

### 5.1.3 Public Policies Supporting EVs in the World

**Author :** *Virginie Boutueil, LVMT (City Mobility Transport Lab), École des Ponts ParisTech*

The development of the electric vehicle market is still heavily influenced by public policies. This section will present the range of public policies supporting electric vehicles on a global scale and give you tools to describe and categorize these policies. It will also describe the public policies supporting electric vehicles which are the most-commonly adopted in the world. And it lays the foundations for the analysis of the impact of these public policies on the evolution of electric vehicle sales.

#### Categorizing public policies supporting EVs

To tackle the analysis of public policies supporting electric vehicles and their characterization, the first question to distinguish one policy from another is : who is implementing this policy ? We will especially focus on the governmental level.

**Who ?** Various governmental levels choose to implement support policies but the nature and conditions of the policies implemented by these governmental agencies usually depend on the expected upsides for these agencies. We can distinguish policies implemented at a national level from those implemented at a lower level. Among the main governmental agencies responsible for implementing public policies supporting electric vehicles, the most local is usually the town level. We can usually identify at least one intermediate governmental level between the town and state levels among the agencies responsible for implementing support policies. It can be the federated states in the United States or India or the provinces in China or Canada. In Europe, we can identify a supranational level which is very active in drawing up public policies supporting electric vehicles, the European Union and Commission. The intermediate level between the state and the town can be the regions in France, the Lander in Germany, the provinces in Spain, etc.

**What ?** A second question before analyzing the public policies supporting electric vehicles is : what, or in other words, which element in the system of electric mobility will the policy influence ? We usually distinguish two types of policies. Some target supply, the design, manufacturing or distribution of the vehicle, battery, charging infrastructure or services associated to the vehicle. Others target demand, whether the policy targets the purchase or usage of the vehicle by the customer.

**How ?** The third question to ask to distinguish public policies supporting electric vehicles is how. We can then look at the indicative, normative or incentive nature of the policy in question. Indicative public policies can, for instance, set governmental goals for the penetration of electric vehicles in the national fleet. They can send signals to the market or set a course but are neither a standard nor an incentive. We can also look at the monetary or non-monetary nature of the policy in question. Monetary public policies supporting electric vehicles, also called financial policies, can

be fiscal measures, taxes, tax exemptions, tax credits, subsidies, direct investments, and so on.

### **Some examples of public policies supporting EVs**

We are now going to study four public policies among the most commonly implemented to support electric vehicles. Two of them target supply and the other two, demand.

**R&D support** The first type of support public policy which targets supply and is frequently implemented in the world, supports research and development activities. Research and development support can target electric vehicles, batteries, infrastructures or, to a lesser extent, any associated services.

Public policies supporting research and development activities of electric vehicles often come from the national level of government since the consequences on employment in the industry or the gross domestic product are usually evaluated at a national level. There are exceptions where local levels, the Chinese provinces or towns, for instance, can implement local policies supporting research and development. In Europe, R&D from European car manufacturers also benefits from support at the European level via programs such as the European Green Cars Initiative from 2008.

These public policies supporting R&D activities are usually incentive and monetary. They can be tax benefits, subsidies to car manufacturers or equipment manufacturers, or direct investments in the industry from the government.

Quite costly for public finances, these measures aim at stimulating, throughout the initial stages of the rise of electric car production, the diversification of vehicle supply, the decrease of the unit cost for battery production, and performance gains.

**Regulatory goals for EV sales by car manufacturers** Another type of public policies supporting electric vehicles which targets supply and is growing on a global scale, is the implementation of regulatory goals for the sales of electric vehicles by car manufacturers. These policies are aimed at car manufacturers which achieve a set volume of sales on the considered territory and require that part of their sales be electric vehicles.

Policies like these exist in the United States and in Canada and are under consideration in China. California was a pioneer in implementing these measures. It started a first wave of regulatory sales objectives, called mandates, in 1990 which came into effect in the late 1990s. Supply and demand being too low, the Californian policy was amended five times to push back the deadline. Today, the minimum objective set for major manufacturers is that 2% of sales made on the territory in 2018 be electric vehicles and 16% in 2025. Following California, nine other American states implemented similar mandates. In the East, Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Rhode Island and Vermont, and in the West, Oregon. In 2016, the province of Québec, Canada, also set an ambitious mandate for manufacturers, 3.4% of sales in electric vehicles in 2016 and 15.5% in 2025.

These public policies are almost normative and non-monetary. However, as many normative measures, to motivate the concerned party to follow them they use significant fines in case the goals are not reached.

Another variation on this type of policies can be implemented in addition to or instead of the mandates for electric vehicle sales. Within the framework of regulations setting standard levels of emissions for new vehicles sold by a manufacturer on a territory, such as the CAFE standards in the United States, for Corporate Average Fuel Economy, the authorities may grant bonuses to car manufacturers which sell electric cars so they can more easily reach the average mandate set on their total vehicle sales.

**EV purchase subsidies** If we now look at public policies supporting electric vehicles which target demand, one of the most commonly-implemented measures on an international scale are purchase subsidies.

The authorities assume part of the purchase cost of the vehicle which befalls the customer.

These incentives are usually implemented at a national level. Purchase subsidies of electric vehicles, called "environmental bonuses" in French, favor the buyers of individual cars and light commercial vehicles in 15 countries of the European Union as well as in China, Japan, etc. They sometimes come from lower governmental levels in addition to or instead of national measures. California implemented a system of subsidies as did three Canadian provinces, Québec, Ontario and British Columbia. Some local authorities in France also did.

Some of these subsidy systems only target private individuals or companies, for instance. Others have a limited volume and only help a preset number of buyers. And others offer a limited subsidy amount per vehicle.

One variation on the purchase subsidy systems are tax credits. In the United States, the federal government implemented this system. Another variation is an exemption from sales tax, either the VAT or import taxes. Norway implemented similar measures.

Quite costly for public finances, these systems aim at supporting the rise of the electric vehicle market only during its initial stages.

**Road access and traffic privileges** Another type of public policies supporting electric vehicles which targets demand is related to access and driving privileges.

These measures usually stem from the local governments. One example of access privilege granted to electric vehicle users is the exemption from access restrictions to city centers such as the ones in place in the low-emission zones in London, or in some Italian and German cities. In the cities which implemented road space rationing based on license plate numbers, as in China, electric vehicles can be exempted from this rationing. Regarding driving privileges which may apply to electric vehicles, access to bus lanes is one of them, as is in place in some Chinese, German and British cities. They can also access high-occupancy vehicle lanes which are reserved for public transportation and carpooling. In Norway, where access to bus lanes was implemented in Oslo, the success of electric cars has led the government to restrict this privilege by only allowing in bus lanes electric vehicles used to carpool. This

example illustrates the limits of access and driving privileges which apply to electric vehicles in case of traffic congestion.

### **What impacts are to be expected from such policies ?**

Analyzing the impacts of these policies on the electric vehicle market requires some contextualization. The decisions made by the authorities are heavily influenced by context.

At the national level, the issues taken into account will relate to the industries, the energy generation and distribution system, the available raw materials, any commitment regarding greenhouse gas emissions.

At a more local level, the decisions will take into account local issues such as local pollution, employment, the conditions of traffic congestion on the infrastructure, etc.

Attempts to evaluate impacts face several types of obstacles. First, public support policies are rarely adopted in a vacuum. They often go together as the authorities try to take simultaneous actions on supply and demand, to make purchase and usage easier on a national and more local level.

The behavioral mechanisms of the concerned parties, the manufacturers and buyers, also complicate the evaluation of the impact of public policies on the electric vehicle market. These impacts can be the anticipation of public policies, inertia, psychological thresholds, and so on.

Lastly, all other things being equal, public policies will have different impacts on the territory depending on the maturity level of the electric vehicle ecosystem. The mandates for electric vehicle sales set for the manufacturers will not be as effective whether supply is low or diversified.

### **Conclusion**

We have highlighted that the range of public policies implemented in the world to support electric vehicles was wide and that there were many ways to combine these policies. The decisions made by the authorities in terms of public support policies usually reflect concerns tied to the local or national context.

Evaluating the impact of public policies on the electric vehicle market is complicated as public policies go together, and are sensitive to the behavior of the concerned parties and to the maturity level of the local ecosystems. This type of evaluation is in its infancy but reports such as the International Energy Agency's, "Global EV Outlook 2017", highlight correlations between certain major evolutions of the public policies supporting electric vehicles and of the market.