incentives to encourage modal shift from road transport to public transport. Currently, 74 per cent of freights isare moved by road transport and 60 per cent of people are using private cars to travelmove. It explains thatIn other words, the modal split rate of energy-efficient transport modes including railways isare much lower than that of road transport. In the case of freight movement, the government plans it is planned to increase the modal split rate from 8 to 15 per cent and from 18 to 22 per cent by 2012 for both railways and coastal shipping, respectively. Some subsidies will be allocated to some freight transporters which show good performance in terms ofof modal shift from trucks to railways or from trucks to ships. In the case of passengers, the government plans it is planned to increase modal split rate of public transport from 50 to 55 per cent by 2012. To attain this target, improvement of the public transport environment and services need to be continued to increase public transport ridership.

Encouragement of walking and cycling

Interest ins on walking and cycling is steadily increasing, particularly since the government's commitment to green growthare now getting accrued more and more, ever since government pledged for Green Growth. Encouragement of these non-motorizsed transport modes is important to guarantee modal shift from private cars to public transport. If the walking and cycling environment is not appropriate, then people find it is inconvenient and unpleasant to access to bus stops or subway stations. It will cause less use of public transport and a the modal shift target cannot be attained. Another reason is that it can substitute much for a lot of car use in many cities. According to a recent travel diary surveys in Seoul, about 44 per cent of car travellers move less than 5km per trip. This is the distance for which cycling can be

competitive withto other transport modes. The survey also shows that 11 per cent of car trips are is shorter than 1km, which can be substituted byfor either walking or cycling.

In order to encourage walking, the government plans it is planned to extend the designation of Pedestrian Priority Zones (PPZ), where pedestrians get high priority over any other transport modes. In PPZspedestrian priority zone travel speed is limited toat less than 30 km/h and various traffic calming measures are installed to guarantee self-enforcement of the speed limit. Parking is not allowed except inlimited restrictive areas. There is also a plan It is also planned to monitor the walking environment in nationwide to allocate national budget to local governments according to the degree to which they have improved their walking environmentshow much walking environment has been improved. A 'Day of Pedestrians' will also be designated to promote walking rights among people.

BThe bicyclists are increasing rapidly in Korea as the government encourages using bicycles. The government plans It is planned to construct a nationwide bicycle network which extends as much as 3,114km by 2018. They will be constructed along rivers and national roads with a good scenic view. In urban areas, so it called 'Road Diets' will be applied. TheyIt aims at reducing vehicle space to secure bicycle space on the roads. It is also in consideration to set aside space for bicycle racks within trains and buses so that bicyclists can make a long distance trips combined with public transport. Around transit centerres more bicycle racks and service points will be provided to promote bicycle use as an accssess transport mode to trains, subways, and buses. The concept of 'public bikes' or 'bike-sharing' will be introduced further in several cities.

Integration of land use and transport is also encouraged. For example, the concept of Compact City Development and Transit Oriented Development will be applied near railway stations. In particular, around high-speed railway (i.e.,or KTX) stations, it is in consideration to allow high density development to boost the economy at a relatively low cost. The strategy of high density development may vary according to characteristics of cities where stations are located. For example, some developments can be geared towards theinto promotion of commercial business, and others may focus on improvement of high-tech industriesy. The advantage of high density development is to reduce the number of unnecessary car trips and to shorten travel distance. It can also give a chance to provide better environments for walking and cycling. The government also promotes designation of Public Transport Only Zones (PTOZ) where private cars are not allowed. It is reported thate total sales in PTOZ

haves increased substantially. It is because more people will visit the zone where walking is convenient and comfortable.

Promotion and dissemination of green transport technology

Development and promotion of environmentally-friendly cars are important forto eradicating tackle greenhouse gas emissions from road transports. They surely eradicate harmful emissions from the roads. There are four types of environmentally-friendly cars: such as hybrid cars, bio-fuel cars, electric vehicles, and hydrogen cars. The hybrid automobile market is now getting competitive as more hybrid car models are available and the car prices goes down. Bio-fuel cars are also in use, particularly for buses and trucks;. hHowever, this increase in usage it caused a sudden hike of prices for food products made from some cereals such as corns and beans. Commercial electric cars are now available onin thea market as well. However,But they are still expensive and have disadvantages such asof low mileage and it requires relatively long recharging time. However, electric cars are also expected to increase on the street as more technical innovations areis made. Experts also foresee that commercial hydrogen vehicles will be available on thein a market within ten years. Some pro-hydrogen groups people say hydrogen cars will substitute for all types kinds of environmentally-friendly cars in the long run.

AIt is quite certain as the price of oil increases, more research and development and more technology innovation will be possible in developing better environmentally-friendly cars that uses alternative energy sources. However, the selection of environmentally-friendly cars is solely dependent on the market conditions. Currently, people select hybrid cars rather than electric cars because the formerirst is cheaper and convenient to use. If electric cars become cheaper than hybrid cars in holistic aspect, then the latter may lose muchlots of market share. Bio-fuel cars can also be competitive in price, but it is not uncertain if these cars can dominate the market share because of unexpected side effects. Furthermore, electric cars and hydrogen cars need rather special facilities for refuellingas conventional cars need petrol stations. If recharging is not convenient enough and electric power is not cheaper than oil, then electric cars cannot be widespread. The recharging points need to be widespread to promote the purchase of electric vehicles. Hydrogen cars also need stations where hydrogen can be fuelled. This service business cannot be introduced without the promise of a

minimuming number of hydrogen cars on the market. The role of government is perhaps to give affirmative signals to thea market that a certain type of alternative cars will be promoted. It can help the private sectors carryrun the risk of investing for this rather adventurous business.

The government is planning to devise safety requirements or standards for hybrid, electric, and hydrogen cars. An experimental laboratory will open to assess the safety of alternative cars. In parallel, the related laws such as the Road Traffic Act and, Vehicle Management Act will also be amended so that these new types of vehicles can be promoted by the law. Neighbourhood electric vehicles are not currently allowed to move around public roads according to the existing law.

Promotion of new transport modes is also important. For example, Personal Rapid Transit (PRT) is known as an attractive mode that combines the advantage of public transport and private cars. It can transport people in a separate car along athe track at relatively fast speed with less operational cost. However,But this seemingly attractive transport mode is not welcomed because there arewas no guidelines for safety design, and because relevant government officials do not want to run the risk of failure byto introducing an entirely new system different from existing transport modes. The government has a willingness to change this passive attitude into a proactive one.

Supporting measures for low-carbon green transport

LThe low carbon green transport can be maintained with the help of some supportiveng schemes. These include a monitoring system of greenhouse gas emissions, education aboutof eco-driving, and reinforcement of transport demand management.

It is important to know how much greenhouse gas is generated from the transport sector for spatial areas and transport modes. If greenhouse gas emissions increases faster than an average in certain areas, some strong measures are necessary to tackle it, whereas if the greenhouse gas emissions decreases, one can justify the overall effort for reducing greenhouse gas is working as expected. Apart from greenhouse gas emissions, more sophisticated performance measures will be devised to evaluate various aspects of sustainable

transport development. For example, the modal split rate of public transport and railway transport, reduction in total vehicle-mileage, and total length of the railway network can be included.

After introducing a monitoring system for greenhouse gas emissions, the government has a plan to designate a special treatment zone if the amount of greenhouse gas emissions from the area is higher than average or the reduction target cannot be attainable at the current pace. In this case, some strong transport demand management measures will be applied such as the introduction of congestion charges, restrictions on total traffic volumes, and reduction in parking areas.

Promotion of eco-driving is also important for reduction in greenhouse gas emissions. The government It is planned plans to develop an eco-driving experience course for the public. People can experience eco-driving using simulators in the experience centerre. It will also be encouraged to iInstalling fuel efficiency indicators in a cars will also be encouraged.

6. Some Cconsideration Ppoints for Green Growth in Transport

The gGreen gGrowth policy in transport brings about some issues that need to be discussed. Firstly, it is not easy to decide the optimal modal split rate in a certain city. Some cities cannot increase the use of public transport any further because the service of the public transport is limited. For example, unless public transports cannot cover all areas in a city, some people have no choicecannot but to use private cars. It is quite arguable to set up a certain fixed target forof modal split rate for the entire nation, regions, and cities because one cannot demonstrate what is the optimal modal split rate for a certain areas.

Similarly, it is also difficult to decide the desirable target forof greenhouse gas emissions in transport sector. To decide the target, analysis of the n effects of a certain transport schemes or programs toward traffic reduction or modal shift is required. In this respect, England uses its National Transport Model to conduct such analysis, and this practice can be applied in other countries including Korea. In the same context, transport models for a region or a city need to be developed as well to decide the emission reduction targets for the corresponding areas.

Some people strongly say that any public transport mode cannot substitute for private cars. Their opinion seems to be right because road congestion is not improved at all although separate lanes are allocated for buses and more frequent services are provided. Privacy, short access distance and time are the main merits of cars. Unlike public transport, a car does not require wait or transfer times and is available at any time at any place. It seems to be unwise to improve public transport service to shift car users into public transport if it is virtually impossible to lessen the gap between public transport and cars. It requires immense cost but the effect is negligible. Therefore, we may need to change the policy direction. Instead of focusing on public transport too much, we may need to concentrate on making an environment where cars are not favoured to use. For example, reduction in parking areas, increase of parking cost, and allocation of road space to buses, cyclists, and pedestrians can change people's attitude toward cars. If it becomes inconvenient to use cars, then people may give up using cars. However, this policy may cause fierce arguments between pro-car activists and pro-public transport activists.

Another consideration point is that whether it is right or not to restrict car use after all cars become environmentally-friendly. For example, if all cars use hydrogen as a fuel, virtually there will not be anyno pollution automobile pollution will exist. If this is the case, motorists may say it is unfair to restrict car use anymore, and they can even require better facilitiesenvironments for environmentally-friendly cars. Nonetheless, private cars cannot be encouraged forto use in the future, even though they do not emit greenhouse gases. They inevitably cannot but towill cause congestion with so many users once they move at the same time in the limited areas. Road accidents are also closely related with the use of private cars. Therefore, it seems to be important to take further strong actions to reduce the use of private cars although they may become entirely environmentally-friendly. We need to remember that these actions can not only reduce greenhouse gas emissions but also reduce the likelihood of congestion and accidents on the roads.

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