SOUTH AFRICAN PORT CAPACITY AND UTILISATION REPORT

2015/16

PUBLIC CONSULTATION ROADSHOW

DISCUSSION DOCUMENT

Comment is invited via written submission by: 30 June 2016, addressed to: The Chairperson, Ports Regulator, Private Bag X54322, Durban, 4000

Or email submissions to: info@portsregulator.org.

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Acronyms

ATS – Across the Ship Rate
CAGR – Compound Annual Growth Rate
CBM – Conventional Buoy Mooring
CTCT – Cape Town Container Terminal
DCT – Durban Container Terminal
FDM – Freight Demand Model
GDP – Gross Domestic Product
GCH – Gross Crane Moves per Hour
GRT – Gross Registered Tons
LTPDF/P – Long Term Port Development Framework/Plan
MDS – Market Demand Strategy
MOPS – Marine Operator Performance Standard
MTSF – Medium Term Strategic Framework
NCT – Ngqura Container Terminal
NPA – National Ports Authority
NPCC – National Port Consultative Committee
PCC – Port Consultative Committee
PECT – Port Elizabeth Container Terminal
RAB – Regulatory Asset Base
Roro – Roll-on, Roll-off
RTG – Rubber Tyre Gantry
SBM – Single Buoy Mooring
STS – Ship to Shore crane
SWH – Ship working hour
TEUs – Twenty Foot Equivalent Unit(s)
TOPS – Terminal Operator Performance Standard
TPT – Transnet Port Terminals
UNCTAD – United Nations Conference on Trade and Development
VTS – Vessel Traffic Service
WACC – Weighted Average Cost of Capital

"There are a lot of insufficiencies to measure port capacity due to ….the sheer number of parameters involved; the lack of up to date, factual and reliable data which are collected in an accepted manner and available for publication or divulgation, the absence of generally agreed and acceptable definitions, the profound influence of local factors on the data obtained and the divergent interpretations given by various interest to identical results…..port performance and capacity cannot be determined by only one indicator or by a single all-encompassing value. The complexity of port operations and in particular the interaction between various essential elements such as the efficiency with ships, equipment and labour utilised, make it compulsory to rely on a set of indicators if one wants to arrive at an accurate and meaningful evaluation of a ports performance" Park, Yoon & Park (2014: 176).

1. Introduction

Economic regulation aims generally to address market failures or monopoly behaviour where there are no effective competitive conditions to set efficient prices in the provision and maintenance of infrastructure.

Economic regulation generally must protect the users and infrastructure owners by creating an enabling environment characterised by openness, transparency, inclusivity and due process. Critically, economic regulation must bring about allocative and/or productive efficiencies as well as open up market to appropriate competition or competitive conditions through coherent regulatory framework and tariff determination processes.

In the case of the South African ports regulation, the National Ports Act of 2005, establishes the Port Regulator of South Africa as an independent agency of the Department of Transport with the following mandates: to exercise economic regulation of the ports system in line with government's strategic objectives; promote equity of access to ports and to facilities and services provided in ports; and monitor the activities of the Authority to ensure that it performs its functions in accordance with the Act.

The Regulator has progressively aimed to improve benefits in the port system for port users, industry and the broader South African economy and has been balancing tariffs from their historically high levels, with tariffs increasingly being rationalised; the regulatory trajectory is proactive, moving towards a fair tariff incidence in the future.

This process in turn is affected by the capex programme of the Authority which is an important factor in ensuring not only that there is capacity in the system but also affects port pricing by influencing tariffs.

This report does not subsume the Authority's function for "planning, construction, development and maintenance of ports" as per section 68 of the National Ports Act. Instead the report will represent an assessment of NPA published port capacity and analysis of its utilisation so as to:

- Establish capacity levels in the SA port system
- Analyse the extent to which this capacity is utilised
- Reflect on performance of SA terminals as it relates to the use of the infrastructure and projected demand in the form of volumes
- Reflect on planned capacity to meet projected demand whilst reflecting on trends in previous years.

As a discussion document which provides and disseminates information, this report will:

- Facilitate discussions with the Authority, port users and industry players on the role of and treatment of capex in the Regulatory Framework;
- Lead to the development of commonly accepted measures for port capacity and utilisation levels as they influence and impact on the possible capacity expansions and the tariff manual's envisaged port efficiency measures; and
- Contribute to the definition of what is used and useful capacity as it relates to the Regulatory Asset Base.
- Be the basis, for benchmarking the performance of South African port terminals. This will be alongside the Authority's Performance Standards with Terminal, Marine, Road and Rail Operators known as TOPS, MOPS, HOPS and ROPS respectively.

The discussion document is structured as follows:

The mandate of the Regulator for infrastructure and efficiency regulation is outlined and briefly discussed in Section 2 which provides a background and outlines the strategic and necessary link between the Regulator's assessment of South Africa's port capacity and productivity with the tariff reform process and thus the relevance of the Authority's capex to the regulatory processes. The section summarily highlights concerns with the capex programme without repeating the complexities in the South African port pricing and tariff system which are adequately covered respectively in the Regulatory Manual for Tariff Years 2015/16 – 2017/18 and the Tariff Strategy for the South African Ports System 2015/16 documents *(for more on these access: www.portsregulator.org/economic and follow links to tariff methodology and tariff strategy documents)*.

Section 3 focusses on an assessment of the Authority's capacity and utilisation rates in relation to both performance or productivity and planned capacity in the five different cargo handling types, starting with defining and setting a common basis for capacity and utilisation.

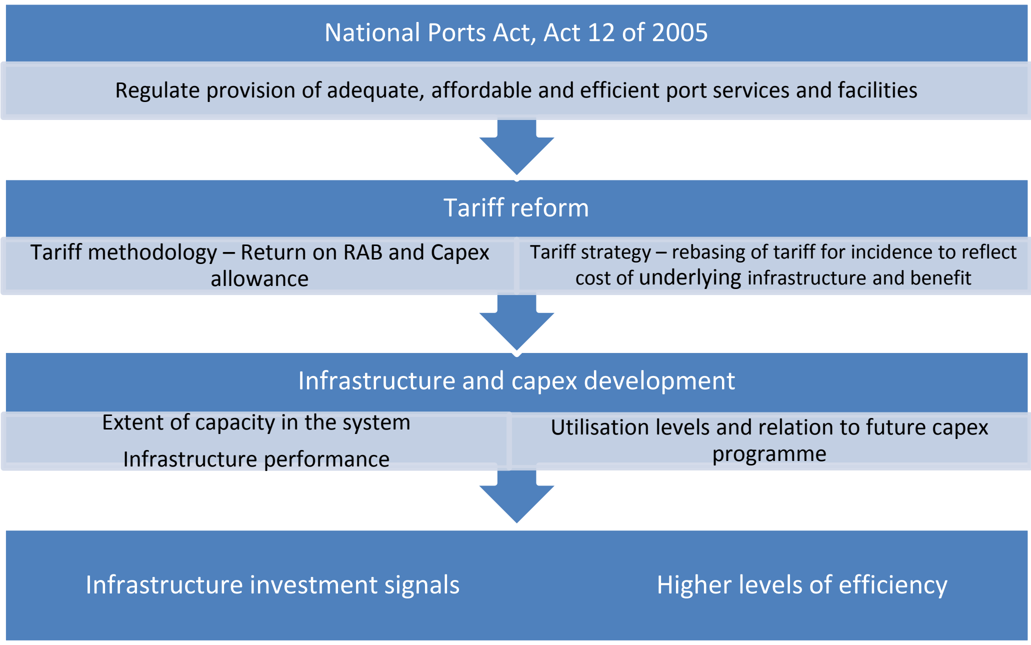
Section 4 summarises and concludes on the discussed capacity and utilisation and highlights the various areas for further investigation by the Regulator in consultation with the NPA and port users.

Due to the long history of the development of the port system in South Africa, this report cannot be, and is not intended to cast judgement on the Authority, and port operators, public or private; but should rather be used as a baseline for improvement where necessary, and an acknowledgement of excellence where relevant.

2. The Ports Regulator of South Africa's Mandate for Infrastructure and Efficiency Regulation

The mandate of the Regulator for infrastructure and efficiency regulation emanates from the National Ports Act, Act 12 of 2005, (the Act) particularly section 30 which, in defining the functions of the Ports Regulator of South Africa (*the Regulator*), requires the Regulator in subsection (2) (f) to "…regulate the provision of adequate, affordable and efficient port services and facilities."

Figure 1: Mandate, functions and objectives for infrastructure regulation



To carry out its mandate effectively, with available resources and capacity, the Regulator began a tariff reform processes to improve port pricing, efficiency and access in the SA system with a particular focus on creating certainty in port tariff setting by defining a process for determining the Authority's Required Revenue.

The *"Regulatory Manual for Tariff Years 2015/16 – 2017/18"* is a multi-year tariff methodology to determine the Required Revenue as applied for by the Authority over a three year period. The multi-year tariff methodology process will enable the Regulator to **balance** the need to support **infrastructure provision** in meeting the country's current and future needs with ensuring that the **right infrastructure investment signals** are sent and that the NPA manages port operations/operators to achieve **higher levels of efficiencies.**

With regard to infrastructure, and in line with the Directives[1] issued in terms of Section 30 of the Act, the Regulatory Manual allows the NPA to earn a return on the Regulatory Asset Base and an allowance for capex spending in the form of capital works in progress as it is allowed to:

- Recover its **investment** in owning, managing, controlling and administering ports and its investment in port services and facilities;
- Recover its **costs** in owning, managing, controlling and administering ports and its investment in port services and facilities; and
- Make a profit commensurate with the risk of owning, managing, controlling and administering ports and its investment in port services and facilities.

Feedback from stakeholders and port users through the Port Consultative Committee (PCC) in compliance with the Regulation (15)(1) – (30) and submissions to the Regulator in its stakeholder consultation/workshops on the Authority's application inclusive of capex projects, shows that stakeholders are not entirely happy with the methodology because it does not provide any incentive for the Authority to reduce costs or improve efficiency as it ensures that it (Authority) recovers its full costs and profits which may be high due to inefficiencies.

Cognisant of this challenge, the methodology addresses itself to the question of an appropriate return allowed to the Authority whilst the Tariff Strategy envisages a Phase 3 where the Regulator will undertake regulatory re-design which may include the adoption of an alternative tariff methodology that may be required.

With a mandate to ensure port pricing efficiency and efficient use of port assets, the Regulator must, as part of its current activities and beyond, in allowing the Authority to earn a return, also identify and conduct an assessment of the utility's capex programme, and be satisfied that adequate infrastructure is provided at the right time, that it is used productively and efficiently, and that there is appropriate phasing of additional capacity.

The Regulator has to date never disallowed any capex applied for. It has only disallowed expenditure towards the acquisition of the old Durban International Airport and related costs (because the site has not been promulgated as a port in terms of the Act), operational expenditure for the operationalisation of Ngqura Manganese terminal, and in the recent ROD the removal of property outside of port land with the associated rental from the RAB. The Regulator has, instead, clawed back what the Authority underspent amounting to R8.6billion of capex and the associated return on it over the past 6 years, in fairness to port users.

[1] Directive 23(2)

The Regulator is also in the process of conducting a valuation of main assets in the different asset classes in the RAB to develop valuation methodologies for these which will address the perennial problem of the acceptable value of the Authority's starting RAB. The project will develop a valuation methodology manual to guide future valuations of the different asset classes by the Authority.

The question of "used and useful" assets that an infrastructure regulator must contend with, will also be addressed in the valuation project. This reports focusses on the other element which is an assessment of the extent to which port terminal capacities are currently used and so partly informs the required future capacity, and a broad sense of when capacity might be required.

3. SA port capacity and utilisation

Port capacity refers to the maximum traffic a terminal can handle in a given scenario i.e. the maximum amount of throughput that can be handled at a terminal (potential production capacity) whereas capacity utilisation is the actual production output as a percentage of the potential production capacity i.e., the proportion of capacity actually used in a given period, expressed as a percent. Berth and terminal area represents, alongside installed cargo handling, operational systems and labour, the static and dynamic capacity in a terminal. Generally, the physical berths are static, in the short term, determining the size of vessels that can be accommodated. Terminal area capacity is dynamic, affected by operational and technological changes i.e. terminal operating equipment, technology and systems to allow higher stacking and/or increasing number of containers per unit area of terminal or stockpiling area for dry bulks or storage/parking in the case of Ro-ros. It is generally accepted that when berth capacity utilisation exceeds 70% to 80% of available capacity it becomes more costly to conduct and handle additional trade through a port. Vessel waiting times generally increases and associated cost rise exponentially and would rapidly grow to become unacceptable unless additional berth capacity is introduced. An outline of the overall system capacity is presented below after which the capacity and utilisation levels per cargo handling types is described and analysed.

3.1. Capacity in the overall system

The capacities in South Africa's port terminal for the five different cargo handling types (container, vehicle (ROROs), dry bulk, break bulk, and liquid bulk cargoes) are summarised Table 1 as extracted from the Authority's Long Term Port Development Framework (2013).

Table 1: Overall capacity in SA terminals - all cargo handling types

All cargo handling	Terminal area(ha)	Total Berths	Usable berths	Berth Length(m)	Design Capacity(TEUs, Units, Million tons) per annum	Installed capacity (TEUs, Units, Million tons) per annum	Latent (under) capacity
Container	367	18	18	5 590	8 013 000	4 790 043	3 222 957
Roro	66	7	5	2 050	850 000	681 041	168 959
Dry Bulk	535	30	25	8 081	229 084 000	187 666 802	17 782 802
Break Bulk	231	40	37	6 476	32 513 153	17 344 903	15 168 250
Liquid Bulk	419	18	17	3 715	66 451 207[2]	26 141 684	40 309 523
Total	1 618	113	102	25 912			

Compiled from Long Term Port Development Framework (NPA) 2013.

Across all the cargo handling types in the port system, there is latent or excess capacity which is the difference between design and installed capacity across the system. Overall, the highest level of spare capacity is in liquid bulk terminals with 61% latent capacity – due to inclusion of SBM/CBM volumes,

[2] This includes volumes handled throughSBM and CBM in Durban and Mossel Bay.

followed by breakbulk (47%) and container terminals (40%). With 20% and 18% latent capacity respectively, the Roro and Dry-bulk terminals demonstrate the least amount of latent capacity. Terminal capacity includes seaward infrastructure (light houses service infrastructure, port control and safety, entrance channels, breakwaters, turning basins, aids to navigation, vessel traffic services, maintenance dredging; landward infrastructure (quay walls, back of port operational space, storage and stockpiling area, roads, rail lines, buildings, fencing, port security, lighting, bulk services); and sea-land interface (berths and quays). Due to the common- user nature of some of seaward infrastructure, a comprehensive breakdown and assignment of the value of the asset base and infrastructure to each cargo handling type in not entirely feasible, at a detailed level, although the tariff strategy has apportioned a share thereof along the four port user types; shipping lines, cargo owners, terminal operators and all other lessees in the port system.

3.1.1. Container terminal capacity

A port by port breakdown of the container capacity given previously is captured in Table 2 for dedicated container terminals. Berth length and draught determine the sizes of vessels the terminals can handle and how heavily they can be loaded. The ability to handle cargo from a vessel is dependent on the number of cranes available, through hourly throughput capability of those cranes and the availability of the cranes.

Table 2: Container Terminal Capacities

Port	Berth Length	Total berths	Usable berths	Draught	Vessel sizes that can be accommodated (length x width x draught)	Design Capacity (TEUs pa)	Installed capacity (TEUs pa)	Latent capacity	Crane numbers
Durban	2 578	8	7	8.2 – 12.3	Container Panamax – 4 500 TEUs (240m x 32m x 12.0m)	3 020 000	3 020 000	0%	22
East London	506	0[3]	2	10.7		93 000	53 390	43%	-
Port Elizabeth	635	2	2	12.2	Post Panamax x 6 600 TEUs (305m x40m x 14m)	600 000	325 211	44%	5
Ngqura	720	4	3	16.5	Ultra Large 15 000 TEUs 400	2 800 000	491 442	75%	10
Cape Town	1 151	4	4	12.8 to 15.5	Post Panamax 6 600 TEUs (305m x 40m x 14.m	1 500 000	900 000	40%	8
Total	5 590	18	18			8 013 000	4 790 043	49%	45

[3] Container volumes at the port of East London are handled at two multi-purpose berths thus exclusion of total and usable berths in this section.

The capacity numbers in all the tables drawn from the NPAs Long Term Port Development Plan shows the terminals in the port of Durban have reached capacity with installed capacity equalling design capacity. This is in stark contrast to the port of Ngqura whose container terminal's installed capacity is significantly below design such that it operates with 75% latent capacity. The other terminals are operating at almost half of the determined designed capacities, which means except at the port of Durban, there is significant excess container terminal capacity. Capex applied for with regards to container terminal expansion, outside the port of Durban, cannot therefore be easily justified without determining how much of this capacity can be made available in the system through performance and efficiency improvements.

The Ngqura Container terminal accounts for the highest proportion of latent capacity. The depth of a berth, or draught, is an important aspect of a terminals capacity as it determines the size of vessels that can call at a port and ultimately the extent to which a terminal is used. In the Port of Durban, the berths at Pier 2 (berths 202 – 205), are the primary container terminals with a published maximum depth of -12.3m. Pier 1 comprises berths 105 – 107 with a published maximum depth of -12.1m. In addition to allowing easy passage for 4 500 TEU vessels (generally 240m x 32m x 12m), the terminal can and handles bigger vessels on tide or not fully laden.

The following large vessels called at the four dedicated container terminals in 2013:

- Durban: *MSC Fabiola (140,259grt), MSC Luciana, and MSC Ivana (both 131,771 grt)*
- Port Elizabeth: *Maersk Labrea and Maersk Lota (89,505grt)*
- Ngqura: *MSC Fabiola (140,259grt); MSC Luciana and MSC Ivan (131,771grt)*
- Cape Town: *MSC Susanna and MSC Joanna (107,849)*

Port infrastructure requires long lead times before additional capacities can be created when required which requires high levels of diligence and conscientiousness in assessing capacity development plans submitted by the Authority for consideration by the port users (in the PCCs and NPCC specifically) and through various other forums available for influencing the Authority's capex programme. The Regulator recognises that not all capacity that seems to be latent will be usable.

For example, there are low levels of utilisation of container terminal capacity at the port of Port Elizabeth which may be linked to a combination of the depressed economic conditions affecting that port's hinterland and thus container traffic on the one hand, and critically the proximity of the port of

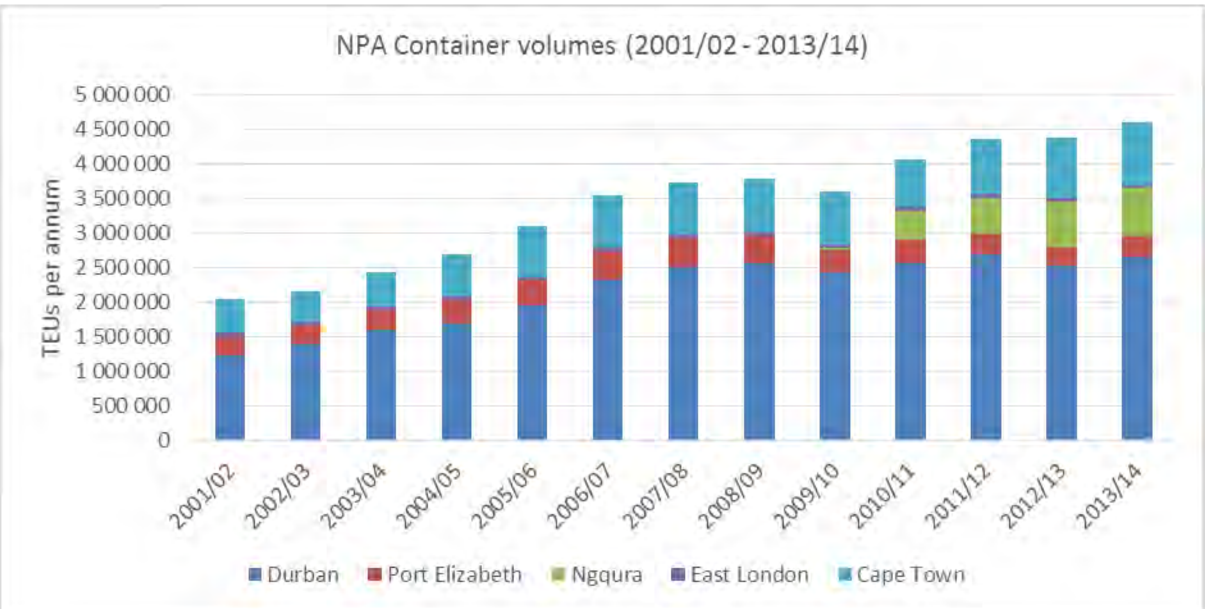
Ngqura and how this would affect vessel calls to Port Elizabeth especially with Ngqura being a deep water port attracting larger vessels which would not be able to call in port Elizabeth. A regulatory concern that starts to emerge, is one of appropriate levels of excess infrastructure that should be allowed for in the system, in supporting the provision of capacity ahead of demand. A container sector strategy that identifies and addresses the trade off in the development of container terminals in servicing their hinterlands and as part of the broader complementary port system is needed.

3.1.2. Container terminal capacity and volumes

With more than 90% of trade moving through the ports, the Authority, in carrying out its mandate of developing South Africa's commercial ports, provides capacity to meet not only current but future demand, to ensure that ports continue to support the country's economy. As alluded to earlier in the introduction, in developing terminals to meet demand, a balance has to be struck between providing infrastructure to meet demand, and optimising non-infrastructure parameters to address capacity, i.e. improved productivity and efficient use of infrastructure and superstructure. Figure 2 summarises the use of South African container terminals through the prism of volumes and terminal throughput.

Due to its relative proximity to the Gauteng hinterland and economic hub of the country, the port of Durban is one of the main drivers of container traffic, followed by the port of Cape Town which services a major economic region in the country.

Figure 2: Historical container volumes (2001/02 to 2013/14)



The number for Ngqura is from 2009/10 when the terminal was first operationalised.

Volume growth has been on a rising trajectory having more than doubled in the decade from 2001/02. The accompanying compound annual growth rate for containers was 6.97% (see Table 3). Although the port of Ngqura has registered the highest growth rate, this has been from a very low base where less than 50 000 TEUs were handled by the terminal when it was operationalised in November 2009.

Table 3 which captures 12 year historical compound annual growth rate (CAGR) for container traffic in each of the container terminals shows during this time, overall growth has been driven by the ports of Durban (6.65%) and Cape Town (5.17%).

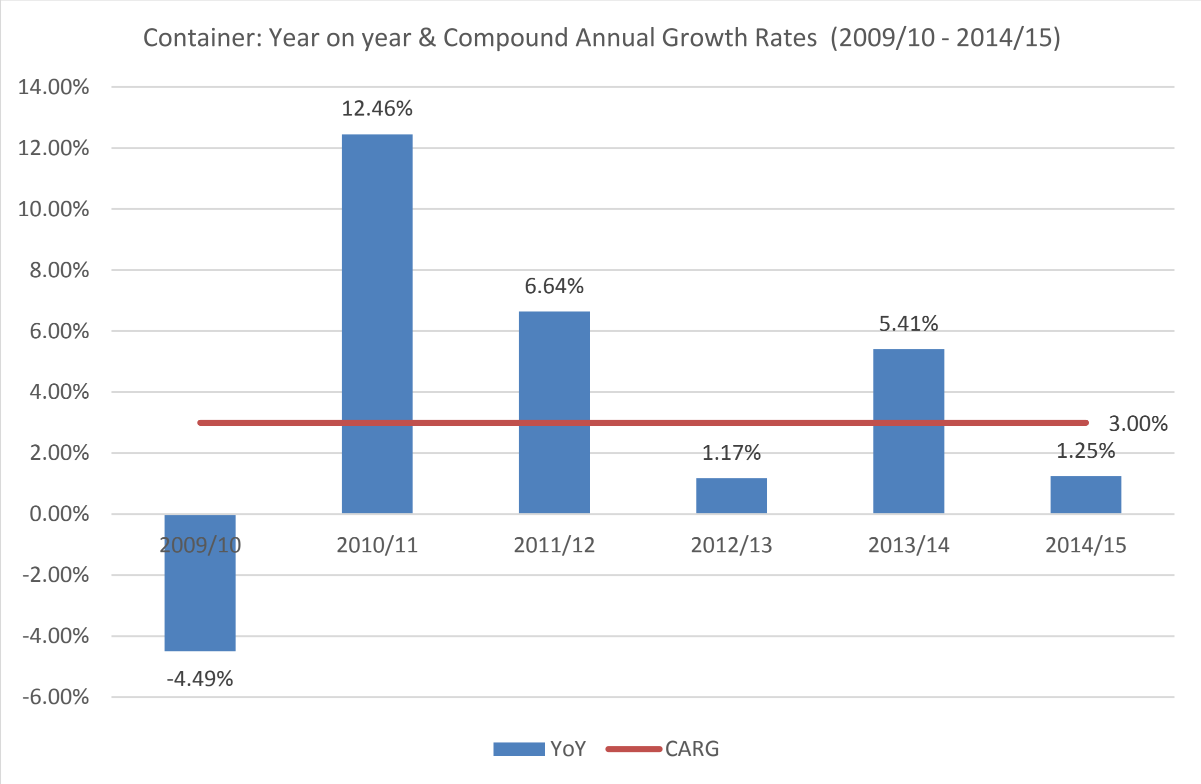
Table 3: Historical Compound Annual Growth Rate for Container traffic per port (2001/02 - 2013/14).

Port of	2001/2002 TEUs	2013/14 TEUs	CAGR
Durban	1 228 493	2 660 146	6,65%
Port Elizabeth	261 957	291 233	0,89%
Ngqura	34 533*	713 306	113,19%
East London	68 674	41 080	-4,19%
Cape Town	496 036	907 796	5,17%
Total	2 055 160	4 613 561	6,97%

- Operations only started in November 2009/10.

Volumes from the port of Port Elizabeth and East London have been consistently on the decline, in contrast to the optimistic projections of future volume growth for this two ports reported later in Figure 4. The significantly high CAGR number for the Port of Ngqura reflects the low base from which this port started in November 2009/10 where the 34 533 TEUs it handled set a baseline against which future increases would be measured.

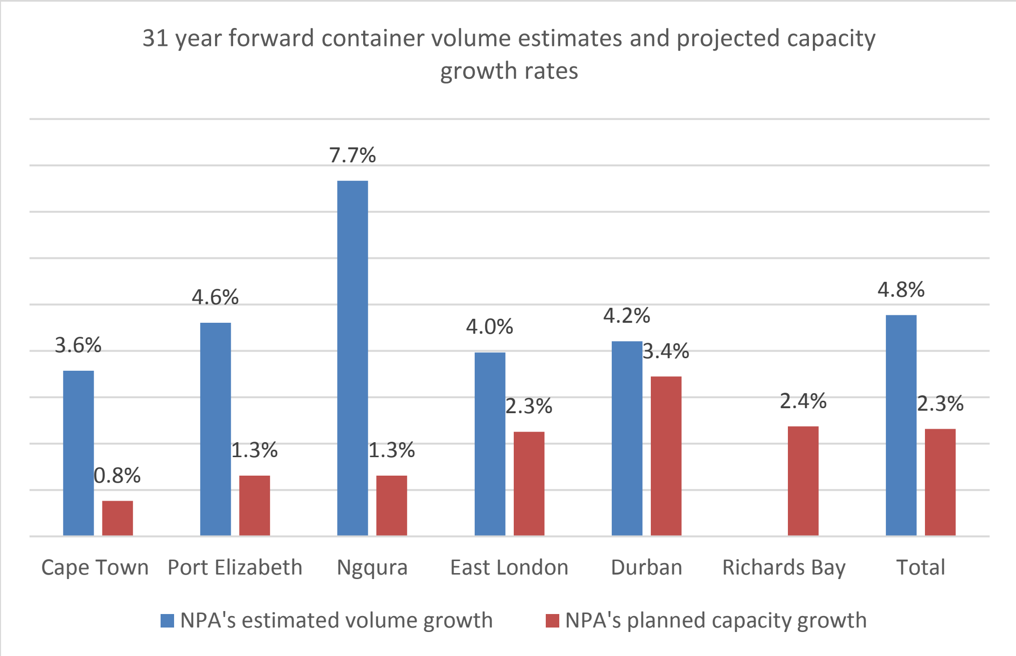
Figure 3: Container volumes: Year on year and Compound Annual Growth Rates (CAGR) 2009/10 – 2014/15.



Overall, the Authority projects container volumes to grow from the current 4 million TEUs per annum to about 17 million TEUs by 2042. This level of capacity planning is based on a projected 4.8 % (see **Figure 4)** annualised growth rate for container traffic up to 2041/42. Considering that most of the ports currently handling more than 10 million TEUs are in countries where economic growth rates exceed South Africa's growth rate, 17 million TEUs by 2042 may seem too optimistic a number. This projections may be supported by the 6.9% historical rate in **Table 3,** including the high growth years from 2004/05 to 2007/08 which correlated with amongst the highest GDP growth years in SA.

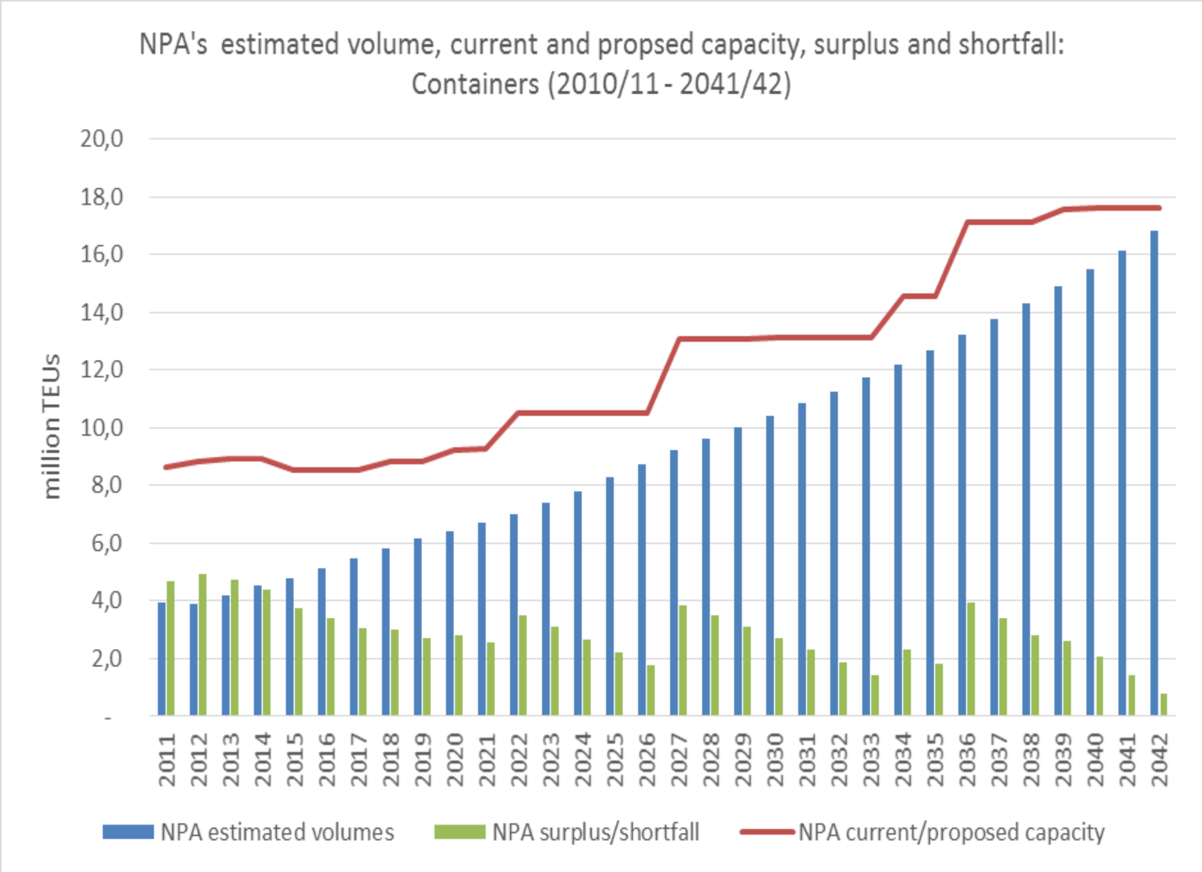
Figure 4 reflects this projected compound container volume growth rates over a 31 year period up to 2041/42 per Container Terminal and the required proportional increase in capacity to meet demand for the projected volumes. More volumes are projected for the port of Ngqura relative to the other ports whose volumes are also projected to grow. As highlighted earlier, volume projections for the port of Port Elizabeth are not consistent with this port's historical performance. In 2015/16 the National Port Consultative Committee, after considering recent trends, supported the Authority's decision to put on hold the planned deepening of container terminal berths until such time that volumes and related developments will justify such investments. Similarly, the port of East London's volumes are projected to grow by 4% over the period, suggesting a reversal of the -4.19% CAGR of the past 12 years and growth thereon. Although there is currently no dedicated capacity for container handling in the Port of Richards Bay, the Authority's plans suggest that in the long run container capacity may be provided for in this port.

Figure 4: Compound container growth rates and planned capacity to meet growth



Future volumes and capacity requirements are summarised in Figure 5 below. Capacity is captured in the red line, which reflects current capacity and periods in the future where additional capacity will be required. As it is impractical to provide for infrastructure for a marginal unit of volume at a time, providing capacity ahead of demand means the green bars (which reflect surplus capacity in the system) will always be a feature of this type of graph. Questions to be considered relate to the size of the bars, in terms of both tariff (affordability to users) and what capacity is required for ports to continue to play their role in supporting trade and South Africa's economy. It is important that the drivers of port specific plans, assumptions about regional/hinterland growth that would support the projections as well as the role of each port in regional as well as global trade be made clear. The Authority's planning principles are informed by these, amongst other considerations, and articulation of these in a comprehensive container terminal strategy will assist development.

Figure 5: Overall container capacity and volume (2010/11 – 2041/42)



The following projects are in the Authority's future plans:

- 2019: Port of Port Elizabeth - The Charl Malan Quay becomes available for handling containers, taking capacity from 600 000 TEUs to 900 000 TEUs per annum.
- 2020: Port of Durban - Completion of the deepening and lengthening of the North Quay which will increase capacity from 3,5million to 3.9million TEUs per annum. An additional 400 000 TEUs per annum.
- 2022: Salisbury expansion by 2 new berths, taking capacity to 5.1million TEUs per annum (additional 1.2m TEUs).
- By 2027: Port of Durban - Phase 1 of the DigOut[4] Port completed increasing capacity to 7.7million TEUs.
- 2034: Port of Ngqura - 4 new berths adding 1.4million TEUs.

[4] The Regulator has excluded the cost of the Durban Dig-out port from the Regulatory Asset Base because it has not yet been proclaimed as part of the South African commercial ports system, and therefore does not fall under its economic regulation jurisdiction and thus tariffing mandate.

- 2039: Port of Cape Town - An additional berth at the Container Terminal adding 400 000 TEU capacity.

The planned additional capacity is based on combined capacities of the ports of Cape Town, Port Elizabeth, Ngqura, Durban, and Richards Bay. The assumptions are that the Salisbury Island Infill project for Durban will continue; if it does not happen then the first phase of the Dig-Out Port will be operational at the end of 2024 with the second 4 berths by 2033, although only 2 would be required until 2042. The infilling of Salisbury Island would push the Dig-Out Port's first 4 berths to 2029 and the rest to 2039. The 2016/17 application by the Authority to the Regulator, includes the following major container terminal projects to expand capacity over the next seven years:

- Execution of the Pier 1 Phase 2 infill - Salisbury Island;
- Durban Container Terminal deepening (Berth 203 – 205);
- Operationalisation of the port of Ngqura for container handling (automated mooring system D101 – 103); and
- Container berth expansion (4 berths and extension of breakwater and sand-bypass).

These interventions are meant to maintain current capacity up to 2018/19 where it will grow by another 400 000 TEUs in 2019/20 and 10,143 million TEUs in 2021/22 and beyond. In the immediate intervening period, the difference between capacity and use of the terminals (discussed in the next section below) suggest that there is excess capacity that should be exploited before additional capacity is provided through new capex. The next section looks at how the current capacity is being utilised.

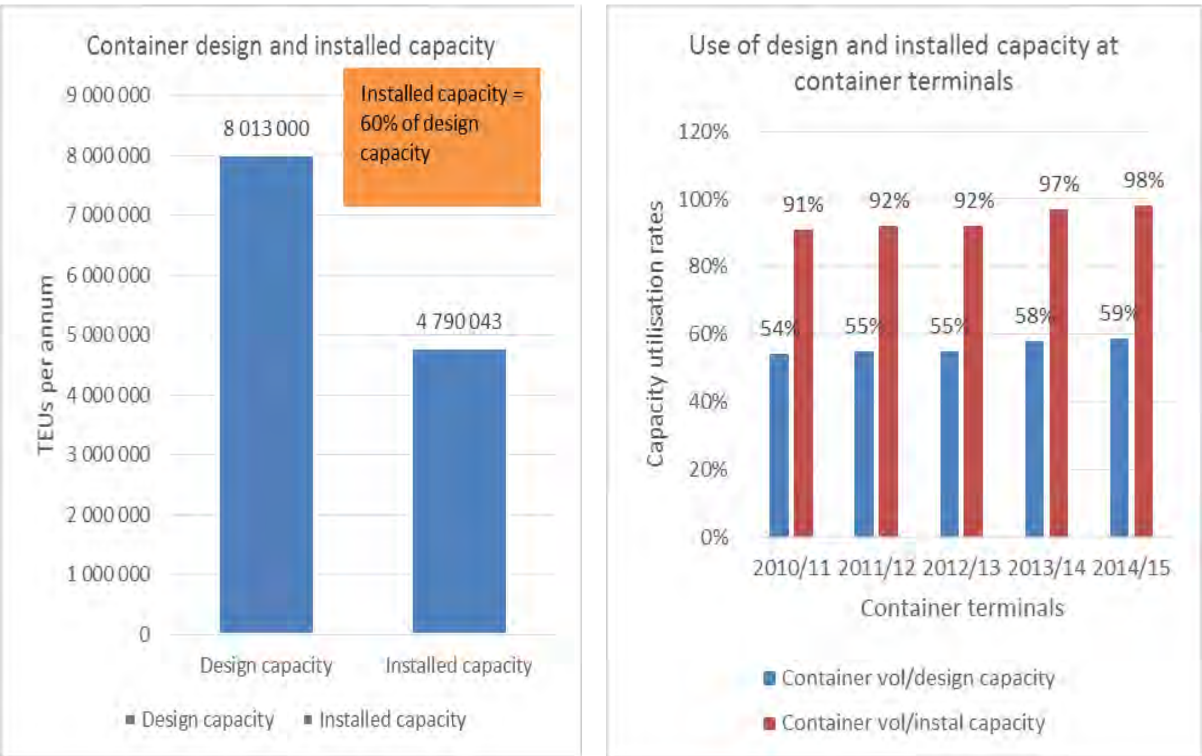
3.1.3. Container Terminal Utilisation

Due to the legislative framework pertaining to port economic regulation in South Africa, the Regulator effectively regulates port infrastructure with a lever to address operational performance as part of the broader mandate, to ensure an effective and efficient port system. On this basis, the utilisation of South African terminals is looked at from primarily an infrastructure perspective, hence consideration of capacity utilisation in terms of terminal design and installed capacities. The official numbers are obtained from the Authority's various planning documents (up to 2014), data submitted to the Regulator on request, as well as Transnet's official data as published in its Annual Reports since 2006.

Overall mapping of annual throughput at container terminal against design and installed capacity shows low levels of utilisation of design capacity, highlighting excess capacity in the system. In the previous iteration of this Report in 2014, the Regulator only looked at one year. The Table below confirms a general trend across the years. As alluded to earlier, this may be explained in the

Authority's approach of providing capacity ahead of demand; however, the variance in utilisation between design and installed capacity in the system is significant to warrant closer scrutiny of the causes.

Figure 6: Use of container terminal's design and installed capacity



Installed capacity in SA container terminals is 60% of the published design capacity. Of the installed capacity, annual utilisation computed from annual TEUs handled in the system shows that terminals are edging close to fully utilising installed but not design capacities. There is about 41% capacity in the system that is not utilised. Berth utilisation shows how productively or efficiently the terminals are used. The Regulator's previous report (2014/15) focussed on throughput per berth meter and terminal area, and container moves per ship working hour as an indication of productive and efficient use of terminals. This section presents results on the Regulator's analysis of trends relating to terminal performance as indicators of efficiencies in the system, namely: *moves per ship working hour* indicating how fast vessels can move in and out of South Africa's container terminals, thus how competitive South African terminals are viewed; *time spent by vessels at anchorage* as an indicator of delays, thus congestion in the system; *gross crane moves per hour*, measuring the moves per ship working hour contributing to the ship turnaround times; and *ship turnaround times*.

The Regulator will in future also undertake work to confirm the veracity or otherwise of the Operator Standards (Terminal, Marine, Road and Rail i.e. TOPS, MOPS, ROPS and HOPS) process, to have that data as input into research and future analysis of productivity and efficiency measures.

3.1.3.1. Container moves per ship working hour

There are various ways of calculating berth utilisation to arrive at how effective the berths are being utilised or berth productivity. The 2014/15 report focussed on throughput per meter of berth as well as throughput per terminal area, as covered in the methodology. This Report focuses on berth productivity as determined through moves per ship working hour/across the ship rate, as it relates to container terminals. All of the designated container terminals in South Africa are 24 hour operations and as per the tariff book, open for business 365 days in a year. The berth utilisation hours per annum for each terminal in Durban, Port Elizabeth, Ngqura and Cape Town is 8 760hrs with East London at 4 576hrs a year. In terms of the UNCTAD berth utilisation factors, the following utilisation rates were therefore established for the four terminals, as reflected in Table 4 .

Table 4: Container moves per ship working hour – based on design and installed capacities, 2013 performance and 6 year average

Container terminals	(1) Berth Utilisation hours (per annum, using UNCTAD factors)	(2)Ship rate based on design capacity (TEUs/hr)	(3) Ship rate based on installed capacity (TEUs/hr)	(4) 2012/13 ship rate (ATS) TEUs/hr based on throughput	(5) Actual ATS as per 2012/13 Annual Report (TEUs/hr)	(6) Reported Average Container moves per hour (6 years)
Durban	42 924	70	70	62	52	47
Port Elizabeth	9 636	62	34	30	40	39
Ngqura	15 768	178	31	45	55	47
Cape Town	24 528	61	37	37	54	49

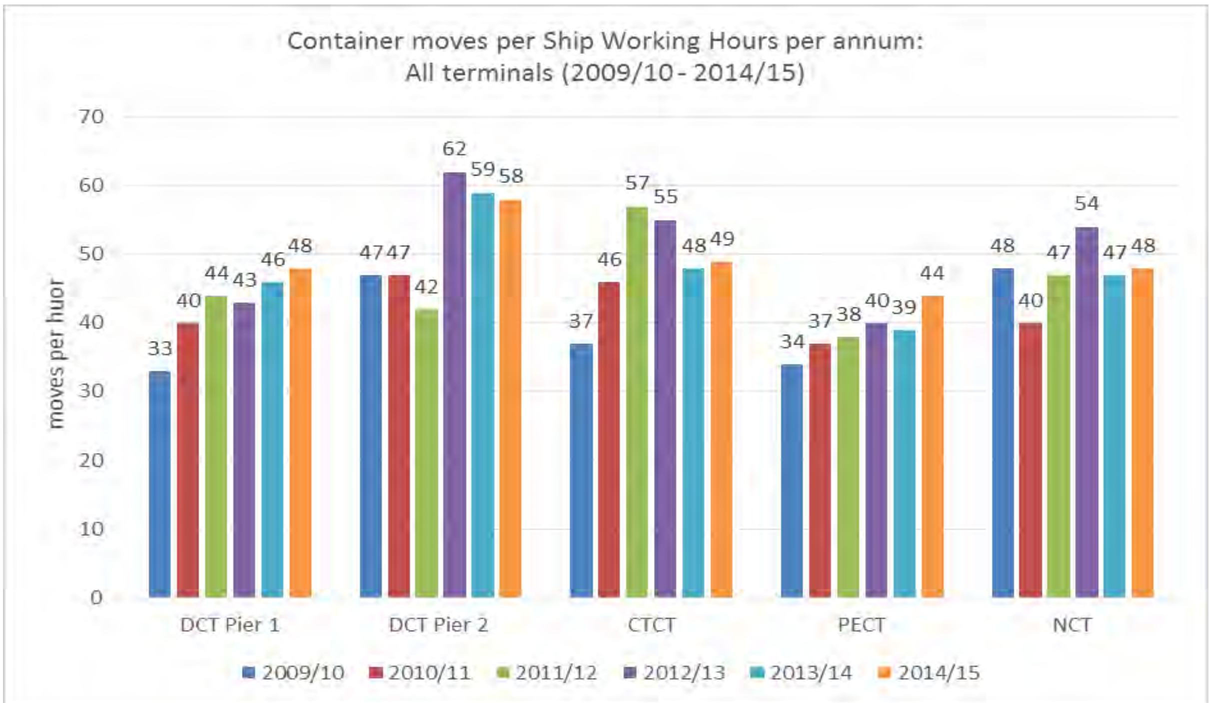
What Table 4 reflects is the number of hours that each of the terminals should be operating in a year given the number of berths and published operating hours, assuming they are appropriately resourced and managed. This is captured in the first column. The next two columns highlight what the moves per ship working hour should be based on design (2) and installed (3) capacity of the terminals. In the previous report, the container moves per ship working hours were determined based on 2013 throughput which is presented in (4) whilst (5) captures each terminal's performance as reported by the Authority. With this performance measure constantly reported on in the past 6 years, the last column presents the 6 year average (6). From an infrastructure point of view, column 2 and 3 sets the performance norm or benchmark for the respective terminals.

The port of Durban's performance results for 2013 is the closest to what it should be based on design and installed norms. Nevertheless, across the terminals, the container moves per ship working hour based on design capacity are significantly higher than what is obtained when annual throughput is used, meaning that if design capacity is used, even the better performing terminals fall short. With regards to installed capacity, only the port of Cape Town's container terminal performance is exactly where it should be in terms of its installed capacity. With the other terminals, the situation does not change significantly when comparing performance against installed capacity as the performance is still less than where installed capacity numbers requires it to be.

The results for the port of Ngqura shows how underutilised the container terminal capacity is, even though its performance is relatively better in relation to installed capacity. Overall, it would seem that more capacity can be provided in the system by improving the productivity of terminals.

The individual terminal's performance since 2009/10 as captured in Figure 7 shows a general trend of unsteady performance on container moves per ship working hour, save for DCT Pier 1 and the port of Port Elizabeth. Even though their performance dipped in 2013 and 2014 respectively, both terminal's performance has generally been improving year-on-year.

Figure 7: Container moves per ship working hour (ATS)

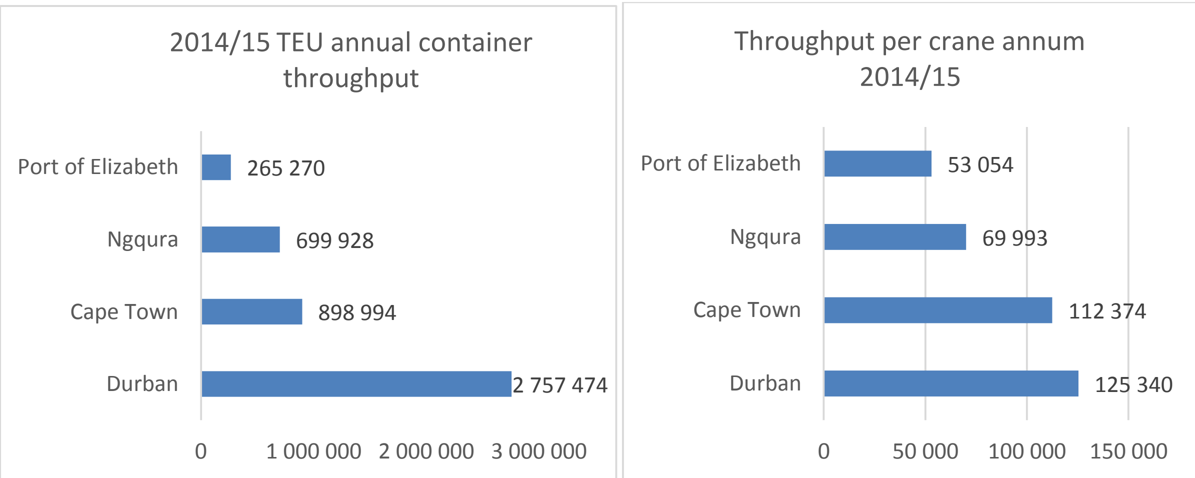


DCT Pier 2 and the Ngqura Container terminal, each handling the most containers per ship working hour in 2013, have not maintained improvements in their performance which has “see-sawed” instead over the period. Cape Town demonstrates the same unsteady pattern having handled the most average containers per ship working hour a year earlier in 2012. It is expected that there would be consistency or an upward trend, up to a point, in the performance of terminals which is not demonstrated in Figure 7. Next we look at terminal performance in terms of gross crane moves per hour, a measure for which a target has been set in government’s Medium Term Strategic Framework.

3.1.3.2. Gross crane moves per hour (GCH)

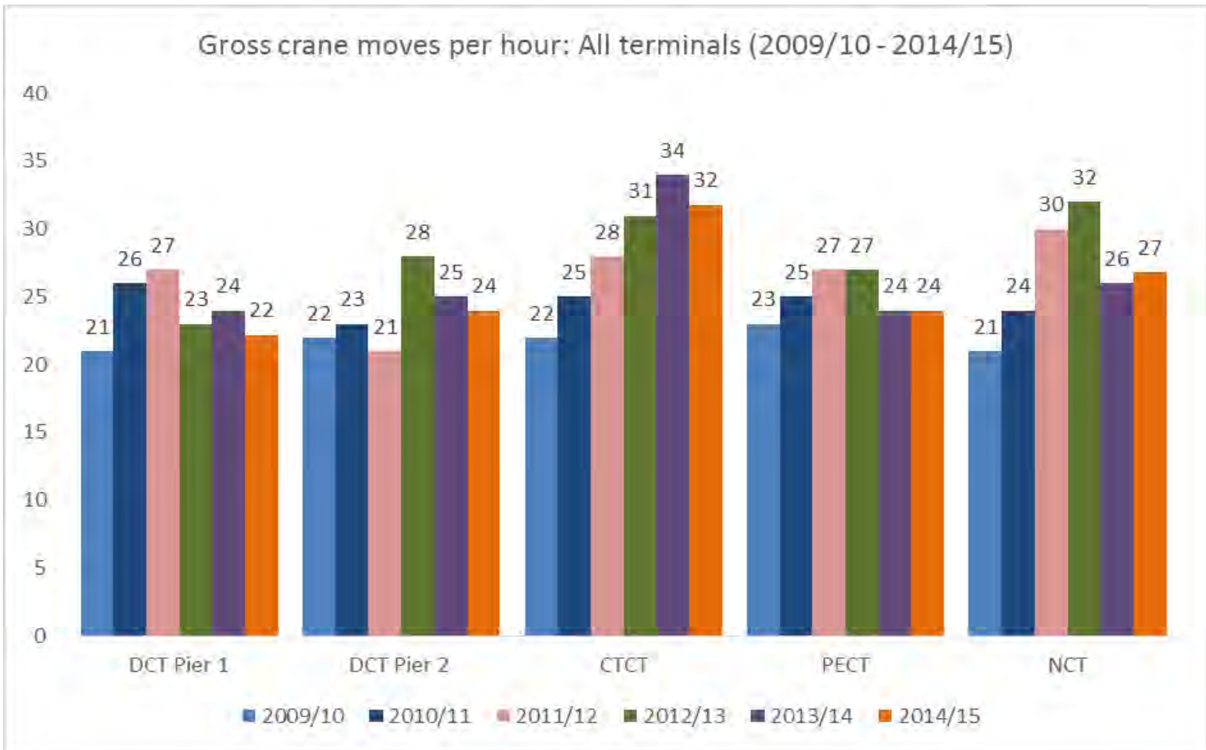
The number of crane moves per hour has been used as a composite indicator for productive and efficient port operations. Crane moves per hour is different from moves per ship working hour in that moves per ship working hour indicates how many boxes should be moving over the quay (with many cranes working), where gross crane moves per hour indicates how many are attributed to a crane. In a simple example, if one crane is deployed to a vessel and the operation achieves 62 moves per ship working hour, then crane moves per hour will be 62. However, if 2 cranes are deployed and the same moves per ship working hour are achieved, then the number will be divided by two. Figure 8 reflects the number of TEUs per crane for each of the Terminals.

Figure 8: TEU throughput and TEUs per crane



The port of Cape Town has recorded 112 374 TEUs per crane per annum, compared to Durban’s 125 340 TEUs per crane. Durban’s performance compares well with the global average of 123 000 TEUs per crane per year, as reported in 2014. Against this backdrop gross crane moves per hour and related terminal performance is reported.

Figure 9: Gross Crane Moves per Hour (GCH) 2010/11 to 2014/15.



The port of Cape Town, where gross crane moves per hour numbers are higher than at the other terminals and generally increased since 2010, has seen a slight decline in 2014/15. With the other terminals there is no consistent performance reflected in the ups and down. This might be a function of the performance target setting process (discussed below) where targets are based probably on previous performance rather than a set standard or even stretching of previous performance.

The terminal's average gross crane moves per hour performance over the last 5 years (2009/10 – 2014/15) has varied significantly year-on-year and is still below the 2014 – 2019 Medium Term Strategic Framework target of 35 moves per hour, set to be achieved by 2019, a target that only the port of Cape Town came close to in 2013 but has not sustained since. The average performance for all terminals shows that more effort is required if the MTSF target is to be met by 2019 since to date, average performance by all terminals is yet to reach 30 moves per hour and beyond.

Figure 10: Average GCH: Container Terminals (2009/10 to 2014/15)

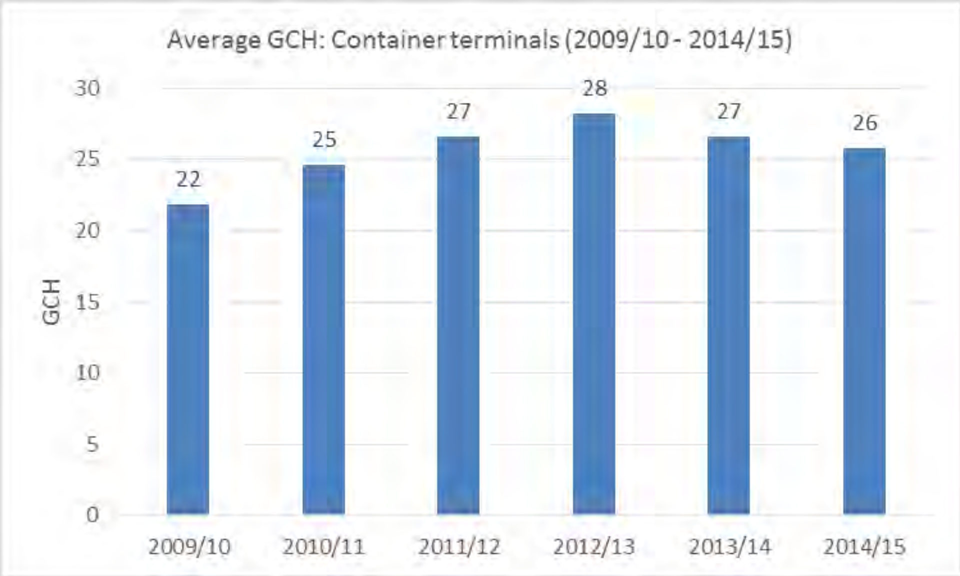


Table 5 summarises the year-on-year improvements in GCH since 2010/11 and the compound annual rate for the period. Cape Town (8%) and Ngqura (5%) registered overall improvements from 22 to 32 GCH and 21 to 27 GCH respectively.

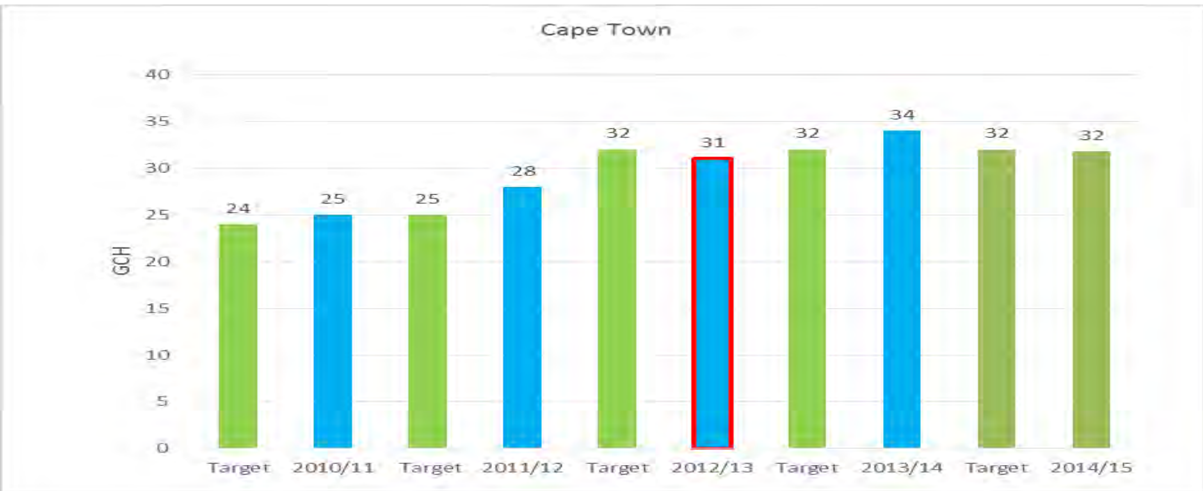
Table 5: Year on year GCH and 5 year compound annual growth rate

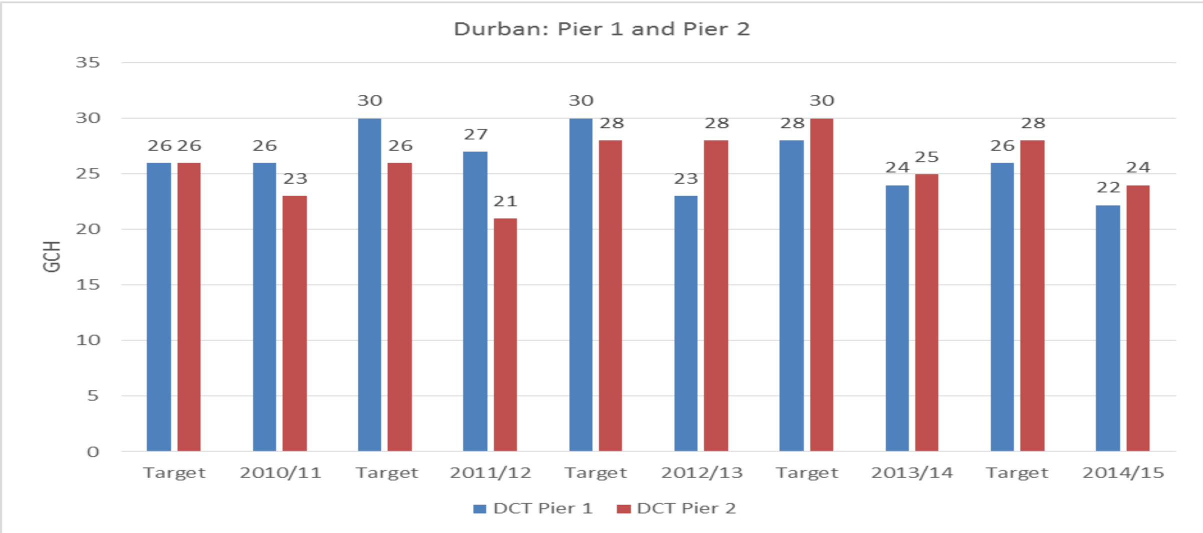
Terminal	2010/11	2011/12	2012/13	2013/14	2014/15	5YR CAGR
DCT Pier 1	24%	4%	-15%	4%	-8%	1%
DCT Pier 2	5%	-9%	33%	-11%	-4%	2%
CTCT	14%	12%	11%	10%	-6%	8%
PECT	9%	8%	0%	-11%	0%	1%
NCT	14%	25%	7%	-19%	3%	5%

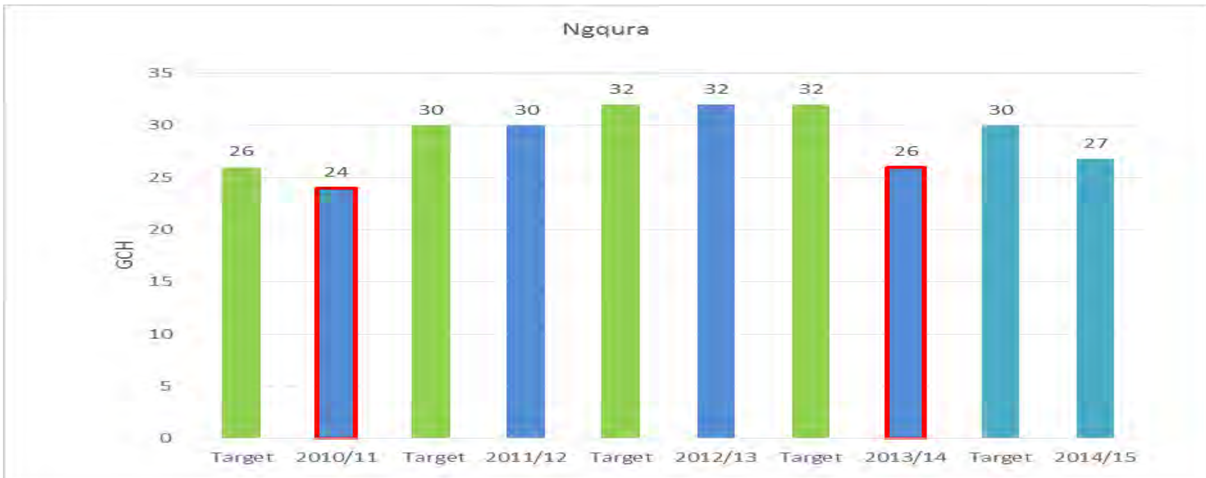
DCT Pier 2 recorded a significant improvement in crane moves per hour in 2012/13 but has not maintained the momentum since, only managing a compound annual growth rate, or improvement, of 2% over the period. Except for 2014/15, the Cape Town container terminal leads the country's container terminals with consistent double digits year-on-year improvements in gross crane moves per hour, and an overall 8% improvement over the period. Ngqura container terminal follows with an overall 5% compound growth rate which is marred by a significant year-on-year 19% reduction in performance for 2013/14. The Port Elizabeth terminal's performance has gradually decreased and stagnated during the 5 years, with the positive changes of 2010/11 and 2011/12 not repeated since.

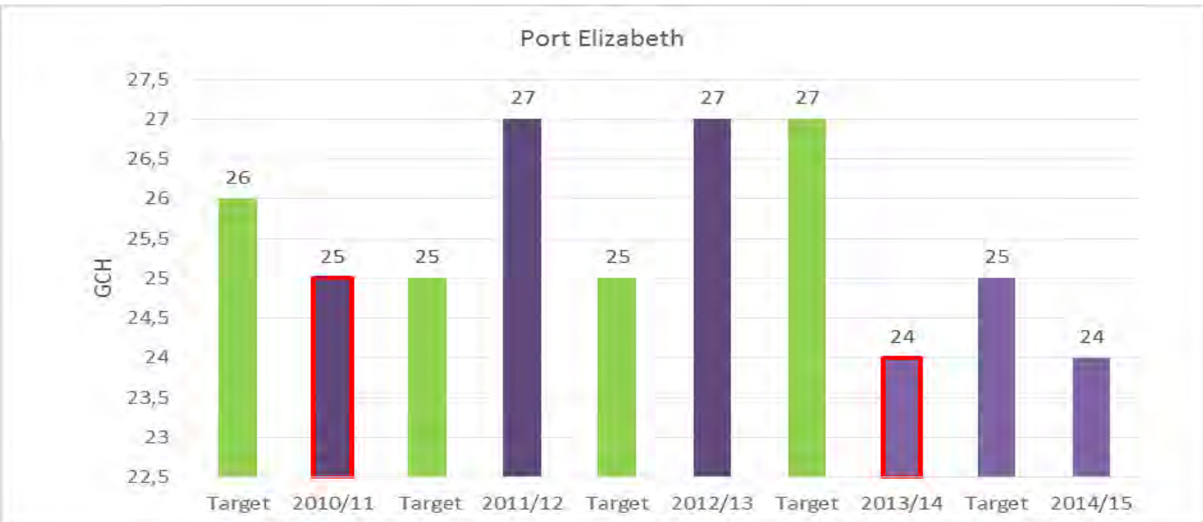
Figure 11 looks at targets that are set per port to understand the varied performance by the terminals. The target bars are all green and each of the bars with a red outline represent actual performance below the set target.

Figure 11: Gross crane moves per hour per terminal (target vs. actual)







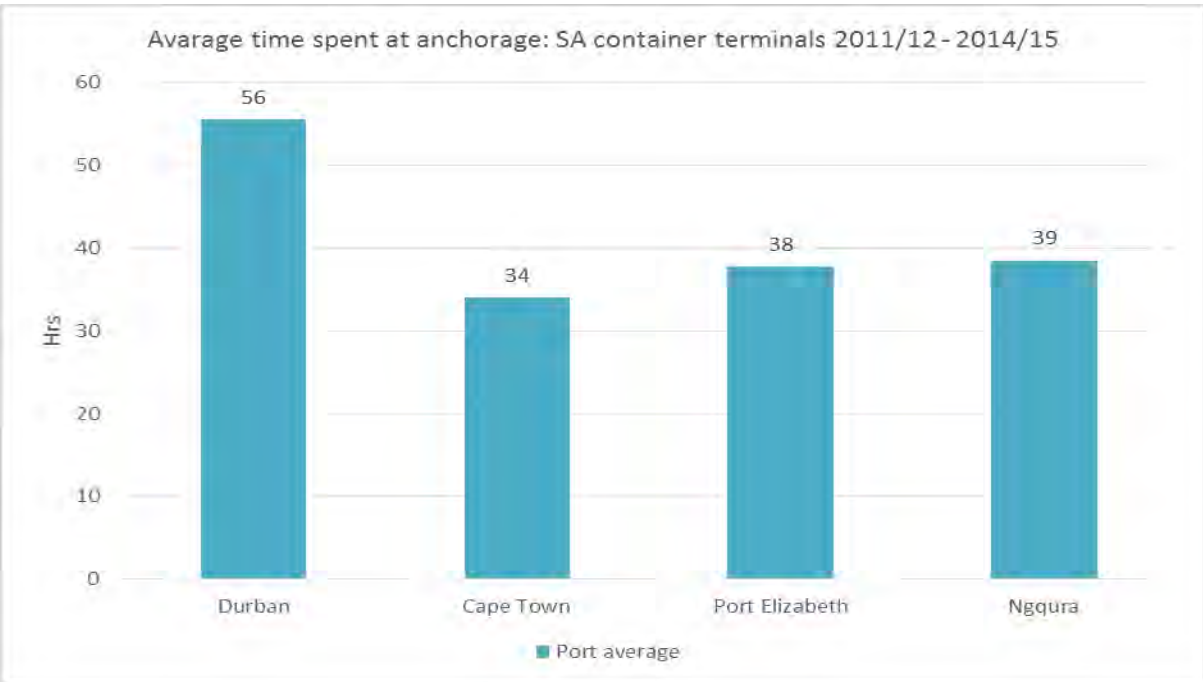


All the terminals have missed some of the set targets over the period; the port of Cape Town only missed its target in one year, performing relatively better than the others. The set targets neither reflect alignment with the MTSF target of 35 GCH by 2019, nor the pursuit of a sustained and/or improving performance, as they lack consistency. Notwithstanding other explanatory factors that may apply, just looking at the numbers, the port of Cape Town's performance not only performed better, it is also the only terminal that has consistent targets at 32 GCH for the past three years, suggesting that targets set on an upward trajectory can produce performance close to what is required. The setting of targets that stretches performance of the terminal operators, rather than being based on previous performance, is encouraged.

3.1.3.3. Time spent at anchorage

Time spent at anchorage by container terminals is summarised below. The only marked and improved performance on this measure is at the port of Durban, which shows a steady improvement between 2011/12 and 2014/15 with a 35% reduction of time spent at anchorage. A part of this improvement may be due to fewer but larger vessels calling at the port. The port of Cape Town's improvement between 2011/12 and 2012/13 is notable, raising questions about the inability of the port to sustain its performance. The other ports performance have overall been inconsistent.

Figure 12: Vessel time spent at anchorage (by port and average)



Owing perhaps to the highest level of container activity, Durban's average for the past four years is higher than at the other three ports and shows vessels waiting more than two days, compared to a day and several hours in Cape Town, and just over a day and a half in Port Elizabeth and Ngqura.

3.1.3.4. Ship turnaround time

The definition of ship turnaround time is the measurement of time from when a vessel crosses the port limit in and out, including berthing, loading/offloading etc.

Figure 13: Ship Turnaround Time - container terminals.

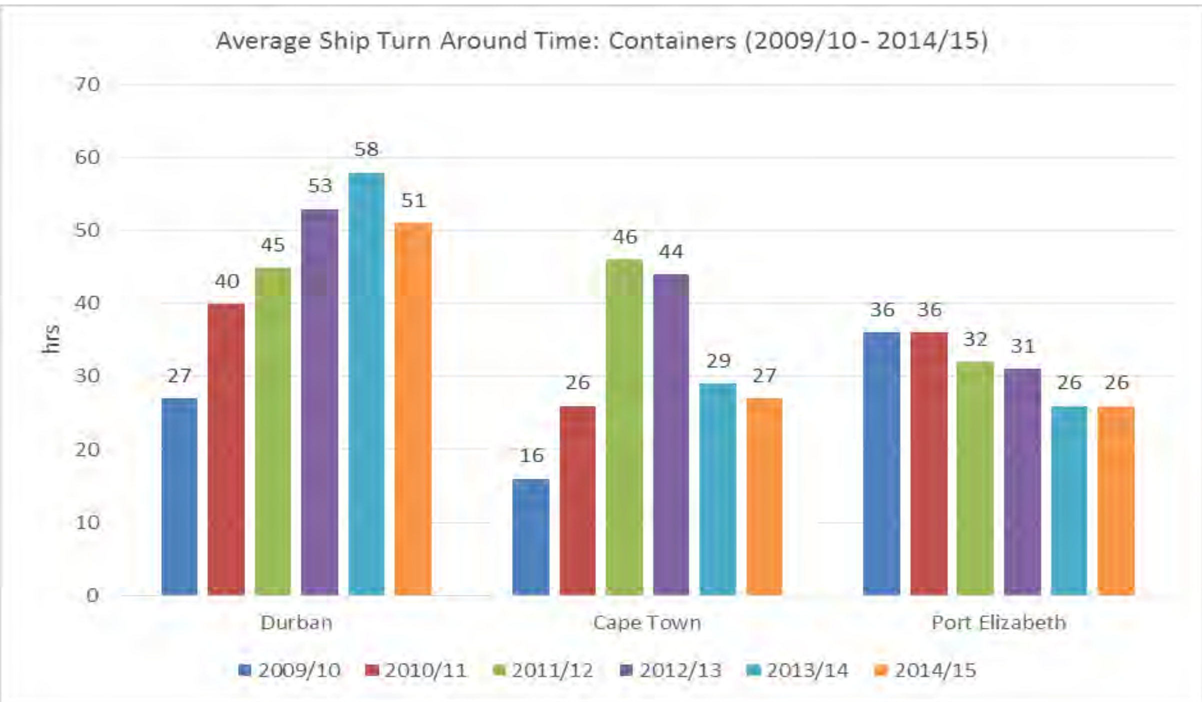
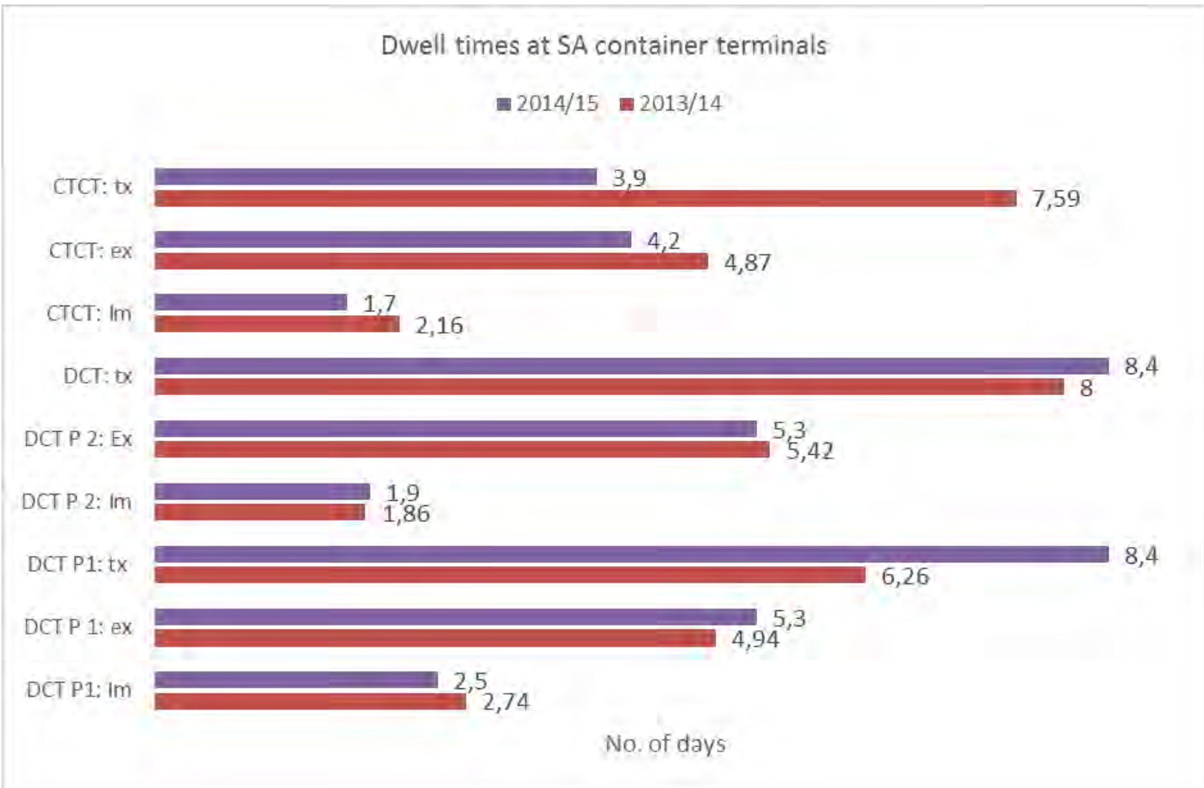


Figure 13 shows the port of Port Elizabeth's ship turnaround time steadily decreasing with 10 hours being shaved off since 2015. Whist the port of Cape Town seems to be improving in the last three years, it has not yet reached the 16hr ship turn around recorded in 2010. The Port of Durban's ship turnaround time has deteriorated, doubling between 2010 and 2014 before a slight improvement in 2015.

3.1.3.5. Dwell times

The last measure for container terminals is dwell times, i.e. the time that cargo spends at the terminal after being off loaded or before being loaded for export. Data for the Port of Ngqura and Port Elizabeth on this measure is yet to be captured by the Authority. Cargo dwell time at a terminal contributes significantly to the efficiency of a terminal, and is one of the measures where different port users' interests diverge, with some gaining from longer dwell times. An OECD/ITF study into reasons why cargo dwell times are so high in terminals/port in Sub-Saharan Africa reported that cargo dwell times can be used to constrain competition, in addition to managing inventory costs. Faster turnaround of containers means that more can be handled with the same capacity. The set target for cargo dwell times differ depending on the movements. For imports, there is a three day dwell time target, whereas export containers can stay on for a further two days. The average stay for transhipment boxes is 10 days, except at the port of Cape Town where 15 days are allowed. Figure 14 shows Pier 1 exports and transhipment dwell times increasing, with Pier 2 almost the same. There is a general reduction in dwell times at the port of Cape Town.

Figure 14: Cargo dwell times (targets and actual)



Terminal performance, as captured in Figure 14, shows that, in general, transhipment (reflected as "tx" in the graph) and import (reflected as "im") targets were met in the two year period, with transhipment faring even better with reported cargo dwell times of less than 10 days even in Cape Town with a higher number of dwell time days allowed. Export (reflected as "ex") cargo has tended to stay slightly longer than the targeted time in the port of Durban in 2014 and 2015. The three terminals generally performed better than the set target on dwell times for imports and transhipments where cargo has stayed relatively shorter periods than what was targeted.

The performance of the terminals on these key measures is noted and will be tracked by the Regulator in line with the Terminal, Marine, Road and Rail Hauliers' Operator Performance Standards process which is nearing its 3 year gestation period allowing for operators to be held to perform against set, agreed and tested targets.

3.1.4. Summary

- All container terminals in the South African terminals are still managed by one operator, i.e. Transnet Port Terminals (TPT).
- The difference between design and installed capacity indicates some 40% of capacity that can be available to the system, should installed capacity be expanded to meet design capacity (these were not the focus of this Report, thus there are no specific recommendation thereon).
- The capacity expansion projects that the Authority will be implementing in the medium to long term are based on volume projections of 4.8% between 2011 and 2042, this is against the recorded previous compound annual growth rate (2001/02 till 2013/14) of 6.97%, and a reduced CAGR of 3% over the last 5 years.
- GCH target of 35 moves per hour set by the Presidency within the MTSF (2014 – 2019) in order to achieve the objectives of the long term National Development Plan (NDP) are unlikely to be met in the current term of office, with the 2014/15 GCH still at 26 moves per hour.
- The setting of performance standards based on previous performance needs to be reviewed including revisiting performance targets in relation to design and installed capacities, whilst balancing this with the provision of capacity ahead of demand.
- There must be consistent and improved performance on the terminal’s efficiency and productivity across the entire chain of measures from time spent at anchorage, to moves per ship working hours, GCH and so on.

The next section focusses on the Automotive or Roll-on, Roll-off (Ro-ro) terminals.

3.2. Automotive/ Ro-ro Terminals

Automotive terminals account for 681 022m^2 of terminal area in the ports system. As with containers, automotive operations are licensed exclusively to Transnet Port Terminals in the ports of Durban, East London and Port Elizabeth. Although full capacity in the RoRo terminals is for handling of 850 000 units per annum, the available or installed capacity is 681 041 units per annum.

3.2.1. Ro-ro Terminal Capacity

The breakdown of capacity per port at the Roro terminals is provided below.

Table 6: Automotive terminal capacity

Port	Terminal Area (ha)	Total Berths (no.)	Usable Berths (no.)	Berth Length (m)	Berth Draft	Design Terminal Capacity (Units per annum)	Installed Terminal Capacity (Units per annum)
Port Elizabeth	21	2	1	342	12.2m	200 000	133 552
East London	9	2	1	559	9 m	130 000	67 489
Durban	39	3	3	1 149	10.1m to 10.6m	520 000	480 000
Total	**69**	**7**	**5**	**2 050**		**850 000**	**681 041**

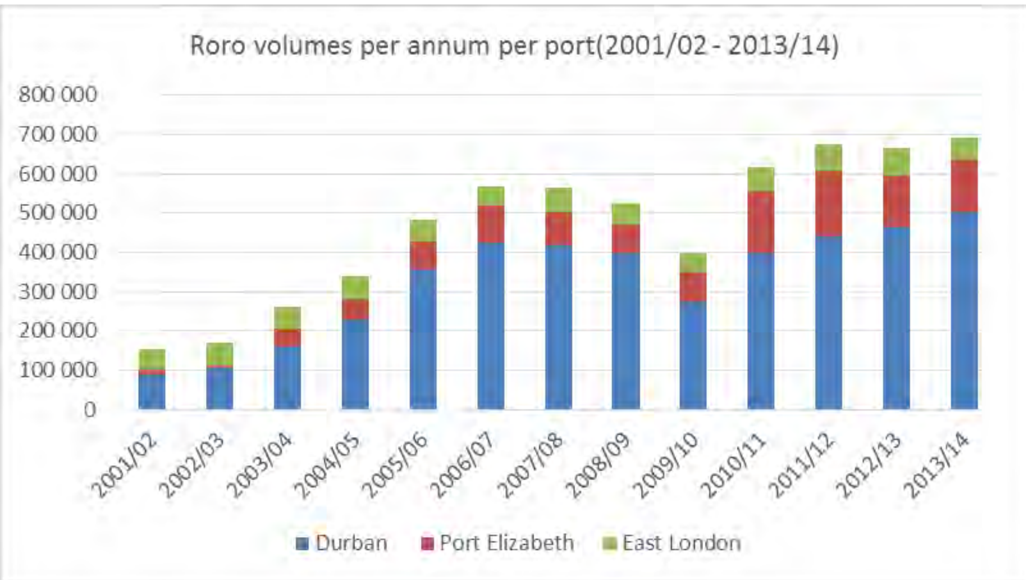
The smallest draught in the system is at the port of East London with a 9m draught, and the deepest is at the port of Port Elizabeth at 12.2m draught. The port of Port Elizabeth's berth length is the shortest of the three and, given the size of vessels below, it can only work one vessel at a time. Yet, it has more installed capacity than the port of East London. All three of South Africa's RoRo terminals are able to accommodate the largest RoRo vessels based on the terminal capacity and vessel dimension. Key performance factors for RoRo terminals after terminal capacity where vessels will berth, is the layout of the parking as well as efficient operations on berthing, stevedoring, and delivery/receipt of the vehicles. The three terminals have road and/or rail interfaces and it is the management of these interfaces and safe passage of the vehicles to/from the vessels that determines the efficient performance of RoRo terminals.

The largest automotive vessels that called in any of the country's ports during the 2013/14 period were: *Figaro* with 74,258 registered tons (and a draught of 10.1m), followed by *Tiger* and *Titania,* both with 74,255 registered tons (and draughts of 8.7m). In October 2015, the port of Durban's RoRo terminal berthed the largest car carrier in the world, the *Hoegh Target*. The vessel, which is 200m long and 36m wide, has 14 decks and a combined deck space of 71 400 square meters and a carrying capacity of 8 500 vehicles.

3.2.2. Ro-ro capacity and volume

Figure 15 shows the growth in Ro-ro volumes in the South African ports system between 2001/02 to 2013/14. As with containers, volume growth in this sector was driven by the port of Durban, with significant numbers also coming from the port of Port Elizabeth which has experienced higher growth rates compared to the other two.

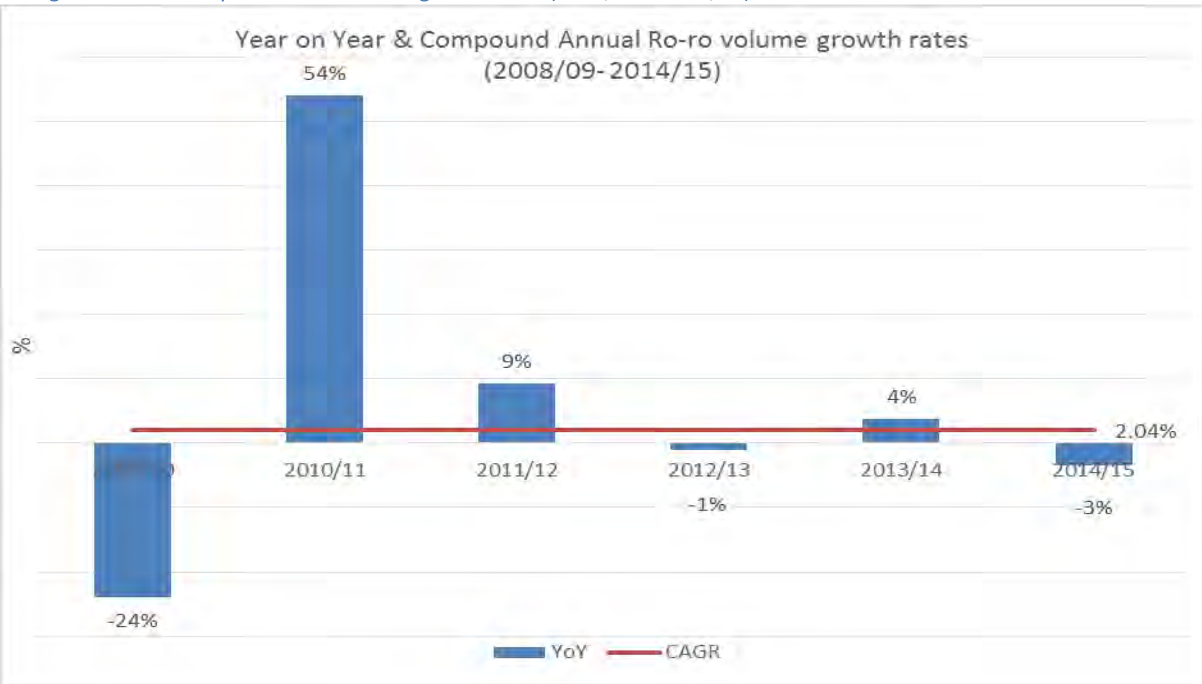
Figure 15: Historical Roro volumes (2001/02 – 2013/14)



(Source: NPA submission to the Regulator 2015/16)

Post the global economic crisis of 2008, automotive port volumes experienced a significant dip in 2009/10, with a year-on-year decline of – 24% from which it recovered in 2010/11. The compound annual growth rate over the 6 year period is a conservative 2.04% volume growth rate.

Figure 16*:* Year-on-year vehicle volume growth rates (2009/10 – 2014/15)



The past 6 year's growth rates are not reflective of historical growth rates recorded in the RoRo sector. The overall growth rate between 2001/02 and 2013/14 was 13.32%, driven mainly by numbers in Port Elizabeth and Durban with East London's rate recording very low growth over the same period.

Table 7: Historic Roro volume per annum and corresponding growth rate 2001/02 - 2013/14

Ro-ro	2001/2002	2013/2014	CAGR
Durban	**89 407**	501456	15,45%
Port Elizabeth	**13 215**	133194	21,23%
East London	**51 361**	56193	0,75%
Total	**153 983**	690843	13,32%

The Authority's plans for capacity expansions to cater for Automotive volume growth based on the projected growth rates and existing capacity are modest, with existing capacity projected to meet demand around 2040. Currently there are no major investments tabled for the RoRo terminals, but it is anticipated that PE Ro-ro capacity will be enhanced in the medium term.

Figure 17: Overall automotive capacity and volume projections (2011/12 to 2041/42)

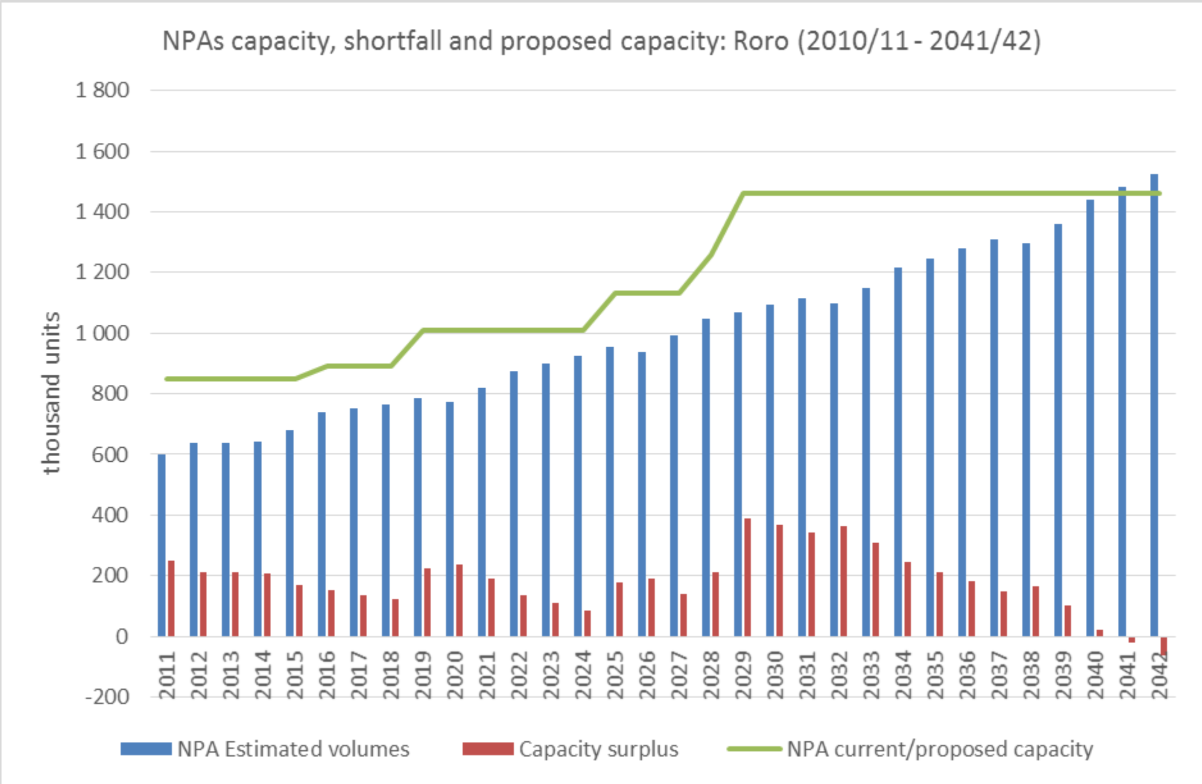
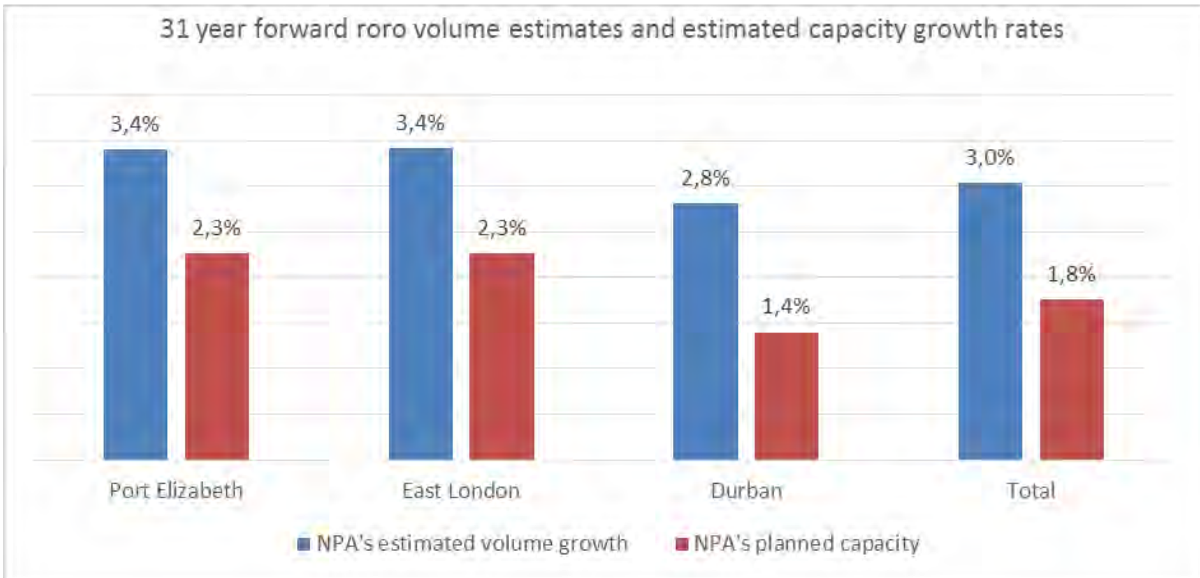


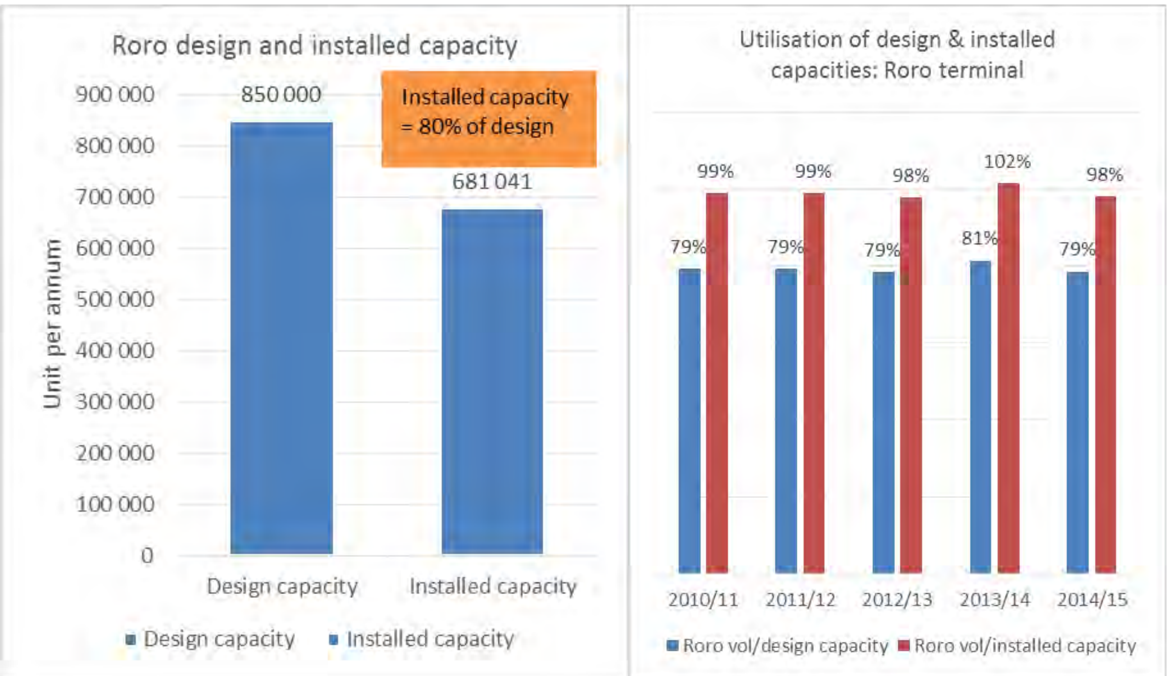
Figure 18: Overall automotive capacity and volume projections (2012 - 2042)



Overall system capacity is anticipated to grow from the current 850 000 (2015/16) units to over 1 400 000 units by 2042. With the repositioning of the RoRo terminal in the port of Port Elizabeth after the relocation of the tank farms and manganese terminal, created capacity is expected to sufficiently cater for volume growth until 2028, which is when the Authority anticipates there will be a need for a new berth in the port of Port Elizabeth to double its capacity to 400 000 units per annum in 2029. Overall system capacity will increase to above 1 400 000 units to cater for projected volumes by 2040. The only projects planned to increase RoRo terminal capacities are two berths in the port of Port Elizabeth, which suggests that additional capacity to be created in the system will mainly be due to operational and efficiency gains.

3.2.3. Ro-ro Terminal Utilisation

Figure 19: RoRo terminal design and installed capacity and utilisation levels

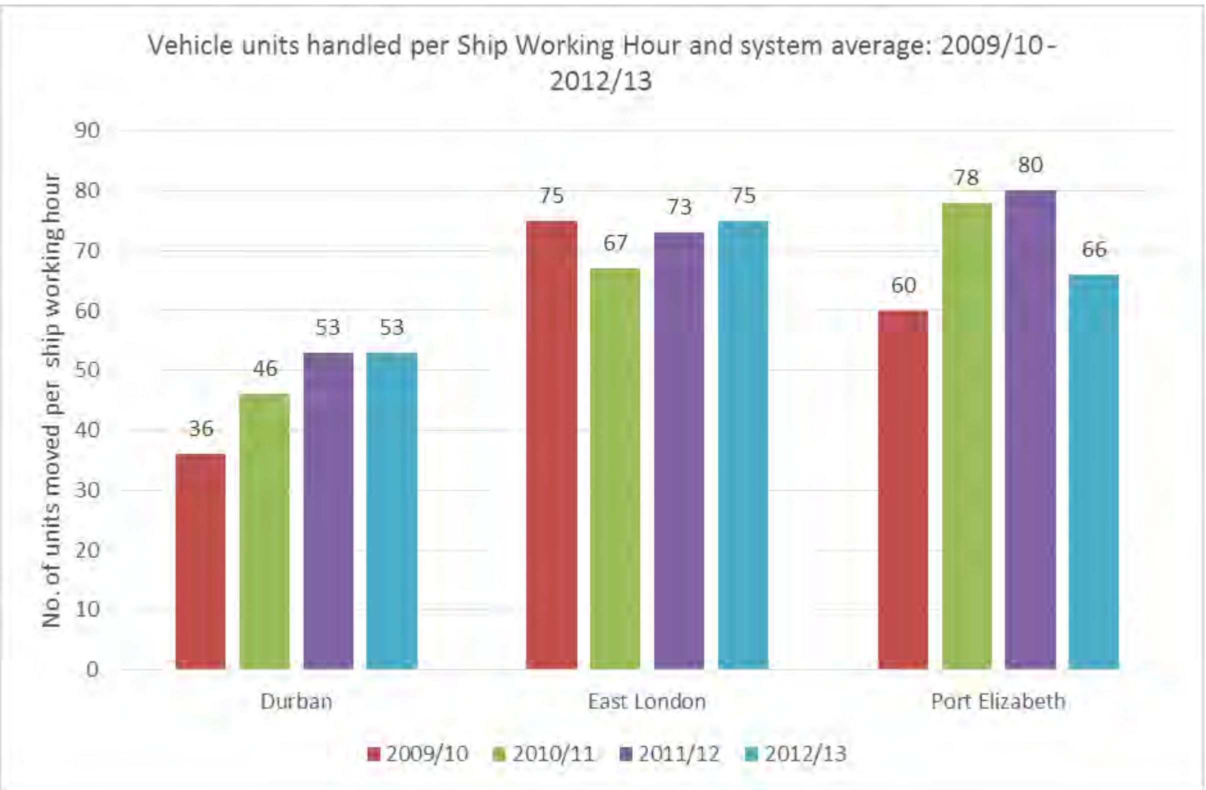


Installed capacity in RoRo terminals is 80% of the published design capacity. Of the installed capacity, annual utilisation computed from annual TEUs handled in the system shows that terminals are at full utilisation of installed, but not of the design capacity, with around 20% of design capacity not used. The high utilisation levels in the Roro terminals without need for immediate capacity expansions highlights the importance of operational parameters more than infrastructure in determining efficiencies in this sector. The capacity created when the terminals were expanded earlier on in the 2000s is being sweated such that even with increasing volumes, the Authority is only planning to provide significant additional capacity much later. The interplay between storage/parking (with dwell times of about 10 days in Durban) and rail (Durban Roro terminal is serviced by trains that share the same lines and scheduling with General Freight) in building parcel sizes (an average of 3000 cars per vessel) as well as the stevedoring functions are critical in the Ro-ro sector.

3.2.3.1. RoRo terminals units per ship working hour

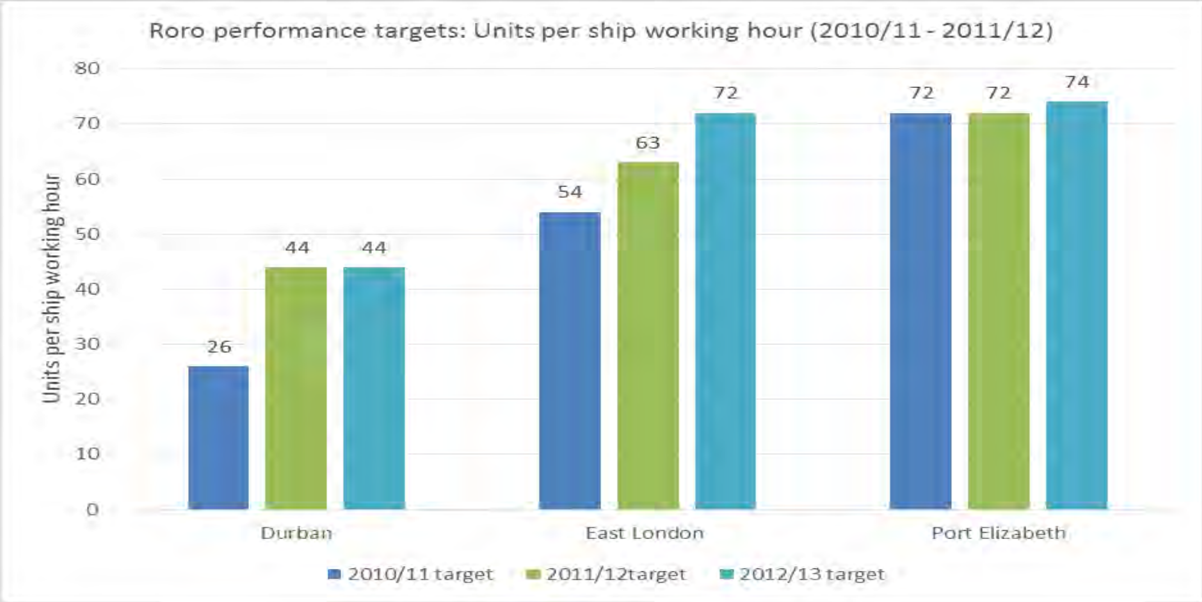
Figure 20 captures the performance of RoRo terminals in relation to units handled per ship working hour. Although demonstrating a steady improvement over the reported period, the Durban RoRo terminal handles the least number of units per ship working hour compared to Port Elizabeth and East London. The port of East London has the best performance having reached 80 units per hour in 2011/12, a feat it has not repeated in the period reported on herein. Given that Durban handles the most volumes, the lower numbers of units per hour is worth looking into.

Figure 20: Vehicles units handled per ship working hour



As with the container terminal's performance in Cape Town, discussed earlier, when consistent targets are set year in and year out, performance has tended to generally start matching the same trend, even if below target. In all three terminals the targets, as reflected in Table 20 are either stable or increasing. The port of East London's performance was notable in that it had the most stretched target, a targeted 33% improvement, of the three and achieved the most consistent performance, despite the fact that the port of Port Elizabeth recorded the highest number of units in one year. Another factor may be berth/terminal configuration which is simple and one –dimensional in Port Elizabeth and East London, whilst Durban has three disconnected berths.

Figure 21: Ro-Ro performance targets (units per ship working hours 2010/11 – 2012/13)



Critical operational factors for RoRo operations are: storage, stevedoring, and the receipt/delivery process, which are critical and are areas that require specific attention as more is understood in setting targets for and measuring performance of RoRo terminals. Proper "roll-on/roll-off" of the vehicles within time and without damage is just as important and the equivalent of container moves per ship working hours. It is commendable that the Authority's efficiency targets in the Long Term Port Development Framework are significantly higher at between 100 and 170 units per hour in the three terminals.

3.2.4. Summary

- There is no competition in South Africa's RoRo terminal space with TPT being the only terminal operator.
- Although the terminals are operating close to installed and design capacity, other operational factors affect Ro-Ro terminal performance, such that a large step up in additional capacity is only required by 2029 and the longer term rather than the immediate period.

3.3. Dry Bulk Terminals

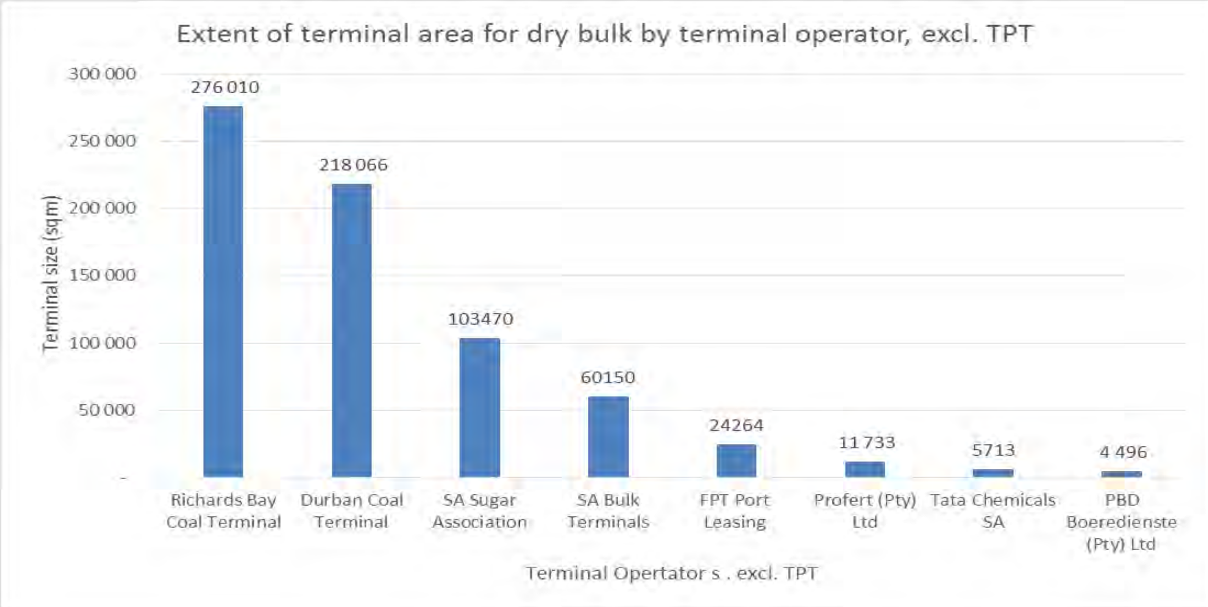
Dry bulk terminals are responsible for the shipping of major and minor bulks. Major bulks constitute the majority of dry bulk cargo by weight and they include iron ore, coal and grains. Minor bulks generally comprise agricultural products, mineral cargoes, cement, forest and steel products. The South African port system handles three main major dry bulk cargoes, i.e. iron ore (port of Saldanha Bay), coal (port of Richards Bay), and manganese (ports of Port Elizabeth and Saldanha Bay).

TPT holds the most number of licences for handling dry bulk cargo (five), followed by SA Bulk Terminals. The other operators each holds one dry bulk license: Richards Bay Coal Terminal (*RBCT*), Durban Coal Terminal, FPT Port Leasing, PBD Boeredienste, Profert, and Rocasync/Proterminal. TPT's land area include the manganese terminal in the port of Port Elizabeth, with terminal capacity of 5,5million tons per annum. The Richards Bay Bulk Terminal handles the import of alumina, aluminium fluoride, coking coal, petcoke and sulphur, as well as the export of anthracite, steam coal, discard coal, chrome, fertiliser, chloride, rutile, zircon, sulphate, magnetite, vermiculite, hematite/iron ore and woodchips. RBCT's 276 010 square meters is reported to have design[5] and installed capacity of 91mtpa.

With dry bulk operations requiring space, the size of a terminal as well as capacity gives a better picture of who the main role players are in the dry bulk sector. The Authority places TPT's total terminal area for dry bulk at 642 123 square meters. The rest of the terminals occupy land area as per Figure 22 with RBCT and coal handling facility at the Port of Durban with holding the second and third largest terminal areas.

[5] The reported design capacity is based on capacity limitation from rail. The terminal can handle up to 115mtpa.

Figure 22: Extent of terminal area for dry bulk by terminal operator excluding TPT



The port of Durban's nine dry bulk terminal operators represent 65% of dry bulk terminal licenses, followed by Richards Bay's two, representing 14% and the balance is accounted for by single licenses in the ports of East London, Ngqura, Port Elizabeth, Cape Town and Saldanha Bay.

3.3.1. Dry Bulk Terminal Capacity

The capacity for handling dry bulk cargo is summarised below.

Table 8: SA Dry Bulk terminal capacity

Port	Berth Length (m)	Total Berths (no)	Usable Berths (no)	Berth Draught (m)	Vessel sizes that can be accommodated (length x width x draught)	Design Capacity (tons per annum)	Terminal Installed Capacity (Tons per annum)
Richards Bay RBCT	2 060	6	6	19	Cape Size 180 000dwt (289m x 45m x 18.4m)	131 000 000	105 000 000
Richards Bay	1 863	8	6	14.5-9	Cape Size 180 000t (289mx 45m x 18.4m)	21 000 000	14 600 000
Durban	1 581	9	7	8.6	Handysize 35 000t (177m x 28m x10)	11 000 000	11 000 000
East London	388	1	1	10.7	Handysize 35 000t (177m x 28m x 10m)	984 000	470 478
Port Elizabeth	360	1	1	12.2	Handy size 35 000t (177m x 28m x 10m)	5 000 000	4 459 369
Cape Town	569	3	2	12.2 - 12.8	Handy size 35 000t (177m x 28m x 10m)	2 100 000	1 400 000
Saldanha Bay	1 260	2	2	23	Cape Size 180 000t (183m x 32m x 11m)	58 000 000	50 736 955
Total	**8 081**	**30**	**25**			**229 084 000**	**187 666 802**

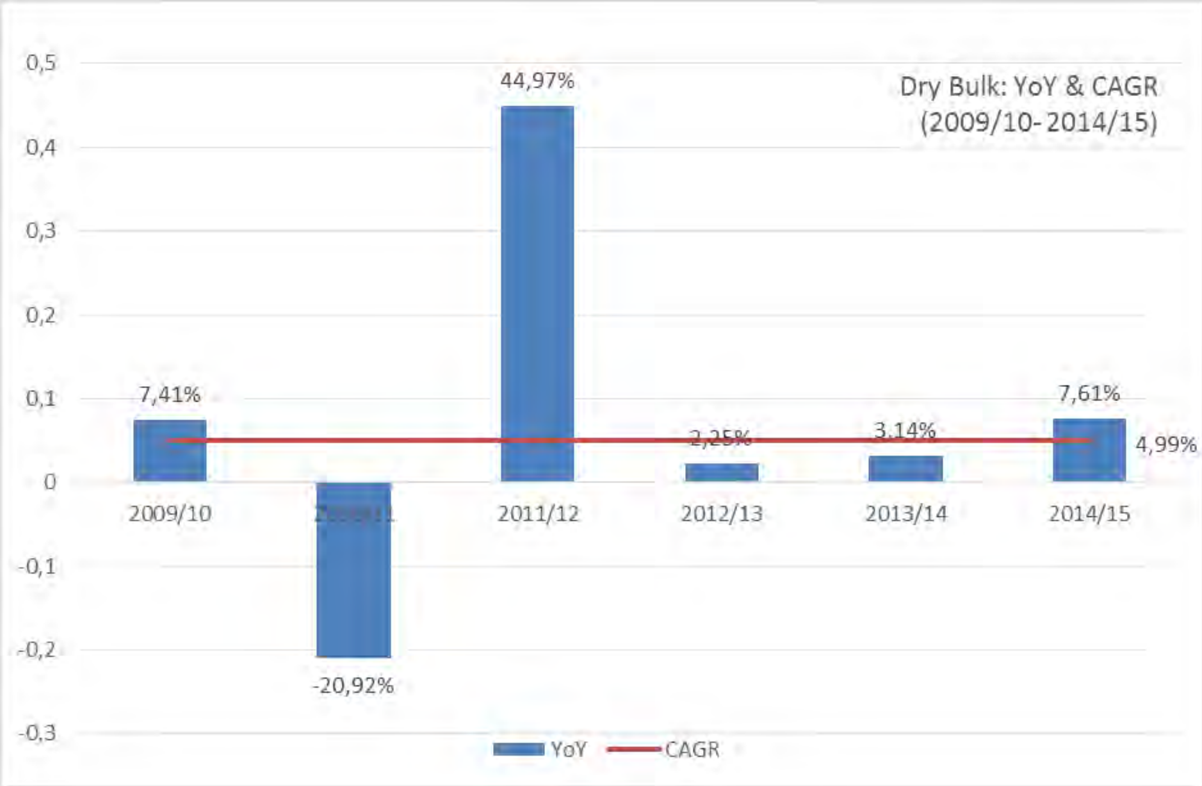
South African dry bulk terminals are able to handle three of four traditional categories of dry bulk carrier vessels, i.e. Handy size, Panamax, and the Cape Size. The ports of Richards Bay and Saldanha Bay are the only two that can handle the specialised and large Cape Size vessels (180 000 deadweight tons), which, worldwide, can only be accommodated by few ports due to infrastructure constraints. The ports of Durban and Ngqura can handle the next larger size dry-bulk carrier, i.e. the Panamax (between 60 000 and 100 000 deadweight tons). The work horses in the bulk sector are the Handymax vessels carrying up to 60 000 dwt, including their own cranes for loading/off-loading. All three vessel sizes operate on South Africa's major iron ore, coal, and grain trade routes, namely South Africa to Western Europe, South Africa to Far East, and South Africa to Europe. Notably, the iron ore and thermal coal trades tend to be Cape size trades. Overall, the indication of vessel sizes that can be accommodated for dry bulks in the table is based on the general design specifications. In practice there are variations as dictated by trades associated with the facilities. For example in the case of Durban, some facilities are capable of accommodating Panamax-size bulk carriers whilst Richards Bay would generally accommodate Cape sizes, outside of the RBCT.

The largest bulk carrier to call during the 2013/14 is *CSB Talent*, a vessel with 152,333 gross registered tons, followed by *CSB Prosperity,* a vessel with 151,825 gross registered tons. Both these bulk carriers called at the port of Saldanha Bay. The reported GRT sizes handled in each of the ports are lower than what the ports capacity indicates can be handled per port. The trend with vessel sizes for bulk carriers is influenced by market determinants, the most important of which being the freight and charter rates which affects the profitability of routes and vessels and thus deployment on trade routes. The Gross Registered Tons (*GRT*) of vessels that have called at the various terminals suggests that the terminals have capacity to handle even bigger vessels.

3.3.2. Dry Bulk Capacity and Volume

Figure 23 shows that between 2011 and 2013, dry bulk volume growth rate declined significantly. There are signs of some pick up in 2014/15, which may be further dampened by the recent low commodity prices due to the slowdown in China's economic growth. The global demand outlook for dry bulk over a five year period from 2011 was an average of 5.9% (6.7% for major bulks like coal, iron ore and grains), and 6.4% for minor bulks

Figure 23: Year-on-year and compound annualised dry bulk volume growth rates



The dry bulk terminals compound annual growth rate over the same period is about 4.99%, which more or less reflects the global projections. The cumulative annualised dry bulk volume growth rate over longer term, between 2001/02 and 2013/14, is a lower 2.73%. Actual volumes over the period are captured and summarised below, together with the compound annual growth rates over the same period.

Figure 24: Annual Dry Bulk volumes (tons) (2001/02 – 2013/14)

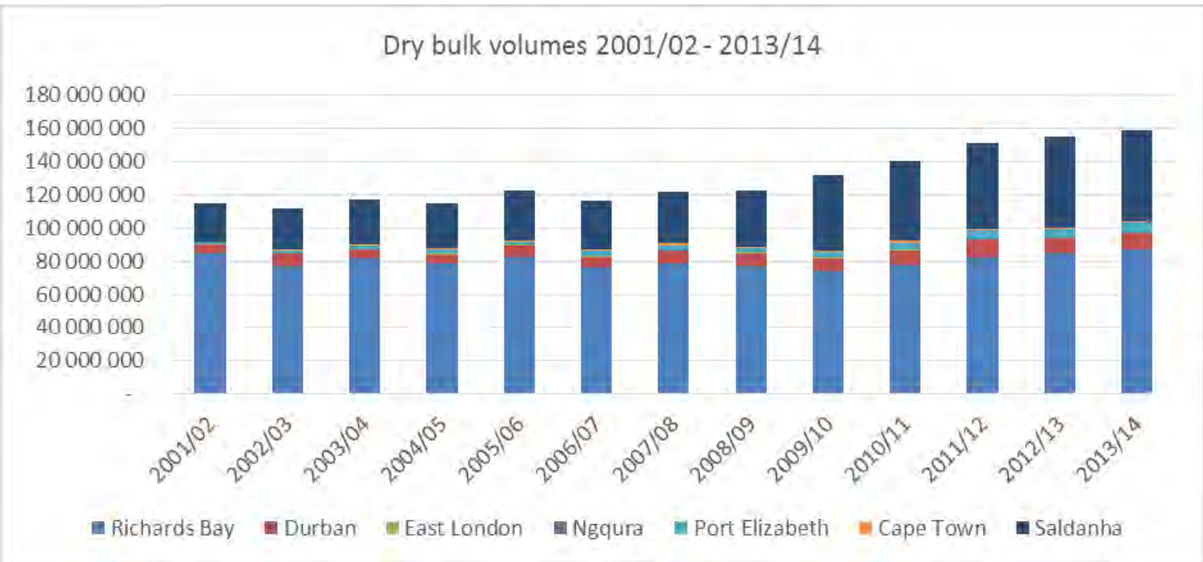


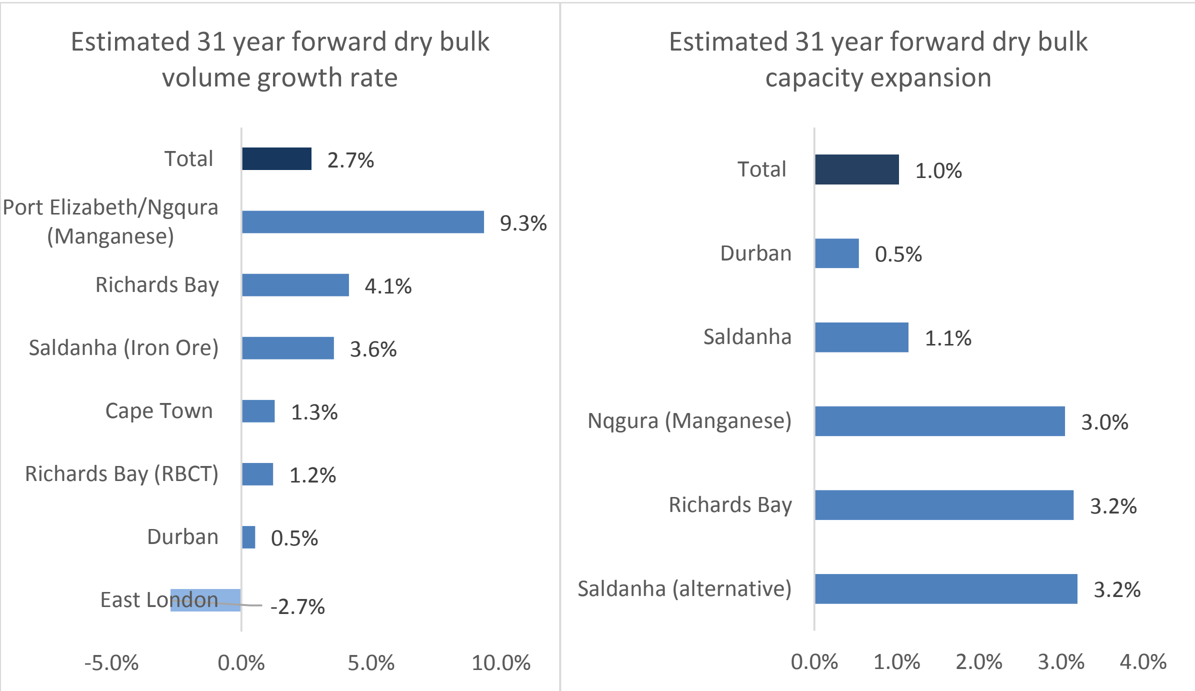
Figure 24 generally confirms that coal and iron ore dominates dry bulk volumes, with Durban and Port Elizabeth (manganese) also featuring and very low volumes in the remaining ports. The growth rates in Table 9 should be read in this context.

Table 9: Compound Annual Growth Rate, Dry bulk (2001/02 - 2013/14)

Port	2001/2002 volumes(tons)	2013/14 volumes (tons)	CAGR
Richards Bay	84 463 129	86 800 028	0,23%
Durban	5 818 480	10 443 959	5,00%
East London	103 572	105 637	0,16%
Port Elizabeth	1 283 348	6 019 655	13,75%
Cape Town	9 396	646 659	42,28%
Saldanha Bay	23 234 548	54 833 018	7,42%
Total	**114 912 473**	**159 848 956**	**2,73%**

Although the port of Cape Town's dry bulk volumes seem to have grown significantly at a compound annual rate of 42.28%, this is was from a very low base. East London's volumes have not grown over this period. Port Elizabeth's 13.75% CAGR is notable as it is driven by Manganese which will be migrated to the Port of Ngqura. Capacity to meet demand is influenced by global trends, volumes and vessels. The capex plans for dry bulks, captured in Figure 25, are based on these projections.

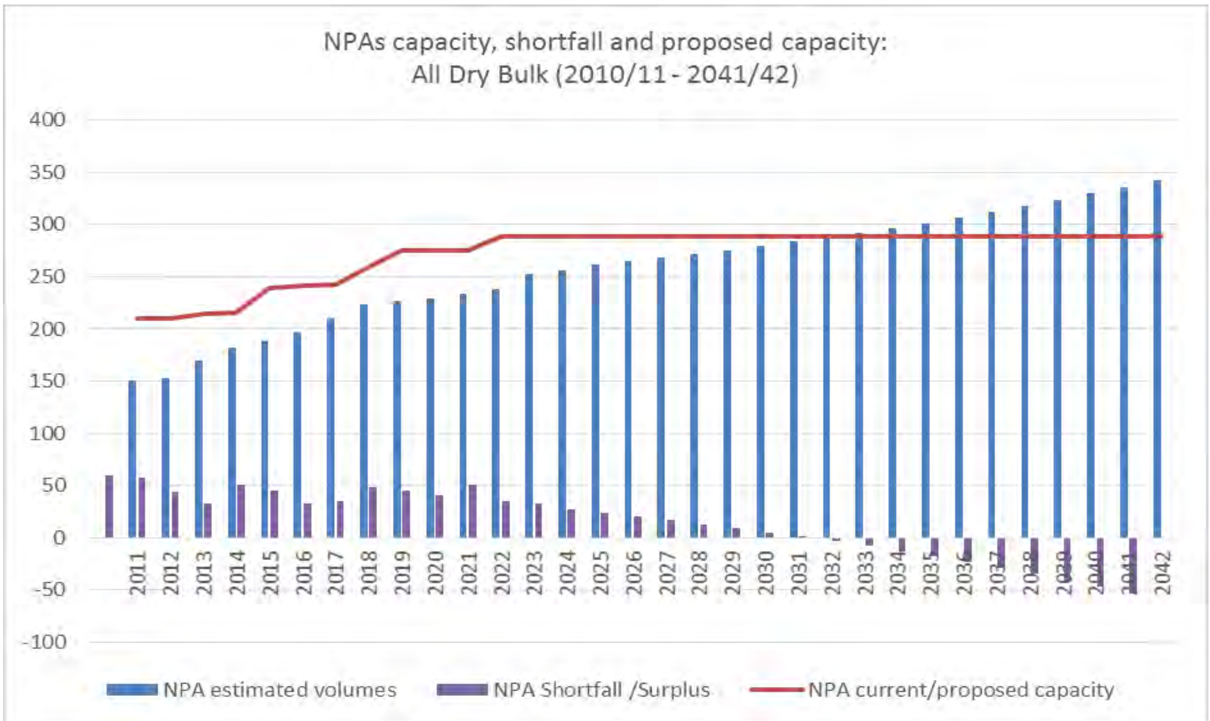
Figure 25: All dry bulk volume projections and estimated capacity requirements



Over the period 2011 to 2042, the Authority estimates an average dry bulk volume growth rate of 2.7%, with only 1.2% projected for the country's biggest coal export terminal, RBCT. The main growth in volumes of dry bulks is anticipated from Manganese whose CAGR is estimated at 9.3% over the period up to 2041/42 – which will be migrated from Port Elizabeth to Ngqura. On the coal side, owing to the latent capacity that can be accessed at RBCT through rail capacity, only 1.2% CAGR is estimated over the same period.

With regard iron ore capacity expansion, the figures for the port of Saldahna Bay are recommended to be capped at 82.5 million tons per annum to take into account rail line restrictions. With unrestricted rail capacity, an additional 3.2% of port capacity would be available in the system. The Authority recommends that capacity be restricted to the current 82.5million tons per annum and for a policy decision to be taken in support of beneficiation of excess volumes, rather than increase in exports and thus only a CAGR of 1% in Iron Ore capacity at the port (NPA - LTPDF: 2014). Thus manganese volume growth is expected to dominate capacity development in the dry bulk sector up to 2041/42.

Figure 26: Dry bulk capacity and volume



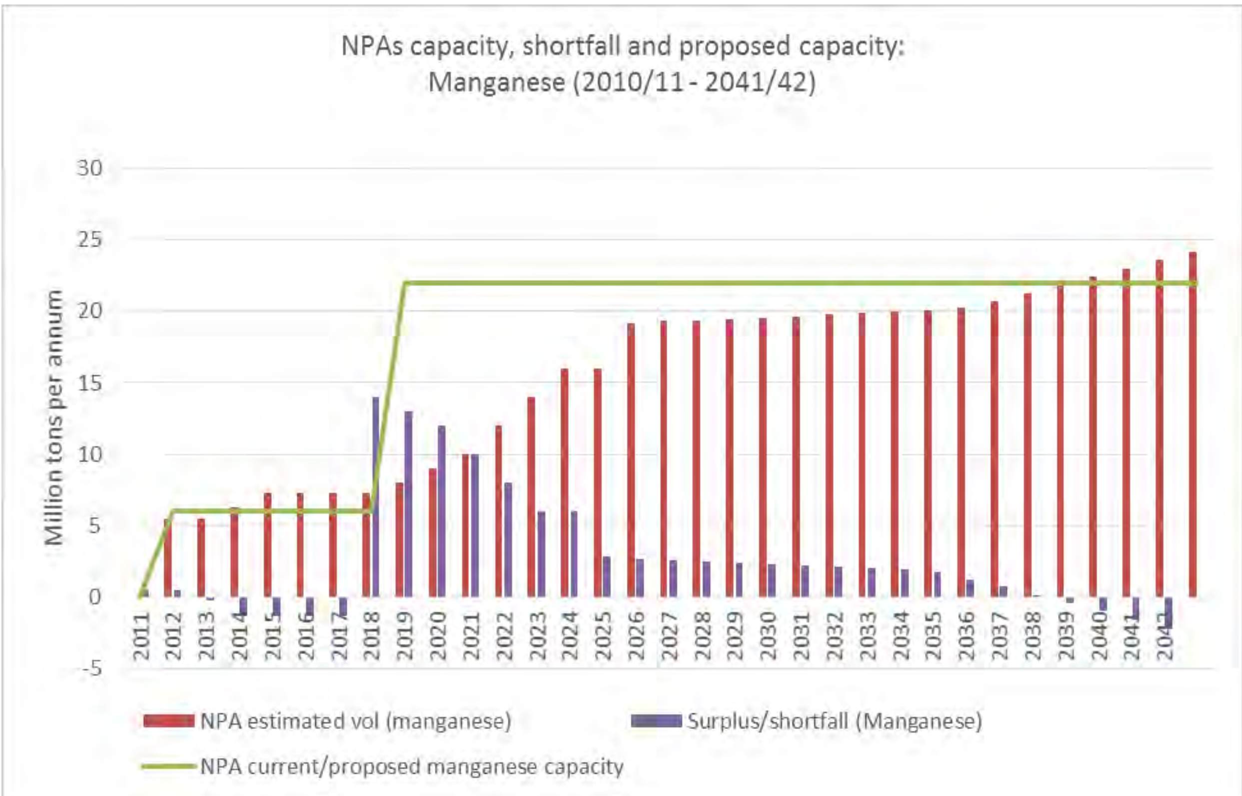
The Authority's estimated volumes and capacity requirements for all the dry bulks are captured in Figure 26 showing very limited requirements for capacity expansions up to 2032 when a capacity shortfall is reflected. These will be met by specific interventions in each of the commodity handling types: manganese, coal and iron ore. The next section briefly describes what is anticipated in each of these.

3.3.2.1. Manganese

Total manganese capacity is based on combined capacities of the ports of Port Elizabeth and Ngqura. In the port of Port Elizabeth, based on the Freight Demand Model, manganese handling terminates at the end of 2018 (with estimations that it would be in August 2018) and moves over to the port of Ngqura. Currently, the port of Ngqura has two berths without ship loading equipment, which is part of a construction package and will be commissioned by the end of 2018.

The Authority’s reported plans for capacity to handle manganese, coal and iron ore is based on long term volume growth projections of 4.9 %, 1.3% and 3.6% respectively, and growth in existing capacity. Manganese plans are to migrate the manganese terminal from the port of Port Elizabeth to the port of Ngqura, hence the -100% growth rate in the port of Port Elizabeth. With the migration, it is anticipated that manganese volumes will grow by 4.9% over the long term and the capacity to handle manganese, currently at 6mtpa (Port Elizabeth and Saldahna combined) will increase to 22mtpa which will be at the port of Ngqura. The specific projections for manganese are captured below.

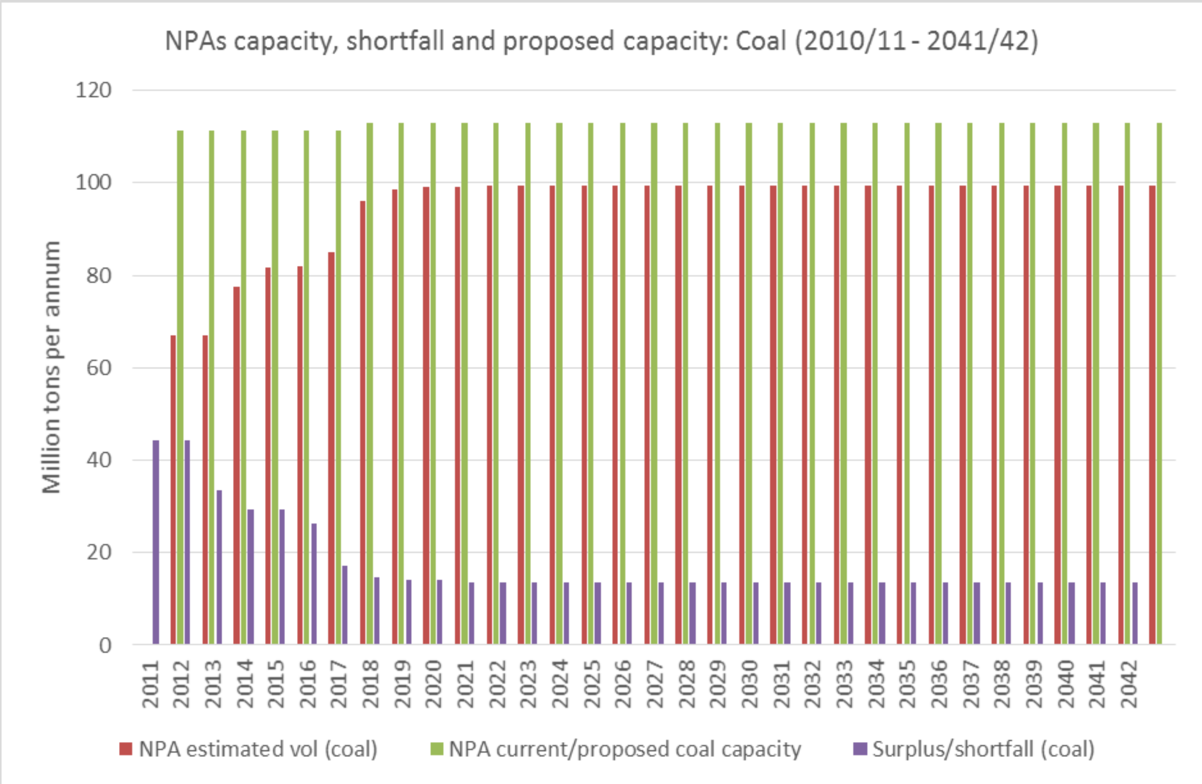
Figure 27: NPA’s estimates of volume and capacity requirements for Manganese terminals



3.3.2.2. Coal

Coal volumes are catered for mainly by RBCT. RBCT capacity is dependent on complementary capacity on the rail side. It is anticipated that there will always be surplus capacity in the dry bulk system thus there would be no major projects, except to respond to localised demand, e.g. coal plans in the port of East London which is anticipated to respond to export requirements by miners in the region. The overall capacity will remain more or less the same at just under 120mtpa.

Figure 28: NPAs estimates of volume and capacity requirements for coal terminal

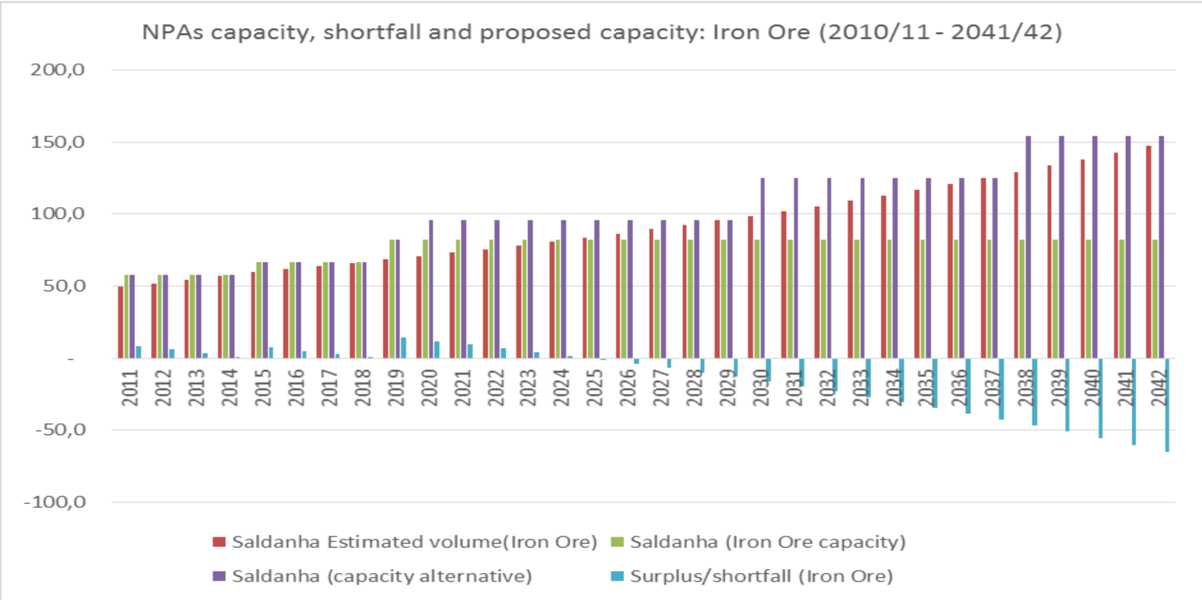


Required total coal capacity is based on combined capacities of the ports of East London and Richards Bay.

3.3.2.3. Iron Ore

Iron Ore is moved primarily through the port of Saldanha Bay, with a dedicated rail line and system from the Northern Cape. Current capacity is 58 million tons per annum, whilst volumes are 50 million tons per annum (mtpa), and thus excess capacity of 8mtpa. This capacity is projected to be depleted in approximately 2023/24. Plans for total capacity to meet demand will be through construction of 2 berths in the Port of Saldanha Bay, which will be phased with 1 berth anticipated to be commissioned by the end of 2019. The Authority recommends the capping of iron ore export volumes to the current maximum of 82.5mtpa and for iron ore volumes above this capacity to be beneficiated. This will mean that existing rail capacity is maintained instead of being extended. Should a decision not be taken in this regard and volume growth is beyond 82.5mtpa, then rail capacity on the Sishen Saldanha line will have to be increased.

Figure 29: NPAs estimates of volume and capacity requirements for Iron Ore terminal



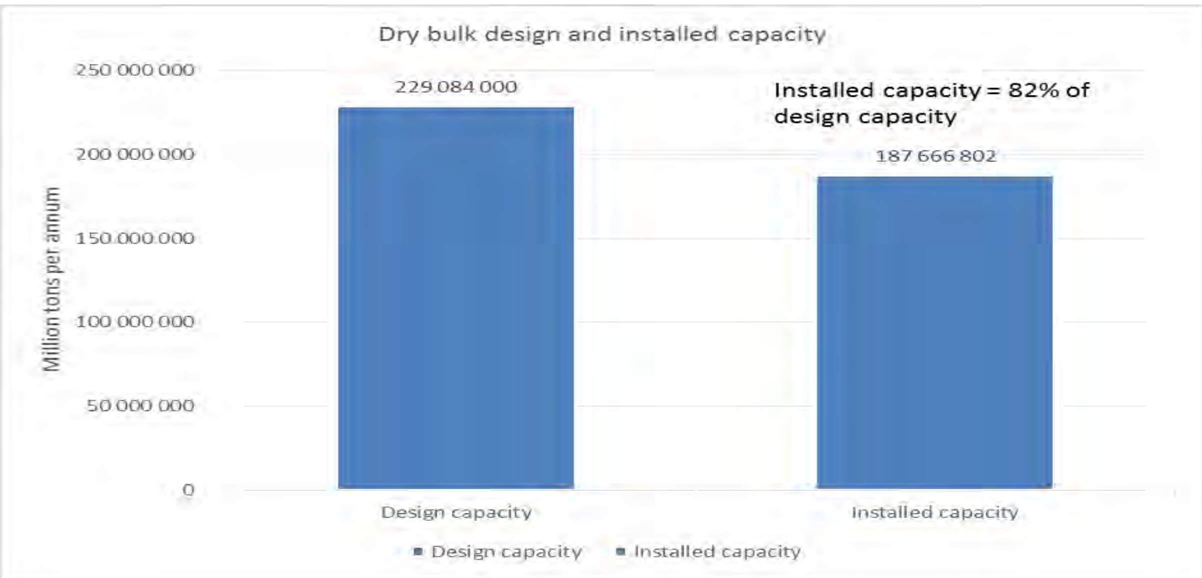
3.3.3. Terminal Utilisation

The utilisation of dry bulk terminals is looked at in relation to the use of design capacity and installed capacity and commodity handling rates in the terminals.

3.3.3.1. Throughput in relation to design and installed capacity

In each year the amount of volumes handled in the terminals shows a utilisation rate of more than 80% of installed capacity and above a third of design capacity, pointing to significant utilisation of dry bulk terminal capacity. However, due to different vessel arrival patterns and homogeneity of cargo, high utilisation rates in the major dry bulks is more manageable thus do not present similar challenges discussed in container trades.

Figure 30: Dry bulk design and installed capacity



Installed capacity for dry bulk terminals is at 82% of overall design capacity which means about 18% capacity is still available in the system that can be addressed by, amongst others, installation of handling equipment.

Figure 31: Rate at which dry bulk terminals' design and installed capacity are used

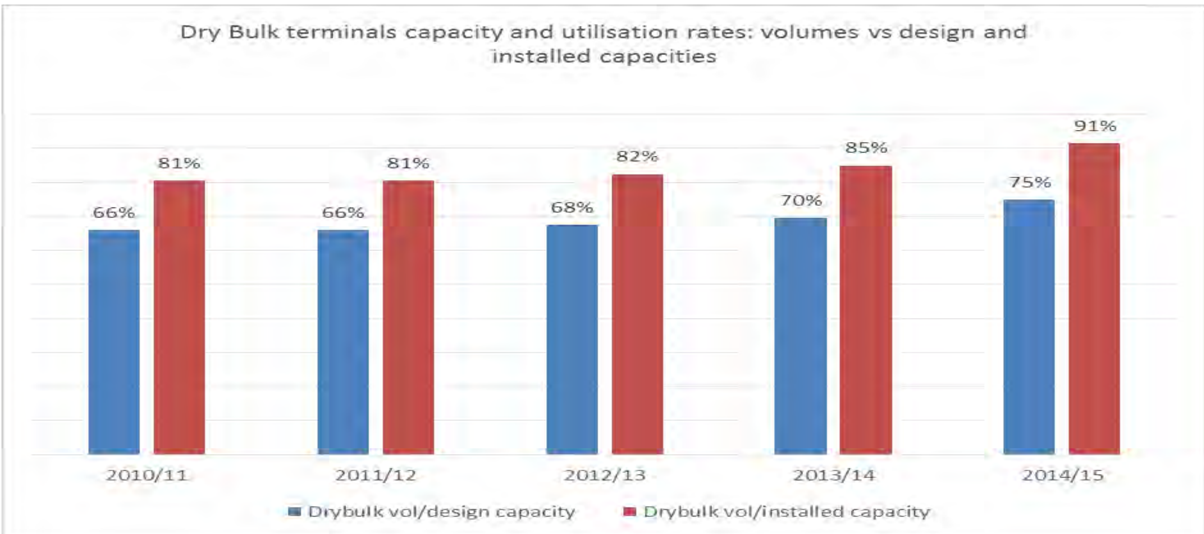


Figure 31 shows a trend where, overall, the volumes being handled are reaching installed capacity given the differences between 2010 and 2015. The same applies if design capacity is considered. In the case of RBCT, installed capacity of 91mtpa can only be fully realised if design capacity is met by related rail capacity and system.

3.3.3.2. Commodity handling rate

Various authors, e.g. Park, Yoon and Park (2014) and Merk & Li (2013), have made a point that conventional utilisation rate calculations in measuring performance of bulk terminals are not as easily applicable as is the case with containers, where the unit is standardised, due to the differentiation of dry cargo and the resultant handling requirements. Accordingly, the terminal utilisation for dry bulks should focus on the main commodities being handled, which in the case of the South African terminals are coal, iron ore and manganese as opposed to just aggregating across the sector.

Figure 32: Iron ore handling rate per hour (targets and actuals)

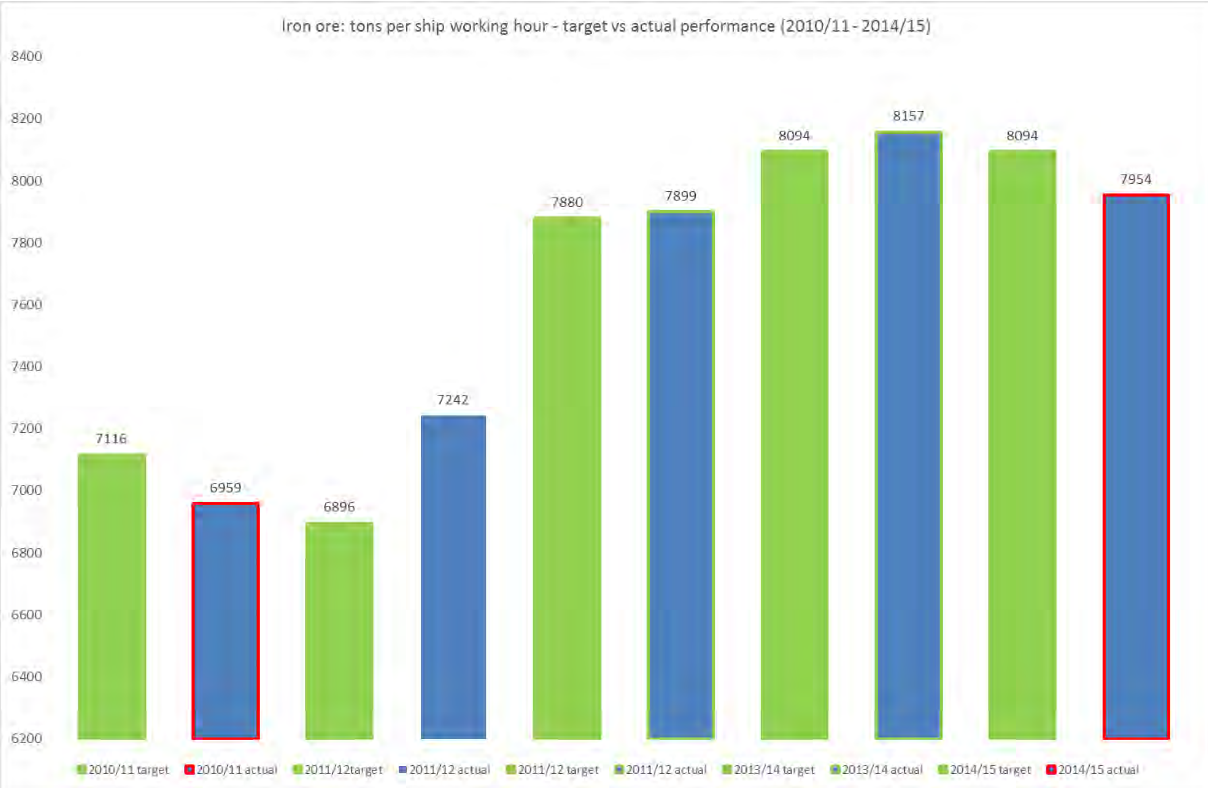


Figure 32 captures the handling rate for iron ore at the Port of Saldanha Bay, with targeted performance reflected in the green bar and actual achievement in blue. The bars with a red outline indicate where targets were not met, which suggest that to a great extent the port is reaching set targets, which in turn are beginning to stabilise.

Figure 33: Iron Ore handling rate targets

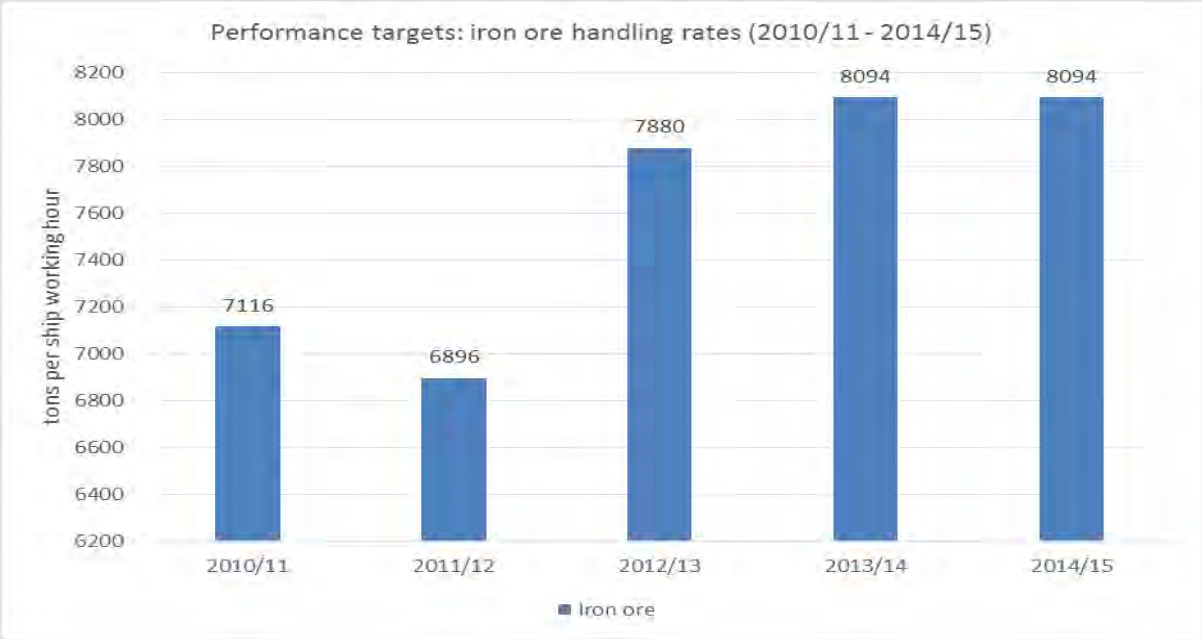
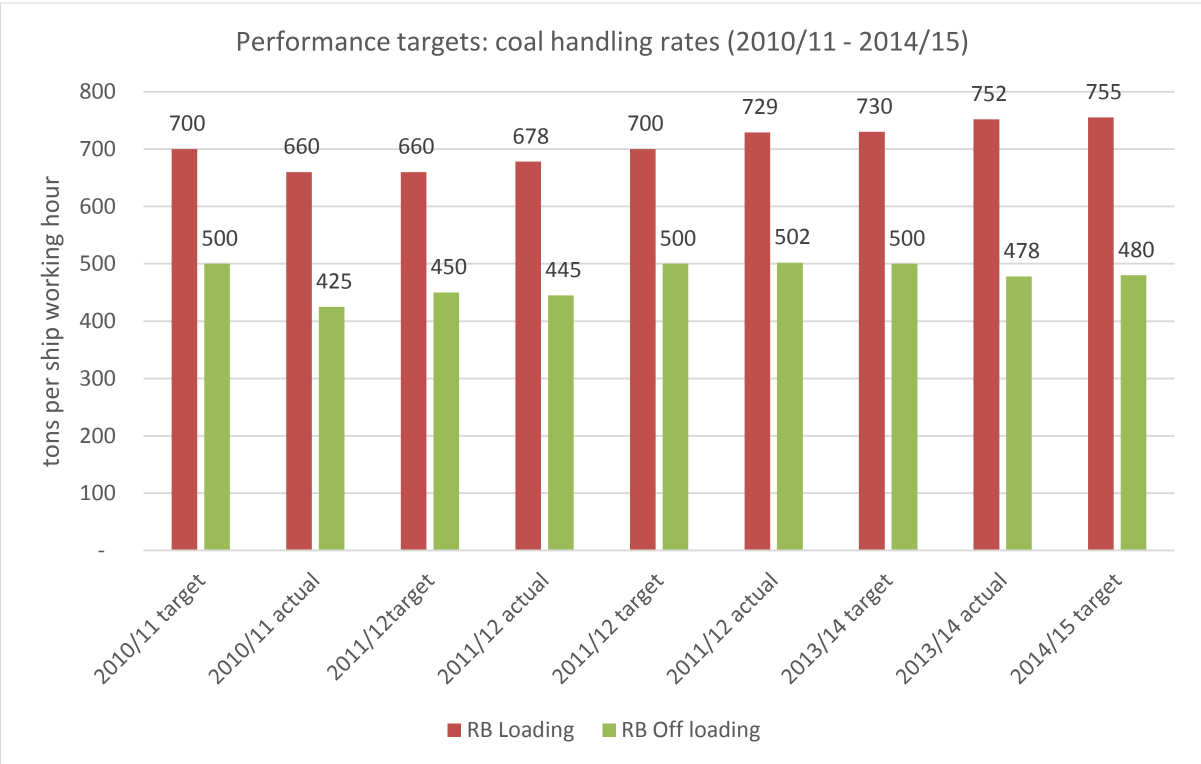


Figure 34: Coal loading and unloading rates per hour



Again, the set targets are variable and will need to heed some recommendations made in earlier sections of the Report. To determine a set of benchmark numbers, the same methodology followed in the preceding sections was applied with dry bulk, namely for coal and iron ore. An indication of performance norms or benchmark based on design and installed capacity is captured in column 1 and

2 in Table 10. Column 3 captures the calculated benchmark based on actual volume performance recorded for the terminals. This was computed using the formula with UNCTAD factors and is treated as indicating what the throughput per ship working hour should be. Column 4 provides a 4 year average from which to gauge performance trends.

Table 10: Dry bulk cargo handling rates: design, installed, actual and average performance

Dry bulk terminals	(1)Across the ship rate benchmark on design capacity (tons per ship working hour) (based on design capacity)	(2) Across the Ship rate benchmark on installed capacity (tons per ship working hour)	(3) Across the Ship rate benchmark (based on 2013 throughput) (tons per ship working hour)	(4) 2013 Actual performance as per NPA Annual Report (tons per ship working hour)	(5) Reported 4 year average dry bulk moves per hour
Coal	3 561	2 854	2 368	2 243	1 996
Iron Ore	4 729	4 139	4 489	3 609	3 248
Manganese	815	727	995	Not reported	Not reported

Two observations can be made from the Table: First, the calculated terminal performance (column 3) in relation to the reported numbers. Secondly, the difference between both these numbers and what they should be in terms of column 1 and column 2. Overall, the actual performance numbers (own calculation and as per the Authority's performance reporting, are lower than those calculated where the terminal capacity (design or installed is considered). What is encouraging though is that the numbers are closer to the benchmark for installed capacity.

Without discrediting whatever historical and operational challenges in the system that may account for current performance, the design and installed capacity numbers represent the targets that the country's ports should be striving towards, if country competitiveness is to be addressed.

3.3.4. Summary

- Iron ore, manganese and coal are the main commodities being moved in the system at the ports of Saldanha Bay, Ports Elizabeth, and Richards Bay respectively.
- The volume projection for dry bulk is in line with global projections for major and minor dry bulks.
- The main capacity expansion project is the relocation of the manganese terminal from Port Elizabeth to Ngqura, and the consolidation of manganese handling in Ngqura. The anticipated/projected coal volumes in the port of East London contributes to the additional capacity required in the long run.
- Port performance based on handling rates shows a trend of underperformance with actual performance figures below the targets. Issues with target setting for dry bulk terminals, i.e.

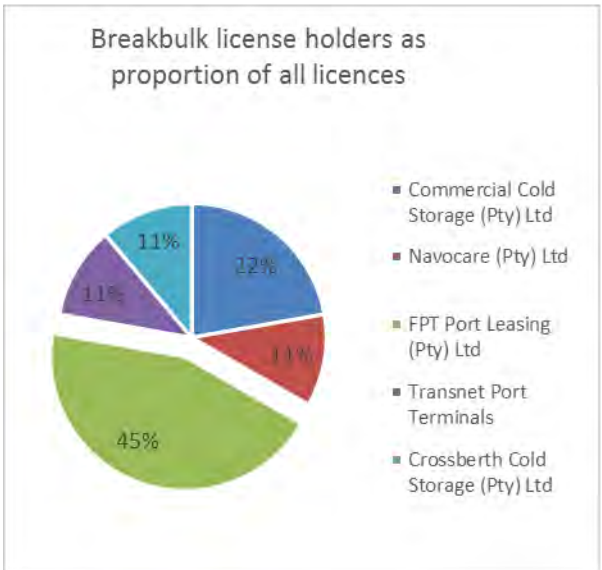
targets that are based on infrastructure capacity and not just previous performance must be addressed.

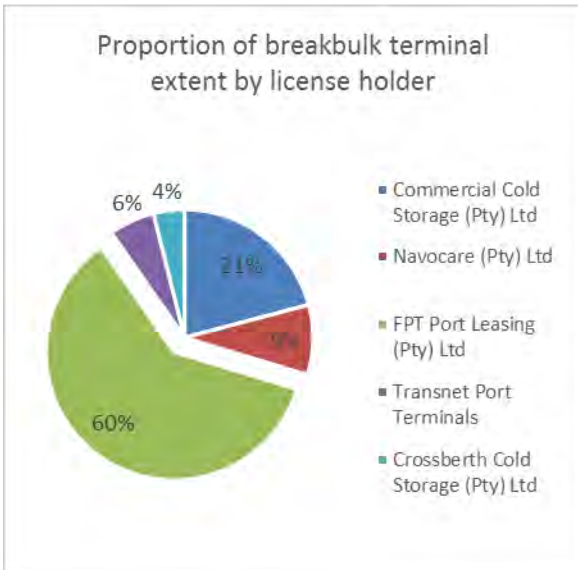
- Installed capacity is at 82% of design capacity. Volume throughput per annum places dry bulk terminal utilisation at an average of 69% of design capacity and 84% of installed capacity.

3.4. Breakbulk and multi-purpose cargo

Breakbulk cargo is handled in the ports of Durban, Richards Bay, Port Elizabeth, Ngqura and Cape Town, at either dedicated breakbulk terminals and berths or multi-purpose terminals. Five terminal operators run the dedicated breakbulk terminals in the ports system, with FPT Port Leasing (Pty) Ltd holding almost half (four) of the terminal licenses and the other four operators accounting for the balance; Commercial Cold Storage (two); and one each for Cross Berth Cold Storage, Transnet Port Terminals and Navocare (Pty) Ltd.

Figure 35: License holders in breakbulk terminals and proportion of terminal extent





The two terminals operated by Commercial Cold Storage (Pty) Ltd in Maydon Wharf have a combined terminal area of 28,552m^2. The main operations thereof are in the intake, cold storage and dispatching of citrus and dry goods, and the cold treatment of specialised product, which is avocado pears (fruit, break bulk). NovaCare (Pty) Ltd holds a single terminal operator license covering a 12 033m^2 facility. NovaCare's main operations cover storing and loading consignments of break bulk cargoes; loading and discharging of vehicles and rail wagons; tailing and sorting of break bulk; handling of fertilizers, animal feed, agricultural products and equipment. With four licenses, FPT Port Leasing (Pty) Ltd holds the most number of break bulk terminal licenses covering a breakbulk port area of 90 782m^2. The license allows for the handling of fresh produce and other commodities, such as steel, off-season. Transnet Port Terminals is licensed to operate a Maydon Wharf break bulk 7 880m^2 facility in Maydon Wharf for loading, off-loading and stowage of break bulk, transhipment/re-shipment, stacking or unstacking, temporary storage, collect and delivery, loading and discharging trucks and rail wagons, transfer, working break bulk on hold and all reasonably associated services. The main actual operations are: steel, overflow project cargo, and containers. In the port of Cape Town, Cross berth Cold Storage is licensed to operate a facility covering 5 359m^2, where it handles the import and storage of fresh and frozen fish and fish products.

There are twenty multi-purpose terminal licenses in the ports system, with a majority (thirteen) concentrated in Maydon Wharf Durban amongst five license holders, i.e. Bidfreight Port Operations (five licenses), Grindrod Terminals (five licenses), Transnet Port Terminals (two licenses) and Ensimbini Terminals, and Manuchar SA (Pty) Ltd, each with one license on Maydon Wharf.

Figure 36: Proportions of licenses held at Multi-purpose terminals by license holders (based on number of license)

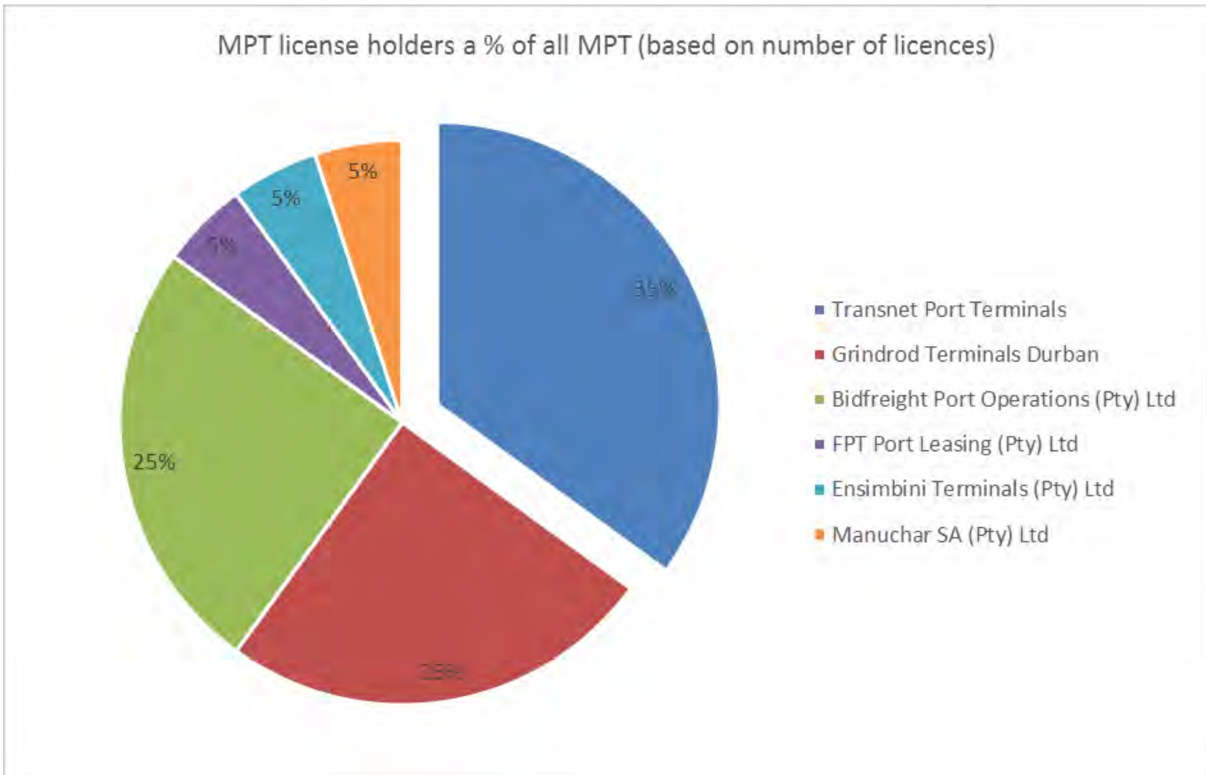
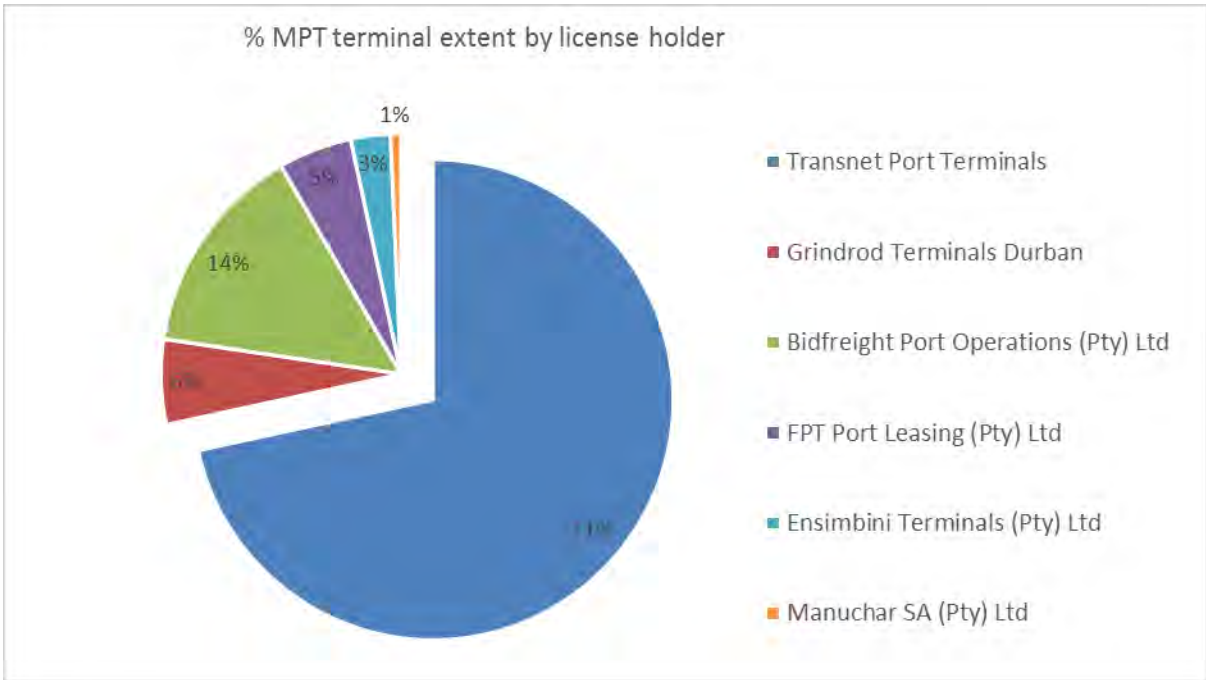


Figure 37: Proportion of MPT terminal extent by license holder



In terms of extent of terminal area for each of the multi-purpose terminal operators, Transnet Port Terminals holds the most with its facilities covering 1 059 977m^2 or 35% in all the ports, except in Mossel Bay and Ngqura, which do not license multi-purpose facilities. This includes the facilities in Maydon Wharf and the Point at the port of Durban. This is followed by Grindrod Terminals' licensed facilities, only in the port of Durban Maydon Wharf covering 85 257m^2, and Bidfreight Port Operations covering 211 668 m^2 also only in the port of Durban Maydon Wharf. FPT Port Leasing (Pty) Ltd in Cape Town operates a facility that covers 73 984 m^2 terminal area, whilst the Ensimbini Terminals (Pty) Ltd facility, also in Maydon Wharf, covers 12 217 m^2, and the Manuchar SA (Pty) Ltd facility covers 10 569 m^2.

The number of licenced operators in Maydon Wharf should result in competition and in turn better operational efficiencies. However, these operators handle different, and to some extent distinct, commodities that makes comparisons on a generalised and like to like basis difficult.

4.4.1. Break Bulk and Multipurpose Terminal capacity

Table 11: Break bulk terminal capacity

Port	Terminal	Berths	No of berths (No.)	Usable berths (No.)	Design terminal capacity (mtpa)	Installed Terminal capacity (mtpa)	Berth Length (m)	Berth Draft
Richards Bay	RB Breakbulk	606,607,608,706,707,708	6	6	9 935 915	7 200 000	1 244	14.5m
Durban	Maydon Wharf, Point and Island View.	MW 9,10,11, & 12, Point B,C,D,E, MW 6 and 15, O&P Jetty, MW 7, 13 and 14, IV 6	14	14	4 000 000	3 800 000	871	5.1 - 13.7m
East London	Quay 3 and 4	G, I	2	2	166 667	3 096	492	11m
Ngqura	Ngqura Multi-Purpose	C101	1	1	3 000 000	0	316	16.5m
Port Elizabeth	PE Multipurpose	8,9,10,11,12	3	4	1 180 500	403 676	1 037	7m to 11m
Saldanha Bay	Multi-purpose	201, 202, 203,	6	3	3 300 000	1 708 047	874	13m to 15 m
Mossel Bay	Quay 4	Quay 4	1	1	53 000	30 084	274	7.0m
Cape Town	Cape Town Multipurpose	B,C, D,E,F,J	7	6	10 877 071	4 000 000	1 368	9.1m to 12,2m
	Total:		**40**	**37**	**32 513 153**	**17 144 903**	**6 476**	

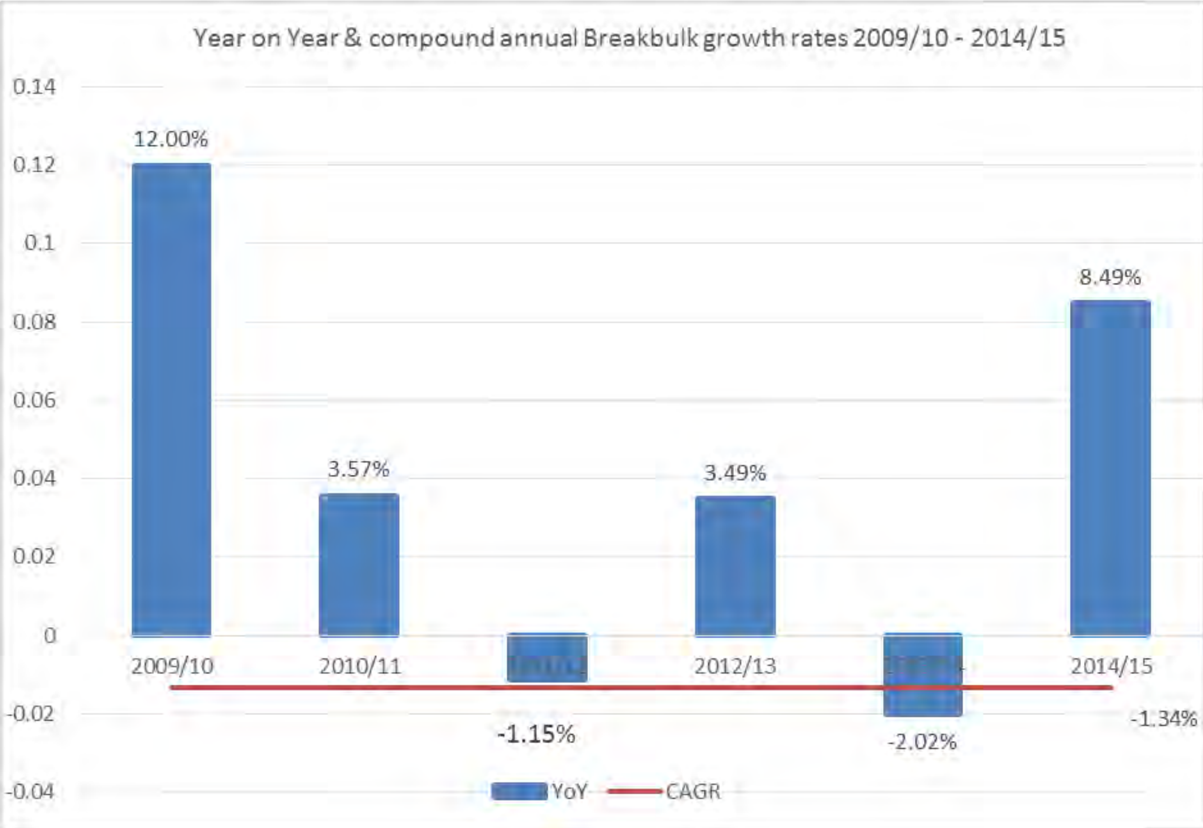
Break bulk and multi-purpose cargo is handled mainly by bulk carriers that, as captured below, tend to require some depth, compared to RoRo vessels as an example. The break bulk terminals in Ngqura, Saldanha Bay, Richards Bay and Cape Town have the deepest berths in the ports system. Only Richards Bay and Saldanha Bay are able to handle the largest Cape Size dry bulk carrier with 180 000tons. The main reason that a container ship is found classified as a general cargo vessel is because the port of Cape Town at times categorised vessels as "working" as they call in multiple berths.

The largest vessel as coming to work general cargo during the 2013/14 period is *MSC Susanna*, a container ship of 107,849 registered tons calling once at the port of Cape

3.4.2. Break Bulk and Multipurpose Capacity and Volume

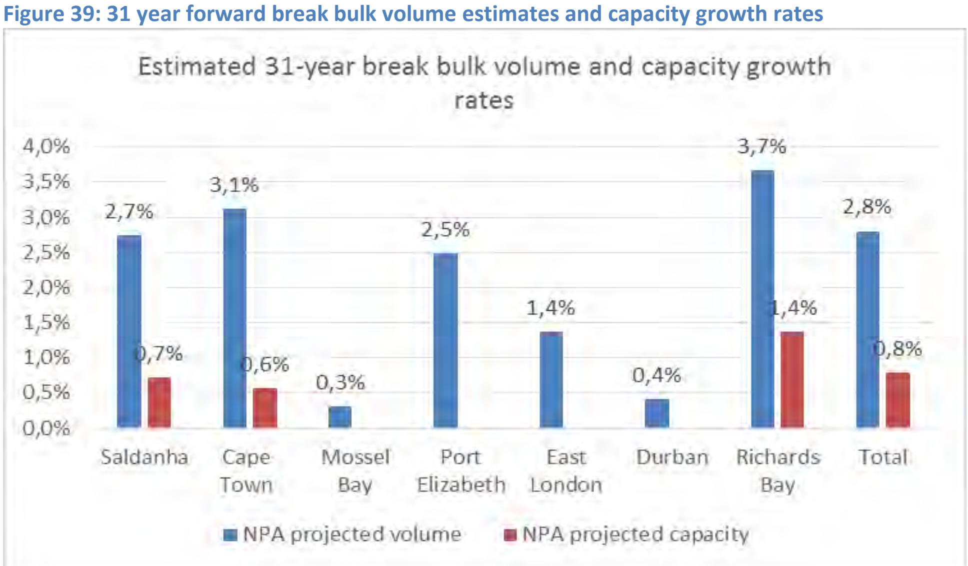
There was a steep decline in break bulk volumes since 2009/10 and growth rates have not stabilised as depicted by the W-shape of the chart.

Figure 38: Year on year and compound annual break bulk volume growth rates



Despite the past few years negative break bulk volume growth rate, the Authority's future volume projections are optimistic with an anticipated 2.8% average annual growth rate over the 31 year planning horizon. Growth is anticipated in all break bulk terminals, except in Mossel Bay and Durban, and the Authority plans to provide capacity additions in Saldanha Bay, Cape Town and Richards Bay as reflected below.

Figure 39: 31 year forward break bulk volume estimates and capacity growth rates



The NPA's national break bulk infrastructure development strategy has three key projects:

- Completion of Maydon Wharf Berth Reconstruction (R1.5b) – at execution stage already;
- 2 new berths in Richards Bay by 2032 (R2.2b); and
- 1 New berth in Saldanha Bay by 2040.

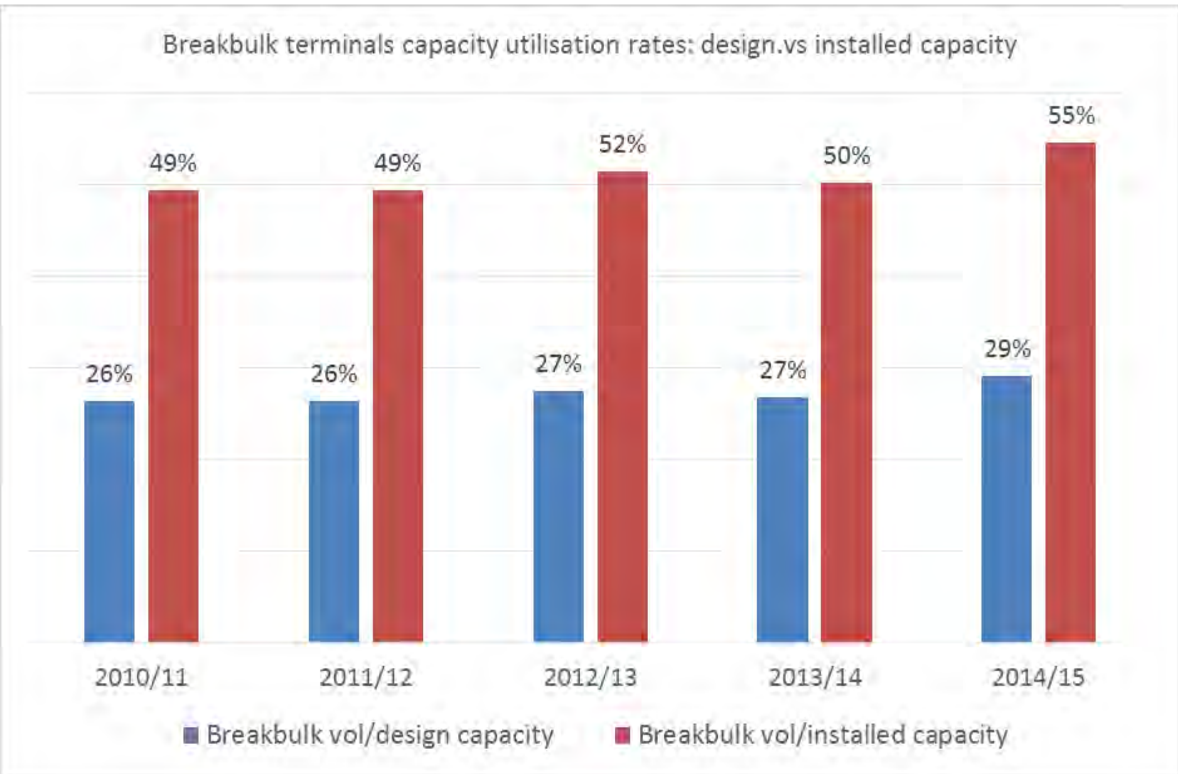
Due to break bulk being constituted by a range of commodities on the one hand and the effect that continued containerisation of commodities will have on the other, it is not easy to obtain market intelligence or aggregate volume growth estimates against which to assess the Authority's projections. Past performance, where there has been a decline of -5.7% in the compound break bulk volume growth rate between 2001/02 and 2013/14, suggests that the volume projections as a basis for expanding capacity of breakbulk terminals should be handled with caution.

Table 12: Historical Break bulk volume growth

Break bulk volumes	2001/2002	2013/2014	CAGR
Richards Bay	4 794 917	3 381 978	-2,87%
Durban	6 911 144	3 380 546	-5,79%
East London	158 352	93 719	-4,28%
Ngqura	-	80 031	-
Port Elizabeth	426 267	314 054	-2,51%
Mossel Bay	-	-	-
Cape Town	2 548 597	384 536	-14,58%
Saldanha	2 424 538	873 803	-8,15%
Total	17 263 815	8 508 667	-5,73%

In addition to the dwindling break bulk volumes, the terminal utilisation levels computed by looking at volumes against design and installed capacity, show very low utilisation levels and suggesting excess capacity.

Figure 40: Extent of use of design and installed capacity at breakbulk terminals



With volumes handled over the past 5 years, less than a third of the design capacity and just about half of the design capacity is used, suggesting that excess capacity exists in break bulk to warrant no capacity expansions in the near future in an overall sense. However, given the varied nature of break bulk, more pointed analysis is required per cargo item as to whether capacity is becoming a limitation to demand for the cargo item being considered, or the locality concerned.

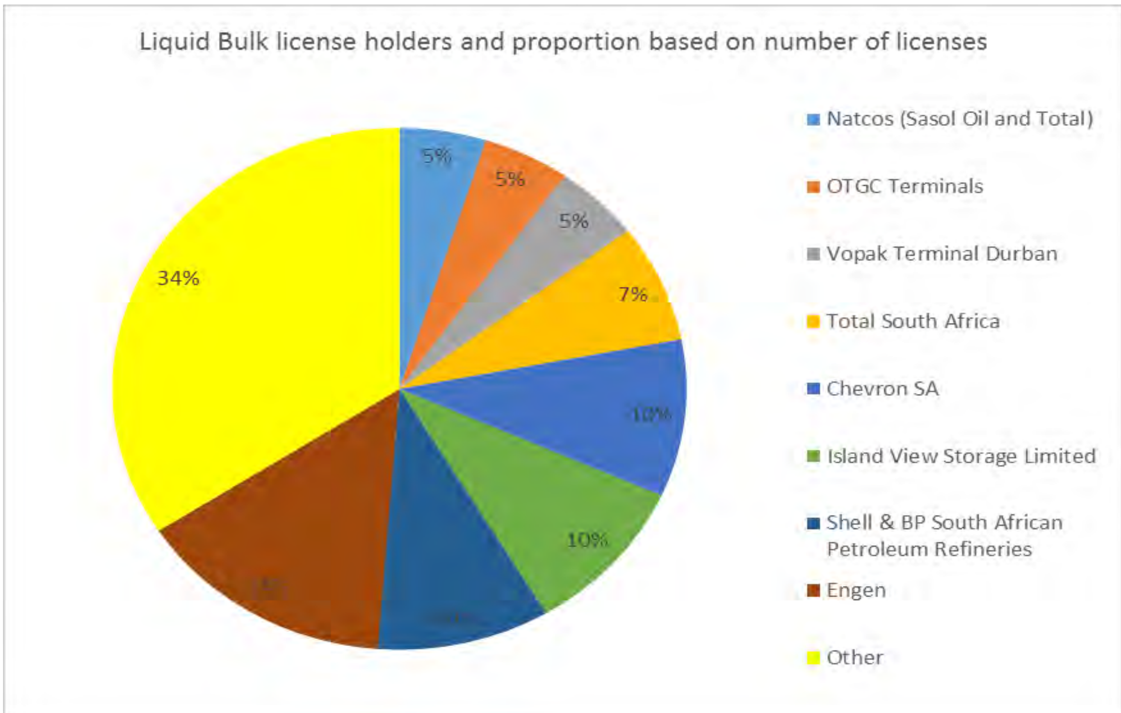
3.4.3. Summary

- Breakbulk terminals, judged by the number of terminal operators, is the most competitive environment in the South African system, except that they tend to handle distinctly different commodities to allow for comparison and competition on a like to like basis, or in terms of increasing the choices that cargo owners would have in the system.
- In line with global trends towards containerisation, the projections for volume growth in the sector are conservative with projects also focused on the maintenance or rehabilitation of current handling capacity.

3.5. Liquid Bulk Terminals

The South African liquid bulk port sector comprises twenty two players who collectively hold thirty six licenses. Of these, Engen South Africa has the most number of licenses (six) across the system in the ports of Durban, Richards Bay, East London and Port Elizabeth. Engen is also part of Joint Bunkering Services which is an amalgamation of BP Southern Africa and Chevron SA. The other players hold one license each and account for 34% of licenses in this sector. This category comprises: AECI Cape Chemicals, Blendcor (PTY) Ltd, BP Southern Africa, Cape Town Bulk Storage, Chemoleo, FFS Refineries, H&R South Africa, Hillside Aluminium Limited, Joint Bunkering Services (BP Southern Africa, Chevron SA, Engen Petroleum, Shell South Africa Marketing), Protank (Indian Ocean Terminals), Shell South Africa Marketing, Strategic Fuel Fund Association, Veetech, and Zenex Oil.

Figure 41: Liquid bulk license holders as proportion of licenses



The size of terminals held by terminal operators in the liquid bulk sector shows key players in the system in the Figure 42.

Figure 42: Liquid bulk terminal operator’s extent of terminal area

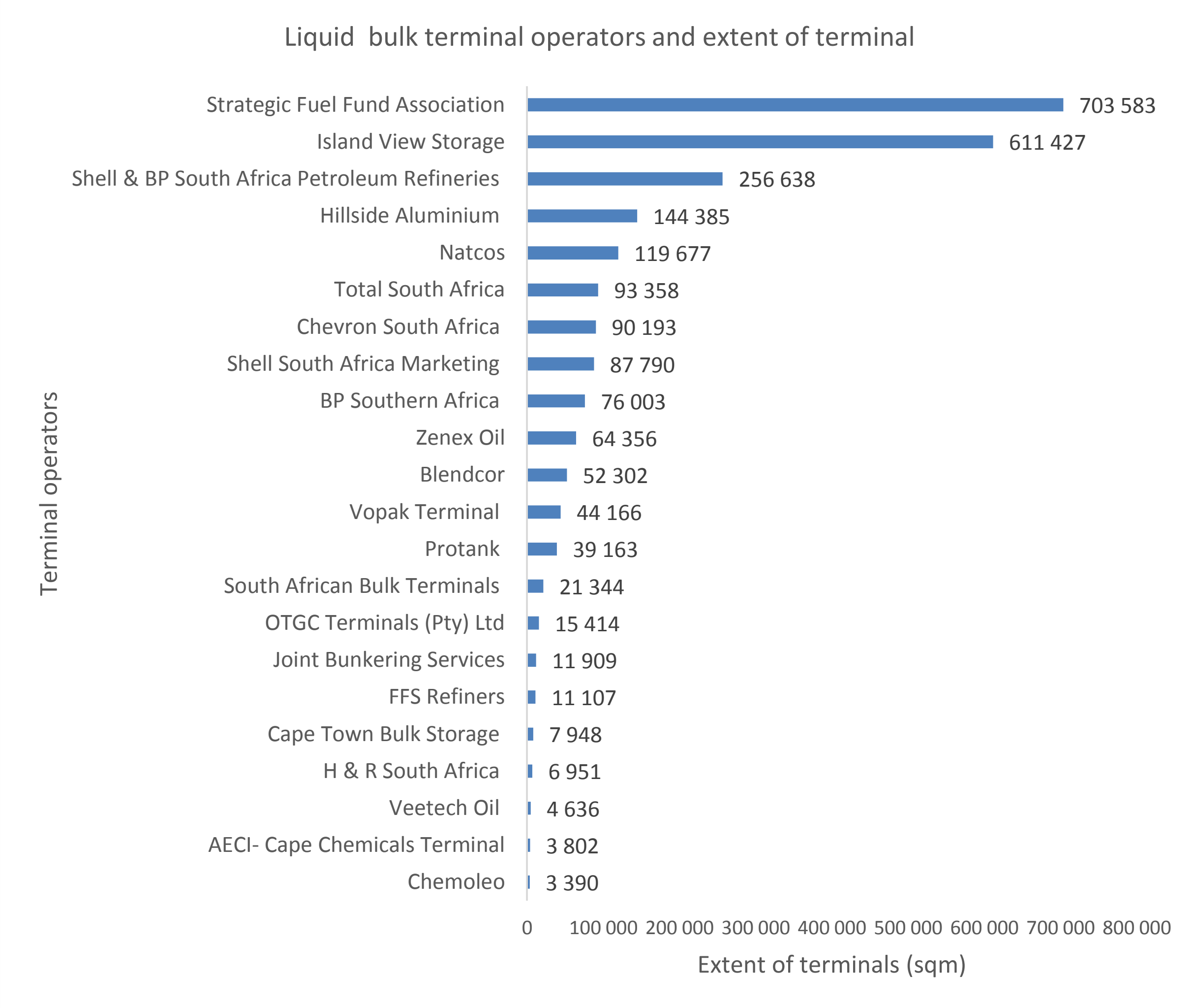


Table 13: Liquid Bulk Terminal license holder's extent of terminal area

Operator	Proportion of total liquid bulk terminal area	Operator	Proportion of total liquid bulk terminal area
Chemoleo	0.14%	Blendcor	2.12%
AECI- Cape Chemicals Terminal	0.15%	Zenex Oil	2.61%
Veetech Oil	0.19%	BP Southern Africa	3.08%
H & R South Africa	0.28%	Shell South Africa Marketing	3.55%
Cape Town Bulk Storage	0.32%	Chevron South Africa	3.65%
FFS Refiners	0.45%	Total South Africa	3.78%
Joint Bunkering Services	0.48%	Natcos	4.85%
OTGC Terminals (Pty) Ltd	0.62%	Hillside Aluminium	5.85%
South African Bulk Terminals	0.86%	Shell & BP South Africa Petroleum Refineries	10.39%
Protank	1.59%	Island View Storage	24.76%
Vopak Terminal	1.79%	Strategic Fuel Fund Association	28.49%

Key terminal operators, in terms of size of terminal area, are the Strategic Fuel Fund Association (SFF) which account more than a quarter (28%), followed by Island View Storage with a quarter (25%), and Shell and BP South Africa Petroleum Refineries' with 10% of the total liquid bulk terminal area. The remainder account for 6% or less of the terminal area. The size of the terminal, amongst other factors, would determine the rental from a terminal operator.

Table 14: Extent and capacity of terminals held by TOPS Liquid Bulk operators

Number of licenses held	Total terminal extent (sqm)	Total design capacity (million tons per annum)
1 License	1 217 325	27 686 841*
2 Licenses	179 257	1 970 139
3 Licenses	93 358	4 652 242
4 Licenses	958 258	958 258**
6 Licenses	196 190	0***
	2 644 388	**35 267 480**

* excl. unavailable capacity figures for 3 "one-license" holder
** excl. unavailable capacity figures for 1 "four-licenses" holder
***excl. unavailable capacity figures for the 1 "six-licenses" holder

Each terminal operator is licensed for loading, off-loading, storage, loading and off-loading of road tankers, transfer, transport of bulk liquid cargoes and all reasonably associated services. All are common user berths with road, and in some instances rail, links (17 terminals are common user with road only links; 13 are common user with both road and rail links; 3 are common user with no road or rail link; 4 are non-common user berths with no road and rail link; 4 are non-common user with road links; and 3 are non-common user with road and rail links).

3.5.1. Liquid Bulk Terminal capacity

Table 15: Liquid Bulk terminal capacity

Port	Terminal	Total Berths	Usable berths	Design Capacity (klpa)	Installed Terminal Capacity (klpa)	Berth Length (m)	Berth Draft
Richards Bay	RB Bulk Liquid	2	2	3 152 778	1 011 432	600	14m
Durban	Island View	9	8	21 000 000	11 000 000	1 765	9.1m to 12.2m
East London	Tanker Berth	1	1	3 000 000	918 688	259	10.7 m
Port Elizabeth	PE Liquid Bulk	1	1	2 926 829	972 208	242	9.9m
Saldanha Bay	Liquid Bulk	1	1	25 000 000	6 946 229	360	23m
Cape Town	Cape Town Liquid Bulk	2	2	3 400 000	3 400 000	489	13.7m to 15.2m

Durban	CBM/SPM	-	-		24 000 000	-	-
Mossel Bay	CBM/SPM	2	2	7 971 600	1 893 127	-	-
	Total **Total CBM/SPM**	**18**	**17**	**66 451 207**	**24 248 557** **31 971 600**	**3 715**	

The port of Saldanha Bay liquid bulk terminal has the deepest draught, followed by Ngqura, Cape Town, and Richards Bay. Handling capacity at the port of Ngqura must still be installed. The ports of Mossel Bay and Durban handle liquid bulks through a loading buoy anchored offshore -Single Point Mooring Buoy (*SBM*) - which is capable of handling any size ship. The CBM/SBMs currently has capacity of about 32 million kilolitres per annum. The largest vessels measure more or less the same length at approximately 275m and based on berth length, these would not be calling in the ports of Port Elizabeth, East London or Durban's Island View.

The largest tanker to call during the 2013/14 period to a South African port is *Boston*, a vessel with 166,093 registered tons that called once at Saldanha Bay port. The second largest tanker by GRT is

3.5.2. Liquid Bulk Capacity and Volume

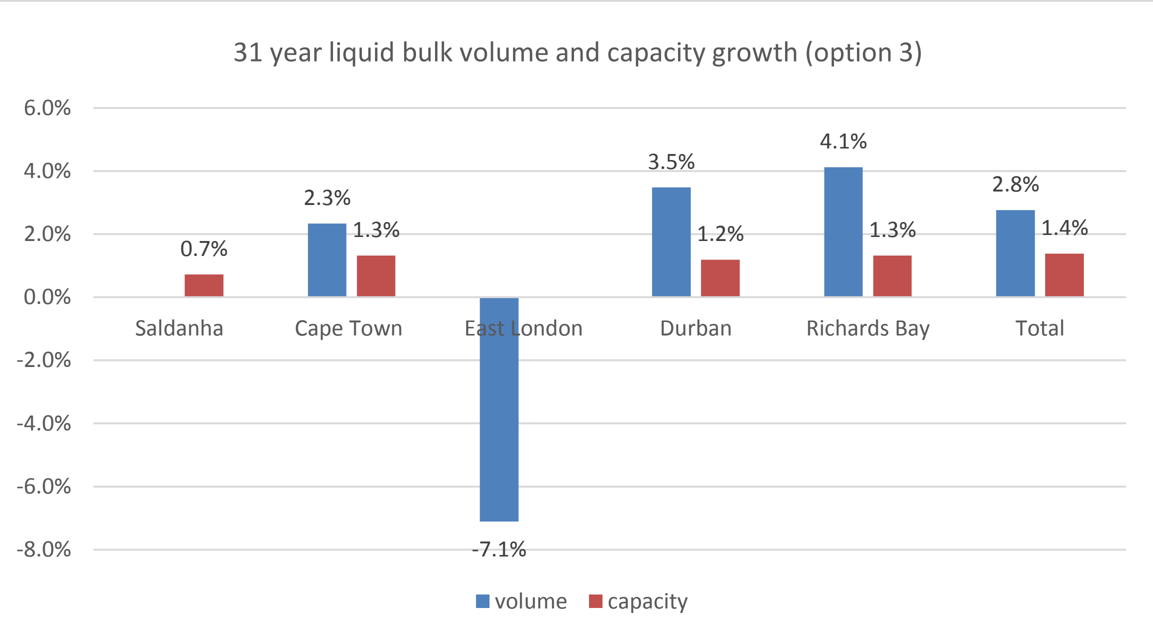
Total liquid bulk capacity is based on the combined capacities of the ports of Saldanha, Cape Town, Port Elizabeth, Ngqura, East London, Durban and Richards Bay. Historical growth rates for liquid bulk are 2.77% with a decline in the ports of Richards bay and Cape Town. The ports of East London and Port Elizabeth account for a significant proportion of the growth rate, at 41% and 24% respectively. The third port with high growth rates is the port of Saldanha Bay, achieving a cumulative average growth of 18% over the period.

Table 16: Historical liquid bulk volume growth rates

Liquid bulk	2001/2002 (klpa)	2013/2014 (klpa)	CAGR
Richards Bay	1 547 576	1 491 481	-0,31%
Durban	19 830 331	25 132 543	1,99%
East London	2122	130 241	40,93%
Port Elizabeth	15 009	197 129	23,94%
Mossel Bay	490 363	1 381 951	9,02%
Cape Town	2 034 165	1 448 213	-2,79%
Saldanha	601 229	4260761	17,73%
Total	**24 520 795**	**34 042 319**	**2,77%**

Future volumes and capacity planning by the Authority is informed by assumptions about the Mthombo project at Ngqura, whether it materialises, and if so, if there will be a pipeline to Gauteng or not. In projections of future volumes and capacity in Figure 43, the Authority expects the same historical trend to follow, with only 2.8% volume growth planned for. Where the port of East London drove the earlier growth, it is expected to register a 7.1% decline in the handling of liquid bulk by 2042. It is not clear what will be driving this decline.

Figure 43: NPA 31 year forward liquid bulk volume estimates and capacity projections



The Authority's three options for future provision of liquid bulk capacity are dependent on scenarios for around the Ngqura Mthombo refinery and pipeline construction as captured below:

1. Option 1 is based on a scenario where there is no refinery capacity at the Port of Ngqura.
   - By end 2032: The port of Durban - 4 Berths must be commissioned, another 4 berths commissioned by end of 2038.
   - By end of 2015: The port of Ngqura – Construction of 1 Berth (A100).
   - End of 2017: At the ports of Port Elizabeth/ Ngqura liquid bulk terminates in Port Elizabeth and moves over to Ngqura.
   - By end 2034: 1 Berth commissioned at the port of Richards Bay.
2. Option 2 assumes that Ngqura Mthombo refinery will be constructed, however without a pipeline to Gauteng. The scenario remains the same as Option 1.
   - Port of Durban - 4 Berths commissioned end 2032, 4 berths commissioned end 2038.
   - Port of Ngqura - Construction phasing: 1 Berths (A100) at end 2015; 4 berths at end 2017.
   - Ports of Port Elizabeth/ Ngqura - End 2017 Liquid Bulk terminates in Port Elizabeth and moves over to Ngqura.
   - Port of Richards Bay - Construction phasing: 1 Berth commissioned end 2034.

4. Option 3: Ngqura Mthombo refinery with pipeline to Gauteng.

- Port of Durban: 4 berths to be commissioned by end 2037.
- Port of Ngqura - Construction phasing: 1 Berth (A100) at end 2015; 2 berths at end 2017 *(same as option 1 and 2).*
- Ports of Port Elizabeth/ Ngqura - End 2017 Liquid Bulk terminates in Port Elizabeth and moves over to Ngqura *(same as option 1 and 2).*
- Port of Richards Bay - Construction phasing: 1 berth commissioned end 2034 *(Same as option 1 and 2).*

Figure 44: NPAs Liquid Bulk capacity, shortfall/surplus and projected volumes (2010/11 - 2041/42) Option 1.

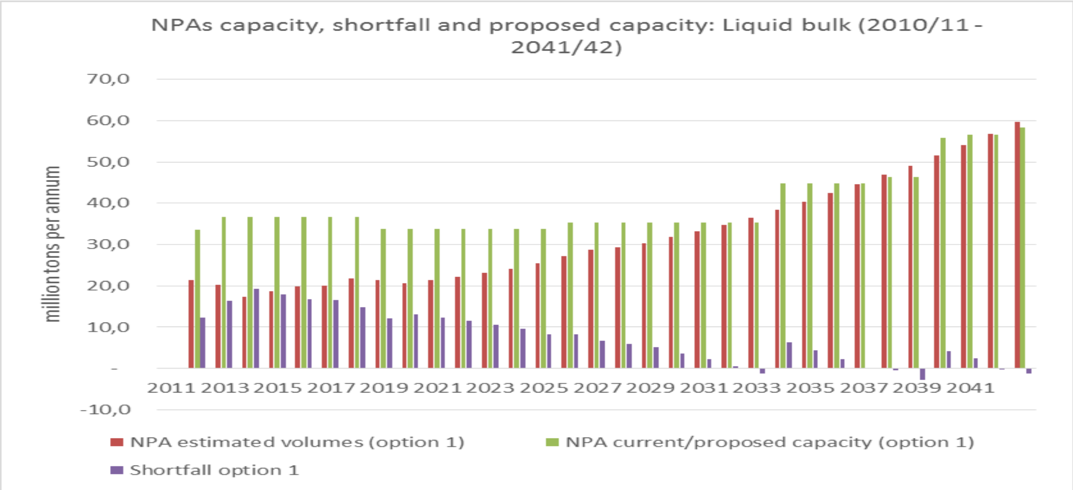


Figure 45: NPAs Liquid Bulk capacity, shortfall/surplus and projected volumes (2010/11 - 2041/42) Option 2.

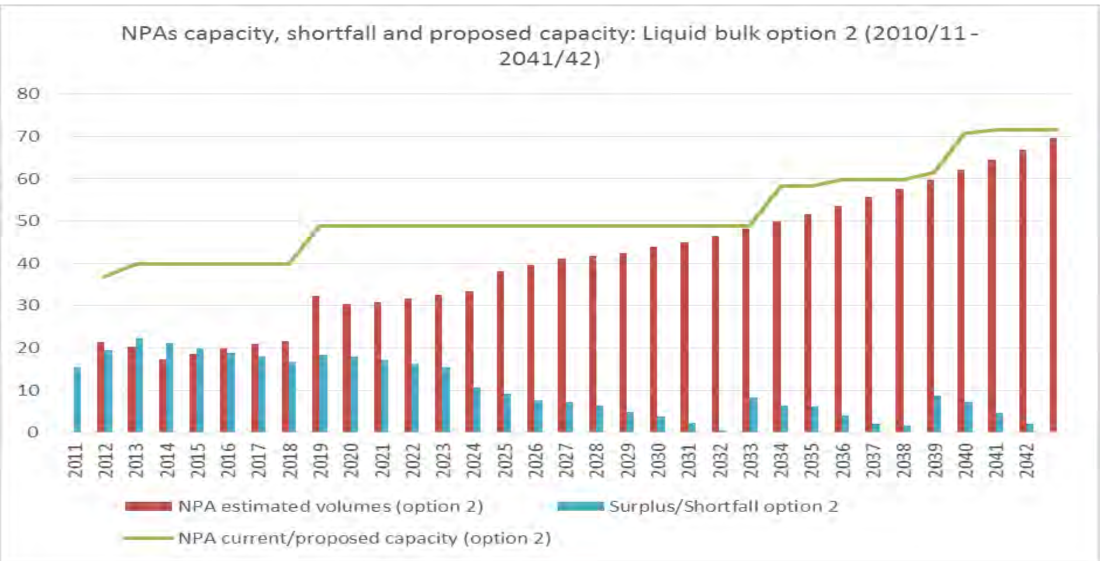
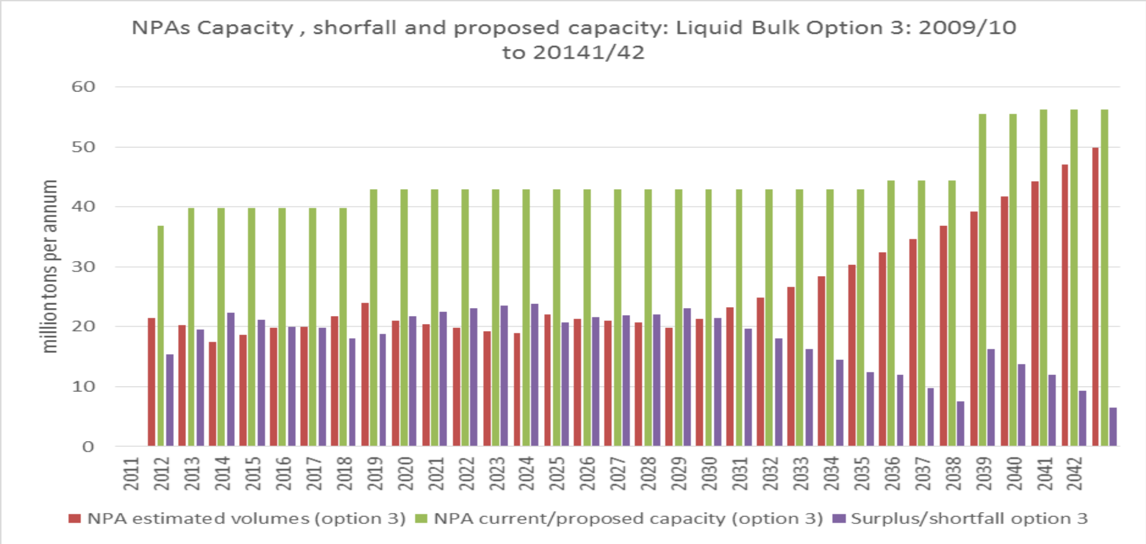


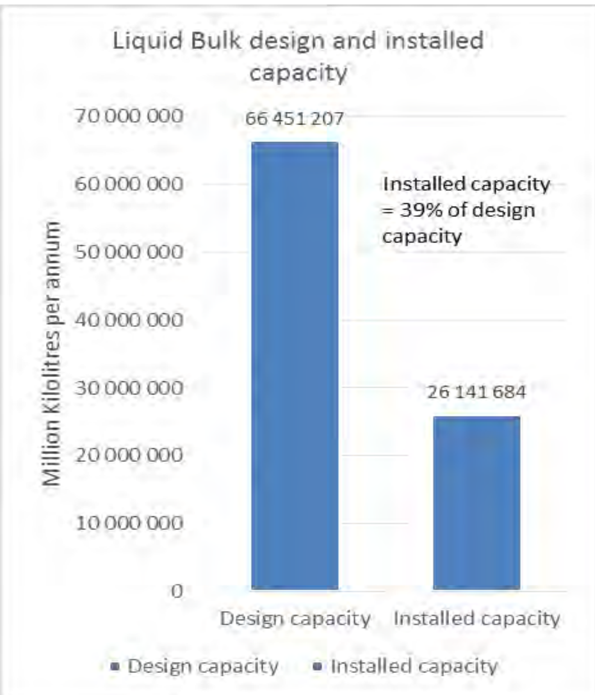
Figure 46: NPAs Liquid Bulk capacity, shortfall/surplus and projected volumes (2010/11 - 2041/42) Option 3.

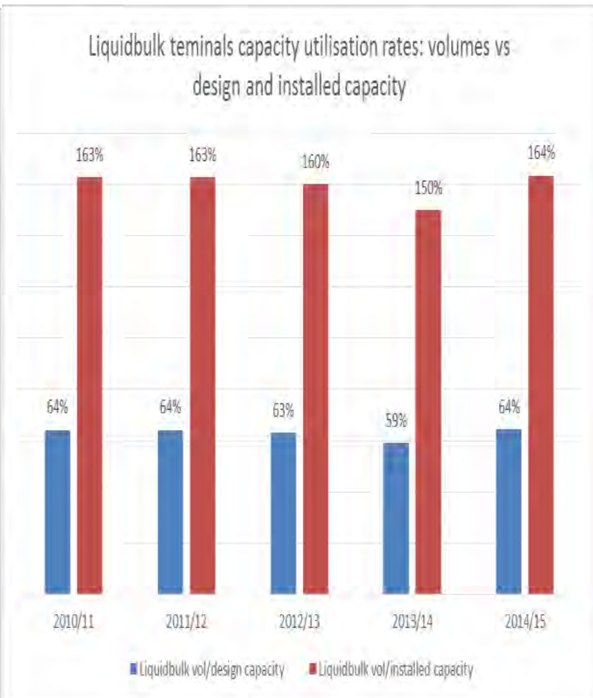


In addition to these capacities are the SBM and CBM and SPM at the ports of Mossel Bay and Durban which amounts to about 32mtpa. The Authority does not plan to increase capacity of the SPM/CBM into the future and they will continue to provide additional capacity.

3.5.3. Liquid Bulk Terminal capacity utilisation

Figure 47: Liquid bulk terminal capacity and utilisation





Installed capacity is only 39% of the design capacity in the liquid bulk sector, which makes the utilisation rates for installed capacity look significantly high, as seen in Figure 47. This is due to CBM/SPM volumes of 31 971 600 might be the effects of volumes that are handled through the CBM/SPM in Durban and Mossel Bay.

3.5.4. Summary

- Almost the same players dominate the liquid bulk sector in the different ports.
- Historical growth rates for liquid bulk have only been 2.77% with the bulk of growth driven by volumes at ports of East London. However, East London's volumes are projected to reduce by 7.1% over the longer term with Durban and Richards Bay driving future growth.
- The utilisation rates at liquid bulk facilities are significantly low when looked at from a design capacity perspective and abnormally high in relation to installed capacity due to CBM/SPM volumes, which means that there is still excess capacity in the conventional liquid bulk sector.
- Capacity expansion is prioritised in the port of Ngqura and linked to the Mthombo project with the main decision and dependency being on the building of a pipeline to link Ngqura with Gauteng.

4. Conclusion

The information provided in this capacity and utilisation report should empower port users to further engage with the plans of the Authority to meet current and future demands. The value of the information may become even more pronounced as the Regulator's tariff methodology review process starts, with necessary linkages between port performance (volumes and operations) and port tariffs in the near future.

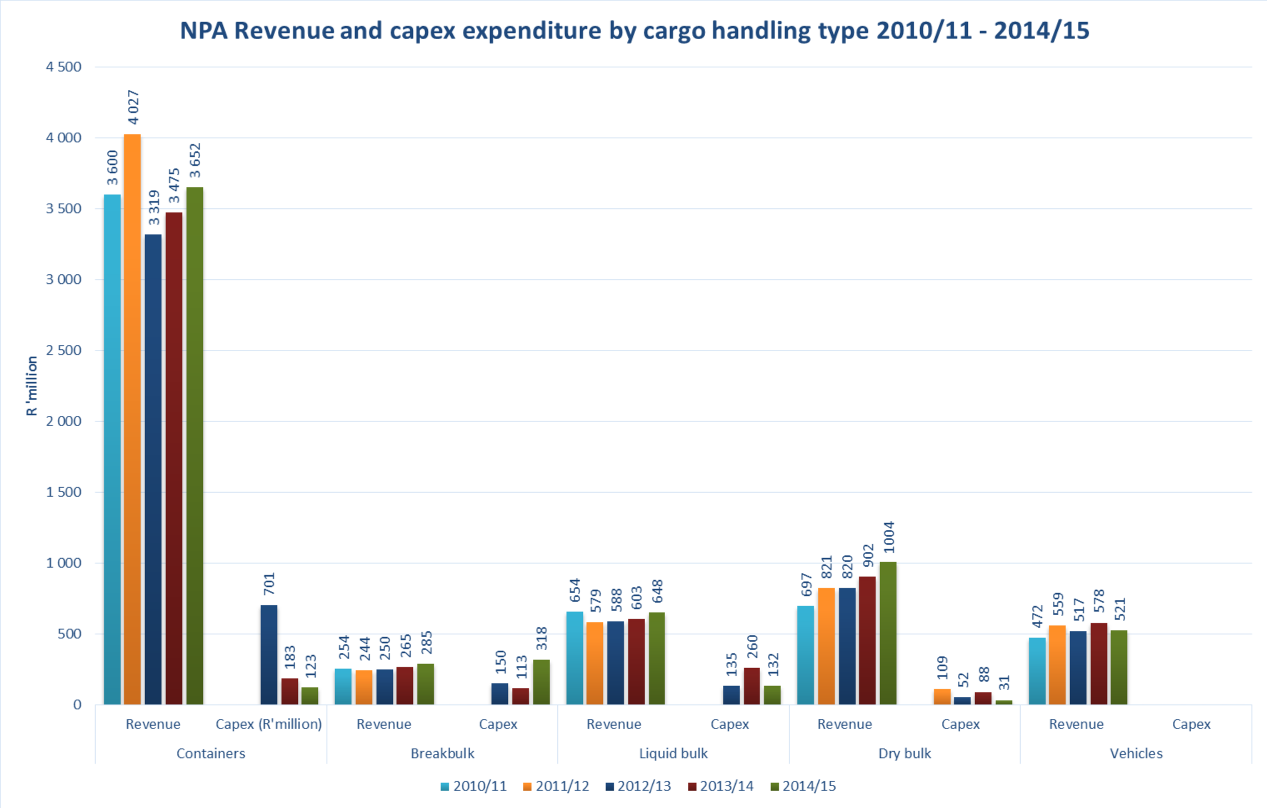
The report is intended to engender robust discussions with port users, and the Authority on a wide range of issues including but not confined to:

- Setting of performance norms for terminals in relation to terminal design and installed capacity.
- Volume and market considerations that determines what happens in the South African system to better plan for future capacity and port performance
- Deciding which indicators must performance norms be set against, given that there will always be excess capacity in the system due to the policy and pragmatic approach of providing infrastructure or capacity ahead of demand.
- The Regulatory treatment of "excess" capacity in the RAB and efficiency levels expected/required of the infrastructure in the intervening years.

This report, and an assessment of the capex component of the application are collective measures that will allow the Regulator, to systematically unpack the capex plan of the Authority and monitor port infrastructure development in line with its mandate in the National Ports Act.

Figure 48 captures the Authority's Capex and investment trends in relation to the five main cargo handling types, reflecting category revenue as well as actual capex expenditure per category over five years.

Figure 48: NPA revenue and capex expenditure by cargo handling type (2010/11 - 2014/15)



Overall, the trends shows more revenue generated than expended capital across the sectors. Taking capex expenditure as a proxy for sustaining and expanding capacity for cargo handling, the figure shows capacity creation efforts across the sectors. Containers do account for slightly more capex expenditure than the other cargo handling with no new capex on Roro's over the past five years.

The proposed expansions as reflected in this document will require the Authority to execute its plans in a timely and cost effective manner. Overall, the immediate past expenditure trends on capex, although improving, places a serious responsibility on the Authority to carry out the major capex investment as highlighted in their plans. The Regulator and port users, primarily through the submissions and in the consultation process, the Port Consultative Committee and National Port Consultative Committee must continue to improve the rigor in analysing and monitoring the Authority's continued and relevant development of South Africa's port system.