

*EVS28*  
*KINTEX, Korea, May 3-6, 2015*

## Comparative Study on Electric Vehicle Policies between Korea and EU Countries

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### **Abstract**

To significantly reduce greenhouse gas, the Korean government announced an ambitious EV deployment plan in 2010. According to that plan, one millions EVs would be provided by 2020. However, the target of EV deployment was not achieved despite strong political support. As a result, the government modified the initial plan by reducing the target number of EVs from 1 million to 200,000. Many EV experts thought the issue arose from poor policy framework and implementation process. The purpose of this paper is to find relevant policy direction in Korea by comparing the policy formulation and implementation process between EU countries and Korea. Concerning policy formulation, we examined the legislation and planning process to know what to prepare for successful EV policy framework. And for the policy implementing process, we analyzed various incentive measures on how to stimulate the deployment of EV. With comparative research results EV policy implications are drawn.

*Keywords: EV, policy framework, subsidy, tax incentives, Korea, Germany, France, Netherlands, Norway*

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### **1. Introduction**

Most countries will meet against the reduction of greenhouse gas (GHG) for sustainable development. South Korea is a nation facing a similar situation. More than 20% of fossil energy is used in the transport sector and the increasing rate of energy consumption did not changed as Korea's national economy grew quickly from the 1980s. To significantly reduce GHS, the Korean government announced an ambitious EV

deployment plan in 2010. According to that plan, one millions EVs would be provided by 2020. However, the target of EV deployment was not achieved despite strong political support. The current number of EVs deployed in Korea numbers approximately 2,500. As a result, the government modified the initial plan by reducing the target number of EVs from 1 million to 200,000. Many EV experts thought that this result arose from irrelevant policy framework and their implementation process.

The purpose of this paper is to propose a relevant policy direction in Korea by comparing the policy formulation and implementation process between EU countries and Korea. To do that, we selected three EU countries including France, Germany, Netherlands and Norway. Concerning the policy formulation, I examined the legislation and planning process to know what to prepare EV policy framework. And for the policy implementing process, I analyzed various incentive measures on how to stimulate the deployment of EV. With comparative research results, I draw EV policy implications for the future.

## 2. Electric Vehicle Policy Framework in Korea

### 2.1 Brief Summary on EV Deployment

Korea has been pursuing a green car policy and running various pilot projects to deploy them from 2005. In 2010, the green car road map was released for reducing GHG. According to that plan 1 million BEVs should be provided by 2020. To achieve this goal the Korean government enacted two acts for EV R&D and deployment and also organized the implementing structures at the central governmental level.

Many local governments have participated in EV pilot projects. Seoul and Jeju have concentrated on EV policy deployment to reduce externalities caused by the transport sector by replacing internal combustion engine (ICE) vehicles with EV buses and taxis. The new governor of Jeju Island announced recently that by 2030 almost all ICE cars would be replaced with EVs running on electricity generated by wind power.

Despite the substantial support by central and local governments, EVs were deployed as per expectations. And the economic incentive, which was an important incentive to deploy EV, would be reduced soon due to financial limitations.

In Korea, 3,044 EVs and 3,201 recharging infrastructures were provided. But, it was only 8.7% of the EV deployment target (35,100) in 2014, even though huge subsidies were assigned from central and local governments. As a result, EV policy in Korea may be amidst an inflection point.

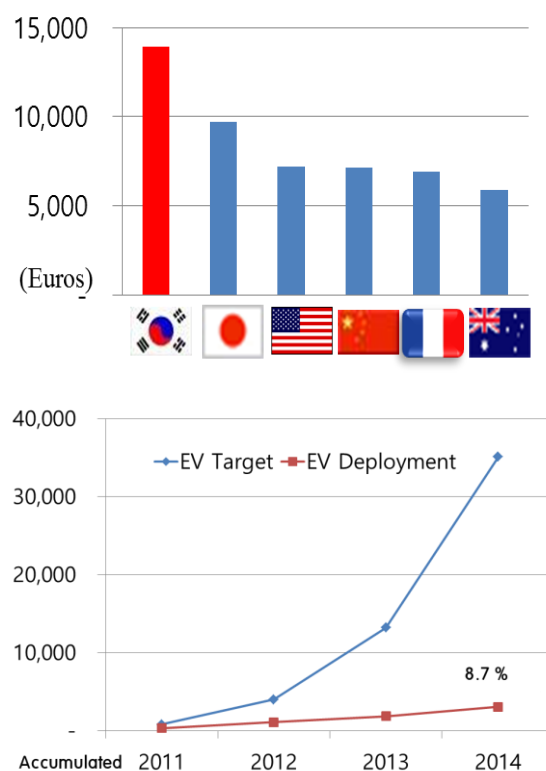


Figure 1: EV Subsidy (Euro) and EV deployment accumulated in Korea

### 2.2 Major Characteristics of EV Policy Framework in Korea

As mentioned above, the major reasons the policy target was not achieved may have resulted from

policy formulation or implementation process. In this context we reviewed the legislation, organization and implementing measures for stimulating EV deployment.

### 2.2.1 Legislation for EV Deployment

Threes acts for stimulating EV deployment were enacted since the early 2000s; Law for Eco-Friendly Cars R&D(2004), Law for Low Carbon-Green Growth (2010), and Law for Sustainable Transport Development (2011).

The purpose of the Law for Eco-Friendly Cars R&D(2004) is to encourage the consistent development of the automobile industry by threes ministries; Ministry of Trade, Industry and Energy(MOTIE), Ministry of Environment(MOE), and Ministry of Land, Infrastructure and Transport (MOLIT). The law was passed in 2004 and

partially revised in 2008 and 2012. This law could be characterized as the first legislation for stipulating R&D and environment-friendly vehicle deployment. It served also to boost environment-friendly vehicle industries.

Compared to the Law for Eco-Friendly Cars R&D (2004), the Law for Low Carbon-Green Growth (2010) aimed to promote development of the national economy by a low carbon-green growth strategy so as to pursue harmonized development of the economy and environment. This law can be characterized as the first law integrating both national and local strategies for greenhouse gas reduction and green growth at the same time.

The Law for Sustainable Transport Development (2011) mentioned the role of national government for EV deployment policy in restructuring national transport system in a sustainable way.

Table 1: Characteristics of two laws related to EV policy and technology

Type	Law for Eco-Friendly Cars R&D (2004)	Law for Low Carbon-Green Growth (2010)
Purposes	<ul style="list-style-type: none"> <li>▪ Original law that mentions the development and distribution of environment-friendly motor vehicles</li> </ul>	<ul style="list-style-type: none"> <li>▪ National strategy for greenhouse gas reduction and green growth</li> </ul>
Major contents	<ul style="list-style-type: none"> <li>▪ Definition of environment-friendly motor vehicles, establishment of annual plans</li> <li>▪ Background of distribution support</li> </ul>	<ul style="list-style-type: none"> <li>▪ Background to national GHG reduction</li> <li>▪ Responsibilities of national and local governments</li> <li>▪ National strategy for green growth</li> </ul>
Roles setting	<ul style="list-style-type: none"> <li>▪ MOIE: EV development</li> <li>▪ MOE: EV deployment</li> <li>▪ MOLIT: EV safety guideline</li> </ul>	<ul style="list-style-type: none"> <li>▪ Composition of Presidential Committee on Green Growth</li> <li>▪ Coordination for controversial issues among ministries</li> </ul>

### 2.2.2 Implementing Organizations and Their Set Roles

In order to implement the EV policy, the Framework Act on Low Carbon, Green Growth instituted their roles among the Ministry of Trade,

Industry and Energy (MOTIE), Ministry of Environment (MOE), and Ministry of Land, Infrastructure and Transport (MOLIT). The Presidential Committee on Green Growth (PCGG) played a key role in mediating controversial

problems raised by the three ministries.

- Ministry of Trade, Industry and Energy:  
EV R&D and Industry Promotion

The MOTIE shall be responsible for technology development and the construction of energy-charging infrastructure for environment-friendly motor vehicles. For this purpose, the MOTIE shall establish the development plans and charging equipment distribution plan. Its major tasks include economic measures for the promotion and distribution of electric vehicles, establishment of the development policy for green car core source technology and core part local production technology, establishment of charging stations and smart grid, safety certificate of electric vehicles and charging equipment, and establishment of the standardized charging equipment policy.

- Ministry of Environment: Deployment of  
EV and Recharging Infrastructure

The MOE shall be responsible for the distribution of environment-friendly motor vehicles. For this purpose, it shall lead the pioneering business for the substantive distribution of environment-friendly motor vehicles. Its major tasks include the setting of the electric vehicle distribution goal, subsidy support, expansion of the distribution of electric vehicle charging equipment, execution of electric vehicle leading city business, green car mandatory purchase and sale ratio adjustment, and establishment of environment-related regulations.

- Ministry of Land, Infrastructure and  
Transport: EV Safety Regulations

The MOLIT shall establish the safety standards for automobiles, focusing on electric vehicles, and suggest the improvement directions for the parking lots necessary for the construction of the charging infrastructure. In January 2009, the MOLIT revised the Guidelines on Vehicle Safety, thereby establishing the safety standard on electric vehicles, such as regenerative braking, high voltage devices and battery.

- Presidential Committee on Green Growth:  
Control Tower of EV Policy

The PCGG was established under the direct control of the President in order to execute "low carbon, green growth" which was presented as the national vision in 2008, as the national task. PCGG had a powerful role to harmonize controversial issues among ministries. In particular, major conflicts have been raised between MOE and MOLTI. For example, MOE wanted to reduce greenhouse gases through providing more electric vehicles as soon as possible. But MOLTI insisted on balancing support between the conventional car industry and EV industry. Also there were conflicts in using governmental subsidy among stakeholders.

PCGG played the role of a control tower to coordinate different opinions among the stakeholders and also checked the processing of EV deployment. After the last presidential election (2012), the Office for Government Policy Coordination took over role of PCGG, but the function of control tower did not work as well compared to PCGG.

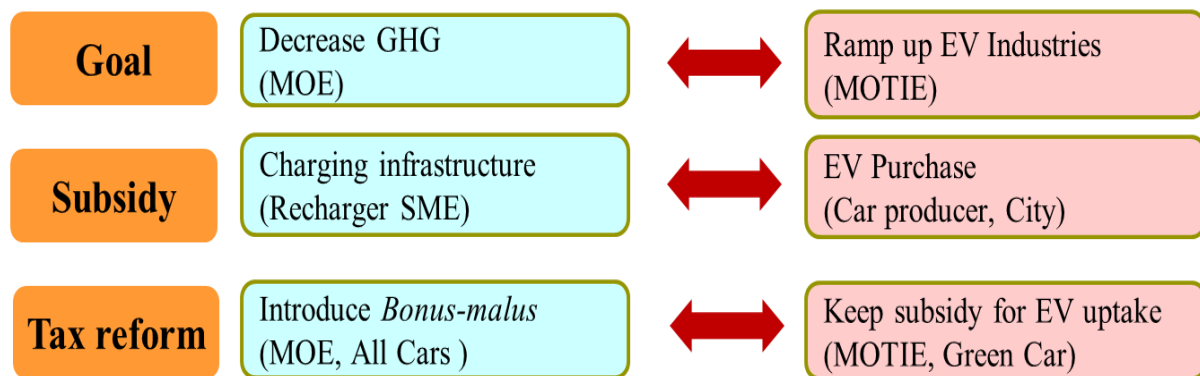


Figure 2: Controversial issues among ministries in Korea

### 2.2.3 EV Deployment Plan

Korean government announced the Green Car Industry Stimulation Plan with intensive preparation over six months. The vision of that plan is for the nation to become one of the world's top-four green car technology players by 2020. To achieve the goal, targets of green car deployment was proposed; 1 million electric vehicles, 405 thousand hybrid vehicles, and 1.8 million clean

diesel vehicles by 2020. However, this plan was modified in 2012 by reducing their targets.

Since 2012, MOE supported an intense deployment of electric vehicles by selecting 10 cities as EV test beds. Central and local governments supported this measure by providing EV purchase subsidies to recover the price gap between EV and ICE vehicles..

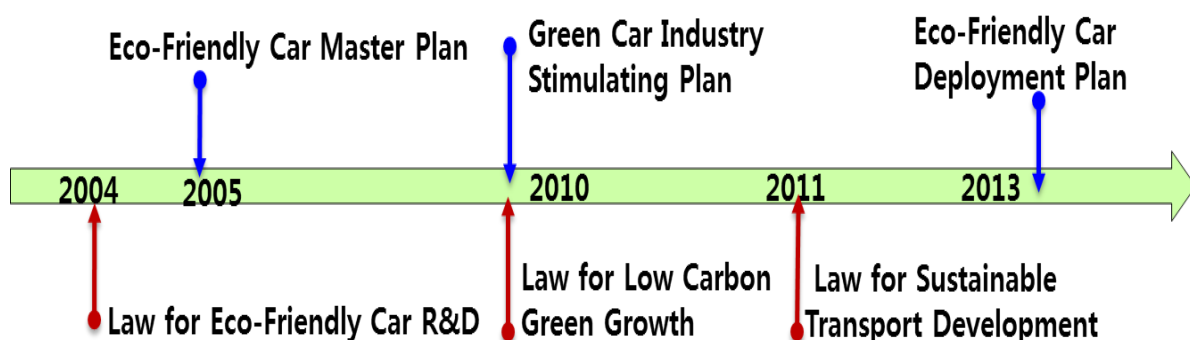


Figure 3: Overviews on legislation and planning process in Korea

## 3. Comparison of EV Policy Framework in Formulation and Implementation

As indicated in the previous section, the Korean

government could be regarded as a nation that well prepared policy framework for EV. In particular, the level of subsidy was relatively higher compared to other countries. But despite the policy framework EVs were not sold to the degree of expectations.

In this section, in order to know the cause of such

weak results, we compared the EV policy framework between EU countries and Korea in terms of policy formulation and implementation process. France, Germany, Netherlands and Norway were selected from among EU countries. Concerning the policy formulation, we have compared the legislation and planning process. And for policy implementing process, we compared incentive measures for deployment of EV.

### 3.1 Germany

In Germany, four ministries have been involved in

decision making for EV policy; BMWi (Federal Ministry of Economics and Technology), BMVBS (Federal Ministry of Transport, Building and Urban Affairs), BMU (Federal Ministry of for the Environment, Nature Conservation and Nuclear Safety) and BMBF (Federal Ministry of Education and Research). Concerning a national EV Plan, a National Development Plan for Electric Mobility (NEPE) was adopted in August 2009. According to this plan, 1 million EVs would be deployed by 2020. To achieve the goal, a national platform for electro mobility (NPE) was established in 2010. The goal was to deliver concrete proposals that help achieve the targets set out in the NEPE.

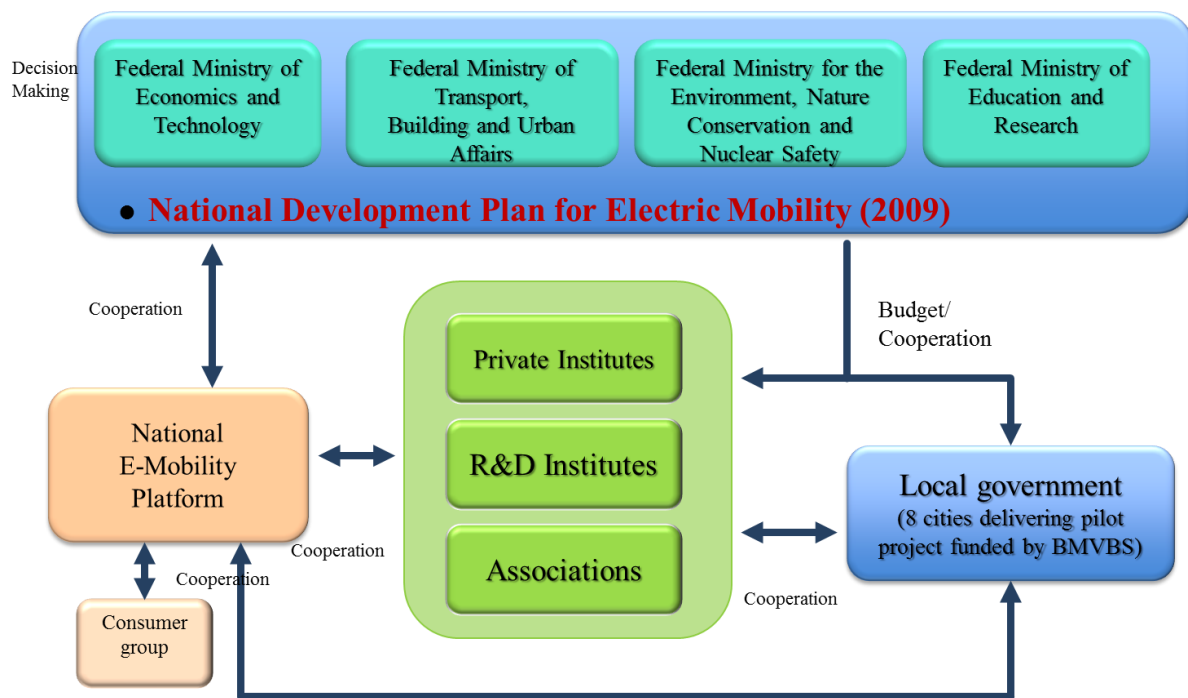


Figure 4: EV policy framework in Germany

In May 2011, the federal government released a national government program based on the NPE's second interim report. It defined solid measures to support R&D activities, EV-system development, educational programs, standardization procedures, and development of infrastructure and electricity

generation. To promote EV sales in the marketplace, economic incentives and tax exemptions were provided for EV buyers and car manufactures.

### 3.2 France

In France, two ministries are leading in decision making for EV policy; Ministry of Ecology, Sustainable Development and Energy and Ministry of Economy, Finances and Industry. An EV committee constituted by several ministries prepared their EV deployment plan. A national plan for EV development was released in 2009 stipulating that French car manufacturers would deploy two million vehicles by 2020 and 4.5 million by 2025. The 2020 target of French EV deployment is twice of that of Germany. public enterprises such as La Poste (French national post), EDF (Électricité de France, French national utility) and 12 local municipalities brought 50,000 vehicles over 5 years to guarantee EV demand for

OEM (car manufactures).

In order to insure the supply of appropriate recharging infrastructure, legislation stimulated that all parking units of newly constructed buildings should be equipped with electricity outlets. Numerous EV demonstration and test projects have also been launched. These projects tested infrastructure and vehicle technologies as well as consumer behavior and business models.

EVs benefit from the highest bonus in an emission based fee and rebate (bonus-malus) system. Until July 2012, this bonus amounted to EUR 5,000 per vehicle at a maximum 20% of the purchase price.

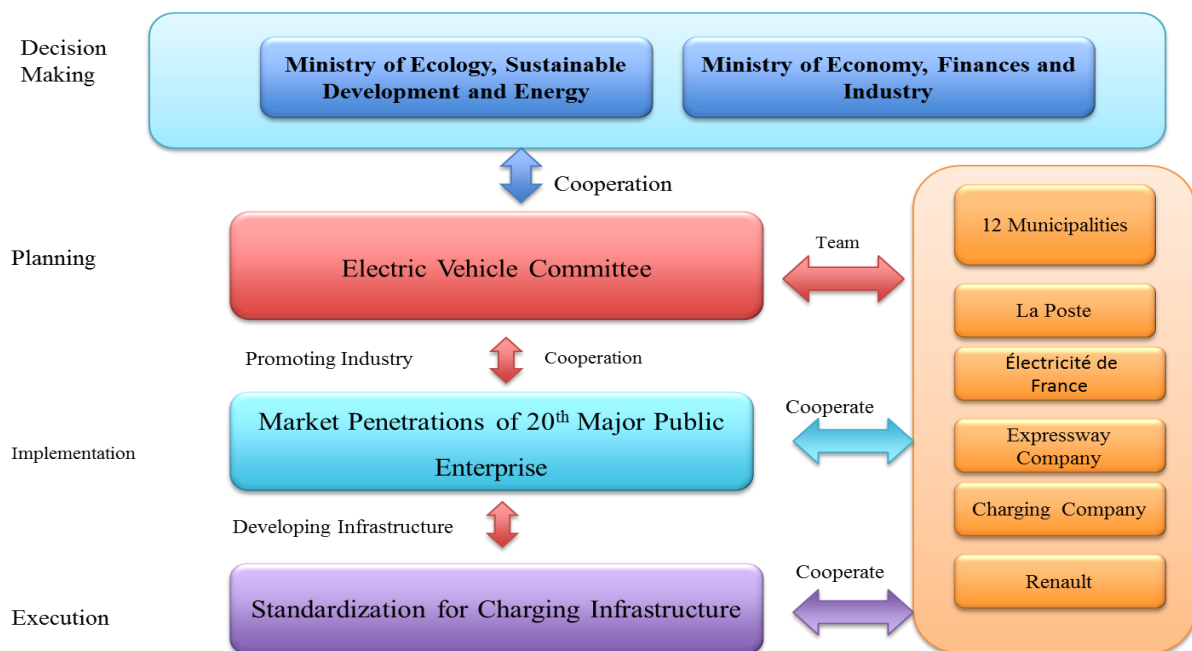


Figure 5: EV policy framework in France

### 3.3 The Netherlands

In the Netherlands, two ministries have been involved in decision making for EV policy; Ministry of Infrastructure and the Environment and Ministry of Economic Affairs. In 2009, the Ministry of Infrastructure and the Environment

announced their action plan and Formula E-Team to support EV deployment. Three main actions of Formula E-Team were defined in the action plan. Their first task was to establish Formula E-Team comprising of individuals from industries essential to deploying EVs. Second is to define and prepare implementation program measures and fiscal

measures; EV charging infrastructure, establish purchasing consortia, and purchase or vehicle tax exemptions. Third is to coordinated and phase development of an EV market to insure that the right actions are taken at the right time while retaining the highest possible level of flexibility.

A supporting policy package was put in place that ranges from measures supporting communication and international collaboration and measures supporting research activities, to the definition of

lead customers (the government) and safety standards. Fiscal measures are provided for EV buyers in the form of tax exemptions: tax exemption from purchase tax on new passenger cars and motorcycles until 2018, tax exemption from road tax until 2018, and tax exemption from income tax surcharge for leased cars until 2014. In addition, fiscal grants were provided for companies to invest in charging stations.

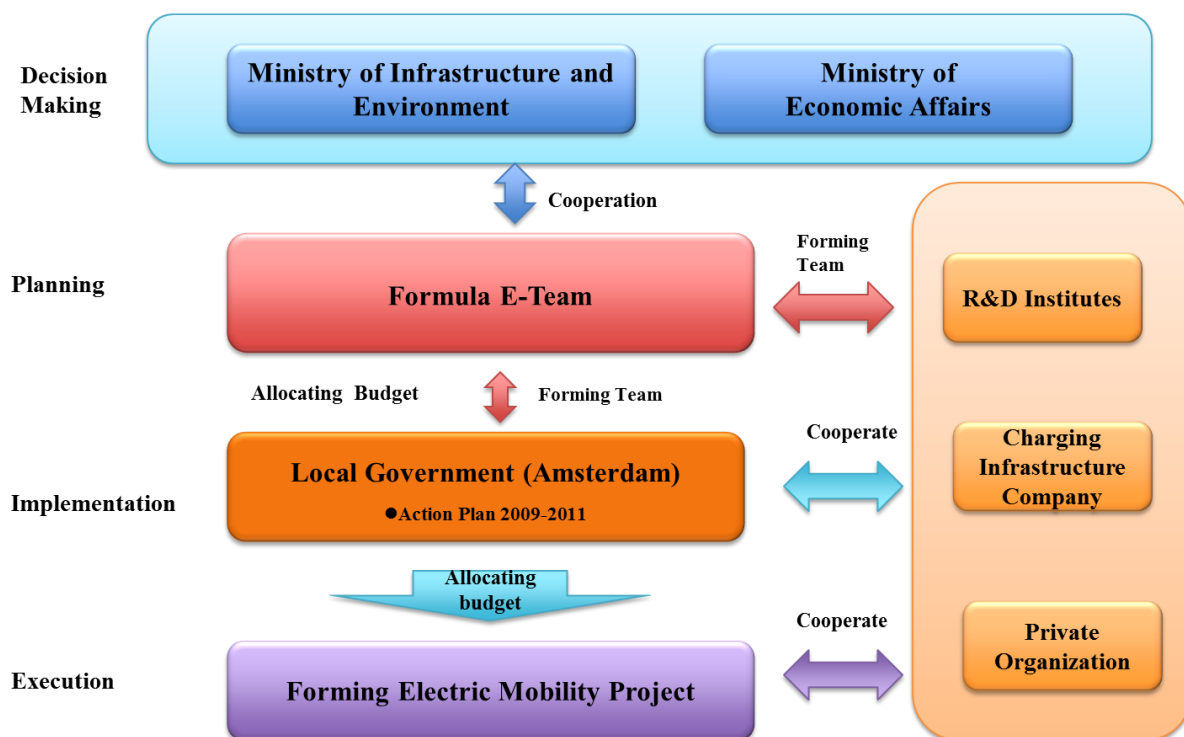


Figure 6: EV policy framework in the Netherlands

### 3.4 Norway

Three ministries have been involved in decision making for EV policy; Ministry of Finance, Ministry of Transport and Communications, and Ministry of Environment.

The Ministry of Transport and Communications prepared the White Paper for Climate Change and the Action Plan for the Electrification of Road

Transport in 2009 by deploying more than 200,000 EVs on Norwegian roads by 2020. To achieve this target, Research Council of Norway, Innovation Norway, Transnova and local cities have participated and cooperated for implementation of the action plan. As a result, Norway attained the worldwide highest EV share of recently sold vehicles. Norway's EV success is certainly due to comparatively strong and comprehensive fiscal

and non-fiscal purchase incentives that have both been stipulated on a national level. These incentives include EVs have access to bus lanes,

benefit from free public parking, and are exempt from 25% VAT, registration taxes, and road and ferry tolls.

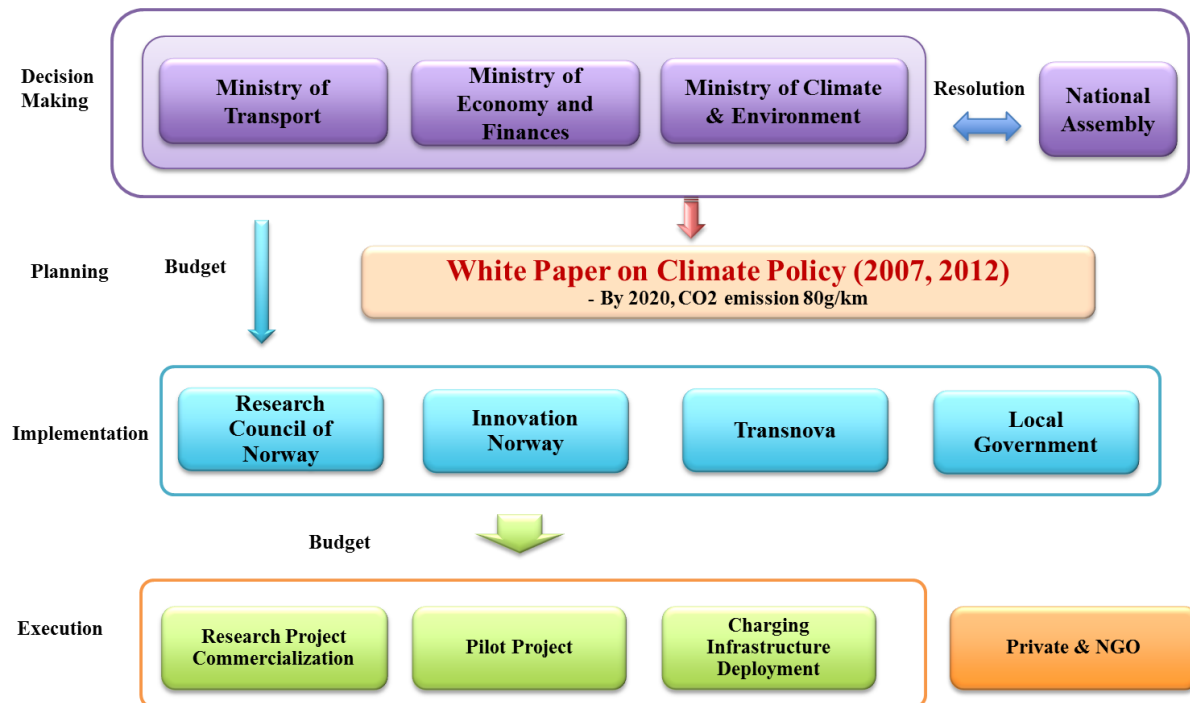


Figure 7: EV policy framework in Norway

#### 4. Lessons from Policy Framework Comparison

Among EU countries, Germany and France have world class car manufactures and EV policy within such countries might be likely influenced by them. Therefore, the target of EV policy was focused more on automobile industry revitalization rather than on the reduction GHG by deploying EVs. On the other hand, Netherlands and Norway did not have EV car manufactures. So, for them it seems to be relatively easier to increase EVs with lower prices thanks to competitions among OEMs of other nations. They did not need to worry about the market share of their own EV models like in the case of Germany or France.

Differences were also found in the approaches to deploying EVs among EU countries. In France and Germany, OEMs or clusters have played key roles to deploy EV by developing EV business models. In general, OEMs were involved in grand pilot projects for developing EV technologies with national R&D programs so they could rely on governmental subsidy to bridge the purchase price gap between ICE cars and EV. On the other hand, in Norway and the Netherlands, local governments have more initiative to deploy EV. For examples, in Norway's capital city of Oslo, EV are permitted EV to run in exclusive bus lanes. In other words, they preferred to increase EV usage utilities (permitted usage of bus lane, exclusive EV parking lots) rather than EV purchase utilities (subsidy or tax exemption).

Table 2: Summary of EV policy framework in select EU countries and Korea

Countries	EV Plan	EV Target (2020) Current no. of EV(2014)	Key Implementing Org. and Major Incentive Measures
France	National Plan for EV & PHEV(2009) <sup>1)</sup>	2 million 29,000 (1.4%)	OEM oriented Bonus-malus
Germany	National Development Plan for Electric Mobility(2009) <sup>2)</sup>	1 million 12,000 (1.2%)	NPE No federal subsidy
Netherlands	National Action Plan(2009) <sup>3)</sup>	200,000	Formula E-Team Subsidy, tax exemptions
Norway	Action Plan for the Electrification of Road Transport (2009)	200,000	Local government oriented Subsidy, tax exemptions
Korea	Green Car Industry Stimulation Plan (2010)	200,000 3,044 (8.7%)	GGC (Ex-PCGG) Subsidy, tax exemptions

\* Remarks : 1) *Le plan véhicules électriques et hybrides*(2009), 2) *Nationaler Entwicklungsplan Elektromobilität der Bundesregierung*(2009), 3) *Plan van aanpak elektrisch rijden*(2009)

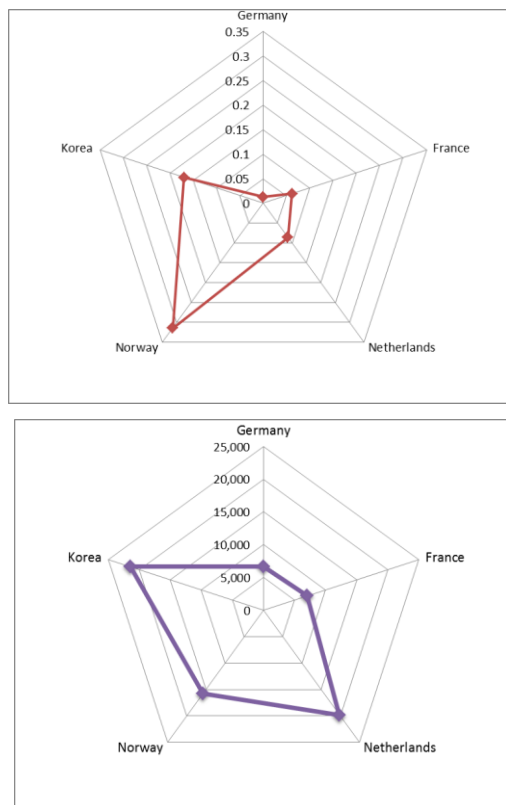


Figure 8: ICE CO2 emissions in transport sector (up)  
and EV deployment levels (down)

In summary, governing structure in EU countries is similar in the sense that not only most federal governments engaged deeply in the decision process, but they also prepared a national plan for the EV deployment. During the implementation

process, most countries formed multi-ministerial organizations under federal governments for assignment of roles among stake-holders (central and local governments, public or private enterprises, etc.). And in many cases national enterprises participated in EV pilot projects to provide more EVs with substantial support from governments in the form of tax exemptions or subsidies.

In general, the policy framework in Korea is relatively similar to that of Germany and France in terms of policy formulation. Normally, the central government took the key role in setting the target of EV deployment and took charge for distribution of subsidies among local government. As a result, it was inevitable to rely on governmental subsidies. But, in the near future the number of EVs sold in the market will drop significantly as subsidies will decreased due of national budgetary restraints. For this reason many experts are worried about an “EV sales cliff” which could result in the face of a lack of subsidies.

In particular, it would be difficult for OEMs to expect to lower vehicle costs by themselves as the

government continues to give subsidies to EV purchasers. Therefore, it would be rational to change EV policy direction from subsidy-oriented policy to businesses model-based policy to we have seen in Norway.

encourage the private sector to provide EVs with lower price and high performance. It would be more effective to increase the utilities for EV usage rather than the utilities for EV purchase, as

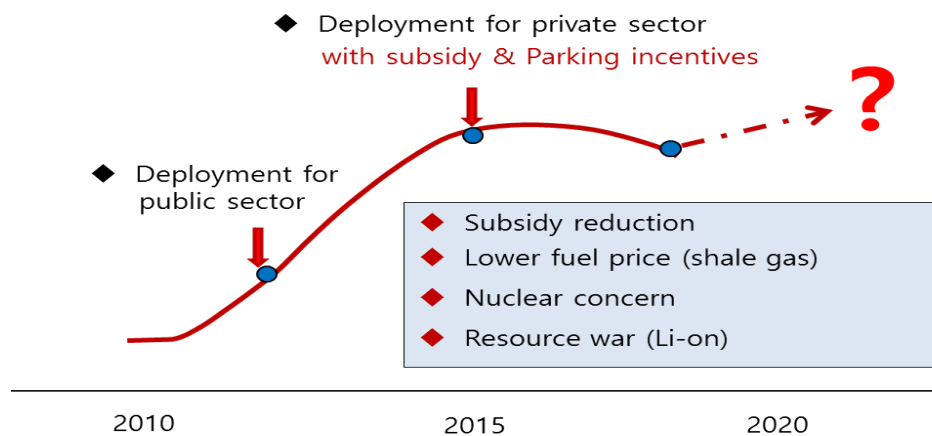


Figure 9: Inflection point of EV policy in Korea

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