19 November 2021

Review of Port of Melbourne's cost allocation, demand and expenditure

Final Report

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Glossary

Term	Definition
AUD	Australian dollar
BISOE	BIS Oxford Economics
CA	Cost allocation
ECI	Early Contractor Involvement
ESC	Essential Services Commission
FEL	Front end loading
FTE	Full Time Equivalent
LTI	Long-term incentive program
PCD	Port Concession Deed
PDIP	Port Development Implementation Plan
PDS	Port Development Strategy
PMF	Project Management Framework
PoM	Port of Melbourne
PRTP	Port Rail Transformation Project
QS	Quantity surveying/surveyor
RAS	Rail Access Strategy
STI	Short-term incentive program
TAL	Tariff Adjustment Limit
TCS	Tariff Compliance Statement
TEU	Twenty foot equivalent units

Executive Summary

Purpose of this report

The Port of Melbourne is Australia's largest container and general cargo port, handling more than one-third of the nation's container trade. It operates as a landlord port and is responsible for planning, operating and maintaining port land and shipping channels. It provides prescribed services related to channels, berthing vessels, storage and cargo marshaling and access to infrastructure such as wharves, slipways, gangways, road and rail infrastructure.

Prior to 2016, the port was operated by the Port of Melbourne Corporation – a Victorian Government entity. In 2016, Port of Melbourne Operations Pty Ltd was awarded a 50-year lease to operate the port and it commenced operations on 1 November 2016.

Under the *Port Management Act 1995*, the Essential Services Commission (ESC) is required to conduct an inquiry into the Port of Melbourne's compliance with a Pricing Order[1] every five years which assesses:

- whether the Port of Melbourne has complied with the Pricing Order during the previous five-year period and
- if there was non-compliance, whether that non-compliance was, in the ESCs view, non-compliance in a 'significant and sustained manner'.

FTI Consulting has been asked to assess the Port of Melbourne's cost allocation, demand and expenditure (operating and capital) over the five-year period from 1 July 2016 to 30 June 2021. Our assessment will inform the ESC's view about whether there has been significant and sustained non-compliance.

Context for this review

This is the first time that the Port of Melbourne's cost allocation, demand and expenditure is being assessed under the new regulatory framework. It focuses on a period where the Port of Melbourne has undergone significant changes and transition. While the nature of its prescribed services has not changed fundamentally, the Port of Melbourne has:

[1] The Pricing Order was issued under the *Port Management Act 1995* on 24 June 2016 and amended on 20 May 2020.

- Transitioned to private ownership and implemented changes to the senior management team
- Been subject to new and expanded legislative, regulatory and contractual obligations including in relation to environmental, quality and OH&S systems
- Undertaken major strategic planning underpinning future infrastructure including through a Port Development Strategy (PDS), a Port Development Implementation Plan (PDIP) and a Rail Access Strategy
- [redacted]
- Completed major projects commenced prior to the new lease arrangements (such as the Port Capacity Project) and commenced preparations for new major projects to be undertaken in the next review period.

Together, these factors have meant that the Port of Melbourne has not experienced a 'steady state' in operations over the last five years. This has implications both for the stability of its operating and capital expenditure programs and the nature of costs incurred. It also means that traditional approaches used to assess prudency and efficiency of expenditure, such as benchmarking and the 'base-step-trend' approach, have more limited value in this first review period.

We expect that the Port of Melbourne should move to a steady state of operations over the next review period, and this will enable a more definitive view to be taken about the prudency and efficiency of its expenditure in future.

At the same time, the Port of Melbourne has been familiarising itself with the requirements of the new economic regulatory framework set out in the Pricing Order. The regulatory framework is different from what previously applied to the Port of Melbourne Corporation. It applies a light-handed price monitoring approach[2] and places the onus on the Port of Melbourne to demonstrate its compliance with the requirements of the Pricing Order. As a result, the transparency and detail set out in its Tariff Compliance Statements (TCS) has evolved during the review period, including for issues such as cost allocation.

A further challenge has also been that this first review has coincided with a period of uncertainty and change related to trade and vessels. The COVID-19 pandemic has created some uncertainty in relation to key economic forecasts which drive trade throughput,

[2] Other infrastructure regulatory regimes are more prescriptive or 'heavy-handed', relying on identification of the efficient costs which under a building block cost approach comprises a return on, and of, capital, plus efficient operating expenditure and tax.

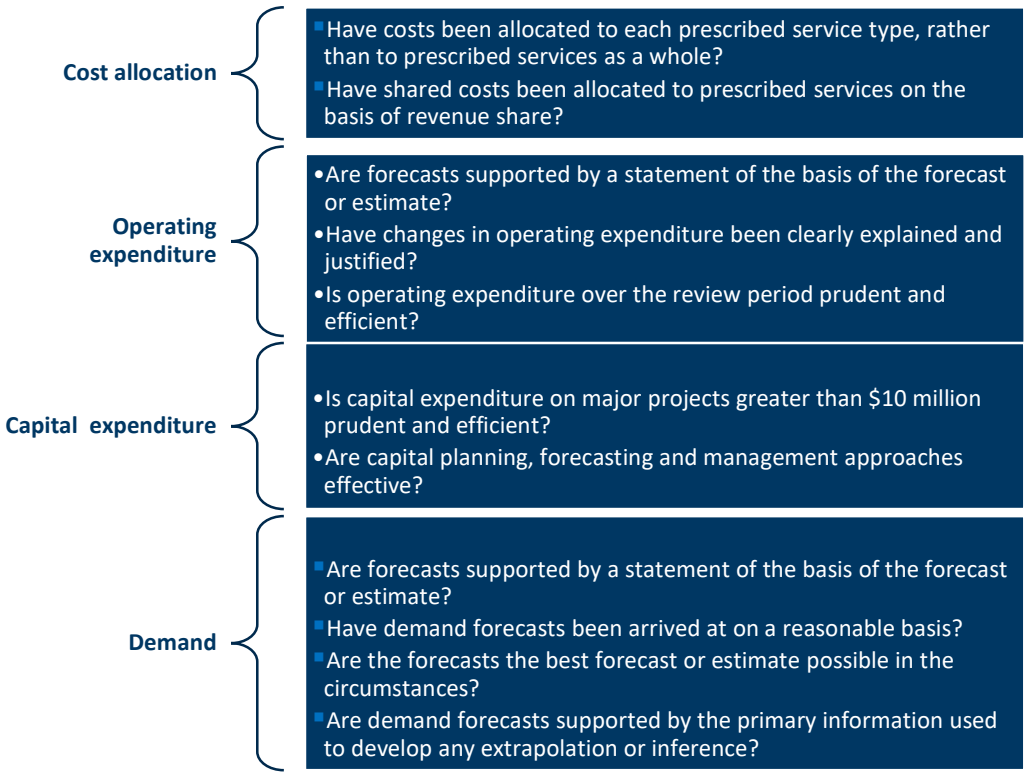
particularly for containerised trade. 'Big ships' have also arrived earlier than expected at the Port of Melbourne, impacting both demand as well as major future capital projects – albeit those projects do not feature in this first review period.

Focus of our assessment

Against this backdrop, FTI Consulting has been asked to assess the Port of Melbourne's cost allocation, demand and expenditure (operating and capital) to inform the ESC's view about whether there has been significant and sustained non-compliance.

Our review focuses on the five-year period from 1 July 2016 to 30 June 2021. The ESC, together with their consultants, are examining the other requirements that the Port of Melbourne is required to comply with in relation to revenue recovery and pricing.

Our assessment includes forming a view about the following:



The following sections provide a high-level summary of our assessment to date, which is further explained in the sections of this report.

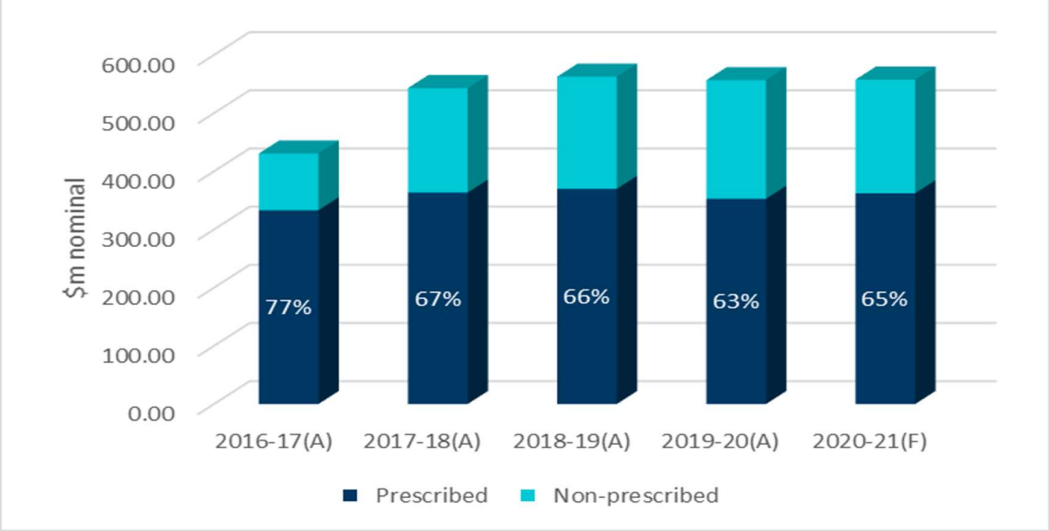
Cost allocation

We have been asked to review the extent to which the Port of Melbourne's cost allocation has met the Pricing Order cost allocation principles which require the Port of Melbourne to allocate costs between the prescribed service and other services as follows:

- costs that are directly attributable to the provision of the prescribe service must be attributed to that prescribed service and
- costs that are not directly attributable to the provision of the prescribed service, but which are incurred in the course of providing both one or more prescribed services and other services must be allocated to the prescribed service on the basis of its share of total revenue from all services provided by the port licence holder.

Apart from the first year of the review period, the contribution of prescribed services to total revenue has been relatively stable in percentage terms. Non-prescribed revenue increased materially between 2016-17 and 2017-18 because of contracts with stevedores and other port tenants leasing land and the licensing of facilities.

Figure 1: Revenue from prescribed and non-prescribed services ($m, nominal)



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, 31 May 2021, Appendix D: Cost Allocation Model.

Operating expenditure comprises costs associated with prescribed services (split between controllable and non-controllable costs) and costs associated with non-prescribed services. Of this, 70-80% is non-controllable and 20-30% is controllable. Non-controllable operating

expenditure includes: the Port Licence Fee, the Cost Contribution Amount and forgone rent and third-party outgoings associated with land excised for the Port Rail Transformation Project (PRTP). These non-controllable operating costs are largely dedicated (not shared).

Most of the Port of Melbourne's capital expenditure is allocated to prescribed services, with the majority of this being dedicated rather than shared expenditure. The Cost Allocation Model indicates that most of this relates to wharfage services.

Transparency of the cost allocation approach

Prior to 2019-20, there was very little information and transparency in the Port of Melbourne's TCS with respect to its cost allocation approach. In 2019-20, the Port of Melbourne developed a Cost Allocation User Guide and Cost Allocation Model which materially improved the transparency of its cost allocation approach. However, further improvements could be made to provide greater transparency of the cost allocation approach in the TCS and we have made a number of recommendations in this regard.

Attribution of directly attributable costs to prescribed services

The first cost allocation principle requires the Port of Melbourne to ensure that costs that are directly attributable to the provision of the prescribed service are attributed to that prescribed service. We have assessed whether the Port of Melbourne's cost allocation approach allocates costs to each prescribed service type, rather than just to prescribed services as a whole.

For the first three years of the review period (2016-17 to 2018-19), the Port of Melbourne's cost allocation approach did not comply with the first cost allocation principle requiring costs directly attributable to the provision of prescribed services to be attributed to that prescribed service.

For the last two years of the review period (2019-20 and 2020-21), the Port of Melbourne has:

- Appropriately allocated non-controllable dedicated prescribed costs based on revenue shares – these costs account for over 90% of dedicated prescribed costs.
- For the remaining (controllable) dedicated prescribed costs, appropriately applied a proxy of the activity used to provide each individual service.
- Appropriately applied a consistent approach to capital expenditure.
- Ensured that operating expenditure categories and asset classes are only allocated to individual prescribed services that benefit from them.

In relation to capital expenditure, our assessment is that the Port of Melbourne's approach over the review period is consistent with the first cost allocation principle to the extent that most of its capital expenditure relates to common user assets.

Allocation of shared costs to prescribed services

The second cost allocation principle requires the Port of Melbourne to allocate costs that are not directly attributable to prescribed services based on its share of total revenue from all services. The Port of Melbourne's cost allocation approach complies with this principle.

Future TCS could be improved by including a more detailed explanation of the detail underpinning prescribed services expenditure (both dedicated and shared costs) for each operating cost category and asset class.

Operating expenditure

We have been asked to assess the extent to which the Port of Melbourne's forecast controllable operating expenditure on prescribed services over the review period is commensurate with what would be required by a prudent service provider acting efficiently.

We have also assessed whether the operating expenditure forecasts are:

- supported by a statement of the basis of the forecast or estimate
- arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances
- supported by primary information used to develop any extrapolation or inference.

It is important to recognise that:

- The Port of Melbourne's operating expenditure on prescribed services accounts for only 20-30% of its aggregate revenue requirement (ARR).
- Between 70-80% of its operating expenditure on prescribed services represents non-controllable cost items that the Pricing Order deems to be prudent and/or efficient.[3]

This is shown below.

[3] These items include the Port Licence Fee, the Cost Contribution Amount and the forgone revenue associated with an agreement between the Victorian Government and the Port of Melbourne to excise land for the Port Rail Transformation Project (PRTP).

Table 1: Aggregate revenue requirement and prescribed operating expenditure, 2016-17 to 2020-21 ($ million)

	2016-17 (actual)	2017-18 (actual)	2018-19 (actual)	2019-20 (actual)	2020-21 (forecast)
Aggregate revenue requirement	561.1	530.5	551.4	547.1	455.1
Total: non-controllable operating costs	96.3	97.8	100.0	102.5	107.1
Total: controllable operating costs	37.7	28.6	24.5	24.2	26.8
Total prescribed operating costs	**134.0**	**126.4**	**124.5**	**126.6**	**133.9**

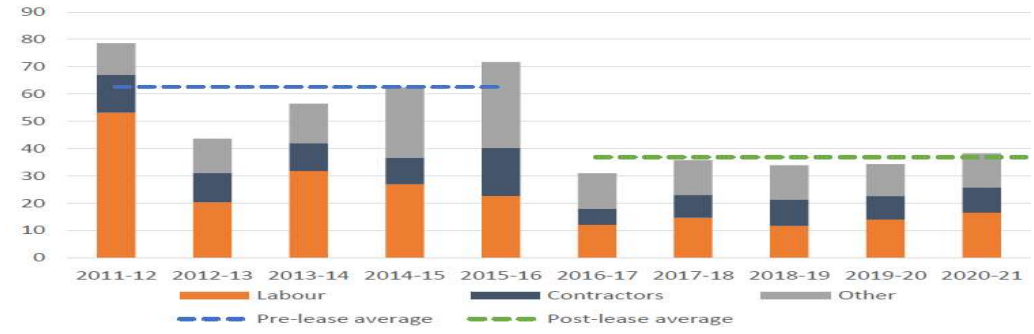
Note: columns may not add due to rounding. [redacted]

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.58 [redacted]

Our assessment focuses on whether the remaining 20-30% of the Port of Melbourne's operating expenditure on prescribed services on controllable items is prudent and efficient. [redacted] It accounts for only 4-6% of the Port of Melbourne's ARR over each year of the review period.

Compared to the previous five-year period, the Port of Melbourne has significantly reduced its average annual controllable operating expenditure on prescribed services (see Figure 2).

Figure 2: Controllable operating expenditure (prescribed and non-prescribed), pre- and post-lease (real $2020 million)

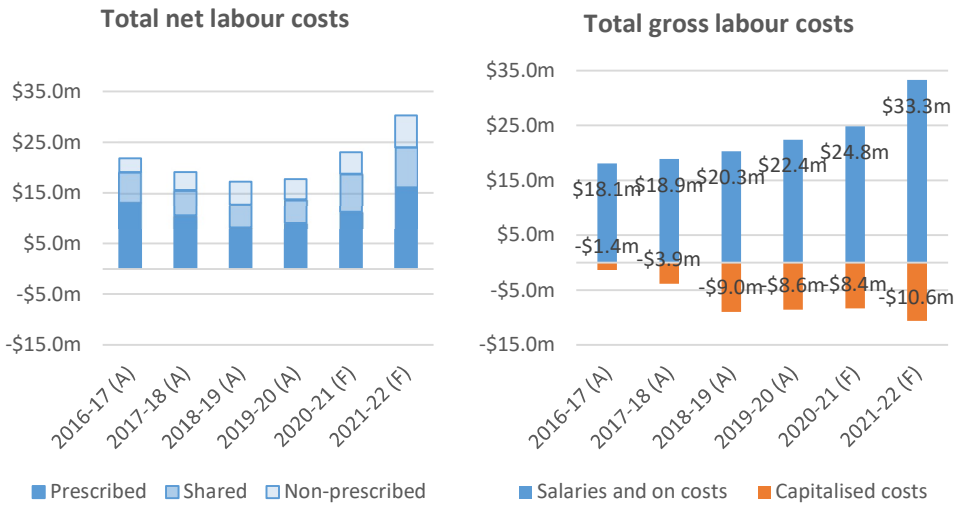


Note: 'Other' includes insurance, rates, taxes, repairs and maintenance, utilities, admin, rental and IT.

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.61.

[redacted] However, this does not change the overall finding that annual controllable operating expenditure on prescribed services is significantly lower than it was pre-lease.

Figure 3: Labour costs with and without capitalisation, 2016-17 to 2020-21 ($ million)



Source: [redacted]

Justification of operating expenditure forecasts over the review period

We do not consider that the Port of Melbourne's TCS have provided sufficient explanation of its forecast operating expenditure. The Port of Melbourne is required to provide sufficient information justifying:

- that operating expenditure forecasts have been arrived at on a reasonable basis, represent the best forecasts or estimates possible in the circumstances and are based on sound forecasting methodologies
- step changes in key operating expenditure categories and the drivers of operating expenditure increases. [redacted]

The TCS in each year have typically provided only:

- A short explanation of why the Port of Melbourne considers that its forecast is prudent and efficient
- A high-level summary of the methodology used to forecast each cost category
- An argument that for as long as prescribed services charges are constrained based on the Tariff Adjustment Limit (TAL), the Port of Melbourne has a strong incentive to achieve cost efficiencies because it is unable to recover any revenue shortfall related to operating expenditure or defer this until future periods.

Going forward, there are opportunities for the Port of Melbourne to improve the information included in its TCS to demonstrate that its operating expenditure forecast is prudent and efficient. The level of detail provided should be consistent with a light-handed price monitoring regulatory model, subject to any changes that are made to that model in future.

Prudency and efficiency of controlled prescribed services operating expenditure

The Port of Melbourne's controllable operating expenditure attributed to prescribed services is significantly lower in the review period compared to the five-years pre-lease.

While costs reduced materially upon commencement of the lease, several cost categories have begun to trend upwards in the last two years of the review period. [redacted]

There is insufficient evidence to confirm that the Port of Melbourne's forecast operating expenditure on prescribed services is prudent and efficient because:

- There is little evidence that the Port of Melbourne has targeted productivity improvements by setting business-wide efficiency targets. This would involve the clear specification of ex ante efficiency targets for individual cost categories and/or for total controllable expenditure, which are then directly reflected in the TCS forecast expenditure. This would then be expected to continue to be reflected in future expenditure forecasts as targeted savings are realised (that is, they are permanent, rather than temporary, savings).
- The methods and governance process used to set and approve annual budgeted operating expenditure do not demonstrate a clear focus on achieving efficient outcomes. With actual expenditure consistently less than forecast by around $2-3 million (equivalent to 7-10% of controllable costs) in each year, this suggests that these forecasts are being consistently overstated.

- [redacted]

We recognise that in the first review period, the Port of Melbourne has been transitioning towards a new organisation and major controllable cost components such as labour have changed significantly over the period.

It is reasonable to expect that operating expenditure will stabilise over the coming years as the Port of Melbourne moves to more of a steady state of operations. This will enable a greater focus on efficiency improvements and a 'base-step-trend' approach to be used to develop and assess its operating expenditure forecasts.

Capital expenditure

We have been asked to assess the extent to which the Port of Melbourne's forecast capital expenditure on prescribed services over the review period is commensurate with what would be required by a prudent service provider acting efficiently.

We have also assessed whether the Port of Melbourne's capital expenditure forecasts are:

- supported by a statement of the basis of the forecast or estimate
- arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances
- supported by primary information used to develop any extrapolation or inference.

The Port of Melbourne's TCS do not provide sufficient justification that capital expenditure over the review period is prudent and efficient.

Over the review period, the Port of Melbourne's capital program averages around $75 million per year, and ranges from $51.2 million and $112.4 million because of major capital projects (see Table 2).

Table 2: Prescribed services capital expenditure by category 2016-17 to 2020-21 ($ million)

Category	2016-17 (A)	2017-18 (A)	2018-19 (A)	2019-20 (A)	2020-21 (F)
Port Capacity Project	42.9	1.7	-	-	-
Channel	8.3	7.2	5.0	33.8	2.4
Wharves	18.4	35.1	42.6	36.3	30.5
Road	0.1	1.5	0.2	1.5	8.1
Rail	0.1	2.3	3.4	34.3	30.2
Plant	1.0	0.8	1.2	1.0	3.3

Other	1.5	2.5	4.8	5.4	6.4
Total	**72.4**	**51.2**	**57.3**	**112.4**	**80.9**

Note: columns may not add due to rounding.

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, Table 20, p.63.

Most of its capital program is non-expansion capital expenditure related to maintenance, repairs and remediation, rehabilitation for life extension, and upgrading or extension of existing infrastructure. This expenditure is equivalent to around 2% of the Port of Melbourne's capital base, which is considered to be of reasonable order for the asset base. There is limited expansion capital expenditure in this review period to respond to additional or new demand, or to achieve an increase in capacity.

Actual capital expenditure in each year of the review period has been close to or less than that which was forecast, primarily due to delays in progressing major projects.

There is significant variation in the rolling five-year capital expenditure forecasts, reflecting unforeseen expenditure on some major projects, and timing changes in expenditure on other major projects.

Prudency and efficiency of major capital projects and program

We have focused our review of the prudency and efficiency of capital expenditure projects on major projects with more than $10 million expenditure incurred over the review period. We identified and examined a total of nine major projects and programs shown in Table 3:

- six projects and programs with capital expenditure greater than $10 million over the review period
- three further projects with less than $10 million capital expenditure over the review period which were part of a broader program of works or otherwise related to the planning and development to inform the implementation of those projects to be undertaken following the end of the review period.

Together these projects account for around 70% of the Port of Melbourne's total capital expenditure on prescribed services for the review period. We note that the Pricing Order deems two of the projects reviewed to be prudent – the Port Rail Transformation Project and the Port Capacity Project – but these still need to be assessed for efficiency.

Table 3: Summary assessment of prudency and efficiency of review period capital expenditure on major projects

	Project	Expenditure 2016-17 to 2020-21	Prudency	Efficiency
1	Swanson Dock East Remediation & Upgrade	[redacted]	Prudent	Efficient
2	Port Capacity Project (PCP)	$44.6m	Deemed prudent	Efficient
3	Port Rail Transformation Project (PRTP)	[redacted]	Deemed prudent	Efficient
4	Maintenance Dredging Program	[redacted]	Prudent	Efficient
5	FY20 Dredging Program	[redacted]	Prudent	Efficient
6	Swanson Dock Upgrades (Part of Big Ships Strategy)	[redacted]	Prudent	Efficient
7	South Wharf Precinct (Rehabilitation Works)	[redacted]	Prudent	Efficient
8	Webb Dock East Upgrades (Part of Big Ships Strategy)	[redacted]	Prudent	Efficient
9	Swanson Dock West Remediation & Upgrade	[redacted]	Prudent	Efficient

We assessed the expenditure over the review period associated with each of these major capital projects and programs to be both prudent and efficient. The evidence suggests that these major projects:

- support the needs of port users, were robust and deliverable
- cost estimates were reasonable, although some increases occurred or were forecast to occur
- were both cost and time efficient and reflected prudent capital planning and delivery decisions.

Capital planning and management

The Port of Melbourne's capital planning and management processes are effective and support the needs of port users, and are robust, adaptive and appropriately risk managed. It has:

- undertaken detailed long-term strategic capital planning to inform the development of a new PDS and PDIP
- developed new governance arrangements, a project management framework and an integrated management system.
- improved existing processes, including for example its asset management system.

These developments have progressively improved capital expenditure outcomes over the review period. All the activities and processes supporting capital planning and management reflect good industry practice, and in some areas (for example, asset management) are beyond that level.

We recommend that the Port of Melbourne introduces a capital forecasting pipeline, a second capex categorisation based on asset management, improves its business cases, cost estimates and contingency setting and improve the collaborative tendering approach on major projects.

Demand

Demand forecasts have two important links to the building block approach to pricing. They are used to determine the need for, and timing of, capacity expansions, and to establish prices that will achieve maximum allowable revenue assuming the expected demand is achieved.

We have been asked to assess whether the Port of Melbourne's demand forecasts are:

- supported by a statement of the basis of the forecast or estimate
- arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances
- be supported by the primary information used to develop any extrapolation or inference.

The Port of Melbourne develops its container trade forecasts by grouping commodities which share a common driver and using integrated macroeconomic models to predict those drivers. It then adjusts for trends including the rate of containerisation, size of container etc.

Transparency of demand forecasting approach

In 2016-17 and 2017-18 there were no forecasts of demand supporting the TCS. Since 2018-19, the Port of Melbourne's TCS have included demand forecasts for the year ahead,

together with an explanation of the observed relationships and underlying economic forecasts.

The *Port of Melbourne Trade Forecasts - Detailed Outlook To 2022*[4] and similar *Outlook* reports since 2018-19[5] have provided economic commentary and discussed relationships between indices generated and historical trade data.

Estimates are supported by a statement of the basis of the forecast or estimate, although the model documentation does not clearly state how an exogenous variable used to adjust short-term full container import forecasts has been determined.

Reasonableness of forecasting approach

The Port of Melbourne's trade forecasts have been arrived at on a reasonable basis. The forecasting approach is consistent with industry best practice for long-term forecasts. Its use of a structural model allows future changes which have not yet been seen in the data (closure of industries, new trades, etc.) to be anticipated and modelled.

Annual forecasts have been made on an appropriate basis but prediction errors on economic variables have translated into errors for trade forecasts. While there are only three years of ex-post evidence to assess the performance of the annual forecasts, they do not appear to perform better[6] than a simple random walk model. In moderation of this point, COVID-19 impacted one of these three years and would defy any economic forecaster's ability to predict.

The logic of the identified relationships with drivers and the consideration of other factors such as exchange rates, production costs and substitutability, capacity limits, capital replacement requirements and trends in containerisation across many products is sound.

Assumptions in the forecasting model are reasonable and data used to support the forecasting are clear, although the validity of the assumption of a 1:1 relationship with demand drivers has not been supported by econometric analysis. The use of an error-correction term in the short-term forecasts mitigates the impact of this misspecification.

While the approach is sound, it relies on accurate forecasts of economic variables which are difficult to predict accurately on an annual basis, particularly when unforeseen events such as COVID-19 occur.

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4 BIS Oxford Economics, 2021.

5 BIS Oxford Economics, Port of Melbourne Trade Forecasts Detailed Outlook, various – FY21, FY20 and FY19.

6 Based on measurements of root mean-squared forecast error or absolute forecast error.

Estimates are supported by the primary information used to develop any extrapolation or inference:

- Estimates are supported by calculations and underlying data except for general cargo and break bulk, where the forecasts were hard-coded numbers in a spreadsheet.
- The modelling approach places significant reliance on outputs from a complex economic model that cannot be interrogated.

[redacted]

Reliability and accuracy of estimates

Forecasts are within ranges published by peers and government agencies.

While there is no obvious bias in the forecasts, as noted above three years of ex-post data are not sufficient to test whether the approach produces biased forecasts.

Forecasts of trade drivers were often significantly different from outturn values and measures of model accuracy indicated that the economic model overestimated GDP growth over five-year period. The Trade Volume Forecast Model also included some immaterial errors.

Long-term forecasts

We have reviewed the consistency of the Port of Melbourne's long-term demand forecasting approach with its annual forecasting approach. [redacted]

[redacted]

1. Introduction

Under the *Port Management Act 1995* (Port Management Act), the Essential Services Commission (ESC) is required to conduct an inquiry into the Port of Melbourne's compliance with a Pricing Order[7] every five years which assesses:

- whether the Port has complied with the Pricing Order during the previous five years and
- if there was non-compliance, whether that non-compliance was, in the ESC's view, non-compliance in a 'significant and sustained manner'.

FTI Consulting has been asked to assess the Port of Melbourne's cost allocation, demand and expenditure (operating and capital) over the five-year review period from 1 July 2016 to 30 June 2021 (review period). This report will inform the ESC's view about whether there has been significant and sustained non-compliance.

The following sections provide some background to the relevant regulatory arrangements that the Port of Melbourne is required to comply with, and the approach we have taken to our review of cost allocation, demand and expenditure (operating and capital) over the review period.

1.1. Prescribed services

The Port of Melbourne provides 'prescribed services' as identified in the Port Management Act and other non-prescribed services such as the leasing of space and facilities on port land. The focus of our review is on the expenditure, demand and cost allocation associated with 'prescribed services' only which includes:

- the provision of channels for use by shipping in Port of Melbourne waters
- the provision of berths, buoys, or dolphins in connection with the berthing of vessels in the Port of Melbourne
- the provision of short-term storage or cargo marshalling facilities in the Port of Melbourne
- the provision of access to, or allowing the use of, places or infrastructure (including wharves, slipways, gangways, roads and rail infrastructure) on Port of Melbourne land
- any other service that is prescribed by the Port Management Act Regulations.

[7] The Pricing Order is issued under the *Port Management Act 1995*. The original Pricing Order was issued on 24 June 2016 and amended on 20 May 2020.

1.2. Pricing Order requirements

In setting its prices for the provision of prescribed services, the Port of Melbourne is required to comply with requirements for setting prices for prescribed services outlined in the Pricing Order — a regulatory instrument made by the Governor in Council under section 49A of the Port Management Act.

The Pricing Order sets out the details of how to calculate process, the extent to which prices can change between years and the process for seeking a variation from the ESC. It also allows for the Port of Melbourne to recover the efficient costs associated with delivering prescribed services such as wharfage, channel use, berth or area hire, and other ancillary services.

1.2.1. Tariff Compliance Statement

The Port of Melbourne must provide the ESC with a Tariff Compliance Statement (TCS) by 31 May each year, describing how its prescribed service tariffs for the coming financial year comply with the Pricing Order. The TCS provide the starting point for our analysis the Port of Melbourne's cost allocation, demand and expenditure.

The Pricing Order lists what the Port of Melbourne's TCS must contain to demonstrate compliance with the Pricing Order. The TCS must also include any additional supporting information that the ESC requires.

1.2.2. ESC Guidance and Interim Commentaries

The ESC has published a Statement of Regulatory Approach (Statement) which provides guidance to the Port of Melbourne on how it can demonstrate compliance with the Pricing Order, including through information provided in its TCS.[8] The Statement provides guidance in relation to the evidence that may be required to demonstrate compliance with the cost allocation, demand and expenditure requirements of the Pricing Order and the approaches that may be taken to assessing compliance.

The ESC conducts a preliminary assessment of the Port of Melbourne's TCS and publishes an interim commentary each year except in the year it is undertaking its formal five-yearly inquiry. The interim commentaries set out what ESC's sees as being some of the key issues or concerns in advance of its formal inquiries and provide an opportunity for the Port of Melbourne to take account of the issues in their subsequent TCS.

We have had regard to the ESC's Statement and interim commentaries in undertaking this review of the Port of Melbourne's cost allocation, demand and expenditure.

[8] Essential Services Commission, Statement of Regulatory Approach, version 2, 28 April 2020.

1.3. Our role and scope

FTI Consulting has been engaged to provide advice to assist the ESC to determine the Port of Melbourne's compliance with the Pricing Order requirements in the first review period. Our assessment focuses on cost allocation, demand, and expenditure (controllable operating and capital) for prescribed services for the review period from 2016-17 to 2020-21.

Our scope does not include assessing:

- Non-controllable operating expenditure
- Whether controllable and non-controllable operating expenditure on prescribed services has been appropriately reflected in the building block model
- Other elements of the accrual building block methodology including the rate of return and regulatory depreciation.
- Whether capital expenditure has been appropriately reflected in the regulatory asset base
- The tariffs used to recover the average revenue requirements.

While we have not assessed TCS 2021-22 as part of this review, we have had regard to information contained in this TCS where it provides:

- an update on actual expenditure or demand undertaken during the review period
- further detail about the methodology and approach adopted by the Port of Melbourne (for example, to forecasting, cost allocation or capital governance arrangements).

1.4. Our approach

This report provides our assessment of the Port of Melbourne's cost allocation, demand and expenditure (operating and capital) over the review period.

The regulatory framework places an emphasis on tariffs promoting the efficient delivery of prescribed services. The relevant provisions of the Pricing Order that we have had regard to are summarised in Box 1.1.

We have used materiality to guide our assessment of cost allocation, demand and expenditure by for example, focusing our assessment on:

- capital expenditure prudency and efficiency on projects and programs that have incurred over $10 million within the review period
- as required by the ESC, controllable operating expenditure on prescribed services
- demand forecasting matters that will materially affect the forecasts and revenue recovery outcomes.

Box 1.1: Pricing Order provisions relevant to cost allocation, demand and expenditure

Cost allocation

Clause 5 requires the Port of Melbourne to allocate its costs between prescribed services and all other services in a manner consistent with the following cost allocation principles:

- costs that are directly attributable to the provision of the prescribed service must be attributed to that prescribed service
- costs that are not directly attributable to the provision of the prescribed service, but which are incurred in the course of providing one or more prescribed services and other services must be allocated to the prescribed service on the basis of its share of total revenue from all services provided by the port.

Demand

Clauses 8.2.1 and 8.2.2 require information in the nature of an estimate or forecast to be supported by a statement of the basis of the forecast or estimate. A forecast or estimate must be arrived at on a reasonable basis and must represent the best forecast or estimate possible in the circumstances. Information in the nature of an extrapolation or inference must be supported by the primary information on which the extrapolation or inference is based.

Expenditure

Clause 4.2 requires that actual or forecast capital expenditure that is added to the capital base be efficient and reflects prudent actions.

Clause 4.5 also allows recovery of forecast operating expenses, commensurate with that which would be required by a prudent service provider acting efficient.

Clause 2 requires proposed prescribed service tariffs to be set to allow the Port of Melbourne a reasonable opportunity to recover efficient costs.

Projects deemed prudent

Clause 4.2.4 deems the completion of the Port Capacity Project to be prudent.

Clause 4.2.7 deems the acquisition of existing rail assets or capital expenditure reasonably necessary to achieve the Rail Asset Deliverables to be prudent.

Clause 4.5.3 deems expenditure associated with the Port Rail Transformation Project to be prudent.

Our assessment has examined:

Expenditure

- Prudency and efficiency of forecast controllable operating and capital expenditure attributed to prescribed services over the five-year review period
- The Port of Melbourne's capital planning approach, asset management systems and governance processes (investment planning process)
- Major capital projects greater than $10 million, which comprise around 80% of the Port of Melbourne's overall capital expenditure.

Cost allocation

- Application of the cost allocation principles
- Allocation of costs between asset classes and prescribed services and all other services
- Mapping of operating expenditure categories and asset classes to services is valid from an engineering and/or operational perspective.

Demand

- Reasonableness of demand forecasting approach, including key assumptions and information used to support any extrapolation or inference
- The long-term forecasts for wharfage services used to determine the prudency and efficiency of forecast expenditure
- Ex post evaluation of the forecasts, including whether they represent the best forecast or estimate possible in the circumstances.

In making our assessment, we have relied upon the following documents:

- The Port of Melbourne's annual Tariff Compliance Statement (TCS) and supporting documents over the review period (including confidential attachments provided by the ESC)
- The Pricing Order 2016 and the 2020 amendment
- The ESC's Statement of Regulatory Approach and Interim Commentaries published annually
- The Port of Melbourne's Tariff Rebalancing Application
- Port Development Strategy 2050 (PDS) and Port Development Implementation Plan (PDIP).

We have also considered further information provided by the Port of Melbourne in response to a section 56 information request issued by the ESC and engaged with the Port of Melbourne senior management and relevant staff to better understand the operational context and the reasons why the Port of Melbourne considers that it meets the requirements of the Pricing Order.

1.5. Verifying the accuracy of our report

This final report sets out our assessment of the Port of Melbourne's cost allocation, expenditure and demand over the review period.

A draft of this report was provided to the Port of Melbourne for comment on its factual accuracy. The Port of Melbourne provided a response to our draft report, where it:

- Welcomed our feedback regarding suggestions around additional detail that could be provided in future TCS submissions and
- Did not agree with some of our conclusions regarding the prudency and efficiency of forecast operating expenditure.

We have made amendments to this final report that clarify our views regarding the issues raised by the Port of Melbourne where appropriate.

We understand that our final report to the ESC will be made publicly available.

2. Cost allocation

Our assessment

The Port of Melbourne's cost allocation approach complies with the second cost allocation principle, which requires shared costs to be allocated to prescribed services based on their share of total revenue.

For the first three years of the review period (2016-17 to 2018-19), the Port of Melbourne's cost allocation approach did not comply with the first cost allocation principle requiring costs directly attributable to the provision of prescribed services to be attributed to those prescribed services.

For the last two years of the review period (2019-20 and 2020-21), the Port of Melbourne has:

- Appropriately allocated non-controllable dedicated prescribed costs based on revenue shares – these costs account for over 90% of dedicated prescribed costs
- For the remaining (controllable) dedicated prescribed costs, appropriately applied a proxy of the activity involved in the provision of each individual service
- Appropriately applied a consistent approach to capital expenditure
- Ensured that operating cost categories and asset classes are only allocated to individual prescribed services that benefit from them.

There are two operating expenditure items that have been incorrectly allocated to prescribed services:

- [redacted]
- [redacted]

Future TCS could be improved by including more explanation of the detail underpinning prescribed services expenditure (both dedicated and shared costs) for each operating cost category and asset class.

2.1. Pricing Order requirements

We have been asked to review the Port of Melbourne's cost allocation approach against the Pricing Order requirements. Section 5 of the Pricing Order sets out cost allocation principles which require the Port of Melbourne to allocate costs between prescribed services and other services as follows:

- costs that are directly attributable to the provision of the prescribed service must be attributed to that prescribed service and

- costs that are not directly attributable to the provision of the prescribed service, but which are incurred in the course of providing both one or more prescribed services and other services, must be allocated to the prescribed service on the basis of its share of total revenue from all services provided by the port licence holder.

These cost allocation principles aim to provide a transparent and consistent methodology for allocating and monitoring costs for the purpose of setting prescribed service tariffs.

The ESC's Statement of Regulatory Approach outlines the expectation that the Port of Melbourne demonstrates its compliance with the cost allocation principles by:[9]

- explaining how it has implemented the cost allocation principles including the process for defining, capturing and attributing direct and indirect costs across the different prescribed and other services, and to each individual prescribed service
- explaining any significant changes in the Port of Melbourne's cost allocation method
- showing in detail the cost allocation calculations in the models submitted with the annual TCS
- providing relevant supporting information, including the underlying cost and revenue data supporting its cost allocations.

2.2. Our approach to assessing cost allocation

The Port of Melbourne's published annual Tariff Compliance Statement (TCS) provide the starting point for our assessment of its cost allocation approach. We have reviewed the following key documents:

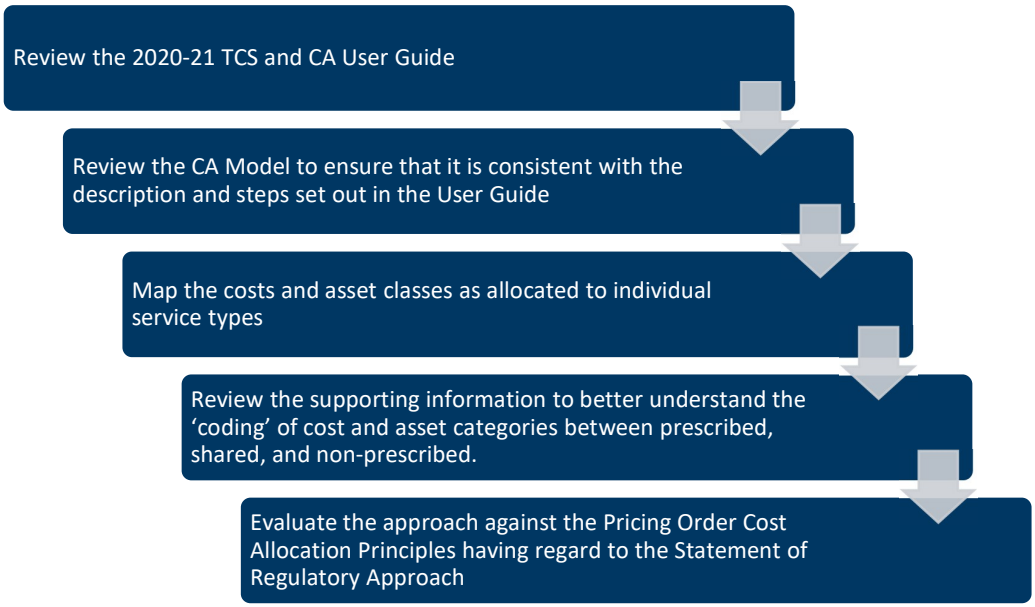
- the TCS - General (2017-18 to 2020-21)
- the Cost Allocation Model User Guide (the CA User Guide) - which describes the Port of Melbourne's overall approach and provides an overview of the Cost Allocation Model (2019-20 and 2020-21)
- the Cost Allocation Model (the CA Model) (2019-20 and 2020-21)
- Appendix F of the 2017-18 and 2018-19 TCS.

We have also reviewed additional information provided by the Port of Melbourne in response to the ESC's Section 56 Request for Information, and confidential documents with the annual TCS.

As Figure 2.1 shows, we have assessed the cost allocation approach that the Port of Melbourne has applied in each year of the review period, starting with the most recent approach outlined in the 2020-21 TCS.

[9] This remains unchanged from the Statement of Regulatory Approach (version 1.0).

Figure 2.1: Our approach to assess Port of Melbourne's cost allocation approach



We focused initially on the 2020-21 cost allocation approach because there was limited transparency of the approach applied in the first TCS. The Port of Melbourne has subsequently addressed this by developing the CA User Guide and CA Model submitted with the 2019-20 TCS.

Having established the 2020-21 cost allocation approach, we have followed the same steps to assess the cost allocation approach adopted in prior years, including to identify whether there have been material changes to the methodology and approach.

Appendix A provides a summary of the Port of Melbourne's cost allocation approach over the review period.

We have also reviewed the more detailed operating expenditure and capital expenditure information provided by the Port of Melbourne to:

- ensure that the classification of expenditure as prescribed, non-prescribed and shared appears appropriate
- identify any changes in that classification over the period.

2.3. Cost allocation trends

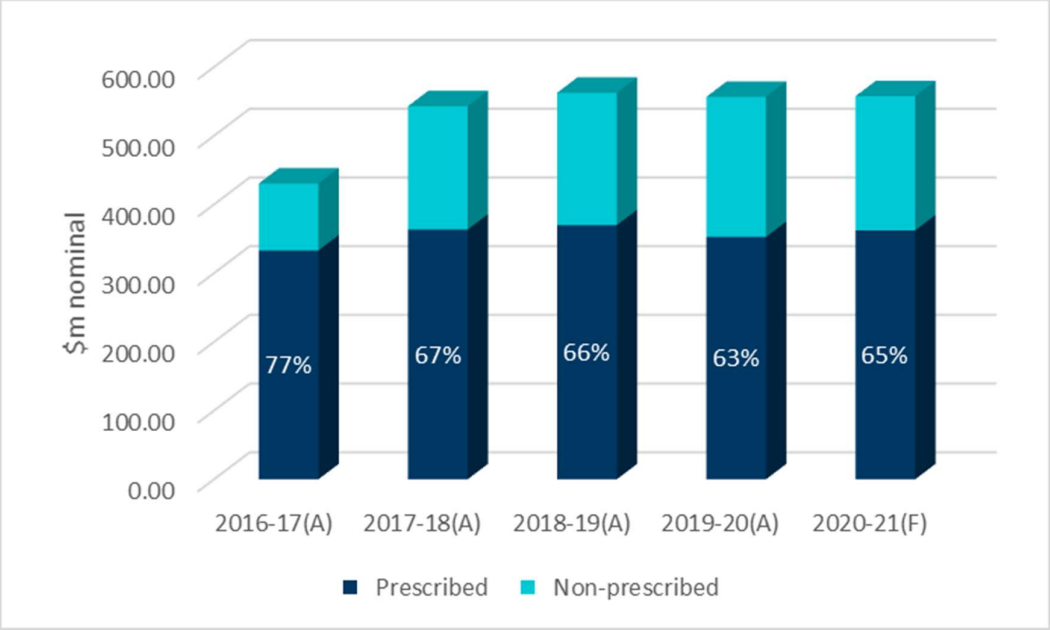
This section summarises the trends in cost allocation for operating expenditure and capital expenditure over the review period. This information can highlight material shifts in cost allocation between prescribed and non-prescribed services. The information for this analysis has been sourced from the CA Model submitted with the Port of Melbourne's 2021-22 TCS, which includes actual data for the 2016-17 to 2019-20 years and the forecast for 2020-21.

2.3.1. Revenue

The cost allocation principles require the Port of Melbourne to allocate shared costs that are not directly attributable to the provision of prescribed services based on its share of total revenue from all services.

Figure 2.2 shows the Port of Melbourne's actual revenue from prescribed and non-prescribed services for 2016-17 to 2019-20 and forecast revenue for 2020-21.

Figure 2.2: Revenue from prescribed and non-prescribed services ($m, nominal)



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, 31 May 2021, Appendix D: Cost Allocation Model.

This shows that apart from the first year of the review period, the contribution of prescribed services to total revenue has been relatively stable in percentage terms.

Non-prescribed revenue increased materially between 2016-17 and 2017-18 because of contracts with stevedores and other port tenants leasing land and the licensing of facilities.[10] [redacted]

[redacted]

[10] Port of Melbourne Operations Ltd, 2021 Industry Update, April 2021.

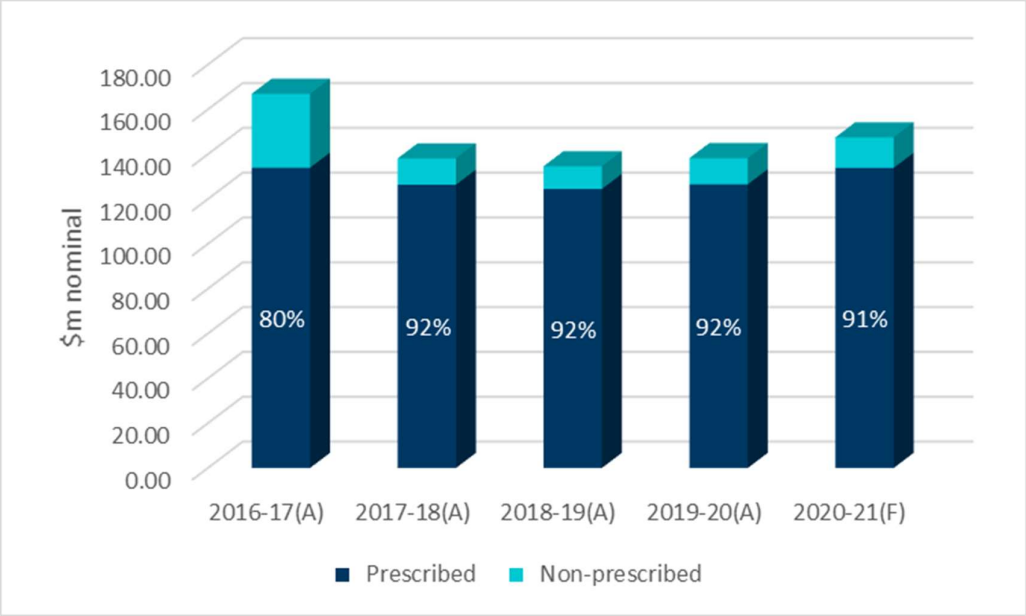
[redacted]

2.3.2. Operating expenditure

The Port of Melbourne has allocated operating expenditure to prescribed services. It includes dedicated prescribed operating expenditure and the allocation of shared costs to these services (based on the prescribed service allocator).

Figure 2.3 shows that apart from the first year, the overall proportion of operating expenditure borne by prescribed services has been stable, at just above 90%. This also reflects the fact that the largest component of operating expenditure is non-controllable dedicated prescribed expenditures – in particular, the Port Licence Fee and Cost Contribution Amount.[13]

Figure 2.3: Prescribed and non-prescribed operating expenditure



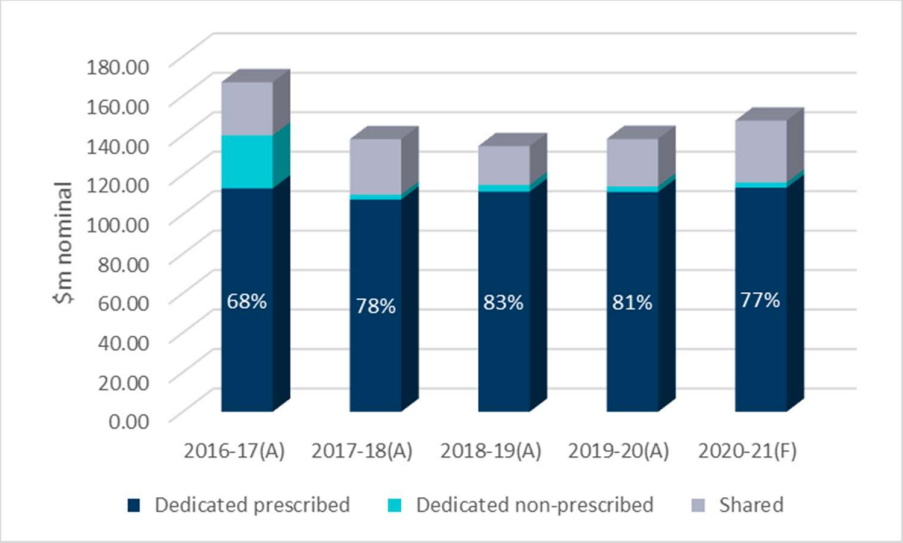
Source: Port of Melbourne, Tariff Compliance Statement 2021-22, 31 May 2021, Appendix D: Cost Allocation Model.

Total prescribed services operating expenditure is projected to increase in dollar terms in 2020-21, which primarily reflects increases in shared expenditure. Chapter 3 explores this increase in more detail.

Figure 2.4 splits this expenditure into dedicated prescribed, dedicated non-prescribed and shared operating expenditure.

13 [redacted]

Figure 2.4: Allocation of operating expenditure to dedicated prescribed, dedicated non-prescribed and shared



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, 31 May 2021, Appendix D: Cost Allocation Model.

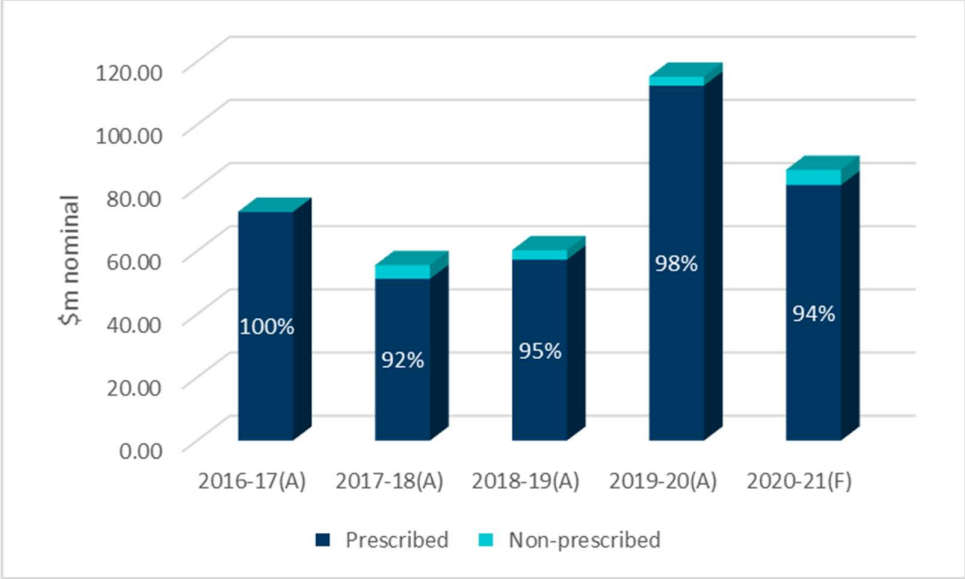
This shows that in 2016-17, dedicated non-prescribed operating expenditure was higher in dollar terms, totalling $26.9 million before dropping to $2.4 million in 2017-18. This can be attributed to $26.5 million in 'transition' expenditure, most of which was identified as a dedicated non-prescribed cost in that year.[14] Some of this transition expenditure continued to be incurred in subsequent years (in shared cost centres) however the amount was comparatively low. This has resulted in a higher proportion of total operating expenditure accounted for by dedicated non-prescribed services in the first year. As transition expenditure was temporary, it does not reflect a change in the costs of delivering non-prescribed services between 2016-17 and subsequent years.

2.3.3. Capital expenditure

Figure 2.5 shows that most of the Port of Melbourne's capital expenditure is allocated to prescribed services. As shown in Figure 2.6, most of this expenditure is dedicated rather than shared expenditure. Based on the information in the CA Model, most of this relates to wharfage services.

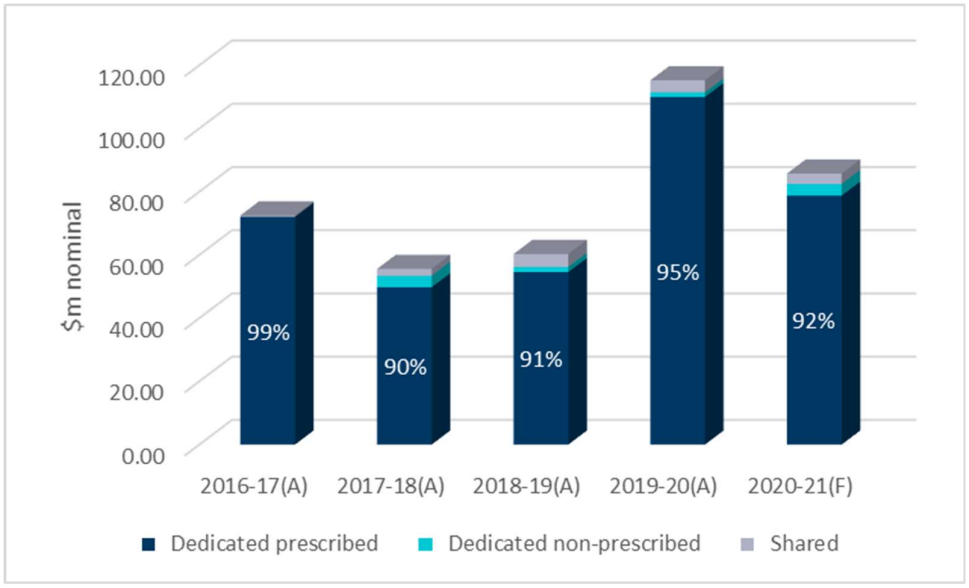
14 [redacted]

Figure 2.5: Allocation of capital expenditure between prescribed and non-prescribed services



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, 31 May 2021, Appendix D: Cost Allocation Model.

Figure 2.6: Allocation of capital expenditure to dedicated prescribed, dedicated non-prescribed and shared



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, 31 May 2021, Appendix D: Cost Allocation Model.

Chapter 4 examines trends in capital expenditure over the review period in more detail.

2.4. Categorisation of costs

This section examines the categorisation of costs as prescribed, non-prescribed or shared.

2.4.1. Operating expenditure

The CA Model shows the total amount of costs designated as prescribed, non-prescribed or shared under the main cost categories (i.e. labour, repairs and maintenance etc). We examined the Port of Melbourne's detailed models to better understand how these costs had been designated within each cost category. We reviewed these allocations for appropriateness and to identify any changes that have occurred during the review period.

Chapter 3 shows that 80% of the Port of Melbourne's forecast prescribed services operating expenditure in 2020-21 is non-controllable, comprising the Port Licence Fee and Cost Contribution Amount and forgone rent and third-party outgoings associated with land excised for the PRTP. These are prescribed service expenditures (although an error was identified with the last category, which is discussed below).

Labour is the largest category of the total forecast controllable expenditure for all prescribed services in 2020-21, accounting for around 42% of these costs. Utilities, Admin, Rental and IT is the next most significant category, accounting for 28% of costs. Repairs and maintenance account for only around 12.7% of controllable costs because these activities are outsourced. Repairs and maintenance costs are fully allocated to prescribed services, which is appropriate given that non-prescribed activities primarily relate to the leasing of land and facilities.

[redacted]

Table 2.1 summarises the 2020-21 designation of controllable costs by cost category. In most cases, there are prescribed, non-prescribed and shared cost centres within each category. [redacted] All percentages cited below relate to dollar terms.

Table 2.1: Designation of costs within each cost category (based on 2020-21 TCS)

Cost category	Designation (2020-21)	Any changes in designation during the review period?
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Source: [redacted]

[redacted]

2.4.2. Capital expenditure

Over 90% of the Port of Melbourne's capital expenditure relates to prescribed services (refer Figure 2.6). Given that most non-prescribed revenue relates to the leasing of land and licencing of facilities, we would expect that to be the case.

[redacted]

[redacted]

[redacted]

[redacted]

The following sections summarise our assessment of Port of Melbourne's cost allocation approach against the cost allocation principles.

2.4.3. First cost allocation principle

The first cost allocation principle is that: "costs that are directly attributable to the provision of the prescribed service must be attributed to that prescribed service".

In assessing the Port of Melbourne's cost allocation approach against this principle, we have examined whether costs have been allocated to each prescribed service type, and not just to prescribed services as a whole.

Operating expenditure

Around 80% of the Port of Melbourne's forecast operating expenditure in 2020-21 is non-controllable prescribed services expenditure.[19] These costs are relevant to all prescribed services rather than individual prescribed service types.

In the first three years, there was no allocation of operating expenditure to individual prescribed services. [redacted]

[redacted]

[redacted]

However, this has been addressed from the 2019-20 year onwards. This allocation is done based on revenue shares, rather than specific cost drivers. This is an appropriate way of allocating costs for

[redacted]

most dedicated prescribed service costs, which are non-controllable costs relevant to all prescribed service types. The question is whether the revenue allocation approach is appropriate for the remaining (controllable) dedicated prescribed service costs, which in 2020-21 are forecast to be less than $10 million.

Given the landlord nature of the port and the scale and scope of its operations, it is not evident that there are specific controllable dedicated prescribed service costs that relate only to individual service types. While there are cost centres that are dedicated prescribed service costs, they relate to several different prescribed service types. The service mapping also ensures that cost categories are not allocated to service types that do not benefit from that cost category.

[redacted]

The alternative is to develop an activity-based costing approach. However, given this currently only accounts for less than $10 million in controllable costs, the benefits of such an exercise may not outweigh the costs. The Port of Melbourne may be able to test this approach on a subset of activities to assess whether revenue shares provide an appropriate proxy.

In conclusion, the Port of Melbourne has not complied the first cost allocation principle in the first three years of the review period. From 2019-20, we consider that the Port of Melbourne's approach to allocating non-controllable dedicated prescribed costs based on revenue shares is appropriate. These costs account for over 90% of dedicated prescribed costs. For the remaining (controllable) dedicated prescribed costs, the assessment of compliance depends on the extent to which revenue shares are an appropriate proxy of the activity involved in the provision of each individual service. The Port of Melbourne has confirmed that it does provide an appropriate proxy.

Capital expenditure

Capital expenditure relating to specific projects or activities is designated as prescribed, shared or non-prescribed and is allocated to the relevant asset class. The Port of Melbourne also identifies the relevant precinct within each asset class. However, the CA Model allocates only the total expenditure by asset class back to individual prescribed service types. This is also based on revenue shares, but only to the extent that the service type benefits from that asset class.

It is possible that this 'top-down' allocation approach could produce a different outcome to a more detailed bottom-up approach that designates individual capital projects and activities to each prescribed service type. Some cross-subsidisation could also be possible across individual service types, noting that capital expenditure in an asset class is not allocated to service types that do not benefit from (or utilise) that asset class.

[redacted]

[redacted] Currently, the tariff structure is based on service type (i.e. containerised, passenger, non-bulk, dry-bulk etc) [redacted] A service-based tariff structure is a common approach applied across regulatory regimes.

Our view is that the Port of Melbourne's current approach is appropriate to the extent that most of its capital expenditure relates to common user assets. This also has implications for the appropriateness of the current service classifications and tariff structures, which is not within the scope of our review.

2.4.4. Second cost allocation principle

The second cost allocation principle requires that: "costs that are not directly attributable to the provision of the prescribed service, but which are incurred in the course of providing both one or more prescribed services and other services must be allocated to the prescribed service on the basis of its share of total revenue from all services provided by the port licence holder."

The Port of Melbourne has allocated all shared costs to prescribed services (in aggregate) based on the share of total revenue accounted for by prescribed services. This results in the same prescribed service allocator being used across all categories.

An alternative approach to meeting this principle would be to allocate shared costs at the individual prescribed service level by identifying all shared costs that are relevant to the provision of that service and then allocating those costs based on the individual prescribed service's share of total revenue. This would result in different prescribed service allocators being used across different service types.

The Port of Melbourne has demonstrated its compliance with the second cost allocation principle.

[22] We note that the pricing of access to terminal services has been contentious elsewhere, for example at the Dalrymple Bay Coal Terminal, which also provides fundamentally different services to the Port of Melbourne. A key source of contention has been the allocation of expansion costs between expanding and non-expanding users.

2.4.5. Improving transparency of cost allocation

We consider that the Port of Melbourne could improve its TCS in future by including a more detailed explanation of the expenditure related to prescribed services (both in terms of dedicated and shared costs) in each operating cost category and asset class. This would involve:

- For operating expenditure, providing a brief explanation of the key cost centres (or cost drivers) in each cost category and whether they are dedicated prescribed or shared costs.
- For capital expenditure, providing a clearer link between individual project expenditures and activities and the relevant individual prescribed service/s. The focus should be on explaining more material expenditures (for example, over a specified threshold).

We have noted issues in relation to the allocation of some operating cost centres, as outlined in section 2.4.1.

3. Operating expenditure

Our assessment

There is insufficient evidence to confirm that the Port of Melbourne's forecast controllable operating expenditure on prescribed services over the review period is prudent and efficient noting that:

- There is little evidence that the Port of Melbourne has targeted productivity improvements by setting business-wide efficiency targets.
- The methods and governance processes used to set and approve annual budgeted operating expenditure do not demonstrate a clear focus on achieving efficient outcomes.
- With actual expenditure consistently less than forecast by around $2-3 million (equivalent to 7-10% of controllable costs) in each year, this suggests that these forecasts are being consistently overstated.
- There is insufficient transparency in terms of the capitalisation of operating expenditure, which has increased in recent years.

We note that operating expenditure on prescribed services is significantly lower than the previous five years, and the controllable operating expenditure on prescribed services accounts for around 20-30% of total operating expenditure, which is equivalent to only 4-6% of the aggregate revenue requirement.

We also note that over the first review period, the Port of Melbourne's operating expenditure has not been in a steady state.

We have recommended that the Port of Melbourne provide additional information in its TCS to demonstrate the prudency and efficiency of its operating expenditure going forward.

3.1. Pricing Order requirements

Clause 4.1.1 of the Pricing Order allows the Port of Melbourne to recover forecast operating expenses, commensurate with those required by a prudent service provider acting efficiently.

In addition to this, section 8 of the Pricing Order provides that forecasts or estimates must be:

- supported by a statement of the basis of the forecast or estimate[23]
- arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances[24]

[23] Pricing Order, clause 8.2.1.
[24] Pricing Order, clause 8.2.2(a).

- be supported by the primary information used to develop any extrapolation or inference.[25]

The ESC's Statement of Regulatory Approach provides further guidance in demonstrating that the Port of Melbourne's forecast operating expenditure is reflective of a prudent service provider acting efficiently to achieve the lowest cost of delivering service outcomes over the regulatory period. This is based on operating expenditure exhibiting the following characteristics:[26]

- based on sound forecasting methodologies and is consistent with the capital expenditure forecasts
- realises economies of scale from higher trade volume growth
- labour cost forecasts reflect realistic expectations that align to wage price indexes such as those provided by the Australian Bureau of Statistics
- material cost forecasts reflect realistic expectations that align to input cost indexes such as those provided by the Australian Bureau of Statistics
- ongoing productivity improvements are accounted for
- expenditure trends relative to actual historical expenditure are identified and any step increases or decreases in operating expenditure are fully explained and justified.

The ESC's Statement of Regulatory Approach also notes that:

> *Our approach to assessing operating expenditure will be guided by the materiality of the port's forecast operating expenditure and how it compares to historical levels. Where operating expenditure is relatively stable, simplified analysis such as trend analysis is likely to suffice. Where a step change in operating expenditure is considered material, we may undertake a more thorough review of the port's forecasting methodologies, assumptions and scope of services.*[27]

3.2. Our approach

We have been asked to assess whether the Port of Melbourne's forecast controllable operating expenditure on prescribed services over the review period was prudent and efficient. In doing so, we have had regard to the guidance provided by the ESC in its Statement of Regulatory Approach and the materiality of Port of Melbourne's controllable operating expenditure attributable to prescribed services.

In reviewing the Port of Melbourne's forecast operating costs, we have focused on actual expenditure during the review period, as this provides the most accurate view of the efficiency of such costs. We have also considered the forecast operating expenditure contained in the annual

[25] Pricing Order, clause 8.2.2(b).
[26] Essential Services Commission, Statement of Regulatory Approach, Version 2.0, 28 April 2020, p.26.
[27] Essential Services Commission, Statement of Regulatory Approach, Version 2.0, 28 April 2020, p.26.

TCS and have made comments in this report regarding our views of the differences between forecasts and actuals.

It is reasonable to expect that a regulated business' operating expenditure will vary significantly in the initial years of a new lease as the new owners and management team seeks to familiarise and review the operation of the business. As a result, controllable operating costs are likely to vary and may not stabilise for several years until the business has reached a steady state of operations and change.

Some of the methods set out in the ESC's Statement of Regulatory Approach are challenging to apply in the first review period which represents a period where the Port of Melbourne has been transitioning to the new operating arrangements and with new ownership. As a result, operating expenditure is likely to not represent a 'steady state', which makes the identification of productivity trends, trend comparisons and benchmarking problematic.

The opportunity for benchmarking is also limited by the fact that the Port of Melbourne's operations are quite different in scale and scope to those of other Australian ports. Putting aside the transition and establishment phase that the Port of Melbourne has been undertaking in this first review period, which would have limited the ability to benchmark against 'steady state' operations, the nature and scope of its operations as a landlord port is relatively unique. This means that it would be extremely difficult to undertake any relevant and meaningful benchmarking analysis in this first review period.

The Port of Melbourne's operating expenditure attributable to prescribed services includes expenditure categories that are controllable and non-controllable. The Pricing Order deems certain (non-controllable) operating expenditure items as prudent and/or efficient including forecast operating expenditure associated with:

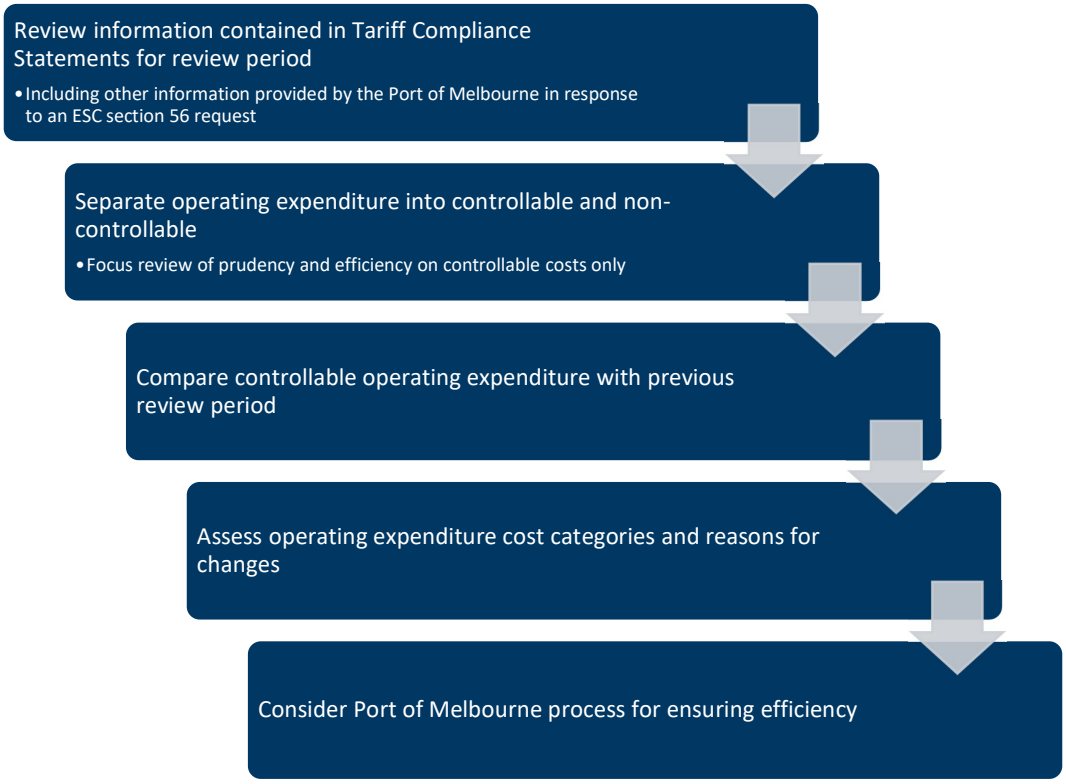
- the Port Licence Fee – deemed as both prudent and efficient[28]
- any Cost Contribution Amount payable under the Port Concession Deed – deemed as both prudent and efficient[29]
- forgone rent and other third-party outgoings associated with an agreement between the Victorian Government and the Port of Melbourne to excise land for the Port Rail Transformation Project (PRTP) – deemed as prudent, with prescriptive detail about how the allowance is to be calculated.[30]

We have been asked to focus our review of the Port of Melbourne's controllable costs. Figure 3.1 summarises the approach we have adopted.

[28] Pricing Order, clause 4.5.1.
[29] Pricing Order, clause 4.5.1.
[30] Amendment to Pricing Order, clause 4.5.4.

We have had regard to the information provided by the Port of Melbourne as part of its annual Tariff Compliance Statements (TCS), as well as supplementary information provided by the Port of Melbourne to the ESC in response to a section 56 request for information.

Figure 3.1: Approach to assessing prudency and efficiency of controllable operating expenditure on prescribed services



We have also met with the Port of Melbourne to understand its approach to ensuring that its operating expenditure is efficient and requested further follow up evidence.

We note that service standards provide an important reference point in assessing the prudency and efficiency of capital and operating expenditure. We understand that Port of Melbourne is still undertaking work to develop additional performance standards, including engaging with customers.

3.3. Overview of operating expenditure trends for the review period

The Port of Melbourne's aggregate revenue requirement (ARR) comprises the amount of capital and operating expenditure that is to be recovered through prescribed port services. Table 3.1 shows that the return on capital makes up the largest component of the Port of Melbourne's ARR,

while the amount of operating expenditure allocated to prescribed services accounts for between 23% and 30%.

Table 3.1: Aggregate Revenue Requirement: 2016-17 to 2020-21 ($ million)

	2016-17 (actual)	2017-18 (actual)	2018-19 (actual)	2019-20 (actual)	2020-21 (forecast)
Return on capital	481.9	495.3	511.3	481.9	425.6
Return of capital	-	-	-	-	-
Operating costs	**134.0**	**126.4**	**124.5**	**126.6**	**133.9**
Indexation allowance	-54.8	-91.3	-84.4	-61.4	-104.4
Total ARR	**561.1**	**530.5**	**551.4**	**547.1**	**455.1**

Note: columns may not add due to rounding.

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.54.

3.3.1. Controllable and non-controllable expenditure

Table 3.2 breaks down the Port of Melbourne's prescribed operating expenditure into cost items that are controllable versus non-controllable. Prescribed operating expenditure is dominated by non-controllable items which account for between 70% and 80% of the total operating costs attributable to prescribed services. By comparison, controllable cost items account for only 20-30% of total operating costs attributable to prescribed services.

Table 3.2: Aggregate revenue requirement and prescribed operating expenditure, 2016-17 to 2020-21 ($ million)

	2016-17 (actual)	2017-18 (actual)	2018-19 (actual)	2019-20 (actual)	2020-21 (forecast)
Aggregate revenue requirement	561.1	530.5	551.4	547.1	455.1
Total: non-controllable operating costs	96.3	97.8	100.0	[redacted]	[redacted]
Total: controllable operating costs	37.7	28.6	24.5	[redacted]	[redacted]
Total prescribed operating costs	**134.0**	**126.4**	**124.5**	**126.6**	**133.9**

Note: columns may not add due to rounding. We have included the allowance associated with the forgone rent and third-party outgoings associated with land excised for the PRTP here as a non-controllable item as it is deemed by the Pricing Order to be prudent.

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.58 and [redacted]

The non-controllable operating expenditure attributed to prescribed services includes three items: the Port Licence Fee, the Cost Contribution Amount and the forgone revenue associated with land excised for the PRTP. [redacted]

Table 3.3 shows the expenditure associated with each of these cost items has been gradually increasing over the review period [redacted]

Table 3.3: Aggregate revenue requirement and operating costs, 2016-17 to 2020-21 ($ million)

Operating cost categories	2016-17 (actual)	2017-18 (actual)	2018-19 (actual)	2019-20 (actual)	2020-21 (forecast)
Port licence fee	81.3	82.5	84.4	86.3	87.6
Cost contribution amount	15.0	15.3	15.6	15.9	16.2
Forgone rent & third-party outgoings	-	-	-	[redacted]	[redacted]
Total non-controllable operating costs	**96.3**	**97.8**	**100.0**	[redacted]	[redacted]

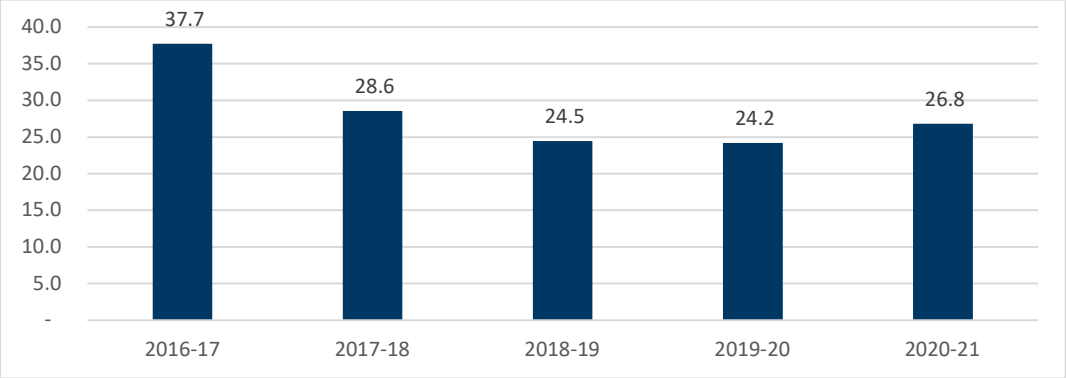
Note: columns may not add due to rounding. We have included the allowance associated with the forgone rent and third-party outgoings associated with the PRTP as a non-controllable item as it is deemed by the Pricing Order to be prudent.

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.58.

We have been asked to focus our assessment of prudency and efficiency on controllable operating expenditure attributed to prescribed services. This represents around 20-30% of operating expenditure attributable to prescribed services, and ultimately accounts for around 4-6% of the ARR over each year of the review period.

Figure 3.2 shows the trend in controllable operating costs attributed to prescribed services over the review period.

Figure 3.2: Controllable operating expenditure on prescribed services, 2016-17 to 2020-21 ($ million)



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.58. Adjusted for forgone rent and third-party outgoings.

[redacted]

Section 3.3.2 below provides further detail around the key drivers of these changes in controllable operating expenditure.

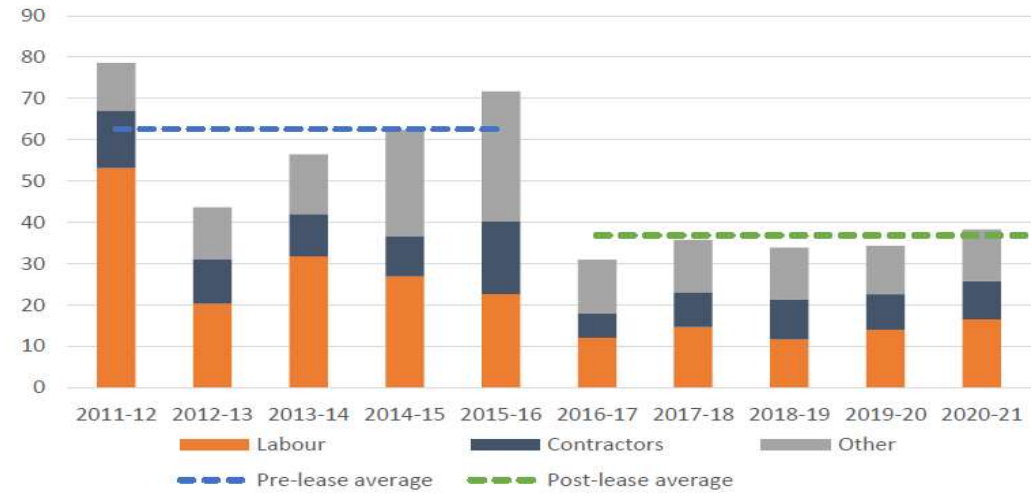
3.3.2. Comparison of controllable operating expenditure with previous five years

We have compared the Port of Melbourne's operating expenditure attributed to prescribed services over the review period with the five-year period prior to the new port lease.

Figure 3.3 indicates that the average annual controllable operating expenditure has reduced significantly over the review period compared to the five-year period pre-lease from around $62.5 million to $36.8 million. The Port of Melbourne has argued that the reduction in averages between these two periods justifies that current (post-port lease) costs are prudent and efficient.

It is important to note that comparisons with these two periods is difficult as the Port of Melbourne was unable to provide the necessary detail related to the prior period as this expenditure relates to the previous operator, the Port of Melbourne Corporation.

Figure 3.3: Controllable operating expenditure (prescribed and non-prescribed), pre- and post-lease (real $2020 million)



Note: 'Other' includes insurance, rates, taxes, repairs and maintenance, utilities, admin, rental and IT.

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.61.

While controllable operating expenditure on prescribed services has reduced significantly on average, the decline in controllable operating expenditure in the early years of the review period has been followed by an increase in 2020-21.

[redacted] However, this does not change the fact that the average operating expenditure remains significantly lower than in the period pre-lease. The issue of capitalisation is discussed further in section 3.5.4.

3.3.3. Dedicated and shared expenditure

As discussed in Chapter 2, operating expenditure on prescribed services comprises direct expenditure and an allocation of shared expenditure. As required under the Pricing Order, the Port of Melbourne has allocated shared operating expenditure based on the prescribed services' share of total revenue.

In examining changes in costs over the review period, we have first considered whether the changes in costs over the period are driven by a change in the amount of costs that are being allocated to prescribed services.

Figure 3.4 shows that the amount of shared expenditure allocated to prescribed services reduced initially and then began trending upwards from 2019-20 onwards.[31] It also shows that the change in controllable dedicated prescribed expenditure over the period has not been material (after falling in the first year of the review period).

Figure 3.4: Controllable prescribed operating expenditure, dedicated and shared ($ million)

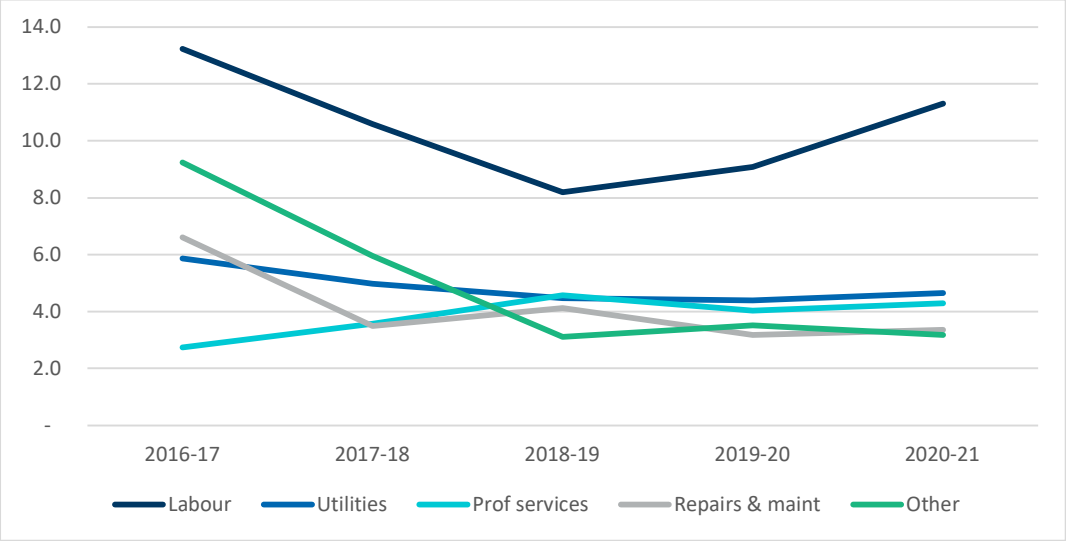
Source: Port of Melbourne, Tariff Compliance Statement 2021-22, 31 May 2021, Appendix D, Cost Allocation Model. Adjusted for forgone rent and third party outgoings.

3.3.4. Categories of controllable operating expenditure attributable to prescribed services

Figure 3.5 shows the trend in each of the controllable operating expenditure cost categories attributable to prescribed services over the review period.

[31] There was a slight increase in dedicated prescribed operating expenditure in 2018-19, with increases observed in Repairs and Maintenance, Professional Services and (to a lesser extent) Utilities, Admin, Rental and IT. Expenditure in each category subsequently fell in the 2019-20 year.

Figure 3.5: Trends in controllable prescribed operating expenditure categories, 2016-17 to 2020-21 ($ million)



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021.

Table 3.4 provides further detail about the categories of controllable operating expenditure attributable to prescribed services over the review period. The largest component of controllable operating expenditure is labour, which accounted for around 42% of controllable costs in 2020-21 (as forecast).

The reduction in controllable operating expenditure between 2016-17 and 2019-20 is largely attributable to:

- **Labour** – [redacted]
- **Repairs and maintenance** – [redacted]
- **Transition costs** – [redacted]

Table 3.4: Detailed controllable prescribed services operating expenditure by cost categories, 2016-17 to 2020-21 ($ million)

Operating cost categories	2016-17 (actual)	2017-18 (actual)	2018-19 (actual)	2019-20 (actual)	2020-21 (forecast)
Labour costs	13.2	10.6	8.2	[redacted]	[redacted]
Repairs and maintenance	6.6	3.5	4.1	[redacted]	[redacted]
Construction	3.3	-	-	[redacted]	[redacted]
Professional services	2.7	3.6	4.6	[redacted]	[redacted]
Security	2.3	2.1	1.7	[redacted]	[redacted]
Utilities, admin, rental and IT	5.9	5.0	4.5	[redacted]	[redacted]
Transition	2.5	2.8	0.3	[redacted]	-
Insurance, rates and taxes	1.1	1.1	1.1	[redacted]	[redacted]
Total controllable operating costs	**37.7**	**28.6**	**24.5**	[redacted]	[redacted]
Total prescribed services operating costs	**134.0**	**126.4**	**124.5**	**126.6**	**133.9**

Note: columns may not add due to rounding.

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.58. Adjustment made for forgone rent and third-party outgoings.

[redacted] Key drivers for this increase in the last year of the review period were:

- **Labour** – [redacted]
- **Utilities, admin, rental and IT** – [redacted]
- **Professional services and Insurance, rates and taxes** – [redacted]
- **Transition costs** - [redacted]

Our assessment of the detailed cost categories is discussed in further detail in section 3.5.3.

[32] Transition costs were $0.7 million in 2019-20 and zero in 2020-21.

3.4. The Port of Melbourne's justification of prudency and efficiency

3.4.1. Annual TCS justification

The Pricing Order allows the Port of Melbourne to recover forecast operating expenses, commensurate with those required by a prudent service provider acting efficiently. It alsorequires the Port of Melbourne to ensure that its forecast or estimates of operating expenditure are:

- supported by a statement of the basis of the forecast or estimate
- arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances
- supported by primary information used to develop any extrapolation or inference.

We do not consider that the Port of Melbourne's annual TCS have provided sufficient explanation of its forecast operating expenditure to address these requirements. The TCS in each year have typically provided only:

- A short explanation of why the Port of Melbourne considers that its forecast is prudent and efficient, primarily founded upon it being based on:[33]
  - the most recent actual operating expenditure "which provides the best available information or outcomes from competitively tendered contracts"
  - "the business-as-usual requirements, as prepared as part of its annual budget process" and
  - the Port of Melbourne's ISO-certified asset management system.[34]

  It is also seen as supported by Port of Melbourne's policies (including procurement and recruitment), procedures that have been subject to internal audit and the structure of its repair and maintenance contracts, with at least 80% of costs fixed under those contracts.
- A high-level summary of the methodology used to forecast each cost category which it explains that forecasts in each category are initially based on a bottom-up approach which are then subject to a top-down review by Finance group, Executive, Directors, Shareholders and the Board.
- An argument that for as long as prescribed services charges are constrained based on the Tariff Adjustment Limit (TAL), the Port of Melbourne has a strong incentive to achieve cost efficiencies because it is unable to recover any revenue shortfall related to operating expenditure or defer this until future periods.

[33] Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.56.
[34] International Standards Organisation 55001:2014 - Asset Management.

Overall, the Port of Melbourne describes its approach to forecasting Labour and Other costs (such as Professional Services, and Utilities, Admin, Rental and IT) as being based on the previous year's expenditure, adjusted for any known and expected changes.

While in principle this would appear to provide a reasonable basis, there is no transparency in terms of how that is applied, in particular:

- The 'known or expected' changes that have been identified in each category: there has been very limited reference or explanation of any known changes in costs in the TCS, despite costs in each category changing year on year. If costs are otherwise being extrapolated based on an assumed factor, this is not stated or known.
- The key drivers of the forecast in each category: The TCS provides only aggregate costs at a category level. It was necessary for us to examine this at a greater level of detail to better understand the key drivers in each category. While we would not expect annual TCS to provide detail down to each underlying cost centre (as we have examined in this review), we would expect the Port of Melbourne to provide an explanation of the key cost drivers in each category.

It is therefore difficult to assess if a forecast or estimate is the 'best possible' in the circumstances, recognising the difficulty of readily benchmarking the Port of Melbourne against ports of different scale and operations, particularly in this first review period.

The TCS do not disclose whether there have been step changes in any year. While the 2020-21 TCS stated that one of the key drivers of the increased operating expenditure forecast was an increase in FTEs in respect of capital projects (mainly due to Rail and Port Development Strategy requirements),[35] it did not provide any further explanation. [redacted]

In relation to other key cost categories:

- **Insurance:** the forecast is based on the most recent year's premium, adjusted for any changes as advised by Port of Melbourne's insurance broker. In the 2020-21 TCS, this was identified as the other key driver of increased operating expenditure forecasts, due to the hardening insurance market (primarily in relation to Crime and Property, and Directors' and Officers' Liability).[36]
- **Repairs and maintenance**: this forecast is based on the Port of Melbourne's competitively tendered contracts. As noted above, at least 80% of the costs under these contracts tend to be fixed.

[35] Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.56.
[36] Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, p.56.

In the first two TCS statements submitted in 2017-18 and 2018-19, the Port of Melbourne stated that its forecasts reflected identified efficiency savings (of at least 20% and 9% respectively). However, no further information is provided as to the source of these savings or how they have impacted the expenditure forecast in the relevant cost categories.

We consider that the Port of Melbourne's TCS need to provide further explanation of the reasons for changes in its operating expenditure and key cost drivers, together with further evidence of the prudency and efficiency of its operating expenditure.

3.4.2. Our engagement with the Port of Melbourne

In undertaking our assessment of operating expenditure forecasts, we engaged with the Port of Melbourne's senior management team to better understand the reasons why it considers that its operating expenditure in the first review period was prudent and efficient. [redacted]

- [redacted]
- [redacted]
- [redacted]

[redacted]

Operating expenditure reduced materially in the initial years of the lease before trending back upwards, particularly in 2020-21. Labour costs have been the key driver of this trend.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

37 [redacted]

3.5. Assessment of the prudency and efficiency of operating costs

3.5.1. Incentives to minimise operating expenditure under the TAL

Where operating expenditure must be set in accordance with the TAL, this can place its own constraint on operating expenditure, as there is a strong incentive to limit spend to an efficient level.

This contrasts with the approach that is applied in more prescriptive regimes, where prices may have a more direct relationship with the revenue required to recover the business's forecast (efficient) costs, which is periodically reviewed based on the building blocks approach.

We agree that the TAL limits the extent of price increases (and hence revenue), and hence provides some incentive for Port of Melbourne to manage its operating expenditure as it may otherwise risk being unable to generate sufficient revenue to recover those costs. However, this does not provide sufficient support for a conclusion that its operating expenditure is therefore prudent and efficient.

At the same time, the operation of the TAL provides an incentive for the Port of Melbourne to capitalise its operating costs albeit under the current regime the potential recovery of those capital costs may not occur until well into the future. This needs to comply with its capitalisation policy.

In contrast, under the approach commonly applied under incentive-based regulation in Australia, the revenue requirement that the business will use to set prices (or at least set the maximum price it can charge) will be based on forecast operating expenditure over the relevant regulatory period. This forecast is often set using a 'base-step-trend' approach, which may include targeted efficiency savings for either 'catch-up' and/or ongoing efficiencies. Where the business is in a steady state of operations, the base year may be set with reference to its actual costs in the most recent year, adjusted for any identified inefficiencies and non-recurring expenditures.

The business then has an incentive to ensure that its expenditure remains prudent and efficient, as any increases in actual expenditure above the approved forecast cannot be recovered via prices.[38] In theory, the business is incentivised to reduce expenditure below that forecast – provided it does not compromise service quality – as it will be able to retain all or part of those savings (depending on the regulator's approach in relation to the sharing of efficiency gains).

In summary, the current pricing arrangements do provide some incentive for the Port of Melbourne to manage its operating expenditure to ensure that it is not exposed to the risk of under-recovery. However, this still doesn't provide a clear link between expenditure and efficiency (or productivity).

[38] Depending on the form of regulation applied, there may be the ability to recover additional demand-related variable costs, where demand increases above forecast.

3.5.2. Governance processes focused on expenditure

[redacted]

3.5.3. Assessment of key cost categories

Labour costs

[redacted]

Figure 3.6: Labour costs: with and without capitalisation, 2016-17 to 2020-21 ($ million)

[redacted]

Source: [redacted]

The Port of Melbourne's capitalisation approach is examined further in section 3.5.4.

[redacted]

[redacted]

[redacted]

Figure 3.7: Breakdown of salaries and on-costs ($ million)

[redacted]

Source: [redacted]

[redacted]

[redacted]

Figure 3.8: Average monthly FTEs, November 2016 – June 2021

Source:

Table 3.5: Changes in key labour cost categories pre- and post-lease ($)

Cost centre	2015-16 (A)	2016-17(A)	2020-21 (F)

Cost centre	2015-16 (A)	2016-17(A)	2020-21 (F)
[redacted]		[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]		[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]		[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]		[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]		[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]		[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Non-labour costs

We requested further information from Port of Melbourne to explain changes in non-labour cost centres. As shown in Figure 3.4, the changes in these other cost centres are not material within the review period. In 2020-21, key increases included:

- Insurance, Rates and Taxes: these costs have been increasing over the last three years due to the hardening insurance market.

- Contractors and Professional Services: [redacted]
- Utilities, Admin, Rental and IT: [redacted]

[redacted]

3.5.4. Capitalisation policy

We note that there is an incentive for Port of Melbourne to capitalise operating expenditure, particularly where the TAL provides a constraint on its recovery of operating expenditure.

[redacted]

The annual TCS do not provide transparency of the value of operating expenditure capitalised in each category, what it relates to and the overall trend in capitalisation. Further information supplied by the Port of Melbourne also does not provide a clear picture of the capitalisation of operating expenditure.

[redacted]

We have not sought to verify the extent to which the Port of Melbourne has capitalised expenditure in accordance with its policy. As to whether it is efficient, the question is whether alignment with accounting standards is appropriate or whether an alternative approach is preferred for regulatory processes.

The Pricing Order does not prescribe an approach to capitalisation, and the ESC's Statement of Regulatory Approach also does not provide any appropriate guidance on the issues of what constitutes an appropriate capitalisation of operating expenditure. This may be a matter for the ESC to consider further. In the absence of such guidance, we consider it would be appropriate for the Port of Melbourne to undertake an internal audit which confirms that its approach is consistent with the accounting treatment.

3.5.5. Explicit efficiency targets or productivity savings

While costs reduced materially upon commencement of the lease, they have since started to trend upwards. We have seen little evidence in this review that the Port of Melbourne has been specifically identifying and targeting efficiency improvements. In a regulatory context, such evidence would involve the clear specification of ex ante efficiency targets for individual cost categories and/or for total controllable expenditure, which are then directly reflected in forecast expenditure in the TCS. It would then be expected that this would continue to be reflected in future expenditure forecasts as targeted savings are realised (that is, they are permanent, rather than temporary, savings).

The ESC's Statement of Regulatory Approach includes guidance that: "expenditure trends relative to actual historical expenditure are identified and any step increases or decreases in operating expenditure are fully explained and justified".

To date, this has been done in a very general sense and in descriptive terms only. In the last two years of the review period, some operating costs have been trending upwards without any supporting explanation in the TCS (other than very limited reference to come increases in the 2020-21 TCS). While the methodology outlined in the TCS is that adjustments are made for 'known or expected changes', it is not clear what these changes are.

As operating expenditure stabilises, the Port of Melbourne's operating expenditure may be able to be developed more in line with a base-step-trend approach.

3.5.6. Comparison of forecast prescribed operating expenditure with actuals

The Port of Melbourne's annual TCS include a forecast of prescribed operating expenditure for that year. Since the Port of Melbourne introduced the more detailed Cost Allocation Model with the 2019-20 TCS, it has also provided a forecast of the following year's prescribed operating costs.

Table 3.7 summarises the Port of Melbourne's actual prescribed operating costs compared to the published forecasts. It shows that the Port of Melbourne's actual expenditure has been consistently less than forecast by around $2-3 million in each year.

Table 3.7: Forecast and actual operating costs, 2016-17 to 2020-21 ($ million)

	2016-17	2017-18	2018-19	2019-20	2020-21
Actual	**134.0**	**126.4**	**124.5**	**126.6**	**Not available**
Forecasts					
2020-21 TCS				128.6	133.9
2019-20 TCS			127.9	128.2	
2018-19 TCS			127.8		
2017-18 TCS		128.4			

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021.

The Port of Melbourne has argued that where actual expenditure is less than forecast, this represents an outperformance and even greater efficiency and productivity gains than expected.

We consider that the consistent underspend of actual operating expenditure attributable to prescribed services suggests that the forecasts are likely to be overstated, particularly given that non-controllable operating expenditure has steadily increased by more than 10% over the review period.

3.6. Improving transparency of operating expenditure

Based on the above, we are unable to conclude that the Port of Melbourne's controllable operating expenditure attributed to prescribed services over the review period is prudent or efficient.

Going forward, there are opportunities for the Port of Melbourne to improve the information included in its TCS to demonstrate that its operating expenditure forecast is prudent and efficient. The level of detail provided should be consistent with a price monitoring regulatory model, subject to any changes that are made to that model in future.

Our key recommendations in this regard are as follows.

- The TCS should directly address the key factors identified in the ESC's Statement of Regulatory Approach including most importantly those related to: (1) methodology; (2) productivity improvements; and (3) identifying and explaining trends and step-changes.
- Once the business has reached a steady state of operations, which we would expect should occur in the next five-year review period, it is reasonable to expect that the Port of Melbourne would establish targets for specific productivity or efficiency improvements, and measure performance against those targets. Consideration could also be given to setting medium-term output-based measures that can be monitored over time. This could be more appropriate under a price monitoring framework than prescribing detailed input-based measures.
- The TCS should clearly and transparently identify the costs that have been capitalised and show forecast expenditure before and after capitalisation. This should be shown for each relevant cost category, as well as in total. A brief explanation of any change in capitalised costs between years should also be provided, as well as any changes in the capitalisation framework.

4. Capital expenditure

Our assessment

The Port of Melbourne's capital planning and management processes are effective and support the needs of port users, and are robust, adaptive and appropriately risk managed. It has:

- undertaken detailed long-term strategic capital planning to inform the development of a new Port Development Strategy and Port Development Implementation Plan
- developed new governance arrangements, a project management framework and an integrated management system.
- improved existing processes, including for instance the Asset Management System.

These developments have progressively improved capital expenditure outcomes over the review period. All of the activities and processes supporting capital planning and management reflect good practice, and in some areas (e.g. Asset Management) are beyond that level.

All major capital projects and programs incurring more than $10 million over the review period were assessed as being prudent and efficient. Those major projects:

- support the needs of port users, were robust and deliverable
- cost estimates were reasonable, although some increases occurred or were forecast to occur
- were both cost and time efficient and reflected prudent capital planning and delivery decisions.

We have recommended that the Port of Melbourne introduce a capital forecasting pipeline, introduce a second capex categorisation based on asset management, improve its business cases, cost estimates and contingency setting, and improve the collaborative tendering approach on major projects.

4.1. Pricing Order requirements

The Pricing Order requires forecast and actual capital expenditure that is added to the capital base to be efficient and reflects prudent actions in the provision of the services.

The ESC's Statement of Regulatory Approach provides further guidance to demonstrate that the Port of Melbourne's forecast capital expenditure is prudent and efficient including that it is:

- based on robust asset planning, management and governance practices
- based on sound forecasting methodologies including, where relevant, market tested cost inputs and reliable escalation indexes
- contingency allowances that are transparent and have considered actual outcomes from recent capital works

- contractual agreements with service providers have been designed to manage project delivery risks.

The Port of Melbourne's TCS are expected to provide supporting information demonstrating how capital expenditure is prudent and efficient including:

- evidence of the prudency of investment governance and asset management processes
- consistency of procurement and project delivery processes with efficient cost outcomes, including any inbuilt incentive arrangements
- an explanation of how and why actual expenditure has differed from the forecasts provided in any previous TCS
- details of the capitalisation policy applied
- details of trends or productivity assessments
- benchmarking, activity-based costing and unit rate analysis
- independent forecasts of demand and input price escalation (see Chapter 5).

Where capital expenditure is relatively low, or stable, simplified analysis such as trend analysis by capital expenditure category, combined with an overview of asset management governance procedures, may be appropriate. However, where capital expenditure is material or lumpy, a more detailed review may be required which could include review of large capital works and forecasting methodologies used in preparation of capital forecasts.

Service standards provide an important reference point in assessing the prudency and efficiency of capital and operating expenditure. We understand that Port of Melbourne is still undertaking work in developing additional performance standards, including engaging with customers.

4.2. Trends in capital expenditure over the review period

4.2.1. Overview of capital program

Table 4.1 provides an overview of the Port of Melbourne's capital expenditure program for the review period. It shows that capital expenditure has ranged from $51.2 million to $112.4 million over the review period, averaging around $75 million per year.

Table 4.1: Prescribed services capital expenditure 2016-17 to 2020-21 by category ($ million)

Category	2016-17 (A)	2017-18 (A)	2018-19 (A)	2019-20 (A)	2020-21 (F)
Port Capacity Project	42.9	1.7	-	-	-
Channel	8.3	7.2	5.0	33.8	2.4
Wharves	18.4	35.1	42.6	36.3	30.5
Road	0.1	1.5	0.2	1.5	8.1
Rail	0.1	2.3	3.4	34.3	30.2
Plant	1.0	0.8	1.2	1.0	3.3
Other	1.5	2.5	4.8	5.4	6.4
Total	**72.4**	**51.2**	**57.3**	**112.4**	**80.9**

Note: columns may not add due to rounding.

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, Table 20, p.63.

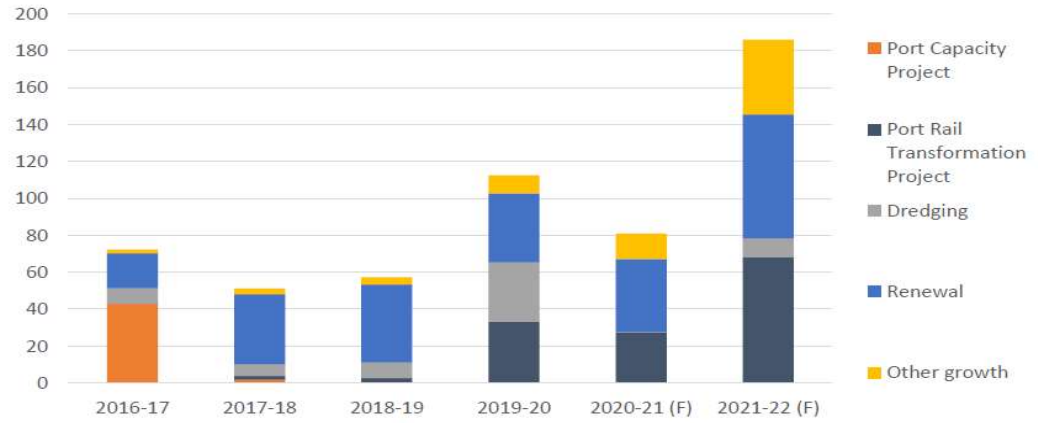
The capital expenditure in the review period includes maintenance and capital projects, including the costs associated with the concept, planning and development phases of several major projects to be delivered in the next review period. The Port of Melbourne's capital expenditure also includes some operating expenses that have been capitalised in accordance with its Capitalisation Policy. While not the subject of this review, the Port of Melbourne has signaled that it expects to spend $186 million in capital expenditure in 2021-22 due to major projects associated with wharves and rail.

The Port of Melbourne has allocated its capital expenditure to service categories. [redacted]

- [redacted]
- [redacted]

Figure 4.1 illustrates the key drivers of the Port of Melbourne's capital expenditure program over the review period, including capital expenditure in 2021-22 which is not the subject of our review.

Figure 4.2: Breakdown of capital expenditure by key driver ($ million)



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, General Statement, 31 May 2021, Figure 21, p.72.

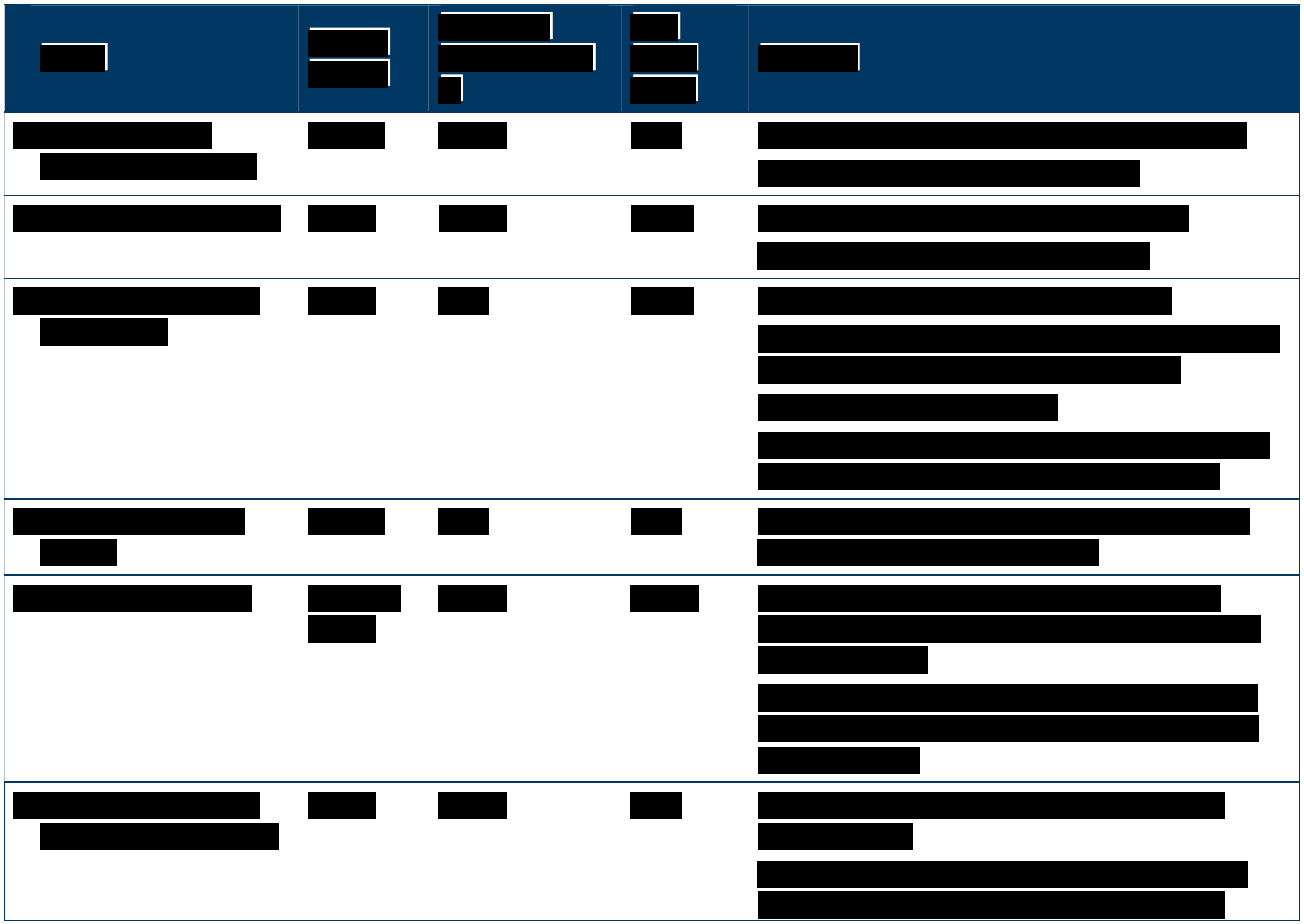
4.2.2. Major capital projects

The Port of Melbourne's capital program for prescribed services includes several large projects, with planning, development and implementation over multiple years. We identified and examined:

- six projects and programs with capital expenditure greater than $10 million over the review period
- three further projects with less than $10 million capital expenditure over the review period which were part of a broader program of works or otherwise related to the planning and development to inform the implementation of those projects to be undertaken following the end of the review period.

Together these projects account for around 70% of the Port of Melbourne's total capital expenditure on prescribed services for the review period. Table 4.2 summarises the major projects reviewed, and our assessment of the prudency and efficiency of these major projects is set out in Section 4.8.

Table 4.2: Major capital expenditure projects, 2016-17 to 2020-21



4.2.3. Actual capital expenditure compared to forecast and budget

The Port of Melbourne's TCS contain forecasts of capital expenditure for the following financial year, and update on actual capital expenditure incurred in previous years. Table 4.3 shows that the Port of Melbourne's typically delivers its capital program within 5% of forecast, although in 2017-18 the Port of Melbourne underspent against its forecast by more than 20%. This is primarily due to delays in major project expenditure.

Table 4.3: Forecast versus actual annual capital expenditure– 2016-17 to 2020-21 ($ million)

Year	Forecast	Actual	Over/underspend
2016-17	$68.7m	$72.4m	Overspend $3.6m (5.3%)
2017-18	$67.6m	$51.2m	Underspend $16.4m (24.3%)
2018-19	$67.7m	$57.3m	Underspend $10.4m (15.4%)
2019-20	$107.0m	$112.4m	Overspend $5.4m (5.0%)
2020-21	$80.9m	n.a.	-

Source: Port of Melbourne, Tariff Compliance Statements, 2018-19 to 2021-22.

[redacted]

Table 4.4: Budget versus actual annual capital expenditure– 2016-17 to 2020-21 ($ million)

Year	Budget	Actual	Over/underspend
2017-18	[redacted]	[redacted]	[redacted]
2018-19	[redacted]	[redacted]	[redacted]
2019-20	[redacted]	[redacted]	[redacted]
2020-21	[redacted]	[redacted]	[redacted]

Source: [redacted]

4.3. Capital forecasting

4.3.1. Assessment of capital forecasting

The Port of Melbourne's capital forecasts have varied significantly over the review period, both in the short term (five years) and medium term (10 years). This is mainly due to:

- Initial forecasts – [redacted]
- Unforeseen expenditure – [redacted]
- Expenditure required earlier than forecast – projects required to support the Big Ships Strategy have been brought forward due to the larger container vessels coming into service earlier than previously forecast.
- Higher expenditure than forecast – [redacted]

Overall, our assessment of the Port of Melbourne's capital forecasting is that:

- Year-on-year forecasting shows actuals within budget, or with only a small increase over budget. [redacted]
- A rolling five-year forecast is being maintained, with inputs from forecasts on committed projects, forecasts on planned projects in the development phase, and forecasts for maintenance and renewal capital using the Asset Management System.
- The approaches and supporting processes are in place for developing and maintaining each of these components of the capital forecast. [redacted]
- Sound governance and frameworks are in place for both the new capital and delivery of committed capital.

The following sections provide further detail related to the Port of Melbourne's capital forecasting.

4.3.2. Rolling five-year forecast

The Port of Melbourne maintains a rolling five-year capital forecast. Table 4.5 sets out the rolling capital expenditure forecasts from the beginning of the review period through to 2025-26. [redacted]

Table 4.5: Rolling five-year capital forecasts ($ million)

Budget date	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
May 2017	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]				
May 2018		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]			
May 2019			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		
May 2020				[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
May 2021					[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Actuals are shown in red.

Source: Port of Melbourne, Tariff Compliance Statements 2017-18 to 2021-22; [redacted].

Table 4.6 also shows that there has been a significant increase in total five-year capital expenditure as it moves from forecast to actual.

Table 4.6: Total estimated 5-year capital expenditure forecasts ($ million)

Year	Total 5-year capital expenditure	Basis for estimate
2016-17	[redacted]	[redacted]
2017-18	[redacted]	[redacted]
2018-19	[redacted]	[redacted]
2019-20	[redacted]	[redacted]
2020-21	[redacted]	[redacted]

Source: Port of Melbourne, Tariff Compliance Statements [redacted].

[redacted] This equates to around 1% of the capital base, which is considered to be of a reasonable order for this asset base.

All the capital expenditure in the first five years can be regarded as maintenance, sustaining capital, life extension and upgrade capital. There is no expansion capital in the review period to create new or larger assets with greater capacity for increases in trade. The Port of Melbourne's total capital spend over the review period was $374 million, or around $75 million per year. This a little under 2% of the capital base, which is considered to be of a reasonable order for this asset base.

4.3.3. Medium term forecasts

[redacted]

Figure 4.2: Expected capital expenditure timings and forecasts, 2017-18 to 2031-32 ($ million)

[redacted]

[redacted]

Source: [redacted]

[redacted]

Table 4.7: [redacted]

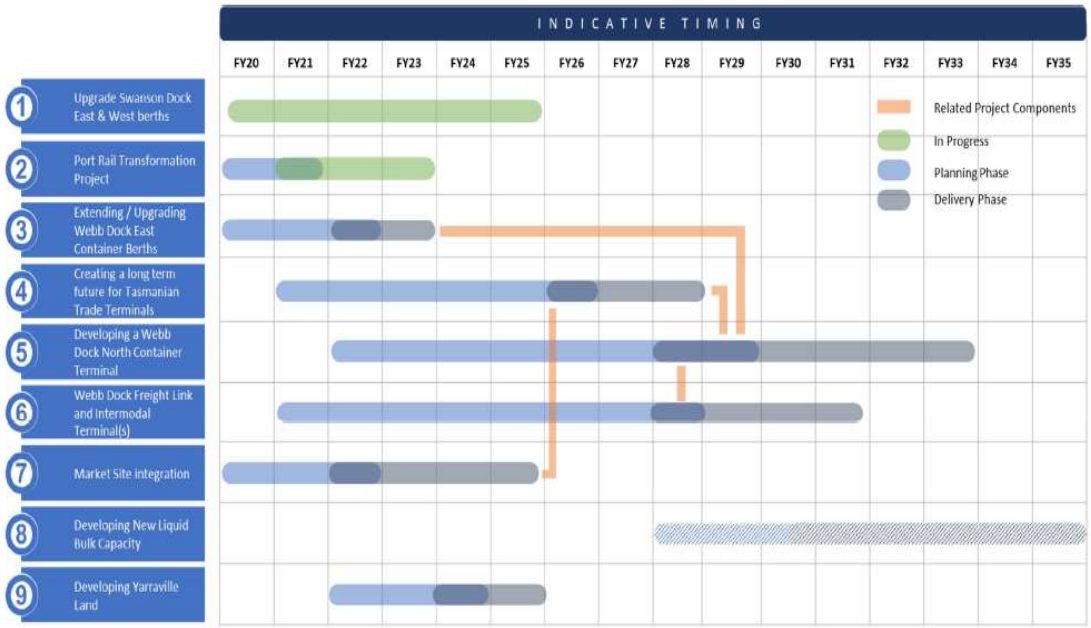
Project type (primary project drivers)	Material / major projects
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

- Maintenance & Renewal and Dredging – Ranging from $30 million to $60 million, with an average slightly less than $40 million.

[redacted]

Figure 4.3: Port Development Implementation Plan major initiatives by 2035



Source: Port of Melbourne, 2050 PDS Delivery Program, p.7.

Figure 4.4: Expected capital investment timings and forecasts to 2035

Source: [redacted]

Figure 4.5: Expected capital expenditure for major projects to 2035

Source: [redacted]

[redacted]

Table 4.8: Medium term capital expenditure forecasts ($ million)

Financial year end	[redacted]	[redacted]	[redacted]
2017	[redacted]	[redacted]	[redacted]
2018	[redacted]	[redacted]	[redacted]
2019	[redacted]	[redacted]	[redacted]
2020	[redacted]	[redacted]	[redacted]
2021	[redacted]	[redacted]	[redacted]
2022	[redacted]	[redacted]	[redacted]
2023	[redacted]	[redacted]	[redacted]
2024	[redacted]	[redacted]	[redacted]
2025	[redacted]	[redacted]	[redacted]
2026	[redacted]	[redacted]	[redacted]
Totals	[redacted]	[redacted]	[redacted]

Note: figures in red are actuals.

Source: [redacted]

Figure 4.6: Medium term capital expenditure forecasts ($ million)

[redacted]

Source: [redacted]

[redacted]

4.3.4. Improving capital forecasting

In addition to the year-on-year and rolling five-year forecasts, the Port of Melbourne should maintain a 'pipeline' view. This will better show the individual major projects and programs, and the development stage of those projects and programs. This will provide a more detailed view of the capital expenditure over time, and better reflect the actual decisions and changes that occur in capital planning and management.

4.4. Capital planning

4.4.1. Assessment of capital planning

Capital planning focuses on forecasting the level of expenditure required and when it is required. In contrast, capital management relates to the development and implementation of capital expenditure. Many of the Port of Melbourne's activities and processes will support both planning and management of its capital expenditure.

We have assessed how the Port of Melbourne's capital planning activities and processes contribute to prudent and efficient capital expenditure. Based on our assessment, we have found that:

- Activities and processes required for effective capital planning and management are in place and working effectively.
- Governance framework and practices are in place, have been improved and are working effectively. [redacted]
- There have been significant improvements in capital planning over the review period including development of a new port development strategy, a Project Management Framework and an integrated management system. [redacted]

- [redacted]
- The activities and processes supporting capital planning and management reflect good practice, and in some areas (such as the Asset Management System) could be considered beyond that level.
- Project cost estimates include contingency and schedules include float, to manage risks during implementation. [redacted]
- There is evidence of staging in major projects, to avoid very large capital contracts.
- There is clear evidence these developments have been improving capital planning outcomes progressively over the review period.
- Early starts to projects, to provide sufficient time for planning, stakeholder engagement, development and approvals.

We consider that these improvements should contribute to more stable and robust capital forecasts going forward. We have also recommended some further improvements to develop a capital forecasting pipeline, a second capital expenditure categorisation based on asset management, and improved business cases, cost estimates and contingency setting. [redacted]

4.4.2. Consultation

The Port Development Plan 2006-2035 and Port Development Strategy 2035 Vision were developed prior to the lease of the Port of Melbourne.[45]

Under Port Concession Deed (PCD), the Port of Melbourne was required to complete a plan for the port within the first year of the lease. It released the First Port Development Implementation Plan (PDIP) on 31 October 2017. [redacted]

[45] Port Development Plan 2006-2035, Consultation Draft, 2006; Port Development Strategy 2035 Vision, August 2009.

Figure 4.7: Port of Melbourne strategic planning and development framework

Source:

In parallel with the PDS, the Port of Melbourne developed a Rail Access Strategy (RAS) was developed aimed at improving rail access to the port and shifting cargo (mainly containers) from road to rail. The RAS provided for a new rail operating framework and the Port Rail Transportation Project (previously Port Rail Program). To inform the development of the RAS, the Port of Melbourne undertook engaged to define the nature of the issues that need to be addressed through the RAS including:

[redacted] The PDIP is not a public document.

The above activities undertaken over the review period represent the development of a long-term plan for the Port of Melbourne, including an extensive consultation program at both industry and stakeholder levels.

The Port of Melbourne is undertaking a program of industry and stakeholder consultation in 2021 to provide an update on key issues, port activities and stakeholder interests. It includes a detailed presentation and release of 2050 PDS Delivery Program, which provides the indicative timing and sequencing of major projects over the medium term to 2035. This is essentially a public release version of the PDIP 2020-2035.

Overall, we consider that there is evidence of industry and stakeholder consultation evident in the development of the 2050 PDS, the RAS, and is also proceeding on an ongoing basis (Industry & Stakeholder Consultation Program, 2021). 2050 PDS is a high-level strategy suitable for public release. The PDIP 2020-35 is not a public document, but a 2050 PDS Delivery Program has been developed and released as part of the 2021 consultation program. Extensive stakeholder consultation is evident for specific projects, starting in the development phase and continuing through project implementation.

4.4.3. Types of capital expenditure

The Port of Melbourne develops capital forecasts for committed projects, for projects identified in future port planning and for maintenance and renewal capex derived from the asset management system. It categorises its capital expenditure as:

- Renewal/Remediation – Legislative and contractual requirements, service levels and safety
- Growth – Port stewardship and development obligations.

It also identifies the relevant investment driver such as: good operating practice, accommodating changing vessel size or maintaining core infrastructure.

It is recommended that a second categorisation of capital expenditure be considered, This would be based on asset management principles, and would provide a more granular split of capital expenditure, for example, splitting non-expansion capex into maintenance, sustaining capex, life extension and upgrades; and expansion capex into growth and new trade/capacity). This will

allow for benchmarking against other asset bases and provide greater confidence in the prudency and efficiency of the capital forecasts.

4.5. Capital management

4.5.1. Assessment of capital management

We have assessed how the Port of Melbourne's capital management activities and processes contribute to prudent and efficient capital expenditure and found that:

- Governance processes are in place and working effectively. Improvements have been made, and these have been implemented by transitioning rather than significant change. [redacted]
- Project Management Framework (PMF) – [redacted]
- Business Cases – [redacted]. Some are only summary papers, rather than comprehensive reports reflecting a detailed consideration of the project at that time.
- Cost estimates – [redacted]
- Contingencies – [redacted]
- [redacted]

[redacted]

The following sections provide further detail about the Port of Melbourne's capital management.

4.5.2. [redacted]

[redacted]

4.5.3. Project Management Framework

The Port of Melbourne has developed a standardised PMF aimed at providing more effective planning, control and reporting of projects, and effective governance over major decisions and approvals.

Figure 4.8: Port of Melbourne project management framework

Source: [redacted]

Tables 4.9 summarises the various phases of capital planning and delivery as set out in the PMF.

Table 4.9: Comparison of Port of Melbourne PMF with FEL Approach

Phase	FEL Approach	Port of Melbourne PMF Gates
Identification	FEL1 – Commonly called Concept or Identification Phase.	[redacted]
Planning – Concept	FEL2 – Commonly Pre-Feasibility or Selection Phase. Needs to consider all options for the project and select best option for meeting the project needs and requirements.	[redacted]
Planning – Development	FEL3 – Sometimes called Feasibility or Definition Phase. Needs to fully define the project and how it will be implemented, and how it will be operated and maintained. This enables	[redacted]
Execution	Project Execution or Implementation	[redacted]
Close Out	Project Close Out or Review	[redacted]

Source: FTI Consulting analysis.

[redacted]

The following observations are made based on the information reviewed for specific major capital projects:

- The PMF has been developed during the review period and has been progressively implemented over the latter half of the review period (say 2019 - 2021). Extent and maturity of application has been increasing. [redacted]
- [redacted]
- Project budgets – [redacted]

4.5.4. Management systems

The Port of Melbourne has Safety, Quality, Environmental and Asset Management Systems in place. It has also developed "The Compass", an over-arching Integrated Management System. The full system is intended to achieve the following:

[redacted]

The Compass is designed to meet the requirements of four ISO standards[47]. [redacted]

[redacted]

[47] ISO 55001:2014 – Asset Management, ISO-9001:2015 - Quality Management Systems, ISO 14001:2015 - Environmental Management and ISO 45001:2018 – Occupational Health and Safety.

[redacted]

The Port Concession Deed required certification for the Asset Management System within the first five years of the lease, and this was achieved in April 2021.

The Asset Management System structure includes:

- Asset Management Policy
- Strategic Asset Management Plan
- Long-term Asset Management Strategies
- Asset Management Plans.

These documents have been provided and are considered to represent a comprehensive and detailed Asset Management System. [redacted] The system represents best practice, and many aspects (for example, wharves, dredging) are highly advanced and tailored to the Port of Melbourne's specific assets.

4.5.5. Procurement and contracting

[redacted]

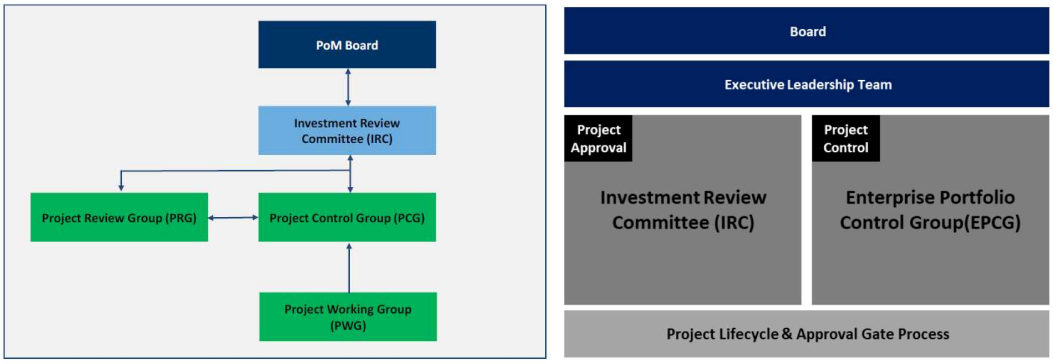
[redacted]

4.5.6. Governance framework

The TCS provide a description of the governance frameworks and processes which relate to capital expenditure. It is understood that from 2016-17 through to around 2020, this consisted of an Investment Review Committee (IRC), supported in turn by Project Control Group (PCG), Project Review Group (PRG) and Project Working Groups. The TCS includes charters for each of these groups.

The Port of Melbourne advised that a transition to new governance arrangements occurred around 2020-21. [redacted] Figure 4.9 compares the new governance arrangements with what applied previously.

Figure 4.9: Port of Melbourne governance arrangements



Source: [redacted], *TCS 2020-21, TCS 2021-22*

The new governance arrangement appears to be more streamlined, with the Investment Review Committee (IRC) considering all matters relating to capital investment decisions and approvals, and the Enterprise Portfolio Control Group (EPCG) considering all matters relating to the

performance of approved investments. The EPCG is supported by Project Controls Groups (PCG) for projects.

Several meeting agenda and minutes have been provided for the IRC and various PCG's. These provide confirmation that the governance processes are in place and working.

[redacted] It is recommended that the Terms of Reference for the IRC, EPCG and PCG's should be extended to ensure that alignment.

4.5.7. Improving capital management

Based on our review, we have made several recommendations aimed at improving the Port of Melbourne's capital management including:

- Business Cases – Improved gate reports (that is, Business Cases in the PMF) will enable better capital management, with greater confidence in the subsequent phases (across both quantum and timing), having passed through the gate.
- Cost estimates – [redacted]
- Contingencies – It is recommended that contingencies are set on a probabilistic basis, even if this is only to provide some level of justification of a discrete value (for example, percentage of capital cost) through assessment of the level of project definition and risk profile. [redacted]
- [redacted]

4.6. Major capital projects

4.6.1. Approach to assessing major capital projects

Our review was initially based on additional information provided by the Port of Melbourne to the ESC, including in response to the ESC's Section 56 request for information. We also met with Port of Melbourne senior management and managers involved in the capital planning and management process to clarify issues on each of the major projects.

Assessing prudency and efficiency of capital expenditure has been based on:

- Prudency – the need for the project to be clearly demonstrated, and the scope, cost and timing of the works to be defined to meet that need (be that growth in demand, productivity improvements, user requirements, asset condition, life extension etc.).
- Efficiency – requires that the project is delivered to achieve the required scope, cost and timing (and does not deliver additional scope, higher cost or later or earlier timing than required). Our assessment of prudency will involve reviewing the following for each of the projects:

Figure 4.10 sets out the documents we have sought and relied on to inform our assessment of the prudency and efficiency of the Port of Melbourne's capital expenditure.

Figure 4.10: Documents reviewed to support prudency and efficiency assessment

Prudency	Efficiency
• Project concept and feasibility study reports • Strategic, preliminary and final business cases • Stakeholder consultation and interactions	• Project delivery plans (contract packages, with scope, cost and schedule) • Project risk and opportunity assessment • Selected project delivery reports, including project status and forecast to complete • Project hand-over and project close-out report, if project is completed within the review period

For the review period, all the major projects are non-expansion works (maintenance, remedial works, rehabilitation or upgrades to existing infrastructure). There are no expansion works, involving new or expanded infrastructure to meet additional demand or create additional capacity. As such, the projects are highly bespoke in nature, and in a brownfield setting and to be

implemented in an operating environment. Benchmarking of project metrics against similar projects to demonstrate prudency and efficiency is therefore not practical.

Our assessment of prudency and efficiency included consideration of the range of factors set out by the ESC, including:

- **Supports the needs of port users** – options account for the service needs of the stakeholders and Victorian consumers. Key stakeholders have provided inputs to or otherwise informed the development of infrastructure options
- **Robust** –business cases clearly outline proposed service outcomes and set out analysis undertaken of the options to deliver these outcomes and identifies the preferred approach. Evidence demonstrates that capital expenditure is consistent with efficient long-term expenditure on infrastructure services based on a best practice asset management framework which considers risk and system-wide needs.
- **Deliverable** – key activities comprising the delivery of the project from planning to construction are identified and thought through and projects are delivered within proposed timeframes, given the port's delivery of major projects greater than $10 million in the past.
- **Reasonable cost estimate** – cost estimates are well supported either by a schedule of quantities using typical rates currently being experienced in the industry or compare favourably with other similar projects or preferably both above.
- **Actual capital expenditure is comparable with historical forecasts** – increases or decreases in capital expenditure are explained and justified, particularly if they divergence from expectations at the time of privatisation. Risk sharing, and incentive and penalty payment arrangements with its contractors are appropriately managed for delivery or non-delivery of projects.

4.6.2. Assessment of major capital projects

As noted in Section 4.2.2, we identified and assessed:

- six projects and programs with capital expenditure greater than $10 million over the review period
- three further projects with less than $10 million capital expenditure over the review period which were part of a broader program of works or otherwise related to the planning and development to inform the implementation of those projects to be undertaken following the end of the review period.

Together these projects account for around 70% of the Port of Melbourne's total capital expenditure on prescribed services for the review period. It is important to note that the focus of

our review of these major capital projects and programs is limited to the expenditure undertaken within the review period only.

Table 4.11 summarises the outcome of our assessment of the prudency and efficiency of these major projects and programs over the review period. Overall, we have concluded that the capital expenditure undertaken during the review period on the nine major projects reviewed is prudent and efficient.

Table 4.11: Summary assessment of prudency and efficiency of review period capital expenditure on major projects

	Project	Expenditure 2016-17 to 2020-21	Prudency	Efficiency
1	Swanson Dock East Remediation & Upgrade	[redacted]	Prudent	Efficient
2	Port Capacity Project (PCP)	$44.6m	Deemed prudent	Efficient
3	Port Rail Transformation Project (PRTP)	[redacted]	Deemed prudent	Efficient
4	Maintenance Dredging Program	[redacted]	Prudent	Efficient
5	FY20 Dredging Program	[redacted]	Prudent	Efficient
6	Swanson Dock Upgrades (Part of Big Ships Strategy)	[redacted]	Prudent	Efficient
7	South Wharf Precinct (Rehabilitation Works)	[redacted]	Prudent	Efficient
8	Webb Dock East Upgrades (Part of Big Ships Strategy)	[redacted]	Prudent	Efficient
9	Swanson Dock West Remediation & Upgrade	[redacted]	Prudent	Efficient

The projects and programs undertaken during the review period are required to support the needs of port users and were robust and deliverable. Initial cost estimates were reasonable although in some cases actual costs had increased or were forecast to increase in future stages. Expenditure for major projects was assessed as efficient in both cost and time and was based on prudent decisions in the planning and delivery of the capital works.

Appendix B provides more detail in relation the reasons why we have assessed each major project as prudent and efficient.

5. Demand

Our assessment

On balance, demand estimates are supported by a statement of the basis of the forecast or estimate.

The Port of Melbourne forecasts have been arrived at on a reasonable basis:

- The overall approach is reasonable and consistent with industry practice.
- Assumptions are reasonable and data used to support the forecasting are clear, although the validity of the assumption of a 1:1 relationship with demand drivers has not been supported by econometric analysis.

Estimates are supported by the primary information used to develop any extrapolation or inference:

- Estimates are supported by calculations and underlying data except for general cargo and break bulk, where the forecasts were hard-coded numbers in a spreadsheet.
- The modelling approach places significant reliance on outputs from a complex economic model that cannot be interrogated.

We cannot confirm that forecasts and estimates were the best possible in the circumstances:

- While there is no obvious bias in the forecasts (forecasts were both higher and lower than predictions), three years of ex-post data are not sufficient to test whether it produces biased forecasts.
- Forecasts are within ranges published by peers and government agencies.

5.1. Pricing Order requirements

Demand forecasts have two important links to the building block approach to pricing. They are used to determine the need for, and timing of, capacity expansions and to establish prices that will achieve maximum allowable revenue assuming the expected demand is achieved.

The Pricing Order requires estimates or forecasts to be:

- supported by a statement of the basis of the forecast or estimate[48]

[48] Pricing Order, Clause 8.2.1.

- arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances[49]
- be supported by the primary information used to develop any extrapolation or inference.[50]

The ESC's Statement of Regulatory Approach elaborates on the factors that will be considered when assessing the Port of Melbourne's demand forecasts against the Pricing Order including those forecasts or estimates are:

- transparent, replicable, and can be traced back to primary information
- supported by an explanation of the forecast methodology, assumptions underlying the methodology, why the assumptions are reasonable, and the data underlying the forecasts
- where relevant, supported by attestations verifying that submitted information is fit for purpose
- supported by relevant consultants' reports, models and data underlying consultants' forecasts.

The Pricing Order requirement for the forecasts to be the best forecast or estimate possible is difficult to assess without considering the performance of every possible approach to forecasting. In assessing the Port of Melbourne's forecasts, we have examined whether:

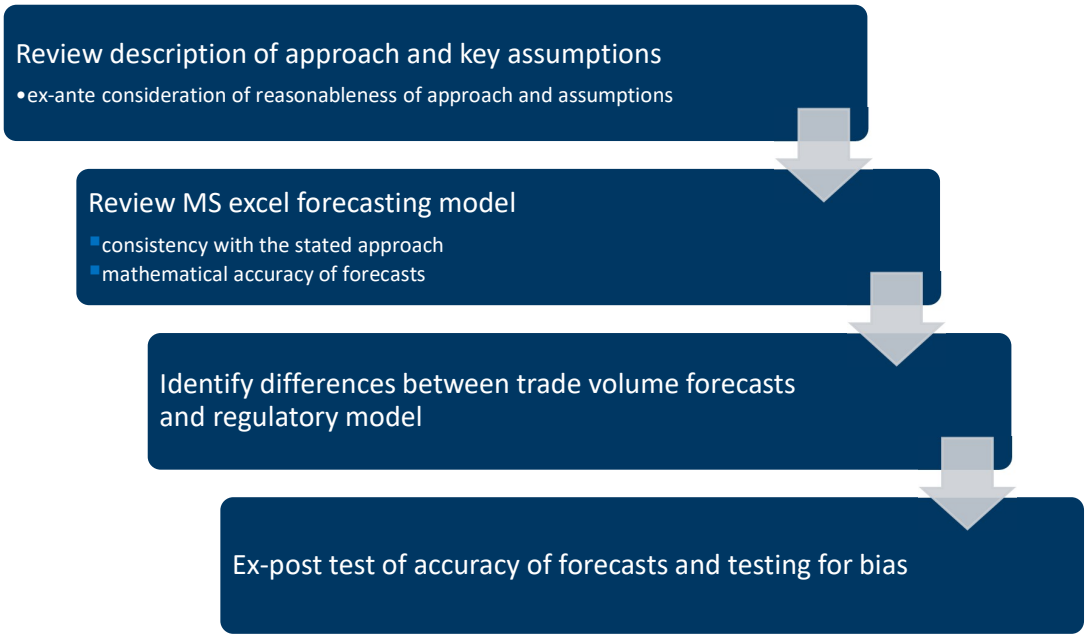
- its approach seeks to minimise the variance between forecasts and actuals and
- does not result in forecasts that consistently over-estimate or under-estimate demand.

5.2. Our approach to reviewing demand forecasts

The Port of Melbourne's trade forecasts include forecasts of export/import and empty containers, general cargo and break bulk, other bulk and transhipments and channel, berth and wharf use (including vessel calls and vessel size).

[49] Pricing Order, Clause 8.2.2(a).
[50] Pricing order, Clause 8.2.2(b).

Our approach to reviewing the Port of Melbourne's demand forecasts has, for each year of the review period, involved:



5.3. Modelling approach

The Port of Melbourne did not publish trade forecasts and commentary for the 2016-17 and 2017-18 TCS submitted to the ESC. [redacted]

Appendix H to the 2018-19 TCS provides the greatest level of detail about the Port of Melbourne's demand modelling approach. It described data classification issues and considered at a high-level the relationships between the BIS Oxford Economics indices and the trade volumes by commodity group.

In 2019-20 and 2020-21, this documentation has been reflected in the following documents:

- *POM Forecast Mechanics*, which describes the mechanics of the modelling
- *POM Trade Forecasts – Detailed Outlook...,* which describes the economic outcomes in the past year and projections for the year ahead.

As documented in the submitted material, the Port of Melbourne develops its container trade forecasts by grouping commodities which share a common driver and using integrated macroeconomic models to predict those drivers. It then adjusts for trends including the rate of containerisation, size of container etc.

The Port of Melbourne's trade volume forecasting approach is consistent with industry best practice for long-term forecasts. Its use of a structural model allows future changes which have not yet been seen in the data (closure of industries, new trades, etc.) to be anticipated and modelled. [redacted]

While the approach to trade forecasting is sound, it relies on accurate forecasts of economic variables. Accurately predicting annual changes to industry demand one year ahead is difficult at the best of times, and near impossible when unprecedented events such as COVID-19 occur. [redacted]

While there are only three years of ex-post evidence to assess the performance of the annual forecasts, they do not appear to perform better[51] than a simple random walk model. For short-term annual trade forecasts, the Port of Melbourne could save considerable effort using simple autoregressive (backwards-looking) specifications such as a random walk (with drift)[52], which would likely perform very well on most measures of accuracy. The main difficulty that this would present is that over time the short-term forecasts would be inconsistent with long-term forecasts derived on a more sophisticated basis.

Channel forecasts were not included in the long-term trade forecasting models and calculations of these have been provided by the Port of Melbourne for 2017-18 to 2020-21. [redacted] This is appropriate for a short-term forecast but of little use for long-term channel forecasts.

[51] Based on measurements of root mean-squared forecast error or absolute forecast error.

[52] Random walk (with drift) implies that the best forecast of tomorrow's volume is today's volume (plus a drift term, for example increasing the forecast in line with population).

[redacted]

5.4. Consistency between TCS and regulatory model forecasts

There was insufficient data provided to compare the trade forecast outputs in 2016-17 to the demand inputs in the Regulatory Model. In the 2017-18 and subsequent regulatory periods the outputs of the trade forecasting model were input into the regulatory model for the relevant period.

5.5. Use of demand forecasts for other estimates

[redacted]

We have reviewed the consistency of the Port of Melbourne's long-term demand forecasting approach with its annual forecasting approach. The long-term demand forecasting approach is the same as used for annual forecasting but includes greater detail than presented in the TCS and different parameters on some of the forecasting equations and assumptions. The long-term demand forecasting model does not include an error that we identified in the annual forecasts (not increasing the population input to the estimate of food imports).

[redacted]

[redacted]

[redacted]

5.6. Mechanics of the Port of Melbourne's demand forecasting

The *Port of Melbourne Trade Forecasts - Detailed Outlook To 2022*[56] and similar *Outlook* reports since 2018-19 have provided economic commentary and evidence of the relationships between generated indices and historical trade data.

Our view is that the logic of the identified relationships with drivers and the consideration of other factors such as exchange rates, production costs and substitutability, capacity limits, capital replacement requirements and trends in containerisation across many products is sound.

Forecasting based on drivers is the only approach that would allow testing of scenarios appropriate to long-term demand forecasting. These scenarios can include COVID-19 recovery scenarios and structural changes in variables such as different Victorian manufacturing and population scenarios.

As a result, we consider that the Port of Melbourne's modelling approach is appropriate. However, the approach would benefit from reporting tests of its forecasting power, that is, tests of BIS Oxford Economics' ability to forecast underlying drivers and whether the assumed trends and relationships are correctly specified in the analysis.

It is not clear that the detailed assessments of relationships and trends made in the *Outlook* reports are reflected into the *Trade Volumes Forecasting Models* which accompany the *Tariff Compliance Statements*. In particular, the use of the 'modelled driver/TEUs trend' parameter which adjusts the forecasts of full import containers in the *Trade Volumes Forecasting Models* is not the same as documented in the *PoM Forecast Mechanics.* [redacted] We assume that values of 'modelled driver/TEUs trend' parameter (in the *Trade Volumes Forecasting Model)* in years prior to the forecast are an error-correction term which matches past 'forecasts' under this methodology to observed actuals.

[redacted]

[56] BIS Oxford Economics, 2021.

5.6.1. Exports

The Port of Melbourne predicts container exports (measured in TEUs – twenty foot equivalent units) on the basis of a 1:1 relationship with a commodity-specific index estimated by BIS Oxford Economics. The containerised commodities forecast on this basis are:

Commodities		
Agriculture	Chemical	Paper
Beverage	Construction	Timber
Mine	Machinery	Vehicles
Manufacturing	Medical	Miscellaneous

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, Appendix L, BISOE PoM Forecast Mechanics to 2020-21.

Other reports set out the details of what is included in these indices.[57] The Port of Melbourne has not established in the TCS the statistical relationships between the index created to represent volume drivers and historical trade data. [redacted]. While BIS Oxford Economics' analysis demonstrates an extremely high R^2 value, they do not correct for non-stationarity of data, meaning that the correlation could be spurious.

It is not clear how the indices estimated by BIS Oxford Economics for the Short-Term model represent trends discussed in the *Outlook* reports related to containerisation. For example, in the short-term modelling there is no adjustment to the indices to reflect changes over time in the use of 20' or 40' containers for exports. [redacted]

Our review considers the outcome of the forecasts and tests the 'out of sample' predictions for accuracy and bias by comparing them to alternative approaches. We performed a regression to test the index' ability to predict movements in TEUs for each commodity. There are only 13 data points, so findings are indicative rather than statistically significant:

[57] BIS Oxford Economics, *Port of Melbourne Trade Forecasts - Forecasts to FY19*, May 2018.

- the model produces an extremely high R^2 statistic (a measure of goodness-of-fit), over 0.99 for each commodity
- the parameter on the index variable was highly statistically significant (albeit not 1, the value used in BIS Oxford Economics' modelling).

Such a high R^2 can give the impression of statistical significance but is more commonly an indicator of autocorrelation[58] between the dependent variables (i.e. autocorrelation of container imports and autocorrelation of the index value). Where there is autocorrelation (non-stationarity), R^2 and t statistics (tests of statistical significance of a parameter) are likely to be large even if the underlying variables are not truly related.

Augmented Dickey-Fuller tests for stationarity indicate that the correlation between the two series is likely to be the result of serial autocorrelation of this year's container trade with prior years and not the power of the explanatory variable. Such an apparent relationship with an explanatory variable is called 'spurious correlation' and it tends to suggest that the explanatory variable has reduced or no predictive power.

While we agree with the Port of Melbourne and BIS Oxford Economics that the explanatory variables are intuitively highly correlated with the dependent variable, this has not been established econometrically in a model that corrects for non-stationarity. Failure to use parameters derived from econometric modelling could violate the pricing order requirement to provide the best forecasts possible.

Comparing the average predicted rate of growth in the indices with the actual growth in TEUs over the period highlights that actual trade growth is not well-aligned with predictions (see Table 5.1).

[58] Autocorrelation is correlation between a series value and past values of the same series.

Table 5.1: Comparison of export growth rates by commodity

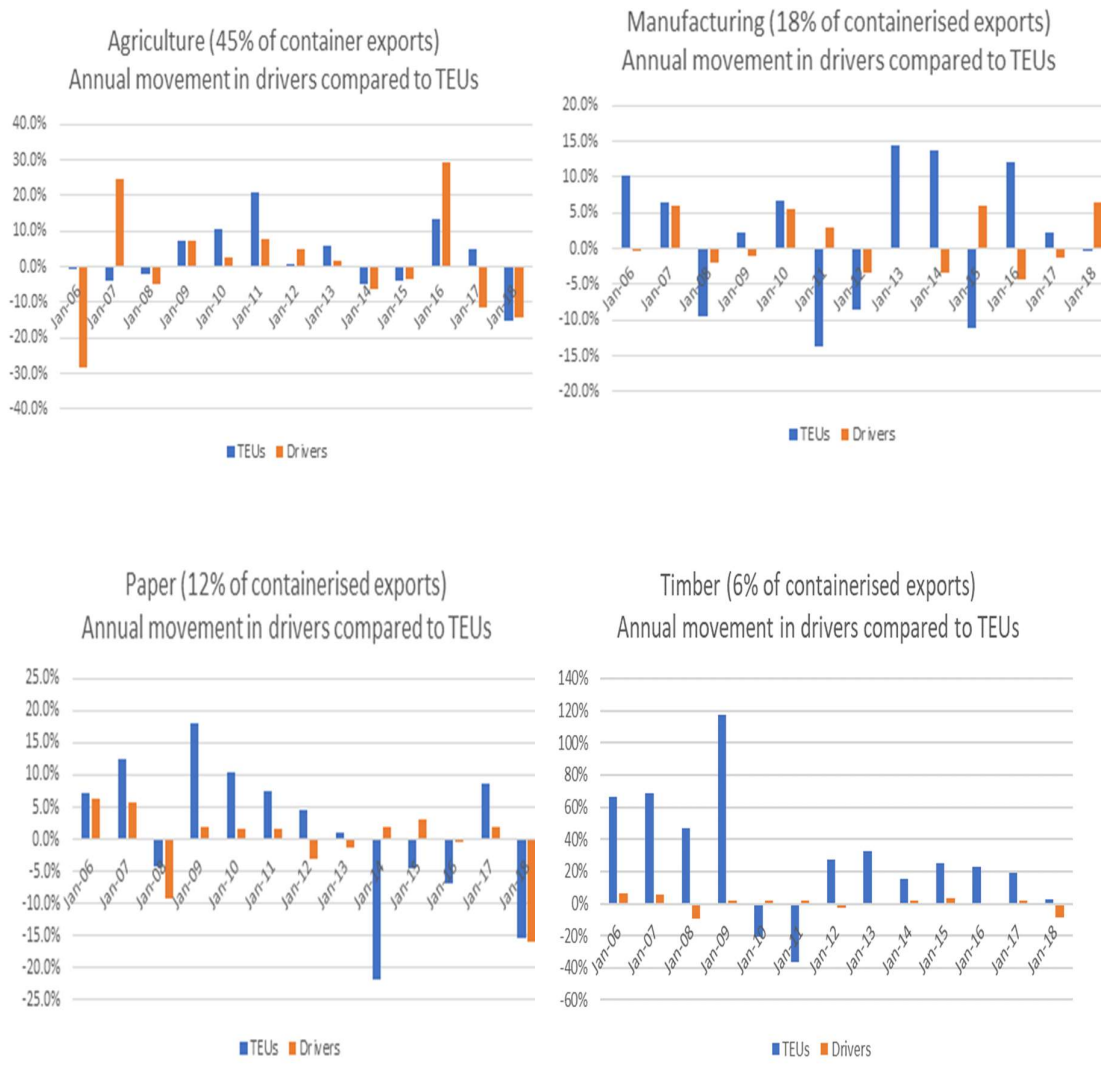
	Category share of export containers	Predicted growth 2006-2019	Actual growth 2006-2019
		Average annual rate of change	Average annual rate of change
Agriculture	45.3%	-0.3%	2.2%
Manufacturing	18.1%	0.8%	1.5%
Paper	11.8%	-0.6%	0.7%
Timber	6.2%	0.0%	24.0%
Misc	4.8%	1.1%	1.3%
Beverages	4.7%	1.2%	-1.4%
Mining/Quarrying	2.4%	4.2%	0.3%
Chemical	2.4%	1.1%	0.5%
Vehicles	1.8%	1.0%	-1.9%
Machinery	1.7%	2.0%	1.0%
Medical	0.7%	1.1%	13.7%
Construction	0.2%	1.1%	3.8%

Source: FTI Consulting analysis based on Port of Melbourne, Tariff Compliance Statement 2021-22, Appendix L, BISOE trade volumes forecasting model.

To test the explanatory power of the indices, Figure 5.1 compares TEU movements against predicted index movements for the four largest commodities. It demonstrates the lack of a 1:1 relationship between TEUs and the indices. It shows:

- Agriculture (45% of container exports) – 7 out of 13 years was the percentage change in TEUs within 5% of the change in index.
- Manufacturing (18% of container exports) – In only 4 out of 13 years was the percentage change in TEUs within 5% of the change in index.
- Paper (12% of container exports) – In only 4 out of 13 years was the percentage change in TEUs within 5% of the change in index.
- Timber (6% of container exports) – The index has consistently underpredicted containerised timber's growth, except the two years where demand fell (and the model predicted growth).

Figure 5.1: Comparison TEU movements against predicted index movements for four largest export commodities



Source: FTI Consulting analysis based on Port of Melbourne, Tariff Compliance Statement 2021-22, Appendix L, BISOE trade volumes forecasting model.

As a simple test of the predictive power of the modelling approach we considered the mean squared forecasting error which arose each year under the forecasting approach and then compared this to a forecasting model that assumes trade follows a Martingale process, or

'random walk' (see Appendix C). The random walk modelling performed better across the three years of observations (2018-2020) than BIS Oxford Economics' structural equation modelling.

5.6.2. Imports

The Port of Melbourne predicts container imports (measured in TEUs) based on a logarithmic relationship with a driver and an adjustment factor. The *Outlook* reports describe the relationships and the indices used for the driver and they appear well-reasoned and correlated.

The containerised commodities forecast on this basis, and their primary drivers are:

Containerised commodity	Driver
Consumer goods (Food and Beverages)	Population
Consumer goods (Other)	Macro driver: Non-Food Retail Turnover
Capital goods and parts	Macro driver: Machinery and Equipment Investment
Other goods (Industrial/Intermediate)	Macro driver: Building Activity + GSP

Source: Port of Melbourne, Tariff Compliance Statement 2021-22, Appendix L, BISOE trade volumes forecasting model.

In addition to a demand driver each commodity has a 'modelled driver/TEUs trend' which adjusts the forecast from the one that would result purely from the driver. Each year this modelled driver/TEUs trend is forecast ahead by one or two years. In relation to this adjustment, the model documentation states:

> *As drivers are generally based in real dollar terms but the output of interest is in TEUs, we have estimated changes in the trend in $/TEU using the series in columns O, S, W, and AA. Changes in this trend reflect composition shifts to products that feature a lower volume per $ and/or a shift towards 40 foot containers as opposed to 20 foot containers.*[59]

The stated rationale above ties with the descriptions of trends outlined in the *Outlook* reports but this is not reflected in the Port of Melbourne *Trade Volume Forecasting Model*. Instead, the model calculates past values of the 'modelled driver/TEUs trend' as the difference between actuals and the forecasts based on drivers which represents a forecasting error term. [redacted]

[59] BIS Oxford Economics, POM Forecast Mechanics (2019-20), p.5.

[redacted]

The *Trade Volume Forecasting Model* is therefore merely a mimic of the long-run model for container import forecasts, and the modelled driver is irrelevant in this model – if the value were zero, the 'modelled driver/TEUs trend' would simply adjust to reflect the long-run model forecast.

[redacted]

The use of the 'modelled driver/TEUs trend' in the long-term forecasts is as documented in the *PoM Forecast Mechanics*, indicating that this difference between the short-term and long-term models has not been reflected in the documentation supporting the short-term model.

This 'modelled driver/TEUs trend' parameter makes irrelevant the consistent error where population has not been increased in the model since 2003. The population driver in the short term model was irrelevant to the forecast food imports, instead the driver in the long-term model was the source of those forecasts.

Consumer goods (Food and Beverage) assumes that the change in TEUs is related to population in a logarithmic relationship. That is, if population increases by 1%, demand for food increases by the same proportion. This is a reasonable assumption and appropriate driver.

The fact that the modelled driver/TEUs trend is consistently negative indicates that the population driver is biased as it consistently and significantly over-predicts the response of food imports to population growth.

It would be appropriate to perform an econometric analysis of the drivers of food imports, for example by looking at the statistical relationship with population and exchange rates, rather than assuming a 1:1 relationship with population and correcting with an error term each year.

As with export forecasts, there are issues of non-stationarity in the data. Imports have been growing over time and any similarly growing explanatory variable would perform well in econometric tests despite the spurious correlation.

To address issues of stationarity it would be helpful for the Port of Melbourne to publish econometric analyses of the relationships in its model, including tests for stationarity. It may be helpful to model the difference in import demand in each year. That is, by regressing the change

in imports each year on the change in some underlying drivers such as population or exchange rates. This may produce a more meaningful model for forecasting purposes.

Comparing the average predicted rate of growth in the indices with the actual growth in TEUs over the period highlights that movements in the index do not accurately match actual trade growth (see Table 5.2).

Table 5.2: Comparison of import growth rates for four largest commodities

	Category share of import containers	Predicted growth 2006-2019	Actual growth 2006-2019
		Average annual rate of change	Average annual rate of change
Agriculture	13.9%	0.0%	8.0%
Manufacturing	30.3%	3.3%	4.0%
Paper	11.5%	2.8%	5.5%
Timber	44.3%	3.1%	4.3%

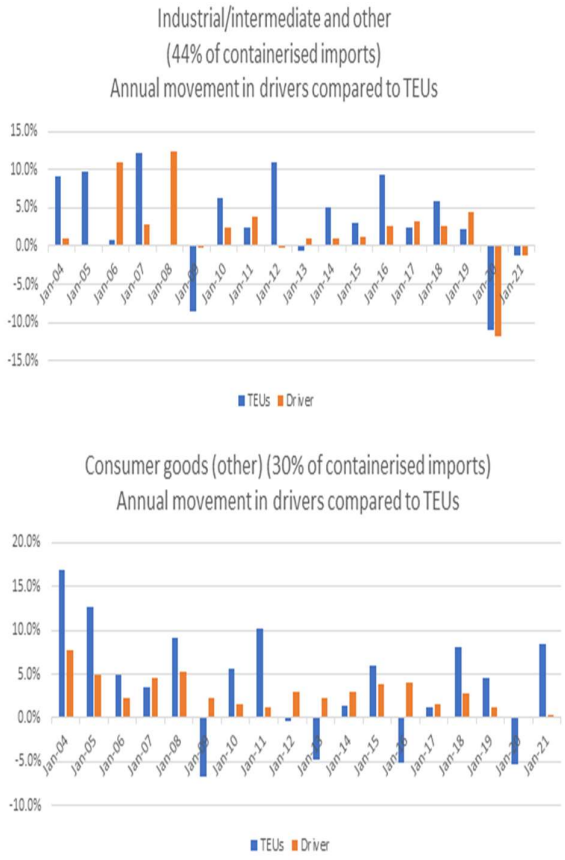
Source: FTI Consulting analysis based on Port of Melbourne, Tariff Compliance Statement 2021-22, Appendix L, BISOE trade volumes forecasting model.

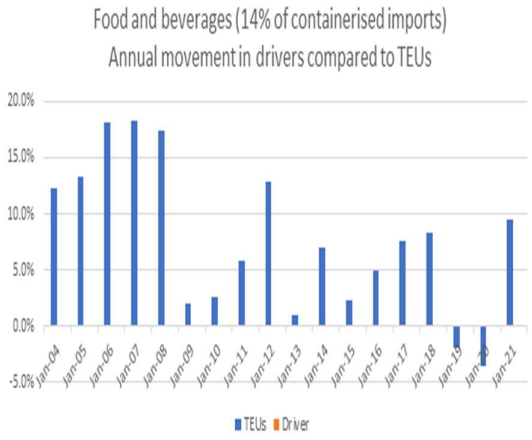
To test the explanatory power of the indices, Figure 5.2 compares TEU movements against predicted index movements for the four largest commodities. It demonstrates the volatility around the 1:1 relationship between the TEUs and the main driver. It shows that:

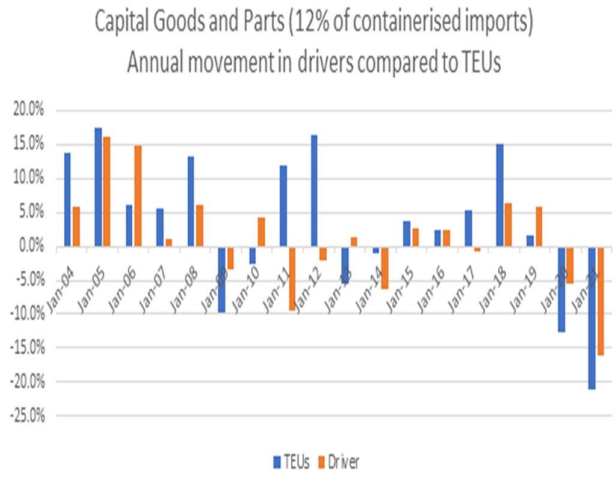
- Industrial, intermediate and other (44% of containerised imports) – In eight of 16 years' forecasts, the change in TEUs was within 5% of the movement in driver. This category saw an average volatility of 5.6% per year.
- Consumer goods (30% of containerised imports) – In nine of 16 years' forecasts, the change in TEUs was within 5% of the movement in driver. This category saw an average volatility of 6.4% per year.
- Food and beverages (14% of containerised imports) – There is no movement in the driver (population) due to an error in the modelling. As a result, the model's entire predictive power is in its error correction term. This may be appropriate if the series follows a random walk but is not the stated operation of the forecast. That said, in six of 16 years' forecasts, the change in TEUs was within 5% of the movement in driver. This category saw an average volatility of 8.3% per year.

- Capital goods and part (12% of containerised imports) – In five of 16 years' forecasts, the change in TEUs was within 5% of the movement in driver. This category was the hardest to predict with an average volatility of 9.2% per year.

Figure 5.2: Comparison of annual movements in drivers compared to TEUs – four largest exports







Source: FTI Consulting analysis based on Port of Melbourne, Tariff Compliance Statement 2021-22, Appendix L, BISOE trade volumes forecasting model.

Reasonableness of long-term container import forecasts

As described above, container imports are categorised as food imports, capital, intermediate and consumer goods. [redacted] We would expect:

- food imports to track population

[60] The Port of Melbourne provided many versions of the long-term model. [redacted]

- capital and intermediate goods to track industrial production and
- consumer goods to track State Final Demand (a measure of consumption) adjusted for a decreasing marginal propensity to import.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

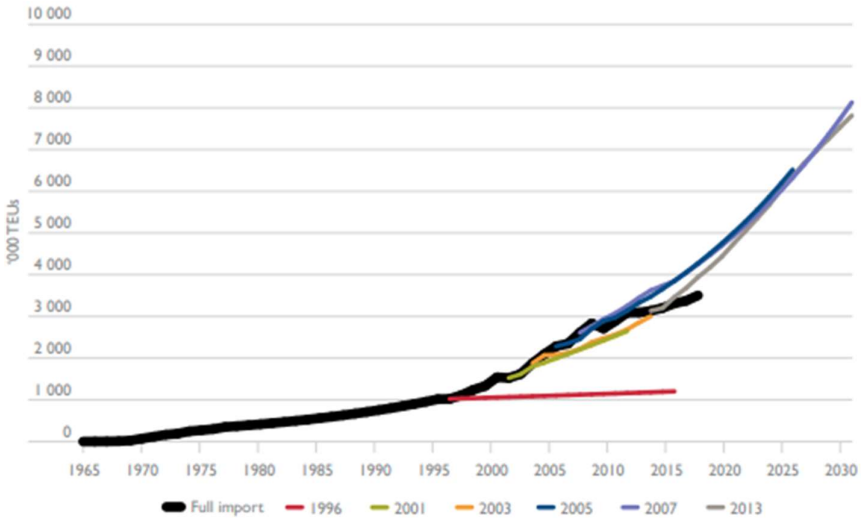
62 State of Victoria, Budget Paper 2 Strategy and Outlook, 2017, Melbourne VIC. Forecast of 2.75% CAGR over the forward estimates.

63 Commonwealth of Australia, 2015 Intergenerational Report - Australia in 2055, 2015, Canberra ACT. Forecast of 2.5% CAGR over the relevant period.

Public sources of alternative container forecasts exist, either in ports' periodic planning statements (for example, NSW Ports[64]forecasting 3.4% growth per year to 2050 or Bureau of Infrastructure Transport and Regional Economics (BITRE),[65] forecasting 5.5% growth per year to 2030).

BITRE presents a useful analysis considering the accuracy of its past forecasts.[66] Older forecasts typically supported growth rates of up to 5% and understated actual growth in the run-up to the Global Financial Crisis, whereas forecasts since 2005 have consistently overstated growth.

Figure 5.3: Container import through capital city ports (Actual TEUs and projections)



Source: Bureau of Infrastructure, Transport and Regional Economics (BITRE), Forecasting Australian Transport: A Review of Past Bureau Forecasts, Research Report 149, 2018.

In conclusion, the Port of Melbourne's long-term demand forecasts included in the PDS may be overstated for the following reasons:

- [redacted]

64 KPMG, Quay conclusions - Finding the best choices for additional port capacity in NSW, February 2019.

65 BITRE, Containerised and non-containerised trade through Australian ports to 2032–33, 2014. .

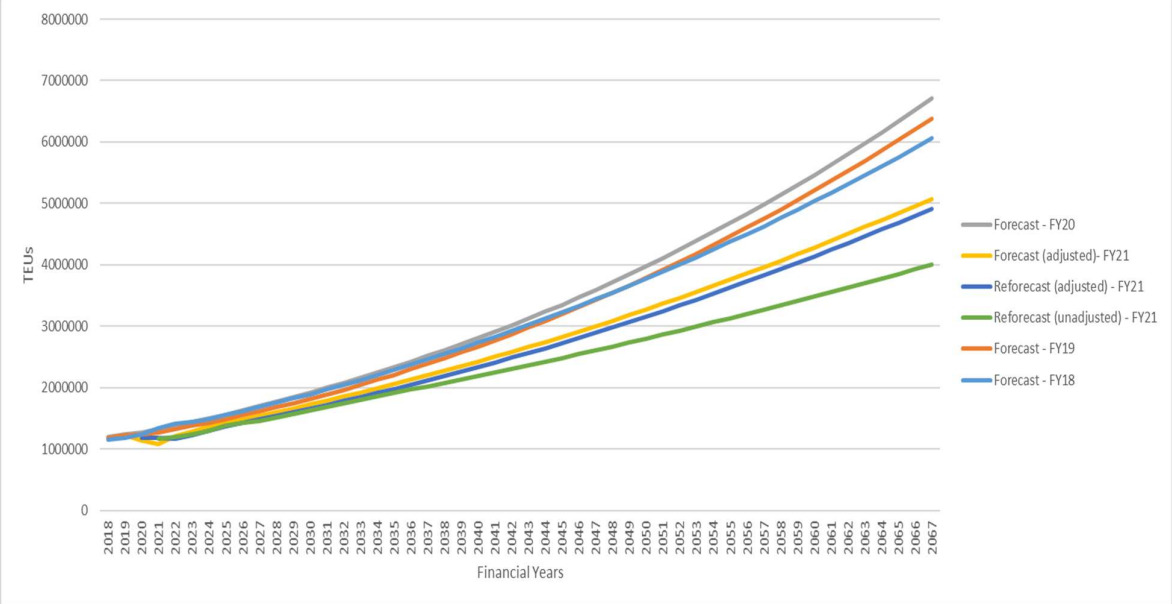
66 Bureau of Infrastructure, Transport and Regional Economics (BITRE), Forecasting Australian Transport: A Review of Past Bureau Forecasts, Research Report 149, 2018.

[redacted]

Despite being higher than expectations and recent history, the Port of Melbourne's forecasts are within the range of similar forecasts undertaken by both BITRE and peers such as NSW Ports. We note that BIS Oxford Economics prepares demand forecasts on a similar basis for many significant ports around the world.[67]

[redacted]

Figure 5.4: BIS Oxford Economics' long-term forecast performance import full containers (TEUs)



Source: [redacted]

[67] https://www.oxfordeconomics.com/about-us/sectors-we-serve/infrastructure

5.6.3. General cargo and break bulk

The forecasts in the BIS Oxford Economics *Trade Volumes Forecasting Model* are hard-coded, and do not provide a rationale for their value, in 2019-20 the workbook references an external source which was not supplied. The model documentation states:

> *Roll-on roll-off trade is presented in columns B and C (Table 1). Growth is assumed to track growth in Bass Strait trade for both imports and exports as this component of trade is focused between Victoria and Tasmania.*
>
> *Break bulk trade is presented in columns E and F (Table 2). Growth here is based on recent trends, partial FY19 data, and professional judgement where applicable.*[68]

The stated approach is reasonable, but the application of that approach could not be verified through the models submitted for review.

5.6.4. Empty containers

The model documentation states:

> *Empty imports are forecast using the historical relationship between full imports and empty imports as these tend to co-move. Forecasts of full imports (column B) are drawn from Sheet 3: 'Full-in'.*
>
> *Empty container exports are forecast using the fact that empty container movements must make up the gap between full imports and full exports –because containers that can't be filled with exports must be sent back empty. Net container imports (total imports less total exports, Column H) are projected forward and then the previously forecast import and export volumes are used to identify the necessary empty export volumes.*[69]

The approach to forecasting empty imports is unusual because these are likely to be specialist containers brought in to support an export trade, such as food grade containers, rather than a fixed relationship to full containers.

In addition, the stated calculation of empty imports does not match the modelling approach. The prior year balance is simply multiplied by 1.2 to derive the forecast. There is no fixed relationship with the past or forecast full imports.

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[68] BIS Oxford Economics, POM Forecast Mechanics (2019-20), p.8.

[69] BIS Oxford Economics, POM Forecast Mechanics (2019-20), p.9.

The logic in modelling empty exports as described in the *PoM Forecast Mechanics* documentation is sound, as the containers brought in should match those exported, with an allowance for retirement, wastage of damaged containers and repurposed units.

However, the calculation does not appear to balance the containers in with containers out, even allowing for a triangular trade with Bass Strait, until significant adjustments were made in the 2020-21 trade forecasts.

Up to the 2018-19 actuals, 2.3% of all container imports to Melbourne since 2006 have not been returned through the Port of Melbourne. This is at the high-end of plausible values.

The 2020-21 and 2021-22 forecasts included a significant adjustment to predicted outflows of empty containers, and empty exports exceeded full exports for the first time. This reversal is a dramatic change from previous predictions. However, there is currently a worldwide shortage of ships and containers because of post-COVID-19 trade. After this adjustment, 0.1% more containers will have been exported from Melbourne than have been imported since 2006 (reflecting, perhaps containers older than 15 years). This assumes no retirements of containers.

Table 5.3 shows our calculations.

Table 5.3: FTI Consulting calculations of the balance of containers

	International trade		Bass Strait		Net	
	Balance remaining	Share of imports	Balance remaining	Share of imports	Cumulative balance remaining	Share of cumulative imports
Jun-06	51,166	6.5%	-17,068	-13%	34,098	4.3%
Jun-07	35,810	4.2%	-20,309	-16%	49,599	3.0%
Jun-08	59,256	6.3%	-28,768	-23%	80,087	3.1%
Jun-09	33,199	3.8%	-14,701	-11%	98,585	2.9%
Jun-10	48,267	5.3%	-14,029	-11%	132,823	3.0%
Jun-11	34,029	3.5%	-16,527	-12%	150,325	2.8%
Jun-12	43,935	4.3%	-20,735	-16%	173,526	2.7%
Jun-13	58,055	5.6%	-26,444	-22%	205,137	2.8%
Jun-14	40,401	3.8%	-24,707	-21%	220,831	2.6%
Jun-15	41,907	3.8%	-20,635	-17%	242,103	2.5%

Jun-16	56,607	5.0%	-21,933	-18%	276,777	2.6%
Jun-17	39,991	3.5%	-21,459	-18%	295,309	2.5%
Jun-18	52,079	4.2%	-24,727	-19%	322,661	2.5%
Jun-19	33,022	2.6%	-21,171	-16%	334,512	2.3%
Jun-20	-110,943	-9.4%	-27,452	-22%	196,117	1.3%
Jun-21	-180,062	-15.2%	-39,859	-32%	-23,804	-0.1%

Source: FTI Consulting analysis based on Port of Melbourne, Tariff Compliance Statement 2021-22, Appendix L, BISOE trade volumes forecasting model.

5.6.5. Other bulk

All the other bulk forecasts appear to be hard-coded numbers in a spreadsheet and there are no calculations in the model.

[redacted]

5.6.6. Transhipments

All forecasts appear to be hard-coded numbers in a spreadsheet. The model does not appear to include any calculations.

We note that there is an error in the labelling of transhipments in and out in the *Trade Volume Forecasting Model*. The full transhipments-in (Forecasting model – Transhipments column C) is referenced in the summary Revenue Sheet as 'full transhipments-out' (Row 17), and that the converse is true for transhipments-out (Forecasting model – Transhipments column G) being referenced as 'full transhipments-in' (Row 18). [redacted]

5.6.7. Forecasts of channel, berth and wharf use

The trade volume forecasting models did not include channel forecasts, but the Port of Melbourne has provided these for 2017-18 to 2020-21. [redacted]

Table 5.4 shows how the approach has varied each year from 2017-18 to 2020-21.

Table 5.4: Basis for determining berthing, wharf and area hire charges

	2018	2019	2020	2021

Source:

[redacted]

[redacted]

[redacted]

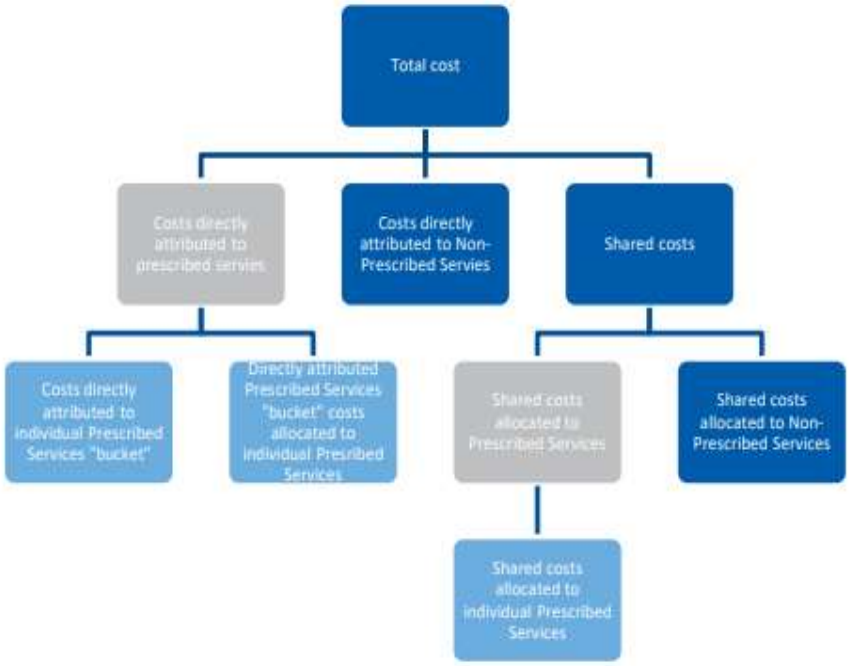
[redacted]

Appendix A Overview of cost allocation approach

A.1 Overview of the Port of Melbourne's cost allocation approach

The 2020-21 TCS and User Guide explain the Port of Melbourne's current cost allocation approach. Figure A.1 summarises the allocation approach.

Figure A.1: Overview cost allocation approach



Source: Port of Melbourne, Tariff Compliance Statement 2021-22, 31 May 2021, Cost Allocation Model User Guide, p.5.

Data

The key data used is as follows.

- **Cost/service map**: Operating expenditure categories and asset classes are mapped to individual services ('Allocators' and 'Mapping' sheets) to establish which services benefit from (or utilise) each operating expenditure category and asset class. These service types align with the tariff classes in Tariff Schedule in the Regulatory Model. Section A.3

summarises the current allocation of costs and asset classes to service type. The User Guide states that the mapping tables "are not expected to change significantly from one year to the next".

- **Revenue**: Actual revenue (2015-16 to 2019-20) and forecast revenue (2020-21) is presented for each service type ('Data' sheet) and used as the basis for allocating costs.
- **Operating expenditure**: Actual operating expenditure (2015-16 to 2019-20) and forecast operating expenditure (2020-21) is presented for each operating expenditure category ('Data' sheet). For the categories other than the Port Licence Fee and Cost Contribution Amount, this is split into (dedicated) 'prescribed', (dedicated) 'non-prescribed' and 'shared'. All references to 'shared' costs (and asset classes) refers to costs shared between prescribed and non-prescribed services.
- **Capital expenditure**: Actual capital expenditure (2015-16 to 2019-20) and forecast capital expenditure (2020-21) is presented for each asset class ('Data' sheet). This is separated into three categories: 'dedicated prescribed', 'shared' and 'dedicated non-prescribed'.

Steps: operating expenditure allocation

The User Guide explains the key steps in the process and how these are reflected in the CA Model. The main steps are summarised below.

Step 1: Allocation of operating expenditure between prescribed, shared and non-prescribed

This step sums total operating expenditure for each of the following categories:

- dedicated prescribed
- dedicated non-prescribed
- shared.

Step 2: Allocation of shared operating expenditure between prescribed and non-prescribed

A prescribed service allocator is calculated as the proportion of prescribed service revenue to total revenue. The total operating expenditure allocated to prescribed services is calculated as follows:

> *Shared operating expenditure allocated to prescribed services = total shared operating expenditure x prescribed service allocator*

Operating expenditure allocated to non-prescribed services is therefore:

> *Shared operating expenditure allocated to prescribed services = total operating expenditure – shared operating expenditure allocated to prescribed services*

Step 3: Allocation of prescribed services operating expenditure to individual prescribed services

Total operating expenditure is then allocated to each prescribed service type. Prescribed services operating expenditure comprises dedicated prescribed operating expenditure along with shared operating expenditure allocated to prescribed services (based on Step 2).

Step 3 allocates operating expenditure to each prescribed service type but only to the extent that the service type 'benefited' from the relevant operating expenditure category. For example, operating expenditure associated with Land Tax is not allocated to channel services. This is done by adjusting the 'revenue divisor' for each service type to only include the revenue from those services that benefit from the relevant operating expenditure category. That is:

- in determining the allocator to allocate shared operating expenditure to prescribed services (Step 2):
  - the numerator is total revenue from prescribed services
  - the denominator is total revenue from prescribed and non-prescribed services
- in determining the allocator to allocate the costs from each Prescribed Services operating expenditure category to each prescribed service type (Step 3):
  - the numerator is the revenue from the prescribed service type
  - the denominator is total revenue from all services (prescribed and non-prescribed) that benefit from that expenditure category.

This 'top down' approach estimates total operating expenditure for each category and then allocates it to each service type based on share of revenue. This applies to dedicated prescribed operating expenditure as well as shared expenditure – effectively treating prescribed services as a single operation, while still excluding costs from individual service types that are not relevant to the provision of that service.

Steps: capital expenditure allocation

The overall approach used to allocate capital expenditure is effectively the same – the main difference being that the costs being allocated is capital expenditure by asset class.

Step 1: Allocation of capital expenditure between prescribed, shared and non-prescribed

This step sums total operating expenditure for each of the following categories:

- dedicated prescribed
- dedicated non-prescribed
- shared.

Step 2: Allocation of shared capital expenditure between prescribed and non-prescribed

The prescribed service allocator is calculated in the same way as for operating expenditure, and hence the same allocator applies.

Step 3: Allocation of Prescribed Services capital expenditure to individual prescribed services

Consistent with the approach applied to operating expenditure, this step allocates prescribed services capital expenditure (comprising dedicated prescribed capital expenditure along with shared capital expenditure) to each prescribed service type. This is also done by adjusting the 'revenue divisor' for each service type to only include the revenue from those services that benefit from the relevant capital expenditure (or asset class).

A.2 Approach applied in prior years

Approach applied in the 2019-20 year

The CA User Guide and CA Model was first applied in 2019-20. There do not appear to have been any changes to the CA User Guide, CA Model or overall approach between 2019-20 and 2020-21.

Approach applied in the 2016-17, 2017-18 and 2018-19 years

Overall, the approaches described the 2017-18 and 2018-19 TCS appear consistent with the 2019-20 approach.[71] However, they do not provide sufficient detail to enable us to assess whether the cost allocation approach complies with the Pricing Order.

Appendix F of the 2018-19 TCS states that minor revisions were made to the allocation of costs between prescribed and non-prescribed services but does not state what these changes were.

[redacted]

[71] Appendix F of the 2017-18 and 2018-19 TCS provide an overview of the cost allocation approach applied in each year. It describes the Port of Melbourne's finance system and how costs are allocated to account codes.

Overall, based on the above information it is not be possible to form a clear view as to whether the Cost Allocation Principles have been complied with in these first three years. However, the Port of Melbourne has provided additional information that shows the approach applied, which is summarised below.

Approach shown in the supporting models

The steps followed by the Port of Melbourne in allocating costs in the first three years of the review period is summarised in Table A.1.

Table A.1: Cost allocation approach steps, 2016-17 to 2018-19

Category	Steps followed
Operating expenditure allocation	[redacted]
Capital expenditure allocation	[redacted]

Source: [redacted]

Overall, while the steps applied in these first three years differ to the steps contained in the CA Model that the Port of Melbourne now uses, they produce the same outcome. The key difference is that in the first three years, there was no subsequent allocation of prescribed services costs to individual service types based on revenue shares (as now occurs under the current approach).

A.3 Cost allocation by service type

Service	Asset classes	Operating expenditure
WHARFAGE		
Containerised – Full outward	Buildings	Port Licence Fee
Containerised – Full inward	Wharves	Cost Contribution Amount
Full Bass Strait	Plant	Insurance rates and taxes - prescribed and shared
Empty (included nested units)	Land	Land tax – prescribed and shared
Empty (return of materials)	Port Capacity Project – initial capital asset value	Labour costs – prescribed, shared, contaminated land group, land use planning
Non-containerised/general	Port Capacity Project – wharves	Repairs and maintenance – prescribed and shared
Accompanied passenger vehicles	Port Capacity Project – civil	Construction – prescribed and shared
Motor vehicles	Utilities	Professional services – prescribed, shared and land-use planning
Liquid bulk	Civil	Security – prescribed and shared
Dry bulk – outwards, overseas and coastal	Minor capital works	Utilities, admin, rental and IT – prescribed, shared, contaminated land group, land use planning
Dry bulk – inwards, overseas and coastal		Transition – prescribed, shared, land use planning
Transhipment – full outward		
Transhipment – full inward		
Transhipment – other		

CHANNELS		
Vessels up to and including maximum summer draught: shared channels **Vessels exceeding maximum summer draught: shared channels**	Shared channel Shared channel over-dredge Channel protection assets Channel service protection Plant Navigational aids Minor capital works	Port Licence Fee Cost Contribution Amount Insurance rates and taxes - prescribed and shared Labour costs – prescribed and shared Repairs and maintenance – prescribed and shared Construction – prescribed and shared Professional services – prescribed, shared and maintenance dredging project Security – prescribed and shared Utilities, admin, rental and IT – prescribed, shared, marine planning and projects, maintenance dredging project Transition – prescribed and shared
Vessels up to and including maximum summer draught: dedicated channels **Vessels exceeding maximum summer draught: dedicated channels**	Melbourne channel Melbourne channel over-dredge Channel protection assets Channel service protection Plant Navigational aids Minor capital works	Port Licence Fee Cost Contribution Amount Insurance rates and taxes - prescribed and shared Labour costs – prescribed and shared Repairs and maintenance – prescribed and shared Construction – prescribed and shared Professional services – prescribed, shared and maintenance dredging project Security – prescribed and shared Utilities, admin, rental and IT – prescribed, shared, marine planning and projects, maintenance dredging project Transition – prescribed and shared
Reduced channel fees: pure car carrier **Reduced channel fees: passenger cruise vessel** **Reduced channel fees: coastal liner vessel** **Reduced channel fees: vessels using dedicated and Geelong channels on same day entry to Pt Phillip Bay**	Shared channel Shared channel over-dredge Melbourne channel Melbourne channel over-dredge Channel protection assets Channel service protection	Port Licence Fee Cost Contribution Amount Insurance rates and taxes - prescribed and shared Labour costs – prescribed and shared Repairs and maintenance – prescribed and shared Construction – prescribed and shared Professional services – prescribed, shared and maintenance dredging project

	Plant Navigational aids Minor capital works	Security – prescribed and shared Utilities, admin, rental and IT – prescribed, shared, marine planning and projects, maintenance dredging project Transition – prescribed and shared
HIRE FEES		
Berth hirer: Maribyrnong No.1 **Berth hire: Holden dock (full charge)** **Berth hire: passenger cruise ships at berth other than Station Pier (full charge)** **Berth hire: lay up charge**	Plant Minor capital works	Port Licence Fee Cost Contribution Amount Insurance rates and taxes - prescribed and shared Labour costs – prescribed and shared Repairs and maintenance – prescribed and shared Construction – prescribed and shared Professional services – prescribed, shared and maintenance dredging project Security – prescribed and shared Utilities, admin, rental and IT – prescribed, shared, marine planning and projects, maintenance dredging project Transition – prescribed and shared
Wharf access: cargo **Slipway – flagfall** **Slipway – slipway hire** **Slipway – wharf edge access**	Roads Rail Plant Land Minor capital works	Port Licence Fee Cost Contribution Amount Insurance rates and taxes - prescribed and shared Land tax – prescribed and shared Labour costs – prescribed, shared, contaminated land group, land use planning Repairs and maintenance – prescribed and shared Construction – prescribed and shared Professional services – prescribed, shared and land-use planning Security – prescribed and shared Utilities, admin, rental and IT – prescribed, shared, contaminated land group, land use planning Transition – prescribed, shared, land use planning

Area hire: standard rate 6 – Yarraville **Area hire: standard rate F – Appleton Dock**	Plant Land	Port Licence Fee Cost Contribution Amount Insurance rates and taxes - prescribed and shared Land tax – prescribed and shared Labour costs – prescribed, shared, contaminated land group, land use planning Repairs and maintenance – prescribed and shared Construction – prescribed and shared Professional services – prescribed, shared and land-use planning Security – prescribed and shared Utilities, admin, rental and IT – prescribed, shared, contaminated land group, land use planning Transition – prescribed, shared, land use planning
OTHER FEES		
Tanker inspection **Other gangway hire** **Wharf inspection: pre-vessel arrival** **Wharf inspection: post-vessel departure**	Plant	Port Licence Fee Cost Contribution Amount Insurance rates and taxes - prescribed and shared Labour costs – prescribed and shared Repairs and maintenance – prescribed and shared Construction – prescribed and shared Professional services – prescribed and shared Security – prescribed and shared Utilities, admin, rental and IT – prescribed and shared Transition – prescribed and shared
OTHER PRESCRIBED		
Other prescribed		Insurance rates and taxes – shared Land tax - shared Labour costs – shared, contaminated land group and land use planning Repairs and maintenance – shared Construction –shared

		Professional services – shared and land use planning Security – shared Utilities, admin, rental and IT – shared, contaminated land group, land use planning Transition – shared and land use planning
NON-PRESCRIBED		
Non-prescribed	Shared channel Shared channel over-dredge Melbourne channel Melbourne channel over-dredge Channel protection assets Channel service protection Roads Rail Buildings Wharves Plant Land Port Capacity Project – initial capital asset value Port Capacity Project – wharves Port Capacity Project – civil Navigational aids Utilities Civil Minor capital works	Insurance rates and taxes – non-prescribed and shared Land tax – non-prescribed and shared Labour costs – non-prescribed, shared, contaminated land group and land use planning Repairs and maintenance – non-prescribed and shared Construction –non-prescribed and shared Professional services – non-prescribed, shared and land use planning Security – non-prescribed and shared Utilities, admin, rental and IT – non-prescribed, shared, contaminated land group, land use planning Transition – non-prescribed, shared and land use planning

Appendix B Major capital project assessment

Swanson Dock East Remediation and Upgrades

Swanson Dock East remediation and upgrade	[redacted]	**2016-17 to 2020-21**	**Prudent** **Efficient**

Overview of major project

[redacted]

[redacted]

Stage	Approved	Completed
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]

[redacted]

Prudency

We have assessed the Swanson Dock East remediation and upgrade to be prudent on the basis that:

- The works were essential for asset integrity and life extension for the period of the end of the current lease.
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

Efficiency

[redacted]

[redacted]

Port Rail Transformation Project (PRTP)

Port Rail Transformation Project	[redacted]	**2016-17 to 2020-21**	**Deemed prudent** **Efficient**

Overview of major project

In January 2020, the Port of Melbourne announced the Port Rail Transformation Project (PRTP) aimed at delivering a new rail operating framework from 1 June 2020 and deliver new rail infrastructure at the Port of Melbourne. The PRTP is designed to encourage freight to shift from road to rail through improved infrastructure and industry reform. It addresses both the infrastructure and commercial frameworks necessary to enable the supply chain to grow the rail mode share.

The PRTP is based on the need to develop a port rail solution that achieves the State's rail objectives, meets industry expectations, and positions the port for long-term success. The PRTP includes:

- new road and rail infrastructure to ensure appropriate capacity and operational flexibility for rail
- restructured commercial and ownership arrangements for port rail supporting an operating framework that drives operational rail efficiencies and establishes a structure that optimises rail user pricing
- a new operating model for port rail terminals that provides rules around access and service levels
- integration of the rail and stevedoring terminals at Swanson Dock East to deliver cost savings and operational efficiencies.

Under the 2020 Pricing Order Amendment, the project is funded through a wharfage tariff increase of $9.75 on all full import TEUs.

[redacted]

[redacted]

Prudency

The Amended Pricing Order deems the project and any capital acquisitions associated with the PRTP to be prudent. It also allows the Port of Melbourne to recover an allowance prescribed services for the forgone rent and third-party outgoings associated with land excised for the PRTP.

Efficiency

[redacted]

[redacted]

Maintenance Dredging Program

Maintenance Dredging Program	[redacted]	**2016-17 to 2020-21**	**Prudent** **Efficient**

Overview of major project

[redacted]

Prudency

We have assessed the Maintenance Dredging Program to be prudent on the basis that:

- Maintenance dredging is essential to achieving the declared depths in the channel, swing basin and berth pockets for safe access of shipping.

[redacted]

Efficiency

[redacted]

[redacted]

Port Capacity Project

Port Capacity Project	[redacted]	2016-17 2017-18	Deemed prudent Efficient

Overview of major project

The Port Capacity Project (PCP) was developed to meet the objectives and intent of the *Port Development Strategy – 2035 Vision* developed by the Port of Melbourne Corporation. The PCP comprised a major expansion of cargo handling and storage facilities at the Webb Dock Precinct. [redacted] It commenced pre-lease but was completed in the review period with $ $42.9m of expenditure in 2016-17 and $1.7 million in 2017-18.

Prudency

This project is deemed by the Pricing Order to be prudent.

Efficiency

We have assessed the $44.6 million PCP capital expenditure to be efficient on the basis that:

[redacted]

[redacted]

Additional Dredging 2019-20 – Use of Boskalis Magnor Dredge

Additional dredging	[redacted]	**2019-20**	**Prudent** **Efficient**

Overview of major project

In 2019-20, the Port of Melbourne rescoped its planned dredging campaign to take advantage of the opportunity to use the Boskalis Australia Pty Ltd (Boskalis) Magnor dredger (the largest backhoe dredger in the world) while it was in Australia.

[redacted]

Prudency

We have assessed the Additional Dredging (and use of the Boskalis Magnor Dredge) project to be prudent on the basis that:

- [redacted]
- The 2019-20 Additional Dredging took advantage of the Boskalis Magnor Backhoe Dredger being in Australia, thereby minimising mobilisation costs and leveraging this dredger's greater productivity and cost effectiveness.

[redacted]

- The TCS 2017-18 noted feedback from port users/stakeholders expressing a desire to use larger vessels to increase efficiencies, and the Port of Melbourne's own analysis supported undertaking growth-related capital expenditure sooner than anticipated to accommodate larger vessels as set out in the PDS 2050.

Efficiency

[redacted]

Big Ships Strategy

Big Ships Strategy	2018-19 to 2020-21	Prudent

Overview of major project

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Prudency

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

72 [redacted]

[redacted]

Webb Dock East Upgrades – [redacted]

Webb Dock East upgrades	[redacted]	**2019-20 to 2020-21**	**Prudent** **Efficient**

Overview of major project

Webb Dock East was completed as part of the Port Capacity project in 2016. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Prudency

[redacted]

We have not assessed the prudency of future capital expenditure, which will depend on the scope and timing of that expenditure.

Efficiency

[redacted]

- [redacted]
- [redacted]
- [redacted]

- [redacted]

Swanson Dock Upgrades – [redacted]

Swanson Dock Upgrades	[redacted]	**2018-19 to 2020-21**	**Prudent** **Efficient**

Overview of major project

[redacted]

Prudency

[redacted] Capital expenditure to end June 2021 is considered to be prudent. The prudency of future capital expenditure has not been assessed and will depend on the scope and timing of that expenditure.

Efficiency

[redacted]

- [redacted]
- [redacted]

- [redacted]
- [redacted]
- All projects delivered to date have achieved cost outcomes within allocated budgets.

South Wharf Precinct rehabilitation works

South Wharf Precinct rehabilitation works	[redacted]	**2017-18 to 2019-20xxxxx**	**Prudent** **Efficient**

Overview of major project

[redacted]

- [redacted]
- [redacted]

Prudency

We have assessed the South Wharf Precinct rehabilitation works to be prudent on the basis that:

[redacted]

Efficiency

[redacted]

- [redacted]
- [redacted]

- The adopted process provided the lowest cost of providing the Prescribed Services.

Swanson Dock West Remediation and Upgrade

Swanson Dock West Remediation and Upgrade	[redacted]	**2020-21**	**Prudent** **Efficient**

Overview of major project

[redacted]

[redacted]

[redacted]

[redacted]

Prudency

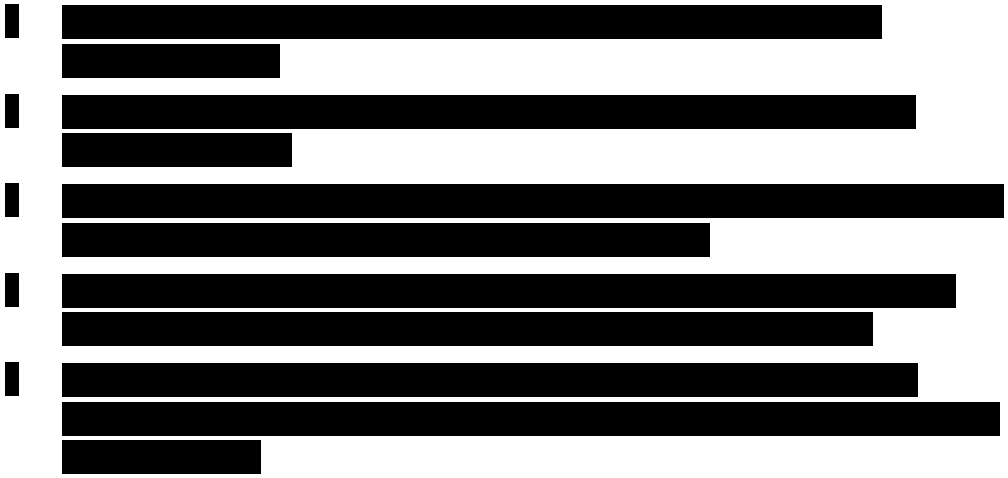
We have assessed the Swanson Dock West remediation and upgrade project to be prudent on the basis that:

- [redacted]
- [redacted]
- [redacted]
- [redacted]

Efficiency

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]



Appendix C Ex-post performance of demand forecasts

Projecting volumes one year ahead for port trades is not difficult unless significant unpredictable events such as COVID-19 occur. There is a high degree of hysteresis in port trade data such that the prior year's trade can predict more than 91%[73] of this year's trade in any containerised export commodity, or 98% of this year's trade in any containerised import commodity.

We tested predictions for 2017-18, 2018-19 and 2019-20 by comparing the forecasts of full containers-in and full containers-out made for those years against the actuals reported three years subsequently. Our hypothesis was that trade is subject to many unpredictable variables, and last year's forecast is a good predictor of next year's trade.

The conclusions from our analysis were mixed. A random walk hypothesis was a better predictor of containers-out (21% more accurate), and a better predictor of containers-in (15% more accurate). This result reflected the drop in container volumes in 2020, which was against trend growth in BISOE's 2019-20 forecasts. However, for both of those categories the random-walk hypothesis was biased, underpredicting the demand for containers-in every year, and containers-out most years.

A random walk model is not appropriate for long range forecasts where structural changes may be relevant, whereas the approach taken by the Port of Melbourne is appropriate for that purpose. If consistency of the short-range approach with the long-term approach, then their continuing use is understandable even if there are more accurate time-series models available for short term forecasts.

73 Goodness-of-fit, measured by R^2 statistic. For most commodities, the R^2 of an auto-regressive model was greater than 0.98, the lowest R^2 was 0.91 - calculated using the same data as provided by the Port of Melbourne in its 2020-21 Tariff Compliance Submission.

Table C.1: Comparison of forecasts between 2020-21 regulatory model and forecasting model

Regulatory model demand less forecast demand		2016	2017	2018	2019	2020	
Wharfage fees		**Actuals**	**Actuals**	**Actuals**	**Actuals**	**Forecasts**	**Difference from forecast**
Containerised - Full - outward	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Containerised - Full - inward	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Containerised - Full - Bass Strait	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Containerised - Empty	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Containerised - Empty - Bass Strait (incl transhipment)	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Containerised - Empty returns	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Non-containerised/general	tonne or cm	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Accompanied passenger vehicles	tonne or cm	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
Motor vehicles	tonne or cm	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Liquid bulk	tonne or cm	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dry bulk - inwards - overseas and coastal	tonne	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dry bulk - outwards - overseas and coastal	tonne	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Transhipment - Full - outward	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Transhipment - Full - inward	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Transhipment - Full - Bass Strait	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Transhipment - Containerised Empty (excl Bass Strait)	TEU	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Transhipment - Motor vehicles and break bulk	tonne or cm	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Transhipment - Non-containerised/general	tonne	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Source: FTI Consulting analysis based on [redacted] *and 2020-21 Appendix L - BISOE trade volumes forecasting model.*

Table C.2: Revenue summary in 2020-21 BIS Oxford Economics forecasts

Wharfage volumes		2016	2017	2018	2019	2020	2021
Containerised - Full - outward	TEU	657,810	701,037	749,977	689,727	656,355	658,926
Containerised - Full - inward	TEU	1,072,624	1,105,845	1,199,795	1,219,638	1,111,449	1,110,835
Containerised - Full - Bass Strait	TEU	191,615	190,271	198,827	202,190	185,864	188,375
Containerised - Empty	TEU	479,777	454,675	495,962	615,132	707,929	773,863
Containerised - Empty - Bass Strait (incl transhipment)	TEU	77,418	72,285	90,714	82,958	96,208	96,912
Containerised - Empty returns	TEU	2,910	2,951	3,703	3,387	3,928	3,956
Non-containerised/general	tonne or cm	2,564,994	2,692,591	3,403,106	3,691,565	3,019,241	3,082,557
Accompanied passenger vehicles	tonne or cm						
Motor vehicles	tonne or cm	6,719,255	6,802,604	7,271,296	6,809,668	5,356,357	6,282,305
Liquid bulk (excl Mobil at Gellibrand)	tonne or cm	2,618,259	2,602,487	2,868,747	2,526,669	2,585,456	1,900,850
Liquid bulk - Inward (Mobil at Gellibrand)	tonne or cm	3,444,973	3,470,794	3,197,018	3,802,459	3,195,191	4,180,034

Liquid bulk - Outward (Mobil at Gellibrand)	tonne or cm	176,060	212,172	185,494	196,043	177,354	196,043
Dry bulk - inwards - overseas and coastal	tonne	3,443,632	3,324,602	3,770,036	3,932,322	3,622,243	3,233,080
Dry bulk - outwards - overseas and coastal	tonne	261,643	973,810	912,066	46,997	63,777	465,938
Transhipment - Full - outward	TEU	57,242	60,411	71,367	78,219	64,959	64,923
Transhipment - Full - inward	TEU	40,167	42,110	45,788	52,640	39,381	39,345
Transhipment - Full - Bass Strait	TEU	36,144	37,209	42,815	38,007	33,820	34,835
Transhipment - Containerised Empty (excl Bass Strait)	TEU	18,608	19,827	16,239	20,350	22,453	22,453
Transhipment - Motor vehicles and break bulk	tonne or cm	8,943	14,233	90,424	122,557	122,557	122,557
Transhipment - Non-containerised/general	tonne	3,201	1,072	8,389	11,850	11,850	11,850

Source: FTI Consulting analysis based on data in 2020-21 Appendix L - BISOE trade volumes forecasting model.

Table C.3: Wharfage estimates in 2020-21 regulatory model

		2016	2017	2018	2019	2020	2021
Wharfage fees		Actuals	Actuals	Actuals	Actuals	Forecasts	Forecasts
Containerised - Full - outward	TEU	657,810	708,538	759,229	699,874	734,377	658,926
Containerised - Full - inward	TEU	1,072,624	1,105,845	1,199,644	1,222,988	1,292,787	1,110,835
Containerised - Full - Bass Strait	TEU	191,615	190,268	198,831	202,223	217,738	188,375
Containerised - Empty	TEU	479,777	454,675	495,300	617,372	632,294	773,863
Containerised - Empty - Bass Strait (incl transhipment)	TEU	77,418	75,209	94,155	81,530	89,313	96,912
Containerised - Empty returns	TEU	2,910	2,951	1,317	476	3,504	3,956
Non-containerised/general	tonne or m^3	2,564,994	2,692,591	3,373,714	3,691,439	3,714,055	3,082,557
Accompanied passenger vehicles	tonne or m^3	-	-	-	-	-	-
Motor vehicles	tonne or m^3	6,719,255	6,802,604	7,271,845	6,763,260	7,296,448	6,282,305
Liquid bulk*	tonne or m^3	2,618,259	2,602,487	2,865,399	2,524,530	4,710,959	6,276,928

Dry bulk - inwards - overseas and coastal	tonne	3,443,632	3,324,602	3,739,036	3,932,321	3,619,664	3,233,080
Dry bulk - outwards - overseas and coastal	tonne	261,643	973,810	912,182	46,996	377,984	465,938
Transhipment - Full - outward	TEU	57,242	60,411	70,983	78,471	83,800	64,923
Transhipment - Full - inward	TEU	40,167	42,110	45,740	52,359	58,221	39,345
Transhipment - Full - Bass Strait	TEU	36,144	37,209	42,821	37,847	44,355	34,835
Transhipment - Containerised Empty (excl Bass Strait)	TEU	18,608	19,827	19,697	23,019	13,946	22,453
Transhipment - Motor vehicles and break bulk	tonne or m^3	8,943	14,233	89,602	122,747	128,353	122,557
Transhipment - Non-containerised/general	tonne	3,201	1,642	9,422	14,936	10,122	11,850

** Assumed to exclude Mobil trade at Gellibrand separately forecast by BIS Oxford Economics.*

Source: Port of Melbourne, Tariff Compliance Statement 2020-21, Appendix B, Regulatory Model.

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