2030- Climate targets for mobility in the Netherlands require a cap for the use of fossil fuels

The Netherlands Platform Sustainable Biofuels argues for a decreasing cap on the use of fossil fuels in the Netherland mobility sector.

Starting from today's level of 494 PJ total energy use in transport (of which 463 PJ is fossil), the use of fossil fuels should be not more than 300-330 PJ in 2030, with a further reduction of the use to maximum of 150 PJ fossil in 2040 and reaching zero in 2050. This is necessary to quickly reduce the climate impact of the transport sector and to make the transition to climate-neutral production and solutions.

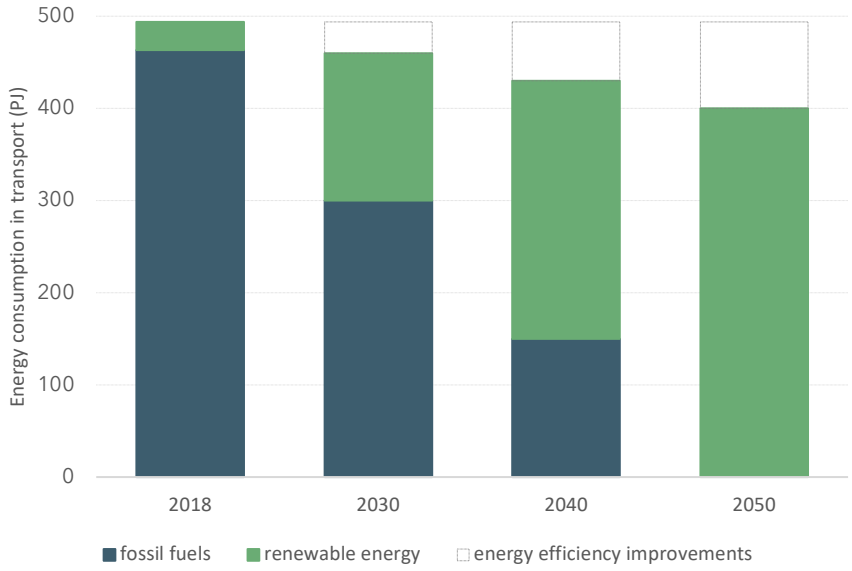

Figure 1: A proposed reduction trajectory for fossil fuel use towards zero in 2050, starting from the actual 2018 energy consumption in Netherlands transport (2018 data based on CBS, Statistics Netherlands).

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Clear reduction path for fossil with lower and lower caps in 2030, 2040 and 2050

Limiting the use of fossil makes it possible to keep CO_2 emissions in the transport sector below 25Mt of CO_2 by 2030[1,2]. A fossil limit also contributes to achieving climate neutrality for the transport sector around 2050, or possibly earlier. The market will focus on alternative options for fossil and provide the necessary investments in alternative energy sources. Figure 2 illustrates the actual CO_2-emissions in transport from 1990 to 2018 and a possible trajectory towards 2050.

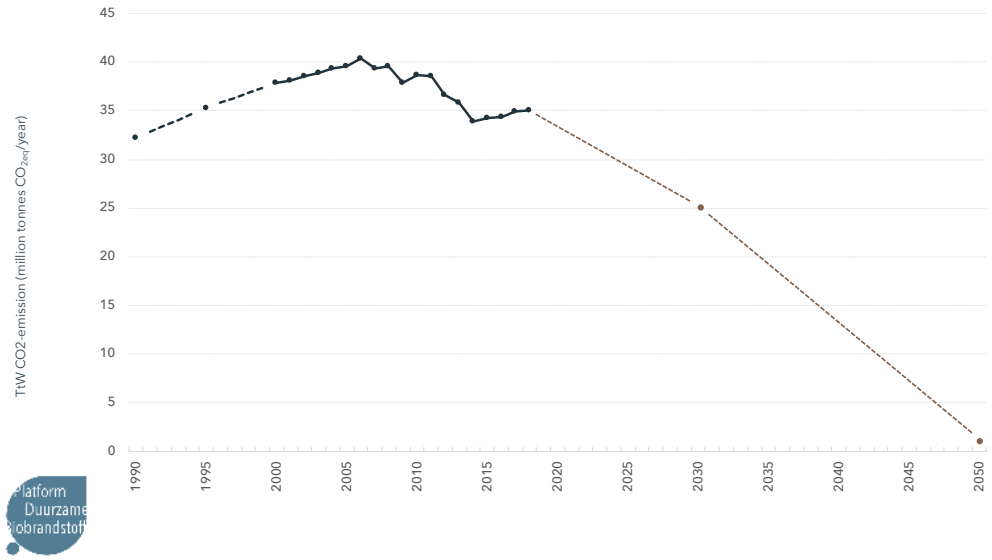

Figure 2: CO_2-emissions in Netherlands transport sector (1990-2018) and proposed reduction path towards 2050

To combat climate change effectively the source for CO_2-emissions needs to be tackled. The continuous addition of CO_2 by burning fossil resources causes an increase in CO_2 concentrations in the atmosphere and acidification of the oceans. This increase in fossil-based CO_2 causes climate change. That is why the use of fossil sources worldwide will have to be phased out quickly in order to limit the rise in global temperature to max 2 °C, as agreed in the Paris Agreement. According to various Energy Outlooks[3] global energy demand will probably continue to rise. Non-fossil energy sources are required to cover this rising energy demand. The transport sector, worldwide and also in the Netherlands**,** still depends for more than 95% of its energy demand on fossil sources. The sector will have to prepare itself for solutions without deployment of fossil feedstocks to meet that energy demand.

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[1] All CO_2-emision values mentioned in this article are Tank-to-Wheel CO_2 emission values. This approach is taken as the Tank-to-Wheel approach has also been used in the Netherlands Climate Agreement, following IPCC methodology. According to this approach Tank-to-Wheel CO_2-emissions of electricity, hydrogen and biofuels are zero. CO_2-emissions as result of the production of fuels or energy carriers occur in the Well-to-Rank part of the production chain and are attributed to the industrial and/or agricultural/forestry sector. The Platform emphasises that it is important to focus on those renewable fuels that have as low as possible Well-Well-to-Tank emissions. For a proper analysis of the CO_2-emission reduction performance of renewable fuels compared to fossil alternative the platform a Well-to-Wheel approach is to be preferred.

2 The Netherlands indicated in the 2014 Energy Agreement that the Tank-to-Wheel CO_2-emissions of the transport sector should not exceed the 25 million tonnes CO_2 in 2030. During the preparation of the Netherlands Climate Agreement the sector table on mobility was developing additional measures to achieving this target in 2030

[3] See e.g. IEA's World Energy Outlook 2019: https://www.iea.org/weo2019/, or the 2019 IRENA report "Global energy transformation: an outlook to 2050: https://www.irena.org/publications/2019/Apr/Global-energy-transformation-A-roadmap-to-2050-2019Edition

The proposed limit, which provides for a fossil reduction pathway, is a clear signal to fuel and energy suppliers and parties in the transport sector to focus in the next three decades on switching to renewable energy carriers and renewable energy mobility services. It provides an incentive for innovation and encourages investments in climate-neutral options. A fossil limit ensures cooperation and at the same time encourages healthy competition between all existing market players and new entrants to come up with cost-effective solutions.

The share of renewable energy in the Netherlands transport sector in 2018

In 2018, total final energy use on Dutch territory[4] was 494 PJ Source CBS, Statistics Netherlands). Road transport used 473 PJ. The remainder was rail transport (6.9 PJ), national aviation (1.5 PJ) and inland shipping (12.7 PJ).

Since 2018, all electricity used by the national public railway company (NS) originated from Netherlands windmills. For that reason, it is assumed in this paper that all 6.9 PJ is renewable electricity. According to information from the Netherlands Emission Authority 24 PJ of renewable energy has been introduced into road transport, in accordance with the annual obligation Renewable Energy in Transport. This is based almost entirely on the basis of certified, sustainable biofuels. Though 0.7 PJ of electricity was supplied to road vehicles, the share of renewable electricity in 20189 in all generated electricity in the Netherlands is still at moderate levels (only 15%)[5], so only 0.1 PJ can be attributed as renewable electricity.[6]

The total contribution from renewable energy in transport adds up to 31 PJ. Compared to a total energy consumption of 494 this equals to 6,3%. The conclusion is that still 463 PJ fossil fuels are use in 2018. The 2018-use of fossil fuels equals a Tank-to-Wheel CO_2-emission of 35 million tonnes CO_2[7] (see also Figure 2). This is 10 million tonnes above the maximum level of 25 million tonnes in 2030. This presents the Netherlands with the task of lowering the annual emissions by 10 million tonnes of CO_2in transport in the coming decade, while energy demand in the sector is expected to keep growing.

Expected share of renewable energy in transport in 2030 does not bring sufficient CO2-emission reduction

It is expected that by 2030 the final energy consumption in transport in the Netherlands could, due to optimizations, fall to 460 PJ (8% lower than in 2018). To remain below 25 million tonnes of CO_2-emissions in 2030, the maximum amount of fossil fuels to be used needs to be limited to 300-330 PJ. The remaining energy demand (130-160 PJ) will have to come from renewable sources. This is more than currently is anticipated in the Climate Agreement. It is clear therefore, that more needs to be done. In fact, the annual renewable energy obligation should by 2030 be at one third of total energy consumption.[8] It must be noted however that in a system with an annual obligation for a mandatory share of renewable energy, the total volume of fossil fuel could still grow. So, an annual obligation for renewable sec does not guarantee that emissions will fall below 25 million tons of CO_2. Therefore, the Platform emphasises that a limit on the volume used of fossil is necessary, in addition to the annual renewable energy obligation.

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[4] This includes road transport, non-road mobile machinery, inland shipping and national aviation, but excludes international bunkering for maritime shipping and aviation.

[5] See https://www.cbs.nl/nl-nl/publicatie/2019/40/hernieuwbare-energie-in-nederland-2018

[6] In the Climate Agreement it is anticipated that by 2030 the share of renewable in electricity generation will grow to 70-75%. See https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-the-netherlands

[7] Based on 75 gCO_2/MJ_{fossil} (tank-to-wheel)

[8] The Renewable Energy Directive for 2021-2030 sets a 2030 target of at least 14% of renewable energy in transport. Due to the optional use of multipliers for specific biofuels and for electricity, the actual share might be lower than this 14%. See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC

Consequences of a fossil limit in 2030

As stated earlier, the energy consumption in the Netherlands mobility sector is currently 494 PJ, significantly above this 330 PJ fossil fuel cap. The Platform expects that the mobility requirements will increase rather than decrease in the coming years. A limit ensures that fossil cannot grow and that brings more perspective into the market for all alternative options. So, more perspective for electrification, increasing efficiency, renewable fuels, public transport, sharing options and awareness for avoiding energy-based mobility (e.g. shift to using bicycles). For renewable energy (both electrons and molecules) a decreasing use of fossil in the system means a four to five-fold increase in the current deployment of renewable energy towards 2030.

That means a major task that requires joint action from all involved parties (public and private) to make this possible. Possible actions are:

- Expanding public transport: rail traffic and other public transport should grow by at least half compared to 2018. The train's electricity consumption would then increase from 6.9 PJ to 10.4 PJ. Given the higher energy efficiency (and lower CO_2-intensity of public transport) this leads to an efficiency gain and a lower total energy consumption in transport.
- Maximise the options to get people travelling by bicycle.
- Making sure that the 2 million electric vehicles[9] that where anticipated in the Climate Agreement negotiations will really materialize. This will require challenging car manufacturers to bring models to the market that meet the functional needs and financial possibilities of most car users.
- All required liquid and gaseous fuels should be based on a growing share of renewable components to which fossil fuels may be added up to a certain maximum. This is to ensure that the CO_2 intensity of the fuel is sufficiently low.

How could a cap for fossil fuels work?

The question is which parties in the market in 2030 can supply the limited volume of 300-330 PJ fossil for that year to the market. There are several methods to design a cap for fossil use. One possibility is to sell the 'right to sell fossil' to market players. The volume of fossil is sold per auction, up to the set limited amount. This creates a threshold on the fossil side and as results opens up the market volumes for renewable solutions. Market parties are invited to come up with further suggestions.

In the current regulation landscape, the renewables share is capped to annual obligation limits. There exists no limit to the use of fossil and as a result the fossil volumes can grow when energy demands grow. Setting a target for renewable means that the market does not go beyond the target. The renewable share remains limited. This limit gives too little incentive to reduce the costs of green options. It is necessary to reverse the situation. Making the share of fossil resources scarce must better position the alternatives.

Under the proposed 'limit on fossil' system the amount fossil allowed is capped (and the cap is lowered over the years) and any further energy demand increase needs to be fulfilled with renewable energy, be it via 'electrons' or 'molecules'. This is how the market operation can be transformed and become based on renewable as the 'new normal'.

Background and motivation for this blog

"The sectoral objective for mobility is a maximum CO_2 emission of 25 Mton in 2030. Based on current emissions and the expected mobility developments, this leads to a reduction task of at least 7.3 Megatons of CO_2in 2030, as an intermediate goal to reach the national goal of 2050 reduce CO_2 emissions by at least 95 percent compared to 1990. " This was stated in the summer 2018 document "Main elements of the Climate agreement, announced by Mr. Ed Nijpels, Chairman of the Climate Agreement Coordination Board responsible for achieving the Netherlands Climate Agreement.

[9] The total passenger car fleet in the Netherlands amounts to 8,5 million vehicles. See https://www.cbs.nl/nl-nl/nieuws/2019/14/aantal-wegvoertuigen-blijft-stijgen

The Climate Agreement that the Netherlands Government presented in the summer of 2019[10] no longer mentions both the sector target of 25 million tonnes and an additional reduction statement of at least 7.3 million tonnes of CO_2.

The Netherlands Platform Sustainable Biofuels regrets that the objectives are no longer explicitly stated. The Platform believes that it is necessary to address the problem in the transport sector at source. It all starts with reducing the use of fossil energy sources, the cause of climate change by emitting CO_2 from underground carbon stocks, with undesirable accumulation in the atmosphere and oceans as a result.

The transport sector is the only economic sector where CO_2 emissions are still. higher than the level of 1990. Reducing emissions in the transport sector is crucial for achieving the integral Climate Agreement target of -49% in 2030 (compared to 1990), as the Netherlands Government strives for. The Platform believes that a clear and strict admission policy (for fossil fuels) at the start of the chain is supportive and reinforcing for all optimization measures that are taken at the end of the chain to fulfil the mobility requirement as efficiently as possible.

In 1990, greenhouse gas emissions in the Dutch mobility sector amounted to 32.2 megatons of CO_2 (see Figure 2). The highest level was reached in 2006, just before the start of the financial crisis. Emissions then amounted 40 million tonnes of CO_2. Since the end of the financial crisis in 2014, CO_2 emissions from the transport sector have risen again. In 2017 and 2018 this amounted to 35 million tons of CO_2. In 2030 the emissions should have been reduced to 25 million then CO_2 and by 2050 this emission must have been reduced to 1.6 megatons of CO_2 (95% below the 1990 level). Preferable, the Netherlands Platform Sustainable Biofuels believes that the 2030 limit of 25 million tonnes of CO_2 should be lower to a maximum of 21.5 million tonnes of CO_2-emissions to pave the way for a net-zero emission level by 2050.

[10] See https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-the-netherlands