EV Research Retrospective
- Ways to Korean EV -

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There have been many researches concerning ways to disseminate electric vehicles(EV). However, messages derived from these studies tend to vary and are, sometimes, in conflicting manner. In order to reconcile these messages, this paper conducts a comprehensive analysis on ways to disseminate EV by utilizing a self-designed framework named 'EV Dissemination Matrix'. The study also attempts to draw out meaningful implications from the matrix in Korean context.

Introduction

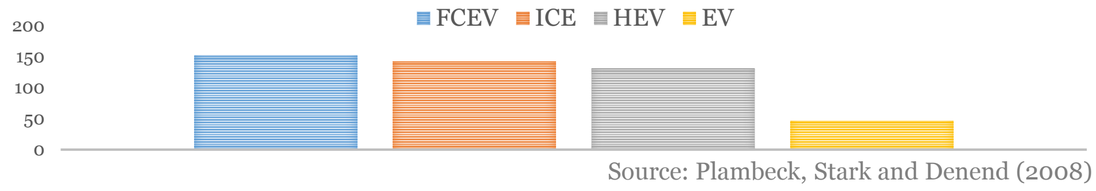
Based on Low-Carbon Green Growth Framework Acts, Korea aims for 30% emissions reduction from BAU by 2020, and transport sector bears the highest reduction rates. Considering the fact that EV has the lowest well-to-wheel emission among available technologies, dissemination of EV is a must for Korea.

Reduction Goals from BAU by Sector in 2020 (Unit: %)

	Industry	Transport	Building	Agriculture, Forest, Fishery	Waste	Public	Total
Reduction Rates	18.2	34.3	26.9	5.2	12.3	25	30

Source: Korea Ministry of Environment

Well-to-Wheel Emission of Transportation Technologies (Unit: g/km)



Source: Plambeck, Stark and Denend (2008)

Research Questions

- What are the key factors of EV dissemination, and how can these factors be incorporated to form a framework for EV dissemination?
- What are the implications from the EV dissemination framework in Korean context?

Contributions

This study provides an overview of meaningful findings of studies concerning the dissemination of EV

The newly introduced 'EV Dissemination Matrix' has methodological contribution as a comprehensive analyzing tool for technology dissemination

Literature Review

Transformational framework (Johnson and Suskewicz, 2009)

- Enabling Technology
- Innovative Business Model
- Delicate Market Adoption Strategy
- Favorable Government Policy

Transformational framework suggests that new technology itself does not eventually create the changes and thus systems designed for the adoption of new technology has to be constructed separately.

Energy Technology Innovation System (Gallagher et al., 2009)

- Research
- Development
- Demonstration
- Market Formation
- Diffusion
- Actors
- Networks
- Institutions

Gallagher et al. points out the importance of considering the interrelationship and interdependence of relevant factors when designing a system for energy technology innovation

Critical Factors Affecting EV Dissemination

Consumer Attitude	Kurani et al. (1996), Ewing and Sarigollu (2000), Lieven et al. (2011)
Price	Ozaki and Sevastyanova (2011)
Infrastructure	Morrow et al. (2008), Markel (2010)

Barriers of EV Dissemination (Lim et al., 2014)

- Range Anxiety of EV
- Resale Anxiety of EV

Various Policies for EV Dissemination (Gallagher and Muehlegger, 2011)

- Income Tax Credit
- Sales Tax Exemption
- Vehicle Emissions Test Exemption
- Registration or Excise Tax Exemption
- Single-Occupancy HOV Lane Access
- State Government Purchasing Requirement
- Parking Fee Reduction or Exemptions

Methodology

EV Dissemination Matrix

Key Factors of EV Dissemination \ Market Players	Firm Strategy	Government Policy
Consumer Preference	What value do consumers want from EV ?	How should government promote EV ?
Product Price	How important is price when it comes to EV ?	Is subsidy a panacea for EV dissemination?
Infrastructure	How should firms provide charging infrastructure?	Is charging infrastructure the game changer ?

EV dissemination matrix incorporates key factors of EV dissemination, which are 'consumer preference', 'product price' and 'infrastructure' with market players of EV, who are firms and government. Purpose of each cell is expressed in the form of questionnaire. For each cell, appropriate cases and studies are chosen and analyzed to draw out solutions and implications.

Results

Answers to the above questionnaires in EV dissemination matrix are drawn out and supported by previous studies as follows.

Key Factors of EV Dissemination \ Market Players	Firm Strategy	Government Policy
Consumer Preference	Fuel cost reduction is consumers' core interest	Providing EV experience is one of the most effective promotion methods
	Accenture(2011), Carley et al.(2013), Razak et al.(2014), Gobczynski and Leroux(2011)	Frank et al.(2011), Bühler et al.(2011), Franke and Krems(2013), Pearre et al.(2011), Cocron et al.(2011)
Product Price	Product value can be more important than low price	Subsidy is definitely not the panacea for EV dissemination
	Klayman(2014), Van Den Steen(2013), Ingram(2014), Chaika(2014)	ICCT (2014), Gallagher and Muehlegger(2011), Accenture(2011), Helveston et al.(2014)
Infrastructure	Providing residential infrastructure, rather than public charging, can be more effective	Other infrastructural support can be more important than charging infrastructure
	Coulomb Technologies(2013), Accenture(2011), Smart et al.(2012), Speidel et al.(2014), Spoelstra(2014)	Gallagher and Muehlegger(2011), Accenture(2011), Stichting Natuure en Milieu and CMMN(2009)

Conclusions

As the matrix suggests, there is no silver bullet for EV dissemination.

A comprehensive approach which incorporates firms, governments and consumers is essential.

Implications in Korean Context

Current EV dissemination policies and strategies in Korea are in somewhat conflicting manner with the findings in this study. For example, Korea provides the highest level of EV purchasing subsidies in the world and tend to focus on public charging infrastructure. For a successful dissemination, Korea should

Reduce EV purchasing subsidy to expand other EV-related policies and implement EV-experiencing promotion

Focus on residential infrastructure and other infrastructural supports which satisfy the needs of Korean drivers (ex. HOV lane access, free parking, etc.)

References: Plambeck, Stark and Denend(2008), *Johnson and Suskewicz(2009), Gallagher et al.(2009),* Kurani et al. (1996), Ewing and Sarigollu(2000), Lieven et al. (2011), Ozaki and Sevastyanova(2011), Morrow et al.(2008), Markel(2010), *Gallagher et al.(2011), Lim et al.(2014),* Accenture(2011), Carley et al.(2013), Razak et al.(2014), Gobczynski and Leroux(2011), Frank et al.(2011), Bühler et al.(2011), Franke and Krems(2013), Pearre et al.(2011), Cocron et al.(2011), Klayman(2014), Van Den Steen(2013), Ingram(2014), Chaika(2014), ICCT(2014), ICCT (2014), Gallagher and Muehlegger.(2011), Helveston et al.(2014), Coulomb Technologies(2013), Smart et al.(2012), Speidel et al.(2014), Spoelstra(2014), Stichting Natuure en Milieu and CMMN(2009)