

Unite the Union response to the Department for Transport's consultation - Supporting recycled carbon fuels through the Renewable Transport Fuel Obligation



1. Introduction

- 1.1. This submission is made by Unite, the UK's largest trade union with over one million members across all sectors of the economy, including energy and utilities, transport, food and agriculture manufacturing, financial services, construction, information technology, service industries, health, local government and the not for profit sector. Unite also organises in the community, enabling those who are not in employment to be part of our union.
- 1.2. Of particular relevance to this submission, Unite represents over a quarter of a million workers in the transport industry, 35,000 energy and utility workers; who will be impacted by these decisions. In this response we aim to respond to the need to decarbonise transport, but plead that the transition is performed in a way that does not price the normal person in the street from driving their vehicle from the roads and farmers forced to give up farming.
- 1.3. Transport fuels are one of the foundations of the logistics and public transport industry which have become a cornerstone of modern society. When there are shortages or sky rocketing prices there is the possibility of civil unrest, in the western world. The price of everything is determined by the price of fuel as logistics companies pass on the cost of transport to the commercial customer who can either absorb the increase or pass it on to the general public. Equally if the price of fuel or supply of fuel is interrupted, particularly to farmers, then the results can have repercussions that last for months.
- 1.4. From a Climate Change perspective the fastest growing area of the economy in terms of Greenhouse Gas (GHG) emissions is transport. In 2020, 24% of net greenhouse gas emissions in the UK were estimated to be from the transport sector¹ despite the impact of the pandemic. The impact of the COVID-19 pandemic resulted in emissions to have been around an estimated 23% lower in 2020 than in 1990 against a trend where there were small increases most years since 2013. Road transport is the most significant source of emissions in this sector, in particular passenger cars; and the changes which have been seen over the period were heavily influenced, by change in the volume of traffic on the roads of the UK rather than the use of any alternative way to power vehicles or improvements in fuel efficiency.
- 1.5. The Intergovernmental Panel on Climate Change (IPCC) have made it very clear in their AR6 report in 2021 that the remaining allowance of CO₂ that a country could emit if the aim is to stay below the Paris Accords 1.5°C² is **just 400 billion tonnes (Bt) of CO₂**³ that you cannot keep the levels of CO₂ and other Greenhouse Gasses (GHG) to stop the climate from warming to more than 1.5°C unless there is a high degree of such gasses extracted from the atmosphere. For an average country, its share of the global carbon budget will run out in 9 years but for a high polluting country such as the UK, our share of the carbon budget will run out in **3 years!** Therefore, the only ethical way to buy more time is to remove carbon from the atmosphere and store it in such quantities to

¹ 2020 UK Greenhouse Gas Emissions, Final Figures
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1051408/2020-final-greenhouse-gas-emissions-statistical-release.pdf

² The UNFCCC Paris Agreement of 12 December 2015 which entered into force 4 November 2016
<https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

³ The Carbon budget calculations had been adjusted slightly since the previous IPCC report of 2018, according to the further information received from scientific sources therefore providing a better understanding of the scientific understanding of climate change.
<https://www.carbonindependent.org/54.html#:~:text=The%20IPCC%20AR6%20Report%20of,run%20out%20in%209%20years.>

compensate for the carbon being released. This is what is meant by Net Zero. Or we could dispense with ethics and buy the capacity from a third world, global south or other such nation that does not emit that much carbon. Doing so of course will make it that much harder for that nation to develop into economically into a nation with a similar standard of living. Therefore the UK cannot wait until 2050 to be Net Zero but needs to achieve something close to Net Zero now, to extend and allow us to remain below the 400 Bt budget. For that reason Unite welcomes the DfT Grant funding of synthetic fuels.

- 1.6. Unite agrees that a principles-based approach should be taken to determine the recycled carbon fuels (RCFs) feedstock eligibility, and welcomes the move to include RCF's in the Renewable Transport Fuel Obligation (RTFO) but would highlight that as well as landfill and flue gasses, there are mountains of recyclable plastics filling up warehouses, whilst new plastics are created every day, worn out tyres and millions of tonnes of municipal waste going into incinerators producing energy but also tonnes of greenhouse gasses, instead of undergoing the gasification and Fischer Tropsch (FT) avenue to form sustainable fuels.
- 1.7. Unite is not against the creation of plastics from oil as long as that the plastics are recyclable and are recycled rather than ending up in warehouses or worse the sea. Whilst manufacturers can make every effort to ensure a product is capable of being recycled, this product may simply end up in warehouses, because the plastics are not clean when they arrive to be reprocessed. Unite would also prefer it if the oil the plastics were obtained from, was from a synthetic source i.e. from municipal solid waste (MSW) via gasification and FT, bioengineered from yeast⁴ and other sustainable biological resources.
- 1.8. Nature based solutions (NbS)⁵ to carbon sequestration will work eventually given millions of years but the process is highly inefficient resulting in the majority of the captured carbon escaping and re-entering the atmosphere in at most a few hundred years⁶. Trees can grow and absorb millions of tonnes of carbon over their lifetime, for example but their leaves fall and rot, as do they, when they die, releasing methane a gas many times as powerful as CO₂, unless there is some intervention to lock away the carbon faster. Sadly the world is industrially extracting carbon from the earth faster than nature can reabsorb it, which in the end is the reason behind climate change and although we can change behaviour, encourage planting which respects biodiversity, human rights⁷ and yet achieves our goals⁸, nature alone cannot compete with the speed that is now need to extract greenhouse gasses and store them indefinitely, not just for months, years or centuries but permanently.
- 1.9. For the FT process to work there needs to be three elements, sources of carbon and hydrogen plus heat, to both deconstruct the existing hydrocarbons, but also to form them. Such heat could be used to reduce the energy requirements of the Direct Air Capture (DAC) of Carbon Dioxide

⁴ See the article on a bioengineered replacement for palm oil by Parsons, Raikova and Chuck at the University of Bath https://www.nature.com/articles/s41893-020-0487-8.epdf?sharing_token=VzOeytvi9_vjDjJNwFclltRgN0jAjWei9jnR3ZoTv0Po6RWTA5cvm9FDac7oQHiyCgYLiE_SWFWiMLYB0wX7dR7OUqxQe9D7vT4YUsw-4_gJtqn1alFfnDnv36z_9OBMQhs52mO4y9mUr1YZWRK2ZaVTUW_7t3t7tVoJ0p5RkwO5DZ9P8K7tES6RkBUneJb7VxZvnnw56d1G189gCzQsW-oJDFGWP8SUF19mvPoMi8s_VR9vpNWPwVp5-bxDbGuj9XcDSbPbbQqsAHaduRqlivDW9cHw6btYLAoSIOlokvGW3JDKACGAWbeeEftDso2d1Eo&tracking_referrer=www.wired.com

⁵ <https://www.naturebasedsolutionsoxford.org/>

⁶ <https://royalsocietypublishing.org/doi/full/10.1098/rstb.2019.0120>

⁷ <https://www.science.org/doi/abs/10.1126/science.abn9668>

⁷ <https://onlinelibrary.wiley.com/doi/10.1111/gcb.15513>

⁸ See the WWF policy paper which provides insights and a practical pathway for the role that NbS can play in the biodiversity conservation agenda in general https://wwfint.awsassets.panda.org/downloads/nature_based_solution_in_the_cbd_gbf_wwf_proposal.pdf

(CO₂) and the extraction of hydrogen from water. The combination of these processes, now means, we have the technology to generate a carbon neutral, liquid, drop in replacements for fossil fuels, plucked from the air, provided that we can obtain enough sustainable electrical power (sometimes referred to as Power to Liquids (PtL). Although these five pilot projects are supported through the Renewable Transport Fuel Obligation⁹ (RTFO), more could still be done to invest in enough projects to make the UK self-sustainable, avoiding the current situation where a rival state can economically cripple the economy without setting foot in our nation, or declaring a war.

- 1.10. Unite notes that although there is value in gaseous feedstocks and solid feedstocks but not liquid feedstocks. Municipal Liquid Waste (MLW) has some value as outlined below in the creation of hydrogen and the resultant investment this could attract, may end the situation, where water companies dump untreated waste in our oceans and seas. Currently solids that cannot be treated at a sewage works are included in the mix of MSW used as a very carbon intensive fuel in incinerators or used in anaerobic digesters to create heat and power. Unite would suggest that we are literally flushing away a useful by product of habitation that can be used in the battle to stop climate change. (see 1.12 below)

Question 1: Do you agree or disagree that a principles-based approach should be taken to determining RCF feedstock eligibility?

- 1.11. Unite agrees that a principles approach should be used but further believes that provided that the feedstock does not utilise a land or sea area that could otherwise be utilised to grow food, that such feedstock will produce a fuel that does not cause a damaging impact of the environment, then it should be utilised. By way of example :-
- Cutting down rainforests in order to grow palm oil for conversion into a “sustainable” fuel substitute
 - Using animal fats grown or hunted specifically as the source material - Whale oil for example. Animal fats should not be included unless this is a waste product and part of a wider mix of MSW.
 - Planting non indigenous crops that become invasive and damage the local flora and fauna.
 - Industrially – if a (DAC) or CO₂ flue gas extraction facility uses energy derived from burning fuel oils or coal to heat the capturing medium (so that the captured CO₂ can be pumped into a CCUS pipeline), the net impact may not be a reduction in atmospheric CO₂ but a net increase.
- 1.12. Unite would also argue that when it comes to FT feedstock the same principle should also apply to the supply of hydrogen, specifically in relation to the point about not causing a damaging impact of the environment. Grey and Black Hydrogen are terms for Hydrogen extracted from fossil fuels such as coal, oil and natural gas, where the extraction process results in the release of large volumes of CO₂ and often other GHG's directly into the atmosphere. Even Blue Hydrogen (the term for such processes where the CO₂ is captured and pumped into a Carbon Capture, Utilisation and Sequestration (storage) (CCUS) pipeline, can release large volumes of GHG's. Hydrogen can be extracted from numerous sources including water, ammonia and even animal waste and Municipal Liquid Waste (MLW) resulting in no CO₂ release¹⁰.

Question 2: Do you agree or disagree with the proposed criteria? Are there any additional criteria we should consider?

- 1.13. There is a lot of untapped potential from PtL especially from nuclear energy, given their major issue is disposing of their waste heat safely. PtL works by either using electrical energy to split a chemical

⁹ For more information on the renewable transport fuels obligation go to <https://www.gov.uk/guidance/renewable-transport-fuels-obligation>

¹⁰ See this article of the plasmalysis of animal slurry <https://fuelcellsworks.com/news/new-tech-turns-manure-into-hydrogen/> referencing a company called Graforce <https://www.graforce.com/en/> The ammonia in slurry and MLW and the methane released can also be used

substance such as sea water, ammonia, even waste water (sewage)¹¹ to generate hydrogen. Once separated from the substance the Green hydrogen can be liquefied by putting it under pressure or chemically combined to create ammonia, combined with a source of carbon in the FT process etc. One source of carbon that needs to be considered is CO₂ from the DAC process. For DAC to work you need electricity to turn the fans to bubble the air through a capture medium which separates out the CO₂ and a source of heat to raise the capture medium to 100°C to boil off the CO₂ when the medium becomes saturated where it is then captured and pumped into cylinders or into a pipeline for storage or utilisation. The capture medium is then cooled and returned to use. If an external source of electrical energy or chemical combustion is needed to provide this heat then the energy requirements for DAC are extremely high, but if free geothermal energy or waste heat is used rather than released into the atmosphere, the sums start to add up.

- 1.14. As an island nation we can become self-sufficient in energy, we can avoid the wild swings of market prices for fossil fuels, as weaponised by Russian president Vladimir Putin during their war with Ukraine. We can become Net Zero or possibly carbon negative, undoing some of the damage the industrial revolution that was started in the UK has done to the planet. If we were self-sufficient in energy we could attract far more manufacturing investment as it would remove the one great obstacle to the supply of almost all products, the knowledge that the lights will come on and will not cost the earth both financially and environmentally.
- 1.15. This requires government secured investment into renewable generation, nuclear power, DAC facilities, CCUS pipelines and to make the situation a reality quickly, the removal of planning delays to the construction process. The thing standing in our way has always been political rather than technological and the resulting paperwork to ensure that all regulations and safety criteria are met with respect to a design and location of such nuclear facilities. If we have a design that is now being built, the one at Hinckley Point for example then this should not require the committees to go over the same points time and time again to obtain approval of the same design just in a different location. Happily the Sizewell C reactors have now been given the go-ahead but it still needs to be built. Similarly on the existing footprint of old nuclear plants there is normally the space to build and the local economy that is built around supporting nuclear generation, often going from a locality that is hostile to nuclear to one that is welcoming.
- 1.16. Unite believes the UK Government should follow the example of the French Government:- tell the energy companies that they cannot increase prices beyond a 4% increase to consumers¹² and tell them to invest in 6 new nuclear facilities¹³. Instead the UK Government has through the protector of the consumer Ofgem¹⁴ to give the go-ahead to energy companies to increase prices¹⁵ forcing millions into fuel poverty this winter. Yes there are companies out there who have attempted to obtain customers but dropping prices to a unsustainable level for the company to be profitable but this should not mean we should bribe one successful company to take on its failing rival. In such cases the Government itself should step in and nationalise the company. Once the company is nationalised the government could issue green bonds and obtain loans to finance the construction of more sustainable generation, not putting all the nations generation in one basket including nuclear and all forms of renewable.
- 1.17. Iceland is one of the only nations on earth to be carbon negative. The nation achieves this by harnessing the geothermal heat that is readily accessible due to the geology of the earth's surface in that area. Geothermal heat is accessible to all if you can drill deep enough to access it. Once accessed unlike most other forms of renewable energy generation, it is hot enough to run DAC

¹¹ Please see the above reference point 10

¹² <https://www.connexionfrance.com/article/French-news/France-extends-energy-price-cap-measure-to-the-end-of-2022>

¹³ <https://www.world-nuclear-news.org/Articles/Macron-announces-French-nuclear-renaissance>

¹⁴ Ofgem's role and responsibilities are prefixed with an obligation to "protect energy consumers, especially vulnerable people, by ensuring they are treated fairly and benefit from a cleaner, greener environment." <https://www.ofgem.gov.uk/about-us/our-role-and-responsibilities>

¹⁵ In October 2022 the price cap will rise so an average household on a dual fuel contract will pay up to £3,549 per year. <https://www.ofgem.gov.uk/publications/ofgem-updates-price-cap-level-and-tightens-rules-suppliers>

facilities and use the steam to turn turbines to generate power enabling the electrolysis of water creating Green hydrogen. Once you have a source of carbon, hydrogen and heat you have the basics needed for the FT process producing the building blocks for a drop in replacement fuel. There are areas of the earth's crust that are thinner than others in the UK but generally it ranges from 24km to 36km

- 1.18. Once built a Nuclear facility's prime problem is getting rid of its waste heat and it manages this by warming the sea, by pumping huge volumes of water through its facility. If just a proportion was used to heat the capture medium in a DAC or used to power an electrolysis facility, we could have a stream of FT created synthetic crude oil from which to balance the market, create a cleaner burning fuel and reduce our net emissions. What is more, if the generated hydrogen were used as additional grid power storage, the hydrogen could be passed through a bank of fuel cells to provide a grid balancing supply until the wind picked up, tide turned or sun came out. When the hydrogen was needed to balance the demand and generation the CO₂ could be injected into a CCUS pipeline effectively producing a carbon negative fuel.
- 1.19. In Civil Aviation synthetic aviation fuels (SAF) are seen as the only realistic solutions to flights over 4,000 km. Hydrogen takes up 4 times the volume of JetA1 Kerosene for the same amount of power so to complete 4,000 km, either the entire section to the rear of the aircraft needs to become a fuel tank or the aircraft needs to be redesigned to more of a delta wing so that the same number of passengers can be accommodated. As the distance from London Heathrow to New York JFK is a 5,555 km, using the great circle¹⁶, either the delta wing design needs to lose passengers for yet more fuel tank space making such connections extremely expensive. As a result hydrogen fuelled flights would require a fuel stop in St Johns, Canada (resulting in a 5,572 km trip) or somewhere like the Azores (resulting in a 6,467 km one way) if flown from Heathrow¹⁷.
- 1.20. Given most new aircraft entering service may be there for 25 years or more, a fuel that could simply replace the JetA1 is preferable given the cost of replacing or retrofitting existing aircraft. SAF production has to compete with other fuel demands for raw materials, especially when it comes to access to Solid Municipal Waste (SMW) which is quickly snapped up by Waste to Energy incineration facilities. Given the growth rate of the industry following the COVID pandemic, the choices governments need to make are to limit aviation growth globally or provide a mandate to enable them to become more sustainable. The UK and EU have mandated that civil aviation needs to fly on an ever increasing percentage of SAF in the fuel mix on all departing flights until they are flying on 100% SAF.
- 1.21. As SAF is synthetic there are no opportunities for aromatic hydrocarbons or sulphur to pollute the fuel. As a result SAF has a higher calorific value meaning less fuel is needed for any flight. Furthermore as there are no impurities the fuel burns cleaner meaning there are no ultrafine particulates released that are thought to be the culprits for the creation of cloud development from condensation trails. If so such a move could substantially reduce the impact of non-carbon based emissions from aviation.
- 1.22. Given the above Unite believes additional support should be given to SAF production as a priority and calls for the deployment of DAC technology, especially those utilising waste heat to extract from the air, flue gases and CO₂ from sea water to more than offset the carbon from the transport industry and potentially create a source of sustainable fuels.

¹⁶ The shortest distance across the Earth's surface from point A to point B which if continued on would form a circle back to point A

¹⁷ All distances measured using Google Earth and assuming a great circle direct path between airports.

Question 3: What is your preferred option for determining feedstock eligibility? Please justify your answer and provide supporting evidence where appropriate / available. We also welcome feedback from stakeholders concerning how to best to structure an annual assessment process.

- 1.23. Unite believes any feedstock should be used, if it can be used, except where that feedstock uses resources that would otherwise provide food or result in more carbon being extracted from the ground. Unite would strongly recommend utilising CO₂ captured from the atmosphere as this would create the infrastructure for a net zero world going forward, permanently storing any excess CO₂ in a Carbon Capture and Storage (CCS) facility.
- 1.24. If there is to be an annual assessment, Unite would recommend calculating the volume of the drop in sustainable fuel created, the energy utilised by the process and taking into consideration the volume pumped into a CCS pipeline for permanent disposal.

Question 4: What is your preferred option for the minimum biogenic content requirement? Please justify your answer and provide supporting evidence where available.

- 1.25. It does not matter where the CO₂ is released from, when looking at the impact on the climate, only that the CO₂ levels and those of other GHG's are reduced to avoid exceeding the Paris Accords 1.5°C limit on warming over preindustrial levels. Unite is concerned that there is not enough technology or nature based solutions operational to capture more or balance the levels of CO₂ that will be emitted to achieve net zero.
- 1.26. The conversion of SMW to SAF or other sustainably derived fuels, has numerous advantages over its combustion in an incinerator or landfill, not least of which, are the emissions produced by both practices. It has been shown by Rolls Royce that SAF not only reduces maintenance but it can burn as a direct replacement being combusted at 100% SAF requiring no additives. Similarly you can burn such drop in alternatives derived from SMW in road vehicles, tractors, generators, trains basically anything that runs on a fossil fuel. The difference is that there are ready made alternatives to a liquid fuel in these other vehicles but there is currently no alternative to a drop in alternative to sustainable kerosene if the aviation industry is to fly further than 4,000 km's. Given this Unite would strongly recommend that priority be given to the civil and military aviation sectors over other forms of transport.
- 1.27. Regarding a minimum percentage, that figure needs to depend on exactly how much sustainable fuel the industry can produce. If there is the capacity to directly replace all the fossil fuel with sustainable alternatives then this should be the case. If not then the minimum should be determined by the capacity of the industry at the time allowing for fluctuations in demand. Unite is concerned however that there will not be a. enough raw materials to convert and b. enough green hydrogen to provide the other key element required for the FT process to work.
- 1.28. If Blue hydrogen is employed there is the possibility of contamination from the sulphur impurities that are not separated out during the Steam Methyl Reformation (SMR) process. Should the synthetic fuel contain the sulphur it could result in a fuel with a lower calorific value and one that produces a volume of sulphur micro particulates. Furthermore as the SMR process is not 100% efficient and produces CO₂ along with a string of volatile hydrocarbon GHG's in the flue emissions it would mean that the footprint of the sustainable alternatives will not be totally zero.
- 1.29. Of course if there was additional capacity to extract CO₂ from the air, water or flue gasses over and above that needed for sustainable fuel production, that additional capacity could pump this

CO₂ into the ground effectively balancing the emissions and potentially turning the tide of CO₂ pollution.

Question 5: Do you agree or disagree with the proposed approach for determining the counterfactual to be used?

1.30. Unite does not wish to provide a full answer to this question without further evidence one way or the other. The three proposed approaches all have their own pros and cons. Unite always believes in a balanced approach to energy so if pressed would currently favour selecting the Aggregate counterfactual and the method of its calculation.

Question 6: Do you agree or disagree that grid average emissions factors for the most recent available year (i.e. the year preceding the year in which the RCF is supplied) should be used as the emissions factor for the displaced energy in the counterfactual?

1.31. Unite feels that the most up-to-date information should be used in all cases to provide an answer to this question, therefore should more recent evidence become available, it should replace the old data. Unite suggests a quarterly review rather than one that is averaged over a year given there may be seasonal priorities and requirements to favour electrical generation over SAF production for a few months to prevent the use of open fires during the winter for example.

Question 7: Do you agree or disagree that the Efe factor for EfW (electricity only) counterfactual should be taken as 22%?

1.32. Unite believes that the factorial re the Efe factor for EfW (electricity only) counterfactual should be dependent on the demand for electricity and the ability to meet that demand. Unite believes that equally the need to keep carbon emissions to a minimum. The influential Committee on Climate Change ("CCC") sixth Carbon Budget suggestion that Carbon Capture and Storage ("CCS") should be one of the many requirements of the UK Government's Net Zero strategy. Unite could not agree more and strongly suggests that if there is to be any waste to energy generation that its waste CO₂ be captured, with the heating of the capture medium fuelled by the waste heat from the combustion process.

Question 8: Do you agree or disagree with the proposed methodology for dealing with processing emissions and coproducts? If you disagree please describe an alternative proposed approach and provide any relevant evidence to support the use of this alternative approach.

1.33. Unite agrees with the proposed methodology as it would appear to be the most appropriate way to take account of the electrical and heat generated that is put to a practical use.

Question 9: What is your preferred option for the GHG emission savings threshold? Please justify your answer and provide supporting evidence where available.

1.34. Unite understands that the challenge is to keep the number of gCO₂e/MJ to the lowest possible figure and eventually once we have achieved a net zero balance to start seeing a net negative value as we start to undo the damage done to the environment. The IPCC has made it abundantly clear that we have exceeded the point where we can still limit global warming to below 1.5°C unless there is major investment into GHG reductions. This is not reductions in the form of emitting less even though this will help, this is reducing the volume of GHG's in the atmosphere. We have the technology to industrially extract CO₂ for underground storage or conversion to solid carbon or carbonates.

- 1.35. The problem is that such processes require energy and hence money to build and maintain the facility and any pipeline to it to work. Unite suggests that if a renewable fuel cannot meet the target that it pays for the equivalent amount of carbon to be captured and stored. Whilst this will make the fuel more expensive it will also incentivise change and result in a system where the government can set the goal to any level, including a carbon negative figure, knowing that the target can be met. It will eventually mean that the renewable fuels which have the lowest natural emissions will cost the least and the most polluting will be the most expensive.
- 1.36. Unite recognises that when processing MSW the calorific value of the waste will not be consistent. The only consistence form of waste would be when processing things like old tyres as they come in a set size and weight or when processing non-recyclable plastics if sorted into chemical makeup. If the government bows to pressure and the excuses of industry that their process does not produce the same result every time, however, and allows Scenario one to be applied then it may as well forget any chance of staying within the 2.0°C upper limit for global warming set in Paris in 2015. Should the government take into account an industrial offset for that fuel type where the fuel suppliers pay for the carbon to be captured and stored that exceeds the government limits, it should result in the ability for all producers to produce a product that conforms to the governments Scenario 3 where the counterfactual is reduced to a 10gCO₂e/MJ and hopefully net zero far earlier than 2050. Similarly imports of fuels could be measured and the additional cost of offsets added to the price at the point of arrival.
- 1.37. Unite recognises that this means that fuels will be that much more expensive but such a plan results in the polluter paying for their emissions at source and may encourage those industry's that use the fuel, to economise and phase out the more carbon intensive activities, or ramp up the price to the consumer of their goods. This will encourage us all to live more sustainably.
- 1.38. Unite also recognises that should a manufacturer decide to move production to another country to avoid such an obligation the UK could follow the example of the EU in setting up a emissions tariff on goods produced to make such imports more expensive than domestic production.

Question 10: Do you agree or disagree that the reporting and verification requirements for RCFs should be aligned with renewable fuels currently supported under the RTFO?

- 1.39. Unite believes that should there be the need to pay for carbon to be captured for every tonne produced, there needs to be receipts attesting to the fact that the carbon capture and storage has been paid for.
- 1.40. If the government does not believe in the idea of the offset then the reporting and verification process would appear to be adequate.

Question 11: Do you agree or disagree that RCF suppliers should be required to demonstrate compliance with the 'sustainable waste management criteria'? If you disagree, please provide alternative suggestions concerning how to mitigate sustainability risks.

- 1.41. Unite agrees that compliance with the sustainable waste management criteria.

Question 12: Do you agree or disagree with our proposal that all RCFs should be awarded 0.5 dRTFCs per litre of fuel supplied? If you propose a higher or lower level of reward, please provide evidence to support your reasoning.

- 1.42. Unite agrees that all RCF could be awarded development renewable transport fuel certificates (dRTFCs) and disagrees there currently needs to be a disparity between gaseous and solid waste raw materials, despite the reasons contained in the government's response to the previous consultation¹⁸. Unite agrees that any GHG's captured from an industrial facility need to be recycled as we currently have no other way to deal with them other than releasing them into the atmosphere and hence these gasses should cause the award of 1 dRTFCs per litre of fuel supplied but CO₂ captured in whatever way needs to be divided between recycling and long term storage/disposal in order to start having an impact in the battle to slow and hopefully reverse global warming. For this reason Unite believes that 0.75 dRTFCs per litre of fuel supplied could be used to strike a balance.

Question B1: Do you agree or disagree that the assumptions made in modelling the RCF counterfactual emissions are reasonable? [Agree / Disagree / Don't know] lease give reasoning for your answer

- 1.43. Unite would argue that electricity from waste has the ability to also supply heat after the release of steam from the turbine. Such heat can and does provide municipal heating and could provide an avenue for the economic capture of CO₂. Therefore Unite argues that the wrong counterfactual has been used as the analysis needs to take into account the heat as well as the electricity to obtain a true reflection of the process.

Question B2: Do you agree or disagree that the assumptions made in modelling how the GHG emissions from RCFs will change over time are reasonable? [Agree / Disagree / Don't know] Please give reasoning for your answer

- 1.44. Unite does not agree with the modelling, in that it would hope for a faster decline in the amount of net CO₂ released from transport, given the climate crisis we all face.

Question B3: Do you agree or disagree that the assumptions made in modelling the impact of different RCF reward rates are reasonable? [Agree / Disagree / Don't know] Please give reasoning for your answer.

- 1.45. Unite argues that when it comes to heating when assessing the Combined Heat and Power (CHP) counterfactual it cannot be assumed that all heating is generated by gas. Currently 85% of all domestic heating is gas fired the remainder is a mixture of fuel oil and electricity. Given the carbon intensity of fuel oil can be many times that of natural gas and electricity is also not carbon zero so its carbon intensity should also be considered. If the CHP scheme is being operated in an area many miles from a gas pipeline the CHP scheme would be replacing fuel oil or electrical heating. None of these are unknown factors, so should be used in the calculation to form a base carbon intensity for heating from conventional sources of heat. Unite believes that currently the difference may be marginal but as CHP, hydrogen and electrical heating expands to replace natural gas over time the difference between the carbon intensity of gas heating and that actually used by the average consumer will change. As this occurs the base carbon intensity of conventional sources may result in it being better to use the heat for carbon capture as opposed to CHP. At this point the incentives should reflect this change to encourage diversification away from the CHP scheme and toward a more environmentally friendly form of heating.

Question C1: Do you agree or disagree that the assumptions made in the cost-benefit analysis are reasonable? Please give reasoning for your answer.

¹⁸ See the more detail in the government response to the previous consultation :-
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1020709/targeting-net-zero-next-steps-for-the-renewable-transport-fuels-obligation-government-response.pdf#page=37

- 1.46. As stated earlier Unite believes that priority needs to be given to the generation of SAF as there are no other fuels that can be utilised by the industry that can achieve sustained flight for more than 4,000 kms¹⁹ (see 1.19).
- 1.47. According to the 2021 Sustainable Aviation Fuels Mandate consultation²⁰ in 2019 the aviation sector in the UK alone used 12.2 Mt of aviation fuel in 2019 (=14,930 million litres), despite significant aircraft efficiency improvements an aviation fuel efficiency. At the same time 30,035.1m litres of diesel and 16,851.2 m litres of petrol were sold in the UK²¹. While there are alternatives to sustainable diesel and petrol in the form of battery technology, hydrogen vehicles and even old cooking oil, there are no alternatives to SAF if the aviation industry is not going to return to the era 100 years ago when only a few passenger flights were possible. Unite would therefore argue that the aviation sector needs to be given priority access to ensure that there will be enough fuel to continue operations.
- 1.48. Due to the pandemic, the aviation sector is still recovering but with the possible recession brought on by the substantial increase in fuel prices, caused by amongst other things the weaponisation of fuel supplies by Russia, it may be due to fall into decline again as airline passengers focus their attention on keeping warm rather than on holidays. This may mean that the volume of fuel needed, may be currently as little as half of that required in 2019 and given the recovery path seen from 2008 following the financial crisis, levels of passenger flying may take years to return to 2019 passenger numbers. By June 2022 despite the rapid growth passenger numbers for the 12 months from July 2021 to June 2022 were around half of that seen between July 2018 and June 2019 with a large proportion of these being pent up demand, using vouchers for cancelled holidays that were booked to occur during the pandemic. The aviation sector passenger demand is reasonably resilient but even so it is very open to critics from the environmental lobby who believe all passengers should use trains or sail boats as opposed to flying, something they do not do to road transport despite the footprint being far greater.
- 1.49. Civil aviation also causes secondary emissions other than CO₂ which cause ground pollution and cause the condensation trails to induce the production of cloud cover. The reason for this is primarily the ultrafine particulates that are expelled from the jet engines exhaust which provide ideal condensation nuclei in the super saturated with water vapour at the altitudes which commercial aviation operates in. This cloud cover has been shown to have a substantial local impact on the local environment at night as it prevents the heat of the day escaping into space and instead it reflects that heat radiation in a similar way to a blanket. This additional cloud cover during the day reflects the sun's radiation too thus cooling the planet. Scientists studying this phenomena have determined that the global impact of this cloud cover can be multiply the impact of the released carbon by as much as 1.7 times the impact of the carbon alone. This warming is often referred to as radiative forcing²².

¹⁹ Airbus 's ZEROe project believes that their cutting edge designs of <200 passenger aircraft may only have a range of a little over 2,000 nm (3,704 km). <https://www.airbus.com/en/innovation/zero-emission/hydrogen/zeroe>

²⁰ Sustainable aviation fuels mandate - A consultation on reducing the greenhouse gas emissions of aviation fuels in the UK
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005382/sustainable-aviation-fuels-mandate-consultation-on-reducing-the-greenhouse-gas-emissions-of-aviation-fuels-in-the-uk.pdf

²¹ <https://www.racfoundation.org/data/volume-petrol-diesel-consumed-uk-over-time-by-year>

²² Please see articles by the likes of Professor Piers Foster if the IPCC on for a greater understanding of this subject area.
https://scholar.google.com/citations?user=5uvTUloAAAAJ&view_op=view_citation&citation_for_view=5uvTUloAAAAJ:ZfRJV9d4-WMC

- 1.50. It has been shown that burning 100% SAF or any fuel without aromatic hydrocarbons in a jet engine creates a massive reduction in these particulates²³ without a subsequent increase in NOx due to the higher calorific value. This reduction has huge benefits to the health of anyone working at or near an airport and in reducing this radiative forcing. As an added bonus burning a higher calorific value fuel means you do not need as much fuel to fly from A to B saving weight and hence even more fuel. Such fuel reductions can equate to as much as a 2-3% reduction in fuel used and hence carbon released according to test information conducted by Rolls Royce that Unite has seen. Therefore if it were possible to ramp up SAF production it may eliminate the secondary cloud formation effects.
- 1.51. Road and rail transport does not have the same secondary impacts on the climate but do produce particulates, often in built up areas. Therefore to reduce climate impacts and improve worker air quality at airports Unite supports the ramping up of SAF production as a priority. If the aim is more about improving air quality from surface transport there are many alternative fuels that can be used including batteries and hydrogen fuel cells that do not have any impact on local air quality.

Question C2: Do you have any evidence on the estimated costs of producing RCFs?

- 1.52. As Unite is not a producer or promoter of RCF's it does not wish to provide an answer to this question other than to point out the costs of ramping down oil and gas production without the provision of an alternative fuel that can be produced at such a volume that the man in the street can afford. Unite would remind the DfT in this response and in other papers that synthetic Crude derived from the FT process will still need to be cracked into its constituent fuels and delivered to the consumer. The only difference is that any waste product from the refining process can be recycled through the FT process to create the fuel that is targeted.
- 1.53. Unite would also call for a just transition of any displaced employees so that they find employment in a profession that aids in the reduction of climate impacts. For this to happen the workers skill set is retained where possible and enhanced if need be to help them find alternative employment which will provide similar financial rewards for their efforts. Without this mindfulness of the workers standard of living there will be resentment from them and the community that relies on those workers trade. If not we will see communities destroyed as has happened in coal mining areas

²³ [Voigt et al. \(2021\)](#) have shown that low-aromatic fuels “can result in a 50 to 70% reduction in soot and ice number concentrations and an increase in ice crystal size. Reduced contrail ice numbers cause less energy deposition in the atmosphere and less warming. Meaningful reductions in aviation’s climate impact could therefore be obtained from the widespread adoption of low aromatic fuels, and from regulations to lower the maximum aromatic fuel content.”

[CE Delft, 2022](#): contains loads of detail but sections:

7.3 Barriers to lowering the aromatics concentration in jet fuel “In principle, the aromatics concentration of fossil aviation fuel can be reduced further through hydrotreatment. **Doing so would increase fuel prices by a few percent.** Since there is no incentive to reduce the aromatics concentration, it is not generally done.”

7.2 The advantages of lowering the aromatics concentration in jet fuel “Next to the climate benefits, any reduction in emissions of nvPM during the LTO cycle due to the use of lower aromatic fuels such as SAF will likely result in proportionally decreasing the LTO contribution to ambient concentrations of nvPM both in terms of number and mass.”

2. Conclusion

- 2.1. Unite believes that a greater level of focus and promotion needs to be given to sustainable fuels to encourage investment and acceptance of sustainable alternative fuels. More should be made of their numerous advantages over fuel extracted from crude oil.
- 2.2. Unite further calls on the government to ensure that any transition from one product to another is just and complies with the need for a just transition as contained in the Paris Accord signed at the UNFCCC COP21 talks in Paris in 2015 and defined by the ILO²⁴. To ensure any transition is not opposed by the workforce, such transition additionally needs to ensure that the workers standard of living is maintained during the transfer and into their new career.
- 2.3. Unite believes that the focus of sustainable fuels creation should be given to the creation of a pollutant free alternative to Jet A1 aviation fuel given its tendency to produce particulates that encourage the condensation trails to transform into additional cloud cover. While there are applications being touted by some airlines to enable avoidance of areas of sky that have the conditions that make increased cloud cover creation a possibility these can mean flying lower or flying a long way off course burning a larger amount of fuel than is normally needed for a flight. Unite feels, in an ideal world, given the need to ramp up production rapidly that the focus should be on producing SAF, especially as there are so many alternatives to petrol and diesel on the market.
- 2.4. Unite also calls for a greater use of waste heat to enable the capture of CO₂ for long term storage or utilisation. Unite believes that there needs to be at least half of all CO₂ captures injected into a CCUS pipeline, to ensure we are reducing the total amount of carbon in circulation, undoing the damage being done by the continued use of fossil fuels.
- 2.5. Unite also calls for a balanced approach to energy generation, including nuclear, wind, wave, tidal and solar. Unite is a supporter of the Green hydrogen generation industry and calls on government to examine the many ways in which hydrogen can be obtained from an array of sources including methane pyrolysis²⁵ to create hydrogen and solid carbon instead of steam methyl reformation and all the issues its GHG footprint.

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²⁴ https://www.ilo.org/global/topics/green-jobs/WCMS_824102/lang-en/index.htm#:~:text=A%20Just%20Transition%20involves%20maximizing,fundamental%20labour%20principles%20and%20rights%20.

²⁵ <https://onlinelibrary.wiley.com/doi/abs/10.1002/ceat.270180510>