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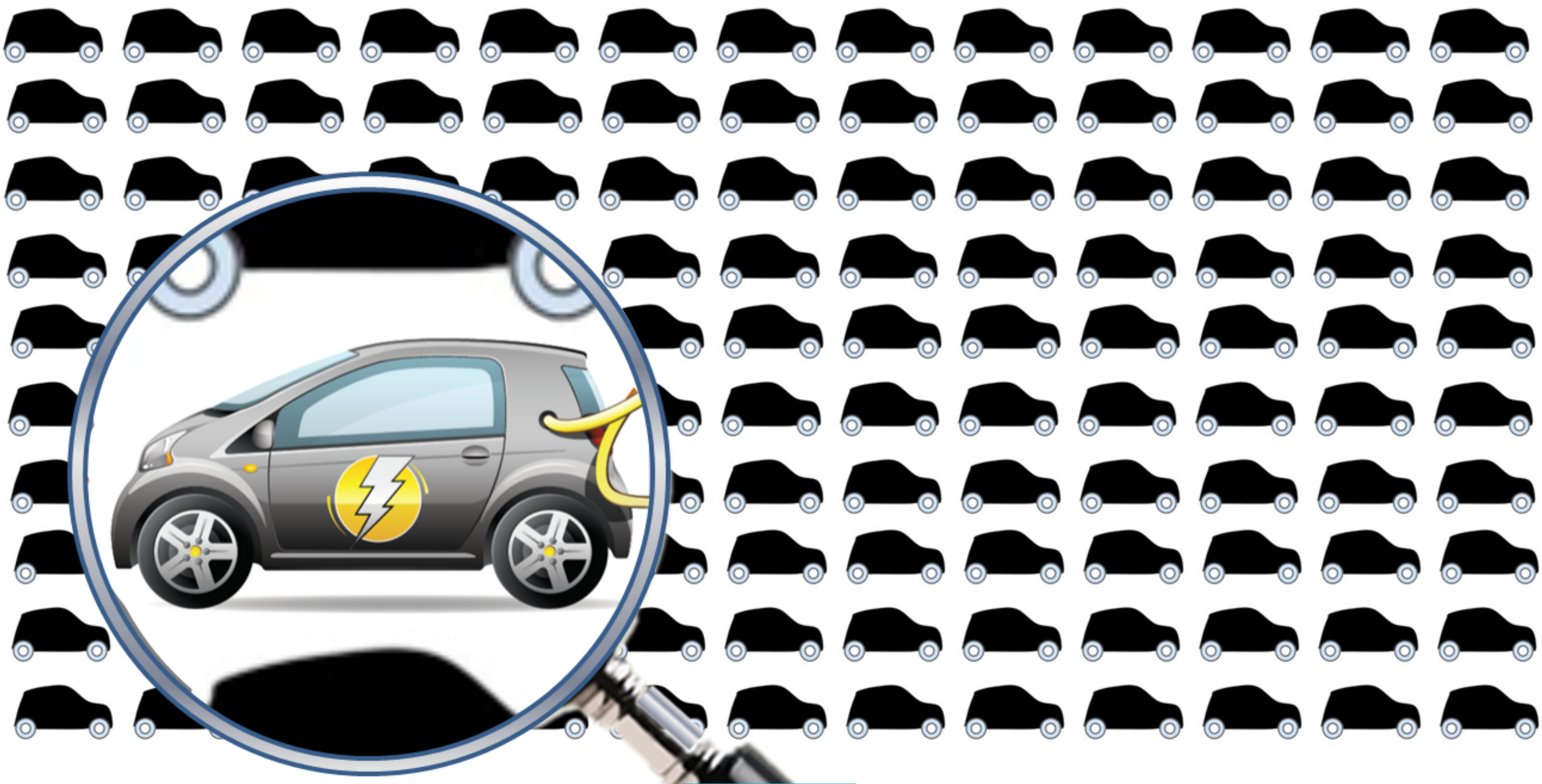
Electric vehicles in the EU from 2010 to 2014 - is full scale commercialisation near?

Christian Thiel
Jette Krause
Panagiota Dilara



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Contact information
Christian Thiel
Address: Joint Research Centre, Via Enrico Fermi 2749, TP 441, I-21027 Ispra (VA), Italy
E-mail: christian.thiel@ec.europa.eu
Tel.: +39 0332 78 9207
Fax: +39 0332 78 5236

http://iet.jrc.ec.europa.eu/
http://www.jrc.ec.europa.eu/

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Abstract

As a means of reducing the climate impact of transport as well as local air pollution, electrification of the road vehicle fleet is a much-discussed option. In the past years, many electric vehicle models have been introduced to the EU market. On the basis of the monitoring databases for the implementation of Regulation EC No 443/2009 and Regulation EU No 510/2011 we have analysed EV deployment in the EU in the past five years. We find that since 2010 the deployment of EV in the EU has gained momentum. The number of models offered as well as the size segment coverage of EV passenger cars has increased significantly from 2010 to 2014. The number of registrations and also the EV share, albeit still small compared to the total vehicle market, has increased steadily in the EU. This trend continued in the first half of 2015. The demand for EV has been fostered by various incentive schemes in different EU member states (MS). The numbers of EV registrations and market shares in the MS align well with the level of financial support for EV buyers. This seems to indicate that policies remain to be needed in order to overcome market barriers for the EV deployment at this moment in time. When comparing EV deployment in Europe to other regions of the world, we find that EV market shares in Europe are more or less on par with those in the US and Japan. From an industrial policy perspective, it is encouraging that the share of EV manufactured in the EU has increased from roughly 30% in 2011 to approximately 65% in 2014. As an overall conclusion we can state that indeed the EU seems to currently witness a transition from testing and experimenting with EV towards full scale EV commercialisation. Nevertheless, the beginning market deployment is still dependent on support policies and vulnerable to changes in support. For the coming years it will be important to accompany the EV market deployment with carefully designed policy measures that should gradually be phased out when EV become a mainstream option.

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1. Introduction

Many scenarios of a future low-carbon energy and transport system suggest that electric vehicles (EV) will have an important role to play in achieving ambitious CO2 reduction targets. EV, replacing conventionally propelled cars and vans, can also reduce air pollution in cities and increase energy security by reducing fossil oil based fuel dependence. Previous studies have analysed various aspects of the deployment of EV, such as their CO2 emissions and total ownership costs in comparison to conventional cars (Thiel et al., 2010), their role in an urban context (Perujo et al., 2011), their potential impact on road transport decarbonisation (Pasaoglu et al., 2012), their cost effectiveness to meet stricter CO2 targets for cars beyond 2020 (Thiel et al., 2014), their potential impacts on the grid (Pasaoglu et al., 2013; De Gennaro et al., 2014), options for vehicle to grid applications (Loisel et al., 2014; De Gennaro et al., 2015), as well as attitudes of car drivers towards electric vehicles (Thiel et al., 2012).
In December 2009, at a time when the first electric vehicles with lithium ion batteries became commercially available in Europe, JRC/SETIS[1] organised a stakeholder workshop in Brussels, bringing together representatives from the automotive industry (OEMs and suppliers), power utilities, and European Commission, to discuss "the current state of the art of the electrification of road transport, its anticipated development and market potential as well as to explore potential actions". (JRC/SETIS, 2010). One of the results of the follow-up of the workshop was the development of an agreed bandwidth of likely future battery electric (BEV) and plug-in hybrid electric (PHEV) sales in Europe (figure 1).

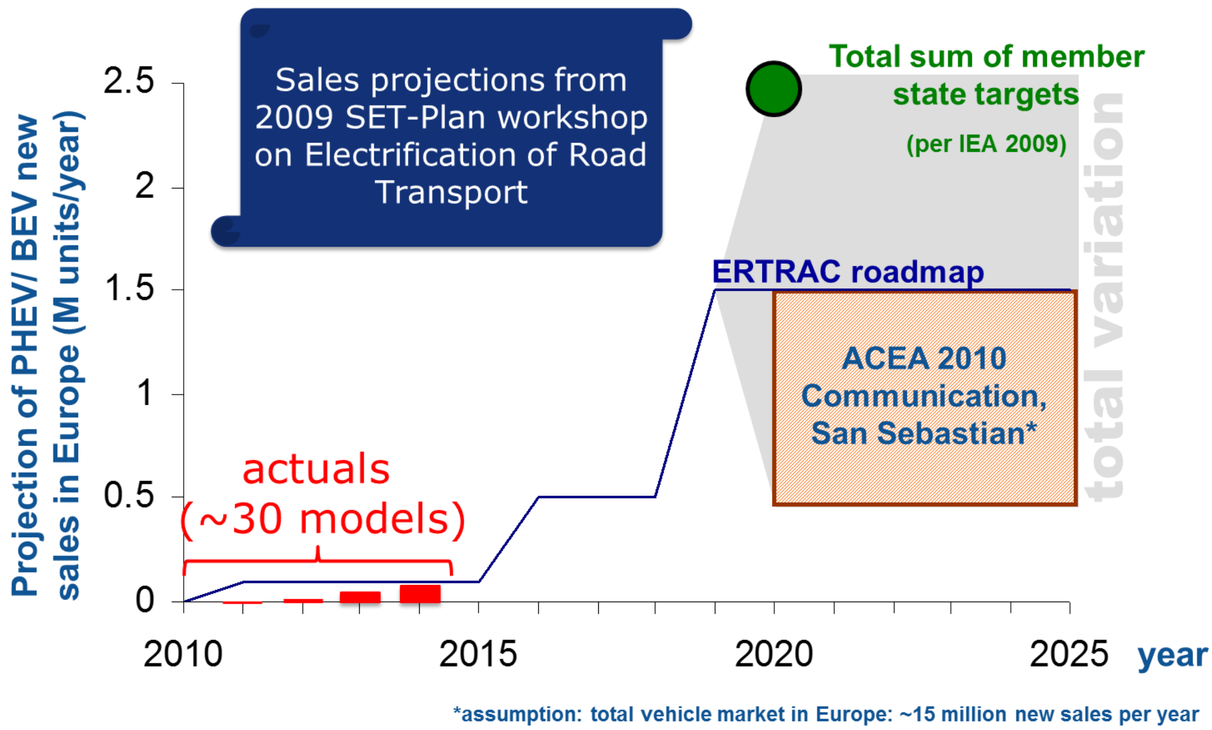

Figure 1: Range of sales projection for BEV/ PHEV in Europe for 2010-2025 from a 2009 stakeholder workshop

[1] SETIS: Strategic Energy Technologies Information System (see for more details: setis.ec.europa.eu)

As it was rather difficult to agree on sales figures, the resulting range was relatively large and was mainly derived from other available sector or member state vision statements. Figure 1 shows the sales glide-path and bandwidth that was developed in 2010, alongside with actual EU registrations of PHEV and BEV from 2010 to 2014, resulting from the analysis that we describe in this report. The increasing electric vehicle registrations in the EU during the past five years provide a good basis for a first analysis of some underlying trends. They also allow deriving first lessons from these initial experiences with regards to future policy design targeting electric vehicles. These are the aims of this report.

On the one hand, figure 1 reveals that actual electric vehicle registrations to date are slightly below expectations. The number of models offered and the recent increase in registrations could still lead to future sales within the projected bandwidth for 2020-2025. On the other hand, the recently published Communication of the European Commission on the "Energy Union Package", in full recognition of the advantages that electric vehicles can offer, highlights that "Europe needs to speed up electrification of its car fleet and other means of transport and become a leader in electro-mobility" (European Commission, 2015).

In the current report we analyse in detail the evolution of electric vehicle registrations in the EU from 2010 to 2014. This report covers BEV, PHEV, range extended electric vehicles (REV), and fuel cell electric vehicles (FCEV)[2]. Whenever we use the term 'electric vehicles' (EV) in this report it refers to all these variants combined (BEV, PHEV, REV, FCEV). We study the development of models offered over time, analyse which EV configurations were successful in which vehicle segments, and examine which member states had high EV registrations and registration shares and why. Lastly, we try to detect signals that indicate what the future may hold for EV in the EU. To our knowledge the present report provides the most comprehensive analysis of recent EV deployment in the EU to date. Besides contributing to the wider policy debate on the role of and challenges for electric vehicles, we expect that this report can also be instrumental to inform the elaboration of national policy frameworks by member states that become mandatory from 2017 onwards in the context of the implementation of the Directive on the deployment of alternative fuels infrastructure (EU, 2014).

The remainder of the report is organised as follows: Chapter 2 describes the data that was used and its processing, Chapter 3 shows and discusses the results, and Chapter 4 draws conclusions on the work presented. As we feel that a transparent approach is required for the kind of analysis that we have undertaken, we present the detailed tables of our processed data in the Annex to this report. The processing of the data required many steps, including manual data manipulation. Although the processed data underwent thorough quality checks and reviews, the attentive reader may find minor mistakes in the resulting tables. The authors would be grateful to receive proposals for corrections, should the need for these arise.

[2] Our analysis is limited to M1 (passenger cars) and N1 (light commercial vehicles) category vehicles as given in EEC, 1970. That means that electric vehicles which are not registered as either M1 or N1 are not part of the analysis in the present report. A popular electric vehicle that falls outside of the scope of this report is the Renault Twizy. As a matter of fact, in the CO_2 monitoring database we found 4 "Twizy" that apparently have been registered as M1 cars (see Annex).

2. Data availability and data processing

2.1. Databases

As source for the raw data, we used the CO_2 monitoring databases for the years 2010 to 2014[3] (EEA, 2015). These databases are a very rich source of information and are publicly available to any interested person. The CO_2 monitoring system was set up for verifying compliance with Regulation (EC) No 443/2009 for M1 and Regulation (EU) No 510/2011 for N1 vehicles. Each year all EU Member States are required to report the car (M1) and van (N1) sales of the previous year in their territory to the system, hosted by the European Environment Agency on behalf of the European Commission.
The database includes 26 fields (see Table 1) that need to be accurately filled with correct data, taken from the Certificate of Conformity (CoC) or the Type Approval (TA) documentation for each particular vehicle.

Table 1: Field names and definitions for the CO2 monitoring database (based on EEA, 2015)

Field name	Field Definition	Example
ID	ID	4555
MS	Member state	AT
MP	Manufacturer pooling	DAIMLER AG
Mh	Manufacturer harmonised	DAIMLER AG
MAN	Manufacturer name OEM declaration	DAIMLER AG
MMS	Manufacturer name as in MS registry	DAIMLER AG
TAN	Type approval number	e1*2007/46*0540*04
T	Type	451 E
Va	Variant	43E4Y0
Ve	Version	ZYAAA201
Mk	Make	SMART
Cn	Commercial name	Smart EV
Ct	Category of the vehicle type approved	M1
r	Total new registrations	1
e (g/km)	Specific CO_2 Emissions	0
m (kg)	Mass	1000
w (mm)	Wheel Base	1867

[3] For our analysis we used the final databases for 2010 to 2013 and the provisional data for 2014 (status April 2015), as the final version was not yet available when we performed our analysis. Here, we describe the process for M1 vehicles. N1 vehicles are covered in chapter 3.6.

Field name	Field Definition	Example
at1 (mm)	Axle width steering axle	1283
at2 (mm)	Axle width other axle	1363
Ft	Fuel type	Electric
Fm	Fuel mode	M
ec (cm3)	Engine capacity	
ep (KW)	Engine power	35
z (Wh/km)	Electric energy consumption	151
IT	Innovative technology or group of innovative technologies	
Er (g/km)	Emissions reduction through innovative technologies	

A series of quality controls is put in place in order to assure that the data received are the best possible, with iterations between member states, car manufacturers and the Commission. However, the final databases for the years 2010 to 2013 and the provisional for 2014 contain a number of mistakes, omissions and misreporting which make the databases hard to use for the purposes of our analysis on electric vehicles, unless one takes great care in correcting them. Still the Commission cannot officially correct data within the system even if evidence exists that they are wrong.
The situation is particularly troubling for new electric powertrains, in view of the novelty of the vehicle types and the limitations of the monitoring system. Electric vehicles can come with complex powertrain combinations which cannot easily be distinguished within the monitoring databases in their current form.
Some vehicle types are also mislabelled. An example of the type of mistakes and challenges encountered is given below in Table 2. It can be seen, e.g., that an Opel Ampera was mislabelled as petrol monofuel vehicle, instead of petrol-electric which would be correct, since the Ampera is a PHEV. A common challenge for distinguishing hybrid electric vehicles without capability to re-charge from the grid (HEV) from PHEV variants is the lack of further disaggregation of the fuel type in the monitoring databases. Examples of this are the Toyota Prius and Prius PHEV, both labelled as petrol-electric, although for the conventional Prius no grid charging is possible. Including the HEV which had no fuel type, the number of our suggested modifications for HEV reached 19,633 vehicles in the 2013 database. In the following analysis HEV are not taken into account, since they can largely be considered as derivatives from mainly internal combustion engine propelled vehicles that do not support maximising electric driving, the focus of this report.

Table 2: Example of cells from the 2013 CO2 monitoring database for passenger cars. In red the incorrect or ambiguous assignments of Fuel Types and Fuel Modes within the database. In blue, our suggested powertrain assignments.

Mk	Cn	e (g/km)	Ft	Fm	Pt	ec (cm3)	ep (KW)	z (Wh/km)
OPEL	AMPERA	27	Petrol	M	PHEV	1398	63	130
TOYOTA	PRIUS	89	Petrol-Electric	M	HEV	1798	73	
TOYOTA	PRIUS PHEV	49	Petrol-Electric	M	PHEV	1798	73	52

Since the registration data contained in the CO2 monitoring databases are very valuable to understand vehicle market developments in Europe, there are frequent attempts to use them in order to draw conclusions about the deployment of various alternative vehicles in the EU. All teams who take this database as the basis of their analysis have to first undergo a tedious and time consuming correction. Usually, the corrected databases are not put under public scrutiny, but remain within the particular teams who did the work, while other teams repeat similar corrections on their own.

An example of this are the databases which were produced as part of the post-analysis for the EEA by EMISIA (EEA, 2014), by Ricardo et al. (2014) as part of the SR4 study on cost curves for DG-CLIMA in the Commission, by the International Council on Clean Transportation (ICCT, 2014) as part of their Pocketbook project, and by Transport and Environment (T&E, 2015) as part of their yearly analysis of sales in Europe.

2.2. Correction methodology and data processing

Part of the problem with correctly identifying specific powertrain types in the CO2 monitoring database lies with the fact that neither the Fuel Type (Ft) nor Fuel mode (Fm) fields were designed explicitly for identifying new powertrains. In fact it is still not easy to find the correct description of electrified powertrains even in the CoCs or TA documents.

In order to correct issues like the ones above, we have included a new column in the database that identifies correctly the type of powertrain, named "Pt". In this new field Pt we have identified hybrid (HEV) and electric vehicles (PHEV, BEV, REV, FCEV). For the differentiation of the powertrains we relied on the widely used definitions as for example documented in SAE (2014) or IEA-IA-HEV (2015).

To correctly identify hybrid and electric vehicles, first several corrections needed to be made in the Ft column. This involved checking the make (Mk) and commercial name (Cn) of vehicles and identifying mistakes in the Ft assigned in the original database. These corrections were based on our knowledge about models available on the market. Common mistakes also included the misspelling of the commercial name or even of the make of the vehicle, so attention was required in order to select all possible name variations. In total, more than 28,000 corrections were made in the field Ft in the 2013 database.

Having corrected the Ft field, the criteria which were used to identify the vehicles by powertrain are shown in Table 3 below. For example, all vehicles found when setting specific CO2 emissions (e) to zero, fuel type to Electric and fuel mode to monofuel (M) where labelled as BEV in the Pt column, unless the make and commercial name raised doubt. Similarly, when setting e to 21 or 48, fuel type to diesel-electric and fuel mode to B (bi-fuelled), all resulting vehicles were labelled PHEV-D (unless dissonant with Mk and Cn).

Table 3: Criteria used for the identification of Powertrain in the 2013 database

Powertrain (Pt)	**e (g/km)**	**Ft**	**Fm**	**OTHER**
BEV	0	Electric	M	Mk, Cn
FCEV	0	Hydrogen	M	Mk, Cn
PHEV	20-80	Petrol-Electric	B	Mk, Cn
REV	13[4]	Petrol-Electric	B	Mk, Cn
PHEV-D	21, 48[5]	Diesel-Electric	B	Mk, Cn

All databases for the years 2010 to 2014 were similarly corrected applying the methodology described above. The final corrected databases were used to calculate the final numbers of new electric vehicles registered in the EU reported in the following chapters of this report.
In view of cleaning the CO2 monitoring database for future years, it can be expected that the general issues of mislabelling in the fuel type column will remain similar as described here, and thus attention will have to be paid to correct these manually. As further EV models are likely to be introduced to the market, however, the selection criteria will have to be adapted, especially as concerns the emissions ranges (field e). In case of identical emission values for PHEV, PHEV-D and REV models, further criteria for differentiation may have to be established. This was already witnessed and considered for the 2014 data.
For the further analysis of the data, we have classified the electric vehicle models in the two groups "mass production / imports" and "small-series / imports and pre-production series". The group "mass production / imports" contains cars that had more than 100 new registrations in at least one of the 5 years in the EU and can or could be purchased or leased during that time period. It encompasses a total of 31 models for the 2010-14 timeframe (see table 5). The group "small-series / imports and pre-production series" contains cars that were only registered in smaller numbers, usually for field tests or measurement campaigns. These cars are or were typically not available through the regular mainstream commercial sales channels. An example of this category is the BMW X1 EV that is sold in China under the name Zinoro 1E and had registrations in Germany of altogether 48 units in 2012-2013. A particular case are the cars of pre-production series that are registered in small numbers during the pre-production stage and mostly become "mass production / imports" in the subsequent years. An example is the Volvo V60 Plug-in Hybrid that had registrations of 37 vehicles EU-wide in 2012 during the pre-production stage and then 7571 registrations in 2013, its first year of regular sales.
In addition, we also categorised the cars by vehicle size segmentation, following the segmentation that the European Commission usually applies when investigating market concentration in the automotive sector (European Commission, 1999). These segments

[4] The BMW i3 REV was the only Range Extended Electric Vehicle in the 2013 data, thus only its e value was used for identifying 2013 REV.
[5] The Volvo V60 PHEV and the VW XL1 were the only Diesel PHEV in the 2013 data, thus only their e values were considered for PHEV-D.

are: A – Mini cars, B – Small cars, C – Medium cars, D – Large cars, E – Executive cars, F – Luxury cars, J – Sport utility cars, M – Multi purpose cars, and S – Sport coupes. A general overview on their main characteristics in the EU market can be found in Thiel et al. (2014). The results of this categorisation of electric vehicles can be seen in table 6.
An important aspect for the offer strategy of automotive manufacturers is the decision to either develop unique electric vehicle models or electric vehicles that are a specific powertrain variant of a conventional car. Both strategies have advantages and disadvantages which are summarised in Table 4, based on our own expert judgement. Intuitively, we assume that offering unique EV models is preferable in the early phase of market creation, as it raises attention and is appealing for early adopters. At later stages an EV model as a specific powertrain variant of a conventional car may be able to attract the interest of the larger mainstream customer base that is often loyal to a specific brand and model. Also, this latter offer strategy will enable larger cost reduction through economies of scale. In order to capture the aspect of offer strategies, we distinguish EV models by the two offer strategies.

Table 4: Advantages and disadvantages of different EV offer strategies

Offer strategy	**Public awareness/ brand image**	**Attractiveness for early-adopters / niche markets**	**Attractiveness for mainstream customers / size of potential market**	**Economies of scale / cost reduction**
Unique EV model	+	+	-	-
EV as specific powertrain of conventional model	-	-	+	+

2.3. Comparison with other databases

In an effort to validate the numbers of EV new registrations we calculated for 2013, we gathered data from other groups that have applied corrections to the CO2 monitoring database as a start. These groups were Ricardo, T&E, ICCT and Emisia. As can be seen from the graph in Figure 2, the final numbers reported by the various groups are similar.

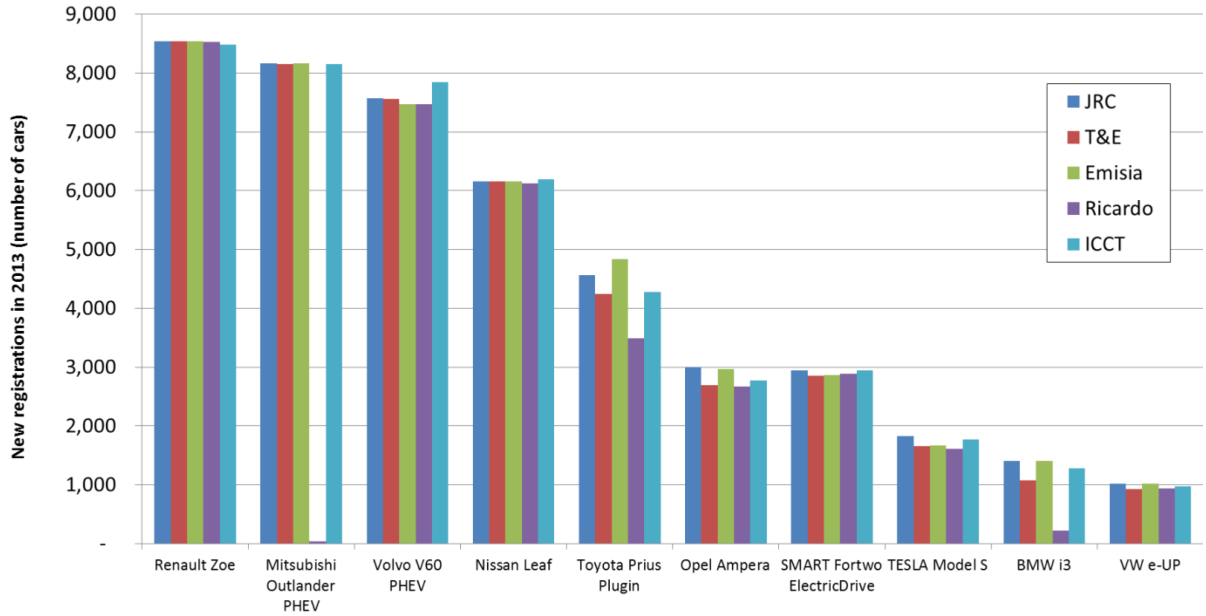

Figure 2: Comparison of 2013 EU EV registration data reported by various research teams (models with more than 1,000 registrations in the EU in 2013).

However, the original differences between various groups' datasets were larger and we had to go through a couple of iterations of identifying mislabelled vehicles in order to arrive at such close results. It is obvious that it is harder to find an agreement for a vehicle like the Toyota Prius Plug-in, which also has a simple hybrid version rather than for a vehicle like the Renault Zoe, which only exists in one version. The Mitsubishi Outlander PHEV was particularly difficult to identify and it was initially overlooked by most teams.

3. Results: Electric Vehicles in the EU 2010 to 2014

According to our analysis, a total of 153,633 electric cars were registered in the EU from 2010 to 2014. Out of this 151,698 were mass produced or mass imported cars and 1,935 were small-series, small number imports and pre-production series cars. In terms of powertrains, the following type numbers were registered: 86,230 BEV, 67,300 PHEV and REV, and 103 FCEV. The PHEV/REV group can be broken down into 50,869 gasoline PHEV, 12,613 diesel PHEV, and 3,818 REV. The only model that we categorised as REV is the BMW i3 range-extender version. We identified three FCEV models in the registration data, namely the Hyundai iX35 fuel cell car, the Mercedes F-Cell, and the Toyota Highlander fuel cell car. All of the FCEV which were registered from 2010 to 2014 can be considered as small-series vehicles. For reasons of simplicity, and as a disaggregated view would not necessarily provide additional insights, we have lumped together PHEV, FCEV, and REV variants as one PHEV group in the following figures and tables.

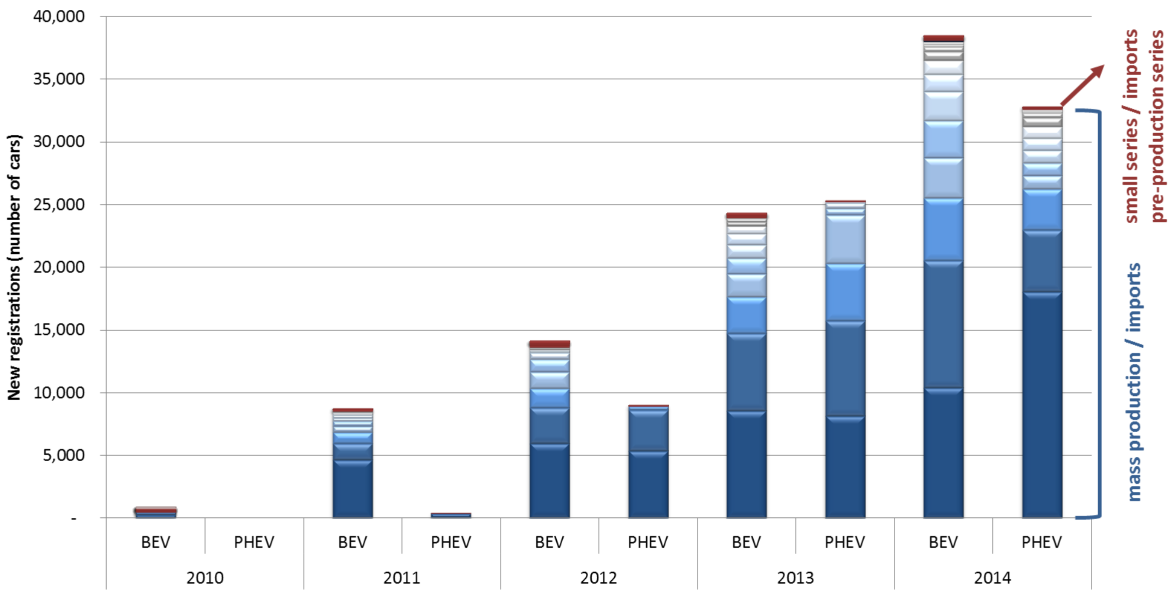

Figure 3: Evolution of registrations of BEV and PHEV in the EU from 2010 to 2014. Each column segment corresponds to a specific model. The blue and grey part of the column corresponds to the group "mass production / imports", while the red part corresponds to the group "small-series / imports and pre-production series".

Figure 3 shows the evolution of BEV and PHEV new registrations in the EU over the last 5 years. The columns are divided in the two groups "mass production / imports", and "small-series / imports and pre-production series". Individual models are shown separately. Table 5 shows the corresponding model names for the group "mass production / imports". Hence, the highest ranking model in table 5 for a given year corresponds to the lowest and largest segment of the respective blue/grey column in figure 3, the second highest ranking model in table 5 corresponds to the second lowest segment in figure 3 and so forth. For example, the lowest blue segment in the BEV column in figure 3 in 2013 and 2014 represents Renault Zoe registrations, the one above it is the Nissan Leaf.

Table 5: BEV and PHEV models of the group "mass production / imports" that were registered in the EU from 2010 to 2014.
Models[6] are ranked by registrations in given year (model with the highest registrations on top). BEV/PHEV models that share same model name with conventional cars are in italics.

Rank	BEV					PHEV			
	2010	2011	2012	2013	2014	2011	2012	2013	2014
1	*Smart EV*	Ion, C-Zero, I-Miev	Ion, C-Zero, I-Miev	Renault Zoe	Renault Zoe	Ampera/ Volt	Ampera/ Volt	*Mits. Outlander PHEV*	*Mits. Outlander PHEV*
2	Th!NK City	Nissan Leaf	Nissan Leaf	Nissan Leaf	Nissan Leaf		*Toy. Prius Plug-in Hybrid*	*Volvo V60 Plug-in Hybrid*	*Volvo V60 Plug-in Hybrid*
3	Tesla Roadster	*Smart EV*	Bollore Bluecar	*Smart EV*	Tesla Model S		Fisker Karma	*Toy. Prius Plug-in Hybrid*	BMW i3 Range Extender
4		*Renault Fluence Z.E*	*Renault Fluence Z.E*	Tesla Model S	BMW i3			Ampera/Volt	*Toy. Prius Plug-in Hybrid*
5		Bollore Bluecar	*Smart EV*	Ion, C-Zero, I-Miev	*Smart EV*			BMW i3 Range Extender	*VW Golf GTE*
6		Mia	Mia	*VW E-Up*	*VW E-Up*			*Porsche Panamera S E-Hybrid*	BMW i8
7		Th!NK City	Tesla Roadster	BMW i3	*VW Golf EV*			Fisker Karma	*Porsche Panamera S E-Hybrid*
8		*Merc. A-Class E-cell*	*Volvo C30 EV*	Bollore Bluecar	Bollore Bluecar				*Audi A3 E-Tron*
9		Tesla Roadster	*Merc. A-Class E-cell*	*Renault Fluence Z.E*	Ion, C-Zero, I-Miev				Ampera/Volt
10			Th!NK City	Mia	*Nissan E-NV200*				*Porsche Cayenne S E-Hybrid*
11				*Merc. A-Class E-cell*	*Merc. B-Class EV*				*Merc. S500 Plug-in Hybrid*
12				Th!NK City	*Kia Soul EV*				*Porsche 918 Spyder*
13					*Renault Fluence Z.E*				Fisker Karma
14					Th!NK City				

Figure 3 reveals that there has been a steady growth of registrations for BEV and PHEV over the last years. The first mass produced or mass imported BEV were registered in 2010, distributed over 3 models, the Smart EV, Th!nk City, and Tesla Roadster. One year later the first mass produced or mass imported PHEV were registered. Only one PHEV model was available in 2011, the Ampera/Volt.

3.1. BEV registrations

BEV jumped from several hundred registrations in 2010 to well above eight thousand in 2011. After 2011, BEV registrations experienced further strong growth with an around 60% increase year by year in 2012, 2013, and 2014. From 2013 to 2014 the growth rate was a little lower than in the previous years. While in 2010, "small-series, small number imports and pre-production series" cars still constituted approximately one third of the total BEV registrations, this group of cars played only a minor role in the later years.

[6] For our analysis we have lumped the following commercial name models into model groups: Opel Ampera and Chevrolet Volt to one model group called "Ampera/Volt" and Peugeot Ion, Citroen C-Zero, and Mitsubishi I-Miev to one model group called "Ion, C-Zero, I-Miev". We did this as the commercial name models are basically re-badges of technically the same model.

The number of individual BEV models offered tripled from 2010 (3 models) to 2011 (9 models). Thereafter about 1 to 2 additional models were added each year, to reach a total of 14 BEV models offered in 2014. There were also a few BEV model exits from the market so far, i.e., the Tesla Roadster and the Volvo C30 EV were not sold after 2012, and the Mia and Mercedes A-class E-cell were last sold in 2013. Simply dividing the number of registered cars by the number of models offered reveals that the average registrations by model increased steadily from approximately 250 in 2010 to more than 2,700 in 2014. Figure 3 shows that the two top BEV models in terms of number of registrations per year constituted more than 50% of total BEV registrations in each year from 2010 to 2014.

Figure 3 in combination with table 4 also reveals the effect of model cycles that, generally speaking, lead to peaking registrations in the second or third year for a specific model and a declining number of registrations thereafter. This is visible for example for the Ion, C-Zero, I-Miev or the Ampera/ Volt. An exception is the Nissan Leaf that still exhibits increasing registrations in its fourth year. In terms of offer strategies we can observe from table 4 that from 2010 to 2013, unique BEV models dominated, while in 2014 the number of models offered is on par with the BEV models that are a specific powertrain variant of a conventional car. Yet, the top two registered BEV models from 2011 to 2014 belonged to the group of unique BEV models. A possible interpretation of this phenomenon is that while the automotive manufacturers prepare the ground to tap the larger mainstream customer base, the market is not ready yet, and remains in the early adoption stage for BEV. In the coming years we may witness the transition from early-adopter to mainstream market deployment. It is important to note that there are still a high number of different BEV models tested on European roads as part of the "small-series / imports and pre-production series" group. In 2010 and 2011, there were 12 to 13 models, while from 2012 to 2014 there were 23 to 30 models in this stage. This is another strong indication that a lot of experimenting is still taking place and the manufacturers are continuing to search for optimal deployment strategies by trying various options. Some of these models are likely to become mass produced or mass imported cars in the future years.

3.2. PHEV registrations

Similar to the BEV evolution, but with one year delay, PHEV jumped from a few hundred registrations in 2011 to just under nine thousand in 2012. From 2012 to 2013 PHEV registrations experienced further strong growth with their number almost tripling. From 2013 to 2014 this growth cooled down considerably, displaying an increase of only 30%. Different from the BEV case, the group of "small-series, small number imports and pre-production series" cars only played a very minor role right from the outset of PHEV deployment. This indicates that the automotive manufacturers seem to have more confidence in the technical and commercial maturity of PHEV and that they seem to be able to apply learnings from BEV field tests to PHEV models.

The number of individual PHEV models offered jumped from one model in 2011 to three in 2012, then more than doubled from 2012 to 2013 and nearly doubled from 2013 to 2014, reaching a total of 13 PHEV models offered in 2014. There have been no PHEV model exits from the market so far. Dividing the number of registered cars by the number of models offered reveals that the average registrations by model so far peaked in 2013 with more than 3,600 registrations per model and decreased again to roughly

2,500 in 2014, a value lower than the one achieved in 2012 (with almost 3,000 registrations per model). Figure 3 shows that the two top PHEV in terms of number of registrations per year were always well above 50% of total PHEV registrations in each year from 2011 to 2014.
The already described model cycles with declining registrations after the second year in the market can also be observed for the Toyota Prius Plug-in Hybrid. In contrast, the Volvo V60 Plug-in Hybrid underwent a sharp decline already in its second year. This could indicate that the further addition of models does not necessarily increase the base of potential customers. Instead, it can be observed for PHEV from 2013 to 2014 that more models increase the competition among the available models. As a result, several PHEV models show lower registration numbers in 2014 than in 2013. This development may have been further influenced by reduced incentives for PHEV in the Netherlands (see chapter 3.4). In terms of offer strategies we can observe from table 5 that for PHEV, different from BEV, models that are offered as a specific powertrain variant from a conventional car dominated from 2013 onwards. In 2014 they constitute 70% of all PHEV models offered. The top two registered PHEV models from 2013-2014 belonged to the group of PHEV models that are derived from a conventional car. This seems to indicate that most of the automotive manufacturers perceive PHEV as better positioned to enter the mainstream market and the customers seem to respond in line with these expectations as the number of registrations of unique PHEV models plays a minor role in 2013 and 2014. In 2014, there were eight additional PHEV models tested on European roads as part of the "small-series / imports and pre-production series" group. Only one of them, the Volkswagen XL1 was a unique PHEV model, while all others were derived from conventional cars.

3.3. EV registrations per segment

Figure 4 shows the total BEV and PHEV registrations along with the number of models offered per segment in the EU for the period 2010 to 2014. The figure reveals that, with the exception of the E-segment, every segment has at least one BEV or PHEV model. The smallest segments (A and B) only offer BEV, while some of the larger and heavier segments (F and J) only offer PHEV models. This indicates a specialisation in terms of optimal powertrain configurations per segment, in line with textbook theory. The intermediate segments C, D, and S offer both BEV and PHEV models. The A, C, and S segments have most of the BEV or PHEV models offered, while all other segments only have one or two EV models offered. Still, a higher number of models offered does not necessarily translate into a higher number of registrations. For example, in the B and J segment, with only two EV models offered in each, similar registration numbers were reached as in the A and C segments with a much greater variety of BEV or PHEV.
Table 6 shows the model names corresponding to the EV available in the various segments. Hence, the highest ranking model in table 6 for a given year corresponds to the lowest segment of the blue/red column in figure 4, the second highest ranking model in table 6 corresponds to the second lowest segment in figure 4 and so forth. For example, the lowest blue segment in the B-segment BEV column in figure 4 shows Renault Zoe registrations, the one above is the Bolloré Bluecar. Dividing the number of segment registrations from 2010 to 2014 by the number of models offered gives approximate information on the average number of registrations per offered model in a given segment in that timeframe. Highest registration numbers per model, with well

above 10,000 units/model are achieved for the BEV in the B-segment, dominated by the Renault Zoe, the PHEV in the J-segment, almost entirely due to the Mitsubishi Outlander PHEV, and the D-segment PHEV, with the V60 Plug-in Hybrid the only offered model. The A- and C-segment BEV and C-segment PHEV feature well above 4,000 but below 5,500 units per model. The D-, M-, and S-segment BEV as well as the F- and S-segment PHEV have lower average registrations per model, all less than 3,500 and some of them only several hundreds of units per model. For some segments the lower registration numbers per model are not surprising, for example in the S- and F-segments. These segments typically don't feature high registration numbers, regardless of their powertrain. Yet, in the S-segment we also find the Tesla Model-S with nearly 7,000 registrations the fifth ranked BEV. The rather low registrations for the BEV variant in the D-segment contrasts with the comparably high number of PHEV registrations in the same segment. This seems to emphasise the above findings on the optimal powertrain configurations per segment. With well above 10,000 units each and a share of more than 75% of the BEV or PHEV registrations in their respective segment the following four models have dominated the EV registrations from 2010 to 2014: Mitsubishi Outlander PHEV, Nissan Leaf, Renault Zoe, and Volvo V60 Plug-in Hybrid (see figure 4 in combination with table 6). As a matter of fact, these four models together constitute more than 50% of total EV registrations in the EU from 2010 to 2014. These highest selling models are unique for the BEV and derived from conventional models for the PHEV powertrain variant. This is in line with our observations in the previous chapters and seems to indicate a clear separation between the BEV market and PHEV market.

The coverage of segments for BEV and PHEV developed over time. BEV started in 2010 with two A-segment models and one S-segment model. As early as 2011 BEV covered five segments (A, B, C, D, S). In 2014 the M-segment was added so that the total of six segments were reached. The deployment of PHEV models in the various segments was more gradual. In 2011 PHEV were only available in the C-segment, in 2012 one model was added in the S-segment. In 2013 the J- and D-segment were added to the coverage, while in 2014 the F-segment featured one PHEV offer. As a result, PHEV cover in total five segments. In 2014 several Mercedes E-class Plug-in hybrid cars were registered as "small-series or pre-production series" cars. Hence, it is not unlikely that the E-segment will soon also feature PHEV cars. This once more confirms the different market penetration strategies for BEV and PHEV, with BEV focussing on smaller and PHEV on larger car segments.

In terms of unique models versus models derived from a conventional car, the A-, B-, and S-segment cars show the highest share of unique EV models offered per segment. In these segments we find many manufacturers that have specialised on the production of EV, such as Mia, Th!nk, Bolloré, Fisker Automotive, and Tesla. Three out of these five manufacturers, Mia, Th!nk, and Fisker Automotive encountered financial problems resulting in liquidation.

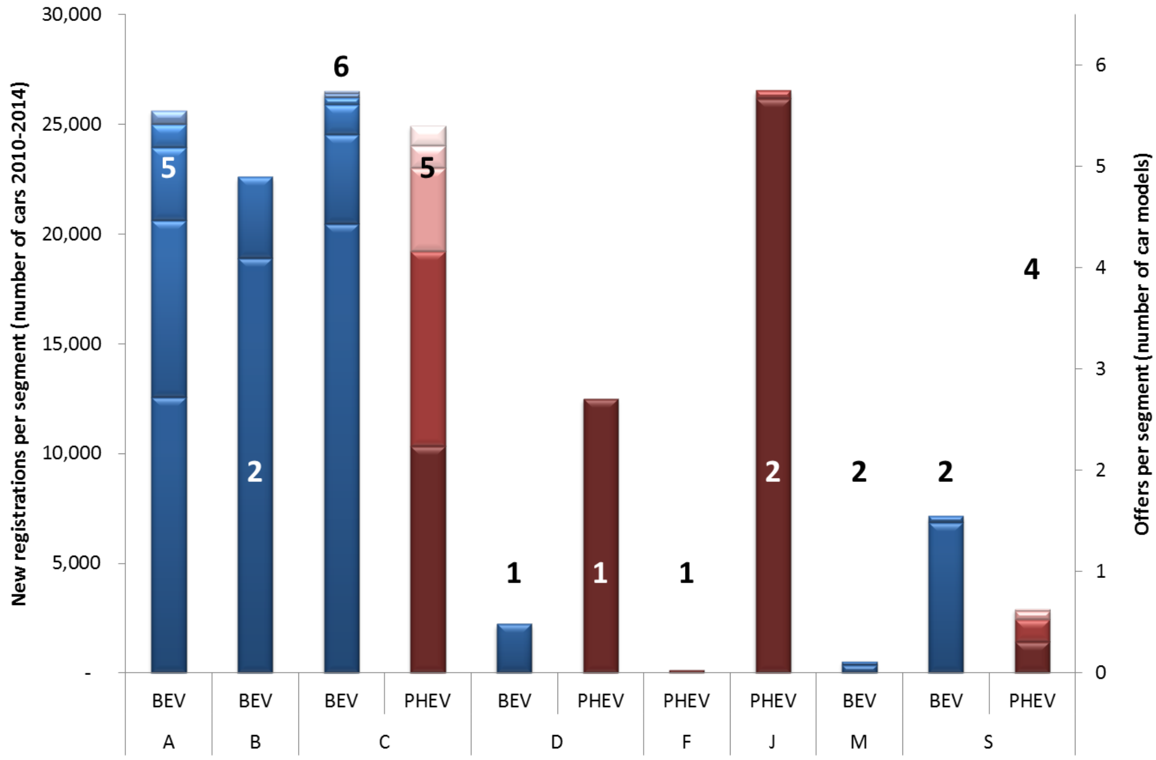

Figure 4: Total BEV (blue column) and PHEV (red column) registrations per segment in the EU from 2010 to 2014.
Each column segment corresponds to a specific model. Number corresponds to models offered per segment. Only models of the group "mass production / imports" are shown.

Table 6: BEV and PHEV models per segment registered in the EU from 2010 to 2014. Only models of the group "mass production / imports" are shown. The models are ranked by number of total registrations (model with the highest number of registrations on top). Model names of BEV/PHEV that share the same model name with conventional cars are in italics.

Rank	A	B	C		D		F	J	M	S	
	BEV	BEV	BEV	PHEV	BEV	PHEV	PHEV	PHEV	BEV	BEV	PHEV
1	Ion, C-Zero, I-Miev	Renault Zoe	Nissan Leaf	Ampera/Volt	*Renault Fluence Z.E*	*Volvo V60 Plug-in Hybrid*	*Merc. S500 Plug-in Hybrid*	*Mits. Outlander PHEV*	*Nissan E-NV200*	Tesla Model S	*Porsche Panamera S E-Hybrid*
2	*Smart EV*	Bollore Bluecar	BMW i3	*Toy. Prius Plug-in Hybrid*				*Porsche Cayenne S E-Hybrid*	*Kia Soul EV*	Tesla Roadster	BMW i8
3	*VW E-Up*		*VW Golf EV*	BMW i3 Range Extender							Fisker Karma
4	Mia		*Merc. A-Class E-cell*	*VW Golf GTE*							*Porsche 918 Spyder*
5	Th!NK City		*Merc. B-Class EV*	*Audi A3 E-Tron*							
6			*Volvo C30 EV*								

3.4. EV registrations in the EU member states

The left map in figure 5 shows total EV registrations from 2010 to 2014 in EU each member state (MS). The following countries, ordered by number of registrations, show the highest numbers: The Netherlands, France, Germany, United Kingdom, Sweden, Belgium, Austria, Italy, Spain, Denmark, and Estonia. All other MS had less than 1,000 EV registrations during the past five years. The top four countries in terms of EV registrations account for more than 80% of all EV registrations in the EU. The total EV registrations in the EU from 2010 to 2014 constitute about 0.25% of the total car registrations during the same period. In 2014 the EV registration share was 0.56%.
The right map of figure 5 shows 2010 to 2014 EV registrations as share of total car registrations per MS. For this metric the ranking of the MS is quite different from the left map in figure 5: The Netherlands lead in terms of EV share (1.87%), followed by Estonia, Sweden, Latvia, France, Denmark, Luxemburg, Austria, and the United Kingdom. All other MS have shares lower than 0.2 %.

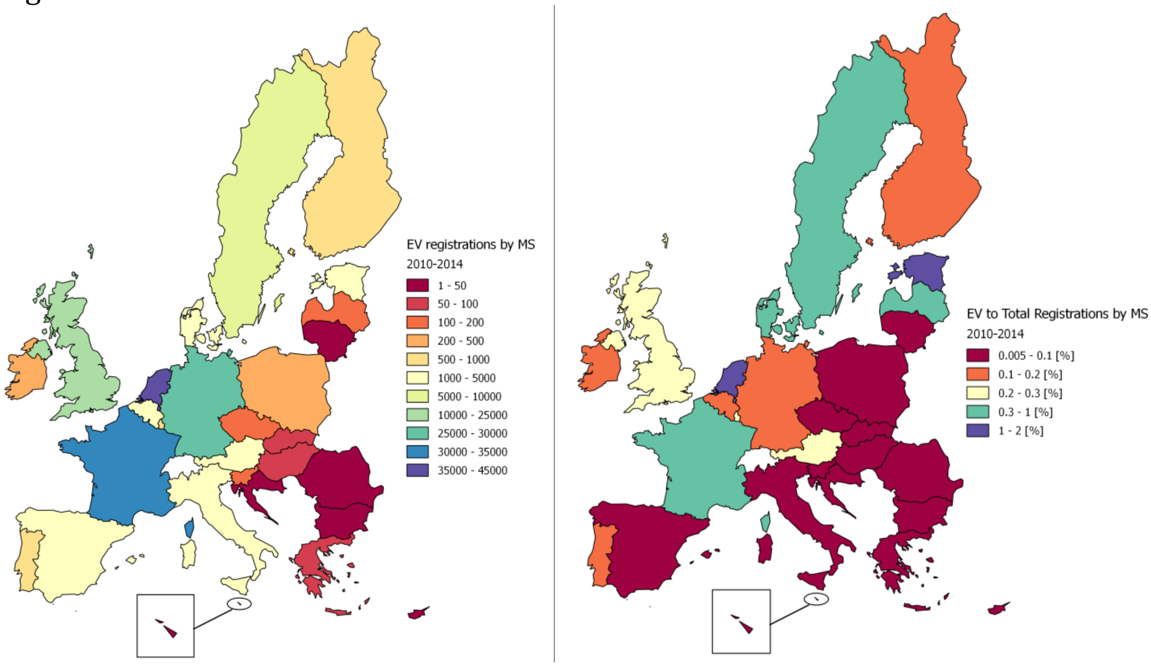

Figure 5: Map of EV registrations per EU member state.
Left side: number of registrations. Right side: EV as share of total car registrations. All based on the sum of registrations 2010 to 2014. Note that the scale is optimised to show differences between MS (class size not uniform).

Figure 6 shows the development of BEV and PHEV registrations and their shares over time for selected MS. The eight MS in figure 6 are the MS that were in the top five in terms of absolute number of EV registrations at least once during the last five years. They are ranked according to the number of EV registrations in 2014, highest to the left, lowest to the right. Six of them, The Netherlands, France, Germany, United Kingdom, Sweden, and Austria, also feature in the top ten MS in terms of EV share, which may be as low as 0.18% (Germany). The remaining four MS that are in the top ten for EV share but not in the top ten for the absolute number of EV registrations are: Estonia, Latvia, Luxemburg, and Denmark. Their evolution of BEV and PHEV registrations and their share over time is presented in figure 7.

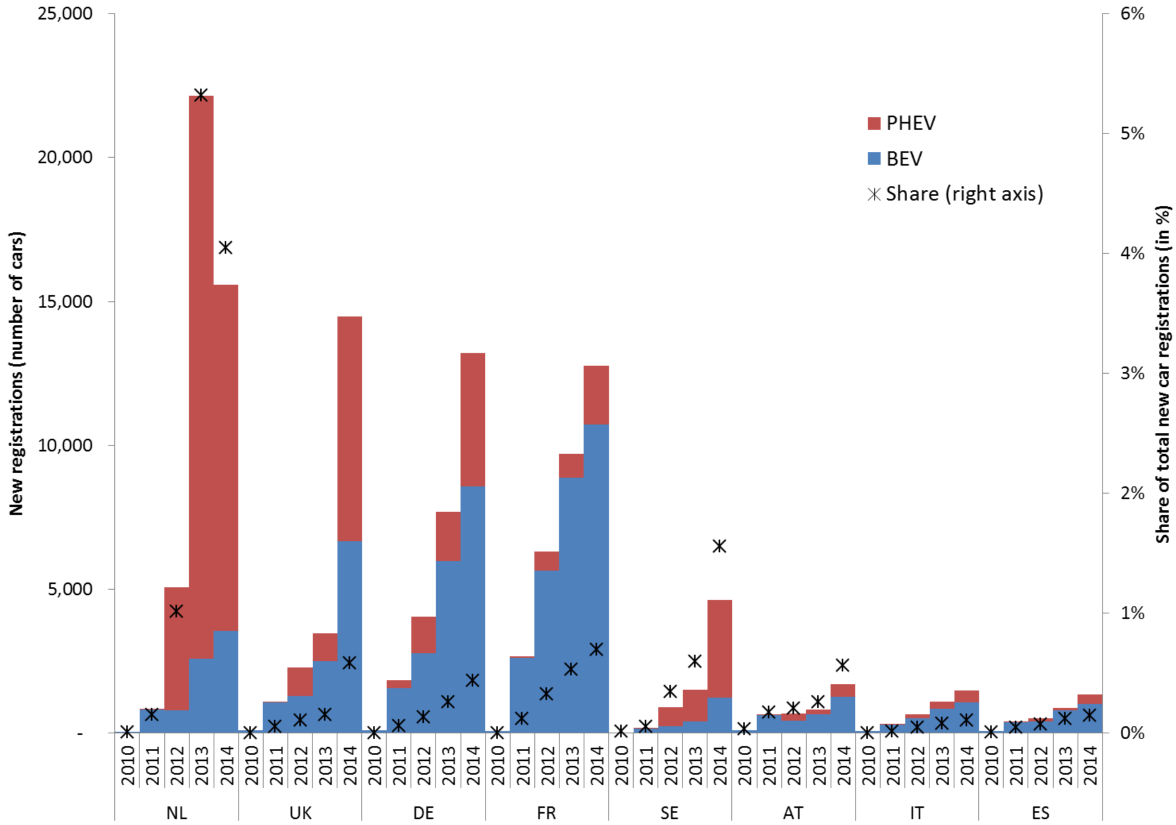

Figure 6: EV registrations in The Netherlands, United Kingdom, Germany, France, Sweden, Austria, Italy, and Spain, 2010 to 2014.
Numbers given in number of cars (left y-axis) and EV as share of total car registrations in given year (right y-axis).

A large part of the evolution of EV registrations in the various MS can be explained by a combination of EV related incentives and models on offer in the MS. The demand structure of markets in the various MS are in general very different with respect to size segments and this can have an effect on EV registrations if not enough EV models are offered in specific segments. In some cases, the mere fact that an EV version of a popular model or brand is offered could lead to a strong increase of EV deployment in specific member states. In the following we highlight the most important developments per MS that are shown in figure 6 and 7. The information on the incentives in place is largely based on ACEA (2010-2015) and IEA-IA-HEV (2015). Incentives may have been in place earlier than 2010 in some MS. But since our report only covers the period from 2010 to 2014, we describe only the situation from 2010 onwards. We focus mainly on financial incentives on a member state level and hence may not capture the full extent of policies or incentives that can have an impact on the purchase decisions for potential EV drivers.
The Netherlands have a strong monetary incentive system in place since 2010, which has changed over time. It affects both the registration and the annual circulation tax. Levels of both taxes are rather high compared to other MS, which made the financial package for low CO2 emitting hybrid and EV buyers very attractive from 2011-2014. The registration tax benefit for EV could easily amount to € 7,000 or more. From 2015 onwards, the exemption from the registration tax is limited to BEV, while the exemption from the annual circulation tax remains in place for both BEV and PHEV emitting less than 50 g CO2/km. The incentive structure in the Netherlands had a very favourable

effect on the uptake of PHEV. Especially in 2013 and 2014, it led to very high registrations for the Mitsubishi Outlander PHEV and Volvo V60 Plug-in Hybrid. These two PHEV models were available in the Netherlands from 2013 on. Already in that year, these two models accounted for more than 70% of all PHEV registrations in the Netherlands. In 2014 this share rose to nearly 90%. For BEV, the Tesla Model S was the most successful car in terms of number of registrations since its market introduction in the Netherlands in 2013. In 2014 it maintained this position. These three models are all competing in the more expensive car segments. Hence, the incentives had a low impact on the smaller segments (A to C). Over the last years, the incentive structure was subject to change and the public debate on possible incentive cuts may have led to the advancement of purchases, which could explain the peak in 2013 at 5.32% of total new car registrations, the highest share reached in any MS during the observation period. Also in the first half of 2015 EV registrations continued to decline in the Netherlands (ACEA, 2015a).

Similar to the Netherlands, the United Kingdom (UK) has a strong monetary incentive system in place since 2010. It affects both the purchase price through a premium as well as the annual circulation tax, although the latter is much lower than in the Netherlands. In 2014, the premium for the purchase price was 25% of the value of the new car and could then amount to £ 5,000 (approximately € 7,000[7]). Compared to the Netherlands, the UK incentive had a much lower effect on EV sales shares, which slowly rose to about 0.59% of total car sales in 2014. Also the impact of the incentives on the different segments in the UK is different from the Netherlands. In the UK, the Nissan Leaf, a C-segment car, was the most successful BEV car from 2011, its first year of sales in the UK, throughout 2014, with its share fluctuating between more than 50% and more than 70% of total BEV registrations. The Nissan Leaf is also manufactured in the UK and this may have boosted its number of registrations in the UK. In 2014 the Mitsubishi Outlander entered the UK market and was immediately responsible for nearly 70% of all PHEV registrations. This demonstrates how the availability of specific models in combination with incentives can have a significant impact on the market in these early days of EV deployment. In the UK, besides the tax benefits, an important driver for EV uptake is the congestion charge for Greater London. Up to the middle of 2013 most hybrid cars and EV were exempted from the congestion charge, while from mid-2013 onwards this exemption is limited to basically BEV and PHEV. Presumably this can explain the surge of EV registrations that happened in the UK from 2013 to 2014.

Since 2010, Germany has seen rather low incentives for EV, consisting of an exemption from the circulation tax for EV. The circulation tax in Germany is low compared to the one of the Netherlands. The benefit in the annual circulation tax is typically in the range of a few hundred Euros. Although the registrations of EV in Germany are high in terms of absolute numbers, their market share remained low, even in 2014 (at 0.44%). Different from the Netherlands and United Kingdom, the registration numbers in Germany grew slowly and steadily. The spread of EV over car segments and models is wide in Germany.

France has had strong monetary incentives in place since 2010. The incentives are tied to a bonus-malus system that places a registration cost penalty on high CO2 emitting cars and gives a premium to EV and other low CO2 emitting cars. The premium is about 50% higher for BEV than for PHEV. The premium increased slightly from 2010 to 2013 and was then slightly reduced in 2014 and beyond. In 2014 it was € 6,300 for BEV and

[7] Exchange rate on 29 July 2015

€ 4,000 for PHEV new registrations. Both premiums were capped at 20% of the vehicle purchase price including VAT. As a result of this incentive structure, France has seen a steady and strong growth of the EV share from 2010 to 2014, reaching 0.7% of new car registrations in 2014. Different from Germany, the UK, and the Netherlands, EV registrations in France can largely be attributed to BEV, with comparably few PHEV registrations. The number one EV car in terms of registrations was the triplet Citroen C-Zero/ Peugeot Ion/ Mitsubishi I-Miev from 2011 to 2012 and the Renault Zoe from 2013 to 2014. The incentive structure in France led to EV registrations mainly in the A-, B-, and C-segments from 2010 to 2014. Only the Mitsubishi Outlander PHEV in 2014 could make some inroads into the market in a larger segment (J).

The role of car-sharing to bring EV on the road:
Especially in the early years car-sharing schemes played an important role to initiate the deployment of EV, mainly BEV, in some EU member states. This can also be seen in the registration data. Most of the Bolloré Bluecar registrations in France can be attributed to the Autolib car-sharing organisation. It is estimated that approximately 2,000 BEV in Germany are registered with car-sharing organisations. Some of the OEM have invested in joint ventures or their own car-sharing organisations and supply these with their BEV. As an example, many Smart EV are registered with car2go, a car-sharing organisation owned by Daimler.

Sweden has several measures in place since 2010: a five year exemption on the annual circulation tax for EV and a reduction of company car taxation. The annual circulation tax in Sweden is much lower than for example in the Netherlands, but higher than in Germany. In 2012, Sweden added a substantial green car premium of 40,000 Swedish Crowns (approximately € 4,200[8]) for EV. It is still in place in 2015 but its funds are limited to 5,000 cars. From 2012 to 2014 this led to a considerable growth of registrations, most notably for PHEV. Sweden witnessed significant changes in the top selling PHEV car over time. In 2012 the top PHEV in terms of registrations was the Prius Plug-in hybrid, in 2013 it was the Volvo V60 Plug-in hybrid, and in 2014 the Mitsubishi Outlander PHEV. In each year, the model leading new registrations accounted for more than 50% of annual PHEV registrations. The very high increase from 2013 to 2014, where EV registrations made up for roughly 1.5% of new registrations, could indicate that potential EV buyers were concerned that the green car premium would expire in 2015. Hence, a significant number of purchases may have been advanced in time. Similar phenomena have been observed in the past with scrappage fees in various countries.

In Austria, since 2010, EV are exempt from the CO2 based registration tax and the annual circulation tax. The exemption from the registration tax is also valid for other cars as long as their CO2 emissions are below a certain threshold (currently 90 g CO2 / km). Additionally, there is a tax bonus on the registration of alternative vehicles including hybrids and EV. It is currently € 600 and was previously € 500 (until 2014). The circulation tax in Austria is comparably high (similar to the Netherlands), hence, the exemption from it is a considerable argument for potential EV buyers. EV registrations, mainly BEV, have grown from 2010 throughout 2014 in Austria and the EV share of total registrations reached 0.57% in 2014. The biggest year to year growth so far could be observed in 2011 and 2014, whereas from 2011 to 2013 the number of EV registrations stayed almost constant. The distribution over segments and models is wide. Most of the registered EV were in the A-, B-, and C-segment. In 2014, with the

[8] Exchange rate of 29 July 2015

arrival of the Volvo V60 Plug-in hybrid and Mitsubishi Outlander PHEV in Austria, the D- and J-segment played a role in the PHEV registrations. The incentive system in Austria is effectively not limited to EV because of the rather high CO2 threshold,. Consequently, it seems that the CO2 based incentives in Austria rather had an effect on the wider deployment of low CO2 emitting cars and not too strong an impact on the deployment of EV, only.

In Italy there is an exemption of the annual circulation tax in place for EV since 2011. Since this tax is comparably low, similar to countries such as Germany and the UK, this exemption is not a very strong incentive for potential EV buyers. The growth of EV registrations in Italy from 2010 to 2014 was steady but weak. The share of EV in 2014 was only 0.11% of total new registrations.

Spain did not have any EV incentives in place on a country level from 2010 to 2014. Instead, in various Spanish regions there were premiums in place for the purchase of alternative cars, including hybrids and EV. For EV, these were generally in the range of 15% of the purchase price with a maximum of € 7,000. The evolution of EV registrations in Spain is similar to the one observed in Italy. From 2010 to 2014 it was characterised by a steady but weak growth. The share of EV in Spain was 0.15% of total new registrations in 2014.

In Denmark, since 2010, BEV are exempt from the registration tax. The registration tax in Denmark is largely based on the vehicle purchase price and very high in comparison to other EU MS. Hence, the tax incentive for BEV is high in Denmark. BEV registrations[9] in Denmark were more or less stable from 2011 to 2013 and then more than tripled from 2013 to 2014, reaching an EV share of 0.8% of total registrations. PHEV play a minor role in Denmark. Denmark witnessed remarkable changes in terms of best-selling models over the last four years. In 2011 and 2012 the model with the highest registrations was the triplet Citroen C-Zero/ Peugeot Ion/ Mitsubishi I-Miev, with the Renault Fluence Z.E. almost on par in 2012. The Renault Fuence Z.E. registrations in Denmark were certainly largely due to the "Better Place" business activities, which were stopped due to bankruptcy in 2013. The top model in 2013 and 2014 was the Nissan Leaf. The Tesla Model S was the runner-up in both years, with the Renault Zoe in third place in 2013 and the Volkswagen E-Up in 2014. This indicates that, with a stable incentive scheme in place, the deployment of BEV in Denmark was largely impacted by the growing model choice and wider coverage of car segments.

In Luxemburg, from 2011 to 2014, BEV and most PHEV (if their CO2 emissions are below or equal to 60 g/km) received a purchase premium. From 2012 to 2014, this premium amounted to 5,000 € per EV. In 2011 it was lower. An interesting detail of this scheme was that the premium was only paid if the purchaser concluded a contract for receiving 100% renewable electricity as well. The number of EV registrations in Luxemburg grew strongly from 2011 to 2014, and the EV new registration share reached 0.84% in 2014. The 2014 boost may partially have been triggered by the anticipation of the expiry of the premium programme by the end of 2014. The EV registrations are distributed widely across segments and models.

Estonia sold unused CO2 emission quotas from the EU Emission Trading System to Mitsubishi, received 507 I-Miev cars for the public fleet in return, offered an incentive of € 16,500 for the purchase of a BEV, and installed 165 public fast chargers, thus creating the densest network of fast chargers in the EU MS (Forbes, 2013; Kredex, 2014;

[9] We found an inconsistency on Tesla Model S registrations between the monitoring files and information from Danish Car Importers (2015) and IEA-IA-HEV (2015). As a consequence, we added 112 Tesla Model S for 2013 and 460 for 2014 for Denmark.

McKinsey, 2014). The incentive scheme started in 2011 and expired in August 2014, when the funds allocated to it were exhausted. The sequence of these events has had a large impact on the deployment of EV in Estonia. The 2011 and 2012 BEV evolution was largely dominated by the registrations of the I-Miev for the public fleet, leading to a peak in 2012. These 507 cars accounted for almost half of all BEV registrations in Estonia from 2011 to 2014. Mainly from 2013 to 2014, car buyers made use of the financial incentives, registering mostly Nissan Leaf cars. This created considerable momentum in the market. Data from the first half of 2015 (ACEA, 2015a) indicate that this momentum can not be sustained without the high purchase incentive. This may also be a hint that a large-scale deployment of public charging infrastructure cannot guarantee a success in EV deployment if it is not accompanied by other support measures. Altogether, with this electro-mobility programme Estonia achieved an impressive 1.4% EV share of total registrations in the period of 2011 to 2014. PHEV did not play any significant role in Estonia, so far.
In Latvia, since 2013, BEV are exempt from the registration tax. The registration tax in Latvia is CO2 based; its level is modest compared to other MS, such as the Netherlands or Denmark. The tax exemption led to a surge in BEV registrations from 2013 to 2014, reaching a 1.46% share of new car registrations in 2014. These registrations can mainly be attributed to the Volkswagen E-Up.

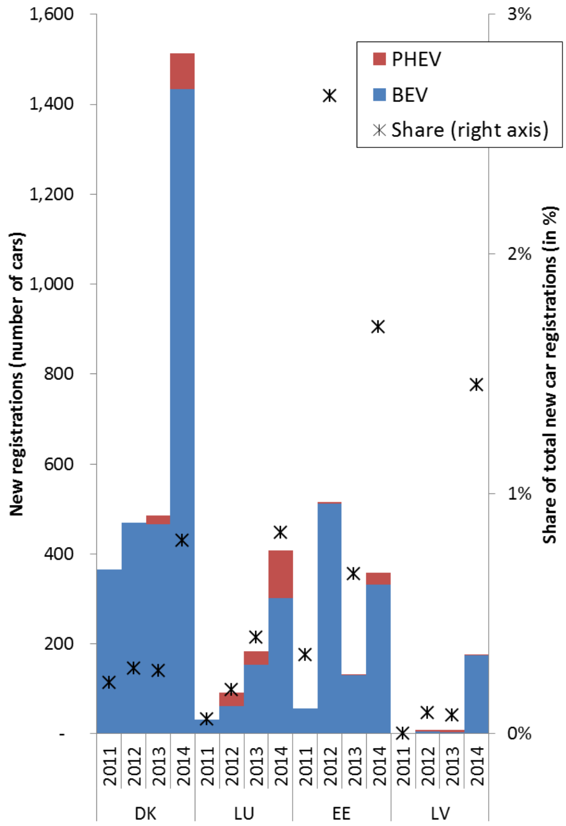

Figure 7: EV registrations of Denmark, Luxemburg, Estonia, and Latvia, 2011 to 2014. Both the number of cars (left y-axis) and the EV as share of total car registrations in given year (right y-axis) are shown.

Based on the incentive structure from 2010 to 2014 for EV, we can separate four groups of countries: (i) countries with strong financial incentives that increase with car price (Austria, Belgium, Denmark, Finland, Greece, Netherlands, Portugal, UK); (ii) countries with strong financial incentives that are largely independent of the vehicle's sales price

(Estonia, France, Ireland, Luxemburg, Spain, Sweden); (iii) countries with rather low financial incentives (Czech Republic, Germany, Hungary, Italy, Latvia, Romania), and (iv) countries with no financial incentives for EV (Bulgaria, Croatia, Cyprus, Lithuania, Malta, Poland, Slovakia, Slovenia). In most of the MS, the EV incentives were based on technology neutral criteria such as CO2 emissions. In reality the low CO2 emission thresholds that were chosen in several MS then led to the fact that only EV could fully benefit from the incentives. In general, the deployment of EV in the EU MS, especially in terms of EV market share, aligns well with the level of financial incentives offered in the MS. Countries with no or very low incentives typically had very low EV shares and countries with high incentives witnessed higher EV uptake. Exceptions were Greece and Spain, which offered high incentives but showed little EV deployment. This may be due to the financial crisis in these two countries. Germany, albeit a low level of incentives, showed relatively higher EV market shares.
Table 7 provides an overview of the various EV support measures that we have identified in the different European countries (including Norway).

Table 7: Different support measures for EV

Impact on	**Type of support**
Purchase	Tax reduction/ exemption; purchase premium; penalty for polluting cars
Annual tax/ cost	Tax reduction/ exemption
Privileged access	Free access to bus/ taxi lanes; access ban for polluting vehicles; reduction or exemption from road tolls or parking fees
Charging	Provision of public charge points (slow/ fast); free charging; condition to use low-carbon electricity
Research, development and demonstration (R,D&D)	Support to R&D projects and field tests

3.5.Comparison with other markets of the world

Figure 8 shows a comparison of 2014 EV registrations in the four most important car markets, Europe, U.S.A., Japan, and China. The US are leading in terms of absolute number of EV registrations, followed by Europe, China, and Japan. In terms of EV as share of total car registrations, Europe, the US, and Japan have all a market share of approximately 0.7%, while China displays a share of 0.3%. The European figures combine the values for the EU and EFTA countries. Among the EFTA countries Norway dominates the EV market. As a matter of fact, in 2014 the Norwegian EV new registration share of almost 14% was the highest share worldwide. Norway has very strong financial and other incentives in place, which make EV a favourable option for car buyers. Besides tax exemption, Norwegian BEV drivers benefit from free toll roads, free national ferries, free municipal parking, free charging at most normal charging stations, and access to drive in bus lanes (Haugneland, 2014).

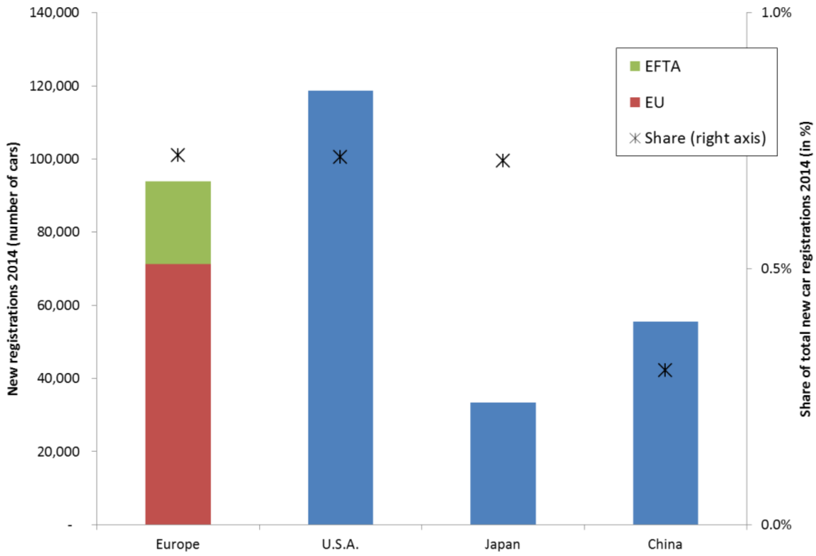

Figure 8: EV registrations in Europe, U.S.A., Japan, and China, 2014.
Europe is EU and EFTA[10]. Both the number of cars (left y-axis) and EV as share of total car registrations (right y-axis) are shown. Data for regions other than EU are taken from ACEA (2015b,c), IEA-IA-HEV (2015), Statista (2015), and EV sales blog (2015.)

From an industrial policy perspective it is important to assess if the deployment of EV can foster employment in the EU. As one proxy for the employment effects of EV market introduction we have analysed the share of EV produced in the EU compared to total EV registrations in the EU. The results are shown in figure 9. It reveals that until 2012, EV that were produced outside the EU dominated the EU market. This changed dramatically for 2013 and 2014. In both years the share of EU-produced EV was well above 60%. This development was influenced by the start of Nissan Leaf production in Sunderland/ UK in 2013. However, it is important to note that the numbers shown in figure 9 do not give any insight into the vertical integration of EV production. Most notably, it needs to be analysed in how far the location of EV manufacturing plants in the EU can also increase automotive traction battery production in the EU, an important part of the value creation of an EV.

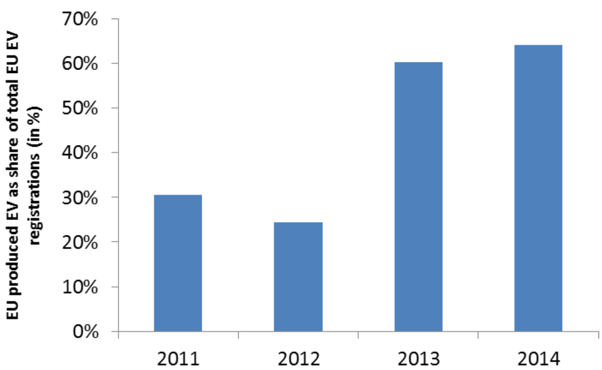

Figure 9: EV produced within the EU as share of total EU EV registrations (passenger cars).

[10] EFTA: European Free Trade Association: Iceland, Norway, and Switzerland.

3.6. Light commercial EV

Electric light commercial vehicles (eLCV) are seen as an interesting option as LCV are often operated in fleets with regular overnight parking and hence charging possibility in defined depots. Many small delivery vans typically cover only short trip distances. Moreover, LCV purchase decisions are typically more strongly based on cost-effectiveness calculations than passenger car purchases, with a stronger focus on total costs of ownership. This may foster EV acceptance, as fuel costs are lower, but may also be detrimental to their choice due to uncertainties regarding the residual value of used eLCV. Thus, it is interesting to have a closer look on the deployment of eLCV in the EU. Monitoring data for LCV are only available for the years 2012 to 2014. We analysed the LCV data on the basis of the final monitoring files for 2012 and 2013, and on the basis of the provisional data for 2014. Compared to the M1 monitoring files we had to do very few modifications to the N1 data. According to our analysis a total of 19,994 electric LCV were registered in the EU from 2012 to 2014. Only very few (in total five vehicles) of these were PHEV or REV, all the rest BEV. In the following we only look at the BEV variants. The total eLCV registrations in the EU from 2012 to 2014 constituted about 0.52% of the total LCV registrations during the same period, which is actually higher than the EV passenger car new registration share in the same period. Different from the electric cars for the eLCV this share did not grow from 2012 to 2014 but was rather stable. France is by far the biggest eLCV market, followed by Germany, UK, the Netherlands, and Italy.

Figure 10 shows the evolution of eLCV registrations in the EU and France from 2012 to 2014. It also shows the number of registrations for the two top selling models, the Renault Kangoo Z.E. and the Nissan E-NV200. Figure 10 reveals that the total registrations of eLCV increased slightly and steadily in the EU from 2012 to 2014. In contrast, the share of EV from total LCV registrations stayed nearly constant, fluctuating between 0.51 and 0.54%. France is the biggest eLCV market and consistently accounted for more than 50% of all eLCV registrations in the EU in all three years. France witnessed a strong growth of eLCV registrations from 2012 to 2013. In 2013 the number of eLCV registrations and also their share of total LCV registrations in France peaked and both numbers declined slightly from 2013 to 2014. France has the same incentives for eLCV as for electric cars (see chapter 3.4). France is also home to Renault and Peugeot/Citroen, which both offer eLCV, and to several smaller eLCV manufacturers.

The top model in terms of number of eLCV registrations, both in the EU and in France, is the Renault Kangoo Z.E. It was responsible for more than 50% of all eLCV registrations in all years in the EU and France. This share declined over the years from a level above 90% to close to 50% with new models entering the market. The Nissan E-NV200 entered the EU market in 2014 and in that year reached a market share of approximately 20% of all eLCV registered in the EU. It did particularly well in the Netherlands with a share of more than 80% of eLCV and the UK with an almost 60% eLCV share. Altogether, this shows that the eLCV market in the EU currently strongly relies on two models. With the advent of new eLCV models it can be expected that the market for eLCV should spread more widely across more models.

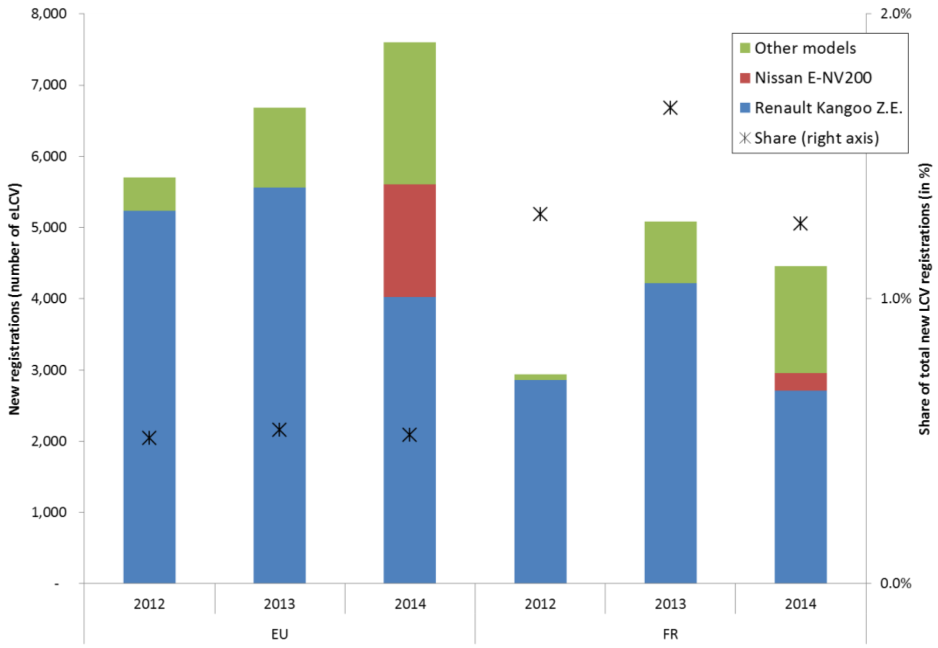

Figure 10: eLCV registrations of the EU and France, 2012 to 2014.
Both the number of eLCV (left y-axis) and the EV as share of total LCV registrations in given year (right y-axis) are shown.

4. Conclusions

On the basis of the monitoring databases for the implementation of Regulation EC No 443/2009 and Regulation EU No 510/2011 we have analysed EV deployment in the EU during the past five years. The monitoring databases are a very good publicly available source for this analysis. However, in order to make them more useful for the intended analysis, we had to perform a number of correction and processing steps on the raw data files. We have compared our corrected databases with database versions used in other studies and generally found good alignment of the corrected files. In order to increase transparency and avoid unnecessary double work for other researchers, we make the summary data of our corrected files available in the Annex to this report.

Since 2010 the deployment of EV in the EU has gained momentum. Models offered and size segment coverage of EV passenger cars increased significantly from 2010 to 2014. The number of registrations and also the EV share, albeit still small compared to the total vehicle market, has increased steadily in the EU. This trend has continued in the first half of 2015.

For passenger cars we identify a clear distinction between the BEV and PHEV markets. PHEV show typically more presence in the larger car size segments, while BEV are more present in the smaller size segments. Also, most of the current PHEV models offered are derived from conventional (internal combustion engine propelled) cars. BEV models offered are still largely constituted by unique models which are specifically developed as BEV, but the number of models derived from conventional cars is increasing. This is an indication for a beginning mass commercialisation of BEV in the EU. It can be expected that the number of models offered will continue to grow in the future. Higher purchase costs for EV, mainly because of the significant cost of the traction battery, seem to remain an important barrier for a larger EV uptake. Nevertheless, recent studies indicate that battery costs may decline faster than originally anticipated in literature (Weiss et al., 2012, Nykvist and Nilsson, 2015). This may help to further decrease the cost gap between EV and conventional cars and hence may substantiate the market momentum further.

The demand for EV has been fostered by various incentive schemes in different EU member states. The number of EV registrations and achieved market shares in the EU member states (MS) align well primarily with the level of financial benefits that EV get. Generally speaking, the MS with low or no incentives display low numbers of registrations and EV shares. The design of the incentives and its continuity can have a large impact on EV deployment. In some MS, such as the Netherlands and Estonia, changes in the incentives led to EV registration peaks and subsequently declining EV registration numbers. This seems to indicate that policies remain to be needed in order to overcome market barriers for the EV deployment at this moment in time. Altogether, various forms of incentives and support policies have been tested in the MS. Lessons learnt from them should be applied for the upcoming development of national policy frameworks that become mandatory in 2016 as part of the directive on the deployment of alternative fuels infrastructure (EU, 2014). Especially the provision of the directive for cooperation among MS for the development of their national policy frameworks should encourage coherent and coordinated approaches across MS. The present report focuses on the vehicle supply side and on incentives encouraging vehicle demand. Infrastructure aspects need to be analysed in more detail in further studies.

When comparing the EV deployment in Europe with the one in other regions of the world, we find that EV market shares in Europe are more or less on par with the EV deployment in the US and Japan. From an industrial policy perspective it is encouraging that the share of EV manufactured in the EU has increased from roughly 30% in 2011 to approximately 65% in 2014. This seems to indicate that during these past five years, EU EV industry has developed from a latecomer into an important player. However, this development should be further substantiated by a higher EU engineering and manufacturing share for automotive traction batteries, as well.

For eLCV we find that their deployment in the EU during the past three years was strongly dominated by the French market and by two models, only. Registration numbers slightly grew from 2012 to 2014, while the eLCV market share stayed more or less constant. Hence, for eLCV we cannot currently observe a clear momentum or trend to increasing deployment in the EU.

As an overall conclusion we can state that indeed the EU seems to currently witness a transition from testing and experimenting with EV towards full scale EV commercialisation. Nevertheless, the beginning market deployment is still dependent on support policies and vulnerable to changes in such support. For the coming years it will be important to accompany EV market deployment with carefully designed policy measures that provide certainty and are consistent and coherent across the EU. These can then be gradually reduced when further cost reduction for EV kicks in and EV become a regular choice option for the mainstream market. Support measures should be based on technology neutral criteria, such as CO_2 and other pollutant emissions, or energy efficiency.

5. Acknowledgements

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ANNEX - Data

2010 M1 data

Row Labels	AT	BE	CZ	DE	ES	FI	FR	IE	IT	NL	PT	SE	UK	Grand Tota
⊟A	**107**	**36**	**4**	**119**	**49**	**4**	**58**	**15**	**67**	**53**	**8**	**35**	**65**	**620**
⊟BEV	**107**	**36**	**4**	**119**	**49**	**4**	**58**	**15**	**67**	**53**	**8**	**35**	**65**	**620**
FIAT500E	12											28		40
Others		17												17
Panda EV									31					31
Smart EV	2	4	4	106	11		34		33		5		62	261
TH!NK CITY	87	15			38	4	11			49		3	1	208
C-ZERO/ION/I-Miev	6			13			13	15	3	4	3	4	2	63
⊟C					**24**			**2**			**10**	**2**		**38**
⊟BEV					**24**			**2**			**10**	**2**		**38**
LEAF					24			2			10			36
Prius EV												2		2
⊟M	**1**	**9**			**2**		**1**	**1**	**17**			**1**	**25**	**57**
⊟BEV	**1**	**9**			**2**		**1**	**1**	**17**			**1**	**25**	**57**
Doblo EV					1				12					13
EXPERT TEPEE EV													10	10
FIORINO ELETTRICO					1		1	1				1		4
Other M									5				15	20
Piaggio S85	1													1
QUBO EV		9												9
⊟S	**2**	**2**			**1**		**11**	**1**				**2**	**26**	**45**
⊟BEV	**2**	**2**			**1**		**11**	**1**				**2**	**26**	**45**
Tesla ROADSTER	2	2			1		11	1				2	26	45
Grand Total	**110**	**47**	**4**	**119**	**76**	**4**	**70**	**19**	**84**	**53**	**18**	**40**	**116**	**760**

2011 M1 data

Row Labels	AT	BE	CZ	DE	DK	EE	ES	FI	FR	HU	IE	IT	LU	NL	PL	PT	RO	SE	SI	SK	UK	Grand To
⊟A	**572**	**152**	**56**	**1346**	**338**	**56**	**276**	**28**	**1737**	**10**	**1**	**277**	**29**	**464**	**34**	**91**	**5**	**132**	**12**	**19**	**417**	**6052**
⊟BEV	**572**	**152**	**56**	**1346**	**338**	**56**	**276**	**28**	**1737**	**10**	**1**	**277**	**29**	**464**	**34**	**91**	**5**	**132**	**12**	**19**	**417**	**6052**
FIAT500E												6										6
MIA		1							249													250
Others																					11	11
Panda EV												9			3							12
Smart EV	31	32	23	283			10		52			80	2	267	2	14		2			114	912
TH!NK CITY	59	2		15			19	6	110					27							3	241
C-ZERO/ION/I-Miev	482	117	33	1048	338	56	247	22	1326	10	1	182	27	170	29	77	5	130	12	19	289	4620
⊟B									**399**													**399**
⊟BEV									**399**													**399**
BLUECAR									399													399
⊟C	**41**	**88**		**485**	**3**		**77**		**125**		**45**	**9**	**2**	**350**		**100**		**21**			**642**	**1988**
⊟BEV	**39**	**72**		**209**	**3**		**76**		**89**		**45**	**7**	**2**	**338**		**98**		**18**			**635**	**1631**
A3 EV												2										2
A-Class E-CELL	19	9		103			17							34								182
C30 EV	2	4		6					6					6				17				41
Golf EV	15			80																		95
LEAF	3	59		20	3		59		83		45	5	2	298		98		1			635	1311
⊟PHEV	**2**	**16**		**276**			**1**		**36**			**2**		**12**		**2**		**3**			**7**	**357**
PRIUS PLUG-IN HYBRID																					3	3
AMPERA/VOLT	2	16		276			1		36			2		12		2		3			4	354
⊟D	**5**	**18**		**10**	**24**		**23**		**394**					**4**		**12**						**490**
⊟BEV	**5**	**18**		**10**	**24**		**23**		**394**					**4**		**12**						**490**
FLUENCE Z.E	5	18		10	24		23		394					4		12						490
⊟J				**1**																		**1**
⊟BEV				**1**																		**1**
Zotye 5008 EV				1																		1
⊟M	**6**	**1**										**9**		**1**							**10**	**27**
⊟BEV	**6**	**1**										**9**		**1**							**10**	**27**
FIORINO ELETTRICO	4											4		1								9
MASTER EV												2										2
Other M																					10	10
Piaggio S85	2																					2
QUBO EV		1										1										2
SCUDO EV												2										2
⊟S	**9**	**19**					**2**		**9**					**28**				**2**			**26**	**95**
⊟BEV	**9**	**19**					**2**		**9**					**28**				**2**			**26**	**95**
Tesla ROADSTER	9	19					2		9					28				2			26	95
Grand Total	**633**	**278**	**56**	**1842**	**365**	**56**	**378**	**28**	**2664**	**10**	**46**	**295**	**31**	**847**	**34**	**203**	**5**	**155**	**12**	**19**	**1095**	**9052**

2012 M1 data

Row Labels	AT	BE	BG	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	Grand T
⊟A	209	264			1738	201	456		184	8	3227	3		318		38	6	1	371	17	37		47	18	2	457	7602
⊟BEV	209	264			1737	201	456		184	8	3227	3		318		38	6	1	371	17	37		47	18	2	457	7601
E-UP					65																						65
FIAT500E					2																						2
INNY																				1							1
iQ EV		3			1																						4
MIA		18			111						381					1			6								517
Others														2												5	7
Smart EV	12	17			734				1		66			37		17			55		17					13	969
TH!NK CITY	8				12				20	2				3			6		13	1							65
TWIZY					1				1																		2
C-ZERO/ION/I-Miev	189	226			811	201	456		162	6	2780	3		276		20		1	297	15	20		47	18	2	439	5969
⊟PHEV-D					1																						1
XL1					1																						1
⊟B	1				35						1583															1	1620
⊟BEV	1				35						1583															1	1620
Agila STROMOS					5																						5
BLUECAR											1543																1543
Corsa EV					30																						30
MAZDA2 ELEKTRO	1																										1
ZOE											40															1	41
⊟C	332	425	4	15	1851	73	57	1	265	166	1171	20	70	285	3	42	3		4471	12	45	5	831	10	5	1746	11908
⊟BEV	82	154			651	73	53		160	43	539	3	70	146		14			293		15		211	1		761	3269
1 Series EV					11																					66	77
A-Class E-CELL	14	5			73				6										14								112
B-Class EV					21																						21
C30 EV	4	10			12														10				83				119
FOCUS ELECTRIC					15																						15
Golf EV		10			51						15																76
I3					14																						14
LEAF	64	129			454	73	53		154	43	524	3	70	146		14			269		15		128	1		695	2835
⊟FCEV					25																						25
F-CELL					25																						25
⊟PHEV	250	271	4	15	1175		4	1	105	123	632	17		139	3	28	3		4178	12	30	5	620	9	5	985	8614
PRIUS PLUG-IN HYBRID	75	61		6	321		4		60	73	407	7		39	3	7	3		1181	4	13	1	499	1		467	3232
AMPERA/VOLT	175	210	4	9	854			1	45	50	225	10		100		21			2997	8	17	4	121	8	5	518	5382
⊟D	126	115			242	195			78	2	295		66	38		9			118	6	11		16			67	1384
⊟BEV	126	111			234	195			78		291		66	38		9			115	6	11					67	1347
A4 EV					21																						21
DS5 EV									1																		1
FLUENCE Z.E	126	111			213	195			77		291		66	38		9			115	6	11					67	1325
⊟PHEV-D		4			8					2	4								3				16				37
V60 Plug in Hybrid		4			8					2	4								3				16				37
⊟J					35																						35
⊟BEV					33																						33
TITAN					1																						1
X1 electric					32																						32
⊟FCEV					2																						2
Highlander FCV					2																						2
⊟M	1				12		3		3					7					1	1							28
⊟BEV	1				12		3		3					7					1	1							28
5008 EV																			1								1
ALTEA EV									3																		3
COOLCAR ELEKTRO	1																										1
FIORINO ELETTRICO							3							6													9
MASTER EV														1													1
PARTNER EV																				1							1
Sprinter EV					2																						2
VITO E-CELL					10																						10
⊟S	20	87		1	135					3	35			18		2			123		1		23			12	460
⊟BEV	8	33			80						10			12					26		1		2			12	184
DRAGHETTO					7									5													12
MODEL S					3																						3
SLS AMG ELECTRIC DRIVE					2																						2
Tesla ROADSTER	8	33			68						10			7					26		1		2			12	167
⊟PHEV	12	54		1	55					3	25			6		2			97				21				276
KARMA	12	54		1	52					3	25			6		2			97				21				273
PANAMERA S E-HYBRID					3																						3
Grand Total	689	891	4	16	4048	469	516	1	530	179	6311	23	136	666	3	91	9	1	5084	36	94	5	917	28	7	2283	23037

2013 M1 data

Row Labels	AT	BE	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	Grand To
⊟A	**111**	**93**		**3197**	**35**	**37**		**209**	**5**	**1053**			**244**		**64**	**1**	**5**	**175**	**2**	**75**	**2**	**59**		**1**	**209**	**5577**
⊟BEV	**110**	**93**		**3168**	**35**	**37**		**209**	**5**	**1053**			**244**		**64**	**1**	**5**	**175**	**2**	**75**	**2**	**59**		**1**	**209**	**5547**
E MII								1																		1
E-UP	8	4		832	30					64					1			12				40			30	1021
iQ EV		3																								3
MIA	2	5		17		19				205			7					6	1						3	265
NEOMA										3																3
Others													2													2
Smart EV	71	59		1897	1			57		478			155		53			53	1	31					85	2941
TH!NK CITY	1	2		8									1			1		6								19
Zero EM1		2											7													9
C-ZERO/ION/I-Miev	28	18		414	4	18		151	5	303			72		10		5	98		44	2	19		1	91	1283
⊟PHEV-D	**1**			**29**																						**30**
XL1	1			29																						30
⊟B	**369**	**85**		**1023**	**91**			**181**		**6256**			**204**		**66**			**505**	**2**	**22**					**376**	**9180**
⊟BEV	**369**	**85**		**1023**	**91**			**181**		**6256**			**204**		**66**			**505**	**2**	**22**					**376**	**9180**
BLUECAR										638																638
MINI BEV				3																						3
ZOE	369	85		1020	91			181		5618			204		66			505	2	22					376	8539
⊟C	**259**	**276**	**8**	**2551**	**193**	**92**	**1**	**350**	**108**	**2030**	**14**	**44**	**410**	**6**	**33**	**7**		**6227**	**29**	**71**	**1**	**738**	**13**	**6**	**2804**	**16271**
⊟BEV	**108**	**166**		**1490**	**193**	**91**		**283**	**43**	**1512**	**11**	**43**	**353**	**2**	**17**	**2**		**701**	**19**	**46**		**324**		**5**	**1901**	**7310**
1 Series EV				2																						2
A-Class E-CELL	2			25																						27
B-Class EV				43																						43
C30 EV																						2				2
FOCUS ELECTRIC	4	4		58				5	2	6			2					7		2		4			7	101
Golf EV				92																						92
I3	14	21		413				15		68			34		1			210	4	6		1			94	881
LEAF	88	141		857	193	91		263	41	1438	11	43	317	2	16	2		484	15	38		317		5	1800	6162
⊟FCEV				**18**																						**18**
F-CELL				18																						18
⊟PHEV	**145**	**90**	**8**	**777**		**1**		**55**	**65**	**468**	**3**		**33**	**4**	**15**	**5**		**5484**	**10**	**21**	**1**	**404**	**13**	**1**	**819**	**8422**
PRIUS PLUG-IN HYBRID	99	55	6	424		1		52	45	397			8	3	10	3		2544	5	14	1	376	8		507	4558
AMPERA/VOLT	46	35	2	353				3	20	71	3		25	1	5	2		2940	5	7		28	5	1	312	3864
⊟REV	**6**	**20**		**266**			**1**	**12**		**50**		**1**	**24**		**1**			**42**		**4**		**10**			**84**	**521**
I3 RANGE EXTENDER	6	20		266			1	12		50		1	24		1			42		4		10			84	521
⊟D	**36**	**165**		**378**	**39**			**128**	**66**	**263**		**3**	**205**		**14**			**5904**		**23**	**1**	**590**			**82**	**7897**
⊟BEV	**13**	**8**		**38**	**35**			**128**		**18**		**3**	**38**		**1**			**13**		**23**	**1**				**7**	**326**
A4 EV				1																						1
FLUENCE Z.E	13	8		37	35			128		18		3	38		1			13		23	1				7	325
⊟PHEV-D	**23**	**157**		**340**	**4**				**66**	**245**			**167**		**13**			**5891**				**590**			**75**	**7571**
V60 Plug in Hybrid	23	157		340	4				66	245			167		13			5891				590			75	7571
⊟J		**1**		**37**	**15**			**2**	**36**	**4**								**8008**		**2**		**99**			**2**	**8206**
⊟BEV				**17**																						**17**
RAV4 EV				1																						1
X1 electric				16																						16
⊟FCEV				**4**	**15**				**1**	**1**												**3**				**24**
IX35 FUEL CELL AUTO				4	15				1	1												3				24
⊟PHEV		**1**		**16**				**2**	**35**	**3**								**8008**		**2**		**96**			**2**	**8165**
OUTLANDER PHEV		1		16				2	35	3								8008		2		96			2	8165
⊟M	**3**	**1**		**20**		**1**		**1**										**5**								**31**
⊟BEV	**3**	**1**		**20**		**1**		**1**										**5**								**31**
E6																		5								5
FIORINO ELETTRICO						1																				1
KANGOO Z.E		1																								1
SOUL EV				6																						6
Sprinter EV				1																						1
VIANO EV								1																		1
VITO E-CELL	3			13																						16
⊟S	**54**	**204**	**2**	**484**	**112**	**1**		**16**	**4**	**115**			**50**		**6**			**1317**	**4**	**14**	**1**	**29**	**5**		**3**	**2421**
⊟BEV	**50**	**148**		**239**	**112**	**1**		**3**	**2**	**36**			**26**		**5**			**1196**	**4**		**1**	**19**	**5**		**3**	**1850**
DRAGHETTO													5													5
E-RUFROADSTER				1																						1
Lotus Exige EV																									3	3
MODEL S	48	148		228	112	1		3	2	35			19		5			1193	4		1	19	5			1823
SCIROCCO EV				1																						1
SLS AMG ELECTRIC DRIVE				8														2								10
Tesla ROADSTER	2			1						1			2					1								7
⊟PHEV	**4**	**56**	**2**	**245**				**13**	**2**	**79**			**24**		**1**			**121**		**14**		**10**				**571**
I8				24																						24
KARMA	1	13	1	11					1	12			1					48				3				91
PANAMERA S E-HYBRID	3	43	1	210				13	1	67			23		1			73		14		7				456
Grand Total	**832**	**825**	**10**	**7690**	**485**	**131**	**1**	**887**	**219**	**9721**	**14**	**47**	**1113**	**6**	**183**	**8**	**5**	**22141**	**37**	**207**	**5**	**1515**	**18**	**7**	**3476**	**49583**

2014 M1 data

Row Labels	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	Grand T
A	312	93				2827	238	77	15	51	6	1123	13	2		352	2	73	138	5	317	12	32	3	214	14	23	230	6172
BEV	310	93				2783	238	77	15	51	6	1123	13	2		352	2	73	138	5	315	12	32	3	214	14	23	230	6124
E-UP	219	41				920	219	38		14	4	276		2		37		19	135		78	1	10		200	3	22	92	2330
FIAT500E						3										8													11
MIA		1				2		1				9				7					1							1	22
Others						1										2													3
Smart EV	78	43				1591	7		15	35		509				252		53			223	1	18		1	11		114	2951
TH!NK CITY	9					79																							88
TWIZY																				2									2
Zero EM1								14				2				4				1									21
C-ZERO/ION/I-Miev	4	8				187	12	24		2	2	327	13			42	2	1	3	2	13	10	4	3	13		1	23	696
PHEV-D	2					44															2								48
XL1	2					44															2								48
B	387	110				1551	145	14		289		7285			10	155		97		2	249	5	34		204			1015	11552
BEV	387	110				1551	145	14		289		7285			10	155		97		2	249	5	34		204			1015	11552
Agila STROMOS						4																							4
BLUECAR												1100																	1100
BlueSummer												70																	70
ZOE	387	110				1547	145	14		289		6115			10	155		97		2	249	5	34		204			1015	10378
C	623	647	2	1	29	5571	657	217	40	618	115	2701		28	209	629	5	155	17	1	2221	62	145	1	928	14	27	6365	22028
BEV	431	397				3339	582	206	23	587	76	1915		24	201	460	1	92	17	1	1241	36	121		552	8	26	4666	15002
A-Class E-CELL						7																							7
B-Class EV						162						15																	177
C30 EV						48																			16				64
FOCUS ELECTRIC	2					16					4	11						2			3				2			11	51
Golf EV	12	45				1046	20			16		92		2	2	7		22			22		3		17	2		53	1361
I3	296	173				1247	62	4	23	107		193		1	11	124		41	12	1	194	17	59		78			556	3199
LEAF	121	179				812	500	202		464	72	1604		21	188	329	1	27	5		1022	19	59		439	6	26	4046	10142
OPEL						1																							1
FCEV						5																							5
F-CELL						5																							5
PHEV	101	69	2	1	8	1235		10	1	31	39	378			2	64	1	18			630	3	11	1	244	6	1	868	3724
A3 SPORTBACK E-TRON	59	27				460			1	9	3	161			2	23		4			79				14			66	908
COLT ATTIVO																												1	1
GOLF GTE		1				498					2	108						2			399								1010
PRIUS PLUG-IN HYBRID	13	28		1	3	153		4		22	18	93				10	1	7			109	3	9		208	5	1	379	1067
AMPERA/VOLT	29	13	2		5	124		6			16	16				31		5			43		2	1	22	1		422	738
REV	91	181			21	992	75	1	16			408		4	6	105	3	45			350	23	13		132			831	3297
I3 RANGE EXTENDER	91	181			21	992	75	1	16			408		4	6	105	3	45			350	23	13		132			831	3297
D	103	138			8	454	6	1	4	48	49	189			3	117	1	10	1	11	3035	7	10		708			167	5070
BEV	2	1				9	4			18		4			3	30		1		11	2	1	1					4	91
FLUENCE Z.E	2	1				9	4			18		4			3	30		1		11	2	1	1					4	91
PHEV						53																							53
C350HYBRIDPLUS						51																							51
MONDEO PHEV						2																							2
PHEV-D	101	137			8	392	2	1	4	30	49	185				87	1	9	1		3033	6	9		708			163	4926
V60 Plug in Hybrid	101	137			8	392	2	1	4	30	49	185				87	1	9	1		3033	6	9		708			163	4926
E						18																						1	19
BEV																												1	1
520D AC																												1	1
PHEV						18																							18
E300PLUGIN						18																							18
F	1	19				70			1		1	10				1					17			2	2			14	138
PHEV	1	19				70			1		1	10				1					17			2	2			14	138
S 500 PLUG IN HYBRID	1	19				70			1		1	10				1					17			2	2			14	138
J	97	196				1185	2	12	2	219	149	905	3	6	25	103	1	23			7743	1	35	9	2297	2		5438	18453
FCEV	3	3				3	1					1				10					2							6	29
IX35 FUEL CELL AUTO	3	3				3	1					1				10					2							6	29
PHEV	94	193				1182	1	12	2	219	149	904	3	6	25	93	1	23			7741	1	35	9	2297	2		5432	18424
CAYENNE S E-HYBRID	15	33				91	1	1	2	10	6	67		1		8		2			49		3		8			70	367
FUSIONPHEV						1																							1
GLC350PIHYBRID4MATIC						32																							32
OUTLANDER PHEV	79	160				1058		11		209	143	837	3	5	25	85	1	21			7692	1	32	9	2289	2		5362	18024
M	14	42				83	4	15		63	2	75				20		3	16	1	220		3	1	5	1	1	57	626
BEV	14	42				69	4	15		63	2	75				20		3	16	1	218		3	1	5	1	1	57	610
E6		36								15											3							8	62
E-NV200	11	3				49	3	9		46	2	12				9		1	16		190		2		3			27	383
E-SCUDO																					1								1
FIORINO ELETTRICO								6																					6
KANGOO Z.E																1													1
SOUL EV	3	3				20				2		63				10		2		1	24		1	1	2	1	1	22	156
VITO E-CELL							1																						1
PHEV						14															2								16
C-MAX PHEV						14															2								16
S	179	802		2	9	1465	461	22	1	70	107	493	1	6	2	119	5	47	5	1	1777	19	39	4	286	14	1	1206	7143
BEV	137	521				825	460	19		20	94	328		3		63	1	35	3	1	1533	7	5	3	266	13		715	5052
DRAGHETTO																10													10
HAI E3	1																												1
MODEL S	136	521				817	460	19		20	94	328		3		53	1	35	3	1	1533	7	5	3	266	13		714	5032
PLUS 8																												1	1
Porsche Electric						3																							3
SLS AMG ELECTRIC DRIVE						2																							2
SPEEDSTER						1																							1
Tesla ROADSTER						2																							2
PHEV	42	281		2	9	640	1	3	1	50	13	165	1	3	2	56	4	12	2		244	12	34	1	20	1	1	491	2091
918 SPYDER	5	2				53				4		4		1		1	2				7	2	2		4		1	9	97
I8	36	56			9	390	1	1		27	1	53		1	2	34	2	9	1		57	10	13		6			294	1003
KARMA		2				21					1	2						1											27
PANAMERA S E-HYBRID	1	221		2		176		2	1	19	11	106	1	1		21		2	1		180		19	1	10	1		188	964
Grand Total	1716	2047	2	3	46	13224	1513	358	63	1358	429	12781	17	42	249	1496	14	408	177	21	15579	106	298	20	4644	45	52	14493	71201

2012 N1 data

Row Labels	BE	DE	DK	EL	ES	FI	FR	IE	IT	LU	NL	PL	PT	SE	UK	Grand To
⊟BEV	**241**	**832**	**116**	**2**	**221**	**12**	**2943**	**45**	**395**	**20**	**311**	**7**	**16**	**266**	**279**	**5706**
CITY CHARGE									1							1
C-ZERO									4							4
DUCATO Electric									5					1		6
eBOXER															1	1
ECOMILE									1							1
ePARTNER	12				18							1			2	33
Esagono Energia GOLIA							2									2
FAAM ECOMILE	2								1							3
FAAM JOLLY 1200	12															12
FAAM JOLLY 2000	1															1
FIORINO Electric									7							7
Giotti Victoria GLADIATOR EV									7							7
IVECO DAILY electric	6															6
KANGOO Z.E.	176	791	116		176		2860	45	250	18	264	6	16	265	255	5238
MIA	15						49				2					66
Micro-Vett EdyOne									25							25
Other N1	1			2					4							7
PANDA ELEKTRA VAN									8							8
Piaggio PORTER ELECTRIC	1	3			26		30		81	1	33					175
SCUDO Electric									1							1
Tata ACE electric															13	13
TRANSIT CONNECT Electric	13														3	16
VITO E-CELL	2	38			1	12	2			1	12				5	73
Grand Total	**241**	**832**	**116**	**2**	**221**	**12**	**2943**	**45**	**395**	**20**	**311**	**7**	**16**	**266**	**279**	**5706**

2013 N1 data

Row Labels	BE	DE	DK	EE	ES	FI	FR	IE	IT	LU	NL	PL	PT	RO	SE	SK	UK	Grand To
⊟BEV	**106**	**492**	**53**	**4**	**115**	**2**	**5088**	**7**	**188**	**42**	**162**	**6**	**27**	**4**	**196**	**2**	**187**	**6681**
Aixam Mega M10 electric							70											70
Alke XT320E/EL		1					2											3
Alke XT420E/EL										1								1
BE SUN							13											13
BERLINGO Electric		1					13								1	1	4	20
C-ZERO							2											2
DUCATO Electric							1		1									2
ePARTNER		1					18										1	20
Esagono Energia GOLIA		2			1		1		2									6
Goupil G3							558											558
Goupil G5 electric							15											15
I-MIEV VAN						1							1					2
ION							56		3									59
IVECO DAILY electric									1									1
KANGOO Z.E.	71	436	53		72		4217	7	104	41	157	6	26	4	195		173	5562
LEAF							3		6									9
MIA	3	1		4			55		1		4						3	71
Micro-Vett EdyOne					4													4
Other N1	8				2												1	11
Piaggio PORTER ELECTRIC		2			35		14		70		1					1		123
TRANSIT CONNECT Electric	24																	24
VITO E-CELL		48			1	1	3										5	58
ZOE							47											47
Grand Total	**106**	**492**	**53**	**4**	**115**	**2**	**5088**	**7**	**188**	**42**	**162**	**6**	**27**	**4**	**196**	**2**	**187**	**6681**

2014 N1 data

Row Labels	AT	BE	CZ	DE	DK	EE	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SK	UK	Grand T
⊟BEV	**195**	**92**	**2**	**556**	**41**	**7**	**377**	**20**	**4458**	**1**	**2**	**11**	**321**	**1**	**21**	**2**	**6**	**588**	**4**	**26**	**3**	**214**	**4**	**650**	**7602**
Aixam Mega M10 electric									78																78
Aixam Mega MW12 electric									3																3
Alke XT320E/EL		3		1																		1			5
Alke XT420E/EL		13		1																					14
BE SUN									170																170
BERLINGO Electric	19	1	1	62	3		15		83		1		13			1		1		1		14	3	4	222
BLUEUTILITY									121																121
CITELEC									4																4
C-ZEN									19																19
C-ZERO									1																1
DUCATO Electric									7				2												9
E-NV200	75	18		98	19	6	132	20	242		1	3	76	1	1	1		471		10		21		381	1576
ePARTNER	4	10	1	47	1		11		81	1			11		8			4		2		1	1	32	215
Esagono Energia GOLIA				4					2				1					1							8
E-UP				11					1																12
FIORINO Electric						1												1							2
Goupil G3		2							432																434
Goupil G5 electric									92																92
I3																			1						1
I-MIEV VAN	1																								1
ION									95																95
IVECO DAILY electric													2									2			4
KANGOO Z.E.	95	43		300	16		161		2712			8	161		12		6	97	3	13	3	175		222	4027
LEAF									8				7												15
Ligier PULSE 4									59																59
MIA		2							3				4												9
Muses MOOVILLE									2																2
Piaggio PORTER ELECTRIC				7			58		2				44					1							112
VITO E-CELL	1			25	2				20									12						11	71
ZOE									221																221
⊟PHEV													**3**												**3**
Giotti Victoria GLADIATOR PHEV													3												3
⊟PHEV-D					**1**																				**1**
V60 Plug in Hybrid					1																				1
⊟REV																			**1**						**1**
I3 RANGE EXTENDER																			1						1
Grand Total	**195**	**92**	**2**	**556**	**42**	**7**	**377**	**20**	**4458**	**1**	**2**	**11**	**324**	**1**	**21**	**2**	**6**	**588**	**5**	**26**	**3**	**214**	**4**	**650**	**7607**

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Author(s): Christian Thiel, Jette Krause, Panagiota Dilara*
European Commission, Joint Research Centre, T.P. 441, Via Enrico Fermi, I-21027 Ispra (VA), Italy
*Panagiota Dilara currently at European Commission, DG GROW, BRU-BREY 10/030, Bruxelles, Belgium

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