

Success factors for hybrid and electric vehicle deployment

IA-HEV outlook 2013

Today's governmental objectives worldwide include reducing dependency on oil and reducing CO₂ emissions for all energy use, including the transport sector. The automotive industry recognizes that some degree of electrification of the vehicle propulsion system becomes necessary to meet CO₂ emission targets, and the hybrid and electric vehicle landscape is rapidly changing. Hybrids have become a mass-market product, the first plug-in hybrids and battery electric vehicles are available, and an infrastructure to charge electric vehicle batteries is under construction. Electric mobility is in an early stage, and today's R&D focuses on increasing the comfort of its users and on expanding its application. Increasing battery capacity and reducing battery cost are important short-term objectives. Two current R&D examples for the mid-term are developing wireless charging of vehicle batteries, and experimenting with catenaries for electric trucks. IEA's Implementing Agreement on Hybrid and Electric Vehicles (IA-HEV) mission in the e-mobility domain is to supply policy makers and decision takers with objective information. Aiming to contribute to the transition towards a sustainable transport system, this year's IA-HEV outlook provides success factors for further deployment of e-mobility.

Eighteen countries collaborate in IA-HEV (see the box on this page) and from their e-mobility experience to date four aspects emerge that appear to be highly relevant for successful deployment. The roles of good timing, involving all stakeholders, taking away uncertainties, and making electric vehicles financially attractive in fostering e-mobility deployment are highlighted below.

Good timing

Measures should fit the actual circumstances. One example is the timing of subsidies. Subsidies for electric vehicle purchase may help to start the market, but they are only effective if products are available that meet customer's needs. When small two-seater battery electric cars were available on the market two decades ago, subsidies were not able to create a mass market because these cars were too different from conventional vehicles. Although it would be wise to judge electric vehicles on their own merits, people tend to compare them with the conventional vehicles that they already know. Today, now electric cars (such as the plug-in hybrid electric Chevrolet Volt, and the pure battery vehicles Mitsubishi iMiEV and Nissan Leaf) that are much

**The IEA Implementing Agreement for co-operation on
Hybrid and Electric Vehicle Technologies and Programmes (IA-HEV)**

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The current eighteen IA-HEV member countries are Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, the Republic of Korea, the Netherlands, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. The Executive Committee of the Agreement consists of people working for governmental bodies and research institutes, who are appointed by the governments of the IA-HEV member countries. This outlook is a synthesis of inputs from the IA-HEV Executive Committee members.

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closer to conventional cars are available, purchase subsidies can have a larger impact. Good timing is related to all aspects of electric vehicle deployment. When electric vehicles are available, also a charging infrastructure must be in place, garages must be able to service these vehicles, and people must understand how electric vehicles can meet their needs. All aspects should develop in parallel. It should be recognized that today electric mobility is at different stages of development in different countries. This means that a measure that works in one country may not work in another. Adaptation to local circumstances is crucial.

Involve all stakeholders

The IA-HEV Task 08 report 'Deployment strategies for hybrid, electric and alternative fuel vehicles' (available at www.ieahev.org/tasks/deployment-strategies-task-8/) demonstrated that all relevant stakeholders must be involved in the deployment of a new vehicle technology. Failing to do so will lead to failure of the deployment. Today, national governments, industry, and research institutes are increasingly collaborating to advance e-mobility. The format of public-private partnerships is one option to reach the critical mass of budget and resources. Countries and regions where e-mobility is advancing quickly may serve as examples of stakeholder involvement. Looking at those cases will show how other parties such as fleet owners, municipalities, utilities, and consumer organizations are involved as well in making clean mobility a success. Participation and exchanges in international groups such as IA-HEV facilitate access to this kind of information and experiences.

Take away uncertainties

When a new product is introduced, financial, psychological and practical uncertainties have to be eliminated to make the mass market accept the new product. Consumers are not always willing to pay for social benefits that do not seem to directly benefit themselves. Low CO₂ emitting vehicles may mitigate climate change, but as long as they are more expensive than conventional vehicles governments need to put measures in place to make vehicle manufacturers confident to develop and supply these vehicles, and to offer a perspective that these vehicles will be economical to use. In parallel these measures need to convince other stakeholders to set up a refuelling or charging infrastructure. Once the new vehicles enter the market, uncertainties about resale value and the limited availability of models have to be overcome during the early stage of market deployment, as we currently see for electric cars. Issues such as range anxiety may be overcome in the long term by increasing battery capacity. In the short term objectively informing people about the possibilities of a car and not overselling its capacities could work, as is shown today in Norway where people buy an electric car because it suits their needs and not because of its favourable environmental performance. Last but not least, letting people try electric vehicles themselves is a powerful instrument to take away uncertainties, and in parallel it offers the opportunity to discover the enjoyable driving characteristics of electric propulsion.

Make electric vehicles financially attractive

One can be willing to mitigate climate change or to improve air quality in urban areas, when buying a vehicle its price has usually a more important impact on the final choice. Putting a system in place that makes electric vehicles financially attractive can be a powerful instrument to enhance market deployment. A wide range of examples exists, and two of them are the success of electric vehicle subsidies in Spain, and the favourable tax conditions in the Netherlands that

make this small country the largest European market for the Opel Ampera plug-in hybrid electric car.

Table 1 presents an overview of national financial incentives for e-mobility in IA-HEV member countries. The reader may already have a global picture of the results of these incentives on electric vehicle deployment in the different countries. The IA-HEV annual report (available at www.ieahev.org/news/annual-reports/) can be consulted for detailed information on the situation in IA-HEV member countries, as well as for general information on selected non-member countries. The table reveals that all countries have a different approach. One could ask if it is right that every country goes its own way, especially for neighbours or for countries that collaborate in economic frameworks. It might be possible to identify best practices and harmonize measures between countries, for effective support of clean e-mobility.

Table 1 Electric mobility implementation plans, and financial incentives on a national level related to electric mobility, in IA-HEV member countries.

	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Ireland	Italy	Republic of Korea	Netherlands	Portugal	Spain	Sweden	Switzerland	Turkey	United Kingdom	USA
National e-mobility implementation plan in place	●	●	●				●			●	●	●	●					
Sales tax level depends on vehicle CO ₂ emission level	●					●		●	●					●	●		●	
Reduced sales tax for energy efficient vehicles	●			●														
Reduced sales tax for low greenhouse gas emitting vehicles					●													
Tax reduction or tax exemption for electric vehicle purchase				●			●	●		●	●	●				●	●	●
Reduced annual tax for low CO ₂ emitting vehicles				●	●	●								●				
No annual (road/circulation) tax on battery electric vehicles							●				●	●						
Reduced income tax for private use of company electric vehicles		●									●						●	
Additional tax on fossil fuels	●			●														
Subsidy/grant for electric vehicle purchase	●							●		●	●		●				●	
Subsidy for installing charging points						●							●				●	●

Besides financial measures to stimulate the actual use of electric vehicles such as shown in table 1, other options to make e-mobility financially attractive exist. National governments may support car and/or truck manufacturers to develop electric vehicles so they can be made available on the market at competitive costs for the user. Also sharing the costs and benefits between all stakeholders in public-private partnerships can be an effective option to make the use of electric vehicles financially attractive.

Impact of measures

Good timing, involving all stakeholders, taking away uncertainties, and making electric vehicles financially attractive are all contributing to the success of e-mobility. The actual level of deployment depends on a wide range of other factors as well, such as governmental priorities, population density and spread, availability of (renewable and clean) electricity, and the economic situation, to name just a few. Hybrid and electric vehicles sales could be used as a possible indicator for the success of e-mobility. Looking at sales shares instead of vehicle numbers enables to compare markets (countries) of different sizes. Figure 1 presents an overview of car sales in 2012 for a number of IA-HEV member countries. This figure shows that hybrids have become a mass-market product, plug-in hybrid electric vehicles are establishing a foothold in the market, and pure electric vehicles are still a niche product.

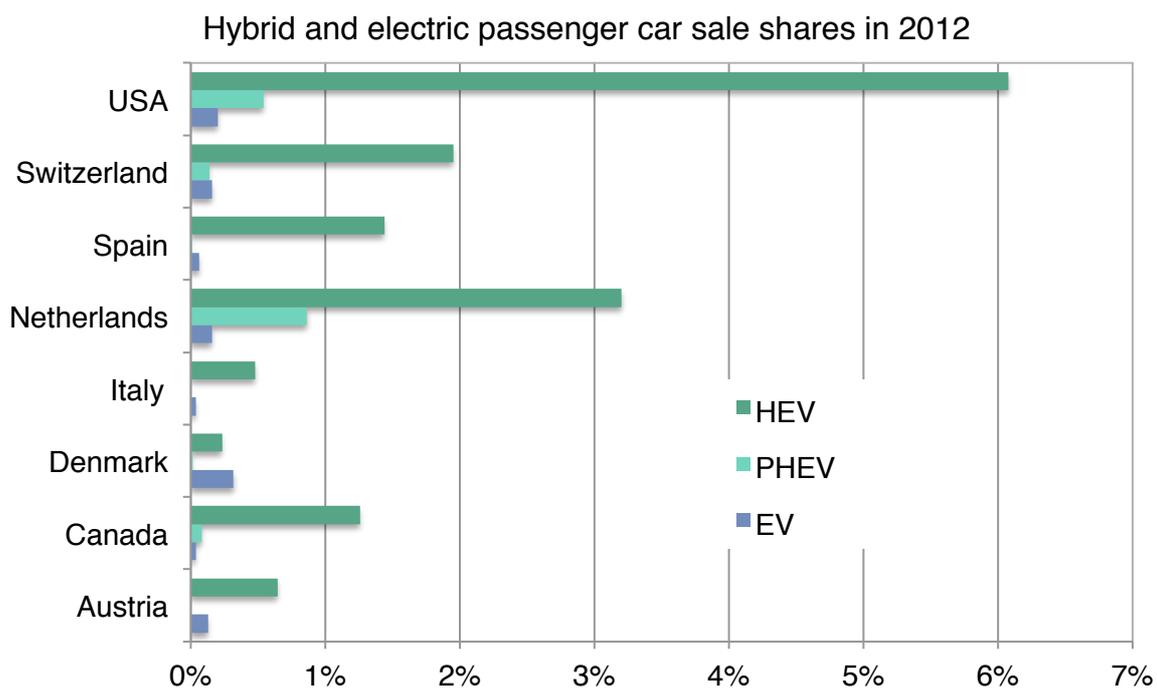


Fig. 1 Hybrid electric vehicle (HEV), plug-in hybrid electric vehicle (PHEV), and pure electric vehicle (EV) passenger car sale shares in 2012 for a number of IA-HEV member countries. PHEVs are not registered separately in Austria and Italy, and are included in the HEV category for these two countries. PHEV sales in Denmark and Spain were small and barely show in this graph.

Outlook

Using hybrid and electric vehicles can reduce oil dependency and mitigate CO₂ emissions, especially when high shares of renewable electricity are used. Good timing, involving all stakeholders, taking away uncertainties, and making electric vehicles financially attractive are necessary and powerful tools to foster the deployment of electric mobility.