

A STAR ALLIANCE MEMBER 



# Sustainable Aviation Fuel

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IN NEW ZEALAND



## Executive Summary

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Sustainable Aviation Fuel (SAF) is the only current option for decarbonising long-haul flights. SAF production also creates numerous co-benefits, including new clean energy jobs, regional development opportunities, the decarbonisation and safeguarding of New Zealand's tourism proposition, the decarbonisation of trade links, opportunities for repurposing waste products, domestic fuel security and improved air quality.

However, there is no SAF supply in New Zealand. Given aviation's limited decarbonisation options and economic and social criticality to New Zealand, it is essential that the importance of SAF and aviation decarbonisation is recognised and prioritised.

There is a viable pathway to establishing SAF production and supply in New Zealand, and this would have broad social and economic benefits, as well as enabling emissions reductions by up to 85% compared to traditional jet fuel. However, the high initial costs of establishing and producing SAF mean that it commands a price premium compared to traditional fossil fuel derived jet fuel unless incentives are in place while the technology and supply chain matures and costs reduce.

To enable a viable SAF industry in New Zealand:

- A public-private aviation-specific decarbonisation advisory body, like those established in the UK<sup>1</sup> and Norway<sup>2</sup>, would be valuable to facilitate the coordination and development of the policies and investment settings needed to support SAF, as well as other areas of aviation decarbonisation
- A detailed feasibility study is required to help confirm high level production cost estimates, confirm feedstock supply, determine necessary policy and investment settings, and quantify the greater benefits to the regions of New Zealand of standing up a SAF industry
- A SAF mandate is required to incentivise investment by providing certainty to producers and investors
- New policies, investment and funding mechanisms are essential to establish a market and capabilities, and to close the commercial gap between SAF and fossil fuels

This document provides information on the above vital and immediate policy steps to achieve absolute emissions reductions from aviation and realise broader co-benefits for New Zealand through SAF.

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## Introduction

Air transport is critical to New Zealand's export, investment, and tourism industries, playing an essential role connecting our people and products to the world, and the world to us. COVID-19 has demonstrated the criticality of global connectivity to New Zealand's primary production sector and highlighted the significant economic benefit tourism provides to New Zealand.

However, flying creates carbon emissions, and they are hard to abate. Even with full deployment of aviation decarbonisation technologies, including electric, hybrid, and hydrogen aircraft and Sustainable Aviation Fuel (SAF), there is no current technology mix that can enable the aviation industry to absolutely decarbonise by 2050. What's more, the industry's share of emissions will continue to increase in coming decades as other sectors decarbonise more quickly given available technologies and policy support. The future prosperity of primary produce exports and the tourism sector depend on the air transport industry being able to reduce its absolute emissions.

COVID-19 has had a huge impact on Air New Zealand, but it has not slowed the airline's commitment to reducing emissions. Air New Zealand is supportive of a national strategy for decarbonising the New Zealand economy, accompanied by appropriate policy settings and investment, and is committed to playing its part in the global response to addressing climate change. Air New Zealand has identified decarbonisation across its network as a key strategic pillar and has the goal of achieving net-zero emissions by 2050. Air New Zealand is committed to working constructively with the Government and others in the aviation and private sectors to achieve these goals.

Electric, hybrid, and hydrogen aircraft are under development, and New Zealand is uniquely placed to adopt these technologies given our highly connected regional network, and high proportion of renewable energy. These aircraft offer significant decarbonisation potential and could be a reality as soon as 2035 (provided there is continued investment by airline manufacturers, and if domestic infrastructure planning and enhancements are coordinated and commenced in the near term).

However, these next generation aircraft will only suit short haul, domestic flying in the foreseeable future. The key aviation decarbonisation technology immediately available and which has the potential to materially decarbonise the aviation industry in the coming decades is SAF. For long-haul air travel, SAF is the only current option for decarbonisation.



## Understanding Sustainable Aviation Fuel

SAF is a term used by the aviation industry to describe non-fossil derived jet fuel. It is produced using alternative feedstocks (raw material from which fuels are produced, such as woody biomass, which is often a waste product, or hydrogen) to crude oil. It is known as a “drop in” fuel, providing direct replacement fuel to fossil jet fuel, and not requiring different infrastructure or engine technology. SAF has the potential to dramatically reduce carbon emissions (up to 85%) compared to traditional jet fuel or diesel.

SAF is a proven technology that is already being used in other parts of the world. Since 2016, over 300,000 flights have used SAF, and 100 million litres of SAF will be produced in 2021<sup>3</sup>. However, currently there is no SAF supply in New Zealand.

## A Pathway to Sustainable Aviation Fuel

The SAF Consortium (Air New Zealand, Scion, Z Energy, LanzaTech and LanzaJet) has established that there is a viable pathway to standing up a SAF industry in New Zealand, and that it would have broad social and economic benefits. As well as reducing gross carbon emissions from flying, it would create skilled jobs benefitting the regions, both in the construction and operational phases. The SAF Consortium estimates this to be around 6,400 temporary infrastructure development jobs, 1,800 new permanent direct jobs and 5,000 additional indirect jobs. It would also create more resilient fuel supply chains, by reducing our current reliance on imported fuels.

However, the high initial capital cost of establishing SAF production, coupled with the ongoing cost of sourcing suitable feedstocks, means that SAF commands a price premium compared to traditional fossil derived jet fuel (even when the cost of complying with the New Zealand Emissions Trading Scheme (NZETS) is included). SAF is significantly more expensive than fossil jet fuel. Given this, globally SAF production facilities have only been established and commercialised with enabling government policy and investment support.

Given aviation’s limited abatement options and criticality to international connectivity, it is essential that the importance of SAF and aviation decarbonisation is recognised and prioritised. Additional studies, collaboration, supply chain development, policies and investment are critical to establishing a SAF market and capabilities, and to close the commercial gap between SAF and fossil-derived jet fuel in New Zealand.

Key measures needed to make SAF a reality in New Zealand and realise absolute emission reductions from aviation are outlined in the next section.



# Key Measures To Establish SAF IN NEW ZEALAND



## An aviation-specific decarbonisation advisory body

The decarbonisation challenges faced by the aviation industry, coupled with the unique social and economic benefits aviation has to New Zealand, make the industry distinctive and requiring of bespoke policy support.

To oversee and coordinate this, the establishment of a public-private, cross-agency advisory body focused on aviation decarbonisation would be invaluable. This body could be tasked with managing and securing the policies and investment settings needed to support the development and commercial deployment of aviation decarbonisation, including the establishment and commercialisation of SAF<sup>4</sup>.

Following a similar request from the aviation industry in the United Kingdom (UK), the UK Government established the Jet Zero Council. Comprised of representatives from the government and aviation sector, Jet Zero is focused on delivering net zero-aviation by 2050, establishing and commercialising SAF production, and developing and industrialising zero emission aviation and aerospace technologies<sup>5</sup>. A similar body has been established in Norway and includes a strong focus on the development of commercial-scale, continuous access to SAF<sup>6</sup>. Air New Zealand supports the establishment of a similar advisory body in New Zealand.



## A feasibility study to determine the pathway to SAF in New Zealand

The SAF Consortium's research has identified a viable pathway to SAF in New Zealand (Appendix One). The analysis concluded that there is enough of the requisite feedstock available in New Zealand to meet SAF demand, as dictated by a ratcheting SAF mandate (discussed below). The roadmap is based on numerous assumptions, including that adequate policy settings and investment are in place to support the establishment and growth of the industry.

To encourage investment in SAF production, further investment to validate the SAF Consortium's findings is necessary. A detailed feasibility study is required to confirm high level production cost estimates and feedstock supply, determine the most viable pathways to SAF in New Zealand, identify necessary policy and investment settings, and quantify the greater benefits to the regions of New Zealand of standing up a SAF industry.

Air New Zealand proposes that any feasibility study also include an assessment of the option to import SAF to New Zealand. SAF Consortium work has determined that local production of SAF results in a lower product price through lower feedstock costs, has the potential to result in significant economic and social benefit for regional New Zealand (mainly through new skilled jobs), and has a (marginally) better Life Cycle Assessment<sup>7</sup> through reduced logistics. However, the Consortium's view is that SAF supply over time will need to include both local production and imported supply to improve supply chain security, particularly in the early years, and improve ability to manage peaks and troughs of demand over time.



## A SAF mandate that increases incrementally over time

A supply-side SAF mandate is vital for incentivising investment in SAF by providing certainty to producers and investors. Air New Zealand supports the Government's recent decision to consider a biofuels mandate for New Zealand and is advocating for a SAF-specific mandate in this context.

Overseas, SAF mandates are being used by governments as a key tool for kick-starting domestic SAF industries. We are seeing initial SAF supply-side mandates set between 0.5% and 2%<sup>8</sup>, ratcheting up over the next 30 years to the current approved maximum SAF blend rate of 50%<sup>9</sup>. Similarly, in the context of New Zealand, a SAF mandate that incrementally increased over time would be appropriate, to allow for the establishment of production and to provide a manageable transition period for producers, suppliers, and distributors.

The SAF Consortium has created a roadmap for what SAF production in New Zealand could look like, with the view to enabling a net-zero carbon future. This starts with a 2.5% mandate in 2025, ratcheting to a 50% mandate in 2050 (see Appendix One)<sup>10</sup>.

Air New Zealand notes that it would not be commercially viable in New Zealand for a SAF mandate to differentiate between fuel uptake for domestic and international travel. This is because domestic fuel uptake demand alone would not be enough to support production economies of scale and the significant SAF investment and production costs. Differentiating between domestic and international travel could also lead to competitive distortions.



## A suite of supporting policies

A mandate alone will not make SAF production and consumption commercially viable in New Zealand. To enable SAF to be supplied cost-effectively, it is essential to have the right policy settings and dedicated investment in place. Crucially, policy settings need to drive biofuel production towards SAF (rather than cheaper to produce ground transport fuels for which industry has existing available alternatives to decarbonise<sup>11</sup>), and to close the commercial gap between SAF and fossil fuels.

The challenges of SAF production and the need for policy and investment support has been recognised overseas, and by the New Zealand Climate Change Commission in its 2021 draft advice to the Government<sup>12</sup>:

*Aviation is particularly challenging to decarbonise. There is currently no commercially viable sustainable aviation fuel supply in Aotearoa. In offshore ports where sustainable aviation fuel is being produced, its use has been supported by public funding and other policies. Aotearoa needs policies to address supply and demand, including measures like grants or tax credits to improve competitiveness with fossil fuels. Measures are also needed to create demand and help build a market for low carbon fuels in the long term.*

Governments around the world are grappling with the best way to establish viable SAF industries in their territories. At this point, no specific policy or support is recommended or favoured over another. A portfolio approach is likely needed. A table of possible policies is attached at Appendix Two. This includes, for example:

- A SAF production incentive per litre
- Capital grants to help establish SAF production capacity and supply chain infrastructure
- NZETS exemptions for SAF use
- Ring-fenced funds for use for CAPEX relating to establishing SAF production, and/or financial incentives for feedstocks sold for mandated SAF production (for example from the NZETS or International Visitor Levy)
- A levy on individual passenger carbon emissions, for example, through the International Visitor Levy, or another funding mechanism

As outlined above, a detailed feasibility study is required to help identify where policy support is necessary to make SAF viable in New Zealand. An aviation-specific forum, such as the UK's Jet Zero Council, could play a useful role in identifying the right policy types and mix for enabling SAF production and supply in New Zealand.



## Conclusion

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Air New Zealand seeks to work proactively with the Government, the SAF Consortium, and others in the private sector to address the challenges posed by aviation carbon emissions. Through these efforts, New Zealand can join other progressive nations and commence this critical aviation decarbonisation journey, whilst maintaining vital trade links, creating clean energy employment opportunities, realising regional development benefits, decarbonising and safeguarding the New Zealand tourism proposition, repurposing waste products, enabling domestic fuel security and improving air quality.

We would welcome further discussion on the content of this document and look forward to working constructively with you.

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## Endnotes

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1. [Jet Zero Council](#)
2. [Nordic Initiative for Sustainable Aviation \(NISA\)](#)
3. [The International Air Transport Association \(IATA\), 2021](#)
4. For example, through the Jet Zero Council the UK Government has pledged to invest GBP 15m in the development and commercialisation of SAF, and GBP 125m in the development and commercialisation of next generation aircraft. Further information at this [link](#).
5. [Jet Zero Council](#)
6. [Nordic Initiative for Sustainable Aviation \(NISA\)](#)
7. A Life Cycle Assessment is a calculation of the life cycle emissions value of a specific type of SAF. The amount of emissions reductions generated by SAF depends on its life cycle emissions value.
8. In Norway, a 0.5% blend mandate has been in effect since Jan 2020, with the plan being for a 30% mandate in 2030. In Sweden, a 0.8% mandate will be in place in 2021, increasing to 30% in 2030. Spain is planning a 2% SAF mandate in 2025.
9. Currently SAF is only approved to fly with if blended with a minimum of 50% fossil fuel. Boeing and Airbus have recently announced development and testing to enable aircraft capable of flying on 100% SAF by 2030.
10. The ambition of the ratcheting SAF mandate in the SAF Consortium's roadmap is consistent with the ambitions of other leading countries, like France. The EU is proposing to start lower with a 2% mandate in 2025 but surpasses the SAF Consortium roadmap with a 20% mandate in 2035, ratcheting to 63% in 2050. Others, like Finland and Sweden, are bringing forward the scaleup even further, with intended 30% mandates by 2030.
11. The European and Californian experiences have confirmed that without policy incentives for SAF production, most biofuel supply will be produced for road transport- a sector with various decarbonisation solutions already available. In response, the EU has developed SAF-specific policies to ensure feedstock is biased to SAF production (see [EU Renewable Energy Directive II recast to 2030](#)).
12. Climate Change Commission, 2021 Draft Advice for Consultation, 31 January 2021, p 110.





# Appendix 1

## SAF Consortium 2050 Roadmap

CONFIDENTIAL

# Sustainable Aviation Fuel growth in New Zealand

NZ SAF production: enabling a 2050 Net Zero Carbon future, a thriving NZ tourism industry, investment and jobs in the regions and enhanced energy independence—underpinned by SAF enabling policy and investment.



### 2050 snapshot

By 2050, SAF accounts for 50% of NZ's jet fuel demand, consistent with the ambitions of other leading countries like France. Others, like Finland and Sweden, are bringing forward the scale up, with intended 30% mandates by 2030.

**985** MILLION LITRES OF SAF PRODUCTION PER YEAR

**50%** OF NZ JET DEMAND FROM SAF

**2.3** MILLION TONNES OF CARBON ABATEMENT (CA) PER YEAR FROM SAF

**1.1** BILLION LITRES PER YEAR OF FUEL IMPORTS DISPLACED WITH DOMESTIC PRODUCTION

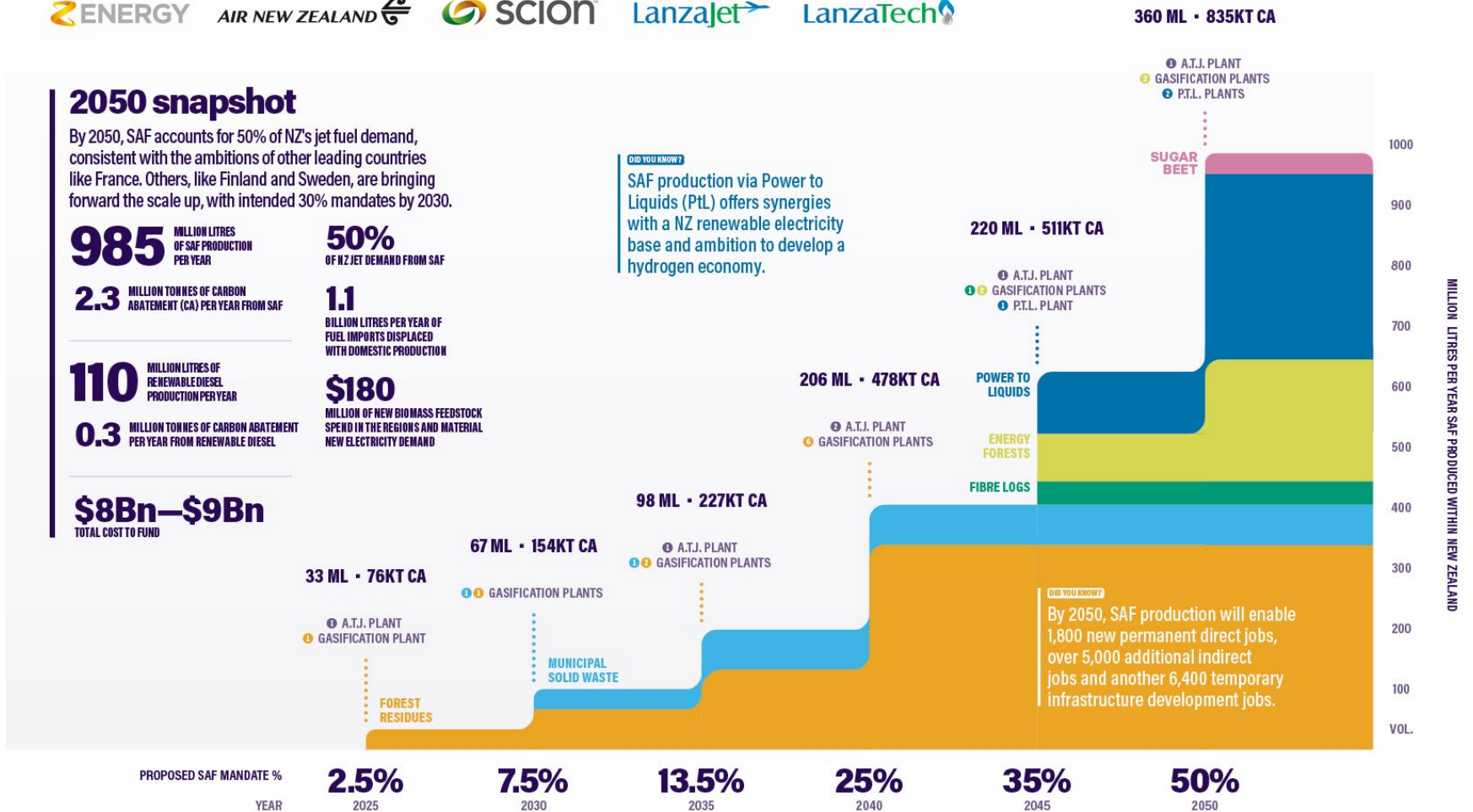
**110** MILLION LITRES OF RENEWABLE DIESEL PRODUCTION PER YEAR

**\$180** MILLION OF NEW BIOMASS FEEDSTOCK SPEND IN THE REGIONS AND MATERIAL NEW ELECTRICITY DEMAND

**0.3** MILLION TONNES OF CARBON ABATEMENT PER YEAR FROM RENEWABLE DIESEL

**\$8Bn—\$9Bn** TOTAL COST TO FUND

**DID YOU KNOW?**  
SAF production via Power to Liquids (PtL) offers synergies with a NZ renewable electricity base and ambition to develop a hydrogen economy.



**DID YOU KNOW?**  
By 2050, SAF production will enable 1,800 new permanent direct jobs, over 5,000 additional indirect jobs and another 6,400 temporary infrastructure development jobs.



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### Sustainable Aviation Fuel: Possible Policy Options

Sustainable Aviation Fuel (SAF) is critical to the decarbonisation of aviation. In addition to reducing carbon emissions, SAF production could contribute to regional economic growth and create green jobs. To attract the necessary investment needed to establish SAF supply in New Zealand (through both local production and importation) and to make SAF commercially viable, a suite of government policies and investments are required. The mix of policy and support needed to make SAF a reality will vary from jurisdiction to jurisdiction, due to variations in feedstock type and supply, and existing aviation fuel and customer supply chains.

Below is an inexhaustive list of possible policies for enabling a SAF industry in New Zealand and closing the commercial gap with fossil fuel.

Policy	Description
<b>SAF mandate</b>	<p>SAF supply-side mandates (requiring fuel suppliers to sell a minimum percentage of SAF per year) are effective for providing producers with demand certainty to de-risk investment commitments, and for shielding sustainable fuels from low oil prices.</p> <p>To mitigate the chance of competitive distortions, a mandate would need to be applied across all operators uplifting aviation fuel within New Zealand's borders, irrespective of international or domestic end use.</p> <p>Mandated minimum volumes of SAF supply as a percentage of total fuel supply are becoming increasingly common as a foundational enabling policy tool. They are generally starting low (~0.5% – ~2%) and growing to more significant percentages by 2050 (~40% - ~63%).</p> <p>A minimum lifecycle emissions reduction should be imposed as an eligibility criterion. To incentivise best performing fuels, the mandate could be translated to a declining carbon intensity standard like the California Low Carbon Fuel Standard. If a volumetric mandate is used, it should incentivise for fuels that exceed minimum performance thresholds.</p> <p>It is likely that a mandate would require some form of penalty to be applied where minimum mandated volumes are not supplied within the mandate period.</p> <p>Where a SAF mandate is introduced, supply-side policies incentivising and safeguarding SAF production over cheaper to produce ground transport fuel are critical to encourage investment in establishing a SAF supply, including infrastructure investment.</p>



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### Sustainable Aviation Fuel: Possible Policy Options



Policy	Description
<p><b>Policy mechanism to ensure feedstock is prioritised for SAF</b></p>	<p>New Zealand’s feedstock base, including woody biomass, will face increasing demand to enable decarbonisation across multiple sectors in the economy, including industrial processing, ground transport, shipping, and aviation. Although SAF can be more expensive to produce than other biofuels, feedstock must be prioritised for SAF because aviation has limited decarbonisation options, particularly for long-haul flights. In contrast, hydrogen and electrification options exist for other sectors of the economy, including ground transportation.</p>
<p><b>New Zealand Emissions Trading Scheme (NZETS) allowance</b></p>	<p>An allowance could be established in the NZETS to incentivise domestic aviation decarbonisation. For example, in the EU ETS an exemption is granted for SAF uptake regardless of carbon reduction potential and blend rate i.e., SAF use is accounted with zero emissions if it complies with greenhouse gas reductions and sustainability criteria from the European Renewable Energy Directive. This could be safeguarded with a minimum lifecycle emissions reduction threshold for eligibility.</p>
<p><b>Research, development, and demonstration funding</b></p>	<p>Research, development, feasibility, and demonstration funding will be essential to support early SAF market technology development and initial commercial projects with longer-term market potential but high investment risk. It would also help to build domestic intellectual capital to enable long-term competitiveness in the SAF sector and to position New Zealand as a science and innovation hub.</p> <p>Research could be conducted within universities and government organisations, while technology development, including pilot, demonstration, and first-of-kind commercial scale deployment, could be performed by the private sector.</p>
<p><b>Contracts for Difference (CfDs)</b></p>	<p>CfDs are bespoke contracts suitable for first of a kind projects and are a key tool for bridging the gap between technology development and mass market adoption. CfD programmes are effective where larger private sector investments are needed (e.g., for commercial plants) but where investors are inhibited by market price and revenue uncertainty in an immature market. In effect, CfDs provide insurance against this price risk. The overall cost of a CfD programme can be managed by a government through a combination of its design of the programme itself and its control over other regulations governing the industry.</p> <p>In the context of SAF, CfDs could be designed to guarantee a price floor for producers for a minimum number of years thus enabling the financing of SAF projects.</p> <p>CfDs are currently being considered in the liquid fuel sector for public-private transactions in the UK.</p>



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### Sustainable Aviation Fuel: Possible Policy Options



Policy	Description
<b>Loan guarantees and capital grants</b>	<p>To help establish SAF production capacity and supply chain infrastructure, industry funds could be leveraged via loan guarantees and capital grant programs using clear criteria to guide project choice (for example high likelihood of viability).</p> <p>Such programs reduce the net capital cost of establishing production capacity by providing access to project capital under comparatively favourable terms. Government can enable SAF development through assistance with upfront construction costs in the form of non-repayable grants, low or zero interest loans, or loan guarantees.</p>
<b>OPEX and CAPEX support mechanisms</b>	<p>The aggregate effect of several OPEX and CAPEX support mechanisms could make a material difference to SAF commercial viability in the market (for example lower energy rates and resource consent fees).</p>
<b>NZETS revenue ring-fenced for SAF investment</b>	<p>A fixed portion of auction revenue generated through the NZETS could be ring-fenced for SAF investment.</p>
<b>Individual passenger accountability for carbon emissions</b>	<p>Revenue generating levies relevant to international tourism could be explored as a revenue source for funding SAF investment. For example, the International Visitor Levy, or a similar funding mechanism</p>



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### Sustainable Aviation Fuel: Possible Policy Options



Policy	Description
<b>Tax and policy incentives for increasing feedstock supplies</b>	<p>Removing or reducing tax or excise duties applied to feedstock production could assist with ensuring a sufficient volume of feedstock to produce SAF.</p> <p>Feedstock cost subsidies could provide an income source for regions while at the same time reducing the negative impact of high feedstock costs on SAF production.</p> <p>Safeguards would need to be applied to ensure feedstock production complied with established sustainability criteria. For example, attention should be paid to direct and indirect land use change, water use, and biodiversity.</p> <p>Incentives could also be put in place to redirect municipal solid waste from landfills to SAF production for use as a SAF feedstock. Care would need to be taken to avoid inadvertently incentivising/creating a market for fossil fuel-derived waste.</p>
<b>SAF producer credits</b>	<p>Implement a SAF producer credit program based on carbon intensity reduction to create domestic SAF capacity, like the California Low Carbon Fuel Standard. SAF's non-CO2 benefits (such as reduced sulphur dioxide and particulate matter emissions) could also be credited, to account for SAF's full climate benefit. A SAF "carve out" within a low carbon fuel standard could also be considered, requiring aviation emissions to be addressed by SAF and not excess credits from ground transportation fuels. Where a low carbon fuel standard is introduced, supply-side policy incentivising and safeguarding SAF production over cheaper to produce ground transport fuel is critical to encourage investment in establishing a SAF supply, including infrastructure investment.</p>
<b>SAF blender tax credits</b>	<p>Provide refundable per gallon tax credits accessible by airlines and aviation fuel suppliers when blending SAF in New Zealand airports for domestic and international use. A blender credit could help attract SAF imports.</p>