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Innovation Procurement – *Lessons for Australia*



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Australian Industrial Transformation Institute

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Executive Summary

Australia Public Procurement Needs Reform to Achieve its Strategic Purpose

This report outlines the strategic value of a thorough-going reform and reorientation of public procurement policy and practice in Australia. This would align with the purpose of using public procurement (in conjunction with other policies) to work in fulfillment of wider and more ambitious strategic goals for Australia's economy, society, and environment.

New public procurement practices should work in tandem with a revived industrial policy on a dual mission to reindustrialise Australia and accelerate the decarbonisation of our economy.

Across advanced economies strong demand-pull policies of public procurement are in use to stimulate and accelerate the development of new products, services and technologies. The principle at work is to use the immense demand-pull and purchasing power of the public sector in a directional manner to bring into existence these new products, services and technologies – where the unassisted private market would not.

Public purchasing power is deployed to create and capture national economies of scale, as well as to use that purchasing power as a demanding lead customer with detailed knowledge of the nature of the problem to be solved, able to drive technical improvement along the value chain. The focus is on capturing technological advantage and spill overs, and industries vital to effective national sovereignty, and the avoidance of excessive external reliance: communications technology, electronics and software, aerospace, medical technologies, and especially defence.

A deliberate focus on understanding not only purchase price but whole-of-life costs and the functional requirements of the new product, service or technology over technical specifications naturally support application of new knowledge and innovations.

In the literature, these policies and practices are variously termed 'advanced procurement', 'advanced procurement as industrial policy', 'technology procurement', 'innovation procurement', and 'public procurement of innovation'. For convenience we follow the OECD and EC in choosing innovation procurement to cover all of these.

Innovation Procurement

Innovation procurement expands the traditional concept of public procurement from not only 'how to buy' but also 'what to buy', whilst avoiding prescription of the technology or product to be procured: the focus is on the problem to be solved.

The three forms of innovation procurement are discussed and defined:

- Pre-Commercial Procurement (PCP): purchase of research and development services for solutions to a problem in advance of production or the making of the product
- Public Procurement of Innovation (PPI): the public sector becomes the 'launching customer' to provide scale for a product, process or service at higher Technology Readiness Levels close to production
- Innovation Partnership (IP): a longer-term Innovation Partnership between the public sector and collaborating firms across research and actual development and production of the innovation.

A recent multi-nation comparative study has found a strong relationship between performance in innovation procurement and economic performance as proxied by GDP per capita. In the OECD, public procurement is equivalent to 14 per cent of GDP. Of this, innovation comprises around 10

per cent, or about 1.8 per cent of GDP. Targets are applied to deliberately increase this share. The European Commission has set a target for Innovation Procurement to attain a share of 20 per cent of overall public procurement (consisting of 3 per cent PCP (pre-production research and development) and 17 percent PPI (purchase of innovative solutions)).

In Europe the focus on procurement to capture technological advantage has been supplemented over the past two decades by use of public procurement to meet broader goals such as post-GFC and post-COVID recovery and providing solutions to long-term challenges like decarbonisation and an inclusive economy. This has expanded European public procurement policies to now include broad infrastructure for health and ageing, and construction and transport, with emphasis on greening and smart cities, and finally, general public services including public safety. There is strong political leadership and advocacy for the approach, with official directives, enabling frameworks and tools, and setting of targets.

Innovation Procurement – Key Success Factors

Key success factors for innovation procurement undertaken in other jurisdictions are a guide for Australian policymakers. These include: the existence of leading institutions of innovation procurement with clear mandates and visions; linking to society-wide challenges; applying functional requirements ahead of technical specifications; applying a broader conception of cost rather than simple purchase price to the problem to be solved; using a pragmatic and stepped approach to build scale, competence and ambition; translating ambitions into actions and commitments through a strategic policy framework and an action plan; building the capacity of procurement organisations; high quality continuous stakeholder engagement, including early and extended supplier and vendor engagement; ensuring opportunities for SME and start-up participation.

In accord with these key success factors, a major benchmarking study has ranked 30 nations on innovation procurement by assessing evidence for the presence of the following features in each country's procurement systems: common definitions and understanding of innovation procurement; horizontal integration of innovation procurement with other policies such as the economy and finance; use of ICT to foster innovation procurement; innovation procurement embedded across different sectors of public sector; evidence that innovation procurement is operationalised in action plans; evidence of investment spending targets for innovation procurement; evidence of a monitoring and evaluation system; the use of incentives to practice innovation procurement; evidence of measures to build the capacity and professionalism of procurement entities; and finally innovation-friendliness evidenced through IPR ownership rules benefiting industry, use of value for money criteria over price, use of variant offers, use of preliminary market consultations, open market consultations, market-focussed dialogue, industry forums, meet the buyer events, etc.

Strategic Procurement Incorporating Innovation Procurement

Australia can apply these key success factors to its procurement practices to optimise outcomes. Innovation procurement is a practice aimed at the production of advanced products, services and technologies that the private market will likely fail to bring about. It applies often at high levels of economic complexity and knowledge intensity. It presupposes already-existing medium to high levels of complexity. Additionally, it should be noted that not all instances of innovation procurement in the international literature are especially strategic in the wider sense of being oriented to largescale challenges.

These observations are important for Australia, which should adapt rather than blindly imitate successful practice from overseas.



Because of deindustrialisation, Australia has relatively low complexity and correspondingly fewer opportunities for application of innovation procurement at the frontiers of new technological breakthroughs. This is not an argument against applying innovation procurement. Rather it is one in favour of using innovation procurement within a broader structured framework of strategic procurement. This means using procurement as an important part of Australia's program for reindustrialisation and accelerated decarbonisation. Projects can be innovative without largescale strategic significance.

Strategic procurement means procurement directed at fulfillment of explicit largescale economic, social, and environmental goals, such as reindustrialisation also geared to decarbonisation. In this connection strategic procurement, incorporating innovation procurement, focusses primarily on gaining competences and capacity at critical points of the value chain to answer and respond practically to the question: what must we be able to do to achieve our goals for decarbonisation and reindustrialisation? What are the critical and decisive points (economic activities) that we must capture to achieve the interdependent goals of reindustrialisation and decarbonisation?

A key element of strategic and innovation procurement is mapping of, and an interventionist orientation to, key value chains.

Australia Lags Global Best Practice

Australia vastly underplays the potential of its largescale purchasing power to spur innovation and the development of new products, services, technologies and industries. Over the past three reported years the Commonwealth has expended \$190 billion on purchasing from external providers. Expenditure by states is additional to this. This report describes Australia's lack of strategic framework for use of public procurement for economic, social and environmental benefit. This judgement includes the Australian Industry Participation Plans, which presently lack specific focus on capturing critical knowledge-intensive, high-value activities within major projects and value chains, and apply weak dollar value definitions of industry participation, without mandating a minimum level (value) of local content. Certain state plans exhibit greater directionality, sectoral focus and concern with innovation, but remain limited in scale and ambition.

Directions for Change – Towards Innovation Procurement

A new national strategic procurement policy incorporating innovation procurement is needed. Recommended actions fall into one of two concurrent streams:

- Actions starting immanently to commence strategic and innovation procurement initiatives linked to reindustrialisation and decarbonisation and through early action plans. This involves starting small and scaling up, allowing for learning by doing and feeding into medium term actions
- Medium term actions to build a robust national framework for strategic and innovation procurement across the Commonwealth and states.
- Review and reform of the Australian Industry Participation framework and policy to become a much more strategic contributor to economic innovation, sovereign capability and domestic value chain development

Decarbonisation and Reindustrialisation (Start now)

This stream would commence early and involve devising action plans, focussing on value-adding in resources through domestic processing and Renewables and low emission technologies priority areas. A small team would lead opportunity identification and development from of a portfolio of projects, in the form of action plans. The key actions are outlined later and include

direct industry targeting based on prioritisation of projects and detailed value chain mapping to identify high-value projects, aimed at linking reindustrialisation to decarbonisation. Lessons here would inform the development of the national framework.

This stream of near-term actions would also include

- Review and reform of the Australian Industry Participation framework and policy to become a much more strategic contributor to economic innovation, sovereign capability and domestic value chain development, and
- Consideration to inclusion of innovation goals in the Infrastructure Australia charter.

Build the National Framework (Medium term)

Concurrent with this urgent work, a separate stream of activity should be directed to creation of desirable systemwide features to operate over the longer term. This should be linked to the eventual launch of flagship mission-oriented projects focussed on reindustrialisation and decarbonisation. This entails:

- Building a national framework guided by a national action plan guided by explicit targets
- Starting with reindustrialisation and decarbonisation, progressively embedding strategic and innovation procurement in key facets of public sector activity, including as a driver of public sector and service delivery innovation
 - This to include targets and KPIs, including ones to increase the proportion of overall procurement accounted for by strategic and innovation procurement (PPI, PCP, IP)
- Progressively build capacity for strategic and innovation procurement linked to other industry development policies, programs and instruments, by employing a national ecosystem approach
 - This to include dynamically linking existing living labs and factories of the future, industry clusters, incubators, and open events such as workshops
- Build the capacity and capability of procurement bodies through measures of training, model templates, manuals, and guides
 - This to include consideration of an Innovation Procurement Capability Network and IPC Unit
- Work to build scale by maximising cooperation and joint procurements with states, as well as bundling demand across projects where these have strong complementarities
- Consider sharing or fully allocating IPR ownership to contractors in public procurements.

Recommendations

RECOMMENDATION 1: Mandate an Innovation Procurement Pilot Targeting Decarbonisation and Reindustrialisation

Policymakers should mandate innovation procurement pilots projects for early action. This should involve devising action plans focussing on priority areas. It should appoint a team to lead opportunity identification and development. The team would identify high-value projects in support of reindustrialisation and decarbonisation. Lessons here would inform the development of a national framework.



RECOMMENDATION 2: Review Commonwealth Procurement Rules and Infrastructure Australia Charter

That concurrent with the pilot program, consideration should be given to further reform of the AIIIP to take greater account of strategic procurement incorporating innovation procurement, and of the imperative of Australian reindustrialisation.

That consideration also be given to inclusion of innovation goals in the Infrastructure Australia charter.

Review and reform of the Australian Industry Participation framework and policy could see it become a much more strategic contributor to economic innovation, sovereign capability and domestic value chain development.

This process should include encouragement to states to consider stronger directions as well as stronger industry targeting, based on regional specialisations.

RECOMMENDATION 3: Work on a National Framework and Action Plan for Strategic and Innovation Procurement

That consideration be given to building a national framework for strategic and innovation procurement, guided by a national action plan in turn guided by explicit targets. This is a medium-term proposal, taking on board lessons from the reindustrialisation and decarbonisation pilot, to progressively embed strategic and innovation procurement in key facets of national public sector activity, including as a driver of public sector and service delivery innovation.

It is envisaged that this function would reside in the Department of Finance with strong links to the Industry portfolio.

RECOMMENDATION 4: Set Targets for the National Framework

That the Framework include targets and KPIs, including ones to increase the proportion of overall procurement accounted for by strategic and innovation procurement (PPI, PCP, IP), reflecting international trends.

RECOMMENDATION 5: Adopt an Ecosystem Approach

That the capacity for strategic and innovation procurement linked to other industry development policies, programs, and instruments, be augmented by employing a national ecosystem approach. This should include dynamically linking existing living labs and factories of the future, industry clusters, incubators, and open events such as workshops.

RECOMMENDATION 6: Focus on Building Capacity and Capability of Procurement Bodies

Build the capacity and capability of procurement bodies through measures of training, model templates, manuals and guides, including establishment of an outward-looking Innovation Procurement Capability Network and Innovation Procurement Capability Unit within the Commonwealth Department of Finance, working closely with the Industry portfolio.

RECOMMENDATION 7: Build Scale Through Joint Procurements, Cooperation and Demand Bundling

That there be deliberate focus on work to build scale by maximising cooperation and joint procurements with states, as well as bundling demand across projects where these have strong complementarities.

RECOMMENDATION 8: Review Intellectual Property Rights

That the Framework give consideration, on a case-by-case basis, to sharing or fully allocating IPR ownership to contractors in public procurements.

Further Reading and Research

The international literature and practice on innovation procurement are vast, including large and detailed manuals aimed at informing procurement bodies, practitioners and industry and the market. Many such aspects are not able to be considered here, such as detailed exposition of the different stages of innovation procurement processes, key decision points, etc. However, key sources relevant to such topics are indicated. Further, these more detailed issues could become the subjects of further papers if desired.

This paper should be read in conjunction with another AITI report *Manufacturing Transformation: High-Value Manufacturing for the 21st Century*.



1 The International Return of Industry Policy

In many advanced economies today, old truths and certainties are being challenged and sometimes overturned. The climate crisis, the GFC with its aftermath of stagnation and heightened inequality, and the COVID pandemic, have changed the minds and policies of many governments and their economic advisers. The positive roles of government in the economy are being recognised and applied where previously the notion of public intervention had been anathema. Many now support public intervention and leadership beyond that acceptable previously.

Although it is far from universal or uniform, many advanced nations are retreating from the former orthodoxy of ‘the best government is the least government’. The idea that government should confine its economic roles to macroeconomic stabilisation and correcting occasional ‘failures’ in a generally ‘perfect’ market, has gone under.

This can be seen in the take-up of ambitious and expansive ideas of active industrial policy. Where minimal government was supposed to deliver for everyone, and policies targeting the development of specific sectors was seen as self-defeating and leading to inefficiency, modern active industrial policy is today widely recognised as critical to finding new sources of growth that are inclusive of all citizens, and addressing system challenges ranging from climate change to galloping social and economic inequality (Rodrik 2014; Aiginger and Rodrik (2020).

This means that industrial policy increasingly goes beyond support for particular sectors (although specific sectors are targeted) into active future-oriented directions-setting to help solve several problems simultaneously: providing new sustainable and inclusive sources of growth and jobs, ensuring the nation has the industrial capabilities required to defend itself and guard against external shocks, capturing sectors and activities that yield higher returns and spill-overs to society, and finding the solutions to largescale challenges like decarbonisation and inequality.

Aiginger and Rodrik (2020) and others (European Commission, 2017; Mazzucato, 2011, 2014, 2015a, 2015b, 2018a, 2018b; Mazzucato, Kattel, & Ryan-Collins, 2020) have provided an account of the rebirth of industry policy emphasising its role as problem solver for societal problems such as climate change, requiring mission-oriented policies and projects.

Industrial policies are then about helping to steer a nation’s industrial structure in desired directions. They go beyond generalised business support aimed at market failures and impediments, instead starting with identification and confirmation of an opportunity, defining the best ways to develop the opportunity, then devising the strategies, programs and policies required, forming a continuous cycle (Australian Industrial Transformation Institute, 2021; Worrall, 2022a, 2022b, 2022c). Aiginger and Rodrik (2020) stress that industry policy should take the high road of innovation and leveraging endogenous growth sources – stimulating new knowledge-intensive output - rather than zero-sum curbing of trade flows and volumes.

1.1 The Role of Public Procurement

Such ‘high-road’ broad-based innovation policy leavers include advanced strategic public procurement, promotion of industry clusters and networks of research and development and innovation bodies.

The US and Europe make explicit use of public procurement to stimulate local industrial activity and innovation. This includes building out value chains (promoting areas of national self-

sufficiency) and stimulating the potential of SMEs, and building the ‘complexity’ (knowledge intensity) of the economy. These public procurement policies will be surveyed and defined in greater detail in section 5. Here only their general characteristics and principles are outlined.

These practices are variously called ‘advanced procurement’, ‘advanced procurement as industrial policy’, ‘technology procurement’, ‘innovation procurement’, and ‘public procurement of innovation’. This distinguishes them from general government contracting involving buying standard goods and services from off-the-shelf. The practices are aimed at bringing new products, services and processes into existence when a fragmented market will not, or only slowly or only partially.

These practices represent transformed concepts of how to buy, and what to buy. ‘What to buy’ here focuses on the problem to be solved and the functional requirements sought, rather than prescribing particular products or technologies. Public procurement takes on a leading role. Procurement goes from being an administrative function, to become strategic. It looks to not only procure goods and services but also additional future benefits to the economy, society and the environment (European Commission, 2021).

Innovation procurement is the term used here to cover the broad field of literature and practice concerned with the public sector operating as a lead customer to drive innovation and capture its benefits. At times this will involve Pre-Commercial Procurement of research and development (in advance of production), Public Procurement of Innovation (where the public sector becomes the ‘launching customer’ for a product, process or service at higher Technology Readiness Levels (TRL) close to production at scale), or to a longer-term Innovation Partnership between the public sector and collaborating firms across research and actual development and production of the innovation (section 5).

The key principle of innovation procurement is to use the large purchasing power of states to create and capture national economies of scale, as well as to use that purchasing power as a demanding lead customer with detailed knowledge of the nature of the problem to be solved, able to drive technical improvement along the value chain.

Typically, this is done with an emphasis on sectors with potential to yield technological advantage and spill overs, and that are vital to effective national sovereignty, and the avoidance of excessive external reliance in key areas including: communications technology, electronics and software, aerospace, medical technologies, and especially defence.

Whole of life costs are privileged over direct capital costs in making procurement decisions. This tends to favour local activity, as well as local innovation, as it takes account of cheaper maintenance and modification, as well as ongoing innovation, close to source. These are strongly demand-pull policies aimed at bringing new products, processes and technologies into existence, moving the nation closer to the relevant technological frontier.

These processes are supported by strong institutional arrangements and capabilities, and across the OECD, National Action Plans often help guide public procurement of innovation processes.

Most recently, the US the Biden Executive Order on supply chain resilience makes strong reference to use of Federal procurement to build domestic supply chains, including ensuring high levels of SME participation, high domestic production levels in awarding of Federal grants, and the Buy American Act (The White House, 2021).



1.2 The Case of Europe

The EU is briefly singled out here as of particular interest. It has explicitly embraced public procurement and innovation procurement especially as a way both of stimulating economic growth and of meeting longer term society-wide challenges and missions. Throughout it has deployed procurement as described above, to create economies of scale in key industries and technology sectors through lead customer relationships, and so forth.

But whilst this is undiminished, over the past two decades it has discernibly added to this a concern to use procurement more broadly. Responding to challenges like the Sustainable Development Goals, then the GFC, climate change and now the COVID 19 pandemic, it sees procurement structures and processes as contributing to the recovery of European economy and society through uncovering new sources of growth and providing solutions to long-term challenges like decarbonisation and an inclusive economy.

Hence the EU has since 2008 especially, increased the scope for its public procurement policies to now include broad infrastructure for health and ageing, and construction and transport, with emphasis on greening and smart cities, and finally, general public services including public safety. Stimulating innovation amongst SMEs is a priority. While the large-scale technology and sector focussed activity has many top-down characteristics, the latter stream of activity has more bottom-up and middle level features and drivers.

Examples of these types of projects include:

- An innovative approach to purchase of implantable defibrillators that helped optimise care costs by reducing hospital visits in favour of remote care, in a move from a device-based to a service-based contract (UK, Spain, Netherlands)
- Several projects aimed at improving public lighting for security and safety and energy and carbon savings
- Cooling systems in a Polish hospital that reduced summer temperatures in patient rooms and reduced air-conditioning costs, specifying functional criteria and using whole of life costing, using solar panels
- Moving to carbon emission-free construction sites in Copenhagen, later spreading to Helsinki and Trondheim, with Amsterdam, Brussels, Budapest and Vienna to follow, and a project in Oslo to ensure that deliveries of goods and service to the city administration are carbon-free
- A hospital bed-moving device at an affordable price that meets the needs of reduced size, environmentally friendly, single person operated, etc.
- Prevention or mitigation of dehydration in people aged over 65, reducing hospital admissions (Denmark)
- Meeting increased demand for transport through greater electrification of heavy traffic (Sweden)
- Improved deployment of telemedicine and telemonitoring in intensive care units for the acutely ill (Germany)
- An Integrated Energy Service Framework Agreement 3 to provide a performance-based contract heating, cooling and electrical systems in which the supplier must guarantee an agreed 'comfort situation', operation and maintenance, energy savings and reduced carbon emissions (Italy).

See OECD (2017), European Commission (2021), and Bos (2020).

How the EU has progressively expanded the scope and ambition of its public procurement policies is mostly explained by political commitment. The European Commission and others have led advocacy of active public procurement policies and its multifaceted uses, together with

provision of enabling directives, policies, guides, benchmarks, performance targets, and so on. Official EU reports state that on average member states are only achieving a quarter of their public procurement potential, and maintain pressure for improvement, such as near-doubling the share of innovation procurement in overall procurement.

Europe (the EU plus the UK, Switzerland and Norway) is estimated to spend EUR 255 billion annually on public procurement, rising to EUR 288 billion when military expenditure is included. The European literature mainly refers to qualitative benefits from a strategic procurement approach such as new products and services, greening the economy and society, growth amongst SMEs, responding to population ageing, greater service quality, and so on.

Estimates of quantitative impact are fewer and partial. There appears to be no estimate of aggregate total impact. As will be seen, there are analyses of the positive correlation of levels of innovation procurement with per capita GDP. Such conclusions are unsurprising and rely heavily on modelling of correlative and causal connections and assume returns from endogeneity, learning by doing and cumulative causation.

However Eliasson's classic study of the Swedish Gripen aircraft project (Gunner Eliasson, 2010) calculated that its 'spill over multiplier' (benefit to the Swedish economy) was at least 2.6 times the original development cost. These types of benefit can arise in large defence projects because of the complexity and interdependency of all parts of the value chain and the wide range of complex problems and challenges needing to be addressed. These benefits are at the very apex of those attainable. It can be assumed that the extent of spill over multipliers will be substantially lower than this in most cases of advanced procurement.

AT A GLANCE: PUBLIC PROCUREMENT IN EUROPE

- Up to EUR 288 billion
- Challenges: new sources of growth, social inclusion, decarbonisation, recovery from GFC and pandemic
- Authorities constantly pressuring member states to do more to face society-wide challenges by using their purchasing power to construct challenges that solve several problems at once
- Constantly setting up framework conditions, promoting increase share of innovation procurement, setting up missions and challenges, targets for doubling of share of innovation procurement
- Public procurement at tech high-end aimed at national scale economies, key technologies and sectors. Top down. Originates in post-war industrial policy and still very much practiced
- Since 2008 (GFC) and pandemic and SDGs, broadening the framework out – health, ageing, decarbonisation, smart cities, etc. More bottom up
- Qualitative benefits (see above examples)
- Quantitative benefits – positive correlation to per capita GDP, at the very top – spill over multiplier of 2.6, others will be positive but lower



2 The Current State of Policy and Practice in Australia

During the pandemic's disruption of imports and international supply chains, Australians learned of the nation's supply chain vulnerabilities, notably our capacity to produce basic protective equipment. This vulnerability has evolved over many years. Australia's position today is the result of a quarter century of deindustrialisation and the lack of a broad based national industrial policy taking account of the strategic importance of manufacturing supply chain robustness and resilience.

Australia's manufacturing GDP share of 6 per cent is the second-lowest in the OECD (and only just above the very lowest, the tiny tax haven of Luxembourg), and is less than half the OECD average manufacturing contribution. Australia is the least self-sufficient country in the OECD for manufacturing, producing the lowest proportion of its consumption requirements for manufactures anywhere in the OECD. Correspondingly, Australia's economic complexity score (an international ranking of the knowledge-intensity of the economy) has fallen to 86th of 133, a decline of 31 places since 1995. This is reflected also in Australia's increasing reliance on extractive and low value-adding resource export industries, such that Australia now ranks below Qatar and the UAE. (Australian Industrial Transformation Institute, 2021; Hausmann et al., 2013; Stanford, 2020).

Much of these represent declining forms of resource extraction in a decarbonising world.

2.1 Australia is Without a National Industrial Strategy

Both in spite and because of this position, Australia lacks a national industrial policy or strategy that approximates those of advanced economies to which we frequently compare ourselves. That is to say, there is an absence of the comprehensive, forward-looking, integrated strategies, policies, programs and objectives that are increasingly characteristic of policy in the US and Europe, and that have been a permanent feature of many successful East Asian nations.

There are programs and discrete initiatives, but not the directions-setting, mission-oriented strategy for reindustrialisation Australia needs: to add value to our immense natural resources, to achieve greater self-sufficiency and sovereign capability, to build new complex knowledge-intensive industries, to benefit economically from decarbonisation and become a renewable energy superpower, to overcome lock-in to declining carbon-polluting industries, and achieve inclusive growth.

Initiatives are under-scaled and disconnected from any set of national missions or objectives. This is true of the Modern Manufacturing Initiative or MMI (\$1.4 billion over four years) and other initiatives (Cooperative Research Centres and Growth Centres), as well as of the recent University Research Commercialisation (URC) Action Plan. Neither of these considers or in any way seeks active use of public procurement toward industrial innovation or development.

They are worthwhile individually but are not equal to the task of reindustrialisation or of having an impact on the nation's industrial structure (see Australian Industrial Transformation Institute (2021); Stanford (2020); Worrall (2022a, 2022b, 2022c).

2.2 No Comprehensive Framework for Strategic and Innovation Procurement

In this absence of industrial policy there is also no national framework for strategic and innovation procurement, that is, for coordinated use of public purchasing to promote innovation, help set directions for future economic development, achieve a desired industry structure, and address society wide challenges and missions.

The sole industries deemed worthy of a dedicated sectoral strategy led by public procurement has been segments of the defence industry, on sovereign capability grounds. With the recent AUKUS announcement on purchase of future submarines, however, this single commitment (the largest of all the defence procurement commitments) is now questionable.

As summarised above and will later be seen in greater detail, new innovative public procurement processes are fundamentally changing decision making about how to buy and what to buy (without prescription of the specific technology or product to be procured). These new practices and processes are enlarging the role and function of public procurement to include a higher and growing proportion of strategic and innovation procurement, the benefits of which are geared to broad costs and value to the purchaser (not simply lowest price) as well as generating wider economic, social and environmental benefit.

The Australian Industry Participation Plan (AIPP) framework, involving Commonwealth and state governments, operates to promote participation by Australian industry in major projects, across the public and private sectors. Therefore, whilst it takes in public procurement, it applies in the period following contract approval. As it concerns public procurement it does not influence greatly what to buy, or how to buy it.

Further, the AIPP's scope and character supports rather than contradicts the conclusion that the nation lacks a framework for innovation procurement as a function of comprehensive industrial policy.

The AIPP framework sets a requirement for an Australian Industry Participation Plan for public sector projects of \$20 million or above, or private sector projects of \$500 million or greater. Definitions are frequently imprecise, allowing slippage and potential for avoidance. 'Industry participation' is defined in dollar terms as percentages of total contract value. No minimum levels of local content are mandated (Australian Industrial Transformation Institute, 2021).

Historically resource industry projects have been a major target for application of industry participation policies and agreements. The ineffectiveness of current frameworks is illustrated by the fact that the sector has grown strongly over the past two decades, whilst its importation of foreign manufactured plant, equipment and technology has ballooned and sourcing from within the Australian economy has declined (Australian Industrial Transformation Institute, 2021).

And like the programs cited above, the local content framework is largely untargeted and disconnected from sectoral strategy and priorities. The weak quantitative (dollar value) local content frameworks do not consider qualitative issues explicitly addressed in advanced procurement practices in Europe and the US: what are the critical technologies and components of the value chain that must be captured to gain long-lasting economy-wide benefits and greater sovereignty? (Australian Industrial Transformation Institute, 2021).

This gap places current Australian practice with respect to industry participation at a vast distance from both advanced industrial policies practiced internationally and from strategic and innovation procurement, the focus of this paper.



3 Lessons from International Experience: A Review of Contemporary Literature on Innovation Procurement

AITI has undertaken an extensive review of the relevant literature, focusing on experiences from the US, European Commission member countries, and East Asian nations such as the Republic of Korea and Japan¹. The review addresses the following questions:

- What are the desired benefits of innovation procurement policies and practices? Why do nations invest in them?
- What types of institutional arrangements accompany successful practice in these nations?
- What defines the major types of innovation procurement specifically?
- What are the key principles for successful practice of these types of procurement? Can we distil common key success factors, common frameworks and processes? What are the key lessons from international experience?

Later these lessons will be brought to bear on analysis and consideration of why and how Australia could apply more active and strategic public procurement policies and practices as significant elements of a national industrial strategy for reindustrialisation.

We argue that in application to Australia, innovation procurement needs to be taken up as an important subset of a strategic procurement framework, geared to Australia's need to reindustrialise and decarbonise.

3.1 Benefits of Innovation Procurement

As previously stated, the broad purpose of Innovation Procurement is to use the massive purchasing power of governments to stimulate local industry development and innovation, focussing on sectors with potential to yield technological advantage and spill overs including communications technology, electronics and software, aerospace, medical technologies, and defence. The principle at play in the application of such policies is: to use the purchasing power of states to create and capture national economies of scale, as well as to use that purchasing power as a demanding lead customer to drive technical improvement along the value chain (Gunnar Eliasson, 2010).

Beyond industrial growth, these practices serve nations' interests in achieving a degree of sovereign capability and self-sufficiency in the face of external shocks, and defence challenges. Increasingly, innovation procurement is also targeting benefits of environmental sustainability, liveable cities, decarbonisation, and inclusive growth.

In Europe innovation procurement is seen as an aid to post-pandemic recovery and an accelerant to the Green Deal. However, benchmarking studies suggest that the European Union is achieving only half the potential of Innovation Procurement to deliver such benefits. (European Commission, 2021).

A recent multi-nation comparative study found "a strong robust relationship between the performance of the countries in PPI (as a percentage of public procurement) and the level of

¹ This paper draws on many valuable sources. References to the vast literature consulted are provided at the end of the document. To help readability, as well as recognising their consistency and similarity of analysis and advice, not all sources are cited in the text. References and citations there are kept to a minimum. However, specific reference is made where a source is especially valuable, or where an issue is signalled without being able to be dealt with.

development (proxied by GDP per capita)” (Bento, N et al 2022, p 2). At the very apex of complexity and sophistication innovation procurement has delivered spill over multiplier returns to the economy of 2.6 times the investment cost (Eliasson 2010).

Innovation Procurement is an explicitly demand-side policy which aims to bring into existence products, services and processes which would not occur within an unassisted market. This means that this form of procurement often operates at or close to the apex of technological development.

Innovation procurement refers to procurement in either or both of the following forms:

- Buying the process of innovation through research and development – the purchaser buys research into something which does not yet exist
- Buying innovation outcomes – the public purchaser does not buy off the shelf but is an early adopter and launching customer of something that has been developed but is new to market.

Other benefits sought through innovation procurement include:

- Higher quality public services on an optimal budget
- Increased ability to anticipate and respond to emerging needs and challenges
- Modernising public services by better matching services to economic, social and environmental needs
- Helping start-ups and SMEs to grow, and building up the supply chain, by acting as a lead customer
- Helping to shape markets to innovation and future needs (European Commission, 2021).

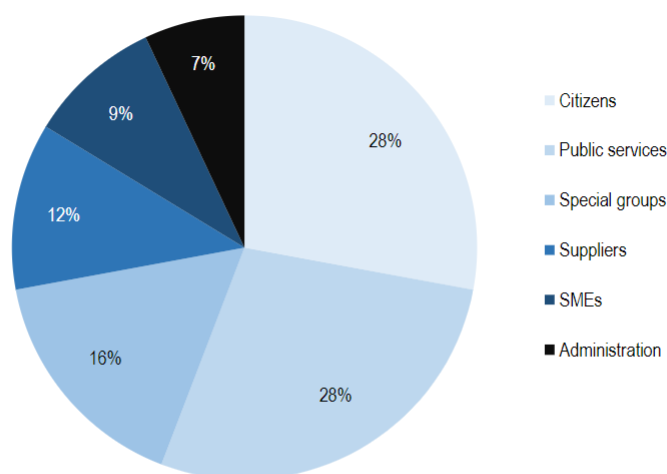
Through structures and processes described below, innovation procurement seeks to anticipate needs, by leading practices that actively shape future markets. This involves fomenting behavioural change in the public and private firms, toward collaboration, greater awareness of demand and technology trends, a longer-term horizon for planning, and closer relationships between public purchasers, vendors and users of the end product or service (Georghiou et al., 2014).

Several studies attest to beneficial results spanning better services delivered at lower long-term cost, increased business revenue and innovation by SMEs, lower carbon footprint, and improved care and service to those needing them.

A major OECD study confirms that innovation procurement can create benefits across the system: for citizens and service consumers, industry vendors, the public sector, SMEs and others (see Figure 1).



Figure 1 - Main Beneficiaries in Procurement for Innovation, According to Good Practice Cases



Source: OECD (2017), *Public Procurement for Innovation: Good Practices and Strategies*, OECD Public Governance Reviews, OECD Publishing, Paris; a distillation of practices from across nations

In the OECD total public procurement is equivalent to 14 per cent of GDP. Innovation Procurement constitutes around 10 per cent of this (see below), but targets are applied to deliberately increase this share. The European Commission has set a target for innovation procurement of 20 per cent of overall public procurement (consisting of 3 per cent PCP and 17 percent PPI, purchase of innovative solutions). (Bento et al., 2022)

A recent extensive comparative benchmarking study of 30 nations concludes that a healthy economy requires that about 17 per cent of its total procurement expenditure be on the form of innovation procurement called public procurement of innovation (as defined below). However this currently accounts for little over half this target figure, at 9.3 per cent (European Commission et al., 2021).

In countries most vigorously pursuing innovation procurement, the critical role of leading institutions is evident (see below). This aligns with the fact that innovation procurement is directional policy aimed at steering outcomes to future societal trends, future technological trajectories, etc.

BOX: THE BENEFITS OF INNOVATION PROCUREMENT

Structured and organised demand side forces propel innovation (application of new knowledge) to the creation of new products, services and technologies help meet emerging needs and challenges. From this flow benefits in higher GDP, better social and environmental outcomes, and improved public sector service provision and responsiveness.

Recommended further reading:

- Bento et al. (2022)
- European Commission (2021)
- Gunner Eliasson (2010)

3.2 Types of Innovation Procurement

Three types of Innovation Procurement are commonly described in the literature. These include Pre-commercial Procurement, Public Procurement of Innovation and Innovation Partnerships.

3.2.1 Pre-commercial Procurement (PCP)

This concerns the R&D phase before commercialisation: it encompasses solution exploration through to limited prototyping and early development at non-commercial volumes, prior to production at commercial scale. Purchase of commercial volumes of the product or service is a subsequent stage. This decoupling is intended to increase flexibility and reduce the risks of committing to a particular technology or solution ahead of full investigation of the full range of potential options.

The public purchaser agrees to share benefits from the R&D with economic operators under agreed market conditions.

The aim is to find solutions at the technology frontier where no commercially stable solution exists or where to be of use, existing solutions require substantial further R&D. Areas commonly nominated for key focus include health care and population ageing, climate change, energy, education, transport and security and defence.

Further aims of PCP are to share risks and benefits between the public and private sectors, benefit from competition between private providers in the various phases of the research, and reduce the public sector risk by separating R&D from commercial development by avoiding vendor lock-in.

Starting the process with several companies and reducing their number through the stages, leverages competitive benefits, allows assessment of alternative solutions and assessment of options progressively, keeping open alternatives and heightening the potential interoperability of solutions eventually found. Processes of this kind are also a learning benefit to the competing businesses, especially SMEs.

In addition, separation of R&D from commercial production allows the exploration of the best possible solutions without being encumbered or slanted by the technology and product biases of the businesses.

The most celebrated PCP largescale program is the US Small Business Innovation Research (SBIR) program, and its derivative programs in the UK, Ireland, the Netherlands and elsewhere, discussed below.

3.2.2 Public Procurement of Innovation (PPI)

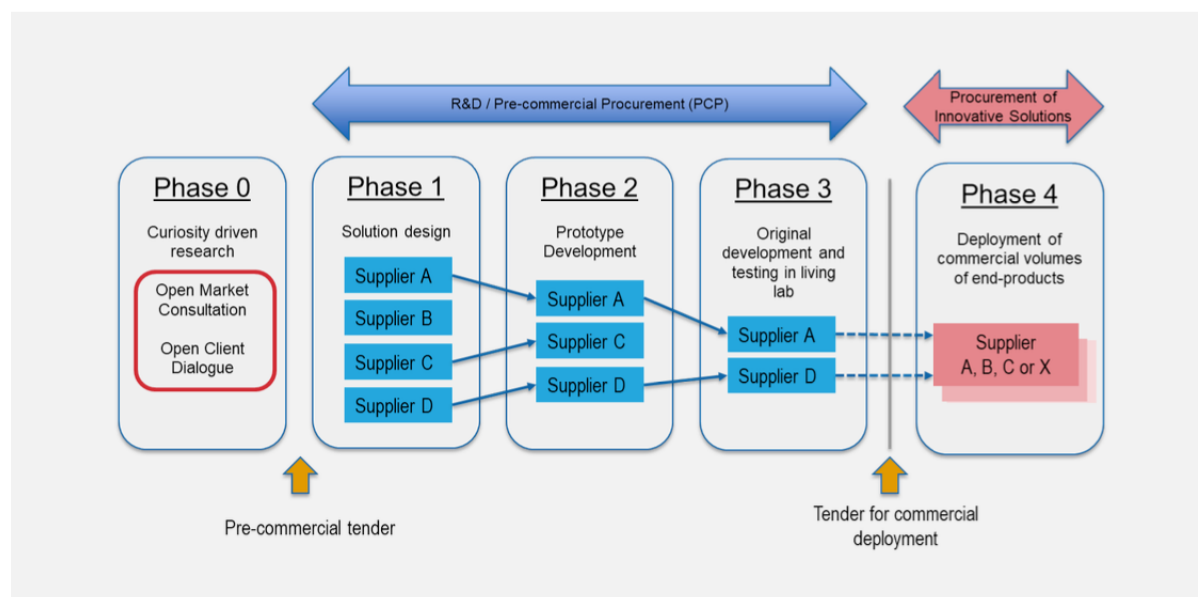
This describes where the public sector has a need that can be met by an innovation that exists or is at a high Technology Readiness Level but is not yet available on a large scale. The public sector acts as the launch or lead customer, not only to provide scale and a market to the products and businesses, but also as a demanding customer to transmit requirements and potential for technical and functional improvements along the value chain prior to full-scale production. A recent multinational benchmarking study concluded that a healthy economy requires its PPI share of overall procurement to be around 17 per cent.

While the PPI focus is on adaptation, adoption, and diffusion, rather than origination (PCP), the two can clearly be complementary in particular instances.

These two types of innovation procurement, as well as the significance of open market dialogue and consultation, and the importance of supplier competition, are illustrated in the following. Note that PCP and PPI could be linked or be separate exercises.



Figure 2: Phases of innovation procurement



SOURCE: European Assistance for Innovation Procurement, The EAFIP Toolkit, Module 2

3.2.3 Innovation Partnerships

The innovation partnership combines the purchase of R&D with subsequent purchase of the products developed, in a long-term relationship. Innovation is meant to occur during the life of partnership, not solely at or prior to contract award. Procurement here combines purchase of R&D with subsequent purchase of the resulting products, services or works (Manika, 2020). This allows public procurers to negotiate private sector suppliers through a multistage process.

Although they contain the potential drawbacks of vendor lock-in and a too-restricted set of choices, the innovation partnership may apply particularly where the public sector needs unique products or services and where there are few vendors able to supply them. The drawbacks are mitigated by attention to quality monitoring and various contract review and contract termination provisions.

The former naval submarine shipbuilding program was of this character. Challenges arise around such issues as vendor lock-in, possible cost overruns, restricted choices in R&D, and possibly lower ability to involve SMEs.

BOX: THE THREE TYPES OF INNOVATION PROCUREMENT

Recommended further reading:

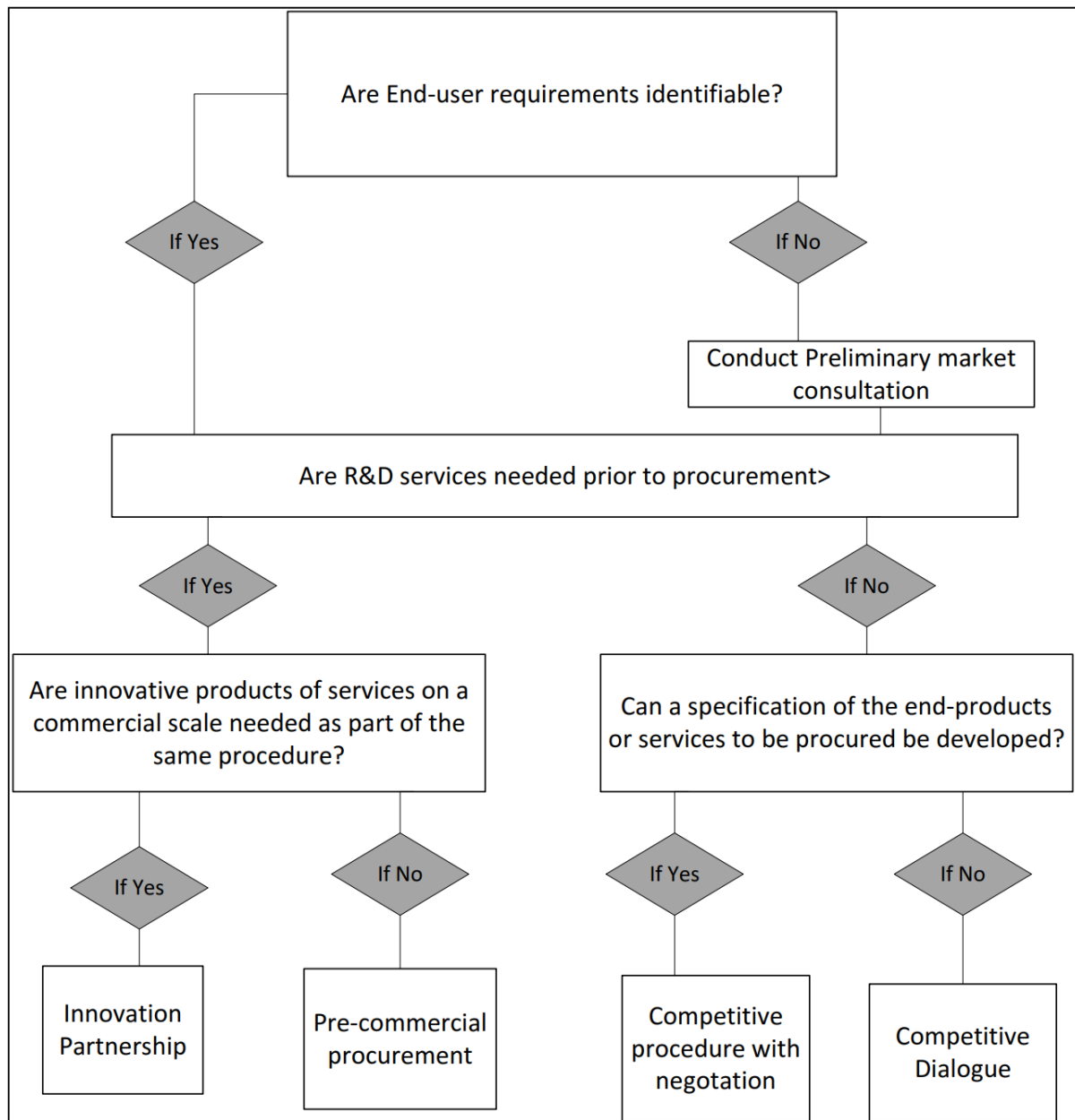
- European Assistance for Innovation Procurement (Module 1, Module 2)
- European Commission (2021)
- Manika (2020)

3.3 Choice of Procurement Procedure and its Rationale

The following graphic sets out the choice of procurement procedure and its rationale according to whether:

- end-user requirements are known fully, or are not known fully (therefore requiring R&D and a PCP process)
- a product or service exists that can meet the need but must be brought into production at scale through government as a launching customer (PPI)
- or a defined need exists but the solution requires a longer-term partnership between the purchaser and the vendor(s), with R&D and production combined (IP).

Figure 3: Choice of procurement path



SOURCE: Rigby et al. (2015)



3.3.1 Traditional Procurement and the Extent of Innovation Procurement

Traditional procurement focuses on the immediate cost or price at the point of decision to procure. Significant innovation is all but impossible. The sale price is prioritised often over quality, long-term functionality or efficiency or whole-life operation costs. Although the aim was lowest cost, the result has often been vendor lock-in, inability to effect improvements and lower value for money over the longer term.

That said it is important to be aware that even in leading countries, innovation procurement averages only a little more than 10 per cent of total annual procurement spending, or 1.8 per cent of GDP (European Commission, 2020a). The European Commission has set a target for Innovation Procurement to increase its share to 20 per cent of overall public procurement (consisting of 3 per cent PCP and 17 percent PPI, purchase of innovative solutions) (Bento et al., 2022).

While it is entirely desirable for nations to set targets to increase the proportion of total procurement represented by their Innovation Procurement, this is a simple reminder of the nature of the bulk of products and services procured by the public sector. This should also serve to underline that innovation procurements should be targeted to high value projects and opportunities with high yield for economic and industry development. It is not possible or desirable to apply these criteria and processes to everything or in a scatter gun way.

Innovation procurement involves challenging processes requiring skilful leadership and orchestration. Its deployment must be targeted.

There is a final point of high relevance to the later discussion of a future Australian framework. Not all public procurement that is of strategic significance for an Australian industrial policy and strategy for reindustrialisation will be innovation procurement in the specific senses outlined above. This is so particularly because of Australian deindustrialisation and the fact that so much of our industry is at a distance from technology frontiers.

A strategy for Australian reindustrialisation will need to use public procurement as not only a spur to innovation at the technical very high-end, but also as an instrument to encourage large scale reshoring of secondary processing industries, and other objectives. This will of course often involve broad based innovation such as a new business model or innovation in business organisation or the approach to the market.

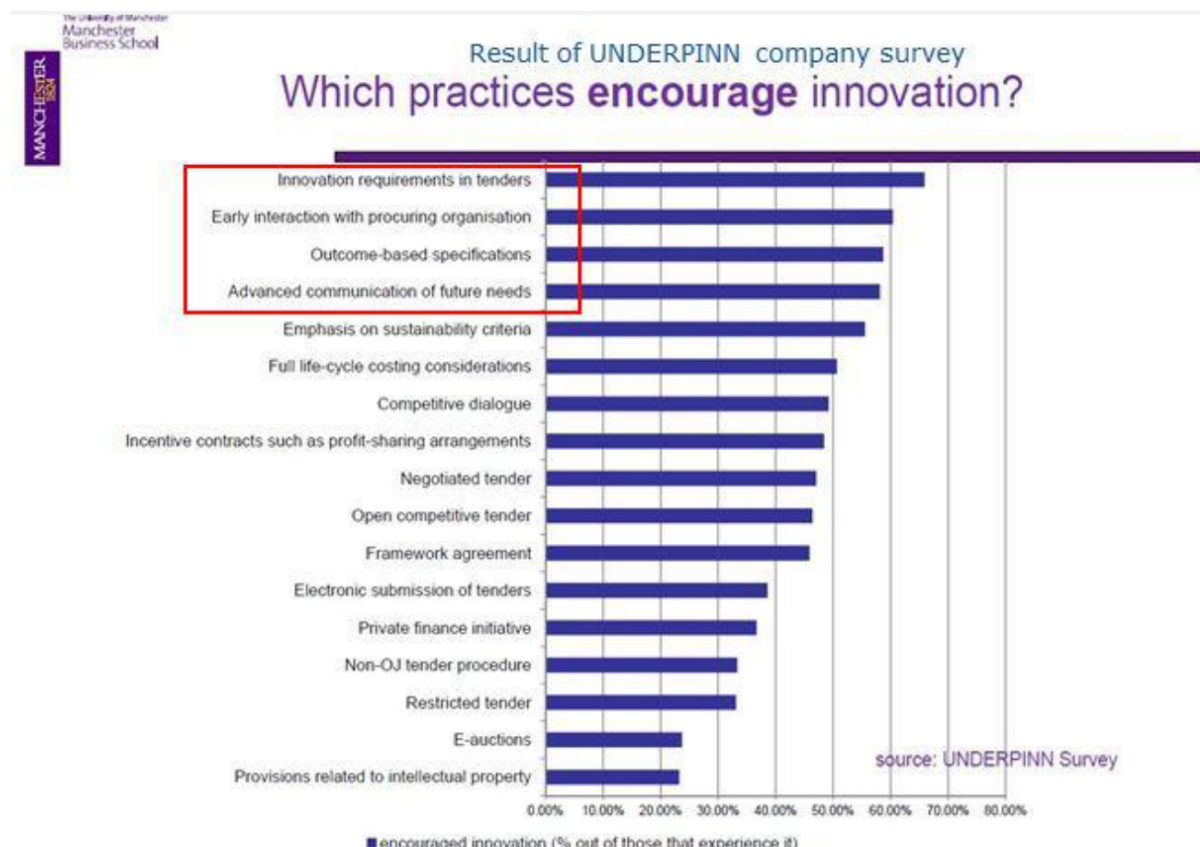
3.4 Guiding Principles and Key Success Factors

The literature allows us to discern certain guiding principles underscoring the successful design and operation of a policy. These can and should inform application to the Australian case.

A major European survey found that the four top features and practices which most encouraged innovation by businesses involved in an innovation procurement were:

- Clear and explicit specification of the innovation requirements in tenders
- Early engagement with the procuring organisation
- Outcome based specifications, or functional specifications about the required characteristics of the product or service, rather than detailed technical specification
- Advanced communication of future needs by the procuring body, allowing businesses time and flexibility to plan how to meet the outcomes and functional specifications.

Figure 4 – Key Factors Promoting Innovation



SOURCE: European Assistance for Innovation Procurement (Module 2)

The following discussion summarises conclusions about the main elements of success from an extensive literature search of leading practices internationally.

BOX: LEADING PRACTICES AND PRINCIPLES

The following discussion concerns a complex of issues including key success factors and the principles of leading practices for applying and deriving benefit from innovation procurement, based on international experience.

Recommended further reading:

- European Commission (2021)
- European Assistance for Innovation Procurement (Module 1)
- OECD (2017)
- Georghiou, Edler, Uyarra, and Yeow (2014)
- European Commission, Directorate-General for Communications Networks, and Technology (2021)

3.5 Leading Institutions

International experience shows the presence of expert and authoritative institutions are critical to long-term success.

3.5.1 United States

In the US, innovation-driven public procurement has been under the direction of a complex of agencies and has brought new industries and capabilities into existence. This originated in the



military and security industries and institutions originating in the Cold War, but since evolving to include additional sectors outside the military, such as energy and health, seeking to develop dual use technologies.

US procurement is described as “a *demand*-based instrument to ‘pull’ new technologies and products into the marketplace through competitive contracts backed by a ready buyer” (Weiss, 2013). This ‘technology procurement’ is distinct from general government contracting (buying goods and services off the shelf, already in existence and known to the buyer) as it actively deploys procurement to bring new goods, services and systems into existence, or adapting existing ones to new ends.

Key examples are the Defense Advanced Research Projects Agency (DARPA) which has led development not only of military but also major civilian technologies, and the Small Business Innovation Research (SBIR) program which solicits proposals for solving high-level problems using incentives including subsidised industrial research and development, insulation from import competition and a guaranteed market and sales on a cost-plus basis see (Weiss, 2013) and Bonvillian (2018); Kattel and Mazzucato (2018); Mazzucato (2011, 2014, 2015a, 2015b, 2018a, 2018b); Weiss (2014)). DARPA dates from the late 1950s, while the SBIR was established in the early 1980s.

In the US DARPA and the SBIR actively deploy procurement and demand-based instruments to bring new goods, services and systems into existence, or adapting existing ones to new ends. The SBIR represents the largest scale and most significant form of PCP encountered in the literature. It seeks a technology, product, or service that either does not exist or requires adaptation to new purposes. Use of the SBIR is mandated in federal law and agencies face sanctions if targets relating to use of the scheme are missed.

This typically takes the form of a challenge-based call for a technology, product, service, or system to solve a cluster of problems. In return the firms receive subsidised industrial research and development, and other benefits. The SBIR program regularly solicits proposals for ways of solving a set of problems: these are high-level topics, seeking ideas rather than prescribing specific technical solutions. Successful firms receive 100 percent funding support to the point of commercialisation, for feasibility and subsequent demonstration of commercialisation potential and usefulness to military and commercial users (Weiss, 2013).

DARPA’s founding mission was of ‘creating breakthrough technologies for national security’ which over its more than 60 years, has also led to huge civilian applications (see Bonvillian (2018); Kattel and Mazzucato (2018); Mazzucato (2011, 2014, 2015a, 2015b, 2018a, 2018b); Weiss (2014)). The key point is it goes beyond funding research to targeting resources and setting directions, brokering relationships between public and private sector players, and driving applications and commercialisation, not just research (Mazzucato, 2011: 76). Its model is of mission- and challenge-based research, in which DARPA program managers define the technology breakthroughs they desire, and then critically examines and sifts the known research proposals or capabilities to select which has the best chance of achieving the breakthrough (Bonvillian, 2018, p. 903).

Over more than 60 years, it has played critical roles in developing the Internet, wireless transmission advances, Microelectromechanical Systems, micro-processing advances, desktop computing, GPS technology, robotics, the ‘revolution in military affairs’ (e.g. drone technology), synthetic biology, computer simulation, etc (Bonvillian, 2018).

3.5.2 United Kingdom

Nations such as the UK, Ireland, the Netherlands now operate extensive programs based on the SBIR model. The UK's Small Business Research Initiative was established in 2001 under the the Technology Strategy Board, and relaunched in 2009 under Innovate UK. The SBRI works on the same principles as the US SBIR. That is to say, the public sector acts as lead customer for a needed product or service that does not yet exist, in response to a challenge. The aim is to demonstrate feasibility of a proposed solution up to prototype stage, before commercial scale production. It is a PCP scheme focussed on R&D only.

But unlike the US, agencies' use of the UK SBRI is not mandated. A 2015 review found a central weakness of the SBRI to date had been the lack of positive leadership and support at the highest levels of agencies, and that the scheme is not used systematically. Whilst it found that the SBRI helps agencies to think more about their operations and policy objectives, it has not yet resulted in the significant behavioural change intended by such schemes. There is not evidence of wide diffusion of new practices under the SBRI.

However the review found steady growth in use of the scheme. It found a high level of support amongst industry with firms indicating the scheme helped their awareness of the existence of new market opportunities, that it helped them explore new markets at low risk and to increase their internal capacity. Early stage networking, precompetitive workshops and similar opportunities promoted collaboration, an awareness of other players in the field and helped define developmental pathways for businesses.

Firms benefited through higher subsequent growth and revenues, involvement in international markets and higher internal capacity. In short, there was more evidence of the SBRI effecting behavioural change in the private, than in the public, sector (Rigby et al., 2015).

3.5.3 Europe

The importance of institutional leadership is also evident in official surveys of the EU and OECD countries, which advocate the adoption of national 'procurement for innovation action plans' either in stand-alone form, or alternatively as elements within other strategies or policy initiatives (European Commission et al., 2021; OECD, 2017).

Hence there is a focus on producing EU Directives, manuals, guides, standards and templates to enable governments to develop comprehensive plans more easily, under overarching high-level strategies. The strategies are especially important in bringing together and coordinating across the several government portfolio areas normally involved, as well as in involving the private sector and communities (OECD, 2017).

There is also emphasis on standardisation of practices concerning innovation procurement specifically (tender specifications, e-procurement, life-cycle costs, production quality, etc.), together with monitoring and evaluation.

The EC Procurement of Innovation Platform provides detailed information and guides, details on assistance available to support innovation procurement, and an online procurement forum and resource centre.

In Europe Austria, Belgium, Finland, and the Netherlands have adopted a dedicated action plan for innovation procurement while Denmark, Estonia, Greece, France, and Sweden have included specific objectives and concrete measures on innovation procurement in wider national strategies or programs, often with a dedicated budget and with a clear commitment of key actors. This is a major contributor to their high performance status in multi-nation benchmarking analyses (section 5.5).



3.6 Clear Mandate and Policy Vision

Leading innovation procurement institutions enunciate a policy vision and communicate clearly and effectively to stakeholders. They forge common directions on the directions sought in line with their policy mandate and action plans. Critically important is advanced communication of future needs by the procuring body, allowing businesses time and flexibility to plan how to meet the outcomes and functional specifications sought.

Targets are important for expressing a strong mandate for action. The US aims for around 2.5 per cent of GDP (annual \$50 billion) on procuring research and development, while the Republic of Korea has a target of 5 per cent of its public procurement on researching developing innovative solutions and 20 per cent on deploying them. Finland is targeting 5 per cent of its public expenditures for innovation (OECD, 2017).

Other nations' targets take the form of shares of innovation procurement support to SMEs (France), spending targets for innovation or innovation procurement (Netherlands, Spain), targets for stimulating procurement for innovation (Netherlands, Belgium and Flanders), targets for overall promotion of innovative public procurement (Denmark), and increased share of domestic high-tech firms involved in innovation procurement (Turkey). (OECD, 2017).

The European Commission has set a target for Innovation Procurement to attain a share of 20 per cent of overall public procurement (consisting of 3 per cent PCP and 17 percent PPI, purchase of innovative solutions) (Bento et al., 2022).

The EC places considerable emphasis on integration of innovation procurement with the key features of its Research and Innovation Strategic Plan 2020-2024, and its focus on a European Green Deal (European Commission, 2020b). As previously stated, emphasis is placed on wide dissemination of robust frameworks, directives, manuals, common standards and guides, to operationalise and give practical effect to the mandate.

3.7 Links to Society-Wide Challenges: Mission Oriented Projects

The literature underlines the importance of linking innovation procurement to broader challenges and themes. These are somewhat misleadingly referred to as 'secondary policy objectives', whereas they can be seen as providing the principal case for innovation procurement, which can contribute substantially to solutions to problems ranging from climate change and decarbonisation, to population health and ageing, to addressing inequality. In so doing, linking innovation procurement and its responsible institutions to society-wide challenges also augments the mandate available to the institutions and players responsible for innovation procurement strategy. The literature frequently refers to linkages to such issues as the UN Sustainable Development Goals, the Green Deal, green procurement and the circular economy.

This has to do with imparting strong directionality to innovation procurement, through mission oriented projects (Mazzucato, 2011, 2014, 2015a, 2015b, 2018a, 2018b; Mazzucato et al., 2020). Only a proportion of the innovation procurement literature extends to this, with much of it focussing on individual projects. Not all the innovation procurement projects studied exhibited strong strategic direction or intent (although many did). But greater directionality comes with:

- Setting directions by defining a challenge and desired outcomes: goals are outcome-based,
- Ensuring the challenge is clearly and accurately defined: experience suggests this should be couched as a target,
- Having leading institutions with core capabilities to coordinate and lead all the relevant partners: researchers, industry, all levels of government, and communities,
- Having measures that allow us to know whether the mission is being achieved,

- Ensuring that there are significant opportunities for the demand-side – final users, the community, and the supply side – businesses, researchers, to shape the project and respond to events and changing requirements etc.

Mission-oriented projects leverage demand around a need defined as a mission, as distinct from solely responding to and evaluating individual project proposals.

In Section 6 we will discuss the potential for innovation procurement to service a larger mission oriented project for Australian reindustrialisation and decarbonisation, as part of a larger concept of strategic and innovation procurement.

3.8 Apply Functional Requirements to the Problem to be Solved Ahead of Technical Specifications

Consistent with the commitment to a directional, mission-oriented approach linked to society-wide challenges, the literature supports broadening the basis of evaluation and awarding of bids.

This starts with a detailed needs analysis in advance of technical specifications, to define the problem which requires a solution. This is the point at which innovation may begin. This will include consultation with end users about their needs.

This leads logically to the priority (in many instances at least) of functional performance requirements of the product to be procured, over detailed descriptive technical specifications. Technical specification is certainly still required but timed so as not to stifle the potential for alternative technologies or innovation.

There is risk here that can be mitigated through expertise, sound processes and rigorous iteration and definition of the functional performance requirements. The risk with prescriptive technical specifications is that bidders only respond to these to meet minimum requirements for success, do not advance innovative propositions (since there is no incentive to do so), and the public sector as purchaser bears sole responsibility for the quality and ongoing performance of the adopted solution.

Functional requirements, on the other hand, spread some of the responsibility for results to the market and industry. Minimum requirements should be set, but the focus should be on the desired outcome to elicit a wider range of options. The definition and application of functional requirements requires expertise on the part of procurement bodies as well as detailed processes and consultations to know the market, suppliers, and the state of technologies.

An option is to allow submission of variant bids. This means allowing a bidder to submit one or more additional solutions based on alternative technologies or processes, in addition to a main bid that conforms closely to the technical specifications of the tender. Allowance of variant bids is a safe and simple way of eliciting proposals for innovation alongside more conventional tendering.

3.9 Apply Cost not Price to the Problem to be Solved

If price is the principal criterion for a procurement, there is almost no scope for innovation. An innovation procurement is impossible where price is the principal basis for award of the tender.

Price encompasses solely the purchase of the product or service at point of purchase. It does not consider costs of use, maintenance or end of life recycling or disposal. Price can be applied in combination with broader criteria such as functional requirements, but is an altogether more restrictive framework than consideration of cost or value.



Here cost refers to purchase price, operation, maintenance, systems integration, and the end-of-life recycling or disposal of the product: in short, whole of life costs, calculated through life-cycle costing methodologies (and requiring procuring agencies competent in these methodologies). To quote a 2014 EU Directive, “This means internal costs, such as the research to be carried out, development, production, transport, use, maintenance, and end-of-life disposal costs but can also include costs imputed to environmental externalities, such as pollution caused by extraction of the raw materials used in the product or caused by the product itself or its manufacturing, provided they can be monetized and monitored” (Manika, 2020, pp. 533-534).

Here price obviously remains a consideration amongst wider factors. An initial higher price can be offset by cost savings to the benefit of the public sector, together with other benefits to the economy and society, such as improved sustainability or wider spill overs. These benefits emerge from the greater allowance and indeed encouragement of innovation through the ability to consider the broader facets of through-life costs. Optimised life-cycle costs may reveal that a higher initial purchase price is compensated by lower longer term operational costs, which may be so significant as to make the apparently cheaper bid more expensive in fact.

Additionally, industry will often be able to offer more innovative products and services because innovation procurement has helped shape and the market to allow this to happen.

The BPQR, or ‘best price quality ratio’ can be used to apply weights to both quantitative and qualitative criteria allowing fuller and more rigorous specification of requirements and bid evaluation. Similarly the EC has adopted a Directive endorsing use of the ‘most economically advantageous tender’ (MEAT) focussed on higher value for money and higher product and service quality (Manika, 2020).

3.10 Stepped Approach to Get Started

Developing the strategies, policies and frameworks for innovation procurement presents challenges even for those countries more advanced than Australia in its practice. That is why the EU and OECD place emphasis on official directives, templates, frameworks and the standardisation of processes and key criteria.

The need is to start at the right level and to build scale, competence and ambition progressively, avoiding taking on challenges beyond current capacity. The opportunity is to build in a modular and stepped fashion. Getting started does not require all features of a developed innovation procurement system to be in place at once and at the beginning.

The process should commence with the identification of key themes and associated well-defined problems and challenges that could develop into large scale mission-oriented projects. It should start with projects and sectors in which implementation is relatively easy and with high impact. Policy leaders and procurers can agree on key themes, such as decarbonisation, health or reindustrialisation, and then select specific projects with high yield and impact in terms of both the challenge and demonstration effect. (European Commission, 2021).

3.11 Translating Ambitions into Actions and Commitments

Translating ambitions into actions and commitments requires development of a strategic policy framework and an action plan. The framework comprises definitions, goals, objectives and priorities, indicators and KPIs, and roles and responsibilities. The action plan specifies clearly defined actions, personnel, tools, resources, budgets, timelines and targets.

The literature also recognises coordination problems across public agencies and the private sector, and the need for coordinating services, together with the role of financial incentives for

agencies to undertake innovation procurement. For example, a Finnish ‘Smart Procurement’ program provides incentives for project planning costs for PPI, whilst Austria’s ‘Action Plan on Public Procurement Promoting Innovation PPPI’ awards grants to public authorities for PCP and PPI on the basis of contests for vouchers. (See (European Assistance for Innovation Procurement, Module 2; OECD, 2017).

3.12 Building Capacity

The main impediments in shifting from conventional to innovation procurement are widely held to be public sector risk aversion, the emphasis on purchase price over lifecycle costs, the frequent preference for too-prescriptive specifications, lack of detailed knowledge of and interaction with the full range of markets and potential suppliers, and the often inadequate competence of procurement bodies (Alhola & Nissinen, 2018)

The effect of these impediments can be countered by measures such as professional training and by behavioural incentives that reward good innovation policy. Effective public procurers of innovation must have knowledge of the market and the ability to engage stakeholders, and of key products and technologies, legal and contract negotiation and management skills, as well as skills key to innovation processes: risk assessment, IPR management and policy leadership. Public procurers must be able to assess and advocate results of effective innovation in such things as lifecycle savings and quality and efficiency gains.

These are increasingly also requirements of companies including SMEs and start-ups, which need to be able to advance their potential contributions to innovation procurement to procurement agencies. Several countries have established national competence centres to provide a one-stop-shop to increase awareness, support capacity- and capability-raising initiatives and assist procurement bodies to implement innovative projects.

Professional bodies and trade associations can also contribute detailed market knowledge, and can contribute member manuals, templates, guidance materials, and evaluation and measurement tools.

The literature also emphasises capacity-building through cooperative procurement, that is, cooperation between public buyers. These arrangements help build scale, amongst other things, and are highly pertinent to Australia’s federal structure. In Australia’s case, the required focus on boosting priority industry sectors to reindustrialise could also deliver focus and scale to innovation procurement (see below).

3.13 Stakeholder Engagement and Market Consultation

High quality continuous stakeholder engagement is critical. Early dialogue involving procurers, the supplier industries, researchers and the end-users is necessary to establish that a need exists requiring an innovative solution unavailable from existing markets, and to provide guidance about the nature of that need. The focus should be on defining the end-user need, and the problem to be solved.

Extended consultation with vendors and industry is vital. Without it an off-the-shelf outcome will often become the default. Early supplier engagement is indispensable to achievement of innovative outcomes.

Whatever the form of the public procurement there must be clear communication with industry about the possible nature of future requests for innovative procurements. This should entail advance notice of both structured and less structured processes aimed at defining the need to be met or the problem to be solved.



An extensive market dialogue and market research before tendering increases procurers' awareness of private sector capabilities and puts the private sector on notice of the potential opportunities.

Starting early and allowing a longer preparation phase allows the procurement body to define needs and tender specifications and for industry to prepare responses. This market consultation phase can include contests, briefings, seminars and workshops of procurers and industry, as ways of encouraging vendors to bring potential solutions forward. This can be further encouraged by announcement of the intention to purchase significant solutions over time.

Early supplier engagement, providing potential suppliers with sufficient opportunity to understand and respond to the brief and challenge, is fundamental to successful innovation.

3.14 SME and Start-up Participation

The above point on market consultation and extensive pre-tender dialogue is especially critical for SME and start-up participation, without which the procurement will likely fail to realise its full potential to build sovereign capability along the value chain.

Other actions that can be taken to lift SME and start-up participation include the following (European Commission, 2021)

- Minimising administrative burden requiring certificates of legal standing and economic and financial capacity. The EU allows self-declaration by the SME of whether it meets requirements and it must only confirm this declaration if they are chosen
- SMEs are frequently frozen out by requirements to demonstrate financial capacity many times their turnovers, and higher than the contract value. The EU now requires a turnover higher than twice the contract value in exceptional circumstances
- The size of public contracts will often exclude SMEs. Their participation can be assisted by disaggregating the project into 'lots' compatible with the capacities and capabilities of SMEs. Provided the various lots are interoperable, large projects can be quite compatible with high levels of independent SME participation, and can help avoid lock-in to a large vendor
- This disaggregation of contracts can be complemented by use of standards, open data, interfaces and software, which aid SMEs in participation
- Action to ensure payment schedules are SME-friendly.

3.15 Innovation Procurement Virtuous Cycle and Framework Conditions

Georghiou et al. (2014) have drawn lessons from a detailed analysis of a large bundle of UK innovation procurements. They have emphasised the importance of understanding the entire procurement cycle starting with:

- The framework conditions, including legislation and other factors determining the levels of centralisation or devolution of authority and degrees of freedom of procurement bodies to design and implement procurement, then considering
- Procurement policies, personnel and practices: is there a procurement plan that explicitly favours innovation, a specialised function within the organisation, or strategic intelligence for technology fore-sighting?, followed by
- The procurement cycle itself, starting with identification of a concrete unmet need (commissioning phase), leading to
- Tendering, prequalification of tenderers, selection and evaluation criteria and procedure. To promote innovation, dialogic processes such as: fore-sighting activities to purchasers and vendors of opportunities for innovation, technical discussion between buyers and

- suppliers, writing specifications in functional terms, allowing consideration of variants and using whole of life costs in the evaluation, leading to
- Issuing and monitoring of the contract and eventual evaluation, also allowing consideration of innovation opportunities.

The authors emphasise the importance of building expertise and the capacity of procurement bodies and the explicit requirement for innovation to be included in tenders. Fundamental is identifying, specifying and signalling needs from buyer to suppliers, through such means as functional specifications, attention to good communication, use of fore-sighting about future technologies and demand and supply, technology road mapping, increasing awareness of future trends, market sounding, use of pilots, training, and educational documents.

Their survey found that public procurement did lead firms to innovate. However, it found also that lack of market signalling from procurement bodies concerning future needs is a major obstacle. There is a lack of interaction through which shared future visions could arise. Largely absent were innovation-friendly practices recognised as of greatest importance in securing innovation in procurement: early engagement, opportunities for interaction with procurers, specifying innovation requirements in tenders, advanced communication of needs and outcome-based specifications. They argue a key response should be to extend the timeframes for innovation procurement to take account of the whole lifecycle of purchasing to allow for a forward vision and a wider range of potential solutions.

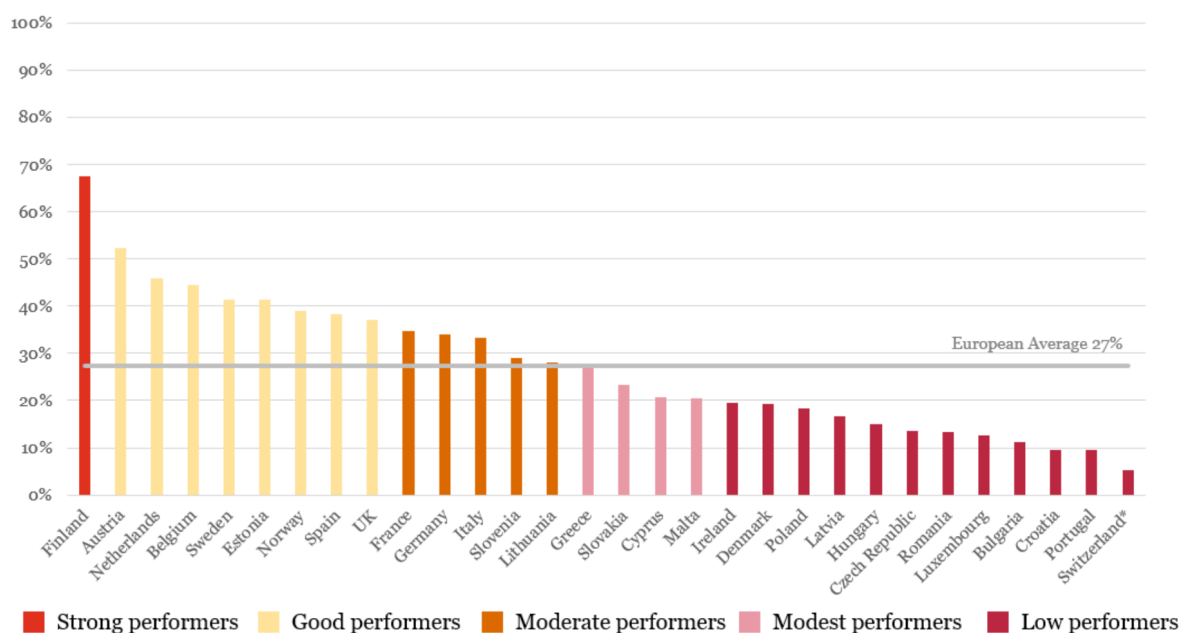
3.16 European Commission Multi-Country Benchmarking Study

This discussion of key success factors and required desirable traits of a robust system of innovation procurement can be concluded by summary of the results of a very recent detailed and meticulous multinational study conducted by Price Waterhouse Coopers (PWC) for the EC.

It assessed and benchmarked the frameworks in use in 30 countries (27 EU countries plus UK, Norway and Switzerland). It focussed on the PPI component of innovation procurement, later zeroing in on ICT specifically. Nevertheless, its scope and the rigor of its analysis and results are highly informative for our considerations.



Figure 5 – Ranking – Benchmarking of National Innovation Procurement Policy Frameworks



SOURCE: European Commission et al. (2021)

The analysis concludes that what defines strong, good, moderate, modest or low performance is the level of development and maturity of each nation’s policy framework for innovation procurement. This means making an assessment against 10 indicators:

1. Definitions: Evidence of common understandings of procurement, R&D procurement, PCP and PPI innovation
2. Horizontal policies: Evidence that innovation procurement intersects with and is embedded in other policies, such as policies relating to entrepreneurship, the economy and finance, competition regulation, regional and urban development, broader R&D, and innovation
3. ICT policy: Evidence that ICT policies foster innovation procurement
4. Sectoral policies: Evidence that innovation procurement is embedded as a strategic priority across sectors of the public sector
5. Action plan: Evidence that innovation procurement is operationalised, mobilising resources to undertakes specific measures, together with the reach of the plan across the public sector
6. Spending target: Evidence that spending targets for investment in innovation procurement, expressed as a proportion of overall R&D expenditure. The paper expresses support for an innovation-friendly public sector requiring overall public procurement to comprise 2.5 per cent of R&D and 15-20 per cent of PPI
7. Monitoring system: Evidence that monitoring occurs systematically, covering both measurement of expenditure and evaluation of impacts
8. Incentives: Evidence of financial and personal incentives for innovation procurement, to overcome public sector risk aversion
9. Capacity-building and assistance measures: Evidence that there are activities to build capacity and overcome barriers from low capability through websites, publication of good practices and case studies, training and workshops, handbooks and guidelines, assistance to public procurers, template tender documents, coordination of procurements, procurement networking to share experiences, and one-stop-shops such as competence centres to assist in innovation procurements

10. Innovation procurement – friendly procurement market: Innovation-friendliness evidenced through IPR ownership rules benefiting industry, use of value for money criteria over price, use of variant offers, use of preliminary market consultations, open market consultations, market-focussed dialogue, industry forums, meet the buyer events, etc.

The survey nominates the following as key areas for focus on improvement across the EU: the development of action plans, instituting more spending targets, improving sectoral integration, monitoring and measurement, and augmenting incentives.



4 Innovation Procurement – Directions for Australia

Innovation Procurement can make a major contribution to improving Australia's innovation performance and wellbeing. The lessons distilled in section 3 are applicable to Australia. The urgent needs to which innovation procurement responds, together with the methods and principles underlying its successful application elsewhere, need to be adapted to Australian requirements, conditions and culture. We must be intelligent enough both to learn from others ahead of us, and to understand what we need to do differently. Blind imitation will not work; adaptation and strategy can.

This applies also to understanding the similar and the different purposes, ends and objectives to which Australia should deploy active public procurement.

The Commonwealth has spent \$190 billion on external procurement over the past three reported years (Department of Finance, 2022), with state procurement additional to this. Procurement exists on a spectrum from purchase of basic goods off the shelf in which price and security and continuity of supply are the principal decision points, to forms of Innovation Procurement, such as the former submarine contract, intended as an innovation partnership of long duration aimed at meeting complex functional requirements in the national interest.

This spectrum is worth remembering in considering the role that public procurement could play in a range of areas, but particularly in reindustrialisation and decarbonisation. This would combine innovation procurement at the technological frontier with strategic use of procurement at 'lower' levels aimed at these missions.

Not all public procurement that is of strategic significance for an Australian industrial policy and strategy for reindustrialisation will be innovation procurement in the specific senses outlined in section 5. This is so particularly because of Australian deindustrialisation and the fact that so much of our industry is at a distance from technology frontiers.

This does not at all mean that the broader strategic effort is devoid of or separate from innovative processes or outcomes. Although differently structured, strategic procurement is replete with innovation potential sometimes in the nature of technology, but often to do with organisation, leadership, and approaches to the market.

Australia needs to adopt innovation procurement as an important part of strategic procurement - procurement aimed at the mission of reindustrialisation and decarbonisation.

Strategic and innovation procurements should be targeted to high value projects and opportunities with high yield for economic and industry development. It is not possible or desirable to apply these criteria and processes to everything or in a scatter gun way.

Innovation procurement involves challenging processes requiring skilful leadership and orchestration. Its deployment must be targeted.

A strategy for Australian reindustrialisation will need to use public procurement as not only a spur to innovation at the very high-end, but also as an instrument to encourage large scale reshoring of secondary processing industries, as well as broad based innovation, not always at the frontier of new technologies, but entailing innovation in business models, enterprise organisation, relationship to the market, etc.

This section considers:

- How Australia should use public strategic procurement and innovation procurement. That is, to what goals, ends and objectives? Upon what should it focus initially, prior to becoming a more widely applied set of tools and processes?

- How should Australia apply strategic procurement incorporating innovation procurement? That is, what are the starting points and key steps? How can we progressively build scope and impact? What are the key processes? And what are the bodies and institutions needed to make it happen?

4.1 Procurement and Industry Participation Policies at Federal and State Levels

Firstly, it is worthwhile briefly reviewing Industry Participation and broader procurement policies of the Commonwealth and states.

4.1.1 Industry Participation

Prior reference has been made to the national Australian Industry Plan (AIP) which is triggered by Commonwealth major procurements of \$20 million or more and major projects worth \$500 million or above. It was pointed out that these do not mandate levels of Australian content and there is no specific encouragement given to transfer of IP or new product development. There is no specific focus on capture of priority, high-value elements of the value chain nor of prioritising specific sectors. Thus, it is stated that “The key objective of the plan must be to ensure that Australian entities have full, fair and reasonable opportunity to bid for the supply of goods or services for the project”.

Once a Plan is approved, reports must be completed detailing participation by Australian entities in supply of goods and services, what goods and services have been acquired, dollar value of purchasing commitments over the reporting period, proportions going to Australian and non-Australian entities, details of the competitiveness and capabilities of Australian entities, and steps taken to meet Australian industry participation targets, amongst other things.

There is no reference to fomenting innovation in the national AIP. Further to this, the critical mandate of Infrastructure Australia also contains no requirement to promote innovation.

State governments are parties to national AIP plans. Although similar to the federal policy, state policies exhibit a greater degree of gearing to their circumstances. The following summarises elements common to the policies of Queensland, New South Wales, Victoria and South Australia found in:

- *Queensland Industry Participations Policy Act 2011* (Qld); also *Local Industry Policy: A Fair Go for Local Industry: Guidelines* (Updated May 2011)
- *New South Wales Government Procurement: Small and Medium Enterprises Policy Framework* (Government of NSW, 2020)
- *Victorian Industry Participation Policy (VIPPP) – Agency Guidelines* (Government of Victoria, 2017)
- *South Australian Industry Participation Policy* March 2018 (Government of South Australia, 2018).

These variously stipulate monetary thresholds of public and private projects for application of industry participation projects. Each state policy applies definitions of local goods and services (Australian or New Zealand) as under the national policy. Some provide annual reports to Parliament.



The Queensland policy emphasises infrastructure and resource projects. The New South Wales policy is pitched at SME participation through SME Opportunities Statements and development of SME Participation Plans.

The Victorian policy appears to have the most ambitious scope from the viewpoint of industry development, emphasising innovation, new product development, amongst other things. The South Australian policy also explicitly references industry development and dynamic facets beyond simply local content levels, to take in value chain development and a benefits realisation framework. The Queensland policy also refers to benefits from the policy in technology transfer and improved competitiveness of local industry. Victoria and South Australia both apply a weighting for local content and impacts on value chains, jobs, and capital expenditure in projects. No jurisdiction mandates minimum levels of local content.

Certain aspects of the frameworks are now ageing.

4.1.2 Public Procurement

The public procurement policies of the Commonwealth and state governments allow for considerations of economic benefit to be made in tender evaluation and award of contracts.

The Commonwealth policy requires that construction contracts valued above \$7.5 million and all other contracts above \$4 million consider the economic benefits of the procurement. These benefits include direct employment, new know-how, benefits to SMEs, impacts on areas of high unemployment and underemployment, impacts on people of disadvantage or disability, and so on. For example:

7. “In general terms, economic benefits to the Australian economy result when the goods or services being procured:
 - make better use of Australian resources that would otherwise be under-utilised (for example employing people who would otherwise be under or unemployed, using spare industrial capacity, or freeing government funds for other spending);
 - otherwise increase productivity (for example by adopting new know-how or innovation, or enabling more people to acquire in-demand skills, or ensuring that resources are allocated to sectors in which Australia has a comparative advantage); or
 - provides broader benefits that support the development and sustainment of industry capabilities;

8. “An increase in productivity-enhancing technology development and adoption can also deliver economic benefit, for example through:
 - research and development related activities and investments (including those undertaken with universities);
 - transfer of technology to Australian businesses such as through licensing arrangements for Intellectual Property;
 - Indigenous workforce participation;
 - engaging a business that provides services of persons with a disability;
 - traineeships or apprenticeships in areas of skills shortage; or
 - boosting a supplier’s international competitiveness (e.g. through greater efficiency or product innovation).”

Department of Finance (2022, p. 2). See also, Commonwealth of Australia (2020)

The policy is governed by Commonwealth Procurement Rules (CPRs). It states that value for money and not simple purchase price should be the overriding principle. This allows space for consideration of innovation and broader economic development. Sustainability goals are also included. However, there is no directional element to these features. There is no requirement to build in innovation criteria into tenders. There are no sector-specific elements that would indicate purposeful and deliberate use of public procurement for industrial development. There is no recognition of the role of innovation procurement specifically.

In the following section we recommend that an overhaul of CPRs include goals in support of strategic procurement incorporating innovation procurement.

The following summarises elements common to the overall public procurement policies of Queensland, New South Wales, Victoria and South Australia found in:

- NSW Government, Procurement Policy Framework, August 2021
- Backing Queensland Jobs: Queensland Government Procurement Strategy 2017
- Procurement Policies and Framework - Buying for Victoria, December 2021
- Procurement Governance Policy, Procurement Services SA, August 2021.

The states operate similar procurement policies that prioritise value for money, and reference economic, social and environmental outcomes. They reference innovation without mandating targets. In NSW and Queensland there are strong emphases on regional development and jobs. Queensland applies a local benefits test that can trigger a weighting to local supply of up to 30 per cent.

Support for SMEs is referenced in all policies, as are support for people with disability and indigenous communities. Queensland explicitly refers to breaking down large contract into smaller units to facilitate SME participation.

In South Australia the State Procurement Board facilitates value for money and 'strategic procurement' through processes of planning, supplier selection and contract management, but detail is relatively scarce. The balance in the system appears to favour agencies contracting independently of a central authority.

NSW and Victoria indicate that they seek to engage with suppliers by having a visible pipeline of future projects.

Buying for Victoria appears to be the most advanced framework, featuring a forward plan for projects of 12 – 18 months, and an advanced notice approach, with plans for supplier engagement and capability development for procurement agencies. It engages in extensive market analysis, and encourages aggregated purchasing.

From our search, only Victoria appears to have policy and practice in the specific area of innovation procurement as described above (Government of Victoria, 2021)

4.2 Innovation Procurement: Challenges, Objectives, Goals

As can be seen, strategic and innovation procurement can be applied to a broad range of challenges. That poses the problem: anchoring the process in properly-defined challenges, objectives and goals that will deliver benefit to society, rather than a process applied across the board without strong strategic goals.

This problem is especially acute for Australia which is far behind in practice and lacks a leading institution with a mandate to coordinate and make things happen.

Added to this is the fact of Australian deindustrialisation. This means fewer and smaller opportunities at the frontiers of new technologies than the US, Britain, Europe and industrialised



Asia. Australia's opportunity is to incorporate strategic and innovation procurement, learning from successes internationally and the distilled lessons above, into a broader framework of innovation procurement focussed on reindustrialisation.

In Section 3 it was observed that several of the projects found in the literature survey exhibited innovation but not all were strategic in the strong sense of influencing wider outcomes. Some were very small scale.

The aim is a national strategy for strategic procurement incorporating innovation procurement, led by an expert and authoritative institution. This is essential to achieving desired goals and maximising the potential impact of such advanced procurement practices. This needs to proceed in stages, in which competence and wider confidence can grow progressively.

In an Australian context, it makes sense to start small to scale up as fast as possible: this means initial use of pilots and smaller scale projects, and then identifying opportunities for large-scale projects linked to major research, development and commercialisation programs and procurement projects.

And it makes sense to link the emerging practice of innovation and strategic procurement to a large pool of investment funds geared to post pandemic economic reconstruction.

4.3 Innovation Procurement: How to Start

The previous subsection instanced goals and ends to which strategic procurement incorporating innovation procurement principles could first be applied and trialled as a mission-oriented project. This subsection concerns how to make a start, taking account of lessons distilled in Section 3, together with Australian needs and conditions. This discussion assumes a practical starting point in advance of acceptance of a national policy framework and a central coordinating function. This reverses the order found in the literature, but envisions the broader framework being argued for subsequently, in the light of demonstrated success in pilot programs and the like.

Hence the following is advice to a future small functional team working at pilot program level. This is prior to development and embedding of a national strategic framework.

This subsection concerns how and to what should Australia apply public procurement strategically, especially innovation procurement? What are the starting points and key steps? How can we progressively build scope and impact? What are the key processes? And what are the bodies and institutions needed to make it happen?

4.3.1 Starting Points and Key Steps

An Innovation Procurement leadership needs to be established with Central agency authority. It is analogous to a start-up enterprise. It is familiar with the operating principles enunciated above (5.3: Guiding Principles and Key Success Factors):

- Clear Mandate and Policy Vision
- Links to Society-Wide Challenges
- Apply Functional Requirements to the Problem to be Solved Ahead of Technical Specifications
- Apply Cost not Price to the Problem to be Solved
- Translating Ambitions into Actions and Commitments – as this relates to an Action Plan
- Stakeholder Engagement and Market Consultation – end users, public sector, industry, open consultation, etc.
- SME and Start-up Participation.

As a start-up, however, not all of the Guiding Principles and Key Success Factors apply to it. These include Leading Institutions and the segment of Translating Ambitions into Actions and Commitments concerned with overarching and ongoing policy, which are intended to be outcomes of this successful demonstration.

As stated previously, a full system of strategic and innovation procurement requires development of a strategic policy framework and an action plan. The framework comprises definitions, goals, objectives and priorities, indicators and KPIs, and roles and responsibilities. The action plan specifies clearly defined actions, personnel, tools, resources, budgets, timelines and targets.

Given the nature of this as a start-up and pilot exercise, however, what is envisaged is concurrent development of a proto-framework and action plans in basic form to allow the gaining of experience to be applied to a later more developed framework and system and to allow learning by doing.

4.3.2 Analysis of Current Situation

The team assesses the state of knowledge and practice in strategic procurement. This assessment encompasses relevant state and federal programs, identifies key personnel, relevant research capacity, successful projects and key lessons. Also, it assesses the nature of lead customer – supplier relationships that are involved. The team engages actively with existing practitioners, particularly those from states that operate successful SBIR and other relevant procurement programs. The team also liaises with the states about prospective major projects with a focus on major industry and energy projects, or infrastructure projects, with relevance to decarbonisation and/or secondary processing of minerals.

4.3.3 Project Identification

The team to consider project prospects, prioritising ‘Value-adding in resources through domestic processing’ and ‘Renewables and low emission technologies’. It compiles an inventory of relevant businesses, research capacity, state and regional programs, etc. The team should also consider relevant Infrastructure Australia projects as well as current projects from within the Industry portfolio.

It interrogates the projects for problems and challenges associated with each of them that could yield benefit through an innovation or a strategic procurement approach. Such benefits might include an increase in domestic production and value adding of an Australian mineral or energy resource, impact on carbon emissions, etc. The project list is then ordered for priority, being potential impact and likelihood of goal achievement, amongst other things.

For each selected project, the team creates a working hypothesis in the form of the challenge, or the problem to be solved. The team makes extensive use of value chain mapping, and gathers together as much information as possible relevant to the following:

- breaking the chain down to its key elements and stages
- examining each stage having regard to the current situation
- analysis of competitors and Australian suppliers
- defining and isolating the decisive opportunities and what must be done to secure identified benefits points.

4.3.4 Open Engagement

A range of potential open engagement modes can be deployed to:

- Validate the challenge statement from the viewpoint of the procurer (whether public sector or private sector lead customer)



- Provoke responses to the challenge from the vendor/supplier sector, as well as research and intermediary organisations such as living labs, cluster organisations, etc.

This will lead to the development of business cases and draft action plans, which will define the nature of the strategic and innovation procurement exercise, including the relevant innovation procurement tools (PCP, PPI or IP), and further steps to engage with industry and the market.

BOX: ACTION PLANS, ENGAGING WITH THE MARKET

Our analysis ends here at the point of applying the action plans and engaging with industry and other stakeholders. This further information and analysis could be provided in future. Elements of it are suggested in the section 5 literature review. Major practical detail is provided in much of the source material, particularly from Europe.

Of this vast literature, the following have been found most helpful on structured engagement processes and the steps in devising action plans:

- European Assistance for Innovation Procurement (Module 1, Module 2, Module 3)
- European Commission (2021)
- Georghiou et al. (2014)

RECOMMENDATION 1: Mandate an Innovation Procurement Pilot Targeting Decarbonisation and Reindustrialisation

That government mandate a strategic and innovation procurement pilot program for early action. This should involve devising action plans focussing on its 'Value-adding in resources through domestic processing' and 'Renewables and low emission technologies' priority areas. It should appoint a small team with central agency authority to lead opportunity identification and development from a portfolio of projects, in the form of action plans. The team would identify high-value projects aimed at a reindustrialisation and decarbonisation remit through key projects. Lessons here would inform the development of the national framework.

RECOMMENDATION 2: Review Commonwealth Procurement Rules and Infrastructure Australia Charter

That concurrent with the pilot projects and complementary to reform of AIIP, consideration should be given to further reform of the AIIP to take greater account of strategic procurement incorporating innovation procurement, and of the imperative of Australian reindustrialisation.

Review and reform of the Australian Industry Participation framework and policy could see it become a much more strategic contributor to economic innovation, sovereign capability and domestic value chain development

This process should include encouragement to states to consider stronger directions as well as stronger industry targeting, based on regional specialisations.

Consideration should also be given to inclusion of an innovation component in the remit of Infrastructure Australia.

4.3.5 Build the National Framework (Medium term)

Concurrent with this urgent work, a separate stream of activity should be directed to creation of desirable systemwide features to operate over the longer term. This should be linked to the eventual launch of flagship mission-oriented projects focussed on reindustrialisation and decarbonisation. But it is also necessary to build larger systemwide processes and institutions that embed strategic and innovation procurement for the longer term.

This would be informed by the key success factors outlined in section 3 and means building a national framework guided by a national action plan in turn guided by explicit targets.

As envisaged, this starts with reindustrialisation and decarbonisation, but progressively embedding strategic and innovation procurement in key facets of national public sector activity, including as a driver of public sector and service delivery innovation. This would include targets and KPIs, including ones to increase the proportion of overall procurement accounted for by strategic and innovation procurement (PPI, PCP, IP). These targets are an explicit feature of strong practice internationally, as we have seen.

The capacity for strategic and innovation procurement can be built progressively by being linked to other industry development policies programs and instruments, and by employing a national ecosystem approach. A priority would be dynamically linking existing living labs and factories of the future, industry clusters, incubators, and open events such as workshops. Our recent Manufacturing Transformation report (Australian Industrial Transformation Institute, 2021) found that Australia could make greater use of existing factories of the future and living labs through greater overarching leadership and coordination, and an ecosystem approach. This approach is strongly endorsed in the literature.

A specific and deliberate approach to development of the capacity and capability of procurement bodies is also essential. In Europe strong emphasis is placed on use of competence centres, together with measures of training, and development and deployment of model templates, manuals and guides. In Australia, in the absence of a strong national procurement policy, capacity and capability are underdeveloped, although there is evidence of broader scope and ambition at state level. We have remarked already on the limitations of the industry participation framework, at state and national levels. An Industry Capability Network (ICN) provides some connectivity and brokerage within this limited framework. Its role and capabilities would be enhanced as part of development of the national framework and reform of the AIIP.

Consideration should be given to complementary initiative aimed directly at public procurement capacity building. This to say, an Innovation Procurement Capability Network and Innovation Procurement Capability Unit within the Commonwealth Department of Finance, working closely with the Industry portfolio.

A strong national system needs also to build scale by maximising cooperation and joint procurements with states, as well as bundling demand across projects where these have strong complementarities.

Finally, across the international experience of innovation procurement, ownership of IPRs stand out as critical issues and inhibitors, prompting advocates of innovation procurement to urge consideration be given to sharing or fully allocating IPR ownership to contractors in public procurements.

RECOMMENDATION 3: Work on a National Framework and Action Plan for Strategic and Innovation Procurement

That consideration be given to building a national framework for strategic and innovation procurement, guided by a national action plan in turn guided by explicit targets. This is a medium term proposal, taking on board lessons from the reindustrialisation and decarbonisation pilot, to progressively embed strategic and innovation procurement in key facets of national public sector activity, including as a driver of public sector and service delivery innovation.

It is envisaged that this function would reside in the Department of Finance with strong links to the Industry portfolio.



RECOMMENDATION 4: Set Targets for the National Framework

That the Framework include targets and KPIs, including ones to increase the proportion of overall procurement accounted for by strategic and innovation procurement (PPI, PCP, IP), reflecting international trends.

RECOMMENDATION 5: Adopt an Ecosystem Approach

That the capacity for strategic and innovation procurement linked to other industry development policies, programs and instruments, be augmented by employing a national ecosystem approach. This should include dynamically linking existing living labs and factories of the future, industry clusters, incubators, and open events such as workshops.

RECOMMENDATION 6: Focus on Building Capacity and Capability of Procurement Bodies

Build the capacity and capability of procurement bodies through measures of training, model templates, manuals and guides, including establishment of an outward-looking Innovation Procurement Capability Network and Innovation Procurement Capability Unit within the Commonwealth Department of Finance, working closely with the Industry portfolio.

RECOMMENDATION 7: Build Scale Through Joint Procurements, Cooperation and Demand Bundling

That there be deliberate focus on work to build scale by maximising cooperation and joint procurements with states, as well as bundling demand across projects where these have strong complementarities.

RECOMMENDATION 8: Review Intellectual Property Rights

That the Framework give consideration, on a case-by-case basis, to sharing or fully allocating IPR ownership to contractors in public procurements.

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