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Global Gateway for NSW: the economic impact of a container terminal at the Port of Newcastle

Prepared by AlphaBeta for Port of Newcastle

Important Notice on Contents – Estimations and Reporting

This report has been prepared by AlphaBeta for Port of Newcastle. All information in this report is derived or estimated by AlphaBeta analysis using both proprietary and publicly available information, other than CGE modelling which was performed by Cadence Economics with input from AlphaBeta. Where information has been obtained from third party sources and proprietary research, this is clearly referenced in the footnotes.

The values in this report are specified in cumulative, NPV terms at from 2018 to 2050, in 2018 dollars, unless otherwise indicated.

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Grow the NSW economy

A container terminal will add **$6 billion to NSW GSP by 2050**

Generate savings for businesses and consumers

Businesses and consumers in Northern NSW will save

$2.8 billion

on freight costs by 2050,

cutting the distance

freight travels over land by

40 %

Sydney and Southern NSW will save

$1.2 billion

in freight costs by 2050 as

competitive pressure

lowers prices at Port Botany

Improve liveability in Sydney

Sydney will save

$400 million

by 2050 on avoided infrastructure costs

Remove

750,000 truck trips

from Sydney's roads in 2050, saving

$130 million

in congestion and pollution costs by 2050

Generate growth & jobs in the Hunter and Northern NSW

The Hunter and Northern NSW will gain

4,600 new jobs

by 2050

The Hunter and Northern NSW

exports will increase by $800 million

by 2050

1. Foreword

The New South Wales (NSW) and global trade picture has greatly changed over the past decade, and the freight task is not the same as it was in 2013-2014, when Port of Newcastle was leased. Australia's freight task is the now the fifth largest in the world,[1] and 97 per cent of Australia's imports and exports are seaborne.[2] Consequently, it is critical to Australia's economic performance to have modern, highly-efficient and productive ports.

Transport for NSW projects the total state freight task and container freight will grow by 28 per cent and 77 per cent respectively by 2036. Global containerisation continues to grow, with 2018 on track to achieve 5.3 per cent growth. The number of "twenty-foot equivalent units" (TEU) handled by Australia grew by 11.6 per cent to 8.0 million in the past year alone.

The imperative to move larger volumes of containerised goods at lower costs has driven, and continues to drive, an increase in the size of vessels. This has resulted in infrastructure investments in ports around the world to facilitate and attract the larger container vessels. With the widening of the Panama Canal in June 2016, the major global shipping lines have changed their fleet mix. Pre-2016, the container ship "workhorse" had a capacity of around 5,000 TEU.

The workhorse of industry now has a capacity of between 8,000 and 10,000 TEU and shipping lines are moving to even larger 10,000-plus TEU vessels such as the Maersk Line E-3, carries 18,900 TEU. The over-10,000 TEU vessels are reducing the slot prices (unit cost of transporting a container), reducing the carbon footprint and making fleets smaller and easier to maintain and manage. The larger vessels should cascade to so-called secondary lanes like those servicing Australia, however existing port infrastructure limits the number, size, frequency and efficient handling of 10,000-plus TEU vessels.

Currently, there are only two locations on the East Coast of Australia capable of handling the large vessels – one berth in Melbourne and another at Port of Brisbane. Both ports have widely acknowledged handling and land-side freight movement constraints. While Brisbane is the best placed of the existing container ports to handle 10,000-plus TEU vessels, it will have to invest in land-side improvement and dredging, and it is entirely reliant on trucks which create bottlenecks and restrictions on truck access to the surrounding metropolitan roads.

Port of Newcastle plans to develop the only "New Panamax" container terminal (13,500-plus TEU vessels) in Australia. The fully developed (stage 3) Newcastle Container Terminal (NCT) will be a fully automated, 11 quay crane terminal with integrated intermodal and warehousing inside the port boundary. This would allow shipping lines to send their larger vessels to Australia, reducing the nation's slot prices.

[1] OECD (2018)

[2] Deloitte (2013)

Port of Newcastle will be able to offer multiple berths with a fully integrated, automated process from wharf to warehouse, eliminating intermodal double-handling. The Port is uniquely positioned to take advantage of this opportunity due to:

- extensive land holdings;
- existing heavy rail infrastructure with direct access to the waterfront;
- direct access to major road and rail freight routes;
- a channel that is only 47% utilised; and
- a channel that can accommodate New Panamax vessels.

EXHIBIT 1: PROPOSED PLAN FOR CONTAINER TERMINAL

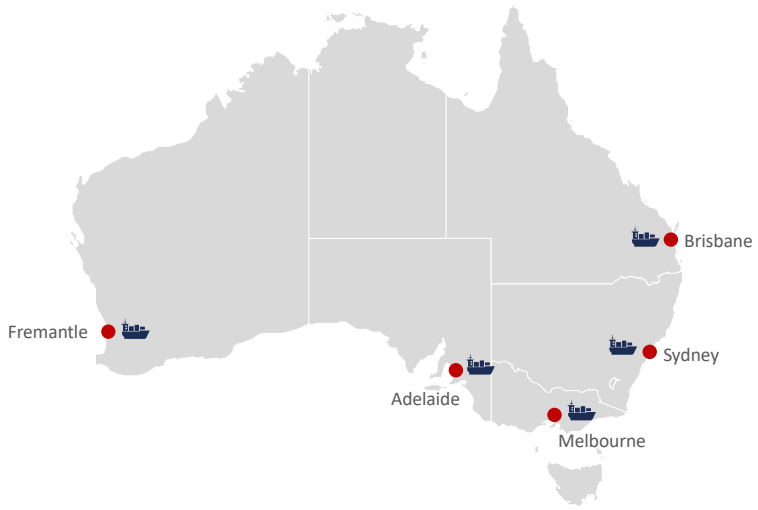
SOURCE: Port of Newcastle

Port of Newcastle is the largest coal port in Australia, exporting approximately 160 million tonnes of coal per annum. It also handles fuel, grain, bulk cargo, liquids and project cargo. More recently, the Port's uses have evolved to match the changing face of the local economy, including opening a high-tech naval shipyard.

Australia has five major container ports, at Brisbane, Sydney (Botany), Melbourne, Adelaide and Fremantle. In New South Wales, Port Botany handles containers, Port Kembla handles cars and steel and Port of Newcastle handles coal, wheat and fuels. Botany and Kembla are co-owned. Port of Newcastle is limited in how many containers it can facilitate, based on a penalty system.

EXHIBIT 2

Australia has five major container ports spread around the coastline



Source: Ports Australia (2018)

Port of Newcastle has physical assets that make it well-positioned for the future of world container trade which entails larger vessels and container ports and automated stevedoring that can facilitate a high-productivity unmanned port.

Port of Newcastle commissioned AlphaBeta to model the economic benefits of the proposed NCT for NSW as a whole, including regional NSW, both in terms of freight costs for businesses and as a complement to Port Botany for optimal handling of the anticipated growth of container traffic.

A restriction currently imposed on Port of Newcastle prevents it from developing a large-scale, commercially viable container terminal capable of accepting larger vessels. However, the study models a scenario where the restriction is assumed not to apply to understand the potential economic impact for the state of taking advantage of global innovations in the container freight market.

AlphaBeta's report clarifies for us that not only will Hunter and northern NSW businesses and households benefit from a container port at Newcastle, but so will Sydney in terms of pollution, congestion and freight costs, which will come down with competition from Newcastle.

AlphaBeta also confirms our own internal assessment: that port-related freight costs are reduced when there is a shorter journey and more efficient operations. This creates significant points of difference for a new, modern large-scale container port. We welcome this independent report, which demonstrates that a container terminal at Port of Newcastle would be good for regional NSW consumers and businesses, and would represent a major economic boost to the state as a whole.

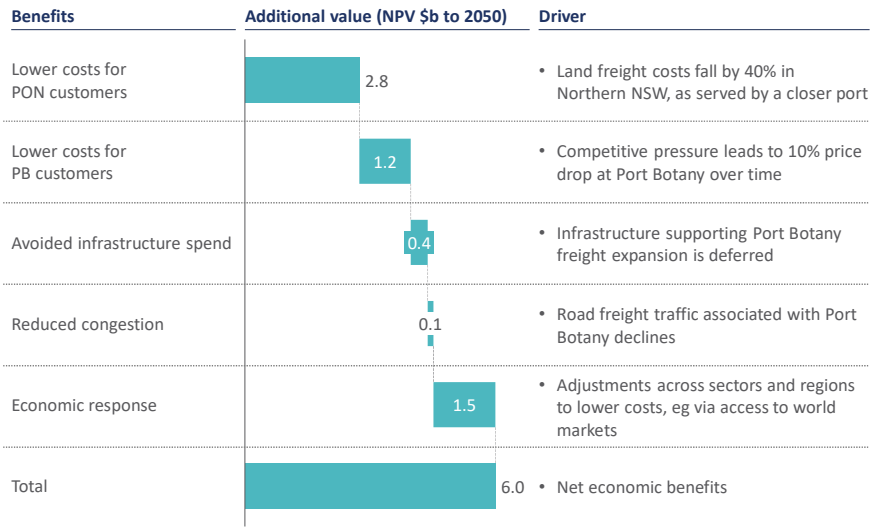
Craig Carmody - CEO, Port of Newcastle

2. Executive Summary

This report examines the economic impact of opening a container terminal at Port of Newcastle. It finds the NCT will increase NSW Gross State Product (GSP) by $6 billion by 2050. Over half of the $6 billion in new economic value for the state comes from lower freight costs. Customers will save $2.8 billion in land transport costs in Port of Newcastle's potential market by 2050 through shorter journeys and more efficient operations. The average land transport journey to port for northern NSW exporters (compared with Botany) will nearly halve. Meanwhile, customers served by Port Botany will save $1.2 billion in freight costs as competitive pressure leads to lower prices. Sydney will also benefit from less freight traffic on its roads. This will create $500 million in extra value from avoided infrastructure spending, and reduced congestion and pollution costs (see Exhibit 3).

EXHIBIT 3

A container terminal at the Port of Newcastle could drive $6 billion in additional economic value in NSW by 2050



SOURCE: CGE modelling, AlphaBeta analysis[3]

Opening a container terminal in Newcastle will also have broader economic and social benefits, including stimulating exports and jobs in the Hunter Region and Northern NSW. Key sectors, such as agriculture, food processing and advanced manufacturing, would see exports grow in value by an extra $800 million by 2050. More than 4,600 jobs would be created in the Hunter Region and Northern NSW by 2050, in industries as diverse as transport, construction, agriculture, manufacturing and local services.

Approach taken to assessing economic impact

This report analyses the potential economic impact of the proposed container terminal at Port of Newcastle by 2050 at a regional, state and national level.

[3] Numbers may not sum to totals due to rounding

The analysis compared the impact of two scenarios from the present day until 2050. The baseline scenario assumed that Port Botany continues to operate as the sole container port in NSW. In the second scenario, Port of Newcastle opens a second container terminal, which scales and serves the Hunter Region and Northern NSW. It did not consider the impact of more ambitious growth scenarios, such as expanding the addressable market for NSW with the advent of inland rail.

Both scenarios applied NSW Treasury GSP and population growth projections. Growth in the container freight market was assumed to be GDP growth plus one, recognising that historically trade volumes have exceeded GDP.

Methodology

There were three stages to our methodology.

In the first stage, we modelled the container freight market in NSW. Using data on population, incomes and industry output by local government area, we estimated where imports go to and where exports originate from, across NSW and the ACT. We also projected growth in the market to 2050.

Using the freight market model, we then estimated the direct value to container freight customers routing their traffic through a container terminal at Port of Newcastle. Using freight rates to all the east coast container ports, we then estimated the potential land freight cost savings of accessing a Newcastle terminal to customers addressable market. We estimated the benefits to customers of being able to site intermodal centres and distribution centres adjacent to the Newcastle terminal, rather than being separated by an additional rail or road link such as the 40 kilometre link between Port Botany and the Moorebank intermodal site.

In the second stage, we estimated the broader potential benefit and impacts across the NSW economy of a Port of Newcastle terminal. We calculated the potential savings from deferred infrastructure spending in Sydney and from lower congestion and pollution, and the potential for incumbent terminals at Port Botany to improve productivity in response to competitive pressure from Newcastle. We also added the capital investment required to build a container terminal in Newcastle, and the associated intermodals and distribution centres.

In the third stage, we integrated all these changes into a computable general equilibrium ('CGE') model of the NSW economy, yielding changes in output, employment, incomes across regions and industries, as well as the export of containerised freight, out to 2050.

The following chapters of the report explain the findings on the economic impacts associated with establishing a container terminal at Port of Newcastle.

3. Generating freight savings in the Hunter Region and Northern NSW through a more efficient freight network

Adding a container terminal to Port of Newcastle could generate $2.8 billion in freight savings to importers and exporters in the Newcastle, Hunter and Northern regions of NSW by 2050. Currently, importers and exporters are served by Port Botany in Sydney or Port of Brisbane.

Both ports are hundreds of kilometers from the origin or destination points of freight in the Hunter Region and Northern NSW, an area responsible for about a sixth of imports and exports in NSW. Opening a container terminal in Newcastle would nearly halve the average overland freight journey in these areas, immediately reducing transportation costs for imports and exports.

As Port of Newcastle will be home to a new, fully automated container terminal with an integrated intermodal terminal facility, it would also introduce productivity improvements in freight handling, generating further savings for Hunter Region and Northern NSW customers. If all freight customers in the potential addressable market switched to being served from Newcastle, the cumulative savings would be equivalent to $2.8 billion in additional GSP in NPV terms by 2050.

Potential market for Port of Newcastle

To calculate the potential savings for freight customers from a Port of Newcastle container terminal, it is first necessary to identify the potential market for the port. This study defines the potential market as NSW regions that are more cost-effectively served from Port of Newcastle than from alternative ports such as Port Botany, Port of Brisbane, and Port of Melbourne.

To identify the addressable market, we modelled the current cost of delivering freight to population centres across NSW from the ports of Botany, Melbourne, Brisbane and Newcastle. Next, we identified geographic areas in the State that had freight transport links to Port of Newcastle and were more cost effective to serve than from Port Brisbane or Port Botany.

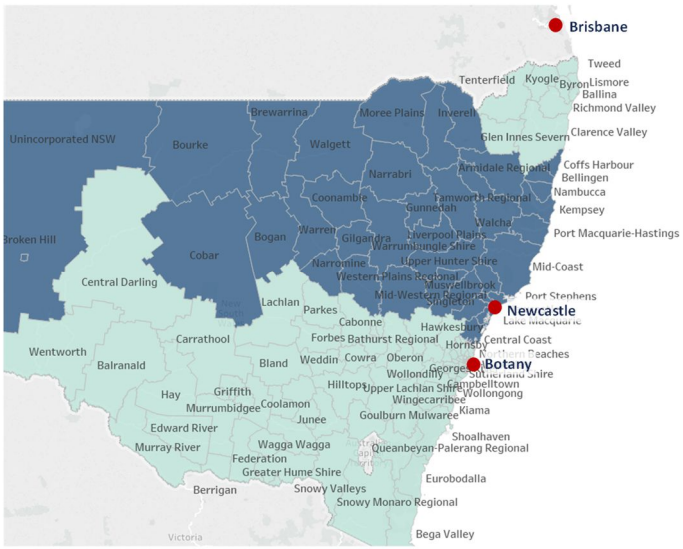
To determine cost-effectiveness, we estimated journey length to key population centres from the different ports; the transport mode share for imports and exports; and the price per TEU for different modes and journey lengths. Any areas that were more cost-effectively served from Port of Newcastle were deemed to be within the port's addressable market.

Based on this analysis, the potential market for a Port of Newcastle container terminal extends across the Hunter Region and Northern NSW and parts of Central NSW (the area shown in blue in

Exhibit 4). The Port's catchment is estimated to comprise 16.5 per cent of the total import-export containerised freight market in NSW.[4] Imports to the area, including groceries, clothing and consumer electronics, serve major regional population centres such as Newcastle, Tamworth and Port Macquarie. The region is also host to containerised exporting industries, such as agriculture and forestry, food processing, and other forms of manufacturing, such as steel and machinery and equipment.

EXHIBIT 4

The potential addressable market for the Port of Newcastle



SOURCE: AlphaBeta analysis

The model suggests that Port Botany would serve 79 per cent of NSW, that Port of Brisbane would serve 3 per cent, and that Port of Melbourne would serve 2 per cent.[5] In time, the area of Newcastle's addressable market could expand. It is possible, for example, that a container terminal at Port of Newcastle could serve parts of the Sydney market, or that inland rail could expand the addressable market served from NSW. However, these scenarios were not included as part of Port of Newcastle's potential market by 2050 in modelling for this study.

[4] Our analysis suggests that the catchment of a container terminal at Port of Newcastle would cover about 16.5 per cent of NSW full import container movements, 28.8 per cent of full exports, and 20.5 per cent of full container movements. As there are more full imports than full exports in the catchment, the port will export some empty containers. The port's share of all NSW import-export container movements, including fulls and empties, is 16.5 per cent. Deloitte Access Economics (2018) estimated the catchment at around 27 per cent of NSW full import container destination and 38 per cent of full export container origins. The difference is largely due to our having excluded areas where estimated transport costs to Newcastle are marginally higher than to Botany, and to our having allocated some of the Northern NSW market to Port of Brisbane on the same basis.

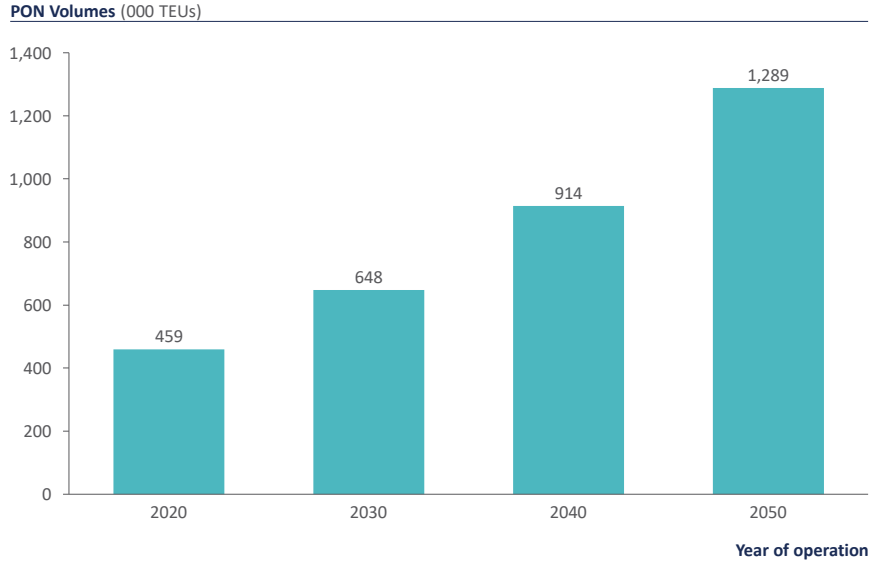
[5] AlphaBeta analysis.

Potential market growth

Freight demand in Port of Newcastle will grow significantly by 2050. This study has applied a freight market growth rate of 3.5 per cent per annum, which is based on a GDP plus one growth rate. This recognises that trade growth has historically outstripped GDP growth. Based on this assumption, the volume of freight in Port of Newcastle's potential market will grow from 460,000 TEU in 2020 to close to 1.3 million TEU in 2050 (see Exhibit 5), including full and empty containers.[6]

EXHIBIT 5

By 2050, the volume of freight through Port of Newcastle could reach almost 1.3 million TEUs per annum



SOURCE: AlphaBeta analysis. Includes empty export containers.

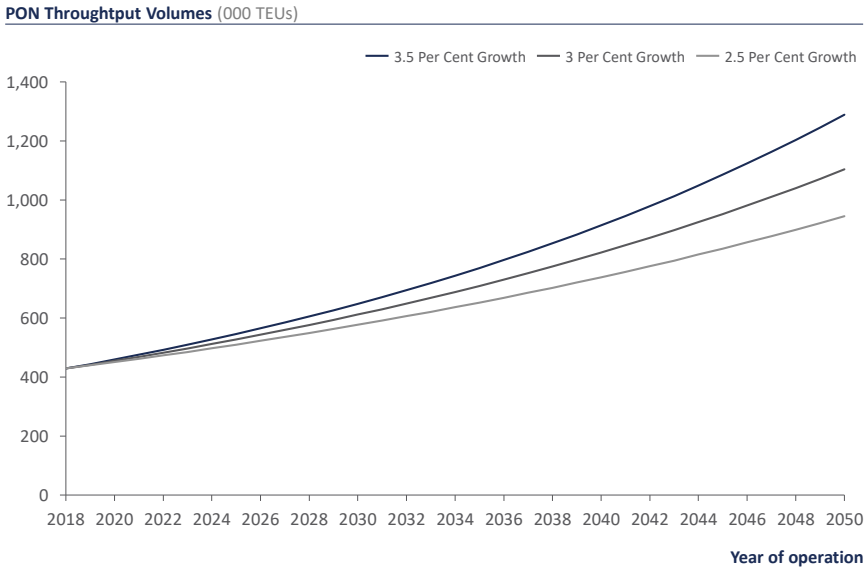
The choice of growth rate is material to freight volumes forecast for the area. Transport for NSW's modelling of freight growth rates assumes more modest growth rates for metropolitan and regional NSW. For metropolitan areas, Transport for NSW assumes a growth rate of 3 per cent. This is because, post the Global Financial Crisis (GFC), trade growth has been slower globally than GDP growth. For regional areas of NSW, Transport for NSW assumes a more conservative 2.5 per cent growth rate, because it assumes regional populations will decline. If these more modest growth rates are applied, freight volumes would be between 945,000 TEUs and 1.1 million TEUs by 2050 (see Exhibit 6). The Transport for NSW assumptions contrast with those made by Port Botany, which assumes a 4 per cent growth rate in the freight market.[7]

[6] Where there is an imbalance between imports and exports, some containers will be moved empty. Full imports total about 1.2 million TEUs and full exports total about 500,000 TEUs (excluding parts of NSW served by terminals in Melbourne and Brisbane), so more than half of containers exported from Botany are empty. We estimate in the PON addressable market, the number of full exports is just 16 per cent lower than full imports, so only about 8 per cent of containers exported from Newcastle would be empty, or about 35,000 at 2018 addressable market volumes.

[7] Transport for *NSW Freight and Ports Plan 2018 – 2023* and *Strategic freight forecasts*; NSW Ports (2018).

EXHIBIT 6

Growth scenarios drive long term volumes strongly



SOURCE: AlphaBeta analysis. Includes full and empty containers.

This study uses a 3.5 per cent growth rate for three reasons. Firstly, given that this study considers the impact of a container terminal over a 30-year period, it is more likely that freight volumes will reflect the long-term average growth rates of trade, rather than the growth rate of the last decade, which has been aberrant. Supporting the view that trade will return to a rate above GDP, BITRE has noted recently that "growth in annual TEU throughput at Australia's container ports was 3.5 per cent in the 12 months to June 2017, while non-farm GDP growth was 1.7 per cent over the same period".[8] Secondly, the demand from Asia for agricultural exports and further containerisation of freight along with population growth forecasts in Newcastle, the Hunter and the coastal regions of Northern NSW suggests that growth in container import and export volumes may be stronger in the region than forecast by Transport for NSW.[9] Finally, a growth rate of 3.5 per cent is a midpoint of Transport for NSW's more modest figures for NSW and Port Botany's more aggressive growth assumptions.

Potential savings in the Port of Newcastle market

A container terminal at Port of Newcastle could deliver $2.8 billion in freight savings for businesses and consumers in the Hunter Region and Northern NSW by 2050. These freight savings are driven by two factors: shorter journeys and more efficient operations.

Port of Newcastle is geographically closer to most markets in the Hunter Region and Northern NSW than Port Botany and Port of Brisbane. This means, on average, freight journeys in the area would fall by 40 per cent compared to the current journeys to Port Botany. The freight task to serve Armidale in Northern NSW would drop by 150km, or 31 per cent. Journeys to Narrabri, Tamworth and the Upper Hunter would all fall by 190 km, or 30-40 per cent. Even the Central Coast between

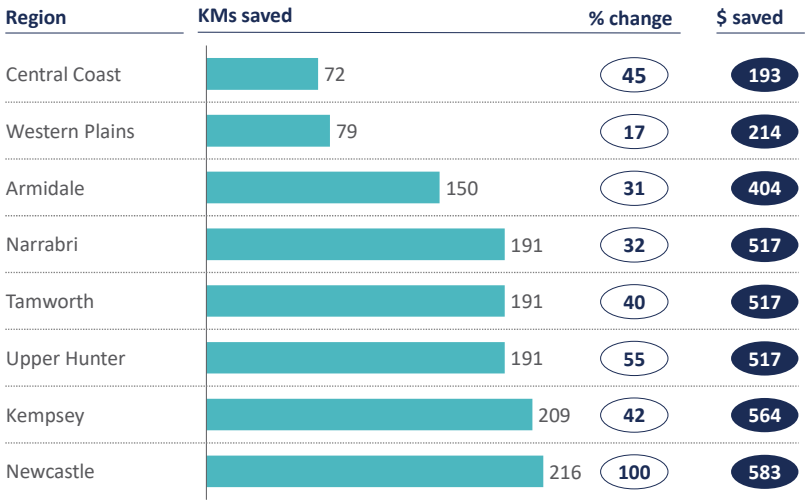
[8] BITRE (2017)

[9] Planning NSW (2018)

Sydney and Newcastle is much closer to Port of Newcastle than to Port Botany, once the trip from Botany to distribution centres in Sydney's west is factored in. Freight costs (also shown in Exhibit 7 for an indicative freight charge) would also fall materially. In some cases, Newcastle has the advantage of being connected by rail to major population and distribution centres in the region, while Port Botany and Port of Brisbane are not. This allows freight to switch from road to rail for much of the journey, which can also have efficiencies, such as allowing greater scale in freight deliveries.

EXHIBIT 7

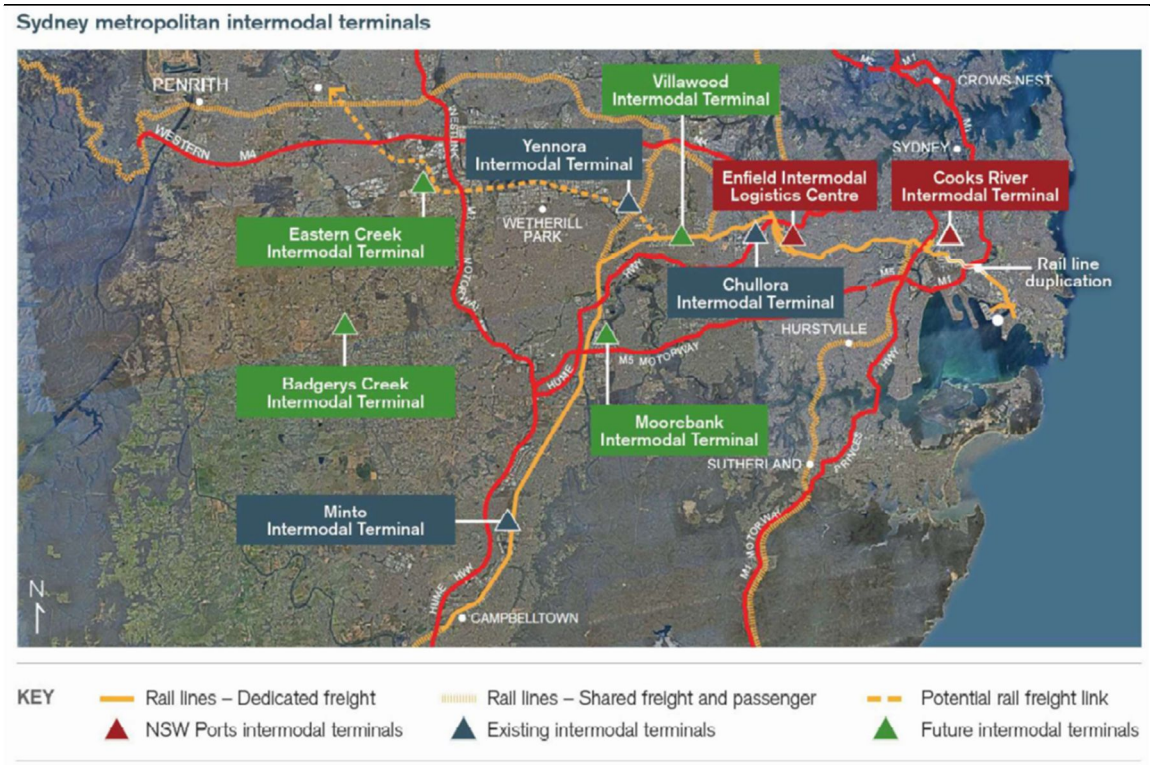
Many major centres in Northern NSW will see significant decreases in freight journey times and freight costs



SOURCE: AlphaBeta analysis. Savings shown are for an indicative $2.70 per TEU-km. Actual savings depend on mode and freight customer characteristics such as size. Savings are rounded.

The second source of savings is more efficient operations at Port of Newcastle. A container terminal at Port of Newcastle will include a rail intermodal facility within the terminal, with an integrated logistics hub located adjacent to it. This is a different arrangement to Port Botany, which by 2050 will be transporting containerised freight to the Moorebank intermodal site, located 40 kilometres from the port, and more distant sites, before the freight can be deconsolidated and sent to distribution centres and other parts of the state (see Exhibit 8).

EXHIBIT 8



SOURCE: Port of Newcastle

There are five main productivity gains from integrating an intermodal facility with the container terminal.

- Vertically integrating the intermodal terminal and container terminal creates efficiencies by reducing the coordination complexity for different groups in the freight supply chain in moving goods between the container terminal and intermodal facility, and their ability to interlink with onward transport modes such as rail.
- It reduces the amount of internal transport infrastructure needed between the container terminal and intermodal site, such as long-distance trucks and special cranes.
- It reduces the external transport infrastructure needed because the operations are on a single site.
- Integrated sites can better utilise capital. Reducing queuing and decreasing timetable windows (that is, periods where freight can be loaded and unloaded) allows trucks to spend less time waiting, thereby increasing capital utilisation and labour productivity. Decreasing the time and distance required to transport empty containers back to the port further increases the utilisation rate of capital.
- Finally, intermodal or distribution centres can be subject to curfews during peak hours because of their effect on traffic. This reduces their hours of operation and therefore their productivity and the productivity of the supply chains they service. The site at Port of Newcastle can operate 24/7 with a predominant emphasis on rail as it is in an industrial area. By comparison, the Moorebank terminal in Sydney has a partial curfew until it is completed in 2030, which

limits it to 16 hours of operation per day, although it will shift to 24/7 by 2030. The distribution centres in Sydney serviced by Moorebank may also have curfews.[10]

Case study: Namoi Cotton

David Titterton, Logistics and Commodities Manager for Namoi Cotton, is keen to see a new container terminal at Port of Newcastle. Namoi Cotton is increasingly looking to export through Port of Brisbane as the logistics of getting long trains through Sydney's congested system into Port Botany become more challenging every year.

Throughout the year, produce is railed to Port Botany from the Wee Waa and Warren warehouses and packing facilities. Around 40 per cent of cotton exports go through Port of Brisbane. Titterton expects all the cotton and grain from its facilities would go through Port of Newcastle if there was a container terminal and the appropriate shipping lines operated from the port.

This could deliver significant savings for Namoi Cotton. The cost of freight from a warehouse to Botany is currently around 8 per cent of the cost to Namoi Cotton of a bale of cotton, and around 15 per cent of the cost to growers of grain.

A significant and growing issue for Namoi Cotton in going through Port Botany is that the supply chain through Sydney is 'very inefficient' and 'expensive'. It requires going through three different networks - John Holland, ARTC, then Sydney Metro.

Delay can mean missing a ship departure and having the train load go into a container park, increasing costs by up to $300 per container. Titterton notes, *'getting through Sydney Metro is very difficult. If your train is a little bit late, you get held up. Once you miss your window, it can be very costly.'*

A new container terminal at Port of Newcastle would improve the cycle time of trains, reducing the cost per bale exported. Return on the reduced cost to growers would make the goods more competitive on the global market and underpin Namoi Cotton's plans for further growth.

Namoi Cotton was originally established as a grower cooperative in 1962, owning and operating 14 cotton gins across NSW from Goondiwindi in the north to Hillston in the south. It is an ASX-listed company with annual revenue of around $480 million. Namoi Cotton Alliance, which is a Joint Venture with Louis Dreyfus Commodities, owns and operates warehouse and grain packing facilities at Goondiwindi as well as Wee Waa and Warren in western and north-western NSW.

The cotton side of the business buys cotton from growers, gins and markets it, then exports to Asia. The commodity packaging service side of the business has been developed over the last five years with the aim of leveraging synergies with the cotton business and existing freight contracts. The business is based on a toll packing model that provides a service to growers within its catchments and traders looking for a containerised export service.

SOURCE: Hunter Research Foundation Centre (2018)

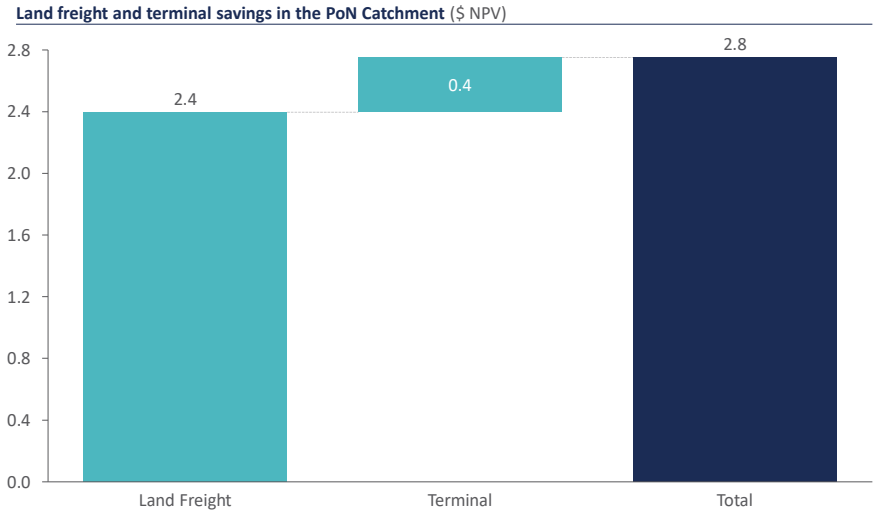
[10] Liu (2010), Moorebank Intermodal Terminal Corporation (2014), Asciano (2015), Standing Committee on Transport and Regional Services (2007)

Quantum of savings

Together, cumulative savings from shorter journeys and more efficient operations will total $2.8 billion by 2050 in NPV terms in Port of Newcastle's potential market (see Exhibit 9). The bulk of the savings come from shorter overland freight journeys (and some mode shift to more efficient rail), which contributes $2.4 billion in savings by 2050. Efficiencies from terminal integration at Port of Newcastle save a further $70 million a year by 2050, worth about $360 million in net present value.

EXHIBIT 9

A container terminal at PON could deliver $2.8 bn in freight savings by 2050



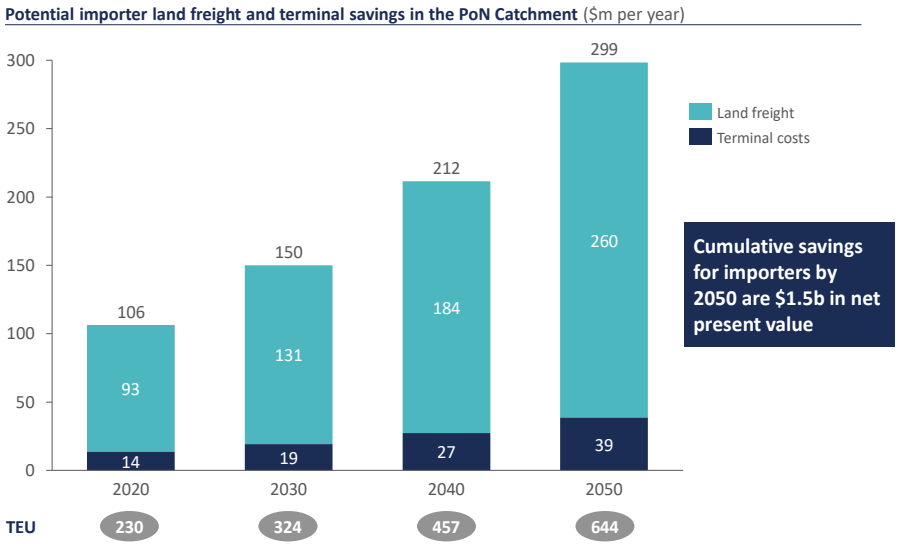
SOURCE: Alphabeta analysis.

Impact on importers and exporters in the Hunter Region and Northern NSW

More efficient freight significantly lowers costs for importers and exporters in the Hunter Region and Northern NSW. Importers could save $1.5 billion in total from lower freight costs by 2050 in NPV (see Exhibit 10). This equates to annual savings of over $100 million in 2020, rising to $300 million per annum by 2050. This is good news for firms that use imported capital goods and consumables, and for households in the region, who are key end consumers of imported goods.

EXHIBIT 10

Importers in Port of Newcastle's potential market could save $300m in freight costs by 2050, on almost 650,000 containers

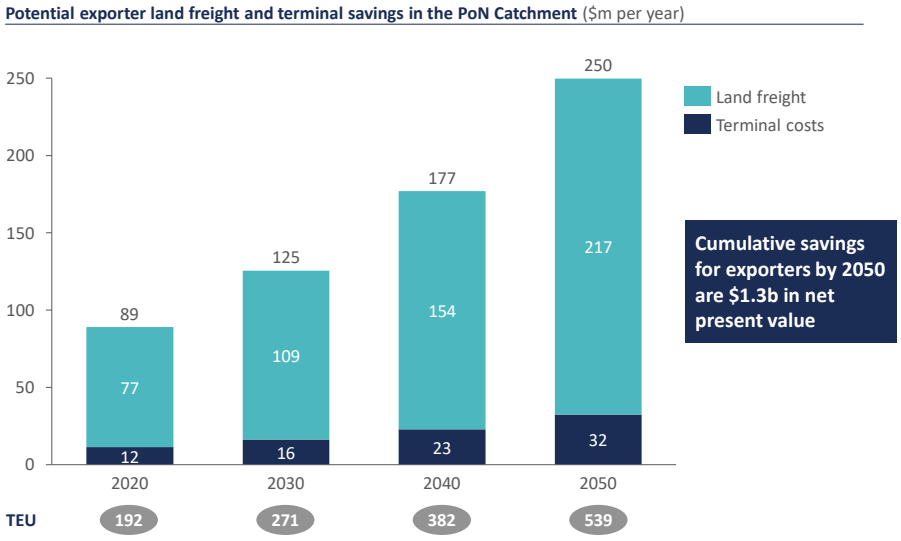


SOURCE: AlphaBeta analysis. Excludes any charges for empty container exports paid by importers.

By 2050, exporters, such as farmers and manufacturers, could save $1.3 billion in total in NPV from lower freight costs (see Exhibit 11), based on TEU volumes growing to over 500,000 in 2050. This equates to annual savings of $90 million in 2020, rising to $250 million per annum by 2050.

EXHIBIT 11

Exporters in Port of Newcastle's potential market could save $250m in freight costs by 2050, based on total TEUs of over 500,000



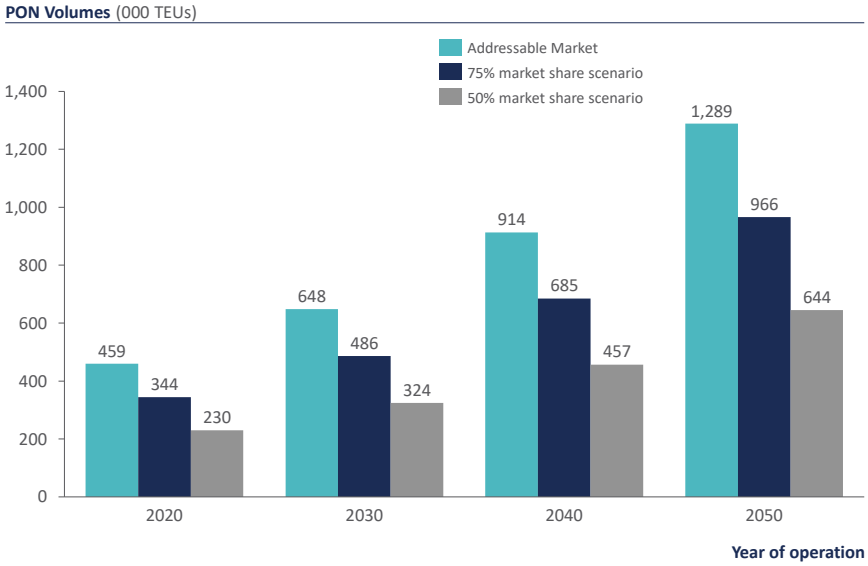
SOURCE: AlphaBeta analysis. Full containers only.

Alternative scenarios if actual market share is lower than the potential market

This study models the freight savings for all the importers and exporters that would be most cost-effectively served from Newcastle. In practice, not all customers in Port of Newcastle's potential market may switch from Port Botany or Port of Brisbane, despite the cost advantages of doing so. If only half or three quarters of potential customers switch, container volumes served by Port of Newcastle will be between 644,000 TEUs to 966,000 TEUs by 2050 respectively (see Exhibit 12).

EXHIBIT 12

The volume of container freight handled by the Port of Newcastle will be impacted by the market share achieved by the Port by 2050

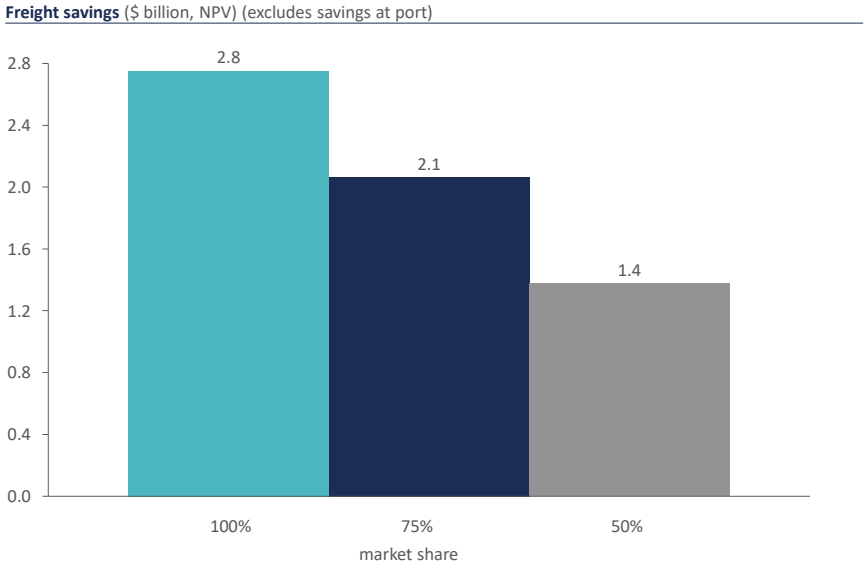


SOURCE: AlphaBeta analysis. Includes empty export containers, which are expected to be about 16 per cent of exports and 8 per cent of all containers handled by the terminal.

Cumulative savings to the region would be $1.4 billion in NPV terms by 2050 were Port of Newcastle to gain only a 50 per cent market share, and $2.1 billion with a 75 per cent market share (see Exhibit 13).

EXHIBIT 13

Potential freight savings in NPV terms range from 1.4 billion to 2.8 billion depending on Port of Newcastle's actual market share



SOURCE: AlphaBeta analysis

4. Savings for NSW consumers and businesses in a more competitive freight market

Greater competitive pressure on Port Botany could save businesses and consumers in Sydney and Southern NSW $1.2 billion by 2050. Currently, there is little direct competition between container port operators in NSW because Australian container ports are geographically dispersed.

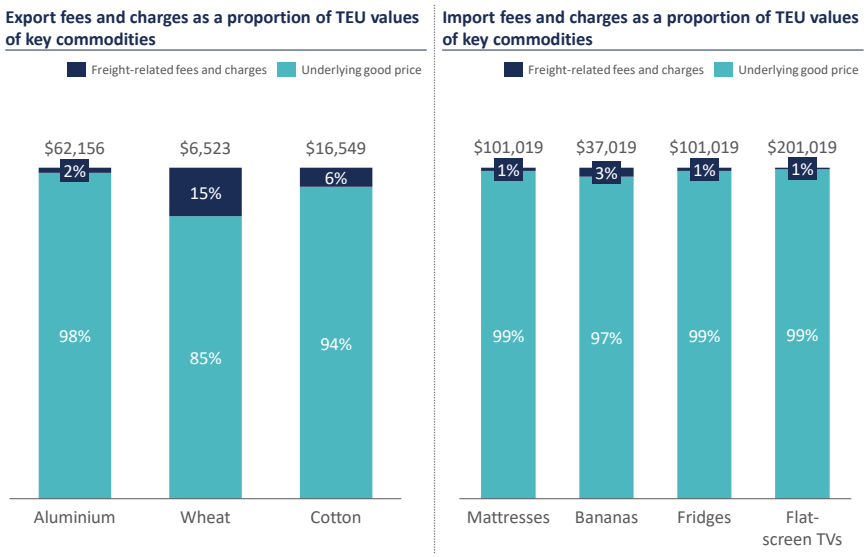
Port of Newcastle is less than 200 kilometres from Port Botany, meaning there is substantial overlap in the potential markets both ports can serve. This will create competitive pressure on Port Botany, which is likely to lead to lower prices and more productive operations. This effect would not be achieved from opening a container terminal at Port Kembla as it is owned by the same operator as Port Botany.

Role of competition in NSW container freight market

Freight is a material cost for many imported and exported goods. Freight-related fees and charges add approximately $1,000 per TEU to imported and exported goods in NSW that currently pass through Port Botany (see Exhibit 14).

EXHIBIT 14

Freight costs can be up to 15% of value



SOURCE: Aqua-calc (2018), Constellium (2018), Index Mundi (2018), Transport for NSW (2018), Icontainers (2018), BITRE (2018).

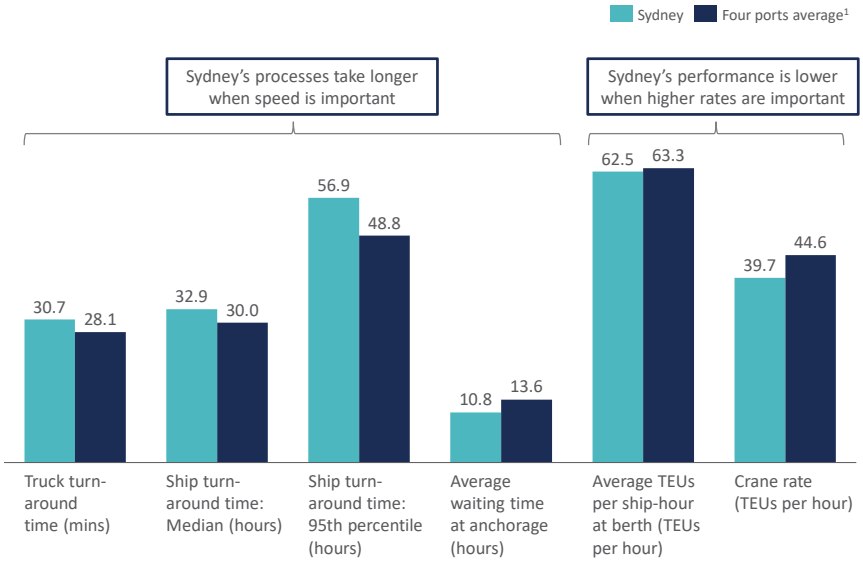
Reducing port and freight related fees and charges through competitive pressure on price and the efficiency of operations is therefore crucial to lowering the cost of imports and exports paid by NSW

consumers and businesses. NSW container port freight customers generally pay higher fees and charges for imports compared with port customers in other Australian states. Australian port fees are also high by international standards. Port Botany's total port fees and charges are $11 per TEU higher than the average of the four other container ports in Australia for imports.[11] This is a significant difference because imports account for approximately 70 per cent of the NSW international container freight task. The higher costs to NSW customers come despite Port Botany having a scale advantage over most other Australian container ports.

NSW freight customers are also more likely to experience congestion and higher waiting times during busy periods compared to customers of other ports. Such delays and congestion decreases transport productivity (see Exhibit 15). Both ship and truck turnaround times are longer at Port Botany than the average of the other four Australian container ports. Port Botany's crane rates also are below the average performance of the four other container ports, despite Port Botany's scale advantage. As an exemplar for Port of Newcastle, the Port of Tauranga, just outside Auckland in New Zealand, achieves a 59 per cent higher productivity outcome than the current Australian port average (see box below).

EXHIBIT 15

Port Botany's productivity is mixed compared to other Australian ports



SOURCE: ACCC (2017). The four ports average includes Brisbane, Melbourne, Fremantle and Adelaide

The higher prices and mixed productivity experienced by NSW customers could be addressed by allowing greater competition in the sea freight container market. Economic research into competition amongst ports has found that competition can occur at three levels. The first form of competition is *intraport,* where providers within a single port, such as stevedores, compete. The second form of port competition is *interport competition in the same geographic area,* where two port operators serve an overlapping market. The final form of competition is *interport competition*

[11] BITRE, (2017).

at a national or international level, such as occurs between Port of Melbourne and Port Botany, or between Singapore and Hong Kong (see Exhibit 16).

EXHIBIT 16

There is a lack of competition between separately owned container port operators in the NSW market

Level of competition: Low, Medium, High

Types of port competition	Description	Status in NSW	Rationale
1. Intra-port competition	Competition between service providers at the same port, e.g. stevedores		3 major stevedores compete at Port Botany
2. Inter-port competition at operator level	Competition between ports or port clusters serving an overlapping hinterland		Single container port in NSW with limited market overlap with interstate ports, e.g. Brisbane
3. Inter-port competition Port Authority level	Competition between sea ports under different port authorities, e.g. Hong Kong vs Singapore; Sydney vs Melbourne		Five major container ports around Australia

SOURCE: Meersman, Van de Voorde, Vanelslander (2010)

While pressure on sea freight exists at the intraport and national interport level in NSW, there is very limited competition between container port operators as Australia's five container ports are geographically dispersed and have limited overlapping markets (see Exhibit 17).[12]

The introduction of a second, separately owned container port operator would apply competitive pressure to Port Botany, likely leading to lower prices and improved productivity. Evidence from other markets that have stronger operator-level competition shows that it can drive down prices and improve productivity at the competing ports, as cost and supply chain efficiency are two primary factors influencing whether shipping lines and freight customers switch to a competitor. A new entrant competing for the same overlapping market can exert downward pressure on price. Competition can also catalyse productivity improvements at the incumbent port, as the efficiency of ports and their related freight supply chains are increasingly important to port and shipping cost structures, and material factors in the decision on whether to stop at an additional port. Improving productivity at the incumbent port can therefore be a key defensive play to avoid losing market share to a new rival port operator.

Approach to estimating savings from competitive pressure

Incumbent terminal operators and the incumbent port operator can be expected to respond to the entry of a competitor by cutting prices and intensifying their focus on productivity. While it is

[12] The distribution of Australia's container ports, and their related hub and spoke transport infrastructure that radiates out from them, is also at odds with the distribution of Australia's population, which concentrate on the East Coast.

difficult to be precise about how strongly and when incumbents will respond, we assume customers will see current prices fall by 10 per cent by 2050 for terminal and port services, reflecting some erosion of margins in the short term, and improvements in productivity over time.

Quantum of savings from competitive pressure

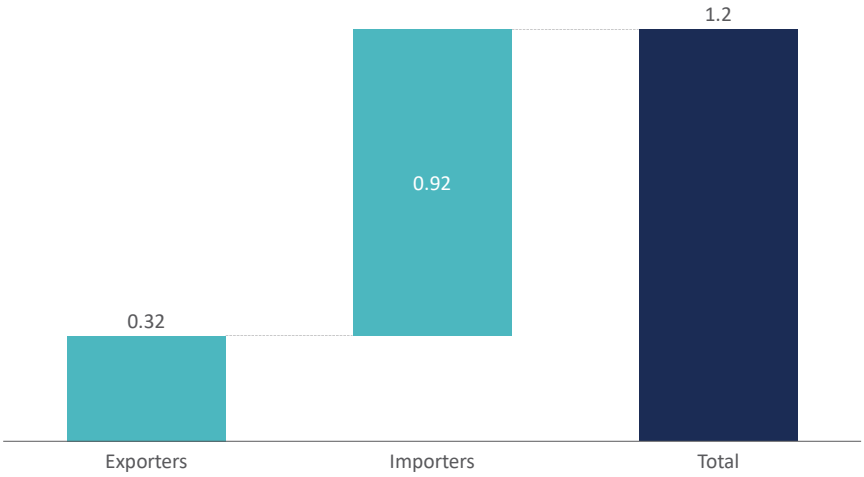
By 2050, lower port prices at Port Botany resulting from competition could deliver $1.2 billion in freight savings to the NSW businesses and consumers that rely on it (see Exhibit 17). Importers would save $900 million, and exporters would save $300 million, in net present value terms. On an annual basis, importers could save about $40 million per annum in 2020, rising to $200 million per annum by 2050. Exporters could save about $15 million per annum in 2020, rising to over $70 million per annum by 2050.

The benefits of competition for container freight will spread across Sydney and Southern NSW. As importers compete for customers, they can be expected to pass on cost savings to consumers and other customers. In turn, consumers will expand their purchases of other goods and services. Ultimately, lower import prices benefit consumers, workers, and the owners and suppliers of firms across Sydney and Southern NSW. Similarly, price cuts for exporters will also have broader effects across the economy. As their returns rise, they expand production, increase their purchases from other sectors, and bid up wages and the prices of inputs.

EXHIBIT 17

Lower prices at Port Botany due to competitive pressure could save Sydney and Southern NSW businesses and customers $1.2 billion by 2050

Sydney and SNSW freight savings by 2050 ($ billion, NPV)



SOURCE: AlphaBeta analysis

CASE STUDY: EFFECTS OF PORT OPERATOR COMPETITION IN NEW ZEALAND

Port of Tauranga opened in New Zealand's Bay of Plenty in 1988, introducing direct, operator-level competition to New Zealand's largest container port, Port of Auckland. This was possible because of reforms to New Zealand's regulatory model for ports, and because Tauranga is located around 230 kilometres from the Port of Auckland. The proximity of the ports, and transport links between the areas, means there is a geographically overlapping area where they compete.

Since Tauranga opened, competition between the two ports has been intense, resulting in the productivity of both ports continually increasing. Today, Tauranga is the most productive port in New Zealand measured by shipping rates, with Auckland second. Tauranga is 59 per cent more productive than the average of Australia's five container ports based on shipping rates.

SOURCE: Port of Tauranga (2018), *Port Strategy* (2018)

5. Improving liveability in Sydney by reducing pressure on infrastructure, congestion and pollution

Establishing a container terminal at Port of Newcastle would generate over $500 million savings by 2050 from avoided infrastructure, pollution and congestion in Sydney. It would relieve capacity pressures on Port Botany and surrounding infrastructure by diverting up to a million container movements each year to the Hunter Region and Northern NSW by 2050.[13] Relieving pressure on Sydney's infrastructure, and thereby deferring infrastructure construction or upgrades, would contribute $410 million of the savings.

Reduced congestion and pollution costs would contribute a further $110 million. Equivalent costs are unlikely to be incurred in the Port of Newcastle area. As the site is in an industrial area, and the terminal would predominantly use rail to transport freight, congestion and pollution impacts will be minimal. In addition, the proposed site has an existing stock of rail infrastructure that can be modified to serve a container terminal at relatively low cost. There is also significant latent capacity within the existing rail network 'to move freight from regional NSW to Newcastle without the need for significant capital investment.'[14]

Avoided infrastructure savings

Context to infrastructure upgrades and construction in Sydney

Freight traffic creates significant pressure on Sydney's road and rail infrastructure. 80 per cent of Port Botany related container traffic is carried by trucks on already congested roads, and heavy vehicles account for approximately 10 per cent of Sydney vehicle-kilometres.[15] This increasing level of container freight traffic places pressure on road, rail and logistics infrastructure (such as intermodal and distribution centre facilities) in Sydney, especially in the South and West of the city. This traffic has contributed to the need for expensive infrastructure upgrades and created congestion and pollution. This is most acute for infrastructure links connected directly to Port Botany, as well as to main arterial links in Sydney which include main freight routes.

The NSW Government and Port Botany's operators recognise the pressure that container freight traffic places on Sydney's roads. In response, they plan to increase the share of containers transported by rail to achieve a target of 40 per cent rail mode share by 2045. This shift is being supported by new investments in rail freight lines and intermodal terminals servicing Port Botany.[16] However, even with this multi-billion dollar investment and partial mode shift, container freight traffic on Sydney's roads will likely return to today's levels within two decades.

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[13] A 1.2m-full-TEU-throughput Newcastle terminal would reduce Botany throughput by about 1 million TEUs, because about five-sixths of the estimated Newcastle container terminal would otherwise be in Botany's catchment (and one-sixth in the catchment of Port of Brisbane).

[14] AECOM (2018)

[15] NTC Paygo model (2018). Adjusted for vehicle impact.

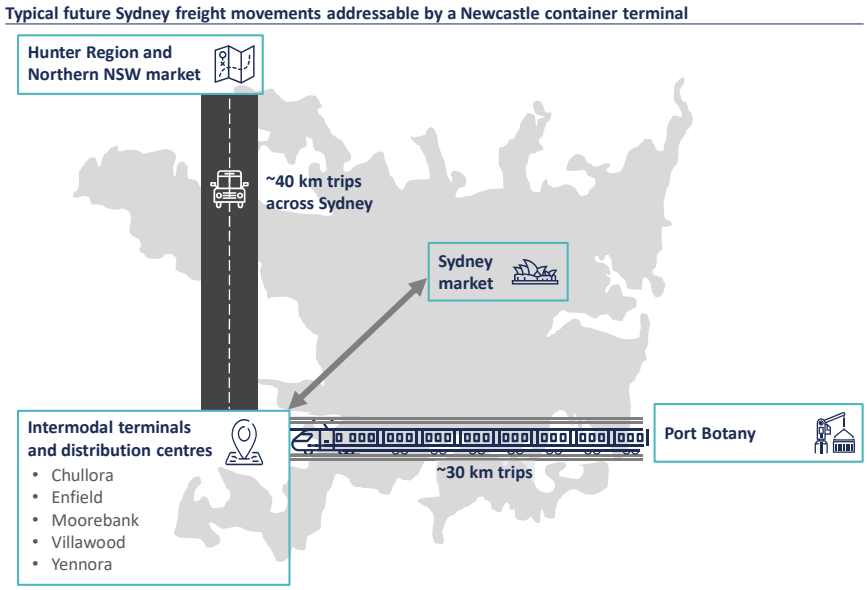
[16] Transport for NSW, *NSW Freight and Ports Plan 2018-2023* (2018)

Establishing a 1.2 million TEU container terminal at Port of Newcastle would relieve pressure on Sydney's road and rail networks by diverting a portion of Port Botany related freight traffic from the Sydney to the Newcastle region. This would defer the need for future infrastructure upgrades or new infrastructure to be constructed. Deferred investment is valuable to the community because the cost of the avoided capital can be used for another purpose, such as allowing the NSW Government to invest in alternative and more productive infrastructure. As Port of Newcastle is already served by under-utilised rail and road infrastructure, moving container freight activity to Port of Newcastle could be achieved without triggering substantial public infrastructure investments.

Two major transport routes would benefit from traffic diversion if some container freight activity switched to Port of Newcastle from Port Botany. Firstly, fewer trips between Port Botany and the Moorebank Intermodal Centre and distribution centres in Western Sydney would be needed, as the total freight volume from Port Botany would reduce. Secondly, trips from the Moorebank intermodal site and distribution centres to the Hunter Region and Northern NSW would decrease, as these regions would be served directly from Port of Newcastle (see Exhibit 18). By 2050, up to 750,000 container truck trips through Sydney could be removed.[17] Freight traffic on other routes, such as freight traffic serving the Sydney market, would not be affected because no traffic would be diverted from these routes unless Port of Newcastle began serving the Sydney market.

EXHIBIT 18

A Newcastle container terminal reduces rail and road journeys through Sydney



SOURCE: Alphabeta analysis.

[17] Assumes 2 TEUs per truck and 50 per cent utilization on return journey. This assumption is conservative given the prevailing empty backhaul ratios (Lycopodium 2018).

Approach to calculating the value of deferred infrastructure investments in Sydney

Moving now to establish a container terminal at Port of Newcastle means that in 2035 to 2040, Sydney can defer a new round of infrastructure investment related to growth in container freight traffic at Port Botany.

We used a five-step method to estimate the value of this deferred investment. First, we identified deferrable components of road, rail and logistics infrastructure related to Port Botany freight traffic which would not be needed if activity switched to Port of Newcastle (that is, the routes shown in Exhibit 18 above). We then estimated when new capacity would be required due to current or planned capacity being exhausted.

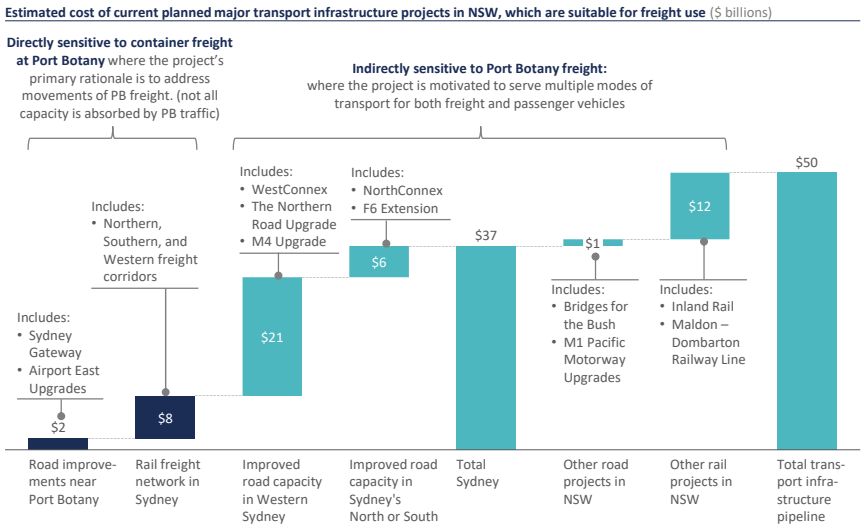
Next, we developed multiple scenarios for building new capacity in Sydney, to account for uncertainty about the nature of future upgrades. We identified two that were most likely, after testing the scenarios in expert interviews. We estimated the cost of these. Finally, we pro-rated the portion of the infrastructure cost reduction attributable to Port of Newcastle, as in many cases the infrastructure is also used for other purposes and therefore the full cost may not be avoided solely because of the switch of container freight activity to Newcastle. **Appendix A:** Methodology has further detail.

Potential future infrastructure upgrades that could be avoided

The NSW Government is currently spending, or planning to spend, $50 billion on infrastructure upgrades over the next ten years. Around $11 billion of this investment is related to container freight traffic at Port Botany (see Exhibit 19), including rail and road infrastructure such as the Sydney Gateway and Airport East Upgrades. Included projects were those listed on the 2018 Infrastructure Australia Priority List that can be used for freight, and other major infrastructure projects intended to support freight activity, for example, the Airport East Upgrades, the Maldon-Dombarton Railway Line, the Bells Line of Road Improvement, Bridges for the Bush, and NorthConnex.

EXHIBIT 19

Infrastructure upgrades to support growing Port Botany container freight traffic are a significant cost to the NSW Government



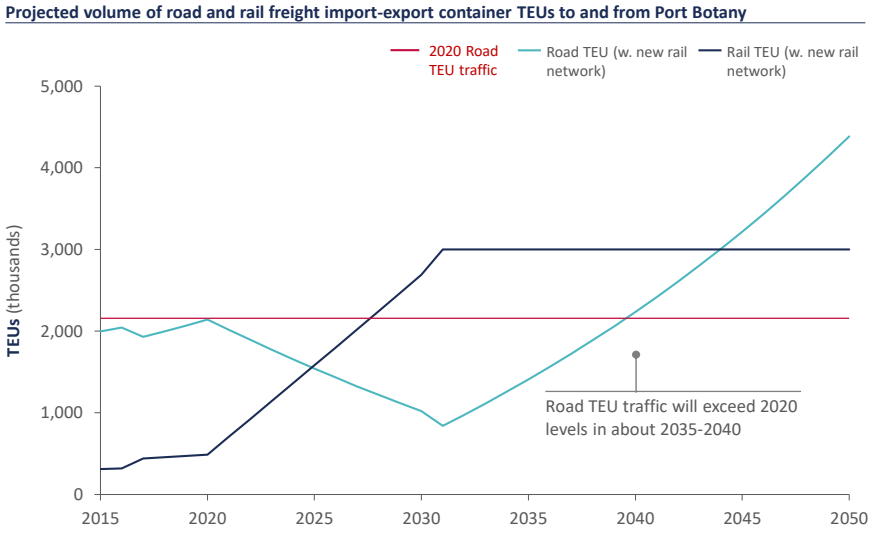
SOURCE: Infrastructure Australia, *Priority Projects List* (2018), Transport for NSW, *Current Projects* (2018), Deloitte Access Economics (2018)

Projects currently under construction, or well-advanced in the planning stage, are too far progressed to be avoided. They will relieve capacity pressures from Port Botany container freight until the late 2030s (see Exhibit 20). However, by then, growth in the container freight market is likely to exhaust the expected capacity of the rail link from Port Botany to the Moorebank Intermodal Terminal. Container road freight from Port Botany is then likely to return to today's level and trigger a new round of infrastructure requirements.[18]

[18] The maximum rail capacity is assumed to be approximately 3 million TEU. Even if this rail capacity is fully utilised, container road freight will return to today's levels before 2040.

EXHIBIT 20

Current projects may only relieve capacity constraints until 2035-2040, at which point a new round of infrastructure investment will be needed



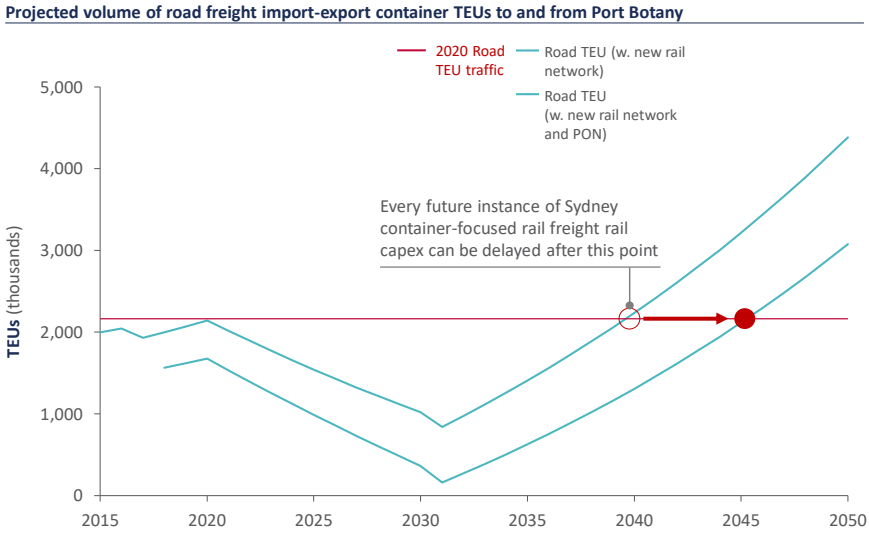
SOURCE: TEU traffic projected based on BITRE (2017). Modal share informed by Transport for NSW (2017). Additional capacity informed by Transport for NSW (2013), ARTC (2015), and NSW Ports (2015), Ellicott (2018)

Opening a container terminal at Port of Newcastle with the capacity to serve its addressable market (growing to 1.2 million full TEUs by 2050, and about 1.3 million total TEUs) would mean rail construction and upgrades in Sydney that would otherwise likely be undertaken in the late 2030s could be deferred for about five years (see Exhibit 21).[19]

[19] Addressable market for full containers only. Subsequent investments would also be deferred. We provide for continuing reduction in road investment throughout the study period as result of lower road traffic. But we assume that only one major round of rail investment is deferred in the study period, reflecting the lumpiness and likely capacity of the largest single investment, discussed later in this section.

EXHIBIT 21

A PON container terminal delays the need for all successive investment in Sydney's rail infrastructure by 5 years from 2040



SOURCE: BITRE (2017), Transport for NSW (2017, 2013), ARTC (2015), Ellicott (2018)

As the nature of future infrastructure upgrades is uncertain, two scenarios were modelled to identify the potential costs of deferring future Sydney infrastructure upgrades (see Exhibit 22), using the cost and capacity of comparable projects that have recently been completed or costed.

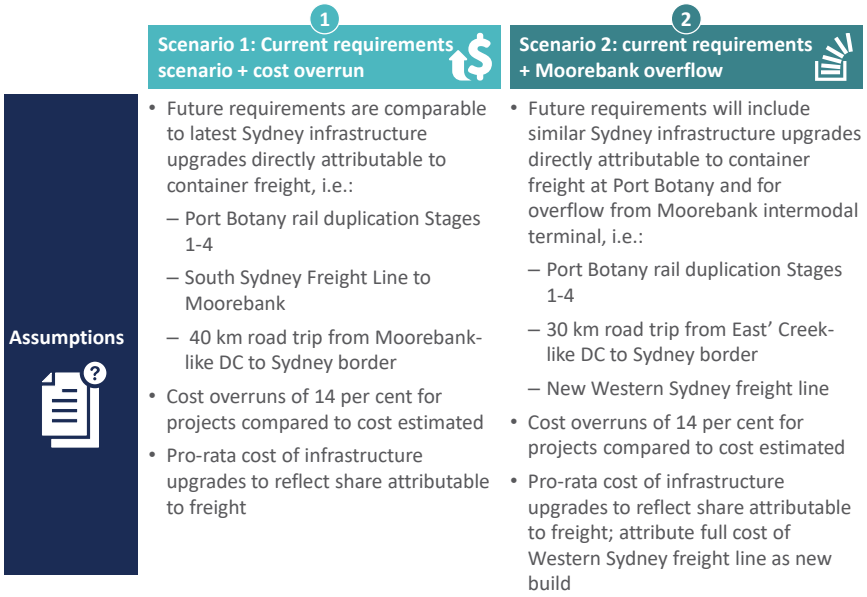
Scenario One assumes that a future upgrade has similar requirements and costs per TEU to the current upgrades and constructions related to Port Botany container freight traffic. The relevant upgrades are to the rail line between Port Botany and Moorebank, the construction of the South Sydney Freight line serving Moorebank and a road upgrade from a logistics hub to the edge of the Sydney market. To calculate costs, we used official information on the actual or estimated cost of the current infrastructure projects the scenario is based upon.[20]

Scenario Two assumes that, in addition to rail and road infrastructure reaching capacity, the Moorebank intermodal terminal and surrounds also reach capacity, and therefore more freight needs to be sent to distribution centres in Western Sydney for unpacking. This would trigger a need for the construction of the Western Sydney freight line.

[20] As this showed that actual project costs were higher than originally forecast, for those projects yet to be completed we added 14 per cent to their cost to allow for overruns, as this is the average overrun cost for major Australian infrastructure projects

EXHIBIT 22

Two future scenarios for future infrastructure upgrades to support growth in Port Botany freight traffic



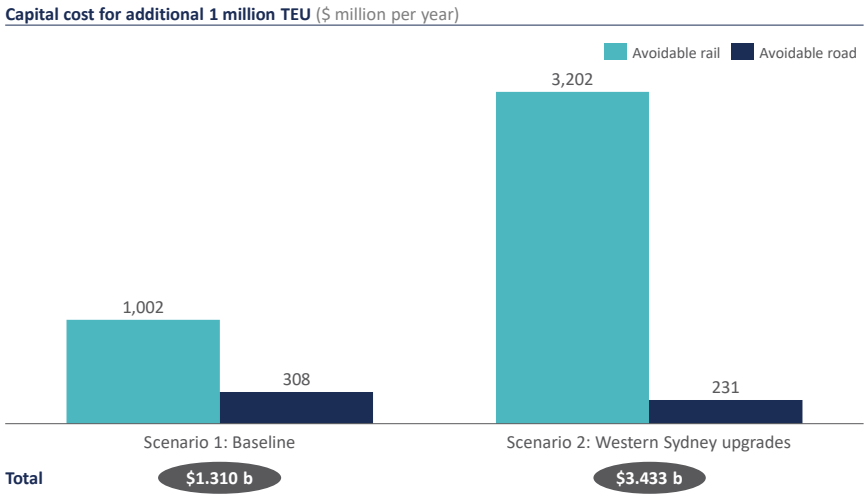
SOURCE: Infrastructure Australia, *Port Botany Rail Line Duplication* (2018), Saulwick (2013), Flyvbjerg et al (2003 and 2016), expert interviews.

Potential savings from deferring infrastructure

Based on the two future scenarios above, Sydney could defer between $1.3 billion and $3.4 billion of infrastructure costs by 2050 should a container terminal open at Port of Newcastle (see Exhibit 23). Scenario Two is deemed most likely as it is probable that Moorebank may reach capacity, as well as capacity being reached on road infrastructure. Scenario Two is more expensive because the required rail investment is much higher, as shown in Exhibit 27.

EXHIBIT 23

Sydney could defer $1.3 billion to $3.4 billion in infrastructure costs by 2050 if a 1.2 million TEU terminal at PON proceeds



Source: Deferred rail capital investment informed by Infrastructure Australia, *Port Botany Rail Line Duplication* (2018). Additional capacity informed by Transport for NSW (2013), ARTC (2015), NSW Ports (2015). Avoidable road costs estimated using NTC PAYGO model.

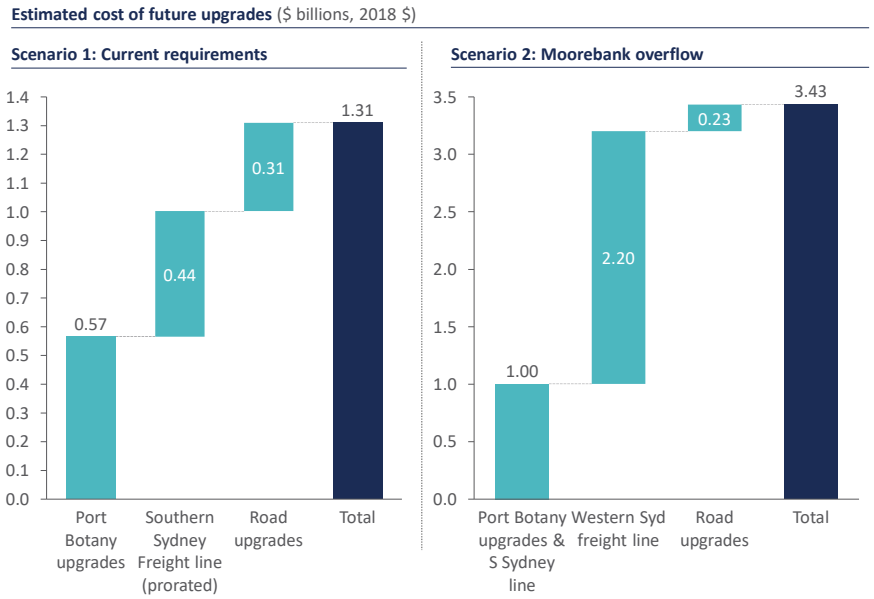
The savings calculated were based on scaled estimates of current costs of equivalent or actual projects included in each scenario (see Exhibit 24). In 2050 Port of Newcastle catchment is estimated to be just under 1.2 million full TEUs, of which 1 million would be drawn from Botany and about 190,000 from Brisbane. Scenario One is therefore scaled to a capacity of 1 million full rail TEUs, based on assumptions about the capacity of the projects on which it is based.[21]

Scenario Two, while more expensive, may offer greater capacity than Scenario One on the larger, 'lumpy' Western Sydney Freight Line. For this reason, we assume that no subsequent rail investment is deferred over the course of the study period.

[21] It also includes the ten-year value of deferred road infrastructure with capacity for 800,000 full road TEUs, the average throughput through the 2040s. Road investment is assumed to be less 'lumpy' than road investment, and so may be built less in advance of throughput. For each two full avoided TEU journeys on rail or road, an additional one empty TEU journey is assumed to be avoided.

EXHIBIT 24

Savings for each scenario were calculated based on current or equivalent project costs

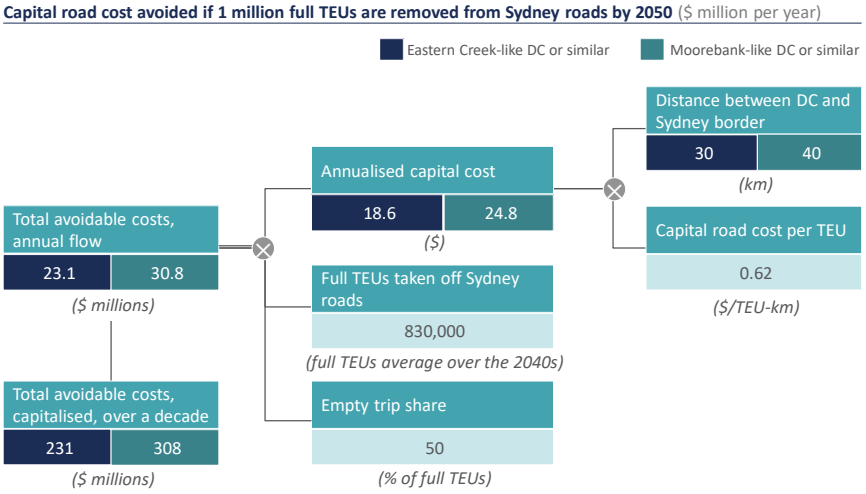


Source: Avoidable rail capital investment informed by Infrastructure Australia, *Port Botany Rail Line Duplication* (2018). Additional capacity informed by Transport for NSW (2013), ARTC (2015), NSW Ports (2015), road costs estimated using NTC PayGo model.

Road costs were estimated for a truck journey approximately the distance between the northern Sydney area and distribution centres near either Moorebank (40 km) or Eastern Creek (30 km), as shown in Exhibit 25. We derived the per-kilometre costs from the National Transport Commission's (NTC) PayGo model, which allocates a cost base to heavy vehicles. We adjusted the model to account for two Sydney-specific factors: the cost of constructing Sydney's roads is about three times more expensive than building roads outside of Sydney; and the increased contribution of trucks to congested roads as they have larger vehicle footprints compared with cars. This charge is a similar size to those of toll roads; for example, the M7 Westlink charges about $1.21 per truck-kilometre. On average, a truck travelling to or from Port Botany carries two TEU, which approximates to about $0.6 per TEU-km. Road maintenance costs are implicit in our avoidable road values. Rail maintenance costs are not calculated due to a lack of credible data.

EXHIBIT 25

Avoidable costs for the 30 to 40 km road trip between a DC in Western Sydney and the Sydney border are up to $300 million over a decade



SOURCE: NTC PayGo model 2018; RMS (2018). TEUs are the average removed from Sydney roads in the 2040s if the entire addressable market is served from Newcastle.

Together, the avoided road infrastructure costs and the deferral of up to $3.2 billion in rail infrastructure costs reduces infrastructure expenditure by over $400 million for NSW by 2050 in NPV terms. The NPV of the deferral is lower than the sum deferred, because rail investment is only deferred for about six years, and because the deferral does not occur until around 2040. Delaying the need for this rail and road investment is worth as much as $170 million each year in expenditure through the 2040s. The benefits of this deferred investment could be enjoyed by NSW residents in the form of higher provision of government services, including other value-creating infrastructure, or in lower taxes.

ADDITIONAL SAVINGS IF PORT KEMBLA CONTAINER TERMINAL IS AVOIDED

The NSW Freight and Ports Plan 2018 – 2023 proposes that Port Kembla be used as a second container terminal site to augment Port Botany. However, construction of terminal has not yet commenced and is projected to take around 30 years to complete.

Port Kembla is currently planning to upgrade multiple aspects of its Port facilities, including bulk and general cargo, such as coal, bauxite and rolled steel, as well adding a container terminal, over three stages. The container terminal would have four container berths, each with 300,000 TEU capacity. The first two berths are planned to be operational by the end of stage two, which would be 600,000 TEU capacity, while the final two berths become operational by stage three, bringing total capacity to 1.2 million TEUs.

Major new rail upgrades are needed to support Port Kembla to transport container and other freight to Sydney. The cost of these upgrades is currently estimated to be $860 million. This includes the Maldon to Dombarton train line, linking Port Kembla to Sydney ($700 million); a South Sydney Freight Line upgrade to accommodate additional freight volumes ($80 million); and an upgrade to the M1 Highway Picton to Bulli Tops road link ($84 million).

However, these costs could rise significantly higher if the Maldon to Dombarton train line has insufficient capacity to accommodate the full volume of container freight from Port Kembla. This is possible as the Port Kembla facility plans to be heavily dependent on rail, for example, 90 per cent of containerised freight is forecast to be moved by rail. If the capacity of the proposed upgraded line is exceeded, the costs of constructing it will rise. Any additional costs are likely to be borne by the NSW and Federal Governments.

SOURCE: Department of Planning (2011); Wollongong City Council (2014); Saulwick (2013), RMS (2018), Transport for NSW (2013), Deloitte Access Economics (2018)

Reducing congestion and pollution

A Port of Newcastle container terminal will reduce the freight truck-kilometres travelled on NSW's roads. Importantly, this will cut congestion and pollution in Sydney, contributing over $130 million in GSP by 2050.

Congestion is a major concern for Sydney road users and operators. The evidence indicates Sydney already has the worst congestion of any city in Australia.[22] It has negative economic and social impacts for workers, who are forced to spend more time on the road commuting, thereby decreasing the time they can spend working. Congestion also negatively impacts the productivity of commercial road users. They spend more time queuing and idling, pay higher transport costs, and undertake fewer trips.

A Port of Newcastle terminal would eliminate about 750,000 heavy vehicle trips a year across the congested roads between the distribution centres in Western and Southern Sydney and the city's North by 2050.[23] At about 30 km each, these trips total over 20 million truck-kilometres a year, or the equivalent of almost 80 million passenger-car kilometres. Eliminating this truck traffic would

[22] Grattan Institute (2017)

[23] As for infrastructure, it is assumed that 1 million full TEUs generates 750,000 trips, due to a 50 per cent empty return ratio and two TEUs per vehicle.

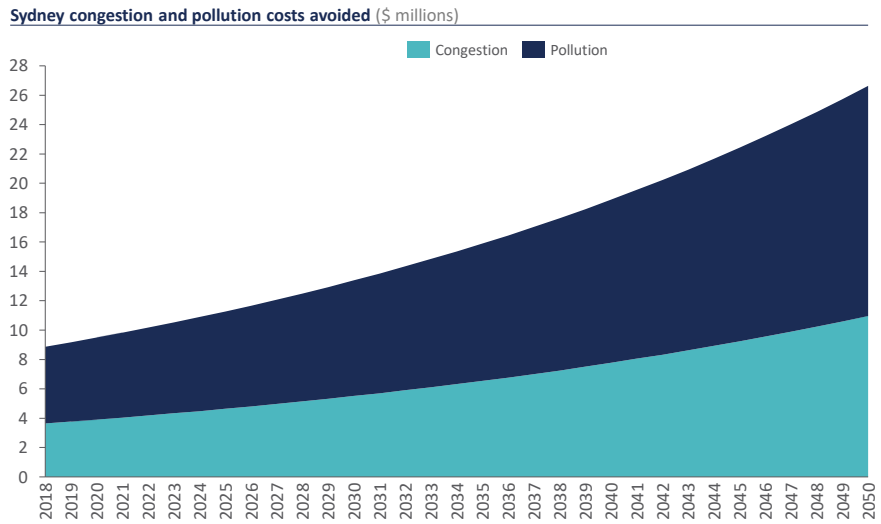
reduce the costs of congestion by about $10 million per annum by 2050 (see Exhibit 26), freeing up drivers to spend more time in more commercially productive or personally rewarding pursuits.

Reducing truck traffic would improve Sydney's air quality. Sydney has the most polluted air of any Australian city, and vehicle emissions are a major part of the problem. They are responsible for 62 per cent of Sydney's nitrous oxides emissions and for 14 per cent of $PM_{2.5}$ particulates, the pollutant that poses the greatest risk to health.[24] Taking container truck trips off Sydney's roads would save an estimated $16 million per annum by 2050.

Together, diverting up to a million TEU of container freight from Sydney to shorter routes in the Hunter Region and Northern NSW saves over $25 million per annum in avoided congestion and pollution costs in Sydney by 2050 (see Exhibit 26). Cumulatively, taking truck traffic off Sydney's would eliminate about $55 million in congestion costs and $79 million in pollution costs by 2050, in present value terms.

EXHIBIT 26

Reduced Sydney congestion and pollution costs from avoided Port Botany container freight traffic are $25 million per year by 2050, saving over $130 million in present value terms



SOURCE: BITRE (2015), Austroads (2012).

As the Port of Newcastle site proposes to rely significantly on rail, the Hunter Region and Northern NSW has little congestion now relative to Sydney, congestion and pollution effects would not be transferred to that area if activity shifted there. Port of Newcastle has supporting road and rail infrastructure with capacity for much larger freight volumes than it currently handles, as well as a port operating at only 50 per cent of its channel capacity.

[24] RMS, *Sydney's air quality fact sheet*, (2018)

6. Regional development and sustainability – generating jobs and growth in regional NSW

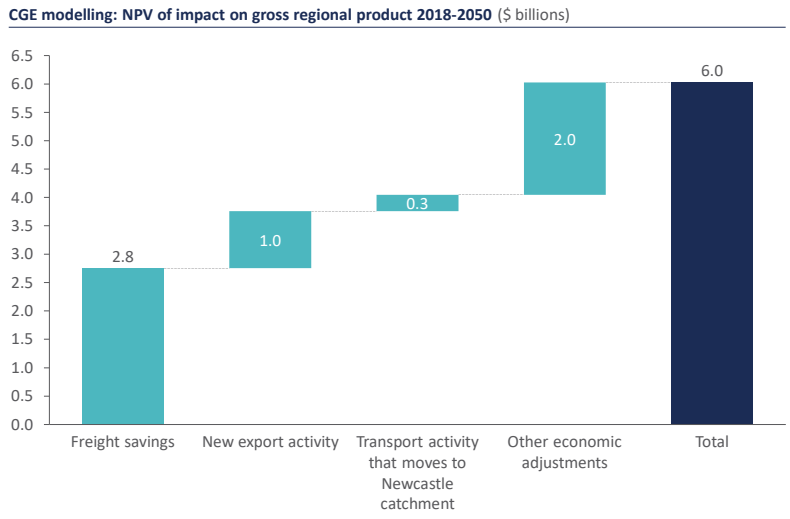
Establishing a container terminal at Port of Newcastle would usher in a new era of economic opportunity for the Hunter Region and Northern NSW. By 2050, the area will gain an additional $6 billion in economic value from the opening of a container terminal compared to the baseline scenario. Over 4,600 jobs will be created in diverse industries across the region, such as transport, manufacturing, agriculture, services and construction. Lower freight costs will stimulate $800 million in additional exports in industries such as agriculture, food processing and manufacturing by 2050. The boost in the competitiveness of exporters will come at a pivotal time as Asian demand for the region's exports grows.

Overview of economic impacts in the region

The Hunter Region and Northern NSW will get a $6 billion economic uplift from a container terminal. Businesses and consumers will benefit from $2.8 billion in lower freight costs. Growth in the value of exports contributes $1 billion, while a further $300 million is a transfer of economic activity from Sydney to the Hunter Region and Northern NSW as some container port activity shifts from Port Botany to Port of Newcastle. There will also be an additional $2 billion of additional economic value, (see Exhibit 27), with a broad-based increase in economic activity stimulated by lower import prices, higher export returns, and greater activity around the container terminal and broader freight distribution system.

EXHIBIT 27

The Newcastle, Hunter and Northern NSW economies will benefit from a $6 bn increase in economic activity

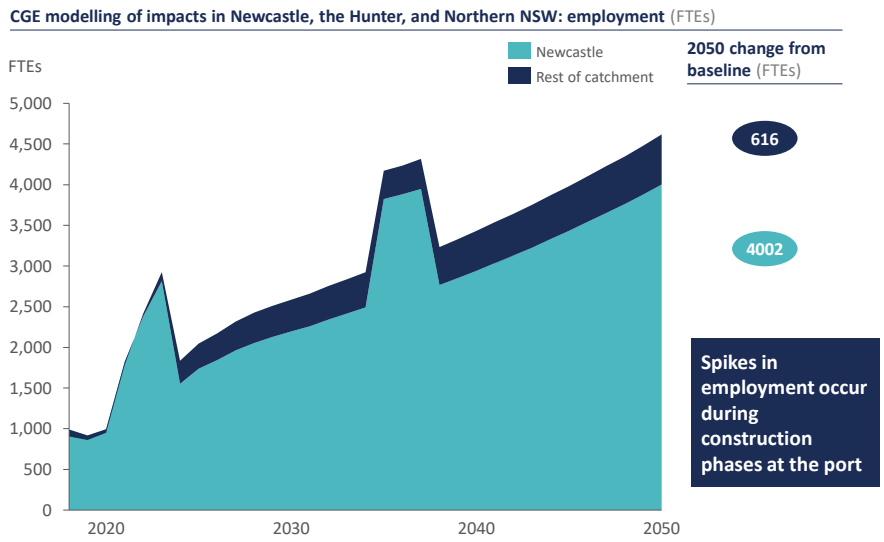


SOURCE: CGE analysis based on freight market modelling and local construction and operating costs. Moved activity is water and land transport.

Workers in the region will benefit with over 4,600 new jobs generated by 2050 (see Exhibit 28). Newcastle will gain about 4,000 of these jobs, both in the construction and operation of the port and in local service businesses such as retail, hospitality and professional service industries. Exporting industries in the Hunter and Northern NSW, such as agriculture, processed food and manufacturing, will also add around 600 new jobs as they expand output due to lower input prices and lower-cost access to world markets. As elsewhere, many jobs will be lost with the impact of technological disruption, but with availability of a locally connected container port, more will be created.

EXHIBIT 28

Workers in the Newcastle, Hunter and NNSW regions will benefit from the creation of over four thousand new jobs by 2050

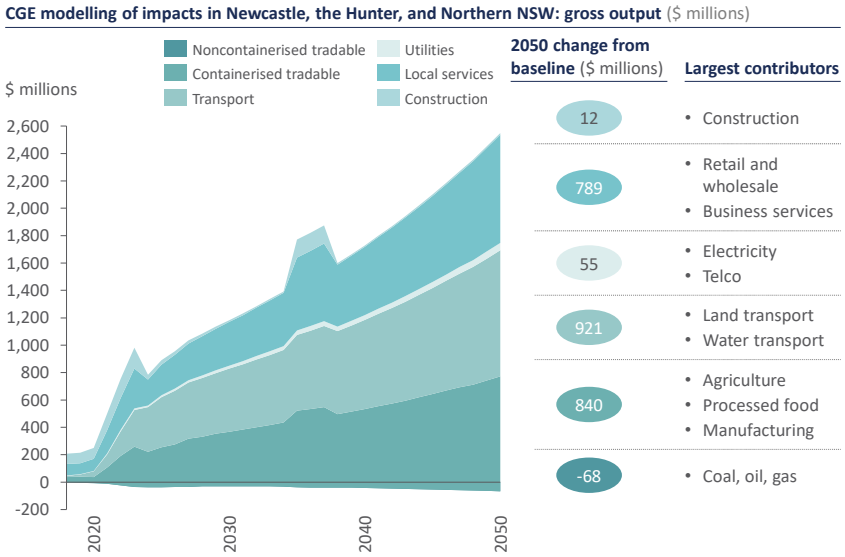


SOURCE: AlphaBeta analysis, CGE analysis. Peaks in employment relate to construction phases for the terminal.

A diverse range of industries will share in the increased economic activity flowing to the region (see Exhibit 29). Transport, including both port and land freight, is the industry with the biggest uplift, generating over $920 million in additional gross output by 2050. Exporting industries, such as agriculture and manufacturing, will gain over $800 million by 2050. Local service providers in in the region, such as construction, retailers and business services, also benefit from the construction and operation of the port, with their output rising by almost $800 million by 2050.

EXHIBIT 29

The economic boost to the region will be shared across industries, including transport, local service businesses, and exporters



SOURCE: AlphaBeta analysis, CGE analysis

Creating economic opportunity for regional exporters

Adding a container terminal at Port of Newcastle will boost the productivity and competitiveness of regional exporters and increase the value of regional exports by almost $800 million by 2050. The Hunter Region and Northern NSW is home to exporting clusters in agriculture and forestry, food manufacturing and steel manufacturing.

The export output of these industry clusters is already 20 to 100 per cent higher than the State average for their industry (see Exhibit 30). These industries will significantly increase the value of their export output by 2050. Agricultural and forestry exporters will gain over $200 million in additional output; food manufacturing will gain almost $250 million and steel manufacturing will gain over $200 million (see again Exhibit 30).

Supporting such industry clusters often brings additional economic benefits. In NSW, industry hotspots like those in the Hunter Region and Northern NSW, are a key driver of jobs and innovation, particularly with a strong university presence.

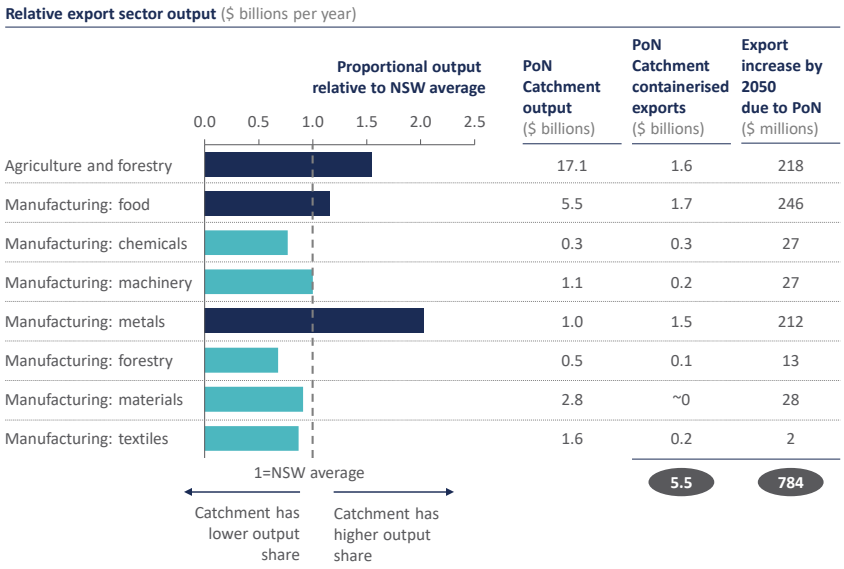
Research commissioned by Jobs for NSW found such industry hotspots (that is, a concentration of an industry in a geographic area) cover only 1.2 per cent of the geographic areas in the state, but generate 12 per cent of all jobs. Indeed, hotspots created a quarter of new jobs in NSW in the five years to 2011.[25] This also reflects international experience, including the transformation of 'older industrial cities', which demonstrate that clustering and connectivity are a key source of competitive

[25] Jobs for NSW (2016)

advantage.[26] As major factors in connectivity, ports and airports contribute along with digital technologies to the success of innovation districts.[27]

EXHIBIT 30

Lower freight costs will see key NSW industries expand exports by almost $800m by 2050



SOURCE: AlphaBeta analysis, CGE analysis

The driver of export growth in the region will be increased competitiveness from lower freight costs. Hunter Region and Northern NSW exporters will save $1.3 billion by 2050 in NPV terms from access to a closer, more productive container port (see Exhibit 31). By 2050, exporters will save $250 million per year compared with a baseline scenario where they are served by Port Botany or Port of Brisbane. While we have not modelled the second round, dynamic impacts of a container terminal, it is possible it will see not only the expansion of established exporters but the emergence of new globally oriented firms, either as start-ups, relocations or increased foreign direct investment. These firms will be in a position to take advantage of the containers that might otherwise leave empty, pursuing a 'smart specialisation' strategy in global markets and value chains.[28]

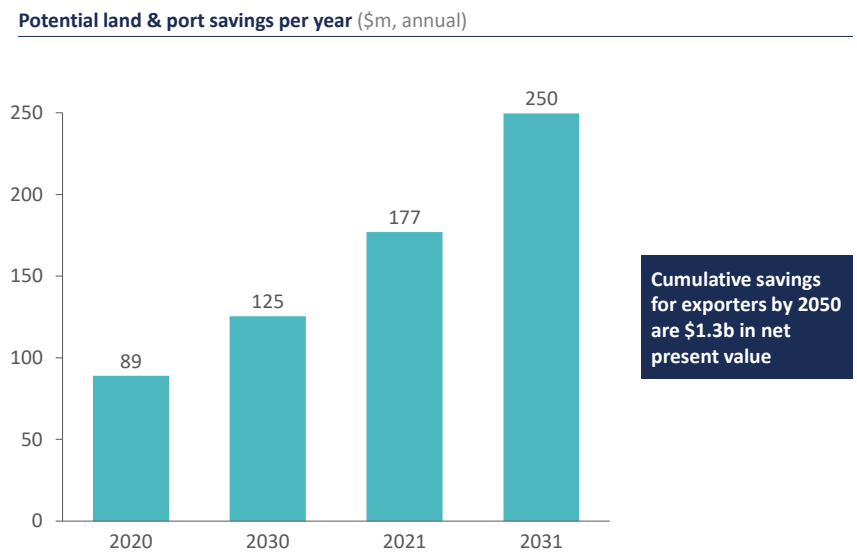
[26] Brooking Institute (2018)

[27] Brookings Institute, 2014.

[28] RDA Hunter (2016)

EXHIBIT 31

Exporters in the region could save $250m per year by 2050, and $1.3b in total by 2050



SOURCE: AlphaBeta analysis

The benefits to individual exporters are clear. Case study interviews conducted by the Hunter Research Foundation Centre with existing exporting businesses in the region identified actual exporting volumes for individual producers in the region. Based on the interviewees' location and export volumes, we calculated the freight savings to the business if they switched to using a container terminal at Port of Newcastle (see Exhibit 32). The savings are meaningful. A single food processing business in Narrabri exporting 170,000 tonnes of pulses per annum could save $5.3 million per year. A cotton farmer in Wee Waa or Warren could save $1.3 million per annum, while a high-tech manufacturer could save $500,000 per annum on imported goods.

EXHIBIT 32

Typical savings for Northern NSW businesses relying on container freight

		Example business	Typical export volumes	Likely savings
Exporters		• Food processor in Narrabri NSW, exporting and processing pulses	• Exports 170,000 tonnes in containerised goods per annum	• $31 saved per tonne of goods shipped • $5.3 million saved per year
		• Farmers in Wee Waa and Warren producing and processing cotton exports	• Currently processing 1000-2500 containers per year through Botany.	• $738 saved per TEU shipped • $1.3m saved per year in transport costs
Importers		• High-tech mining equipment manufacturer in Beresfield NSW.	• Imports around $10m of raw material (Chinese Steel) through Botany	• $500,000 per annum saved in production delays and transport costs

SOURCE: Hunter Research Foundation Centre (2018), AlphaBeta Analysis

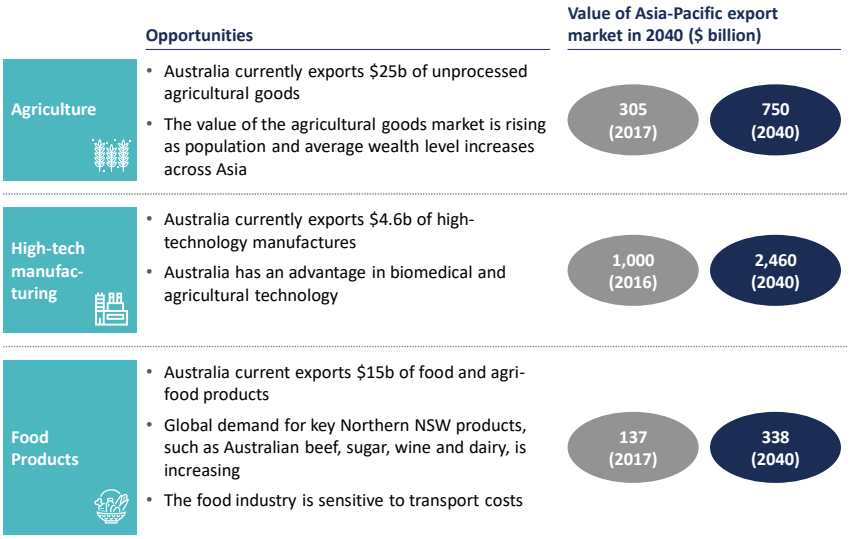
Exporters may also benefit from productivity increases if the new port, which will be technologically sophisticated and highly integrated, acts as a catalyst for exporting supply chains to improve their productivity. Experience in other markets shows that a new sea port can trigger efficiencies in the supply chains connecting to it by improving supply chain coordination, improving supply chain processes and efficiency, and increasing supply chain adoption of frontier technologies.[29]

Increasing the productivity and competitiveness of Hunter and Northern NSW exporters is critical to capturing a larger share of the significant and fast-growing Asia-Pacific markets for food, wine, advanced manufacturing and renewable technologies. By 2040, the Asia-Pacific market for agribusiness products could grow to $770 billion, the market for high-tech manufacturing will exceed $2.4 trillion, and the market for food products will be $337.6 billion (see Exhibit 33). These are opportunities that will advance the interest of NSW in regional diversification and sustainable growth.

[29] Hunter Research Centre Foundation (2018), London Gateway (2018)

EXHIBIT 33

Making exporting easier and more cost effective can help NSW exporters take advantage of growing, Asia-Pacific markets for their products



SOURCE: World Bank, United Nations Comtrade, AlphaBeta analysis. NOTE: *Extrapolation to 2040 using 4 per cent annual growth.

CASE STUDY: Weathertex

Weathertex is an innovative manufacturer of building products based in the Hunter Region of NSW. The company specialises in manufacturing exterior siding for homes made from waste from the forestry industry. Weathertex has a global presence and is currently sending their green building panels to 13 countries. The company has 120 staff and turnover in excess of $45 million per year. They foresee an opportunity to double their output by tapping into other new, targeted markets around the world. That is good news for the region's timber industry, as Weathertex utilises wood pulp that would otherwise go to waste.

Locally available freight container services are very important to Weathertex. It costs them half the price to send a container of their panels from Newcastle compared to Sydney. To ship a 20-foot container through Sydney costs $2,500, while it would be only $1,300 to go through Newcastle.

Freight prices are also important to Weathertex's export ambitions. Last year, Weathertex sent in excess of 60 containers overseas, both 20-footers and 40-footers. As Paul Michael, Weathertex's owner, notes, "a 40-foot container going to Korea costs $400 for sea freight, which is almost nothing. So, the overland cost to port at this end is significant, more than double the cost of the sea freight." By contrast, a 40-foot container going to the US costs $6,000-$7,000. Weathertex is already 15 per cent more expensive than other fibre cement competitors. Reducing their domestic freight costs by $1200 by switching to Newcastle is equivalent to 17 - 20 per cent of shipping costs to the US, which would make them more price competitive in the US market. This could lead to a significant increase in containers shipped.

SOURCE: Hunter Research Foundation Centre

Appendix A – Detailed methodology

Approach taken to assessing economic impact

This report analyses the potential economic impact of the proposed container terminal at Port of Newcastle by 2050 at a regional, state and national level. To determine the net economic impact, the analysis evaluated four impact categories:

- **Cost reductions in the freight market** in both Port of Newcastle and Port Botany catchments due to increased competition, increased efficiency and improved productivity and innovation
- **Avoided infrastructure costs,** such as deferment or avoidance of new or upgraded rail and road infrastructure
- **Avoided externalities**, such as pollution, congestion and road safety
- **Induced economic activity** arising from the container terminal or lower freight prices, such as growth in exports

Key scenarios and assumptions

The analysis compared the impact of two scenarios from the present day until 2050. The baseline scenario assumed that Port Botany continues to operate as the sole container port in NSW. In the second scenario, Port of Newcastle opens a second container terminal, which scales and serves the Hunter Region and Northern NSW market. In this scenario, the potential market Port of Newcastle could serve was modelled and defined as regions of NSW that would be more cost-effectively served from Newcastle.

Both scenarios applied NSW Treasury GSP (set to 2.5 per cent per year) and population growth projections. Growth in the container freight market was assumed to be GDP growth plus one per cent per year, recognising that historically trade volumes have exceeded GDP. We estimated the potential economic value to NSW of the terminal in three stages.

Stage 1: Containerised Freight Market Model

In the **first stage**, we modelled the container freight market in NSW. First, we estimated where containerised imports go to and where containerised exports originate from, across NSW and the ACT, based on statistics on population, incomes and industry in each local government area (LGA), and on NSW container imports and exports.

To estimate demand for containerised imports geographically across New South Wales, we used an equally-weighted average of output and population in each LGA to reflect the use of containerised imports in final consumption and as intermediate inputs. Output at each LGA is estimated using the Census 2011 and 2016 for employment by industry, to allocate NSW and ACT output from the National Accounts and a range of other sources.

To estimate the volumes of container exports geographically across New South Wales, we used data on the industry composition of container exports published by Ports Australia and by Transport for NSW.[30] (About 45 per cent of containerised exports originate from food processing and from the agriculture, forestry and livestock industries. The other 55 per cent originate from manufacturing,

[30] Transport for NSW, *Strategic Freight Forecasts*, 2018.

including mineral ores). We then allocated these exports to LGAs according to the estimated industry output of each LGA. We estimate output by industry in each LGA by employment in each industry. Our approach provides an estimate that assumes that export-intensity of the sectors that contribute NSW's containerised exports does not vary across LGAs.

We then estimated land freight costs for containerised imports for all NSW LGAs and the ACT from four ports (Melbourne, Brisbane, Botany, and Newcastle), based on an assumed fixed charge of $2.70 per TEU-KM. Freight costs depend on many factors apart from distance. But for many destinations, this simplification approximates the average estimated charges resulting from more detailed modelling of the mix of road and rail (and a mix of train lengths). Botany distances approximate a route through Western Sydney, to capture typical journeys to/from Port Botany via intermodals or distribution centres. We overrode the pure distance-based approach for LGAs where factors other than distance are decisive. For example, some LGAs that are closer to Botany (or Brisbane) can be more economical to serve from Newcastle because long trains can be used, thanks to flatter grades and more capacity at port.[31]

We then estimated the direct value to container freight customers routing their traffic through a container terminal at Port of Newcastle. Using freight rates to all the east coast container ports, we estimated the potential land freight cost savings of accessing a Newcastle terminal. We defined the addressable market as the area where proximity or transport mode advantage makes Newcastle lowest cost. The resulting volumes and savings are set out in the body of the report.

In addition, we provide for benefits to customers of being able to site intermodal centres and distribution centres adjacent to the Newcastle terminal, rather than separated by an additional rail or road link as in Sydney.

A ten per cent change in estimated land freight cost savings would change the estimated overall impact of the terminal by about $240 million in NPV terms. However, if freight costs were much lower than we estimate, then serving some of the much larger Sydney market will become more economic, and competitive pressure on the incumbent would be stronger. A ten per cent change in estimated Port of Newcastle productivity advantage over the incumbent would change the results in this study by about $40 million in NPV terms.

Stage 2: Broader benefits and impacts

In the **second stage**, we estimated the broader potential benefit and impacts across the NSW economy of a Port of Newcastle terminal, including a lower burden of building road and rail infrastructure in Sydney, lower costs of congestion and pollution in Sydney, and the benefits of more intense competitive pressure on incumbent port and terminal operators in Sydney.

First, we calculated the potential savings from deferred infrastructure spending in Sydney. We estimated potential costs of rail infrastructure based on the costs and likely capacities of the most comparable recently constructed, committed, or designed freight rail investments. We estimated the period over which rail investments could be postponed if some baseline Port Botany container traffic were to be routed through a terminal at Port of Newcastle. The resulting avoided capital charge is assumed to be a benefit to the State Government budget, prorated over the period 2040-2050. State output rises by 30 per cent of this amount, reflecting an assumed efficiency cost of taxation of 0.3.

[31] Lycopodium (2018).

We estimated road infrastructure costs using PAYGO, the standard road cost allocation model, adjusted to reflect the costs of road construction in Sydney and larger footprint of heavy vehicles on congestible urban roads.[32] We assume that, on average between 2018 and 2050, the requirement for road investment will be lower in proportion to the reduction in truck-kilometres resulting from lower container throughput at Port Botany.

We estimated the congestion and pollution costs of baseline freight movements based on sources that are standard in Australian transport studies. The resulting heavy vehicle congestion cost estimates are about 50 cents per km in Sydney; heavy vehicle pollution costs are estimated at about 70 cents per km.[33] Under the assumption that trucks would otherwise take two TEUs each on a 30-40 kilometre journey (depending on scenarios discussed in the chapter) from a distribution centre through Sydney, the total benefits for reducing container freight traffic are calculated as shown in Chapter 5.

We also imposed assumptions about the construction costs of a terminal at Port of Newcastle and of associated intermodal and distribution centres with guidance from Port of Newcastle, supported by a review of the literature on the costs and capacity of recently constructed terminals in Australia. Operating costs are assumed to result in the assets earning a market-competitive cost of capital at the imposed revenues per container.

We then estimated the potential benefits to Botany customers from competitive pressure. Literature suggests that incumbent operators are likely to reduce prices and to intensify their focus on productivity improvement.[34]

A ten per cent change in avoided infrastructure benefits would change the budget impact by about $40 million and the GSP impact by about $12 million in NPV terms. A ten per cent change in congestion and pollution would change GSP by about $13 million in NPV terms. A ten per cent change in the modelled effect of competitive pressure would change the result by about $120 million in net present value terms.

Stage 3: Computable General Equilibrium Model

In the **third stage**, working with Cadence Economics, we applied the direct savings and productivity boosts detailed above to a computable general equilibrium ('CGE') model of the NSW economy, yielding changes in output, employment, incomes across regions and industries, as well as the export of containerised freight, out to 2050.

The CGE model was divided into six regions: Sydney, Southern NSW, Newcastle, the Hunter, and the rest of Northern NSW, and the rest of Australia. The changes in activity and costs detailed above were applied to sectors and geographies as follows.

First, we imposed changes in water transport activity in Botany and Newcastle, equal to the assumed exogenous shifts resulting from shifting container handling to Newcastle. We also imposed productivity boosts in each port. Water transport in Newcastle was modelled as experiencing a boost to multi-factor productivity (MFP), equal in value to a 10 per cent productivity boost in the PON container terminal. Water transport in Sydney was modelled as experiencing a MFP boost,

[32] National Transport Commission (2018)

[33] Austroads (2012); ABS (2017)

[34] See the discussion in Chapter 4, Deloitte Access Economics (2018) and the works cited in it.

equal in value to an initial 5 per cent productivity boost in the container terminal, rising to 10 per cent over time. These productivity boosts result in price reductions to sea-freight-using sectors and households in both catchments

Second, we imposed a capital investment profile in the water transport sector in Newcastle equal to the indicative capital investment profile for the terminal provided by Port of Newcastle. We allowed for investment in adjacent intermodal terminals and distribution centres, based on the investment required in comparable Australian operations in recent years. This capital is invested at the baseline rate of return and is serviced at that rate of return. There is currently underutilised rail and road infrastructure on the port site and in the surrounding rail and road network, built in expectation of larger freight volumes associated with BHP's steel operations than those it currently handles. To proxy for the progressive utilisation of currently underutilised rail and road capital, the model provides that further capital around the terminal is made available without any servicing cost, in sufficient quantity to hold the rate of return in Newcastle at its baseline level.

Third, land freight savings were allocated to containerised exports (processed food, agriculture, and manufacturing) and to imported manufactures in the model. Forty-five per cent of land freight savings go to exporting industries, and 55 per cent go to imports, reflecting the shares of activity calculated in the freight model. The benefit to these exporting sectors is implemented as a single-factor productivity boost in the containerised export sectors, permitting them to produce more output with the same land transport input, calibrated to equal their share of total land freight savings. The benefit to imported manufactures is implemented as a price reduction to households, also calibrated to equal the importer share of land freight savings.

Finally, we implemented the benefit of deferred infrastructure investment, and of avoided congestion and pollution. The deferred infrastructure investment is implemented in the model as an increase in the provision of government services for a given tax burden, equal in size to the efficiency cost of the taxes that would otherwise have been raised. The benefits of reduced congestion and pollution is modelled as a labour productivity boost across all sectors in Sydney equal to the size of the congestion and pollution benefit.

Appendix B: Savings by LGA

The below table shows the savings at the LGA level across the catchment for Port of Newcastle Container Terminal.

Region	LGA	Next closest port to Newcastle	KM saved	KM saved (per cent)	Dollars saved per TEU
Central West	Dubbo Regional	Botany	150 (*)	45%	$405
Far West	Broken Hill	Botany	78	6%	$210
Greater Metropolitan Newcastle	Cessnock	Botany	175	78%	$473
	Lake Macquarie	Botany	189	90%	$510
	Dungog	Botany	190	70%	$512
	Muswellbrook	Botany	191	60%	$517
	Singleton	Botany	191	71%	$517
	Upper Hunter Shire	Botany	191	55%	$517
	Maitland	Botany	199	86%	$537
	Mid-Coast	Botany	209	58%	$564
	Newcastle	Botany	216	96%	$583
	Port Stephens	Botany	217	83%	$586
Mid-North Coast	Coffs Harbour	Brisbane	9	2%	$24
	Bellingen	Brisbane	59	14%	$159
	Nambucca	Brisbane	142	30%	$385
	Port Macquarie-Hastings	Botany	209	47%	$564
	Kempsey	Botany	209	42%	$564
Northern	Gwydir	Brisbane	10	2%	$27
	Inverell	Brisbane	15	3%	$40
	Moree Plains	Brisbane	100 (*)	20%	$270
	Armidale Regional	Brisbane	150	31%	$404
	Narrabri	Botany	191	32%	$517
	Tamworth Regional	Botany	191	40%	$517
	Gunnedah	Botany	191	38%	$517
	Liverpool Plains	Botany	191	45%	$517
	Uralla	Brisbane	193	37%	$521
	Walcha	Botany	209	43%	$564
North-Western	Cobar	Botany	78	10%	$210
	Bogan	Botany	78	12%	$210
	Bourke	Botany	78	9%	$210
	Narromine	Botany	78	15%	$210

	Western Plains Regional	Botany	79	17%	$214
	Warren	Botany	97	17%	$263
	Walgett	Brisbane	117	16%	$317
	Brewarrina	Brisbane	117	14%	$317
	Gilgandra	Botany	122	24%	$329
	Coonamble	Botany	122	20%	$329
	Warrumbungle Shire	Botany	168	34%	$455
Sydney Surrounds	Central Coast	Botany	72	45%	$193

Note: Distance savings to LGAs can be identical where the routes from ports to LGAs overlap. Distances are calculated by road from each port to the point on the road network closest to the population-weighted centre of each LGA. Savings for LGAs marked (*) due to transport mode change (for example, using rail instead of road, or longer trains) are represented here by an approximately equivalent distance saving. Other LGAs may also benefit from transport mode change in addition to those shown here.

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