A case for high capacity coal trucks to reduce costs & emissions at South Africa's power utility

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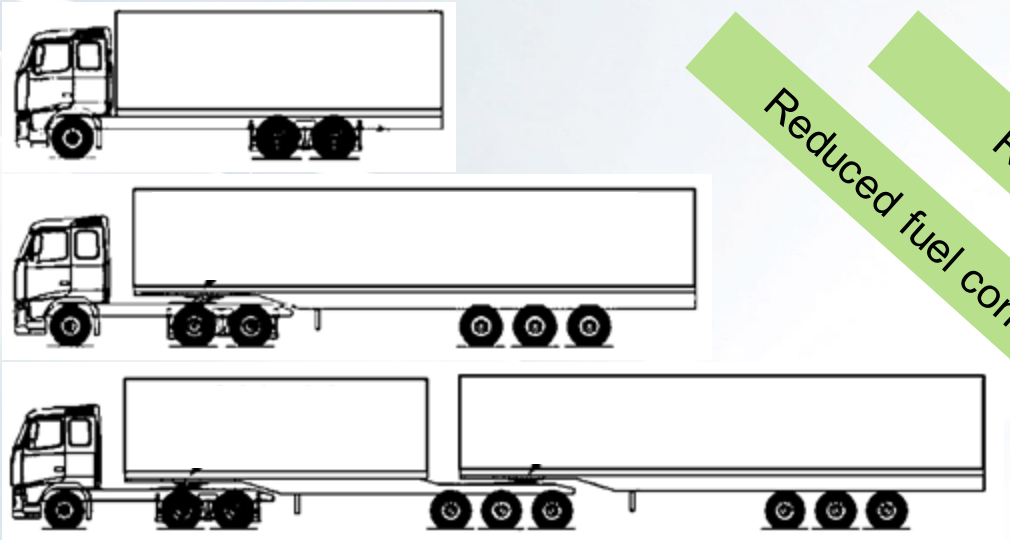
High capacity vehicles (HCVs)
&
The Smart Truck (PBS) pilot project in South Africa

High capacity vehicles

*Per tonne-km



Reduced fuel consumption*

Reduced emissions*

Fewer trucks on the road

Reduced road wear*

Safe high-speed performance

Adequate manoeuvrability for route

Ensure vehicle infrastructure match

Performance-Based Standards (PBS)

Professional & compliant operators

Well-maintained vehicles

The best drivers

Self-regulation

Smart Truck (PBS) Pilot Project in South Africa

Productivity

Sustainability

Safety

Smart Truck (PBS) Pilot Project in South Africa

PBS vs. "baseline" vehicles

TOTAL FUEL SAVED PER YEAR 3.82 M Litres = R 46.98 M	17 %
GREENHOUSE GAS EMISSION 10 056 tons CO2 / year	17 %
TOTAL TRIPS SAVED PER YEAR 74 874 trips	23 %
TOTAL km SAVED PER YEAR 11 486 821 km	23 %
ROADWEAR COST REDUCTION R24 500 per vehicle / year	13 %
CRASHES PER MILLION km 1.14 vs 2.09 for baseline vehicles	45 %

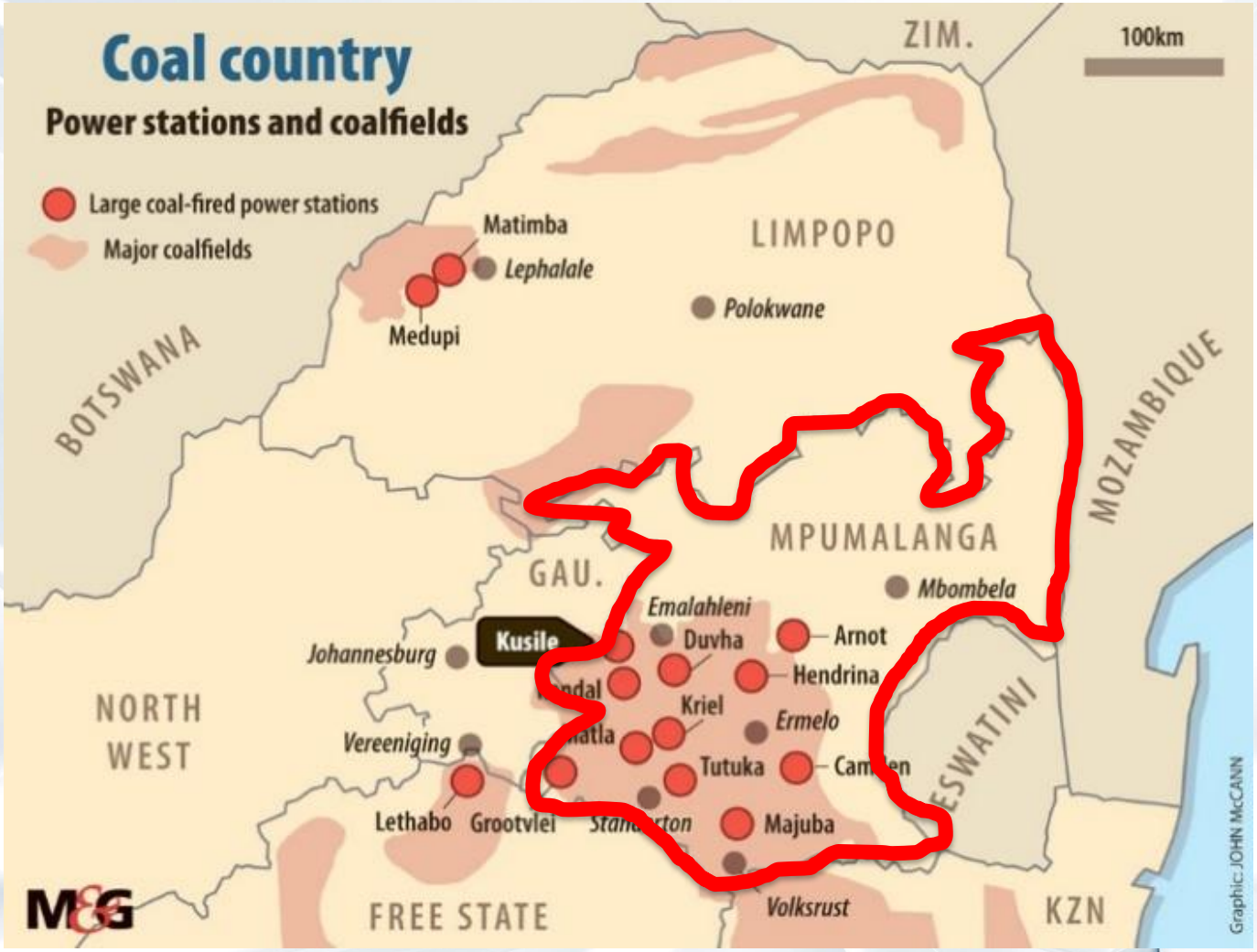
£1=R21 ¥1=R0.15 ₹1=R0.22

Smart Truck (PBS) Pilot Project in South Africa

Mpumalanga

Power station coal &
its transport in South Africa

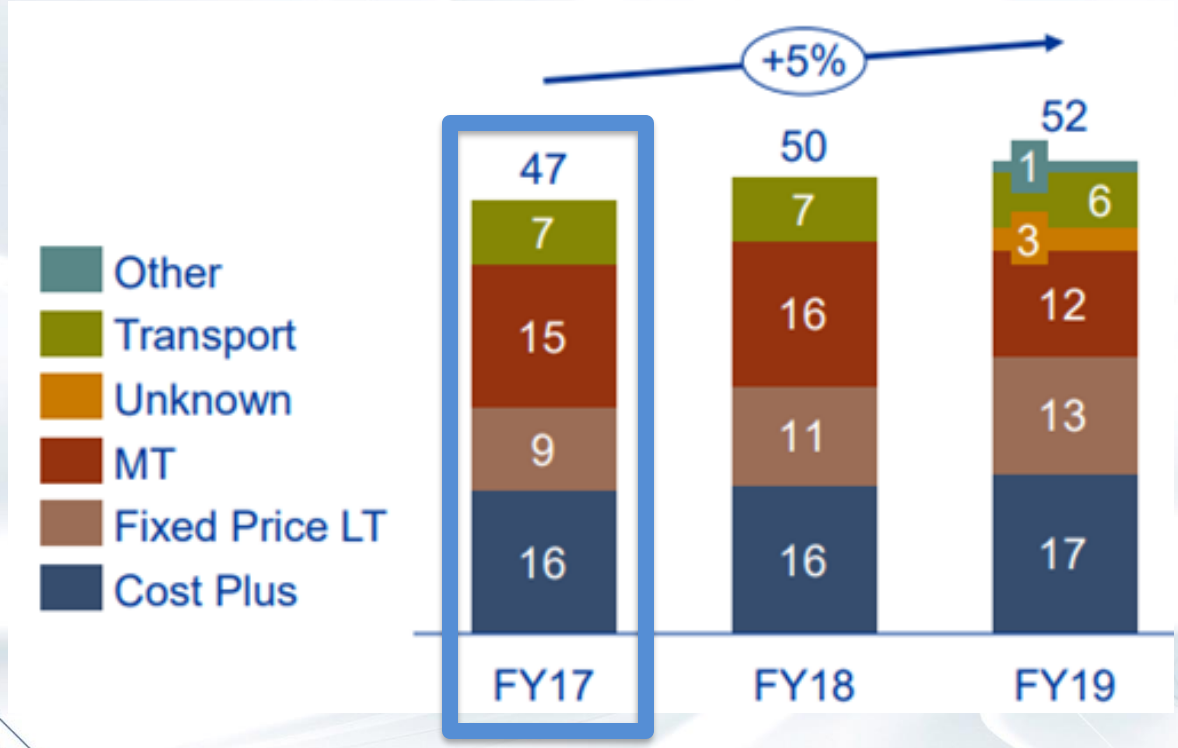
Power stations and coalfields



Davie, K. (2019) *Power stations truck up Eskom's image*. Mail & Guardian

Coal: costs and emissions

- **90%** of Eskom's generating capacity is from coal
- **114 million tonnes** of coal was burned in 2018/19
  - **221 million tonnes** of CO_2 emissions
  - This is **42%** of South Africa's total CO_2 emissions

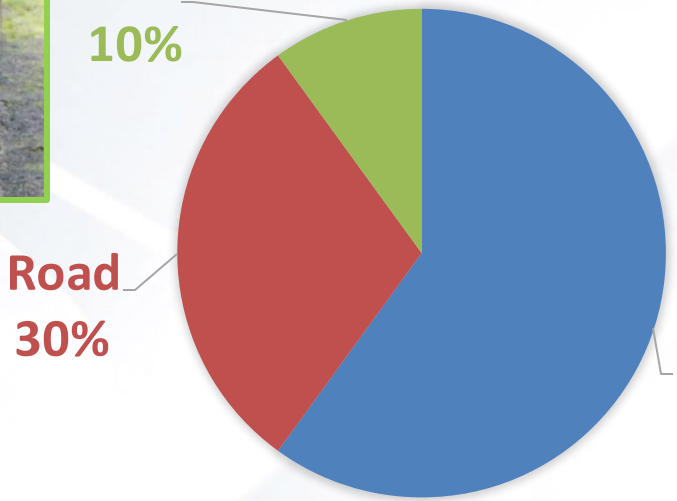


Total cost of coal = **R 47 billion**
Coal transport = **R 7 billion (15%)**

Sources:

- Eskom Holdings SOC Ltd (2017) *Eskom 2018/19 revenue application - Nersa public hearing 16 November 2017*
- Eskom Holdings SOC Ltd (2019) *Integrated Report 2018/19*
- Eskom Holdings SOC Ltd (no date) *Understanding electricity*
- Carbon Brief (2018) The carbon brief profile: South Africa.

Power station coal transport



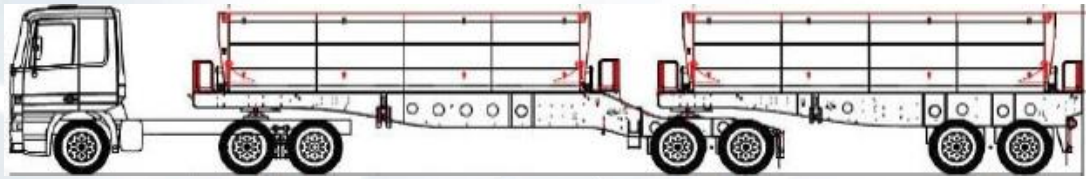
- In 2015, Eskom reported that they use **~3200 km** of Mpumalanga's road network, comprising **30-40 haulage routes**, and a fleet of **>2000 trucks**
- A fully laden 56-tonne interlink at 50% utilisation costs around **R 1.18/tonne-km (US$0.07)**

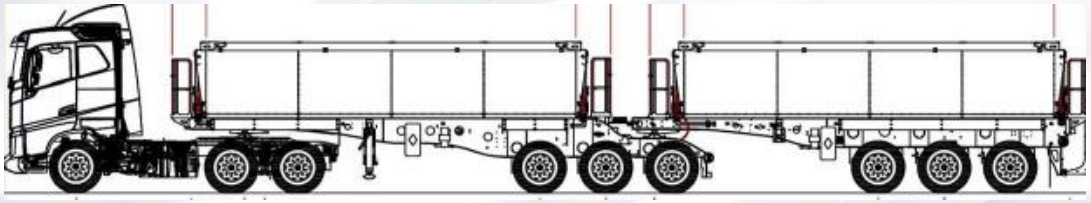
Sources:
- Solomons, I. (2015) *Eskom aiming to slash truck-delivered coal as it seeks cost, other benefits*, *Mining Weekly*. Saxby, P. and Elkink, J. (2010) 'Material transportation in mining - trends in equipment development and selection', *Australian Bulk Handling Review*,
- Braun, M. (2018) 'Truck operating benchmarks 2018', *FleetWatch*

PBS coal trucks & monitoring data

PBS coal trucks

	GCM	PL
Std.	56 t	35 t
PBS	74 t	50 t





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PBS coal trucks – monitoring data

- 3 years of monitoring data collected for both PBS and baseline vehicles (2017-2019)

	Baseline	PBS
litres/tonne-km	0.0157	0.0133
Ave. lead (km)	116	88

Fuel saving / tonne-km:	15%
Average lead distance (all):	89 km

Lead distance validation

- GAIN Group's Freight Demand Model (FDM) was used to calculate another representative lead distance, based on coal demands to power stations and modal share

Mode of transport	Lead distance (km)	Volume (million tonnes)
Conveyor	3	75.9
Rail	275	8.7
Road	97.5 km	33.3
Total	49.8	118

GAIN GROUP
Insight drives growth

Cost and emissions benchmarks

Assumptions:

1. Eskom's reported data are accurate
   - Modal split, coal tonnage, coal costs, haulage routes
2. Eskom's reported data represents non-PBS trucks
   - This fleet consists primarily of 56-tonne tandem interlinks
   - Minimal/no smaller tractor semi-trailer combinations
3. No back-hauling
4. Fuel accounts for 40% of transport costs [1]
5. 50% of the transport cost savings will be passed on to Eskom
6. Fuel emission factors (GLEC, diesel, North American data) [2] :
   - 2.43 kg CO_2e/l (Tank-to-Wheel)
   - 2.98 kg CO_2e/l (Well-to-Wheel)

[1] Havenga, J. H. *et al.* (2016) 'A Logistics Barometer for South Africa: Towards sustainable freight mobility', *Journal of Transport and Supply Chain Management*, 10(1).

[2] Greene, S. and Lewis, A. (2019) Global Logistics Emissions Council Framework for Logistics Emissions Accounting and Reporting Version 2.0. Amsterdam.

Results: Annual savings potential

Coal transported (2018/19)	118 000 000 t
Coal transported by road (30% of total)	35 400 000 t
Road transport cost	R1.18 / t-km
Number of haulage routes	35
Average lead distance	97.5 km

*Annual	 Cost of transport	 TTW	 WTW	 Truck trips
Benchmark	R 4 072 770 000	186 381 t	231 251t	1 011 429 trips
PBS saving	R 122 183 100	27 957 t	34 688 t	303 429 trips

Final thoughts & next steps

mePADS

1. Road wear impact cost benchmarking analysis
2. Explore alternative public-private models for sharing the cost saving benefit, including road wear impact savings

3. Longer, heavier combinations on appropriate routes? (>74t, >22m)
4. Formalising PBS in South Africa beyond the pilot project
5. Increased participation by coal transporter in the PBS pilot project

Thank you.

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