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**Short sea shipping: Lessons
for or from Australia?**

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ABSTRACT: Over the past decade, there has been a substantial volume of research on short sea shipping and related national maritime transport regulation. In spite of significant support for the policy of growing the volume of short sea shipping in Europe, and the signing of a Memorandum of Cooperation within NAFTA in 2003, there has not been the level of adoption by cargo interests or shipping lines expected. In Australia, where the regulatory environment is somewhat different from Europe or North America, the industry is more focused on the bulk sector and the Rudd Government is contemplating an agenda of maritime reform. This situation presents an opportunity to build an understanding of why, how and whether short sea shipping works, and, in particular, what lessons from the Australian experience might apply to the Canadian and/or North American context and vice versa.

This paper builds on two separate but linked streams of research. On one hand, it will review the research conducted in North America. Large-scale studies have been undertaken for Transport Canada over the past five years, and several studies have also been conducted in the U.S. On the other, it reviews the studies undertaken in Australia, where short sea shipping received considerable attention from both consultants and academics, and there has been a recent government investigation into the coastal shipping industry. In its examination of research done to date, this paper explores the lessons from these studies by answering four research questions. It draws preliminary conclusions about the role of the regulatory environment in promoting or deterring the development of land transport-competitive short sea services and about which research agenda gaps remain to be filled. The paper does not focus on bulk shipping; the key emphasis is on what governments need to consider if they seek to induce switching from land modes, like truck or rail, to coastal shipping in order to revitalise the domestic industry or improve GHG-efficiency in the transport sector or both.

KEY WORDS: *Short sea shipping, Australia, regulation, mode switching, maritime reform*

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1. Introduction

Over the past decade, there has been a substantial volume of research into short sea shipping¹ and related national maritime transport regulation. In spite of significant support for the policy of growing the volume of short sea shipping in Europe, and the signing of a Memorandum of Cooperation within NAFTA in 2003, there has not been the level of adoption by cargo interests or shipping lines expected. In Australia, where the regulatory environment is somewhat different from Europe or North America, the industry is more focused on the bulk sector and the Australian Government is contemplating an agenda of maritime reform. This situation presents an opportunity to build an understanding of why, how and whether short sea shipping works, and, in particular, what lessons from the Australian experience might apply to the Canadian and/or North American context and *vice versa*.

We begin with a brief discussion of the current Australian situation. Australia is a vast island nation with 37,000 nautical miles of coastline, which, including islands, increases to 60,000 nautical miles (O'Connor, 2010). Seaborne trade accounts for 99 percent of Australia's international trade by weight. With the majority of the population and industry located on or near the coast, coastal transport would appear to be an obvious modal choice for domestic supply chain logistics. However, despite a 23 percent growth in coastal freight over the period 1998-99 to 2007-08 (BITRE 2009a, Table 3.1), coastal shipping carries only 26 percent of the domestic freight task, down from 44 percent in 1984-85 (House of Representatives, 2008). Shipping's share of the total freight task has been eroding steadily for several years due to an increasing proportion of both inter- and intra-state freight being moved by road and rail (Australian Shipowners Association, 2008).

Recently there has been a push to revitalise Australia's coastal shipping industry to meet anticipated growth in freight traffic. A resurgence of the coastal trade through modal shift, it is argued, can assist in reducing greenhouse gas (GHG) emissions, and help alleviate current infrastructure constraints and concerns about road safety. The House of Representatives (2008) report argued that coastal nations benefit from the creation of employment opportunities in the maritime sector, that is shipping, ports and maritime services, with additional gains from the improvement in maritime safety, security and defence. Sánchez and Wilmsmeier (2005) point to the gains from reduced infrastructure expenditure through short sea shipping development.

The Australian coasting trade² is regulated by Part VI of the *Navigation Act of 1912*, requiring vessels engaged in the coasting trade to be licensed, irrespective of flag and crew nationality. Licences are issued for a 12-month period (or part thereof) ending 30 June and are renewable annually. Licences are issued, pursuant to section 288 of the Act, on two conditions: that seafarers employed on the ship are paid at least Australian wages (and accorded Australian work conditions³). Thus, a foreign-flagged licensed ship may engage in the coasting trade at any time without a permit.⁴

An unlicensed ship may be granted a permit to trade on the Australian coast in the carriage of cargo and/or passengers where there is no suitable licensed ship available for the shipping task or the service carried out by a licensed vessel is inadequate, (BITRE, 2009b).

1 Coastal shipping is the common term in Australia for shipping between two domestic ports. In Canada, it is called short sea shipping and, in the U.S., it is called America's Marine Highways. We use these terms interchangeably throughout this paper.

2 Under the Act, a ship is deemed to be engaged in the coasting trade if it takes on board cargo or passengers at any port in a State or a Territory, to be carried to, or delivered at, a port in the same or another State or Territory (Government of Australia, 2009).

3 Under the regulations of the Fair Work Act 2009, all license holders and some permit holders from 1 January 2010 will be required to comply with the act starting on 1 July.

4 The Act provides for certain trades to be exempt from the requirement that a ship be licensed or have a permit. Exemptions are provided either by Ministerial Direction or through an Instrument signed by the Governor General. (Examples: in mainland to and inter-island trades involving Christmas Island, Norfolk Island and the Cocos Islands.)

Permits are of two types. A Single Voyage Permit (SVP) is issued for a single voyage between designated ports for the carriage of a specified cargo or passengers. A Continuous Voyage Permit (CVP) enables a vessel to carry specified cargo between ports for a specified period.⁵ These permits, issued under Part VI of the Act, only apply to unlicensed vessels in the inter-state trade and not for the carriage of intra-state cargo. This is an important distinction because Australia's intra-state transport is regulated at the state level and that regulation is not currently consistent between states or with inter-state regulations.⁶

At this point it is important to look at the existing Australian shipping supply situation. The number of vessels in the Australian coastal trading fleet (over 200 dwt) has been declining for many years, as have total deadweight and gross registered tonnage. In 1996, the number of ships stood at 75; by 2005-06, there were 46, a decline of 39 percent (House of Representatives, 2008). By 2007-08, just two years later, the number had fallen a further 24 percent to 35 ships (BITRE 2009b) (Table 1).

Table 1: Australian coastal trading fleet 2007-08

| Registration | Vessels | DWT | GRT | Bulk Ships |
|--------------|---------|---------|---------|------------|
| Australian | 28 | 644,807 | 524,883 | 15 |
| Foreign | 7 | 337,767 | 208,947 | 6 |
| Total | 35 | 982,574 | 733,830 | 21 |

Note: Bulk ships includes bulk carriers, chemical tankers and tankers.

Source: Extracted from BITRE (2009b), Tables 6.1 and 6.3.

These ships are both Australian and foreign registered vessels, licensed under the *Navigation Act of 1912*. Apart from the subsidised Bass Strait route and one vessel providing a Western Australia coastal service, there are no licensed Australian or foreign registered **container** ships in the coasting trades. This means that the only container transport services along Australia's coasts, services that could take traffic from land-based modes, are unlicensed international foreign-flag operators using permits—either SVPs or CVPs.

Because unlicensed, foreign registered vessels may trade on the Australian coast under permit, foreign vessels now carry around 25 percent or about 15 million tonnes of the total inter- and intra-state coastal cargo (see Table 2). Of this tonnage, bulk commodities—dry bulk (69 percent) and liquid bulk (26 percent)—make up 95 percent of all coastal shipments, with containerised and general cargo the remainder.

Table 2: Permitting activity by cargo type 2007-08

| Cargo group | Total coastal (million tonnes) | SVP and CVP (million tonnes) | SVP and CVP (% of total coastal trade) |
|--|--------------------------------|------------------------------|--|
| Bauxite, iron ore and other dry bulks | 35.6 | 10.3 | 17.5 |
| Crude oil, petroleum and other liquid bulk | 15.1 | 3.9 | 6.6 |
| Containerised and general cargo | 8.2 | 0.7 | 1.2 |
| Total cargo | 59.0 | 14.9 | 25.3 |

Source: BITRE (2009b), Table 4.2

In 2007-08, 3,186 voyages were undertaken by foreign-flagged ships using permits, 1,814 with SVPs and 1,372 with CVPs (Table 3). This implies that, if permit volumes were fully exercised, at least 850 TEUs on average per week in all of Australia would have been carried, although on

5 CVPs are typically issued for a period of three months.

6 Intergovernmental negotiations on the single maritime jurisdiction initiative have begun (BITRE, 2009d).

what routes is not published. After a voyage is complete, a declaration of actual volume carried must be submitted.

Table 3: Summary of voyage permits 2007-08 and TEUs carried on permits

| Year | SVPs | CVPs | Total Permits | SVP TEUs | CVPs TEUs | Total TEUs Permitted |
|-------------|-------------|-------------|----------------------|-----------------|------------------|-----------------------------|
| 2002-03 | 798 | 454 | 1,252 | 12,161 | 37,619 | 49,780 |
| 2003-04 | 681 | 350 | 1,031 | 7,908 | 38,810 | 46,718 |
| 2004-05 | 892 | 977 | 1,869 | 5,855 | 56,938 | 62,793 |
| 2005-06 | 1,133 | 1,291 | 2,424 | 16,501 | 32,758 | 49,259 |
| 2006-07 | 1,876 | 1,915 | 3,791 | 20,455 | 53,474 | 73,929 |
| 2007-08 | 1,814 | 1,372 | 3,186 | 6,694 | 37,776 | 44,470 |

Source: BITRE (2009a), Table 1.3.

In conclusion, bulk services currently dominate coastal shipping supply. Other than the subsidised Bass Strait Tasmania–Victoria and Western Australian coastal routes, there is currently no supply of coastal container operations except via permit. Permit data for 2007-08 is analysed in section 3.3.1 for particular port-pairs.

2. Approach

In order to understand the issues of coastal shipping more broadly, and to examine the Australian case in this larger context, this paper will build on two separate but linked streams of research. On one hand, it will review the research conducted in North America, where a number of large-scale studies have been funded over the last seven years. On the other, it will review the studies undertaken in Australia, where coastal shipping has received considerable attention, and there has been a recent investigation into the coastal shipping industry. This paper will explore the lessons from these studies and others by answering four research questions along with interviews with key regulators:

1. Is there a corridor where new business demand may be built in addition to existing sea carriage of containers? In other words, is there an opportunity?
2. In the absence of subsidy, as in Europe, what legislative or regulatory factors may impede or promote the development of short sea shipping in such a corridor?
3. What drivers currently exist that may enhance the prospects for increasing shipping volumes and the likelihood of increasing the short sea share of the transport market?
4. Assuming that the prospects for short sea shipping can be improved commercially by maritime policy reform, what is needed to encourage switching from land-based modes to sea modes by trading interests?

The paper then draws preliminary conclusions about the role of the regulatory environment in promoting or deterring the development of land transport–competitive short sea services. It does not focus on bulk shipping, as the key emphasis is on what governments need to consider if they choose to induce switching from land modes to coastal shipping to revitalise the domestic industry or improve GHG-efficiency in the transport sector or both.

3. Research question 1: Is there a corridor where new business demand may be built? Defining the opportunity.

3.1 Lessons from research in North America

In published North American studies, the findings indicate that road corridors with particular characteristics have the greatest likelihood of success for a short sea shipping service to take market share from the road carriers. By studying the freight distance, congestion, availability of secondary ports and whether there is a competing rail corridor, coastal shipping opportunities can be identified.

Freight distance. To understand the opportunity requires determining the distance the existing or potential traffic moves and the constraints potential transport providers face, e.g., driver hours of service, highway speeds allowed, equipment fuel consumption and regulations, and so on (Brooks *et al.*, 2006). Brooks and Trifts (2008) found that shipping was truck-competitive in corridors under 1,000 nautical miles under specific conditions; in their study, land transit time was longer due to physical network structure and congestion was an issue. Trade-offs between modes occurred in a contestable range, while truck was successful in attracting cargo on the shorter route (under 750 road km) and sea gained a substantial allocation of business on longer routes (over 1,000 nautical miles), particularly in the absence of rail competition.

In the Australian context, there is a belief that coastal shipping is only competitive in corridors exceeding 2,200 road km, while under 1,500 km is the road market and rail succeeds in the over 1,500 km market (Meyrick and Associates, 2008: 108; Commonwealth of Australia, 2006). However, there does not appear to be any empirical research behind these statements to test the validity of the trade-off distance argument. Given the considerably shorter distance found in the North American mode allocation study, we believe that corridors shorter than 2,200 road km require a closer look.

Traffic volume and road congestion. There is significant volume of traffic already travelling on the route by truck, and a high level of congestion is present on existing road infrastructure. The Global Insight and Reeve & Associates (2006) identified several corridors with sufficient volume to support a short sea operation, while the Institute for Global Maritime Studies (2008) identified corridors with serious congestion problems that would benefit from coastal shipping operations.

The importance of road congestion in the U.S. has triggered re-examination by cargo interests of their mode choice decisions. Brooks *et al.* (2006) found that on the I-95 corridor, due to the delays currently incurred, Atlantic Canadian manufacturers and forwarders would support a coastal sea service that by-passes the Hudson River/Manhattan area. Brooks and Trifts (2008) found that environmental concerns, particularly if incorporated into pricing the route, could also play a role. Both studies find that road congestion may induce switching in corridors of shorter length than suggested by Commonwealth of Australia (2006).

Availability of secondary ports. Successful coastal shipping operations are contingent on the availability of ports to service short sea operations. Brooks *et al.*, (2006) concluded that many main ports on the east coast of North America were simply not enthusiastic about servicing feeder traffic, preferring to compete for trunk services as opposed to transshipment volume. Six secondary ports were identified for further investigation but several were that not that interested in the opportunity.

No competing rail corridor. Finally, as cargo interests using trucks will switch to rail intermodal rather than short sea (MariNova Consulting Limited, 2005) under certain circumstances, the existence of competing intermodal rail service on the corridor is a consideration. In the Marinova study, the sea option was unable to offer year-round service while rail and truck could. Clearly, winter closures are not an issue in the Australian market

(although it may be argued that cyclones might have some influence in the Queensland, Northern Territory and Western Australia.

In summary, the North American research to date illustrates that there are shorter corridors on which short sea shipping could have sufficient volume and could compete, absent issues associated with the regulatory environment (discussed in a later section). It also indicates that the land corridor should ideally be congested so that there is a social benefit arising from removing trucks from the highway, thereby increasing the likelihood that cargo owners and/or truck operators may be incentivised, in the case of the former, to switch to coastal shipping and, in the case of the latter, to restructure their operations so as to act as retailers for a coastal operator partner.

3.2 Lessons from research in Australia

A number of recent commentaries on Australian coastal shipping provide a particularly strong base from which to examine the issues and determine what future research remains to be conducted. These studies include Meyrick and Associates (2007), Macintosh (2007) with its review of other studies as well as its focus on environmental emissions, and the House of Representatives (2008) investigation, together with its 68 submissions from industry, government and other interested parties (including key ones from the Department of Education, Employment and Work Place Relations, 2008; the Australian Shipowners Association, 2008; and the Maritime Union of Australia, 2008). Supported by statistics from the latest BITRE (2009c) report (see Figure 1) as well as earlier Bureau investigations, some appropriate corridors for further analysis can be identified. It is possible to remove those flows where commercial coastal shipping would likely not play a role, i.e., the short, intra-state routes already carried by road, or those where the commodity would not move by road or rail because it is already dependent on sea transport (e.g., bauxite from Weipa to Gladstone).

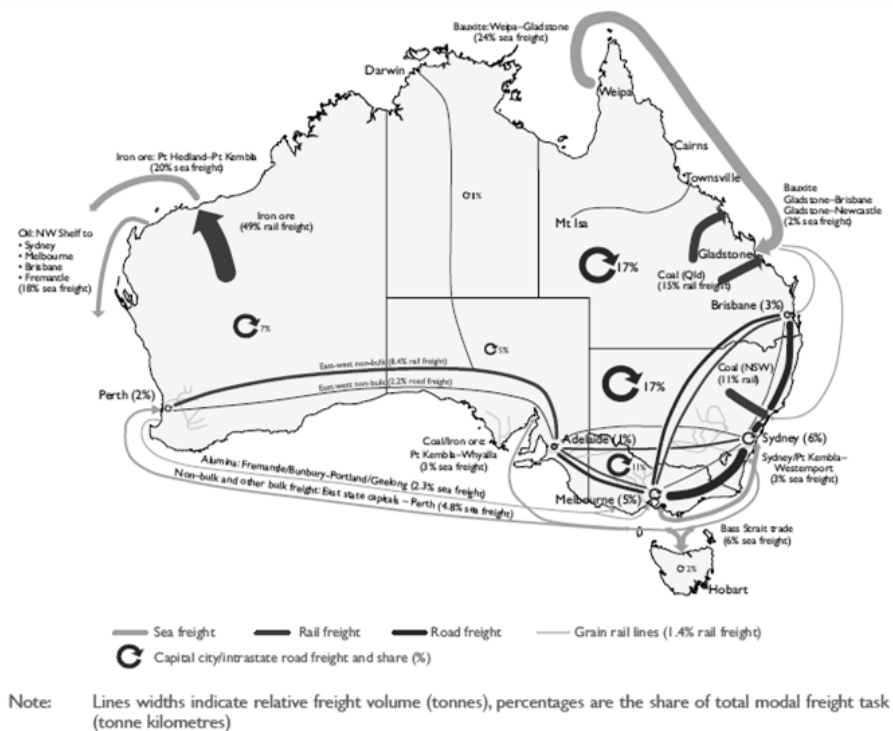


Figure 1: Major Australian domestic freight movements, 2006-07

Note: This figure includes all commodities, and therefore only provides a high level view of the coastal cargo potential available from diversion of cargo from road or rail.

Source: BITRE (2009c), Figure 2.

Meyrick and Associates (2007) relied on Commonwealth of Australia (2006) research to identify several corridors where the government had already concluded there was likely to be significant growth in freight traffic volumes by 2025. However, the Meyrick study did not decompose the opportunity into bulk and non-bulk traffic, critical if the purpose is to identify those corridors where growth might be driven by GHG incentives and the concept of switching cargo to coastal shipping from land-based transport.

First, we need to understand the land-based modes currently used for freight. The majority of rail traffic in Australia is intra-state bulk tonnage. Of the 381.8 million tonnes of rail traffic carried in 2007-08, non-bulk cargo accounted for only 5.7 percent, or 21.8 million tonnes; of that non-bulk traffic, more than half (9.8 million tonnes) was intra-state (Australasian Railway Association Inc., 2009: Table 2). The rail intermodal market is well-developed; as of June 2008, the Perth–Melbourne corridor had 32 intermodal trains a week, the Melbourne–Brisbane corridor 33 trains a week, the Adelaide–Melbourne corridor 34, and Perth–Sydney 16 (BITRE, 2010: Figure 3). While BITRE (2010) notes only one intermodal train a week between Sydney and Brisbane at that time, Pacific National and Queensland Rail together now run nine trains each way per week, and Melbourne–Sydney has increased from six to nine each way per week. The intermodal rail industry is working hard to increase its intermodal volumes.

On the road side, the Bureau of Transport and Regional Economics (Commonwealth 2006) examined the future likely road traffic by beginning with existing 1999 traffic volumes and built its forecasts by understanding likely car (passenger) growth and projected freight growth through an extensive and detailed trade gravity analysis on a commodity-by-commodity basis and each route on a road segment-by-segment basis. Focusing only on the non-bulk road freight transport segment, extracting the anticipated growth in traffic volumes associated with cars, a picture of the future road freight corridors where coastal shipping might play a role emerges in Table 4.

To illustrate, the Melbourne–Brisbane corridor is comprised of various segments, each with light vehicle traffic (e.g., cars) and heavy vehicle traffic (e.g. freight). For each road segment, the annual level of growth in congestion is projected. At the level of segment analysis, the Melbourne–Seymour leg of the road trip has an average daily vehicle projection of 31,875 in 2025, which can be decomposed into 26,516 light vehicles and 5,359 heavy ones. However, not all of these heavy vehicles are relevant as many may merely be distributing product in the Melbourne environs and a fair number are identified as headed to Sydney (minimum daily vehicles Melbourne–Sydney is 4,158). Likewise, the Brisbane–Toowoomba segment shows 3,484 heavy vehicles in 2025, some of which are headed to Darwin not Melbourne. How many of these are through traffic is probably some number less than the minimum daily projection for a segment in the total Melbourne–Brisbane route, or less than the 1,012 heavy vehicles projected in 2025, to travel on the Narrandera–West Wyalong segment of the route. This same thought process has been applied to the other corridors to get the numbers in the final column of Table 4. Where the corridor did not have traffic forecasts, combinations of corridors were used as the next best scenario.

The next question is what percentage allocation that sea might expect of the road market. If that magic number were identified in future research to be 10 percent, this would imply that about 70 trucks a day from Brisbane–Cairns might be switched to a coastal operator. Further empirical research is needed to examine the minimum volume commitment necessary for a coastal operator to run with sufficient asset utilisation to be profitable. We also need to recognise that the major competitor on this corridor is rail.

For the Australian case, we assume that at least one North American lesson can be applied—coastal shipping of containers will never be competitive against the road alternative in corridors where the road distance is less than can be accommodated by one day of driving (for next day delivery guarantees). The shipping market simply cannot compete against the flexibility of departure that short-haul truck offers; also it would include two terminal lifts (or ramp clearances if ro-ro) at the ports on either end plus local delivery arrangements, raising the price

above what than the cargo owner would be willing to pay. This effectively indicates a minimum corridor distance threshold of less than 1,000 road km.

Table 4: Non-urban road corridors for consideration

| AusLink Corridor (1) | 2025 Traffic (000 t) | Road Distance (km) | Sea Distance NM (kms) | Comments (2) |
|-----------------------------|-----------------------------|---------------------------|------------------------------|---|
| Sydney–Melbourne | 17,243 | 832 | 582 (1,078) | Route deemed too short to be truck competitive. |
| Melbourne–Adelaide | 14,399 | 713 | 514 (952) | Route deemed too short to be truck competitive. |
| Sydney–Brisbane | 11,828 | 947 (inland) | 515 (954) | Route deemed too short to be truck competitive. |
| Melbourne–Brisbane | 5,325 | 1,690 (inland) | 1,080 (2,000) | Minimum daily volume of heavy vehicles projected in 2025 is 1012. |
| Melbourne–Perth | 3,728 | 3,423 | 1,681 (3,058) | Minimum daily volume of heavy vehicles projected in 2025 Melbourne–Adelaide is 1795. See Adelaide–Perth. |
| Sydney–Adelaide | 2,801 | 1,375 | 973 (1,802) | Minimum daily volume of heavy vehicles projected in 2025 is 1629. |
| Sydney–Perth | 1,658 | 3,942 | 2,140 (3,963) | Minimum daily volume of heavy vehicles projected in 2025 is 1629 for Sydney–Adelaide. See Adelaide–Perth. |
| Adelaide–Perth | 1,530 | 2,692 | 1,343 (2,487) | The study concludes that traffic growth on this corridor will more likely accrue to rail (p. xxvi) Only 62 minimum heavy vehicles projected here in 2025. |
| Brisbane–Cairns | 1,069 | 1,699 | 846 (1,567) | Minimum daily volume of heavy vehicles projected in 2025 is 718. |

Note 1: Sydney–Canberra has been removed from the table as unsuitable for coastal shipping, as have intra-state corridors. Given that a corridor needs a minimum amount of traffic, also removed are the AusLink corridors with less than 100,000 tonnes of non-bulk traffic in 1999. The data in the table has been sorted by tonnage, which does not include air tonnes, as we do not consider air a modal competitor to sea.

Note 2: Where there is a minimum traffic notation, this is taken from the relevant table in the source. The maximum is not used as it is not city congestion sought but through traffic that would be suitable for a coastal shipping operation.

Source: The corridor and non-bulk tonnage data are taken from Table 2.16 of Commonwealth of Australia (2006) while the distance in km is taken from Table 3.2, except Perth to Sydney, Perth to Melbourne, Melbourne to Brisbane, and Adelaide to Sydney, where source discrepancies have been adjusted by Google Maps. Nautical mile (NM) data are taken from www.portdistances.com with Fremantle as Perth's port.

For the Australian case, we assume that at least one North American lesson can be applied—short sea shipping of containers will never be competitive against the road alternative in corridors where the driving distance is less than can be accommodated by one day of driving (for next day delivery guarantees). The shipping market is simply not able to compete against the flexibility of departure that short-haul truck offers, and the shipping option would include two terminal lifts (or ramp clearances if ro-ro) at the ports on either end plus local delivery arrangements, raising the price above what than the cargo owner would be willing to pay. This effectively indicates a lower distance threshold of less than 1,000 km sets the parameters for the corridor consideration.

Is there an opportunity for a shipping line beyond the identification of a contestable corridor where shipping can compete successfully against road or rail or both? From closer examination of Table 4, it appears that rail competes very effectively for intermodal cargo on the Melbourne–Perth corridor (clearly not a long-haul truck corridor given the absence of road traffic between Norseman and Coolgardie—see the Adelaide–Perth row). Three routes are clearly too short for a sea operator to be competitive against a road alternative without

significant promotional support by government. That leaves five corridors to be examined more carefully in a future study: Melbourne–Brisbane, Sydney–Adelaide or Cairns–Brisbane may have promise as they are sufficiently long enough to be considered, although the last may not have sufficient volumes. Sydney–Perth and Melbourne–Perth do not appear to have adequate volumes on the road as seen in the shorter distance Adelaide–Perth segment analysis, but we retain these two for permit analysis in section 3.1.1.

3.3 *Looking forward: The Australian situation*

New traffic for a coastal line may come from three sources: (1) attracting existing traffic from that currently carried by foreign-flag container shipping line under a single or continuous voyage permit, (2) attracting new business due to changes in foreign-flag shipping lines' network configuration, i.e., the line goes changes from a multi-port configuration, where traffic is loaded/unloaded for distribution to the immediate hinterland, to one where a hub–and–spoke configuration is used and the cargo is transshipped to a coastal operator at one hub, thereby increasing cargo available for feeder operations, and (3) attracting new business from existing land operations offered by road or rail carriers.

3.3.1 Attracting the existing permit volume

Traffic for a short sea operator might result from disallowing foreign-flag licenses, i.e., invoking a North American style cabotage environment to force trading interests to switch to an Australian–flag operator; however, there is no guarantee that an Australian coastal service will win the business. Removal of the permitting option may well result in a cargo owner either ceasing trading, in those cases where transport has become too expensive, or switching to a land-based alternative.

While in the financial year 2006-07 a total of 73,929 TEUs were carried under permit, that number had dropped 40 percent to 44,470 TEUs by 2007-08. There are two contributing factors for this drop. First, ANL and MISC licensed that year some vessels previously under permit and so the volume they carried would no longer show up in the permit statistics. Second, 2007-08 was a year of strong demand and GDP growth worldwide; it may have been that load factors for international cargoes were up, and foreign operators preferred to carry international TEUs at the full market rate rather than coastal traffic at marginal cost. The actual traffic carried under permit needs to be examined to determine if the market is large enough to support an operator on a particular port pair, unless it is clear that there are significant volumes possible from modal switching and/or carrier network reconfiguration. Although Table 5 presents port pair data on the five corridors for 2007-08, it does not indicate how many currently permitted TEUs would switch to an alternative coastal operator as opposed to a land-based option if changes were made in the regulations. What it does tell us is that there is no permit traffic switchable on two port-pairs, Brisbane–Melbourne and Adelaide–Sydney, and insufficient volume on the Brisbane–Townsville corridor. The most promising port-pairs are Melbourne–Brisbane and Melbourne–Fremantle. For these, a modal switching study is still warranted, particularly as total transit time Melbourne–Brisbane is much longer by sea than by road or rail.

Table 5: Port pair analysis of 2007-08 permits

| Port Pair (1) | CVP TEUs | CVP Voyages | SVP TEUs | SVP Voyages |
|---------------------|----------|-------------|----------|-------------|
| Melbourne–Brisbane | 9,851 | 162 | 9 | 3 |
| Brisbane–Melbourne | 0 | 0 | 0 | 0 |
| Sydney–Adelaide | 134 | 10 | 131 | 3 |
| Adelaide–Sydney | 0 | 0 | 0 | 0 |
| Townsville–Brisbane | 0 | 0 | 0 | 0 |
| Brisbane–Townsville | 10 | 1 | 0 | 0 |
| Sydney–Fremantle | 4,997 | 29 | 1,670 | 16 |
| Fremantle–Sydney | 460 | 19 | 114 | 15 |
| Melbourne–Fremantle | 12,476 | 64 | 1,973 | 43 |
| Fremantle–Melbourne | 593 | 26 | 54 | 13 |

Note 1: Fremantle is the port for Perth. We have substituted Townsville for Cairns as Townsville is the industrial centre on the corridor. SVP data includes Urgent SVP permits.

Source: BITRE in response to data request April 2010.

3.3.2 Network re-configuration

As carriers examine their costs and profitability, they often make the strategic decision to drop ports or alter their route network in a way that will deliver value to the operation. Likewise, cargo interests often examine the value they get from carriers and, for example, determine whether inventory carrying costs with a particular supply chain are too high. The cargo demands on a single carrier's operation are also dynamic, relating to sales to new customers and the loss of other customers. Network reconfiguration is a continuing dynamic force that may be triggered to grow opportunities for routes and suppliers. In the Canadian context, CPCS Transcom (2008) examined how hub-and-spoke operations might be supported in developing the Canadian domestic shipping market (the case studies in this study provide considerable food for thought on how coastal shipping can be profitable).

Port choice in network structure is a key factor in reconfiguration; a port with substantial population or access to a significant volume hinterland is unlikely to be dropped from a service, but fewer maybe chosen if they are in proximity. For example, Fremantle handled more than 500,000 TEUs in 2008 and, as the dominant port for the Western Australia market, it will likely continue to be served, whereas the Victoria/South Australia market can be as easily served by one port as two and several international carriers' have consolidated traffic over Melbourne at the expense of Adelaide in 2009 (BITRE, 2009b online).

To understand the current network configuration for international operators, we undertook a route analysis of the 11 member shipping lines of the Australia/North and East Asia Trade Facilitation Agreement (ANEATFA).⁷ While this does not represent all services between the two regions, the routes and schedules offered by these lines provide some insight into the conditions foreign-flag operators face in seeking to carry cargo under permit between two ports incidental to their existing international schedules.

Many of these 11 companies offer more than one string between Australia and the regions of Southeast Asia, North Asia and China as part of their service. It is also common to see the slot charter arrangements of the global alliances as part of these offerings. So a particular carrier, like MSC Mediterranean Shipping or COSCO Container Line, is not offering a vessel every week, but is contributing one or more vessels to a scheduled service operated jointly with its alliance partners. Such an operator may be in more than one alliance, depending on the geographic coverage it seeks. The route network analysis also illustrates that, for some, cargo is

⁷ Using the web sites for all members of the ANEATFA, all routes coming to or departing from Australia were mapped. As well, transit times between Australian ports were calculated on the basis of published schedule arrival and departure days, in order to evaluate the network structure from a cargo owner's perspective. Note was taken of alliance partners on each service and whether the service was a 'loop' encircling Australia (clockwise or counterclockwise) or a 'string' where the operator reversed direction, retracing the inbound route when returning to the start of the vessel cycle.

consolidated at key ports—there is consolidation of Adelaide cargo at Melbourne, thus avoiding an additional port call in Adelaide.

There are a number of reasons why incidental carriage would be unattractive to an operator:

Currently, services call multiple ports. While picking up a box in Melbourne for delivery to Brisbane may be possible, it adds to the complexity of managing the vessel logistics through a Sydney call. Unless the carrier has an unused allocation in its block stow for Brisbane that can be topped off, it risks a double-handling situation to unload the intervening Sydney cargo.

Transit times for carriers stopping in Sydney between Melbourne and Brisbane are road uncompetitive, given the need to unload cargo for Sydney. (The service offered by OOCL and its partners is one that warrants a closer look. Their Australia–China Express Service, with Shekou–Sydney–Melbourne–Brisbane–Kaoshiung legs, has an interesting double-back that directly connects Melbourne to Brisbane with a four-day transit time, and as it is a strong contributor to the permit numbers Melbourne–Brisbane in Table 5, it is clear that there are some cargo interests sacrificing transit time savings for other considerations in their routing decisions.)

Many economists and industry-watchers speculate that incidental coastal cargo is carried at marginal cost prices. This view is reinforced by cargo owners seeking price concessions on contracts involving slower transit times, because they bear a higher inventory carrying cost. Low prices raise questions for carriers about the cost and time for permitting, against the contribution made to profits. A carrier is likely only to seek such cargo if a volume commitment were made; such a negotiated supply contract would have both the cargo owner and the carrier wanting a longer duration arrangement than the continuous voyage permitting system currently allows.

In summary, there are many foreign-flag carriers offering multi-port and highly competitive services that could take advantage of the permit arrangements. Australia is not a natural international transshipment hub as it is at the end of the world, where return strings or circumnavigating loops are the only two commercially likely network options. How the carrier juggles the cargo, including empties, becomes the critical question in determining the attractiveness of seeking a permit and the likelihood of offering a permit-based service.

3.3.3 Modal switching from road/rail

Based on the North American research, it is possible to conclude that additional coastal shipping may also result from other factors: (1) As transportation fuel prices rise (inevitable after the peak oil threshold⁸), the cost of trucking will increase more quickly than the cost of either rail or sea on a tonne-km basis. (2) A similar situation can be induced by the imposition of more road tolls or greater road congestion and delay. (3) The imposition of carbon taxes on truck fuels will hit the road transport option harder than it will the other modes on a contestable route. (4) Should road safety concerns reduce truck driver hours of service, the altered time competition would favour shipping.

As it is now, the road situation in Australia is not dissimilar to that of the U.S.; safety legislation for truck drivers provides a threshold distance under which sea is definitely uncompetitive with truck. In the U.S., current hours of service regulation permits a one-day maximum driving time of 11 hours; given speed regulation plus pick-up and delivery times, this provides an effective maximum daily threshold of about 900 km for a one-day service. In Australia, standard hours of work regulation for solo drivers caps the distance at what can be driven in 12 hours, although a longer distance may be accomplished under Fatigue Management rules (see Work Diary Instructions, nd). Either way, given the road distances noted in Table 4, coastal shipping would

⁸ There is considerable debate about when 'peak oil', the maximum global petroleum extraction, will occur. The Association for the Study of Peak Oil (2008) estimated it would be 2007 but this did not occur. There is little debate however that fuel prices will rise once the peak oil threshold is crossed if consumption is not curbed in some significant way.

not provide a contestable market in truck corridors of under 900 km as this would leave no time for local transport at the feeder ports.

4. Research Question 2: Legislative or regulatory factors?

4.1 Lessons from research in North America

Numerous studies in the U.S. short sea market conclude the primary deterrents to the development of America's Marine Highways are regulatory. Cambridge Systematics Inc. (2007) found that high labour costs, customs clearance rules, delays and fees were significant impediments to the development of commercially viable short sea operations. Global Insight and Reeve & Associates (2006) concluded that the principal obstacles to the short sea development are the high cost of domestically-built cargo vessels, a requirement under cabotage legislation. Also, the Harbor Maintenance Tax puts an additional burden on short sea operations, particularly as no similar charge is imposed on domestic shipments by trucks.

Security is also noted as a key factor conspiring against coastal Canada–U.S. short sea shipping development. The 24-hour Advanced Notification (AN) rules for trucking are 30 minutes for C-TPAT-compliant trucking companies with FAST certification and 60 minutes for all others. The AN rules for marine shipments under the Container Security Initiative require notification 24 hours before loading. Until the playing field is levelled on security regulation between the modes, marine will remain less desirable.

Finally, as charters provide the operator with the ability to change ships in response to market considerations, build requirements stifle short sea development where right-sizing to market demand is critical to growing the business. In Canada, build requirements are replaced by duties on the purchase of non-Canadian vessels, and these can act as a barrier to entry; also, they significantly increase feeder and regional short sea start-up costs as duties are unrecoverable sunk costs. Therefore, charter terms become critical and taxation regulations for charters a factor to examine.

As Harbor Maintenance Tax, similar security rules and build requirements do not occur in the Australian market, we conclude that these regulatory issues are not relevant to Australia's situation. The conditions imposed on charters, however, deserve a closer look.

4.2 Lessons from research in Europe

Are there lessons from Europe's regulation of coastal shipping? There are two applicable here from Brooks and Frost's (2009) examination of the European short sea market. First, the conditions in the cabotage regime play a large part in the development of short sea services. For example, Europe has a very open cabotage regime, and enjoys a dynamic short sea sector as a result. Second, the size of the cabotage area is important. This EU liberalisation of the cabotage market enlarged the region in which short sea services could operate and gave vessel operators access to longer routes, ensuring that there were now corridors of sufficient length to allow coastal shipping to compete with land-based alternatives. Australia clearly has sufficient length of sea lane to enable coastal shipping to compete with road.

4.3 Lessons from research in Australia

The maritime industry is considered by many governments to be vital to the economy and, for some, important to their national security; consequently most protect their shipping industry through cabotage legislation (Lewarn and Francis, 2009). In Australia, the coastal shipping industry is in a "confused and confusing situation" (Independent Review of Australian Shipping, 2003), and maritime reform is currently under consideration. The *Navigation Act 1912* was designed to protect the then-fledgling Australian shipping industry through cabotage-type clauses but, at the same time, Part VI of the Act made provisions for the issuing of permits and licences to vessels, including foreign owned, to participate in the coastal shipping trades. In

Part VI's current form, cargo preferences are not linked to the flag of the ship but to the payment of Australian wages, leading to a situation where foreign owned and crewed vessels are able to operate on the Australian coast and not breach the Act (Webb, 2004; House of Representatives, 2008).

Today, the situation is more confusing as a result of the many *ad hoc* steps taken to liberalise the Act since its inception. This has imposed a competitive disadvantage on Australian operators as foreign ship owners, operating under coastal permits, face a far less onerous regulatory operating environment, and thus have a significant cost advantage over Australian coastal ship owners. The Workplace Relations Act 1996, Seafarer's Rehabilitation and Compensation Act 1992 and Occupational Health and Safety (Marine Industry) Act 1993 have impacted negatively on the Australian coastal sector relative to foreign vessels issued with permits. New regulations—the Seagoing Industry Award (2010)—is attempting to redress the balance to some extent. The Fair Work Act (2009) will apply to foreign vessels under CVP permit and those using multiple SVP permits from 1 January 2011. The aim is to ensure that all seafarers working regularly on ships on the coast have the benefit of Australian workplace laws and a fair safety net of employment conditions, but the impact will likely result in a fair number of foreign flag operators ceasing to use permits and vacating the coastal market.

Taxation is another element in competitiveness. It is not just about the registration costs (the tonnage tax issues are well explored by Francis and Lewarn, 2009), there is also the taxation difference applicable to the vessel, with variances in the taxation treatment between time and bareboat charters, a matter of considerable importance when right-sizing a fleet for short sea operational growth over time is a likely operational matter.

The Australian government, particularly throughout most of the 1990s and 2000s, has taken the view that Australia is a shipper rather than a shipping nation. As a consequence it has been prepared to let the Australian-flagged coastal shipping industry decline. It has failed to integrate coastal shipping into infrastructure supporting national and international logistics chains. No one report was more telling of Government attitude to shipping than when the Auslink Green Paper (Department of Transport and Regional Services, 2002), which was unveiled by the then Minister for Transport and Regional Services, John Anderson, in November of that year. Auslink, he stated, provided a “unified national plan for a national interest”. The plan's aim was to provide a blueprint to support transport and infrastructure projects with the greatest benefits regardless of mode. Nowhere is shipping mentioned (Bendall, 2003). Australia's vast coastal highway was totally ignored despite the fact that studies indicate that sea transport *ceteris paribus* is the most carbon-efficient mode. Considering that Australia can claim credit for many of the technical innovations in the maritime industry over the last 30-40 years, such as the first purpose-built cellular container ship, twist locks for safe stowage of containers on deck, hatchcoverless container ships, dual-fired marine engines and the acknowledged leadership in design of high speed vessels, one wonders why the government failed to incorporate coastal shipping in its national plan.

Since the release of the Green Paper, and a subsequent White Paper, numerous enquiries and commissioned independent reports into the future viability of Australian-flagged vessels and the coastal trade industry have been published. In response to pressures from the shipping industry, maritime unions and other interested parties, and because of its desire to be seen as environmentally conscious, the current government has expressed support for the revitalisation of the industry (Albanese, 2009). Recommendations have been made to reform Part VI of the *Navigation Act 1912*, the Navigation (Coasting Trade) Regulations 2007 and the Ministerial Guidelines for Granting Licences and Permits to Engage in Australia's Domestic Shipping and the implementation of an optional tonnage tax regime, amongst other reforms (House of Representatives, 2008). However, with an election looming in 2010, the Minister announced in December 2009 that no formal announcement on the implementation of any of these recommendations would be made until late 2010, after the election, most likely for fear of being perceived by the electorate as beholden to the wishes of the maritime unions and opposition from Treasury over the tonnage tax initiative.

In light of this history, what are the market issues for shipping companies operating in Australia? The voyage permit system means sniping is possible by large multinational shipping lines, making it difficult for a new domestic operator to start a sustainable service. Meanwhile, the international companies will focus on full rate cargoes when load factors are high, only actively seeking permit cargo when convenient and space is available. This results in instability for the cargo owner, and diminishes the prospects for conversion of road or rail cargoes to a coastal service. On the other hand, it means that more trade happens because marginal cost prices attract additional volume.

It also raises the question: What would large foreign operators do if permit rules change? As Australia is primarily a destination, not an en route market, it is probable that the costs must be borne by the remaining import cargo, raising prices and making exports less competitive. If Australian-flag operators attract current permit cargoes, the cost of the transport service will be higher than available today under marginal pricing. What is not clear, as modal switching studies have not been done, is whether coastal shipping can compete on the identified corridors against road and rail options.

The current impediments to coastal shipping development in Australia appear to be regulatory, in terms of work place rules, taxation (the unequal treatment between time charter and bareboat or demise charter—the latter has a royalty withholding tax), and the absence of a short sea promotion program (along the lines of Europe's Marco Polo programs to help with start-up or to induce modal switching). Furthermore, intra-state shipping is governed differently from inter-state shipping and regulatory uniformity is desirable, particularly as it relates to equipment and safety regulation as these can stifle ship investment.

5. Research Question 3: What drivers exist that may enhance the prospects for increasing shipping volumes?

5.1 Lessons from research in North America and Europe

Not only has coastal shipping in many countries been undervalued by policy makers (Rowlinson and Wixey, (2002), it has perhaps also been ill-served by the industry itself. Everard⁹ and Boyle (1995) suggested 15 years ago that the inability of coastal shipping operators to market their services effectively was leading to the invisibility of the sector. Criticism about customer service standards has also been levelled at some coastal shipping operators. Saldanha and Gray (2002) argue that for a modal shift to occur towards coastal shipping, there must be an attitude change by the ship operators themselves. Shipping lines must stop seeing themselves as wholesalers providing line haul (i.e., port to port) but must become more like road haulers who view themselves as transport retailers (i.e., door to door). In contrast, Brooks *et al.* (2006) concluded that, in North America, short sea services were more likely to succeed through partnerships between trucking and shipping companies; trucking companies should retail the wholesale short sea service because they have more direct contact with the cargo interests.

Brooks and Trifts (2008) attempted to identify the inducements needed to encourage modal switching to short sea; they found that price is more critical than transit time for those contemplating switching to short sea operations from trucking. The European Commission has recognised that modal switching will not occur without promotional programming to support switching, and five Marco Polo programs focus on the development of new short sea services as well as removing freight from road networks (Brooks and Frost, 2009).

Finally, one cannot under-estimate the power of disgruntled citizens in effecting change. In California, as reported by Giuliano and O'Brien (2008), citizens mounted considerable political pressure on the ports of Los Angeles and Long Beach, by lobbying the California Air Resources Board about air quality from port operations in San Pedro Bay. This led to the restructuring of

⁹ FT Everard is a British shipping coastal operator.

port drayage operations. This is really no different from the power wielded by citizens over politicians when highway fatalities grow and the citizens want trucks removed from national highways. Unhappy voters can and do force change, change that can lead to supply chain restructuring through regulation or incentives devised by politicians in response. This leads to the question about how important road congestion and air emissions from transportation are to the citizens of Australia.

5.2 *Lessons from research in Australia*

Australia has a national target of cutting GHG emissions to 108 percent of 1990 levels (National Transport Commission (NTC), 2009). Since transportation is the fastest growing sector, there is some potential to move towards this target by focusing on inducing switching to a more carbon-efficient mode of transportation—coastal shipping. Yet the word shipping does not appear in the NTC’s Annual Report; solutions to GHG emissions are currently seen as land-based only by those responsible for policy. Coastal shipping is not seen as a solution.

While Macintosh (2007: 35) has documented that coastal shipping offers superior energy intensity to other modes in moving a tonne of cargo a kilometre, interest in promoting short sea alternatives appears to remain a low priority except to a small Australian-flag shipping industry. Despite Cosgrove’s (2008) excellent assessment of the emissions of transport modes, the promise of reduced environmental impact has not captured the imagination of either politicians or the cargo owners who pay the freight bill. Macintosh (2007: viii) reported that modal switching from land to coastal shipping “as a means of reducing emissions is unlikely to be an effective or efficient greenhouse strategy.”

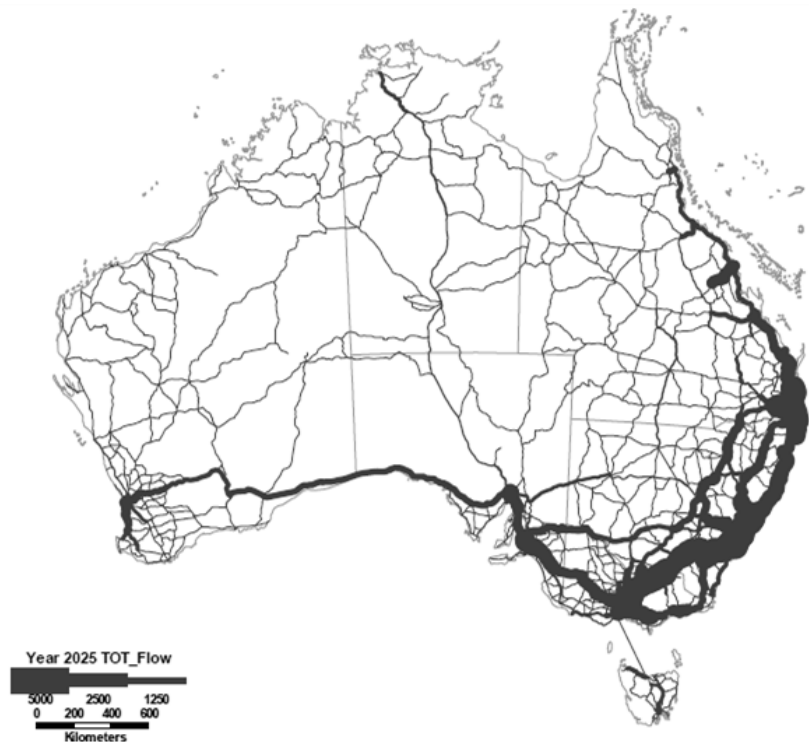


Figure 2: *Inter-regional truck highway usage in 2025*

Source: Commonwealth of Australia (2006). Table 3.4.

Many of those we interviewed considered congestion to be an issue only for cities and their ports. However, the Commonwealth of Australia (2006) concluded that congestion on highways is very much an issue when looking forward to 2025. While it does not appear to worry those in the freight industry, it does worry passengers in cars, who are also voters. Figures 2 and 3, based on the modelling of freight and passenger moves on Australian highways by BTRE in Commonwealth of Australia (2006), make a case similar to that seen in the U.S. under the

Federal Highway Administration Freight Analysis Framework.¹⁰ Road congestion will grow as an issue in and around cities. For example, there are already port access issues for Melbourne (Victorian Freight and Logistics Council, 2010), and coastal shipping is seen as one solution to congestion and associated environmental impacts in the state (Victorian Freight and Logistics Council, 2008).

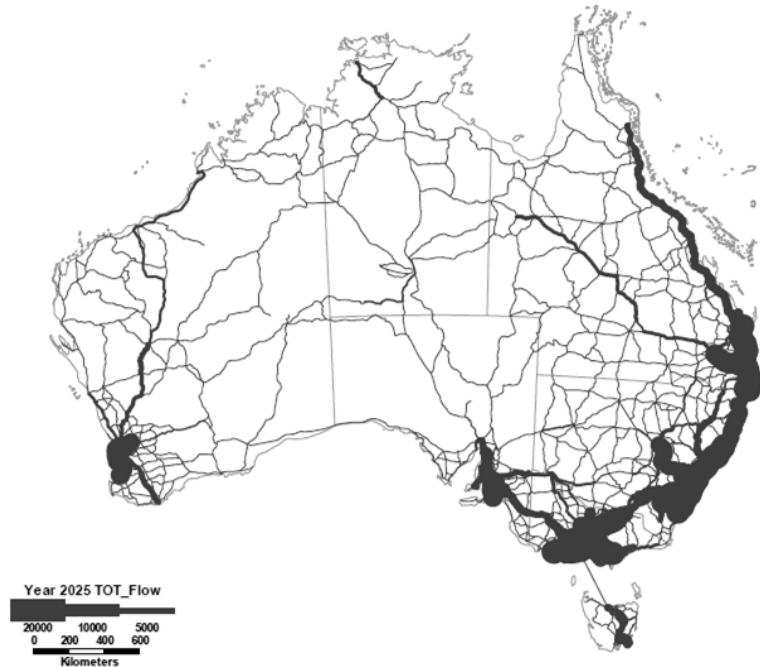


Figure 3: Inter-regional car usage in 2025

Source: Commonwealth of Australia (2006). Figure 3.2.

6. Research Question 4: What is needed to encourage modal switching to sea by trading interests?

García-Menéndez *et al.* (2004) investigated a road versus short sea discrete mode choice in Europe, and found that shippers' choice of short sea transport is more sensitive to changes in road transport prices than to changes in sea transport costs, concluding that modal switching to short sea could be induced by imposing an eco-tax on road transport. In this case, as road transport does not bear its full environmental costs, we see that the substitute for an eco-tax could be provided by a subsidy for switching, possibly explaining the EU's thinking behind its Marco Polo programs.

We know that perceptions are important drivers of the mode choice decision outcome. Paixão and Marlow (2002) concluded that European short sea shipping is perceived as slower and less reliable than truck and the GAO (2005) noted that U.S. shippers are also reluctant to use short sea shipping. On the other hand, Brooks and Trifts (2008) found that Canadian shippers are frustrated with landside congestion on the I-95 corridor and ready to try a marine alternative. Brooks *et al.* (2006) concluded that supply chain interests, e.g., those of the cargo owners, dominate and that the cargo owner interests become those of the carriers seeking customers. A modal switching study is the next research step.

¹⁰ See the U.S. Federal Highway Administration estimate of road congestion in 2035 at: http://www.ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/images/hi_res_jpg/nhsconghghvoltrk2035.jpg.

Conclusions

To date, Australian research into the promise of coastal shipping has had a split personality. On one hand, a significant volume of research has focused on the promise that discontinuing the permit system will necessarily create new business for Australian carriers, without looking at that permit environment from two perspectives—that of the potential operator and that of the cargo owner who pays for the service. Second, there is also a significant body of research that examines the issue of maritime reform but fails to explore whether levelling the playing field for Australian operators with foreign-flag operators will actually generate more shipping activity. As noted in section 5.2, GHG is not a driver for change in shipping policy in Australia.

While interviews and the published studies reviewed have provided an appreciation of the issues, what has been missing from the Australian research to date—with the exception of preliminary efforts by Commonwealth of Australia (2006); Meyrick and Associates (2007) and BITRE (2009c)—is a closer examination of the potential to generate more traffic from road corridors. Also missing is any empirical evidence on modal choice and allocation to mode decisions by cargo interests. It is here that the greatest contribution of future research may be made.

We conclude from the above evaluation above that there are few corridors on which coastal shipping might compete effectively against rail or road operations. Taking a page from the MariNova (2005) study of short sea versus rail, and the low volume currently travelling by road, we agree with the Commonwealth of Australia (2006) conclusion that the Perth–Adelaide corridor will likely be dominated by rail intermodal, but we do not dismiss this corridor without a modal switching study. Future modal-shifting studies should focus efforts on the Melbourne–Brisbane, the Sydney–Adelaide and Townsville–Brisbane corridors, because they are long enough and we do not know what service attributes could entice traffic from road or rail.

In Brooks *et al.* (2006), port interest by secondary ports was an issue limiting the expansion of coastal shipping expansion, and by 2008, port capacity was expected to be a problem in future. Port capacity is not an issue in Australia, as Meyrick and Associates (2007:99) concluded that total planned port capacity for containers is adequate to 2020. Interest in serving the coastal market has been confirmed as alive in Australia in the course of this research.

In summary, we see the next steps as having three components. First, undertake a study of those corridors identified in section 3.2 from the perspective of a coastal shipping operator, testing both Australian-flag and foreign-flag options, to determine what a service offering might look like and whether or how it could be made profitable; this requires more detailed port-pair analysis of permit data. Second, because interest by ports in supporting coastal shipping remains unclear, clarification is required; also remaining is the question of rail congestion and access—how much of a competitor is rail for intermodal cargo? The impact of the location of key distribution centres also has not been examined. Third, a mode choice study of cargo interests is needed to identify the key features necessary to induce switching to short sea operations from rail and truck-based competition. At this point, it is relatively safe to conclude that intermodal rail is a serious land-based competitor on the Perth–Adelaide corridor, and possibly by extension on Perth–Melbourne and Perth–Sydney. A closer look at rail on the Melbourne–Sydney–Brisbane corridor would be instructive. A study on inducing switching would also provide the empirical evidence to evaluate regulatory reforms, like tonnage tax.

Finally, conducting a mode choice study would enable a move away from the wholesale acceptance that modes in Australia compete on distance alone, as implied in current research. The Brooks and Trifts (2008) study illustrated that most cargo owners practice risk mitigation and that cargo allocation to differing modes may be part of that strategy. Mode choice is seldom an all-in-one-basket choice. The sharing of cargo across modes, across routes, and/or across operators are accepted practices for many cargo owners. How that allocation occurs between land-based options and coastal shipping options is a missing piece of intelligence needed.

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