



# The Macrologistics impact of Transnet on the economy

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**4 May 2023**

- Introduction (Macrologistics, freight demand and supply)
- Rail's "original sin"
- Density, global benchmarking and performance
- Inserting rail into supply chains
- The port system
- Effect on the economy
- A road ahead

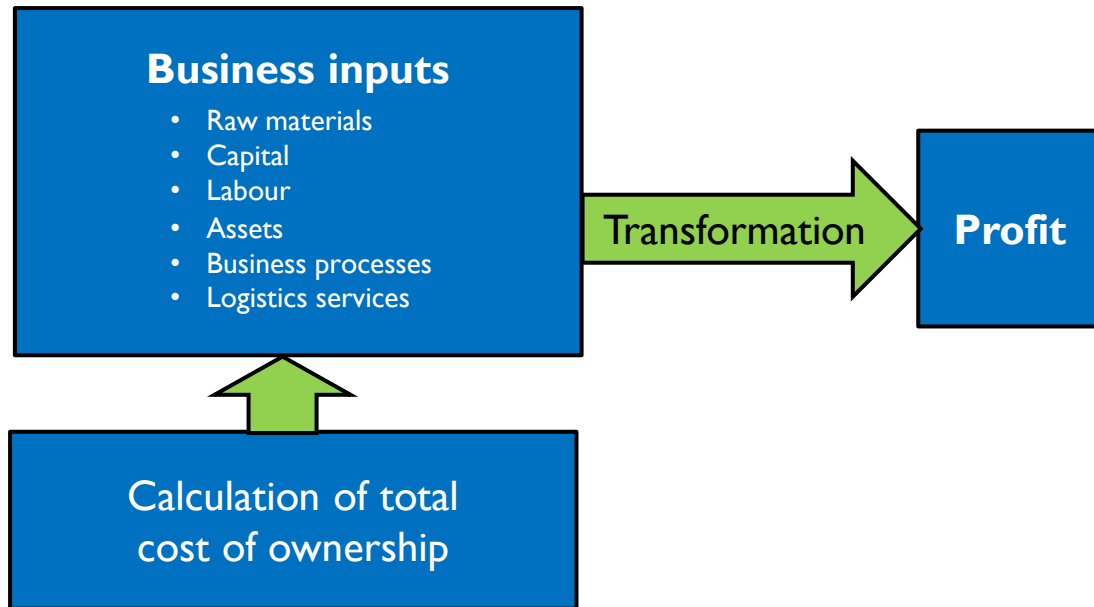
# The objective of Macrologistics

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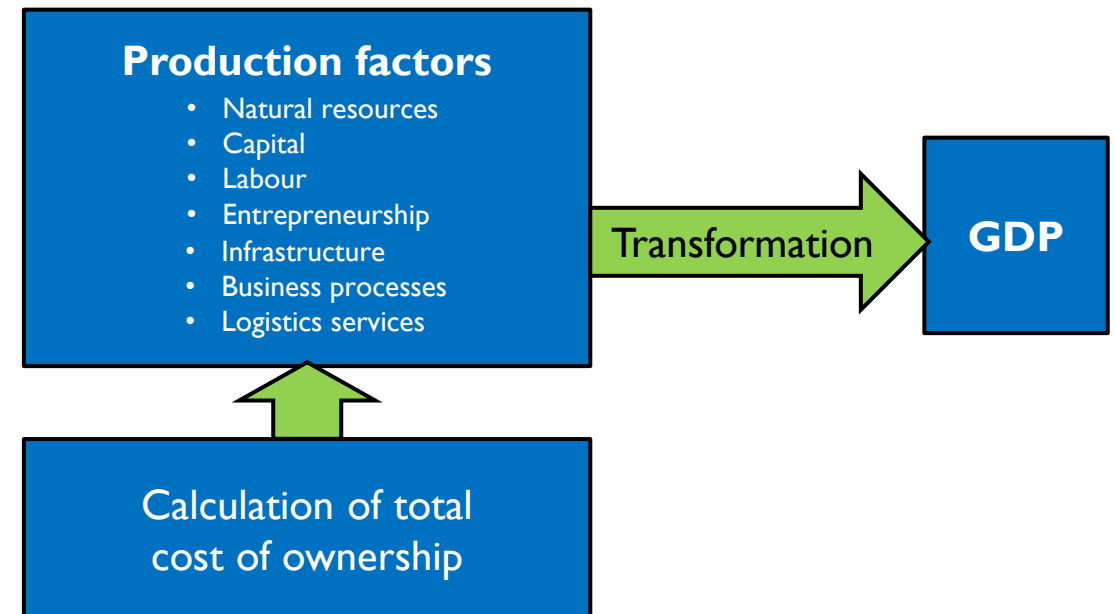
- Logistics is an integrated discipline
- Targeting the lowest cost of ownership for each customer
- In macroeconomics, society is the customer of logistics
- Macroeconomics objective:
  - Economic growth
  - Full employment
  - Price stability
- Macrologistics objective:
  - National lowest cost of ownership (and global)
  - Improvement of societal well-being
  - Ecological sustainability

# From micro to macrologistics

## MICROLOGISTICS



## MACROLOGISTICS



Macrologistics is to macroeconomics what logistics is to business economics – GDP in motion.

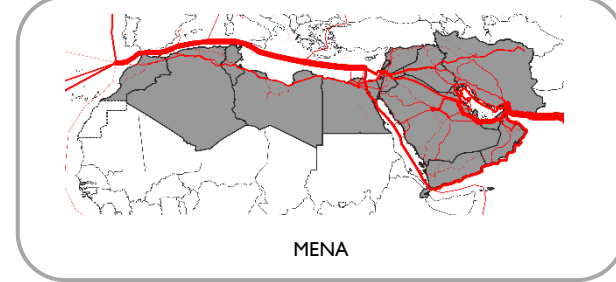
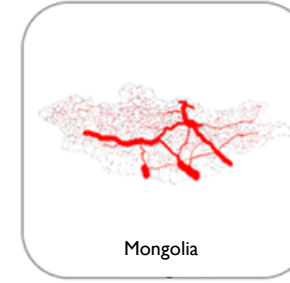
# Understanding freight movements

- How much of what moved where and how and at what cost?
- Tonnage
  - TEUs
  - Tonne-km
  - Import/Export/Domestic
  - Commodities
  - Origins & Destinations
  - Road/rail/pipeline/waterway
  - Containers/bulk

## Africa

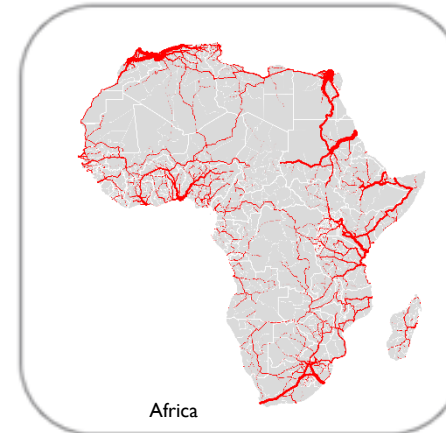


## Other



We include as many variables as possible:

- Costs
- Other activities: cash to cash cycle / warehousing / administration
- Including all externalities: emissions / noise / congestion / policing / accidents / land use



The **GAIN FDM™** is comprised of

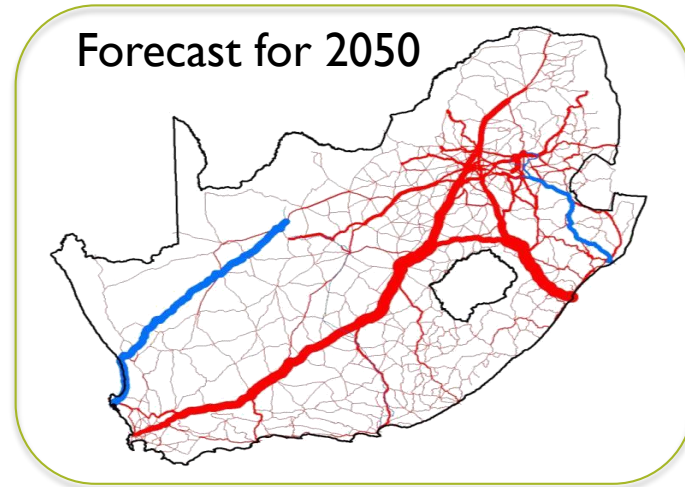
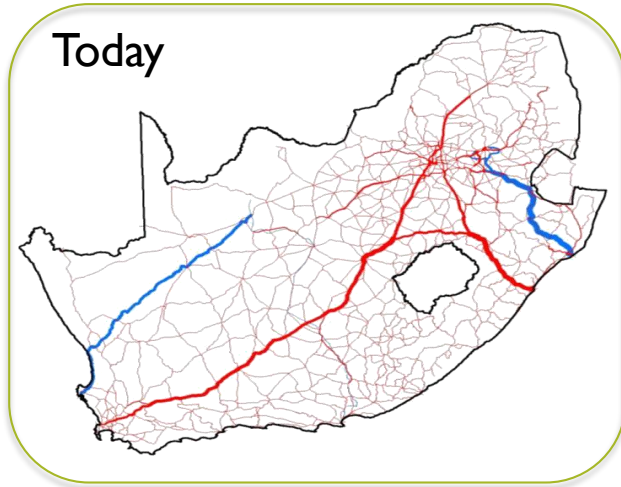
1.5 million unique data lines, and considers

- 372 geographic origins or destinations (O-D pairs),
- 83 commodities,
- 4 transport modes,
- 356 local districts,
- 7 sea ports,
- 8 land border posts, and
- an airport.

And disaggregated forecast for 5 consecutive years, year 10, 15 and 30



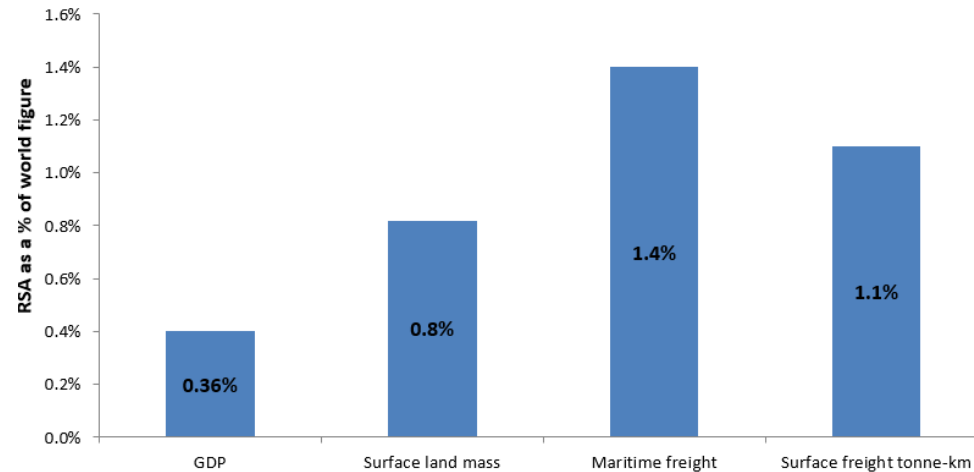
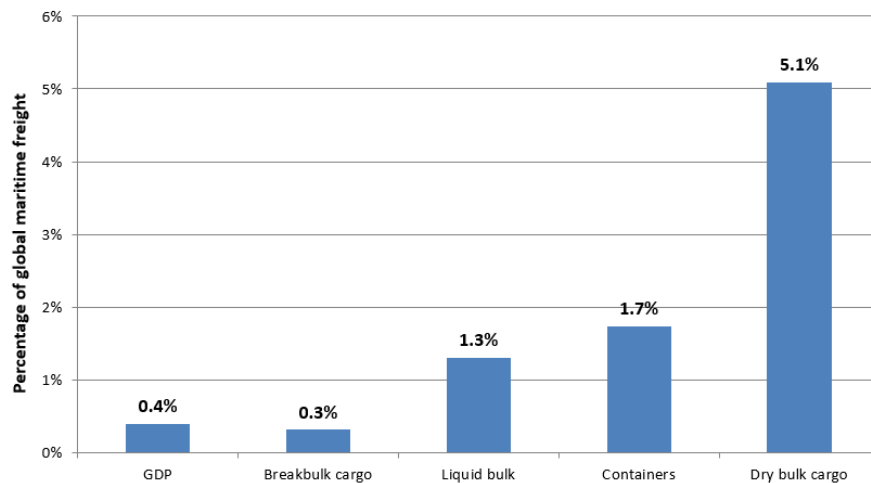
# South Africa's freight demand is high



## GDP

- South Africa  
\$0.35 trillion
- France/Germany  
\$6.26 trillion

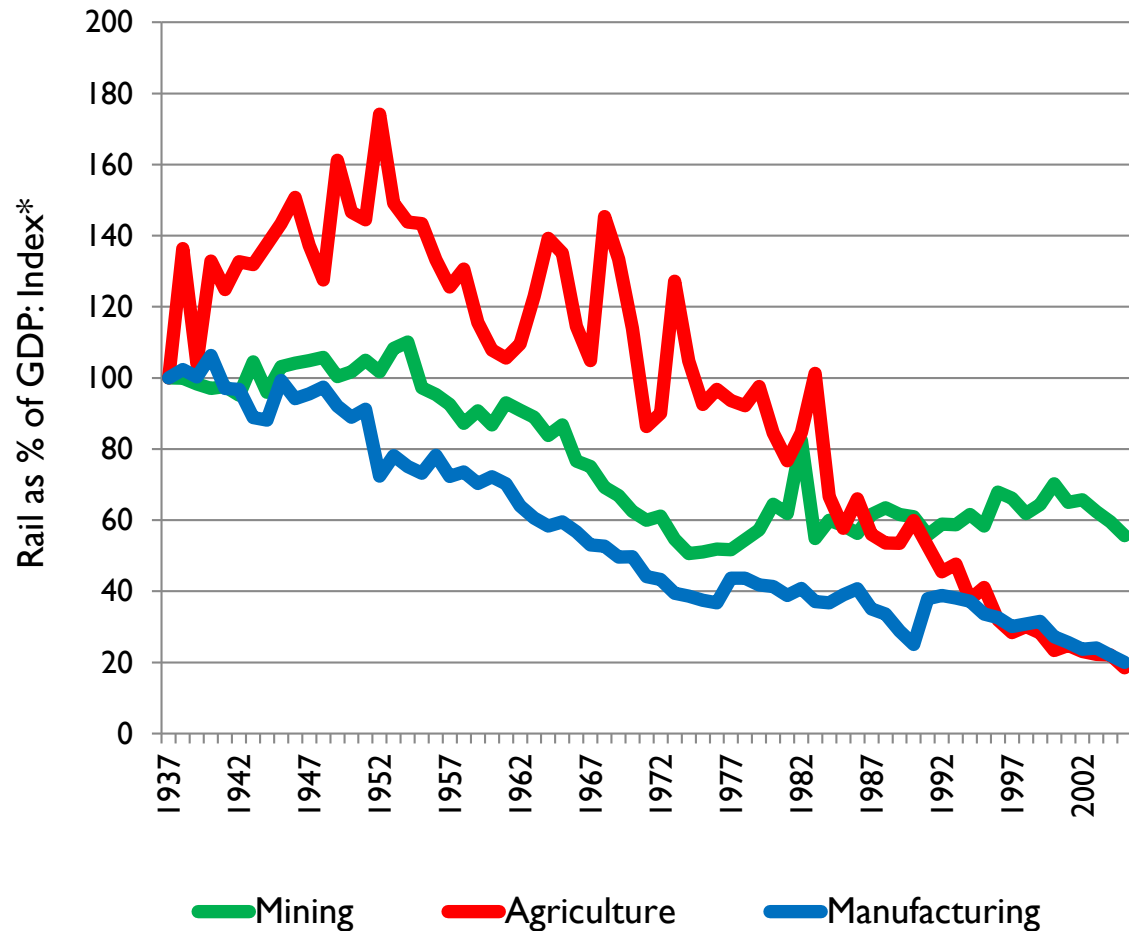
**Note:** In the maps above, the red lines indicate all freight flows and the blue lines indicate dedicated export line flows.



SA's landmass is about equal to Germany and France combined, while its GDP is nearly 18 times smaller

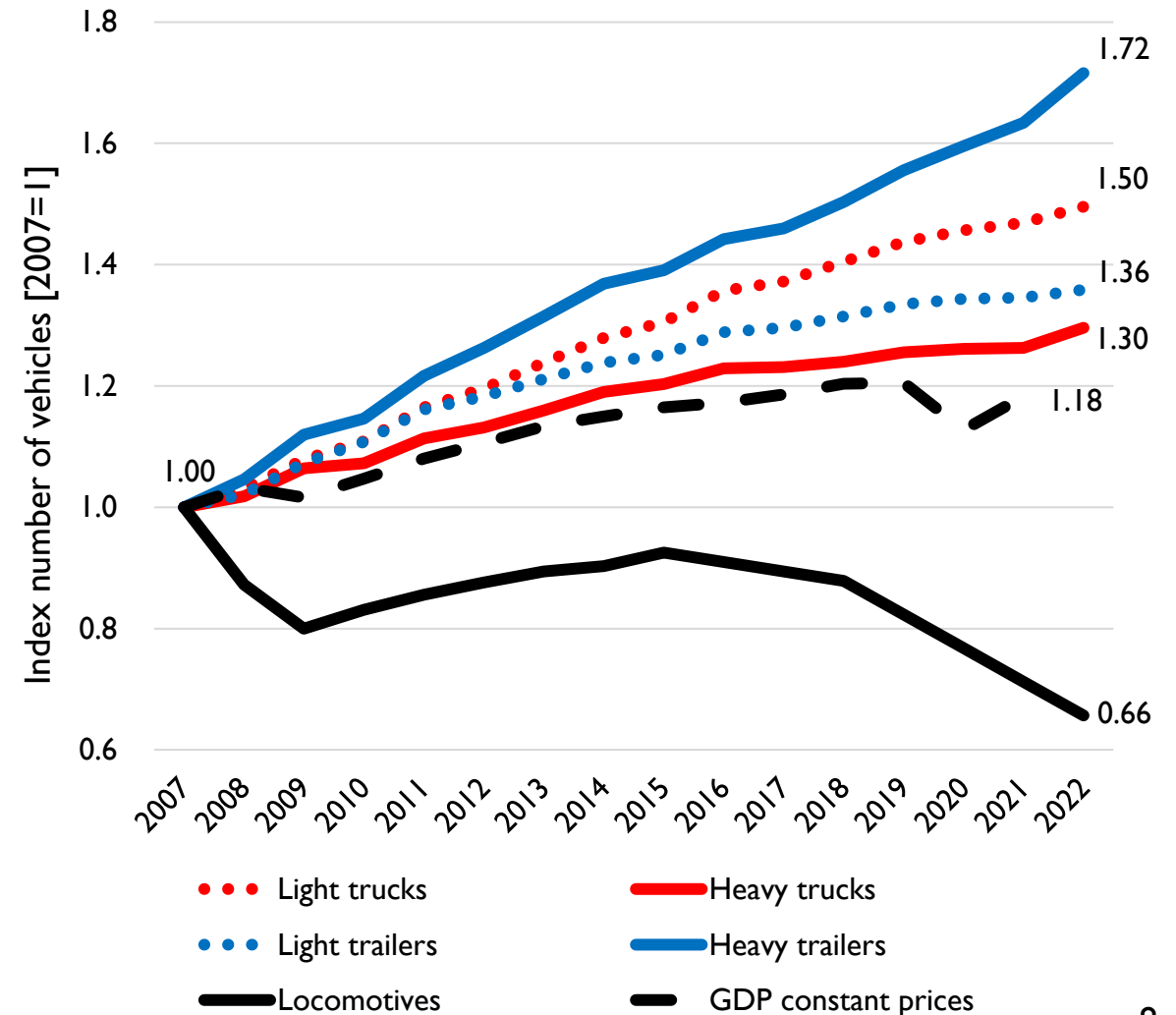
Source: GAIN Freight Demand Model™

# With a slow and sometimes unnecessary move to road supply



\*Indexed correlation of the relationship between rail transport and physical production in the

— Mining      — Agriculture      — Manufacturing



Source: GAIN Freight Demand Model™; Havenga et al. (2021) with 2022 data for eNaTIS vehicles, Transnet locomotives and World Bank GDP

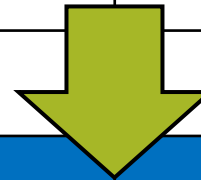


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# “Original sins” have a 150-year history

- Two major “sins” morphed into four

SIN	Cause	Symptom	Solution
Narrow gauge (1870)	To reach gold and diamonds quickly	Lower yield	Continuous CBA of new developments to determine when to switch
Political interference (1909 till present)	Political party constituents insisted on rail connectivity	Large network and cross subsidization	Restructuring



SIN	Cause	Symptom	Solution
Network size too large	Political party constituents insisted on job and rural town preservation	Low density	Rationalization
Cross subsidization	The need to preserve inefficient freight	“Hidden” problems	Business strategy

# Cross subsidization is rampant at Transnet

- **Pre 1976:** Cross subsidization of high value traffic to mining and agriculture
- **Post 1976:** Cross subsidization of export lines to GFB
- **Post deregulation:** Cross subsidization of port “ad valorem” (NPA) to Transnet and within rail continuing export lines to GFB

**Sources:**

- (1) Chasomeris, M. & Gumede, S. 2022. Regulation, Governance and Infrastructure Pricing in South Africa’s Ports Sector, in C. Ferrari, H. Haralambides, S. Prete, and A. Tei (eds.). *Regulation and Finance in the Port Industry*. Palgrave Studies in Maritime Economics. Cham: Palgrave Macmillan, [https://doi.org/10.1007/978-3-030-83985-7\\_4](https://doi.org/10.1007/978-3-030-83985-7_4)
- (2) Zulu, J.M. 2014. *The Political Economy of Port Institutional and Pricing Reform in South Africa*. Published master’s thesis. Cape Town: University of Cape Town, School of Economics.

Exposure to two major vulnerabilities:  
Removal of NPA “tax” and continuing success of especially the coal line.

Future Transnet and TFR management are required to watch this closely.

# Many mistakes were made over 160 years

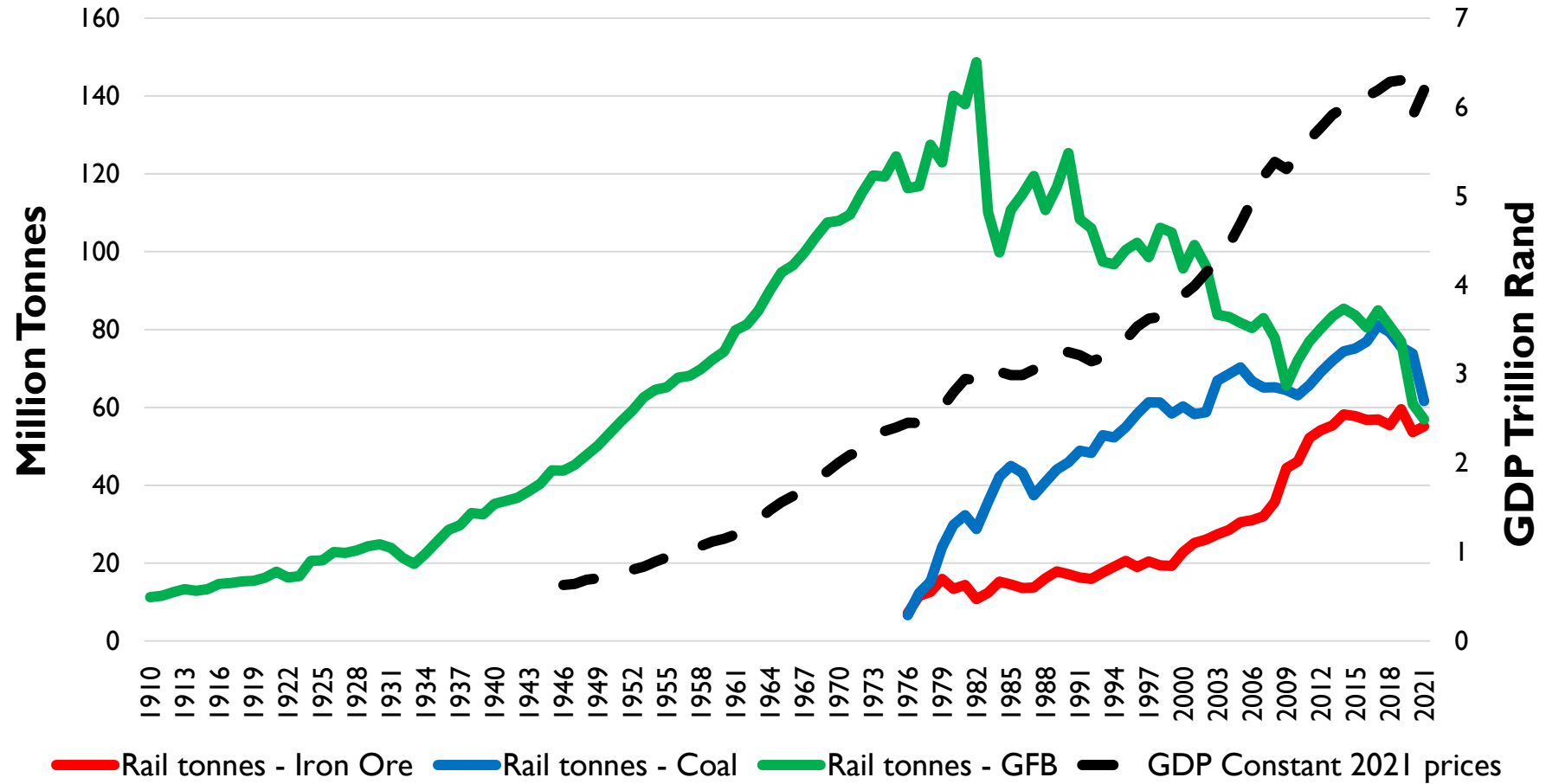
- Rail's economic life span averages **150 years**
- Oldest “mistake” is **150 years** (1870) – gauge
- Act of the Union – “business principles” – **112 years** (1909) – not followed
- Commercialisation policy – **47 years** (1975) – export lines rather smokescreen
- De Villiers report – **36 years** (1986) – misunderstood rail's role
- Transport White Paper (RDP based) – **26 years** (1996) – foundational, but never built on
- Moving South Africa – **24 years** (1998) – sound strategy, but never executed
- Investments and policy mistakes of note – 1990 - 2020
- Rail policy – 2007 to 2022 (too long) – will take minimum of 2/3 years to implement

Source: Havenga, J.H., De Bod, A., Simpson, Z.P., Swarts, S.J. & Witthöft, I.E. 2021.

*A proposed freight and passenger road-to-rail strategy for South Africa.* Helsinki: UNU-WIDER, <https://sa-tied.wider.unu.edu/article/proposed-freight-and-passenger-road-rail-strategy-south-africa>

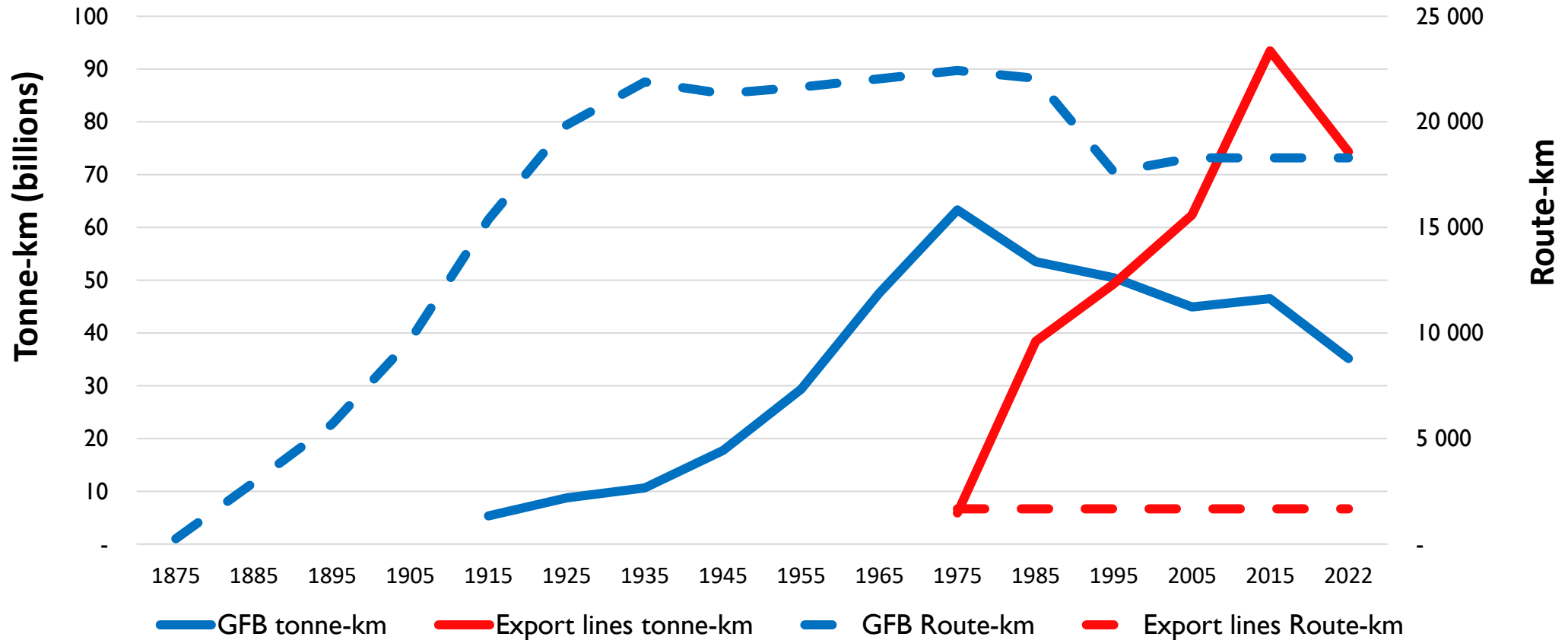
Everything happened 25 years too late  
(and some things should never have happened).

# Comparison between South Africa's historic rail volumes and economic growth



Source: GAIN Freight Demand Model™

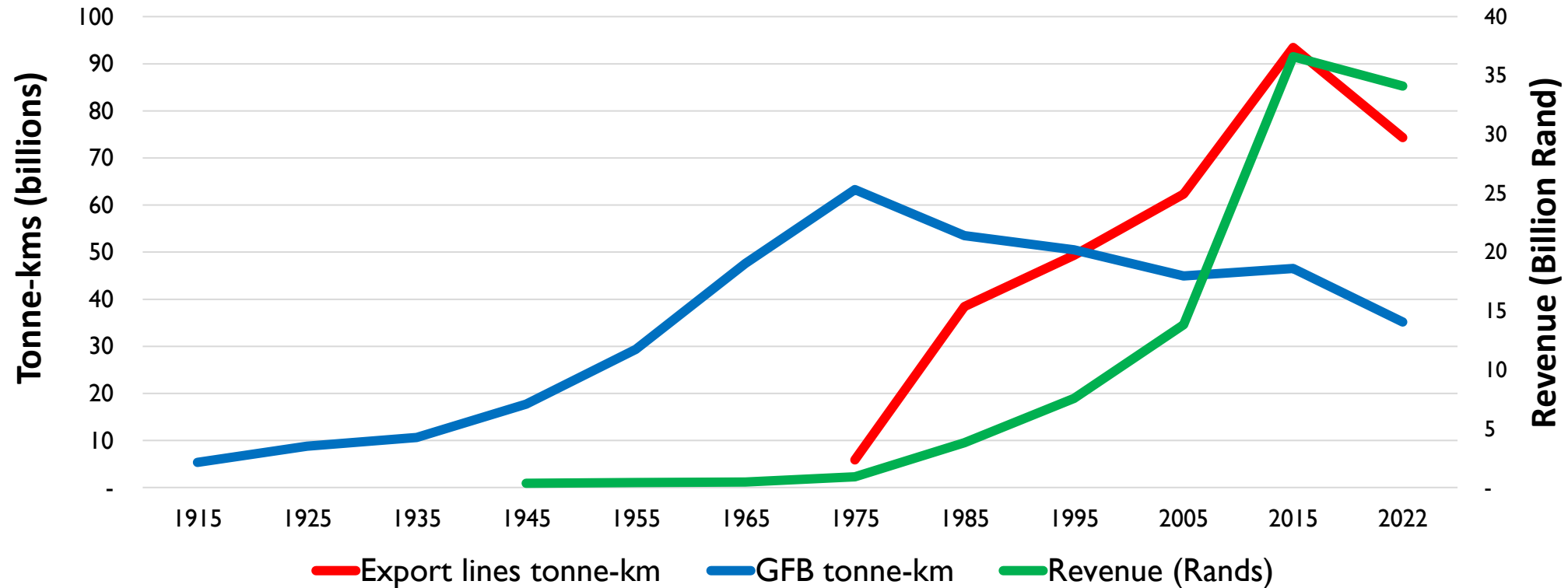
# Route kilometre and tonne-kilometre growth from 1875 to 2022



Source: GAIN Freight Demand Model™

General freight business (GFB) reached its peak in 1935 and remained largely unchanged. The dip in 1985 was mostly due to the Namibian rail - and metro networks' changeover (to SARCC). 14

# Tonne-kilometre and revenue growth from 1915 to 2022



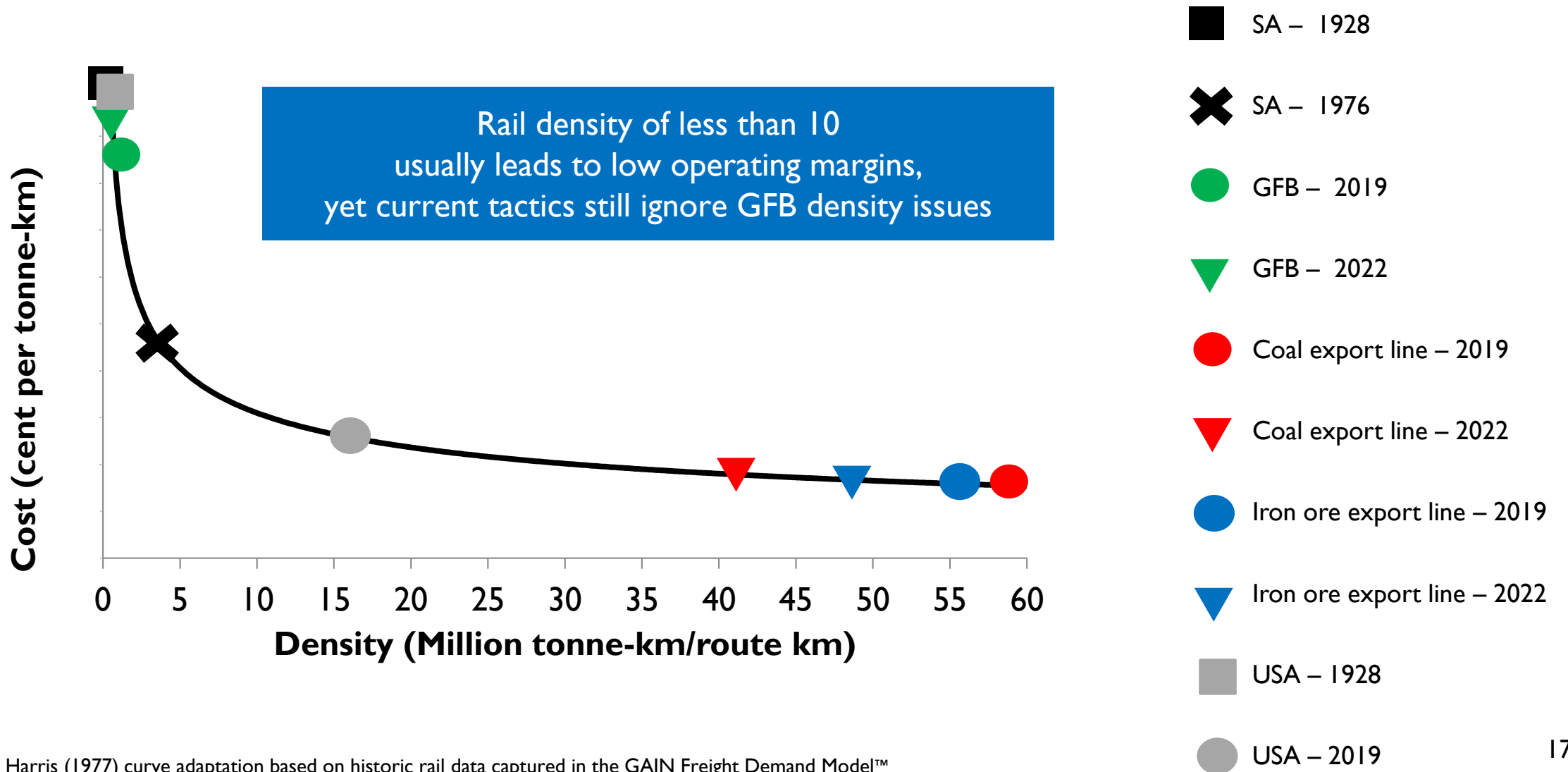
Source: GAIN Freight Demand Model™

Although revenue split between export lines and GFB is not available, the fact that revenue was driven by the highly densified exports lines is undeniably visible.

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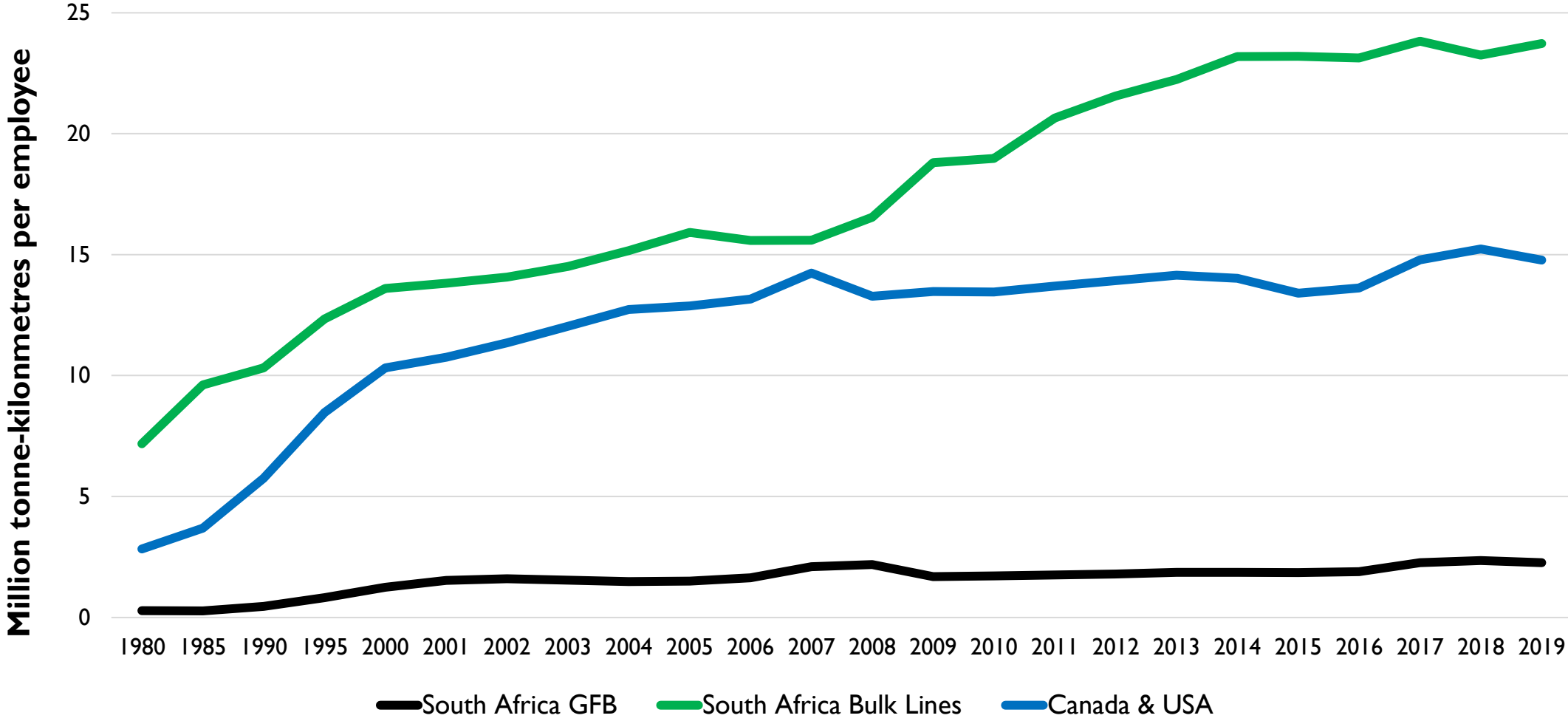


# GFB rail density loss



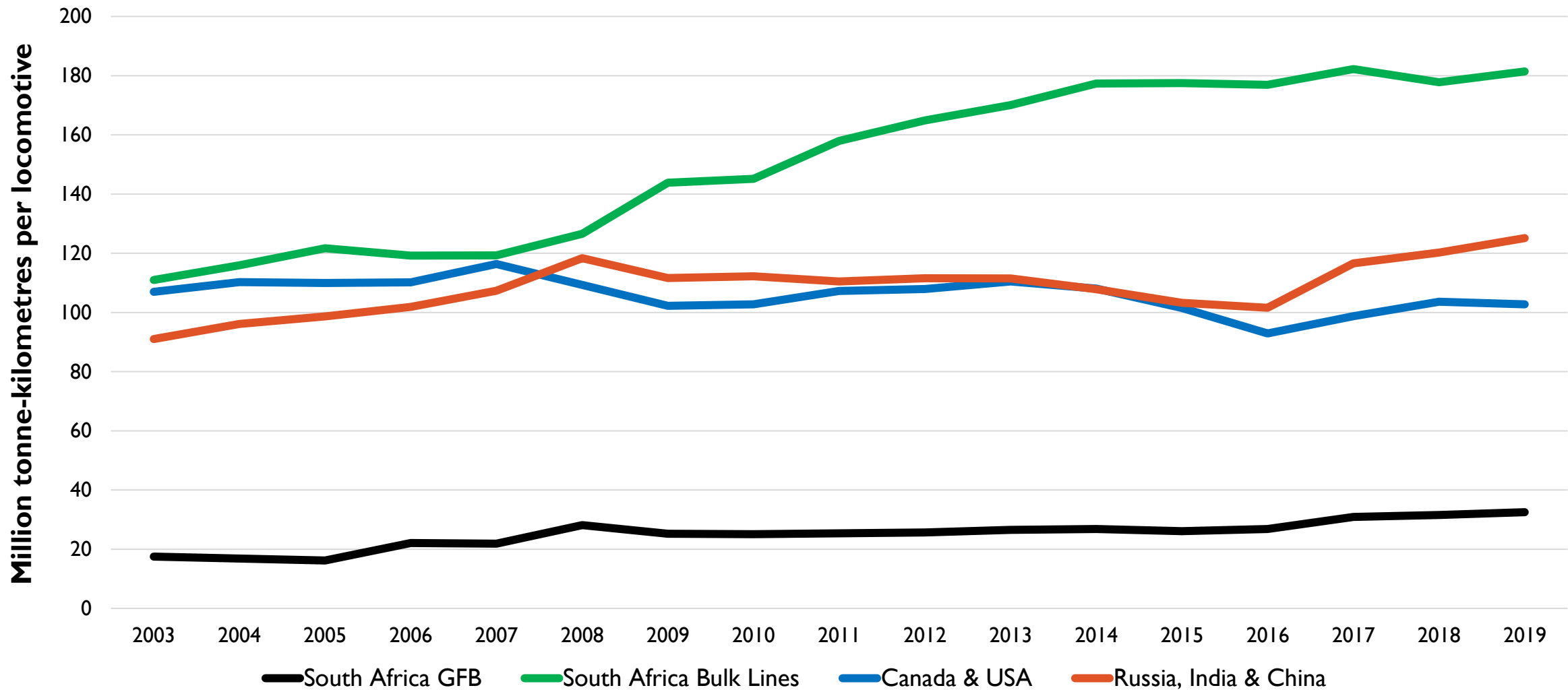
Source: Harris (1977) curve adaptation based on historic rail data captured in the GAIN Freight Demand Model™

# Low employee productivity for GFB



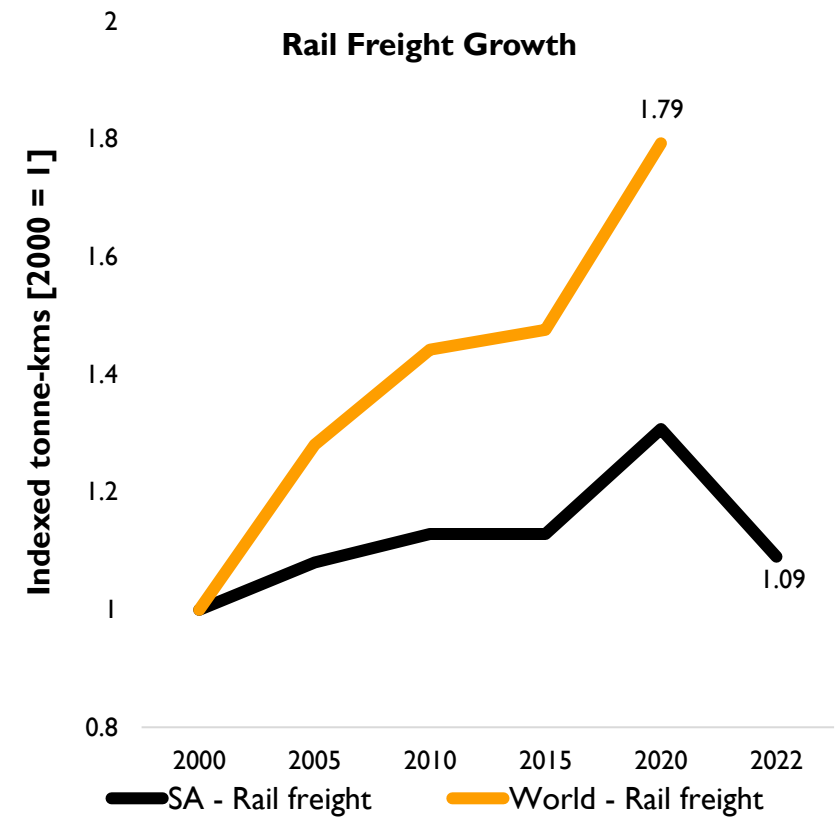
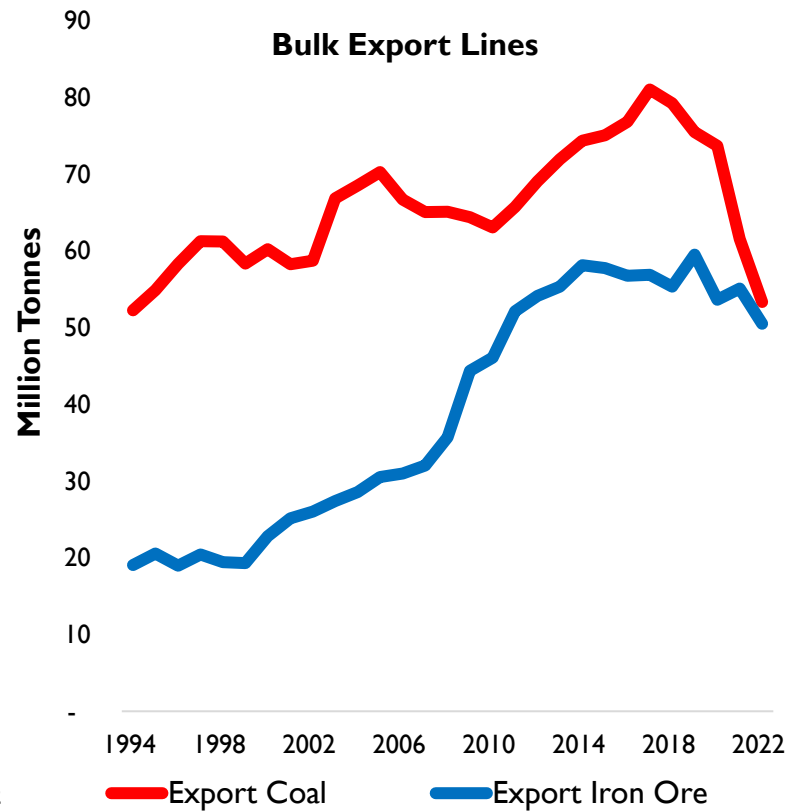
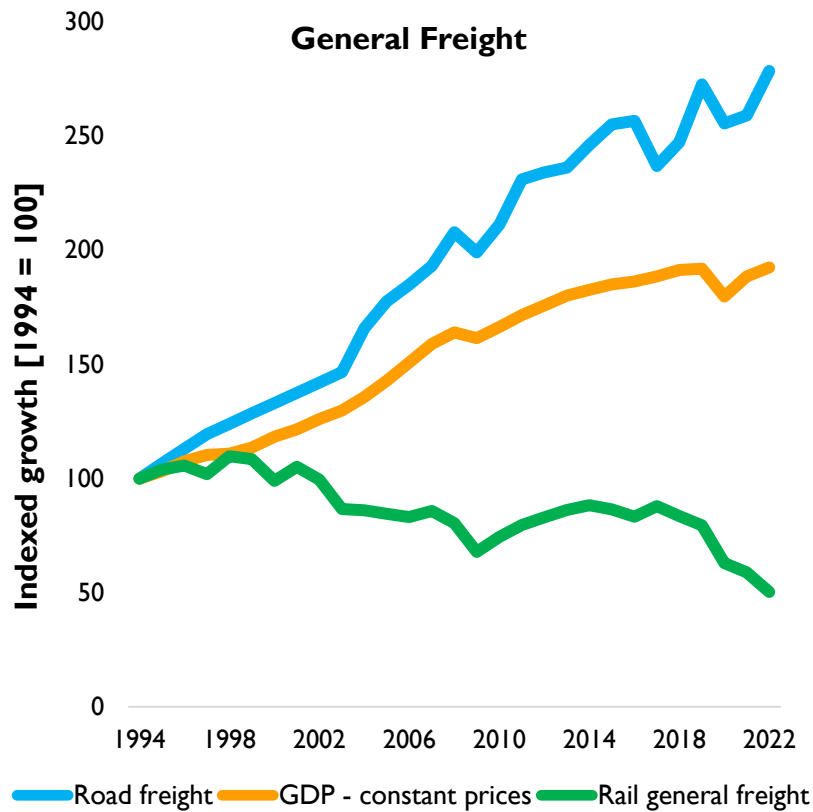
Source: Created by GAIN Group based on 1980 – 2019 UIC tonne-km and employee data

# Low locomotive productivity for GFB as well



Source: Created by GAIN Group based on 1980 – 2019 UIC tonne-km and Transnet locomotive data

# The last three decades saw the price of inefficiencies rise to 6% of GDP in 2022



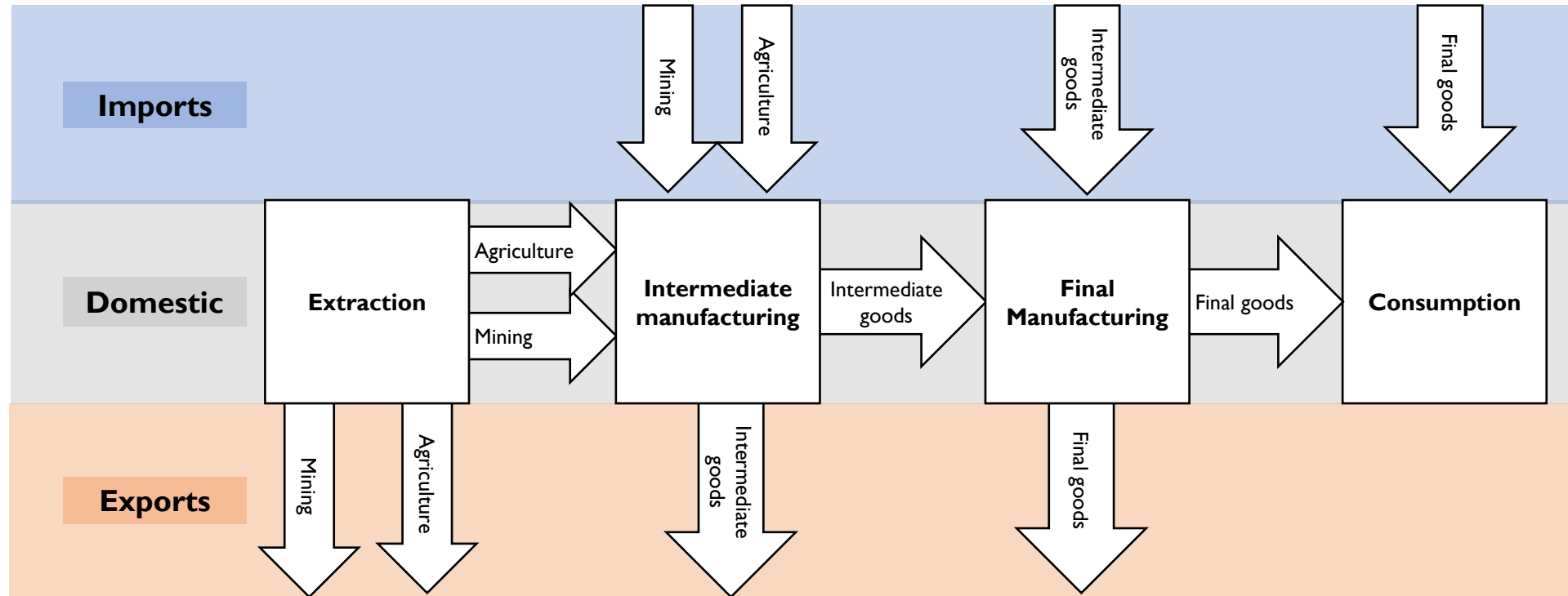
Source: Havenga, J.H., Witthoft, I.E. & Simpson, Z.P.. 2022. Macrologistics Instrumentation: Integrated national freight-flow and logistics cost measurement. *Transport Policy*, 124: 106-118, <https://doi.org/10.1016/j.tranpol.2019.10.014>

- Updated with 2022 data in the GAIN FDM™ and macroeconomic Statistics South Africa data

72 billion missing tonne-kms – meant 2% of GDP lost for GFB and 4% of GDP lost due to missed export opportunities for bulk exports

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# Rail market spaces are actually flow market spaces – requiring segmentation



Source: GAIN Freight Demand Model™

Segmentation leads to five rail market spaces.

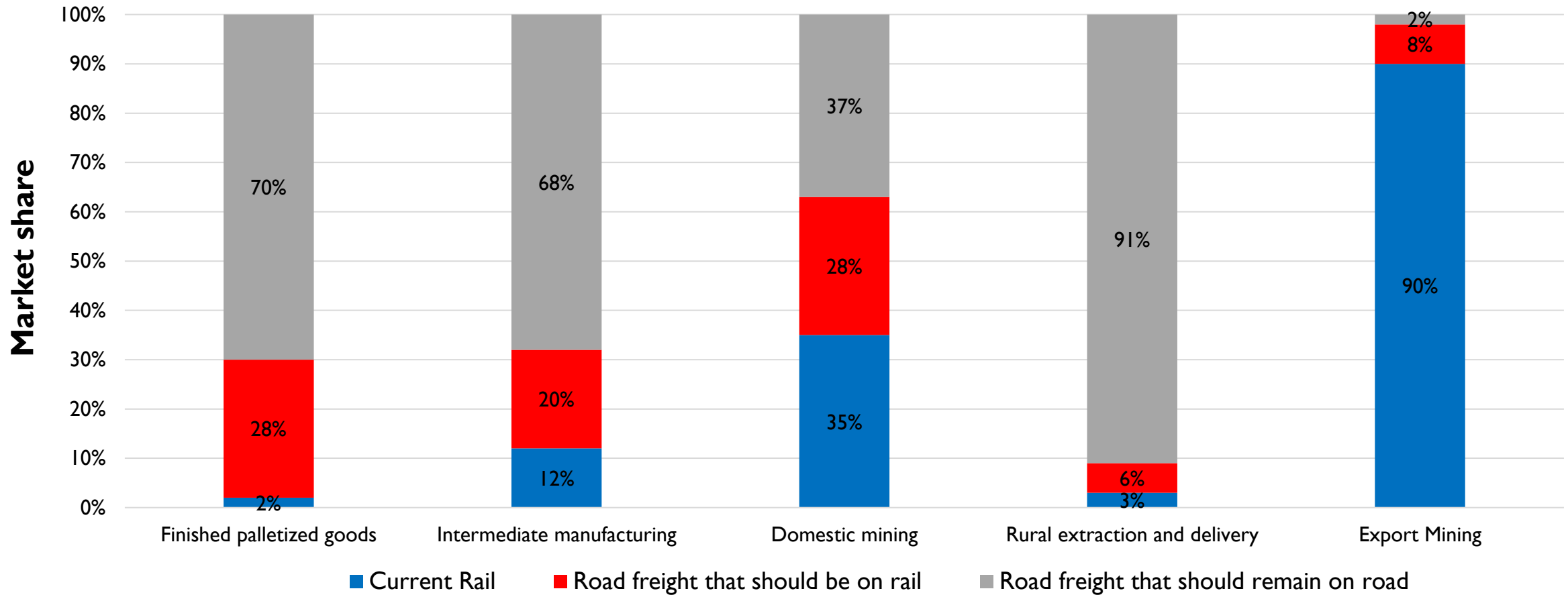
# Rail market spaces are actually flow market spaces – requiring segmentation

Flow typology	Typical South Africa	Rail market share	Rail success/competency	
Large volume export mining	Coal, iron ore and manganese exports	High	✓ ✓ ?	Export Machines
Domestic mining	Local minerals to domestic beneficiation centres	Medium	✓ ?	GFB
Intermediate manufacturing	Semi-beneficiated commodities to processing	Low	?	
Finished palletized	FMCG and other to and between distribution centres	Non-existing	X	
Rural	Agricultural bulk from rural areas to processing	Low	✓ ?	

Source: GAIN Freight Demand Model™

Segmentation leads to five rail market spaces.

# The biggest market share gap is in palletized freight



Source: GAIN Freight Demand Model™

One third of palletized freight should be on rail (often dry food), but nothing is. The same is true for industrial commodities where only 10% remain. Domestic and export mining failures are killing our rural roads.



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# Ports is far less of a problem, but

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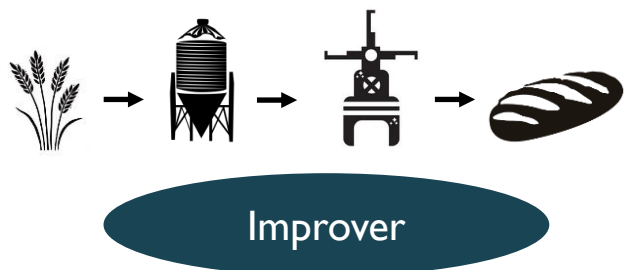
- Certain industries has significant challenges
- Limited investment due to cross-subsidization
- Investment often lower than budget
- Critical project delays
- TPT terminal ownership
  - Car terminals – 100%
  - Containers from 97% to 98% - decline in efficiency
  - Breakbulk from 78% to 69%
  - Bulk terminals – 50%

Sizeable negative impact on the economy, but far less than rail.

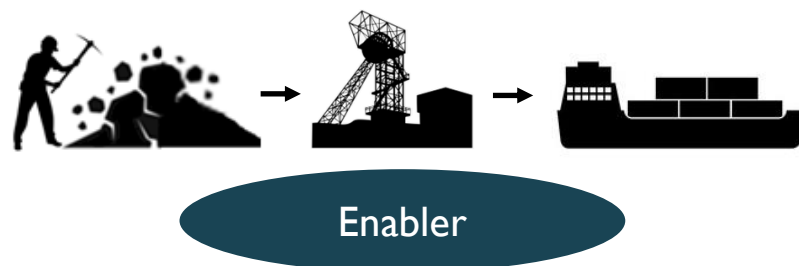
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# People don't want quarter-inch drills, they want quarter-inch holes

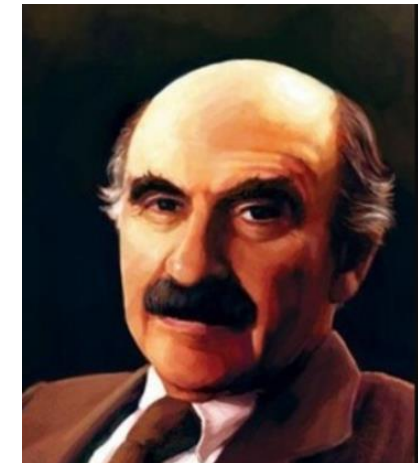
- We used to think the hole is transportation
- Transportation relates to value chains, in which rail can play one of two roles: It can either **improve** it or **enable** it



This value chain exists, but rail can be inserted in silo-to-miller and miller-to-baker flows. If not, it will go on, but rail could be more efficient.

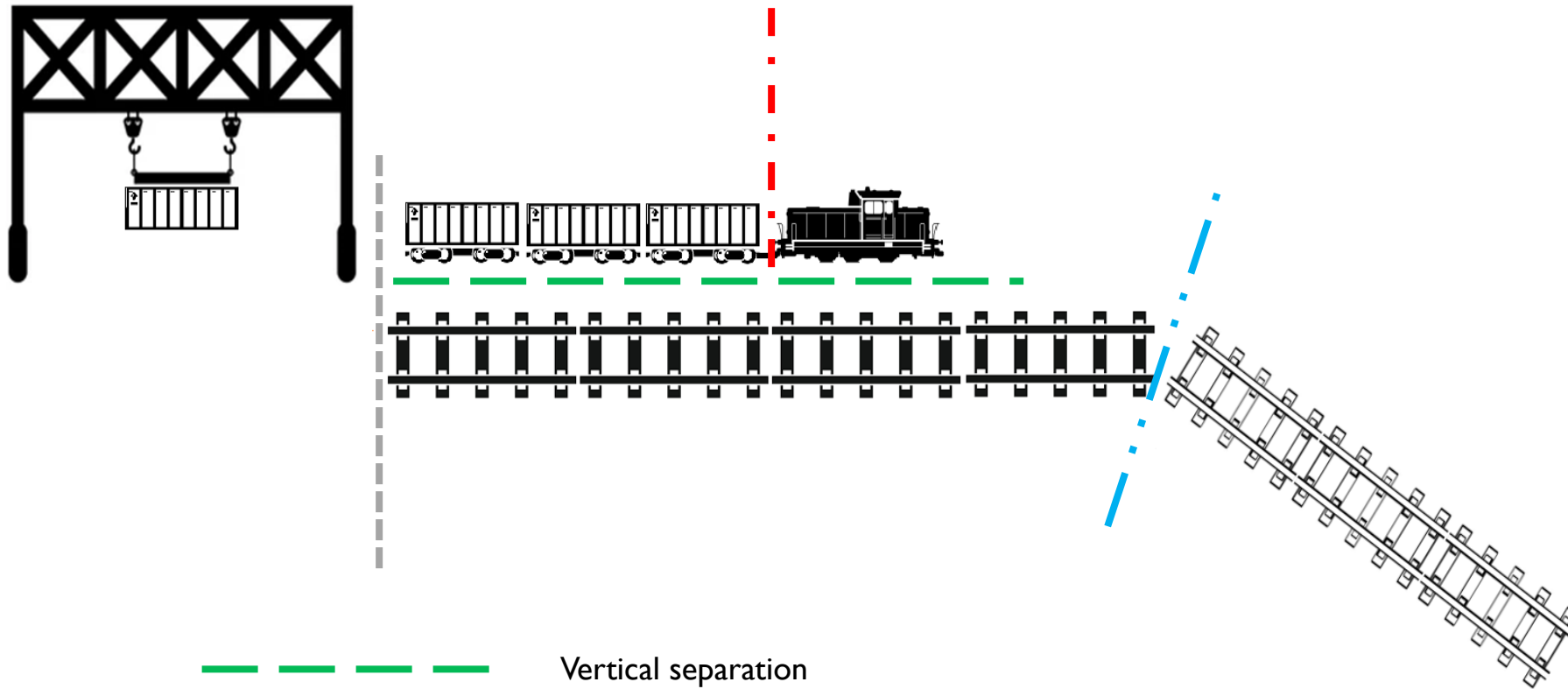


Without efficient guided transport a mass export mining industry is not possible.



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# Separation logic



Vertical separation



Horizontal separation between low – and high-density lines

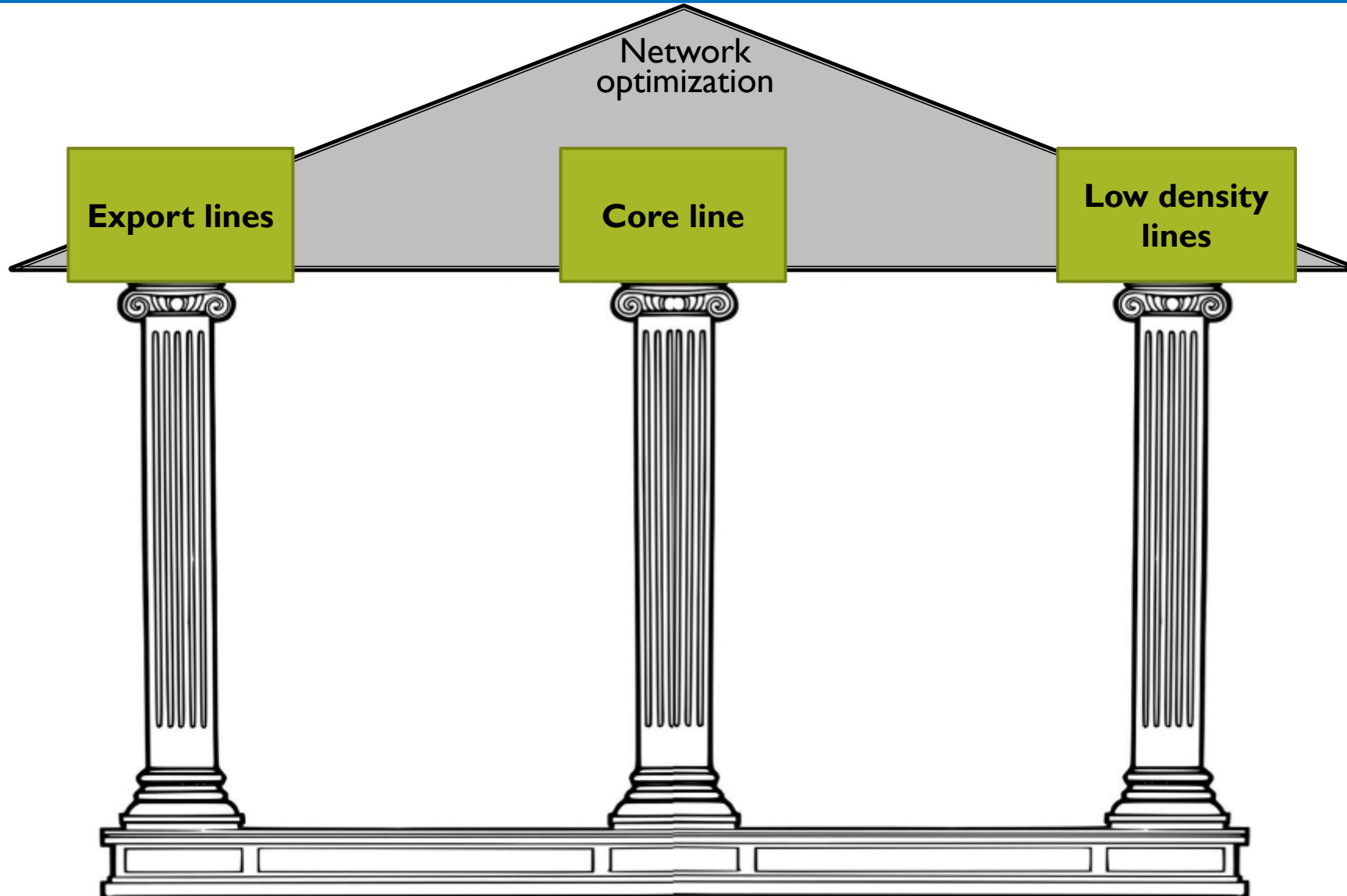


Horizontal separation between terminals and operating slots

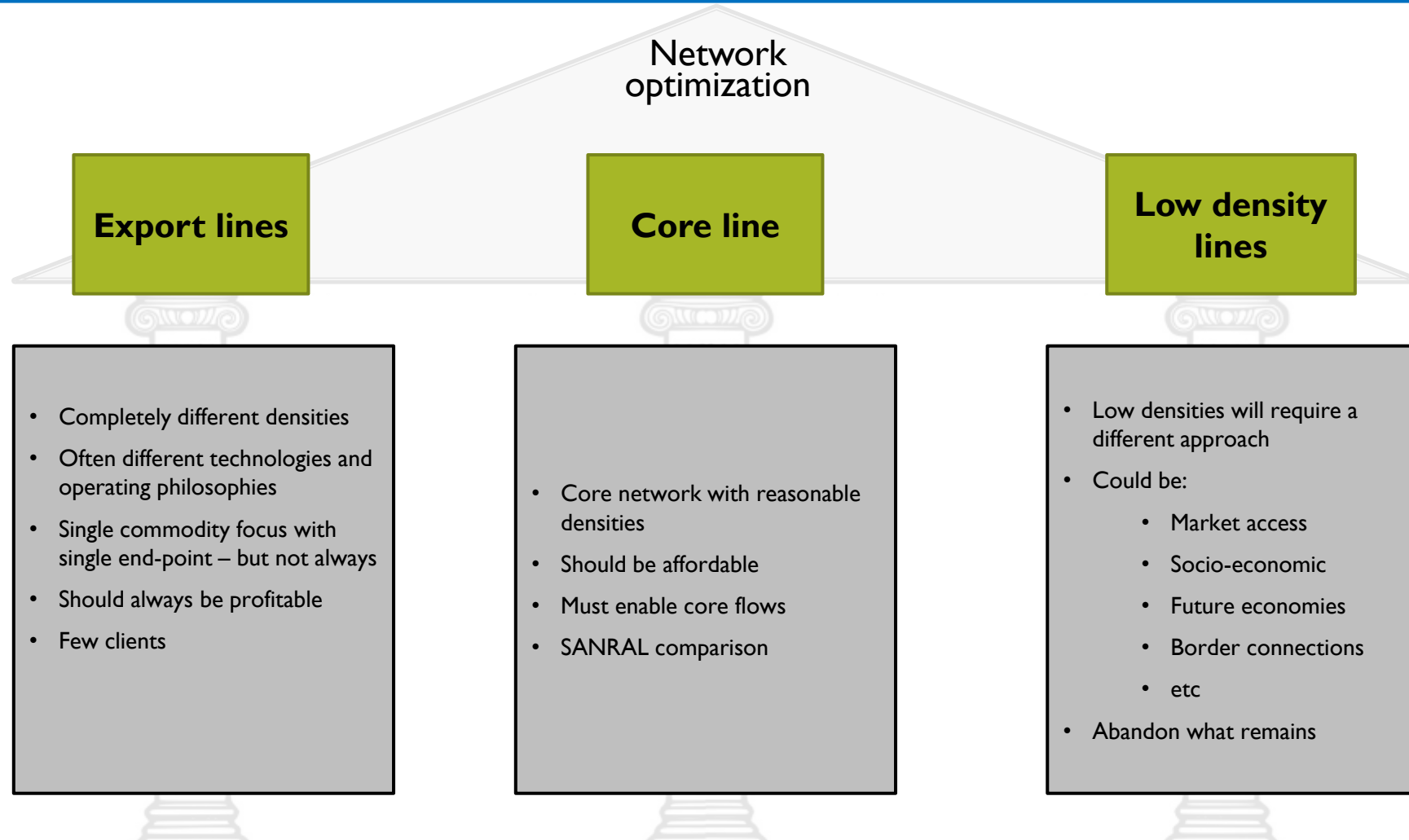


Horizontal separation between locomotives and wagon fleets

# All agree that there are three components



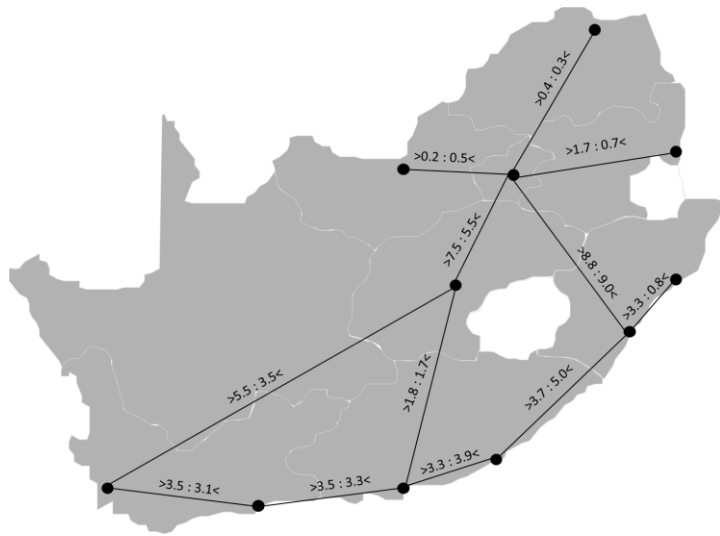
# components must now be described in detail. This is an ongoing process in OV – results before the end of May



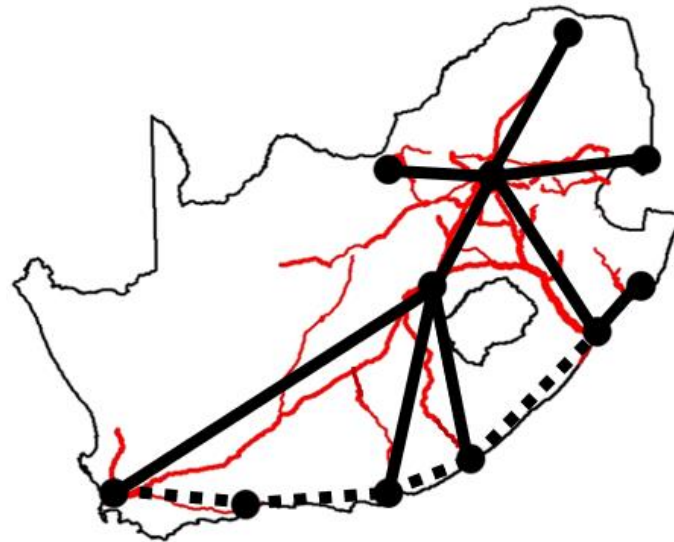


# Ideal network developments over the last few decades

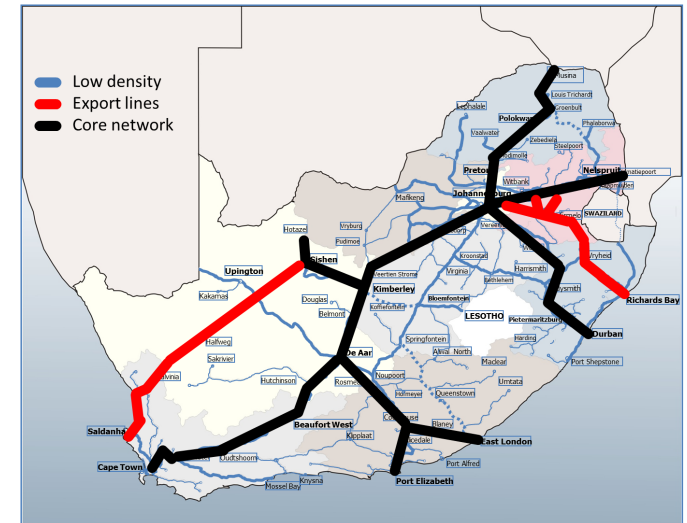
2009 Design



2013 Design

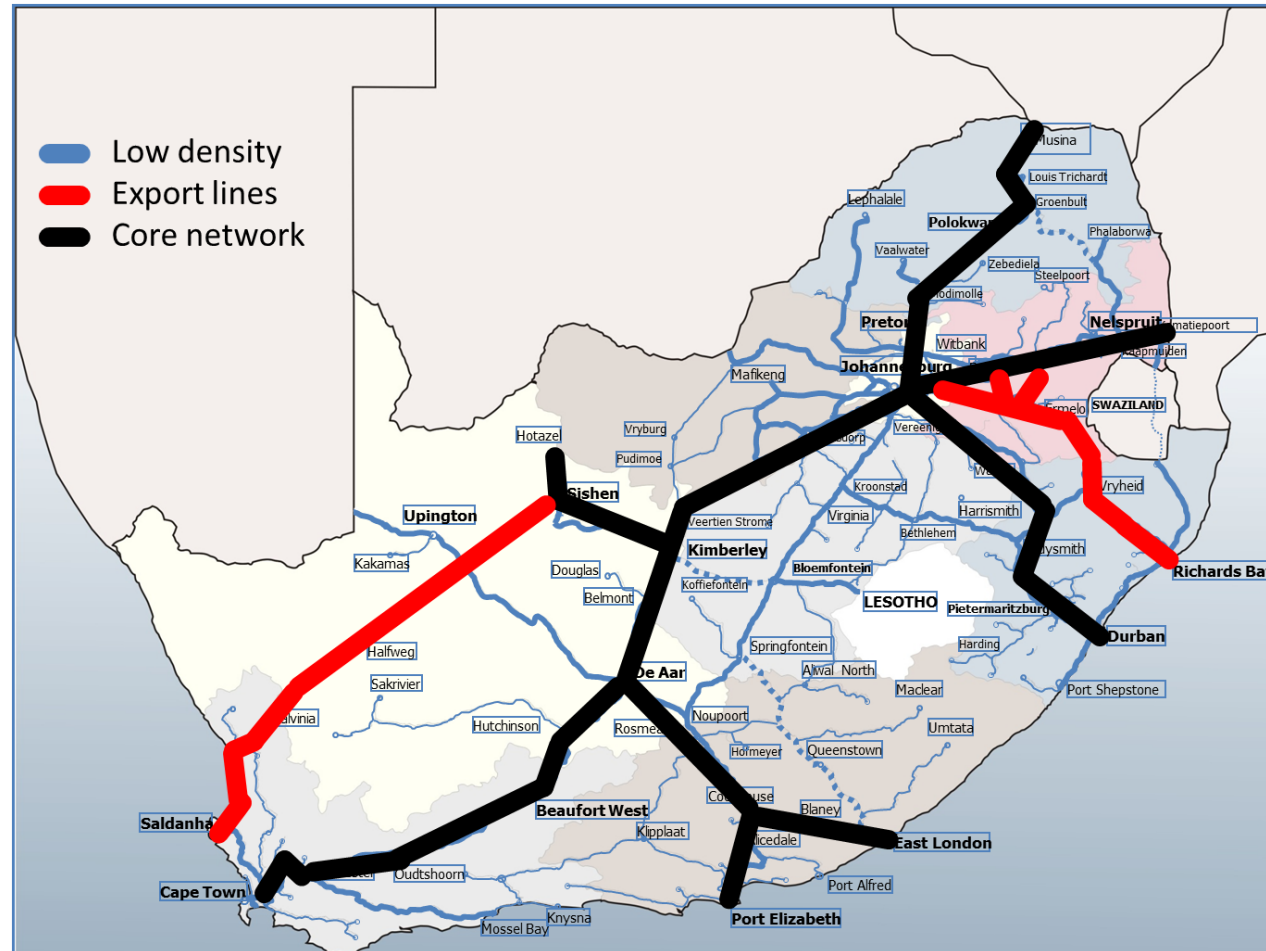


2023 Design



Source: GAIN Group

# A possible description of the core network – for discussion purposes



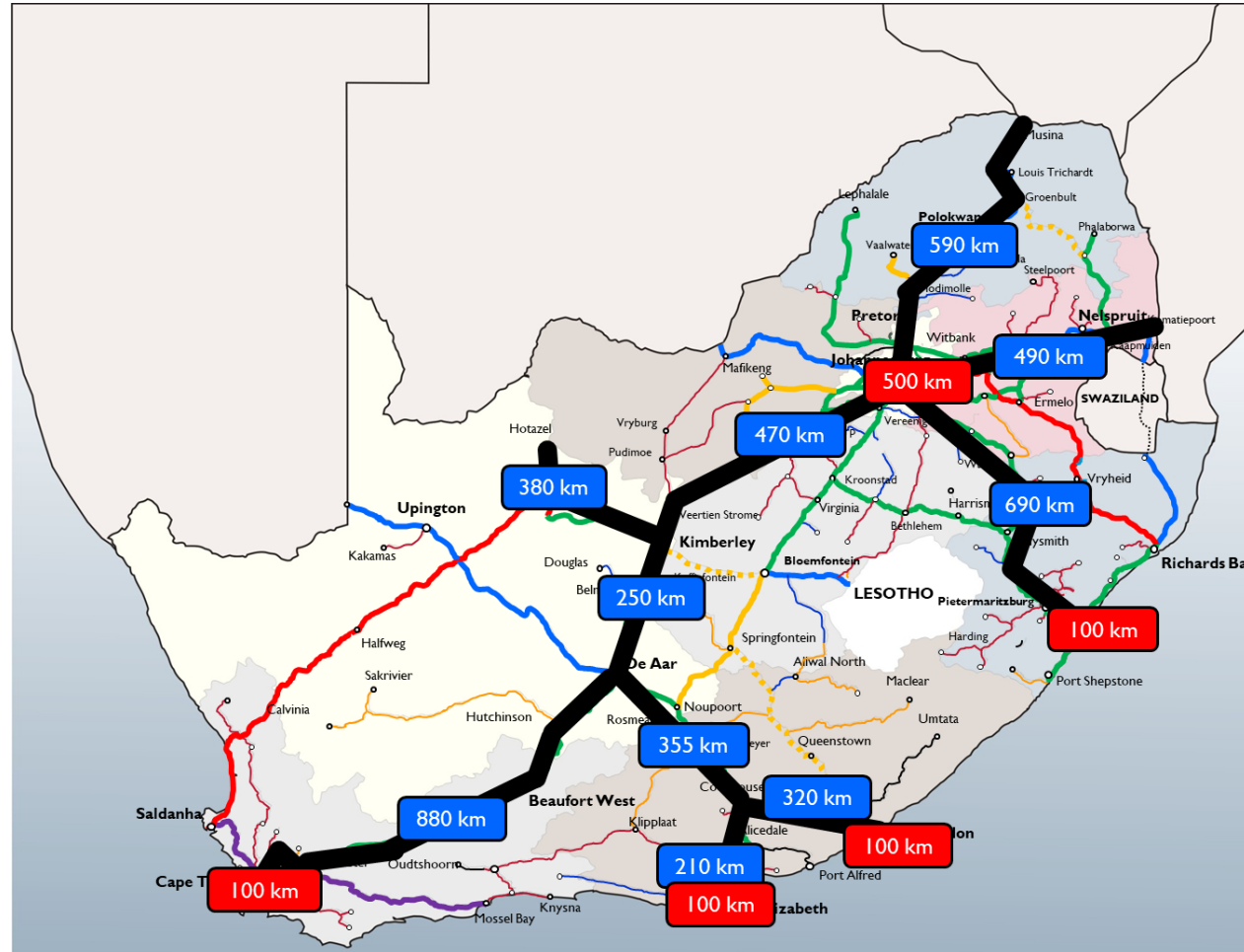
The 2023 example is just an example. There is an ongoing process, but it will probably not be smaller than 5 000 km or more than 7 000. The objective is to reach agreement this month.

# An example of a reduced core network of just under 5 000 km

4 635 km  
line

900 km  
hub and yard

5 535 km  
Total



Source of background map: Transnet (2009)

This example can increase freight from 14 to 80 billion tonne-kms

**8**  
terminals

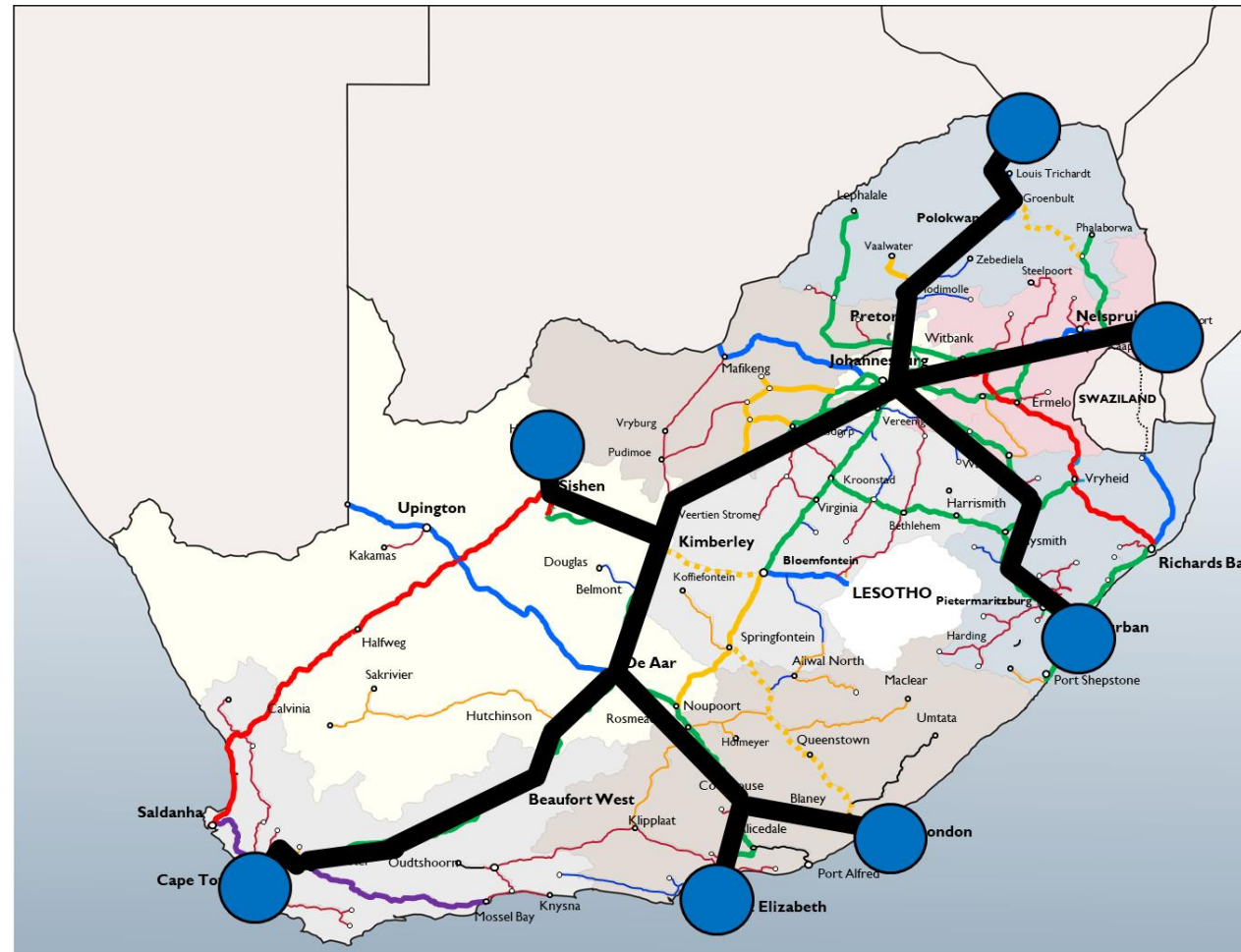
**5 535**  
kilometre network

**13.8 billion**  
current rail tonne-kms

**23.7 billion**  
additional potential/  
missing tonne-kms

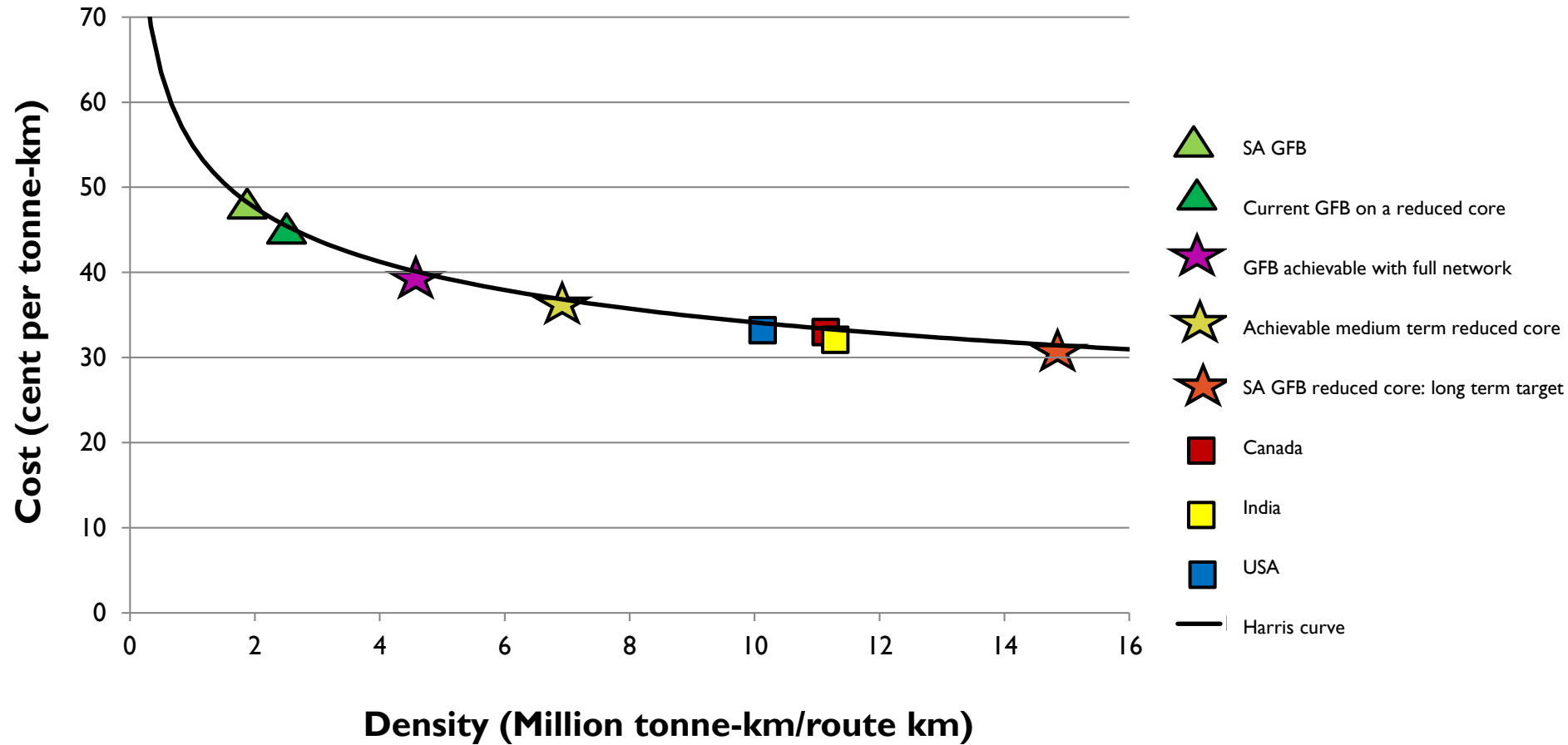
**37.5 billion**  
tonne-kms

**81.2 billion**  
future tonne-km



Source of background map: Transnet (2009), with freight flow and cost data based on output from the GAIN FDM™

With respectable density achieved –  
pointing toward an operating ratio of better than 50%



The new build price tag could be between 0.5 and 1 trillion rand:

Rehabilitation around R60 billion

Source:  
F.Q. Callard (2023)

The last red star is the light at the end of the tunnel. We know how to get there

The important output here is to agree on a network and then have the next discussion

# The future of rail has a direct link to mankind's survival

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- A world without mass guided transport will be a failed world
- The same is true of South Africa

An active and vibrant railway system confers many benefits on society.

Olumyemi Osinbajo

Let us imagine ourselves transferred to our old friend, the railway carriage...

Albert Einstein



**Thank you!**