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Learning from an electromobility living lab: Experiences from the Estonian ELMO programme

Liina Joller*, Urmas Varblane

Faculty of Economics and Business Administration, University of Tartu, Narva Rd. 4, Tartu, Estonia

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ABSTRACT

The article provides insights into the setting up of the Estonian electromobility pilot programme (ELMO) and evaluates its first outcomes. The uniqueness of the Estonian case lies in its nationwide scale and extremely fast implementation. In the middle of 2010 the government initiated the ELMO programme as part of the larger project for using excess carbon emission quotas for emission reduction projects. The programme also contained the building of the first nationwide electric car quick charging network in the world. This paper focuses on the underlying objectives at different spatial levels and the setting up of the feedback mechanisms according to the living lab framework. In order to provide recommendations for effective policy measures for fostering the diffusion of radical innovations like electromobility, a holistic view proves to be essential. The case study aims to offer overview of experiences that either could be copied or should be avoided when planning and executing electromobility pilot projects in follower countries.

1. Introduction

Road transport generates about one-fifth of the EU's CO_2 emissions, with passenger cars responsible for around 12%.[1] This makes it the second most important source of greenhouse gases. Although there have been significant improvements over recent years in vehicle technology, these have not been enough to neutralise the effect of increases in road traffic intensity. Electric cars, as an alternative to traditional internal combustion engine cars, have been discussed and promoted in several countries. See, for example, Liu and Kokko (2013) about China, Propfe et al. (2013) for Germany, Feng and Figliozzi (2013) about USA, etc. It is expected that wider diffusion of electric cars would bring along environmental improvements in the transport sector, as well as provide a solution to alleviate oil demand and in the case of several countries, decrease dependence on imported energy (European Commission, 2011). In the scenario analysis by Roland Berger Strategy Consultants, it has been suggested that taking into consideration the market trends in the automotive industry, in the most positive case, electric vehicles will account for around 10% of new vehicle sales by 2025 (Kalmbach et al., 2011). When it comes to absolute numbers then naturally larger countries also form the top of the electric car sales rankings (International Energy Agency, 2013). However, smaller countries like Estonia, Norway and the Netherlands are placed on top by the penetration ratio of electric cars among the total registered passenger car fleet.

The aim of the paper is to provide insights into the unique experiment of introducing electric cars by the Estonian government. In March 2011 the Estonian government approved the selling of 10 million unused emission allowance units (Assigned Amount Units—AAUs)[2] to the Japanese conglomerate Mitsubishi Corporation. With support of this transaction, during 2012–2013 the Estonian nationwide electric vehicles' charging network was built, the electric vehicle purchase grant scheme for private buyers was launched in order to foster the introduction of electric cars, and a demonstration fleet of 507 Mitsubishi i-MiEV electric cars was distributed for free to social workers around Estonia. As a result, during a few months the electric cars were spread across the whole country.

The flexibility, speed of implementation of novel solutions and the feasible nationwide coverage of a small country make Estonia a perfect testing ground. Although the implementation started without thorough prior planning, these actions and actors

* Corresponding author.
E-mail addresses: liina.joller@ut.ee (L. Joller), urmas.varblane@ut.ee (U. Varblane).

[1] European Environment Agency (EEA) [http://www.eea.europa.eu/themes/transport].

[2] Assigned Amount Unit (AAU) is a tradable 'Kyoto unit', known also as 'carbon credit' or 'CO_2 quota', representing an allowance to emit greenhouse gases comprising one metric tonne of carbon dioxide equivalents.

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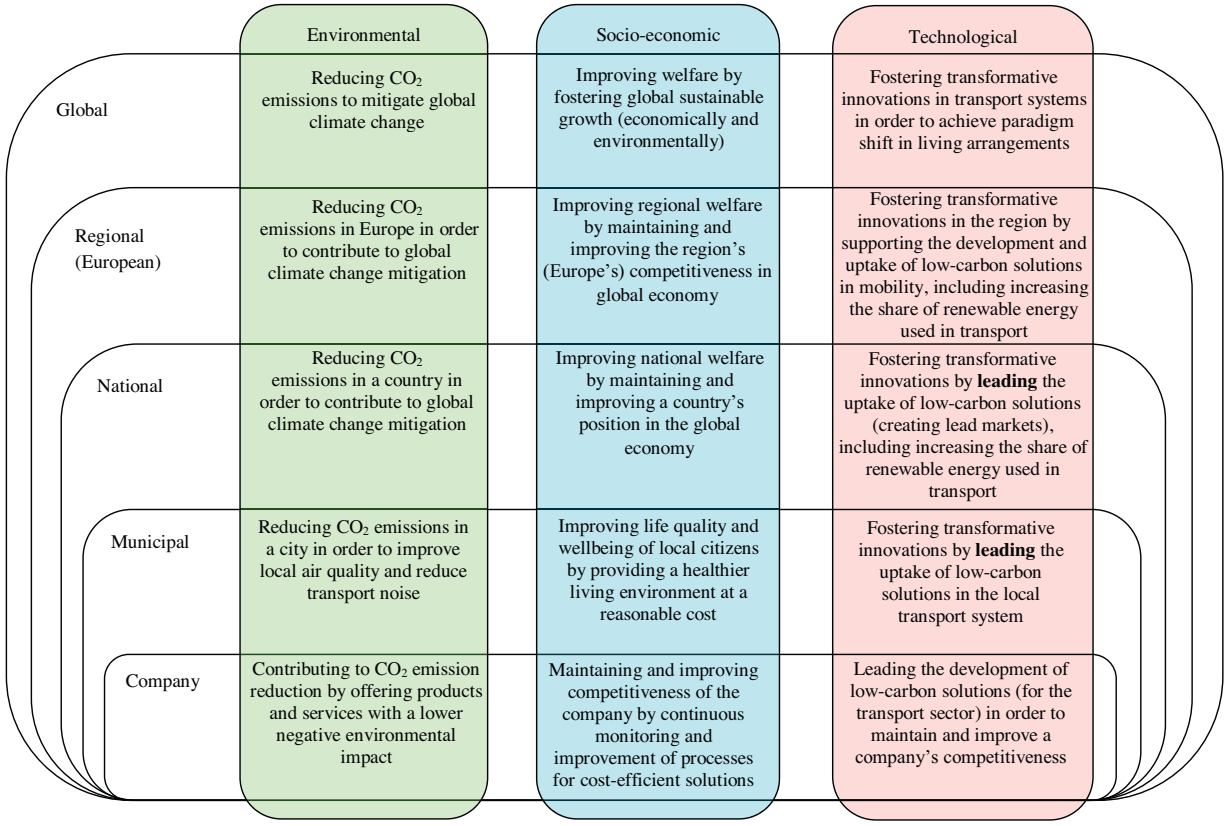

Fig. 1. Matrix of objectives for fostering transformative environmental innovations, the case of transport in Europe. (authors' own compilation).

combined to create a system which allows analysing this country-level experiment in the living lab framework.

The roots of the Estonian electromobility programme, as often in the case of national CO_2 reduction policy actions, date back to the Kyoto Protocol[3] that entered into force in 2005, and the global agreement on creating the emissions trading systems (ETSs).[4] The situation in Estonia was unusual and extraordinary. Based on emissions in 1990, Estonia was assigned 196 million AAUs (e.g. 39 million AAUs annually)[5] and took responsibility to reduce greenhouse gas emissions by 8% by 2012 compared to the base year 1990. Due to the major structural changes in national economy, accrued renewable energy production methods, and several energy efficiency projects implemented in Estonia since 1990, only around 56% of it was actually used by existing production units. The excess amount (around 85 million AAUs) was available for trading according to the Green Investment Scheme (GIS), a financing mechanism where financial resources that come from trading the country's CO_2 quotas under the Kyoto Protocol are channelled into environmental projects that help to cut CO_2 and other greenhouse gas emissions. When it comes to selecting the investment targets, each country sets its own priorities. At the time when the programme was initiated, projects falling under the scope of the Directive 2003/87/EC, lasting until the end of 2012 and in compliance with the Estonian National Allocation Plan for 2008–2012 (NAP)[6] were authorised to use funding from excess AAUs.

The amount of excess AAUs made Estonia one of the biggest tenderers on the market, where, due to oversupply of about 10–20 times,[7] buyers usually set the terms. As the project to which the income from the AAUs will be directed is chosen by the buyer (which may be a country or a corporation), the negotiation process goes in parallel with the development of project proposals by the tenderer's ministries. For Mitsubishi, an electric car manufacturer, it was naturally a strategic decision to choose this deal in the market conditions of vast oversupply of AAU quotas.

The electromobility project was already the fourth deal that Estonia made with Mitsubishi Corporation. The revenue from previous AAU sales to Mitsubishi had been targeted at renovation of the state and local government buildings for the purpose of energy conservation. Estonia has also used excess AAUs for several other projects ranging from supporting the market entry of renewable energy technologies to new electric trams in the capital city, Tallinn, and biogas buses in Tartu. However, the electromobility programme is one that stands out due to its cross-national nature.

For Estonia, the second rationale behind choosing the deal with Mitsubishi Corporation and launching the electromobility programme was derived from the EU Directive[8] about reducing the

[3] Kyoto Protocol [http://unfccc.int/key_documents/kyoto_protocol/items/6445.php].

[4] The EU Emissions Trading System (EU ETS) [http://ec.europa.eu/clima/policies/ets/index_en.htm].

[5] United Nations Framework Convention on Climate Change.Report of the review of the initial report of Estonia. 14 November 2007. [http://unfccc.int/resource/docs/2007/irr/est.pdf].

[6] National Allocation Plan for 2008–2012. [http://www.envir.ee/orb.aw/class=-file/action=preview/id=1174608/NAP_2008_2012.pdf].

[7] Anne Sulling in webcast in 2010 [http://valitsus.ee/et/uudised/videod/Eksperdi+kommentaar/-/2/#1002].

[8] EU Directive 2003/87/EC [http://ec.europa.eu/energy/renewables/targets_en.htm] and [http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=DD:15:07:32003L0087:ET:PDF].