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‘’I-CVUE: Incentives for Cleaner Vehicles in Urban Europe, FINAL RESULTS‘’

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Executive Summary

I-CVUE is a project co-funded by the Intelligent Energy Europe Programme of the European Union. The main goal of the I-CVUE project is to reduce CO2-emissions in urban environment by increasing the number of Electric Vehicles within fleets in urban areas. It includes a) supporting national and local authorities in defining their Electric Vehicle stimulation incentive schemes, as well as b) hands-on coaching of fleet managers in introducing EV’s in their fleets. This resulted in the uptake of an additional number of 1.000 electric vehicles in fleets replacing ICE-vehicles. It also resulted in policy change and additional incentive schemes for EV’s in some countries and regions.

I-CVUE is a cooperation between Energy Saving Trust UK, Coventry University UK, Transport for London UK, RACC Spain, Bosch Germany, Deutsches Zentrum fuer Luft- und Raumfahrt (DLR) Germany, FIER Automotive Netherlands, Austrian Energy Agency Austria, Electric Vehicle Union Norway and IRU Belgium.

Keywords: BEV, federal government, market development, municipal government, prediction, (5 key words)

1 Background

Since 2014, the I-CVUE consortium has partnered to accelerate the EV-uptake in fleets in Europe. The project officially ended in April 2017, but dissemination of results and lessons learned will continue. The I-CVUE project has two interrelated focus areas:

1. Increasing the uptake of EV’s in fleets by mentoring individual fleet-managers, offering EV usage analysis and coaching based on relevant incentives. By this mentoring process, the partners were able to support the uptake of an additional number of 1.000 electric vehicles in fleets replacing ICE-vehicles. I-CVUE also developed a Decision Support Model as support instrument for fleet-managers to calculate the total-cost-of-ownership of EV’s in their fleets.

2. Assess the effects of national incentives aiming at stimulating the uptake of EV's. For this purpose, a toolkit has been developed and tested. This toolkit calculates the difference in TCO between EV- and ICE-vehicles within the same vehicle segment. It also gives the users insights in various user scenario's (type of vehicle, mileage etc.), considering the local tax and incentive regulations. A predictive tool has been developed in which local and national policy makers can estimate the effects of introducing EV incentives on EV uptake. These results are visualised in a so called "heat-map", which shows the expected sales uptake in the various segments. This enables policy makers to fine-tune and gear their measures towards the segments they want to stimulate.

This paper will focus on the second focus area and will not take into account the results of mentoring fleet managers.

2 Policy measure results

2.1 National level

During the I-CVUE project, the consortium partners have analysed the effects of boundary conditions like (financial) incentives, charging infrastructure and the relation with the uptake of EV's[CITATION ICV \l 1043]. This has been done both in qualitative (through surveys and workshops) as well as in quantitative analysis. These analysis were done by comparing the relative prices (difference in purchase price and TCO) with the success of EV uptake. Although the focus for I-CVUE was on the partner countries, the information from other highly relevant countries have been used in the analyses (for example Iceland and Denmark).

2.1.1 Approach

Many countries stimulate the sales of EV's. This varies from the exemption of road tax, purchase subsidies, lowering purchase tax up to the exemption of VAT. All national incentives schemes have an influence on the purchase price and/or the operational costs of a vehicle. Some of these incentives only effect private ownership, others only business usage and some have effects on both.

All different national financial systems in combination with complex incentives, make it hard to create a comprehensive overview of the effect on the cost of ownership. Therefore the I-CVUE partnership analysed many different TCO calculations, so the effect could be visualised. The variables in the TCO calculation were;

1. Countries;
2. Private or business ownership (incl. Benefit in Kind);
3. Different mileages (12k km/y / 24k km/y);
4. Vehicles types (A, B, C, D, E & N segment) ;
5. Fuel type (diesel, petrol, electricity).

In terms of Purchase costs we calculated with;

1. List price;
2. Purchase tax;

3. Incentives/grands;
4. Other One Time Costs;
5. Other tax breaks (Like MIA in NL).

These outcomes were used to calculate the operational costs;

1. Depreciation;
2. Motor tax;
3. Insurance costs;
4. Energy costs (diesel, petrol, electricity);
5. Maintenance costs;
6. NIC (UK only).

The outcomes gave a good overview of the real effect of the incentives. This has been compared to the relative EV uptake within those countries.

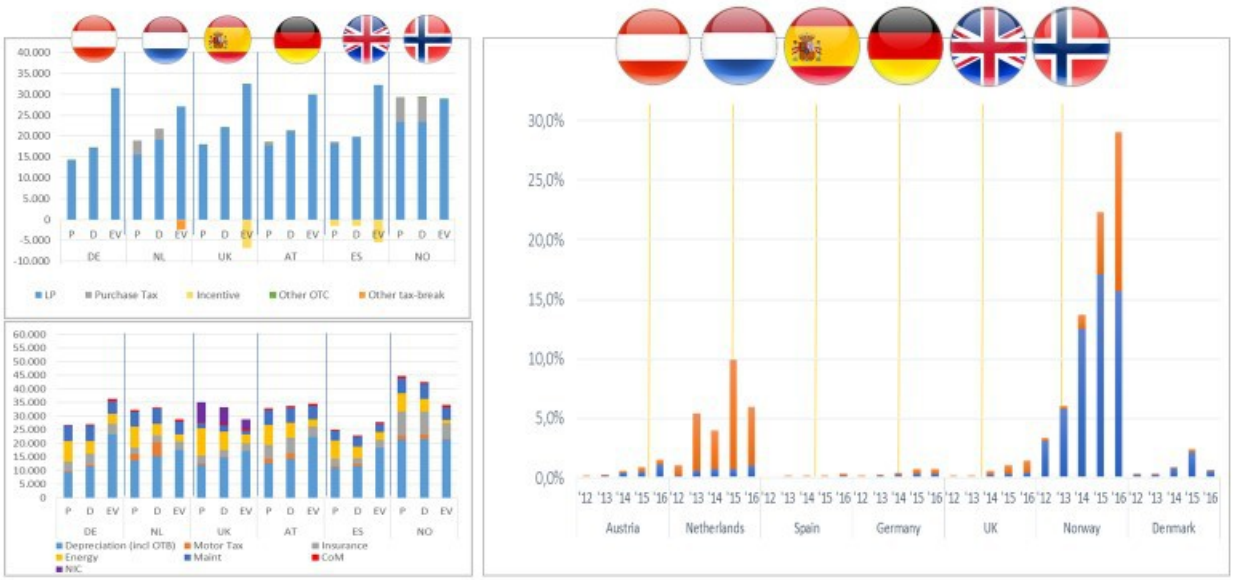

Figure 1. Overview of purchase costs, TCO costs and relative EV uptake – See attachment for more details

2.1.1 Observations

After gathering the information and analysing the costs and EV uptake, we have made the following observations:

- It appears that the VAT exemption in Norway has a strong impact on the private market, for the new sales, as well as for the pre-owned market (because the higher residual value, it also has a strong effect on the new sales for business usage). The VAT exemption in Norway is approved by

the EFTA by a detailed ‘State aid analyses’ with positive feedback of the EU. There are several European countries where there are exemption rules with regards to VAT on vehicles like Belgium and Austria.

- The effect for the other countries of these kinds of VAT exemption incentives is the expectation of the export of EV’s from these countries to Norway.

- There are differences between the countries with regards to stimulating PHEV’s and BEV’s. There are countries only focussing on the stimulation of BEV’s, while other countries like the UK and Norway recently started stimulating PHEV’s as well. Because Norway recently only supported the uptake of BEV’s, the total percentage of BEV’s is high (only 10% of the EVs is an PHEV). Reliable comparisons for the private market are not yet there, but it’s clear that stimulating PHEV’s needs less incentives when compared to the stimulation of BEV’s.

- It’s clear that making the PHEV’s relatively more attractive, has a negative influence on the sales of BEV’s. Vice versa, making the purchase tax higher for PHEV’s, the BEV’s will get more attractive. This is a logical effect that also is applicable when the financial advantages are larger between EV’s and fuel-efficient petrol and diesel vehicles.

- The effect of incentives is visible in most countries, but at the same time, the relative growth in sales of EV’s is still limited. In most countries, it leads to an EV sales rate of below 1%, with some exemptions of 2%, of which 0,6% BEV’s (combined figures of business and private market). There are two more extreme exemptions for Norway (35% in 2017) and the Netherlands (10% 2015). In the Netherlands, there are high scores of PHEV’s in the business market, but low sales of BEV’s. In Norway the sales of EV’s are mostly BEV’s, most of them in the private market.

2.2 Local level

Against the background of the national boundary conditions, tax and incentive systems, we have evaluated with City Authorities throughout Europe, which effective measures can be taken to stimulate the uptake of EV’s in cities. I-CVUE has created a policy support instruments in which policy makers at local and national level test the estimated effectiveness from specific policy measures on EV uptake. Measures at national levels, like changing the tax regulation or incentives, but also at local level like for example free toll road access, bus-lane access, free park & charge and emission zones are also taken into account. Many comparative studies have been done on the incentives in different countries before. However, the study done by I-CVUE is unique in methodology and depth. Most studies just compare incentives, which says little about what the real comparative benefits for EV buyers are.

Via multiple surveys in different regions, the I-CVUE consortium gathered the information to create a tool which indicates possible scenario’s. These scenarios are based up-on a conservative, a basic and a progressive estimation of the effect of several local incentives within different cities. At the time of writing, it’s work in progress, but in the following graphs the scenarios of uptake are shown.

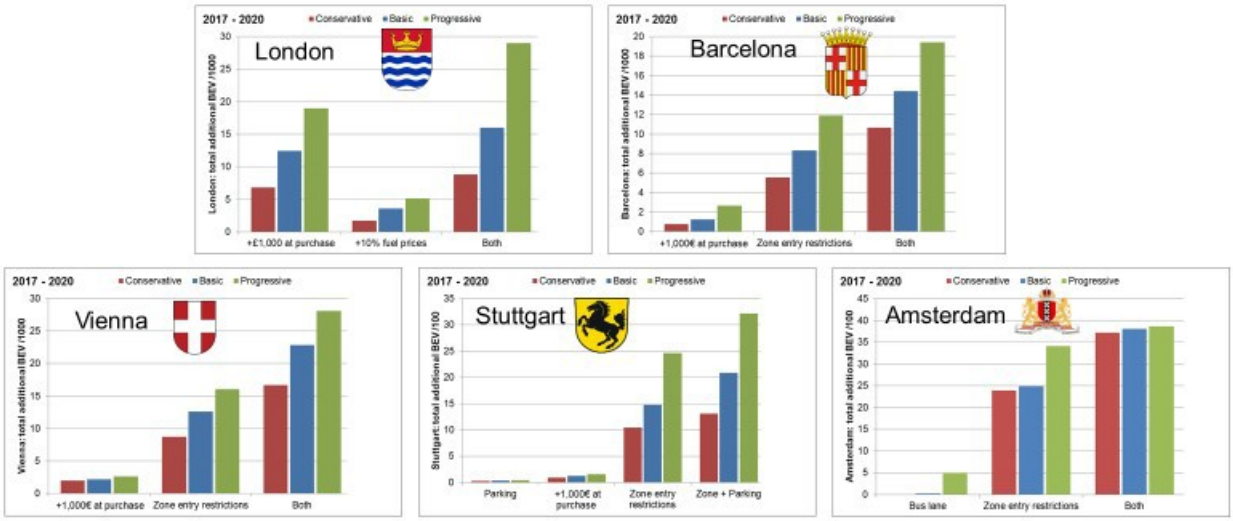

Figure 2. Impact of policy measures at local level – Indicative scenario's

A local measure earlier this year in the city of Oslo, Norway, caused a dramatic (and unforeseen) impact. Because of low windspeeds, the air quality in the city reached a low level. Therefore, the city decided to ban all diesel vehicle from the city during 2 days. This contributed to increase in PHEV+BEV sales share to >45%, which means this had an effect of > 10%.

2.3 TCO tool

Due to the complexity of the study (in which each country has its regulatory framework for taxes (ranging from road taxes, purchase taxes till company profit taxes as well as incentive models and national car park specifics), I-CVUE developed a TCO (2) tool which enables fleet managers and private purchasers to calculate and compare the purchase cost and TCO, specific for their country including the specific tax and incentive systems. At present, the study includes several of the major European markets for EV's. An unique factor within the tool, is the calculated effect of the incentives on the actual purchase price as well as on the TCO for each vehicle segment. In order to match the decision making process of fleet and private buyers as close as possible, these purchase prices and TCO's of EV's are compared to the actual ICE-vehicles buyers would normally purchase.

2.4 Price elasticity

In Germany, a subsidy of € 4.000 for BEV purchase was introduced in 2016. I-CVUE compared the sales uptake of BEV's before and after the purchase subsidy and the effect was an uptake of + 0,05% of BEV sales. The effect was relatively low, because even with the subsidy, there was still a big difference in the TCO calculations between ICE and BEV.

We have looked at the purchase price and TCO differences in multiple countries and cities, and placed them in a graph (see figure 3). All the comparisons generated insights into the price-elasticity of BEV uptake in the various EU countries. It has shown that financial thresholds needs to be overcome, to differentiate between incentives from being marginal effective versus having substantial effects in terms of a market share.

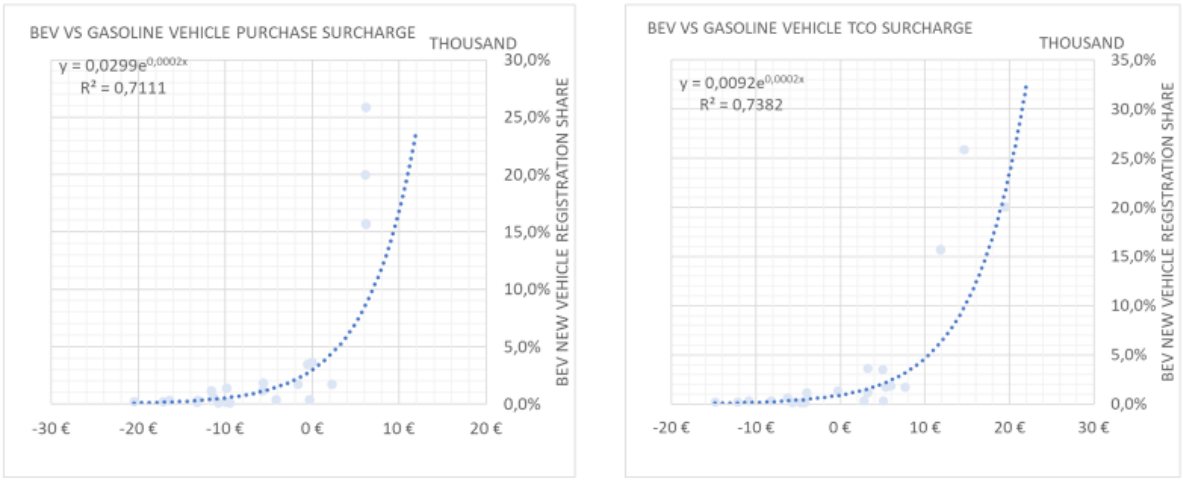

Figure 3. BEV vs petrol vehicle, purchase surcharge and TCO surcharge

We are currently working on improving the graphs in figure 3 with more reference points. From a scientific point of view we can only say that the R^2 value is showing a medium to strong relation, but not very strong. Therefore we are careful with the current conclusions, but we can say that there seems to be a certain threshold where EV uptake significantly increases when the TCO is getting more positive for EVs. From these graphs it looks like this point is somewhere at a positive TCO between €10.000 and 20.000.

2.5 Conclusions

The I-CVUE consortium came to the following conclusions after the analyses of the international comparison of the (financial) boundary conditions and the success of EV uptake:

- It doesn't matter how good the incentives are, if the buyers do not understand it or if the incentives are not consistent and there is no long-term-policy about the advantages (what happens with the road tax, can I charge against reasonable prices, and what about the residual value) the effect will be minimal. Consistency and long-term stability appear to be crucial.

- A clear and pre-communicated long-term 'reduction schedule' gives the market the right stimulation and leads to acceptance at governmental level and society.

- The intentional results indicate there is a threshold where the sales of EV's will show progressive uptake. The difference in purchase price between BEV's and comparable petrol vehicles must be brought to a minimum. This results in a positive TCO for EV's, which can compensate for the hassle.

- The effect of incentives is not to be overestimated. Also with regards to the vehicles that are currently in the market. In the year 2017 there will be more models with higher ranges, in the mid-price-range, which makes higher uptake more realistic.

- Purchase subsidies and lowering purchase tax are powerful incentives, but will not change the uptake of EV's significantly. It can be concluded that (even in case of no purchase subsidies) a powerful, large, visible and general policy aimed at advantages of EV's consisting different types of priorities (road use, parking) can play an important role in the accelerated uptake of sales of EV's.

- Examples are less travel time (not standing in traffic jams), free parking (and charging), zero-emission zones and or the implementation of regional tax on conventional vehicles. The advantages are strongly depended on mobility patterns, travel time, parking spot occupation, etc. It's clear that giving advantages to EV's and disadvantages to conventional vehicles is a difficult theme. However, it's recommended to give this the right attention because of the high effect and the high society cost of urban emissions.

5 Presentation at EVS30

Our main aim for presenting the results at the EVS30 would be:

a) To raise awareness for the uniqueness of the comparative study on purchase prices and TCO and the effects on the uptake of EV sales (beyond what is normally done by multi-country studies which compare incentives);
b) To reach-out to national and state EV incentive policy makers, and provide them with the tools, methodologies and study results as guidance for their incentive policies;
c) To identify and discuss opportunities with the audience for expanding the (EU funded) TCO calculation toolbox. Expanding the comparison to countries and analysing this, will make the sales effects of EV incentive more predictable.

6 References

1. I-CVUE, Transferability of Best Practice. [Online] http://I-CVUE.eu/resources/transferability+of+best+practice.

2. I-CVUE Market Potential Supported by Predictive Tools. [Online] http://I-CVUE.eu/resources/market+potential+supported+by+predictive+tools.

7 Authors

Harm Weken MSc is Managing Partner of FIER Automotive since 1995, a business development company in the international automotive sector, with a focus on electric mobility. Harm is also chairman of the board of Foundation Limburg Electric and member of the Council of Advisors at Drive Oregon. From 2007 till 2015 he has been Board-Director of EASN ltd, a European platform for automotive clusters and starting-point of various EU-projects.

Edwin Bestebreurtje MSc is partner and senior consultant of FIER Automotive & Mobility**.** Edwin has been specialized in business development projects in the automotive and mobility sector. He was responsible as project manager for developing the Automotive Campus in Helmond and project manager in European projects on (e-) mobility, such as ENEVATE and I-CVUE. Edwin was also responsible for several innovation missions inside and outside Europe with important mobility topics. He has been involved in many projects and initiatives.

Rob Kroon BSc has a wide experience in the automotive and (electric) mobility sector. Employed as Project Manager / Consultant at FIER Automotive, he worked on several EU projects like ENEVATE, I-CVUE, FREVUE, BATTERIE and their spin-of projects. Due to the involvement in these EU projects and other business development projects, Rob has built experience, knowledge and an interesting network in the field of electric mobility.

8 Attachment

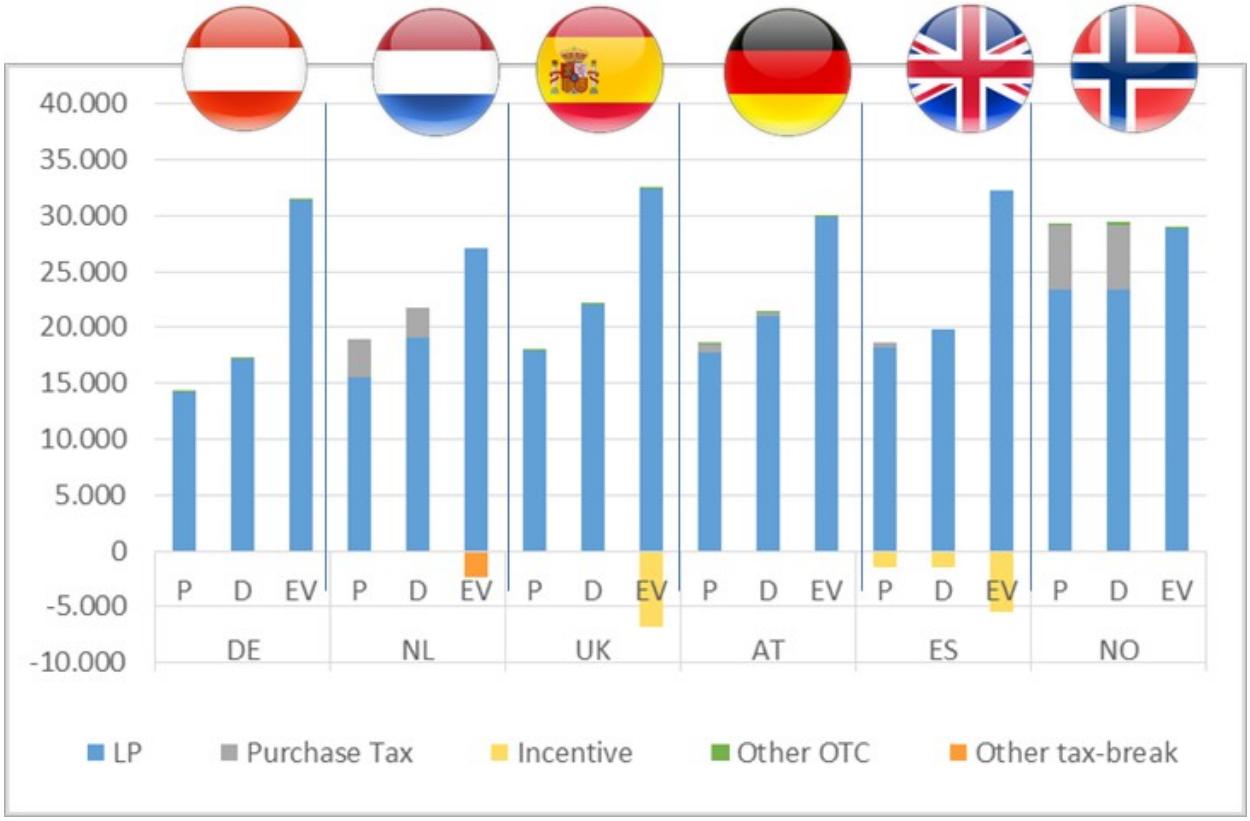

Figure 4. Purchase costs

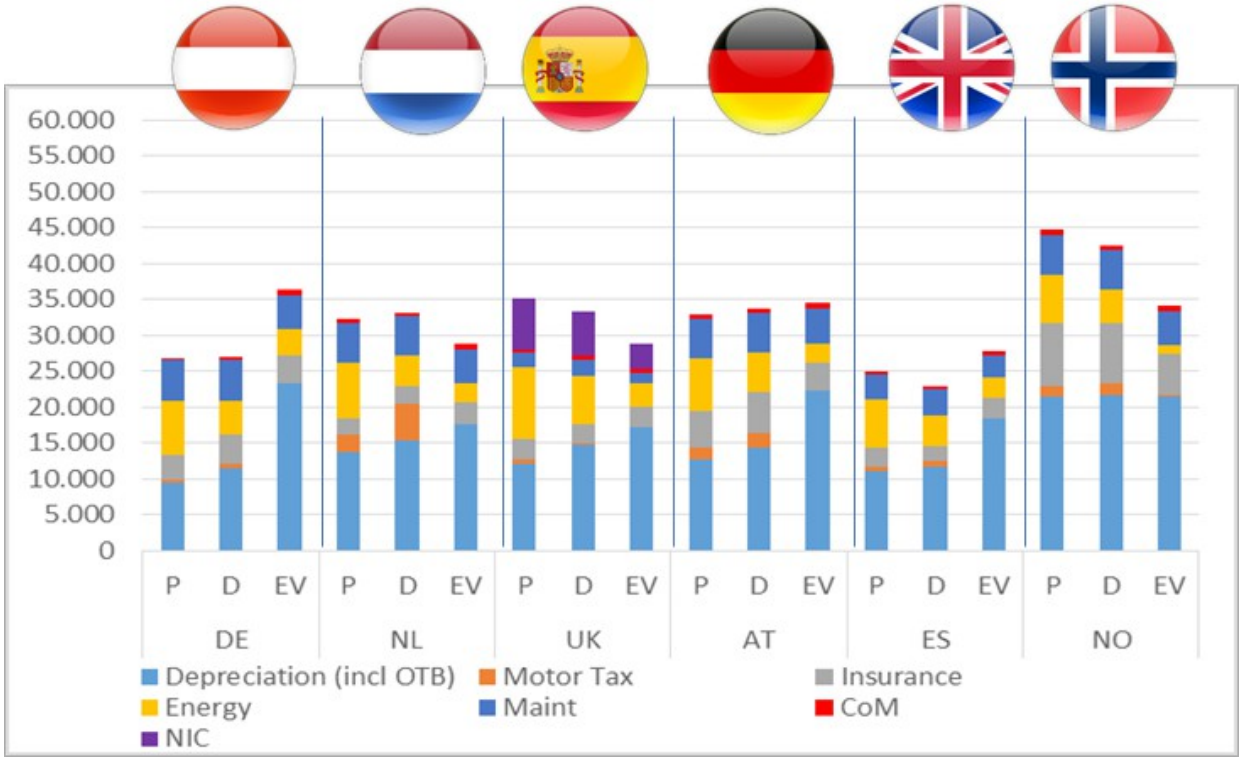

Figure 5. TCO costs

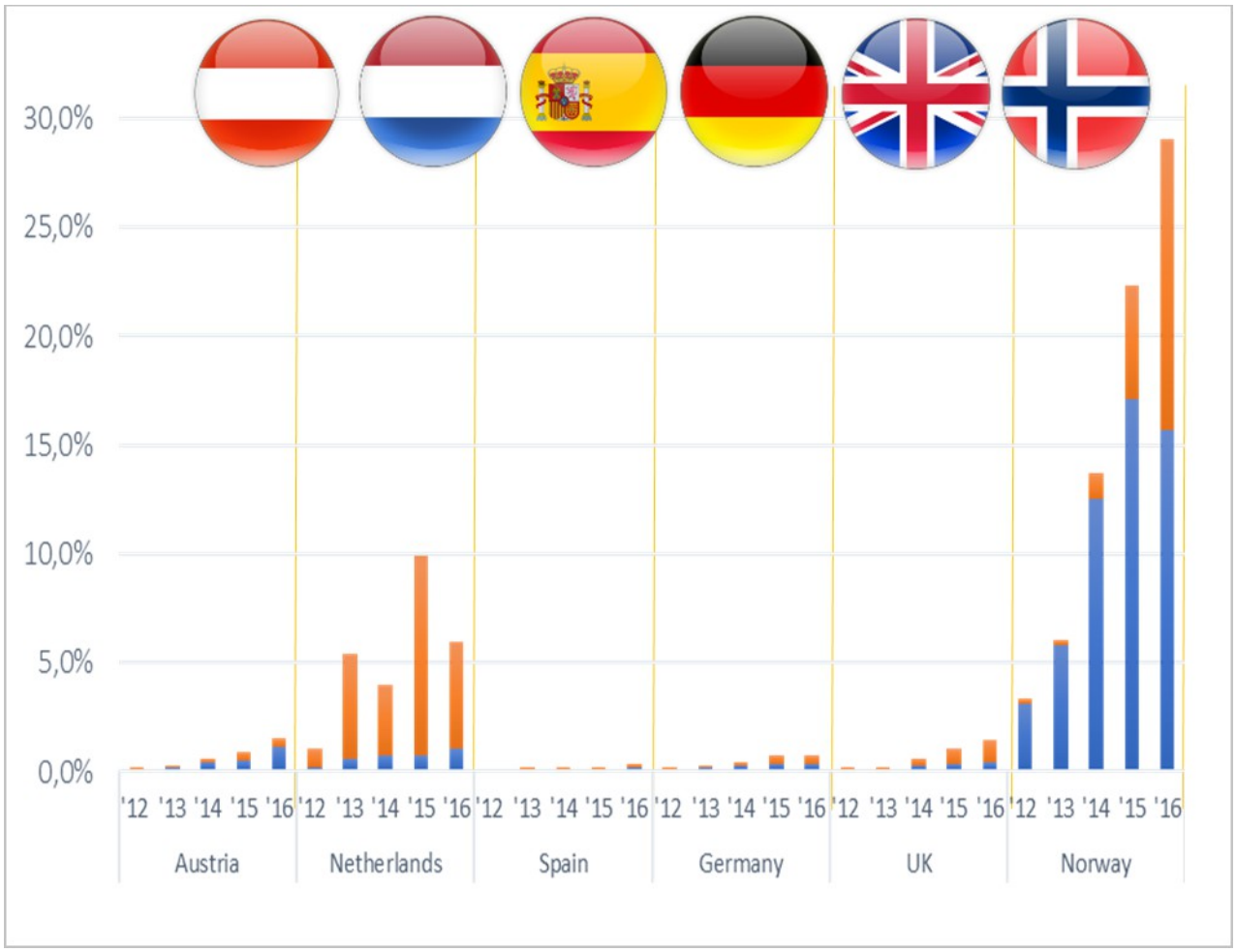

Figure 6. EV uptake