Senate Foreign Affairs, Defence and Trade Committee

INQUIRY INTO
NAVAL SHIPBUILDING IN AUSTRALIA

VICTORIAN GOVERNMENT SUBMISSION

April 2006

State Government Victoria

Contents

CONCLUSIONS OF THIS SUBMISSION

Constructing major warships in Australia has many benefits including:

- **effecting a more efficient naval repair and maintenance capability;**
- **contributing to the achievement of the strategic defence objective of self-reliance; and**
- **significant flow-on benefits to the wider economy and the community.**

These benefits support decisions to build major warships in Australia even where costs of acquisition may be lower overseas. A public value approach is recommended as a superior framework for making procurement decisions.

To maximise the effectiveness and efficiency of in-country construction, and to ensure that Australian industry is sustainable at a level consistent with self-reliance, the Commonwealth must take a strategic approach to development of the industry, particularly in the next decade where the construction workload is lower than in the recent past.

Strategic actions include better planning and management of demand and assisting local shipbuilders to tap into export markets.

Overview

The Royal Australian Navy (RAN) has played a key role in the defence of Australia since its establishment in 1911. The current strategic posture suggests that it will continue to do so for the foreseeable future.

Australia's naval shipbuilding and repair (NSR) sector has emerged over the past two decades to be a competitive industry able to deliver Defence's needs to a world class standard. However, the future of Australia's NSR sector cannot be left to chance. As the dominant customer shaping the direction of the sector, Defence must take account of future industry development if Australia is to retain an efficient and effective self-reliant industry.

The Committee's terms of reference draw attention to some particular aspects of shipbuilding activity. This submission provides analysis and discussion relevant to each of these.

The Australian industrial base presently has the capacity to construct large naval vessels. However, the sustainability of this capability over the long term depends on the overall workload in the NSR sector comprising ship construction, component manufacture and through life support. A holistic approach is needed to ensure that the sector as a whole is sustainable in the future. Current Defence demand for shipbuilding activities over the next decade is likely to jeopardise industry sustainability, affecting Australia's ability to undertake many activities in an efficient and effective manner. Whether or not Australia's NSR sector can be sustained at a level to ensure self-reliance in warfighting capability is a separate question, but of greater relevance for strategic planning purposes, and is a major theme of this submission.

While not the case in every situation, construction of major vessels in Australia is generally more expensive than construction overseas, because international shipyards benefit from greater economies of scale in activity as well as productivity improvements generated by experiential learning on larger production runs of a particular ship type. However, as pointed out in this submission, the comparative costs of construction is only one factor, and perhaps not even a dominant factor, in making an appropriate decision on where to build Australia's new warships. Whether warships are built in Australia or overseas generates a number of different costs and benefits aside from the cost of actual construction. This submission provides a framework for procurement decisions taking account of these other factors. The result is, even where overseas construction is significantly cheaper than building in-country, the dominance of other public value factors suggests that in-country construction provides a better outcome for the taxpayer.

One of the reasons for this is that in-country construction of warships lowers the costs of repairing, maintaining and refitting warships throughout their useful lives. This is due to familiarity and experience with the warships themselves, resulting in more efficient through life support. It is also due to the increased level of overall NSR activity which increases critical mass in the industry to encourage greater investment in innovation, infrastructure, skills and supply chains, resulting in a more efficient repair and maintenance capability.

Another factor that should be taken into account in procurement decisions is the indirect economic impacts of building major warships in Australia. Compared to buying warships from overseas, in-country construction of major defence platforms generates additional activity throughout the local economy. Some of this additional economic activity is captured in standard economic models that are based on multiplier effects, as local expenditure is spread through the economy through wages and profits. Modelling of the *ANZAC* frigate program suggests that the $5.6 billion construction program generated

between $3 billion and $7.5 billion in additional GDP. But there are additional economic benefits not captured in standard modelling that are also relevant, including the contribution major defence projects make to critical mass for innovation and technology transfer, and the building of skills that translates to an improved productive capacity through the economy. Importantly, the additional economic activity stemming from in-country construction of major warships generates additional taxation revenue for the Commonwealth that would not occur if warships are purchased directly from overseas.

The terms of reference also require the Committee to inquire generally on the scope and opportunity for naval shipbuilding in Australia. This must necessarily involve inquiry into the appropriate development of the NSR sector in Australia and an assessment of self-reliance and sustainability as a whole. While the terms of reference draw some attention to large vessels, it must be recognised that the nature of Australia's NSR sector means that the sector must be considered as a whole if any sensible outcomes are to be achieved. Australia can only construct large vessels effectively if there is a strong NSR sector across the board.

The Victorian Government notes that, since the non-acceptance by the Commonwealth Government of the *Australian Naval Shipbuilding and Repair Sector Strategic Plan*[1], decisions on shipbuilding activity are being made in the absence of an agreed strategic framework or direction. While the previous Minister for Defence posited that there was sufficient NSR workload over the next decade to support *competition for individual projects*, this does not necessarily mean there is sufficient workload to ensure a sustainable industry in the longer term, nor sufficient workload to achieve self-reliance in shipbuilding capability in Australia.

A new approach must urgently be developed that focuses on how to achieve an overall NSR capability that meets the requisite level for self-reliance, ensures stability and sustainability in the sector, and delivers both efficient and effective outcomes for the ADF.

To achieve the objective of a sustainable, self-reliant naval shipbuilding capability, Australia cannot afford to allow the current thin demand to disrupt the longer term development of the sector.

If Australia's capability is to be shaped purely by narrow tendering of individual projects, the sector would be able to deliver a capability that meets the planned Defence acquisition needs, but would be fragile and struggle to respond to a changed strategic environment or unforseen work demands. While tenders for individual projects seek to identify the most efficient option for that particular project, the range of options is limited to the capability at that time, and gives no weight to how the potential for greater efficiency might be achieved over a longer period. A project-by-project approach is likely to see unused capability eroded in the short term, only to be needed again in the future should demand increase. This shrinking/expansion approach compromises the ability to lock in productivity gains on an ongoing basis.

Alternatively, Australia can seek to promote an NSR sector that includes a surge capacity to be able to effectively respond to changing and unplanned needs. An NSR sector with a higher workload can maintain a level of commercial sustainability that will allow step-change improvements in productivity in the longer term. An NSR sector that is able to quickly tap into latent capability, especially a strong skilled workforce and infrastructure, will be critical in achieving self-reliance.

Achieving a sustainable, self-reliant NSR sector requires a national approach. The risks of concentrating industry at single locations have been widely acknowledged. Given Australia's wide distribution of a relatively small population, a self-reliant industry will need to be able to tap into the skills and expertise that are spread around the country.

[1] Defence Materiel Organisation, 2002. Hereafter "NSR Sector Plan".

Victoria currently has the most developed industrial capability in major surface ship construction in Australia, with a highly developed supply chain, infrastructure, and a skilled and experienced workforce. While shipbuilding demand is scheduled to be significantly lower over the next decade compared to the previous decade, there are strategic reasons for Australia maintaining some latent capability. The capability that has developed over the past twenty years in Victoria is a vital element of a national approach to ensuring self-reliance in the future.

The Commonwealth Government must set the right conditions for the NSR sector to evolve and achieve self-reliance on a sustainable basis. As part of developing an agreed NSR Strategy, Defence must determine the appropriate level and nature of national NSR capability that is necessary for self-reliance. Because self-reliance is about the ability for industry to respond to unforseen and unplanned work requirements, a self-reliant industry must be more that just the capacity to deliver the planned defence projects. Defence must create the opportunities for industry to achieve a self-reliant level.

These opportunities are explored in the final chapter of this submission, and include maximising Australian industry involvement in future projects such as the large amphibious ships (LHDs), smoothing Defence demand including bringing forward replacement of the FFGs and ANZACs, a greater sharing of repair and maintenance work, and actively pursuing export markets.

One option recommended in this submission involves construction of warships in Australia and used by the Navy for up to 15 years, and then sold on the second-hand market before the need for costly refits. There is an established second-hand market for such ships, which is expected to grow in the future in our region. These savings (avoiding the cost of expensive refits and generating revenue from sales) would be used to facilitate a continuous cycle of construction of new warships for the Navy, which could improve value for money, ensure that the Navy's fleet is state of the art, and provide industry with a consistent work level that would encourage greater investment in infrastructure, skills and innovation.

This submission draws on the valuable research and analysis that has been done in recent years about Australia's NSR future, in particular the NSR Sector Plan, the Australian Strategic Policy Institute's (ASPI) *Setting a Course for Australia's Naval Shipbuilding and Repair Industry* (2002), and the more recent work by the Allen Consulting Group on the *Future of Naval Shipbuilding in Australia: Choices and Strategies* (May 2005). However, the conclusions of these publications must now be considered in light of the Commonwealth's decision to base the Air Warfare Destroyer (AWD) project in South Australia, leaving little new work for the existing shipyards. This submission considers the implications of this decision.

The NSR sector is introduced in Chapter 1. Chapter 2 considers why a local NSR capability is important to Australia's strategic defence needs and Chapter 3 considers how to achieve this strategic need at best value for money. Chapter 4 focuses directly on the wider economic benefits of undertaking shipbuilding activities in Australia. The remainder of the submission focuses on longer term development of the NSR sector from an efficiency and effectiveness point of view: Chapter 5 canvasses NSR demand and supply going forward, Chapter 6 assesses the likely sustainability of the NSR sector, and Chapter 7 recommends a number of actions that would allow the Commonwealth to achieve greater value from the local NSR sector.

1 The naval shipbuilding and repair industry

Key points:

- **Naval shipbuilding is complex and draws on many diverse activities across the economy. It is more than assembling steel, with the greatest value of modern warships being in design and systems integration. Naval shipbuilding is a high-technology mix of advanced manufacturing and services.**
- **Australia has had mixed experiences with constructing major warships in-country, although the past two decades have seen Australian shipbuilders emerge as very capable and productive businesses.**
- **Construction of warships and subsequent through life support are not separate activities. Construction of warships in-country has provided significant advantages in the delivery of through life support.**

The nature of the NSR sector

Modern naval construction is comprised of two key elements, namely ship design and production. Both of these elements are required to develop and deliver Navy's required capabilities. Major ship construction requires access to specialised facilities and a workforce which possesses unique design, systems engineering, platform integration and production skill-sets.

Basic production of naval platforms spans many activities that draw on the capabilities of Australia's traditionally diverse manufacturing base, from steel fabrication through to product assembly.

Large naval ships are not just assembled steel. Shipbuilding is a challenging exercise in design, engineering and logistics. Modern warships are integrated platforms incorporating advanced design and systems. The presence in Australia of a number of subsidiaries of global defence electronics players has helped to develop capability in defence systems. In parallel with similar successes in the automotive sector, Australian shipbuilders have demonstrated important creative skills in ship design and naval architecture.

Design constitutes a major part of any naval ship construction project. While significant Australian naval ships are always based on overseas designs, considerable work is required to adapt the designs to Australian requirements. The ANZAC frigates were extensively modified versions of the MEKO 200 design and Tenix in liaison with Blohm+Voss played a very important role in producing detailed designs. The AWDs will be subject to substantial detailed design work in Australia.

Shipbuilders such as Tenix do not succeed in export markets without expertise in design, and the shipbuilding work being done at Williamstown for the New Zealand Navy's *Project Protector* requires a major design capability. Currently ASC has retained a design team with a strong expertise in submarines, and should develop a strong design capability in surface ships under the AWD project.

In shipbuilding, as in other manufacturing industries such as motor vehicles, Australian expertise is being increasingly recognised at the creative, high end of the value chain.

Australia also has strengths in high end production capabilities. In March 2005, John Dikkenberg noted that "The Australian [naval shipbuilding] industry is lean, produces ships of exceptional quality and is progressively being seen as a world leader in innovation."[2]

The two Australian shipbuilders that have had significant commercial success globally, Austal and Incat, place a great deal of emphasis on design, which is an important feature of their value propositions. Austal, for example, maintains a design team of around 200 at its Henderson facility, including a large number of naval architects.

Systems account for the greatest share of a modern warship's overall cost[3]. The ability to maintain, upgrade and repair naval systems is an integral element in achieving self-reliance. In some respects this is becoming more important these days as naval systems become ever more complex, although the adoption of open architecture systems also increases accessibility.

As with all manufacturing industries supplying an advanced finished product, naval shipbuilding sits at the end of an extensive supply chain. However, most of the companies in the supply chain are not exclusively engaged in the naval shipbuilding industry. Many supply products, such as pipes, valves and cables, which are the same as or derived from the goods they regularly supply to other commercial activities. Nevertheless, the existence of a chain of reliable and efficient suppliers is a critical element in ultimately determining a shipbuilder's capability.

In the case of the *ANZAC* ships, a very extensive supply chain was developed. According to a Defence report[4], the *ANZAC* ship project is estimated to have involved over 1300 companies in Australia and New Zealand. Over 90 per cent of these were small and medium sized businesses. Companies in Victoria, where the ships were assembled, received over 75 per cent of the value of Australian sub-contracts.

Melbourne is home to DSTO's Maritime Platform Division, Australia's centre for naval platform R&D. The Division works on construction materials and processes, propulsion systems, vulnerability and survivability, fatigue and corrosion monitoring, signature management and structural acoustics. The Division has a major role to play in the AWD project and will carry out trade studies and technology studies to mitigate and manage risk. It will undertake AWD modelling and simulation, field and laboratory trialling and paper studies.

Although the skills associated with design/engineering and production address different functions in a naval shipbuilding program, the two activities are inextricably linked. Both are necessary to meet Navy's requirements and are likely to require collocation to mitigate the risks inherent in highly complex, major naval programs.

History of Australian naval shipbuilding and repair

Australia's naval shipbuilding industry has developed in the last 20 years from a marginal, uncompetitive activity to one with a successful record of performance and the demonstrated ability to compete internationally. While some of the participants have demonstrated an ability to supplement their local defence workload with exports, demand from the ADF is likely to continue to be the major driver of the national industry in the future.

In the years leading up to World War 1, Australia was one of the first nations in the world to acquire a dreadnought capital ship, the battlecruiser *HMAS Australia*. The Australian

[2] John Dikkenberg, "What future for Australian naval exports?" *Asia-Pacific Defence Reporter*, March 2005, page 54.
[3] Electronics systems can account for up to 80% of the total cost of some modern platforms: Dept. of Defence, *The Australian Defence Electronics Sector Strategic Plan*, 2002.
[4] Dept. of Defence, *HMAS ANZAC: Australia's Defence and Industry Partnership*, 1997.

Naval Fleet including submarines were all built in the United Kingdom. Whilst Government-owned shipyards at Cockatoo Island in Sydney and Williamstown in Melbourne constructed cruisers, sloops and auxiliaries between world wars, its destroyers, heavy cruisers and modern light cruisers were again sourced from the United Kingdom.

Australian shipyards were particularly active in ship construction and repair in World War 2, with many US naval units operating out of Australia and the British Pacific Fleet based in Sydney in 1944-45. Three destroyers, eight frigates and fifty corvettes were built for the RAN in Australia during World War 2.

In the post-war period, there was a policy change to build most of the Navy's warships in Australia. A total of eleven destroyer/destroyer escorts and four frigates were built in the Government-owned shipyards during post World War 2 years and into the 1960s as well as major rebuilds such as the conversion of four 'Q' class WW2 destroyers into fast anti-submarine frigates. As ASPI has pointed out[5], the three *Daring* class destroyers built in the late 1950's were delivered significantly over time and over budget. The six *River* class destroyer escorts built in the 1960s and early 1970s suffered a three-fold cost escalation during the project.

Because of this poor experience, Australia changed policy. In the 1960s, Australia purchased three guided missile destroyers from the US.

A project to continue naval ship building in Australia – the construction of three light guided missile destroyers in Australian Government shipyards at Williamstown and Cockatoo was cancelled in the early 1970s. The then latest evidence of the problems with Australian shipyards was provided by experience with ship upgrades of existing warships including the rebuild of two *Daring* Class destroyers. Subsequently four FFG frigates were ordered from the US.

These decisions were based on continuing problems in local naval ship building and refitting - the shipyards continued to suffer from poor productivity, serious cost over-runs, disruptive industrial relations, defensive management and consequential under investment. Poor performance was a catalyst for the privatisation of the Government's shipyards.

In the mid 1980s, policy was redirected again, with a decision to acquire two more FFGs, built in the then Transfield-operated shipyard at Williamstown where significant reforms and investment had been undertaken – all part of a major privatisation process.

Since the mid-1980s, there has been a renaissance in naval shipbuilding in Australia. Two projects – the *ANZAC* frigates and the *Collins* submarines – have been worth over $12 billion over the past two decades. As a consequence, the naval shipbuilding industry is dominated by two companies.

First, Tenix has developed a strong and internationally competitive position in building substantial and complex surface combatants at Williamstown and has been successful in the highly competitive export markets for warships. The Allen Consulting Group wrote[6]:

> "Tenix is a relatively recent competitor in the global naval shipbuilding industry. Over the last two decades it has completed two FFGs and is in the final stages of the successful program to construct ten ANZAC class frigates in Australia. Tenix's record in delivering these ships on time and on budget, with all systems fully operational, is an excellent one even by global standards. The Company has also made a significant impact in highly competitive export markets, with its recent success in winning Project Protector for New Zealand being of particular note."

[5] ASPI, *Setting a course for Australia's naval shipbuilding and repair industry*, 2002, page 16.
[6] ACG, *Future of Naval Shipbuilding in Australia: Choices and Strategies*, May 2005, page 41.

Second, ASC has delivered a sophisticated class of conventional submarines, for which the RAN has parent navy responsibilities. ASC, through ASC Shipbuilding's participation in the AWD Alliance, will also expand its capabilities to include construction of surface warships with three AWDs to be built over the next decade.

2 Strategic importance of Australian naval shipbuilding and repair

Key points:

- **In order to achieve Australia's defence objectives, Australian industry must be capable of supporting our naval fleet in times of conflict and operational use.**
- **The effectiveness of self-reliance is determined by both the level of shipbuilding activity and the ability of the industry to be responsive, flexible, and quickly mobilise skills, suppliers and infrastructure in periods of urgent unplanned work. Some latent capacity is required to ensure this effectiveness.**

Self-reliance is a necessary strategic objective

Australia is geographically distant from potential suppliers and repairers of warships. Irrespective of this distance, during war time or high levels of operational use, access to overseas suppliers could be limited. Therefore, the credibility of Australia's current defence posture relies on the ability of Australian industry to maintain defence assets in a state of operational readiness.

This strategic imperative has been articulated in terms of the policy objective of "self-reliance". Self-reliance means the capability to be battle ready, and sustain defence assets during operations. In the modern setting, operations extend beyond traditional war situations and span a range of activities including broader security, humanitarian or civil responses.

One major objective of self-reliance is to allow battle damage to defence platforms, such as warships, to be repaired in Australia in a war situation and returned to front line service as expeditiously as possible[7].

Even outside of conflict situations, maintaining Navy capability will require local industry to perform certain activities. As ASPI points out[8], "there is a high priority to be able to repair, maintain and upgrade vessels in-country because it is simply impractical to do otherwise."

The Australian NSR sector is a key element of Australia's defence industry base and performs an essential role in relation to the support, repair, maintenance, upgrade and construction of Navy's surface ships and submarines. The Commonwealth Government has indicated[9] that a continued in-country capability to perform these functions is critical (support, maintenance, upgrade) and/or desirable (construction) to achieving Australia's Defence self-reliance posture as it relates to the delivery and support of Navy's capability requirements.

In *Defence 2000: Our Future Defence Force*, the Commonwealth Government stated its objective to have a sustainable and competitive defence industry base, with efficient, innovative and durable industries, able to support a technologically advanced defence force.

[7] ACG, op cit, page 19.
[8] ASPI (2002), op cit, Chapter 2.
[9] *Defence 2000: Our Future Defence Force*

The Defence Materiel Organisation (DMO) also noted in the NSR Sector Plan that the Australian naval shipbuilding and repair sector is of strategic importance, as self-reliance cannot be assured unless the capabilities exist in Australian industry to maintain, modify, upgrade and repair our warships. The DMO states[10] that "as the facilities, equipment and skills needed to build new warships could be vitally important if our strategic circumstances were to deteriorate, these are important long-term strategic assets."

Self-reliance is fundamentally about contingency planning and risk management. It is about sustaining a domestic industry capability at a certain level for the possible scenario that other sources are not able to be used to maintain our desired defence capability. The strategic questions are: what are the industrial elements necessary for self-reliance?; and at what level should this capability be sustained?

It has been argued that construction of warships per se is not a necessary element of self-reliance[11], as it is generally impractical to consider the need to acquire new warships during a time of conflict, given long lead times in production and delivery.

The ability to repair, and perform major upgrades and refits, is part of self-reliance. Australia needs the ability to maintain warfighting capability during conflict, and Australia's cost- and time-prohibitive distance from international repair locations, as well as congestion or restricted access for repairs during periods of conflict, makes in-country support the only practical solution.

It is not sensible to focus only on the *necessary* elements of self-reliance. Defence activities, like all activities of governments, are also subject to the overriding requirement to achieve value for the taxpayer. The Defence strategic objective must be to sustain an industry base at best overall value, at a level which can deliver the elements necessary for self-reliance. The next chapter discusses how construction of warships in-country can reduce the costs of subsequent through life support. In other words, in assessing procurement options, Defence must recognise both the value attributable to the construction itself, as well as the value attributable to achieving self-reliance.

The characteristics of a self-reliant industry

Self-reliance is also about *how* the industry responds to emerging needs. Before any assessment can be made about whether or not Australia has achieved self-reliance in supporting its naval fleet, the desired characteristics of a self-reliant sector must be articulated.

Remembering that the imperative for self-reliance is contingency planning (ie ensuring a capability exists in times of conflict, tension or civil need), a self-reliant industry must be more than just enough capacity to meet planned demand schedules. Like an N-puzzle[12], the industry must have some excess capacity that can ensure the industry can logistically respond to urgent needs. Shipyards full of half-completed ships may have difficulties in undertaking major repair work promptly.

A self-reliant industry must be able to be quickly activated for urgent and unplanned needs. This includes the ability to tap into skilled workers and suppliers. Given Australia's spread of industry, it is likely that a self-reliant NSR sector will require a similar national distribution. As skilled workers become scarcer in the wider economy, the effectiveness of NSR self-reliance will be critically linked to ensuring capability exists where there is sufficient depth of readily available skilled labour.

[10] NSR Sector Plan, page 3.
[11] For example, ASPI (2002) op cit.
[12] The popular puzzle comprising sliding squares within a frame to reach some specified outcome. The N-puzzle is a classical problem for modelling algorithms involving heuristics. It is only workable because one of the squares is missing, allowing the other squares to be sequentially moved in order to reach an outcome.

3 Economics of naval shipbuilding and repair

Key points:

- **While self-reliance is narrowly about the capability to repair and support operational warships, this is likely to be done at better value for money where industry is able to leverage off construction work to provide critical mass for development of expertise and skills, and investment in infrastructure and innovation.**
- **Constructing warships in-country has flow on advantages in the delivery of through life support to the ships.**
- **Whole-of-life costs must be considered in evaluating acquisition options.**

Evaluating the costs and benefits

The Commonwealth Government's primary aim in developing Australia's naval shipbuilding industry should be to maximise the cost effective delivery of naval combat capability. That means ships and crews are made ready to go to sea, with systems and weapons ready for operational use, and the repair and maintenance capacity to keep them that way[13].

Local procurement of significant warships will often (but not always!) cost more than acquiring an equivalent ship "off the shelf" from an overseas supplier.[14] Overseas shipyards have a scale advantage over Australian producers and, where the parent navy is acquiring a substantial number of ships of the same class, will benefit from significant learnings in construction.

The development of Australia's naval shipbuilding capability has been driven by major defence contracts over the past two decades. The changed philosophy that led to this local procurement policy was not based on a naïve desire to promote local industry and jobs, but was directed towards developing Australian industry capability in pursuit of the defence objective of self-reliance. The logic was that if local procurement required the acceptance of only a small cost premium, this was worth paying if in return local industry developed the capability to maintain and repair the increasingly complex platforms and systems that comprise Australia's naval assets.

ASPI argues[15]:

> "It makes sense to [build warships in Australia] if the premium is not too high, because there are economic benefits and some advantages in developing the skills for repair and maintenance."

The local procurement programs have not resulted in substantial cost premia[16]. In return, the industry has developed a high level of capability and two players in particular, Tenix and Austal, have shown an ability to compete aggressively in global markets, reflecting their internationally competitive productivity and quality.

[13] ASPI (2002), op cit.
[14] ACG, op cit, page 19.
[15] ASPI (2002), op cit.
[16] The cost premium most frequently quoted for the *ANZACs* is of the order of 3 to 3.5 percent: ACG, op cit, page 45.

While the monetary saving of overseas acquisition for single projects is often obvious to the Defence budget, it is virtually impossible to put a dollar value on the strategic benefit associated with Australia having a defence-capable domestic industry.

However, the focus on measuring a "cost premium" for local construction is somewhat misleading. While such quantification is descriptive of a difference in purchase costs, a whole-of-life cost comparison is more relevant for achieving defence's strategic capability against value for money considerations. Little attention, and in fact no published study, has measured how whole-of-life costs vary between overseas and local production.

There are compelling reasons why whole-of-life costs might be lower where naval platforms are constructed in Australia. The DMO's analysis[17] of the industry found that construction of naval vessels provides for many of the capabilities and skill-sets required to ensure the effective whole-of-life support of Navy's capabilities.

There is a strong connection between the capabilities and skills required for naval shipbuilding and for upgrade, repair and maintenance. For example, the skills that have been built up during the construction of the *ANZAC* frigates are essential to the whole-of-life support of those platforms and cannot be easily replaced once lost.

The DMO has recently pointed out[18] that success as a shipbuilder undoubtedly provides a competitive advantage in the repair and maintenance activities associated with the whole-of-life support required for that class of vessel. Specifically, building a ship based on a whole-of-life philosophy establishes an effective configuration management and integrated logistics support regime from the outset. It also establishes capabilities that are essential for effective support in the sub-contractors responsible for ship sub-systems through the pre-existence of supplier networks and working arrangements.

A recent study of the *ANZAC* Frigate program[19] also points to the advantages of constructing naval ships in-country on through life support capabilities. The study pointed out that Australian industry involvement in major defence projects aims to cost-effectively achieve independence in operations and a national integrity to support a key security capability.

Navy follows the standard practice of complex upgrades and major modifications to its major surface ships throughout their lives. The cost-effectiveness of major upgrades (which can approach costs similar to the initial acquisition) is a critical consideration. Such upgrades require from industry many of the higher level skill-sets found in naval construction. Refits in particular require nearly all the capabilities of original construction.

Australia faces its largest cost disadvantage in the areas of hull construction and steel fabrication. This has led to a financially attractive proposition that involves the basic hull of a warship being constructed overseas, and then floated to and fitted out in Australia. This proposition should best be evaluated against the implications for the cost of repairs to damaged hulls. Were all major warships procured in this way, it is unlikely that local industry would maintain a capability in this area, and the result would be considerably higher costs of repairing damaged hulls. The Allen Consulting Group point out that building the LHDs locally would result in the benefit that the hulls and many of the systems could readily be repaired in country[20].

In short, constructing warships generates the local skills, knowledge and experiential productivity improvements to undertake subsequent repair, maintenance and upgrades more efficiently. The additional workload to the industry from ship construction also

[17] NSR Sector Plan, page 33.
[18] NSR Sector Plan, pp 51-52.
[19] Tasman Asia Pacific, *Impact of Major Defence Projects: A case study of the ANZAC ship project*, February 2000.
[20] ACG, op cit, page 46.

enables a more sustainable industry sector that is then better able to maintain its capability from a greater incentive for private investment in skills and infrastructure. Investors are unlikely to commit funds to maintaining shipyards that have only a repair and maintenance function[21].

Taking a whole-of-life approach to initial procurement decisions is the only sensible way to decide where to build new ships. The DMO has pointed out[22]:

> "Options for future major naval ships need to be considered in terms of their relative merits in delivering capability, as well as leveraging the maximum benefits for the investment made. This may be measured in terms of sustaining critical skills and capabilities, reducing the cost of through life support and achieving best value for money."

This quote alludes to other sources of advantage from local construction of warships. These can be summarised as:

- Lower costs of modification for Australia-specific needs – imported ships must often be modified to be ready for Australia's defence needs, including fit-out of systems that form part of Australia's wider integration of defence platforms. Local construction allows these modifications to be done during the construction phase itself, reducing overall costs.
- Lower repair and maintenance costs across the entire Navy Fleet – while the discussion above draws the rather obvious link between local construction and lower servicing costs for those particular ships, it is also likely that construction activity of any particular type of ship to some degree lifts the generic shipbuilding and repair capability in the domestic industry that will allow more efficient servicing of all warships.
- Returns to investments beyond a single project – undertaking major projects usually requires investment in skills, infrastructure and technologies. These accrued capabilities do not end with the project, but become embedded in the local industry and are available to be exploited for future projects. Hence, the return on investment from a single project should include the likelihood that these assets will be available for later projects. As the industry innovates through major projects, it is able to become more efficient, lowering the cost of future acquisitions. Workloads from major projects also provide critical mass for local producers to expand into export markets – once competing in global markets on the back of local projects, these producers step on to an ongoing improvement path. All of these effects bolster the productivity of our local industry, which feeds back into better value for Defence contracts in the future, which would not be possible without the critical mass of constructing major platforms here.
- Wider economic benefits from local construction vis-à-vis offshore procurement, which are examined in the next chapter.

These factors suggest that evaluating merely acquisition costs of a new warship is inappropriate for making decisions on achieving value for money to the community in relation to Defence's strategic needs. All of these other factors must be taken into account. Appendix A recommends a framework for evaluating procurement options incorporating these other benefits.

[21] ACG, op cit, page 20.
[22] NSR Sector Plan, page 44.

What about self-reliance?

So far, this chapter has not mentioned self-reliance as a specific factor in making decisions on procurement options. But Australia has settled on a policy of self-reliance that must be considered in all procurement planning. Therefore, in any evaluation of costs and benefits, the value attributed to achieving self-reliance must be included in the calculation.

The value attributed to self-reliance in a given project will depend on the project itself, and how it fits with contextual issues, such as other naval projects being undertaken or planned. Self-reliance becomes a critical factor in procurement decisions if the evaluation of all other costs and benefits would lead to an outcome that leaves the local industry unable to sustain the capabilities necessary for self-reliance on a commercial basis.

This may arise in two scenarios. Firstly, where a full evaluation of the other costs and benefits results in a preference for offshore purchasing, leaving the local industry unable to sustain the capabilities required for self-reliance. Or secondly, if the same evaluation results in in-country construction, but total demand is below that level required to sustain local capability for self-reliance.

Whether or not the Australian shipbuilding and repair sector will have sufficient workload to ensure self-reliance is considered in Chapter 5. For now it suffices to examine the two situations as hypotheticals.

Where an evaluation of costs and benefits (except self-reliance) results in offshore procurement, leaving local industry unsustainable, Defence will need to balance this outcome against the value it places on self-reliance. Because the reduced level of work for the local industry would not naturally sustain an industry base, the capacity for self-reliance in repair and maintenance would be continually under increased risk of deterioration and would demand escalating costs to maintain. These increasing costs would need to be assessed against the value that Defence places on self-reliance. If self-reliance is an objective to be met at any cost, then prices would be ignored altogether, and construction contracts awarded to Australian firms up to a point where the volume of shipbuilding work would guarantee self-reliance. Once this volume of local shipbuilding work was ensured, any additional shipbuilding work would be evaluated on price.

Where a cost-benefit consideration results in local construction, but the workload is still insufficient to commercially sustain local capacity for self-reliance, additional measures would be necessary. In the simple case, Defence would need to pay a premium to maintain a latent local capability ready for when self-reliance was needed – ie to maintain skills and infrastructure for possible future use even though there was no immediate need for them to exist. In order to maintain skills, actual shipbuilding work would need to be done.

Given the need for some workload to sustain skills, and Defence paying some premium for preserving this capability, it would be a logical conclusion that Defence use this scenario to actually deliver some product it can use to supplement Navy's strategic capability. Industry capability "only exists if it is being used. The ability to deliver naval programs in the future depends on achieving continuity in the workload between now and then."[23] Creating additional workload would be needed to ensure self-reliance, but also create value in terms of boosting Defence's immediate assets. Some practical options for increasing the naval shipbuilding and repair workload are discussed in later chapters.

The framework for evaluation recommended at Appendix A incorporates the value attributable to self-reliance.

[23] Vic Emery, Managing Director BAE Systems shipbuilding, "An Industry Perspective on UK Naval Construction", Address to Naval Construction in the 21st Century Conference, October 2004.

4 Economic impacts of naval shipbuilding

Key points:

- **A study of the ANZAC frigate project found that, at a minimum estimate, the $5.6 billion project led to increased GDP of $3 billion in the Australian economy. This would not have occurred if the ships had been purchased from overseas.**
- **The actual benefit to the economy is probably greater. Standard modelling excludes more intangible, but often more important, impacts such as technology and skill spillovers to other industries, and achieving critical mass for increased investment.**
- **Major defence projects lead productivity improvements in industry, and as a legacy after the project, contribute to the innovative capability of the Australian economy through industry's linkages to defence projects.**
- **The wider economic benefits to the public (who ultimately pay for the ships) should be taken into account when the Commonwealth makes decisions on buying new warships.**

Undertaking naval shipbuilding projects has implications for the wider economy. Naval shipbuilding draws in resources from many areas of the economy, and in exchange generates incomes for businesses and workers that can stimulate new consumption and investment in the wider economy. However, little empirical analysis exists that quantifies the full economic impacts of naval shipbuilding.

Estimated economic benefits of the ANZAC Frigate program

In February 2000, Tasman Asia Pacific completed a study[24] on the economic impacts of the *ANZAC* frigate program.

The *ANZAC* frigate program, at $5.6 billion in 1999 dollars, was the largest single defence contract ever awarded in Australia. The program was one of many projects subject to Defence's Australian Industry Involvement (AII) program.

It was estimated that the *ANZAC* program called on the resources of over 1,300 Australian and New Zealand companies[25]. Over the life of the project, it was estimated that the value added from Australian and New Zealand companies represented over 72 per cent ($4 billion) of the contract value.

The Tasman Asia Pacific study used firstly an input-output multiplier model to estimate the benefits accruing to the wider economy as a result of the injection into the Australian economy from the shipbuilding project. Multiplier analysis can be used for predicting the total impact on all industries of the change in demand for the output of a particular industry. For example, an industry's output multiplier estimates the total value of production by all industries required to satisfy an extra unit of demand for that industry's output. Special input-output databases were constructed for the *ANZAC* program.

[24] *Impact of Major Defence Projects: A Case Study of the ANZAC Ship Project*, Final Report February 2000, prepared for the Australian Industry Group Defence Council.
[25] Dept of Defence (1997), op cit.

The input-output multiplier analysis concluded that each additional $100 million that the Australian Government spends in Australia (vis-à-vis offshore purchases) on a major defence project like the *ANZAC* frigates generates $195 million in additional national output, and over 1,000 Australian jobs per annum. For the ANZAC project value of $5.6 billion, this would imply additional national output of over $10 billion (1999 dollars) during the construction phase, and around 57,000 new jobs.

However, input-output multiplier analysis is widely regarded as inadequate for such meaningful measurement, as the assumptions underlying the construction of the multipliers ignores many, often larger, second round effects through the economy, particularly where there is competition for factors of production causing price adjustments. Bare input-output estimates are therefore generally considered to be upper limits of economic impacts.

In light of this, the Tasman Asia Pacific study also provided estimates of economic impacts of the *ANZAC* project using a general equilibrium model of the economy, which was designed to capture second–round effects[26]. General equilibrium models mimic the working of the economy through a system of interdependent behavioural and accounting equations. General equilibrium analysis is a well-established analytical tool for examining alternative policy scenarios. Unlike the input-output approach, the general equilibrium approach takes into account constraints that can exist in an economy – for example economic impacts may be constrained by access to capital or access to a pool of qualified labour.

Using the general equilibrium approach, the Tasman Asia Pacific study found that the indirect economic benefits of constructing the ten frigates in Australia rather than purchasing similar vessels from overseas was:

- an additional $200m to $500m in annual GDP – over the fifteen-year construction phase of the program, this would mean GDP was increased by a minimum of $3 billion up to $7.5 billion;
- an additional $147m to $300m in annual consumption – or $2.2 to $4.5 billion over the construction phase of the program; and
- an additional 7,850 full time equivalent jobs (beyond the employment directly involved in the ship construction).

The higher estimates reflect a case where there is excess capacity in the economy (ie unemployment), while the lower estimates indicate a case where there is full employment in the economy. As resources become scarcer, a large project puts upward pressure on the price on resources, causing a reallocation of resources through the economy and reducing the economic value of the project.

It is noted that the *ANZAC* project began at a time of relatively high unemployment with restructuring in many industries, meaning that many excess resources in the local economy were able to be utilised in the project. But even in a scenario of full employment, the Tasman Asia Pacific study finds significant economic benefit generated by the project.

Are the ANZAC estimates translatable to future projects?

One might question whether these estimates for the *ANZAC* program are relevant for future major defence projects. The general equilibrium model used in the Tasman Asia

[26] The study uses the STATE model – a multi-sector computable general equilibrium model of the Australia economy designed specifically for the purpose of measuring economic impacts of large projects. It is an extended version of the ORANI model, and draws on model development work by the (then) Industry Commission and the Centre for International Economics.

Pacific study showed that as excess capacity in the economy is smaller, the economic benefits of in-country defence contracts are also smaller (although still significant).

The general equilibrium analysis assumes not only full employment, but also fully mobile labour, flexible capital stocks and market clearing prices. So what happens when there are labour shortages and other rigidities in the local economy?

Prima facie, according to how the model is constructed, this would further reduce the economic benefit. But it should be noted that many rigidities in the economy, which stifle the realisation of economic benefits, have further reduced since the Tasman Asia Pacific study, which would theoretically allow greater economic gains to be realised.

But these characteristics do lead to one interesting conclusion: that when constructing major defence projects within Australia, choosing a location that has a more dynamic economic base and relatively greater availability of resources for the project will maximise the overall economic benefits stemming from the project for the nation as a whole.

Therefore, the lower estimates from the ANZAC case study should continue to be regarded as minimum estimates for similar major defence projects in the future.

And this estimate should truly be regarded as a *minimum* estimate. The general equilibrium model used in the ANZAC study, because of the nature of such modelling, assumed continuity of economic relationships between shipbuilding and the wider economy. But in reality, such a major defence project can induce step-change improvements to the wider community that are not able to be captured in a general equilibrium model.

Economic benefits not captured by the model include:

- technology spillovers to other industries as a direct result of activities under the project;
- increases in investment, innovation and export which only begin to emerge once the major defence project causes the industry to pass a particular critical mass of scale; and
- efficiency improvements on the project itself, and the investment in skills and knowledge that may provide value beyond the project itself, which remain embedded in the industry until the next major defence project.

Major defence projects lead productivity improvements in industry, and as a legacy after the project, contribute to the innovative capability of the Australian economy through industry's linkages to defence projects. While economic modelling assumes that productivity remains constant, the reality is that major defence projects lead to technology, knowledge and process spillovers that build greater innovative capacity in the industry and flow-on productivity improvements to the rest of the economy.

For obvious reasons, these types of benefits are very hard to quantify for any given project, although their existence should not be ignored when establishing estimates for economic impacts.

Are wider economic benefits relevant for Defence procurement decisions?

Some might argue that wider economic impacts should be ignored in government procurement activities.

It should be remembered that all government decisions (such as increasing defence capability) are in the end to benefit the community, and the money for purchases comes from the community. The purchase should be made to deliver the best outcome for the

community as a whole. To reflect the real costs and benefits of such projects, a whole-of-government approach is required, not a whole-of-Defence approach.

Such an approach is reflected in Appendix A. Interestingly, when it is recognised that the public derives additional value from constructing defence projects in-country, there is a stronger case for increasing Defence's overall capability budget.

But even if only taken from a narrow budgeting point of view, the additional economic impacts generated from such a large defence project have obvious implications in terms of higher individual and company tax revenue accruing to the Commonwealth Government that would not occur where the purchase is sourced offshore. This additional revenue partially offsets the funding need for the project itself. Based on the above estimates for the economic impacts of the *ANZAC* project, the additional Commonwealth revenue generated from undertaking the *ANZAC* project in-country could have been as high as $1-2 billion over the life of the construction program (compared with the $5.6 billion cost of the project itself).

Unfortunately, Defence is not allowed to count this generated revenue as a 'genuine saving' for Commonwealth budget management purposes. A more holistic approach is needed to measuring costs and benefits from budget decisions.

Appendix A provides a summary framework for how warship procurement decisions should be made given the existence of economic benefits beyond the project itself.

5 Demand and supply in the NSR sector

Key points:

- **Demand for local NSR capabilities is likely to be lower over the coming decade than in the recent past.**
- **Australian industry capability is at a high level, with present capacity able to undertake major shipbuilding projects in-country.**

This chapter analyses the prospective demand for and supply of naval shipbuilding capability in Australia in the medium and longer term. Judgements about the sustainability of the NSR sector are considered in the next chapter.

Naval Shipbuilding Demand

New capital acquisition by Defence

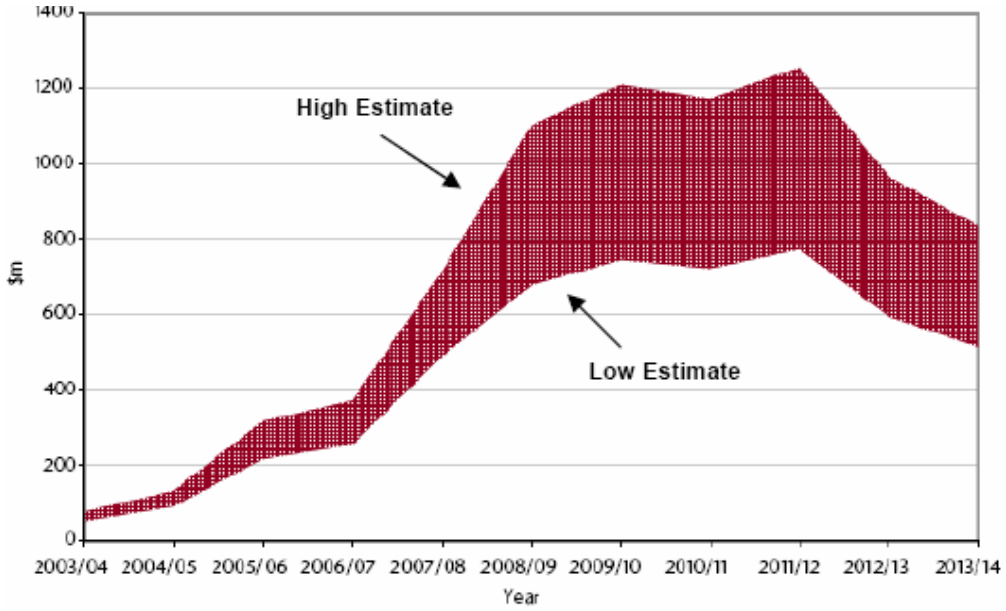
While a number of shipbuilders have demonstrated an ability to compete on the world stage, the high level of barriers to export of warships means that new platform acquisitions by Australian Defence will be the dominant element of naval shipbuilding demand in the foreseeable future.

Defence naval expenditure is expected to be worth more than $8 billion over the next decade or so[27], although this continues an historical lumpiness in distribution (see Figure 1). As Firecone/CRA point out[28]:

> "The Department of Defence's Defence Capability Plan (DCP) covers the expected defence related procurement from 2004 through to 2014. Analysis of past naval defence spending shows a marked increase in locally produced equipment over the last two decades, dominated by the *Collins* class submarines and the *ANZAC* class frigates. The DCP suggests that this trend will peak with the letting of two tenders for the AWDs and the Amphibious Ship Project. Naval defence spending after this will decline as major new construction projects give way to upgrades, repair and maintenance of the existing fleet."

[27] Dept of Defence, Defence Capability Plan 2004-2014 (Public Version), 2004.
[28] Firecone Ventures/Charles River Associates, *Air Warfare Destroyers Final Report*, May 2005, page 12.

Figure 1: Projected Australian Naval Defence Expenditure (2002 prices)



The two largest naval projects in this plan are:

SEA 4000 Construction of three air warfare destroyers for the Royal Australian Navy, with delivery scheduled from 2013	$4½-6bn	• Shipbuilding contract awarded to ASC in May 2005. • 'Second pass' approval 2007 • Module work to be decided
JP 2048 Replacement of the two amphibious transport ships *HMAS Kanimbla* and *Manoora*, and the landing ship *HMAS Tobruk*, with two large 'flat-topped' amphibious transport ships (LHDs) between 2010 and 2016	$1-2bn	• Tenders close in March 2006 • Decision in 2007 • Decision in 2014 on Phase 4C (acquiring a Strategic Lift capability - $200m)

These projects are additional to already programmed construction and repair work.

It is noted that not all of this demand translates into shipbuilding work. Following a trend in all defence sectors, a substantial amount of estimated budgets account for the cost of purchasing systems and designs.

SEA 4000: Air Warfare Destroyers

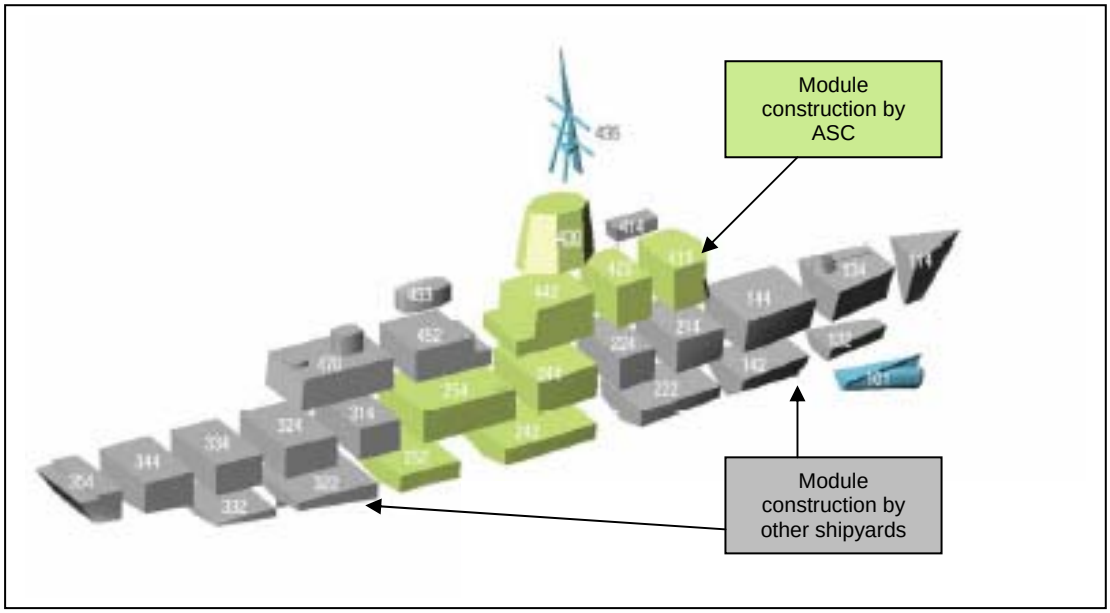
The AWD project will be one of the most significant shipbuilding programs undertaken in Australia, and will provide considerable opportunities for Australian industry. The build phase of the program is scheduled to commence in mid 2007, subject to Government second pass approval.

At over 6,000 tonnes displacement each, the AWDs will be the largest combatants ever built in Australia and the most powerful warships in the Southern Hemisphere. According to the AWD Alliance website, the AWDs will provide air defence for accompanying ships in addition to land forces and infrastructure in proximate coastal areas, and for self-protection against attacking missiles and aircraft. The Aegis weapon system, incorporating the state-of-the-art phased array radar, AN/SPY 1D(V), will provide an advanced air

defence system capable of engaging enemy aircraft at ranges in excess of 150km. The surface warfare function will include long range anti-ship missiles and a naval gun capable of firing extended range munitions that could be used for support to land forces. The AWDs will also be able to conduct undersea warfare and will be equipped with modern sonar systems, decoys and surface-launched torpedoes. The AWDs will carry helicopters for surveillance and response to support these key warfare areas.[29]

Based in Osborne, South Australia, the AWD project will draw on capability around the country. More than 1000 workers will be required in South Australia as part of the build contract. As the project is too large to undertake at a single shipyard, other shipyards will be able to participate as sub-contractors to construct modules for the ships, which will then be assembled in Osborne. It has been foreshadowed that up to 70 per cent of the module construction will be subcontracted to other shipyards around Australia, creating the need to fill an additional 1000 jobs around the country.

Figure 2: indicative module construction of AWDs



The AWD Systems Centre will be headquartered in South Australia, although specific design projects will be carried out where they can be done most economically and productively with systems nodes expected to be created in Sydney (for combat system design work) and Melbourne (for ship design work).[30]

JP 2048: large amphibious ships

The government has decided to acquire two large naval vessels known as Landing Ships, Helicopter Dock (LHD). These ships will replace the amphibious command ships *Manoora*, *Kanimbla* and landing ship *Tobruk* and will be able to carry a significant number of helicopters on a flight deck and in a hangar below. They will also carry landing craft in a floodable dock and be able to transport and land Australia's new Abrams tanks. Overall, the ships will provide a major boost to the ADF's sealift capability and offer a considerable increase in Australia's force projection capacity.

United States versions of such ships do not offer the broad range of capabilities required by the RAN and instead two European designs are being considered:

[29] http://www.ausawd.com/overview.html
[30] Media Release, Senator the Hon Robert Hill, Minister for Defence, 10 November 2005.

- Navantia (IZAR) of Spain's 27,000 tonne strategic projection ship, which has a 'ski-jump' flight deck and thus a capacity to deploy STOVL fixed wing aircraft such as the Harrier and the F-35B; and
- Armaris of France's 21,300 tonne Mistral class force projection and command vessel, together with a larger version based on the original extended design.

These are large ships of approximately 200 metres in length with a displacement greater than Australia's last aircraft carrier, *HMAS Melbourne*, and around four times that of the AWDs. Their systems are less complex than those of major combatants and they would rely on other warships such as the AWDs to provide protection in any combat situation. They essentially represent large steel hulls capable of transporting and deploying valuable assets such as the ADF's new troop lift helicopters and tanks, although will also likely have a significant command, control and communications capability.

Other naval programs

Construction and modification work over the next decade also includes the replacement of the Navy's replenishment ship *HMAS Westralia* (a second hand vessel has been purchased and is being modified by Tenix at Henderson, and is in turn scheduled for replacement in 2018), and the support vessel, *HMAS Success* (which will be replaced by a new Strategic Lift capability).

Repair and Maintenance

Other major programs are the continuation of the upgrades of the FFGs (ADI as lead contractor) and the *ANZAC* frigates (ANZAC Ship Alliance, comprising Tenix, SAAB and DMO). These will provide workload, but probably not enough to satisfy the requirements of these companies' naval divisions.

The workload for repair and maintenance is likely to be higher in the future as Navy's fleet expands from nine major ships to fourteen. That is the largest number of fighting ships Australia has had in service at any one time since World War II. This will put new strains on the repair and maintenance capability if this activity is limited to the current sites that undertake repair work, and increase pressure to draw on the existing capabilities in other shipyards.

Defence has decided that all repair and maintenance (everything except major upgrades) will be done at locations near to where fleets are based. This means that virtually no repair and maintenance work will be available for Victoria ahead of the next major upgrades to the *ANZAC* frigates (excepting warranty work).

International markets

Tenix has demonstrated some success in shipbuilding work for export. The work at the Williamstown shipyard for *Project Protector* will end by 2007-08. While Tenix is seeking more export markets in our region, it is considered that export opportunities are limited.

Defence demand beyond the Defence Capability Plan

The DCP is limited to ten years of new acquisition. However, any sensible planning or commentary on industry capability must look beyond this to avoid going down a path that appears to suit the present workload, but may not suit future industry capability needs.

This is especially relevant where the relatively thin demand for shipbuilding over the next decade risks an erosion of industry capability that may need to be re-established in the future to undertake such projects as the replacement of the FFGs and *ANZAC* Frigates.

Local Industry Supply

Australia's naval shipbuilding industry has developed in the last twenty years from a marginal, uncompetitive activity, to one with a successful record of performance and the demonstrated ability to compete internationally.[31]

The DMO has identified Australia's shipbuilding capabilities as follows:

	Major Surface Ships				Submarines		
Facility	**Consolid-ation / final assembly**	**Modular fabrication**	**Upgrade**	**Repair & maintenance**	**Consolid-ation / final assembly**	**Upgrade**	**Repair & maintenance**
Tenix Williamstown VIC	✓	✓	✓				
Tenix Henderson WA				✓			✓
ASC Osborne SA					✓	✓	✓
ADI Garden Island NSW		✓	✓	✓		✓	✓
Forgacs Newcastle NSW	✓	✓					
Forgacs Cairncross Qld				✓			

Source: NSR Sector Plan, page 39.

Some updates would now be necessary. Two commercial shipbuilders, Austal and Incat, both aluminium shipbuilders, are also active in the market and have been proving increasingly competitive in the supply of vessels for naval support, fast deployment and coastal patrol work. These companies are Australian-owned and are global players in commercial shipbuilding, having built significant niche positions in designing and building aluminium fast ferries.

With the decision to base construction of the AWDs in Osborne, ASC will now be expected to develop a capability in major surface ship construction, modular fabrication, and presumably upgrade. Certainly the South Australian Government's strategy foreshadows a significant development of surface shipbuilding under the project which will position the location as a contender for other shipbuilding projects in the future.

[31] ACG, op cit, page 43.

ASPI has also provided a snapshot of the capabilities at each of Australia's shipyards.

COMPANY	FACILITIES
Tenix: (formerly Transfield Defence Systems [Victoria] and Transfield Shipbuilding WA), which built the last two FFGs and Pacific class patrol boats and is presently the prime contractor for the *ANZAC* Frigate Project. The frigates are built at its Williamstown yard in Victoria. Also, some paramilitary and commercial vessels are built at Henderson, Western Australia.	**Victoria**: Two 6000 tonne building slipways. Graving dock effective length 145 metres. Could construct large ship modules, but infrastructure changes would be necessary for consolidation of large ships. **Western Australia**: 8000 tonne shiplift, length 123 metres, width 23 metres. Existing hardstand berths suitable for surface ship and submarine repair. Additional berths necessary for ship assembly. Could construct large ship modules. The new industrial facility being developed nearby may provide ship construction capability, eg. module construction.
Australian Submarine Corporation: is the prime contractor for the six *Collins* class submarines, built at Osborne, South Australia. With the construction program virtually complete, ASC will transition from a builder to maintainer and repairer. Routine maintenance work will be undertaken in Western Australia while major refits and upgrades are planned for Osborne.	**Osborne South Australia**: 5000 tonne shiplift, length 80 metres, width 20 metres. Significant facility development required for participation in major surface ship module construction or ship assembly. Adjacent land is available for significant expansion.
ADI: (a 50-50 joint venture between Transfield and Thales) - prime contractor for the six Huon class minehunters. ADI also operates the major naval repair facility at Garden Island in Sydney (New South Wales) under lease from the Commonwealth. ADI is also a major maintainer/repairer of commercial vessels.	**Sydney**: Key capabilities relate to repair sector. Could construct large ship modules. Technically, Captain Cook Dock could be used to assemble modules but this would disrupt repair and maintenance dockings.
Forgacs: substantially modified Manoora and Kanimbla at its Newcastle (New South Wales) facility. Also provides ship repair for the commercial coastal fleet and has undertaken some limited work on warships and large auxiliaries.	**Newcastle**: Major facility is 15 000 tonne capacity floating dock. Length 180 metres, width 33 metres. Associated facilities in Newcastle area would allow construction of large ship modules. **Cairncross (Brisbane)**: Large 85 000 tonne capacity drydock and associated ship repair facilities. This facility is not appropriate for ship construction.
NQEA: (Queensland) built Fremantle class patrol boats and hydrographic ships. Also builder of commercial vessels including fast ferries.	**Cairns**: Facilities geared to small- to medium-sized ships. Significant facility development necessary to construct large ship modules.

Source: ASPI, Setting a course for Australia's naval shipbuilding and repair industry, 2002.

Again, this table would require some updating to reflect the emergence of businesses such as Incat and Austal, and ASC Shipbuilding.

The thing to note is a degree of specialisation of shipbuilding activities. While no site is particularly limited to a class of vessel, it is apparent that the Australian capability to consolidate/assemble major surface ships is focussed on Williamstown, Henderson, and shortly Osborne. Other sites are primarily used for module construction or repair work.

While leading naval shipbuilding companies can deliver across the full spectrum of warship design requirements, it is less common for individual shipyards to produce across a wide range of vessels. Different warships present different engineering challenges and, as their specifications become more ambitious, can be seen as increasingly distinct technologies.[32] Overseas experience suggests a significant specialisation in warship construction. Risk management objectives have tended to see a growing consolidation of expertise and experience.

In terms of large ships, of the size planned for the LHDs, there is presently no operating shipyard that could readily undertake the assembly. However, plans are afoot for infrastructure upgrades at Henderson including a large ship lift.

[32] ACG, op cit, page 5.

Of course, mapping shipbuilding capability must not simply focus on physical construction. In practical terms, capability is much more than just the physical infrastructure established in shipyards. Capability is embodied in the industry's intangible infrastructure in the workforce and relationships with suppliers, as well as the ability to train and educate people with the requisite skills to sustain the industry out to 2020 and beyond.[33]

As with all manufacturing industries supplying an advanced finished product, naval shipbuilding sits at the end of an extensive supply chain. Most of the companies in the supply chain are not exclusively engaged in the naval shipbuilding industry. Many of them will supply products, such as pipes, valves and cables, which are the same as or derived from the goods they regularly supply to other commercial activities. Nevertheless, the existence of a chain of reliable and efficient suppliers is a critical element in ultimately determining a shipbuilder's capability. In the case of the *ANZAC* ships, a very extensive supply chain was developed. According to a Defence report[34], "the *ANZAC* ship project is estimated to have involved over 1300 companies (over 90 per cent of which were SMEs) in Australia and New Zealand. Companies in Victoria, where the ships were assembled, received over 75 per cent of the value of Australian sub-contracts."

As noted in Chapter 1, systems design and integration are also an integral part of a modern warship. Key companies with a major systems capability in Australia are:

ADI	ADI has developed a systems integrator capability within its Electronics and Aerospace Division. ADI command and control systems currently operate on the HMAS *Manoora* and *Kanimbla* and ADI is prime contractor for the systems upgrade on the FFGs.
Australian Marine Technologies	Under the joint and equal shareholding of Blohm + Voss in Germany, and Tenix Defence, offers specialist design and project services to the naval and general marine industries utilising the resources and experience base established during the *ANZAC* ship project. Based in Williamstown with a staff of 36, AMT has a close relationship with the RAN and is working on ways for new systems and capabilities to operate on RAN ships.
BAE Systems	BAE Systems Australia specialises in electronic and software engineering applications, with a strong background in serving defence needs. It employs around 2,600 people across Australia and is based in Adelaide.
CEA Technologies	CEA Technologies is an Australian company specialising in advanced radar and communications systems. The CEA-FAR Active Phased Array Radar is currently being trialled on an *ANZAC* class frigate. Successful trials may lead to a contract with the Royal Australian Navy to supply CEA-FAR as part of the SEA 1448 Anti-Ship Missile Defence (ASMD) program. Additionally, the company has sold systems to navies around the world, including the US Navy. With 200 employees, CEA Technologies has its headquarters in Canberra and offices in Melbourne, Adelaide and San Diego.
GKN	GKN Aerospace Engineering Services is bidding to undertake AWD systems design work.
Honeywell	Honeywell has an extensive background in electronics in automated systems. It deals across a wide range of defence activities and has a particularly strong presence in aerospace. Honeywell's Australian arm is based in Sydney.
Raytheon	Raytheon Australia is a mission systems integrator providing solutions for sea, land, air and office environments. The company employs over 900 people across Australia. Raytheon currently supports a range of weapons, radar and communication systems for the Australian Defence Forces and provides components for the Aegis combat system, which has already been selected as the core of the new air warfare destroyer. The company is based in Canberra, Sydney, Adelaide and Henderson.
SAAB	SAAB Systems' core business is advanced operational software intensive systems. It provides development, integration, production and support for defence and professional applications. SAAB provided the combat system for the *ANZAC* frigates, and the integrated, control, management and monitoring system for the *Collins* submarines. SAAB Systems has offices in Canberra and Rockhampton, and is headquartered in Adelaide.
Sinclair Knight Merz	Sinclair Knight Merz (SKM) is Australia's largest independent naval platforms engineering group with a broad range of skills and competencies relevant to the full range of defence materiel systems. That experience is now being applied to a wide range of Defence programs including the AWD project and is highlighting areas where significant improvements and savings can be made to the through life support of Defence systems.
Tenix	In addition to its shipbuilding capabilities, Tenix operates an Electronic Systems Division which specialises in systems engineering and integration. The Division was formed in 1999 and employs 310 professional staff across 5 Australian sites.

Adapted from Future of Naval Shipbuilding in Australia: Choices and Strategies*, Allen Consulting Group, 2005.*

[33] ACG, op cit, page iv.
[34] Dept. of Defence, op cit, 1997.

The Allen Consulting Group identified some gaps and weaknesses in Australia's overall NSR capability[35]:

> "Power plants and propulsion systems are fully imported, but there are only a few companies in the world making gas turbines and marine diesel engines and Australian engineering skills are quite sufficient to enable the engines to be maintained in-country. Secondly, the local industry is not competitive in building large steel hulls. This is largely because a relatively low throughput means that investing in some of the global state-of-the-art techniques, such as robotic welding, cannot be justified. This weakness is covered to some degree by the use of sophisticated modular techniques to build significant warships."

[35] ACG, op cit, page 41.

6 Assessment of sustainability

Key points:

- **Judgements on the appropriate level of NSR capacity to ensure self-reliance must consider possibilities beyond those projects planned in the current Defence Capability Plan (ie make provision for possible escalation of support needs if the security environment changes, and foreshadow projects after 2014).**
- **If it relies on current planned Defence work alone, it is likely that the capabilities embedded in the people and businesses in Victoria are the most likely to experience an erosion of existing capability during the next decade.**
- **There are strategic reasons why the existing capability embedded in Victorian industry should be preserved for the future.**

Sustainability can be measured in a number of ways. In the present context, there is only one sensible approach to assessing sustainability: given market forces and actions taken by Defence (in terms of workload and allocation), will Australian industry sustain a capability that meets the objectives of self-reliance?

The DMO described the future demand for naval shipbuilding in the NSR Sector Plan as follows[36]:

> "Australia is emerging from a period of historically high naval shipbuilding activity, dominated by construction of vessels that have been substantially adapted to meet Australia's specific operating requirements. These high activity levels have been driven largely by the ANZAC Frigate and Collins submarine projects - both of which have been atypically large, by Australian standards, in terms of value, numbers of vessels and complexity of technologies. These technologies are now embodied in a naval fleet, the bulk of which was built fairly recently.
>
> "However, the future looks very different. The average level of shipbuilding activity, even including major upgrades to the existing contingent of FFG class vessels and future builds of Air Warfare Destroyers and large amphibious and support vessels, is going to be well below that of the recent past.
>
> "The level of Defence's demand for warship construction during the next 15 years will be only half that of the last 15 years. Defence spending on major naval projects over the period will total only about $6 billion, compared to $12 billion in the last decade and a half."

The analysis undertaken by the DMO in the NSR Sector Plan of projected demand and supply led it to the conclusion that industry restructuring and consolidation was inevitable. The Sector Plan stated[37]:

> "... Defence's future naval shipbuilding and repair requirements will not sustain the current capacity in Australia's naval shipbuilding industry. Specifically, there will be

[36] NSR Sector Plan, page 3.
[37] NSR Sector Plan, page 20.

> insufficient Defence business to sustain the current specialised waterfront facilities for the construction and upgrade of major surface combatants and submarines. Maintaining excess supply within each of Australia's shipbuilding facilities has the potential to increase costs, lead to fragmentation of core naval shipbuilding and repair skills, and is non-viable for industry.
>
> "The two central conclusions are that future demand is sufficient to sustain only one shipbuilder, and that the single shipbuilding entity model provides the only feasible structural arrangement to meet Navy's new construction capability requirements."

Both the DMO and industry views at the time were that future demand levels would almost guarantee the emergence of a natural monopoly for shipbuilding work in Australia.

Since 2002, there has been considerable debate on the merits of an active attempt to engineer a single, monopoly, provider[38]. At the same time, the naval workload for the decade has increased by over 20 per cent since the NSR Sector Plan was published. The issue of Defence's future approach to contracts appears to have been resolved in 2004, following commercial advice by John Wylie of Carnegie Wylie. In their joint press release of May 2004, Senators Hill and Minchin stated:

> "Given the significant increase in NSR sector expenditure resulting from the Defence Capability Review, a competitive model is the preferred approach in the NSR sector with intervention by Government only in exceptional circumstances."

Or as Mark Thompson of ASPI put it, "in the period since Defence's NSR plan was finalised, the Australian naval shipbuilding sector became more diverse and more capable of sustaining competition."[39]

It is apparent that this discussion reflects a judgment of the ability of the industry to sustain a competitive model in the allocation of individual projects. This is quite different from the ability to sustain industry capability at a level consistent with self-reliance, or even consistent with value for money in the longer term.

For instance, the Allen Consulting Group state[40] that the major investment in the NSR sector by Defence and private sector interests (such as Tenix) has achieved the capability for self-reliance for the ability to repair battle damage and achieve combat readiness for the *ANZAC* ships and the *Collins* submarines, as well as the FFGs, the Houn minehunters, patrol boats and the amphibious ships *Manoora* and *Kanimbla*. However, the report notes that this capability for self-reliance could quickly become unsustainable without new NSR construction programs. Importantly, the report finds that if the AWDs and LHD ships were not built in Australia, the capability to maintain and provide through-life-support for the *Collins* and *ANZAC* classes could be compromised.[41]

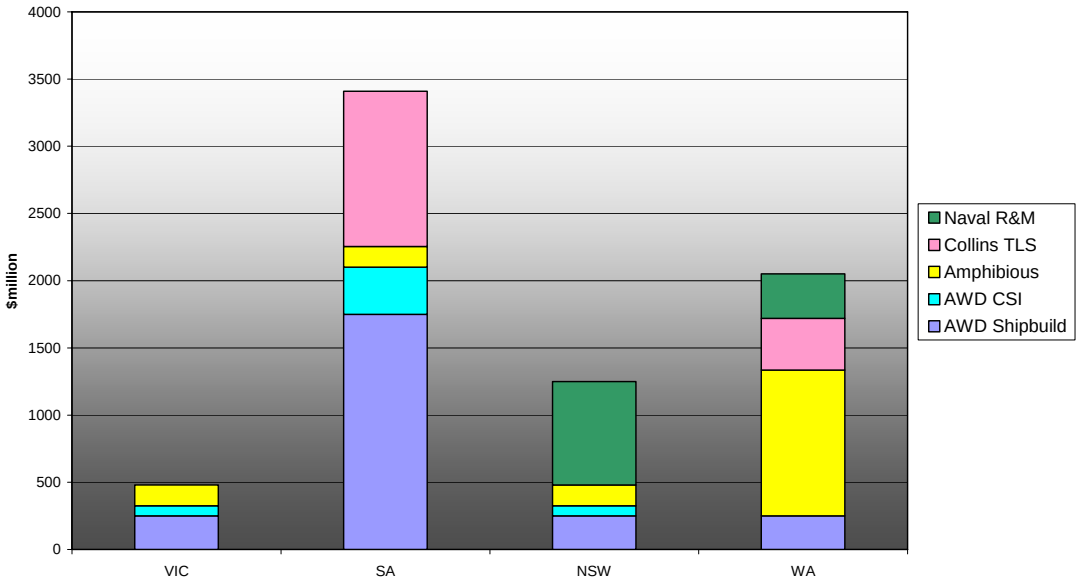
As a result of the Commonwealth's commitment to a competitive model, the AWD project was open to competitive tender. The result of that tender outcome is that a large slice of the next decade's naval shipbuilding work will not go to fill existing domestic capacity, but will generate an expansion of surface ship construction capability at a new shipyard in South Australia, and remove a large chunk of the decade's shipbuilding work from the existing shipyards. Based purely on matching industry demand and supply, it is clear that Australia will have an apparent excess capacity over the next decade.

Assuming that module work for the AWDs is shared equally between Victoria, Western Australia and New South Wales, and also that the LHD project is based in Western

[38] Firecone/CRA, op cit, page 5.
[39] Mark Thompson, ASPI, speech given at the Pacific International Maritime Conference, February 2004.
[40] ACG, op cit, page 44.
[41] ACG, op cit, page 46.

Australia, with some module work shared among the other three states, the resulting NSR workloads over the next decade for the industry capabilities in each state are shown below:

Figure 3: Naval shipbuilding, repair and maintenance: 2007-2017 ($million)



This scenario reflects a dramatic decrease in shipbuilding work being done in Victoria. The projected Defence workload for Victoria in the next decade suggests only around $500 million over the entire period. For the past 15 years, shipbuilding activity in Victoria has amounted to around $500 million each year, and Victoria has developed a strong industry capability to deliver this, including labour market depth, soft and hard infrastructure and a critical mass underpinning advanced manufacturing. Victoria is presently home to the greatest share of national capability for major naval combatants, which cannot be simply transferred to other shipyards.

The Allen Consulting Group report foreshadowed some consequences for Australia's overall shipbuilding capability of transferring shipbuilding activity to a new shipyard in Osborne. It considered "there will be no balanced workload. Naval shipbuilding will be concentrated in two states, with a relatively thin labour market. It seems likely that the future capability of the industry would be subject to a substantial risk."[42]

Clearly, the basis of these consequences stems from an excess capacity for major surface shipbuilding. Even with the LHDs constructed in Australia, there is likely to be insufficient workload to sustain commercially the existing Australian shipyards. Because the LHDs are too large to assemble and launch at Williamstown, and there would be little benefit in a major upgrade to infrastructure to accommodate these ships at Williamstown given the very small production run and the capability already exists elsewhere, it would appear that the Williamstown shipyard is the shipyard most likely to become unsustainable if it relies on Defence projects. This is further reinforced by Navy's home-port repair policy, which excludes Victoria from being used for repair and maintenance work.

A narrow approach to sustainability (ie merely matching demand and supply) would suggest that, given the current environment, shipbuilding capability in Victoria is not sustainable. Provided the AWD and LHD projects create sufficient workloads to build and sustain capability in Western Australia, Adelaide and Sydney, these shipyards would be

[42] ACG, op cit, page iv.

sufficient to undertake the planned construction and through life support to the Navy's fleet for the next decade without a capability in Victoria.

However, any assessment of sustainability must be framed in the context of self-reliance and longer term effectiveness. As noted above, self-reliance is about contingency planning. In this context, sustainability is not only about the capacity of industry to deliver *planned* defence projects, but the ability to deliver any unplanned work that may be needed in the future. Importantly, it is an industry that is flexible and responsive. It has access to skills and suppliers that can be quickly mobilised.

What is the right level of capability that needs to be sustained?

As noted above, the objective is not to have a local capability that is sustainable merely to undertake planned projects, but an industry that is sustainable to achieve self-reliance and best value for money in the long term.

Chapter 2 described the characteristics of a sustainable, self-reliant NSR sector, suggesting that a degree of excess capacity, or at least the ability to quickly tap into latent capacity, is critical if self-reliance is to be practically achieved.

The experience of Europe is illustrative. Europe has a number of naval shipbuilders, spanning a broad capability set. As is common in the naval sector, may nations strive to maintain a domestic construction capability, exhibited in a strong overlap in capacity in naval shipbuilding, and resulting in a degree of under-utilisation. Some degree of excess capacity appears natural.

In the UK for example, naval shipyards are experiencing continuing pressure for rationalisation, as suppliers compete for a declining number of naval contracts. Shipyards operate in an environment where the Ministry of Defence seeks competitive bids for projects with the objective of minimising costs, but also has the objective of keeping a range of skill sets and capability alive in a market where supply outstrips demand. The dilemma facing navy planners is how best to maintain access to skills and experience that they do not need in the short term, but may wish to access in the future.

As noted earlier in this chapter, Defence demand to undertake repair and maintenance will increase in the future with the expansion of the Navy's fleet, putting increased pressure on the sector to meet this demand. Genuine self-reliance means the ability for industry to quickly mobilise to deliver required activities during operational times. Unforseen and urgent repairs and servicing of operational warships may be difficult if industry capability only just meets planned demand.

Location is also relevant for effective self-reliance. Self-reliance is not just about capacity, but about responsiveness. An industry capacity that just fits demand schedules is unlikely to have this responsiveness. Further, where industry is concentrated in locations that require significant effort to develop capabilities for planned projects, it is likely that there will be difficulties in quickly expanding those capabilities for unplanned needs.

Sustainability is also about a stable capability in the longer term. An industry capability that erodes with declining demand, and requires re-establishment as demand subsequently increases is likely to compromise sustainability, and denies the ability to lock in productivity gains on an ongoing basis.

Victorian industry is a vital part of a self-reliant NSR sector

It is worthwhile considering the implications to Australia's NSR capability if Victoria's existing capability is allowed to erode over the next decade.

Firstly, Victoria holds most of the residual value of the investment that Australia has made in naval shipbuilding capability over the past two decades. This cannot be easily transferred somewhere else. There is an imperative to not lose this capability. The Allen Consulting Group[43] conjectured about the consequences of undertaking the AWD project in Osborne:

> "It would mean writing off a significant investment in capability. Defence, on behalf of the Australian community, has invested heavily in developing capability at Williamstown in major surface ship construction, repair and upgrades. This capability is embodied not just in the shipyard, but its highly skilled and experienced workforce and in its supply chain."

Secondly, the conclusions drawn by some commentators on excess capacity only relate to Australia having inadequate demand in the forthcoming decade or so. There has been virtually no analysis done of required shipbuilding capability beyond that, for instance, when the FFGs and *ANZACs* become due for replacement. It would be extremely myopic to let Victoria's capability erode over the next decade only to then realise that Australia needs expanded capability for future higher levels of shipbuilding activity, which would be expensive to re-create.

Thirdly, removing Victoria from the NSR landscape would reduce competition in the future. As discussed in the next chapter, competitive tendering should remain a key management tool in promoting efficiency in the NSR sector in the longer term. Competition will be most relevant for future projects not yet part of the DCP. Effective competition in the NSR sector relies on proven capability, and the ability for new entrants to bid for projects is considered limited. Therefore, Defence may need to consider a trade-off between competition in the short run (for individual projects) and competition in the longer run. A single tender decision that quickly leads to a monopoly situation has far more significant implications for value for money in the future. In terms of future projects, such as the replacement of the FFGs and *ANZACs*, Victoria has an existing capability that should be brought to those future competitions. In the absence of a Victorian capability, the Commonwealth may have very limited options about who builds these ships and what price they charge.

Fourthly, Victorian industry is vital in achieving effective self-reliance. The characteristics of a self-reliant, sustainable NSR sector require some latent capability to respond to unforseen needs, as well as a geographical spread. Victoria's strong and established NSR capability provides a proven capability that, even though likely to be used mainly for component work in the next decade, can be quickly mobilised to respond to new needs. Victoria has access to a large, highly skilled and experienced workforce, and a diverse and sustainable supply chain that provides a latent capability for shipbuilding activities.

Overall, Victorian industry plays a critical element in ensuring a national NSR capability. Overseas experience suggests a high and growing degree of interdependence between participants in the naval shipbuilding industry, and it is inevitable that if Australia wants to maintain a national capability that effectively and efficiently meets our future strategic needs, Victoria's existing industry must be a part of that capability.

[43] ACG, op cit, page 50.

7 Options for industry development

Key points:

- **Competition for individual contracts alone does not ensure that the industry will be sustainable or most efficient in the long term. Defence must take a balanced approach to awarding contracts that seeks to promote and reward efficiency in the long run, while ensuring that industry is sustainable and best positioned to respond to future needs.**
- **The effectiveness of competition can be improved by other strategic actions by Defence to increase the opportunities for Australian industry to remain sustainable and best able to meet future defence needs.**
- **Recommended actions include greater forward planning of shipbuilding needs, including integrating defence capability plans with industry development plans; maximising Australian involvement in projects such as LHDs; greater sharing of repair and maintenance work; consideration of bringing forward replacement of FFGs and ANZACs in order to smooth demand; and assisting Australian firms to seek export markets.**

The key question now is how the industry is likely to develop in the future and what are the prospects for the current players in the industry. While some of the participants in the industry (Tenix, Incat and Austal) have demonstrated an ability to supplement their local defence workload with exports, demand from the ADF is likely to continue to be the major driver of the industry in the future. The current industry structure has developed largely on the back of two major naval projects, the *Collins* class submarines and the *ANZAC* frigates. Delivering these two projects has required a major investment in a sophisticated level of capability that had not existed before. That capability represents the critical element in delivering self-reliance in naval shipbuilding and repair.

The previous chapters suggested that the projected Defence demand schedule for the next decade was insufficient to sustain the current industrial landscape, and that, without other action, the resulting deterioration would have implications for ensuring self-reliance and for achieving value on defence projects in the future. This chapter outlines other actions that Defence can take to facilitate a more strategic approach to industry development.

DMO needs to develop a new Sector Strategic Plan

The previous Defence NSR Sector Plan was not endorsed by the Commonwealth Government. Instead, the Government policy has focused on individual projects, and has not addressed many of the issues that were raised in the Sector Plan.

That said, the previous Sector Plan focused on arrangements for *how* to allocate projects, and not on strategies to ensure the *level* of projects was consistent with a sustainable, self-reliant industry. A new Sector Plan must urgently be developed that focuses on sustainability in the longer term, preserving competition, and managing NSR workloads. Importantly, the Sector Plan must articulate the level and nature of an NSR sector required for self-reliance.

In describing the characteristics of the NSR sector that are necessary to achieve self-reliance, Defence must give weight to locational factors, availability of skills, flexibility and responsiveness to meet unplanned needs, scenario planning for possible changes in the strategic environment, and anticipating industry requirements for new defence acquisitions beyond the current DCP period. To be a useful objective, Defence must attempt to quantify the value it places on self-reliance.

The Sector Plan should then examine the level of activity that is required to make this self-reliant capability sustainable, including what actions Defence can take to assist, and how to balance efficiency and effectiveness. As noted above, Defence should not seek to engineer a particular model for the industry. Defence must seek to provide the conditions necessary to develop the industry on a sustainable basis.

The current policy of competition has value…

It has been frequently stated that the appropriate role of government is to determine the level and nature of the defence industry capability it requires and then to allow market forces to prevail by allowing industry to bid for the resulting contracts.[44]

In the developments since the release of the NSR Strategic Plan in 2002, the view that prevailed was that the market should be allowed to determine the future structure of the industry in response to the level and composition of government demand. The Commonwealth Government has endorsed and used the policy of competition in awarding defence contracts.

Competitive tension is effective in keeping downward pressure on the price paid by Defence for acquisitions, and to act as a motivation for innovation and productivity. Competition in the industry has generally produced good results: where the invisible hand of market forces has been free to direct the traffic, the result has generally been to deliver the performance sought by Defence.[45]

Firecone/CRA concluded[46] that it appears the debate on engineering a desired industry structure has been concluded in favour of a continued reliance on competitive procurement, with an assumption that the volume of procurement will be sufficient to retain existing multiple providers, reinforced by the threat of entry. It is further inferred from this approach that the Commonwealth Government will have no objective of promoting a particular industry structure during the sale of the ASC.

… but there are some problems with a competitive approach

The DMO has written[47]:

> "The NSR Sector, more than any other Defence industry sector, exemplifies the problems associated with Defence's project-by-project approach to acquisition and the ineffective application of Defence's industry policy framework. Over the past 15 years, Navy's six major projects have been awarded to five different companies at five different locations. Consequently, the key capabilities and skill sets created within these companies, which are critical to the effective whole-of-life support of Navy's ships and submarines, are not being sustained once the projects come to an end. The $12 billion invested in the sector over that period and the resultant stimulation provided by these major naval construction projects, has energised and created a number of key industry capabilities. However, as major naval projects wind down and Defence's demand decreases, the lack of any long-

[44] Eg, see ACG, op cit, page 53.
[45] ACG, op cit, page 2.
[46] Firecone/CRA, op cit, page 6.
[47] NSR Sector Plan, page 19.

> term planning and/or strategic sustainment strategy has resulted in a situation where Australia is at serious risk of losing critical industry capabilities."

The Commonwealth's open competition philosophy has allowed any competent firm to bid for naval shipbuilding work, and has precluded Defence from putting significant weight on long-term industry development factors in awarding individual contracts.[48] Many industry leaders argue that such unrestricted competition is wasteful.

As Allen Consulting Group point out[49]:

> "It is entirely feasible for a more experienced shipbuilder to bid a high price for construction of a warship and to be simultaneously efficient, pragmatically accurate and unsuccessful in a competitive process that did not engage sufficient expert advice and experience in the selection. The successful tenderer may then find they have significantly underestimated costs of undertaking the project. As a consequence, the Australian taxpayer may wind up paying considerably more for the warship than originally promised. In a thin market like naval shipbuilding this might also mean the loss of valuable skills and capability.

The DMO has also found that reliance on competition alone for a single project may have undesirable outcomes[50]:

> "Over the past decade it has become evident that the procurement strategy normally used by Defence has not always delivered the best value for money… [the competitive tender for prime contractor] has encouraged tenderers to under-bid, downplay risk and offer optimistic schedules that in reality are difficult to achieve. Profit margins then tend to be recovered as detailed production specifications emerge as contract variations. The procurement strategy also tends to produce an adversarial relationship, rather than a close partnership between Defence and its contractors… It may also discriminate against bids that in fact offer greater through-life value."

Competition can be destructive if it leads to a boom and bust cycle where companies establish a capability only to see it atrophy when a different firm wins the next contract. ASPI noted[51] that awarding work "in a too piecemeal a fashion can be less cost effective than longer term arrangements."

Importantly, project-by-project tendering is aimed at achieving allocative efficiency only, which is getting the best value from resources available at the time. Project-by-project tendering has given no weight to dynamic efficiency, which is about how the industry develops over time to provide better value in the longer term.

The tender for the construction of the AWDs – a decision made against a range of project-specific commercial factors – suggests that Defence did not give adequate consideration to the longer term implications for the development of the industry, and how the decision will affect the opportunity to achieve value for future projects.

In an address to a recent UK Shipbuilding conference, the Managing Director of BAE Systems' naval shipbuilding arm said[52]:

> "Competition has played an important part in driving out waste and inefficiency. It forced the pace of rationalisation and reorganisation of the industry over the past 20 or

[48] For example, the criteria for the AWD tender were all narrowly focused on successful completion of the AWD project itself, without any consideration for how each proposal might affect the longer term development of the industry.
[49] ACG, op cit, page 48.
[50] NSR Sector Plan, page 19.
[51] Mark Thompson, op cit.
[52] Vic Emery, op cit.

> so years. Indeed, what remains of UK industry is reasonably efficient – but it is now quite fragile and needs stability. Developing an industrial strategy gives us the opportunity to complement efficiency with effectiveness."

This same theme might equally be applied to Australia. Competition has been used to achieve greater efficiency, but in the context of thinning demand to a level below that necessary to sustain future capability needs, the Australian industry is at risk of becoming too fragile, too risky, and less effective in meeting Defence's needs.

Is rationalisation inevitable?

Rationalisation of the industry to a smaller number of players is neither inevitable nor desirable.

As noted above, it has been suggested that Australia has too many naval shipyards. Australia now has shipyards at Williamstown, Osborne, Henderson, Sydney, Newcastle and Queensland. In Europe and the US, where production runs are much larger, the industry has consolidated to quite a small number of shipyards to optimise economies of scale.

Despite being made under a competitive framework, there is a risk that the AWD project will induce rationalisation of capability in the Australian shipbuilding sector, as the ASC will have the lion's share of shipbuilding activity (on top of its $3.5 billion contract for the through life support of the *Collins* class submarines) that will allow it to sustain shipbuilding capabilities ahead of other shipyards, and position it well for future projects. Other shipyards must attempt to stay commercially viable with residual Defence work.

In both Europe and the United States, the naval shipbuilding industry has been subject to substantial consolidation and rationalisation since the end of the Cold War. While the complexity and costs of naval platforms and weapons systems have greatly increased, some shipyards, particularly in the United States, have been able to take advantage of long production runs to benefit from significant scale and learning economies. (Both General Dynamics' Bath Iron Works and Northrop Grumman's Ingalls shipyard, for example, will have built more than twenty DDG-51 *Arleigh Burke* class destroyers by the end of their contracts.) Despite the pressure for rationalisation, the most efficient shipbuilders clearly see benefits in specialisation in their shipyards, with surface warships generally being constructed in a different location to submarines. Industry consolidation can also bring its problems: in Britain, for example, there have been tensions between the Ministry of Defence and BAE Systems that have clearly arisen as a consequence of that company's increasingly monopolistic position in the UK defence industry.

The experience of the UK Government and BAE Systems suggest that "rationalising the industry down to one effective supplier can bring about dysfunctional and sub-optimal relationships between purchaser and provider."[53] A natural monopoly within Australia can be kept somewhat in check by including overseas bidders in future tenders. This is not the case for repair and maintenance, which is the critical element in achieving self-reliance. A single shipbuilding entity for all of Navy's repair and maintenance work would have incentives to escalate prices, not only because of its monopoly position, but in order to transfer as much cost to repair activities as possible to be able to compete with international bids in ship construction. This reinforces the need to ensure there is adequate *domestic* competition.

As noted by the Allen Consulting Group[54], while rationalisation is a feature of the global industry, no country is contemplating closing down an existing successful shipyard and

[53] ACG, op cit, page iv.
[54] ACG, op cit, page 16.

attempting to re-create the capability in a new facility elsewhere. Such rationalisation is not natural, but disruptive and costly.

Availability of workforce and other suppliers are important characteristics of a responsive and effective self-reliant industry. The Allen Consulting Group point out[55]:

> "Defence needs to take account of the distribution of workload among naval suppliers with an explicit aim of retaining sufficient depth in the available skill set. Skill shortages are merging as a significant issue across Australia, and are also affecting the defence industries … It is unlikely that the industry's skill requirements will be met if activity is concentrated in a few locations, particularly in states with less depth in their labour markets. The analysis presented in our first report suggests that the skill creation rate in the states of Victoria, in particular, and New South Wales is critical to maintain industry capability. The industry needs to be able to draw on labour markets on a national basis if it is to be able to satisfy its significant skill requirement."

Competition should remain a tool in industry development, but not the only tool

There is an obvious need to, as part of a competitive evaluation, give sufficient weight to the implications on industry sustainability and self-reliance brought about by that decision.

The challenge of achieving an appropriate balance between, on the one hand, the use of competition as a tool for driving innovation and cost minimisation and, on the other, a desire to share work among competitors in order to sustain and grow naval shipbuilding and repair capability, is an increasing policy theme in the UK.

It should be remembered that competition is not an end in itself – it is merely a tool to bring about an objective that the public values. In this case, competition is used to drive value for money in Defence acquisitions. In order to achieve this outcome, competition requires a well-functioning market with a number of buyers and sellers, and relative ease to enter and exit the market.

Market competition as a tool for efficiency occurs through incremental change within an overall industry capability. Within an industry with many transactions, efficiency gains occur through regular reallocation of new work to more efficient suppliers. Over time, it is the suppliers who display an ability for ongoing improvement that receive the market share, kept in check by the ability to quickly reallocate work to other established or new suppliers. Defence NSR contracts do not facilitate incremental change in this way.

But competition will still be an important feature of a future NSR market. Where there is sufficient workload to sustain industry development, competition will be vital in facilitating better value for money to the Commonwealth in the long term. But where the NSR workload falls below the level required for self-reliance, competition may need to be complemented with other measures.

The challenge for Defence is to balance competition for individual projects with a need to retain a competitive environment for future capability. Obviously, decisions for individual projects are made on a sequential basis, increasing the complexity of the task for Defence. But it is not a task that should be ignored.

In evaluating two competing bids, Defence must include as a criterion in the competition the implications for the future of the NSR sector. This means a consideration of how the project decision will affect the industry's ability to meet the characteristics of a sustainable and self-reliant industry going forward. As noted earlier in this submission, desired characteristics of a self-reliant industry include aspects of locational distribution and access

[55] ACG, op cit, page 46.

to skills, as well as sustainability of previous investments in infrastructure. Competing bids must compete on how each option will affect scope for ongoing competitive tension in the future.

In the absence of a long-term strategy, project-by-project decisions may encourage systematic errors in awarding contracts. In addition to the risks of underbidding by tenderers with no experience in building major surface warships as noted above, narrow competitive tenders ignore the opportunity for an individual project to be an investment in the future capability of the industry. For example, the decision on the shipbuilder for the AWDs did not include any assessment of the future efficiency or effectiveness of the industry overall. A proper evaluation of risks surrounding the project would suggest that seeking to establish a new capability in a location with a very thin supplier and skills base, while letting proven established capabilities atrophy elsewhere, is a more important consideration than any short-run price advantage for a single project. This is particularly the case when the apparent price advantage does not stand up to financial and risk scrutiny as the Victorian Government contends is the case with the recent AWD decision.

Strategic Actions for Industry Development

In terms of managing the sustainability of a competitive industry, no single action is likely to provide a complete solution. As the analysis in the previous chapters shows, even with full sourcing of the LHDs in Australia, the distribution of workload is still unlikely to sustain the current capability. The Victorian Government recommends that all of the options below are acted upon as part of a new Sector Strategic Plan.

1. Maximise Australian involvement in construction of LHDs

The Commonwealth recently announced that it will go to open tender and allow local shipbuilders to bid against an offshore benchmark. Aside from a complete offshore purchase, the Commonwealth may decide on an option to build them in Australia using modular techniques or an option to contract for the hulls to be built overseas and then fitted out in Australia. A feature of Tenix's successful bid for the New Zealand *Project Protector* was that the hull for the only large ship in the program is being built in the Netherlands and then floated out to Australia for fitting out.

Australia has a strong capability able to deliver the LHD program in-country. If the hulls for these ships were to be built in Australia, a modular approach would provide significant work for shipyards in New South Wales, Western Australia and Victoria, with consolidation of final ships being done in Western Australia's maritime complex.

On the other hand, Defence may decide that the best trade-off between cost and sustaining local industry capability lies in having the hull constructed offshore with the fitting out occurring in Western Australia. As noted in previous chapters, this decision should not be made on costs of acquisition alone, and the full implication of a procurement strategy must be taken into account. Further, irrespective of cost, failure to construct LHDs in Australia will compromise Australia's self-reliance in supporting our naval fleet in the future, and continue to push up repair and maintenance costs in the future (not only for the LHDs but for all classes of major warships).

2. Take action to smooth demand

The final part of the Sector Plan notes that the quantum and timing of Defence's demand for naval shipbuilding and repair have significant implications for the sustainability of industry capabilities and skill-sets. In fact, the Sector Plan points directly to the problems caused by the unevenness of the provisional build program. Demand management issues will require close attention in the future.

The discussion in this submission reaches an obvious conclusion: it is difficult to make judgments about future sustainability of the industry in the absence of a clear picture of what it is being sustained for. While most attention has been on the AWD and LHD projects, the real question for analysing implications about those projects is the required capacity beyond the current DCP. Defence must urgently determine its naval capability needs in the longer term, both for self-reliance and to undertake projects beyond the current DCP period. Only then can any sensible conclusions be drawn on how industry should evolve over the next decade.

More information would assist planning. For the type of activity that is naval shipbuilding, with few contracts and very long lead times in tendering, design and construction, a ten year procurement plan may be inadequate. Decisions made in this decade will affect what the industry looks like in the next decade, so at least a sense of future industry capability needs is required now.

At the same time, industry capability considerations should be a factor in determining the practical timing of future defence capability acquisitions. It is undesirable to merely define a defence capability need and then, only as a second step, consider how the industry might deliver that capability. Capability planning is not at present informed by the pragmatics of meeting that demand. The fragmented industry base and the project-by-project approach that has been taken to acquisitions have both contributed to this. An acquisition plan for DCP purposes should give explicit consideration to how that capability might be delivered. In other words, Defence must consider both demand and supply aspects in their forward planning. Explicit consideration of the industry capability necessary to deliver future projects would also assist in present-day decisions, which have the ability to impact on the development of the industry capability into the future.

Within such a better approach to planning, consideration must be given to smoothing Defence demand. Less lumpy and more predictable demand has benefits for a more sustainable industry sector, but also a more efficient sector as private businesses are more prepared to make critical investments in skills, infrastructure and innovation.

There are two areas where Defence could make changes to demand management:

A. Bring forward replacement of *ANZAC* fleet

Notwithstanding changes in work-practices and technology, experience with the Destroyer Escorts, DDGs and LPAs has shown that major mid-life overhaul and re-equipment programs are very expensive for the capability achieved.

Further, the many constraints imposed by the original design tend to militate against achieving significant capability improvements and the required post-upgrade life expectancy.

Major refits/upgrades usually occur at a ship's half life (ie 15 years), but modern technology changes, equipment retrofits, and modular construction of modern warships means such upgrades may be required more frequently to maintain state of the art and inter-service and inter-nation interface capabilities (eg with the US Navy/Military forces).

Alternatives to major mid-life upgrades such as earlier platform replacement or evolutionary build programs might provide more cost-effective capability solutions.

The DMO has written[56]:

[56] NSR Sector Plan, pp 12-13.

> "There may be substantial scope for reducing industry (and hence Defence's) costs through modest modification to Defence's pattern of demand. Industry costs, and necessary levels of capability in key skill and infrastructure areas, are heavily influenced by peak demands. Were there scope for smoothing the demand profile to lower the peaks and raise some of the troughs, the benefits may be substantial, conceivably including increases in the value of the capability that is delivered. This could flow from changes as simple as modified timing of delivery schedules through to a more fundamental change to the age at which vessels are replaced.
>
> "Navy's future construction demand would ideally be managed in such a way that it contributes to a sustainable and efficient NSR sector. Changes could be made to capability planning processes, construction strategies and financing arrangements that would help to smooth out demand, and give the NSR sector improved prospects of sustaining its capabilities and skills.
>
> "Varying the length of ships' in-service lives may also have effects on the sustainability of industry skills, and may have cost benefits for Defence. Recent Defence analysis indicates that the current strategy of replacing naval ships only after their designed hull lives have expired (about 30 years) delivers the worst annualised value, and that replacement after 20 years would achieve optimal annuity value - largely by dispensing with the need for expensive mid-life upgrades, and imposing a regime of more regular system upgrades. Theoretically, a shorter in-service life would allow for a more continuous build and replacement cycle, and a net cost/capability benefit for Defence."

The DMO analysis suggests that if the current mixed class combatant force of 14 ships are considered as a whole, it may be feasible for Australia to adopt a rolling build program in relation to major naval surface combatants.

In other words, it may be feasible to shorten the effective lives of current warships, avoiding costly mid-life upgrades and allowing our naval fleet to more easily adapt to new technologies. The indirect benefit is that Defence demand for new warships becomes smoother, more predictable and better able to sustain (and improve) industry capability.

Under this approach, Australian ships could be sold on the second-hand market before their half-lives, with Australian ship construction replacing the ships so sold. This approach would apply for ANZACs as well as FFGs for which there is a proven market. Many countries in our region are actively seeking to increase their navy capabilities, but find the cost of new major warships prohibitive. Supplying these markets with second hand Australian ships would facilitate meeting this demand (see also section below on exports generally), as well as providing a revenue stream for Defence to meet the costs of continual replacement.

<u>B. Fairer sharing of repair and maintenance work</u>

Defence has applied a policy that all repair and maintenance (everything except major upgrades) will be done at locations within 100km of where the ship is based. Navy's fleets are based in Sydney and Perth. The intent of the policy was to avoid crew leaving their home port during ship maintenance periods. The effect of the policy is that virtually no repair and maintenance work will be available for Victoria ahead of the next major upgrades to the *ANZAC* frigates (excepting warranty work).

This decision by Defence is despite entering through life support (TLS) agreements for life-of-type with shipbuilding primes. Tenix was initially contracted to maintain a TLS service capability at Williamstown for the *ANZAC* fleet, but has been released of that obligation.

This policy prevents Victorian firms participating in repair and full cycle docking work. There is some evidence to suggest that the factors that led to Navy declaring a policy on the location of this type of work do not fully justify the policy reached. It is possible for the

crew to remain in their home location during protracted periods of ship maintenance and for the contractor to assume some of the responsibilities currently performed by Navy. The Victorian Government notes that this policy has been relaxed for the support to submarines (done in South Australia) and for the repair and maintenance work on surface ships in Western Australia (where repair work is done along the Western Australia coast outside the 100km policy). Surface ship repairs on the East Coast remains the anomaly.

Some have suggested that undertaking repairs away from home port has implications for personnel. But if the ship's company were to be removed from the ship they could be located with their family, take leave or undertake required training courses. The BAH Study [57] proposed an option involving the establishment of a port logistic team of approximately 10 specialist people, permanently located at each repair and maintenance locality. This team would replace the ship's company during all repair and maintenance activities and provide the critical interface between Navy and the ship repairer.

The cost of implementing this model was estimated in the BAH study to be approximately $1 million per annum per port logistics team. However, this might be offset by greater savings by allowing more repair and maintenance availabilities to be conducted outside Sydney. It is pertinent to note that not all of a ship's company may find the proposition of being temporarily located away from a home port unattractive.

Sharing repair and maintenance work would create an opportunity for supporting a more diverse national capability going forward.

3. Support export market development

A single government rarely has the buying power or the military demand to sustain domestic economic production of the highest value defence equipment. Nor can government demand alone generate within their national industry the range of technological capability needed to meet their military requirements.

Developing markets in other countries is difficult. The Allen Consulting Group states[58]:

> "The Australian naval shipbuilding sector should be considered in the context of an international industry characterised by substantial barriers to trade. Government purchasing policy and subsidies have distorted the global market for warships to an extremely high degree and no matter how internationally competitive a particular shipyard may be, the lack of anything resembling a level playing field means it is very difficult for it to succeed internationally. Tenix's success, in the face of strong international competition, in winning the contract to re-build much of New Zealand's Navy under *Project Protector* is both very rare and a tribute to the competitiveness of Australian industry."

Substantial assistance from the Commonwealth Government is generally required for defence industry exports. This stems from both the need for government-to-government negotiations on market opportunities, as well as providing credibility support – ie "why would other governments buy warships from an Australian company if the Australian Government doesn't?" Exports are also more feasible where they leverage off a planned local production run of a particular class of vessels.

Provided this assistance is forthcoming, there are some emerging opportunities ahead for naval exports that Australia could pursue, and indirectly sustain our local capability for the

[57] Study prepared by Booz, Allen Hamilton (BAH) into the repair and maintenance of naval ships on the East Coast of Australia, commissioned by Defence as part of the development of the NSR Sector Plan.
[58] ACG, op cit, page i.

future. According to one major international supplier[59], the global naval shipbuilding market is expected to grow by 20% between 2001 and 2008 and reach a total value of more than US$30 billion.

The Asia-Pacific region is one of the largest arms markets in the world, procuring roughly US$150 billion in weapons and related services between 1990 and 2002. US Government analysts expect this trend to continue throughout the foreseeable future.[60] The characteristics of this build-up suggest that Australia will need to maintain a robust defence industrial base for at least the next several decades, particularly as it pertains to maritime security.

A review[61] of the acquisition policies and practices of the largest Asian-Pacific militaries reveals that buyers are seeking more sophisticated capabilities, particularly long-range precision strike, command and control and intelligence systems. Buyers have determined that the development of an open-ocean "blue water" naval capability is an important facet of nation power.

In particular, China, India, South Korea, Japan, Taiwan, Singapore and Thailand have launched ambitious naval acquisition programs intended to provide their respective militaries with greatly increased regional power projection capabilities. These efforts will dramatically increase the region's number of advanced diesel-electric submarines, aircraft carriers, amphibious assault ships and destroyers and frigates with long-range air and missile defence systems.

Defence exports are hard won, and generally require significant involvement of national governments. The Australian Government must increase its support to Australian shipbuilders to exploit export opportunities.

[59] Thales, 2004.
[60] Bitzinger, APCSS, 2004.
[61] Firecone/CRA, 2005.

APPENDIX 1

A PUBLIC VALUE APPROACH TO NAVAL SHIPBUILDING: PROCUREMENT

This submission has presented the contextual elements that should affect decisions on where to source new major warships. These factors are wider than those typically used by narrowly-focused procurement offices.

A recent discussion paper from the UK Cabinet Office[62] suggests that the concept of "public value" offers a useful way of setting out the ultimate goals of public service activities and decisions. It makes the case that public value can help to avoid the narrow and over-simplified approaches that have sometimes dominated in the past.

The concept of public value is an attempt to measure the total benefits which flow from government action. The concept of public value provides an appropriate yardstick against which to gauge the performance of policies and public institutions, make decisions about allocating resources and select appropriate systems of delivery. [63]

The concept of public value is central to expenditure on defence capability, as the returns to the community of maintaining a defence force are not tangible. Decisions on increasing defence expenditure requires an assessment of what the public is prepared to give up, in terms of tax revenue or other public expenditure, in order to fund defence activities. Defence expenditure is based on legitimacy – defence capability should increase where the public continues to derive value from its provision, above the sacrifice it makes for funding it.

Within this realm of public value, all decisions that affect public value must be considered. A decision to increase defence capability must take account of the overall public value, broadly defined. Decisions on procurement must also look to implications beyond single projects. Tender evaluation between local and overseas build options must balance:

- the cost differential of production;
- costs of modification to offshore purchases;
- implications for R&M and TLS costs (both the ships in question and other Navy ships that can benefit from enhanced local capability);
- residual benefit embedded in local industry that will reduce costs for future projects – this is akin to a further dividend payable to Defence from the investment in local capability; and
- wider economic benefits (including those benefits that flow back to Commonwealth budget);

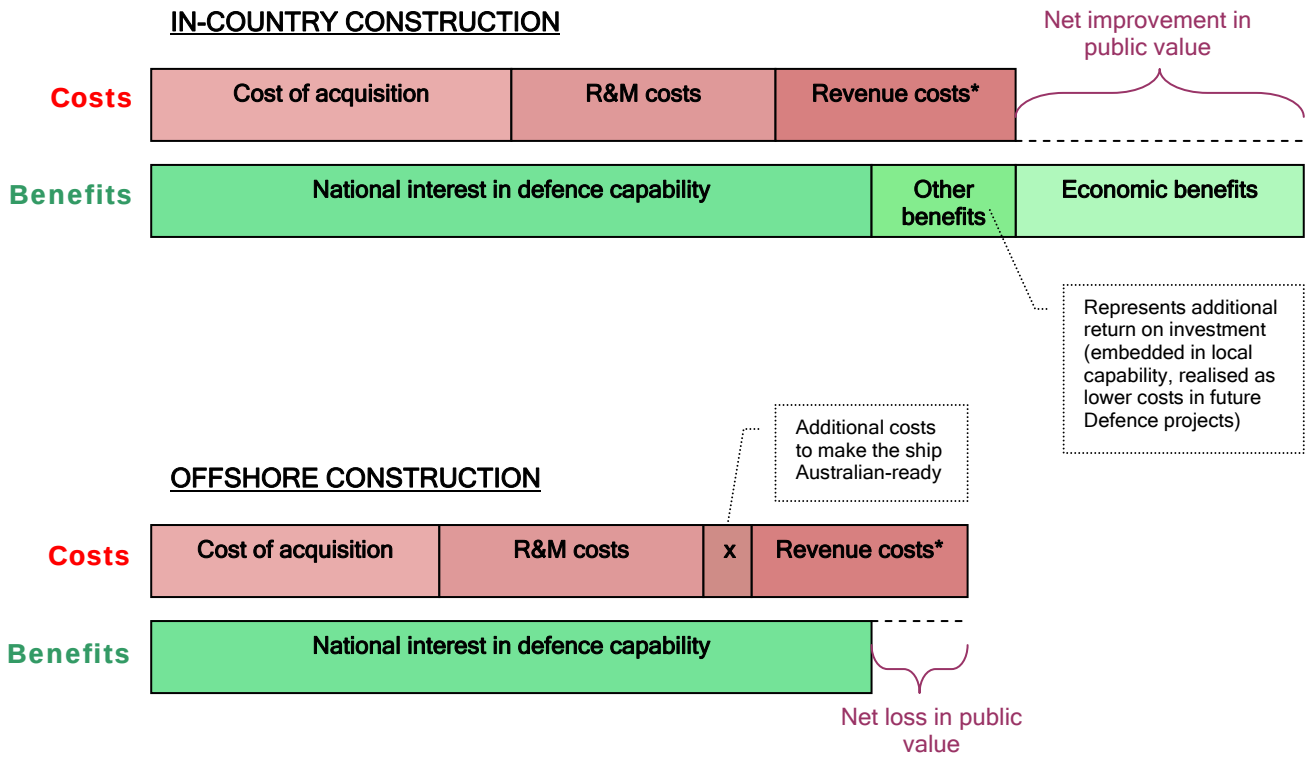
as all these elements affect how the public derives value from the increased defence capability.

But perhaps most importantly, the public value framework must recognise the objective of self-reliance, and where achieving self-reliance is at risk, the contribution that individual projects make to self-reliance.

[62] Gavin Kelly, Geoff Mulgan and Stephen Muers, "Creating Public Value: An analytical framework for public service reform", Strategy Unit, UK Cabinet Office, March 2005.
[63] There is an emerging literature making use of the concept of public value. See Moore *Creating Public Value* (1995); Bozeman *Public Value Failure: When Efficient Markets May Not Work* Public Administration Review (2002) and Jackson *Public Sector Added Value: Can Bureaucracy Deliver?;* Public Administration (2001).

The following Box gives an illustrative, hypothetical example comparing two procurement options. Both options deliver the same defence capability, and therefore have the same 'national interest' value in delivering Defence's strategic needs. However, in-country construction provides further benefits that are not realised with off-shore procurement. Even where the cost of acquisition is considerably cheaper offshore, the scope to deliver better value for the public is much higher with in-country construction.

BOX 1: Delivering public value in warship construction



** Note: 'Revenue costs' represent the additional economic cost of raising taxation to fund public expenditure, sometimes called 'deadweight loss', or more accurately 'excess burden of taxation'.*

The quantification of these cost/benefit elements cannot be known ahead of a specific project. The key is to use the tender process to gather information on these elements, and evaluate them in the above framework. Some elements will need to be estimated by Defence based on the particular project.

The above approach reflects an appropriate framework for decisions on incremental increases to defence capability. Public value is also affected by impacts resulting from a series of successive decisions.

The above comparison therefore needs to include (in the "other benefits" element of in-country construction) a value to reflect how the decision is likely to contribute to sustainability in the longer term, or more importantly, the contribution that a particular in-country construction program makes towards achieving a self-reliant local NSR sector, both in terms of level of workload and the desired characteristics of a self-reliant sector outlined in this submission.