

Using renewable electricity in transport to meet RED targets

Creating a credit mechanism at national level

October 2019

Summary

The recast of the Renewable Energy Directive (RED) can be the start of a shift in EU policy after 2021, away from food-based biofuels towards cleaner and more advanced fuels, including renewable electricity. A surge in EV sales as well as a growing share of renewables such as wind and solar in the electricity mix offers a window of opportunity for such a shift. Electricity produced from renewables used in transport is the cleanest alternative to oil. So far, a majority of EU countries has not incentivized the use of electricity in the same way they do with biofuels. Through the implementation of the new RED for the period 2021 to 2030, Member States have the opportunity to include renewable electricity in their compliance mechanism to reach a target for renewable advanced fuels.

Looking at California and the Netherlands, it is clear that such a system will diversify the options available to the RED obligated parties - fuel suppliers - for meeting their targets and allow them to use other options than just biofuels. It will also generate a new and significant financial flow to support the transport revolution towards zero-emissions vehicles, encourage the uptake of renewable electricity but also provide an additional private financing route for roll-out of electric charging infrastructure or targeted rebate programmes for purchasing EVs. The system could generate up to €5.9 billion of credit value in 2030 at EU level or up to €1.2 billion for a country like Germany.

A crediting system is a key tool for creating a level-playing field between renewable electricity supplied to EVs and blended biofuels, enabling the most cost-effective compliance with RED II for fuel suppliers.

1. Why creating a place for electricity in fuels markets is important

Until now, Member States have been hesitant to prioritise transport electrification as a way of meeting their targets for renewable advanced fuels under RED. Renewable electricity is not a drop-in fuel - you can't blend it - and it requires separate infrastructure in order to be deployed to the market. This explains why, in many countries, the compliance mechanism for the RED target rewards only the use of liquid renewable alternatives - mainly biofuels. Few EU Member States have created a level-playing field for suppliers of renewable electricity to transport to help fossil fuel suppliers meet their 2030 targets under RED II without resorting to biofuels.

However, this needs to change. EU Member States now face a tipping point on EVs, which has important implications for how governments can achieve their targets for 2030 in the most cost-effective and sustainable way. What does this tipping point look like? The number of EVs models - and particularly Battery EVs (BEV) models - is about to grow more than 4-fold, from 40 today to 172 in 2025. For some BEV models, cost-parity with ICE vehicles is expected in 2025. By 2025, at least 2,5 million EVs (of which 1,4 million BEVs) will be sold *annually* in the EU. These annual sales figures are expected to double again by 2030. And these

numbers are conservative estimates.¹ It is important to highlight that good progress is also being made on building out charging infrastructure, especially in Western and European markets where EVs have been increasing their share of sales.²

Driven by the recently agreed vehicle CO2 standards, T&E estimates that electricity as a fuel will meet 4.7% of the final energy demand in passenger cars in 2030.³ With such a surge in EVs plus charging infrastructure on European roads, EU Member States should seize the opportunity and use transport electrification as an attractive option to meet their targets under RED II, as part of the binding 7% target for advanced renewable fuels that fuel suppliers need to reach⁴.

The combined effect of 3 factors will facilitate this: First of all, the rapid growth in EVs, as outlined above. Secondly, a growing share of renewable electricity like wind and solar in the power generation mix: The 32% renewable energy target for the EU will result in ~ 54% renewable electricity by 2030.⁵ Thirdly, the inclusion of a multiplier of 4 for renewable electricity, directly used in EVs, is not only an accurate reflection of the higher efficiency of EVs over ICEs, but also helps to ‘supercharge’ their contribution to meeting the renewable transport targets. In this context, suppliers of electricity to road transport should be enabled to sell renewable electricity credits to allow fossil fuel suppliers to meet their obligations under RED II.⁶

The RED II implementation offers Member States an opportunity to meet their renewable transport targets, without having to resort to unsustainable, crop-based biofuels. The 3 factors - more EVs, more wind and solar power and a multiplier of 4 - will facilitate this objective. However, this will require the creation of a credit system, which allows for an easy transfer of renewable obligations between fuel suppliers. Such a mechanism should allow for a technology-neutral, market-based and cost-effective implementation of the RES target and would include and treat all renewable energy forms in an equal manner under the same general requirement of a specific share of renewable energy in road transport.

In line with a 2017 T&E paper available [here](#), this briefing offers some concrete examples about how to credit renewable electricity effectively in the context of the RED implementation (the implementation deadline is June 2021), some implementation options and finally some recommendations, based on the lessons learned.

¹ https://www.transportenvironment.org/sites/te/files/publications/2019_07_TE_electric_cars_report_final.pdf

² <https://www.transportenvironment.org/publications/roll-out-public-ev-charging-infrastructure-eu>

³ The 4.7% figure is an average value for the EU28 and only includes passenger cars, i.e. no trucks. To calculate the share of electricity in final energy demand from the transport sector, we assumed that - of all the EV sales - 30% will be BEVs and 20% PHEVs.

⁴ There is an indicative 14% target for all renewables in transport by 2030 but member states can decide to avoid the use of food-based biofuels, which creates a minimum binding target of de facto 7%.

⁵ <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/renewable-technologies-eu-electricity-sector-trends-and-projections-analysis-framework-eu>

There will be considerable variations in the power mix of different Member States. However, it shows that RED II provides the correct incentives to Member States to not only electrify transport, but to simultaneously grow the share of renewable electricity, as they must “refer to the two-year period before the year in which the electricity is supplied in their territory” (Article 27.1 (3)).

⁶ For example, non-obliged parties such as charging station operators could sell credits to fuel suppliers. <https://www.transportenvironment.org/publications/how-make-renewable-energy-directive-red-ii-work-renewable-electricity-transport>

2. RED II and implementing a crediting system

EU rules do not propose a harmonised way of integrating electricity in fuels markets, but Member States have the possibility to set a dedicated crediting system in place. Such a national system will give companies that supply electricity to transport the opportunity to qualify for clean fuel credits which they can sell to fuel suppliers (e.g. oil companies or petrol stations)⁷. Electricity could then become a compliance option for fuel suppliers and compete with other fuels such as food-based biofuels, advanced biofuels, renewable hydrogen or used cooking oil.

On top of diversifying the compliance options, this is an opportunity to implement the “polluter pays principle”: Fuel suppliers that deliver final transport fuels will need to purchase renewable electricity⁸ credits to reduce their GHG footprint, when in most cases these fuel suppliers don’t invest themselves in electric mobility or in the production of electricity as a transport fuel. At the same time, the system can create a direct financial flow to entities that are taking part in building electromobility services, without using public money.

The Netherlands and California already include electricity credits into their support system for low carbon fuels. The section below describes in more detail how the system works in these countries.

3. The comparative cases of The Netherlands and California

In the Netherlands, the fuels market is regulated by two main EU laws - the Renewable Energy Directive and the Fuel Quality Directive - but both are currently implemented as an energy target on fuel suppliers. In California, the alternative fuels market is governed by the Low Carbon Fuel Standard (LCFS) - a GHG intensity target set on fuel suppliers.

3.1 Who is eligible to enter in the system?

The Dutch system currently enables companies that deliver electricity to road vehicles and that have “connections to the electricity grid exclusively for that purpose” to generate electricity credits⁹. This category basically includes charging point operators and in practice only large charging points are part of the system. The system covers only a tiny part of the electricity used in transport as it focuses on road vehicles and does not cover full electricity use - smaller charging points have not opted in the system and residential charging is not covered.

In California, several entities can generate credits for electricity provided to the transport sector¹⁰. For residential charging, the administration authority (CARB) provides state estimates and allocate credits to utilities on that basis. For non-residential areas, several entities can opt into the system and generate their own credits, such as EV fleet operators, charging points operators, including car makers (e.g. through metered information on board of the vehicle). This system applies not only to electric cars, but also electricity used by buses, trucks, rail lines and forklifts.

⁷ Fuel suppliers (e.g. oil companies, petrol stations) are the entities that need to comply with fuels target, either in the form of a GHG target or a blending mandate. In the new RED fuel suppliers are clearly defined as the obligated entities that need to deliver the targets, not the Member States, (even if Member States have to put in place the obligation).

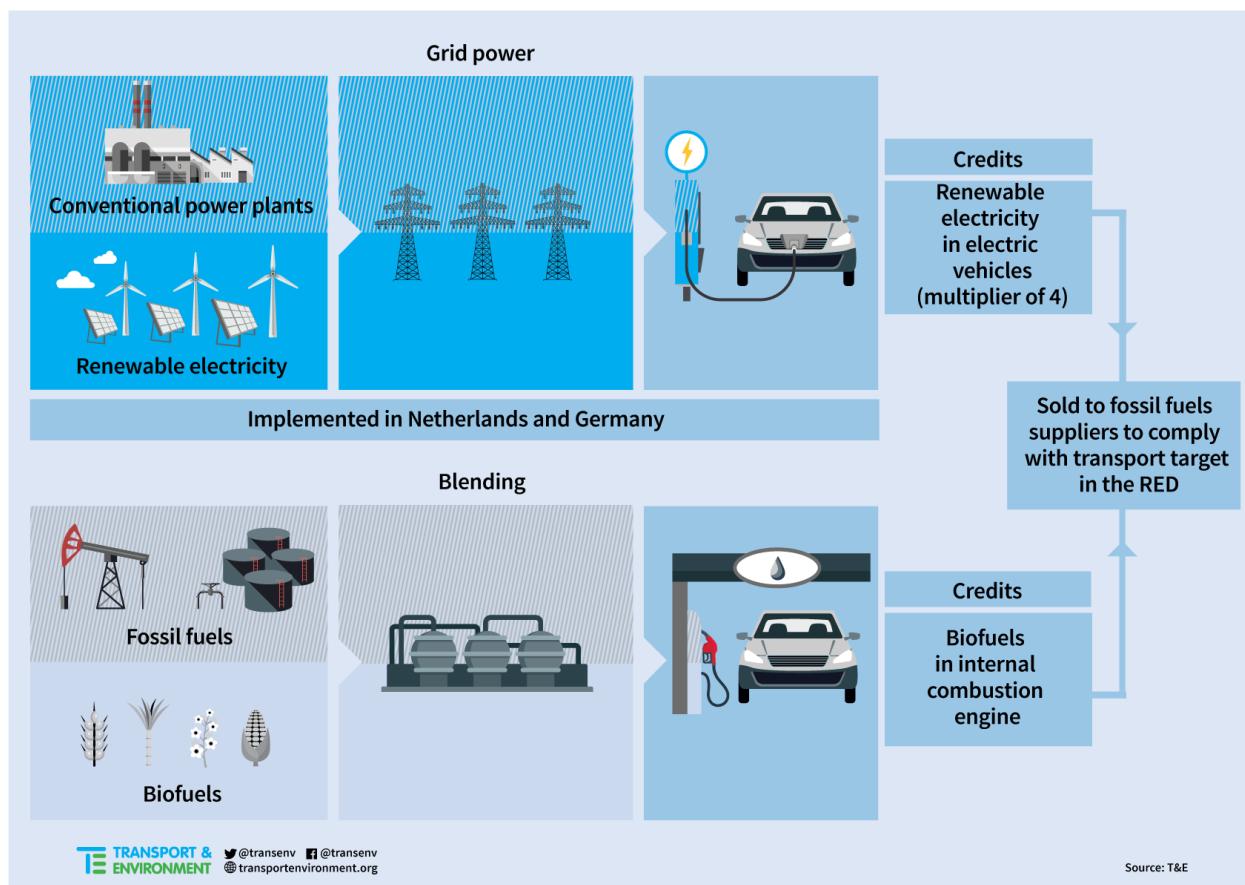
⁸ It is important to note that we do not consider renewable electricity to be sustainable when produced from biomass burning. This is due to the high inefficiency of biomass burning for electricity production and the issue of carbon debt linked to biomass burning.

⁹ More details on the participation to the Dutch system here: Participants - Energy for Transport <https://www.emissionsauthority.nl/topics/general---energy-for-transport/participants---energy-for-transport>

¹⁰ More details here: LCFS Electricity and Hydrogen Provisions, <https://www.arb.ca.gov/fuels/lcfs/electricity/electricityh2.htm>

3.2 How does the crediting work?

In the Netherlands, electricity can be traded as a renewable energy unit (HBE). The amount of HBE generated is a factor of two pieces of information: (a) the amount of electricity reported as supplied to EVs to which (b) the percentage of renewables in the EU or national mix is applied. These units are also subject to the RED multiplier (of 5 under the current RED). The value of the HBE ranged from €5.50/GJ to €6.50/GJ in 2017¹¹. Based on discussions with a broker of HBEs in May 2019, the price of electricity HBEs has increased and is currently around €10.30/GJ.



California has set a carbon intensity target on fuel suppliers - to reduce the GHG intensity of fuels supplied in California by 10% by 2020. Under the system, one credit represents one metric tonne of avoided carbon dioxide emissions. Credit value fluctuates with demand and supply but in 2017 it had an average value of 90\$¹². Contrary to the EU RED, the Californian system does not focus only on renewables, but on low carbon fuels more broadly. Every entity opting in the system gets the same carbon intensity value for electricity - the average carbon intensity value of the California electricity grid. But companies can also demonstrate 'carbon free' charging (e.g. solar panels on charging sites) which increases the electricity credits they get¹³.

¹¹ Based on Kamerstuk 34717, nr. 7, a briefing to Tweede Kamer der Staten-Generaal <https://zoek.officielebekendmakingen.nl/kst-34717-7.html>

¹² California's Clean Fuel Standard Boosts The Electric Vehicle Market (2018) <https://www.ucsusa.org/LCFSandEVs>

¹³ "The LCFS already has provisions allowing fleets or charging stations to install solar panels on site and get credit for carbon-free charging, which increases credit generation by almost 50 percent. CARB is expected to adopt new rules in 2018 to enable more EV drivers to charge with renewable energy through programs run by their utilities, and recognize and reward the additional emissions reductions." California's Clean Fuel Standard Boosts The Electric Vehicle Market (2018) <https://www.ucsusa.org/LCFSandEVs>

3.3 Where does the credit value go?

In the Netherlands, the money generated by selling fuels credits is not earmarked for specific projects and entities benefitting from the crediting system can use it as they wish. This is the case more widely for any type of renewable fuel credited in the EU - such as biofuels. There is no obligation to use the money in a particular way. But California has a different system in place.

The revenue from selling credits is earmarked by utilities for rebate programmes¹⁴, including providing point-of-sale rebates to EV buyers or payments to customers owning an EV. As an example, one utility offers a \$800 rebate for EV owners¹⁵. The value derived from electricity credits in California is quite substantial and is expected to continue growing in the coming years. Overall, in 2016, the Low Carbon Fuel Standard generated electricity credits worth \$92 million¹⁶. By 2030, electricity is expected to account for one quarter of GHG reductions under the LCFS and could generate credits for a value of \$4 billion between 2017 and 2030¹⁷.

Box: A different approach in Germany

To implement the EU's Fuel Quality Directive and reduce the greenhouse gas intensity of fuels, Germany set up a scheme to facilitate compliance by fuel suppliers: They pool with utilities, which provide electricity for EVs in both public and private charging points.¹⁸

For public charging, the energy supplier can have the kWh supplied to both BEVs and PHEVs certified and trade with the fuel suppliers. For private charging, a standard sets what an electric vehicle consumes per annum at home, work or depot. This fixed amount was set at about 2 MWh of electricity per year, given the difficulty in tracking the electricity used for transport purposes without a dedicated smart meter. For private charging, only BEVs can participate. To calculate the electricity supplied to these BEVs via private charging, utilities should keep track of how many of their customers own BEVs in a given year and multiply that number by the fixed amount of about 2 MWh.

Last year's electricity mix in Germany (e.g. in 2018, 40% of renewable electricity) is used to weight the CO₂ emission of the electricity supplied to the EVs in Germany. The final amount of avoided CO₂ resulting from the GHG difference between fossil fuels and the German electricity mix renewable electricity can then be sold by utilities as credits to fuel suppliers.

Only utilities are able to sell their renewable electricity credits to fuel suppliers. Charge point operators, electro-mobility platforms, car manufacturers and individuals that own an EV cannot participate. The revenue of selling the credits stays with the utilities. In other words, the German scheme does not include any earmarking of revenues for promoting EV (e.g. funding rebate programmes).

¹⁴ LCFS Utility Rebate Programs, <https://www.arb.ca.gov/fuels/lcfs/electricity/utilityrebates.htm>

¹⁵ Clean Fuel Rebate for fueling electric vehicles, PG&E, https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/electric/clean-fuel-rebate-for-electric-vehicles.page

¹⁶ Union of Concerned Scientists, <https://www.ucsusa.org/sites/default/files/attach/2018/01/cv-fact-sheet-lcfs.pdf>

¹⁷ UCS, assuming future credit prices at 100\$.

¹⁸ <https://www.umweltbundesamt.de/themen/verkehr-laerm/kraft-betriebsstoffe/vollzug-38-bimschv-anrechnung-von-strom-fuer#textpart-1>

4. Implementation options in EU Member States

It is important for electricity to become a compliance option as part of a target to push fuel suppliers to increase the share of renewable advanced fuels in their mix and decrease the GHG intensity of their fuels. This is the priority. Based on the examples of California and the Netherlands, there are several elements and options that need to be considered for the implementation of a system to credit electricity used in transport at national level.

4.1 The eligible entities

Several options exist regarding the choice of the entities that could be eligible. It comes down to three main options:

➤ Option 1: Charging point operators are the eligible entities (the Dutch example)

This option does not cover all electricity used in transport (e.g. home charging is not covered). It covers a broad range of actors investing in charging infrastructure - car makers, utilities, oil companies, etc.

➤ Option 2: A variety of actors is eligible (the California example).

This option enables utilities, charging point operators, car makers and other entities (e.g. aggregators of EV users) to opt into the system. This option offers a broad coverage (e.g. also rail electricity) and allows the allocation of credits for home charging - using grid power - of EVs. The number of credits for home charging is calculated on the basis of the carbon intensity of California's generation mix.¹⁹ Several market players benefit from the value generated by credits.

➤ Option 3: Metering on the means of transport.

In this case, information would be provided by on-board metering. This has the potential to cover more of the electricity supplied to EVs than the first option, as charging from non-public territories (such as workplaces, home, etc.) is also covered. But only vehicle producers deploying EVs (and other types of electric transport modes) benefit from the value generated by credits, not other actors of the electromobility system.

There is not one single answer regarding the design of the system and several elements will need to be considered by decision-makers when deciding on the best system at national level. Which type of charging will be covered by the system: Only public charging or also residential/private charging? Do administrative obstacles (e.g. an entry threshold) prevent small players (private car owners, SMEs) to participate in the crediting mechanism? Which transport modes can participate in the system (road, including heavy duty, rail, inland shipping, etc.)? Which actors receive benefits from credits and do these actors need to be supported by national or EU regulations or programs? Is the system based on detailed information reported by entities or does it include averaging some data to allocate credits to specific entities (like utilities)? All these questions will be important to take into account.

4.2 The type and use of the credits under the new RED

The type of credits

Another element to consider is the type of credits that Member States will issue and which depends on the target that Member States implement - an energy target or a GHG target. Depending on this choice, the system of credits will be based on renewable units like in the Netherlands or on avoided GHG emissions like in California. A country choosing the GHG target will allocate different carbon intensity values to the electricity - depending if it comes from the grid or from a direct connection to renewable electricity

¹⁹ <https://ww3.arb.ca.gov/fuels/lcfs/background/basics-notes.pdf> (slide 20)

generation. In order to incentivize the best performing options on the market, we have always advised to opt for a GHG target rather than an energy target²⁰.

Accounting for 100% renewable electricity?

As of 2021, new EU rules will take effect. The multiplier for road vehicle will be 4 instead of 5 currently. In addition, the national share of renewables in the electricity mix will need to be applied and Member States will no longer have the option to use the EU average. After 2021, there will also be a possibility to count 100% renewable electricity under the new RED II, when “*electricity obtained from a direct connection to an installation generating renewable electricity and supplied to road vehicles*”²¹. If strict criteria for eligibility are respected, this option will reward investments in renewables production.

Earmarking options

Regarding the earmarking of the money generated by credits, a first decision to take is whether the money is earmarked for specific programs that support the shift to zero emissions in transport (like in California) or whether it is fully channelled to market players. We support the earmarking option because it ensures that revenues will be used to support and reward consumers in their choice for electromobility, potentially also for less wealthy social groups.

The earmarking could take different forms. One avenue is the Californian option with rebates for EV owners or potential purchasers. Another possibility is to ensure that a certain share of the credit value is channelled to a specific fund and used for supporting the shift to a more sustainable transport system and to zero-emissions vehicles, e.g. to support residential or public charging infrastructure.

Based on a projection of 54% of renewable electricity at EU level in 2030, the price of €10.3 /GJ for an energy unit (current price in the Dutch system) and assuming the grid system covers the entire amount of electricity used in cars (as mentioned above, 4.7% by 2030), the electricity credit system could generate up to €5.7 billion of credit value in 2030 at EU level. Assuming the same RES-E share, the contribution in Germany alone could be up to €1.2 billion.²²

4. Recommendations for REDII national implementation

- **Including renewable electricity in a credit system broadens the compliance options to reach the national target for renewable advanced fuels.** Electricity, as a fuel, should be eligible to generate credits the same way other fuels - like biofuels - do. The share of electric transportation will increase in the coming years and so will the share of renewable electricity used in transport. It is thus very important to set the right system in place now.
- **Including renewable electricity in a fuels market brings many benefits, including additional revenues for the shift to electromobility.** On top of diversifying the compliance options, this is an opportunity to implement the “polluter pays principle” and ensure fossil fuel suppliers that deliver final transport fuels reduce their GHG footprint. The system also creates direct financial flows to

²⁰ NGOs recommendations for post-2020 sustainable low carbon transport fuels policy, October 2016, <https://www.transportenvironment.org/sites/te/files/publications/28%2010%202016%20NGO%20letter%20low%20carbon%20fuels%202030.pdf>

²¹ Article 27.3, Directive 2018/2001, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN>

²² We assume that the total amount of electricity used in transport in 2030 will amount to just over 250 PJ (i.e. 4.7% of total energy demand in transport) and apply the multiplier of 4 used in the RED II to calculate the total value of the credits.

entities that are taking part in building electromobility services, without relying on public money. The electricity credit system could generate up to €5.7 billion of credit value in 2030 at EU level or up to €1.2 billion for a country like Germany.

- **Several options exist regarding the choice of the entities that could be eligible but earmarking of the revenues is necessary.** How the system will be designed will impact the share of electricity covered by the system (e.g. home charging or not) as well as the beneficiaries of the financial reward from the system (e.g. utilities, car manufacturers, etc.). Earmarking will ensure that the credit system contributes to the deployment of zero emissions vehicles, for instance via the creation of a specific fund to support the shift to zero-emissions vehicles e.g. to support residential or public charging infrastructure.
- **Enabling the crediting of 100% renewable electricity will be important.** Under the future EU rules, electricity will be credited on the basis of the national renewable share, but an option also exists after 2021 to enable the crediting of 100% renewable electricity. If strict criteria for eligibility are respected, this option will reward investments in renewables production.

Further information

Geert De Cock
Electricity & Energy Manager
Transport & Environment
geert.dc@transportenvironment.org
Tel: +32(0)2 851 02 02