Biofuels on the Dutch market

Update: data for 2012

Brief report
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1 Introduction

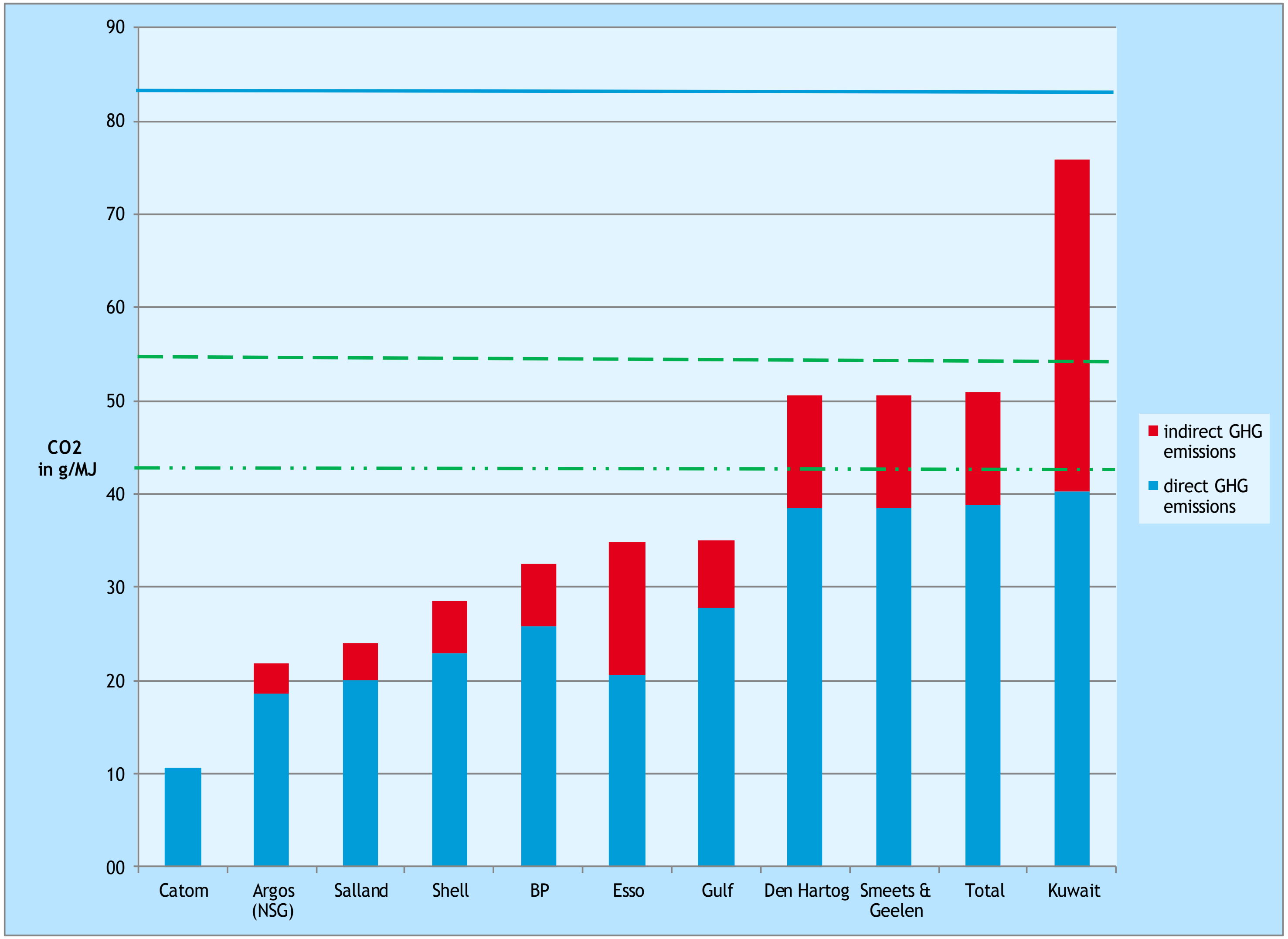
In 2012 the Dutch NGO Natuur & Milieu together with three European environmental NGOs commissioned the study 'Biofuels on the Dutch market - Ranking oil companies in the Netherlands' (CE Delft, 2013). In this study CE Delft assessed the biofuel data per supplier as published by the Dutch Emissions Authority (NEa), resulting in a ranking of fuel suppliers based on the average greenhouse gas (GHG) emissions of their biofuel blends in 2011 (NEa, 2012). At the end of January 2014, the Dutch Emissions Authority has published a document containing the data over 2012 (NEa, 2014).
Natuur & Milieu and Greenpeace have requested an update of the ranking to see whether changes in the biofuels mix and therefore average greenhouse gas (GHG) emissions will result in a different ranking.

This paper provides this new ranking followed by an analysis of the share of feedstocks and the way of reporting in order to explain the differences between 2011 and 2012. This updated ranking is in line with the previous calculation methodology of which a detailed description can be found in the study mentioned above. Due to a lack of data on absolute volumes sold by the oil companies, calculations are based on relative shares. Consequently fuel suppliers can only be compared on their average GHG emission factor.

2 Average GHG emissions per fuel supplier

The new ranking of fuel suppliers is depicted in Figure 1 and shows a wide variety between fuel suppliers. The ranking of 2012 differs from the ranking in 2011 due to changes in fuel suppliers, the order of the ranking and the height of the average emissions factors. In addition, limitations of the reporting methodology of the NEa, as laid down in Dutch legislation, also have an impact on the ranking. Due to these limitations only a ranking based on the seven biofuels mostly used can be provided.

Figure 1 Ranking of fuel suppliers based on total GHG emissions of the seven biofuels mostly used in 2012*



* The dotted green lines represent a 35 and 50% reduction of GHG emissions compared to the fossil fuel reference (83.8 gCO_2/MJ, blue line) (based on NEa, 2014).

2.1 Fuel suppliers included in the ranking

First of all, the new ranking includes different fuel suppliers compared to 2011. Like in 2011, Allesco could not be included in the ranking due to a lack of data on the type of feedstocks (100% ‘other’). Due to this same issue Smeets & Geelen was left out the ranking in 2011, but could be included in 2012. Catom is totally new in this overview. Argos and NSG merged in 2011, therefore NSG is indicated as ‘Argos (NSG)’ in this paper. An explanation for these changes could be the requirements of the obligations: only above a certain volume of fossil fuels fuel suppliers are obliged to blend biofuels.

2.2 Top and bottom of the ranking

While Esso had the highest average emission factor in 2011, the biofuels brought onto the market by Kuwait resulted, with an average of 75.8 gCO_2/MJ, in the least emission savings in 2012. On the other side of the spectrum, the average GHG emission factor of the biofuels brought onto the market by Catom was limited to 10.7 gCO_2/MJ, which can be explained by the use of biofuels from waste and residues only.

The GHG performance of the biofuels of Esso improved significantly. Although the indirect GHG emissions are still substantial, Esso ended up in the middle of the ranking.

The places of other fuel suppliers in the ranking only differ to some extent: like in 2011 Argos (NSG), Salland, Shell and BP all have a relative low average GHG emission factor, while fuel suppliers such as Den Hartog and Total still have a high average GHG emission factor.

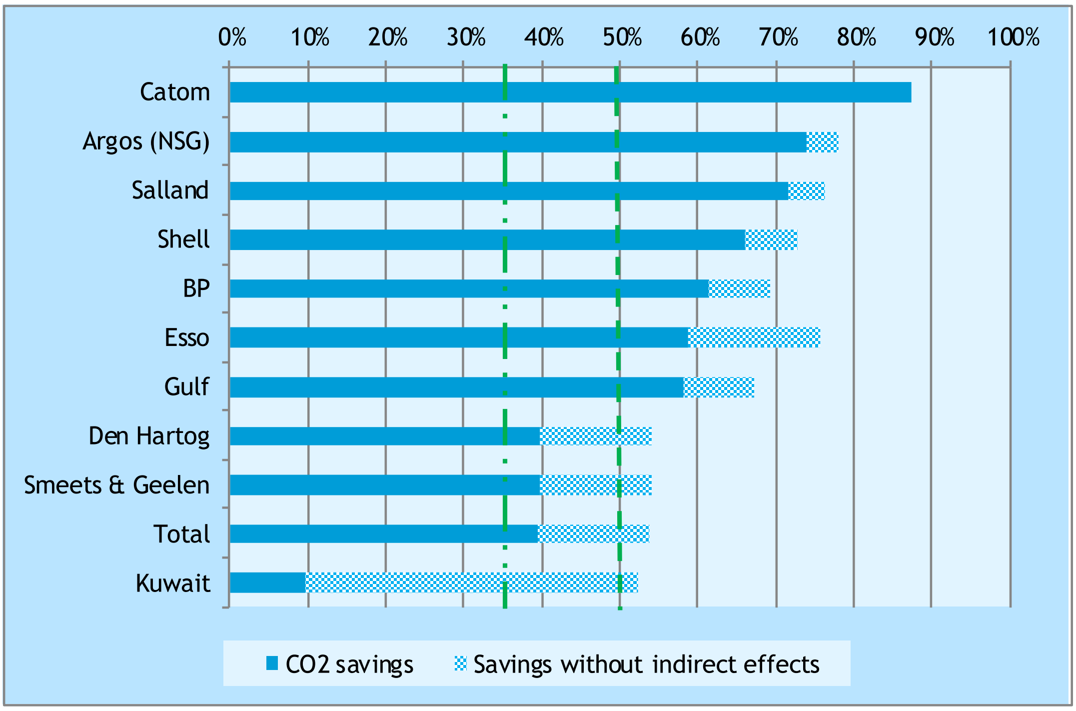
2.3 Difference in relative emission savings compared to 2011

In the previous ranking Esso slightly exceeded the fossil fuel reference, which meant the biofuels brought on the market by Esso resulted in an increase of GHG emissions rather than emission savings. In 2012, on average all biofuels performed better than the fossil fuel reference.

Looking at the direct GHG emissions, all fuel suppliers achieve at least 50% reduction of GHG emissions compared to the fossil fuel reference. Note that the direct emissions of the fuel suppliers with a relative high average emission factor (Kuwait, Total, Smeets & Geelen and Den Hartog) alone exceed the total average GHG emissions factors of the other fuel suppliers. Because the indirect emissions of these four suppliers are also substantial, these fuel suppliers are only able to reduce nearly 40%, when all GHG emissions are included. The relative emission savings of Kuwait are limited to nearly 10%, as can also be seen in Figure 2.

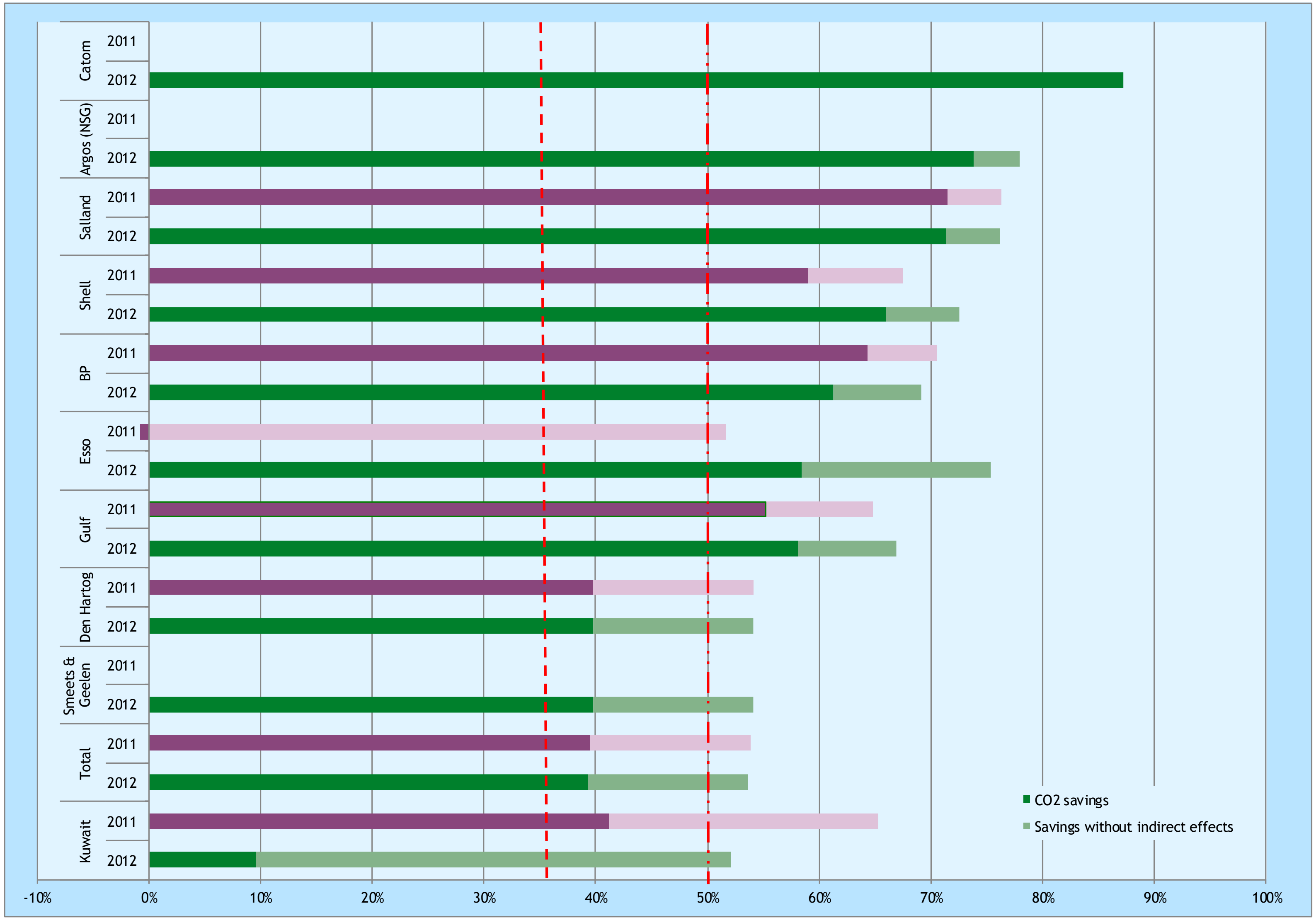
In these relative emission savings per fuel supplier are presented for 2012 (green) and 2011 (purple). As can be seen, the emission savings of Total, Den Hartog and Salland did not change. The average GHG emission performance of Gulf and Shell slightly improved, while BP slightly decreased. In line with the changes in the ranking Kuwait and Esso show the largest differences in their average GHG performance.

Figure 2 Relative CO_2 savings compared to fossil fuel reference per fuel supplier in 2012*



* The green dotted lines represent a 35 and 50% reduction of GHG emissions (based on NEa, 2014).

Figure 3 Relative CO_2 savings compared to fossil fuel reference per fuel supplier in 2011 and 2012*



* The red dotted lines represent a 35 and 50% reduction of GHG emissions (based on NEa, 2014).

2.4 NEa reporting limitations

Because not all shares of feedstocks can be included in the calculations and the ranking, there is a certain level of uncertainty. This level is high for fuel suppliers with a high share of 'other feedstocks'. For example, Smeets & Geelen, Total and Kuwait have a high share of 'other feedstocks'. Due to this level of uncertainty the average GHG emission factor in practice could be lower or higher depending on the type of feedstocks in this category and thus the position in the ranking is also uncertain for these fuel suppliers.
This issue will be further explained in Section 4.

3 Feedstocks used per fuel supplier

3.1 Different groups of feedstocks

The differences in the ranking between 2011 and 2012 can to a large extent be explained by changes in the feedstocks used per fuel supplier. Roughly put we can speak of three categories of biofuels, which are depicted in Table 1. Biodiesel from food crops generally results in the highest direct GHG emissions in combination with high indirect GHG emissions. Bioethanol produced from food crops causes slightly less direct GHG emissions, but more importantly result in lower indirect GHG emissions. On the contrary biodiesel produced from waste and residues has relatively low direct GHG emissions. Because waste and residues are used to produce the biodiesel, no emissions associated with indirect land use change are taken into account.

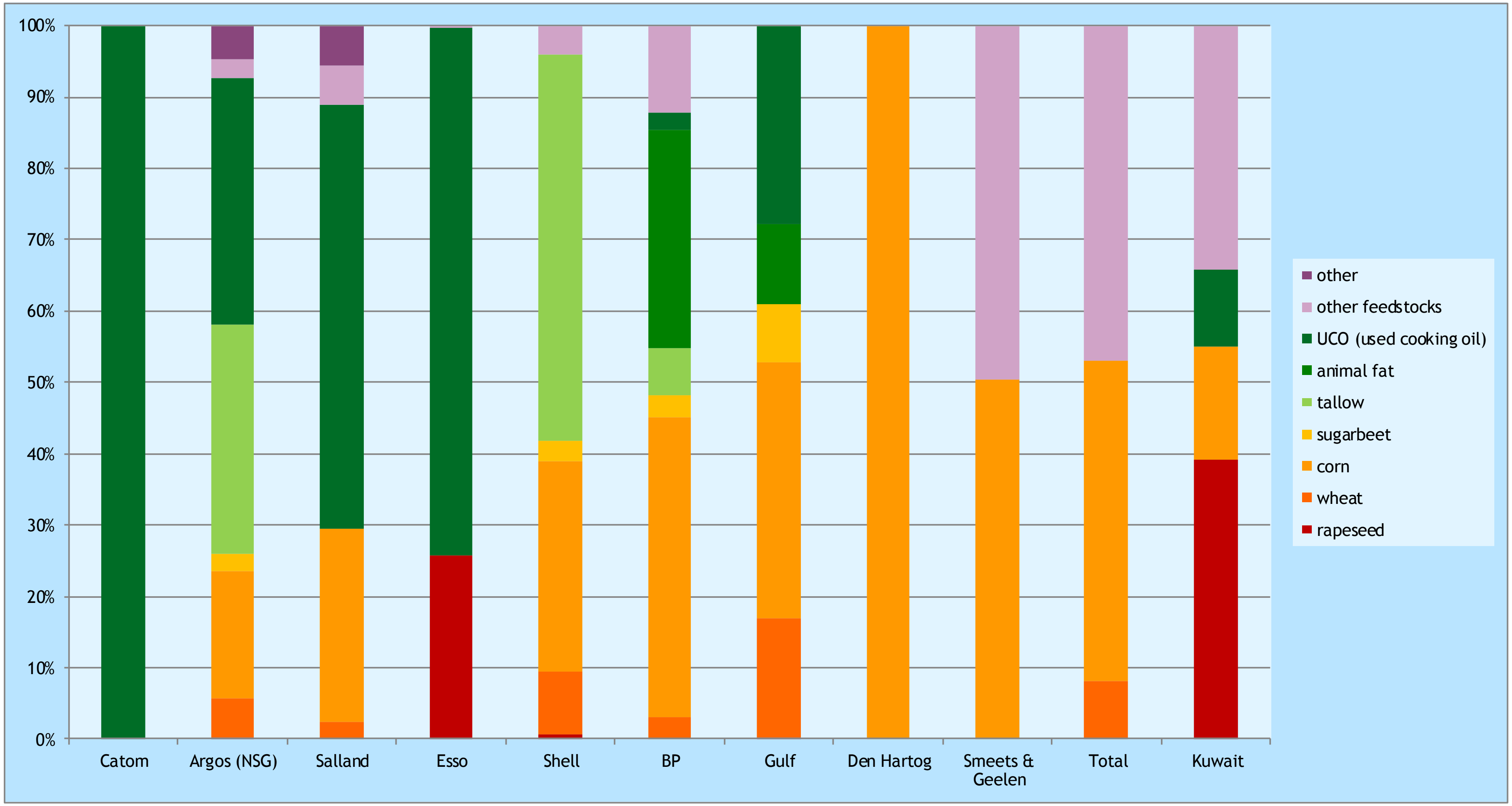
Table 1 Classification of biofuels based on type of feedstock including GHG emission factors (gCO_2/MJ) (see also CE Delft (2013))

Group	Feedstocks	Direct GHG emissions	Indirect GHG emissions
Biodiesel from food crops	Rapeseed	49	55
Bioethanol from food crops	Wheat	41.1	12
	Corn	38.5	
	Sugar beet	34.1	
Biodiesel from waste and residues	UCO (used cooking oil), tallow, animal fat	10.7	0

3.2 High share of biofuels from food crops, high GHG emissions

Based on the total amount of biofuels brought onto the market in 2012, NEa (2013) concludes an increase of double-counting biofuels (being produced from waste and residues) from 40% in 2011 to 51% in 2012. In Figure 4 the shares of feedstocks per fuel supplier are depicted. Because the order of fuel suppliers is similar to the ranking of fuel suppliers, the relationship between these shares and the ranking becomes clear. Despite a share of used cooking oil (UCO), Kuwait has the highest average GHG emission factor due to the high share of rapeseed biodiesel. All other fuel suppliers with a relatively high average GHG emission factor, like Den Hartog, Smeets & Geelen and Total, have high shares of bioethanol from food crops in combination with a lack of biodiesel from waste and residues. Catom, the fuel supplier having the lowest average GHG emission factor, only reported biodiesel produced from used cooking oil.

Figure 4 Overview of feedstocks used per fuel supplier based on NEa, 2014



* Note that all feedstocks from waste and residues have the same GHG emission factor. The different colours of green therefore do not represent a difference in GHG performance.

3.3 From biofuels from corn to biofuels from waste and residues

Compared to 2011 several shifts in feedstocks can be identified. Kuwait has a higher share of rapeseed and lower share of used cooking oil, which could be one of the explanations for the high average emission factor in 2012. In case of Esso the shift occurred the other way around: the high share of rapeseed in 2011 has been replaced by a high share of used cooking oil in 2012.
The biofuels brought onto the market by Den Hartog have been produced from corn in both years. On the other hand, we see fuel suppliers like Gulf, Shell and Total having far lower shares of corn in 2012 in combination with a higher share of waste and residues. Based on these shifts it may be concluded that overall, fuel suppliers slowly shift from land-based biofuels to biofuels from waste and residues.

4 Changes in reporting

4.1 The seven feedstocks mostly used

The changes in the ranking can partly be explained by a shift in feedstocks, but another reason could be the different way of reporting by the Dutch Emissions Authority. As laid down in the ministerial regulation 'Regulations on Renewable Energy in Transport' of 2 May 2011, the reporting by the Dutch Emissions Authority should be in line with the way of reporting in the United Kingdom, where only the seven most important feedstocks are reported.
The feedstocks other than top 7 have been included in the category 'other feedstocks'.

Due to the shift in feedstocks, the top 7 in 2012 differs from the top 7 in 2011. Table 2 shows glycerine is no longer included in 2012, while sugar beet was not included in 2011. The differences in categorisation between 2011 and 2012 influence the ranking: because calculations are only based on the top 7 feedstocks the average GHG emission factor of a supplier can be too positive or negative compared to the real situation. For example, glycerine, animal fat and wheat straw do not result in indirect emissions, because these are seen as waste and residues. A fuel supplier with a high share of these feedstocks has in practice a lower average GHG emission factor than included in this analysis.

Table 2 Top 7 feedstocks mostly used

	2011	2012
Animal fat (from goats, sheep and cows)	X	X
Glycerine	X	
Rapeseed	X	X
Corn	X	X
Tallow	X	X
Wheat	X	X
UCO	X	X
Sugar beet		X
Other feedstocks	Palm oil, soy, sugarcane, sugar beet	Other animal fat, glycerine, palm oil, sugar cane, wheat straw

4.2 Development in share unknown

To what extent the average GHG emission factor could be higher or lower in reality than what we have calculated here (and in Figure 1) depends on the mix of feedstocks that fall under the categories ‘other feedstocks’ and ‘other’. The Dutch Emissions Authority does not have insight in the category ‘other’, because the fuel supplier itself classified a share of their biofuels as ‘other’.

From Figure 5 the conclusion can be drawn that especially Smeets & Geelen, Total and Kuwait have a high share of ‘other feedstocks’: 30 to 50% of the feedstocks fall within this category. This results in a relatively high uncertainty of the average GHG emissions of their biofuels. To estimate the potential impact of these feedstocks, calculations also have been performed including the unknown categories by assuming best and worst case GHG emissions factors. In Figure 6 the range between these extremes is visualised by black error bars. The ends of these represent the best and worst case and the length of the error bars is determined by the share of unknown biofuels.

In 2011 the categories which could not be included in the analysis represented 6.6% of total biofuels, while in 2012 this share increased to 7.1% of all biofuels. The reason for this higher share is the increase in the category ‘other feedstocks’ as described in Section 4.1. However, the share of ‘other’ has dropped to 1.7%. (NEa, 2014) While the Dutch Emissions Authority tries to further limit this share, a more detailed overview of the category ‘other feedstocks’ would benefit the representativeness and accuracy of the ranking presented in this paper.

Figure 5 Overview of share of unknown biofuels per fuel supplier according to NEa, 2014

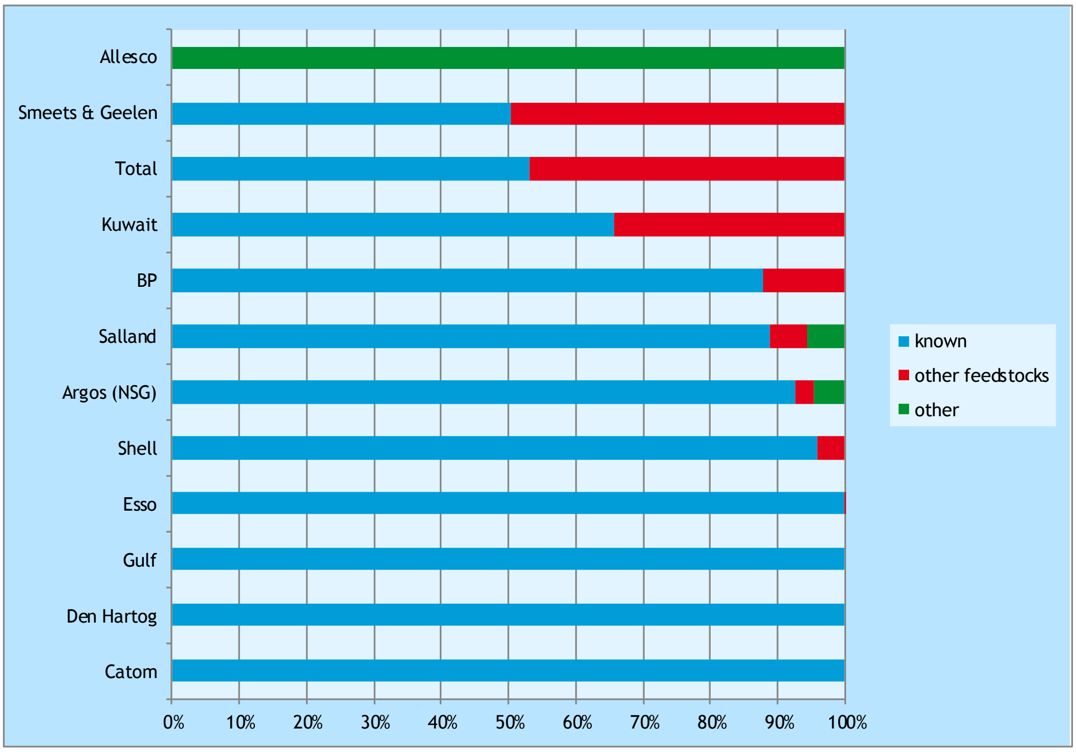
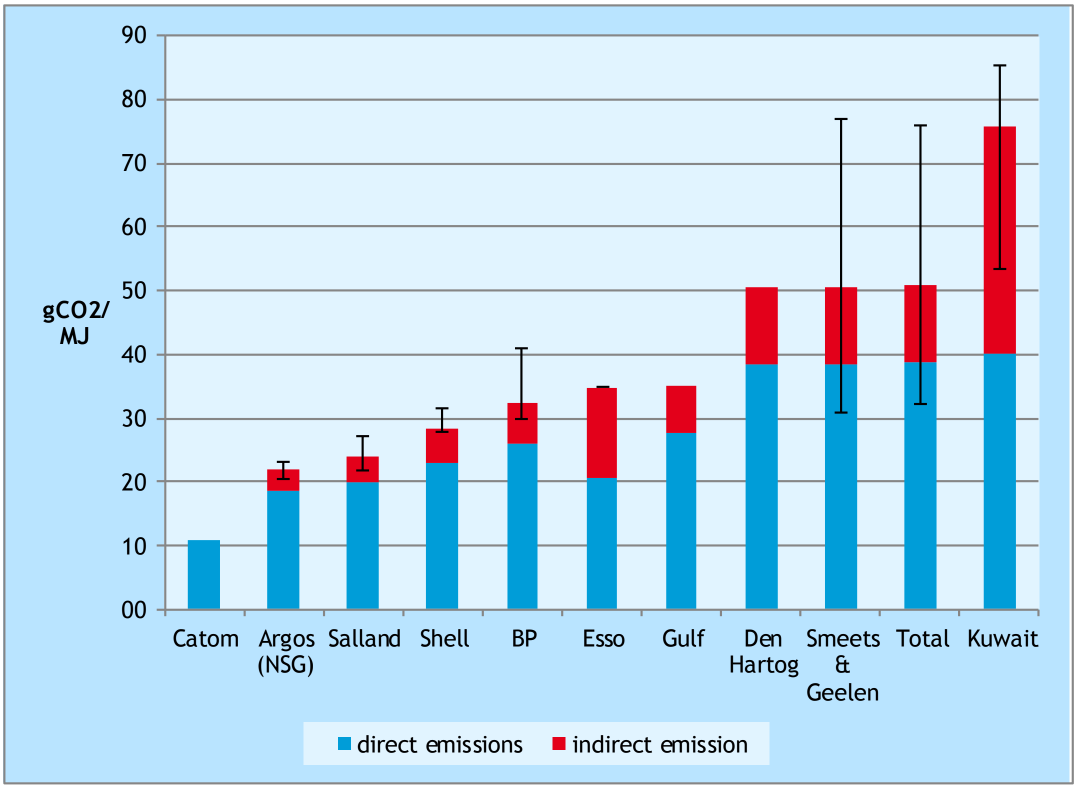


Figure 6 Level of uncertainty as result of share of 'other feedstocks' and 'other' per fuel supplier



5 Conclusion

Overall, it can be concluded that the updated ranking is quite similar to the ranking in 2011. A majority of the fuel suppliers has a similar place in the ranking compared to 2011.

On average, GHG emission savings have improved. All biofuels cause less GHG emissions than the fossil fuel reference, although there is a large range in the level of emission savings. The biofuels brought onto the market by Kuwait resulted in the least emission savings (to some extent depending on the biofuels mix in the 'other feedstock' category), while the biofuels of Catom were responsible for an average GHG emission reduction of more than 85%.

The changes in the ranking could to a large extent be explained by the changes in the feedstocks used. Overall, the shares of biofuels from food crops decreased and the shares of biofuels from waste and residues increased. Especially in the case of Esso, the shift from rapeseed to used cooking oil resulted in a large decrease of its average GHG emission factor.

Due to the reporting methodology of the Dutch Emissions Authority there could be a difference between the average GHG emission factor in practice and the emission factor calculated for this ranking. This should be kept in mind when interpreting the updated ranking. Overall, however, the data transparency increased as result of a lower share of unknown feedstocks.

6 References

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