South Africa's road freight decarbonisation experiences

Decarbonising road freight workshop of ITF-OECD: 28 and 29 June, Paris

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Key messages

- South Africa's transport demand side problem
- Supply is not efficient
- There is an appetite for decarbonisation
- The road carbon "overspend" is nearly 100%
- Change drivers have mixed results

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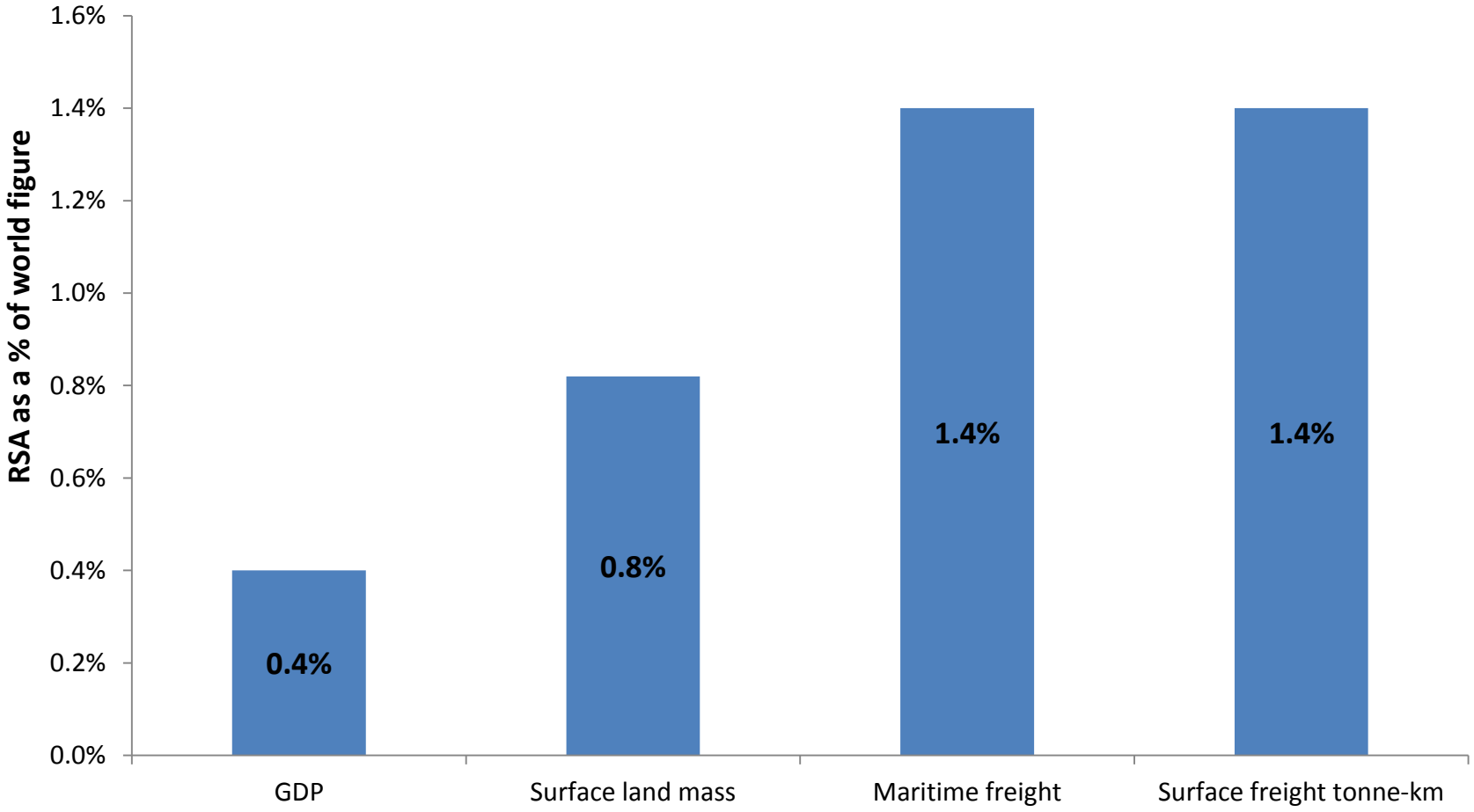
Where in the world are we

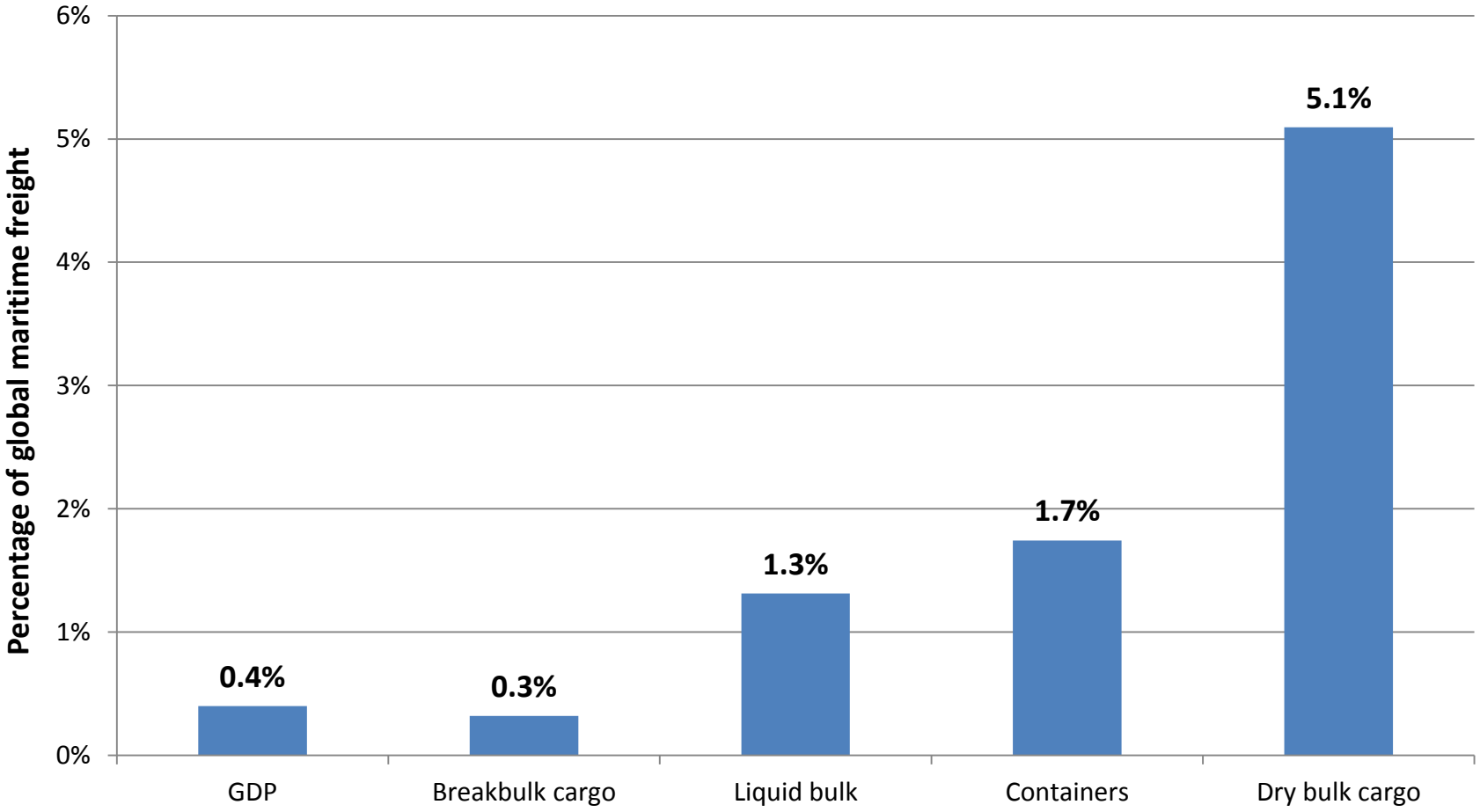
- Key stats of South Africa:
  - GDP of $295 billion (2016)
  - Population of 56 million
  - Tons of 1.8 billion
  - Tonne-kms of 445 billion
  - Cost of freight transport R268 billion ($19.5 billion)
  - Cost of Logistics R470 billion ($34.3 billion)
  - Cost of externalities R38.6 billion ($2.8 billion)
    - Carbon cost R14.2 ($1 billion) – ~$17 per ton

A spatially challenged country

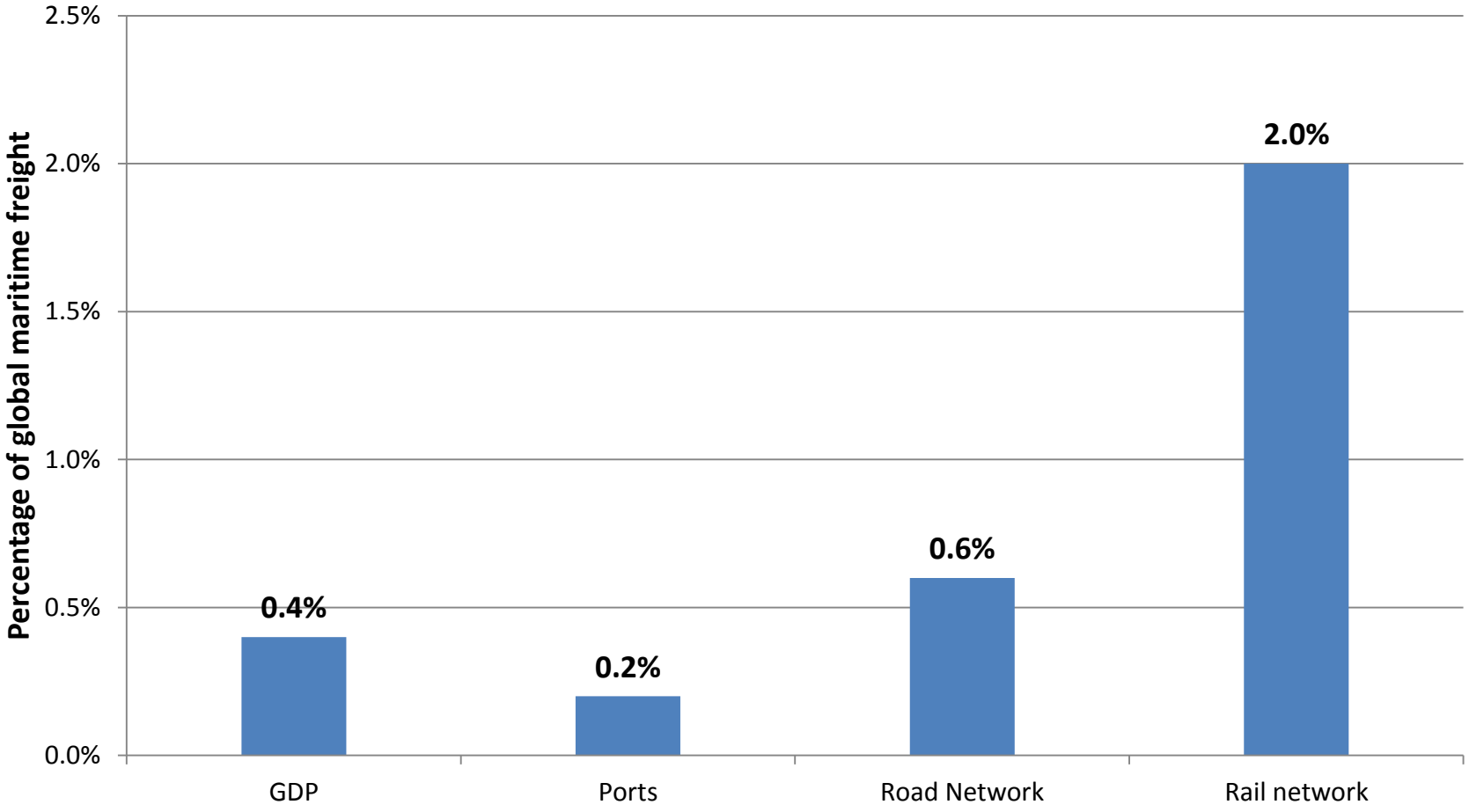


Source: *In 2004 the world produced about 49 000 Mt CO2 - equivalent of which South Africa emitted 440 Mt CO2 – equivalent roughly 1% -Scenario Building Team (SBT) 2007, Jones, T.Rodrigue, J.P., Gielen, D. – low calculation based on 2002 data / Comparison of Datamonitor 2009 (2008 data) and world GDP (2008) – high calculation*

Relatively high maritime volumes



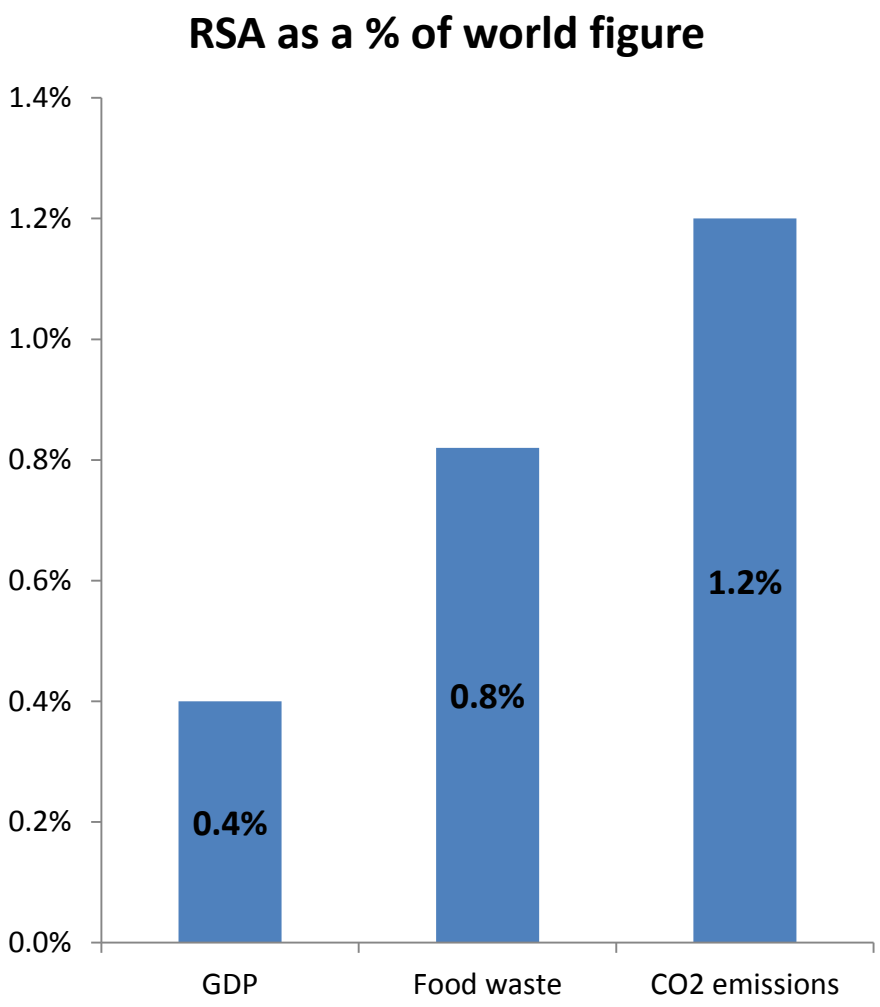
High infrastructure requirement

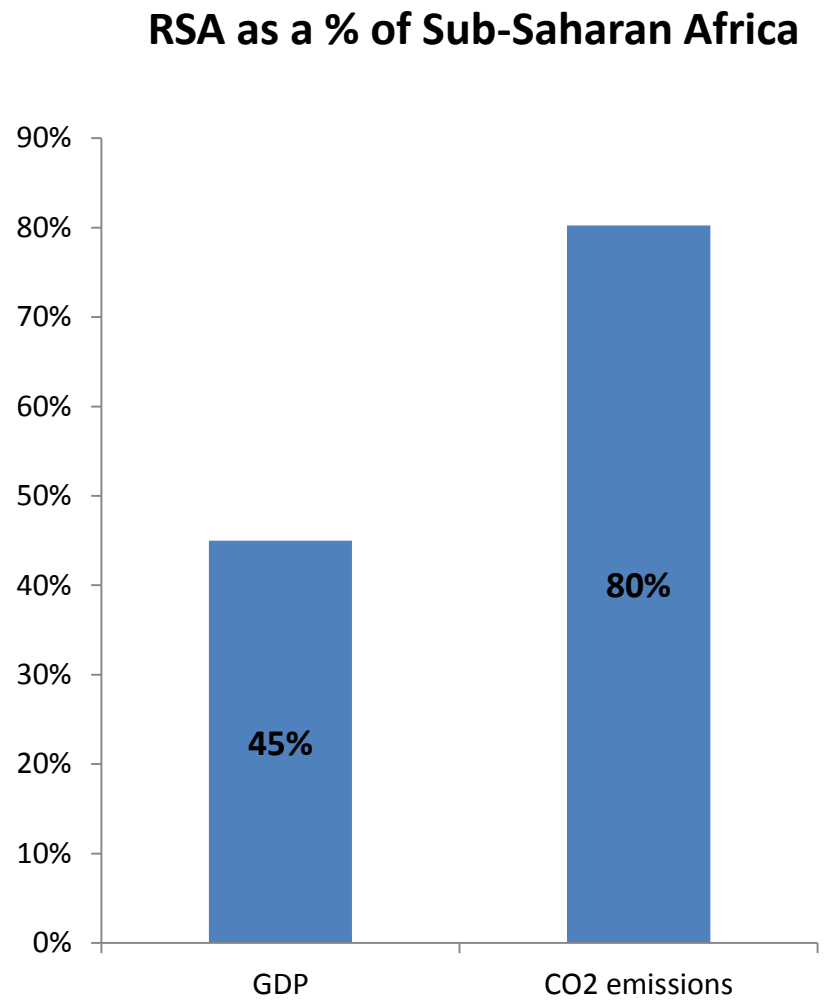


Worldportsource.com. n.d [Online]. Available: http://www.worldportsource.com/countries.php [2018, June 20].

Logistics Barometer South Africa 2015

With sustainability issues





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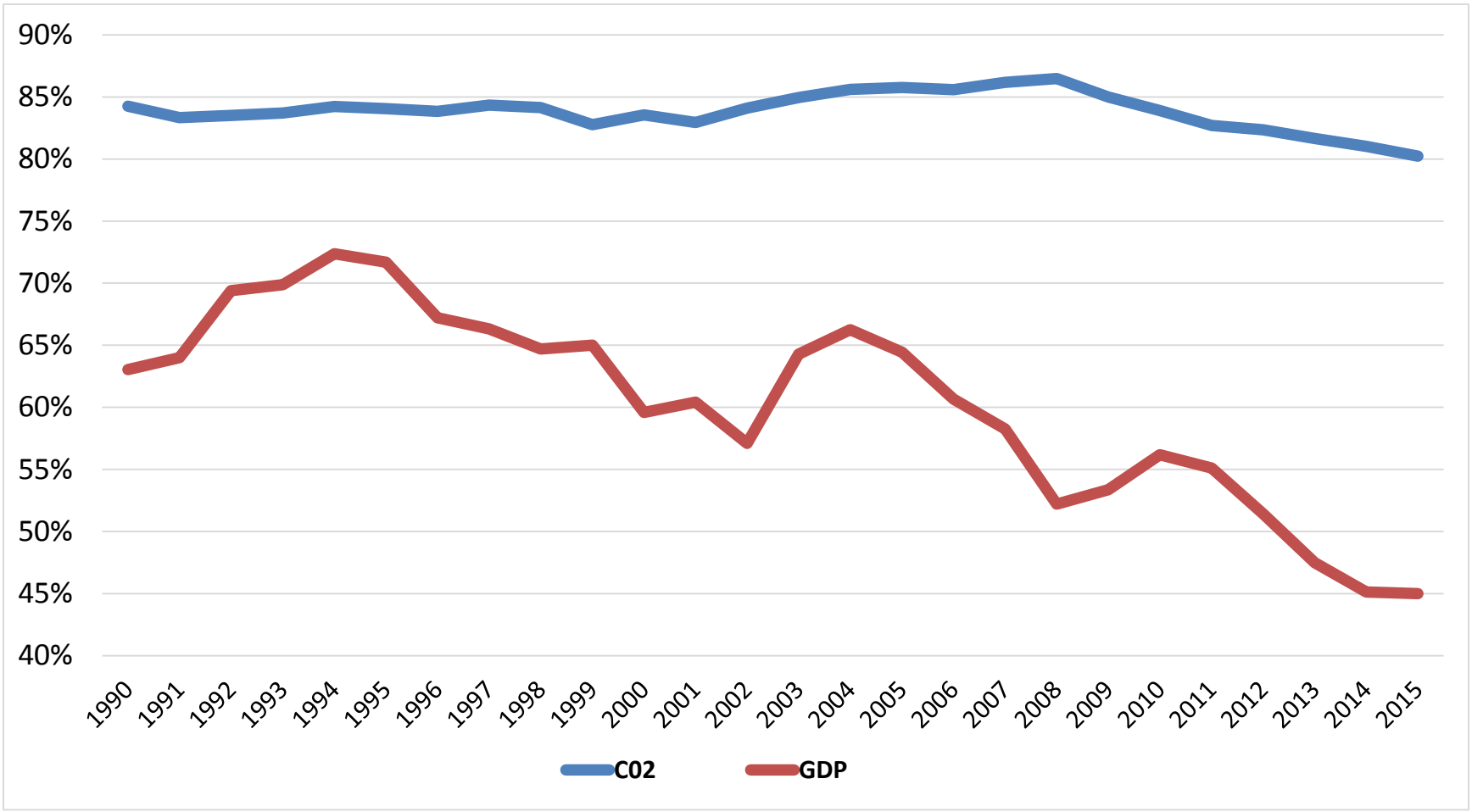
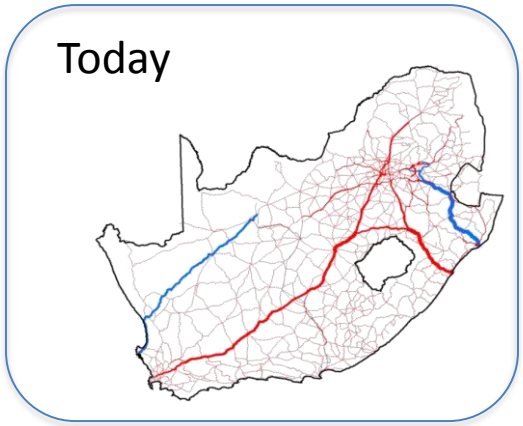
“Misbehaving” in the subcontinent

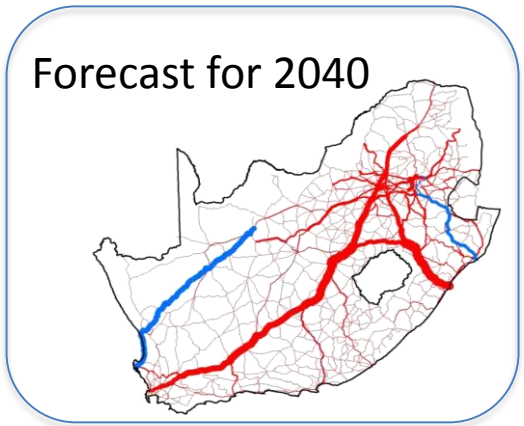


Source: **GDP** from world Bank, World Development Indicators - 2018/05/21

CO2 from Olivier, J.G.J., Janssens-Maenhout, G., Muntean, M. and Peters, J.A.H.W. (2016) Trends in global CO2 emissions: 2016 Report. European Commission, Joint Research Centre (JRC), Directorate C - Energy, Transport and Climate; PBL Netherlands Environmental Assessment Agency, The Hague. JRC103425, PBL2315, Internet: http://edgar.jrc.ec.europa.eu/news_docs/jrc-2016-trends-in-global-co2-emissions-2016-report-103425.pdf, November 2016

Freight movements in South Africa

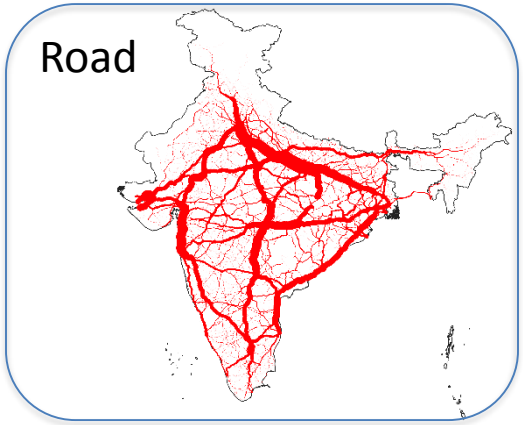


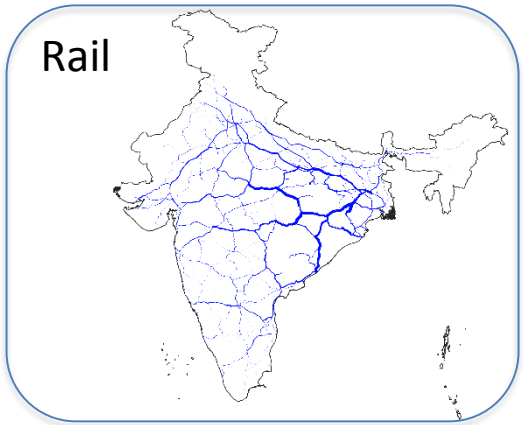


- Tons
  - 0.9 million supply and demand
  - 1.8 billion shipped
    - Average double handling (2.1x)
- Ton-kilometres
  - 445 billion
    - 164 billion on road
    - 140 billion on rail
    - 8 billion in pipelines
    - 1 billion on conveyorbelts
    - 132 billion of last mile

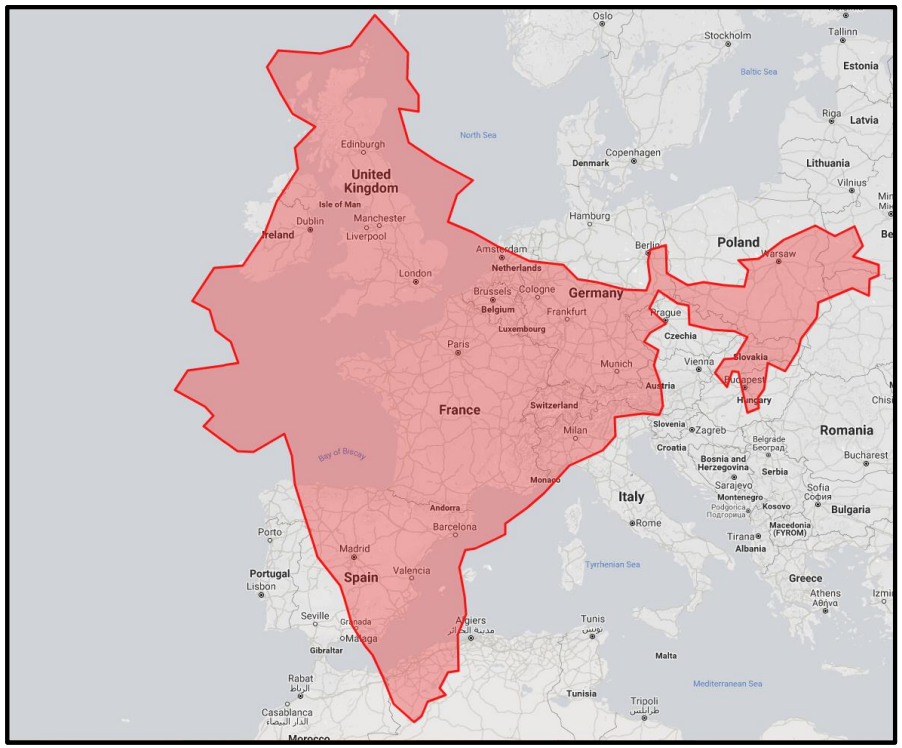
Total tonkm (billion)		
	Road	**Rail**
Current	164	140
Optimal split	130	174
10 year target	167	200

Freight movements in India





- Tons
  - 4.6 billion supply and demand
- Ton-kilometres
  - 3 trillion
    - 2.49 trillion on road
    - 0.6 trillion on rail



Total tonkm (billion)

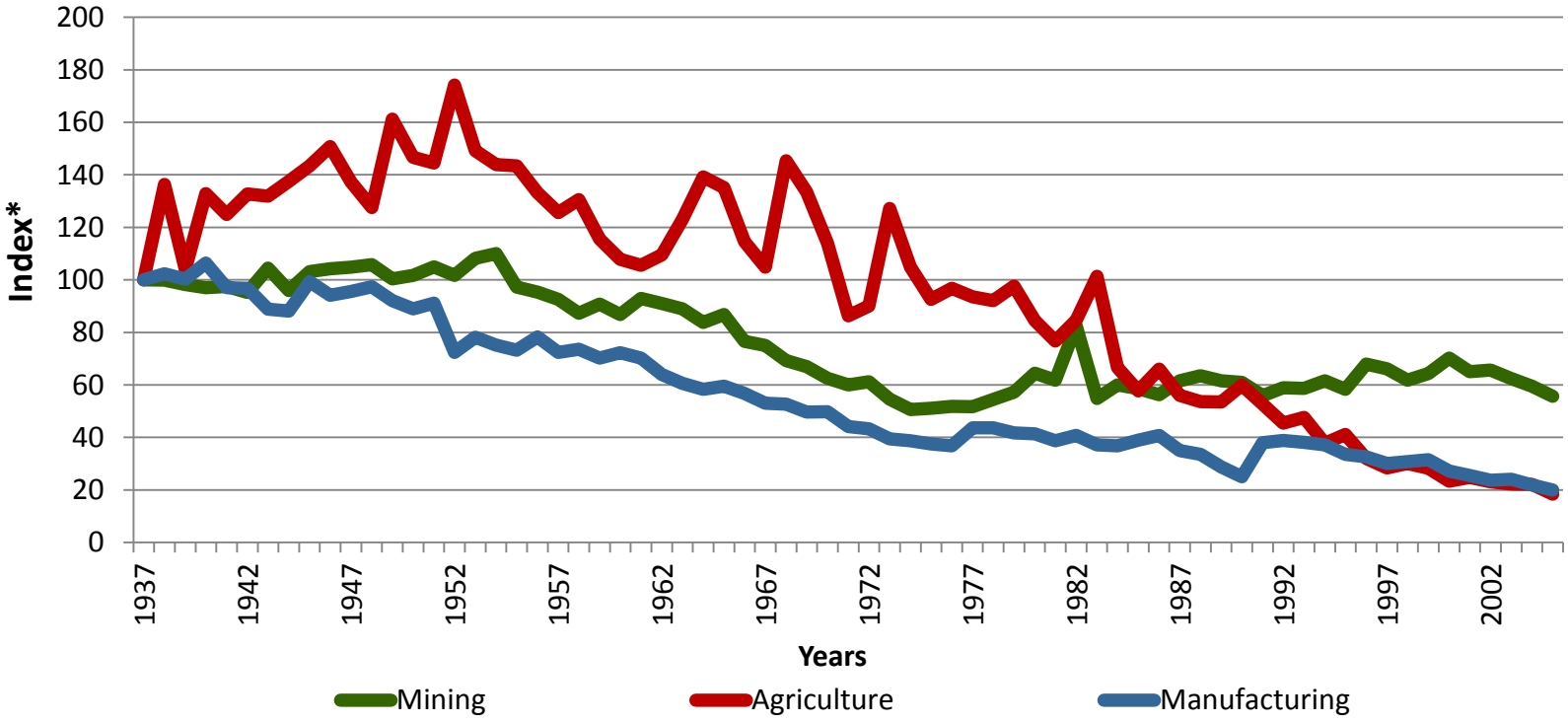
	Road	Rail
Current	2.5	0.6
Optimal split	1.8	1.3

Key messages

- South Africa's transport demand side problem
- Supply is not efficient
- There is an appetite for decarbonisation
- The road carbon "overspend" is nearly 100%
- Change drivers have mixed results

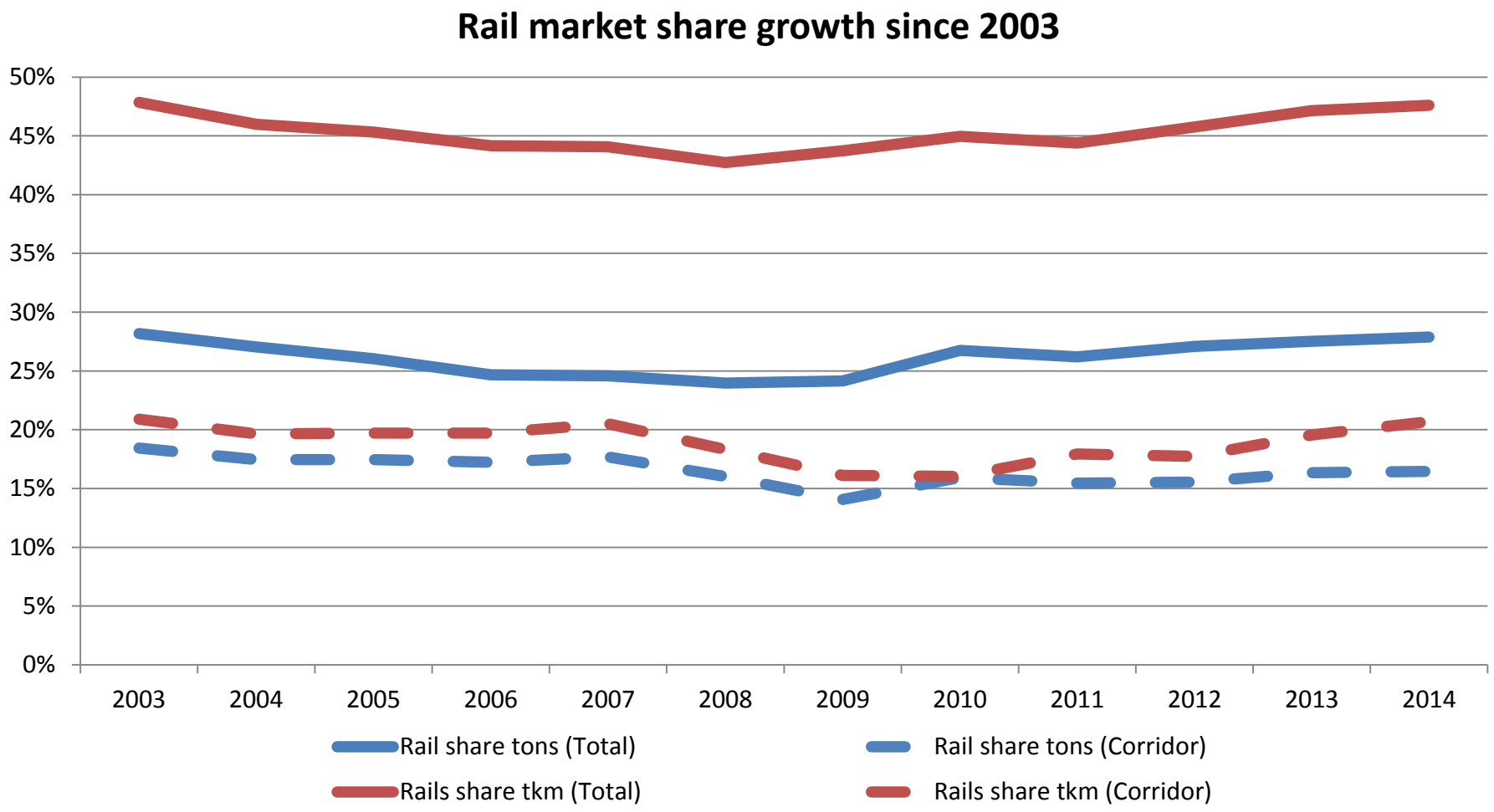
Rail market share decline

- Transnet's transported tonnes to GDP have decreased as follows:
  - Mining: 40%
  - Agricultural & manufacturing: 80%

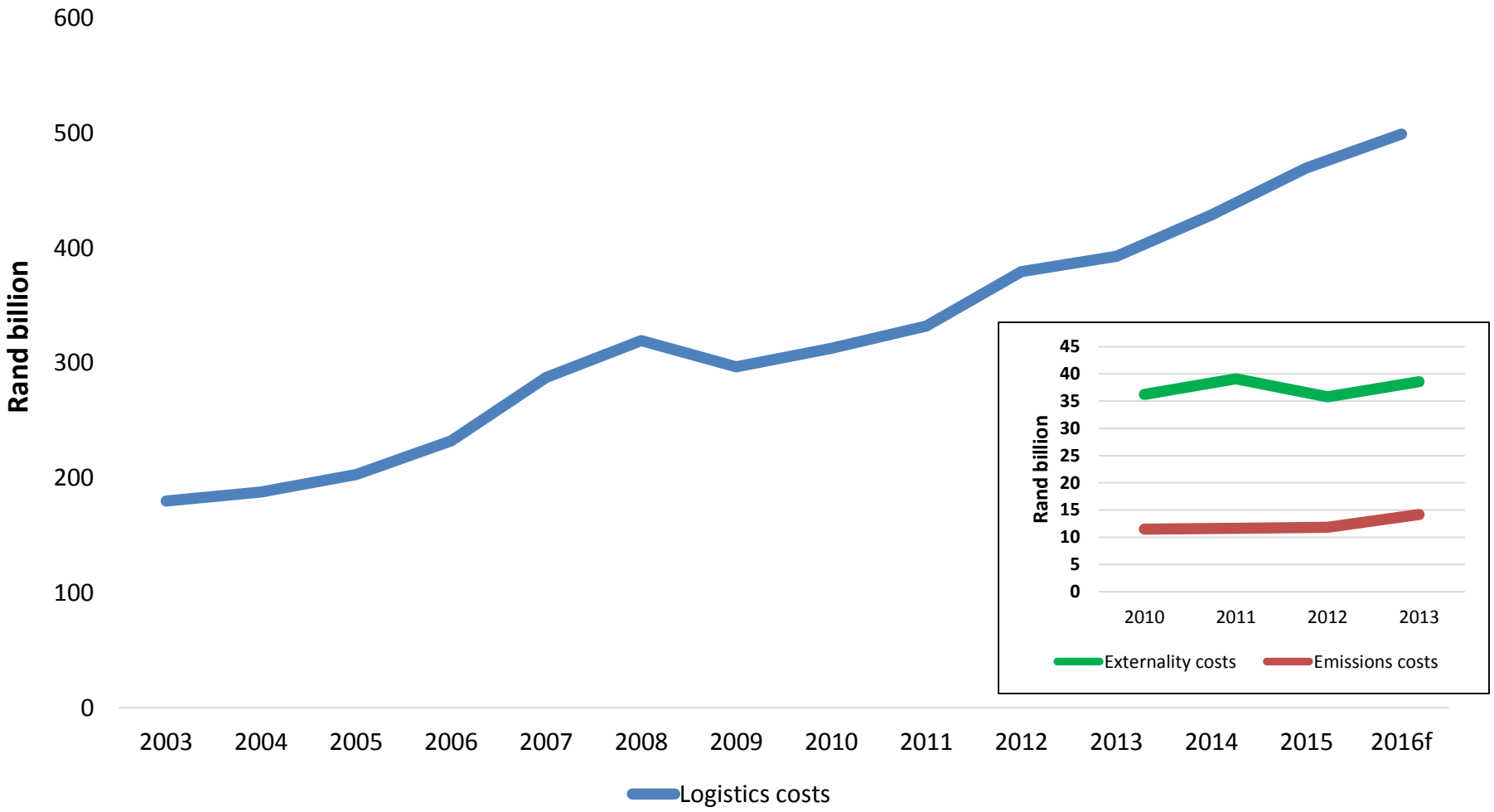


*Indexed correlation of the relationship between rail transport and physical production in the economy

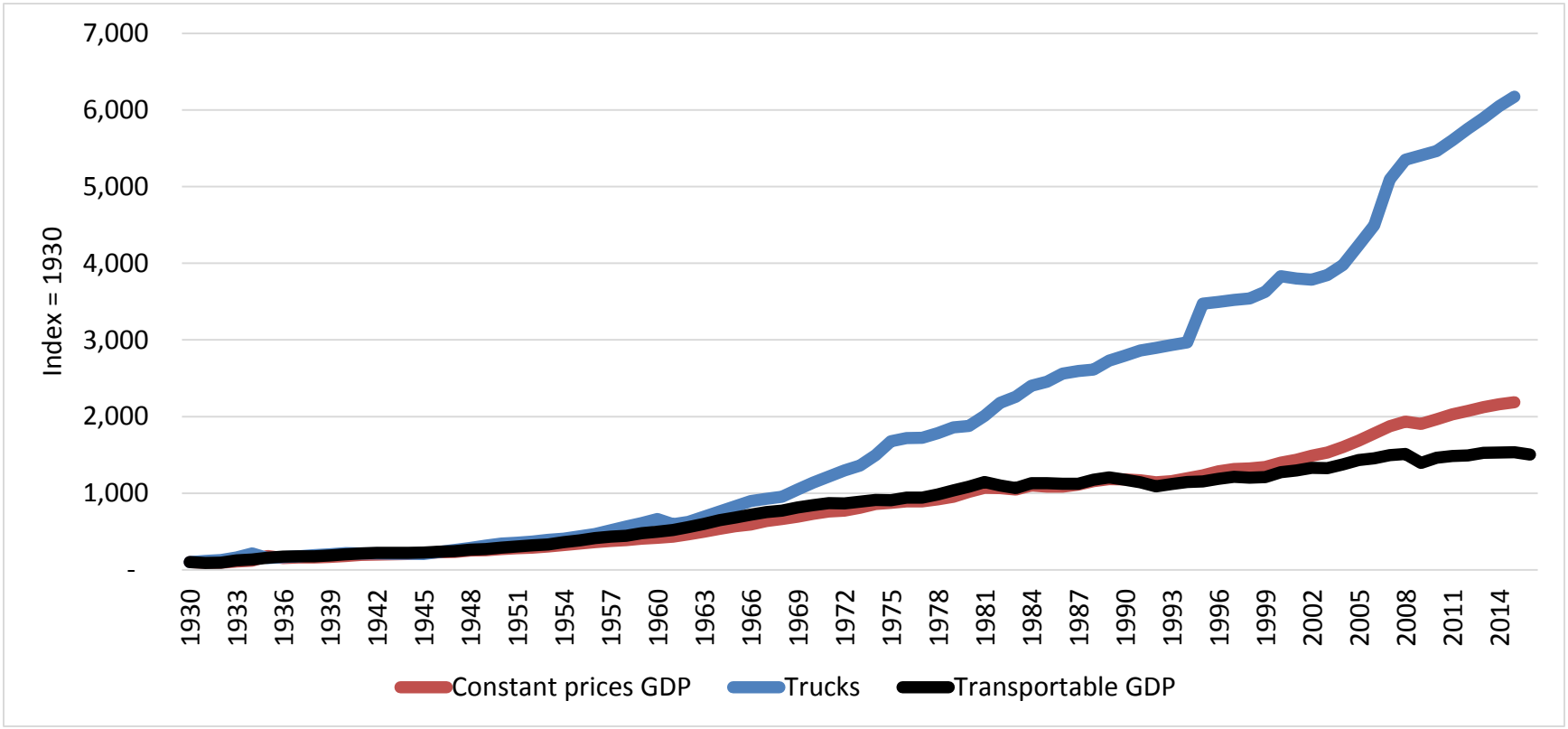
Renaissance?



Transport cost over time



Massive increase in truck fleet



Sources:

Sanral Vehicle data

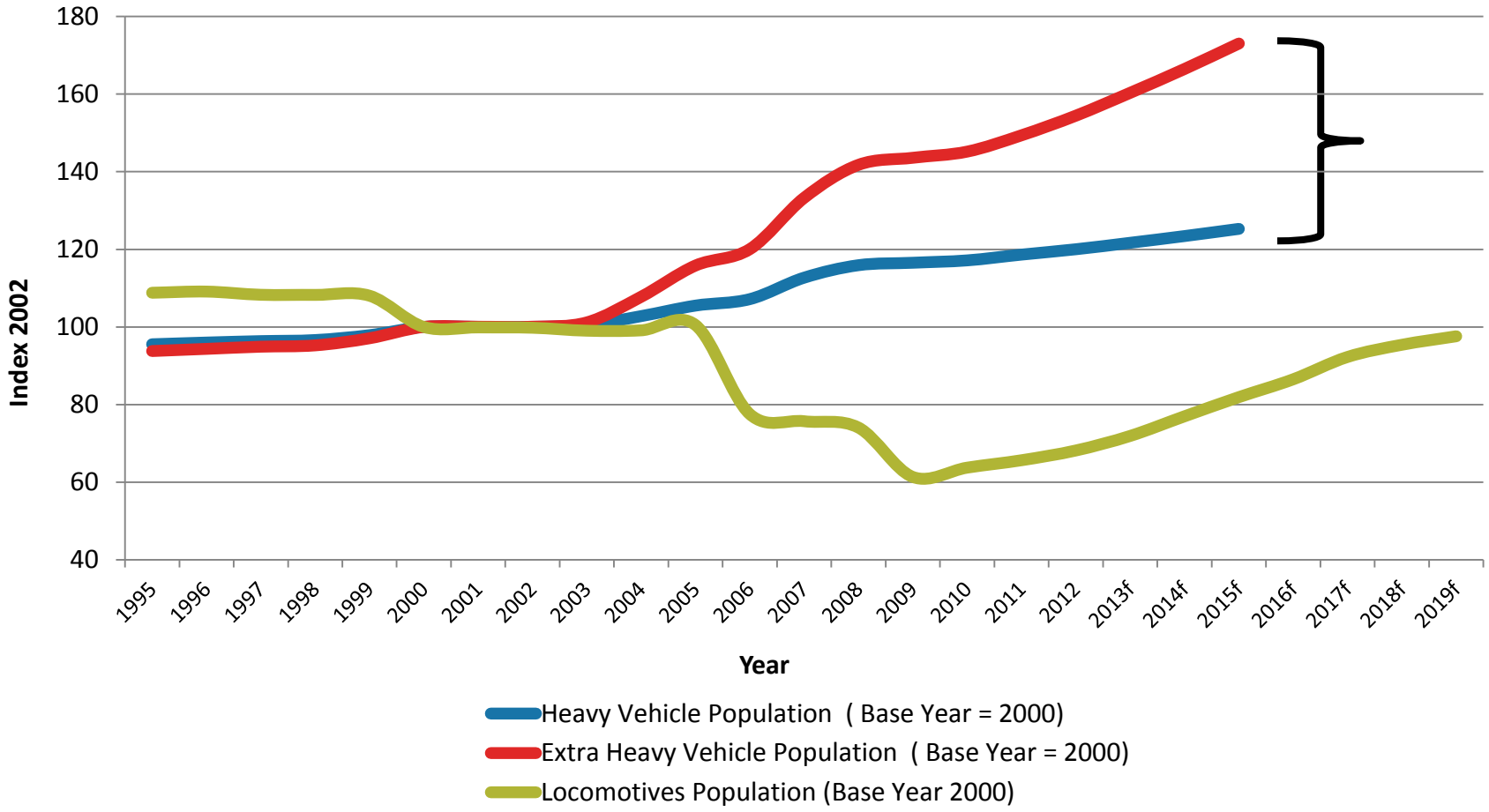
Botha, D.P.J. 1970. Gross Domestic Product at Factor Cost, 1911-1968. Report: Pretoria.

Historical GDP, www.resbank.co.za

Statistics South Africa. 2017. Gross Domestic Product (GDP), 2nd Quarter 2017: Statistical release P0441 [Online]. Available: http://www.statssa.gov.za/publications/P0441/P04412ndQuarter2017.pdf [2017, September 1].

National Traffic Information System. 2017. Live vehicle population as per the National Traffic Information System – Enatis. [Online]. Available: http://www.enatis.com/index.php/statistics/13-live-vehicle-population[2017, August 20].

New equipment contribution



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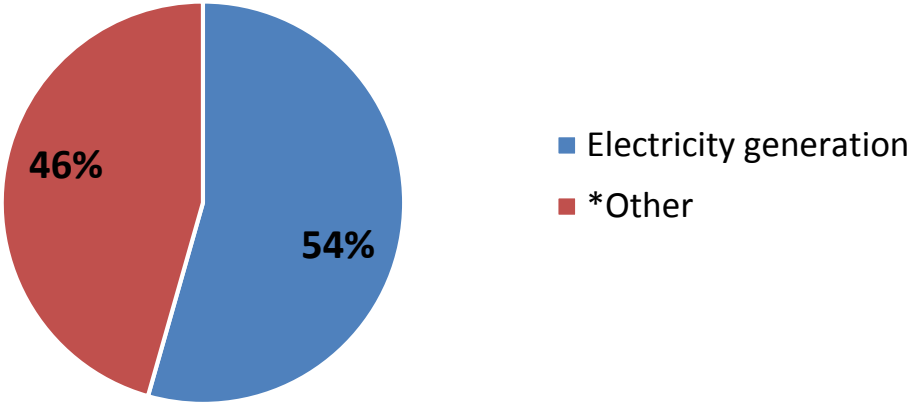
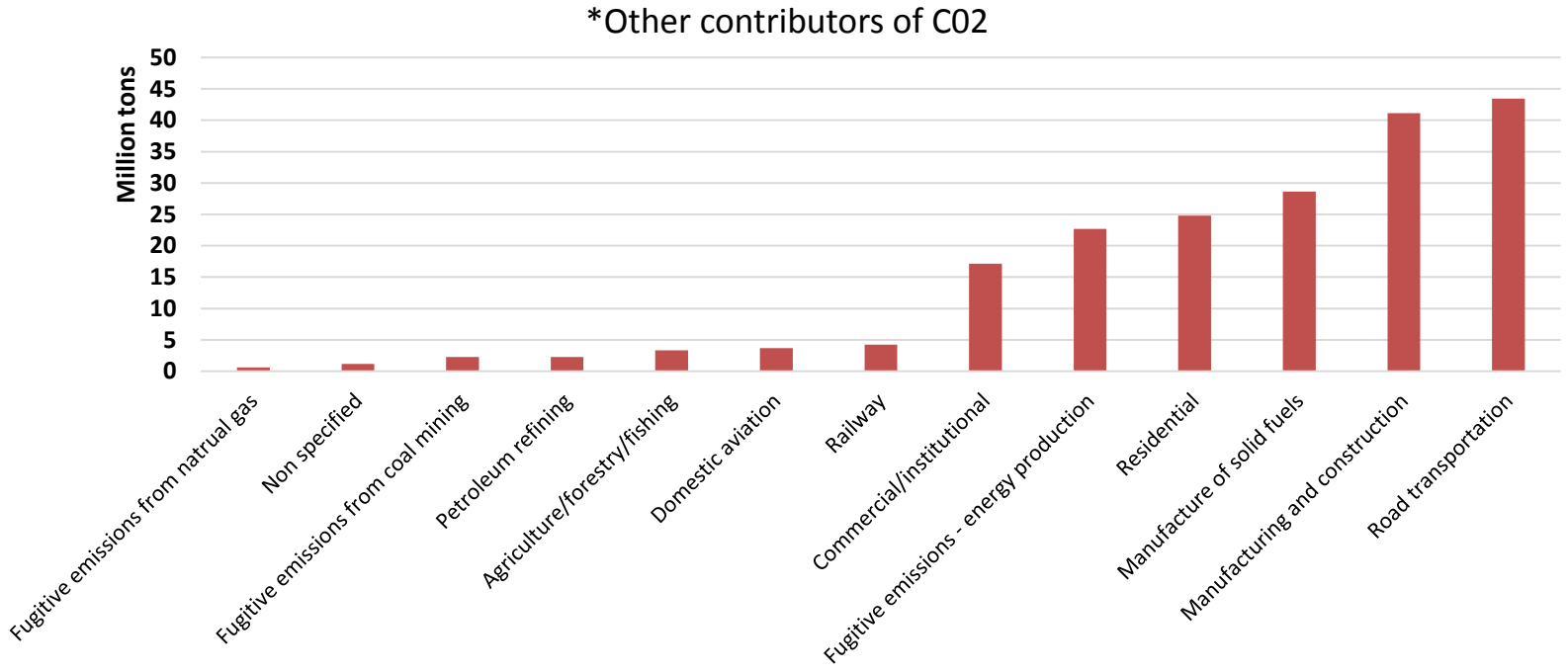
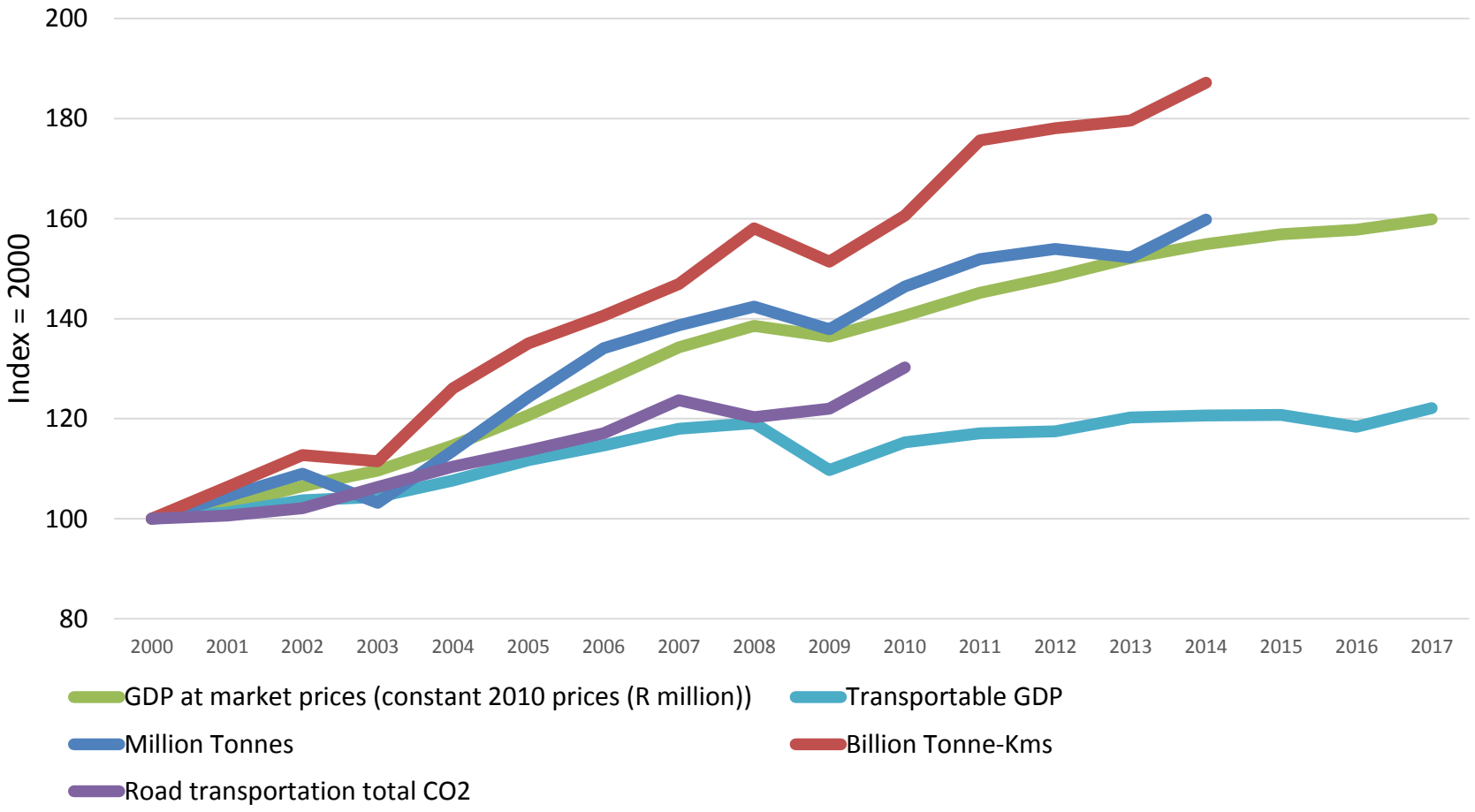
Total CO_2 Kilotonnes for South Africa





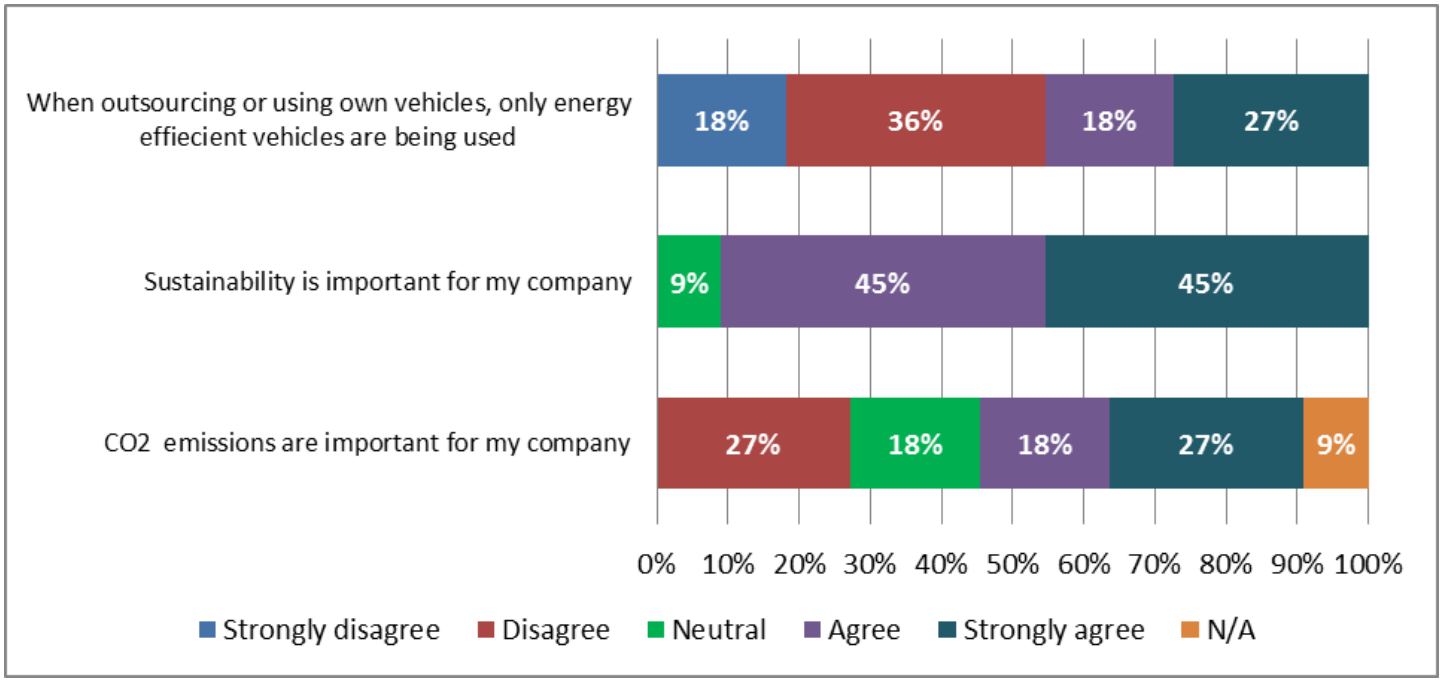
Sources: SA DEA - GHG Inventory for south Africa 2000-2010
https://unfccc.int/resource/docs/natc/zafnir1.pdf

Efficiency gains - partly



Source: National Freight Flow Model - GAIN Group; StatsSA Annaul GDP figures; SA DEA - GHG Inventory for south Africa 2000-2010

Attitudes towards decarbonisation



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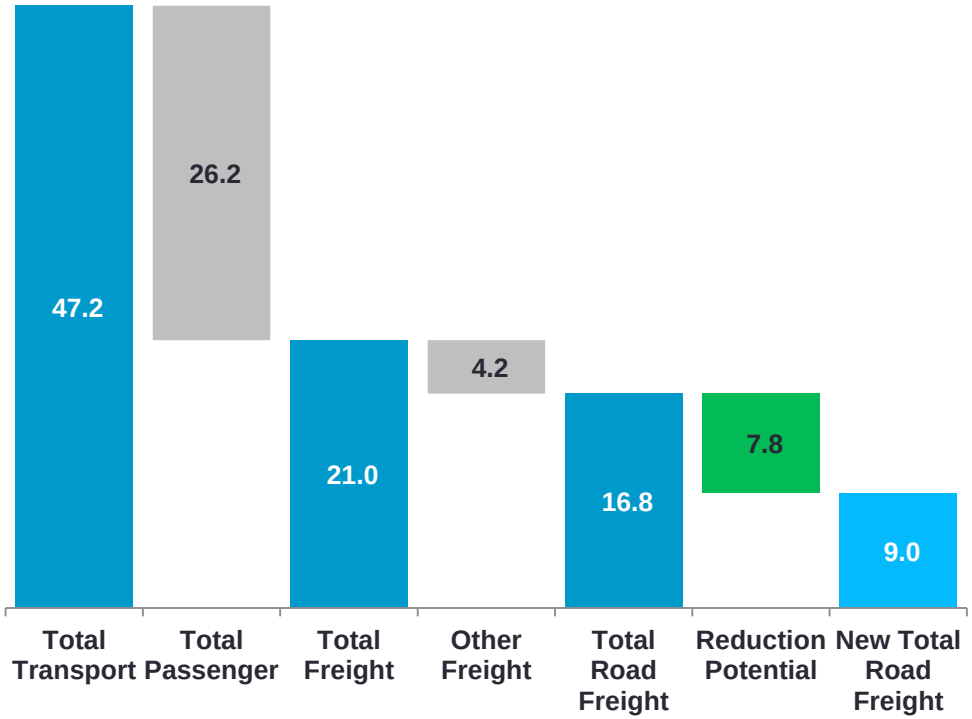
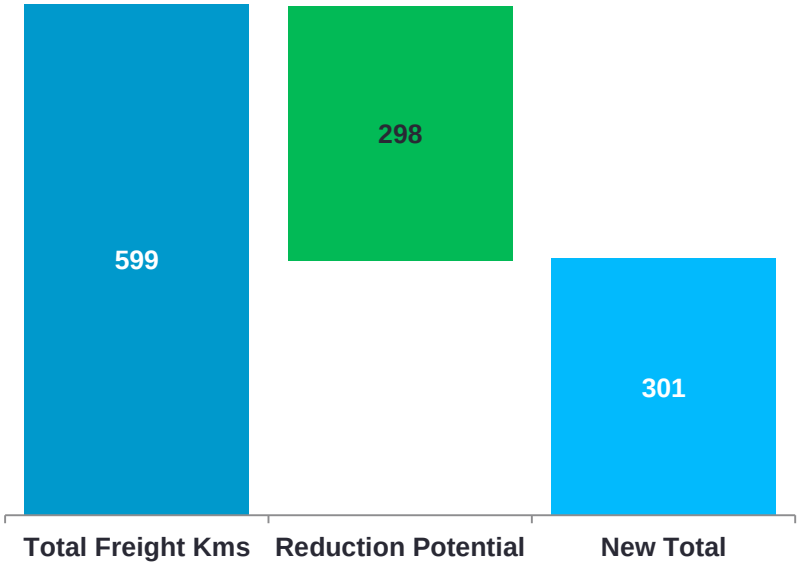
Carbon emissions target

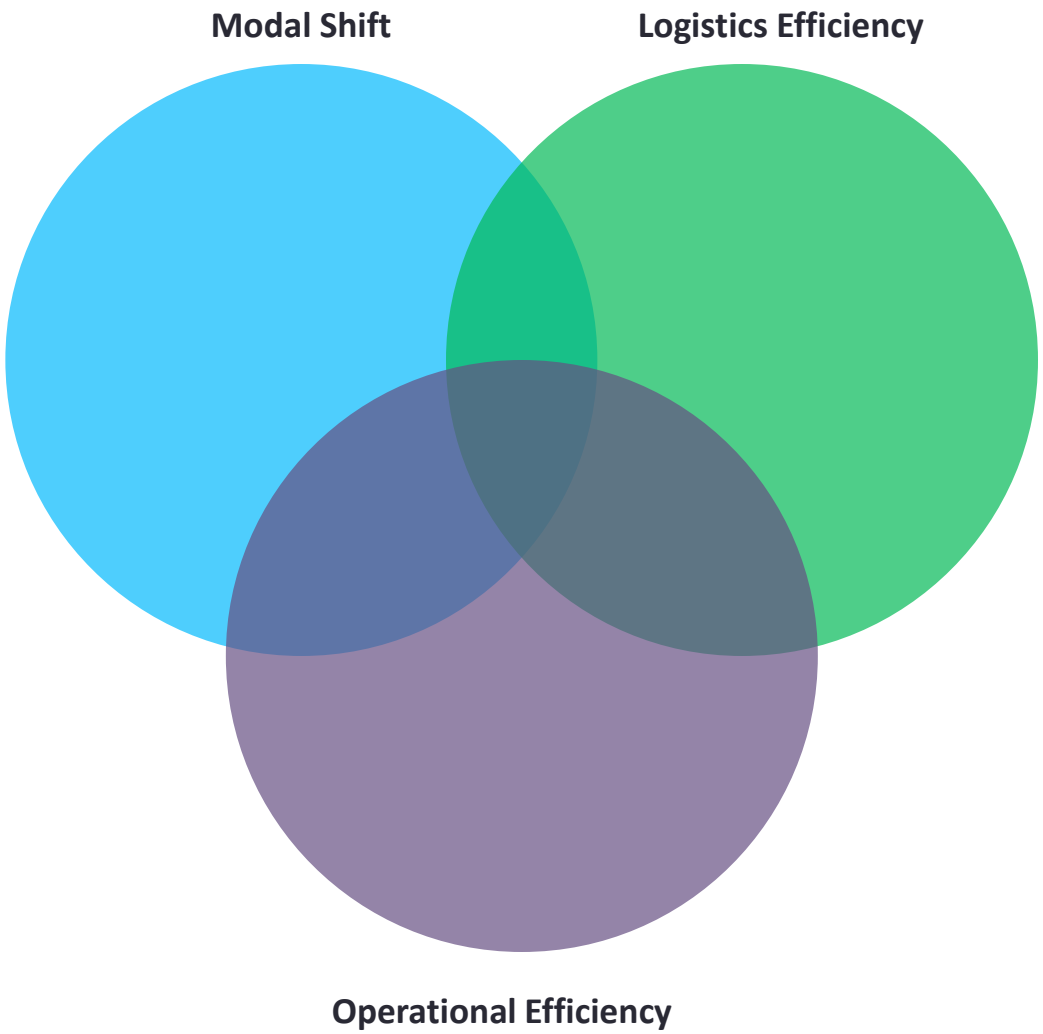
- Emissions reduction (million tons)



- Kilometer reduction (millions)



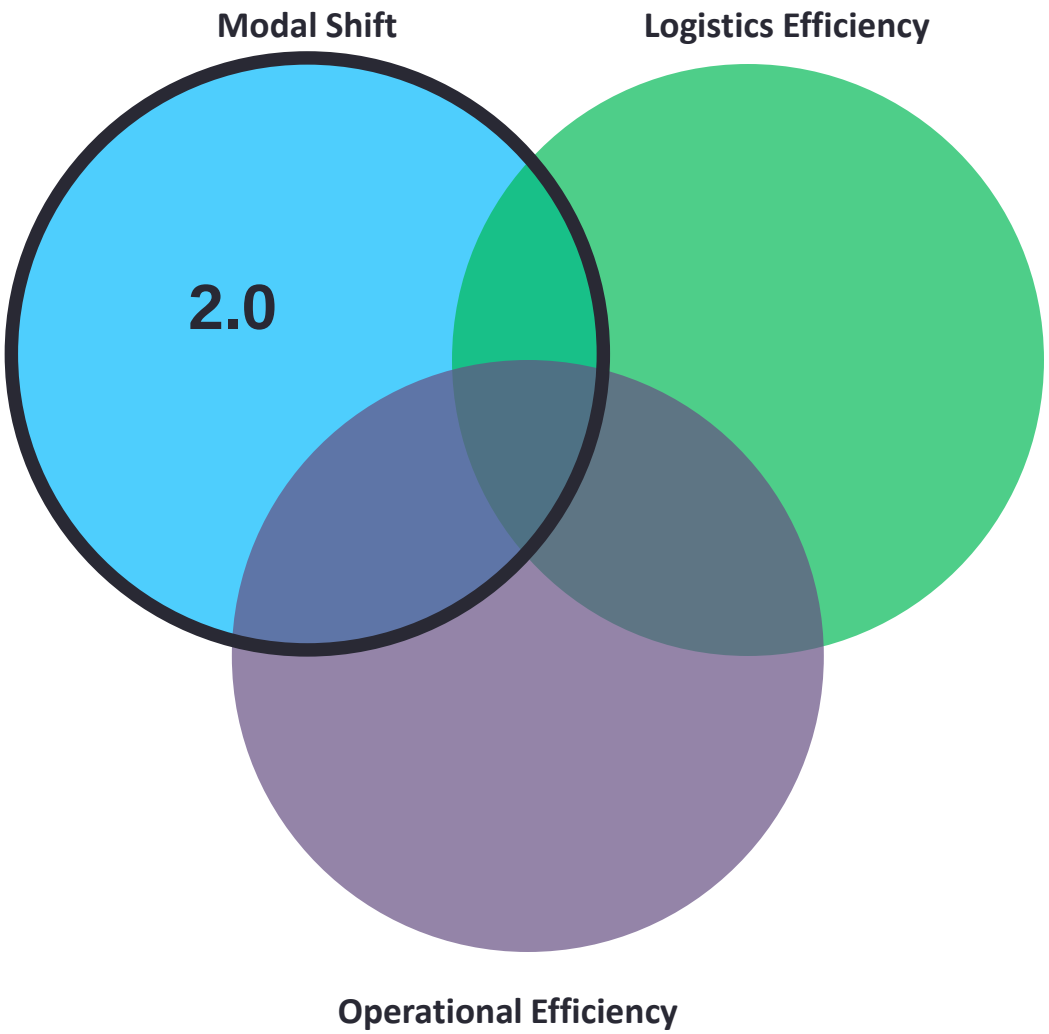
Target deconstructed



Total of 298 million kms saved 49.7% of total road freight kms driven each year in South Africa

Million tons of CO_2

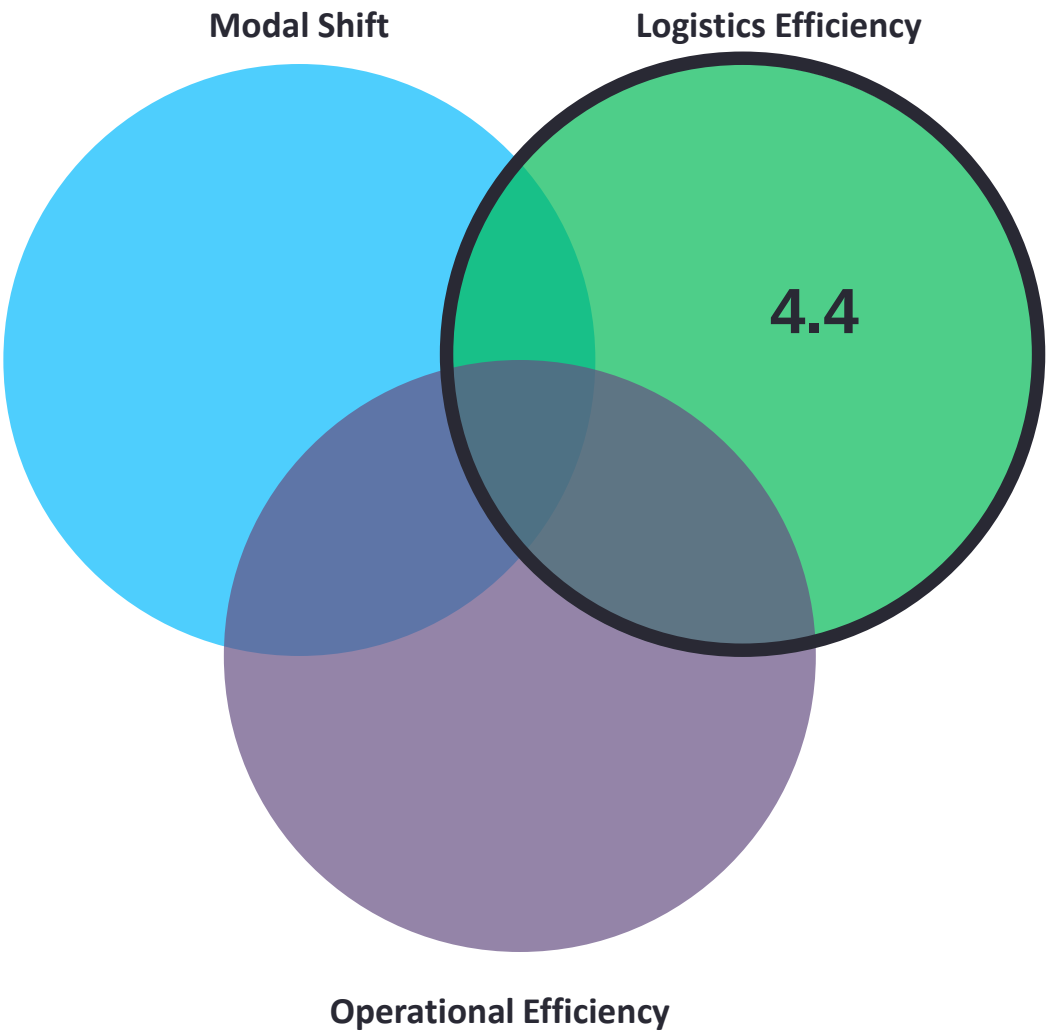
Target deconstructed



Total of 298 million kms can be saved 49.7% of total road freight kms driven each year in South Africa

Million tons of CO_2

Target deconstructed



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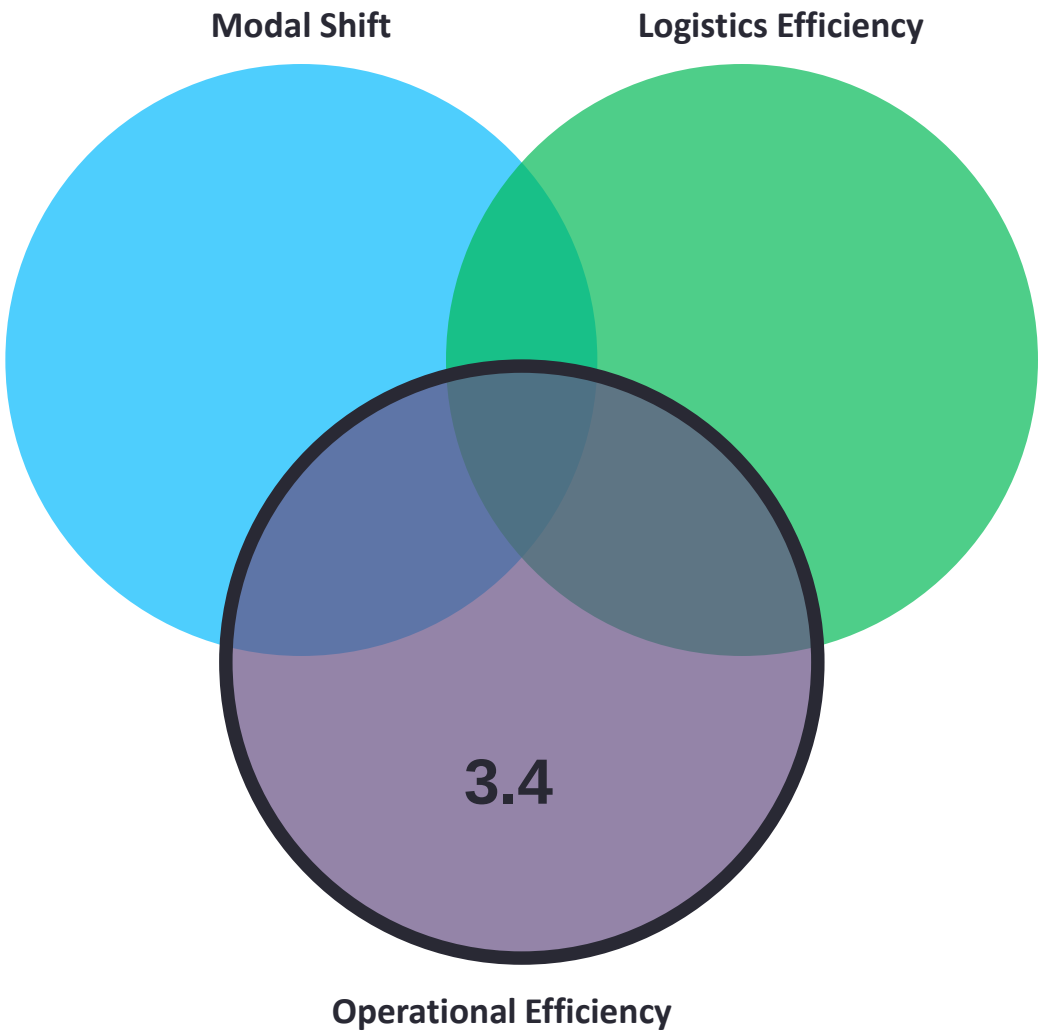

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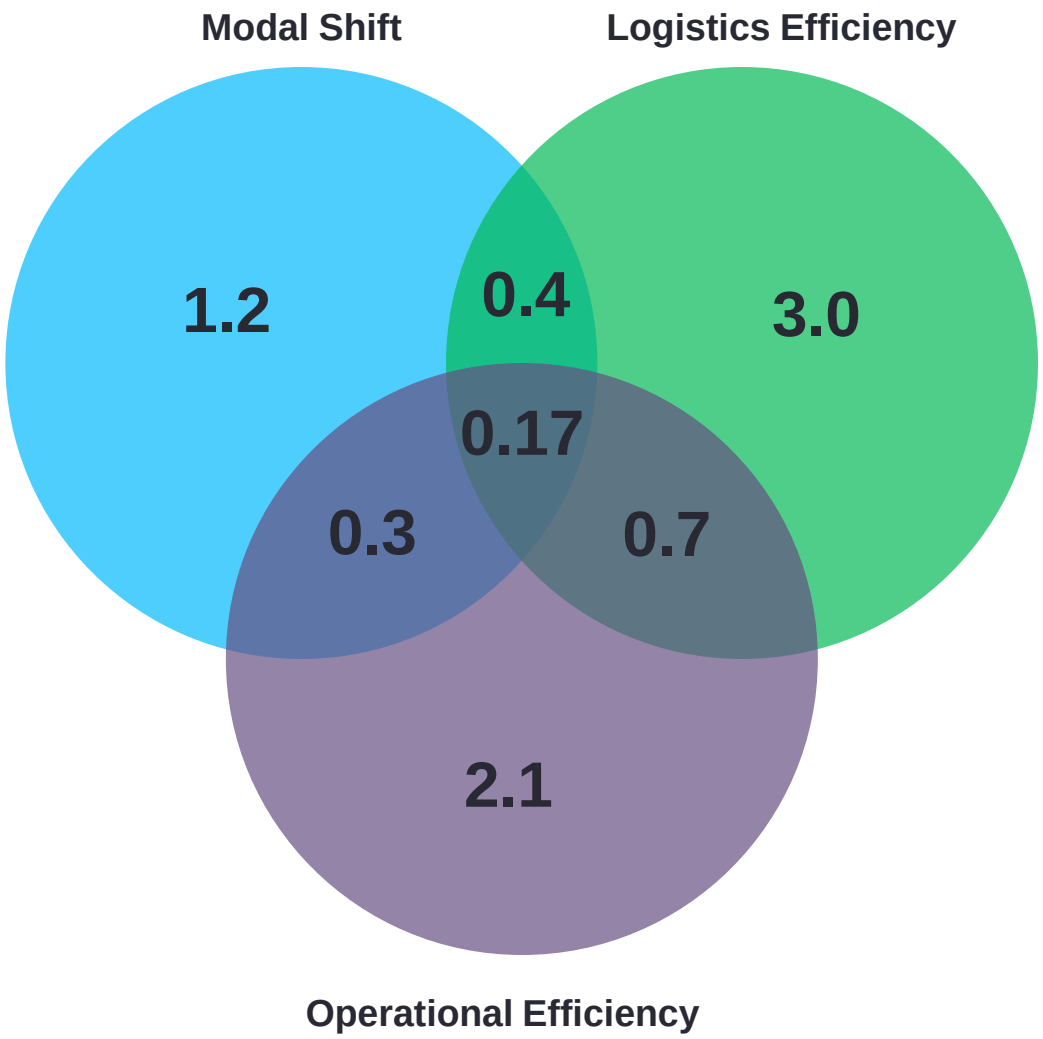
Million tons of CO_2

Target deconstructed



Total of 298 million kms saved 49.7% of total road freight kms driven each year in South Africa

Total saving of 7.8 Million tons of CO_2

Key messages

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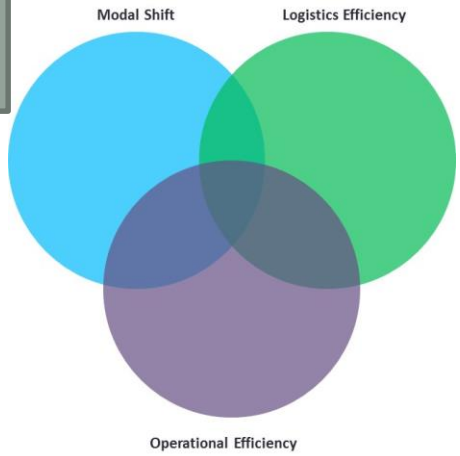
The drivers of change

Infrastructure and policy



Logistics competency

Culture and behaviour

Infrastructure and policy

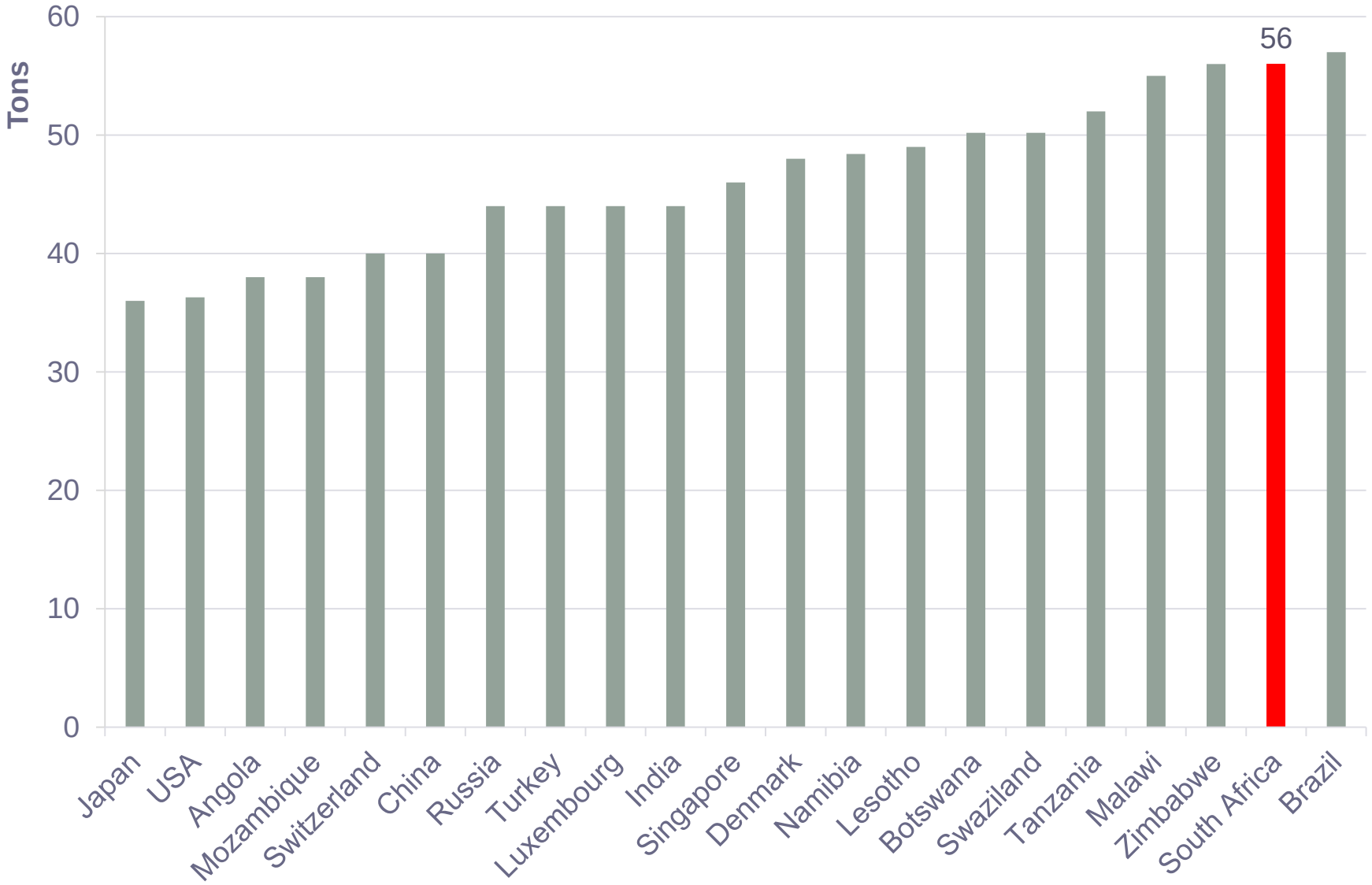
- Policy
  - User pay inducements
  - Carbon tax
  - Congestion management
  - Negative inducements:
    - Hi Cube issue
- Infrastructure
  - Rail investment
  - Road quality
  - Productive neighbourhoods

Carbon Tax

- White paper was produced 7 years ago
- The draft bill was produced in 2015
- Treasury stands firm on 2019 implementation
- Implementation January 2020 likely
- Rate will be R120 per ton, i.e. ~$8-9 per ton
- Businesses will initially get a 60% “discount”
- Complex array of discounts might reduce effective rate to less than R48 per ton (~$3)

Head, T. 2018. Carbon tax is on its way to South Africa: Here’s what you need to know. *The South African.* [Online]. Available: https://www.thesouthafrican.com/carbon-tax-sa-budget-speech-2018/ [2018, June

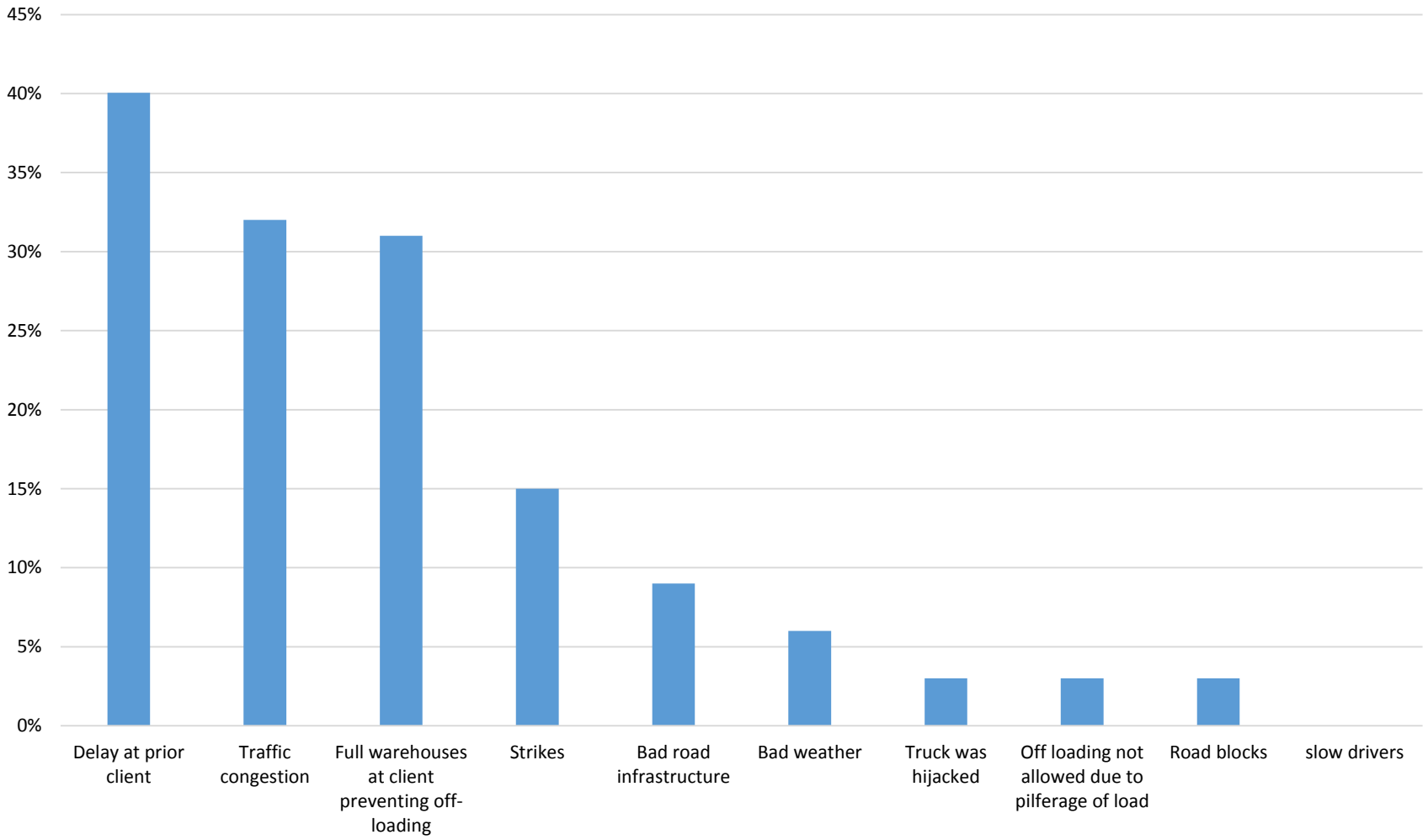
Maximum permissible combination axle loads



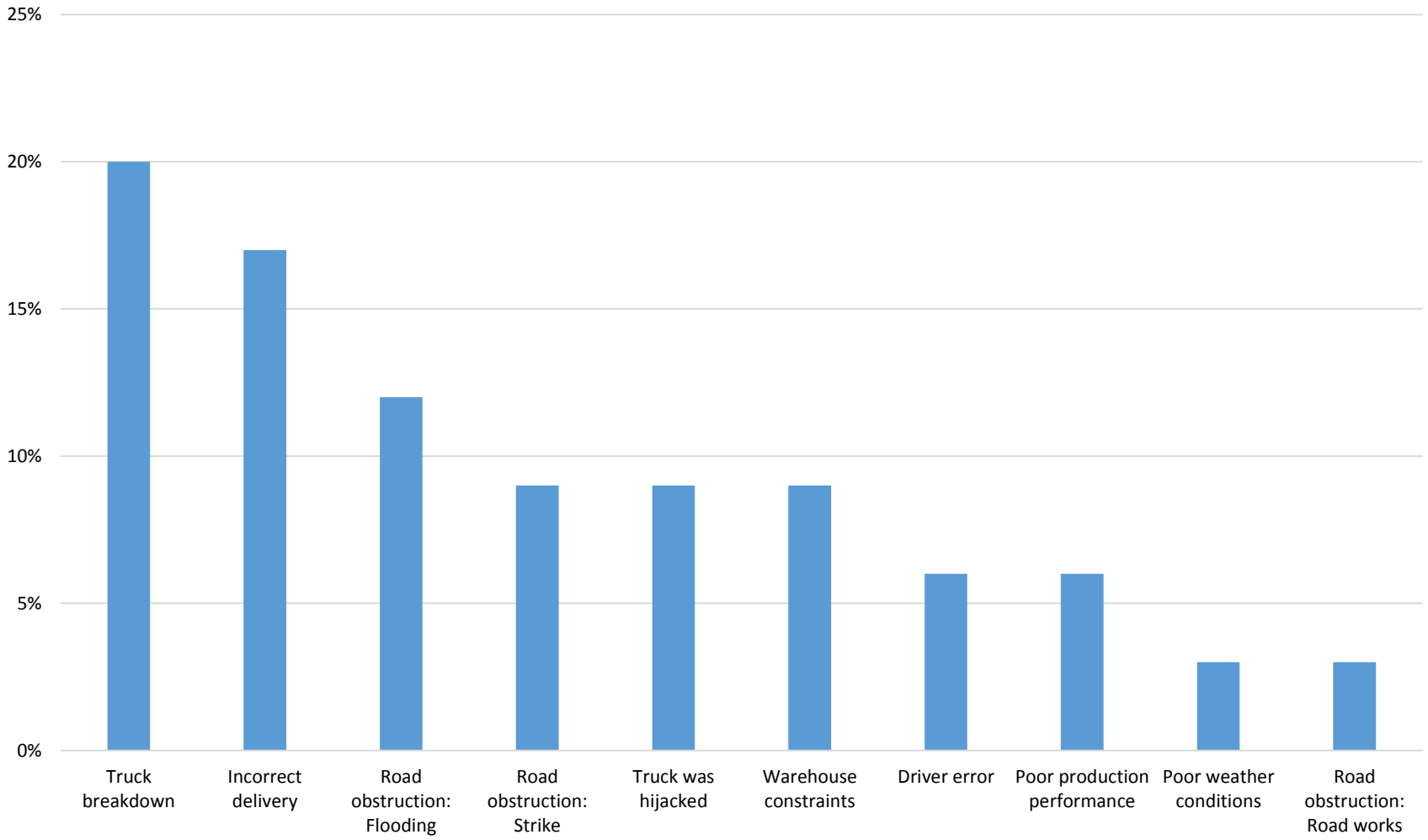
Logistics efficiency

- Load factors
- Unnecessary trips
- Missed slot times

Missed slot times – the critical “mistake”



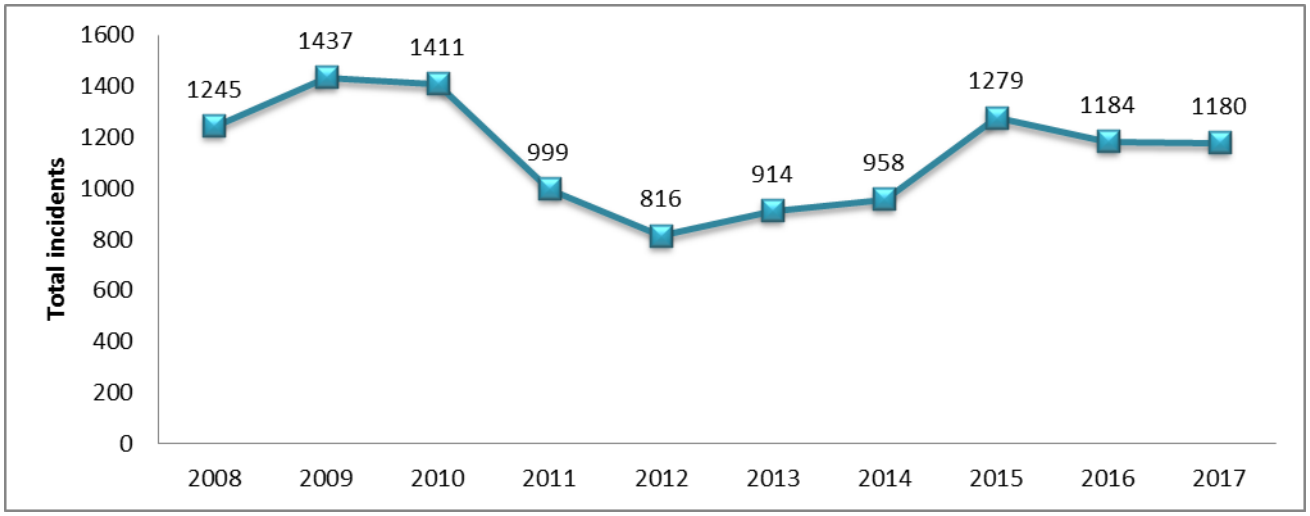
Unnecessary trips – extra kilometres



Culture and behaviour

- Truck efficiency
- Driver efficiency
- Environment
  - Crime
  - Hi-jacking
  - Strikes

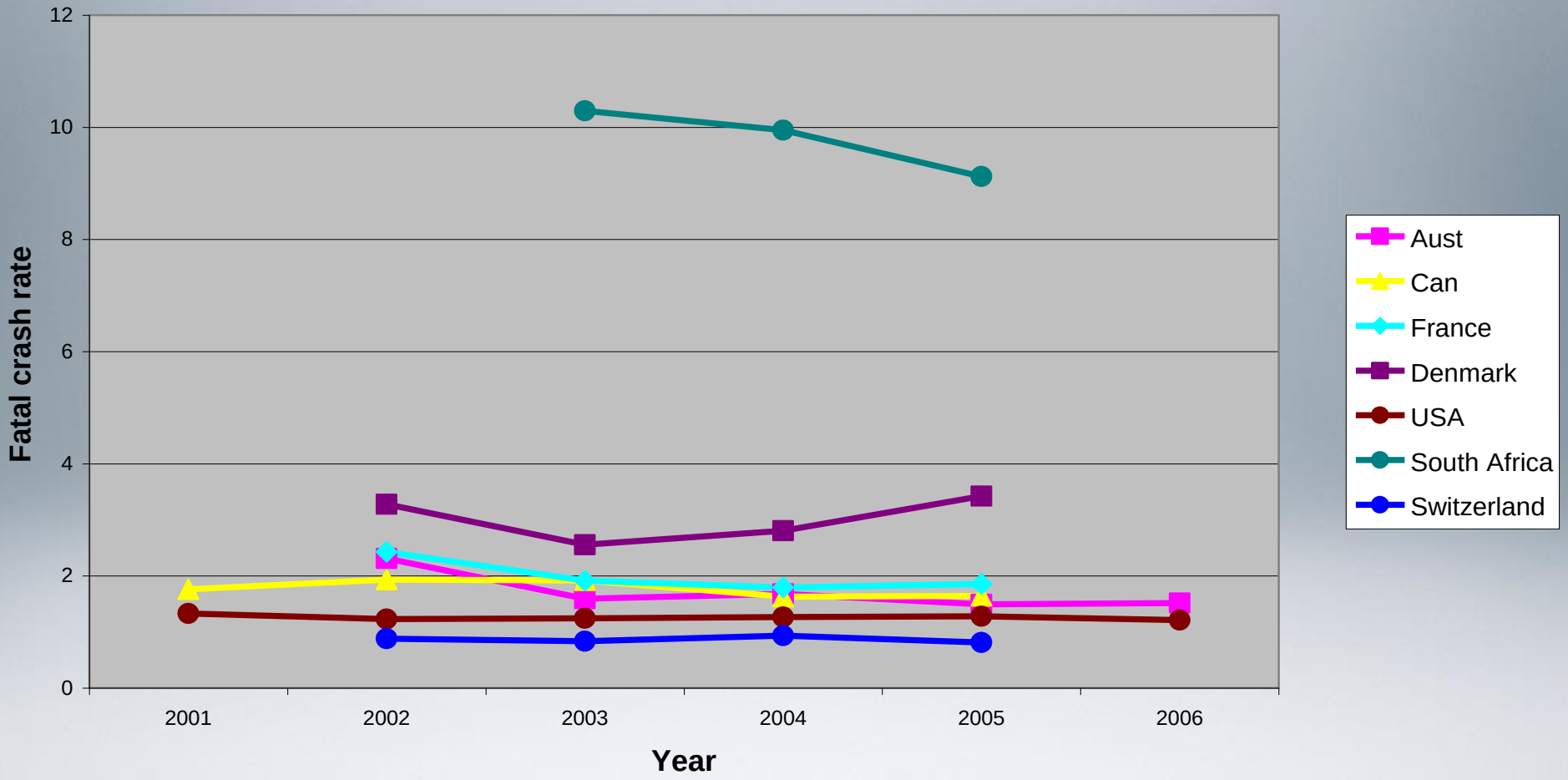
The amount of truck hijacking incidents in South Africa



Culture and behavior program - RTMS

- Deregulation quality promise (1989)
  - Unfulfilled
- Low quality
  - Distorts the market
  - Overcrops road equipment
  - Damages road infrastructure
  - Drive blue chip operators from certain market segments
- Most important behavioural intervention were RTMS
- It is voluntary
  - The underlying factors should be enforced
  - But the voluntary nature of the program is proving succesful

Heavy Vehicle Fatal Crash Rates



Fatal truck crash per 100 million vehicle kilometres travelled

Source: OECD report, Moving Freight with Better Trucks, 2010

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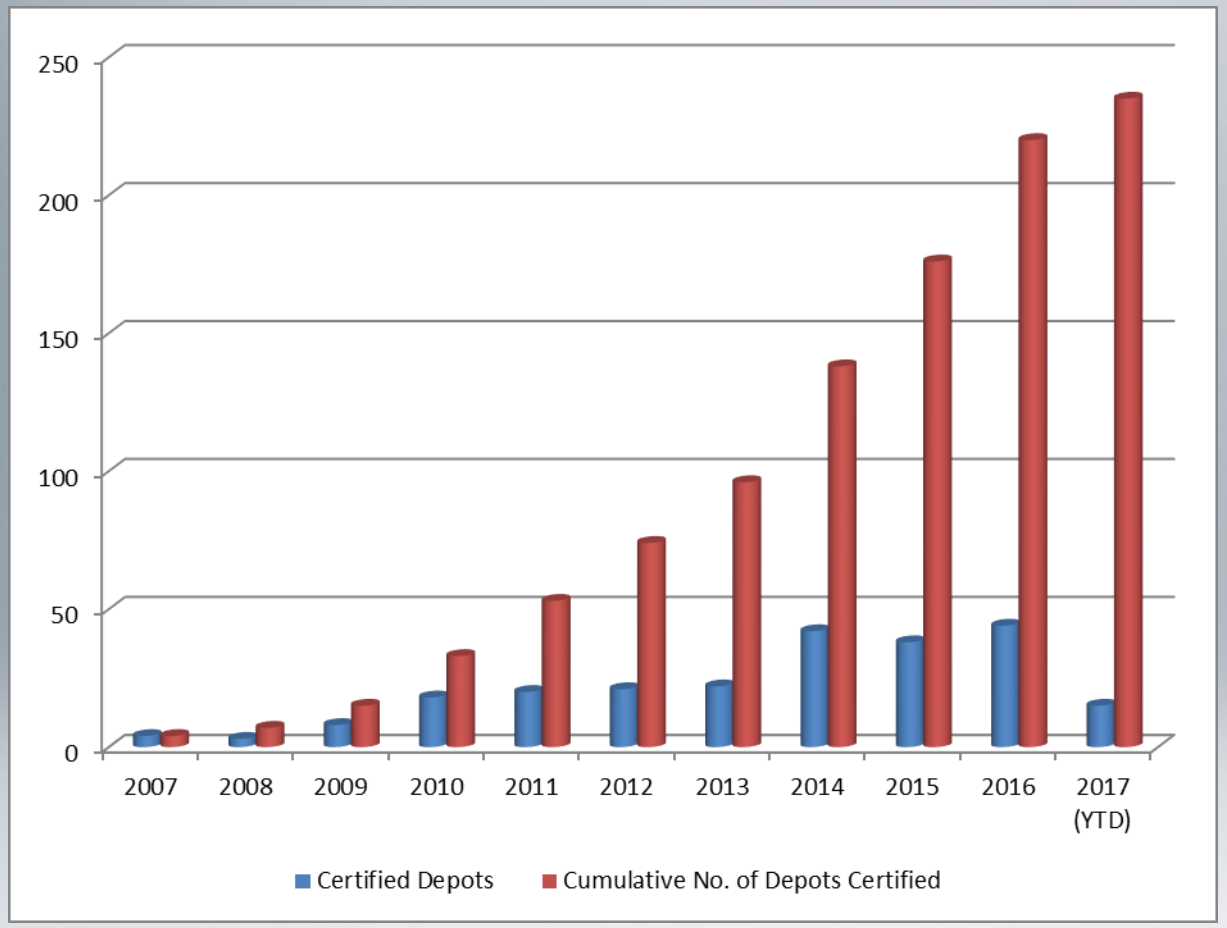
our future through science

Growth of the RTMS in SA



Over 250 fleets representing over 15 000 trucks & buses (In 2007 their were 74 certified vehicles)

Four bus operators:

- Buscor 420 buses
- Intercape 160 coaches
- GABS 1100 buses
- Intestate 237 buses (Bloem)

24 abnormal load operators:

- 258 vehicles
- Plant hire, construction, engineering, mobile cranes
- 2 commercial A/L operators (108 vehicles)

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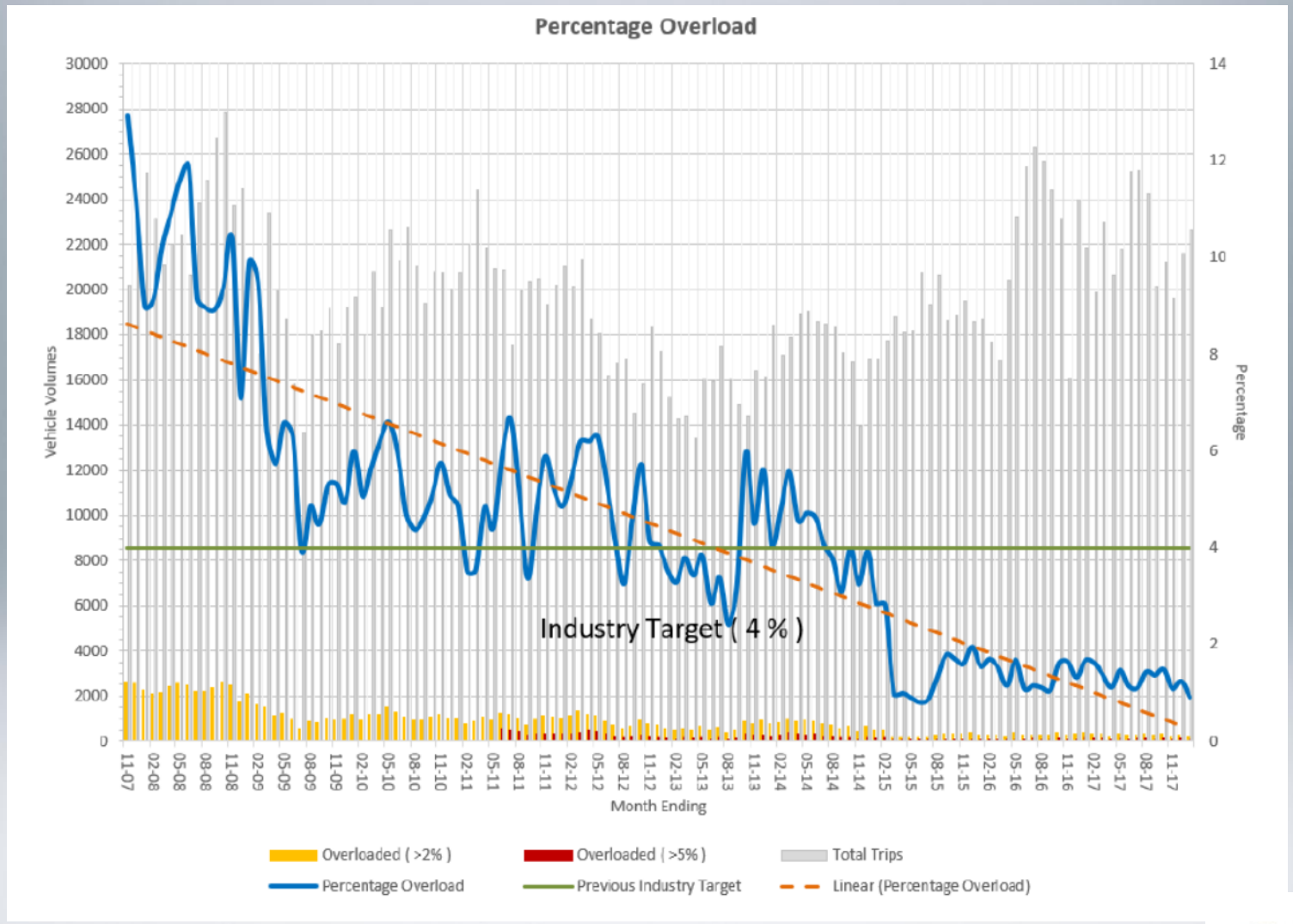
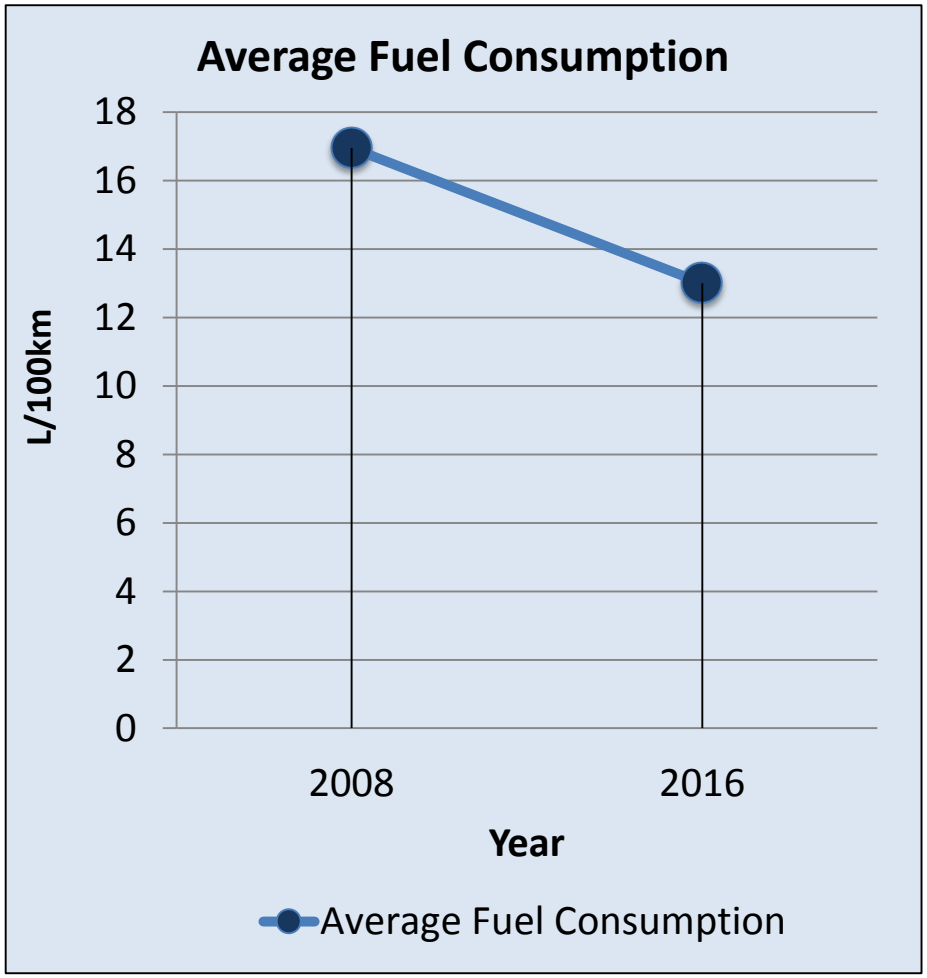
RTMS: Overloading trend in forestry



Road Transport Management System
RTMS
Driver Wellness • Safety • Loading • Productivity

CSIR
our future through science

Benefits: Efficiency Improvements



Fuel Consumption Improved from 17l/100km to 13l/100km

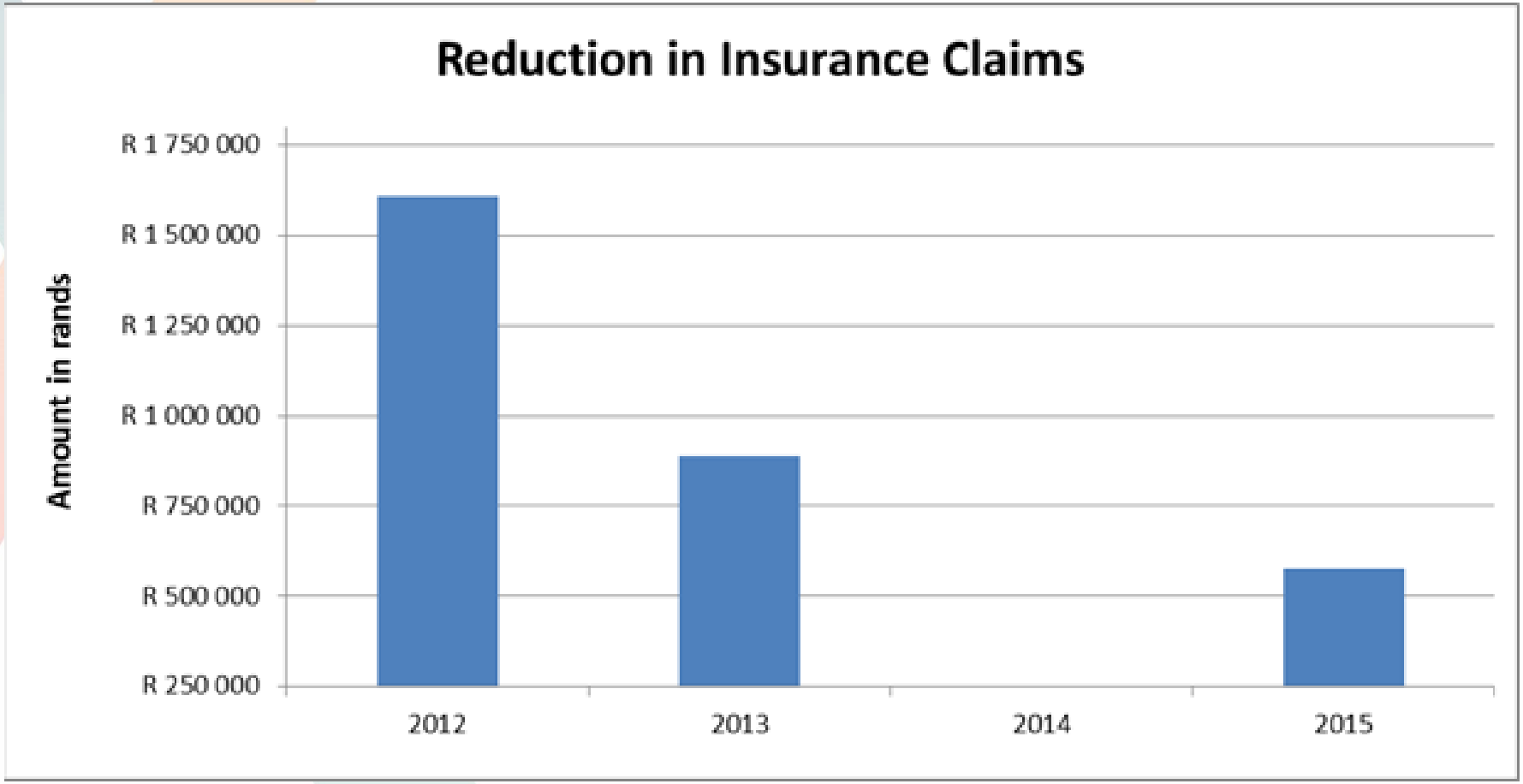
Carbon footprint improved by 24%

Cost savings on fuel =R5.7 Million

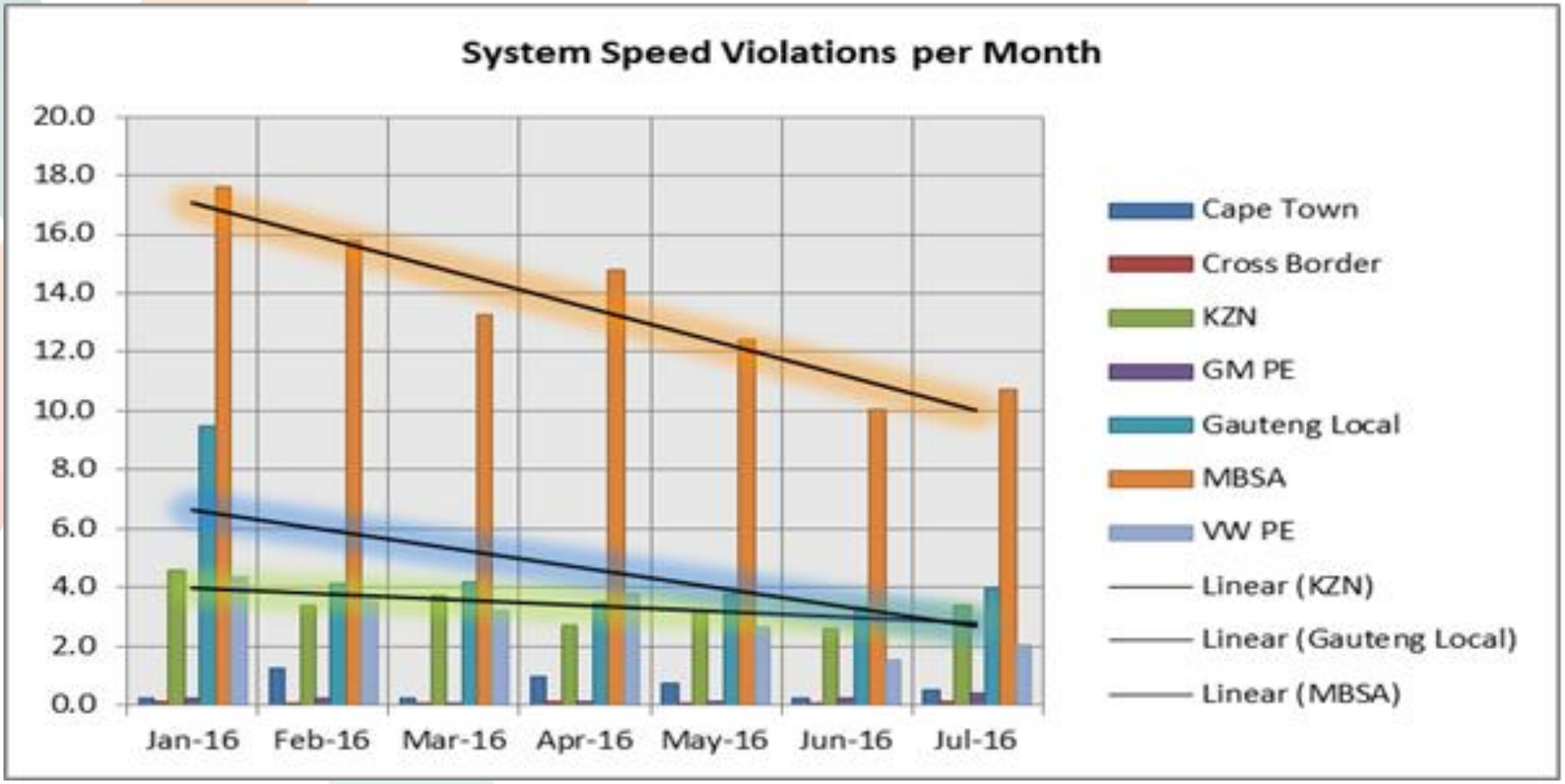
Cost savings on repairs and maintenance =R4.2 Million (2016FY)

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

ZZ2 (Tomato producers): Reduction in Insurance Claims



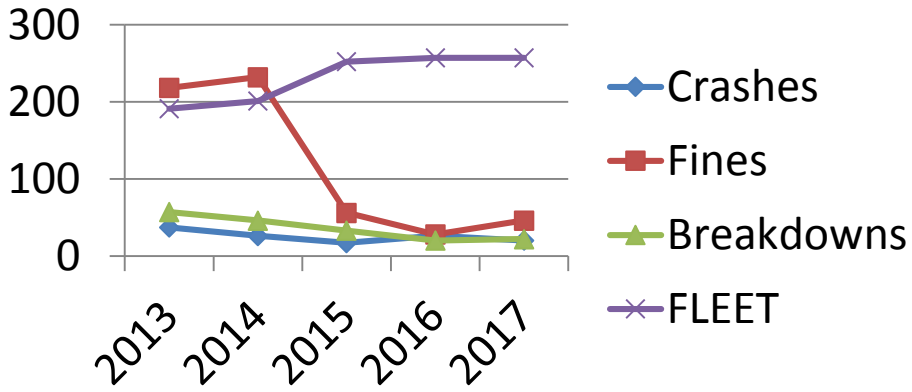
Vehicle Delivery Services: Reduction in Speed violations



POSITIVE RESULTS

DAWN LOGISTICS

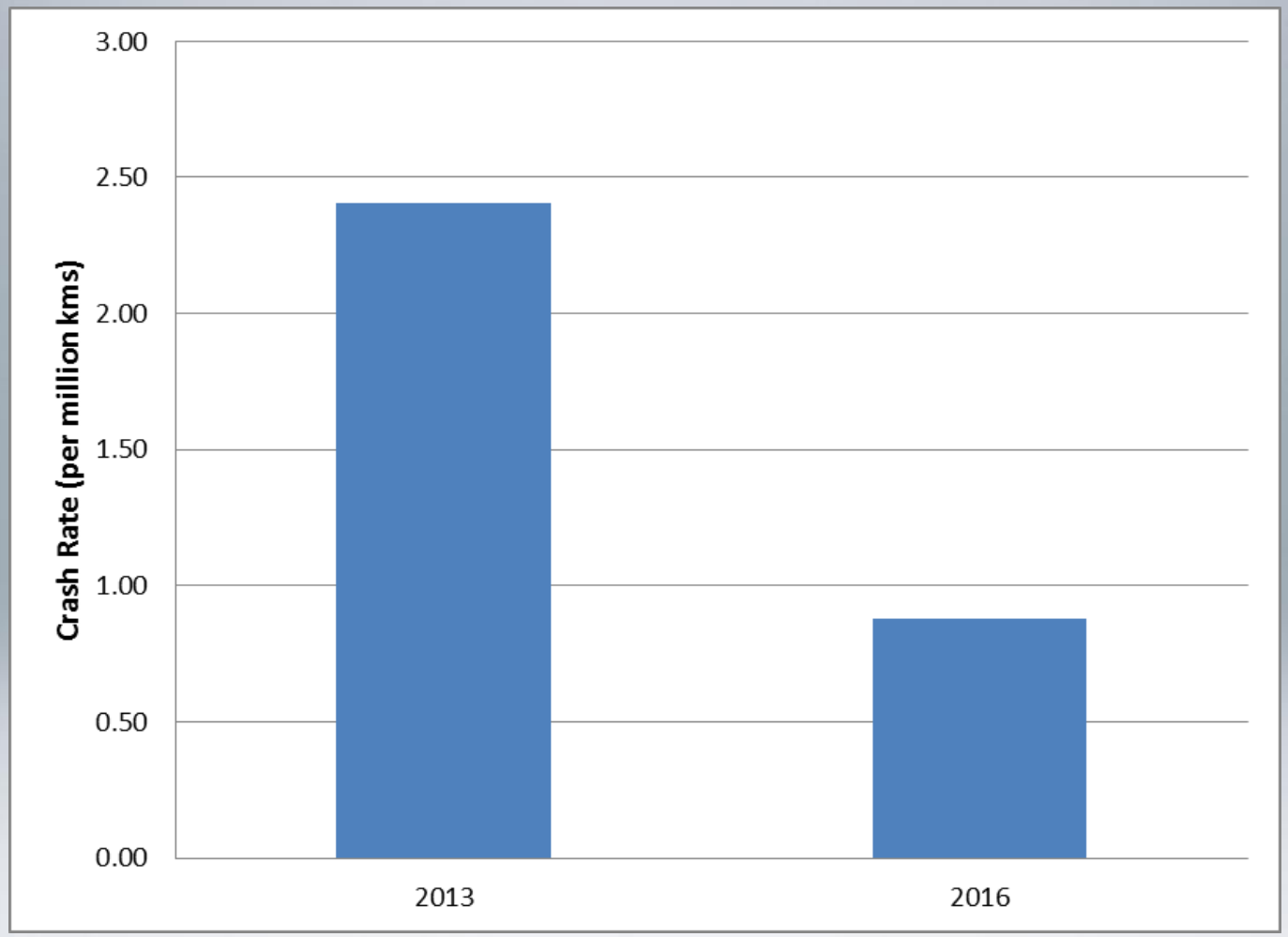
YEAR	FINES	CRASHES	DRIVER ERROR	BREAKDOWNS
2013	218	37	19	57
2014	232	26	11	46
2015	56	17	5	33
2016	48	26	4	20
2017	46	20	5	22



RTMS benefits: Crash reductions

- Barloworld Logistics: 66% reduction in the number of crashes in 2012 (owner driver fleet);
- Vehicle Delivery Services: 42% reduction in serious crashes from 2011 to 2012;
- Timber Logistics Services: 50% reduction in crashes and incidents from 2009 to 2012;
- The City of Cape Town, Electricity Support Services: 44% reduction in the number of crashes;
- Unitrans Amatikulu: cost of crashes reduced from 5.0% of revenue to 1.3% of revenue (reduction in the frequency and severity of crashes)

Crash rate of RTMS-certified fleets



2013/1: 24.1 million kms 2016/1: 94.2 million kms

Estimated savings per annum: R 114.9 million

SA Breweries E. Cape PBS combinations: Efficiency improvements

	Kms Travelled	Kms Saved	Hours on the road	Hours Saved	Fuel Used (ℓ)	Fuel Saved (ℓ)
Dec-16	33 250	13 253	621	248	23 940	3 962
Jan-17	74 642	29 720	1 477	588	55 059	7 558
Feb-17	63 854	25 519	1 245	497	46 564	7 060
Mar-17	82 108	32 349	1 614	636	60 497	8 117
Total	**253 854**	**100 841**	**4 957**	**1 969**	**186 060**	**26 697**
% Savings		**28.4**		**28.4**		**12.5**

Smart Truck Pilot Project: Impact

TOTAL TRIPS SAVED PER YEAR **74 067** trips	**22 %**
TOTAL FUEL SAVED PER YEAR **R 26.64 M**	**12 %**
TOTAL km SAVED PER YEAR **8 693 848** km	**22 %**
GREENHOUSE GAS EMISSION **6 246** tons CO2 / year	**12 %**
ROADWEAR REDUCTION **R 24 448** per vehicle / year	**13 %**
ACCIDENTS PER MILLION km **1.37** vs **2.24** for baseline vehicles	**39 %**

Note: Statistics are reported as at June 2017

Brian Keating paraphrased:

My question is one of bringing data

When people became philosophical or confused

Feynman used to say:

"Shut up and calculate"

This meant that stories, dreams, philosophies doesn't matter

What mattered were the answers at the end of a calculation

Professor BRIAN KEATING is an astrophysicist with the University of California San Diego's Department of Physics.

https://www.edge.org/conversation/brian_g_keating-shut-up-and-measure