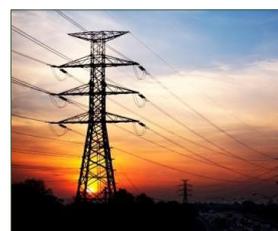


# **Consultation on Maximum Resale Price as it applies to Ultra Low Emission Vehicles (ULEVs)**

4 November 2019



# About the Utility Regulator

The Utility Regulator is the independent non-ministerial government department responsible for regulating Northern Ireland's electricity, gas, water and sewerage industries, to promote the short and long-term interests of consumers.

We are not a policy-making department of government, but we make sure that the energy and water utility industries in Northern Ireland are regulated and developed within ministerial policy as set out in our statutory duties.

We are governed by a Board of Directors and are accountable to the Northern Ireland Assembly through financial and annual reporting obligations.

We are based at Queens House in the centre of Belfast. The Chief Executive leads a management team of directors representing each of the key functional areas in the organisation: Corporate Affairs; Electricity; Gas; Retail and Social; and Water. The staff team includes economists, engineers, accountants, utility specialists, legal advisors and administration professionals.



## Our mission

To protect the short- and long-term interests of consumers of electricity, gas and water.



## Our vision

To ensure value and sustainability in energy and water.



## Our values

- Be a best practice regulator: transparent, consistent, proportionate, accountable and targeted.
- Be professional – listening, explaining and acting with integrity.
- Be a collaborative, co-operative and learning team.
- Be motivated and empowered to make a difference.

## Abstract

This paper seeks views on whether the Maximum Resale Price (MRP) for electricity is a barrier to the maintenance and development of public charging infrastructure for Ultra Low Emission Vehicles (ULEVs). The MRP was introduced via a Direction made by the Utility Regulator in 2007 and provides that the reselling of electricity can only be on a cost pass through basis.

This paper focuses solely on the MRP. The potential impact on the electricity network of large scale uptake of ULEVs is also important and will be considered as part of our future work on the energy transition. In that regard both SONI and NIE Networks are considering future scenarios.

## Audience

This document is likely to be of interest to regulated companies in the energy industry, government and other statutory bodies and consumer groups with an interest in the energy industry or related to ULEVs. It will be of particular interest to ULEV owners and charge point operators.

## Consumer Impact

Changes to the MRP Direction could impact consumers as the aim of the Direction is to prevent potential instances of overcharging for electricity.

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## Acronyms and Glossary

Acronym	Explanation	Detail
CRU	Commission for the Regulation of Utilities	Republic of Ireland's independent energy & water regulator.
DSO	Distribution System Operator	Securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources.
DUoS	Distribution Use of System Charges	A tariff levied on electricity suppliers used to fund the operation and maintenance of distribution assets.
ESB	Electricity Supply Board	A statutory corporation supplying electricity in the Republic of Ireland. ESB own a network or public ULEV charge points in Northern Ireland under their e-cars banner.
GB	Great Britain	England, Scotland and Wales collectively.
MRP	Maximum Resale Price	The MRP was introduced via a Direction made by the Utility Regulator most recently in 2007 and means that the reselling of electricity, for example by a landlord or electric vehicle charge point owner can only be on a cost pass through basis.
NI	Northern Ireland	One of the four countries of the United Kingdom along with England, Scotland and Wales.
NIE Networks	Northern Ireland Electricity Networks	Owns the electricity transmission and distribution network and operates the electricity distribution network which transports electricity to over 860,000 customers.
OLEV	Office for Low Emission Vehicles	A team working across government in the United Kingdom to support the early market for ultra-low emission vehicles (ULEVs).
ULEV	Ultra Low Emission Vehicle	Ultra low emission vehicles (ULEVs) are vehicles that emit less than 75g of carbon dioxide (CO <sub>2</sub> ) from the tailpipe for every

		kilometre travelled. In practice, the term typically refers to battery electric, plug-in hybrid electric and fuel cell electric vehicles.
UK	United Kingdom	United Kingdom of Great Britain and Northern Ireland.
UR	Utility Regulator	The regulator for the gas, electricity and water industries in Northern Ireland.

# 1. Introduction

- 1.1. The UR has the power, provided by Article 47 (2) of the Electricity (NI) Order 1992 to set the Maximum Resale Price (MRP) of electricity through a Direction. Currently the MRP is set on a cost pass through basis (for both unit charges and standing charges) plus VAT at the appropriate rate.
- 1.2. The Direction will apply where electricity is supplied by an authorised supplier to a consumer's premises.
- 1.3. Under the current Direction a ULEV charge point could fall within the scope of consumer premises, and therefore the MRP would apply to electricity resold for use in the propulsion of a ULEV.
- 1.4. The original aim of the MRP was to protect consumers from being locked into paying prices which the consumer could avoid if purchasing directly from a supplier, for example in rental accommodation or caravan parks.

## 2. Purpose of this Paper

- 2.1. In the context of energy transition, and increasing uptake of ULEVs, the UR wishes to ensure that the MRP Direction is not a barrier to the maintenance and development of ULEV public charging infrastructure.
- 2.2. Whilst the current Direction includes the resale of gas, this paper is solely focused on the MRP for electricity. In section 4 we present two options for consultation with associated questions. These options are:
  - no change to the current Direction at present or;
  - to amend it to include an exemption for the resale of electricity where it relates to the propulsion of a ULEV.
- 2.3. We welcome respondent views on these options along with any other views stakeholders may have.

2.4. The UR is aware that there are wider issues, such as the impact of the electricity network of large scale uptake of ULEVs. However, this paper focuses solely on the question of whether or not the MRP Direction is a barrier to the development or maintenance of ULEV public charging infrastructure. The electricity network operators are considering scenarios for the future uptake of ULEVs.

### Responding to the Consultation

2.5. The consultation questions are in Section 4.

2.6. We welcome responses to this consultation no later than **5pm on 2<sup>nd</sup> December 2019**. Please send any responses to:

Laura Kane

Networks Directorate

Utility Regulator

Queens House

14 Queens Street

Belfast BT1 6ER

to [laura.kane@uregni.gov.uk](mailto:laura.kane@uregni.gov.uk)

with cc to [Electricity Networks Responses@uregni.gov.uk](mailto:Electricity_Networks_Responses@uregni.gov.uk)

2.7. The Utility Regulator's preference would be for responses to be submitted by e-mail.

2.8. Individual respondents may ask for their responses (in whole or in part) not to be published, or that their identity should be withheld from public disclosure. Where either of these is the case, please provide also a non-confidential version suitable for publication.

- 2.9. As a public body and non-ministerial government department, the Utility Regulator is required to comply with the Freedom of Information Act (“FOIA”). The effect of FOIA may be that certain recorded information contained in consultation responses is required to be put into the public domain. Hence it is now possible that all responses made to consultations will be discoverable under FOIA, even if respondents ask us to treat responses as confidential. It is therefore important that respondents take account of this. In particular, if asking the Utility Regulator to treat responses as confidential, respondents should specify why they consider the information in question should be treated as such.
- 2.10. The Utility Regulator has published a privacy notice for consumers and stakeholders which sets out the approach to data retention in respect of consultations. This can be found at <https://www.uregni.gov.uk/privacy-notice> or, alternatively, a copy can be obtained by calling 028 9031 1575 or by email at [info@uregni.gov.uk](mailto:info@uregni.gov.uk).
- 2.11. This paper is available in alternative formats such as audio, Braille etc. If an alternative format is required, please contact the office of the Utility Regulator, which will be happy to assist.

## 3. Background Context

### Energy Transition

- 3.1. The Energy Transition<sup>1</sup> represents a global change in energy sectors to reduce energy-related carbon dioxide emissions. ULEVs have a key role in the Energy Transition, both through lowering vehicle emissions and boosting renewable energy use. Consequentially, UK Government launched the Road to Zero Strategy in July 2018. The strategy has a UK wide scope and creates a target for 50% of all new vehicles on UK roads to be ULEV's by 2030.
- 3.2. The Automated and Electric Vehicles Act<sup>2</sup> was passed by the UK Parliament also in July 2018 with the aim of improving electric charging infrastructure across the UK. Part two of the Act applies to Northern Ireland and provides that regulations may be made related to public charging and refuelling points in areas such as the method of payment, access and connection to charging points, information for users, and potential to prescribe requirements for smart charge points.
- 3.3. The UR's role is to facilitate the changes brought about by the Energy Transition in accordance with Government policy and our statutory duties. This is reflected in the UR's strategic objective Strategic objective number 3 in our Forward Work Programme<sup>3</sup> of "Ensuring security of supply and a low carbon future".

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<sup>1</sup> The International Renewable Energy Agency (IRENA) defines the Energy Transition as "a pathway toward transformation of the global energy sector from fossil-based to zero-carbon by the second half of this century".

<sup>2</sup> <http://www.legislation.gov.uk/ukpga/2018/18/contents/enacted>

<sup>3</sup> <https://www.uregni.gov.uk/sites/uregni/files/media-files/FWP%20201920%20final.pdf>

## ULEV position in Great Britain and other jurisdictions

- 3.4. GB has experienced rapid growth rates in ULEV uptake which has increased from 2254 new registrations in 2012 to almost 50,000 in 2017<sup>4</sup>.
- 3.5. During 2018, almost 64,000 ULEVs were registered for the first time in Great Britain, up 20% on 2017 and 53% on 2016.
- 3.6. There are more than 25,000 ULEV charging stations in GB from a range of different charge point operators.<sup>5</sup> We understand that a range of different charging models are in use in GB, for example some charge point operators apply a connection or parking charge in addition to the electricity cost, or offer subscriptions which require registration and a monthly fee.
- 3.7. We also understand that some charge point owners base their fees on minutes or hours of use of the charging infrastructure and not kilowatt-hours of electricity consumed. This charging model offers less transparency if the electricity cost is not clearly visible to the consumer as a separate item.
- 3.8. Ofgem removed the MRP restriction in the case of electric vehicles in 2014<sup>6</sup>. The rationale behind Ofgem's decision to not apply the MRP to resale of electricity from electric vehicle charge points was that the application of MRP could act as a barrier to the commercial expansion of charge points.
- 3.9. Ofgem also reasoned that consumers would have sufficient choice of charge point providers to maintain competitive pressure on providers, and ensure that any charges are clear upfront.
- 3.10. In preparing this consultation, the UR wished to be informed order on the EV environment across wider Europe. Further information on other European jurisdictions prepared by our consultants Gemserv can be found in Appendices 1 and 2.

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<sup>4</sup> [https://www.ofgem.gov.uk/system/files/docs/2018/07/ofg1086\\_future\\_insights\\_series\\_5\\_document\\_master\\_v5.pdf](https://www.ofgem.gov.uk/system/files/docs/2018/07/ofg1086_future_insights_series_5_document_master_v5.pdf)

<sup>5</sup> <https://www.goultralow.com/ev-charging-point-map/>

<sup>6</sup> <https://www.ofgem.gov.uk/publications-and-updates/decision-application-maximum-resale-price-resale-electricity-charging-electric-vehicles>

## ULEV position in Northern Ireland

- 3.11. The ULEV market is emerging in Northern Ireland (NI). The latest figures from the Department for Transport show that there are currently 2,794 <sup>7</sup>ULEVs licensed in NI. This is an increase of 95 ULEVs (or 3.5%) from the March 2019 figure of 2699. This is reflective of the current growth trend of around 100 cars per quarter. It can be noted that the uptake of ULEVs in NI is increasing, but that this growth is very small compared to that in GB.
- 3.12. ULEV's in Northern Ireland are supported by a public network of 337 charge points. <sup>8</sup> These are all operated by the Electricity Supply Board (ESB) under their "ecars" banner<sup>9</sup>. There are also a further 54 privately owned charge points in the public sector estate, not publically available, but some of these can be used by ULEV drivers visiting or working at these premises. We are aware that there are also a small number of charge points available for use for customers of retail outlets. We are not aware of the charging arrangements for the electricity resold at these charge points.
- 3.13. There are also home charge points provided by Northern Ireland Electricity Networks (NIE Networks). The UR understands that this is when the majority of ULEV charging would take place, with owners plugging in when they return home from their journeys. The MRP restriction would not apply in the case of home charging, as there is no resale of the electricity.
- 3.14. The UR concludes that, currently, the ULEV environment in NI differs significantly from our neighbouring jurisdictions in terms of consumer demand for ULEVs and choice of charge point operator.

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<sup>7</sup> <https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01>

<sup>8</sup> <https://www.ecarni.com/project-ecar>

<sup>9</sup> <https://www.esb.ie/our-businesses/ecars/about-esb-ecars>

## **The MRP Direction for electricity**

- 3.15. Article 47 (2) of the Electricity (Northern Ireland) Order 1992 provides the UR with a power to set the Maximum Resale Price (MRP) of electricity where electricity is resold after it has been supplied by an authorised supplier to a consumer's premises.
- 3.16. The MRP was set via a UR Direction<sup>10</sup> in 2007, which sets the resale price of electricity on a cost pass-through basis (for both electricity unit charges and standing charges) plus VAT at the appropriate rate. Therefore the resale price of the electricity cannot exceed the original price paid by the reseller to the supplier.
- 3.17. Under the current Direction a public charge point where electricity is resold could fall within the scope of the existing MRP.
- 3.18. The rationale behind an MRP provision is to protect consumers from being locked into paying prices for electricity which the consumer could avoid if purchasing directly from a supplier. For example, a tenant who is charged for their consumption of electricity by their landlord may be unable to choose a different supplier due to the terms of their rental agreement. In this instance there is the potential for the landlord to overcharge for the electricity.

## **Charges which fall outside of the Direction (non-electricity costs)**

- 3.19. A ULEV charge point operator may have a range of other costs on top of the electricity supplied that it may need to recover from charges levied to charge point users. Such costs may include but not be limited to capital costs of the infrastructure, ongoing maintenance and operating costs of the infrastructure, and/or overhead costs.

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<sup>10</sup> [https://www.uregni.gov.uk/sites/uregni.gov.uk/files/media-files/MRP\\_Direction\\_2007.pdf](https://www.uregni.gov.uk/sites/uregni.gov.uk/files/media-files/MRP_Direction_2007.pdf)

- 3.20. If the charge point operator wishes to include these costs in the charges a consumer would pay to use the charge point, the MRP Direction does not prevent this. Such costs may be charged in addition to the electricity today, provided there is transparency in the electricity cost.
- 3.21. The only cost which the UR can regulate is the electricity cost. Consequently, neither of the options below provides a level of consumer protection in regard to charges that may be levied for any other costs of using charge point infrastructure.
- 3.22. From our review of charging in other jurisdictions we note that some charge point operators apply a charge per kilowatt hour which bundles together in one charge all the costs of using the charge point, including the cost of electricity. This type of charging model could be consistent with the MRP Direction provided that the electricity charge (compliant with the MRP Direction) is clearly separated out for the consumer. This could be done on a receipt for example.
- 3.23. This means that charging for infrastructure costs can be consistent with the existing MRP Direction but the consumer must be able to clearly see the separation between the electricity cost and the other items making up the price, however it is charged.

## 4. Options

- 4.1. The UR is interested in respondents' views on whether or not the existing MRP Direction for electricity is a barrier to the development or maintenance of ULEV public charging infrastructure.
- 4.2. We present two options for consultation, set out below with associated questions. These options are:
  - no change to the current Direction at present or;
  - to amend it to include an exemption for the resale of electricity where it relates to the propulsion of a ULEV.

### Option 1 – Exemption for ULEVs within the UR Direction

- 4.3. This option would entail the UR amending the existing Direction to include an exemption for the resale of electricity where it relates to the propulsion of a ULEV.
- 4.4. This would mean that the cost of the electricity at the point of sale at the charge point would not be regulated by the MRP Direction. The non-electricity costs applied by the charge point operator, such as for connection or parking (in compliance with the MRP Direction) would remain unregulated.

### Option 1 Consultation Questions

- 4.5. Do respondents consider that removal of the MRP restriction in relation to ULEVs is required or will more easily enable charge point operators to charge for development and maintenance of ULEV infrastructure? Please provide an explanation for your answer.
- 4.6. Do respondents consider that the removal of the MRP restriction for ULEVs

would decrease consumer protection by introducing a lack of transparency in relation to the electricity cost?

- 4.7. To what extent do respondents value transparency in the electricity element of the cost of charging a ULEV? Please provide detailed rationale.
- 4.8. Overall, how much do respondents support an exemption from MRP for the resale of electricity where it relates to the propulsion of a ULEV?
- 4.9. Are there any other factors or information the UR should take into account when considering this option?
- 4.10. Do you have any other views on this Option not covered by the above questions?

## **Option 2 – No Change to the current Direction**

- 4.11. This option would mean no change to the MRP Direction at present. This option developed from consideration of the ULEV environment in NI as it currently is, together with the existence of other means for charge point operators to include additional costs outside of the MRP Direction in the price for charging a ULEV.
- 4.12. As in Option 1, the non-electricity costs which may be applied by a charge point operator would not be regulated.
- 4.13. This option would ensure that the electricity cost remains regulated by the MRP Direction and is transparent to the consumer using the charge point. The electricity cost could then be compared across charge point providers and between public and home charging points.

## Option 2 Consultation Questions

- 4.14. Does the MRP Direction as it is currently drafted act as a barrier to the development or maintenance of ULEV infrastructure in Northern Ireland?
- 4.15. Do you believe the MRP Direction should remain in place in its current form? Please provide an explanation for your answer.
- 4.16. Are there any other factors or information the UR should take into account when considering this option?
- 4.17. Do you have any other views on this Option not covered by the above questions?

## 5. Next Steps

- 5.1. We welcome responses to this consultation no later than **5pm on 2<sup>nd</sup> December 2019**. We intend to publish a decision before the end of January 2020.
- 5.2. The UR recognises that a wider ULEV context falls outside of the scope of this paper. The UR will continue to work with relevant stakeholders, as necessary on other workstreams related to the Energy Transition.

# Appendices

## Appendix 1 - Case Study: Republic of Ireland

In the June 2019 Climate Action Plan, the Irish Government set a target of almost 1 million EVs on the road by 2030<sup>11</sup>. To date, Ireland has installed around 1 charger to 5 EVs<sup>12</sup> which is comparatively high against other European countries. The roll out of charge points has been predominately via semi-state-owned energy group, ESB and DSO, ESB Networks<sup>13</sup>. The charging network has received €25m funding through Distribution Use of System (DUoS) charges, and going forward, ESBN will arrange for the sale of the assets so they will be transitioned from ESBN's ownership with no further DUoS funding<sup>14</sup>. Until the sale is ready, ESBN will continue to ensure that the assets are operated and maintained. CRU also state that "any further funding required [for infrastructure] would have to come from other sources such as, for example, subsidies or from fees recovered from the users of EVs"<sup>15</sup>

Using DUoS as a method for funding infrastructure investment has benefits for the EV driver (more investment compared to, e.g. private funding) and initial roll out of the charging network, there are risks around this approach.

Should the 'indirect subsidy' method be used to recoup these upfront investment costs, e.g. via taxation, DUoS, or Electricity Distribution price control mechanism, the general taxpayer or electricity consumer could pay for an EV charge point which they will never use. However, it might be worthwhile noting that the uptake of EVs also has significant societal benefits including air quality and health benefits.

EV users in the Republic of Ireland currently enjoy free charging within a network of 1100 charge points provided by ESB's ecars banner. However, ESB made an announcement around its pricing structure for the charging of electric vehicles at its public stations in October.

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<sup>11</sup><https://www.gov.ie/en/publication/5350ae-climate-action-plan/>

<sup>12</sup>[https://esipp.ie/images/upload/UCD%20policy%20report\\_EV%20Charging%20Infrastructure%20Nov%202018.pdf](https://esipp.ie/images/upload/UCD%20policy%20report_EV%20Charging%20Infrastructure%20Nov%202018.pdf)

<sup>13</sup>[https://researchrepository.ucd.ie/bitstream/10197/9912/2/UCD%20policy%20report\\_EV%20Charging%20Infrastructure%20Nov%202018.pdf](https://researchrepository.ucd.ie/bitstream/10197/9912/2/UCD%20policy%20report_EV%20Charging%20Infrastructure%20Nov%202018.pdf)

<sup>14</sup><https://www.cru.ie/wp-content/uploads/2018/09/CRU18218-ESBN-Project-Close-Downrt-Proposal-on-CRU-17283-EVs-1.pdf>

<sup>15</sup><https://www.cru.ie/wp-content/uploads/2017/10/CRU17283-Decision-paper-on-ESBN-Electric-Vehicle-Pilot-Associated-Assets.pdf>

## Appendix 2 - Case Study: Netherlands

In the Netherlands, ULEVs are exempt from the yearly road tax<sup>16</sup>. By 2030, every new car sold in the Netherlands must be an electric vehicle, and the aim is to have 1.7m public and semi-public charge points by 2030.

Currently, there is around 1 charge point per car<sup>17</sup> in the Netherlands, and the country has created an auction system for all public charging station installations, in which utilities can bid competitively for funding to provide charging access<sup>18</sup>

While there are Ministries (Government departments) which oversee energy and the environment, the roll out of national public ULEV charge points was facilitated by Foundation E-iaad<sup>19</sup>. This is a foundation comprising of electricity transmission system operators with the goal of facilitating the roll out of public charging stations while gathering information about usage/behaviour. The foundation worked with 350 municipalities to install the charge points – all installed for free, and operation and maintenance all free. By 2014 there were 3000 public charging stations across the Netherlands. There were some obstacles to overcome including the state ownership of the system operators which were not allowed to undertake commercial activities. This was overcome via creation of sub-foundations, and EvnetNL is now responsible for the management and maintenance of the 3000 charging points, and has converted them into smart charge points for peak shaving etc. Municipalities now have the responsibility for managing and installing new charging infrastructure in their area.

The Dutch government implemented a market model for supplying and paying for electricity from public charging infrastructure so interoperability and ability to charge the consumer for electricity provided are both nationally standardised<sup>20</sup>. The market model is: consumer chooses a Mobility Service Provider to contract with (like a mobile phone company) and swipes their MSP card on any charge point. The Charge Point operator charges the MSP for the electricity supplied via the charging point infrastructure. There are different infrastructure providers so the Charge Point Operators (who supply the service, can pick and choose which

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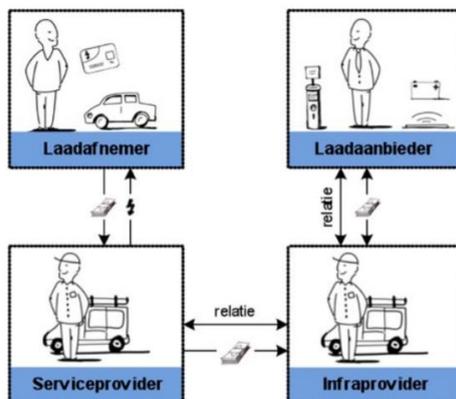
<sup>16</sup> <http://www.ieahev.org/by-country/the-netherlands-policy-and-legislation/>

<sup>17</sup> <https://www.government.nl/documents/speeches/2019/04/09/speech-by-stientje-van-veldhoven-state-secretary-for-infrastructure-and-water-management-for-the-panel-discussion-on-sustainable-infrastructure-at-the-future-mobility-symposium>

<sup>18</sup> Hall, D, Lutsey, N., 2017a. Emerging best practices for electric vehicle charging infrastructure. The International Council on Clean Transportation (ICCT), Washington DC

<sup>20</sup> Agentschap NL. (2012). De stekker in elektrisch vervoer, maar hoe? Startgids voor gemeenten die aan de slag gaan met elektrisch vervoer. <https://nederlandelektrisch.nl/u/files/2012-03-startgids-ev-gemeenten.pdf>

infrastructure to use). The methods of charging are also standardised into 4 options to be compatible with different cars, and there are also different connectors provided at each charging point (to plug into the car).

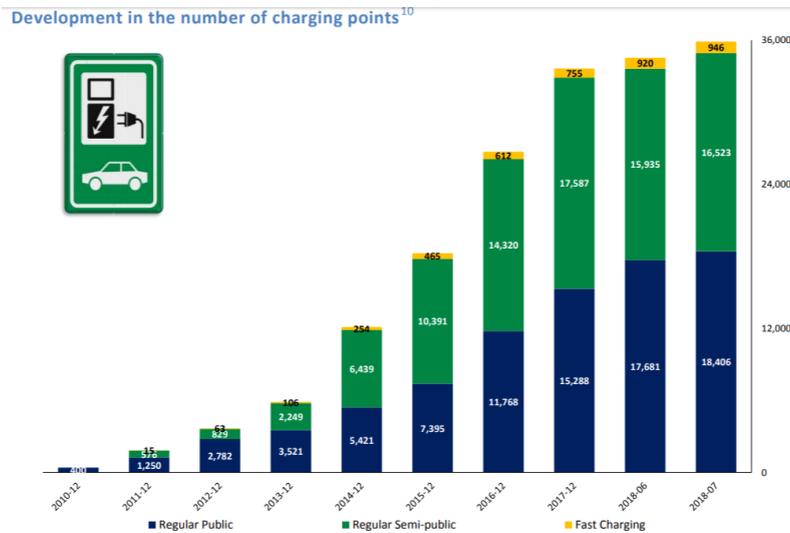


In terms of general price regulation, the regulator reviews every new retail price before it is introduced into the market.

#### Number of charging points<sup>10</sup>

Number installed at	31-12-2015	31-12-2016	31-12-2017	30-06-2018	31-07-2018
<b>Regular/slow charging points</b>					
Public (24/7 publicly accessible)	7,395	11,768	15,288	17,681	18,406
Semi-public (limited publicly accessible) <sup>11</sup>	10,391	14,320	17,587	15,935	16,523
<b>Fast charging</b>					
Fast charging points - Public and semi-public	465	612	755	920	946
Fast charging locations <sup>12</sup>			178	195	199
<b>Private charging points<sup>13</sup></b>					
	55,000	72,000	80,000	87,500	

**Figure 1: Charge Points NL<sup>21</sup>**



**Figure 2: Graph of development in the number of Charge Points in NL<sup>22</sup>**

A recent report from Bloomberg New Energy Finance (BNEF) notes considerable consolidation among ULEV charging companies, as large energy firms acquire or invest heavily in infrastructure players. This includes Royal Dutch Shell’s purchase of Dutch charging company NewMotion, with its 20,000 charging points, as well as Statoil’s investment in Chargepoint, Engie’s in EVBox, and Enel’s in eMotorWerks<sup>23</sup>.

The Dutch National Transport Plan (NTP) is a 12 year plan revised every 4 years and states that until Zero Emission Vehicles take over the market, cars should be plug-in hybrids, and after 2025 all new light vehicles, city buses and light commercial vans should be zero emission. To achieve this, tax differentiation or subsidies must continue. Zero and low emission vehicles should be cheaper to use than fossil fuelled vehicles and more convenient, so via policy instruments like toll rates, road tax, and lanes for queuing on roads will be introduced. Charge points should be so easily available that long distance driving is possible.

<sup>21</sup><https://www.rvo.nl/sites/default/files/2018/08/Statistics%20Electric%20Vehicles%20and%20Charging%20in%20The%20Netherlands%20up%20to%20and%20including%20July%202018.pdf>

<sup>22</sup><https://www.rvo.nl/sites/default/files/2018/08/Statistics%20Electric%20Vehicles%20and%20Charging%20in%20The%20Netherlands%20up%20to%20and%20including%20July%202018.pdf>

<sup>23</sup>[https://researchrepository.ucd.ie/bitstream/10197/9912/2/UCD%20policy%20report\\_EV%20Charging%20Infrastructure%20Nov%202018.pdf](https://researchrepository.ucd.ie/bitstream/10197/9912/2/UCD%20policy%20report_EV%20Charging%20Infrastructure%20Nov%202018.pdf)