



PREDICTIVE  
ANALYTICS  
GROUP

# Department of Infrastructure and Regional Development –

## Cost Benefit Analysis of Regulatory Coastal Shipping Options

### Final Report April 2015

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# CONTENTS

Executive Summary	1
1. Introduction	7
1.1 Background	7
1.2 Terms of Reference and Scope	8
1.3 Approach	9
1.4 Structure of the Report	10
2. Overview of current regulatory context	11
2.1 Current legislative regime	11
2.1.1 The Coastal Trading Act	11
2.1.2 Shipping Registration Act	12
2.2 Summary of regulatory settings by ship type	12
3. Policy options	14
3.1 Option 1: Removal of all regulation of access to coastal trading	14
3.2 Option 2: Option 1 plus enactment of legislation to account for potential undesired effects of other Australian laws	2
3.3 Option 3: Maintain current coastal trading licensing scheme with amendments to regulatory settings to minimise industry burden and costs	2
3.4 Option 4: Introduce single permit system for coastal trading to replace current licensing scheme, with amendments to regulatory settings to create equal opportunity between Australian and foreign ship operators	3
3.5 Option 5: Australian Master and Chief Engineer required if the vessel operates more than 120 days	4

3.6	Option 6: Australian Master and Chief Engineer required if the vessel operates more than 183 days	4
4.	Framework	5
4.1	Overview of CBA framework	5
4.2	Evaluation of policy options	7
5.	Assumptions	9
5.1	Ship cost assumptions	9
5.1.1	Crew costs	9
5.1.2	Other operating costs	11
5.1.3	Capital costs	11
5.1.4	Foreign ship costs	12
5.2	Daily time charter costs by ship type	12
5.3	Market share assumptions	19
5.3.1	Bauxite - Weipa to Gladstone	25
5.3.2	Bauxite - Triangular route	26
5.3.3	Iron Ore	26
5.3.4	Other Dry Bulk	27
5.3.5	Crude Oil	29
5.3.6	Petroleum	30
5.3.7	Other Liquid Bulk	31
5.3.8	Cruise shipping	32
5.3.9	Inter-Capital containers	34
5.3.10	Bass Strait Non-Bulk Freight	34
5.4	Cargo forecasts	35
5.4.1	Introduction	35
5.4.2	PAG Forecasting methodology	36
6.	Results	38
6.1	NPV Results	38
6.2	Sensitivity analysis	42

6.2.1	Reduced manning	42
6.2.2	Shadow price factor	46
6.2.3	SIA Part A wages	49
6.2.4	3% NPV	52
6.2.5	10% NPV	54
6.4	Limitations	57
Appendix A – Refinements to the BITRE shipping cost model		58
Appendix B – Shipping industry survey		61
Appendix C – Data collection		68
Appendix D – Compliance requirements		69

# List of Tables

Table 4.1 – OBPR CBA Framework.....	5
Table 5.1 - Vessel characteristics (base case scenario) .....	14
Table 5.2 - Vessel characteristics (policy scenarios).....	15
Table 5.3 - Daily time charter financial costs (\$ per day).....	16
Table 5.4 - Daily time charter economic costs (\$ per day).....	17
Table 5.5 - Market share assumptions for Bauxite - Weipa to Gladstone Trade .....	25
Table 5.6 - Market share assumptions for Bauxite - Triangular Trade .....	26
Table 5.7 - Market share assumptions for Iron Ore Trade .....	27
Table 5.8 – Other dry bulk market shares based on volumes traded in 2014.....	28
Table 5.9 – Tax treatment of General Licence vessels .....	28
Table 5.10 - Market share assumptions for Other Dry Bulk Trade.....	29
Table 5.11 - Market share assumptions for Oil .....	30
Table 5.12 - Market share assumptions for Petroleum .....	31
Table 5.13 - Market share assumptions for Other Liquid Bulk .....	32
Table 5.14 - Market share assumptions for cruise shipping .....	33
Table 5.15 - Market share assumptions for Bass Strait non-bulk freight .....	35
Table 6.1 - NPV results (\$m) (main scenario) .....	38
Table 6.2 - NPV results (\$m) (main scenario) .....	41
Table 6.3 - Crew cost /benefit across cargo sectors .....	42
Table 6.4 - NPV results (\$m) (Reduced Manning Scenario) .....	45
Table 6.5 - NPV results (\$m) (lower shadow price factor scenario) .....	48
Table 6.6 - NPV results (\$m) (SIA Part A wages scenario).....	51
Table 6.7 - NPV results (\$m) (3% NPV scenario).....	53
Table 6.8 - NPV results (\$m) (10% NPV scenario) .....	56

# List of Figures

Figure 4.1- Base case scenario for each cargo trade by financial year.....	6
Figure 5.1- Percentage of foreign vessels registered in each flag state.....	10
Figure 5.2- Crude Oil freight per vessel (in aggregate) per financial year .....	20
Figure 5.3 –Iron Ore freight per vessel (in aggregate) by financial year.....	21
Figure 5.4 –Other Liquid freight per vessel (in aggregate) by financial year .....	22
Figure 5.5 –Bass Strait freight by vessel for 2014 financial year .....	22
Figure 5.6 –Other Dry Bulk freight by vessel 27/7/2012 – 2/11/2014 .....	23
Figure 5.7: Statistical Modelling Framework .....	36
Figure 6.1- Main Scenario NPV results (\$m).....	39
Figure 6.2- NPV results (\$m) (Reduced Manning vs Main Scenario – Part A) .....	43
Figure 6.3- NPV results (\$m) (Reduced Manning vs Main Scenario – Part B) .....	44
Figure 6.4- NPV results (\$m) (Lower Shadow Price Factor vs Main Scenario – Part A) .....	46
Figure 6.5- NPV results (\$m) (Lower Shadow Price Factor vs Main Scenario – Part B) .....	47
Figure 6.6- NPV results (\$m) (SIA Part A Wages vs Main Scenario – Part A).....	49
Figure 6.7- NPV results (\$m) (Reduced Manning vs SIA Part A Wages – Part B).....	49
Figure 6.8- NPV results (\$m) (Main Scenario vs Discount Factor = 3% - Part A) .....	52
Figure 6.9- NPV results (\$m) (Main Scenario vs Discount Factor = 3% - Part B) .....	52
Figure 6.10- NPV results (\$m) (Discount Factor = 10% vs Main Scenario - Part A).....	54
Figure 6.11- NPV results (\$m) (Discount Factor = 10% vs Main Scenario - Part B).....	55



## Executive Summary

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### Background and Scope

The Department of Infrastructure and Regional Development (**the Department**) engaged Predictive Analytics Group (**PAG**) in May 2014 to conduct a cost-benefit analysis (**CBA**) of three coastal trading regulatory options to inform a Regulation Impact Statement (**Phase 1**). These regulatory options were outlined in the Department's Options Paper: *Approaches to regulating coastal shipping in Australia, April 2014* (**the Options Paper**).

Phase 1 also included certain intermediate deliverables, namely:

- the refinement and update of the existing Bureau of Infrastructure, Transport and Regional Economics (**BITRE**) Ship Cost model having regard to the PwC review of the previous BITRE CBA of the proposed (at the time) 2012 shipping reform package; and
- the capture and analysis of industry data.

At the conclusion of Phase 1, PAG delivered a comprehensive report to the Department outlining the results of its CBA. PAG was re-engaged in October 2014 to model the costs and benefits associated with three additional options and the inclusion of Cruise Shipping as a new sector (**Phase 2**). PAG was again re-engaged in March 2015 to remodel the costs associated with the six options based on updated license data provided by the Department (**Phase 3**). This report outlines the CBA results in relation to all six regulatory options under consideration by the Department, namely:

1. Option 1: Removal of all regulation of access to coastal trading via a repeal of the *Coastal Trading (Revitalising Australian Shipping) Act 2012* (**the Coastal Trading Act**).
2. Option 2: Removal of all regulation of access to coastal trading and enactment of legislation to account for potential undesired effects of other Australian laws, such as the *Customs Act 1901* (**the Customs Act**).
3. Option 3: Maintain current coastal trading licensing scheme with amendments to regulatory settings to minimise industry burden and costs.
4. Option 4: Continued regulation of coastal trading but with amendments to regulatory settings to create equal opportunity between Australian and foreign ship operators.
  - a. This approach would replace the existing four tiered licensing framework with a single coastal trading permit for both Australian and foreign ships.
5. Option 5: Australian Master and Chief Engineer required if the vessel operates more than 120 days (Variant 1 of Option 4).
  - a. This requires foreign vessels to operate with an Australian Master and Chief Engineer on the Seagoing Industry Award 2010 (SIA) Part B wages for Australian and foreign crew, if performing coastal voyages for more than 120 days per year.
6. Option 6: Australian Master and Chief Engineer required if the vessel operates more than 183 days per year (Variant 2 of Option 4).
  - a. This requires foreign vessels to operate with an Australian Master and Chief Engineer on SIA Part B wages for Australian and foreign crew, if performing coastal voyages for more than 183 days.





## Approach

In Phase 1 of the engagement, PAG undertook the following steps to identify the costs and benefits associated with the proposed regulatory options:

1. A project initiation meeting was held with the Department in the week following commencement of the engagement to confirm the scope of the engagement and key deliverables.
2. A shipping industry survey was developed to serve as a data collection tool for the CBA.
  - This included development of a web-based survey.
3. The BITRE Ship Cost model (2011) was reviewed and the refinements and updates required to be made were identified and implemented.
4. Data collected from the shipping industry survey were analysed and assessed for usefulness for incorporation into updates of the BITRE Ship Cost model (where appropriate).
5. Remaining data required were collected from the Department and other sources.
6. Projected net benefits were developed under each regulatory scenario and sensitivity analysis conducted using (and after updating) the Department's previous CBA workbook.
7. Finally, a report was produced outlining the expected net benefits associated with each regulatory option.

Following completion of Phase 1, PAG undertook the following steps for Phase 2:

1. A project initiation meeting was conducted via teleconference on the 30th of October 2014.
2. Dialogue with the Department and BITRE to clarify and update assumptions was conducted - the current model was examined to determine whether additional variables were required for inclusion in the execution of the current cost-benefit analysis.
3. Data collection and analysis of three additional scenarios.
4. The model was updated with the latest observations and source information relating to any additional variables required to model the three new options.
5. Following data collection, PAG examined the underlying properties of the data and applied statistical techniques to identify anomalies.
6. Development of base case and the 3 additional policy scenario projections, using quantitative and qualitative techniques to isolate and quantify each relevant item.
7. A workshop was conducted to present key findings and seek feedback from the Department, BITRE and key participants.
8. This report was then updated to reflect the modelling results of the new policy scenario variants and expected net benefits associated with each regulatory option.

## Key Findings

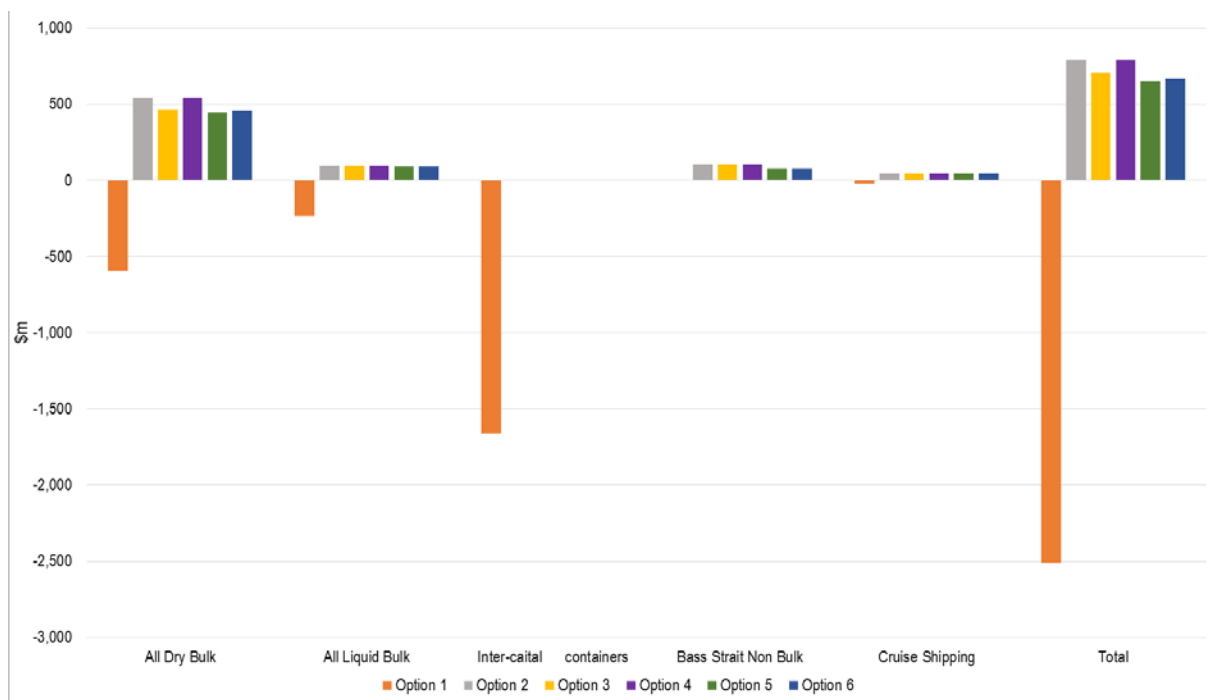


The CBA is conducted from 1 December 2014 with any change in regulatory settings assumed to commence from 1 July 2015 and the net economic benefits of a regulatory change measured over a 20 year horizon. We define net economic benefit in Net Present Value (NPV) terms.<sup>1</sup> The chart below summarises the key results of the NPV analysis.

**NPV results (\$m) over the 20 year horizon**

Option	2015	2016	2017	5 years	10 years	20 years
1	-184.9	-194.4	-204.1	-886.5	-1624.9	-2510.7
2	41.3	57.8	68.9	280.7	531.5	786.2
3	38.6	51.0	61.3	252.0	476.9	705.3
4	41.3	57.8	68.9	280.7	531.5	786.2
5	32.7	45.8	57.0	231.9	442.8	653.6
6	33.2	46.5	57.9	235.8	450.7	667.4

**NPV results (main scenario)**



**Note:** In accordance with the Office of Best Practice Regulation – Department of Prime Minister and Cabinet (OBPR) guidance a discount value of 7 per cent is assumed to facilitate the CBA. Tables and charts presenting results at discount rates of 3 per cent and 10 per cent can be found in section 6.3.4 and 6.3.5 respectively. Note: For Inter-capital containers, we observe large economic costs for Option 1 whilst there are no economic costs/benefits for all other Options.

<sup>1</sup>  $NPV(i, N) = \sum_{t=0}^N \frac{R_t}{(1+i)^t}$  where  $t$  denotes the time of the cash flow,  $i$  is the discount rate, and  $R_t$  is the cash flow. Note, when the  $NPV > 0$  the policy has net positive benefits (compared to the base case), when  $NPV < 0$  the policy under examination would subtract value from the industry and the economy, and when  $NPV = 0$  the industry and the economy as a whole would neither gain nor lose from the implementation of the particular policy option.



The results show that Options 4 and 2, are the most favourable options in the medium to long-term from an economic benefit standpoint. According to the CBA, Option 4 generates net benefits of approximately \$786.2m. Option 2 also generates net benefits of approximately \$786.2m. Options 4 and 2 are closely followed by Options 3 and 6 which produce net benefits of approximately \$705.3m and \$667.4m respectively. The table below summarises the results for all cargo types and options.

**NPV results – all cargo types and options (main scenario)**

Policy Options	Dry Bulk					Liquid Bulk				Inter-capital containers	Bass Strait Non-Bulk	Cruise Shipping	Total
	Bauxite Triangular	Bauxite Weipa-Gladstone	Iron Ore	Other Dry Bulk	Sub-total	Oil	Petroleum Products	Other Liquid Bulk	Sub-total				
Option 1	-100.9	-105.0	-91.0	-296.9	-593.8	-24.9	-172.6	-37.0	-234.5	-1662.1	0.0	-20.2	-2510.7
Option 2	0.0	249.6	29.9	262.9	542.4	9.4	71.7	14.0	95.1	0.0	103.5	45.2	786.2
Option 3	0.0	249.6	29.9	182.0	461.5	9.4	71.7	14.0	95.1	0.0	103.5	45.2	705.3
Option 4	0.0	249.6	29.9	262.9	542.4	9.4	71.7	14.0	95.1	0.0	103.5	45.2	786.2
Option 5	0.0	168.0	29.9	247.0	444.9	9.4	66.1	13.4	88.9	0.0	74.6	45.2	653.6
Option 6	0.0	181.3	29.9	247.0	458.2	9.4	66.1	14.0	89.5	0.0	74.6	45.2	667.4

The results in the above table are presented in terms of the relative impact of each policy option to the base case. For example, Options 4 and 2 generate a positive economic cost savings of \$786.2 compared to the base case. The difference in total NPV economic cost savings across policy options 2-4 can largely be attributed to Other Dry Bulk where large volumes of trade is undertaken by domestic vessels. Domestic vessels are more sensitive to variation across the policy options since they have the most to gain from changing their crew composition. Accordingly, we observe greater variation in NPV economic cost savings for this trade. All other cargo trades are undertaken by predominantly foreign vessels and thus the economic cost savings are relatively similar across policy options 2-4.

Option 1 results in a significant NPV economic cost of \$2,510.7m. The primary reason is that the cost of replacing foreign crew on Maritime Crew Visas (MCV) with either Australian crew or crew who hold 457 visas greatly increases the crew cost for a foreign vessel previously paying SIA Part B or ITF wage rates.<sup>2</sup> Furthermore, the cost associated with moving inter-capital containers onto rail under Option 1 is approximately \$1,662.1m.

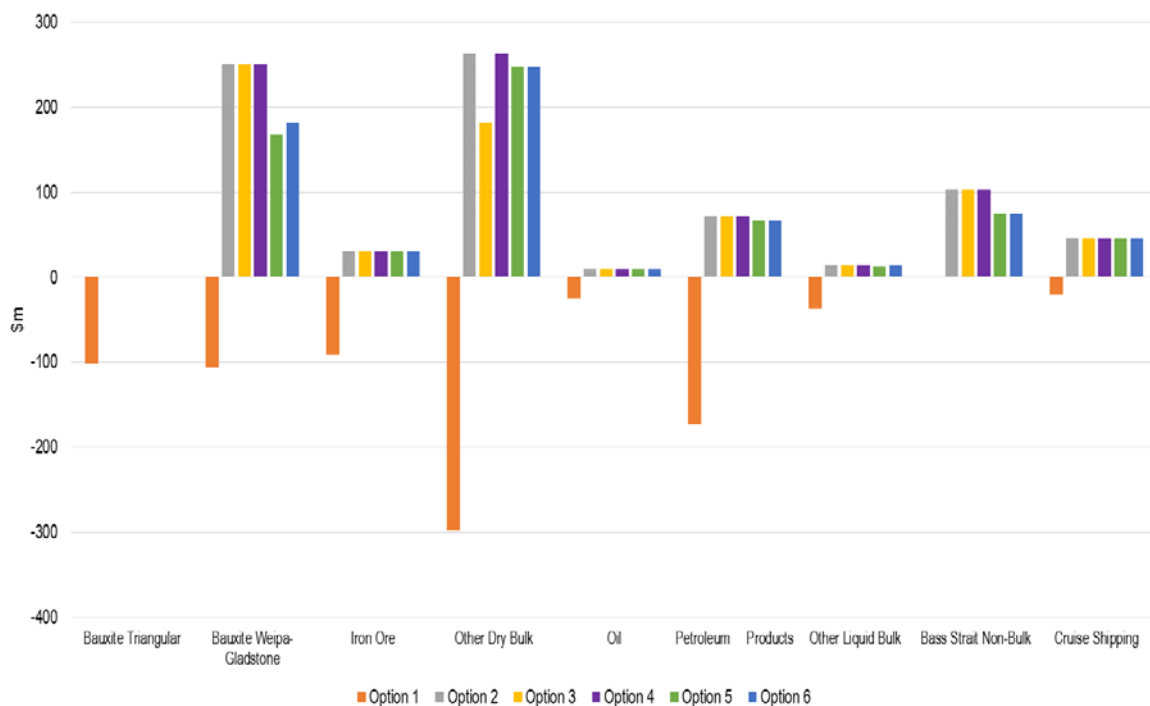
<sup>2</sup> It is important to note that this result does not change if GST is factored. GST charged on importation may only serve to further reduce the market share of foreign vessels; as Australian vessels take up an increased freight task, higher net costs are still incurred as Australian vessels (under the modelling assumptions) have higher economic daily time charter costs than foreign vessels.



Option 2, generates a NPV economic cost saving of \$786.2m. The removal of temporary licences under this option means that foreign vessels gain an increased share of the market. Furthermore, ship owners may have little incentive to register vessels in the Australian General Register (Australian flagged) and may opt to register their vessels under a foreign register (foreign flagged) and employ an entirely foreign crew. It is assumed that foreign vessels manned entirely by foreign crew incur lower economic costs compared with Australian flagged vessels. As such, foreign vessels may capture tonnage away from Australian flagged vessels.<sup>3</sup>

Option 3 yields NPV economic cost savings of \$705.3m. The cost reductions under Option 3 result purely from an increase in the share of the freight task attributed to foreign vessels. Relative to Option 2, Option 3 generates less economic cost savings.<sup>4</sup> The reason for this is that it is assumed (under Option 3) that ship owners continue to register vessels in the Australian General Register and maintain Australian crew rather than register in a foreign register and employ foreign crew. Isolating and quantifying the exact number of jobs Australian seafarer jobs displaced under Option 3, relative to Option 2, is a complicated task. Notwithstanding, it is assumed that since, under Option 3 foreign vessels ship an increased share of the freight task, there may be some displacement of Australian operated vessels and Australian seafarer jobs relative to the base case scenario.

**NPV results – all cargo types and options (main scenario)**



<sup>3</sup> It is important to note that not all possible costs and benefits that may be associated with Option 2 are not captured entirely by the CBA and the ensuing NPV results. These include a potential loss of Australian seafarer jobs which may have flow-on implications for shore-based maritime skills and the shore-based maritime sector in general. Legislative costs associated with the identification, and enactment, of new legislation to negate the undesired effects of a repeal of the Coastal Trading Act are also not captured.

<sup>4</sup> Inter-capital containers has been purposefully excluded from the chart as it only relates to Option 1 and the magnitude of the impact (-\$1,662.1) skews the chart making the remaining results unintelligible.



Similar to Option 2, Option 4 yields NPV economic cost savings of \$786.2m. Options 2 and 4 represent the highest economic cost savings of all policy options. The basis for this result is three-fold. First, the assumed increase in the market share of foreign vessels. Second, the proposed extension of the legislation to cover offshore operations where licence holders opt in. Third, through relaxed licensing arrangements. In essence, it is assumed that many of the operators currently operating under the Australian General Register, incurring Australian Enterprise Agreement (EA) wage rates, would re-flag their vessels in order to compete with the foreign operators who enjoy the benefit of comparatively lower ITF wage rates. Notably, although ship operators are likely to replace Australian seafarers with foreign seafarers, a portion of the crew may still be represented by Australian seafarers due to the world-wide shortage of high ranking positions.

Options 5 and 6 result in economic cost reductions of \$653.6m and \$667.4m respectively. The economic cost reductions are somewhat similar to Options 4 and 2 due to minimal changes in the proposed amendments. The economic cost reduction for Option 5 is less than that of Option 6 due to more stringent crew conditions proposed under Option 5, where foreign vessels must operate with two senior Australian crew if the vessel conducts coastal voyages for more than 120 days.

Options 6 is less stringent in this regard as this requirement is extended to 183 days leading to more favourable crew composition impacts.

We note that the cost-benefit framework used in our analysis is not without limitations. To the extent that a different view may be taken with any of the assumptions (including market share assumptions, cargo trade forecasts and discount rate), the NPV analysis may lead to different results and thus rankings. As outlined above, the ranking of the NPV results for the policy options are predominantly driven by the market share assumptions for the 'other dry bulk' trade. The 'other dry bulk' trade is influenced by many variables which adds to the speculative nature of the market share assumptions. In turn, our results should be considered as forming 'part' of an evidence base of information rather than absolute findings.



# 1. Introduction

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## 1.1 Background

Coastal trading plays an important role in the Australian economy. This importance was recognised by the implementation of a shipping reform package in 2012 aimed at fostering a vibrant domestic shipping industry. As part of the reforms, the *Coastal Trading (Revitalising Australian Shipping) Act 2012 (the Coastal Trading Act)* was introduced which establishes the licensing system that regulates access to coastal trading. This effectively replaced, from 1 July 2012 onwards, the previous permit system that was established under Part VI of the *Navigation Act 1912*.

A vessel engages in 'Coastal trading' within the meaning of the Coastal Trading Act if, for or in connection with a commercial activity, the vessel transports cargo or carries passengers between ports:

- in different Australian States or Territories; or
- within the same Australian State or Territory where some passengers disembark or some cargo is unloaded, and the remaining passengers or cargo are then carried to a port in another Australian State or Territory where some or all of the passengers disembark or some or all of the cargo is unloaded; or
- within the same Australian State or Territory and pursuant to an application made by the vessel's owner, and where a declaration has been made by the Minister that the Coastal Trading Act applies in relation to the vessel.<sup>5</sup>

The Coastal Trading Act offers some protection to the domestic shipping industry by restricting the participation of foreign flagged (registered) vessels in coastal trading, and enables Australian vessels to compete for voyages proposed to be undertaken by foreign flagged vessels. However, the objects of the Coastal Trading Act has caused confusion as to whom the Coastal Trading Act is intended to support. Section 3 of the Coastal Trading Act provides that:

- 1) The object of this Act is to provide a regulatory framework for coastal trading in Australia that:
  - a. promotes a viable shipping industry that contributes to the broader Australian economy; and
  - b. facilitates the long term growth of the Australian shipping industry; and
  - c. enhances the efficiency and reliability of Australian shipping as part of the national transport system; and
  - d. maximises the use of vessels registered in the Australian General Shipping Register in coastal trading; and
  - e. promotes competition in coastal trading; and
  - f. ensures efficient movement of passengers and cargo between Australian ports.

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<sup>5</sup> Sections 7 and 12 of the *Coastal Trading Act*.



The Department's Options Paper: *Approaches to regulating coastal shipping in Australia, April 2014 (the Options Paper)* notes that users of shipping services may have interpreted the object of the Coastal Trading Act as supporting their claims to competitive freight rates and shipping services, including those offered by foreign flagged vessels. Further, no clear weighting has been given to the elements that comprise the object of the Coastal Trading Act (or any other part) regarding the relative importance of each of these objects. The Department noted that this has made effective administration of the Coastal Trading Act particularly challenging. The Options Paper also suggests that the Coastal Trading Act has created uncertainty for market participants and as such, created an environment of higher shipping costs and restricted access to timely and efficient shipping services impacting the broader Australian economy.

In light of the above regulatory ambiguity, the Department requires a Cost Benefit Analysis (CBA) of different coastal shipping regulatory options to inform the Regulation Impact Statement and potential amendments to current regulatory settings.

This report outlines the results of the CBA in relation to the six regulatory options currently under consideration, namely:

1. Removal of all regulation of access to coastal trading via a repeal of the Coastal Trading Act.
2. Removal of all regulation of access to coastal trading and enactment of legislation to account for potential undesired effects of other Australian laws, such as the *Customs Act 1901 (the Customs Act)*.
3. Maintain current coastal trading licensing scheme with amendments to regulatory settings to minimise industry burden and costs.
4. Continued regulation of coastal trading but with amendments to regulatory settings to create equal opportunity between Australian and foreign ship operators.
  - a. This approach would replace the existing four tiered licensing framework with a single coastal trading permit for both Australian and foreign ships.
5. Australian Master and Chief Engineer required if the vessel operates more than 120 days (Variant 1 of Option 4). Furthermore, the Fair Work Act and SIA Part B wage rates would apply to the whole crew for the entire permit period.
6. Australian Master and Chief Engineer required if the vessel operates more than 183 days (Variant 2 of Option 4). Furthermore, the Fair Work Act and SIA Part B wage rates would apply to the whole crew for the entire permit period.

Further details of these options can be found in Section 3.

## 1.2 Terms of Reference and Scope

The Department engaged PAG to conduct a CBA of the aforementioned coastal trading regulatory options. While the engagement ultimately entailed a CBA, it included intermediate deliverables, namely:

- the refinement and update of the existing BITRE Ship Cost model having regard to the PwC review of the previous BITRE CBA of the proposed (at the time) 2012 shipping reform package;
- the inclusion of Cruise Shipping as a new sector; and



- the capture and analysis of industry data.

### 1.3 Approach

The following steps outline the approach taken by PAG to complete the CBA of the proposed regulatory options in Phase 1 of the engagement:

1. A project initiation meeting was held with the Department in the week following commencement of the engagement to confirm the scope of the engagement and key deliverables.
2. A shipping industry survey was developed by PAG on behalf of the Department to serve as a data collection tool for the CBA.
  - a. This included the development of a web-based survey tool to distribute the survey.
    - i. The survey was intended to enhance understanding of industry cost structures, and comprised five questions for capturing information on cargo volumes delivered, crew size, crew cost, other ship operating expenses and compliance costs.
3. The BITRE Ship Cost model (2011) was reviewed and the refinements and updates required to be made were identified and implemented. These are summarised in Appendix A.
4. The Cruise shipping sector was added to the CBA model. Ship cost and occupancy levels were estimated for the purpose of the CBA.
5. Data collected from the shipping industry survey were analysed and assessed for usefulness for incorporation into the BITRE Ship Cost model.
  - a. The analysis produced summary statistics for each question which are detailed in Appendix B.
6. Remaining data were collected from the Department and other sources. A list of data sources is available in Appendix C.
7. Projected net benefits were developed under each regulatory scenario and sensitivity analysis conducted using (and after updating) the Department's previous CBA workbook.
8. Finally, this report was produced outlining the expected net benefits associated with each regulatory option.

Following completion of Phase 1, PAG was engaged to model the costs and benefits associated with the three additional options referred to above, and undertook the following steps for Phase 2:

1. A project initiation meeting was conducted via teleconference on the 30th of October 2014.
2. Dialogue with the Department and BITRE to clarify and update assumptions was conducted - the current model was examined to determine whether additional variables were required for inclusion in the execution of the current CBA. Updates included:
  - a. revision of freight growth forecasts for all sectors to reflect recent trends;
  - b. clarification of assumptions for the bauxite trade;
  - c. justification for market share assumptions for the base case and policy scenarios and undertake additional sensitivity tests for the market share assumptions; and





- d. clarification of assumptions for coastal containers with possible revision to calculations.
3. Data collection and analysis of three additional scenarios
4. The model was updated with the latest observations and source information relating to any additional variables required to model the three new options.
5. Following data collection, PAG examined the underlying properties of the data and applied statistical techniques to identify anomalies.
6. Development of base case and the 3 additional policy scenario projections, using quantitative and qualitative techniques to isolate and quantify each relevant item. Specifically, PAG undertook the following steps:
  - a. modelling of the three additional policy scenario variants, with modelling of anticipated economic benefits for 2015, 2016 and 2017 as well as over 5, 10 and 20 years for all scenarios with the results to include expression in Net Present Value (NPV) terms;
  - b. utilised the current/refined BITRE shipping costs model where applicable to forecast (or make assumption) about costs over the forecast horizon; and
  - c. where the BITRE costs model and/or other economic models could not be applied, PAG made reasonable assumptions about projected costs on the basis of past and current trends, and discussions with the Department, BITRE and industry experts. This included assumptions regarding:
    - i. freight volume growth;
    - ii. market share of Australian flagged and foreign flagged vessels; and
    - iii. supply of skilled seafarers.
7. A workshop was conducted to present key findings and seek feedback from the Department, BITRE and key participants.
8. This report was then updated to reflect the modelling results of the new policy scenario variants and expected net benefits associated with each regulatory option.

## 1.4 Structure of the Report

This report is structured as follows:

- Section 2 outlines the current regulatory context;
- Section 3 discusses the proposed regulatory options and potential implications for the CBA modelling;
- Section 4 discusses the CBA framework;
- Section 5 discusses the assumptions; and
- Section 6 discusses the CBA results and concludes.

The report concludes with a series of appendices which detail the shipping industry survey questions, the data collection and the survey findings and refinements made to the BITRE model.



## 2. Overview of current regulatory context

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### 2.1 Current legislative regime

Coastal trading is currently regulated by the following legislation:

1. Coastal Trading Act; and
2. *Shipping Registration Act 1981 (the Shipping Registration Act)*.

This section outlines the provisions of the aforementioned legislation which informs the base case scenario which we assume remains constant for the forecast horizon.<sup>6</sup>

#### 2.1.1 The Coastal Trading Act

The Coastal Trading Act establishes the licensing system enabling coastal trading activities. There are four main types of licences available under the Coastal Trading Act. Each is summarised below.

##### *General Licence*

A General Licence is available to vessels registered in the Australian General Register and grants unrestricted access to coastal trading activities for five years. This licence offers the licensee the opportunity to compete for coastal voyages that are proposed to be undertaken by foreign flagged vessels.

##### *Transitional General Licence*

A Transitional General Licence is available to eligible vessels that held a licence under the previous permit system that was in effect under part VI of the *Navigation Act 1912*. This licence provides the holder with the same rights as a General Licence holder for a period of five years. However these vessels are registered under the law of a foreign country. A condition of this licence is that crew employed on board such vessels must be Australian citizens or permanent residents, or hold permanent or temporary visas with appropriate work rights.

##### *Temporary Licence*

A Temporary Licence is available to a shipper, or the owner, charterer, master or agent of a vessel for the purposes of enabling a vessel to be used in coastal trading activities for a period of up to 12 months. As a condition, the Temporary Licence requires the vessel to be registered either in the Australian International Shipping Register (AISR) or in a foreign register, i.e. under a law of a foreign country.

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<sup>6</sup> A detailed overview is available in the Department Options Paper, *Approaches to regulating coastal shipping in Australia* (2014).



Applications must be for the proposed undertaking of at least five voyages and are subject to the availability of a General Licence holder to undertake one or more of the proposed voyages. General Licence holders are provided with notice of voyages proposed to be undertaken by a foreign flagged vessel and are permitted to submit a *notice in response* indicating that they are able to undertake one or more of the proposed voyages. Subject to Ministerial direction, in consideration of the availability of General Licence holders to undertake the proposed voyages, and other factors (e.g. shippers' requirements), an application for a Temporary Licence may then be either approved or refused.<sup>7</sup>

In general, by restricting foreign flagged vessels from engaging in coastal trading and providing unrestricted access to Australian flagged vessels, the Coastal Trading Act aims to "maximise the use of vessels registered in the Australian General Register in coastal trading".<sup>8</sup>

### ***Emergency Licence***

An Emergency Licence can be granted for coastal trading to vessels registered in any register (whether it is the Australian General Register, the AISR or a foreign register). The purpose of this Licence is to manage situations relating to significant national emergencies and is valid for a period of up to 30 days. According to the Department's website reports, no Emergency Licences have been issued to date.

## **2.1.2 Shipping Registration Act**

The Shipping Registration Act operates in conjunction with the Coastal Trading Act and was amended as part of the 2012 shipping reforms to rename the shipping register as the Australian General Register, as well as to create a new AISR and the rules governing eligibility for registration in the AISR. Registration according to the Shipping Registration Act ultimately governs the eligibility for applying for General Licences or otherwise. An important provision in the Shipping Registration Act requires that every Australian owned ship "be registered through the Shipping Registration Act unless the ship is operated by a foreign resident under a demise charter and the Australian Maritime Safety Authority has exempted the ship from registration".<sup>9</sup>

## **2.2 Summary of regulatory settings by ship type**

For the purposes of establishing the base case scenario, it is important to consider the current regulatory settings. Below we outline the relevant provisions affecting each vessel type in relation to licensing and labour laws available to ship owners and/or operators.

### ***Australian flagged vessels***

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<sup>7</sup> Full details are available in the *Coastal Trading (Revitalising Australian Shipping) Act 2012* at <http://www.comlaw.gov.au/Details/C2012A00055>.

<sup>8</sup> Section 3 of the Coastal Trading Act 2012.

<sup>9</sup> Coastal Trading Options Paper: *Approaches to regulating coastal shipping in Australia*, p. 5



Australian flagged vessels are registered either in the Australian General Register or the AISR. Vessels in the Australian General Register must employ Australian crew subject to the *Fair Work Act 2009 (the Fair Work Act)* and Part A of the SIA.<sup>10</sup> The SIA sets out additional provisions supplementary to the Fair Work Act specifically for the maritime industry including minimum wage rates; allowances for meals, study, accommodation; ordinary hours of work; and leave entitlements.<sup>11</sup> Although ships operating under a Transitional General Licence are covered by the same legislation, they are nevertheless foreign flagged.

Vessels in the AISR must employ an Australian national (or resident) master or chief mate, and an Australian national (or resident) chief engineer or first engineer. Seafarers employed on these ships are covered by the Fair Work Act only while the ship is engaged for domestic voyages. AISR ships are subject to Part B of the SIA if they have conducted at least two other voyages under a Temporary Licence in the last 12 months. The SIA applies from the third (coastal) voyage onwards (on a rolling 12 month period) but not to AISR ships while engaged on international voyages. Ships registered in the AISR must be predominantly engaged in international trading. No ships are currently registered in the AISR.

### *Foreign flagged vessels*

For foreign flagged vessels, the Fair Work Act and Part B of the SIA also apply under the same conditions as those outlined for Australian vessels registered in the AISR. That is, the Coastal Trading Act and SIA apply from the third (coastal) voyage onwards (in a rolling 12 month period) assuming the vessel is also licenced under a Temporary Licence. The first two coastal voyages are not subject to the Fair Work Act or the SIA. As such, wages may be set below SIA rates, such as at International Transport Federation (ITF) rates, for the first two coastal voyages.

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<sup>10</sup> Provisions encompass the National Employment Standards, the national minimum wage and workplace protections (e.g. from unfair dismissal). Refer to the *Fair Work Act 2009* for full details.

<sup>11</sup> Refer to the *Seagoing Industry Award 2010* for further details.



## 3. Policy options

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This section discusses each policy option and their potential implications in further detail.

### 3.1 Option 1: Removal of all regulation of access to coastal trading

Under Option 1, the Coastal Trading Act would be repealed in its entirety, along with all other associated legislative provisions currently in operation due to the existence of the Coastal Trading Act (without any amendments to other Commonwealth legislation that may interact with the Coastal Trading Act). There are several possible implications which are discussed below.

Importation status may be triggered

Repealing the Coastal Trading Act will remove the provision that allows the Australian Customs and Border Protection Service (ACBPS) to consider a vessel otherwise imported, as not being imported for the purposes of the *Customs Act 1901* (the **Customs Act**). Consequently, all foreign vessels engaging in coastal trading would be considered “imported” under the Customs Act and therefore required to be entered into home consumption in accordance with the Customs Act. The act of importation triggers the application of a range of other laws, including but not limited to quarantine, prohibited and restricted goods, immigration and revenue laws.

The main consequences associated with importation status are discussed as follows:

#### a) Customs duty, regulatory compliance and GST

Some of the adverse impacts associated with “importation” status include potential customs duty and GST. In general, a 5 per cent customs duty applies to imported vessels if they are less than 150 gross construction tons. In the case of cargo ships and tankers with greater than 150 gross construction tons, this will not apply.<sup>12</sup> Customs duty may apply on the ship’s parts and equipment alternatively. However, given the complexity of legal provisions, this will not apply in all cases and not with certainty.<sup>13</sup>

GST may apply to imported vessels. In general, where ship owners ‘carry on an enterprise’ and are entitled to an Australian Business Number and GST registration, the imposition of GST upon importation attracts a small interest cost associated with the time value of foregone interest earnings. As the GST paid can be claimed back through input tax credits, the net cost of the GST payment is reduced. A GST deferral scheme also exists that allows GST payments on imported goods to be deferred until the next Business Activity Statement (**BAS**) subject to satisfying specific requirements such as monthly submission of BAS. This effectively offsets the GST payment as it can be claimed back in the form of an input tax credit at the time of payment. In some cases, the ship owner may not ‘carry on an enterprise’ and so be ineligible for GST registration and input tax credits. This would impose a significant 10% increase in the ship yard cost.

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<sup>12</sup> Refer to Schedule 3 of the *Customs Tariff Act 1995* (<http://www.comlaw.gov.au/Details/C2013C00072>).

<sup>13</sup> For example, a fully imported vessel is required to pay duty on the bunker fuel; however, this treatment of ‘importation’ and customs duty on bunker fuel according to the ATO is not directly related to importation as defined under the Customs Act or related to the Coastal Trading Act exemption of ships from importation. Moreover, there is ambiguity around GST that may apply to ship’s equipment and stores including bunker fuel. Currently, foreign vessels engaged on a voyage that has a destination outside of Australia are not required to pay GST on bunker fuel as it is considered part of ships’ stores under item 5, subsection 38-185(1) of the GST Act.



Note that an import declaration processing charge may apply under section 71 of the Customs Act 1901 but this is of a negligible amount.<sup>14</sup>

#### b) Maritime crew visas

An important regulatory consequence of repealing the Coastal Trading Act is the impact on crewing of foreign vessels once importation is triggered. Currently, foreign crew require either a Maritime Crew Visa (MCV) or a 457 temporary skilled visa when engaged in coastal trading along the Australian coast. The MCV only applies to foreign workers employed on a non-military ship. The definition of a non-military ship in the Migration Regulations 1994 applies only to ships that have not been imported or entered into home consumption, with the exception of AISR vessels. AISR vessels are exempt in that MCV-holders on AISR vessels will still satisfy visa requirements even if they are deemed imported.<sup>15</sup> For non-AISR ships, MCV privileges cease once the ship is imported and foreign crew with MCVs must depart Australia within five days. This may result in several possible scenarios having various implications for the shipping industry and the coastal freight task. In particular:

1. Foreign flagged vessels may replace MCV-holders with crew possessing appropriate work rights, i.e. crew with 457 visas.
2. Foreign flagged vessels may replace MCV-holders with a combination of 457 visa holders and Australian residents.
3. Foreign flagged vessels cease to operate in Australia due to a lack of supply of Australian seafarers and foreign seafarers possessing appropriate work rights (457 visas).

The likely scenario that would result depends on the supply of seafarers with 457 visas and the number of foreign crew holding MCV visas. It is possible that foreign flagged vessels may need to replace only a small number of crew per vessel if most foreign crew are already in possession of 457 visas. However, this appears to be unlikely since a 457 visa is not currently required for coastal voyages for foreign vessels with the simpler MCV as a substitute option. Moreover, according to the House of Representatives Standing Committee on Infrastructure, Transport, Regional Development and Local Government's report 'Rebuilding Australia's Coastal Shipping Industry' – Inquiry into coastal shipping policy and regulation paper<sup>16</sup>, 457 visa approvals for maritime crew are the exception rather than the norm.

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<sup>14</sup> The charge does not exceed \$98.60 for a documentary import declaration; further details are at <http://www.comlaw.gov.au/Details/C2013C00150>.

<sup>15</sup> Refer to the Migration Regulations 1994 for further details.

<sup>16</sup> Available at

[http://www.aph.gov.au/parliamentary\\_business/committees/house\\_of\\_representatives\\_committees?url=itrdlg/coastalshipping/report.htm](http://www.aph.gov.au/parliamentary_business/committees/house_of_representatives_committees?url=itrdlg/coastalshipping/report.htm)



In general, ship operators/owners must hire from the Australian maritime pool first. This also suggests that the number of 457 visa holders on foreign flagged vessels may be limited at the current time. The 457 visas are intended to allow foreign maritime crew to be employed where employers are “unable to meet their skill needs from the Australian labour market.”<sup>17</sup>

In another scenario, foreign ships may not be able to source their labour from the Australian maritime labour pool given potential shortages in local maritime skills despite evidence suggesting that there are a large number of applicants each year for maritime training.<sup>18</sup>

Under the third aforementioned scenario, foreign vessels may cease to undertake coastal trading in Australia if there is an inadequate supply of relevant skilled seafarers. If foreign vessels are unable to fill crew positions with either 457 visa holders or Australian resident seafarers, it is possible that the freight task carried by foreign vessels will fall if the Coastal Trading Act is repealed.

In general, it may be expected that upon importation, given the provisions of the *Migration Act 1958* and *Migration Regulations 1994*, crew costs may increase. If foreign vessels replace MCV holders with 457 visa holders, the 457 visa holders must be paid market wages which may be higher than SIA Part B wages as a condition of 457 visas. Specifically, sponsors of 457 holders must show that they are “providing no less favourable terms and conditions of employment to the nominee than they are providing or would provide to an Australian performing equivalent work in the sponsor’s workplace at the same location”.<sup>19</sup> A market wage may prevail that is equivalent to Australian Enterprise Agreement (EA) wage rates assuming that Australian workers may choose not to work on a foreign vessel if paid below market standards. The replacement of foreign crew with resident Australians will likely also attract EA wage rates; this may apply particularly in occupations not covered by the 457 visa eligibility requirements.<sup>20</sup>

According to 457 visa occupation listings, the occupations that are acceptable include:

- Ship Officer.
- Ship Master.
- Ship Engineer.

An additional cost associated with replacing MCV crew may be visa sponsorship and nomination fees (of \$420 and \$330 respectively) for 457 visas.

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<sup>17</sup> House of Representatives Standing Committee on Infrastructure, Transport, Regional Development and Local Government’s report ‘Rebuilding Australia’s Coastal Shipping Industry’ – Inquiry into coastal shipping policy and regulation, p. 44.

<sup>18</sup> Ibid. p. 56.

<sup>19</sup> Temporary Work (Skilled) (subclass 457) visa booklet (2014), Department of Immigration and Border Protection, <http://www.immi.gov.au/allforms/pdf/books9.pdf>, p. 14.

<sup>20</sup> According to the APH *Rebuilding Australia’s Coastal Shipping Industry* paper, foreign maintenance crew are not listed as a skilled occupation; hence, foreign vessels may need to hire Australian workers (paid Australian EA rates) for maintenance, or recruit under labour agreements, which may substantially increase costs.



### **SIA Part B wage rates and conditions**

SIA Part B wages and conditions will no longer apply if the Coastal Trading Act is repealed since the SIA Part B applies to Temporary Licence holders. Also, in the absence of a Temporary Licence system, there would be no such Temporary Licenced vessels to attract the SIA Part B provisions. Moreover, the Fair Work Act applies to vessels operating under a Temporary Licence only if they have conducted at least 2 coastal voyages under the licence in the last 12 months (over a rolling 12-month period).<sup>21</sup> As the SIA is operative via the Fair Work Act, this means that foreign flagged vessels would no longer be subject to Australian minimum wages and conditions, and there may be a return to ITF or similar rates.

### **3.2 Option 2: Option 1 plus enactment of legislation to account for potential undesired effects of other Australian laws**

It is not apparent what types of legislative provisions may be enacted to account for the potential undesired effects of other Australian laws if the Coastal Trading Act is repealed. For the purposes of this CBA, we assume that foreign ships remain exempt from treatment as 'imported'. Therefore, there will be no customs duty or GST provisions applying to foreign vessels and MCVs will continue to be operative. Without the Coastal Trading Act the coverage provisions of the Fair Work Act would not be triggered and SIA Part B wages would no longer apply to foreign vessels.

Another consequence of Option 2 is that the relative advantage previously afforded to General (and Transitional General) Licence vessels via unrestricted access to coastal trading over Temporary Licence vessels would cease. There would be reduced incentive to register in the Australian General Register given the more attractive tax incentives and minimum wage obligations in other registries. As such, existing ships already registered in the Australian General Register may be re-flagged to a foreign register.

Ship owners may also choose to register new vessels (not yet registered) in a foreign register rather than in the Australian General Register, i.e. ship owners may have originally registered vessels in the Australian General Register if the Act remained operative in the base case scenario, but in the event of a repeal of the Coastal Trading Act, may find it more attractive to register new vessels in a foreign register.<sup>22</sup> The re-flagging of vessels to a foreign register or the registering of new vessels in a foreign register over the Australian General Register may lead to re-crewing, or increased crewing, of vessels with foreign crew.

Under Option 2, compliance costs for vessels operating in the coastal trade will be reduced as a result of the elimination of the licensing system governing coastal trading.

### **3.3 Option 3: Maintain current coastal trading licensing scheme with amendments to regulatory settings to minimise industry burden and costs**

There are five amendments associated with this option as outlined in the aforementioned Options Paper. We briefly discuss each amendment below:

<sup>21</sup> Refer to the *Fair Work Regulations 2009* at [http://www.comlaw.gov.au/Details/F2013C00049/Html/Text#\\_Toc345666886](http://www.comlaw.gov.au/Details/F2013C00049/Html/Text#_Toc345666886)

<sup>22</sup> Transitional General Licence vessels which are already registered in a foreign register may also discontinue a transition to registration in the Australian General Register if the Coastal Trading Act is repealed.





#### ***a) Extending the geographical reach of the Coastal Trading Act***

The Coastal Trading Act does not currently cover voyages from the mainland to and between places outside the coastal waters of Australian states or territories including offshore installations and floating production, storage and offtake vessels. Extending the geographical reach of the Coastal Trading Act to cover these voyages would allow operators to apply for temporary licences that permit such voyages. Foreign vessels undertaking these voyages would otherwise be treated as imported under the Customs Act.

#### ***b) Changing the five voyage minimum rule***

Currently, Temporary Licence applicants can only apply to undertake voyages in groups of five or more per application. If the five voyage minimum rule is removed, a greater number of Temporary Licence applications may be expected; the current requirements restrict foreign vessels from applying to undertake only one to four voyages within a 12 month period.

#### ***c) Temporary Licence variations***

Temporary Licence applications can be varied to add new voyages (in groups of five or more) or to amend existing voyage details. Amendments of existing voyages or additions of voyages are both subject to consultative processes. Current considerations outlined in the Options Paper are to remove or reduce the consultative process in order to expedite Temporary Licence variations. Aside from reducing compliance costs, this may reduce the likelihood of cancelled voyages where existing voyage details cannot be amended on time.

#### ***d) Amending tolerance provisions***

Tolerance provisions currently allow Temporary Licence voyages undertaken to deviate from the voyage details specified upon initial licence application or upon licence variation within acceptable tolerance limits. These are  $\pm 20$  per cent of the nominated cargo volume and  $\pm 5$  days for the specified loading date. The provisions do not consider force majeure or other unexpected occurrences that may affect shipping volumes and schedules. Under consideration is the broadening of existing tolerance limits to provide greater flexibility to operators particularly for container cargoes and to accommodate disruptive weather events. This includes allowing the Minister or their delegate to provide exceptions to licence holders unable to accord with voyage details within existing tolerance allowances where this is beyond the reasonable control of the licensee. Alternatively, changes to legislation may permit Temporary Licence applications to be granted on the basis of the type of cargo to be carried rather than the specific volume. Overall, this may lead to fewer cancelled voyages.

#### ***e) SIA Part B wage rates and conditions***

SIA Part B wages will be removed through legislative amendments to remove the link between the Fair Work Act and foreign vessels.

### **3.4 Option 4: Introduce single permit system for coastal trading to replace current licensing scheme, with amendments to regulatory settings to create equal opportunity between Australian and foreign ship operators**

There are five amendments outlined under this option. Each amendment is briefly discussed below.



### ***Extending the geographical reach of the Coastal Trading Act***

This amendment is identical to amendment a) under Option 3. Increasing the geographic reach of the Coastal Trading Act to offshore facilities may increase the presence of foreign operators undertaking coastal shipping.

### ***Removing the five voyage minimum rule***

This amendment is identical to amendment b) under Option 3. Removing the voyage minimum would allow foreign operators greater flexibility when applying for a new temporary licence or when applying to add voyages to an existing temporary licence. Foreign operators who plan to conduct less than five voyages within the 12 month licence period would be eligible to apply for a temporary licence.

### ***Removing tolerance provisions***

This amendment is similar to amendment c) under Option 3. Removing the tolerance provisions would further increase the number of foreign operators as the restrictions imposed on nominated cargo volume and loading date would no longer exist. This would lead to a reduction in voyage cancellations.

### ***Single Licence system***

Under this amendment, the current four-licence system would be combined into a single licence. The trading advantage previously held by the General and Transitional licence holders over Temporary licence holders would no longer exist. Operators currently in the Australian General Register or AISR may re-flag their vessels to a foreign register to benefit from the lower foreign wage rates (compared to EA wage rates).

### ***SIA Part B wage rates and conditions***

SIA Part B wages will be removed through legislative amendments to remove the link between the Fair Work Act and foreign vessels.

## **3.5 Option 5: Australian Master and Chief Engineer required if the vessel operates more than 120 days**

This option is a variant of Option 4. It imposes a restriction on the crew composition of foreign flagged vessels. The amendment would require a foreign flagged vessel to operate with an Australian Master and Australian Chief Engineer if it conducts coastal trading for more than 120 days. It is assumed that the Fair Work Act and SIA Part B wage rate would apply to both the Australian and foreign crew for the whole permit period.

## **3.6 Option 6: Australian Master and Chief Engineer required if the vessel operates more than 183 days**

This option is a variant of Option 4. According to Option 6, crew composition criteria described in Option 5 (120 days) is adjusted to 183 days.



## 4. Framework

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### 4.1 Overview of CBA framework

The analysis set out in this report follows the framework promulgated by the OBPR and is summarised in Table 4.1 below.

*Table 4.1 – OBPR CBA Framework*

Step	Action
1	Specify the set of options.
2	Decide whose costs and benefits count.
3	Identify the impacts and select measurement indicators.
4	Predict the impacts over the life of the proposed regulation.
5	Monetise (attach dollar values to) impacts.
6	Discount future costs and benefits to obtain present values.
7	Compute the net present value of each option.
8	Perform sensitivity analysis.
9	Reach a conclusion.

Source: Department of Prime Minister and Cabinet, Office of Best Practice Regulation, Guidance Note, Cost-Benefit Analysis, p 2.

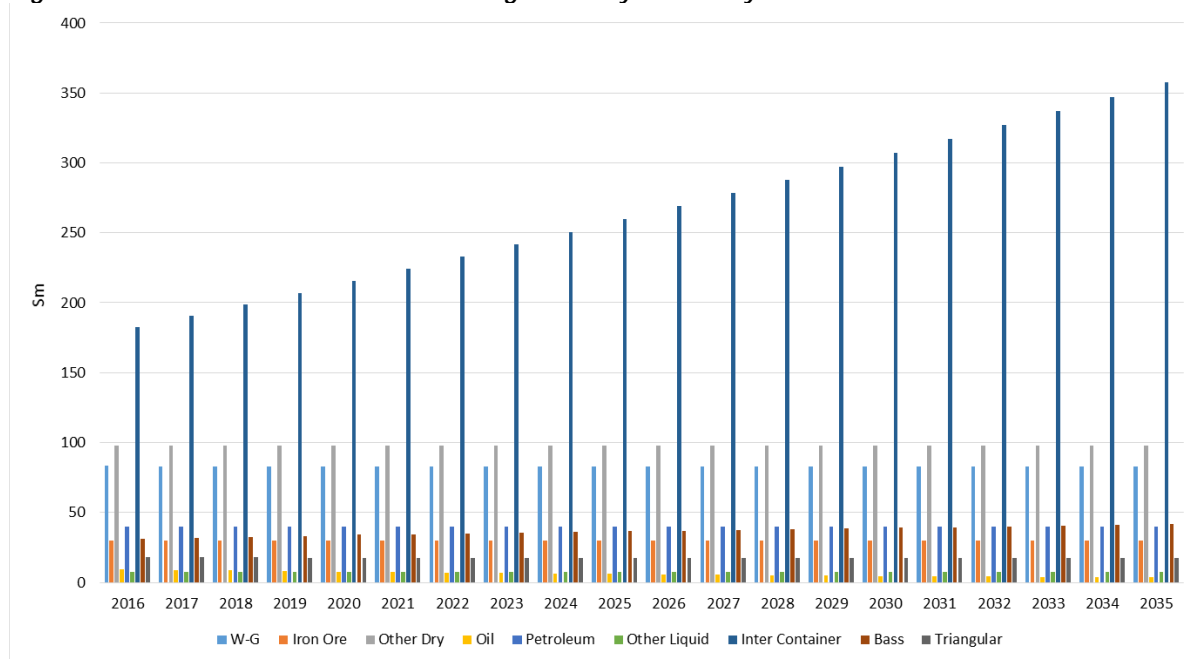
The CBA is conducted from 1 December 2014 with any change in regulatory settings assumed to commence from 1 July 2015 and the net economic benefits of a regulatory change measured over a 20 year horizon. The CBA is modelled in terms of the economic cost savings associated with coastal shipping. In the base case scenario, regulatory settings are assumed to be unchanged and the Coastal Trading Act continues to operate unamended. Accordingly, the base case forms the benchmark by which the costs and benefits of each policy option are determined.

The net economic cost savings for each regulatory option is compared to the base case (for which there is no regulatory change) and discounted at a (real) rate of seven per cent in line with guidance issued by the Office of Best Practice Regulation.

The base case is the cost of cargo trade under the current coastal trading regulatory setting, as demonstrated by Figure 4.1 below. The cost for cargo trade is calculated by multiplying the yearly cargo freight (Mt) by the cost of transporting cargo (\$/T). Cost of transporting cargo is defined by the market share assumptions detailed in Section 5.7. These calculations are performed over a 20 year forecast horizon - between the 2014 and 2035 financial years.



Figure 4.1- Base case scenario for each cargo trade by financial year



The high cost of the inter-capital container trade compared to the other cargo trades is due to different cost components being included in the analysis. For the inter-capital container trade, costs relate to stevedoring, wharfage, and surpluses earned by foreign overseas-going container vessels, while for other trades, costs comprise time charter costs only for the assumed average voyage length. Note that costs per tonne vary with voyage length. The costs for the inter-capital container trade were adopted from the 2010 BITRE shipping reform model. Costs for other cargo trades were taken from the updated (BITRE) cost model.

Internal BITRE modelling undertaken in 2010 shows a cost of \$67.11 per tonne for container vessels. This cost has been updated to \$86.57 per tonne using CPI index. The 2010 BITRE shipping model also estimates a cost of \$109.44 per tonne for rail to undertake the task. After inflation, this cost becomes \$145.56 per tonne.

The economic cost savings of each regulatory option are expressed in real terms in 2013 prices. A long-term average exchange rate of 0.9 for the analysis period is adopted which is relevant for converting costs expressed in USD to AUD.<sup>23</sup>

<sup>23</sup> Australian Government, *Budget 2014-15*, Budget Overview, Appendix F, Detailed Economic Forecasts found at: [http://www.budget.gov.au/2014-15/content/overview/html/overview\\_35.htm](http://www.budget.gov.au/2014-15/content/overview/html/overview_35.htm). According to this document "the exchange rate is assumed to remain around its recent average level — a trade-weighted index of around 71 and a \$US exchange rate of around 93 US cents.". For the purposes of this CBA we have taken a slightly more conservative long-term view of 90 US cents given the recent downward trend in the exchange rate.



There are two broad ship types modelled in the base case scenario. It is assumed that the only ships that are operative are General Licence, Transitional General Licence and Temporary Licence vessels (registered in a foreign register). However, as Transitional General Licence vessels are required to man vessels with Australian residents or crew with appropriate work rights (and hence, may have similar cost structure) and may be transitioning to registration in the Australian General Register, they are treated as foreign flagged vessels for the purposes of this analysis. According to the Options Paper, there are no AISR ships at the current time. Accordingly, operating costs of these vessels have not been modelled.

The Australian and foreign ship types are further subdivided into types of vessels, namely:

- handy size;
- panamax;
- capesize;
- product tanker;
- container ship;
- crude tanker; and
- cruise ship.

The CBA is conducted across sectors (cargo type). The sectors are dry bulk, liquid bulk, containerised cargo and cruise shipping where dry bulk encompasses commodities including iron ore, bauxite and other dry bulk (e.g. cement, fertiliser); and liquid bulk comprises of oil, petroleum and other liquid bulk (e.g. chemicals, LNG).

Although the financial costs of Australian flagged vessels will be affected by differing tax incentives, because these incentives are a redistribution between the government and the domestic shipping industry (with a net economic impact of zero) they will not be considered in this analysis.

For the CBA, we exclude voyages (and their associated costs) undertaken under Emergency Licences as they will likely be exceptions rather than the norm. Given the inherently unpredictable nature of events qualifying for the issuance of an Emergency Licence, it would also be difficult to make accurate or realistic assumptions about the freight carried by Australian or foreign vessels operating under such a licence. Since the commencement of the Coastal Trading Act on July 1 2012, there have also been no Emergency Licences that have been issued.

## **4.2 Evaluation of policy options**

To evaluate the aforementioned policy options, the following steps are taken:

- market shares are assumed for each ship type by sector for the base case scenario and each regulatory option (policy scenario);
- daily ship costs associated with each ship type under the base case and policy scenarios are estimated;
  - these daily ship costs are calculated on a per tonne basis;
- forecast freight volumes are obtained for each cargo type/sector over the analysis period;



- the market shares of each ship type in the base case and for each regulatory scenario are multiplied by the respective ship's daily cost per tonne to obtain the weighted average cost per tonne;
- the difference in weighted average cost per tonne is calculated between the base case and each regulatory scenario;
- the difference in weighted average cost per tonne for each regulatory scenario is multiplied by the freight volume for each sector; the costs are discounted at a rate of 7 per cent to obtain the Net Present Value (NPV) of a regulatory option for each sector; and<sup>24 25</sup>
- the NPVs are summed across the sectors to obtain the total NPV associated with each regulatory option (relative to the base case).

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<sup>24</sup> <http://www.dpmc.gov.au/deregulation/obpr/reporting-publications/publications.cfm#Guidance>

<sup>25</sup> In accordance with the OBPR guidance a discount value of 7 per cent is assumed to facilitate the cost-benefit analysis. Tables presenting results at discount rates of 3 per cent and 10 per cent can be found in section 6.3.4 and 6.3.5 respectively.



## 5. Assumptions

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This section outlines the key assumptions underpinning the CBA and relate to the following:

1. Ship costs including crew costs, operating and capital costs.
2. Foreign ship costs.
3. Ship daily time charter costs (by ship type).
4. Market shares.
5. Forecasts of cargo freight volumes.

### 5.1 Ship cost assumptions

The ship costs modelled in the CBA are daily time charter costs and can be segmented into crew costs, other operating costs and capital costs. The assumptions and method of calculating each cost type are discussed in turn below.

#### 5.1.1 Crew costs

Crew costs are estimated for both Australian flagged and foreign vessels. Crew costs for Australian vessels are calculated on the basis of EA wage rates and conditions. The EA wages are estimated from a sample of EAs. Foreign vessels in the base case are assumed to pay their crew SIA Part B minimum salaries from the third voyage in a 12 month period.<sup>26</sup> Leave for Australian seafarers is offered at a rate of 0.926 days for each day at sea. According to ITF rates, foreign crew are assumed to receive leave of 7 days for every 30 days worked for ratings from low-wage countries; and for senior officers, one day's leave per day worked.

Salaries are multiplied by a factor for leave and on-costs of 2.982 for Australian seafarers. Foreign crew leave factors range from 2.0 to 2.4 for the ship master, deck officers and engineers and for ratings, 1.48 is assumed. Market wages for Australian seafarers are believed to be greater than the opportunity cost of labour and hence, the financial costs for Australian vessels of employing seafarers are multiplied by a shadow price factor of 0.9 to derive economic costs.<sup>27</sup>

In competitive markets, employers hire additional labour until the incremental cost of an extra unit of labour is equal to the value of the marginal product of that unit of labour. The opportunity cost of labour represents the true cost, i.e. the value of the output a seafarer would produce if employed in their next best alternative use in the economy (that is foregone when their labour is utilised in seafaring).

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<sup>26</sup> SIA Part B rates were calculated assuming 10 hours of overtime per week.

<sup>27</sup> Department of Infrastructure, Transport, Regional Development and Local Government: Review of BITRE Cost Benefit Analysis of Shipping Reform Package, May 2010.

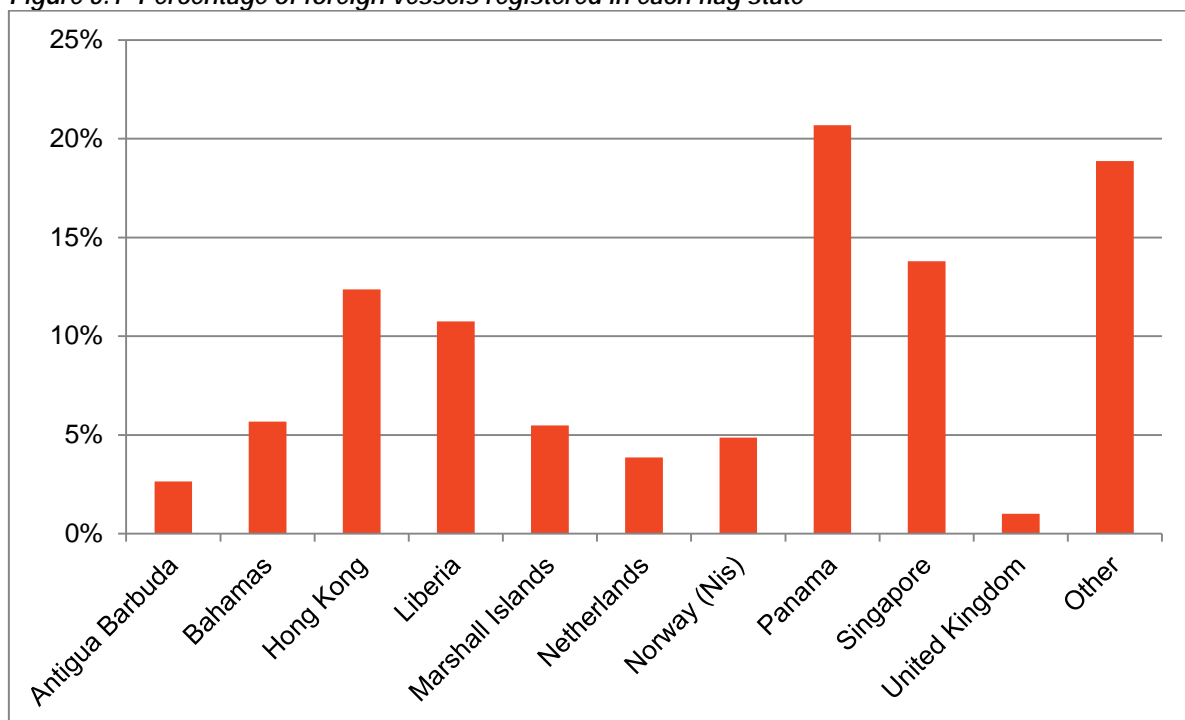


It is assumed in the main scenario that there is no further reduced manning. Bulk carriers and product tankers for Australian vessels are assumed to be manned by 17 seafarers on average which is generally in line with one seafarer per berth. Sensitivity analysis is later conducted assuming reduced manning and the use of riding gangs which reduces time spent in dry docking. In the case of no reduced manning, Australian registered ships operate for 353 days per year on average compared with 360 days for foreign ships because less maintenance work is undertaken compared with foreign crews, causing the ships to spend longer in dry-dock.

In the absence of SIA Part B regulation, foreign vessels incur crew costs in line with (lower) ITF wage rates, or costs close to ITF wages. Most foreign vessels are registered in open registry countries. Worldwide, 73 per cent of ships were registered under open registry settings in January 2013, i.e. under a foreign flag that differs from the nationality of the ship owner.<sup>28</sup>

An analysis of the ships that operated under a Temporary Licence between July 2012 and June 2014 using Lloyds data indicates that foreign vessels operating in Australian coastal shipping are registered mostly in open registry countries including Panama, Liberia, the Marshall Islands or the Bahamas, or otherwise registered in low-wage countries or countries offering favourable conditions to foreign ship owners (Figure 1).<sup>29</sup> These include international shipping registers such as the Norwegian International Shipping Register (NIS). At least 48 per cent and upwards of approximately 60 per cent of foreign vessels that operated in Australian coastal trade at some point between July 2012 and June 2014 are covered by ITF arrangements.<sup>30</sup> Singapore and Hong Kong are other popular countries of registration.

Figure 5.1- Percentage of foreign vessels registered in each flag state



<sup>28</sup> Review of Maritime Transport (2013), United Nations, [http://unctad.org/en/PublicationsLibrary/rmt2013\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2013_en.pdf), p. 55

<sup>29</sup> E.g. Seafarers on vessels registered in Hong Kong and Singapore may be entitled to personal income tax exemptions.

<sup>30</sup> Some vessels are covered by national agreements but may still be covered by ITF-related policies.





### 5.1.2 Other operating costs

Other ship operating costs accounted for in the overall vessel operating costs include victualling, ship stores, insurance costs, administration costs and repair and maintenance costs. These are estimated using the BITRE ship cost model. Port and fuel costs are not included as they do not depend on the flag of the vessel and because the freight task is assumed to be the same in the base and policy cases.

### 5.1.3 Capital costs

#### *Financial capital costs*

Financial ship capital costs are calculated using the BITRE ship cost model as the real required annual freight rate (RRAFR) on the initial ship yard cost. The RRAFR represents the equivalent real annual cash flow required by a ship owner to obtain a particular rate of return on capital invested, assumed to be 5 per cent. In relation to Australian vessels, after-tax cash flows are estimated for each year of the ship's life (20 years) and these are discounted to the present at the assumed after-tax real rate of return of 5 per cent. Given the present value, the equivalent annual cash flows (in the form of an annuity) required (RRAFR), is calculated using the same discount rate. This is then converted to a before-tax required annual freight rate. It is assumed that the ship owner has sufficient profits from alternative sources to receive the depreciation and interest tax deductions in the year the expenses are incurred.

The capital cost calculation assumes that the ship is purchased on favourable terms of the type offered by governments of major shipbuilding nations. 65 per cent of the ship cost is repaid over 10 years at a 4 per cent interest rate (that is lower in real terms given assumed 3 per cent annual inflation), with the principal repaid in equal amounts semi-annually along with interest on the outstanding balance. (The remainder of the ship cost is financed by equity).

#### *Economic capital costs*

A discount rate of 7 per cent is applied to represent the social opportunity cost of capital. An annual economic cost is calculated in a similar manner as for financial capital costs, using the social opportunity cost of capital as the discount rate. The cash outflows made to foreigners are discounted to obtain a net present value which is then annuitized to obtain annual economic costs of capital. Second-hand ship prices will bear some relation to the purchase price of a new ship particularly when freight rates are high and ship owners are willing to incur similar costs as new ships to capitalise on higher freight rates immediately. Annual economic capital costs for Australian ships are estimated to be \$0.0828 for each dollar of ship yard (purchase) cost.

As part of the 2012 shipping reform package, a royalty withholding tax exemption now applies to bareboat charter arrangements. For bareboat chartered ships, the capital cost is taken to be the annualised rate of return required by a foreign ship owner from capital invested.



In calculating the financial capital costs of Australian vessels, tax incentives such as accelerated depreciation and shipping income tax exemption (ITE) may reduce the required freight rate on capital invested. Typically, these tax incentives and their effect on capital costs are not relevant to economic capital costs as the taxation are transfers between the government and the ship owner. However, in the case of claiming an income tax exemption, vessel operators must maintain minimum training arrangements which may increase economic crew costs despite reducing financial capital costs (but not economic capital costs).<sup>31</sup> The crew costs of trainees were calculated as follows:

- Trainee integrated ratings attract Certificate III National Training Wage costs of \$366.80 per week in line with school leavers with Year 12 as their highest qualification.
- Deck and Engineer trainees are assumed to be paid the national minimum wage of \$640.90 per week since diplomas are not covered by the national training wage.

#### 5.1.4 Foreign ship costs

As CBAs consider relative costs and benefits of regulatory reform from a national perspective, the costs incurred by foreigners are not of direct importance. However, freight rates paid to foreigners are considered to be relevant costs. The freight rates paid for foreign shipping services are estimated on the basis of financial costs incurred by foreign vessels as a long term average.

As noted earlier, most foreign vessels operating in the Australian coastal trade are open-registry ships that pay ITF wages (in the absence of Seagoing Industry Award 2010 minimum wages and conditions) and minimal company tax. As most foreign ships are either open registry ships or ships registered in low-cost countries, ITF wage rates are used as benchmarks for the crew cost of operating a foreign ship in the absence of SIA Part B wage conditions. SIA Part B wage rates are used to measure foreign crew costs when required by the permit framework.

For foreign vessels, the capital costs are estimated assuming no Australian company tax and no tonnage tax in line with the low taxation arrangements in open registry countries and other non-open registry countries in which foreign vessels operating in Australian coastal trade are typically registered.<sup>32</sup> Given the low taxation arrangements, these are disregarded in capital cost calculations.<sup>33</sup> Annualised foreign capital costs are estimated as \$0.0725 per dollar of ship yard cost computed using a real rate of return of 4.9315 per cent. This compares with financial capital costs of \$0.0751 and \$0.0688 for Australian ships attracting accelerated depreciation and an ITE respectively per dollar of ship purchase cost.

The purchase cost of ships is assumed to be the same between foreign and Australian ship owners.

## 5.2 Daily time charter costs by ship type

The ship types modelled in the CBA are summarised in the tables below (Figure 5.1 - Figure 5.4), followed by a summary of the daily time charter costs by ship type (financial and economic).

<sup>31</sup> For vessels claiming an ITE, three additional berths for trainees are assumed to apply.

<sup>32</sup> E.g. Registration in Singapore and Hong Kong attracts low or no shipping income tax.

<sup>33</sup> Further detail on these taxation arrangements are available in the Reforming Australia's Shipping – Regulation Impact Statement 2011, p. 61.



In regards to ship type B1a, shipping companies continue to be taxed at 30 per cent for profits earned and claim depreciation tax deductions over an assumed ship life of 20 years. Under B1b, companies claim an ITE for 'qualifying shipping activities' but also comply with training requirements. Under B1c, companies claim accelerated depreciation tax deductions under a reducing balance under a statutory cap of 10 years and continue to pay company tax at the 30 per cent rate.<sup>34</sup> The benefits of the ITE are reduced by the cost of maintaining training berths.

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<sup>34</sup> A reducing balance depreciation method is assumed over a prime cost method as it tends to yield a lower annual capital cost for shipowners.



Table 5.1 - Vessel characteristics (base case scenario)

Ship code	Register	Tax treatment	Officers		Ratings		Min. wages	Company tax	Depreciation
			Nationality	Wage rates	Nationality	Wage rates			
B1a	Australian General Register	No special treatment	Australian	EA	Australian	EA	SIA Part A	30%	20 years prime cost
B1b	Australian General Register	ITE	Australian	EA	Australian	EA	SIA Part A	0%	N/A
B1c	Australian General Register	Accelerated depreciation	Australian	EA	Australian	EA	SIA Part A	30%	20% reducing balance
B3a	Foreign	Temporary Licence	Foreign	ITF	Foreign	ITF	ITF	0%	N/A
B3b	Foreign	Temporary Licence	Foreign	SIA Part B	Foreign	SIA Part B	SIA Part B	0%	N/A
B3c	Foreign	Transitional General Licence	Australian	EA	Australian	EA	SIA Part A	0%	N/A



Table 5.2 - Vessel characteristics (policy scenarios)

Ship code	Register	Tax treatment	Officers		Ratings		Min. wages	Company tax rate	Depreciation
			Nationality	Wage rates	Nationality	Wage rates			
P1a	Australian General Register	No special treatment	Australian	EA	Australian	EA	SIA Part A	30%	20 years prime cost
P1b	Australian General Register	ITE	Australian	EA	Australian	EA	SIA Part A	0%	N/A
P1c	Australian General Register	Accelerated depreciation	Australian	EA	Australian	EA	SIA Part A	30%	20% reducing balance
P3a	Foreign	Temporary Licence	Foreign	ITF	Foreign	ITF	ITF	0%	N/A
P3b	Foreign	Temporary Licence	Foreign/Aust.	SIA Part A	Foreign	SIA Part A	ITF	0%	N/A
P3f	Foreign	Temporary Licence	2 Australian; foreign	SIA Part B	Foreign	SIA Part B	ITF	0%	N/A
P3g	Foreign	Transitional General Licence	AUS	EA	AUS	EA	SIA Part A	0%	N/A



Table 5.3 - Daily time charter financial costs (\$ per day)

Base Case									
Code	Register	Ship type	Handy Size Bulk Carrier	Panamax Bulk Carrier	Capesize Bulk Carrier	Product Tanker	Container Ship	PT 20	CT 100
B1a	General Register	Reduced crew – no special tax treatment	31665	35817	47219	42883	28377	36129	45579
B1b	General Register	Reduced crew – ITE	31156	34868	44728	41406	28199	35532	43661
B1c	General Register	Reduced crew – accelerated depreciation	30986	34896	45450	41672	27880	35402	44125
B3a	Foreign	Temporary licence – ITF	15486	18752	28259	22201	13974	16233	24075
B3b	Foreign	Temporaray Licence – SIA B	19285	22551	32059	26134	17773	20166	28007
B3c	Foreign	Temporary General Licence	28770	32035	41543	38482	25655	32513	40355
Policy Case									
P1a	General Register	Reduced crew – no special tax treatment	31665	35817	47219	42883	28377	36129	45579
P1b	General Register	Reduced crew – ITE	31156	34868	44728	41406	28199	35532	43661
P1c	General Register	Reduced crew – accelerated depreciation	30986	34896	45450	41672	27880	35402	44125
P3a	Foreign	Temporary licence – ITF	15486	18752	28259	22201	13974	16233	24075
P3b	Foreign	Temporary licence – SIA A	19484	22914	32565	27585	17972	21617	29187
P3f	Foreign	Mix crew (Australian Master & Chief Engineer	16228	19531	29083	23231	14716	17262	25104



Base Case									
P3g	Foreign	Transitional General Licence	28770	32035	41543	38482	25655	18654	26496

Table 5.4 - Daily time charter economic costs (\$ per day)

Base Case									
Code	Register	Ship type	Handy Size Bulk Carrier	Panamax Bulk Carrier	Capesize Bulk Carrier	Product Tanker	Container Ship	PT 20	CT 100
B1a	General Register	Reduced crew – no special tax treatment	30026	34179	45580	40937	26899	34183	43632
B1b	General Register	Reduced crew – ITE	30678	34830	46232	41589	27551	34834	44284
B1c	General Register	Reduced crew – accelerated depreciation	30026	34179	45580	40937	26899	34183	43632
B3a	Foreign	Temporary licence – ITF	15486	18752	28259	22201	13974	16233	24075
B3b	Foreign	Temporary Licence – SIA B	19285	22551	32059	26134	17773	20166	28007
B3c	Foreign	Temporary General Licence	27131	30397	39905	36535	24177	30567	38408
Policy Case									
P1a	General Register	Reduced crew – no special tax treatment	30026	34179	45580	40937	26899	34183	43632
P1b	General Register	Reduced crew – ITE	30678	34830	46232	41589	27551	34834	44284
P1c	General Register	Reduced crew – accelerated depreciation	30026	34179	45580	40937	26899	34183	43632
P3a	Foreign	Temporary licence – ITF	15486	18752	28259	22201	13974	16233	24075



Base Case									
P3b	Foreign	Temporary licence – SIA A	19484	22914	32565	27585	17972	21617	29187
P3f	Foreign	Mix crew (Australian Master & Chief Engineer	19285	22551	32059	26134	17773	20166	28007
P3g	Foreign	Transitional General Licence	27131	30397	39905	36535	24177	30567	38408





AISR ships are not directly modelled because there are currently no AISR vessels conducting coastal trading. Hypothetically, an AISR ship may occur if the ship is manned by one Australian Master and one Australian Chief Engineer, both attracting the seafarer tax offset.<sup>35</sup> The costs of AISR ships would remain higher than for foreign vessels. This remains the case for the individual cost of an Australian Master or Chief Engineer even with a seafarer tax offset and therefore reduces the likelihood of AISR ships coming into existence.

### 5.3 Market share assumptions

Market share assumptions are established for the base case and each of the regulatory options. Various factors influence shipping service user's decision to ship cargo with an Australian or foreign carrier. These include:

1. Cost.
2. Availability.
3. Maximising the efficiency of the shipping schedule.

To a lesser extent, factors such as reliability of vessel also play a role. Cost and availability are related. An agent may prefer to ship with a particular vessel for several reasons. In particular if:

- The shipping service user is engaged in a long-term contract with a shipper.
- The vessel is carrying cargo that is already owned by the same agent and it makes operational sense to load the same vessel (which in many instances may be foreign flagged) with cargo for delivery to an Australian coastal port;
  - the agent will decide on the optimal visiting routes/sequences for ships. In doing so, price/cost will be just one of many variables in the decision making process.

Given the planning period, the ships and ports involved, constructing a set of ship schedules and cargo routings that allow for efficient service and minimisation of operating cost means that various, equally important factors, in addition to price/cost, are taken into account. This is an important point as the ensuing analysis, in lieu of detailed information and data relating to agents' shipping decisions, implies that cost is an overriding factor in the determination of market shares. Whilst this may be regarded as a simplifying assumption it is a necessary assumption in the context of this analysis. The model framework takes few variables into consideration and is designed almost exclusively to model ship costs.

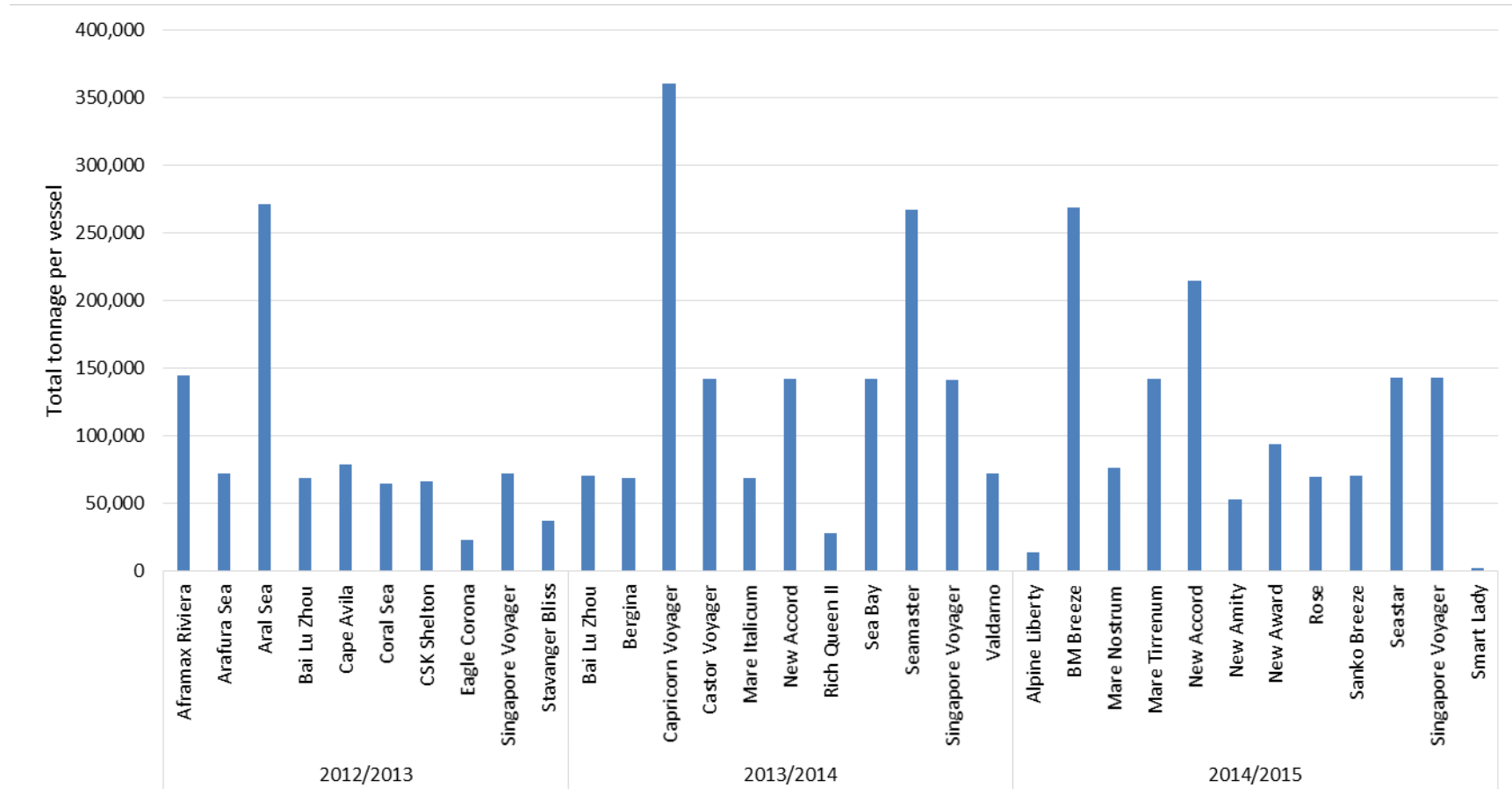
The task at hand is further compounded by the fact that close examination of the Coastal Trading Licensing System (CTLS) database shows a consistent story in the vessels chosen to undertake coastal trading. For example, crude oil is shipped exclusively by vessels with a Temporary Licence as shown in Figure 5.2 below.

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<sup>35</sup> To calculate the offset, it is necessary to know the number of days spent on overseas voyages. It is assumed for the purposes of estimating financial crew costs and the appropriate offset that seafarers are engaged for 91 days on overseas voyages. This minimises the cost saving and is line with typical leave arrangements of one day on, one day off for Australian seafarers, and with an AISR vessel engaging slightly over 50 per cent of the time in international voyages.



Figure 5.2- Crude Oil freight per vessel (in aggregate) per financial year

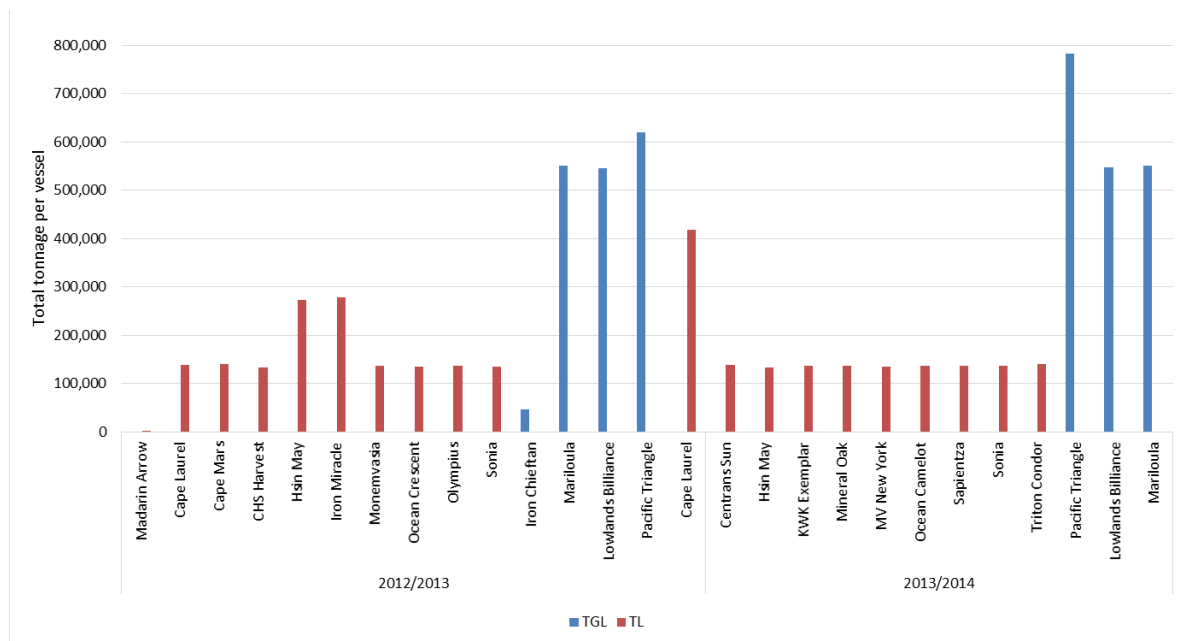




The information presented in this section reflects the current state of coastal trading within Australia. The information is based on data from the CTLS database provided by the Department. The data spans July 2012 – November 2014 and relates to Temporary, General and Transitional General Licence Registers. The data includes information relating to voyage number, category of trade, cargo description, load port, discharge port, aggregated volume, volume type, and vessel name.

According to Figure 5.2 over the period Jun-2013 to Nov-2014 crude oil was carried exclusively by foreign flagged vessels (as indicated by the ship name) with Temporary Licences. Similarly, according to Figure 5.3, Iron Ore was freighted predominantly by foreign flagged vessels. Over the period Aug-2012 to Sep-2014, Iron Ore was sea freighted around Australia by vessels with a Transitional General Licence. On all other occasions, this cargo type was shipped by foreign vessels holding a Temporary Licence.

Figure 5.3 –Iron Ore freight per vessel (in aggregate) by financial year<sup>36</sup>



For completeness, similar charts are presented for the following cargo types:

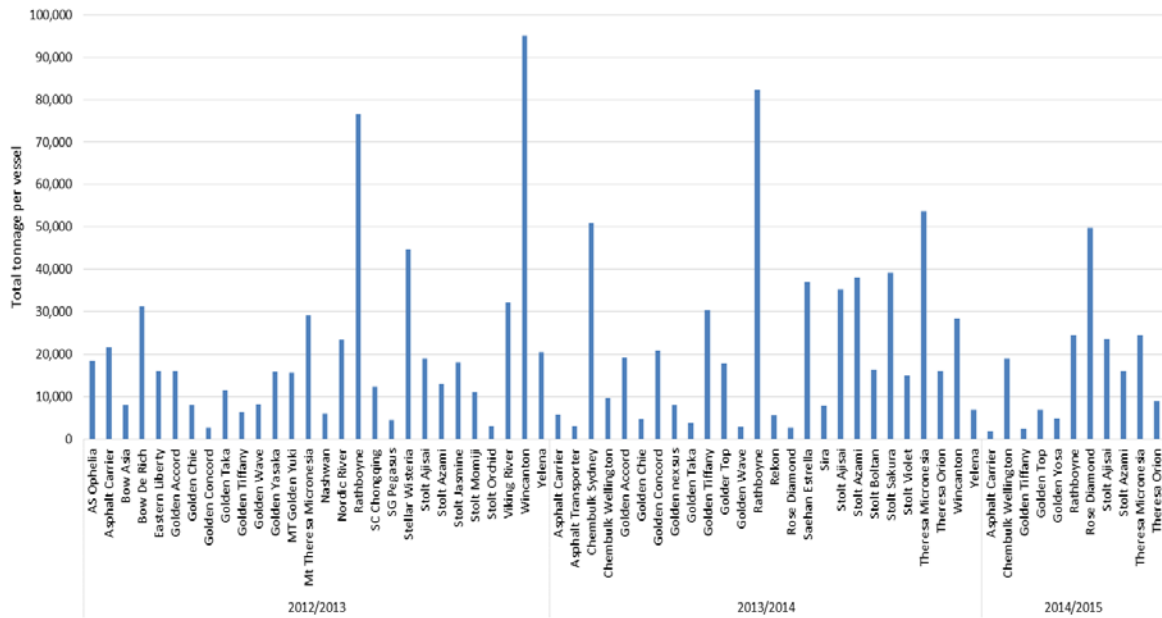
- Other liquid.
- Bass Strait.
- Other dry bulk.

In all cases we see that either foreign or Australian vessels dominate the freight task of particular cargo types.

<sup>36</sup> Note, CSL Whyalla holds a GL and transhipped iron ore in 2012/13 and 2013/14.

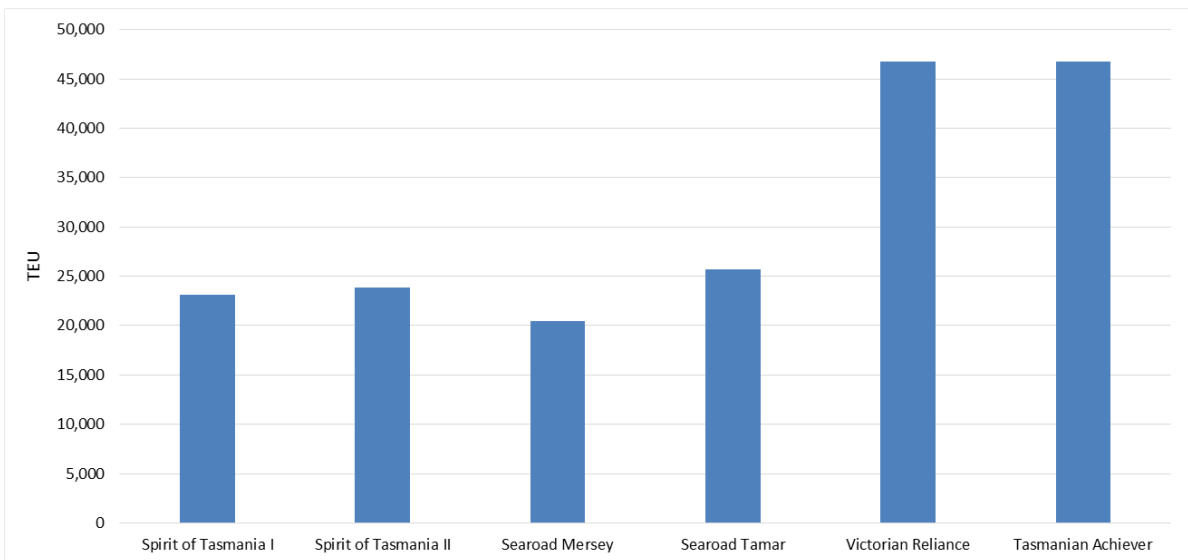


Figure 5.4 –Other Liquid freight per vessel (in aggregate) by financial year



According to the licence data summarised in Figure 5.4 above, the Other Liquid cargo type is shipped predominantly by foreign vessels with a Temporary Licence.

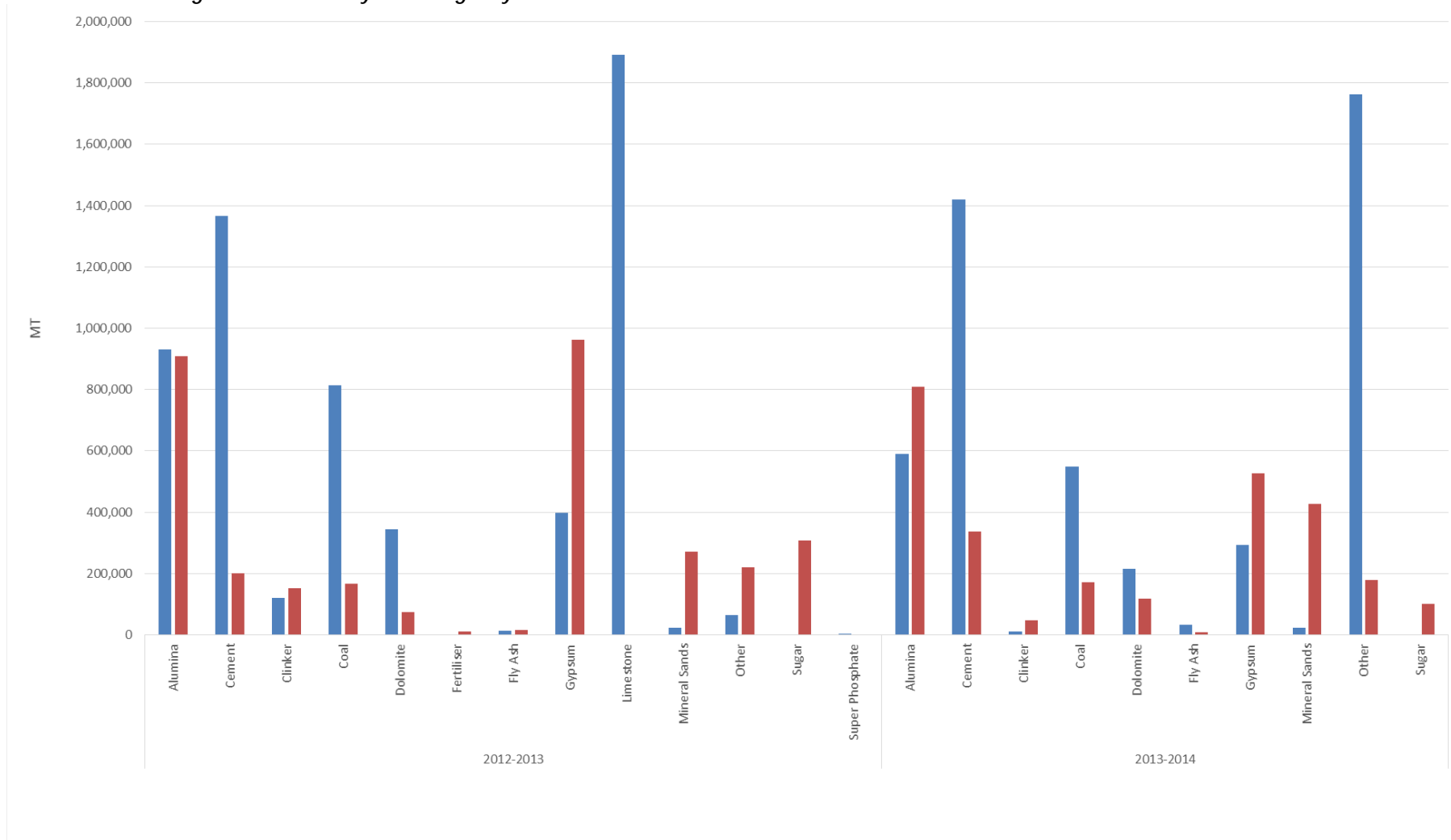
Figure 5.5 –Bass Strait freight by vessel for 2014 financial year



According to Figure 5.5, freight across Bass Strait (non-bulk) involves only Australian flagged vessels with a General Licence. Regarding Other Dry Bulk outlined in Figure 5.6, we find that this category is shipped by both Australian and foreign flagged vessels.



■ GL/TGL ■ of TL **Figure 5.6 –Other Dry Bulk freight by vessel 27/7/2012 – 2/11/2014**







This information presented in the above charts was utilised to develop market share assumptions for each policy option. Of particular interest was the assumed change in the number of Australian and foreign vessels under each option and the change in crew composition for a particular vessel. Each cargo type is discussed below.

### 5.3.1 Bauxite - Weipa to Gladstone

At present, there are 5 Rio Tinto vessels shipping Bauxite on the Weipa-Gladstone route which accounts for 90 per cent of the total Bauxite trade. The vessels are of the same vessel class, i.e. bulk carriers with the same capacity. As such, the market share attributed to each vessel is set at 20 per cent.<sup>37</sup> All 5 vessels are foreign flagged. The crew composition for all 5 vessels is 100 per cent Australian, paid EA waged rates. Given that these vessels are foreign flagged, the base case market share for the Weipa-Gladstone route is assumed to be 100 per cent foreign with Australian crew.

Under Option 1, we assume that all 5 Rio Tinto vessels will register as Australian flagged vessels since the crew composition on these vessels is already 100 per cent Australian and the cost of registration is minimal.

In relation to Options 2, 3 and 4, we assume that Rio Tinto will keep all vessels foreign flagged but may alter the crew composition of its vessels from 100 per cent Australian to 100 per cent foreign, in order reduce operating costs. It is assumed that Rio Tinto will alter the crew composition at a rate of one vessel per year.

Under Option 5, it is assumed that Rio Tinto's 5 vessels will require Australian crew. Accordingly, it is assumed that the crew composition under this option will be 100 per cent foreign. In contrast, under Option 6 it is assumed that only one of Rio Tinto's vessels will not reach the 183 day limit and therefore can have a fully foreign crew. The market share assumption pertaining to the Weipa-Gladstone route are summarised in Table 5.5 below.

**Table 5.5 - Market share assumptions for Bauxite - Weipa to Gladstone Trade**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	0	100	100	0	0
Option 1	100	0	100	0	0
Option 2	0	100	0	100	0
Option 3	0	100	0	100	0
Option 4	0	100	0	100	0
Option 5	0	100	0	0	100
Option 6	0	100	0	20	80

<sup>37</sup> Note that data pertaining to the exact number of voyages carried out by each vessel is not available.



### 5.3.2 Bauxite - Triangular route

According to the CTLS data, the Triangular route accounts for 10 per cent of Bauxite trade. The CTLS data show that in 2014 only 2 voyages were completed using 1 foreign vessel within the Triangular Route. As such, the base case market share of the Triangular Route is 100 per cent foreign. We note that for the Triangular route, only the Gladstone – Newcastle section of the voyage is captured by the Coastal Trading Act.

Under Option 1, foreign flagged vessels (and Australian flagged vessels) engaged in the trading of domestic cargo on the Australian coast will be subject to all applicable Australian laws. In particular, Australian workplace relation laws will, in the absence of the Coastal Trading Act, require foreign workers who want to work in Australia to hold relevant visas. Accordingly, foreign flagged vessels may only carry crew who are either Australian residents or foreign residents who hold the appropriate visas (collectively referred to as 'Australian crew').

The outcomes of Options 2, 3, 4, 5 and 6 would not change from the base case, as the vessel would continue to operate under a foreign register using foreign crew. As such, the market share would be 100 per cent foreign and the vessel would enjoy the benefit of ITF rates. The market share assumption pertaining to the Triangular route are summarised in Table 5.6 below.

**Table 5.6 - Market share assumptions for Bauxite - Triangular Trade**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	0	100	0	100	0
Option 1	0	100	100	0	0
Option 2	0	100	0	100	0
Option 3	0	100	0	100	0
Option 4	0	100	0	100	0
Option 5	0	100	0	100	0
Option 6	0	100	0	100	0

### 5.3.3 Iron Ore

In 2014, Iron Ore trade was undertaken by a total of 9 vessels, comprised of 6 Temporary Licence holders and 3 Transitional General Licences owned by Teekay (all foreign flagged).<sup>38</sup> Given that 9 vessels are in operation, the market share allocated to each vessel has been rounded to 10 per cent.

<sup>38</sup> CSL Whyalla is not included in the analysis as it is only conducting trans-shipping.





The market share under the base case is 100 per cent foreign, as all vessels are foreign flagged. It is further assumed that 70 per cent of vessels (i.e. 6 vessels/9 total vessels) employ all foreign crew and the remaining 30 per cent of vessels (i.e. the 3 Transitional General Licence vessels owned by Teekay) employ all Australian crew.

Under Option 1, it is assumed that the Transitional General Licence vessels will register as Australian flagged vessels since the crew composition on these vessels is already 100 per cent Australian and the cost of registration is minimal. It is assumed that the 6 Temporary Licence vessels will continue to operate as foreign flagged vessels whilst there is still demand in the market. Accordingly, the market shares under this option will be 30 per cent Australian and 70 per cent foreign. The foreign flagged vessels will be imported and the foreign crew would lose their work rights enjoyed under the Coastal Trading Act. To continue trading domestic cargo along the Australian coast, foreign flagged vessels will be required to carry only Australian crew.

Under Options 2, 3, 4, 5 and 6, all vessels currently shipping iron ore will remain in a foreign register (100 per cent foreign market share) with all crew being paid ITF wage rates. The market share assumptions pertaining to iron ore are summarised in Table 5.7 below.

**Table 5.7 - Market share assumptions for Iron Ore Trade**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	0	100	30	70	0
Option 1	30	70	100	0	0
Option 2	0	100	0	100	0
Option 3	0	100	0	100	0
Option 4	0	100	0	100	0
Option 5	0	100	0	100	0
Option 6	0	100	0	100	0

### 5.3.4 Other Dry Bulk

According to CTLS data, in 2014 Other Dry Bulk trade was performed by 104 Temporary Licence vessels, 4 Transitional General Licence vessels and 4 General Licence vessels. Using the volume of cargo transported in 2014 (consider Table 5.8 below), the base case assumes that market share is 20 per cent Australian and 80 per cent foreign. It is also assumed that the Transitional General Licence and General Licence vessels employ 100 per cent Australian crew and Temporary Licence vessels employ 100 per cent foreign crew.

Out of the 112 vessels operating the Other Dry Bulk trade, 8 vessels (7 per cent) operate with 100 per cent Australian crew, and 93 per cent of vessels operate with foreign crew. The same applies for Option 1, as there are still 8 vessels operating with 100 per cent Australian crew.



**Table 5.8 – Other dry bulk market shares based on volumes traded in 2014**

Licence	Cargo Volume (k/tonnes)	Market Share	Comment
General Licence	1,814	1,814/9,204 = 19.7%	Assume Australian vessels hold 20% market share under the base case.
Transitional General Licence	2,727	2,727/9,204 = 29.6%	Assume foreign vessels hold 80% market share under the base case. Note under Option 1 the ~30% market share held by Transitional General Licence shift to Australian. As such, under Option 1 (described below), the market share is 50/50 foreign/Australian.
Temporary Licence	4,663	4,663/9,204 = 50.6%	
	<b>9,204</b>		

Of the Australian vessels (4 General Licence), we assume that those which are not subject to a specific tax treatment have a market share of 25 per cent and the remaining 75 market share pertains to vessels receiving accelerated depreciation tax. Consider Table 5.9 below:

**Table 5.9 – Tax treatment of General Licence vessels**

Tax Treatment	Number of vessels (applies only to General Licence)	Comment
Accelerated Depreciation	3	Dry bulk is shipped by all 3 vessels including Goliath, Iron Chieftain and CSL Thevenard accounting for 75% (i.e. 3 / 4) of Australian vessels transporting dry bulk and receiving accelerated depreciation. The remaining vessel carrying dry bulk, i.e. Accolade II is in the 'no special treatment' category.
ITE	5	
No special treatment	39	
<b>Grand Total</b>	<b>47</b>	

Source: Adapted from information provided by the Department of Infrastructure and Regional Development.



Under Option 1, it is assumed that all 4 Transitional General Licence vessels will register as Australian flagged vessels since the crew composition on these vessels is already 100 per cent Australian and the cost of registration is minimal. It is assumed that the Temporary Licence vessels will continue to operate as foreign flagged vessels assuming there is still demand in the market. Foreign vessels will be imported and foreign crew will lose their work rights. To continue trading domestic cargo along the Australian coast, foreign flagged vessels will be required to carry only Australian crew. Accordingly, it is assumed that the market share for Other Dry Bulk will shift in favour of Australian vessels. The market share will be split evenly between foreign and Australian. According to information provided by the Department, 40 per cent of the Australian vessels enjoy the benefit of accelerated depreciation treatment.

Under Option 2, foreign market share would increase to 100 per cent, with all crew paid under ITF wage rates. The regulations under Option 3 are less favourable for foreign operators compared to Option 2 (though more favourable than the base case). Accordingly, the market share under Option 3 is assumed to be 15 per cent Australian and 85 per cent foreign (i.e. between the base case and Option 2).

Option 4 provides the most favourable conditions for foreign operators. Australian market share is assumed to reduce to zero and foreign market share increases to 100 per cent.

Since Options 5 and 6 are variations of Option 4, the same Australian and foreign market share values are adopted. Under Options 5 and 6, CTLS data shows the majority of vessels would not be required to hire Australian crew. Market share for foreign crew vessels is assumed to be 90 per cent and mixed crew vessels to be 10 per cent. A summary of these assumptions is provided in Table 5.10 below.

**Table 5.10 - Market share assumptions for Other Dry Bulk Trade**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	20	80	7	93	0
Option 1	50	50	100	0	0
Option 2	0	100	0	100	0
Option 3	15	85	5	95	0
Option 4	0	100	0	100	0
Option 5	0	100	0	90	10
Option 6	0	100	0	90	10

### 5.3.5 Crude Oil

For the crude oil trade, CTLS data shows a total of 14 vessels, all trading under Temporary Licences. Accordingly, the case base market share is 100 per cent foreign.



Under Option 1, it is assumed foreign flagged vessels will be imported and the foreign crew would lose their work rights enjoyed under the Coastal Trading Act. To continue trading domestic cargo along the Australian coast, foreign flagged vessels will be required to carry only Australian crew.

For Options 2, 3, 4, 5 and 6 the market share assumptions remain identical to the base case, as all coastal trading for oil is already performed by foreign vessels. A summary of the market share assumption relating to crude oil is provided in Table 5.11 below.

**Table 5.11 - Market share assumptions for Oil**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	0	100	0	100	0
Option 1	0	100	100	0	0
Option 2	0	100	0	100	0
Option 3	0	100	0	100	0
Option 4	0	100	0	100	0
Option 5	0	100	0	100	0
Option 6	0	100	0	100	0

### 5.3.6 Petroleum

For the Petroleum trade, CTLS data indicates 5 vessels operating under Transitional General Licences and 69 vessels operating under Temporary Licences. Accordingly, the base case market share is 100 per cent foreign flagged. All Transitional General Licence vessels carry 100 per cent Australian crew whilst Temporary Licence vessels carry 100 per cent foreign crew.

Under Options 1, we assume that the 5 Transitional General Licence vessels will register as Australian flagged vessels since the crew composition on these vessels is already 100 per cent Australian and the cost of doing so is therefore minimal. It is assumed foreign flagged vessels will be imported and the foreign crew would lose their work rights enjoyed under the Coastal Trading Act. To continue trading domestic cargo along the Australian coast, foreign flagged vessels will be required to carry only Australian crew.

In relation to Options 2, 3 and 4, Transitional General Licence vessels may alter the crew composition from 100 per cent Australian to 100 per cent foreign, to reduce operating costs. It is assumed that Transitional General Licence vessels will alter the crew composition of their respective fleets at a rate of one vessel per year.



Since Options 5 and 6 are variations of Option 4, the same Australian and foreign market share values are adopted. Under Option 5, CTLS data shows the majority of vessels would not be required to hire Australian crew as they do not meet the 120 or 183 day limit respectively. Market share for mixed crew vessels is assumed to be 10 per cent and foreign crew vessels to be 90 per cent. A summary of the market share assumption relating to petroleum is provided in Table 5.12 below.

**Table 5.12 - Market share assumptions for Petroleum**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	0	100	10	90	0
Option 1	70	30	100	0	0
Option 2	0	100	0	100	0
Option 3	0	100	0	100	0
Option 4	0	100	0	100	0
Option 5	0	100	0	90	10
Option 6	0	100	0	90	10

### 5.3.7 Other Liquid Bulk

For 2014, CTLS data shows that 25 Temporary Licence vessels serviced the Other Liquid Bulk trade. Accordingly, the base case market share is 100 per cent foreign. For the purposes of our model we elected SIA Part B wages to apply as the proportion of voyages covered under SIA Part B wages exceed the proportion of voyages covered under ITF wages for the 2014 year.<sup>39</sup>

Under Option 1, it is assumed that the Temporary Licence vessels will continue to operate as foreign flagged vessels as it is assumed that coastal trading in Australia comprises a small portion of a Temporary Licence holder's core activities. It is assumed foreign flagged vessels will be imported and the foreign crew would lose their work rights enjoyed under the Coastal Trading Act. To continue trading domestic cargo along the Australian coast, foreign flagged vessels will be required to carry only Australian crew.

Contrary to the base case where SIA Part B wages are applied, under Options 2, 3, 4 and 6, the 25 vessels would all remain foreign flagged, using ITF wage rates.

<sup>39</sup> We note that ITF wages ought to apply to vessels conducting less than three voyages, however the model only allows for the election of one wage structure.



For Option 5, while all vessels remain foreign flagged, the licensing data indicates that 1 of the 25 vessels would exceed the 120 day limit and would therefore be required to hire Australian crew. Accordingly, 4 per cent of the foreign flagged vessels are assumed to employ mixed crew and 96 per cent are assumed to employ foreign crew. Table 5.13 below summarises the market share assumptions underpinning other liquid bulk.

**Table 5.13 - Market share assumptions for Other Liquid Bulk**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	0	100	0	100	0
Option 1	0	100	100	0	0
Option 2	0	100	0	100	0
Option 3	0	100	0	100	0
Option 4	0	100	0	100	0
Option 5	0	100	0	96	4
Option 6	0	100	0	100	0

### 5.3.8 Cruise shipping

To model the cruise ship sector we relied on information and data pertaining to the Australian expedition cruise vessels published in The Australian Expedition Cruise Shipping Association's (AECSA) public submission (Submission 11).<sup>40</sup> Currently, 3 Australian vessels (all Australian crew) and 4 foreign vessels (all foreign crew) are in operation with a combined passenger capacity of 554.<sup>41</sup> The public submission by AECSA states that a cruise operator's business is viable at 95% occupancy level, but becomes unviable when the occupancy level drops to 85%. For the purpose of conducting the CBA, a mean of 90% occupancy is assumed. Using this assumption, the number of passengers carried by cruise vessels would be 500 (554\*0.9).

<sup>40</sup> [http://www.infrastructure.gov.au/maritime/business/coastal\\_trading/review/submissions.aspx](http://www.infrastructure.gov.au/maritime/business/coastal_trading/review/submissions.aspx)

<sup>41</sup> A list of International vessels can be found on <http://kimberleycruises.com/>; such as the Caledonian Sky.



According to the Cruise Industry Report 2013<sup>42</sup>, 8-14 day cruise trips represents 57% of the market. The Kimberley cruise data show a majority of cruise trips have a duration of 10 days.<sup>43</sup> Therefore, we assume that the average number of days per trip is 10. The Department provided an estimate of the crew cost for cruise ships, based on a mid-sized cruise vessel for all ranks and including rotation crew (inclusive of tax and superannuation). The Australian crew cost is estimated at USD3,500,000 and mixed crew is estimated at USD1,350,000 (including USD250,000 paid for two senior Australian crew). The daily operating cost is derived by dividing the total cost by 180 days, which is assumed to be the length of the cruise ship season.

There are currently 7 vessels operating in the expedition cruise ship market, with 3 General Licences 1 Temporary Licence and a further 3 ships exempted from the operation of the Coastal Trading Act. Passenger capacities of the vessel types have been taken into account in determining the base case market shares are as follows:

- 3 Australian registered vessels have a combined capacity of 172 passengers per voyage; and
- 4 Foreign registered vessels have a combined capacity of 382 passengers per voyage.<sup>44</sup>

Taking the passenger capacities into account, the market share for the base case is determined as 30 per cent for Australian (172 passengers/554 total passengers) and 70 per cent for foreign (382 passengers/554 total passengers). Forty per cent of the market share is comprised of Australia crew (3 of the total 7 vessels).

For Option 1 we do not include the three foreign cruise vessels which are exempt from the operation of the Coastal Shipping Act. The market share based on passenger capacity is 60 per cent domestic and 40 per cent foreign. It is assumed foreign flagged vessels will be imported and the foreign crew would lose their work rights enjoyed under the Coastal Trading Act. To continue trading domestic cargo along the Australian coast, foreign flagged vessels will be required to carry only Australian crew.

Options 2, 3 and 4 are assumed to result in the three Australian cruise vessels registering under a foreign register, using all foreign crew to reduce operating costs. Accordingly, the market share is assumed to be 100 per cent foreign flagged vessels.

Under Options 5 and 6, the Australian crewing requirements would not be triggered. For the purposes of this CBA, it is assumed that cruise ships do not operate for more than 120 days.

**Table 5.14 - Market share assumptions for cruise shipping**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	30	70	40	60	0
Option 1	60	40	100	0	0

<sup>42</sup> [www.cruising.org.au/downloads/CLIA-Report-2013.pdf](http://www.cruising.org.au/downloads/CLIA-Report-2013.pdf)

<sup>43</sup> Found at <http://kimberleycruises.com/tours/list-of-boats/>

<sup>44</sup> Found at <http://kimberleycruises.com/tours/list-of-boats/>



Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Option 2	0	100	0	100	0
Option 3	0	100	0	100	0
Option 4	0	100	0	100	0
Option 5	0	100	0	100	0
Option 6	0	100	0	100	0

### 5.3.9 Inter-Capital containers

The inter-capital containers are transported by foreign vessels using spare capacity on international voyages between Australian ports. We assume that for the base case and Options 2, 3, 4, 5 and 6 that the costs associated with transporting inter-capital containers are limited to: stevedoring (loading/unloading) costs, wharfage charges and the surpluses earned by foreign containerhips from charging what the market will bear above costs.

Under Option 1, no foreign vessels would be available for the transportation of inter-capital containers. Rather, the transportation of the inter-capital containers would be conducted via rail. The transportation costs are taken from the 2010 BITRE shipping reform report. These costs are inflated using the rail freight transport and water transport support producer price indices to 2014 terms. The overall cost or benefit of this sector under Option 1 is determined by the difference in cost between rail and shipping.

### 5.3.10 Bass Strait Non-Bulk Freight

The Bass Strait non-bulk trade is modelled separately to the inter-capital containers trade. Non-bulk freight is considered to be containers and other freight such as transport equipment, break bulk freight, pallets and timber. This avoids data issues arising from potentially inconsistent classification, and takes into account the same commodities may switch between the two according to ship availability. Approximately 70 per cent of the Bass Strait non-bulk trade is containerised.

The key differences between the two sectors are:

- Bass Strait non-bulk freight is only transported via vessels; and
- Transportation of Bass Strait freight is only performed by Australian vessels for the base case.

For the Bass Strait non-bulk sector, the CTLS data shows 6 vessels operating under General Licences and are therefore Australian flagged. The base case market share is 100 per cent Australian. According to information provided by the Department, 65 per cent of those vessels are receiving ITE tax treatment.





For Option 1, there are no changes to the market share as all vessels remain Australian flagged.

Under Options 2, 3 and 4, we assume 4 vessels will register under a foreign register to reduce operating costs. However the two Spirit of Tasmania vessels are very unlikely to reflag given that they are owned by the Tasmanian Government. For the purposes of our analysis we assume that they will remain Australian flagged (Options 2 to 6 inclusive). Accordingly, the market share under these options will be 65 per cent foreign (under ITF wages) and 35 per cent domestic (under EA wages). The two Spirit of Tasmania vessels (which comprise the domestic market share) will be composed of 100% Australian crew. In the crew composition columns in Table 5.15 below, the figures represent the total percentage of crew composition across all vessels for this trade.

For Option 5 and 6, all vessels would exceed the 120 and 183 day limits and so all foreign flagged vessels will be required to employ mixed crew. Table 5.15 summarises the market share assumptions relating to Bass Strait.

**Table 5.15 - Market share assumptions for Bass Strait non-bulk freight**

Option	Market share (%)		Crew composition (%)		
	Australian flag	Foreign flag	Australian	Foreign	Mixed
Base case	100	0	100	0	0
Option 1	100	0	100	0	0
Option 2	35	65	35	65	0
Option 3	35	65	35	65	0
Option 4	35	65	35	65	0
Option 5	35	65	35	0	65
Option 6	35	65	35	0	65

## 5.4 Cargo forecasts

### 5.4.1 Introduction

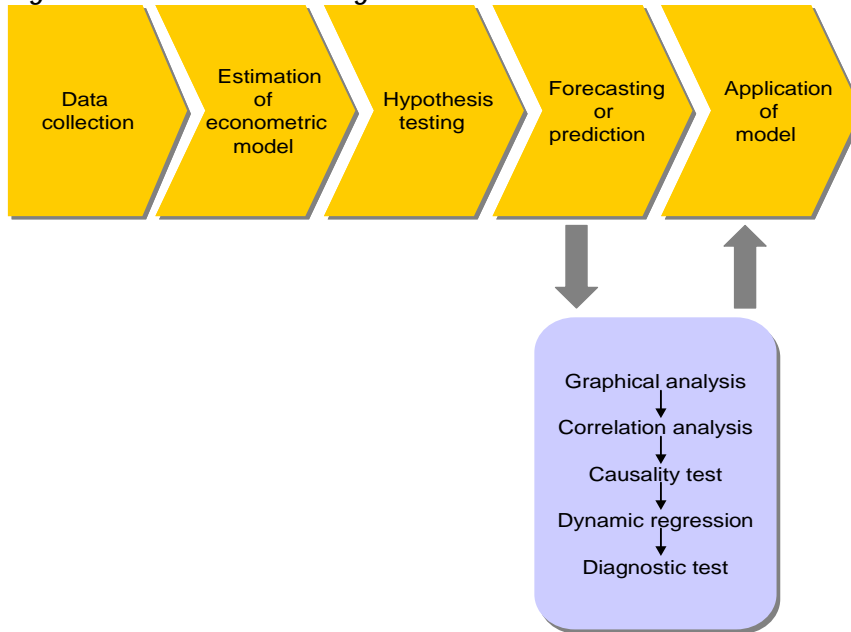
Assumptions relating to the total freight task (for each cargo type) are an important element of the CBA model. The assumptions have implications for the volume of trade which influences the behaviour of both Australian and foreign vessels. Forecasts of freight data for each cargo type were provided by BITRE. PAG developed forecasts of total freight volumes for each cargo type using econometric models. PAG adopts and makes forecast comparisons with BITRE's forecasts for each cargo type below.



## 5.4.2 PAG Forecasting methodology

PAG developed econometric models of the freight volumes associated with each cargo type. Figure 5.7 below summarises the methodology employed by PAG.

Figure 5.7: Statistical Modelling Framework



The model specifications for each of the cargo types are presented in



Appendix E – Freight forecasting **models**. Note, the forecast horizon in all cases is t=2014, 2015, ..., 2035.



## 6. Results

### 6.1 NPV Results

Table 6.1 and Table 6.2 below summarises the results of the CBA using NPV analysis.

Table 6.1 - NPV results (\$m) (main scenario)

Option	2015	2016	2017	5 years	10 years	20 years
1	-183.9	-194.4	-204.1	-886.5	-1624.9	-2510.7
2	41.3	57.8	68.9	280.7	531.5	786.2
3	38.6	51.0	61.3	252.0	476.9	705.3
4	41.3	57.8	68.9	280.7	531.5	786.2
5	32.7	45.8	57.0	231.9	442.8	653.6
6	33.2	46.5	57.9	235.8	450.7	667.4

Table 6.1 above shows the NPV results of all policy options across various time horizons. Option 1 results in a significant NPV economic cost of \$2,510.7m. The reason for this is twofold. Firstly, the cost associated with replacing foreign crew on MCVs with either Australian crew or crew who hold 457 visas - it is assumed that the replacement crew are paid Australian EA rates which greatly increases the crew cost for a foreign vessel previously paying SIA Part B or ITF wage rates. Secondly, the cost of moving inter-capital container from ship to rail is relative high, i.e. approximately \$1,662.1m under Option 1 (20 year horizon). This result does not change if GST is considered. GST charged on importation may only serve to further reduce the market share of foreign vessels.

Under Options 2 and 4, the analysis shows NPV positive economic cost savings of approximately \$786.2m. This result is driven by existing foreign vessels increasing coastal shipping operations pursuant to the removal of the requirement to apply for temporary licences. Since ship owners may have minimal incentive under Option 2 to register vessels in the Australian General Register, they may opt to register ships in a foreign register and hire only foreign crew. These vessels may capture tonnage away from Australian vessels. Foreign vessels with 100 percent foreign crew incur lower economic costs than Australian flagged vessels.

There are other relevant costs associated with Options 2-6 that are not reflected in the NPV results. These include a loss of Australian seafarer jobs which may have ramifications for the shore-based maritime sector in general. Legislative costs associated with the identification and enactment of new legislation (to negate the undesired effects of a repeal of the Coastal Trading Act) are also not modelled.



Option 3 yields NPV economic cost savings of \$705.3m. The cost reductions under Option 3 result purely from an increase in the share of the freight task attributed to foreign vessels. Relative to Option 2, there may be a smaller loss of Australian seafarer jobs as ship owners may continue to register vessels in the Australian General Register and maintain Australian crew rather than register in a foreign register and employ foreign crew. However, since foreign vessels ship an increased share of the freight task, there may nevertheless be some displacement of Australian operated vessels and Australian seafarer jobs relative to the base case scenario.

Options 2 and 4 reflect the highest economic benefit of all the policy options. This result is driven by the assumed increase in the market share of foreign vessels, the extension of the Coastal Trading Act to cover offshore installations where applicants opt in and the relaxed licensing and crewing conditions. Many of the operators currently operating under the Australian General Register would likely re-flag their vessels in order to compete with the foreign operators who enjoy the benefit of comparatively lower wage rates. Australian seafarer jobs would be adversely affected as Australian operators re-flag from the Australian General Register.

Ship operators are likely to replace Australian seafarers (paid under EA rates) with foreign seafarers (paid under ITF rates). Nevertheless, a portion of the crew may remain Australian due to the world-wide shortage of high ranking positions.

Options 5 and 6 result in NPV economic cost savings of \$653.6m and \$667.4m respectively. The economic cost reductions are similar to Option 4 due to minimal changes in the proposed amendments. The economic cost reduction for Option 5 is less than that of Option 6 due to more stringent crew conditions, where foreign vessels must operate with two senior Australian crew if the vessel conducts coastal voyages of more than 120 days. It is also important to note that Fair Work Act and SIA Part B wage rates would apply to the whole crew for the entire permit period. Under Options 6, the temporal requirement is extended to 183 days leading to less onerous requirements.

The results for the base case and each policy option above will be collectively referred to as the 'Main Scenario' for the purposes of the sensitivity analysis below.

Figure 6.1- Main Scenario NPV results (\$m)

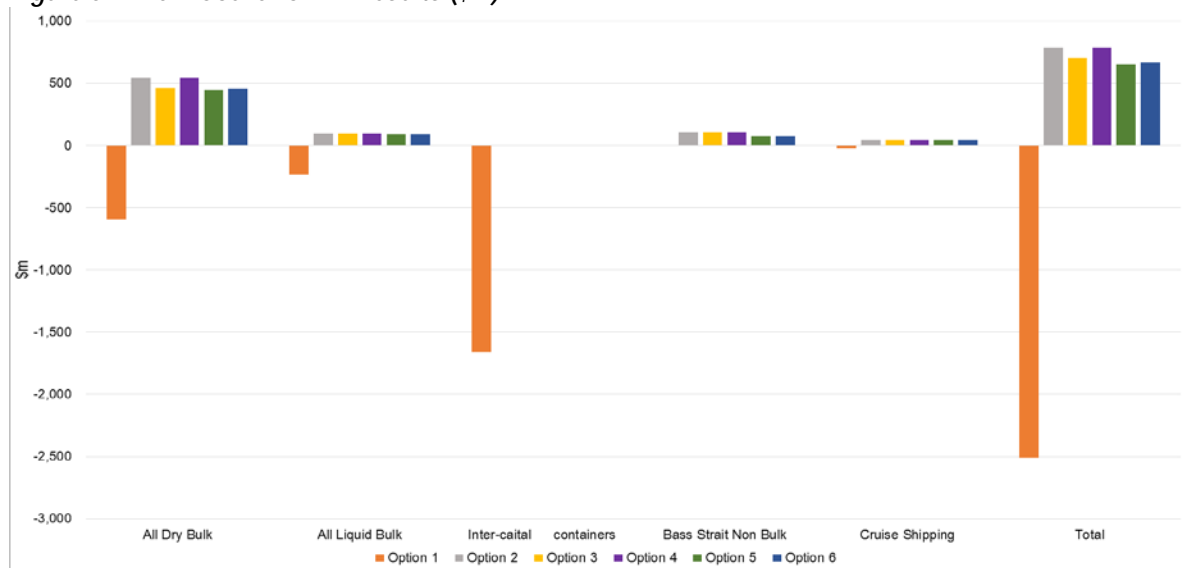






Table 6.2 - NPV results (\$m) (main scenario)

Policy Options	Dry Bulk					Liquid Bulk				Inter-capital containers	Bass Strait Non-Bulk	Cruise Shipping	Total
	Bauxite Triangular	Bauxite Weipa-Gladstone	Iron Ore	Other Dry Bulk	Sub-total	Oil	Petroleum Products	Other Liquid Bulk	Sub-total				
Option 1	-100.9	-105.0	-91.0	-296.9	-593.8	-24.9	-172.6	-37.0	-234.5	-1662.1	0.0	-20.2	-2510.7
Option 2	0.0	249.6	29.9	262.9	542.4	9.4	71.7	14.0	95.1	0.0	103.5	45.2	786.2
Option 3	0.0	249.6	29.9	182.0	461.5	9.4	71.7	14.0	95.1	0.0	103.5	45.2	705.3
Option 4	0.0	249.6	29.9	262.9	542.4	9.4	71.7	14.0	95.1	0.0	103.5	45.2	786.2
Option 5	0.0	168.0	29.9	247.0	444.9	9.4	66.1	13.4	88.9	0.0	74.6	45.2	653.6
Option 6	0.0	181.3	29.9	247.0	458.2	9.4	66.1	14.0	89.5	0.0	74.6	45.2	667.4



The table below highlights the reduction in daily crew costs (averaged across all ship types) between the base case and each policy option. Crew costs are the sum of the annual salaries for each employee crew class i.e. Master, Chief Engineer etc. These crew costs differ across ship type according to tonnage (vessel size).

**Table 6.3 - Crew cost /benefit across cargo sectors**

Wage cost/benefit per day	Bauxite Weipa-Gladstone	Bauxite Triangular	Iron Ore	Other Dry Bulk	Oil	Petroleum	Other Liquid Bulk	Bass Strait Non Bulk	Cruise Shipping
Option 1	0	-\$12,592	-\$8,814	-\$6,569	-\$8,735	-\$7,861	-\$8,735	0	-\$10,550
Option 2	\$12,592	0	\$3,778	\$4,589	\$3,857	\$12,592	\$3,857	\$12,592	\$4,522
Option 3	\$12,592	0	\$3,778	\$3,873	\$3,857	\$12,592	\$3,857	\$12,592	\$4,522
Option 4	\$12,592	0	\$3,778	\$6,023	\$3,857	\$12,592	\$3,857	\$12,592	\$4,522
Option 5	\$12,592	-\$746	\$3,361	\$5,501	\$3,260	\$4,321	\$3,521	\$11,846	\$4,522
Option 6	\$12,592	-\$746	\$3,361	\$5,501	\$3,335	\$4,470	\$3,633	\$12,219	\$4,522

The values in Table 6.3 above reflect the differences in crew composition between the base case and the options. For example, in Table 5.5 relating to Bauxite Weipa to Gladstone trade, the crew composition for the base case and Option 1 are the same (100 per cent Australian crew). As such, the net impact on crew costs in Table 6.3 above for the Bauxite Weipa to Gladstone trade is 0. However, for the same cargo trade, Table 5.5 reflects differences in the crew composition between the base case and options 2-6. In fact, the difference relates to a movement away from Australian crew to 100 per cent foreign crew (consider crew composition in Table 5.5 for Options 2-6). This benefit in cost is reflected in Table 6.3, in the order of \$12,592 per day, relating to Options 2-6.

## 6.2 Sensitivity analysis

Sensitivity analysis is utilised to show the changes in economic cost impact (and the overall option rankings) through marginal adjustments to key variables, namely:

- Reduced manning.
- Shadow price factor.
- SIA Part A wages.
- Discount factor.

By adjusting the above variables we were able to isolate and quantify the impact on the final option rankings. The results of the sensitivity testing together with associated assumptions are outlined below.

### 6.2.1 Reduced manning

Reduced manning is considered where crew numbers are assumed to fall below the current crew numbers for Australian vessels in the base case scenario. Figure 6.2 and Figure 6.3 below compare the NPV results of the base case and each policy option under reduced manning as against the Main Scenario for each cargo trade.





Reduced manning only impacts Australian vessels in accordance with our assumptions. Due to reductions in crew numbers and associated crew costs, economic cost savings for policy options 2-6 are smaller as compared to the Main Scenario. Simultaneously, economic costs are reduced for option 1.

Bass Strait non-bulk is the most sensitive to changes in crew numbers (manning) as trade of this cargo type is only undertaken by domestic vessels. The reduction in economic cost under Option 1 for the petroleum trade is due to the 5 Transitional General Licence vessels assumed to register under the Australian General Register. Following registration, these vessels will operate with reduced crew numbers. Accordingly, associated crew costs decrease.

Figure 6.2- NPV results (\$m) (Reduced Manning vs Main Scenario – Part A)

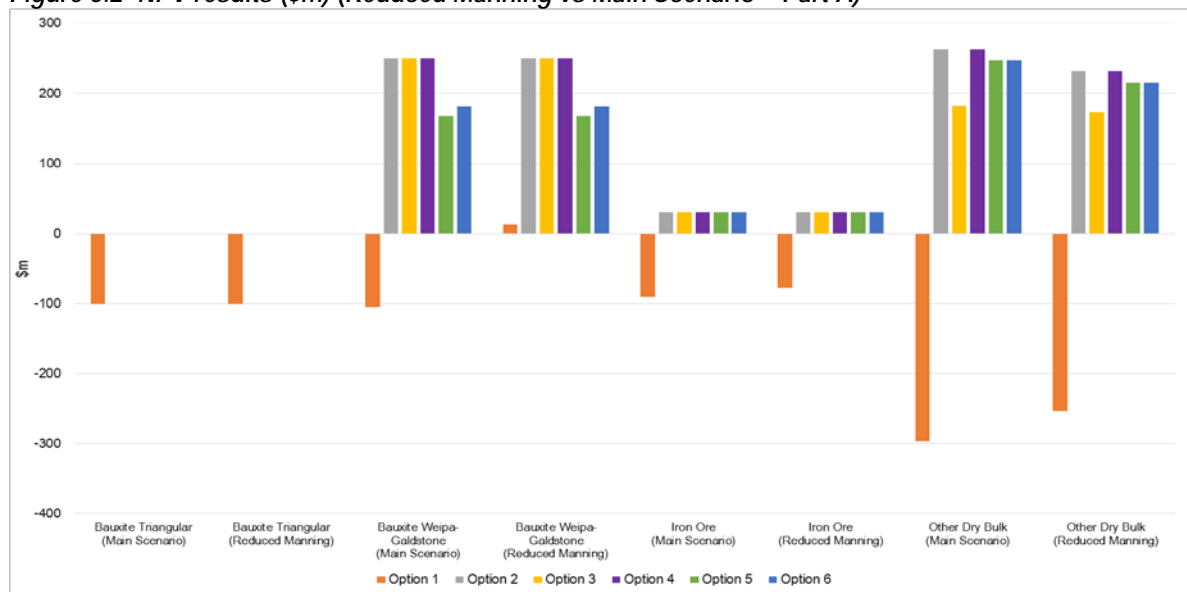




Figure 6.3- NPV results (\$m) (Reduced Manning vs Main Scenario – Part B)

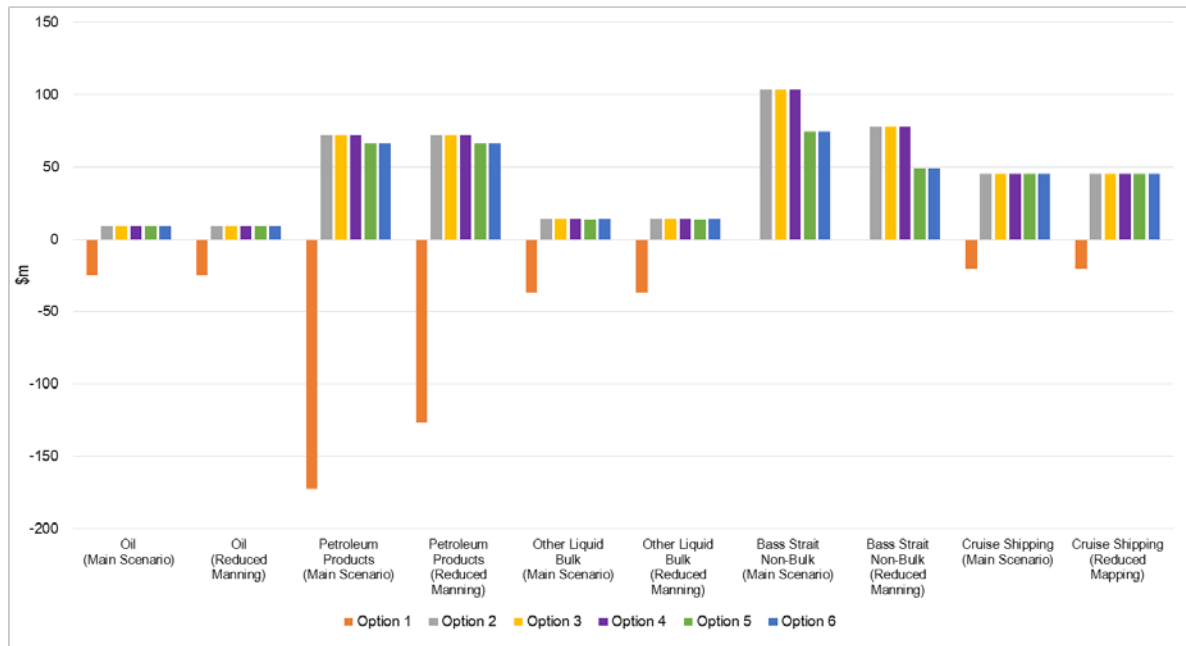




Table 6.4 - NPV results (\$m) (Reduced Manning Scenario)

Policy Options	Dry Bulk					Liquid Bulk				Inter-capital containers	Bass Strait Non-Bulk	Cruise Shipping	Total
	Bauxite Triangular	Bauxite Weipa-Gladstone	Iron Ore	Other Dry Bulk	Sub-total	Oil	Petroleum Products	Other Liquid Bulk	Sub-total				
Option 1	-100.9	12.5	-77.9	-253.4	-419.8	-24.9	-126.6	-37.0	-188.5	-1662.1	0.0	-20.2	-2290.6
Option 2	0.0	249.6	29.9	231.1	510.6	9.4	71.7	14.0	95.1	0.0	77.8	45.2	728.7
Option 3	0.0	249.6	29.9	172.9	452.4	9.4	71.7	14.0	95.1	0.0	77.8	45.2	670.6
Option 4	0.0	249.6	29.9	231.1	510.6	9.4	71.7	14.0	95.1	0.0	77.8	45.2	728.7
Option 5	0.0	168.0	29.9	215.2	413.1	9.4	66.1	13.4	88.9	0.0	48.9	45.2	596.1
Option 6	0.0	181.3	29.9	215.2	426.4	9.4	66.1	14.0	89.5	0.0	48.9	45.2	610.0



### 6.2.2 Shadow price factor

According to the BITRE model, a shadow price factor of 0.9 is applied to the crew costs for Australian vessels. By assuming a shadow price factor of 0.7 (rather than 0.9), we observe changes in the NPV differential between the regulatory options. Policy option NPV rankings remain constant. Consider Figure 6.4, and Table 6.5 below.

Similar to reduced manning, changes to the shadow price factor only impacts Australian vessels. A reduction in the shadow price factor results in decreases to crew costs. Accordingly, economic cost savings for policy options 2-6 are less than they would be under the Main Scenario. Simultaneously, economic costs are reduced for option 1.

Figure 6.4- NPV results (\$m) (Lower Shadow Price Factor vs Main Scenario – Part A)

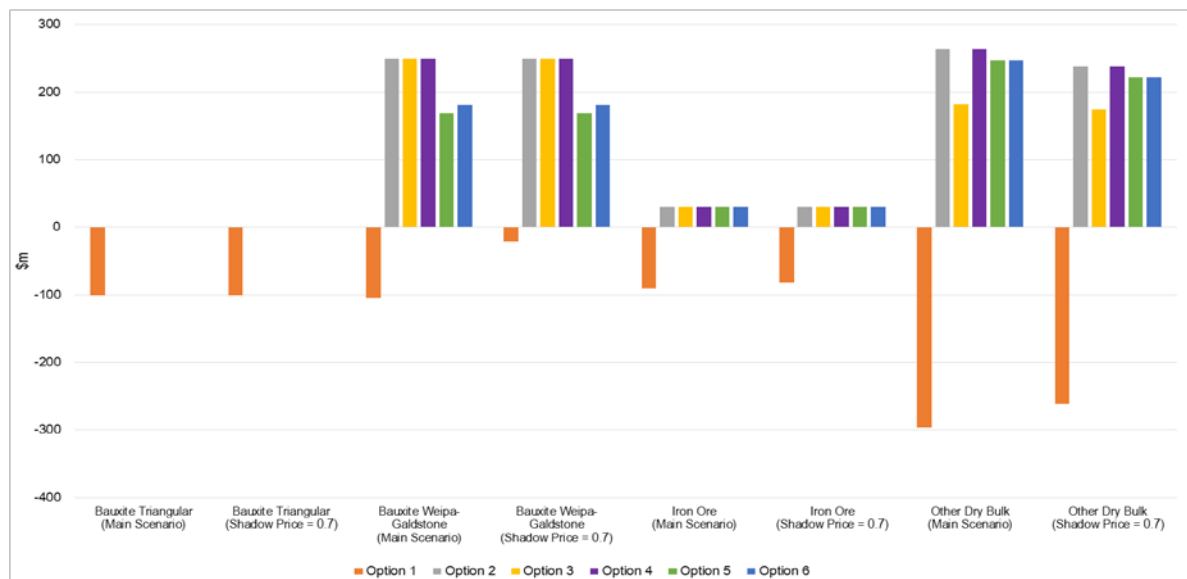




Figure 6.5- NPV results (\$m) (Lower Shadow Price Factor vs Main Scenario – Part B)

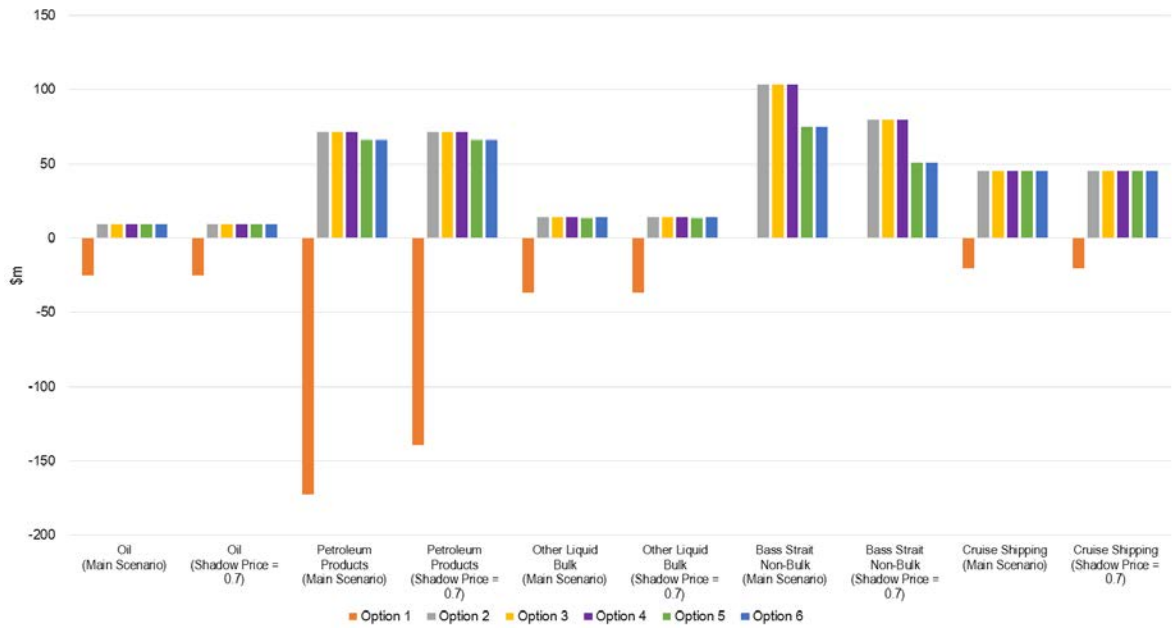




Table 6.5 - NPV results (\$m) (lower shadow price factor scenario)

Policy Options	Dry Bulk					Liquid Bulk				Inter-capital containers	Bass Strait Non-Bulk	Cruise Shipping	Total
	Bauxite Triangular	Bauxite Weipa-Gladstone	Iron Ore	Other Dry Bulk	Sub-total	Oil	Petroleum Products	Other Liquid Bulk	Sub-total				
Option 1	-100.9	-21.0	-82.5	-261.9	-466.4	-24.9	-139.4	-37.0	-201.3	-1662.1	0.0	-20.2	-2350.0
Option 2	0.0	249.6	29.9	237.3	516.8	9.4	71.7	14.0	95.1	0.0	79.9	45.2	737.0
Option 3	0.0	249.6	29.9	174.7	454.2	9.4	71.7	14.0	95.1	0.0	79.9	45.2	674.4
Option 4	0.0	249.6	29.9	237.3	516.8	9.4	71.7	14.0	95.1	0.0	79.9	45.2	737.0
Option 5	0.0	168.0	29.9	221.5	419.3	9.4	66.1	13.4	88.9	0.0	51.0	45.2	604.4
Option 6	0.0	181.3	29.9	221.5	432.6	9.4	66.1	14.0	89.5	0.0	51.0	45.2	618.3



### 6.2.3 SIA Part A wages

To facilitate the sensitivity analysis regarding SIA Part A wages, it is assumed that foreign crew are replaced with 457 visa holders and Australian seafarers who are paid under EA rates. There is a possibility that the market wages required under 457 visas do not equate to EA rates but may be closer to SIA Part A wages. The results are outlined in Table 6.6 below. By altering SIA Part A wages, Options 4 and 2 generate the highest economic benefit and the rankings remain unchanged. A comparison across the cargo types is provided below in Figure 6.6 and Figure 6.7.

Figure 6.6- NPV results (\$m) (SIA Part A Wages vs Main Scenario – Part A)

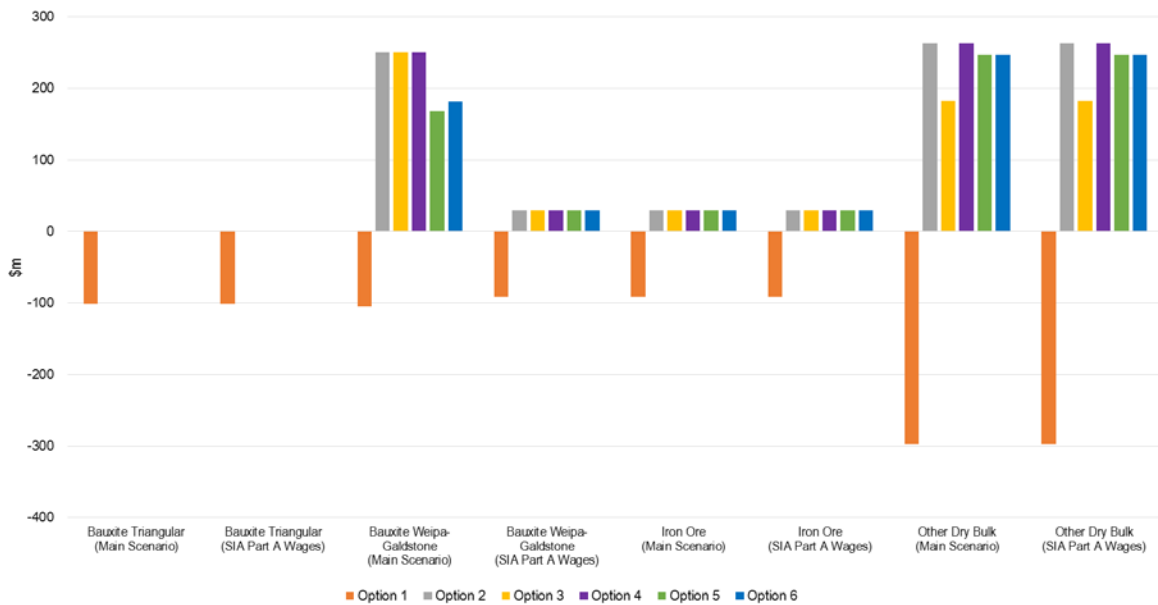
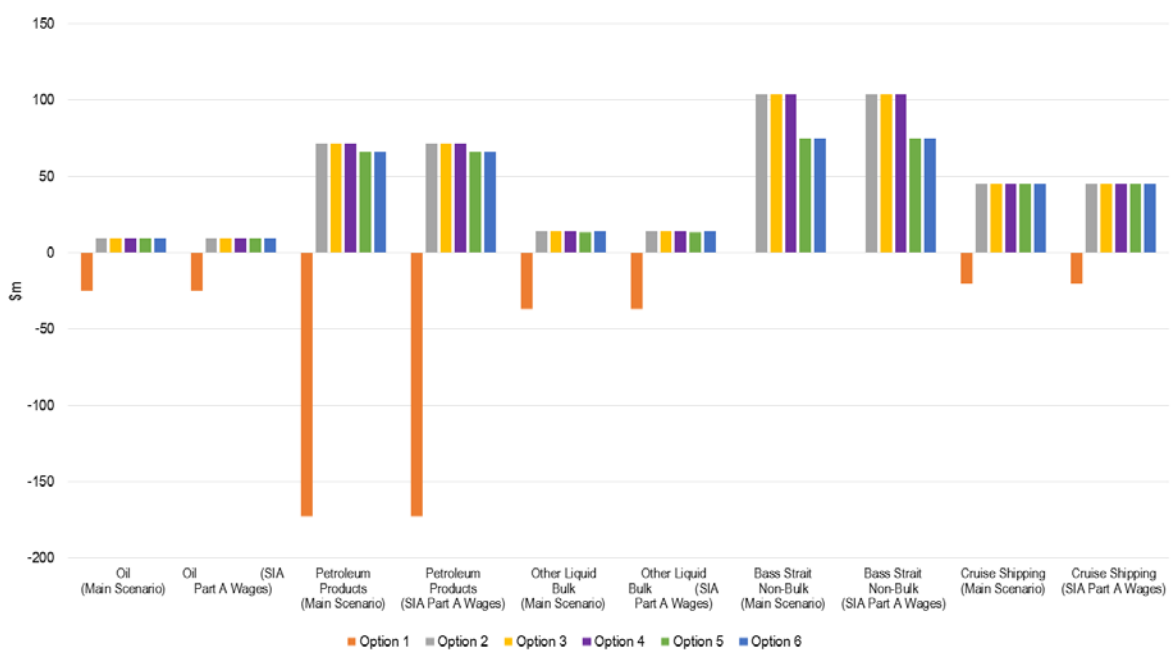


Figure 6.7- NPV results (\$m) (Reduced Manning vs SIA Part A Wages – Part B)





The other dry bulk trade is undertaken by 104 foreign vessels, 4 General Licences and 4 Transitional General Licences. Under option 1, foreign vessels will re-crew to only Australian seafarers whom are paid SIA Part A wages instead of EA wages. This lower wage rate means lower crew costs and a reduction in economic cost. For policy options 2 - 4, General Licence and Transitional General Licence vessels will register under foreign registers and re-crew to have only foreign seafarers who are paid under ITF wages. Consequently, SIA Part A wages will not apply to these policy options. Notably, policy options 5 and 6 already assume SIA Part A wages and so will remain unchanged from the Main Scenario.

The Bauxite Weipa-Gladstone cargo trade is only undertaken by Transitional General Licence vessels. Under option 1, these vessels already have Australian crew and therefore will not be impacted by a change to SIA Part A wages. For options 2 - 6, the vessels will re-crew from all Australian to all foreign crew. This is identical to the Main Scenario. Accordingly there is no change to the NPV values.





Table 6.6 - NPV results (\$m) (SIA Part A wages scenario)

Policy Options	Dry Bulk					Liquid Bulk				Inter-capital containers	Bass Strait Non-Bulk	Cruise Shipping	Total
	Bauxite Triangular	Bauxite Weipa-Gladstone	Iron Ore	Other Dry Bulk	Sub-total	Oil	Petroleum Products	Other Liquid Bulk	Sub-total				
Option 1	-36.3	-105.0	-41.0	-105.6	-288.1	-2.8	-119.9	-5.2	-127.9	-1662.1	0.0	-20.2	-2098.3
Option 2	0.0	249.6	31.7	262.9	544.1	9.4	71.7	14.0	95.1	0.0	103.5	45.2	788.0
Option 3	0.0	249.6	31.7	182.0	463.3	9.4	71.7	14.0	95.1	0.0	103.5	45.2	707.1
Option 4	0.0	249.6	31.7	262.9	544.1	9.4	71.7	14.0	95.1	0.0	103.5	45.2	788.0
Option 5	0.0	235.4	31.7	260.3	527.4	9.4	70.5	13.6	93.5	0.0	98.8	45.2	764.8
Option 6	0.0	242.0	32.7	260.3	535.0	9.4	70.5	14.0	93.9	0.0	98.8	45.2	772.9



### 6.2.4 3% NPV

The base NPV rate of 7 per cent is adjusted to 3 per cent (see Table 6.7 below). While the magnitude of the CBA results (absolute values) increases significantly, the option rankings remain constant as the changes are proportionate across each cargo trade and each policy option. As a result, policy options 4 and 2 remain the preferred options.

Figure 6.8- NPV results (\$m) (Main Scenario vs Discount Factor = 3% - Part A)

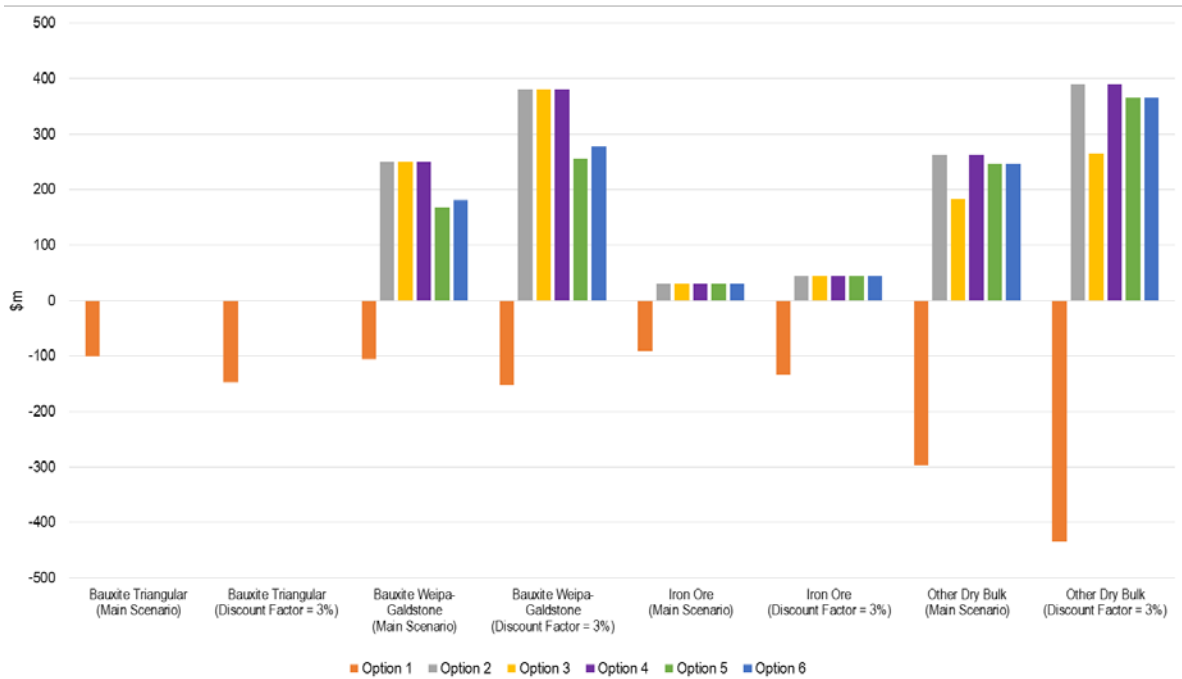


Figure 6.9- NPV results (\$m) (Main Scenario vs Discount Factor = 3% - Part B)

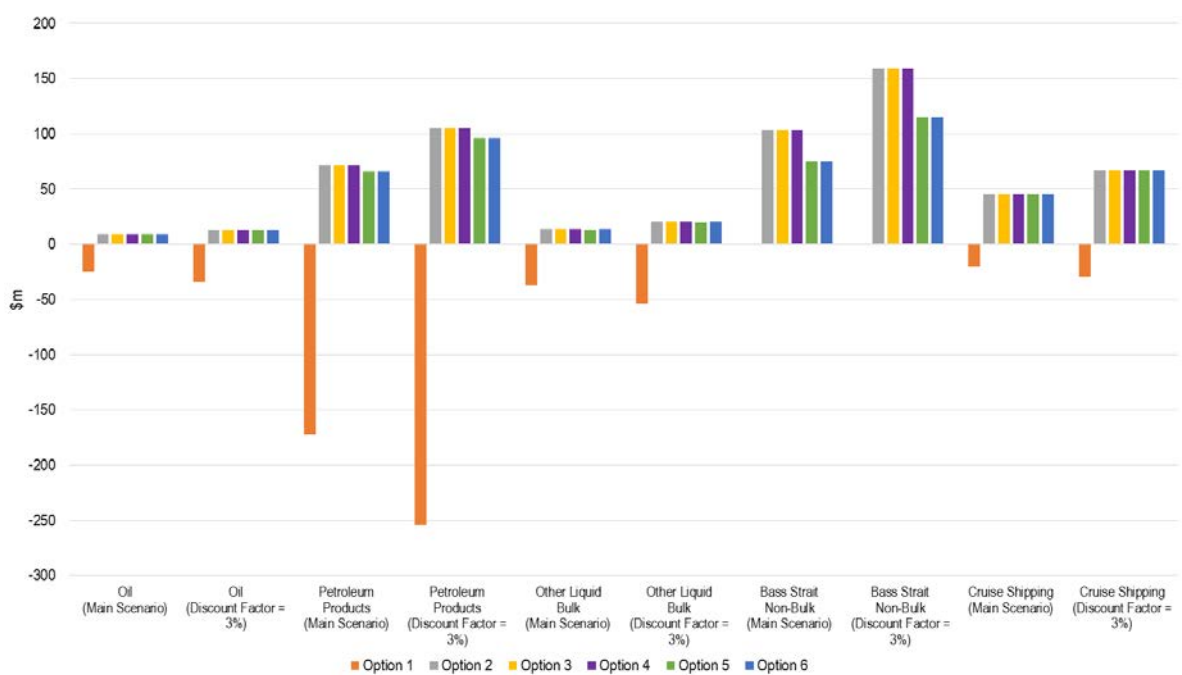




Table 6.7 - NPV results (\$m) (3% NPV scenario)

Policy Options	Dry Bulk					Liquid Bulk				Inter-capital containers	Bass Strait Non-Bulk	Cruise Shipping	Total
	Bauxite Triangular	Bauxite Weipa-Gladstone	Iron Ore	Other Dry Bulk	Sub-total	Oil	Petroleum Products	Other Liquid Bulk	Sub-total				
Option 1	-147.2	-153.2	-133.2	-435.7	-869.3	-34.3	-254.2	-54.0	-342.5	-2533.4	0.0	-29.4	-3774.6
Option 2	0.0	380.8	44.7	389.3	814.8	13.0	104.6	20.4	138.0	0.0	159.2	66.7	1178.8
Option 3	0.0	380.8	44.7	265.5	691.1	13.0	104.6	20.4	138.0	0.0	159.2	66.7	1055.0
Option 4	0.0	380.8	44.7	389.3	814.8	13.0	104.6	20.4	138.0	0.0	159.2	66.7	1178.8
Option 5	0.0	256.3	44.7	365.7	666.7	13.0	96.4	19.6	128.9	0.0	114.7	66.7	977.1
Option 6	0.0	277.7	44.7	365.7	688.1	13.0	96.4	20.4	129.8	0.0	114.7	66.7	999.3



### 6.2.5 10% NPV

The NPV discount rate is adjusted from 7 per cent to 10 per cent (see Table 6.8 below). While the magnitude of the CBA results (absolute values) decreases, the option rankings remain constant as the changes are proportionate across each cargo trade and each policy option. As a result, policy options 4 and 2 remain the preferred option. Consider Figure 6.10 and Figure 6.11 below.

Figure 6.10- NPV results (\$m) (Discount Factor = 10% vs Main Scenario - Part A)

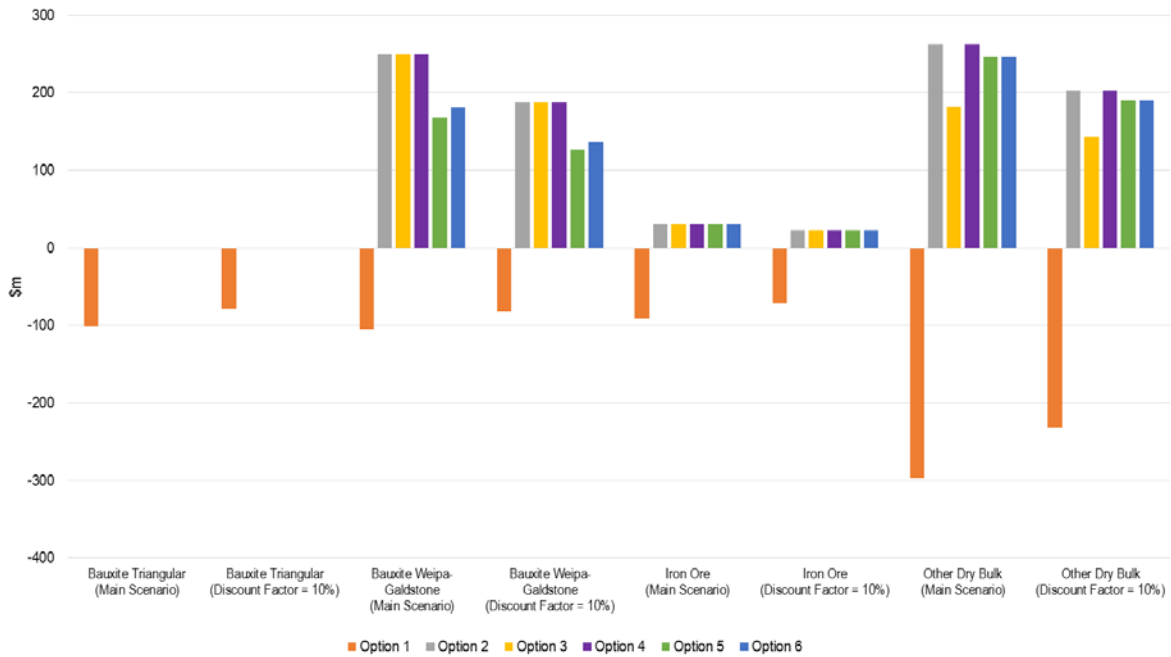




Figure 6.11- NPV results (\$m) (Discount Factor = 10% vs Main Scenario - Part B)

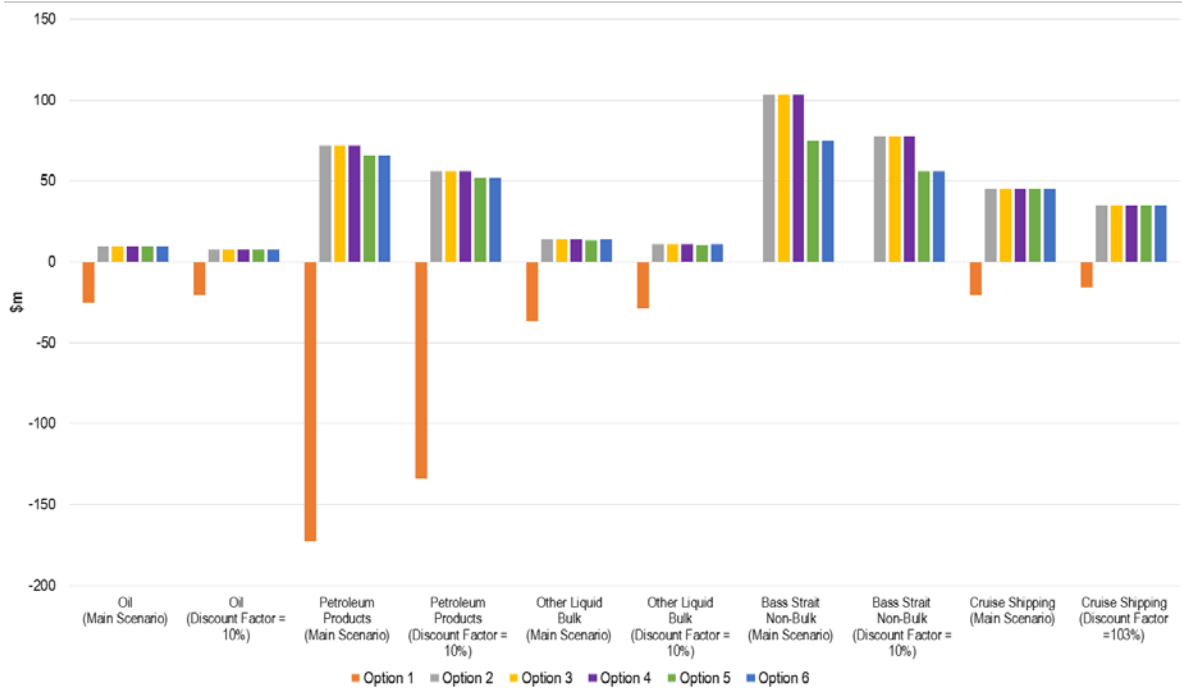




Table 6.8 - NPV results (\$m) (10% NPV scenario)

Policy Options	Dry Bulk					Liquid Bulk				Inter-capital containers	Bass Strait Non-Bulk	Cruise Shipping	Total
	Bauxite Triangular	Bauxite Weipa-Gladstone	Iron Ore	Other Dry Bulk	Sub-total	Oil	Petroleum Products	Other Liquid Bulk	Sub-total				
Option 1	-78.9	-82.1	-70.9	-231.1	-463.0	-20.3	-133.9	-28.9	-183.1	-1260.6	0.0	-15.8	-1922.4
Option 2	0.0	188.2	22.9	203.1	414.2	7.7	56.1	10.9	74.7	0.0	77.6	35.0	601.4
Option 3	0.0	188.2	22.9	142.3	353.4	7.7	56.1	10.9	74.7	0.0	77.6	35.0	540.7
Option 4	0.0	188.2	22.9	203.1	414.2	7.7	56.1	10.9	74.7	0.0	77.6	35.0	601.4
Option 5	0.0	126.6	22.9	190.8	340.4	7.7	51.6	10.5	69.8	0.0	56.0	35.0	501.1
Option 6	0.0	136.2	22.9	190.8	350.0	7.7	51.6	10.9	70.2	0.0	56.0	35.0	511.1



## **6.4 Limitations**

It must be noted that the CBA was conducted on the basis of a large number of assumptions including:

- ship size;
- ship type;
- market share; and
- ship crew, operating and capital costs.

For example, some cargo volume data from 2012-13 was measured in Twenty-Foot Equivalent Units (TEU). This made it difficult to determine current cargo volumes (in metric tonnes) and market share for market segments. However, to the extent possible, this information was used to inform assumptions made about market share in the base case scenario.

In light of the limitations of the CBA, the net economic cost savings for each regulatory option are merely indicative. Notwithstanding these limitations, it is noted that the overall ranking of the regulatory options (according to the NPV figures) may not necessarily change if alternative assumptions are adopted.

To the extent that a different view may be taken in relation to any of the assumptions (including market share assumptions, cargo trade forecasts and discount rate), it should be noted that the NPV analysis may lead to different results and thus rankings. As outlined above, the ranking of the NPV results for the policy options are predominantly driven by the market share assumptions for the 'other dry bulk' trade. The 'other dry bulk' trade is influenced by many variables which adds to the speculative nature of the market share assumptions. In turn, our results should be considered as forming 'part' of an evidence base of information rather than absolute findings.



## Appendix A – Refinements to the BITRE shipping cost model

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### Introduction

The CBA approach that PAG has adopted builds on the pre-existing BITRE shipping costs model (2011) that was used to inform the Regulatory Impact Statement in 2011 regarding the shipping reform package implemented in 2012. Refinements and updates are made to the BITRE model to perform the CBA of the current proposed reforms. These refinements are conducted in two steps, namely:

1. Updating the model to establish a new 'base case' scenario to model the current regulatory settings, and policy scenarios; and
2. Refining the model to incorporate findings from the PwC review of the BITRE CBA of the shipping reform package (2010)

### Updating the model to establish a new base case scenario to model the current regulatory settings, and policy scenarios

The main updates required for establishing a new base case scenario and the policy scenarios were:

- accounting for the ITE and removing the tonnage tax from calculations of capital costs
  - tonnage tax was previously considered in the 2012 shipping reform package but was not implemented;
  - to claim the ITE, companies must support training of ship crew by maintaining a minimum of one person per ship undertaking training in each of engineer officer, deck officer, and integrated ratings and steward training; and
  - this comes at a wage cost and offsets some of the benefits associated with obtaining exemptions from income tax on income earned.
- incorporating accelerated depreciation over a statutory cap on vessel life of 10 years
- accounting for the seafarer tax offset
- incorporating SIA Part B foreign ship costs
- a specification of ship types and cost estimates for each regulatory option, including:
  - estimating foreign vessel costs assuming EA rates are paid to 457 visa holders and Australian residents/nationals under regulatory Option 1
  - estimating 'mixed crew' ship costs where Australian ratings are assumed to be replaced with foreign ratings

Data updated in the BITRE ship cost model included:

- Seagoing Industry Award 2010 minimum salaries





- ITF TCC agreement salaries
- Australian EA rates

Capital yard costs were not updated. This is since updated data could not be sourced from a credible source. However, it is noted that capital yard costs may not have increased greatly and may have fallen slightly given the oversupply of ship capacity worldwide according to United Nations Review of Maritime Transport 2012 and 2013 reports. Low freight rates worldwide may have reduced the demand for new ships.

Other operating costs (victualling, stores, lubricating oils, etc.) were inflated by 2 per cent for three years as data for updating these costs were unable to be obtained.

## Refining the model to incorporate findings from the PwC review (2010)

The PwC review identified a set of key assumptions underpinning the previous BITRE CBA that could be improved upon. Some of these assumptions were considered for the current CBA; however, not all of these assumptions bear the same relevance as for the previous CBA for the 2012 shipping reform package.

### 1. The PwC review identified issues pertaining to crew costs and capital costs.

Specifically, the PwC review suggested that using open registry vessel crew costs as a benchmark for all foreign vessels' crew costs may not be reasonable. This assumption was checked by determining the number of foreign vessels registered in open registry countries or in low-wage and other countries offering favourable terms to ship owners. As outlined earlier in the report, in the absence of SIA Part B wage conditions, it appears reasonable to benchmark foreign vessel crew costs using ITF wage rates given the large number of vessels registered in open registry countries or countries offering favourable terms to ship owners. This is further supported by findings reported in the Reforming Australia's Shipping: Regulation Impact Statement (2011). Notwithstanding the above, in the base case scenario, foreign ships are assumed to pay crew SIA Part B wage rates which tend to be higher than ITF rates.

The PwC review also suggested that capital costs for foreign vessels may have been understated given that tonnage and company taxes were assumed to be zero in the previous CBA. It is noted that given the open registry countries and countries offering favourable tax arrangements that temporary licensed vessels tend to be registered in, the assumption of low tonnage and company taxes for foreign ship owners appears to be reasonable.

### 2. The crew leave factors and on-factors were identified as areas potentially requiring further justification

It is noted that the previous crew leave factors appear to be reasonable. Australian vessels tend to employ a two crew manning system whereby two seafarers are employed per berth. It also appears reasonable that higher leave factors are assumed for foreign officers as opposed to foreign ratings as this appears consistent with international practice.



### **3. Regulatory compliance costs were not estimated for the previous CBA**

For the current CBA, estimation of regulatory compliance costs was considered. However, as there is inadequate information to draw reliable estimates and to make an informed assessment, this was not incorporated into the final modelling. Although a general question was raised in the shipping industry survey, the minimal responses do not allow for reliable estimates to be obtained. Overall, compliance costs may be small relative to other ship operating costs.

### **4. A shadow price factor of 0.9 was assumed for the previous CBA**

For the current CBA, sensitivity analysis is conducted around the shadow price factor, namely a rate of 0.7 is applied in line with the 46 per cent differential between union and non-union wages in the transport sector suggested by the PwC review as estimated in recent studies of the Australian transport sector.

### **5. Other assumptions were identified by the PwC review as potentially important**

Other assumptions identified by the PwC review included the assumption that demand for shipping freight is perfectly inelastic (i.e. unresponsive) to changes in daily time charter costs. This is not modelled in the current CBA given the complexity associated with estimating the costs. Reduced freight transported by ship may have impacts on shipper's businesses and their profits which is inherently difficult to estimate. The implicit elasticity assumption is likely to be more relevant for Option 1 where the total freight task may fall in response to the need to replace foreign crew with Australian seafarers or those with 457 visas. However, this is not expected to affect the overall ranking of the regulatory options in terms of which yields higher net benefits as accounting for the reduced total freight task may only serve to inflate the costs associated with Option 1 relative to the other regulatory options.



## Appendix B – Shipping industry survey

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### Purpose of survey

A shipping industry survey was developed in May 2014 “to assist government in further developing its understanding of the Australian coastal shipping market by obtaining accurate information about current pricing regimes.”<sup>45</sup> It is intended to enhance understanding of industry cost structures.

The survey comprised five questions intended to capture information on cargo volumes delivered, crew size, crew cost, other ship operating expenses and compliance costs. PAG developed a web-based tool on behalf of the Department to distribute the survey. Each question is discussed in turn below.<sup>46</sup>

### Analysis of Question 1

Question 1 was intended to obtain general information about the ships operating in the industry partly for the purposes of relating such information to subsequent questions. It was structured as follows:

“Please list each vessel owned/operated and record:

1. whether it is listed on the Australian General Register or on a Foreign Register;
2. the vessel’s size in terms of deadweight tonnage (dwt);
3. the number of coastal voyages; and
4. the annual Australian coastal freight volume (in tonnes) carried by each vessel for each cargo type.”

The sample size for Question 1 was 47, i.e. there were 47 vessels for which details were recorded. Respondents predominantly listed vessels as registered in a foreign register (37) as opposed to the Australian General Register (10).

The freight task for respondents’ vessels for financial year 2012-13 is shown in Figure A1 below. Iron Ore and ‘Other Dry Bulk’ categories attracted a higher fraction of total freight. Note that the freight volumes recorded do not capture industry total volumes as not all ship operators/owners participated in the survey.<sup>47</sup>

Vessel cargo carrying capacity measured in terms of deadweight tonnage was, on average, greater for foreign registered vessels than Australian vessels, approx. 68,000 and 58,000 respectively, for this small sample of respondents (Table A1).<sup>48</sup> The average deadweight tonnage across sectors are outlined in the below table:

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<sup>45</sup> Department of Infrastructure and Regional Development front matter to online survey.

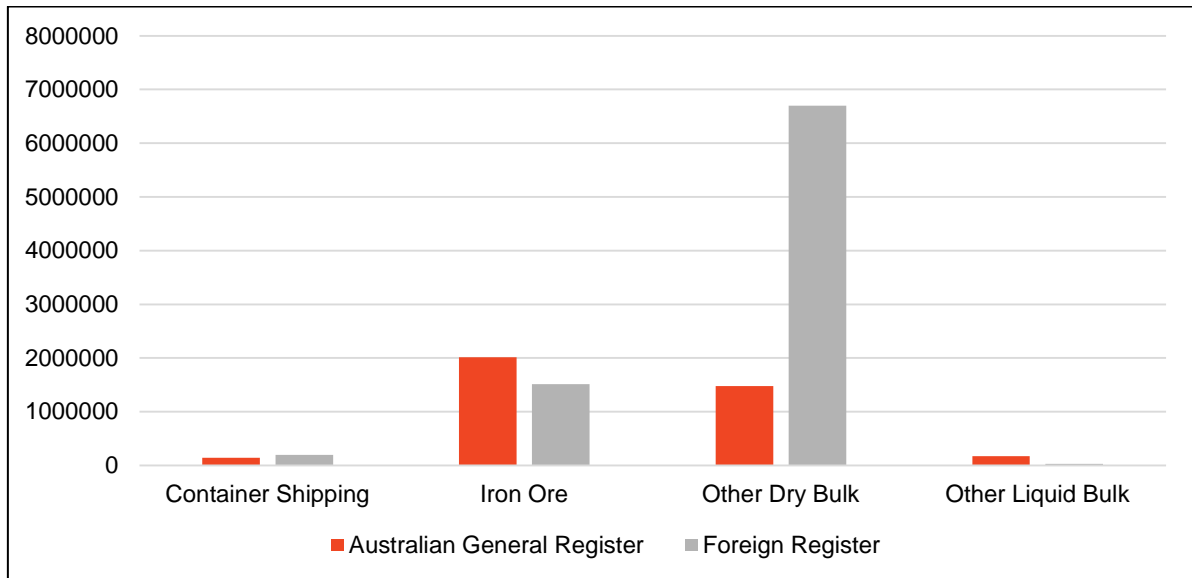
<sup>46</sup> Note: all figures reported are in Australian dollars unless otherwise stated.

<sup>47</sup> The figures should not be used consequently to draw inferences about relative freight volumes delivered by Australian and foreign vessels across sectors.

<sup>48</sup> Deadweight tonnage is measured in tonnes and is specifically the “difference between the vessel’s lightship (unloaded) and its loaded displacement”; hence, it represents the weight of cargo, crew, passengers, fuel, ballast water and ship stores, among other things that the ship can carry (source: [https://www.bitre.gov.au/publications/2013/files/asf\\_2011\\_12.pdf](https://www.bitre.gov.au/publications/2013/files/asf_2011_12.pdf), p. 69).



**Figure A1: Freight volume by sector (metric tonnes), 2012-13**



**Table A1: Average deadweight tonnage by sector**

Sector	Average deadweight tonnage
Container Shipping	42,755
Iron Ore	161,538
Other Dry Bulk	14,982
Other Liquid Bulk	4,396

The large deadweight tonnage of ships (in this sample) carrying Iron Ore is consistent with Capesize bulk carriers while 'Other Dry Bulk' may be carried by smaller Handy Size bulk carriers.

### Analysis of Question 2

Question 2 was targeted at obtaining information on crew numbers and costs. It was structured as follows:

"What is the typical crew size, and what are the gross annual crew costs, inclusive of on-costs (superannuation, leave and payroll tax), of each vessel?"



Average crew size for the small sample of Australian General Register respondents was 17. This was for ships engaging in Dry Bulk trade.<sup>49</sup> Average annual crew cost across the six Australian vessels was approx. \$5.8 m (which is in fact close to the BITRE ship crew cost estimate for Dry Bulk carriers). Average crew size in the sample of foreign registered vessels was 18 across Container ships, Liquid Bulk and Dry Bulk categories. For Dry Bulk, this was approx. 17 on average; for Container ships, 19; and for Liquid Bulk, 15 on average. However, it is noted that the sample size was small in all instances. For foreign Dry Bulk carriers, the annual average crew cost was slightly less than \$1.3 m. No figures are available for Liquid Bulk. Some respondents noted the incremental cost of operating on the Australian coast associated with complying with the Seagoing Industry Award. Estimates of the incremental annual cost are approx. \$0.2 m (assuming an exchange rate of 1AUD:1USD for 2012-13) for Container ships.

### Analysis of Question 3

Question 3 was aimed at obtaining information on other ship operating costs besides crew costs and was structured as below:

“What are the total, other operating expenses of each vessel? Other operating expenses include: victualling, administration, insurance, repairs and maintenance, dry docking, lubes and riding gang expenses.”

Australian General Register vessels for which other operating costs were reported tended to incur, on average, annual operating costs for 2012-13 of approx. \$2.6 m to \$2.7 m for Dry Bulk carriers, and ranged from approx. \$1.1 m to \$3.0 m. This calculation is only over 4 to 5 bulk carrier vessels. Amongst foreign flagged Dry Bulk carriers, the average operating cost was lower at approx. \$2.4 m for 2012-13, and ranged from approx. \$1.7 m to \$3.0 m.

### Analysis of Question 4

Question 4 was intended to gauge the approximate range of compliance costs faced by vessel owners/operators under the Coastal Trading Act and was structured as below:

“What are your average annual costs associated with regulatory/legal compliance and reporting obligations under the Coastal Trading Act and associated shipping regulations? Estimate the costs based on staff required to manage compliance obligations.”

There were only 6 responses to this question. As some ship companies operate both Australian and foreign-registered vessels, an aggregate compliance cost is measured, rather than a compliance cost specific to General Licence and Temporary Licence operators. Annual costs were on average \$60,000 for 2012-13 but ranged from \$600 to \$225,000. It is possible that some respondents entered in a 1 to represent 100 per cent instead of entering 100 as the measure of the percentage of year a regulatory compliance staff member may spend on compliance matters pertaining to the Coastal Trading Act. Excluding the highest and lowest annual compliance cost figures reported gives an average of approximately \$32,700.

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<sup>49</sup> However, note that there were only seven responses for this.



## Analysis of Question 5

Question 5 of the survey aims to examine the costs associated with complying with wage rates and conditions of Part B of the SIA. Specifically, the question is structured as below:

“What is the additional crew cost associated with paying crew at least Seagoing Industry Award Part B wage rates (inclusive of on-costs and leave entitlements) relative to the cost that may have been incurred if crew could be paid less than Part B wage rates? [Report at the voyage average or annual level for FY2013, whichever is easier].”

Summary statistics related to the figures are set out in the tables below.

Table A2 displays summary measures where zero figures are excluded, i.e. some respondents have as their response a value of zero (which is in place by default). In cases where this occurred, the currency recorded was “AED” (default currency in list) rather than “AUD”. It appears that respondents may have intended to leave the response blank and hence, inclusion of these figures may distort the result.

Costs are, on average, just slightly over \$0.5 m with a median of \$0.5 m. A maximum additional cost was recorded of slightly below \$1 m. The BITRE ship cost model indicate that costs of complying with SIA Part B wages are, on average, \$1.37 m with the cost varying somewhat with ship type (e.g. Handysize bulk carriers vs. product tankers). The BITRE ship cost estimate compares the difference between a ship paying SIA B wage rates and a ship paying ITF Total Crew Cost Agreement rates. The estimates from the current version of the BITRE ship cost model may be higher due to the fact that leave factors and salary on-costs are considered and these may have been excluded in the cost estimates of survey respondents. With ITF market rates<sup>50</sup>, the incremental cost narrows to approx. \$1.1 m. According to an ASA submission to PC in relation to Tasmanian shipping, the cost of compliance is approx. \$0.73 m.<sup>51</sup> Given that the cost estimates in the survey may be inflated, we may expect the compliance costs to be less than \$0.5 m for some fraction of ships in the industry, but not for the entire industry – the sample size is too small for an industry-wide conclusion.

In Table A3, zero figures are included in the calculation of the compliance costs. This should be treated with caution as it appears the zero figures may not be accurate reflections of the intended response of survey participants. The average crew cost is slightly lower than when zero figures are included at approx. \$0.371 m.

### Table A2: Additional crew cost incurred to comply with SIA Part B

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<sup>50</sup> According to a Deloitte Access Economics report into shipping, ITF market rates may be “26 per cent greater than basic ITF rates”,

<http://www.cement.org.au/Portals/0/Documents/CIF%20Publications/DAE%20Shipping%20Reform%20Analysis.pdf>, p. 7

<sup>51</sup> [http://www.pc.gov.au/\\_\\_data/assets/pdf\\_file/0015/131244/sub029-tasmanian-shipping.pdf](http://www.pc.gov.au/__data/assets/pdf_file/0015/131244/sub029-tasmanian-shipping.pdf), p. 11



Additional crew cost	
Summary measure	AUD (\$)
Average (mean)	\$ 525,350.25
Standard deviation	\$ 153,222.30
Median	\$ 500,000.00
Mode	\$ 500,000.00
Range (max. - min.)	\$ 662,857.00
Minimum	\$ 320,673.00
Maximum	\$ 983,530.00
BITRE ship cost model*	\$ 1,370,000.00

Note: Excludes figures where the cost was listed as zero.

\* BITRE ship cost model estimate is an estimate of the difference between Award B crew costs and ITF TCC Agreement crew costs.

**Table A3: Additional crew cost incurred to comply with SIA Part B (zeros included)**

Additional crew cost	
Summary measure	AUD (\$)
Average (mean)	\$ 370,835.47
Standard deviation	\$ 277,527.06
Median	\$ 500,000.00
Mode	\$ 500,000.00
Range (max. - min.)	\$ 983,530.00
Minimum	\$ -
Maximum	\$ 983,530.00
BITRE ship cost model*	\$ 1,370,000.00

Note: Includes figures where the cost was listed as zero.

\* BITRE ship cost model estimate is an estimate of the difference between Award B crew costs and ITF TCC Agreement crew costs.

Limitations of survey



As there are several limitations associated with the survey, the survey findings should be treated with caution. In developing the survey, there was a trade-off between reducing the likelihood of non-response by potential survey participants and obtaining detailed information on industry costs. As a lengthy survey may have deterred responses, a short survey was developed. However, this limited the quality and depth of information that could be obtained. It is recognized that the questions were of a general nature and did not address specific details that may distinguish between ship companies and ship types operated.

The figures reported in the survey are useful only as an indication of the potential range of ship costs in the industry that pertain to some but not necessarily all ships. A summary of the limitations of the survey include:

- a small sample size
  - minimal responses to the survey do not enable industry-wide conclusions to be drawn
- some respondents may have interpreted questions differently or misinterpreted questions
  - this will create variability in responses even if, for instance, vessel costs overall may be the same across certain types of vessels
  - for Question 2, some elements of crew costs such as on-costs may have been included by some respondents but excluded by others
  - for Question 3, some elements of other operating costs such as fuel, port and management fees may have been included in the figure reported by some respondents but excluded by others
  - for Question 4, it is possible that some respondents entered in a 1 to represent 100% instead of 100% as the measure of the fraction of year a regulatory compliance staff member may spend on compliance matters pertaining to the Coastal Trading Act.
  - for Question 5, leave factors and on-costs may have been included in estimates of cost by some respondents but excluded by others; moreover, costs will vary across ship types
- figures reported can only be approximate as the questions do not allow for a detailed breakdown of costs by e.g. crew position, ship type and crew size
- response bias may be present in some figures with costs inflated, for example, the cost of compliance with the Coastal Trading Act
- measurement error in responses are possible given that respondents may not have information on costs readily available and may have responded with a general estimate of the cost without obtaining more detailed, accurate information
- sample response bias is possible given that some shipping industry participants chose not to respond which can lead to a biased sample, i.e. skewed representation of the industry given the types of respondents and non-respondents





In light of the inherent limitations of the survey questions and responses, the summary figures reported in this section should not be relied upon in ship cost modelling and any other such analysis where more accurate estimates should be obtained. However, they may be useful for informing a general understanding of the possible range of ship costs that may be expected for some ships operating in the industry, but not necessarily for all ships.

To obtain detailed, on-going information on the shipping industry, it may be necessary to develop a more comprehensive survey series not necessarily for the sole purposes of informing a Regulation Impact Statement, and that also minimize non-response.



## **Appendix C – Data collection**

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### **Data sources**

Data were obtained from multiple sources:

- International Transport Federation (ITF) Uniform Total Crew Cost (TCC) Agreement rates were obtained from the ITF seafarers website, and were publicly available.
- Seagoing Industry Modern Award 2010 minimum wage rates and conditions were obtained from the Fair Work Commission.
- General Licence reports were obtained from the Department.
- Temporary Licence voyage reports were obtained from the Department's website as they are publicly available.
- Web-based shipping industry survey.
- The following Australian shipping Enterprise Agreements (EAs) were obtained from the Fair Work Commission website (for shipping companies including, but not limited to Teekay Shipping):
  1. ASP Ship Management Aimpe Engineers' (Alcoa) Enterprise Agreement 2013
  2. ASP Ship Management / Aimpe Zemira Bunkering Service Union Collective Agreement 2013
  3. ASP Ship Management Pty Ltd Integrated Ratings, Cooks, Caterers And Seafarers (Offshore Oil And Gas) Greenfields Agreement 2012
  4. ASP Ship Management/Aimpe Engineers Enterprise Agreement 2013
  5. Varley Ship Services Collective Agreement 2012
  6. Aimpe / Searoad Shipping Engineers Officers Enterprise Agreement 2011
  7. Teekay Shipping (Australia) Pty Limited Seagoing Ratings Enterprise Agreement 2011
  8. Teekay Shipping Australia Pty Ltd/Amou Seagoing Deck Officers Dry Cargo Enterprise Agreement 2011
  9. Three Ocean Maritime Pty Ltd and Maritime Union of Australia Enterprise Agreement 2012
  10. V Ships Australia Pty Ltd Officers Collective Agreement 2012 MV CSL Brisbane



## **Appendix D – Compliance requirements**

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The compliance requirements under the Coastal Trading Act include:

- Submitting an application for General, Temporary or an Emergency Licence and providing the required evidence that conditions are met or information necessary for assessment against required conditions, namely:
  - registration on the Australian General Register for General Licence applications, and statement of declaration that each seafarer on coastal voyage is an Australian.
  - for Temporary Licence applications, the number of voyages; the types and volume of cargo to be carried, type and size of vessel; name of vessel; ports for loading/unloading cargo.
  - for Emergency Licence applications, similar information to that required for Temporary Licence applications.
- For Temporary Licence applicants, consultation with General Licence holders in response to a 'notice in response'.
- For Temporary Licence holders, Temporary Licence variation applications if voyage details are required to be amended
- Reporting requirements.
  - For General Licenced vessels, this includes submitting an annual report detailing type and volume of cargo carried; ports at which cargo was loaded and unloaded.
  - For Temporary Licenced vessels, this includes pre-voyage notice of each voyage's details (vessel used, date of voyage, evidence of vessel registration, type and volume of cargo carried; ports for loading/unloading).
  - For Temporary Licenced vessels, this includes reporting on actual voyage details post-voyage.



## Appendix E – Freight forecasting models

Table E1 below provides details in relation to the freight forecasting models developed by PAG to facilitate this analysis.

*Table E1 – PAG Freight Volume Forecasting Models*

Cargo Type (freight volumes)	Model Specification	Model Parameters/Initial Predictions
Bauxite	$\hat{y}_t = \hat{y}_{t-1} + \phi_1(\hat{y}_{t-1} - \hat{y}_{t-2}) + \theta_1 \hat{w}_{t-1}$	$\phi_1=0.51, \theta_1=0.28; \hat{y}_{2012}=13.67, \hat{y}_{2013}=16.32, \hat{w}_{2013} = 2.57$
Iron Ore	$\hat{y}_t = \hat{y}_{t-1} + \phi_1(\hat{y}_{t-1} - \hat{y}_{t-2}) + \phi_2(\hat{y}_{t-2} - \hat{y}_{t-3}) + \theta_1 \hat{w}_{t-1}$	$\phi_1=-0.37, \phi_2 = -0.54, \theta_1 = -0.05; \hat{y}_{2011} = 6.5, \hat{y}_{2012} = 3.95, \hat{y}_{2013} = 3.52, \hat{w}_{2013} = -1.55$
Other Dry Bulk	$\hat{y}_t = \hat{y}_{t-1} + \phi_1(\hat{y}_{t-1} - \hat{y}_{t-2}) + \phi_2(\hat{y}_{t-2} - \hat{y}_{t-3}) + \theta_1 \hat{w}_{t-1}$	$\phi_1=-0.92, \phi_2 = -0.84, \theta_1 = -0.30; \hat{y}_{2011}=13.59, \hat{y}_{2012}=15.56, \hat{y}_{2013}=12.85, \hat{w}_{2013} = -1.09$
Oil	$\hat{y}_t = \hat{y}_{t-1} + \sum_{i=1}^3 \phi_i(\hat{y}_{t-i} - \hat{y}_{t-i-1}) + \theta_1 \hat{w}_{t-1}$	$\phi_1=-0.42, \phi_2 = -0.03, \phi_3 = 0.41, \theta_1 = 0.51; \hat{y}_{2010}=4.61, \hat{y}_{2011}=2.45, \hat{y}_{2012}=2.88, \hat{y}_{2013}=2.46, \hat{w}_{2013} = -0.61$
Petroleum	$\hat{y}_t = \hat{y}_{t-1} + \phi_1(\hat{y}_{t-1} - \hat{y}_{t-2}) + \phi_2(\hat{y}_{t-2} - \hat{y}_{t-3}) + \theta_1 \hat{w}_{t-1}$	$\phi_1=0.34, \phi_2 = -0.45, \theta_1 = -0.52; \hat{y}_{2011}=6.29, \hat{y}_{2012}=5.7, \hat{y}_{2013}=6.36, \hat{w}_{2013} = 0.36$
Other liquid Bulk	$\hat{y}_t = \hat{y}_{t-1} + \phi_1(\hat{y}_{t-1} - \hat{y}_{t-2}) + \phi_2(\hat{y}_{t-2} - \hat{y}_{t-3}) + \theta_1 \hat{w}_{t-1}$	$\phi_1=-0.01, \phi_2 = -0.67, \theta_1 = -0.78; \hat{y}_{2011}=0.61, \hat{y}_{2012}=0.98, \hat{y}_{2013}=0.68, \hat{w}_{2013} = -0.08$
Inter-capital containers	$\hat{y}_t = \hat{y}_{t-1} + \sum_{i=1}^5 \phi_i(\hat{y}_{t-i} - \hat{y}_{t-i-1}) + \phi_2(\hat{y}_{t-2} - \hat{y}_{t-3}) + \theta_1 \hat{w}_{t-1}$	$\phi_1=0.22, \phi_2 = -0.15, \phi_3=0.45, \phi_4 = 0.34, \phi_5=0.14, \theta_1 = -0.96; \hat{y}_{2009}=1.56, \hat{y}_{2010}=1.31, \hat{y}_{2011}=1.74, \hat{y}_{2012}=1.85, \hat{y}_{2013}=1.58, \hat{w}_{2013} = -0.23$



Cargo Type (freight volumes)	Model Specification	Model Parameters/Initial Predictions
Bass Strait Non-bulk	$\hat{y}_t = \hat{y}_{t-1} + \sum_{i=1}^8 \phi_i (\hat{y}_{t-i} - \hat{y}_{t-i-1}) + \sum_{j=1}^8 \theta_j \hat{w}_{t-j}$	$\phi_1 = 0.77, \phi_2 = 0. -0.10, \phi_3 = 0.65, \phi_4 = -0.22, \phi_5 = -0.34, \phi_6 = -0.22, \phi_7 = -0.33, \phi_8 = 0.79, \theta_1 = -2.75, \theta_2 = 3.65$ $\theta_3 = -2.75, \theta_4 = 0.10; \hat{y}_{2006}=4.24, \hat{y}_{2007}= 4.53, \hat{y}_{2008}= 4.75$ $\hat{y}_{2009}= 4.4, \hat{y}_{2010}= 4.39, \hat{y}_{2011}= 4.45, \hat{y}_{2012}= 4.41, \hat{y}_{2013}= 4.39.$ $\hat{w}_{2010}= -0.06, \hat{w}_{2011}=-0.04, \hat{w}_{2012}=0.04, \hat{w}_{2013}= -0.01$



## Forecast results

In the following figures, the PAG forecast are represented by the black perforated line and the BITRE forecast are represented by the green lines.

Figure E.1 below presents forecasts of Bauxite trade. There is little difference in the forecasts provided by the BITRE and those generated by PAG. A significant increase in Bauxite trading in 2014-2015 will occur due to the ramp-up of production at the Yarwun alumina refinery in Gladstone after a large capacity expansion (the initial phase of the ramp-up was also responsible for the increases seen in the coastal bauxite trade between 2011-12 and 2013-14). However, beyond this point, it is reasonable to assume no refinery closures and no further increase in exports. Taking these factors into account, PAG agrees with and adopts (for modelling purposes) the forecasts represented by the green line.

**Figure E.1 - Comparison of Bauxite forecast (financial years)**

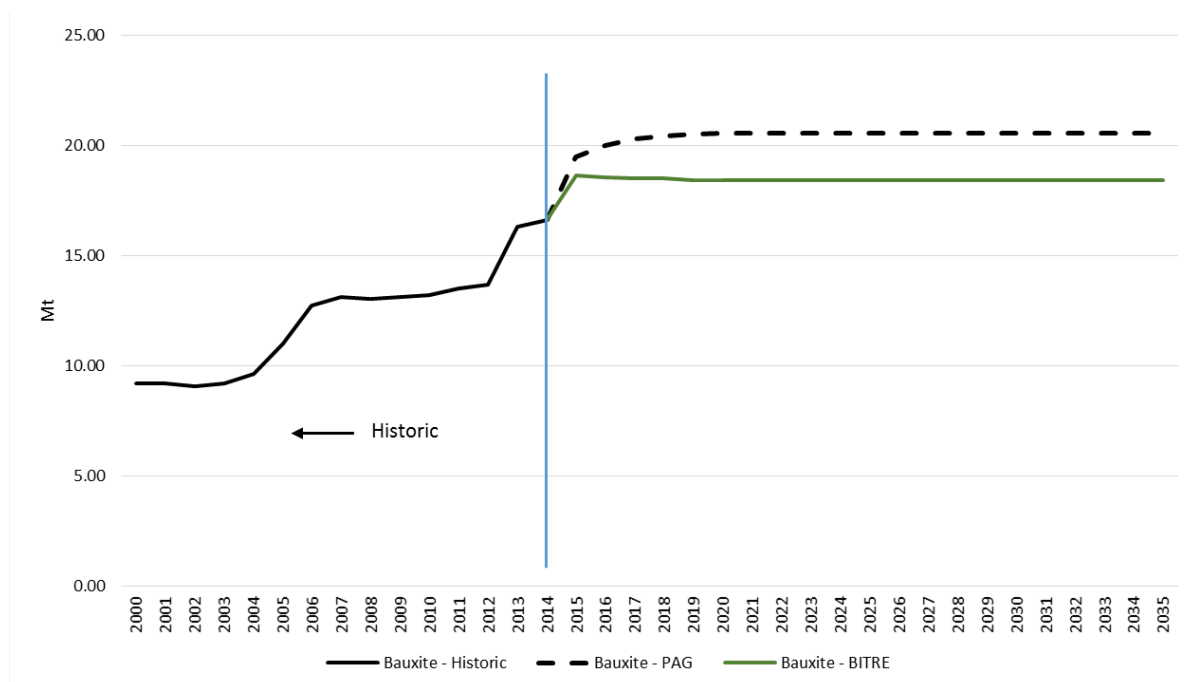


Table E.2 below summarises the size and assumed growth rates for Bauxite (Weipa-Gladstone) forecasts.

**Table E.2 – Size and assumed growth rate of Bauxite (Weipa-Gladstone) forecasts**

Financial Year	Bauxite (Weipa-Gladstone) Historic Coastal (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2000	9.21				
2001	9.18				



Financial Year	Bauxite (Weipa-Gladstone) Historic Coastal (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2002	9.04				
2003	9.20				
2004	9.62				
2005	11.02				
2006	12.73				
2007	13.13				
2008	13.01				
2009	13.11				
2010	13.20				
2011	13.49				
2012	13.67				
2013	16.32				
2014	16.61				
2015		19.46	18.61	5.77%	12.02%
2016		20.00	18.55	2.78%	-0.33%
2017		20.28	18.50	1.38%	-0.23%
2018		20.42	18.48	0.70%	-0.11%
2019		20.49	18.42	0.35%	-0.32%
2020		20.53	18.42	0.18%	0.00%
2021		20.55	18.42	0.09%	0.00%
2022		20.55	18.42	0.05%	0.00%
2023		20.56	18.42	0.02%	0.00%
2024		20.56	18.42	0.01%	0.00%
2025		20.56	18.42	0.01%	0.00%
2026		20.56	18.42	0.00%	0.00%
2027		20.56	18.42	0.00%	0.00%
2028		20.56	18.42	0.00%	0.00%
2029		20.56	18.42	0.00%	0.00%



Financial Year	Bauxite (Weipa-Gladstone) Historic Coastal (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2030		20.56	18.42	0.00%	0.00%
2031		20.56	18.42	0.00%	0.00%
2032		20.56	18.42	0.00%	0.00%
2033		20.56	18.42	0.00%	0.00%
2034		20.56	18.42	0.00%	0.00%
2035		20.56	18.42	0.00%	0.00%

Figure E.2 below provides a comparison of the PAG and BITRE Iron Ore forecasts. Both forecasts assume a stationary trend over the forecast horizon.

Figure E.2 - Iron Ore (to Port Kembla) forecasts (financial years)



Table E.3 below summarises the size and assumed growth rates of Iron Ore forecasts.

Table E.3 – Size and assumed growth rate of Iron Ore forecasts

Financial Year	Iron Ore Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2000	6.44				
2001	6.75				





Financial Year	Iron Ore Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2002	6.50				
2003	6.59				
2004	6.51				
2005	6.87				
2006	6.57				
2007	6.48				
2008	6.73				
2009	4.65				
2010	6.67				
2011	6.50				
2012	3.95				
2013	3.52				
2014		5.14	3.52	45.98%	0.00%
2015		4.77	3.52	-7.13%	0.00%
2016		4.03	3.52	-15.49%	0.00%
2017		4.50	3.52	11.68%	0.00%
2018		4.73	3.52	5.00%	0.00%
2019		4.39	3.52	-7.14%	0.00%
2020		4.39	3.52	0.08%	0.00%
2021		4.58	3.52	4.13%	0.00%
2022		4.51	3.52	-1.50%	0.00%
2023		4.43	3.52	-1.61%	0.00%
2024		4.50	3.52	1.44%	0.00%
2025		4.51	3.52	0.34%	0.00%
2026		4.47	3.52	-0.89%	0.00%
2027		4.48	3.52	0.15%	0.00%
2028		4.50	3.52	0.43%	0.00%
2029		4.49	3.52	-0.24%	0.00%
2030		4.48	3.52	-0.15%	0.00%



Financial Year	Iron Ore Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2031		4.49	3.52	0.18%	0.00%
2032		4.49	3.52	0.01%	0.00%
2033		4.49	3.52	-0.10%	0.00%
2034		4.49	3.52	0.03%	0.00%
2035		4.49	3.52	0.04%	0.00%

As nearly all of the iron ore shipped around the coast goes to Port Kembla for use in BlueScope Steel's Port Kembla steelworks, this analysis concentrates only on this trade. In October 2011, BlueScope Steel closed one of its two remaining smelters, in response to its lack of export competitiveness, halving the steelwork's capacity and leading to a near halving of iron ore being shipped to Port Kembla from around 6.5 Mt per annum to 3.5 Mt per annum. All of BlueScope Steel's remaining steel production is used to supply the domestic steel market. According to information provided by BITRE it is reasonable to assume the remaining Port Hedland to Port Kembla Iron Ore trade continues at current volumes while the Whyalla to Port Kembla and the Port Latta to Port Kembla trade is negligible.

Figure E.3 below shows that the PAG and BITRE forecasts relating to Other Dry Bulk are very close.

**Figure E.3 - Comparison of Other Dry Bulk (financial years)**

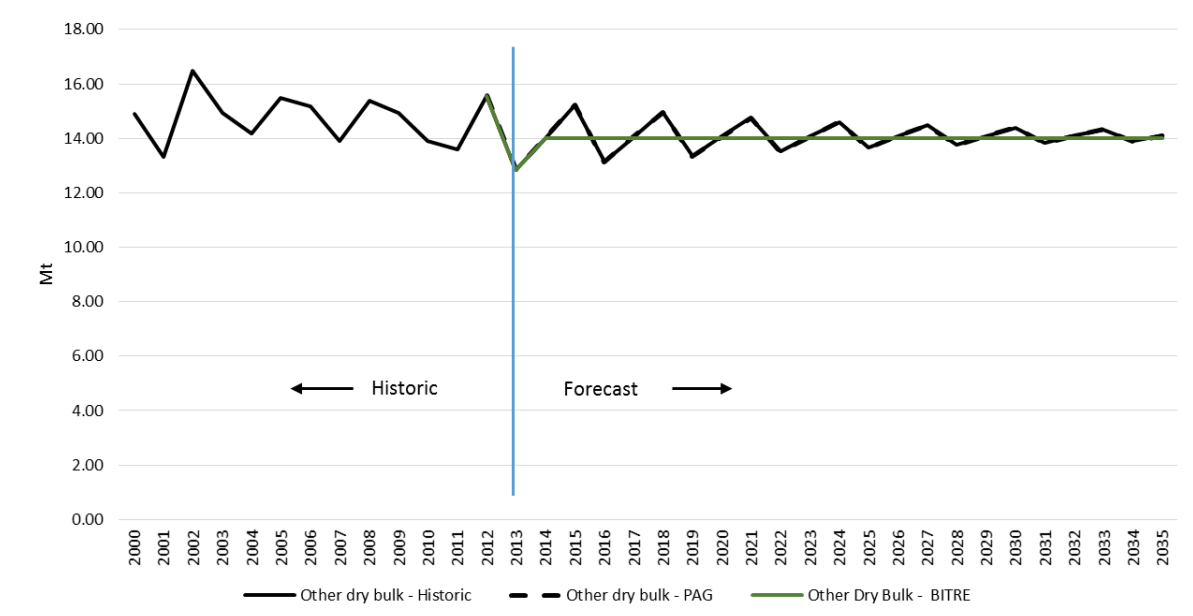


Table E.4 below summarises the size and assumed growth rates of Other Dry Bulk forecasts.



Table E.4 – Size and assumed growth rate of Other Dry Bulk forecasts

Financial Year	Other Dry Bulk Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2000	14.90				
2001	13.31				
2002	16.48				
2003	14.94				
2004	14.19				
2005	15.47				
2006	15.18				
2007	13.92				
2008	15.38				
2009	14.95				
2010	13.92				
2011	13.59				
2012	15.56				
2013	12.85				
2014		14.01	14.00	9.06%	8.96%
2015		15.22	14.00	8.58%	0.00%
2016		13.13	14.00	-13.70%	0.00%
2017		14.04	14.00	6.92%	0.00%
2018		14.95	14.00	6.49%	0.00%
2019		13.35	14.00	-10.72%	0.00%
2020		14.06	14.00	5.32%	0.00%
2021		14.75	14.00	4.91%	0.00%
2022		13.52	14.00	-8.35%	0.00%
2023		14.07	14.00	4.10%	0.00%
2024		14.60	14.00	3.72%	0.00%
2025		13.65	14.00	-6.49%	0.00%
2026		14.08	14.00	3.17%	0.00%
2027		14.48	14.00	2.82%	0.00%



Financial Year	Other Dry Bulk Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2028		13.75	14.00	-5.03%	0.00%
2029		14.09	14.00	2.45%	0.00%
2030		14.39	14.00	2.13%	0.00%
2031		13.83	14.00	-3.89%	0.00%
2032		14.09	14.00	1.90%	0.00%
2033		14.32	14.00	1.61%	0.00%
2034		13.89	14.00	-3.00%	0.00%
2035		14.10	14.00	1.48%	0.00%

According to Figure E.3 a slight downward trend persistent in the historical data is modelled over the forecast horizon. For the CBA, PAG adopts the BITRE assumptions.

Figure E.4 below compares the BITRE and PAG forecasts for crude oil trade. The recent downward trend in the volume of freight loaded (measured in metric tonnes) is assumed to persist over the forecast horizon in both cases, although the PAG case levels out over 2026 – 2034.

Figure E.4 - Comparison of Crude Oil forecasts (financial years)

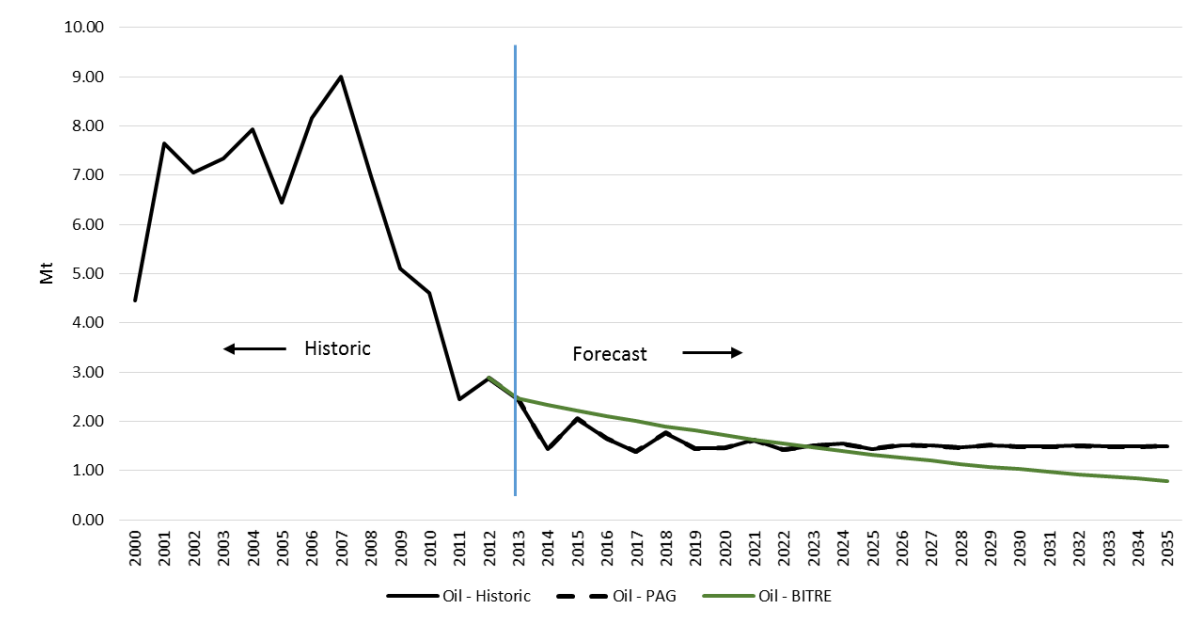


Table E.5 below summarises the size and assumed growth rates of Oil forecasts.



Table E.5 – Size and assumed growth rate of Oil

Financial Year	Oil Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2000	4.45				
2001	7.65				
2002	7.06				
2003	7.34				
2004	7.94				
2005	6.44				
2006	8.17				
2007	9.01				
2008	6.98				
2009	5.10				
2010	4.61				
2011	2.45				
2012	2.88				
2013	2.46				
2014		1.44	2.34	-41.62%	-5.00%
2015		2.06	2.22	43.25%	-5.00%
2016		1.65	2.11	-19.67%	-5.00%
2017		1.39	2.01	-15.94%	-5.00%
2018		1.77	1.91	27.10%	-5.00%
2019		1.45	1.81	-17.94%	-5.00%
2020		1.46	1.72	1.10%	-5.00%
2021		1.62	1.63	10.63%	-5.00%
2022		1.43	1.55	-12.06%	-5.00%
2023		1.51	1.47	5.95%	-5.00%
2024		1.54	1.40	2.20%	-5.00%
2025		1.45	1.33	-6.23%	-5.00%
2026		1.52	1.26	5.14%	-5.00%
2027		1.51	1.20	-1.00%	-5.00%



Financial Year	Oil Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2028		1.47	1.14	-2.31%	-5.00%
2029		1.52	1.08	3.09%	-5.00%
2030		1.49	1.03	-1.61%	-5.00%
2031		1.49	0.98	-0.35%	-5.00%
2032		1.51	0.93	1.44%	-5.00%
2033		1.49	0.88	-1.25%	-5.00%
2034		1.49	0.84	0.36%	-5.00%
2035		1.50	0.80	0.47%	-5.00%

Between 2006-07 and 2012-13 coastal shipments of crude oil declined substantially from 9 Mt per annum to about 3 Mt per annum. This fall was larger than the fall in production as most new domestic crude oil production occurred off the coast of north-west Australia and is export focused. The forecasts assume that over the next 20 years coastal shipments of crude oil fall at the same rate as production, or about 5 per cent per annum, based on BREE's long-term forecasts of production.<sup>52</sup>

Figure E.5 below compares the PAG and BITRE forecasts of petroleum freight volumes. Although the trend shows an increase in freight in recent years, several reports express negative sentiment about the future of coastal petroleum flows. For example, an article in Llyods List DCN, "Australia's coastal confusion has a long, inglorious history" suggests that demand for coastal shipping will decrease as product tankers deliver closer to consumption.

<sup>52</sup> BREE (Bureau of Resources and Energy Economics) (2012). Australian Energy Projections to 2049-50.



Figure E.5 - Comparison of Petroleum forecasts (financial years)

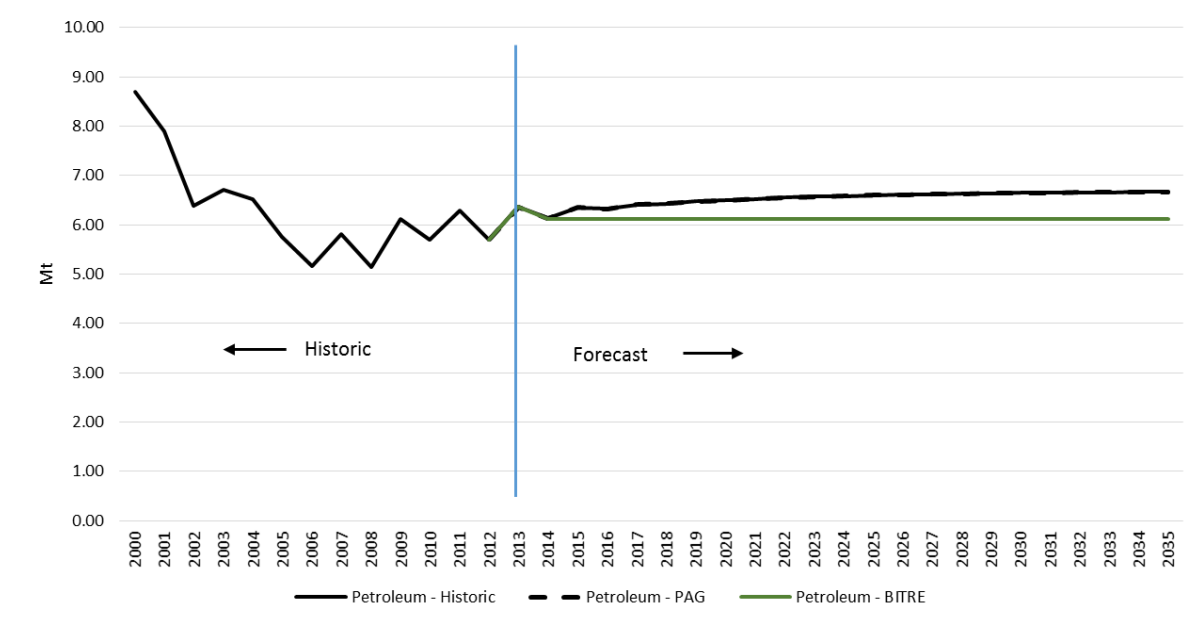


Table E.6 below summarises the size and assumed growth rates of Petroleum forecasts.

Table E.6 – Size and assumed growth rate of Petroleum

Financial Year	Petroleum Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2000	8.70				
2001	7.90				
2002	6.38				
2003	6.72				
2004	6.53				
2005	5.76				
2006	5.17				
2007	5.81				
2008	5.14				
2009	6.11				
2010	5.70				
2011	6.29				
2012	5.70				



Financial Year	Petroleum Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2013	6.36				
2014		6.13	6.12	-3.58%	-3.85%
2015		6.35	6.12	3.57%	0.00%
2016		6.32	6.12	-0.43%	0.00%
2017		6.41	6.12	1.41%	0.00%
2018		6.43	6.12	0.28%	0.00%
2019		6.48	6.12	0.72%	0.00%
2020		6.50	6.12	0.37%	0.00%
2021		6.53	6.12	0.45%	0.00%
2022		6.55	6.12	0.32%	0.00%
2023		6.57	6.12	0.31%	0.00%
2024		6.59	6.12	0.25%	0.00%
2025		6.60	6.12	0.22%	0.00%
2026		6.61	6.12	0.19%	0.00%
2027		6.62	6.12	0.16%	0.00%
2028		6.63	6.12	0.14%	0.00%
2029		6.64	6.12	0.12%	0.00%
2030		6.65	6.12	0.10%	0.00%
2031		6.65	6.12	0.09%	0.00%
2032		6.66	6.12	0.08%	0.00%
2033		6.66	6.12	0.07%	0.00%
2034		6.67	6.12	0.06%	0.00%
2035		6.67	6.12	0.05%	0.00%

Furthermore, according to the Australian Institute of Petroleum in its "Submission to the Department of Infrastructure and Regional Development on the Approaches to Regulating Coastal Shipping in Australia" coastal shipping of refined petroleum will decrease with the closure of Australian refineries. Due to the uncertainty on whether Petroleum freight will actually decline and the rate which it will decline, both PAG and the BITRE forecasts assume a growth rate close to zero.





Figure E.6 below outlines the forecasts of other liquid freight volumes. Again, both sets of forecasts assume a relatively flat growth rate over the forecast horizon. Historic trends suggest that the sector is somewhat volatile. As such a conservative approach, i.e. assuming a flat growth rate is reasonable.

**Figure E.6 - Comparison of Other Liquid forecasts (financial years)**

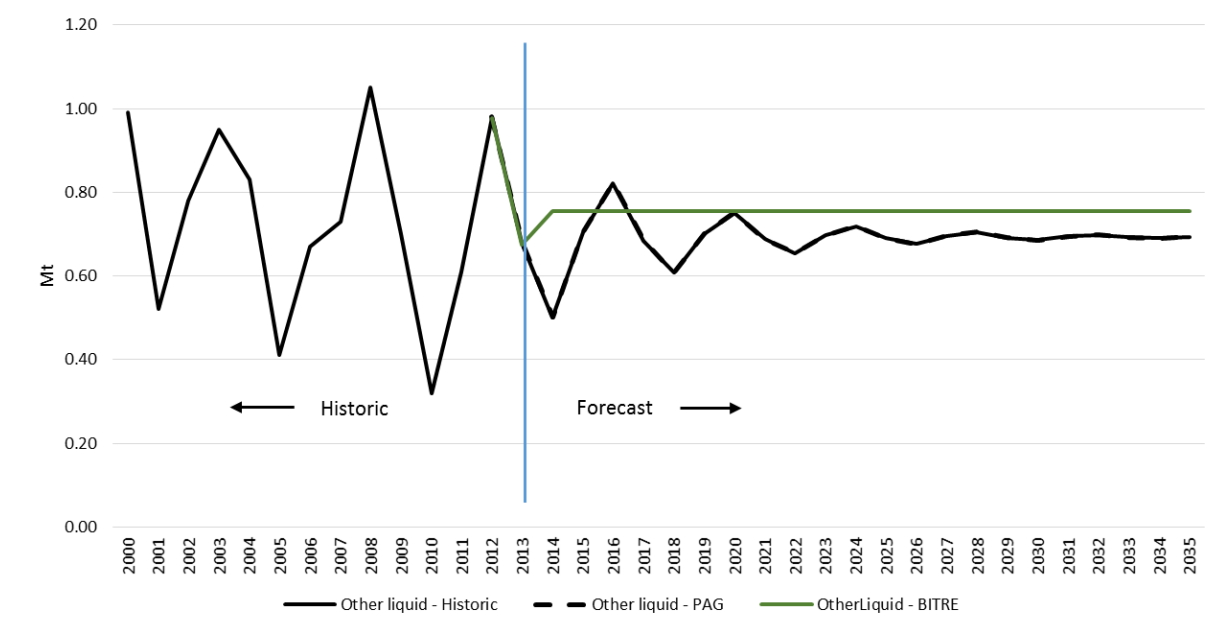


Table E.7 below summarises the size and assumed growth rates of Other Liquid forecasts.

**Table E.7 – Size and assumed growth rate of Other Liquid**

Financial Year	Other Liquid Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2000	0.99				
2001	0.52				
2002	0.78				
2003	0.95				
2004	0.83				
2005	0.41				
2006	0.67				
2007	0.73				
2008	1.05				



Financial Year	Other Liquid Historic Freight Loaded (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2009	0.70				
2010	0.32				
2011	0.61				
2012	0.98				
2013	0.68				
2014		0.50	0.76	-26.25%	11.87%
2015		0.70	0.76	40.46%	0.00%
2016		0.82	0.76	16.66%	0.00%
2017		0.68	0.76	-16.69%	0.00%
2018		0.61	0.76	-11.27%	0.00%
2019		0.70	0.76	15.26%	0.00%
2020		0.75	0.76	7.24%	0.00%
2021		0.69	0.76	-8.35%	0.00%
2022		0.65	0.76	-4.83%	0.00%
2023		0.70	0.76	6.46%	0.00%
2024		0.72	0.76	3.13%	0.00%
2025		0.69	0.76	-3.98%	0.00%
2026		0.68	0.76	-2.07%	0.00%
2027		0.70	0.76	2.86%	0.00%
2028		0.70	0.76	1.35%	0.00%
2029		0.69	0.76	-1.85%	0.00%
2030		0.69	0.76	-0.89%	0.00%
2031		0.69	0.76	1.28%	0.00%
2032		0.70	0.76	0.58%	0.00%
2033		0.69	0.76	-0.85%	0.00%
2034		0.69	0.76	-0.38%	0.00%
2035		0.69	0.76	0.58%	0.00%



Forecasts of inter-capital containers as displayed in Figure E.7 show a steady increase over the forecast horizon in both the PAG and BITRE cases. The forecasts are influenced by projections of economic activity as proxied by Gross Domestic Product (GDP) which is used as a regressor (i.e. explanatory variable) in both models.

**Figure E.7 - Comparison of Inter-capital container forecasts (financial years)**

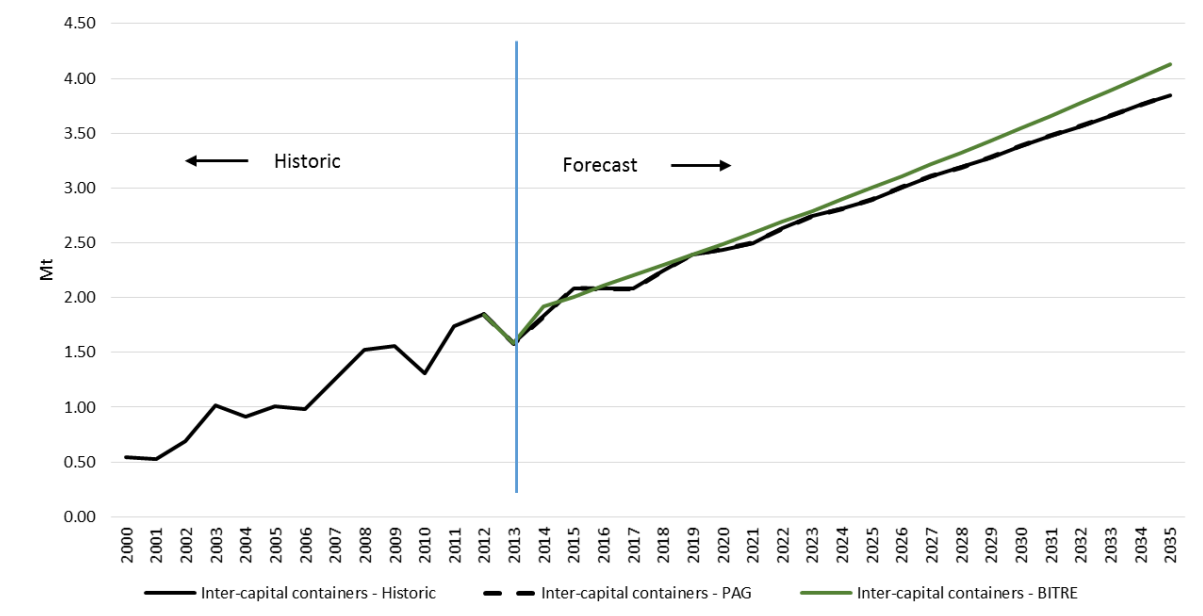


Table E.8 below summarises the size and assumed growth rates of Inter-capital Container forecasts.

**Table E.8 – Size and assumed growth rate of Inter-capital Containers**

Financial Year	Inter-capital Containers Loaded (Mt) Historic	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2000	0.54				
2001	0.53				
2002	0.69				
2003	1.02				
2004	0.91				
2005	1.01				
2006	0.98				
2007	1.26				
2008	1.52				
2009	1.56				



Financial Year	Inter-capital Containers Loaded (Mt) Historic	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2010	1.31				
2011	1.74				
2012	1.85				
2013	1.58				
2014		1.83	1.92	16.05%	21.30%
2015		2.09	2.01	13.82%	4.49%
2016		2.08	2.11	-0.35%	4.89%
2017		2.08	2.20	0.05%	4.45%
2018		2.24	2.29	7.83%	4.33%
2019		2.40	2.39	6.82%	4.21%
2020		2.44	2.49	1.79%	4.11%
2021		2.50	2.59	2.45%	3.99%
2022		2.63	2.69	5.23%	3.89%
2023		2.74	2.79	4.31%	3.80%
2024		2.81	2.90	2.49%	3.71%
2025		2.90	3.00	2.97%	3.63%
2026		3.01	3.11	3.86%	3.54%
2027		3.11	3.21	3.31%	3.47%
2028		3.19	3.32	2.64%	3.40%
2029		3.28	3.43	2.86%	3.33%
2030		3.38	3.55	3.11%	3.26%
2031		3.48	3.66	2.81%	3.20%
2032		3.57	3.78	2.54%	3.14%
2033		3.66	3.89	2.63%	3.09%
2034		3.76	4.01	2.66%	3.04%
2035		3.85	4.13	2.50%	2.99%

In regards to the inter-capital containers sector, the output of the structural time series model closely aligns with the assumptions developed by the BITRE.



Figure E.8 below compares the PAG and BITRE forecasts relating to Bass Strait non-bulk freight. Projections of Gross State Product (GSP) in Tasmania of between 1.5 – 2.0 per cent per annum influence the forecasts in both cases.

**Figure E.8- Comparison of Bass Strait non-bulk forecasts (financial years)**

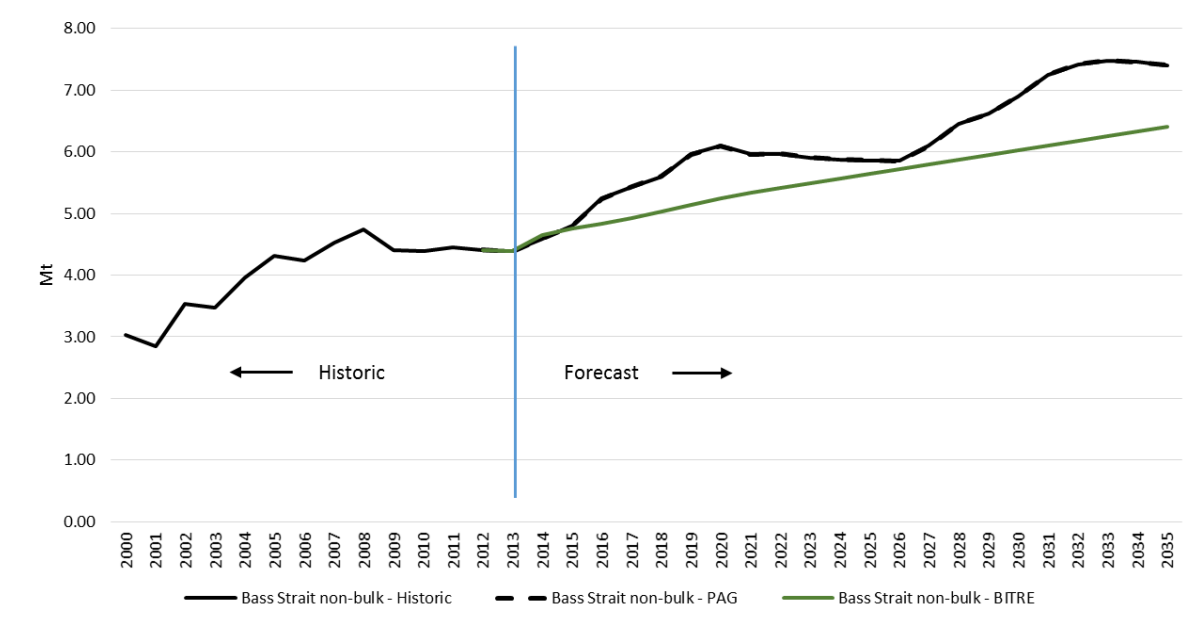


Table E.9 below summarises the size and assumed growth rates of Bass Strait Non-Bulk forecasts.

**Table E.9 – Size and assumed growth rate of Bass Strait Non-Bulk**

Financial Year	Bass Strait Non-Bulk Freight (sum of Tasmania as Destination and Origin) Historic (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2000	3.03				
2001	2.85				
2002	3.54				
2003	3.47				
2004	3.96				
2005	4.31				
2006	4.24				
2007	4.53				
2008	4.75				



Financial Year	Bass Strait Non-Bulk Freight (sum of Tasmania as Destination and Origin) Historic (Mt)	PAG Forecast	BITRE Forecast	PAG Forecast Growth Rate	BITRE Forecast Growth Rate
2009	4.40				
2010	4.39				
2011	4.45				
2012	4.41				
2013	4.39				
2014		4.59	4.65	4.64%	6.04%
2015		4.80	4.75	4.43%	2.12%
2016		5.25	4.83	9.37%	1.74%
2017		5.43	4.92	3.51%	1.79%
2018		5.60	5.03	3.17%	2.12%
2019		5.96	5.15	6.35%	2.41%
2020		6.10	5.24	2.30%	1.91%
2021		5.96	5.34	-2.25%	1.80%
2022		5.97	5.42	0.13%	1.55%
2023		5.91	5.49	-0.97%	1.34%
2024		5.88	5.57	-0.48%	1.38%
2025		5.86	5.65	-0.26%	1.37%
2026		5.85	5.72	-0.22%	1.35%
2027		6.10	5.80	4.24%	1.34%
2028		6.46	5.88	5.88%	1.32%
2029		6.62	5.95	2.45%	1.31%
2030		6.90	6.03	4.34%	1.29%
2031		7.26	6.11	5.12%	1.28%
2032		7.42	6.18	2.30%	1.26%
2033		7.49	6.26	0.84%	1.25%
2034		7.46	6.34	-0.36%	1.24%
2035		7.41	6.42	-0.68%	1.23%



The table below provides reports the results of the diagnostic tests for normality ( $N$ ), heteroscedasticity ( $H$ ) and the  $R^2$  measure of goodness of fit relating to each of the PAG forecasts. The standard error ( $SE$ ) associated with each of the models is also presented. In all cases the forecasting models pass the diagnostic tests. In each case, the models passed the relevant diagnostic tests, indicating that the forecasts are statistically robust.

**Table E.11 – Diagnostic tests associated with PAG forecasting models**

Test statistic	Bauxite	Iron Ore	Other Dry Bulk	Oil	Petroleum	Other Liquid	Inter-capital Containers	Bass strait Non-Bulk
$R^2$	0.78	0.69	0.86	0.37	0.52	0.58	0.42	0.39
$SE$	1.62	1.11	1.84	1.20	1.39	3.36	2.79	1.88
$N$	0.95	8.2	0.64	6.89	1.67	8.35	4.80	8.98
$H$	0.85	1.76	1.22	0.92	0.95	4.32	0.98	0.07

**General limitations associated with forecasting**

It is important to note that the forecasts contained in this report have been prepared on the basis of assumptions and methodology which have been described in this report. It is possible that some of the assumptions underlying the forecasts may not materialise. Nevertheless, we have applied our professional judgement in making these assumptions, such that they constitute an understandable basis for estimates and projections. Accordingly, readers of this report must appreciate that, to the extent that certain assumptions do not materialise, the estimates and projections may vary.