

REPORT TO  
**INFRASTRUCTURE VICTORIA**  
22 JULY 2019

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# REGIONAL INFRASTRUCTURE INVESTMENT OPPORTUNITIES & CONSTRAINTS

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ASSESSMENT FRAMEWORK  
FINAL REPORT





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# EXECUTIVE SUMMARY

## Context

This report presents a regionally focused economic infrastructure assessment framework developed by ACIL Allen Consulting (ACIL Allen) for Infrastructure Victoria (IV). The report supports IV's work on updating its 30-year Infrastructure Strategy. The updated strategy will recommend infrastructure that targets the unique opportunities and challenges facing regional Victoria.

To ensure the strategy accounts for unique and diverse character of Victoria's regions, the Infrastructure Priorities for the Regions (IPR) project is seeking to develop frameworks and evidence to help in the determination of infrastructure priorities. One framework will identify investment priorities that build on regions' economic strengths (this assessment framework), while the other will address regional disadvantage. IV will use the frameworks to assess and prioritise regionally specific infrastructure recommendations for the updated strategy.

## Assessment framework

This assessment framework outlines an approach to making decisions about public infrastructure which are at an industry or regional level. The framework's objectives are derived from the outcome statements developed specifically for this project. The objectives focus on:

- Delivering greater productivity and efficiency to the regions
- Unlocking new areas of economic growth throughout the regions
- Delivering regional areas better access to markets
- Improving the match between skills supply and industry skills needs through infrastructure decisions which support the regions
- Supporting industries operating in regions to be more resilient to economic shocks and climate change.

The assessment framework's objectives are also consistent with several objectives identified in IV's 30-year strategy, as shown below:

- Objective 4: enable workforce participation
- Objective 5: lift productivity
- Objective 6: drive Victoria's changing, globally integrated economy
- Objective 9: advance climate change mitigation and adaptation
- Objective 10: build resilience to shocks.

A review of existing infrastructure assessment frameworks and strategies was undertaken to inform the development of this assessment framework. This review identified the relatively unique nature of

this assessment framework and the aspects it must consider. Unlike many other frameworks, the assessment framework is not intended to identify and then assess specific infrastructure projects. Assessment of infrastructure projects typically occurs at the business case or feasibility study stage when a clear problem has been identified and there are clear solutions (i.e. specific infrastructure projects) that government can consider.

A key feature of the assessment framework is that draws on a first principles approach to help understand the appropriate role of government in the decision-making process for regional infrastructure. These principles should be used to drive decision-making under the framework and are applied at various stages of it. They are:

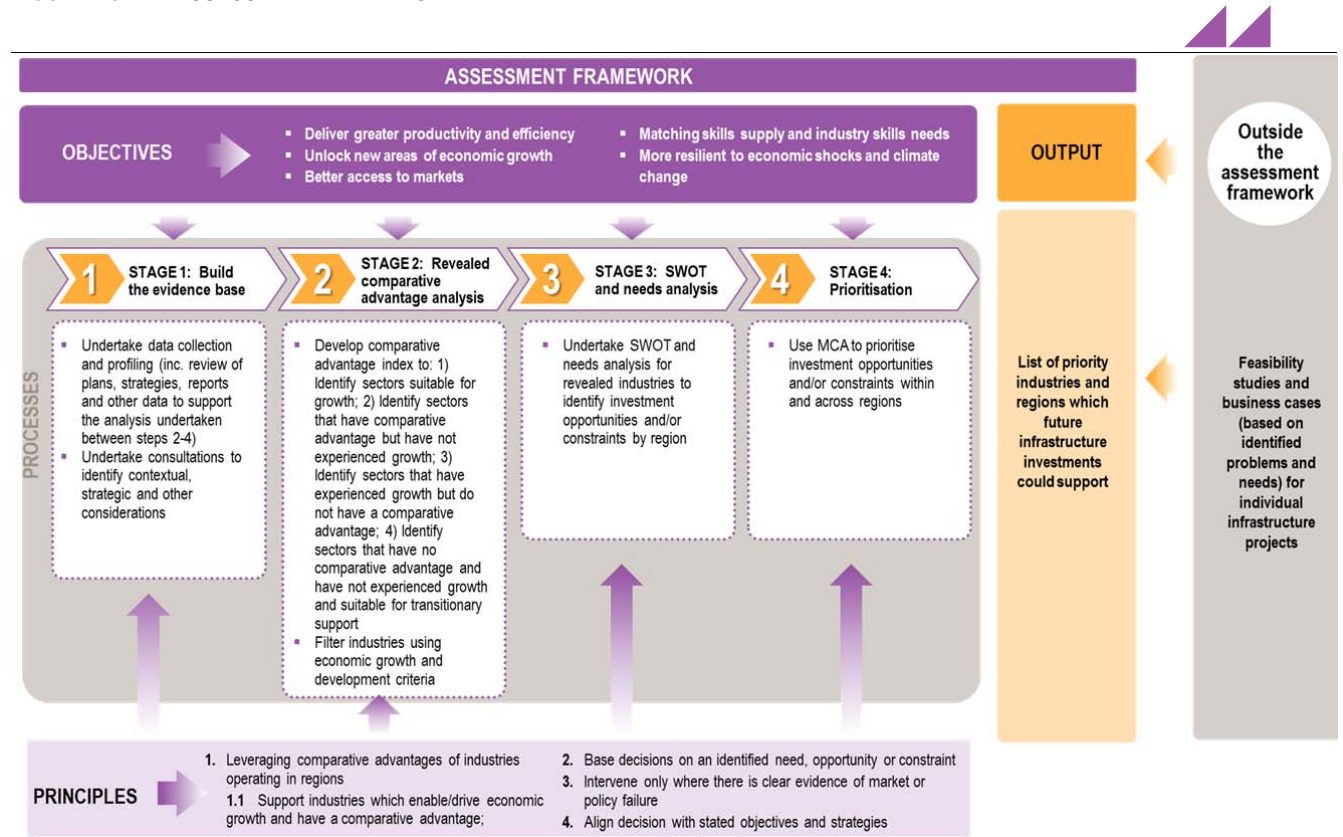
- *Investment principle 1:* Infrastructure investments should leverage the comparative advantages of industries operating in regions. That is, infrastructure investments should leverage what the industries in one region do 'relatively well', compared to what the industries in other regions do 'relatively well'.
  - *Investment sub-principle 1.1:* Ideally government should seek to support the infrastructure needs of industries with a comparative advantage that are material to a regional economy and enable growth to occur at the regional level. These are typically industries that have demonstrated growth in the past or demonstrate the potential to grow in the future.
- *Investment principle 2:* Infrastructure investments should seek to address an identified need/constraint or maximise an identified opportunity for the industries operating in a region. Investments must be tailored to local conditions, so they address the actual (as opposed to theoretical) opportunities/constraints facing comparative advantage industries operating in regions.
- *Investment principle 3:* Government should intervene where there is evidence of market or policy failure that requires remediation through infrastructure investment. Where evidence of market or policy failure does not exist, infrastructure provision should be left to the market to determine when and where investments will be made in the regions.
- *Investment principle 4:* Public infrastructure investment decisions should be aligned with the policies and strategies set by the government and/or agencies authorised to make independent assessments of public infrastructure proposals, such as IV. In this instance they should be, at a minimum, aligned with the 30-year strategy published by IV.

The assessment framework is an accumulative process divided into four key stages. Its structure consists of:

- An evidence building stage (stage 1). The objective of this stage is to construct the evidence base from which robust infrastructure decisions can be made in the future.
- A revealed comparative analysis stage (Stage 2). The objective of this stage is to use a revealed comparative advantage analytical technique to identify those industries which are important to the future productivity and growth of regions.
- A Strengths, Weaknesses, Opportunities and Threats (SWOT) and needs analysis stage (Stage 3). The objective of this stage is to consider the characteristics of industries and regions which underpin their comparative advantage, and to identify the opportunities and constraints facing key industries in regions.
- A prioritisation stage (Stage 4). The objective of this stage is to prioritise the opportunities and constraints facing key industries in regions to identify which are the most important opportunities/constraints warranting government intervention. Addressing these opportunities/constraints will be maximised where priorities also address aspects of regional disadvantage.

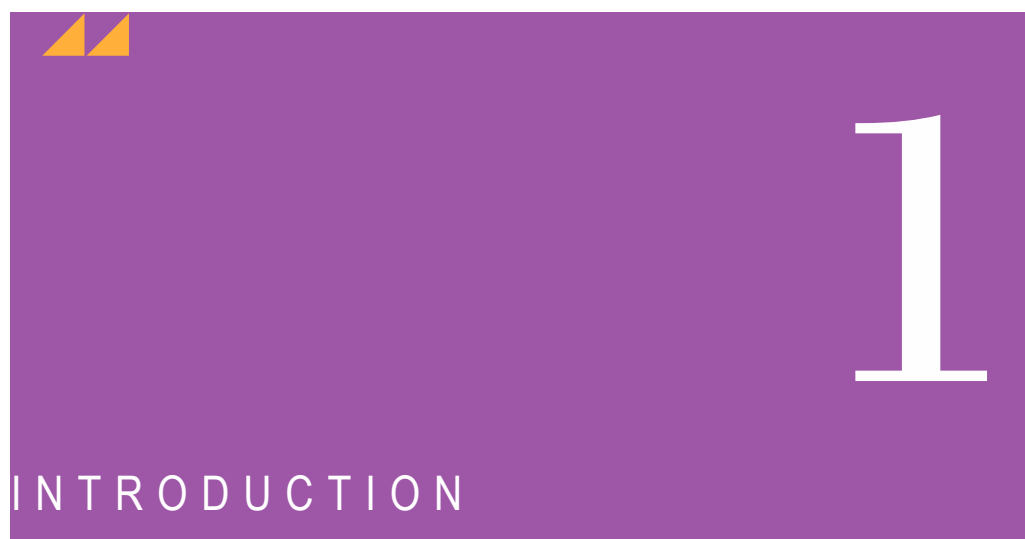
An overview of the assessment framework is provided at Figure ES1.

FIGURE ES 1 ASSESSMENT FRAMEWORK



SOURCE: ACL ALLEN

To understand how the assessment framework works in practice, this report should be read in conjunction with the industry profiles of Victoria’s Regional Partnership regions developed by ACIL Allen. These profiles demonstrate how the principles and processes of the assessment framework can be used to identify the infrastructure opportunities and constraints facing a region.



## 1.1 Purpose

This report presents a regionally focused economic infrastructure assessment framework developed by ACIL Allen Consulting (ACIL Allen) for Infrastructure Victoria (IV). The framework will be used by IV to assess and prioritise economic development and infrastructure investment opportunities for the Regional Victoria. These opportunities will be incorporated into the upcoming update of the 30-year Infrastructure Strategy.

The framework aims to support infrastructure assessment that is grounded in the principles of good public policy and economics. The framework is built upon outcomes statements developed primarily for this report. The framework is also underpinned by the key economic concepts of comparative advantage, market failure and dimensions common to the assessment frameworks of other jurisdictions. These concepts are defined in the next chapter.

To understand how the framework works in practice, this report should be read in conjunction with the profiles of Victoria's Regional Partnership regions developed by ACIL Allen. These profiles demonstrate how the key principles and processes of the assessment framework can be used to identify the infrastructure opportunities and constraints facing a region.

### Strategic policy context

#### 30 Year Infrastructure Strategy

IV was established in 2015 as an independent advisory body tasked to develop Victoria's first ever state-wide, all sector, 30-year infrastructure strategy. The 30-year strategy, released in December 2016, is anchored by a vision of a thriving, connected and sustainable Victoria where everyone can access good jobs, education and services.<sup>1</sup>

The strategy's purpose is to outline a pipeline of priority infrastructure projects that deliver against guiding principles and objectives, whilst meeting some clearly defined needs for Victoria for the coming decades. Essentially, all recommended projects aim to deliver against the stated objectives (see Table 1.1).

<sup>1</sup> Infrastructure Victoria 2016, 'Victoria's 30-Year Infrastructure Strategy', Accessed 3 April 2019, <http://www.infrastructurevictoria.com.au/30-year-strategy>.



TABLE 1.1 VICTORIA'S 30-YEAR INFRASTRUCTURE STRATEGY

Guiding principles	Objectives
– Consult and collaborate	1. Prepare for population change
– Drive improved outcomes	2. Foster healthy, safe and inclusive communities
– Integrate land use and infrastructure planning	3. Reduce disadvantage
– Draw on compelling evidence	4. Enable workforce participation
– Consider non-build solutions first	5. Lift productivity
– Promote responsible funding and financing	6. Drive Victoria's changing, globally integrated economy
– Be open to change	7. Promote sustainable production and consumption
	8. Protect and enhance natural environments
	9. Advance climate change mitigation and adaptation
	10. Build resilience to shocks

The strategy provided 137 recommendations for future infrastructure investments across the State. Whilst most recommendations were applicable to both metropolitan and regional Victoria, the strategy lacked the kind of evidence required to undertake a bottom-up assessment of future regional infrastructure needs.

### Infrastructure Strategy Update

IV has begun work on an updated 30-year infrastructure strategy, and expects to release a draft Strategy in 2020.

Responding to the opportunities and challenges of Victoria's record population growth will be the focus of the 2020 strategy. The strategy will present a vision for how Victoria could accommodate and capture the benefits of growth over the next 30 years and identify the infrastructure initiatives required to achieve this future. Improving the integration of land use infrastructure and transport planning will be central to the strategy.

IV will also identify infrastructure priorities for each of Victoria's regions to reduce disadvantage and build on economic strengths.

To develop these priorities, IV will draw on the findings of its research programs – Regional Infrastructure Needs (RIN) and Infrastructure Priorities for the Regions (IPR).

Through the RIN project, IV developed profiles on each of Victoria's nine regions which outline the unique strengths and challenges in different parts of Victoria. These profiles were published on the IV website in April 2019 along with the discussion paper *Growing Victoria's Potential*. The profiles are the result of a year-long process of gathering data and working with stakeholders right across the state to ensure they included local insights. A key finding from the research is that regional investments should be targeted towards building on a region's competitive strengths or reducing place-based disadvantage.

The IPR project will build on the regional profiles to develop complementary frameworks for determining potential infrastructure priorities. One framework will identify investment priorities that build on regions' economic strengths (the Comparative Advantage Stream), while the other will address regional disadvantage (the Addressing Regional Disadvantage Stream).

This Framework is being developed for the Comparative Advantage stream. IV will use these frameworks to assess and prioritise regionally specific infrastructure recommendations for the updated strategy.

This Framework will help IV to identify regional infrastructure investment opportunities/constraints that contribute to the outcomes outlined in Table 1.2.

TABLE 1.2 OUTCOMES STATEMENTS FOR FRAMEWORK

Outcomes	What is being explored in each outcome
Greater productivity and efficiency	<ul style="list-style-type: none"> <li>- Opportunities to improve operation and production efficiency allowing regions to compete domestically and globally</li> <li>- Opportunities to improve industry yield through leveraging technological adoption and complimentary factors of production (e.g., skills)</li> <li>- Promoting greater productivity and efficiency by optimising land use</li> </ul>
Unlocking new areas of economic growth	<ul style="list-style-type: none"> <li>- Opportunities for new sources of economic growth and industry specialisations, such as the emergence of renewable energy generation or advanced manufacturing industries or the development of new product lines within the same industry</li> </ul>
Better access to input and output markets	<ul style="list-style-type: none"> <li>- Allowing regional industries to compete domestically and globally by connecting them (both physically and digitally) to larger markets for: <ul style="list-style-type: none"> <li>- input goods and services (including raw materials, utilities, financing and capital etc.)</li> <li>- their products</li> </ul> </li> <li>- Opportunities to lift efficiency value chains for supply chain industries. For example, reducing the transport costs and connectivity between industries and their supply chain</li> </ul>
Improved match between skills supply and industry skills needs	<ul style="list-style-type: none"> <li>- Improving industry's access to the required skills sets. For example, improving required local skills supply through adequate education locally, or by accessing skills supply from outside the region</li> <li>- Improving skills-match and job outcomes for both firms and workers to enable economic growth and inclusion</li> </ul>
Industries that are resilient to economic shocks and climate change	<ul style="list-style-type: none"> <li>- Identifying responses, including infrastructure responses, to support industries adaptation to climate change risks</li> <li>- Regional industries increase their capacity to respond to industry shocks and transitions, enabling industries to stay competitive in rapidly changing global markets</li> </ul>

SOURCE: INFRASTRUCTURE VICTORIA

### The Victorian Government's Regional Statement and the Regional Partnerships

Victoria's Regional Statement (2015) acknowledges the contribution of regional Victoria to the State's economic strengths and way of life. The Statement focuses on job creation, providing a better start for young people and supporting a brighter future for families and communities. It is built on the Government's recognition that every region is different. The Statement also set a new approach around involving regional communities in government decision-making across all areas of policy and service delivery. The centrepiece of the Statement was the establishment of nine Regional Partnerships that will direct the regional priorities of government.

Regional Partnerships (established in 2016) recognise that local communities and towns are in the best position to understand the challenges and opportunities faced by their region. Victoria's nine Regional Partnerships consult and engage with their communities year-round to identify priorities for their regions and develop collaborative solutions to local problems. The Partnerships provide advice directly to the Victorian Government about these regional priorities so they can be incorporated into government policies, programs and planning. This provides an opportunity for local communities to have their voices heard and acted on.

Each Regional Partnership is made up of community and business leaders who are passionate about regional Victoria. They are joined on the Partnership by the CEOs of local councils, a representative of Regional Development Australia and a Victorian Government representative, so that all levels of government are represented.

The nine Regional Partnership regions<sup>2</sup> are:

- Barwon
- Central Highlands
- Gippsland
- Goulburn
- Great South Coast
- Loddon Campaspe

<sup>2</sup> The Victorian Government has also established Metropolitan Partnerships.

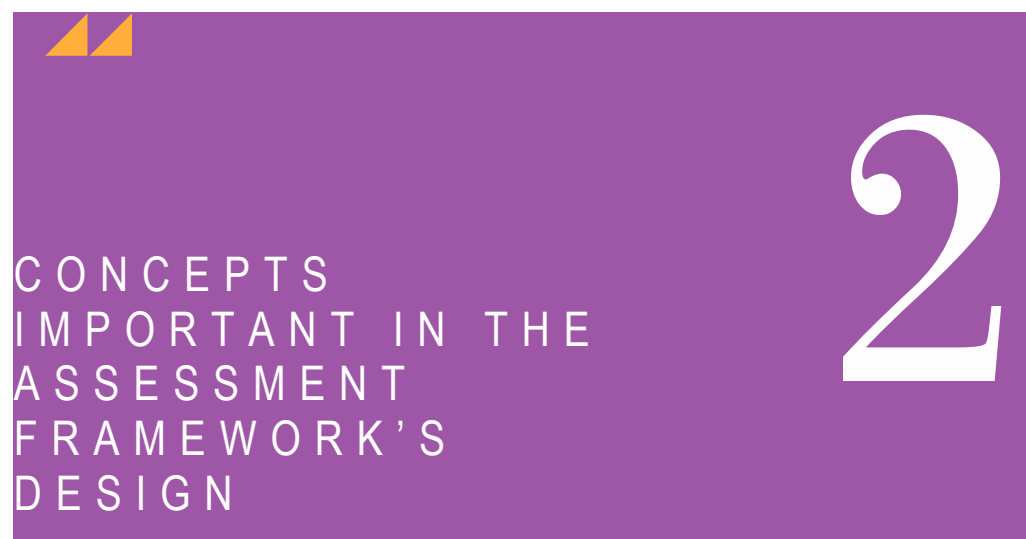
- Mallee
- Ovens Murray
- Wimmera Southern Mallee.

## Report structure

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The remaining chapters of this report are as follows:

- *Chapter 2* defines the key concepts that are important to the assessment framework's design
- *Chapter 3* outlines the assessment framework (based on the key concepts discussed in Chapter 2), presenting its objectives, assessment principles and assessment processes.



## Introduction

This chapter outlines the key concepts used in the assessment framework's design. These concepts are discussed to ensure there is conceptual and definitional clarity underpinning the framework.

The chapter also considers the concepts used in the infrastructure strategies, plans and assessment frameworks of other Australian jurisdictions. These strategies, plans and assessment frameworks provide a reference point for the design of the framework presented in Chapter 3.

## Conceptualising comparative advantage

The foundations of comparative advantage, established by David Ricardo, contend that one country which produces a good has a comparative advantage over other countries if the good can be produced at a lower relative opportunity cost. This is a relatively narrow view of comparative advantage, based on the production of specific tradable goods. Comparative advantage in this framework is determined by a country's endowments of productive resources and technologies, compared to other countries.

In the modern context, the notion of comparative advantage has been described as both a 'complex and contested one'. In 2015, the Australian Council of Learned Academies (ACOLA)<sup>3</sup> defined comparative advantage as 'creating and playing to Australia's strengths, and of ensuring flexibility and resilience in the pursuit of this ambition'.<sup>4</sup> For ACOLA, comparative advantage is the 'high road' to sustained advantage for Australia. It is the realisation of longer-term potential and it is imperative that governments implement policy options to realise that potential.

Comparative advantage is not simply competitive advantage which is one source of advantage. It also involves maximising national benefit from all contributing factors. Comparative advantage therefore goes beyond the 'market proposition of firms', though these remain central, and embraces political cultural, environmental and social factors as well.<sup>5</sup>

For a regional comparison study like this one, a simple definition such as "*comparative advantage is what one region does, relatively well, to what other regions do relatively well*" is enough to drive the development of an assessment framework.<sup>6</sup>

<sup>3</sup> ACOLA prepared a report on Australia's Comparative Advantage and the opportunities it presents for future policy settings

<sup>4</sup> Withers, G., N. Gupta, L. Curtis & N. Larkins 2015, 'Australia's Comparative Advantage', report for the Australian Council of Learned Academies, [www.acola.org.au](http://www.acola.org.au).

<sup>5</sup> Withers, G., N. Gupta, L. Curtis & N. Larkins 2015, 'Australia's Comparative Advantage', report for the Australian Council of Learned Academies, [www.acola.org.au](http://www.acola.org.au).


<sup>6</sup> D. Felsenstein, A. Fleischer and A. Sidi 1998, 'Market Failure and the Estimation of Subsidy Size in Regional Entrepreneurship Programme', *Entrepreneurship & Regional Development*, vol. 10, p. 152.

Based on this definition, ACIL Allen has identified three dimensions of comparative advantage which we believe are important to this study: 1) regional considerations of comparative advantage; 2) sectoral considerations of comparative advantage; and 3) historical or revealed considerations of comparative advantage. Each dimension is considered in more detail below.

### Regional dimensions

The economic and social development of regions has been a long-considered aspect of infrastructure investment in Australia. The Productivity Commission has played a leading role in identifying the principles of regional economic development and the policy factors which enhance the capabilities and competitiveness of regional communities and enable development.<sup>7</sup> According to the Productivity Commission, the principles for regional development include a range of considerations that encompass aspects of 'comparative advantage' (as shown in Box 2.1).

#### BOX 2.1 PRODUCTIVITY COMMISSION'S PRINCIPLES FOR REGIONAL DEVELOPMENT

- 
- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Consider the views and knowledge of regional communities</li> <li>2. Identify the region's relative strengths (comparative advantage)</li> <li>3. Consider any unnecessary regulatory impediments to people or businesses taking up economic opportunities</li> </ol> | <ol style="list-style-type: none"> <li>4. Examine whether existing programs and strategies aimed at regional development are achieving value for money, in terms of enabling people in the regional community to take advantage of opportunities and connect with other regions and markets</li> <li>5. Examine whether there are robust and transparent processes for policy assessment and selection, implementation, monitoring and evaluation</li> </ol> |
|---|--|

SOURCE: PRODUCTIVITY COMMISSION 2017, 'TRANSITIONING REGIONAL ECONOMIES', STUDY REPORT, CANBERRA.

The second principle outlined in Box 2.1 focuses on a region's comparative advantage. According to the Productivity Commission, the strengths of a region can be understood from the perspective of its' natural, historical or social attributes. It is these attributes which, if understood and effectively harnessed, can be used to drive future growth opportunities. They typically include:<sup>8</sup>

- a region's geographical location and proximity to other markets where goods and services can be traded
- the resources that are available to a region
- the existence of industry clusters within a region
- a region's access to critical or enabling infrastructure
- the skill profile of the population living within a region
- the connectivity a region has to other regions (via transport and telecommunications infrastructure)
- the social factors of a region (i.e. leadership, networks and connections, social and cultural strengths and weaknesses).

### Sectoral dimensions

ACOLA's 2015 study examined Australia's comparative advantage at a sectoral level. ACOLA's report drew on the expertise of some of Australia's most respected academics and industry thought leaders to identify areas that industry, government and research bodies should consider in the future. This study represents one of the most significant examinations of comparative advantage in Australia over the past decades and there are several learnings from the study which can be drawn upon to design an infrastructure assessment framework for IV.

First, it is entirely appropriate to consider comparative advantage from the perspective of the industries which are economically important to a region. The ACOLA study embraces a 'foundational notion of comparative advantage' that is either inherent or created. It is the combination of both the

<sup>7</sup> Productivity Commission 2017, 'Transitioning Regional Economies', Study Report, Canberra.

<sup>8</sup> Productivity Commission 2017, 'Transitioning Regional Economies', Study Report, Canberra.

natural and man-made advantages of a region which facilitate sectoral comparative advantage. Examples of sectoral level comparative advantage outlined by ACOLA included the agriculture, mining and services sectors, where these sectors were endowed with a range of natural and man-made attributes like skilled work forces, general profitability, endowments of resources and favourable climate conditions.

Second, it is entirely appropriate to use strength, weakness, opportunity and threat (SWOT) analysis techniques in a project such as this. The ACOLA report identifies areas of sectoral strength as industries/sectors which exhibit a comparative advantage at a national level. These strengths were examined within the context of the weaknesses, opportunities and threats facing key sectors to give them meaning and to understand the broader range of factors which impact an industry's economic performance.

ACIL Allen will draw on both concepts/techniques to the design of the assessment framework.

### Historical or revealed dimensions

Revealed comparative advantage (RCA) is an approach used in international economics for calculating the relative advantage or disadvantage of a certain country in a certain category of goods and services.<sup>9</sup> RCA is typically defined as:<sup>10</sup>

*The ratio of two shares. The numerator is the share of a country's total exports of the commodity of interest in its total exports, and the denominator is share of world exports of the same commodity in total world exports. The RCA takes a value between 0 and (infinity). A Country is said to have a revealed comparative advantage if the value is more than one.<sup>11</sup>*

RCA can be used as an assessment approach to identify investment opportunities based on a region's past economic performance. The approach then measures the relative significance of different industries in a regional economy.<sup>12</sup>

RCA considers the historical growth and comparative advantage of an industry, which becomes a key determinant of the assessment of future economic development opportunities.

Figure 2.1. provides an example of ACIL Allen's previous analysis of revealed comparative advantage undertaken for the Western Australia Government.

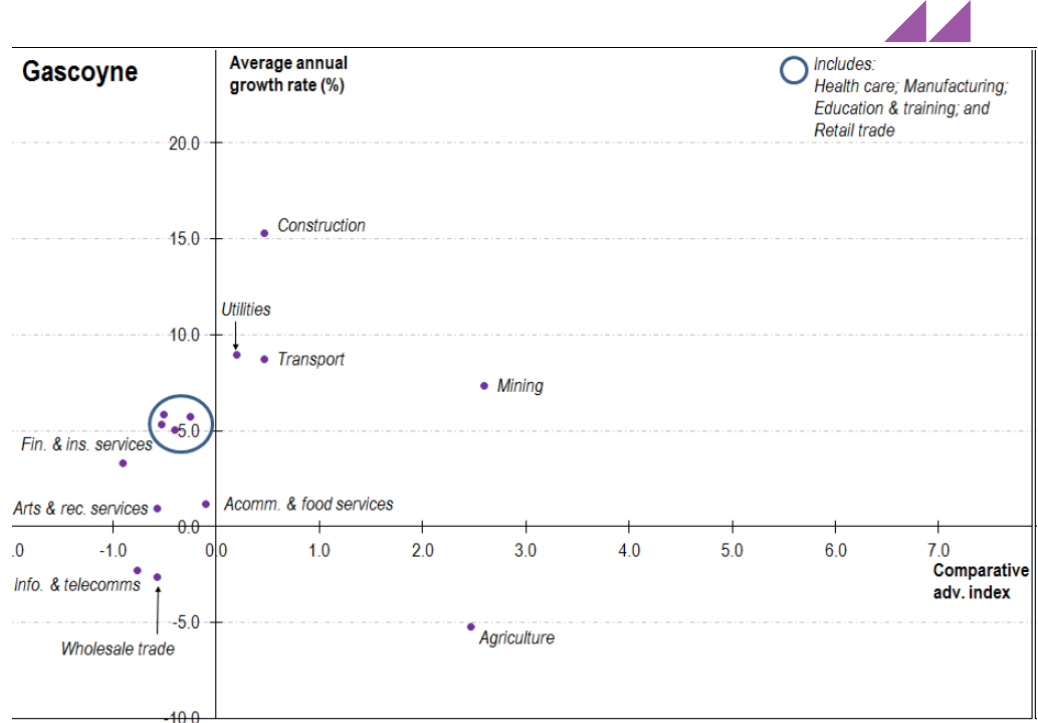
<sup>9</sup> RCA is based on analysis of historical data which limits its ability to predict the future performance of industries/sectors. The limitations of the RCA approach are outlined in section 3.3.1 of this report.

<sup>10</sup> <https://www.igi-global.com/dictionary/revealed-comparative-advantage/51295>

<sup>11</sup> ACIL Allen adopts the same approach as outlined in this definition. However, ACIL Allen uses zero (as opposed to one) as the way of demonstrating that an industry has a comparative advantage.

<sup>12</sup> ACIL Allen 2015, 'Collective Review of Regional Blueprints and Implications for a Regional Development Strategy', Report to the Western Australia Government.

FIGURE 2.1 SAMPLE RCA ANALYSIS: GASCOYNE, GOLDFIELDS-ESPERANCE AND GREAT SOUTHERN WA



SOURCE: ACIL ALLEN 2015 COLLECTIVE REVIEW OF REGIONAL BLUEPRINTS AND IMPLICATIONS FOR A REGIONAL DEVELOPMENT STRATEGY

Figure 2.1 can be interpreted by examining the location of industries within each quadrant as discussed in Table 2.1 below.

TABLE 2.1 CATEGORIES OF RCA

Quadrant presented in Figure 2.1	Category of RCA
Top right	Industries in this quadrant are identified as having a comparative advantage, have experienced growth and could be considered to grow in the future
Bottom right	Industries in this quadrant have a comparative advantage but have not experienced growth. Analyses of these industries can be undertaken to understand what the main constraints to future growth are
Top left	Industries in this quadrant are identified as having experienced growth, but do not have a clear comparative advantage. In this instance this sector may be considered as an emerging industry
Bottom left	Industries in this quadrant are identified as having no comparative advantage or growth. This may identify declining industries, where government may need to assist these industries to transition resources to a higher or more productive use

SOURCE: ACIL ALLEN

The RCA analysis provides some objective assessment of industries which are currently strong, could be potentially strong if supported by government or are weak and in decline.

## Integrating the concepts

A key requirement of this study is that it can identify the infrastructure-related opportunities and constraints facing industries which have the potential to deliver regional economic growth in the future.

Table 2.2 draws together the comparative advantage concepts outlined above, using examples of the economic, structural, environmental and other factors which characterise a region and its industries. It shows how all elements can be integrated and used to drive the development of an assessment framework.

TABLE 2.2 INTEGRATING THE KEY CONCEPTS OF COMPARATIVE ADVANTAGE

Dimension	Examples of considerations required under the SWOT			
	Strengths	Weaknesses	Opportunities	Threats
Regional	Geographical location Social and cultural factors Connectivity to other regions via transport and telecoms	Skills shortages stemming from low educational attainment levels Ageing populations	Change market demand for a region's major outputs	Climate change or increased variability
Sectoral	Skill profile Availability of resources Natural endowments	High relative costs of production Supply chain blockages	Emerging industries with export opportunities	Sectoral specific threats (such as changes in demand for exported commodities)
Historical or revealed	Historical export growth (in a region/sector)	Industries that have declined over the past decade	Industries that have grown rapidly over the past decade and continue to grow	Historical growth of competitor markets

SOURCE: BASED ON ACIL ALLEN'S ANALYSIS

## Market failure

In almost all cases Australia's markets are 'regulated' by competition rather than by governments. Governments create, or support, an environment in which firms can compete fairly and then allow the competitive process to guide those firms in identifying the best way to meet consumer preferences.

Against this backdrop, a key rationale for government intervention is to ensure that competition can play its role. For the most part, this is done by seeking to prevent or remove *market failure*.

Market failure occurs when markets are not competitive or when competitive markets result in prices that are not equal to the social opportunity costs of production. Almost every market will be characterised by some degree of market failure, so the mere existence of market failure does not provide a case for government intervention in and of itself. However, it is helpful when designing an intervention to understand the market failure it is intended to address.

There has been much written about market failure in Australia and elsewhere. It is not the intention of this report to review the voluminous body of academic literature, government reports and other studies relating to market failure. Only the literature which relates to infrastructure is discussed in this chapter.

### Market failure and infrastructure

Before government invests in capital projects there should be a strong rationale on why government should intervene. Government should not invest in infrastructure simply because it is desirable, but rather because it will provide a net benefit to society (i.e. the benefits of the infrastructure should exceed the costs of its provision). If there is demand for a valuable service, then in many cases the private market will provide that service to users who are happy to pay for the benefits they receive.



However there are legitimate reasons why a beneficial investment in infrastructure will not have been made by the private market. When a project with a net benefit to society is not developed by the private market this is referred to as a 'market failure'. Some sources of market failure include:

- Monopoly
- non-excludable public good
- information failure
- externalities
- coordination failure.

Each of these market failures are briefly described below.

### Monopoly

Economically efficient outcomes may not be achieved where there is insufficient competition in a market or industry. Where there are very few sellers in a market their market power can be used to charge high prices consumers, leading to less of the good or service being provided than is optimal for society.

In most cases, the conventional response to high levels of market power is to remove or reduce barriers to entry or otherwise stimulate or foster competition – driving down prices to the efficient level. In some cases, this is not possible.

One example of monopoly power in infrastructure would be where a small group of people, or an individual, hold the rights to land required for an important infrastructure project. Without government intervention, ownership rights for this resource could delay the project indefinitely, perhaps resulting in the failure of the project itself.

### *Natural Monopoly*

Natural monopoly occurs when there are very substantial economies of scale (such that the lowest cost way of meeting the demand in a market is for there to be only one supplier) making it unlikely that more than one producer will supply the market and inefficient if more than one producer supplies the market. Examples include utility networks (such as power or water) in which it is prohibitively costly and inherently inefficient to provide duplicate networks to each household.

Similarly it is often more efficient to have one bridge, road or railway line (that is accessible to the public) than encourage competing networks or infrastructure.<sup>13</sup> This holds true particularly for a continent like Australia, which requires significant infrastructure to enable economic activity across a relatively small population dispersed over large geographic regions.

In regional areas, extensive road and rail networks link key industries (e.g. agriculture, mining and tourism) with regional hubs that provide goods and services to these industries. These rail and road networks are also linked to seaport and airport infrastructure to ensure goods and services reach other markets. In such instances, it is infeasible for a competitive market for road or rail infrastructure.

Telecommunication infrastructure on the other hand has some properties of natural monopolies (i.e. large set-up costs, economies of scale realised from one provider particularly in the fixed line networks) however, parallel mobile networks have been developed to varied degrees of success. John Quiggin argues that Australia's telecommunication networks continue to justify treatment as natural monopolies and that the expected benefits from competition (such as reduced prices for consumers) have not been realised.<sup>14</sup>

### Public goods

A public good is one that is both non-rivalrous and non-excludable. Non-rivalrous means that use of a good by one person does not reduce the ability of another person to use it. Non-excludable means that it is not possible to stop people using the good. A classic example of a public good is a lighthouse. All ships benefit from the lighthouse and the use of the lighthouse by one ship does not

<sup>13</sup> Terrill, M., O. Emslie, and B. Coates 2016, 'Roads to riches: better transport investment', Grattan Institute

<sup>14</sup> Quiggin, J. 1998, 'The Premature Burial of Natural Monopoly: Telecommunications Reform in Australia'.

reduce its usability by another. This is why there was a very limited private market for lighthouses themselves, with funding often coming from charitable donations, government contributions or port access fees. Typically, public goods will not be supplied in efficient amounts, if at all, by private providers, because it is difficult to get people to pay for something they can use even if they do not pay for it. This is called the “free-rider” problem.

### *Non-excludable goods*

A non-excludable good is an ‘impure’ public good that exhibits the quality of non-excludability, but the good is also concurrently partially (or fully) rivalrous, in the sense that use by one person can reduce use by another, because of crowding effects.<sup>15</sup> The non-excludability enables the free-rider problem to occur, whereby individuals that benefit from the provision of the good or service do not contribute to its provision.<sup>16</sup>

Classic examples are public parks, roads, infrastructure and open-access resources.

Public roads are non-excludable because drivers cannot be stopped from driving if they do not contribute to the cost of the road (unless they are toll roads). Equally a public road can be non-rivalrous as a driver does not reduce another driver’s ability to utilise the same road. However, there are exceptions for non-rivalry in metropolitan areas where congestion precludes other drivers from (fully) utilising a public road.

Similarly, energy and water infrastructure (such as transmission networks or domestic water) are non-excludable and non-rivalrous. It is impractical to exclude access or availability of resources to individuals and the use of water or energy by one person does not preclude another person from accessing the resource.

Examples from regional Australia include the protection or enhancement of environmental assets (such as national parks or river systems) that benefit all and may stimulate tourism or improve agricultural productivity.<sup>17</sup>

### Information failure

Information failure comes in two forms: imperfect information and information asymmetry. Imperfect information arises where there are information gaps for both buyers and sellers, while information asymmetry arises where one party has greater information than the other, and uses this fact to its advantage.

There is limited literature on the role of information failure in infrastructure investment. Government does have unique powers to access information that may be difficult for the private sector to attain, which may enable it to do greater research on a project than a private company. In general information failure does not appear to be a major problem that inhibits the efficient delivery of infrastructure.

### Externalities

An externality (positive or negative) is generated when an exchange between a buyer and a seller imposes a cost on, or benefits, a third party. These external effects and spill overs are not considered by the transacting parties. Consequently, market prices cannot play their role in ensuring optimal resource allocation and economic efficiency.

An example of a market failure from externalities would be the construction of a dam which impacts the environment and communities both up and down stream.

Another way of thinking about an externality is that it is a missing market.<sup>18</sup> This can include markets for risk. Thus, in the infrastructure context, a private investor might not invest in a regional airport

<sup>15</sup> NSW Department of Industry 2016, ‘Market Failure Guide: a guide to categorising market failures for government policy development and evaluation’.

<sup>16</sup> NSW Department of Industry 2016, ‘Market failure guide: a guide to categorising market failures for government policy development and evaluation’.

<sup>17</sup> ACIL Allen 2015, ‘Collective Review of Regional Blueprints and implications for a regional development strategy’, p.48.

<sup>18</sup> <https://ideas.repec.org/p/mse/cesdoc/16007.html>

because it doesn't want to take on the demand risk, and there is no market that will provide insurance against that risk.

### *Network externalities*

A network externality is a form of positive externality that occurs when the value of a certain good or service is determined by how many other people use it. In this instance, the value of network externalities realised by the individual increases as more people use the good or service.<sup>19</sup>

Provision of transport or telecommunication services gives people access to more job opportunities. Conversely, more infrastructure may lead to more pollution or accidents.<sup>20</sup>

An example in the context of regional Victoria is the cluster of wine, restaurant and function centres in the Rutherglen region, which is situated in the Ovens Murray region. Together, this cluster can attract more customers than would be the case if the firms were geographically isolated.<sup>21</sup>

### Co-ordination problems

Co-ordination problems occur when groups of people cannot co-ordinate themselves in order to achieve the greatest outcome for all. In more technical terms a co-ordination failure exists where there is more than one equilibrium in a market, and the market is stuck at a 'sub-optimal' equilibrium and neither buyers nor sellers are sufficiently motivated to move away from the sub-optimal equilibrium. A modern example is electric cars and charging stations. If there are not enough charging stations, people are less likely to buy electric cars and so producers are less likely to make them. If people are not buying electric cars, owners of charging stations have no incentive to roll them out, so a sub-optimal equilibrium exists where there are no/few electric cars and no/few charging stations. It would be better for all concerned if there were many electric cars and charging stations; but no one wants to be the first to move.

Co-ordination problems are often solved, eventually, by the market (e.g. the market for fax machines developed and grew, at least until they were replaced by a better technology). But there can be a case for governments to accelerate development, especially in the infrastructure space, by providing incentives for market participants to move to the better equilibrium. The trick for governments is to resist paying people to do things they would have otherwise done over the short term.

### Summary

It should be noted that there are almost always elements of market failure which result in less than ideal outcomes (or inefficiencies). However government intervention can also be characterised by inefficiencies from imperfect information, lack of incentives for efficiency and the fact that revenue raising through taxation can result in significant losses to the economy (known as the dead weight loss from taxation).

Therefore, as a general rule, in the assessment of specific projects, government should invest only in cases where there are specific, significant and identifiable market failures that preclude the right amount or mix of private sector investment. (Exceptions to this rule are cases where there is no market failure as such, but the private sector cannot invest because of fundamental barriers like absence of property rights e.g. no private investor could build a major highway or railway, unless authorised by government, because only government has the necessary powers of compulsory land acquisition.) This assessment framework requires that a clear rationale for government intervention is identified before an investment decision is made.

Another reason for government intervention in infrastructure provision is a requirement for people to have access to basic services. This is primarily an equity issue, and will be primarily considered in the IV framework for infrastructure investment that will accompany this framework: *Addressing Regional Disadvantage*.

<sup>19</sup> NSW Department of Industry 2016, 'Market failure guide: a guide to categorising market failures for government policy development and evaluation'.

<sup>20</sup> NSW Department of Industry 2016, 'Market Failure Guide: a guide to categorising market failures for government policy development and evaluation'.

<sup>21</sup> ACIL Allen 2015, 'Collective Review of Regional Blueprints and implications for a regional development strategy', p.48.

## Assessment frameworks used in other jurisdictions

To support the framework's design, ACIL Allen considered the infrastructure assessment frameworks and plans/strategies of other Australian jurisdictions. This included a review of:

- The ACT Government's 'Infrastructure Plan 2017-18'
- Infrastructure NSW's 'Building Momentum – State Infrastructure Strategy 2018-2038'
- The Queensland Government's;
  - 'State Infrastructure Plan'
  - 'Project Assessment Framework – Strategic Assessment of Service Requirement'
- The WA Government's 'State Planning Strategy 2050' (prepared by the WA Planning Commission)
- Infrastructure Australia's 'Assessment Framework: For Initiatives and Project to be included in the Infrastructure Priority List'
- The Tasmanian Government's 'Tasmanian Infrastructure Project Pipeline 2018'
- The NT Government's;
  - 'Infrastructure Strategy 2017'
  - '10 Year Infrastructure Plan 2017-2026'
- The SA Government's 'Overview of Infrastructure Planning and Delivery in South Australia 2014'.

This review identifies the relatively unique nature of this project and the role that the assessment framework will play in shaping Victoria's infrastructure investment decisions. None of the framework or plans/strategies reviewed integrate the concepts of comparative advantage or market failure into their design – although many use economic assessment tools (such as Cost Benefit Analysis) to inform final investment decisions.

Moreover, most frameworks reviewed are typically at a level in detail below or the stage in the decision-making process that is beyond the framework ACIL Allen has been asked to develop. The assessment frameworks are typically designed to consider the merits of a particular project or business case that has been identified as worthy of government support. The framework ACIL Allen has developed operates at the prefeasibility stage of investment decision making and centres on identifying the priorities for investment that have not yet been considered and translated into a particular project or funding opportunity. For example, there are only three frameworks reviewed by ACIL Allen which explicitly reference a process for prioritisation. However, one of these frameworks does not detail the process of, or technical approach to, prioritisation:

*In December 2016, the NSW Government endorsed an enhanced process for prioritising capital infrastructure. Under this process, Infrastructure NSW, in consultation with the Department of Premier and Cabinet and NSW Treasury, prioritises all emerging projects as an input to the NSW Government's Budget deliberations. The process promotes transparency around the State's fiscal capacity, promotes informed decision-making and allows priorities to be assessed consistently between sectors.*

*Infrastructure NSW's 'Building Momentum – State Infrastructure Strategy 2018-2038', p 46.*

Two other frameworks discuss prioritisation, however they do so at the project level, as demonstrated in the quotes below:

*The Queensland Government's approach to infrastructure planning recognises there is typically more than one way to solve a problem. Often the best solution may be to upgrade existing infrastructure or consider different ways of meeting a service need. Infrastructure is ultimately built to deliver a service, so it is critical we explore options that involve building as well as those involving a change in the way we deliver services. This is why the future opportunities articulate infrastructure service gaps and challenges, not solutions. To prioritise future infrastructure investment, the government is implementing an Infrastructure Investment Framework. This four-stage approach to prioritising infrastructure consists of the following steps:*

- *Step 1: Project identification*
- *Step 2: Options assessment*
- *Step 3: Options alignment*
- *Step 4: Investment decision.*

*The Queensland Government's Project Assessment Framework – Strategic Assessment of Service Requirement', p. 40.*

*Infrastructure Australia formally assesses submissions as Initiatives and Projects for inclusion... Submissions are considered against the three assessment criteria: Strategic fit; Economic, social and environmental value; Deliverability.*

*Infrastructure Australia's 'Assessment Framework: For Initiatives and Project to be included in the Infrastructure Priority List', p. 14*

That said, there are some consistent themes, principles and concepts in the frameworks and plan, and strategies reviewed by ACIL Allen which are suitable for application to this project. In particular, there are aspects of these frameworks, plans and strategies that can be used to develop or build criteria for assessment under the framework. For example, the Infrastructure Australia Assessment Framework provides guidance on how to define the nature of an opportunity and constraint (a key requirement of this project) and how to understand the costs and benefits associated with unlocking these opportunities and constraints. These themes as well as the other principles and concepts of the documents considered go to the heart of the design decisions underpinning ACIL Allen's assessment framework (as summarised in the table below) presented in the next chapter.

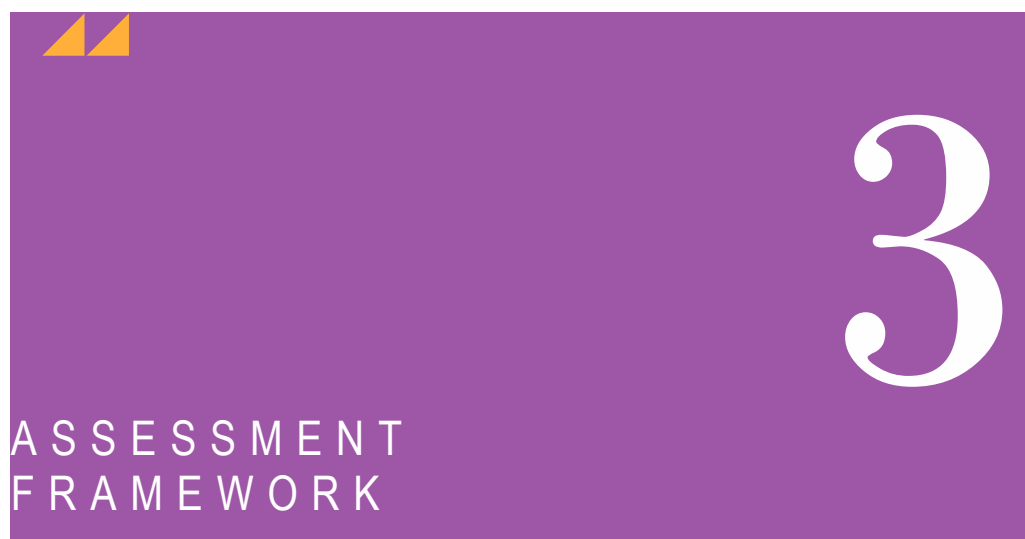
**TABLE 2.3** ELEMENTS PRESENT IN THE INFRASTRUCTURE STRATEGIES AND FRAMEWORKS OF OTHER JURISDICTIONS

Strategy / framework	Principles to drive decision making	Building the evidence base to support the strategy/framework		Analytical tools to identify infrastructure priorities					Prioritisation (processes and/or tools)	Comment
		Consultation as a part of the assessment process / document	Profiling of regions / economy	Needs assessment at regional or sectoral level	Comparative advantage analysis	Market failure analysis	SWOT, opportunities, constraints, options analysis*	Other economic assessment techniques cost and benefit assessments)		
ACT Strategy	x	x	✓	✓	x	x	x	x	x	Strategy presents the outcomes of other analysis so many items assessed here are not captured
QLD Infrastructure Plan	x	✓	✓	✓	✓	x	✓	✓	✓	Plan has only one minor reference to comparative advantage
QLD Assessment Framework	x	x	x	✓	x	x	✓	✓	x	Framework focused at the project level and of minimal use
WA Strategy	✓	✓	✓	✓	x	x	✓	✓	✓	Prioritisation inferred by not detailed in the Strategy
IA's Framework	✓	✓	✓	✓	✓	x	✓	✓	✓	Profiling is conceptualised as part of the problem identification stage, however some guidance about benefits and business case design is useful

Strategy / framework	Principles to drive decision making	Building the evidence base to support the strategy/framework			Analytical tools to identify infrastructure priorities				Prioritisation (processes and/or tools)	Comment
Tas Infrastructure Pipeline	x	✓	x	✓	x	x	✓	x	x	Document mainly a list of infrastructure projects and hence is less useful for the purposes of this study
NT's Infrastructure Strategy	x	✓	✓	x	x	x	✓	✓	✓	Strategy focuses on framework issues relating to project identification and assessment
NT 10 year Infrastructure Plan	x	✓	✓	✓	✓	x	✓	x	✓	Comparative advantage only mentioned in one instance and at a high level
SA's Infrastructure Plan	✓	✓	x	x	x	x	x	x	x	Document mainly focused planning framework on issues that are not core to this project

Note: \*The documents reviewed typically consider options as part of the analysis. SWOT-based forms of analysis are generally not included in the documents reviewed.

SOURCE: ACIL ALLEN



## Assessment framework

The assessment framework provides a structured and evidence-based approach to making decisions about infrastructure which are at an industry or region level.

The assessment framework's objectives are derived from the outcome statements (presented at Table 1.2). The framework's objectives focus on:

- Delivering greater productivity and efficiency to the regions
- Unlocking new areas of economic growth throughout the regions
- Delivering regional areas better access to markets
- Improving the match between skills supply and industry skills needs through infrastructure decisions which support the regions
- Supporting industries operating in regions to be more resilient to economic shocks and climate change.

The assessment framework's objectives are also consistent with several objectives identified in IV's 30-year strategy (presented at Table 1.1), as shown below:

- Objective 4: enable workforce participation
- Objective 5: lift productivity
- Objective 6: drive Victoria's changing, globally integrated economy
- Objective 9: advance climate change mitigation and adaptation
- Objective 10: build resilience to shocks.

A review of existing infrastructure assessment frameworks and strategies was undertaken to inform the development of this assessment framework (see section 2.4). This review identified the relatively unique nature of this assessment framework and the aspects it must consider. Unlike many other frameworks, the assessment framework is not intended to identify and then assess specific infrastructure projects. Assessment of infrastructure projects typically occurs at the business case or feasibility study stage when a clear problem has been identified and there are clear solutions (i.e. specific infrastructure projects) that government can consider.

A key feature of the assessment framework is that it draws on a first principles approach to help understand the appropriate role of government in the decision-making process for regional infrastructure. These principles should be used to drive decision-making under the framework, and are applied at various stages of it. They are:

- *Investment principle 1:* Infrastructure investments should leverage the comparative advantages of industries operating in regions. That is, infrastructure investments should leverage what the industries in “one region do relatively well”, compared to what the industries in “other regions do relatively well”.
  - *Investment sub-principle 1.1:* Ideally government should seek to support the infrastructure needs of industries with a comparative advantage that are material to a regional economy and enable growth to occur at the regional level. These are typically industries that have demonstrated growth in the past or demonstrate the potential to grow in the future.
- *Investment principle 2:* Infrastructure investments should seek to address an identified need/constraint or maximise an identified opportunity for the industries operating in a region. Investments must be tailored to local conditions so they address the actual (as opposed to theoretical) opportunities/constraints facing comparative advantage industries operating in regions.
- *Investment principle 3:* Government should intervene where there is evidence of market or policy failure that requires remediation through infrastructure investment. Where evidence of market or policy failure does not exist, infrastructure provision should be left to the market to determine when and where investments will be made in the regions.
- *Investment principle 4:* Public infrastructure investment decisions should be aligned with the policies and strategies set by the government and/or agencies authorised to make independent assessments of public infrastructure proposals, such as IV. In this instance they should be, at a minimum, aligned with the 30-year strategy published by IV.

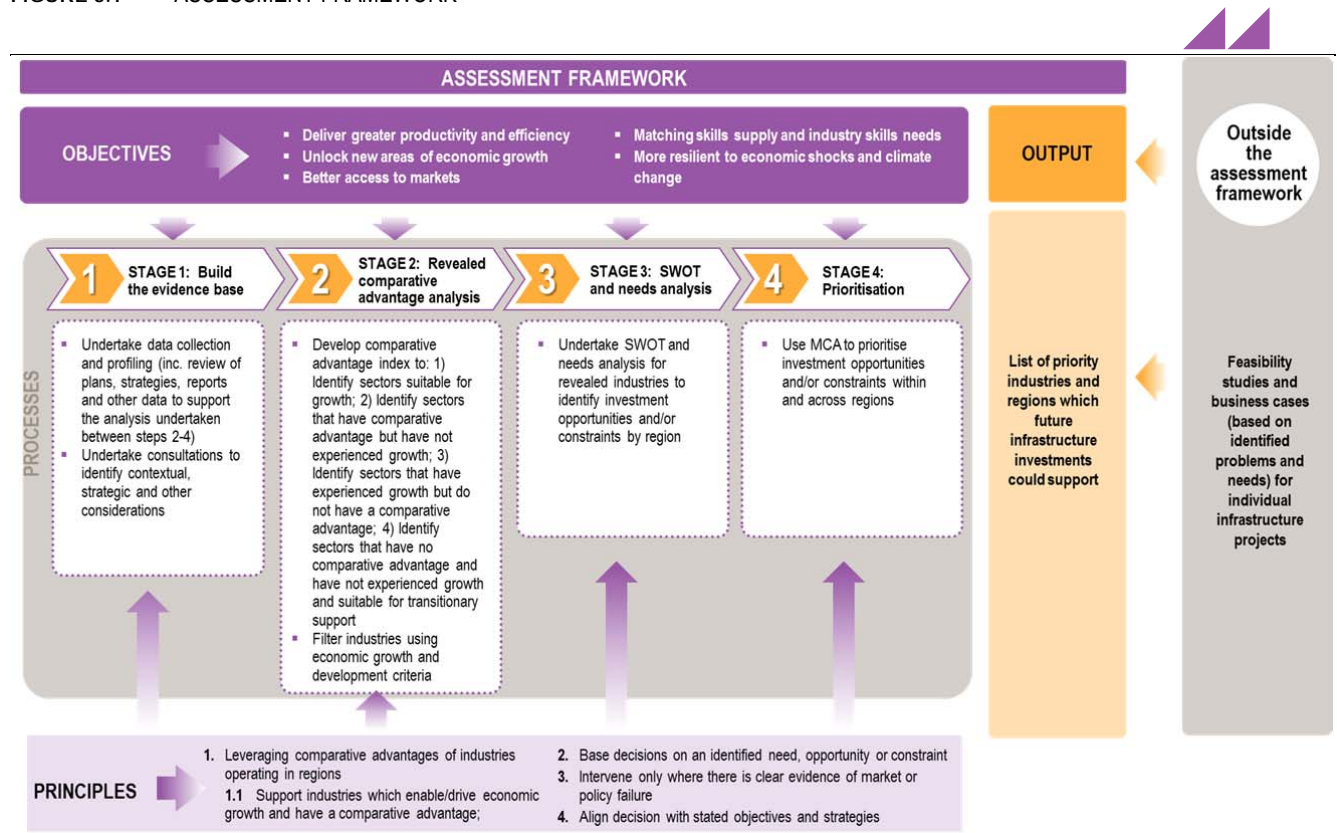
Assessment under the framework is undertaken through an accumulative process divided into four key stages. The processes consist of:

- An evidence building stage (stage 1). The objective of this stage is to construct the evidence base from which robust infrastructure decisions can be made in the future.
- A revealed comparative analysis stage (Stage 2). The objective of this stage is to use a revealed comparative advantage analytical technique to identify those industries which are important to the future productivity and growth of regions.
- A SWOT and needs analysis stage (Stage 3). The objective of this stage is to consider the characteristics of industries and regions which underpin their comparative advantage and to identify the opportunities and constraints facing key industries in regions.
- A prioritisation stage (Stage 4). The objective of this stage is to prioritise the opportunities and constraints facing key industries in regions to identify which are the most important opportunities/constraints warranting government intervention.

Figure 3.1 shows the assessment framework’s overarching logic.



FIGURE 3.1 ASSESSMENT FRAMEWORK



SOURCE: ACIL ALLEN

A more detailed description of the assessment framework’s process-related dimensions is provided in the sections which follow.

### Stage 1: Build the evidence base

The process for identifying economic development opportunities and/or removing constraints needs to be grounded in robust evidence. This evidence should be drawn from a combination of qualitative and quantitative data/information and used to profile the regions and industries operating in them.

#### Data collection and profiling

Developing a strong understanding of a region’s key characteristics is an important step in the framework’s application. Each region is endowed with natural and man-made assets which impact the performance of its economy. Profiling can be used to identify the demographic characteristics of a region, what natural assets and infrastructure the region already has, what industries operate in the region, the SWOT of these industries and their infrastructure needs. Profiling can be undertaken at a region-wide level as well as at the sub-regional level. The ability to undertake profiling at the sub-regional level is contingent on data availability and the complexities associated with analysing the key characteristics of a sub-region.

A summary of the information that should be captured in the profiles is provided in the table below.

TABLE 3.1 EVIDENCE CAPTURED IN THE PROFILES

Theme	What's included	Key data source(s)
Overview of the region	– Population and geographic information	– ABS data – IV profile data
	– Key natural and environmental attributes	– IV profile data
	– Key infrastructure	– Other web sources
	– Other relevant features of the region	
	– Subregional discussion	– IV profile data – Other web sources
Industry composition	– Distribution of Gross Value Added (GVA) across the largest industries in the region	– National Institute of Economic and Industry Research (NIEIR)
Revealed comparative advantage industry analysis (using the revealed comparative advantage index described at Stage 2)	– Level 1 ANZSIC industry analysis for the entire region	– Level 1 ANZSIC data (ABS)
	– Level 2 ANZSIC industry analysis for the entire region	– Level 2 ANZSIC data (NIEIR)
	– Level 2 ANZSIC industry analysis by the Local Government Areas (LGAs) within the region	– Level 2 ANZSIC data, by LGA (NIEIR)
	– Analysis of Level 2 ANZSIC revealed industries by LGA	– Level 3 ANZSIC data, by LGA (ABS) for selected industries, using customised data assembled by ACIL Allen specifically for this project
Analysis of revealed industries	– SWOT analysis of the region and revealed industries (including LGA level analysis where data are available)	– IV profile data – ABS data – ABARES data – Victorian Government regional strategies and growth plans – Sectoral analyses (various sources) – Consultancy and other reports
	– Needs analysis of the region and revealed industries	– Based on data already assembled for the profile
	– Consideration of the opportunities and constraints facing revealed industries in the region	– 30-year infrastructure strategy – Regional intelligence

SOURCE: ACIL ALLEN

### Consultation with key stakeholders

In the design of this framework ACIL Allen examined the infrastructure assessment and prioritisation frameworks used in other Australian jurisdictions. Consultation is typically used as a tool for supporting infrastructure decisions in as much as it seeks the views of people who have a deep understanding of the local social, economic and environmental issues of a region or regions.<sup>22</sup>

<sup>22</sup> See for instance the South Australian Government's 2014 'Overview of Infrastructure Planning and Delivery in South Australia', which articulates the important role of consultation in the infrastructure planning and assessment process.

Consultation is often cited as a core principle of infrastructure decision making as promulgated by Infrastructure Australia:

*Governments and proponents should undertake meaningful stakeholder engagement at each stage, from problem identification and option development to project delivery. This engagement should seek early input and feedback from a range of stakeholders, including local communities, businesses and industry groups, infrastructure users, private infrastructure owners and operators, and, where public funding is required, taxpayers.*

*Infrastructure Australia 2018, 'Infrastructure decision making principles', July.*

Consultation gives stakeholders opportunities to identify local area issues that are unlikely to be identified through a desktop review of existing data sets and published information. The consultation process should seek to capture the views of representatives from State and Local Government organisations, the non-government sector, the private sector and communities should be engaged.

The consultation themes and questions used to develop the evidence base under this framework should draw on the key concepts of comparative advantage and market failure (as outlined in chapter 2), as well as seek to understand the nuances of a region and the factors which shape its infrastructure requirements.

## Stage 2: Revealed comparative advantage analysis

This stage involves building and then applying the comparative advantage index (CAI) to identify priority sectors within regions. As identified in Chapter 2, there are four main types of revealed comparative advantage that this step in the framework must consider:

1. Industries that have a comparative advantage and growth and could be considered for growth opportunities.
2. Industries that have a comparative advantage but have not experienced growth, which government can use as indicators for further assessment of what the main constraints to future growth are.
3. Industries that have experienced growth, but do not have a clear comparative advantage. In this instance this sector may be considered as an emerging industry.
4. Industries that have no growth or comparative advantage. These may be industries of decline. In this instance, government may consider supporting these industries to transition to a more economically sustainable purpose.

### Revealed comparative advantage formulas and index

An RCA approach assumes that the historical economic performance of a region can serve as a good indicator of the industries which have a comparative advantage in that region. The strength of an RCA approach is that it enables the identification of significant industries in each region while using a consistent methodology. In other words, with RCA, the results are truly comparative across regions because, for each region, the results are derived in a consistent way. Specifically, industries with a CAI above 1 have a higher proportion of GVA in that region compared to the state or national economy and can indicate a potential strength of a region.

The revealed RCA measures the concentration of industries in a region compared to the Victorian or Australian economy (that is, it compares the proportion of an industry contribution to the region's GVA, relative to the proportion at the State and National level). The reasons why both comparators are important to the analysis under the framework are outlined in Box 3.1 below.

### BOX 3.1 EXPLANATION UNDERPINNING ACIL ALLEN'S USE OF VICTORIAN AND NATIONAL CAI COMPARISONS

The RCA approach was developed initially to calculate relative advantage or disadvantage of a country in certain goods and services as evidenced by trade flows. In recent years, the concept has been adopted to assess the comparative advantage of industries in a region.

When assessing regional RCA, there was a question of which denominator to use in the index.

A key reason for using a national denominator (in addition to a Victorian denominator) to calculate the CAI for industries is that while an industry may be significant compared to the Victorian average, it may not be significant compared to the broader Australian economy. A National benchmark may be more appropriate to measure comparative advantage in a global/national market. However, a comparative advantage within Victoria may still be significant especially for goods/services primarily focused on a local market.

When the CAI for an industry, within a region, shows a similar strength compared to both the Victorian and the national averages, this is likely to indicate a stronger comparative advantage than one in which the two CAI's conflict.

Therefore, under this framework, two comparisons (Victorian and national) have been provided to assist IV in understanding a region's/industry's comparative advantage from multiple perspectives.

For example, the CAI of a mining commodity may be very strong in a region compared to Victoria because there happens to be an economic deposit within that region that is not available elsewhere in Victoria. When compared to Australia as a whole, however, a low CAI would indicate that there are more competitive mining provinces elsewhere in Australia. In contrast, a high CAI using both the Victorian and national denominators is likely to indicate that not only is there an economic deposit present, but that it is potentially a world class deposit.

SOURCE: ACIL ALLEN

#### Formula used to undertake the RCA analysis

In short, for each region, the index compares the share that an industry has in a regional economy relative to the share that the same industry has in the Australian economy.

The revealed comparative advantage formula is expressed below:<sup>23</sup>

$$RCA = \frac{Output_{ir}/Total\ output_r}{Output_{ia}/Total\ output_a} - 1$$

Where:

$RCA^{24}$  = revealed comparative advantage;

$Output_{ir}$  = Output of industry  $i$  in region  $j$ ;

$Total\ output_r$  = Total output of region  $j$ ;

$Output_{ia}$  = Output of industry  $i$  in Australia (or Victoria);

$Total\ output_a$  = Total output of Australia (or Victoria)

An RCA that is greater than zero for industry  $i$  means that industry  $i$  is more important in region  $j$ 's economy than it is in the country as a whole; thus implying a comparative advantage. The larger the comparative advantage index number, the stronger is the *comparative advantage*.

An RCA that is less than zero for industry  $i$  means that industry  $i$  is less important in region  $j$ 's economy than it is in the country as a whole; thus implying a comparative disadvantage. The smaller (more negative) the RCA number, the stronger is the *comparative disadvantage*.

<sup>23</sup> Clark D, Sawyer W and R Sprinkle 2005, 'Revealed Comparative Advantage Indexes for Regions of the United States', *Global Economic Journal*, vol 5(1), pages 1-26.

<sup>24</sup> Note this RCA formula compares revealed comparative advantage across regions within a country. As such it differs from the RCA formula discussed in section 0 which compares comparative advantage across countries.

RCA measures the relative significance of different industries in a regional economy. Those industries that are relatively significant are likely to be industries for which a regional economy has comparative advantage. Relative significance is measured by the combination of two elements:

- The first element is the contribution of an industry to the total regional economy. This is simply the share that the industry has in the total regional economy. All else equal, the larger the share of an industry in the regional economy, the more significant it is to that economy. This aspect of the calculation is captured by the numerator of the revealed comparative advantage formula.
- The second element takes into account the relative share that the same industry has in the national economy. The intent behind the inclusion of this element is to enable the identification of truly significant (or specialist) industries in a regional economy because it is these industries that are likely to be the comparative advantage industries. This aspect of the calculation is captured by the denominator of the revealed comparative advantage formula.

### Limitations of the RCA approach

The RCA approach tells us how, in terms of size, regions compare to that of the broader economy. The approach is based on historical data which has its limitations. Industries which demonstrate historical comparative advantages may not be the same industries that have a comparative advantage in the future. For example, industries which emerge rapidly, are not part of an existing industry classification (such as tourism) or have grown rapidly or could grow rapidly in the future are unlikely to be identified from the historical data. Other data and regional/industry insight are required to determine whether these other (often smaller) industries (not identifiable within the historical data) could be important industries in the future.

Moreover, where there is variation in size relative to the broader economy RCA can be an indicator of strength and 'importance' to the future of the economy. However, it is only an indicator and other indicators and further analysis are needed to determine if the industry warrants future investment and attention by government.

Furthermore, the RCA approach does not tell us if a high CAI industry is a driver or a consequence of growth. This is important because an industry may only exist as a consequence of government funding (as is the case for correctional facilities/prisons) and not because of the private market's demand for its goods and services. There may be policy or other reasons to support these industries, however, these reasons may not be overtly economic in nature.

### Criteria for assessing whether revealed industries are suitable for further analysis

A step of Stage 2 is to filter those industries which are less likely than other industries to contribute to the future economic growth of a region. It is also a way of filtering industries at the Level 2 ANZSIC and LGA level (a requirement of this project) which number nearly 100 in total to a more manageable list of industries suitable for analysis.

For this filtering to occur effectively, it is important to apply the following criteria to each industry listed at Level 2 ANZSIC. The criteria are based on fundamental principles of economic growth and productivity improvement. The criteria also seek to filter out micro industries which even if they have growth potential are not operating at a scale that is suitable for further analysis.

Application of the filters (especially, criteria 1-3) was undertaken in a general way, using informed professional judgement about the contribution an industry makes to the growth of an economy, in this instance a regional Victorian economy.

A key point of judgement is whether an industry is (for the most part) a driver of economic growth or a consequence of economic growth. Some public sector industries (e.g. health and education) are in this analysis potentially filtered out because they are a consequence of growth, in the sense that economic growth provides governments with revenue which is then spent on public services. This said, the causality can be argued to go in the other direction as well, in that health and education improve human capital which then leads to economic growth. This argument is inherently circular, which is not very helpful in practice. Moreover, the argument that public services are causes of economic growth is more convincing at the national rather than the regional level.

To keep the analysis manageable, decisions have to be made about which industries to filter and these decisions are as described in Table 3.2 below.

TABLE 3.2 CRITERIA FOR ASSESSING REVEALED INDUSTRIES

Criterion	Included / excluded from the analysis?	Justification / examples
1. Industries dominated by private firms and private investment	Included	Industries which meet this criterion are included in the analysis as they meet standard definitions of economic growth. Examples include private sector dominated industries such as agriculture, transport, mining, professional services, retail trade, food and accommodation services, etc.
2. Industries which have a mixture of private firms and public sector agencies operating in competitive or quasi competitive markets	Potentially included if they are key to the region and of specific size/scale to warrant further investigation	Industries which meet this criterion are potentially included in the analysis if they have a comparative advantage. Examples of these industries include higher education (which is driven by a mixture of public funding and revenue generating export activities), and electricity gas and water (which are driven by a mix of private investment/market activity and government subsidies and support).  Other examples include health and aged care and some aspects of social assistance. For these industries, demand may be driven by population growth or ageing, however goods and services are delivered by a mixture of public and private suppliers
3. Industries dominated by public sector investment	Excluded	The application of this criterion excludes the industry from being progressed in the framework as it is assumed that the demand and supply of services within the industry is a consequence of government policy and not the private market. Examples of these industries include some aspects of public administration and safety which are almost exclusively publicly funded
4. Industries that are below a threshold size	Excluded	Industries that are immaterial (or micro in scale) to the region are excluded from the analysis (estimated to be 0.1% of the region's Gross Value Add (GVA)).

SOURCE: ACIL ALLEN

### Stage 3: SWOT and needs analysis

Identifying the priority industries by regions will reveal where government might invest, but it will not identify what infrastructure government should invest in over the longer term. To identify what these infrastructure investments should look like, it will be important to use qualitative and strategic assessment techniques that complement the quantitative analysis undertaken at Stage 2.

To be consistent with the approaches used by ACOLA and others, this stage adopts the techniques and approaches of SWOT analysis and integrates them with needs analysis. This allows the assessment framework to identify what infrastructure investment opportunities will propel a region/industry forward and what constraints are holding the region/industry back. How the framework does this is detailed below.

## SWOT analysis

Using a SWOT analysis technique it is possible to develop list of potential investment opportunities and constraints under the framework. The SWOT draws on the evidence assembled in the regional profiles, feedback from stakeholders collected during consultations and evidence from the Analysis of Regional Victoria's Strengths and Challenges Report.<sup>25</sup> The outcomes of the SWOT can be captured and reported in a table format (such Table 3.3). The table can be used to identify the key characteristics of a region by the RCA industries identified at Stage 2.

TABLE 3.3 SAMPLE SWOT ANALYSIS TABLE FOR A REGION EXAMINED UNDER THE ASSESSMENT FRAMEWORK

Industries	Strengths	Weaknesses	Opportunities	Threats
Cross-industry				
RCA industry 1				
RCA industry 2				
RCA industry 3				

SOURCE: ACIL ALLEN

Consideration of region's strengths, weaknesses, opportunities, and threats provides a useful guide to the issues that impact its RCA industries, however, it is important to take this exercise one step further to identify the potential investments that will address the infrastructure needs of regions.

The next step in the assessment process, sometimes called a TOWS analysis, helps to make connections between each element of the SWOT. It involves working around the SWOT and combining information from two elements to create options that are potentially actionable by an infrastructure investment. These combinations include:

- *Strengths–Opportunities*. The idea is to use the strengths identified to take advantage of opportunities identified by the SWOT.
- *Strengths–Threats*. The idea is to use the strengths identified to minimise threats facing a region and/or revealed comparative advantage industries.
- *Weaknesses–Opportunities*. This involves improving the weaknesses identified by the SWOT by taking advantage of opportunities facing a region and/or revealed comparative advantage industries.
- *Weaknesses–Threats*. This involves eliminating the weaknesses identified by the SWOT to avoid threats.

Table 3.4 shows how the exercise can work in practice. It uses a series of targeted questions to help identify the investment options or actionable strategies arising from the SWOT analysis.

A matrix like this one can be developed for the region and the RCA industries identified at Stage 2.

TABLE 3.4 SAMPLE TOWS ANALYSIS MATRIX

	Opportunities	Threats
Strengths	<p>Strength-Opportunity options</p> <p>Which of the region's/industries' strengths can be used to maximise the opportunities identified?</p>	<p>Strength-Threat options</p> <p>How can the region's/industries' strengths be used to minimise the threats identified?</p>
Weaknesses	<p>Weakness-Opportunity options</p> <p>How could the region's/ industries' weaknesses be minimised through the opportunities identified?</p>	<p>Weaknesses-Threats options</p> <p>How can a region's/ industries' weaknesses be minimised to avoid the threats it/they are facing?</p>

SOURCE: ADOPTED FROM VARIOUS SOURCES

<sup>25</sup> Aither (2019) Inter-regional assessment: an analysis of regional Victoria's strengths and challenges.

## Needs analysis

The next part of Stage 3 is to consider the outcomes of the SWOT analysis in light of the infrastructure needs of a region/industry and the gaps in current infrastructure provision. This part of the analysis can be undertaken using a “compare and contrast” approach that draws on some basic questions, such as:

- What infrastructure is needed at the regional/industry levels?
  - What is the evidence of this need for the region/industries analysed?
- What are the infrastructure investment opportunities to address these needs, and why?
- What are the infrastructure investment constraints that governments must unlock?

Table 3.5 shows how these questions will be used to progress the analysis undertaken at this step.

**TABLE 3.5** WHAT ARE THE INFRASTRUCTURE INVESTMENT OPPORTUNITIES AND CONSTRAINTS FOR REGION X?

Revealed sectors	Relevant LGAs	Identified needs	Opportunities to address needs	Constraints facing Government
Industry 1				
Industry 2				
Industry 3				

SOURCE: ACIL ALLEN

This part of the assessment process concludes by identifying the investment opportunities and constraints that governments should address. The next stage of the assessment process is to prioritise the investment opportunities and constraints (identified in Table 3.5), as outlined in Stage 4.

## Stage 4: Prioritisation

Multi-criteria analysis (MCA) is an evaluation approach used to structure and solve decision-making problems involving multiple criteria. MCA differentiates and evaluates options ‘using a set of identified assessment criteria with weights assigned to each criterion. The analysis involves subjectively scoring each option against criteria and calculating a weighted score.’<sup>26</sup>

MCA techniques are ideal for ranking opportunities and/or constraints within each region and between the regions. This is important because governments have finite resources (including financial, expertise and time-based resources) and it is simply not possible to address all infrastructure opportunities/constraints identified through an assessment process like this one.

MCA techniques essentially give each opportunity/constraint identified a score against criteria which are weighted towards aspects of IV’s decision-making/role as an independent advisor.

At a minimum, all MCA’s should evaluate options/issues against the key objectives or outcomes a government/organisation is seeking to achieve (in this instance, the framework’s objectives as outlined in section 3.1). This is a requirement of most guidance material governments publish about the use of MCA techniques in public policy decision-making.<sup>27</sup>

In addition, the criterion should cover spatial, temporal dimensions of the opportunity and constraints identified in the stages above to ensure that the analysis is consistent with the regional dimensions of this project and the forward-looking nature of the 30-year infrastructure strategy currently being revised by IV.

To this end, two criteria relating to the benefits arising from addressing an opportunity and/or constraint are included in the MCA. These criteria emerge from ACIL Allen’s work on the regional profiles which shows that some opportunities and constraints identified in one region/industry have implications for other regions/industries. For example, an infrastructure opportunity which improves the connectivity between one region and Melbourne might also benefit other regions that have access

<sup>26</sup> Infrastructure Australia 2018, ‘Assessment framework for initiatives and projects to be included in the Infrastructure Priority List’.

<sup>27</sup> Commissioner for Better Regulation 2014, ‘Guidance Note for Multi-Criteria Analysis’, [www.betterregulation.vic.gov.au/.../Guidance-note-Multi-Criteria-Analysis-MCA.pdf](http://www.betterregulation.vic.gov.au/.../Guidance-note-Multi-Criteria-Analysis-MCA.pdf)



to the same infrastructure. These are likely to include infrastructure such as road or rail infrastructure which could connect multiple regions to key markets across the state and elsewhere.

Moreover, the benefits arising from addressing an opportunity or constraint facing a region should be enduring. For those opportunities and constraints which generate long term benefits to a region/industry, these will be ranked as a higher priority than opportunities and constraints which (if addressed) only deliver short term benefits to a region/industry.

Each criterion will be weighted to reflect their relative importance (see below).

The criteria used for the MCA and the justification for using them are provided in Table 3.6. Assessment against the criteria should be largely qualitative and based on the informed judgement of the individual/persons making the assessment.

TABLE 3.6 CRITERIA USED TO PRIORITISE OPPORTUNITIES AND CONSTRAINTS

Criteria	Definition / key question	How assessed
Alignment with framework objectives	This criterion considers the alignment dimensions of the opportunity or constraint. It considers whether the identified opportunity or constraint contributes to one or more of the following objectives of the framework: <ol style="list-style-type: none"> <li>Greater productivity and efficiency</li> <li>Unlocking new areas of economic growth</li> <li>Better access to input and output markets</li> <li>Improved match between skills supply and industry skills needs</li> <li>Industries that are resilient to economic shocks and climate change</li> </ol>	The opportunity or constraint will receive a rating for each objective. The more that an opportunity or constraint contributes to an objective the greater score it will receive in the MCA
Ability to deliver economic benefit beyond a single industry, LGA or region	This criterion considers the spatial (or breadth) dimensions of the opportunity and constraint	The opportunity or constraint will receive a rating based on its ability to deliver benefits beyond the: <ol style="list-style-type: none"> <li>LGA it relates to</li> <li>Industry it relates to</li> <li>The region it relates to</li> <li>A combination of 1-3</li> </ol>
Ability to support industry or regional growth that will be sustained over time	This criterion considers the enduring impacts (or temporal dimensions) that addressing the opportunity or constraint may have	The opportunity or constraint will be assessed against its ability to deliver short, medium or long-term benefits to an industry, LGA or a region

SOURCE: ACIL ALLEN

The criteria should be assessed using an intensity scale as outlined in the table below.

TABLE 3.7 INTENSITY SCALE OF IMPORTANCE

Scale	Definition	Explanation
0	N/A	Not applicable or does not meet any aspects of the criterion
1	Low	Addressing the opportunity or constrain meets few aspects of the criterion, or meets all aspects of the criterion to a low level
2	Medium	Addressing the opportunity or constraint meets most but not all aspect of the criterion, or meets all aspects of the criterion to a medium level
3	High	Addressing the opportunity or constraint meets all aspects of the criterion to a high level

SOURCE: ACIL ALLEN

The suggested weighting for each criterion is shown in the table below.

ACIL Allen reviewed other infrastructure plans, strategies and assessment frameworks to determine how the criteria should be weighted. However, there was limited guidance on this aspect in the infrastructure plans, strategies and assessment framework reviewed. One exception related to the 'objectives criteria' included in the MCA. Most guidance material on MCAs suggests that these criteria should be weighted more heavily than the other criteria used in an MCA. As such, ACIL Allen has given the five framework objectives equal weightings and has subsequently allocated 50 per cent of the MCA's total weightings to these criteria.

The other criteria used in the MCA were weighted equally (due to the absence of a suitable benchmark for determining the weightings). However, this weighting could be changed, especially if the other criteria included considerations of regional disadvantage (which are a different but complementary consideration to this framework/report). For example, infrastructure decisions could be given a higher weighting if they also address disadvantage in a way that is consistent with the framework developed for the regional disadvantage project. This could include infrastructure which:

- Creates jobs and pathways for local lower skilled populations, particularly in sectors involving technologies that create jobs, and provide young people with skills that are transferable to a great range of work for example (e.g. renewable energies).
- Supports infrastructure that can improve transport access to these and other job opportunities.
- Supports infrastructure that can improve the digital connectivity of regional communities.
- Supports infrastructure that enhances the resilience and adaptive capacity of regional communities.

It is important to note that the weights were determined using ACIL Allen's professional judgement, and are essentially subjective in nature. It is acknowledged that a different interpretation of each criterion's relative importance would result in a change to these weightings.

TABLE 3.8 WEIGHTING OF CRITERIA

Criteria	Weight	Justification
Alignment with framework objectives	50% of total weight (or 10% of the total weighted value for each objective contributed to)	Contribution to stated outcomes/objectives is a critical component of any potential investment as it relates to the use of public moneys
Ability to support economic benefit beyond a single sector, LGA or region	25% of total weight	Ability to deliver benefits beyond a sector or region is important in ensuring a broader cross-section of the Victorian community benefits from Government investment in regional infrastructure
Ability to support industry or regional growth that will be sustained over time	25% of total weight	Ability to deliver benefits that endure will drive longer term economic growth

SOURCE: ACIL ALLEN

## Considerations outside the framework that are important to its operation

This assessment framework takes a top down (i.e. whole of Victoria) approach to the identification of infrastructure opportunities and constraints facing the industries that are important to the State's regions. It does not consider the detailed infrastructure options, projects or solutions that are required to address these opportunities/constraints. These options, projects or solutions will naturally emerge from the regions through the process of government and government's interactions with regional stakeholders (in particular).

When infrastructure options, projects or solutions are identified by the regions or other stakeholders it is important that they meet the principles economics and good public policy. These principles should be enshrined in any feasibility studies and business cases submitted which are seeking government funding and support.

It is critical *as a threshold issue* that these feasibility studies and business cases outline the rationale for government intervention and provide *strong justification* why the private market is not in a position

to provide the infrastructure funding being sought from government. Chapter 2 identifies at least five grounds for market failure that could be considered as reasonable grounds for justifying public investment in an infrastructure option, project or solution which addresses a priority identified under this framework.

To provide some guidance as to the aspects that a good practice feasibility study or business case should consider, ACIL Allen has adapted the advice given by Infrastructure Australia on the processes it uses to assess a business case. This advice is highly relevant to IV's role as an independent infrastructure assessment agency, as shown in Box 3.1 below.

## BOX 3.2 KEY REQUIREMENTS OF A FEASIBILITY STUDY OR BUSINESS CASE SUBMITTED UNDER THE ASSESSMENT FRAMEWORK

Any feasibility study or business case submitted against the assessment framework's priorities, should at a minimum include the following six considerations:

1. *Significance of option/project/solution to Victoria*  
The proponent demonstrates that the project addresses a problem or an opportunity of significance to a region or industry important to Victoria.
2. *Options assessment*  
The proponent demonstrates that an appropriate range of options have been considered and robustly assessed to determine the short-list of preferred options.
3. *Relevant government support*  
The proponent demonstrates that the project is supported by local council(s), local communities (including local industries) and/or the Commonwealth government.
4. *Economic appraisal*  
IV could assess the proponent's economic appraisal to ensure there is a strong rationale for government intervention in terms of demonstrating that market failures are present and require public funding to be addressed. These market failures could include:
  - Monopoly
  - non-excludable public good
  - information failure
  - externalities
  - coordination failure.
 Other economic assessment techniques could include:
  - a robust CBA, which includes best practice evaluation methods, such as probabilistic risk-based cost estimates
  - consideration of a project's net benefits to ensure they outweigh its costs (as measured in real present dollars)
  - consideration of the equity and distributional impacts of the project, with identified impacts properly accounted for on relevant social groups.
5. *Benefit realisation*  
IV should assess the proponent's benefits realisation approach, including the Benefits Realisation Plan attached to the feasibility study or business case.
6. *Deliverability*  
IV should assess the deliverability, funding and other risks associated with the project, with a focus on how this could impact on the costs and benefits.
7. *Value for money*  
IV should consider the overall value for money that an infrastructure solution represents to the region in question, its relevant industries, local communities and the broader community of Victoria.

SOURCE: ADAPTED FROM INFRASTRUCTURE AUSTRALIA 2018, ASSESSMENT FRAMEWORK, P. 35

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