



RSB
Roundtable on
Sustainable Biomaterials
www.rsb.org



SUSTAINABLE AVIATION FUEL IN SA:

REPORT ON THE SAF STAKEHOLDER MEETING
IN SOUTH AFRICA





INTRODUCTION 1

THE CONTEXT

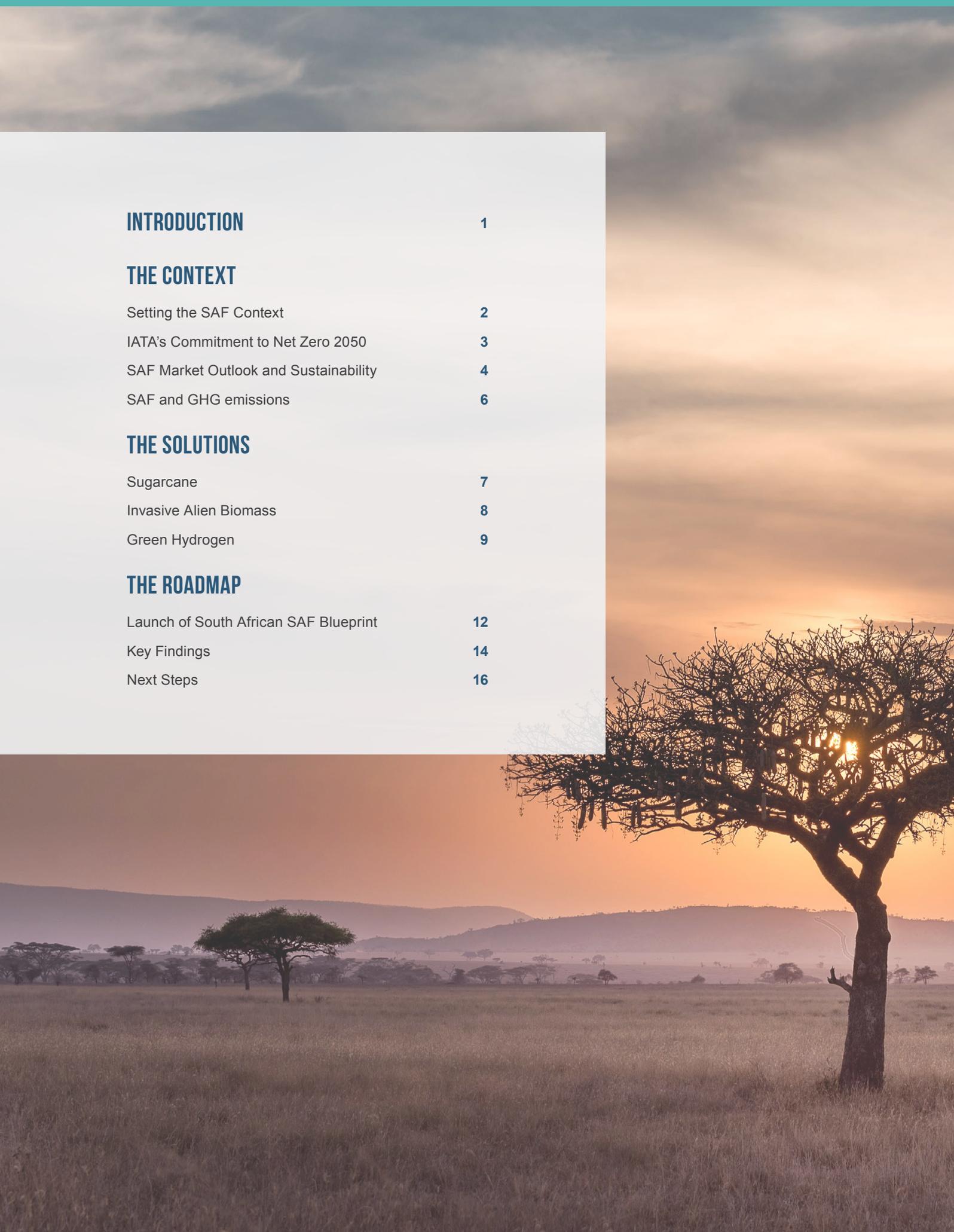
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The aviation industry requires effective and sustainable solutions to meet its carbon emission reduction commitments, as part of a global effort to reduce the impact of climate change. Aviation fuel is set to be one of the most important sources of savings if the industry is to achieve its target of carbon neutral growth from 2020, with a 50% reduction of 2005 emissions levels by 2050.

The Roundtable on Sustainable Biomaterials (RSB) and the World Wildlife Fund - South Africa (WWF-SA), in collaboration with local and international stakeholders, have researched opportunities for the development of Sustainable Aviation Fuels (SAF) in South Africa and the region for several years.

On 21 April 2022, the RSB brought together key stakeholders to learn more about the status of SAF development in South Africa, and to advise on what the future of a national SAF economy should look like, with the aim of co-creating a roadmap for SAF development in the country. The audience included decision-makers and experts from government, aviation, biomass producers, industry, and civil society who have a vested interest in SAF and whose agendas are aligned with the development of SAF in South Africa.

The event also launched the South African SAF Blueprint compiled by WWF-SA in collaboration with Stellenbosch University, which identified seven value chain opportunities for SAF production in South Africa.

This report outlines the key conversations held at the event, the outcomes and next steps that can be undertaken to make SAF a sustainable reality in the region.





SETTING THE SAF CONTEXT

The production of fossil kerosene (conventional jet fuel) is a limited resource. To convert fossil fuel extracted from the ground into jet fuel, various refining processes are used. The combustion of jet fuel accounts for more than 95% of an airline's total carbon emissions. The most effective way to address carbon emissions is through SAF and other efficiency and technological improvements in airline operations.

SAF is a drop-in fuel for aviation that is blended at a ratio of up to 50% with conventional jet fuel and can be used in existing infrastructure and engines. The SAF value chain includes feedstock growth, conversion, downstream distribution and end-use. The feedstock requires transporting, processing and refining to be converted into SAF. It can be produced from several bio-based and circular feedstock sources, including waste oil and fats, green and municipal waste, non-food crops and even industrial pollution. It can also be produced synthetically via a process that captures carbon directly from the air or hydrogen from water.

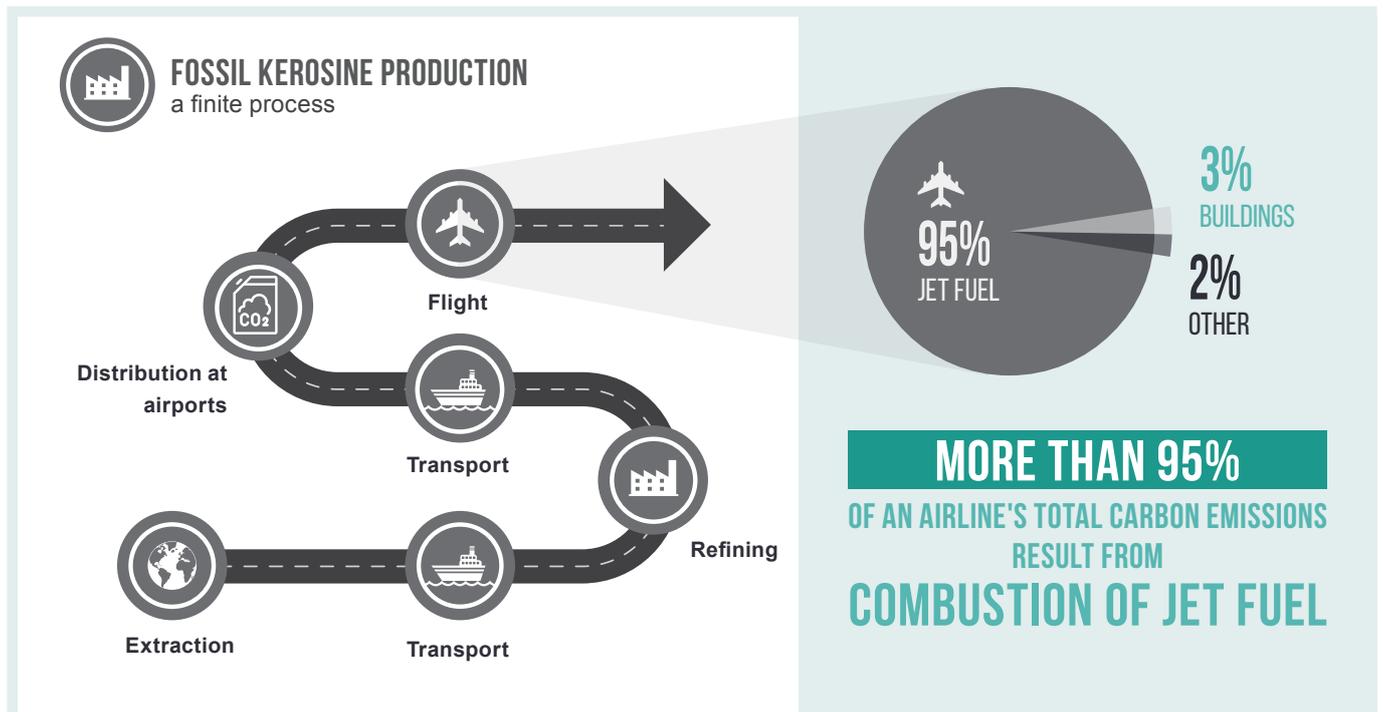
Generally, sustainability certification is needed to demonstrate that the raw feedstock does not compete with food crops or water supplies or is responsible for forest degradation. Whereas fossil fuels add to the overall level of CO₂ by emitting carbon that had been previously locked away, SAF recycles the CO₂ absorbed by the biomass used in the feedstock during its life, or gives a second life to wastes and residues, thereby reducing the amount of fossil feedstock used. Demonstrating the sustainability of bio-based and circular feedstock sources is the key for success.

While many projects to date have focused on the carbon component, an increasing number of initiatives globally are now looking at the other side of fuels - hydrogen. Hydrogen plays a vital role during the refining process of SAF, so using green hydrogen would reduce the carbon footprint of the SAF value chain.

There are five conversion technologies and nine pathways certified to produce SAF and supply commercial aviation, with others being developed. Hydroprocessed Esters and Fatty Acids (HEFA) is the most widely used conversion technology, followed by Fischer-Tropsch. Due to existing Fischer-Tropsch facilities available at scale in South Africa¹, this pathway looks like the nearest to market to date.

Downstream, SAF is blended with conventional jet fuel using a maximum 50% blend and distributed to airports. Finally, the 'drop-in' SAF is used in existing engines during end-use. No infrastructure modification is required.

The greenhouse gas (GHG) emission reduction of SAF is calculated on its lifecycle, and includes emissions generated from the cultivation, harvesting and processing of feedstock, down to transport, refining, and distribution. This means that SAF is never entirely carbon neutral (although there are project looking at carbon neutral and even carbon negative fuels that can be produced in the future), but can achieve anywhere between 10 to 90% GHG reductions and significantly support aviation's net-zero goals.



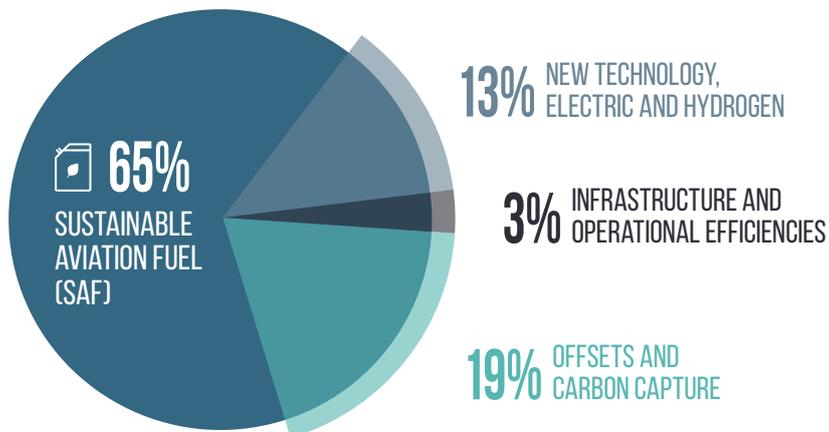
¹ <https://www.sasol.com/about-sasol/sasol-ecofit>



IATA'S COMMITMENT TO NET ZERO 2050

In 2021, the International Air Transport Association (IATA) approved a resolution for the global air transport industry to achieve net-zero carbon emissions from their operations by 2050. This pledge brings air transport in line with the objectives of the Paris Agreement to limit global warming to 1.5°C.

IATA ESTIMATES THAT THE MOST SIGNIFICANT CONTRIBUTIONS TO ACHIEVING NET-ZERO CARBON IN 2050 WOULD BE:



The main concern for airlines is that SAF must be safe, sustainable, and commercially viable to be scaled up for use by every airline. The key will be to implement policies that expedite the commercial production and deployment of SAF. Once the abatement costs are made, there are great opportunities. Many countries that were importers of jet fuel will be able to sustainably produce, and even export SAF.

An estimated investment of just over \$ 1 trillion is required for the aviation sector's energy transition. IATA's *Fly Net Zero Report*, estimates that up to 5,000 – 7,000 facilities may be required to produce sufficient SAF to achieve the climate targets of the aviation industry.

The report also estimates that this shift could generate up to 14 million jobs in SAF production worldwide. In Africa, the energy transition would result in approximately 2 million jobs.

KLM AND SAF

KLM is a member of IATA and has been at the forefront of SAF development.

“KLM has committed to working with all stakeholders and policymakers to achieve the climate objective of reaching net-zero CO₂ emissions by 2050 with the guidance of SBTi.

To reach these targets, KLM cannot only rely on operational efficiency and new aircraft to minimise the energy of fuel use, we also need SAF to replace fossil kerosene usage. We estimate that we need more than 10% of our total fuel usage to be SAF by 2030.

However, there is a considerable volume and price challenge. In January 2022, KLM started adding 0.5% SAF for flights departing from Amsterdam to address the price challenge. In addition, KLM offers its customers the option of purchasing an extra amount of sustainable fuel. In this manner, KLM aims to stimulate the market for SAF.

Our goal is to contribute to establishing a sustainable fuel industry for aviation. To this end, KLM has established innovative partnerships with corporate customers, suppliers, airports and logistics partners.”

Remona van der Zon, Sustainability and Reporting Manager, KLM



SAF MARKET OUTLOOK AND SUSTAINABILITY

The main driver behind the shift towards using SAF is climate change. The aviation sector is hard to abate industry as there aren't many avenues for decarbonisation. SAF is a relatively new product that hasn't reached commercial scale yet and requires new investments and technological developments.

There are several policies implemented globally to support aviation decarbonisation. One of the critical policy mechanisms to support SAF uptake is the ICAO CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation).

"The policy focuses on international aviation and includes SAF and carbon offsets as reduction measures, and requires airlines to reach the goal of carbon-neutral growth as of 2020 and a 50% reduction by 2050 on the 2005 baseline," said Arianna Baldo, RSB Programme Director and Aviation Sector Lead.

Baldo emphasised that SAF must be certified against an ICAO-recognised voluntary sustainability standard and meet certain sustainability and GHG emission standards in order to obtain funding from public authorities. These standards include a 10% reduction in GHG emissions, with leading sustainability standards like the RSB requiring no less than 50%, and no biomass should be grown on land already containing a significant amount of carbon or on land that is used for food production.

The European Union's Renewable Energy Directive (EU RED) sets mandatory renewable energy targets to further

stimulate investment in the industry and overcome the hurdles facing SAF uptake. For example, before 32% of the energy used in road and rail transportation by 2030 must come from renewable sources, including SAF.

There are several other policy mechanisms put in place worldwide in Europe and the U.S. President Biden introduced the Sustainable Skies Act in May 2021, aiming to boost incentives to use SAF and submit minimum sustainability criteria for SAF.

Corporate demand is also increasing. Globally, businesses spent \$1.4 trillion on corporate travel in 2021. Companies are looking at supporting SAF by decreasing their Scope 3 emissions. Over 33% of the price premium associated with the global SAF volume target in 2025 will be covered by corporate demand alone. In the last 12 months, several corporates have been interested in purchasing SAF environmental claims (i.e. the GHG reduction) against their GHG mission reduction targets. This means companies will forge partnerships with airlines, pay the price premium for SAF, and take ownership of those claims for their targets. The RSB is working on an approach called 'book and claim', to provide a robust system on how this can be done transparently and credibly.

RSB is recognised by numerous policy mechanisms to provide sustainability assurance on SAF through the use of 12 sustainability principles and criteria and a minimum GHG reduction threshold of 50%. RSB Principles & Criteria range from food security to rural development, air quality, soil and water resources, and waste management.

SAF IS ALREADY A TANGIBLE REALITY GLOBALLY



**7 PATHWAYS
CERTIFIED**

**AT UP TO
50% BLENDING RATIO**



**100 MILLION
LITRES OF SAF**

**PRODUCED
IN 2021**



**37,000+
FLIGHTS**

**CARRIED OUT USING SAF
SINCE 2016**

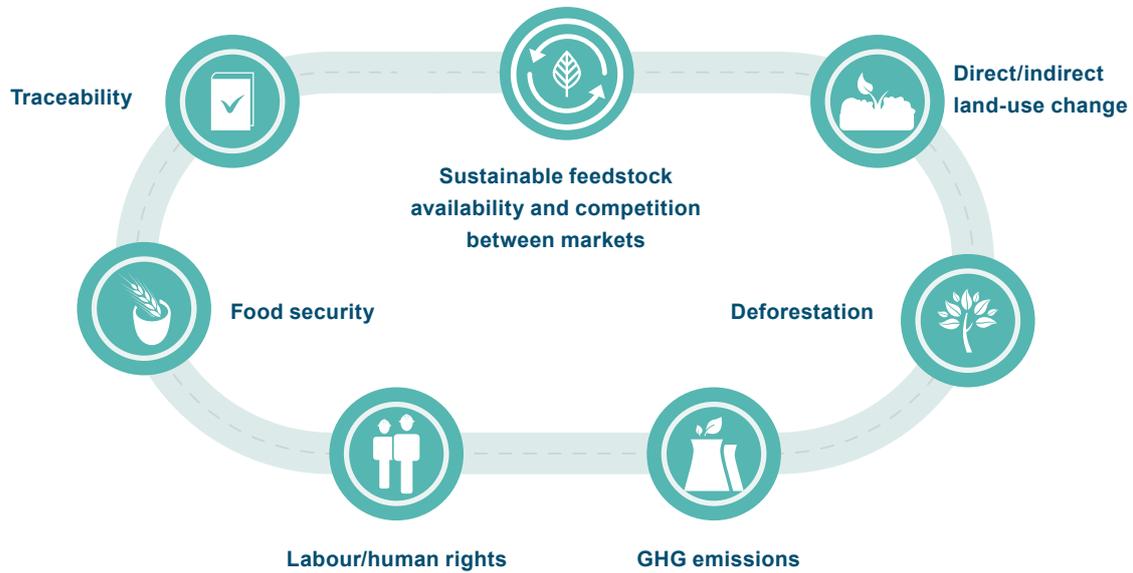


**14 BILLION
LITRES OF SAF**

**IN PURCHASING
(OFFTAKE) AGREEMENTS**



KEY SUSTAINABILITY RISKS CONNECTED TO THE SAF VALUE CHAINS:



SAF does not necessarily deliver better GHG emissions reductions than conventional jet fuel. That is why assessments are done across the SAF value chain – to make sure that it will reduce GHG emissions. For example, some feedstocks, especially plant-based feedstocks, require a land-use change to produce (e.g. deforestation), so some SAF feedstock growth methods may be worse than jet fuel.

Sustainability is also crucial for market access, and needs to address business and brand image risks, as well as social and environmental risks.

To support a just transition, sustainable options for South Africa's SAF economy involve the use of innovative feedstock and technologies – energy crops can be grown on degraded land or where alien invasive plants are used, and innovative technologies such as green hydrogen can be harnessed.

Furthermore, the SAF industry in South Africa has the potential to promote food security through its ability to drive employment and afford more people a livelihood. South Africa exports millions of litres of used cooking oil to Europe for their biofuel production. South Africa needs to utilise its waste and resources to produce its own SAF.

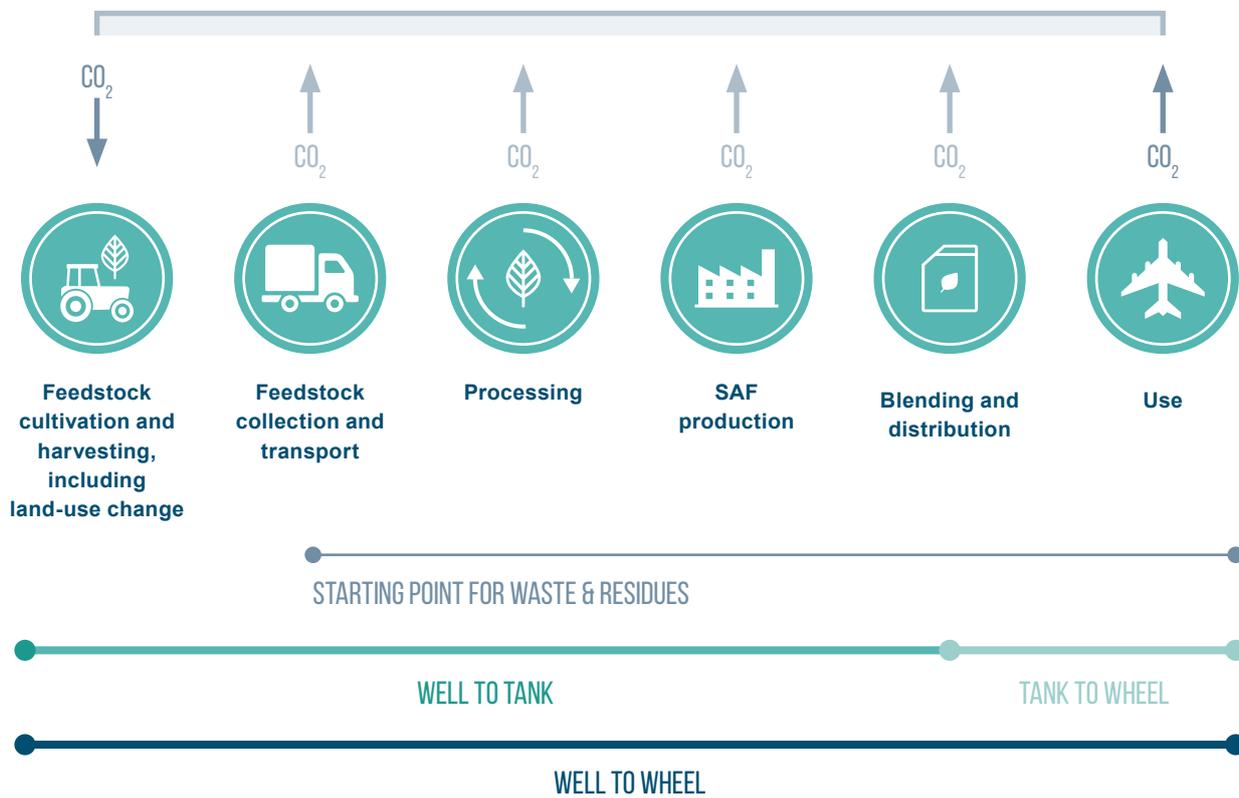


SAF AND GHG EMISSIONS

How is SAF's carbon footprint evaluated? The GHG emissions of SAF, and its potential relative reduction compared to fossil fuels, are calculated using a life-cycle assessment approach (LCA), which includes all activities related to the cultivation and harvesting of the biomass feedstock, transport, processing stages, SAF production, and distribution to the airport.

Carbon dioxide absorbed by plants during the growth of biomass is roughly equivalent to the amount of carbon dioxide produced when the fuel is burned in a combustion engine, which is simply returned to the atmosphere. Processing and industrial waste materials and residues benefit from a zero GHG emission at the point of origin as the life-cycle carbon emissions are allocated to the primary products. The GHG LCA boundary is demonstrated in the graphic below.

SAF'S GHG EMISSIONS ARE CALCULATED ON A LIFECYCLE BASIS - FROM WELL TO WHEEL



When these elements are accounted for, the use of SAF has been shown to provide significant reductions in overall CO₂ lifecycle emissions compared to fossil fuels, up to 80% in some cases. Furthermore, SAF contains fewer impurities (such as sulphur), which enables an even greater reduction in sulphur dioxide and particulate matter emissions.



SUGARCANE

Sugar and molasses are currently the only industry products in the sugarcane industry. However, there is an opportunity to change this through the Sugarcane Value Chain Masterplan – driving a new future for the sector. According to Thomas Funke, CEO, SA Canegrowers, The Sugar Act and Sugar Industry Agreement are being discussed to diversify the sugar sector to deliver products other than sugar and molasses. The Sugarcane Value Chain Masterplan will act as the catalyst in initiating the production of SAF using ethanol derived from sugarcane as a viable significant business opportunity for the South African sugarcane sector.

“Surplus sugarcane is available for alternative uses, provided the economics justify it. There are 384 000 hectares currently under sugarcane cultivation (with a potential of 440 000

hectares). If 50% of the country’s 19-million tons of annual production of sugarcane was diverted to the production of ethanol, the result could be the production of some 700-million litres of low-carbon ethanol, which could, in turn, be used to make 433-million litres of SAF,” said Funke.

A key consideration is that the viability of SAF production varies between irrigated, dryland and dryland green sugarcane as a feedstock, with the cultivation of irrigated cane having a higher carbon footprint due to the use of grid-energy powered irrigation in a country where the vast majority of grid energy is produced from coal. Also, several essential steps need to be taken to make the change to SAF feedstock possible. “An enabling regulatory framework would have to be created, small-scale growers would have to be assisted with essential structures and equipment to ensure occupational health and safety, and internal farm level administrative support would have to be provided,” said Funke.

“In addition, to promote the use of local labour, preferential labour laws and procurement processes would have to be implemented. Further, proper impact assessments would have to be carried out, and the national greenhouse gas (GHG) reporting requirement would be improved.”





INVASIVE ALIEN PLANTS

*RSB developed guidance to unlock the significant potential of invasive alien plants (IAP) to feed the biofuel and bioenergy markets within its **Standard Amendment for Woody Biomass**. RSB requires that eradication of invasive alien plants is driven by government law or environmental mandate to qualify for certification.*

By providing guidelines on identifying invasive alien plants, requirements for harvest, and ensuring the necessary plans are in place to ensure land is rehabilitated and environmental gains maintained, RSB aims to build market confidence in IAP as a feedstock source and support local and national eradication programmes. The Just Fuel Africa Project is an example of the potential of IAP as a feedstock.

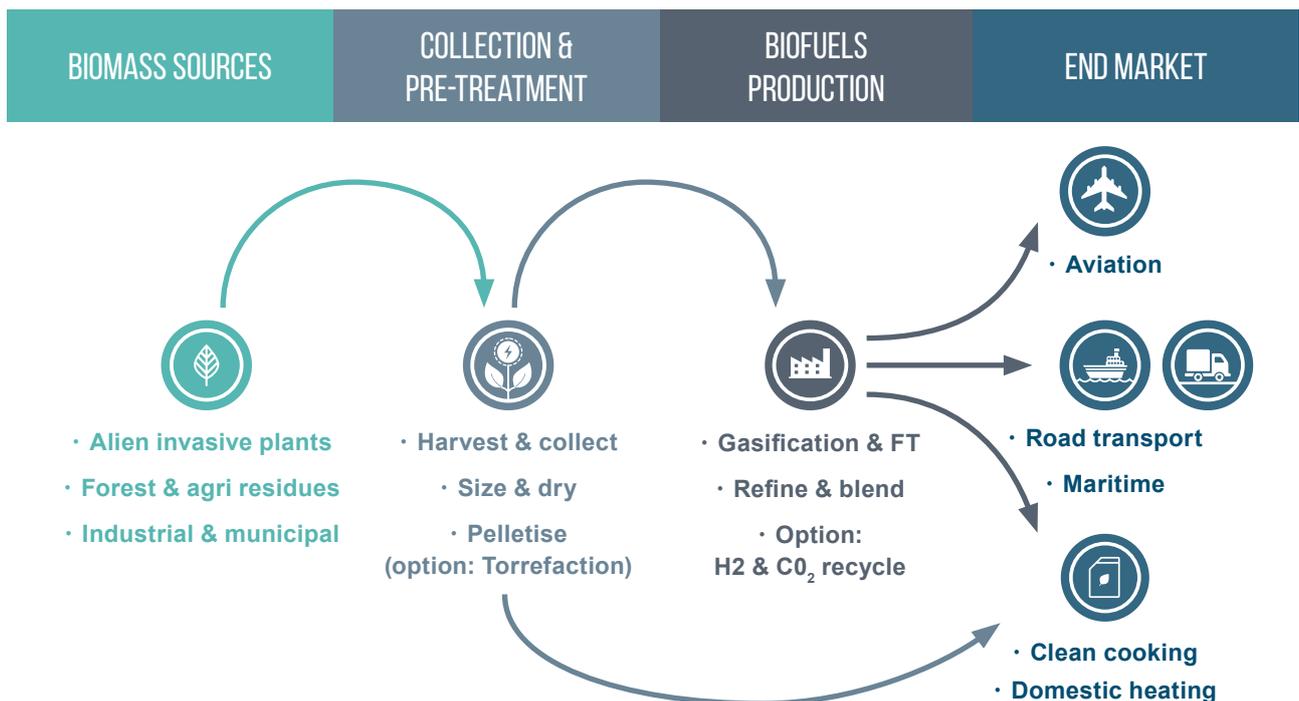
JUST FUEL AFRICA PROJECT

Just Fuel Africa converts solid biomass (alien invasive plants, forest and agricultural residue and industrial waste) into liquid fuels and ensures it happens equitably. However, the biofuel value chain is complex. Werner Euler, who leads the Just Fuel Africa project, says there are significant challenges (pre-treatment and production) to getting to the end market, and is calling for collaboration with partners who can help understand what is needed to get the fuels into the market.

According to Euler, the programme will require R9 billion of new investment, but expected outputs are significant including a reduction of approximately 4 million tons CO₂ per annum, 7 000 new direct permanent jobs, 30 000 ha of land restored from IAPs and 1 million litres pa of groundwater restored.

Several parties have already committed to the programme, including the Dutch embassy, KLM, and COEGA Biomass Centre. The collaboration consortium aims to produce 1 million metric tons per annum of synthetic aviation and biofuels used in South Africa. South Africa's natural resources and current assets (SASOL, PetroSA) could realise these volumes and help the country be a leader in SAF production.

THE BIOFUEL VALUE CHAIN FROM SOURCE TO END-USE





GREEN HYDROGEN

Achieving global net-zero by 2050 has been estimated to cost \$130 trillion by IRENA, making the energy transition possibly the single most significant global growth opportunity. Although prompted by climate change, the global energy transition is now clearly being driven by technology innovation and commercial returns. Keshan Pillay, Director Oil, Gas and hydrogen, Green Industries Chief Directorate/ Director, Upstream Mining, Coal Oil and Gas, at the Department of Trade Industry and Competition (DTIC), explained the green hydrogen energy opportunity.

“The need for transportable and tradeable green energy molecules is a critical part of satisfying future global energy demand and decarbonising hard-to-abate industries and is driving the growth of a global energy market for green hydrogen (GH). SAF is one of the value chains that has found its way into the GH strategy,” said Pillay.

This bodes well for South Africa with its abundant renewable energy resources, and provides significant economic growth opportunities through:

- production and export of GH into future global green energy trading markets;
- production and domestic use of GH to decarbonise South Africa’s economy; and
- development of industrial capability in the manufacturing and supply of equipment used in the global GH value chains

WHAT IS GREY, BLUE, AND GREEN HYDROGEN?

You might encounter the terms ‘grey’, ‘blue’ and ‘green’ when describing hydrogen technologies. The differentiation arises from the way hydrogen is produced. Hydrogen emits only water when burned, but creating it can be carbon intensive. Depending on production methods, hydrogen can be grey, blue or green.

GREY HYDROGEN

is produced from methane (CH₄), split with steam into CO₂ – the main culprit for climate change – and H₂, hydrogen. Grey hydrogen is increasingly being produced from coal, with significantly higher CO₂ emissions per unit of hydrogen produced.

BLUE HYDROGEN

follows the same process as grey, with the additional technologies necessary to capture the CO₂ produced when hydrogen is split from methane or coal, and store it for long term. By capturing large part of the CO₂, the climate impact of hydrogen production is reduced.

GREEN HYDROGEN

is defined as, hydrogen produced by splitting water into hydrogen and oxygen using renewable electricity. Green hydrogen is the only type produced in a climate-neutral manner making it critical in efforts to reach net zero by 2050.



In response to GH economic development opportunities, Minister of Trade and Industry, Ebrahim Patel, established a South African GH Panel (GHP) in June 2021. Under the guidance of the Industrial Development Corporation of South Africa and the GHP, the DTIC's GH strategy report addresses six broad key objectives with the aim of establishing a strategic framework and roadmap for commercialisation:

	<p>Secure export markets, ensuring global market share and a competitive trade position</p>		<p>Develop training and skills development programmes and capacity, to support job creation within the GH sector</p>
	<p>Develop the domestic market, through policies that support R&D, and a regulatory framework for GH that aids GH price parity to increase domestic GH demand</p>		<p>Grow local industrial capability and participation, targeting international technology partnerships and transfers to expedite local manufacturing capability, investing and implementing research and development programmes</p>
	<p>Focus on investment and finance, focusing on foreign direct investment, low-cost green finance programmes, and defining government's role, financial investment and support for pilot projects private sector investment</p>		<p>Consider a just transition, quantifying the commercial and economic impact and sustainability of industrial sectors as they decarbonise their businesses. Ensure appropriate training and skills development programmes to limit job losses and support employment</p>
	<p>Ensure economic and socio-economic development, incorporating non-financial criteria in procurement processes, skills transfer, local supply and enterprise development, and opportunities for local ownership</p>		

The report and policy for GH are currently being finalised. "The next step will be to write detailed business plans for the catalytic projects identified during the analysis - This includes assessing various locations in and around SA for the production and export of green hydrogen-based commodities and ensuring we complement the efforts of other countries in the region," said Pillay.

Key considerations include establishing what is required in terms of infrastructure, resources, technology and cost to get projects started. There are already numerous pilot projects up and running and small-scale economics make sense.



SASOL & SAF IN SOUTH AFRICA

Sasol Limited, an integrated energy and chemical company based in South Africa, has committed to reducing its carbon emissions by 30% by 2030, with the ultimate goal of net-zero by 2050. Dumisani Nkala, Vice President of Business Development at Sasol, says that the company’s transition towards SAF is built around Fischer Tropsch (FT) technology, which is feedstock-agnostic and well-suited to producing net-zero fuels and chemicals.

The technology has the flexibility to shift from grey to blue to GH, and carbon can come from sustainable feedstock sources such as biomass, industrial processes and direct air capture.

Sasol is pursuing numerous SAF opportunities and has already entered into two partnership agreements, where its FT technology will be deployed to produce green fuel. The Boegebaai Green Hydrogen Export Special Economic Zone, which upon successful implementation, is expected to produce 4 kilotons of hydrogen per annum, and will unlock 4000 job opportunities. Ultimately, tens of gigawatts of renewable energy will feed electrolyzers on a massive scale, producing the hydrogen power fuels of the future.

The second project is HyShiFT in Secunda, where the plan is to produce SAF through a carbon feedstock such as biomass and GH using renewable energy (wind and solar). The carbon and hydrogen are converted to synthetic gas and then processed into SAF via Fischer-Tropsch. The aim is to

produce up to 50 000 tons pa of SAF. It is Sasol’s intention to bid under the German H2Global consortium, which has a powerful platform to support the development of these new technologies and their applications and markets.

The key consideration is that the green feedstock needs to be affordable and sustainable and the required product premiums must be achieved to justify the capital needed for asset reconfiguration.

Sasol will need to account for the sustainable carbon in its products. Proportionate and selective attribution are the two ways to engage with certification bodies. However, the challenge is that while certification bodies recognise both methods, only proportionate attribution is recognised under the EU RED. Selective attribution allows Sasol to maximise green product allocation to SAF in the early years, thus stimulating innovation and enabling affordable decarbonisation.

Policy clarity is required on what carbon, and from which industrial processes, will be allowed as sustainable carbon sources.

The Secunda and Sasolburg facilities give South Africa a competitive edge over other renewable resource-rich countries. However, to enable the energy transition, Sasol needs to collaborate, create partnerships, acquire funding, and to ensure policy, regulations and green financing are in place.

SASOL'S FT TECHNOLOGY IS FEEDSTOCK-AGNOSTIC

HYDROGEN		SOURCES		
 <p>Flexibility to shift to Blue / Green H₂</p>		Grey H ₂		
		Blue H ₂		
		Green H ₂		
CARBON		SOURCES		
 <p>Carbon agnostic; potential for unlimited sustainable feedstock</p>		Coal		
		Gas		
		Bio feedstock		
		Industrial processes (CCUS)		
		Direct air capture (DAC)		

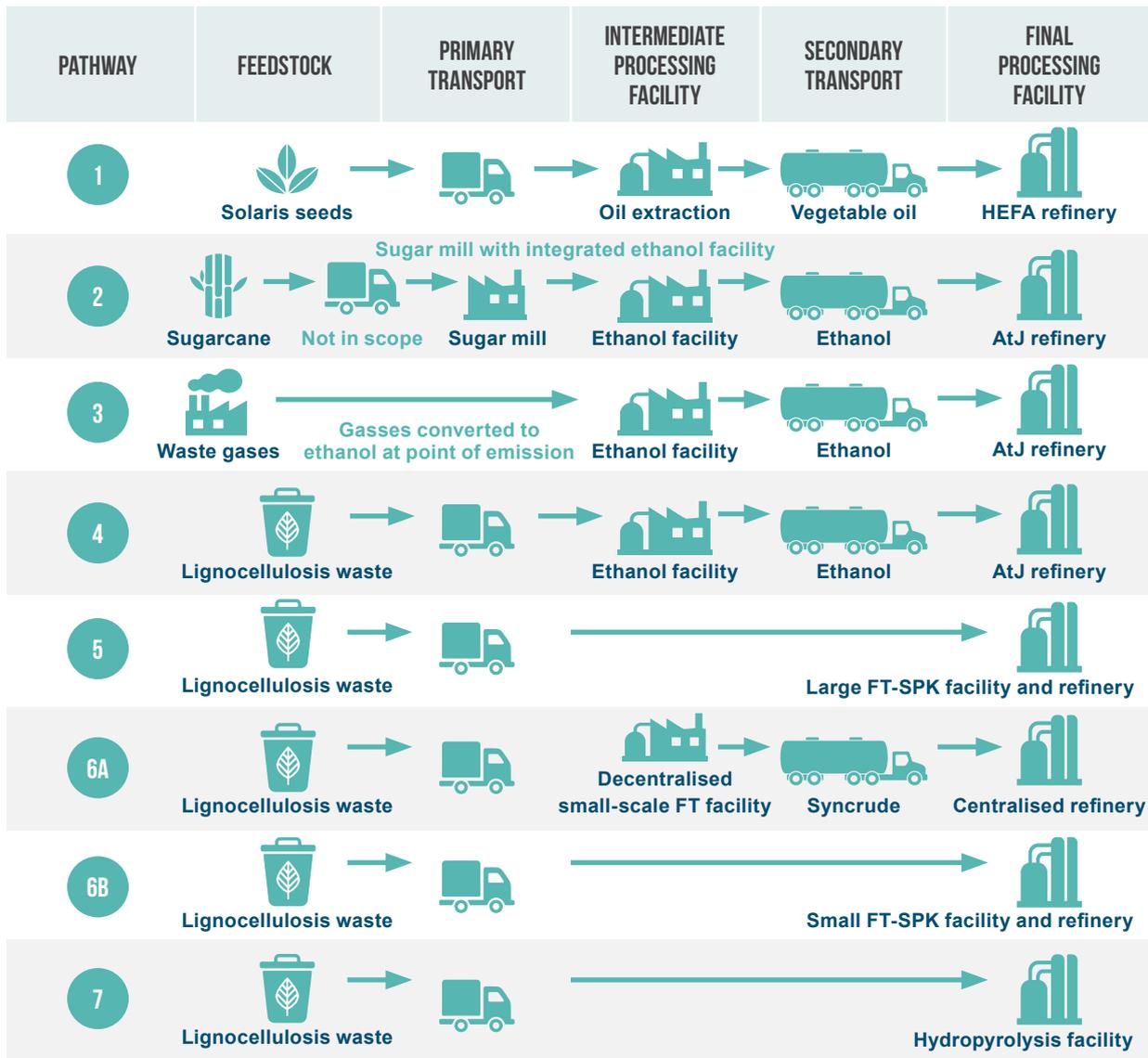


LAUNCH OF SOUTH AFRICAN SAF BLUEPRINT

RSB member and long-term partner WWF South Africa has published an excellent report on the potential for sustainable aviation fuel (SAF) production in South Africa, across 7 feedstock/technology combinations.

The report, entitled *Fuel for the future: A blueprint for the production of sustainable aviation fuel in South Africa*, was presented at the South African SAF stakeholder meeting a few weeks ago, which the RSB hosted, and was very well received. RSB contributed to the report through inputs on the GHG assessment. [Download the report here.](#)

Using techno-economic modelling, the WWF report shows a number of potential pathways for South Africa's potential to become a major producer – and potential exporter – of up to 4,5 billion litres SAF. The feedstocks considered include: A-molasses, a co-product from sugar production; a modified tobacco plant called Solaris; biomass from the clearing of water-thirsty invasive alien plants; as well as using carbon-rich waste gases from heavy-emitting industries.

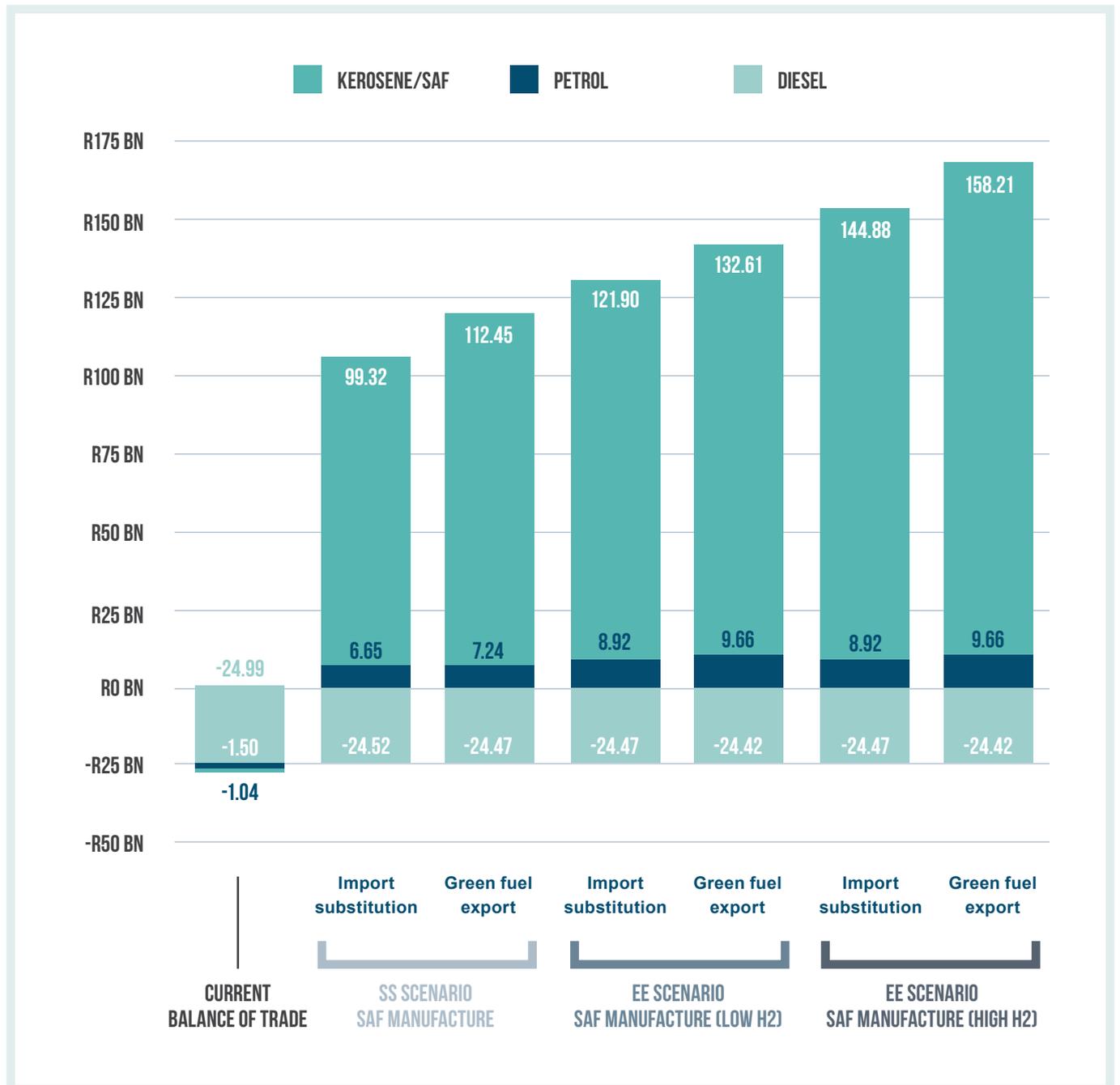




The development of a new domestic SAF industry could be a pillar of South Africa’s low-carbon economy and play an important role in a just energy transition.

The SAF industry has the potential to create some 90 thousand jobs in the country, and almost 75% of the current

coal hauling jobs could be directly transitioned to biomass transport because of overlap in coal and biomass supply chains and usage of the same truck types. Moreover, SAF implementation can improve South Africa’s balance of trade by R81,5 billion to R170 billion per annum.





KEY FINDINGS

SA AVIATION INDUSTRY NOT ONBOARD:

- The aviation industry would be willing to partner on SAF, but the industry is financially challenged, and the cost of fuel is a major factor. The SAF strategy needs consider off-takes, incentives for airlines, and how to provide market certainty.
- A policy is needed to facilitate partnerships with airlines, to align the producer to the end market.
- Sasol is having conversations with local airlines in South Africa on providing SAF. There have also been discussions on how to make O.R Tambo international airport a SAF hub. Besides local airlines requiring SAF, international airlines need the assurance that they can fill up with SAF in South Africa.

ATTITUDE AND APPETITE FOR SAF INCENTIVES:

- The government needs to consider ways to incentivise industries, possibly with neutral incentives.
- Regarding green hydrogen, a powerful motivation is the product's green uptake, which gives the incentive at the end and not upfront without production. Incentives are revised depending on the uptake, allowing for a blended incentive model.
- Airlines investing in SAF should see it as investment in their product and as part of being a sustainable business.
- There needs to be a mental shift in airline and customer attitudes, regarding cost and price increases. It is important to raise awareness and educate the market about the value of SAF in mitigating climate change. Consumers should be educated to demand sustainably produced products and to lobby government and the airline industry to invest in SAF.
- South Africa is unclear about blending mandates and is not following them, and applying blending mandates to local airlines could skew the market. Authorities should look at different incentives, and how airlines would qualify for them.
- Incentives must ensure that sufficient fuel remains in South Africa for local use.

GOVERNMENT INVOLVEMENT:

- There is no fiscal space to create more incentives in SA. Tax incentives may be a creative way to get incentives from National Treasury.
- Feedstock materials such as IAPs, and agricultural and industrial waste, have multiple government overlaps in the supply chain. Government needs to liaise across the sectors to enable agricultural residue or industrial waste to be seen as feedstock and to support feedstock development for a SAF or bioenergy market.
- There needs to be a multi-department task force to support biofuel production.
- It would be worth redirecting government funds to support or subsidise private sector interventions to support the development of the biofuel market.
- The Department of Innovation's, Industry and Environment Directorate offers funds specifically for biofuels, and is looking for private sector projects looking for funding.

SUGARCANE CHALLENGES:

- The viability of SAF production varies between irrigated, dryland and dryland green sugarcane as a feedstock, with the cultivation of irrigated cane having a higher carbon footprint.
- An enabling regulatory framework would need to be created.
- Small-scale growers would need assistance with essential structures and equipment to ensure occupational health and safety, and internal farm level administrative support would need to be provided. The use of local labour, preferential labour laws and procurement processes would have to be implemented.
- Proper impact assessments would have to be carried out, and the national greenhouse gas (GHG) reporting requirement would need to be improved.

GREEN HYDROGEN AND SASOL:

- Sasol is not stopping CTL and will continue to do both as it is one of the largest employers in the coal sector and must look for a suitable transition for the labour market.



- Green hydrogen production costs are significantly higher than coal or gas. The cost of electrolytes, green electricity and green infrastructure, govern the high GH prices. For Sasol to reach net-zero sustainably, it will have to convert to green hydrogen and green carbon sources through different pathways, starting with gas then investing in green hydrogen.
- The allocation of products to just SAF from Secunda is not permitted under the EU renewable energy directive. Sasol is liaising with RSB to look at how they can identify levers and policy enablers to help the transition. The SA government is aware of the challenge and is supportive. The DTIC and DMRE are working with Sasol to bring SAF to South Africa.

locally, so there could be a SAF allocation for the local market in a separate budget. This would enable a pilot project on the ground for policy to take forward and provide momentum to develop further SAF projects

ACCESS TO INVASIVE ALIEN BIOMASS:

- SA has enough IAPs to serve as a feedstock for the next 20 years to ensure security of supply. The concern is rather whether clearing can be ramped up fast enough for SAF supply.
- A viable commercial market is needed.
- The integrity of the product must be guaranteed, so certification boards are essential.
- The off-take agreements are essential. If the market demand is there, the off-take is automatic.
- The industry and technology must be close to facilities, faster clearing will not be an issue.
- SMME challenges in upscaling SAF production include training, biomass availability and transport costs.

THE NEED FOR PROJECTS ON THE GROUND:

- Having a project on the ground is critical. The RSB is CORSIA and EU RED aligned, and their global standard allows for the sort of allocation SA needs. A way forward would be for the South African government to find a way to apply the global standard

KEY PREREQUISITES TO BE MET



ENABLING POLICY & LEGISLATION



INCENTIVES & SUBSIDIES



PUBLIC PRIVATE PARTNERSHIPS



STAKEHOLDER SUPPORT

KEY ISSUES TO BE RESOLVED



STAKEHOLDERS' AMBITION AND CAPACITY TO SUPPORT SAF DEVELOPMENT



WHO IS RESPONSIBLE FOR LEADING A NATIONAL SAF ROADMAP PROCESS



TOP 3 PRIORITIES FOR SAF DEVELOPMENT IN THE NEXT 1, 2, 5 YEARS



NEXT STEPS

TIMEFRAME	1 YEAR	2 YEARS	5 YEARS
KEY OBJECTIVE	<ul style="list-style-type: none"> • Raise awareness • Develop partnerships 	<ul style="list-style-type: none"> • Create demand • Enable supply chain 	<ul style="list-style-type: none"> • Scale up activities
STAKEHOLDER GROUP	ACTION REQUIRED	ACTION REQUIRED	ACTION REQUIRED
Airline Industry	<ul style="list-style-type: none"> • Change internal mindsets/ increase awareness of climate impacts of aviation • Make sustainability plans • Engage with one another • Passenger / customer education • Support public debate / understanding • Explore incentive packages • Work out an economic model to enable purchase of SAF • Actively engage in international fora on aviation 	Provide market certainty: <ul style="list-style-type: none"> • Conclude offtake agreements • Equity investment in SAF projects 	<ul style="list-style-type: none"> • Increase offtake quantities • Commit to regular SAF refuelling
Government	<ul style="list-style-type: none"> • Create inter-departmental taskforce on SAF to avoid policy fragmentation • Develop domestic flexibility mechanisms to facilitate uptake • Leverage position on international bodies to increase flexibility of SAF accounting • Evaluate possible incentives (carrots vs sticks); take broad view - they can be budget neutral • Develop national flexible allocation system linked to flexibility mechanism to prioritise SAF from integrated production systems 	<ul style="list-style-type: none"> • Implement the incentives • Support availability of low cost green hydrogen • Align existing government programmes with SAF supply chain • Create regulatory framework for domestic use • Transpose relevant international regulations • Develop sectoral SAF masterplan • Develop Green Climate Fund proposals to drive sector transformation • Policy shift to SAF instead of road transportation 	<ul style="list-style-type: none"> • Include SAF in industrial policy • Scale up incentives



STAKEHOLDER GROUP	ACTION REQUIRED	ACTION REQUIRED	ACTION REQUIRED
Private Sector	<ul style="list-style-type: none"> • Support government to liaise and correspond across different departments and sectors • Look to Department of Science and Innovation for funding • Develop proof of concept • Form industry body to coordinate interaction with other stakeholders • Commit to strong sustainability principles 	<ul style="list-style-type: none"> • Long term offtake agreements • Unlock role of airports and other partners • Share learnings from early projects • Trial local SAF certification with flexibility of allocation to demonstrate / pilot concept 	<ul style="list-style-type: none"> • Scale up production capacity • Invest in R&D • Ensure continued sustainability certification
Civil Society	<ul style="list-style-type: none"> • Continue with climate awareness campaigns, focus on flying public • Get citizens on board to demand sustainable products 	<ul style="list-style-type: none"> • Ensure integrity of supply through certification • Ensure rehabilitation of landscapes • Support acceptance of higher costs of flying 	<ul style="list-style-type: none"> • Continued sustainability monitoring of different SAF supply chains

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