

Policy paper: Advanced, renewable biofuels in the European Union transport sector

The challenge: Sustainable mobility in the EU

The climate policy objectives of the European Union in the transport sector for increasing the share of renewable energy sources to ten percent while reducing greenhouse gas emissions by six percent cannot be achieved solely through the use of conventional biofuels. Climate-friendly, sustainable mobility in Europe can only be achieved by supplementing the use of conventional biofuels with advanced renewable fuels. Hydrogen and synthetic methane produced with electricity from renewable energy sources (*Power to Gas*) are two renewable liquid and gaseous fuels of non-biological origin already available that offer a wide range of advantages. In order to integrate these alternatives into the European fuel market, a course must be set that can ensure the rapid development of the market and the realisation of political objectives.

A major milestone in this case is Directive 2014/94/EU on ‘the deployment of an alternative fuels infrastructure’, which took effect on 22 October 2014. The development of a strategic framework and concrete targets for the market development of alternative fuels and the deployment of the corresponding infrastructure in EU Member States establishes an important basis for achieving climate protection goals in the transport sector. In legislative procedures currently underway to amend Directive 98/70/EC on the ‘quality of petrol and diesel fuels’ (Fuel Quality Directive, FQD) and Directive 2009/28/EC on ‘the promotion of the use of energy from renewable sources’ (Renewable Energy Directive, RED), it is now important that the EU parliament advocates the establishment of advanced biofuels and that a swift agreement is reached with the Council.

Recommendations

dena’s strategy platform *Power to Gas* and the wind hydrogen initiative *performing energy* advocate the successful continuation of the legislative process on the quality of fuels and energy from renewable sources as well as the rapid accord between the Parliament and the Council. The use of renewable liquid and gaseous fuels of non-biological origin is essential for achieving the EU’s climate protection objectives in the transport sector.

We recommend that the Parliament and the Commission implement the following points:

- A minimum quota of 2.5 percent for advanced biofuels in 2020
- Renewable liquid and gaseous fuels of non-biological origin shall be considered to be four times their energy content
- Fuels produced from carbon (CO/CO₂) rich gas streams from agricultural residues, waste and residues of non-renewable energy sources shall be considered to be four times their energy content
- To consider the use of renewable hydrogen in refineries as a possible method of reducing the greenhouse gas emissions of fossil fuels

Power to Gas

In *Power to Gas*, electricity from renewable energy sources is converted into hydrogen and optionally into synthetic methane in an additional step. The renewable gases produced can be used immediately or fed into the existing natural gas infrastructure, stored and, independent of location or time, subsequently utilised. Hydrogen and synthetic methane from renewable energies can be used in various fields of application – mobility, heat generation and material recovery – or even over the long term for conversion back into electricity. All this makes *Power to Gas* an innovative, cross-system solution for integrating renewable energies into the entire energy system.

The use of electricity from renewable energy fuels (hydrogen or synthetic methane) provides the mobility sector with the potential to drastically cut greenhouse gas emissions in comparison to fossil fuels and to keep changes in land use to a minimum compared to that required by biogenic fuels from food crops. The nearly 1.15 million natural gas vehicles¹ on the roads throughout the EU also present enormous potential: potential that can be exploited immediately by using synthetic methane from renewable energy sources, with no vehicle modifications necessary. The market introduction of hydrogen fuel cell vehicles has already begun, with a number of car manufacturers announcing production models for the coming years. However, hydrogen from renewable energy can already easily replace the fossil fuel-based hydrogen used during the production of fuel at refineries.

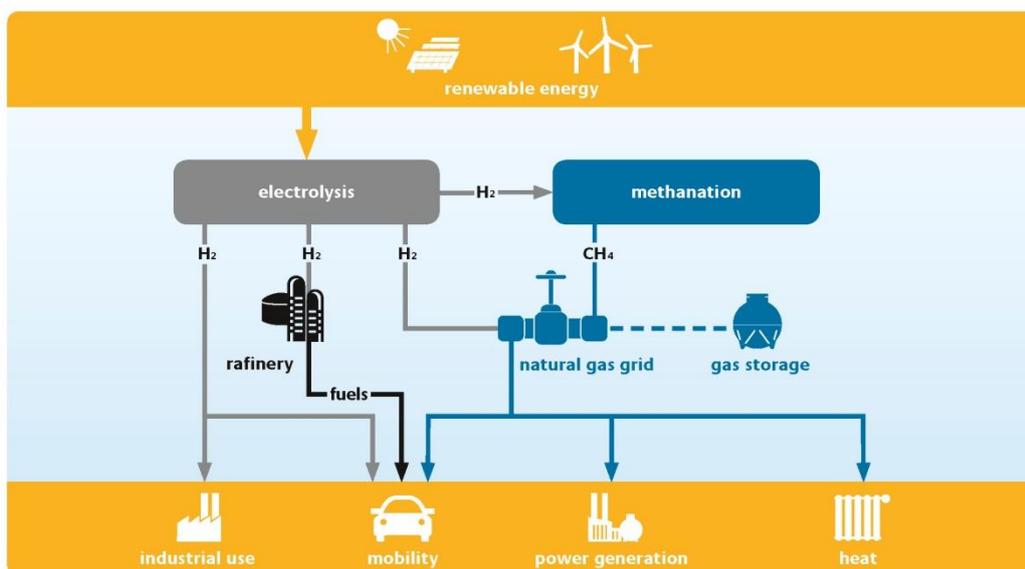


Illustration 1: System solution Power to Gas: Production and utilisation pathways.

Although the market for hydrogen and synthetic methane from *Power to Gas* is still developing, it will soon be able to compete with conventional biofuels. The establishment of these advanced biofuels in the fuel market is largely dependent on the creation of a legal framework, including regulatory incentives provided by the EU.

¹ NGVA Europe: European NGV shares in total vehicle market. September 2014

Reasons for using renewable hydrogen and synthetic methane in the mobility sector

1. Sustainability

Hydrogen and methane from *Power to Gas* are advanced, renewable fuels with low specific lifecycle greenhouse gas emissions. They present no threat to conventional biofuels or food production and a very low risk of changes in land use. Synthetic methane does not emit additional carbon dioxide during its combustion as the CO₂ was previously bound by methanation of biogenic or industrial sources of carbon dioxide. Combining *Power to Gas* with biogas or bioethanol systems improves specific energy yields during the production of bio-methane or bioethanol while also reducing carbon dioxide emissions.

2. Versatility

Renewable hydrogen is not only suitable for use in low-emission and low-noise fuel cell vehicles (FCEV, Fuel Cell Electric Vehicle) but in internal combustion engines as well. Synthetic methane, produced from electricity generated by renewable energy sources, can be used in conventional natural gas vehicles without the need for vehicle modification. Furthermore, the integration of renewable hydrogen can improve the greenhouse gas balance of fossil fuels.

3. Rapid implementation

No infrastructure or technical modifications are needed to integrate renewable methane into the fuel market. The fossil fuel-based hydrogen used in refinery processes can also be replaced immediately by its renewable counterpart. The direct use of hydrogen in the mobility sector requires the rapid uptake of fuel cell vehicles in the market as well as the necessary hydrogen infrastructure to be put in place.

4. Significant leverage

The production and use of advanced, renewable fuels promotes the integration of renewable electricity in the energy sector while increasing the share of renewable energy in the transport sector. The use of relatively small amounts of hydrogen and synthetic methane can already significantly reduce greenhouse gas emissions in the transport sector. By using the renewable fuels of *Power to Gas*, this innovative and pioneering technology will continue to be developed and create new jobs.

5. Security and diversification of supply

Hydrogen and methane from *Power to Gas* are locally produced fuels increasing the regional added value as well as creating local employment. Their use further diversifies the sources of energy in the fuel market and reduces dependence on oil and natural gas imports. Similarly, an uptake in the use of advanced biofuels can reduce biomass imports from third countries. Together, they can make a significant contribution to securing Europe's energy supply.

dena's Strategy Platform *Power to Gas*.

With the *Power to Gas* Strategy Platform, the Deutsche Energie-Agentur GmbH (dena) – the German Energy Agency – and its partners are supporting the use and development of the *Power to Gas* system solution. In the Strategy Platform, partners from business, associations and science pool their diverse expertise and experience. The core objective is to establish *Power to Gas* as a reliable, cost-efficient and large-scale multi purpose option with at least 1.000 MW installed capacity in Germany by 2022.



performing energy – The Alliance for Wind Hydrogen.

performing energy – The Alliance for Wind Hydrogen – consists of representatives of 19 industrial companies, research institutions and organizations in the fields of environment and technology promotion. The initiative is supported by the federal states of Brandenburg and Schleswig-Holstein and the Free and Hanseatic City of Hamburg. The Alliance would like to help to gain a better understanding of the benefits, the system boundaries and the interfaces required of wind-hydrogen systems in their interaction with the use of renewable energy.

