**Estonia Case**

Most of countries official priorities are the reduction of negative environmental of energy use ,the promotion of resource efficiency together with sustainable consumption and production patternsare, reduction in CO2 and other pollutant. Developing their electric mobility Estonia is a good example which trying through electric mobility development achieving its goals . Estonia may not be the first country that comes to mind when you think of electric cars, but the small Eastern European nation was actually the first country in the world to install a [nationwide network of electric vehicle fast chargers](http://cleantechnica.com/2013/02/23/estonia-is-1st-country-in-the-world-to-install-nationwide-system-of-fast-chargers-for-evs/) .By the beginning of 2013, 163 fast chargers have been installed around the country for the comfort of EV users. This report intends to provide a fact-based perspective on the status and current developments of the electrical car charging stations in Estonia.

**Background**

The Kyoto Protocol was ratified by the Estonian Parliament in September 2002. According to the Kyoto Protocol, Estonia had to reduce its greenhouse gases emissions by 8 % in comparison with its 1990 level between 2008 and 2012. Estonia is participating in two Kyoto flexible mechanisms – international emissions trading and joint implementation. In March 2011, the Government of the Republic of Estonia concluded a contract with Mitsubishi Corporation for the sale of AAUs in the amount of 10 million AAUs to start the Estonian electrical mobility programme. The programme consists of three parts: 507 Mitsubishi iMiev electric cars were commissioned by the Ministry of Social Affairs as an example, the Ministry of Economic Affairs and Communications developed a support system for natural and legal persons for acquisition of electric cars, and infrastructure for charging electric cars was created to cover the whole country. Distribution of the purchase grant and the administration of the quick charging network is organised by Foundation KredEx.

**Electrical vehicle in Estonia**

As Demo experience , the Ministry of Social Affairs took 507 Mitsubishi i-MiEV electric cars into use in 2011, That's the largest single order Mitsubishi has ever received for its little car.Estonia electrical vehicle market is very small due to Estonia’s small population which is 1.34 million, but look like most other markets Nissan Leaf is the favorite electrical car for individual buyer in Estonia .

As can be seen , 69% of the market was occupied by Nissan Leaf with 95 sales. Two small vehicles—the Mia Electric and the Mitsubishi i-MiEV—sold 22 and 20 cars, respectively. And there was one Tesla Model S sold in Estonia in 2013.

Estonia has become the second country after Norway in the world in terms of the share of EVs. While there is one electric car registered per each 1,000 cars in Estonia, the respective figure for Norway is four. Estonia is followed by the Netherlands with 0.6 electric cars registered per 1,000 cars.

**Electrical Vehicle Charging infrastructure**

Estonia has become the world’s first country to launch a nationwide fast-charging network for electric vehicles.

The EV fast-charging network is operated by a national foundation KredEx, the chargers were produced and installed by a technology company ABB, the innovative payment solution was designed by NOW Innovations!, and customer support is provided by a security company G4S.

ABB’s fast charging station They conform to the CHAdeMO standard, and each features a 50 kW DC and a 22 kW AC outlet.



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The car’s battery can be charged up to 90% in less than 30 minutes and – depending on the model – you will be able to drive for up to 140 km.

Fast-charging points are distributed as follows:

* All roads with dense traffic are covered
* The distance between quick charging points is 40-60 km Suitable and frequently visited places are considered as locations for quick charging stations, e.g. petrol stations, cafes, shops, etc.
* Ports servicing international private transport and local travel ports
* All settlements with over 5000 inhabitants
* In towns, charging points are built in locations where people move anyway – for example, next to shopping centres, petrol stations, post offices, bank buildings, parking lots, etc.



**Electrical vehicle Charging Payment Support**

Fast-charging network users are offered three service packages to choose from:

1- Combined package: user use 1-2 times fast charging service . Monthly fee :10 EURO , pay per charge: 2.5 EURO

2- Flex package: user use 1-2 times fast charging service . Monthly fee :0 EURO , pay per charge: 2.5 EURO

3-Volume Package: user use more than 1-2 times fast charging service . Monthly fee :30 EURO , pay per charge: 1.2 EURO after monthly 150kwh charge is exceeded

Payments can be made using an authorized card (RFID card) or mobile phone. The uniform payment solution can encourage the growth in number of EVs users.



**Electrical vehicle user adoption**

The EV rental project is part of Estonia’s electric mobility program ELMO. The main goal of the rental project is to offer the population the opportunity to drive an EV and thereby reduce consumer uncertainties about adopting a new technology. 18 Nissan Leafs and 6 Mitsubishi iMiEVs are available for rental from outlets in Tallinn and Tartu. These rental points, located in busy public locations such as shopping malls, business centers and central bus/train stations, are equipped with direct current (DC) fast charging points that allow the charging time to be as short as 15-30 minutes.   
the rental just cost 8-10 Euros to rent an EV in Tallinn and user just need to use a Smartphone application or call a number to unlock a car.

**Government Incentives**

Besides having a public fast-charging network, Estonia promotes a quicker deployment of EVs by providing direct support to both private persons and companies, with the amount reaching up to 18,000 Euros of the all-electric car’s purchasing price. Also, new EV owners can apply for a support of 1,000 Euros for setting up a charging system at their home.

**Problems and Solutions**

Estonia as first country in the world with national wide fast charging stations is facing some problems in developing its elector mobility system , some of the main problems are as follow:

**1- Generating electricity from Oil shale**

Oil shale is a strategic energy resource in Estonia which constitute about 4% of Estonia’s gross domestic product. In 2012, 70% of oil shale was used to generate electricity which accounts for gets around 85% of Estonia’s total electricity production. Electricity generation plants which fires oil shale have negative impact on environment. Seems Estonia’s electro mobility program is not a perfect plan if the aim is to reduce carbon emission. Estonia’s government should has long term plan for switching from oil shale to some other clean energy resources.

2- **Low number of non government worker electrical car user**

As of December of 2015 , 1188 plug in electric vehicle were registered in Estonia , which include 507 i-MiEVs which Mitsubishi gave to Estonian government as part of Carbon credits exchange contract. The first 507 i-MiEVs were given to social workers of ministry of social affairs as a pilot test, as can be seen Estonian normal citizens electrical car just owns around 57% of the total electrical cars. Governments should provide more flexible incentive package to encourage more people purchase and use electrical cars.

**3- Estonia’s sever climate**

The main challenge for charging process is harsh winter in Estonia which temperature can reach lower than -10 degree centigrade which can influence on the operation of the charging stations and charging speed .

**4- Existing different charging standards in European commission**

There are many different standards used worldwide for electric car charging. Estonian charging network uses CHAdeMO standard, but European Commission proposed Combo2 standard as European Union common standard for chargers. This standard is not used very widely in the world. If that happens, the charging networks in many countries must rebuild the chargers to support Combo2.

**5- lack of academic research on electro mobility system**

Although Estonia is the first country in the world with national wide fast charging system, but the number of published academic research is very small. For having a developed electro mobility system one of the important factors is encourage and motivate academic researcher to analysis user adoption and behavior , market situation and government policy to find new opportunities in electro mobility system.

**Discussion**

Estonia is a role model of electrical car charging stations development for other European countries even some states of united states. Estonia carbon credits exchange contract with Mitsubishi co. entails not only the purchase of cars but also the development of a nationwide network of charging stations and it is good pathway for small European countries with limited budget which has ratified Kyoto protocol to develop their electro mobility system and as a result decrease reliance on fossil energy and also reduction in CO2 emission.