Smart public charging in the Netherlands

- An experience-based approach to stimulating electric driving-

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ABSTRACT:

A vital condition for the success of electric vehicles in the Netherlands is good public charging infrastructure. As MRA-Electric – a joint government venture in the Metropolitan region of Amsterdam – we have been promoting electric driving since 2012. The approach embodies our ongoing strategy: why wait until everything is crystal clear, when you can take action and gain real-world experience? We share our experiences gained in all the phases we have encountered: the installing of public charging stations, deferred charging (to stop the grid from overloading), and charging with renewable energy (charging when solar power or wind power is available).

KEY WORDS: electric driving, public charging infrastructure, government, smart charging, renewable energy

1. INTRODUCTION

As MRA-Electric – a joint government venture in the provinces of Flevoland, Noord-Holland and Utrecht – we have been promoting electric driving since 2012. We have taken this step because we are determined to achieve key objectives in terms of air quality and combating climate change. The Dutch government is working hard to ensure that all new cars sold in 2030 will produce zero emissions[1]. The countries that signed up to the Paris international climate change agreement are committed to the reduction of greenhouse gases[2]. Electric driving is an integral part of reaching that goal.

2. Mobility in the Netherlands

The average Dutch person travels 32 kilometers on a normal day, and about 11,000 kilometers per year[3]. This mobility gives us freedom, but there is also a downside: congestion, noise pollution, air pollution and CO2 emissions. For longer distances we need cars, but they must be cleaner and quieter. The number of people who live in cities and in urban areas is increasing. Therefore, we need to keep the cities livable.

2.1. How we started in Amsterdam

In Amsterdam, we did not meet European standards for air quality. In 2009 we started with electric transport and in 2010 we

[1] https://www.klimaatakkoord.nl/mobiliteit/documenten/publicaties/2019/1/08/achtergrondnotitie-mobiliteit-laadinfrastructuur

[2] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

[3] https://www.cbs.nl/nl-nl/maatschappij/verkeer-en-vervoer/transport-en-mobiliteit/mobiliteit/personenmobiliteit/categorie-personenmobiliteit/personenmobiliteit-naar-vervoerswijze

started a unique car sharing project with 300 electric Smarts cars[4]. We installed public charging points throughout Amsterdam. But to make sure that the cars that enter the city of Amsterdam were also clean, a broader approach was needed. MRA-Electric was founded in 2012, in order to support the region around Amsterdam with the stimulation of electric cars and transport. The three provinces of Noord-Holland, Flevoland and Utrecht decided to join forces. Together they represent 80 local municipalities.

2.2. Learning by doing

A vital condition for the success of electric vehicles is good public charging infrastructure. Eventually around 70% of electric drivers in the Netherlands will have to charge their vehicles on the street[5]. That's why MRA-Electric has shown a strong commitment to public charging infrastructure from the very beginning. The launch of our three-province approach to public charging infrastructure embodies our ongoing strategy: why wait until everything is crystal clear, when you can take action and gain real-world experience step by step? So let's take a closer look at the steps we are taking.

2.2.1. Installing of public charging stations

Our first goal was to make electric driving possible and visible to everyone in the street. The first one-hundred charging stations we installed even had an ordinary domestic plug. A specially designed car plug had yet to be developed. But by installing those first one-hundred stations, we gained a wealth of experience. It was an important first stepping stone towards realizing our ambitions.

2.2.2. Deferred charging

When the first charging stations had been rolled out and more people began to embrace electric driving, it was time to shift the focus: how can we stop the grid from overloading when all these electric drivers want to charge their vehicles at the same time? The answer to that question became our second step.

We launched the 'deferred charging' project in the city of Alkmaar in 2016[6]. This experience has taught us a number of valuable lessons, not least that rate differentiation can encourage electric drivers to charge their vehicles during off-peak hours[7].

2.2.3. Charging with renewable energy

We have taken the knowledge acquired in Alkmaar and moved on to the next phase. Now, at step three, we want to forge a strong link between electric driving and sustainable energy. In other words, we want electric cars to start charging mainly when plenty of solar power or wind power is available. This is a crucial development for the energy transition and essential to achieving our objectives for air quality and combating climate change[8].

[4] http://linkey.nl/uploads/elektrisch_rijden_in_amsterdam%20april2013.pdf

[5] https://www.rvo.nl/sites/default/files/2017/05/Visie%20op%20de%20laadinfrastructuur%20voor%20elektrisch%20vervoer.PDF

[6] https://www.mra-e.nl/nieuws/mra-e-en-gemeente-alkmaar-starten-pilot-met-innovatief-laden-elektrische-auto/

[7] Improving Electric Vehicle Charging Station Efficiency through Pricing. R Wolbertus, B Gerzon - Journal of Advanced Transportation, 2018

[8] https://www.elaad.nl/uploads/files/Final_report_TKI-1_definitieve_versie_190214-1.pdf

But we face a huge challenge: the times when solar and wind power are plentiful do not always coincide with the demand for electricity. And this is precisely where the electric car can offer a solution. Unlike households – which tend to operate according to fixed patterns of power consumption – the timing of when you charge your electric car is far more flexible.

If you plug in your car at night and pick it up in the morning – something that is true for the vast majority of drivers – it doesn't really matter exactly when it is charged.

And that offers opportunities. The car can charge at a time when solar power or wind power is at its peak. At a time when this renewable energy is also cheaper. Thanks to new software, we can charge cars with renewable electricity at the best price, which the exchange sets hour by hour for the next day on the basis of supply and demand[9]. Our goal is to ensure that the driver of an electric vehicle can opt for renewable energy at the best charging rate. And to promote awareness among the electric drivers that it makes a difference when you charge your vehicle.

4. Future of electric driving in the Netherlands

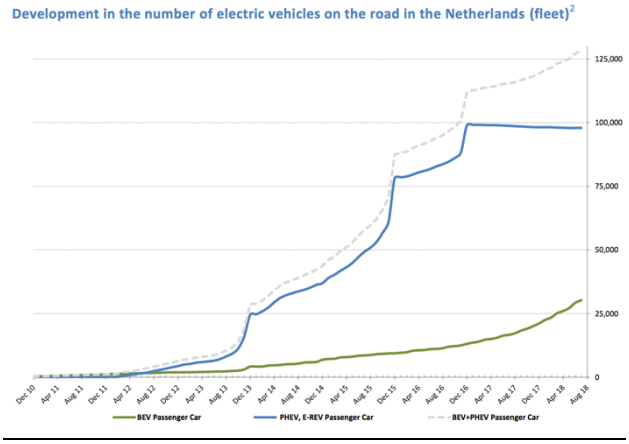
After years of experience, the Amsterdam region is now at the forefront and MRA-Electric serves as a model project within the rest of the Netherlands. Cooperation between local governments pays off. We have a clear vision of how we can fulfill the government's major ambitions in the area of electric transport. Our working method is underlined in the so-called *climate agreement*.

The climate agreement was handed over to the Dutch parliament in December 2018. A coherent package of measures to reduce CO2 emissions in the Netherlands. In 2030, CO2 emissions must be reduced with at least 49 percent. MRA-Electric is pleased with the agreement, because it underlines the importance of a regional approach for the roll-out of the required charging infrastructure, which fits seamlessly with the proven pragmatic approach of MRA-Electric. This is also why MRA-Electric has been asked to join the National Steering Committee for Loading Infrastructure (Nationale Agenda Laadinfrastructuur, NAL) to share knowledge and experiences. We see many advantages in the division of the Netherlands into five parts, where each part of the country has its own project agency such as MRA-Electric.

MRA-Electric also participates in projects with other European countries to make sure electric drivers are facilitated and can easily charge across borders within Europe. As cooperating governments, we also work together with the market to realize a network with fast charging stations, charging stations in private areas and public places. Only together, we can continue to accelerate electric transport.

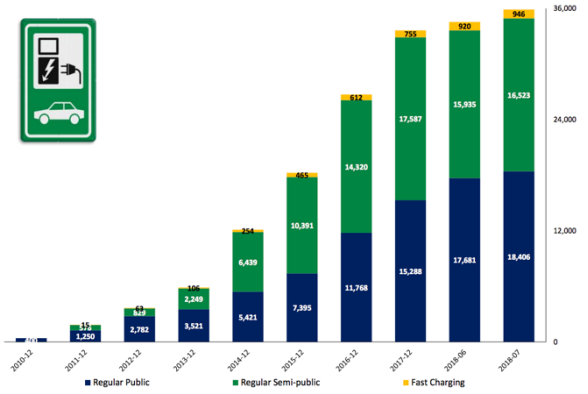
5. CONCLUSION

The number of electric cars is growing in the Netherlands and will keep growing rapidly over the next few years. MRA-Electric and the Dutch government will keep on stimulating innovation and public charging opportunities.



9 https://www.mra-e.nl/nieuws/duurzaam-grenzeloos-en-voordelig-je-elektrische-auto-opladen-het-kan/

Development in the number of charging points[10]



Source: Dutch Road Authority (RDW), edited by Netherlands Enterprise Agency (RVO.nl). The numbers represent the vehicle fleet, the cumulative registrations on balance: increase due to new registrations and decrease due to export, theft, etc. Corrections of the data with retroactive effect are not taken into account here. [Passenger Car (E-REV, PHEV): full hybrid vehicles excluded; Commercial Car ≤ 3.5 tons: Including: BEV, FCHEV and FCEV; Commercial Car > 3. 5 tons: BEV, FCEV; Bus: BEV, FCEV, Including trolley busses and some hybrid busses.]

We have taken important steps to facilitate electric drivers by installing public charging stations. We also managed to do research -and keep on doing research- about deferred charging to prevent the grid from overloading. Today we are able to charge cars with renewable electricity. We are excited to see what the future holds. The importance of a regional approach for the roll-out of the required charging infrastructure in the Netherlands is clear. Cooperation between local governments pays off. Together we can fulfill the government's major ambitions to reduce CO2 emissions with the help of electric transport. We are determined to improve air quality and combating climate change for future generations.

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