EMPLOYMENT OPPORTUNITIES IN A BIOMASS VALUE CHAIN

A case for coal truckers

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INTRODUCTION & CONTEXT

About 4 000 people currently employed as coal truck drivers

These jobs are at risk as the country moves away from coal.

There is potential to find alternative opportunities for coal truckers by transporting sustainable biomass for new green industries.

A Sustainable Aviation Fuels (SAF) industry is one example.

The growing impact of aviation on the climate

The commercial aviation industry currently accounts for 2–3% of global carbon dioxide (CO_2) emissions.

Without mitigation, this is expected to account for over 22% of all anthropogenic CO_2 emissions.

Sustainable aviation fuels expected to contribute 65 % of the emission reductions in 2050[1].

[1] International Air Transport Association (2021)

Why should SA pursue Sustainable Aviation Fuel (SAF)?

Excellent resource base

Long-standing experience with promising SAF production technologies

Need to start decarbonising own aviation sector

SAF represents an important export opportunity

APPROACH TO ESTIMATING THE JOBS OPPORTUNITY IN A BIOMASS (SAF) SUPPLY CHAIN FOR SOUTH AFRICA

Approach to assessing SAF production potential

FEEDSTOCK SELECTION

Solaris

A-molasses

Industrial off-gas

Cleared IAP & garden waste

SELECTION OF SAF PRODUCTION PROCESSES

Hydroprocessed esters and fatty acids (HEFA)

Alcohol (ethanol)-to-Jet (AtJ)

Fischer-Tropsch Synthetic Paraffinic Kerosene (FT-SPK)

Fischer-Tropsch Synthetic Paraffinic Kerosene plus Aromatics (FT-SPK/A)

Integrated hydropyrolysis and hydroconversion (IH^2)

7 SAF PRODUCTION PATHWAYS

Approach to assessing SAF production potential

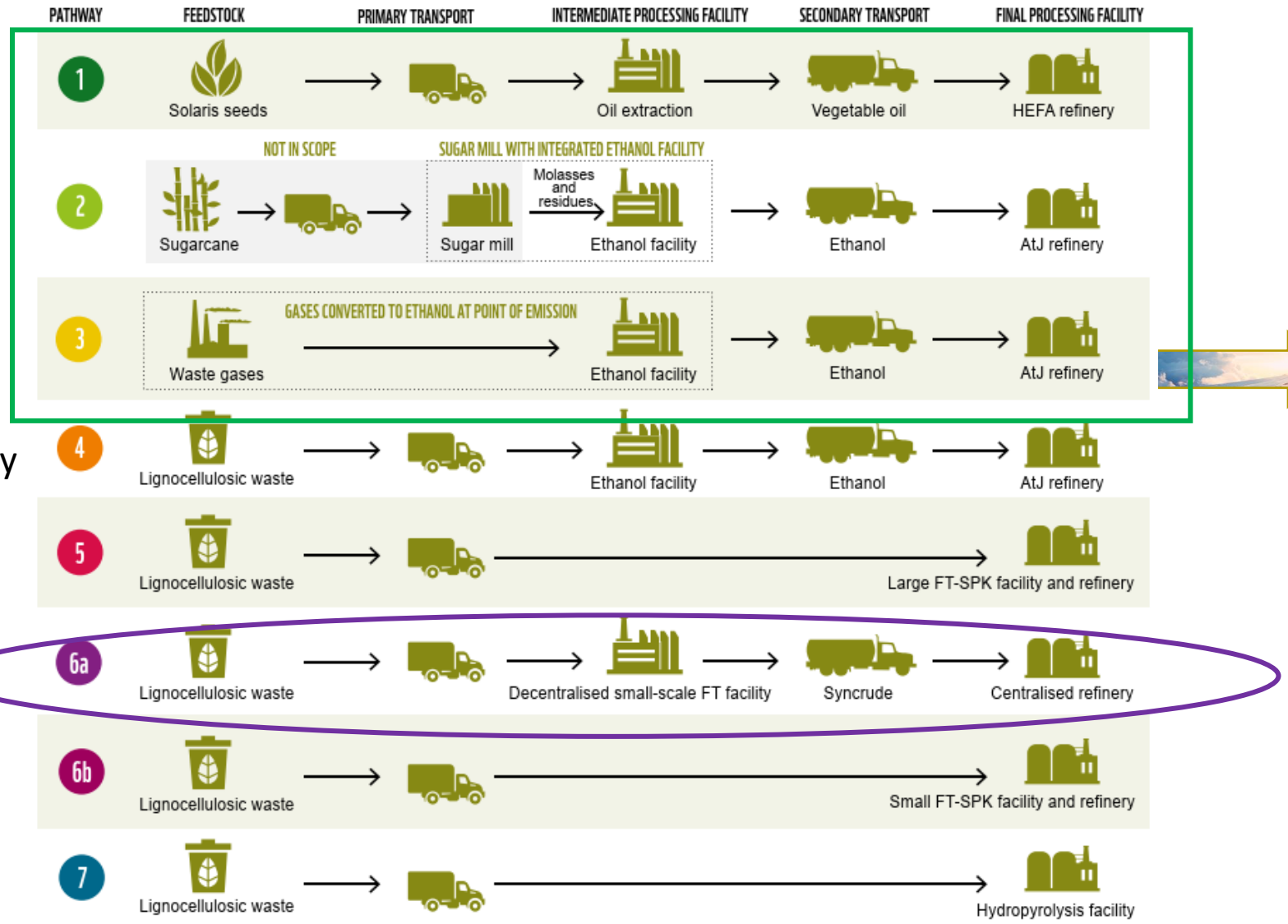
NETWORK OPTIMISATION

Centre of gravity

2 scenarios:

- Energy self-sufficiency
- External (renewable) energy for gH2

TRANSPORT COSTING



SAF PRODUCTION POTENTIAL & COST PER FACILITY

NATIONAL SAF PRODUCTION POTENTIAL

Approach to assessing socio-economic impacts of a domestic SAF sector

CONSTRUCTION & OPERATIONS JOBS

MODEL INPUTS

Facility specifications
- Plant capacity/throughput
- Construction year / time period
- Life of facility

Costing data and localisation potential
- Capital/construction costs
- Local content
- Fixed and variable operations and maintenance costs

Social Accounting Matrix (SAM) / economic multipliers and consumption profiles

QUANTITATIVE ECONOMIC MODEL (I-JEDI*)
Input-output model

OUTPUTS PER BIOFUEL PATHWAY

During construction
- Total jobs (direct, indirect, induced)
- Total output (direct, indirect, induced)

During operations
- Total jobs (direct, indirect, induced)
- Total output (direct, indirect, induced)

Source: Calitz et al., 2022

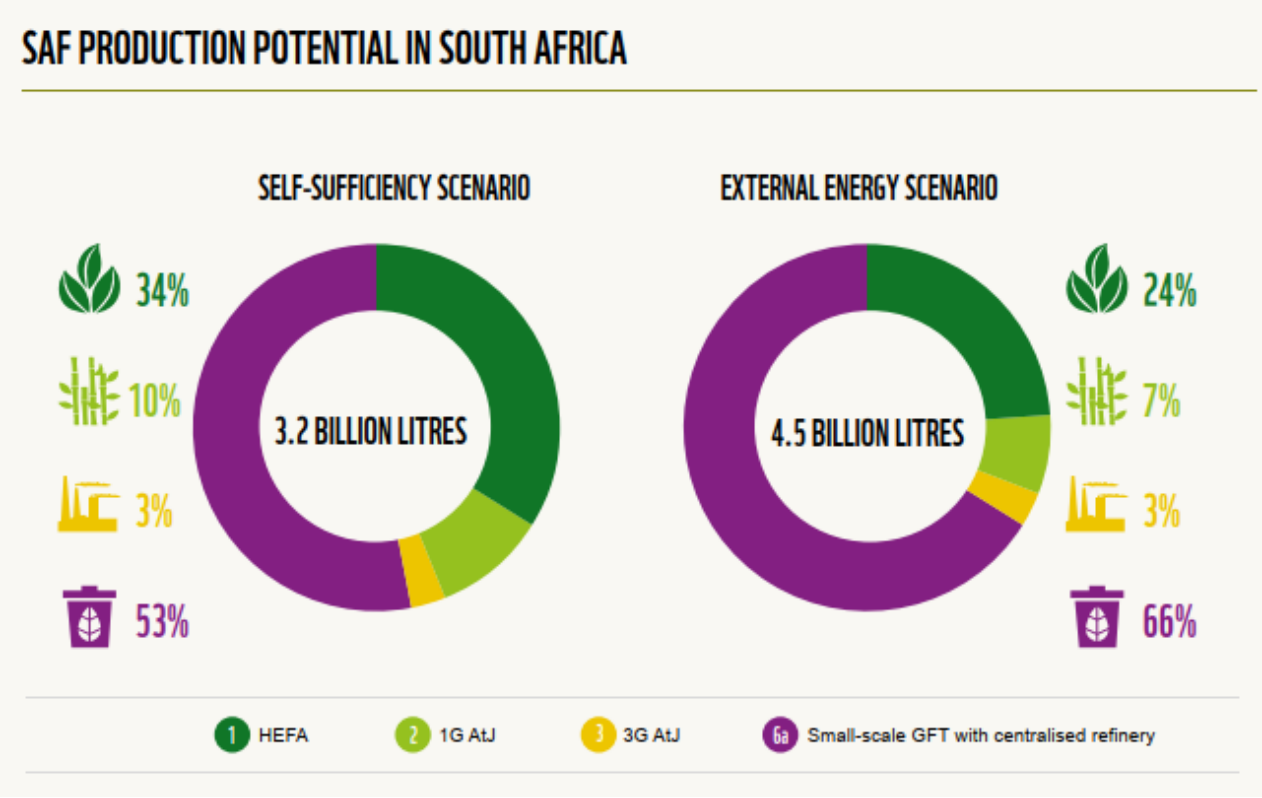
TRANSPORT JOBS

Route and volume analysis to determine the number of trucks (tanker, superlink and side-tipper) & drivers and administrative staff required to fulfil the supply chain for different shift options

THE SAF OPPORTUNITY IN SOUTH AFRICA QUANTIFIED

SOCIO-ECONOMIC IMPACTS

South Africa's SAF production potential



Socio-economic impacts of a domestic SAF industry

IF AS MUCH AS POSSIBLE OF THE CONSTRUCTION MATERIALS AND EQUIPMENT IS MANUFACTURED IN SOUTH AFRICA, THE CONSTRUCTION PHASE ALONE COULD CREATE ALMOST 40 000 DIRECT JOBS

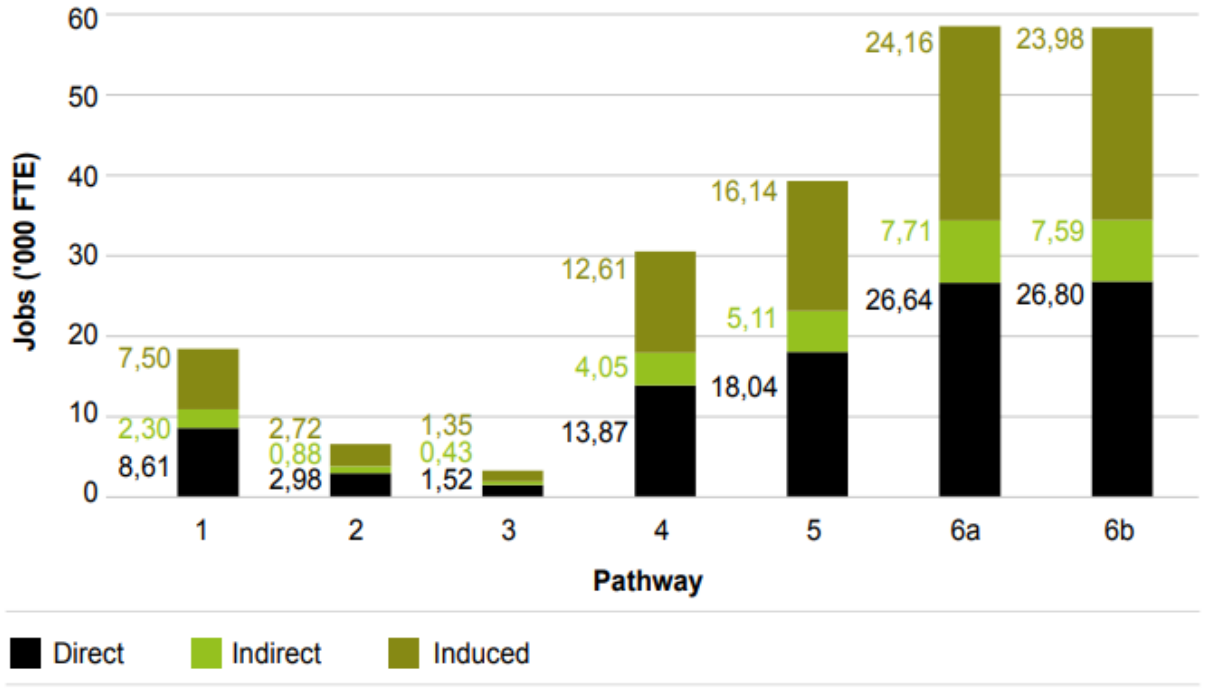
GROWING SOLARIS IS LABOUR INTENSIVE AND COULD RESULT IN THE CREATION OF OVER 19 700 PERMANENT AGRICULTURE JOBS

A DOMESTIC SAF SECTOR HAS THE POTENTIAL TO CREATE 90 000+ GREEN JOBS* IN SOUTH AFRICA

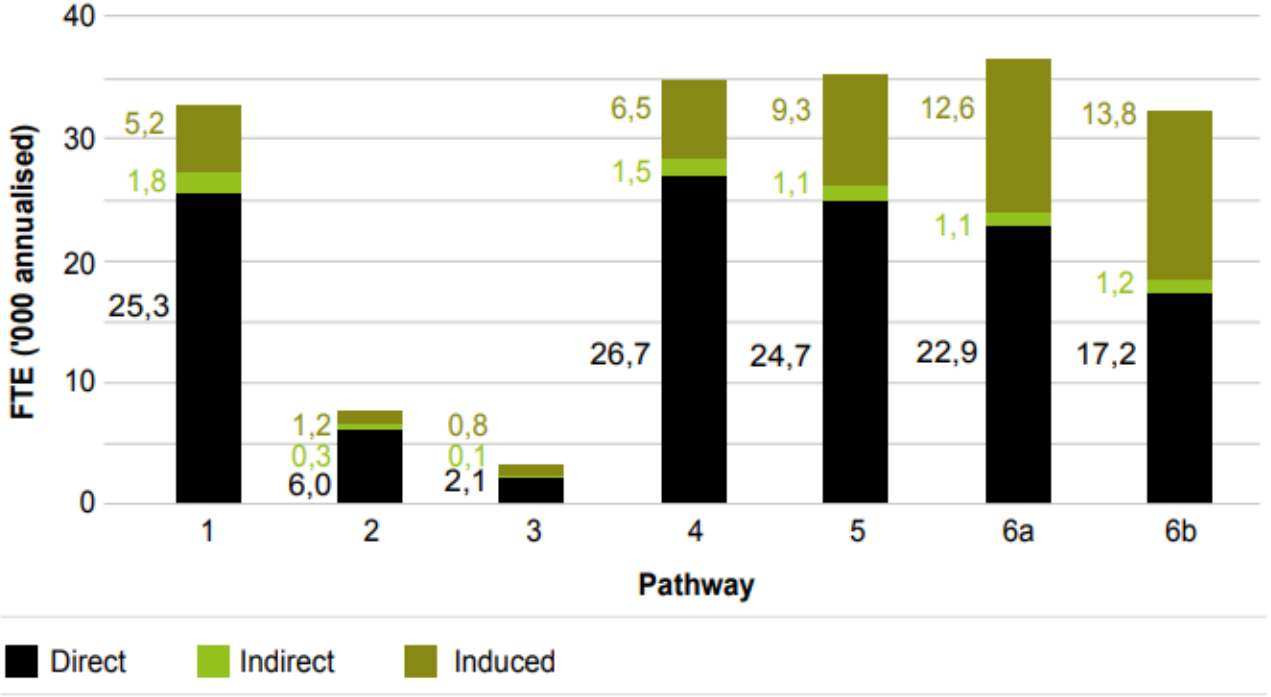
*Direct Jobs

Socio-economic impacts of a domestic SAF industry

JOBS GENERATED IN CONSTRUCTION PHASE FOR MAXIMUM LOCALISATION SCENARIO



JOBS GENERATED IN THE OPERATIONS PHASE



Transport employment opportunities of a domestic SAF industry

OVERVIEW OF BIOMASS-TO-SAF SUPPLY CHAINS ANALYSED FOR POSSIBLE JOB TRANSFERS

Primary transport			Secondary transport	
Raw feedstock	Truck type	Intermediate processing facility	Truck type	Final processing facility

SOLARIS TABACCO

Solaris seeds → Superlink tautliner → Oil extraction → Tanker → SAF refinery

NATIONALLY	649	837	100	NATIONALLY	133	172	25
COAL MINING AREAS	427	551	68	COAL MINING AREAS	87	112	16

To move the Solaris seeds from the fields to the extraction facility.

A-MOLASSES

A-molasses → Sugar mill with integrated ethanol facility → Tanker → SAF refinery

Only the secondary leg is considered here since the supply chain for the primary leg (plantation to sugar mill) already exists

NATIONALLY	100	130	16
COAL MINING AREAS	37	48	6

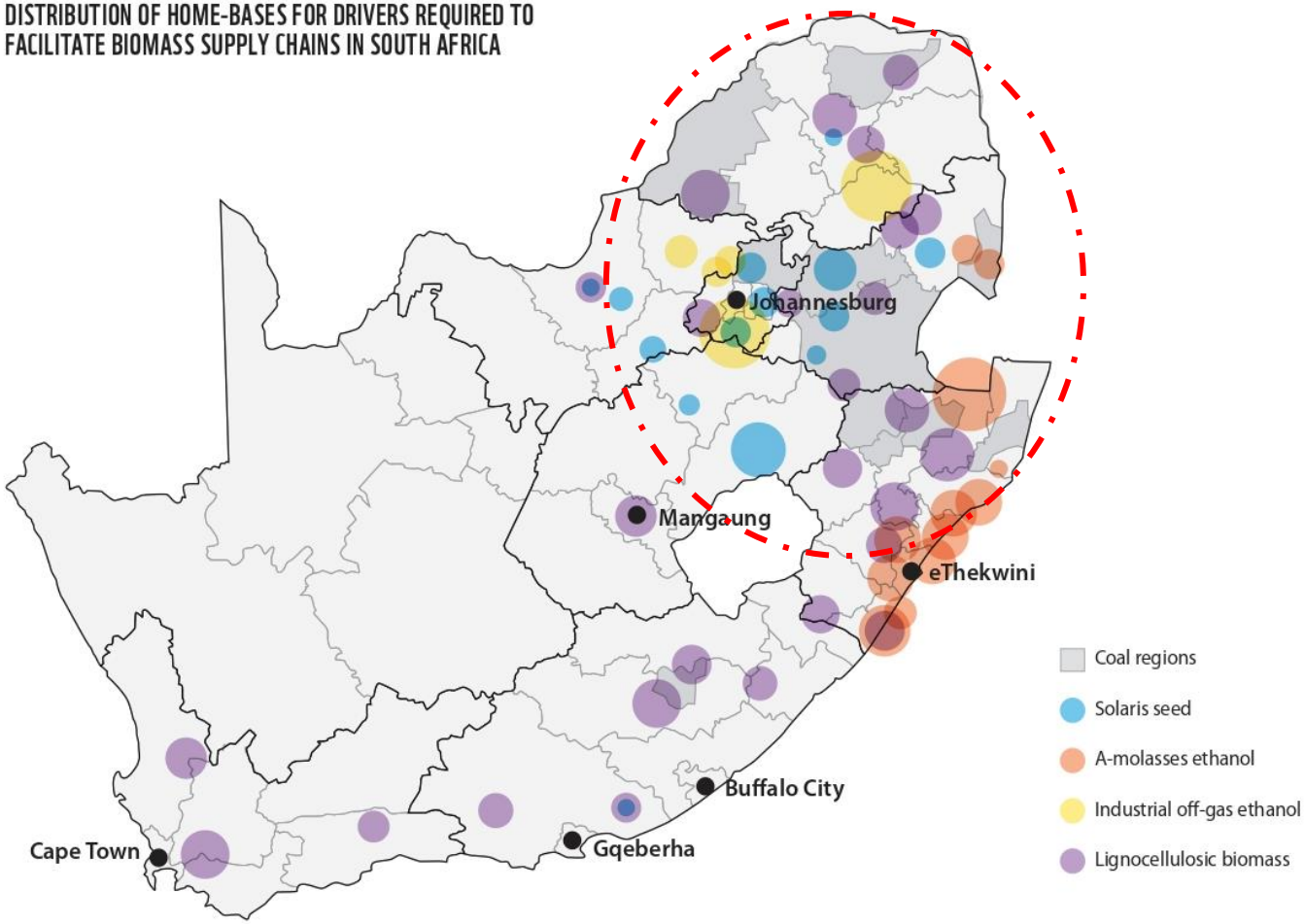
LIGNOCELLULOSIC BIOMASS

Lignocellulosic waste → Superlink tautliner → Decentralised small-scale GFT facility → Tanker → SAF refinery

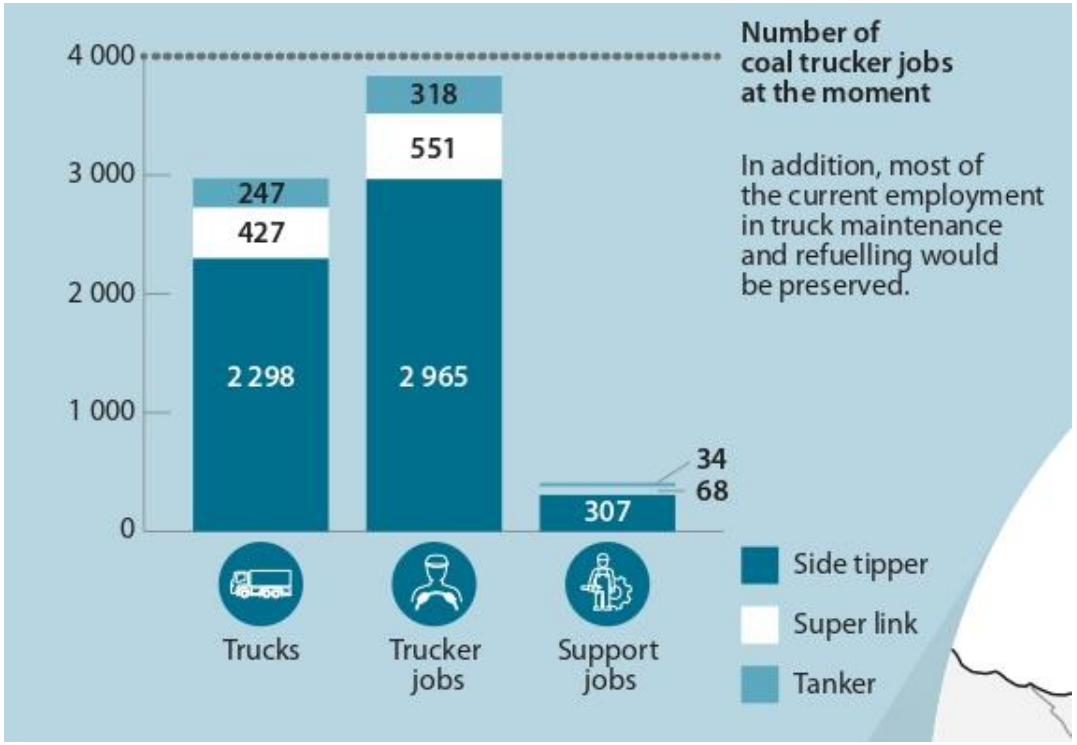
NATIONALLY	4 800	6 000	650	NATIONALLY	190	240	16
COAL MINING AREAS	2 298	2 965	307	COAL MINING AREAS	86	111	8

To move the chipped alien invasive biomass from clearing sites to a number of GFT plants accross the country

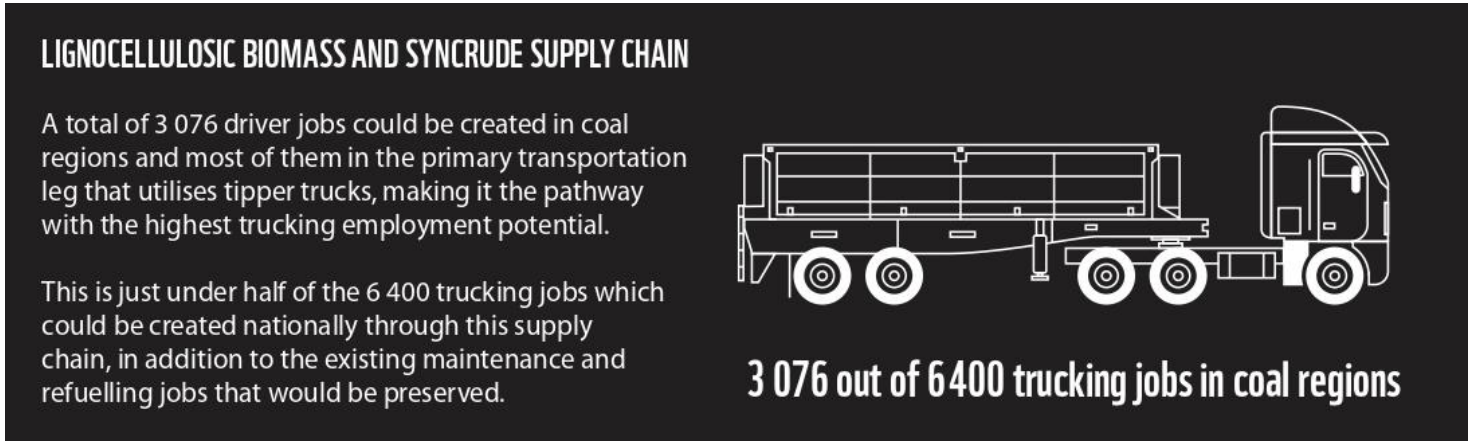
DISTRIBUTION OF HOME-BASES FOR DRIVERS REQUIRED TO FACILITATE BIOMASS SUPPLY CHAINS IN SOUTH AFRICA



Alternative trucker jobs in coal regions



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.



KEY MESSAGES

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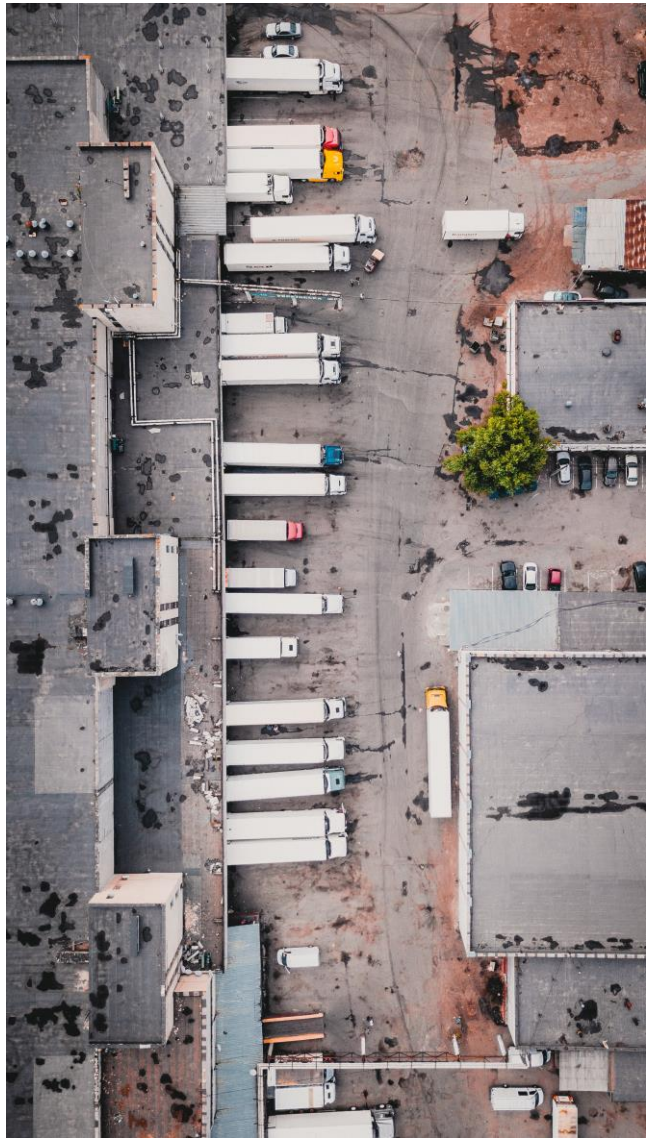
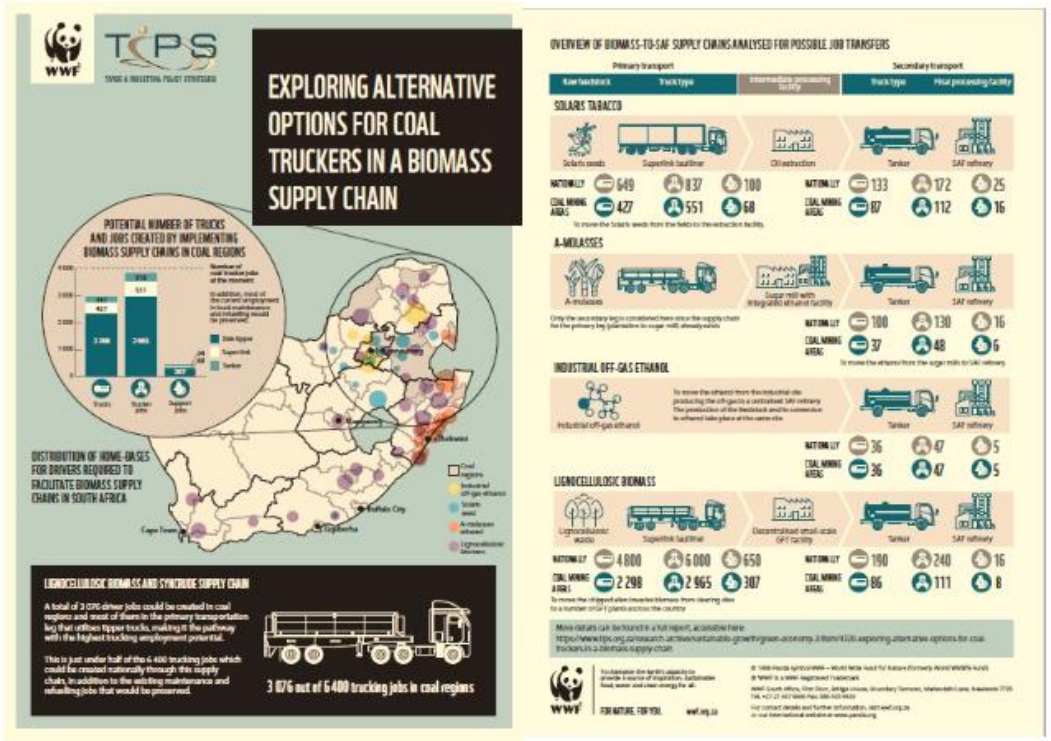
Key messages

- A domestic SAF industry could be a pillar of South Africa's low-carbon economy, playing a key role in the just transition process.
- Over 90 000 direct jobs can be created from a domestic SAF industry and could offset jobs lost in traditional petrochemical operations.
- Feedstock production could provide employment to 20 000 farm workers and possibly even bigger numbers of IAP harvesters. It would also preserve at-risk jobs in sugarcane production.
- Opportunities for coal trucker jobs vast. The nationwide SAF supply chains could create nearly 7 500 truck-driver jobs and over 800 support jobs
- 75 % of coal truckers (2965) can be directly transitioned to biomass trucking without re-skilling.
- Over 20 % of current coal truckers could have opportunities driving other truck types but would need investment to obtain new trucks and reskilling for tanker drivers.
- Shifting coal transportation to biomass transportation would preserve most of the current employment in truck maintenance and refuelling.
- SAF industry can be hydrogen sink and support development of local hydrogen economy.



Relevant Publications

https://www.wwf.org.za/our_research/publications/?39122/fuel-for-the-future



https://www.tips.org.za/research-archive/sustainable-growth/green-economy-2/item/4320-exploring-alternative-options-for-coal-truckers-in-a-biomass-supply-chain

https://www.wwf.org.za/our_research/publications/?26941/taking-off-understanding-the-sustainable-aviation-biofuel-potential-in-sub-saharan-africa

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FOR YOUR ATTENTION

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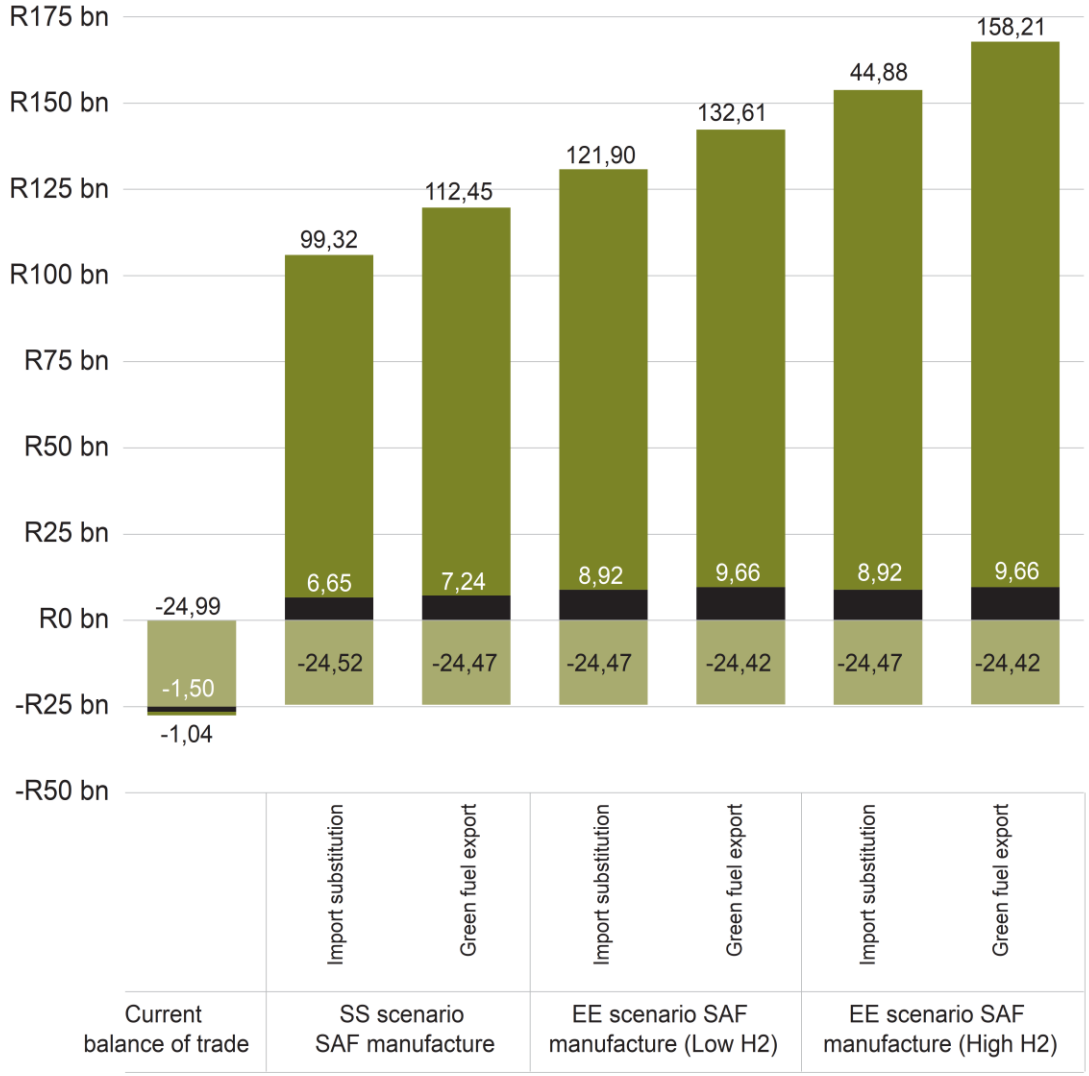
EXTRA SLIDES

Macro-economic impacts of a domestic SAF industry

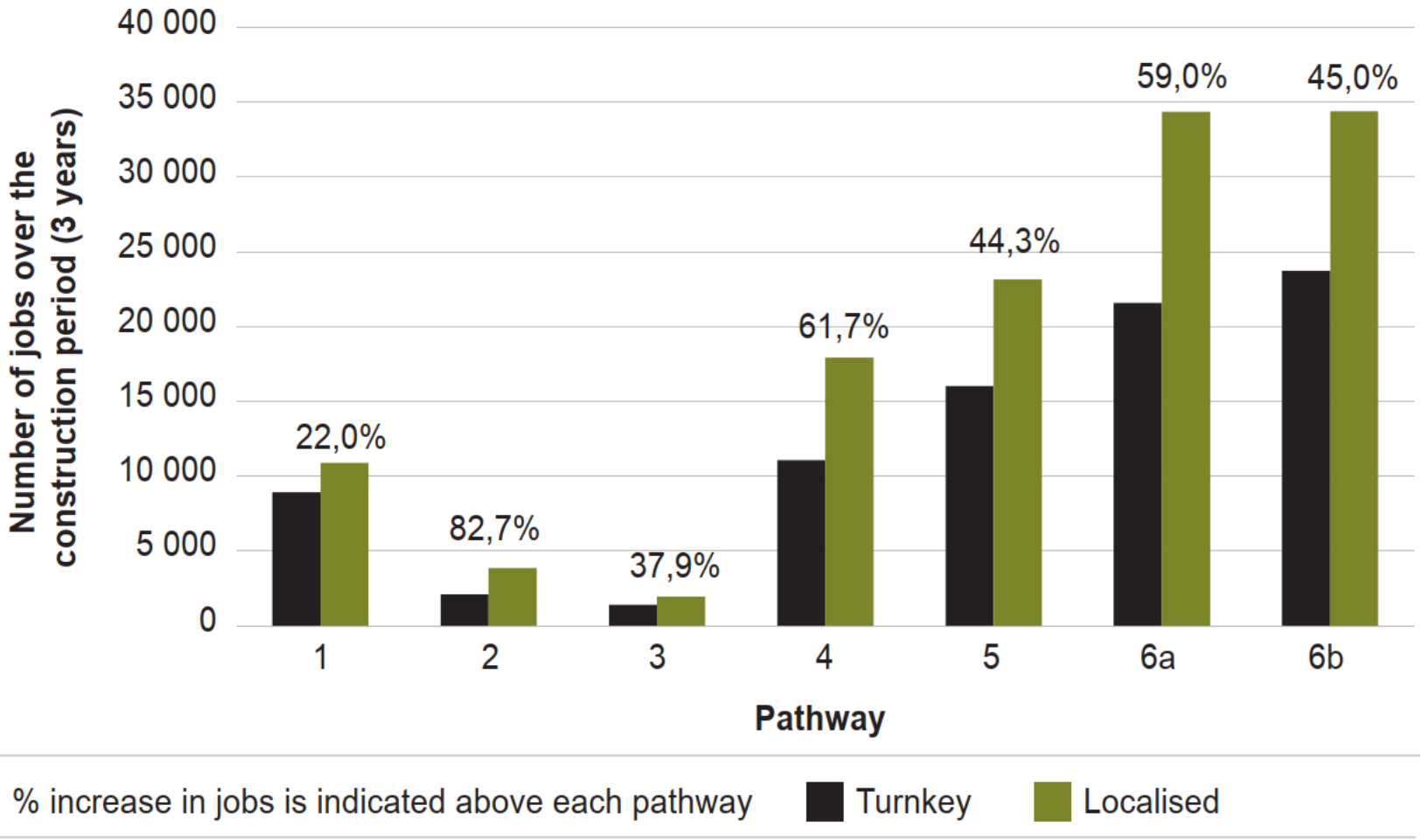


SAF implementation can improve South Africa's balance of trade by

R81,5 billion to R170 billion per annum.

Socio-economic impacts of a domestic SAF industry

Jobs over construction phase



Impact of localisation on direct and indirect jobs