



Collaborative Exploration Initiative Impact Study Summary Report

Department of Resources

July 2021



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1 Overview

The Queensland Government’s (the Government’s) Department of Resources (the Department) is currently developing its Queensland Resources Industry Development Plan (QRIDP) (the Plan). This will set out a long-term vision to ensure the future of the state’s resources industry and identify immediate actions designed to achieve this. The plan will have a focus on:

- Removing barriers to resources industry growth;
- Helping regional communities recover from the impacts of COVID-19; and
- Responsibly unlocking our precious resources.

The plan is intended to support the Queensland economy as it seeks to build on its position as a world leader in resources – particularly in coal and gas – into a more diverse resource mix. In particular, it will seek to position Queensland to capitalise on the global trends of transitioning to a lower carbon economy, a focus on renewables and growing demand for new economy minerals.

As part of the development of the plan the Government is undertaking a review of exploration activity incentives at the front end of the mineral value chain. This review is seeking to understand how Government financial support and incentives can better encourage exploration and development of the state’s resources.

The incentive mechanism that is currently deployed to accelerate mineral exploration is the Collaborative Exploration Initiative (CEI), which:

- provides grants to businesses to conduct mineral exploration activities; and
- publishes the resulting data as ‘pre-competitive geoscience information’ freely available to the public.

The CEI replaced the Collaborative Drilling Initiative (CDI) in 2017 and has funded four rounds of grants with a fifth currently under assessment. The CEI has been funded for a further two rounds up until 2023/24. The stated purposes of the CEI are to:

- encourage exploration, particularly in frontier/greenfield areas;
- support innovative exploration techniques, including machine learning; and
- promote the discovery and development of ‘new economy’ minerals.¹

This summary report presents the findings from this review which:

- 1) Incorporates an economic impact assessment of existing Queensland Government support provided to the resources sector, particularly for the exploration sector, and include a review of the current CEI grants program and government-led pre-competitive geoscience programs; and,
- 2) Provides findings from a market sounding exercise to assess the optimal government support mechanisms, beyond grant funding, to assist companies in expediting their exploration and development programs.

The assessment has been informed by a desktop review of similar programs in other Australian jurisdictions along with findings from stakeholder consultation. These findings have led to a series of key considerations for the Queensland Government to improve the program and has identified opportunities to better align the program with the Department’s objectives including value for money outcomes. Consistent with the QRIDP, a key focus of this review is understanding how best to position Queensland as a resource leader in the emerging market for new economy minerals.

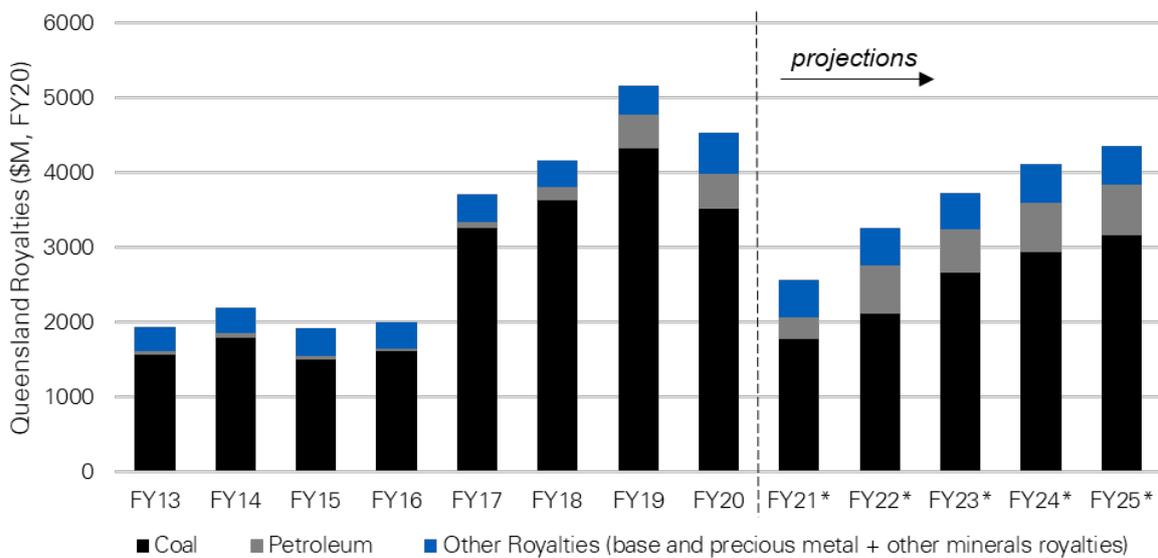
¹ (Business Queensland, 2021)

2 Background

2.1 Resources in Queensland

The Queensland economy has benefited from sustained production of traditional resources. Over the past decade (since FY12), resource royalties have generated over \$27 billion (FY20 prices) for the State of Queensland, with this contribution growing materially in recent years. These recent spikes in revenue have been a product of both proactive government support and favourable market conditions.

Figure 2-1: Queensland royalties (\$M, real terms – price year FY20)



Source: Queensland Budgets (2014-15 up to 2021-22)).

*FY21-25 uses projected nominal royalties from Budget and a PPI escalation factor based off FY12-20 CAGR

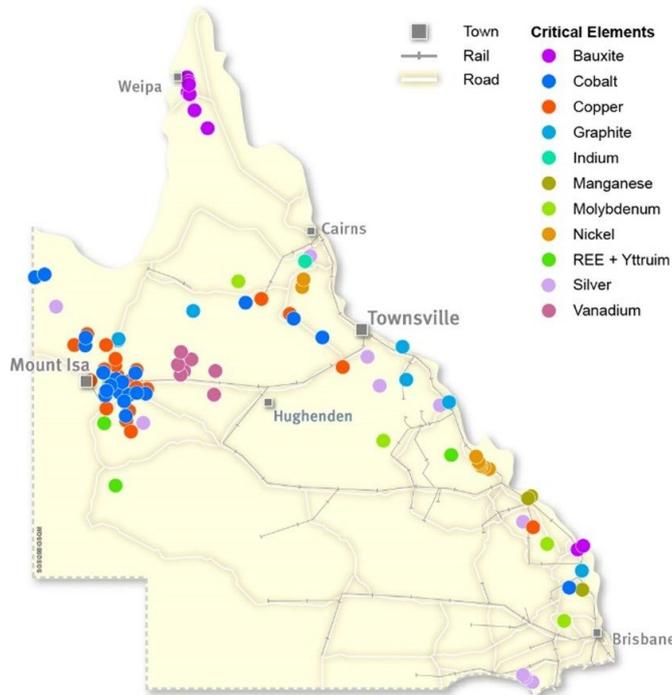
As demonstrated in Figure 2-1, the greatest share of royalties within the Queensland economy are derived from coal and petroleum (combining for approximately 89% of the total royalty revenues in FY20). Base and precious metals along with other minerals make up the remaining 11%. This large concentration of coal and petroleum activity has enabled the development of a mining industry with market leading expertise, underpinned by a workforce of approximately 76,000 across the state.²

Nevertheless, the energy market globally is experiencing a transition towards a lower carbon mix of fuels which will impact on the long-term demand for Queensland’s traditional resource strengths. This transition will ultimately mean that Queensland will need to broaden its resource mix to continue to maintain and grow both the scale and royalty contribution from resource activities.

Fortunately, Queensland has strong endowments of mineral resources beyond coal and oil which vary in scale and nature to the other Australian states and territories. Figure 2-2 demonstrates Queensland’s significant identified mineral deposits.

² Four-quarter average of Queensland employees in Mining Industry, Aug 2020 to May 2021 (Australian Bureau of Statistics (ABS), 2021)

Figure 2-2: Major mineral deposits in Queensland



Source: Geological Survey of Queensland in Australasian Institute of Mining and Metallurgy Bulletin, 2020.

Historical success in unlocking Queensland’s natural endowments has relied on both external market conditions (i.e. where sufficient demand exists and/or the extraction is economical) and available information. Equally, the relative risk has significantly influenced deposit development, with private investment typically favouring commodities with the least volatile market conditions given the time lag from investment to cash flow. This has led to the development of base metals in the north west (particularly copper, zinc and lead) and traditional coal and oil reserves across the state.

Given a less-developed market for rare earth metals, precious metals and other minerals, private exploration has been lower. This activity will require signals from the market and/or government to improve economic conditions and/or reduce the risk associated with exploration and development relative to existing traditional resources.

Factors contributing to exploration activity³

The discovery of new reserves involves both “extensive” (greenfield) and “intensive” (brownfield) processes, with new resources primarily identified through the extensive exploration of large areas. Gelb, et al (2012) highlight that the probability of successful outcomes in exploration for a host region depend on a range of factors including:

- the quality and availability of geological data;
- the level of maturity of the local industry;
- the state of technology;
- fiscal incentives;
- economic feasibility (including access to markets); and
- the credibility/reputation of the host region’s government.

Many external factors will influence the economic viability of exploration and investment in new economy minerals. Of particular relevance to Queensland is the global transition towards a lower carbon economy, which is likely to result in changes to market conditions for the state’s traditional resource base (falling demand). In parallel, technology advances such as battery enhancements have the potential to increase demand for other resources – such as new economy minerals.

To this end, one of the key objectives of the QRIDP is:

to ensure the Queensland resource industry can successfully navigate these changing market conditions, including the rise in demand for new economy minerals.

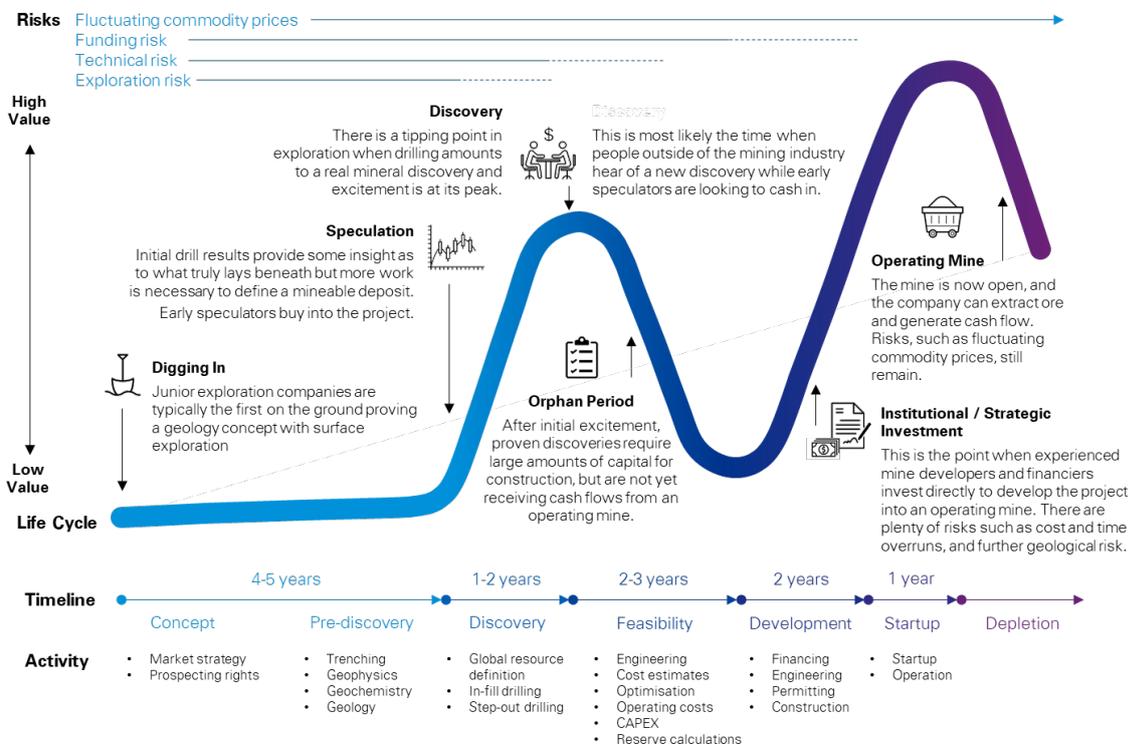
In doing so, programs such as the CEI support the current gap in exploration of Queensland’s ‘riskier’ minerals – where market conditions are still too volatile to warrant sustained investment.

³ (Gelb, Kai, & Vinuela, 2012)

Existing geological evidence supports the hypothesis that Queensland has a large bank of untapped naturally-occurring resources. Continuing to build a repository of publicly-available quality information on the state’s mineral deposits will serve to position Queensland at the forefront of the cost curve and enable the State to capture a greater share of investment as market conditions permit. This view was reinforced by industry (Section 6) in their acknowledgement that the availability of quality geological data helps to encourage and de-risk the investment of explorers and miners.

Figure 2-3 provides a detailed overview of this proposition in the context of the resources value chain from mineral discovery to production, along with key funding challenges. This lifecycle is referred to as the ‘Lassonde Curve’ and models the relative stock value and time horizon for a company in a deposit’s development. It is characterised by two significant spikes in value: firstly upon the discovery of a deposit and secondly when an operating mine is established. This study focuses on the role of the Department in supporting industry from concept through to discovery and how this can be both accelerated and complemented by private investment.

Figure 2-3: The lifecycle of mineral discovery value chain



Source: KPMG (2021) adapted from Visual Capitalist⁴ based on Lassonde (1990).

⁴ (Visual Capitalist, 2019)

2.2 Rationale for government participation in resources

2.2.1 Mineral resources

Mineral resources in Queensland are effectively owned by the Crown, which in practical terms means that mineral resources are managed by the State Government on behalf of Queensland citizens. Businesses seeking to undertake mineral exploration activities and/or mining activities to extract and sell minerals must be authorised by the State. Such authorisations establish the rights and obligations of businesses to look for and extract minerals. The obligations include a range of payments by businesses to the state, including for permits/licences, mining leases and royalties.

Exploration is crucial to the minerals value chain. The value of Queensland's resources can only be realised if they are discovered and ultimately extracted. In the absence of investment in exploration, existing reserves will eventually be exhausted. This means that the mining industry and supporting businesses will contract over time and become a smaller part of the economy. While the resources released by a contracting mining sector (including capital and labour) can be re-deployed to other activities, such a transition may be economically disruptive, particularly for regional economies. Moreover, unless the alternative economic activities generate as much value added as mining activities, the overall living standards of Queenslanders is likely to decline.

2.2.2 Economic value generated by mining

There is no economic value to minerals exploration unless it ultimately results in the development of commercially viable mining operations that extract minerals and sell them to users. Mineral mining businesses cannot exist without access to minerals reserves, which can be discovered through exploration activity around existing deposits (brownfield) or unexplored areas (greenfield). These distinctions are not hard and fast because technologies for finding, extracting and processing minerals change over time and because the commercial value of minerals can change over time as new technologies emerge and the demand for particular minerals increases.

Greenfield exploration leads to new discoveries that maintain the pipeline of projects and replace the depleting resources. However, lower likelihood of success and higher uncertainty of adequate return on investment make greenfield exploration less attractive to private companies.^{5,6} Over the past five years, mineral exploration has shifted away from greenfield towards brownfields in response to the global demand for resources.⁷ In the long run, this shift can impede the ability to sustain a pipeline of new resources to replace existing mines that are gradually depleted. A free market is unlikely to yield the socially optimal level of greenfield exploration.

An investment in minerals exploration has the potential to generate significant economic value if it ultimately leads to the development and operation of a mine. This value includes:

- royalties that the government collects on behalf of Queensland citizens;
- payments of wages and salaries to Queensland workers directly and indirectly supported by mineral exploration activities, and the development, construction and operation of mines;
- payment of profits to Queensland citizens that hold equity in businesses that directly and indirectly benefit from mineral exploration activities, and the development, construction and operation of mines; and
- net taxes on production and imports generated directly and indirectly by mineral exploration activities, and the development, construction and operation of mines.

⁵ (Schodde, 2011)

⁶ There is a risk that a brownfield explorer becomes responsible for any outstanding remediation of legacy mining areas, which could make extraction uneconomical. Despite this, the overall risks of greenfield exploration still tend to outweigh those of brownfield.

⁷ (IBISWorld, 2020)

Governments collect a range of other taxes and revenues that may be directly or indirectly boosted by mining-related activity (e.g., payroll taxes, income taxes, GST, etc). Transfers of this form to the State Government from individuals and entities domiciled outside of Queensland contribute the economic well-being of Queenslanders. Transfers by Queensland citizens to the state government also contribute to the well-being of Queenslanders insofar as the government provides goods and services (e.g., infrastructure, health, education) that society values but that would not be privately provided.

There is compelling evidence of market failures (see Box A) that result in the minerals exploration sector investing less than is socially optimal. Government intervention to alleviate such market failures has the potential to increase the economic well-being of Queenslanders. The following subsection provides discussion on the key market failures of the mineral exploration market.

2.2.3 Market failure in mineral exploration

The output produced by mineral explorers is information about resource quantity and quality in a particular location. Information produced by an explorer from a particular project can end up in the public domain, available to competitors at little or no cost. In this way, businesses undertaking exploration do not capture the full benefits of their investments as some benefits spill over to others in the market. That is, the private benefits for the business undertaking the exploration are lower than the total benefits generated. For example, the outcome of a drilling campaign undertaken by an explorer is a key source of information for other businesses about the chance of success of drilling campaigns in similar regions.⁸ The information externality (or spillover) associated with exploration creates an incentive for companies to ‘free ride’ on investments made by competitors.⁹ As a result, the market left to its own devices will invest less than the socially optimal amount in exploration.¹⁰

The underinvestment in minerals exploration due to information spillovers is compounded by the behaviour of capital markets. Mineral exploration is a risky activity that requires a systematic and sustained effort to process existing data and to generate and process new data through drilling and other techniques. Exploration is done in the context of highly uncertain market conditions for minerals over very long horizons, where technologies, demand, and supply conditions can change significantly.

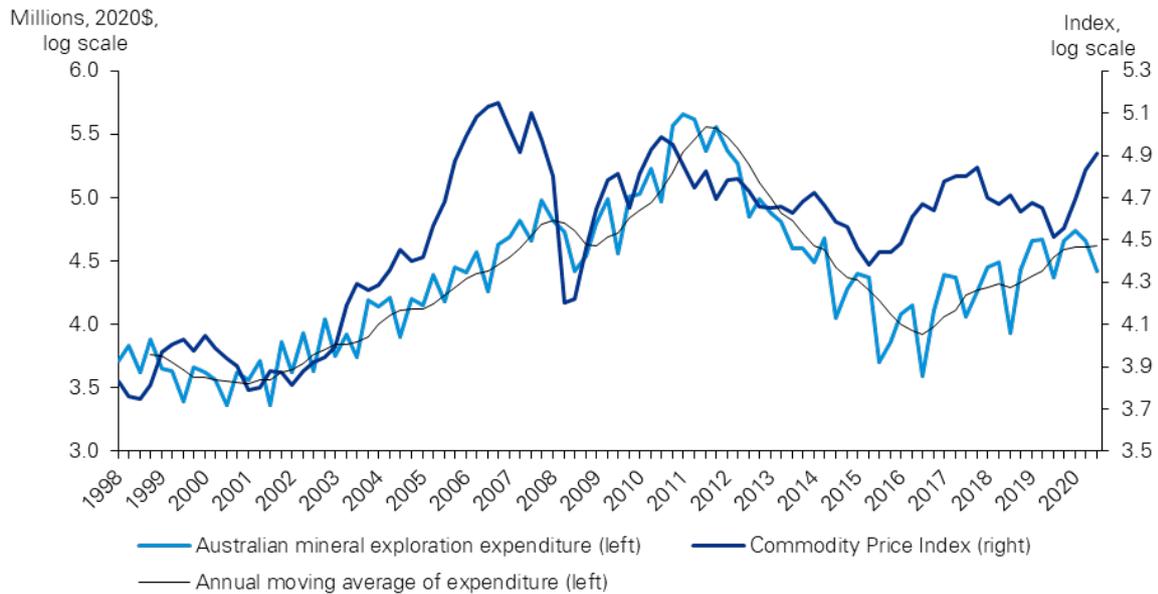
The success rate of mineral exploration projects is very low, and the costs of exploration are likely to increase following each discovery as the low-hanging fruit are picked off first. The complex risks inherent in minerals exploration are difficult for capital markets to price and manage. Evidence from stakeholder consultation (see Section 6) suggests that the supply of capital for mineral exploration is inconsistent with abundant capital available in periods where particular commodity prices are booming and extremely scarce at other times. This is indicated in Figure 2-4 by the relationship between base metal prices, which are highly cyclical, and mineral exploration expenditures for Australia.

⁸ (ACIL Allen, 2015)

⁹ (Fogarty, 2021)

¹⁰ We note that providing exploration businesses with greater proprietorship over the information they generate (e.g., by extending confidentiality periods) is not an effective solution. There are public good elements to exploration activity and policy should provide explorers with a greater incentive to generate positive spillovers.

Figure 2-4: Quarterly Australian mineral exploration expenditure (\$M, 2020\$) and base metals price index



Sources: ABS. 2021. 8412.0 Mineral and Petroleum Exploration, Australia: Table 4 Mineral Exploration, (Other than for petroleum) (original data); ABS. 2021. 6427.0 Producer Price Indexes, Australia. Table 11 Input to the Coal mining industry; RBA Index of Commodity Prices; Non-rural component – Base metals; US\$, 2019/20 = 100.

Capital markets tend to have a shorter-term focus than is optimal for funding minerals exploration. This makes it difficult to plan and execute exploration projects and may encourage exploration businesses to engage in sub-optimal practices. For example, capital markets appear to encourage too much brownfield exploration relative to greenfield exploration.¹¹ The underlying cause of this underinvestment in greenfield exploration appears to be the focus of capital markets on short term returns, which influences the behaviour of both established and junior resource companies.¹²

- Established companies operate working mines, and for active firms that undertake exploration, the majority of activity is at existing deposits and includes delineating or setting up the extent of a known deposit as these activities are generally less risky.¹³
- Junior companies are mostly engaged in exploration and in general take on the responsibility of greenfield exploration due to its risk and lower barriers to entry.¹⁴ This involves either unknown mineralisation or known mineralisation that has not been sufficiently explored. Due to limited funding, to deliver short-term results, exploration is usually undertaken in mature areas with known mineralisation. However, such areas are likely to be only available to junior miners if they are considered by the sector to be of poor quality and/or largely depleted, which leads to relatively small mineral discovery results.¹⁵

¹¹ (ACIL Allen, 2015)

¹² (Cairns, Hronsky, & Schodde, 2010)

¹³ (IBISWorld, 2020)

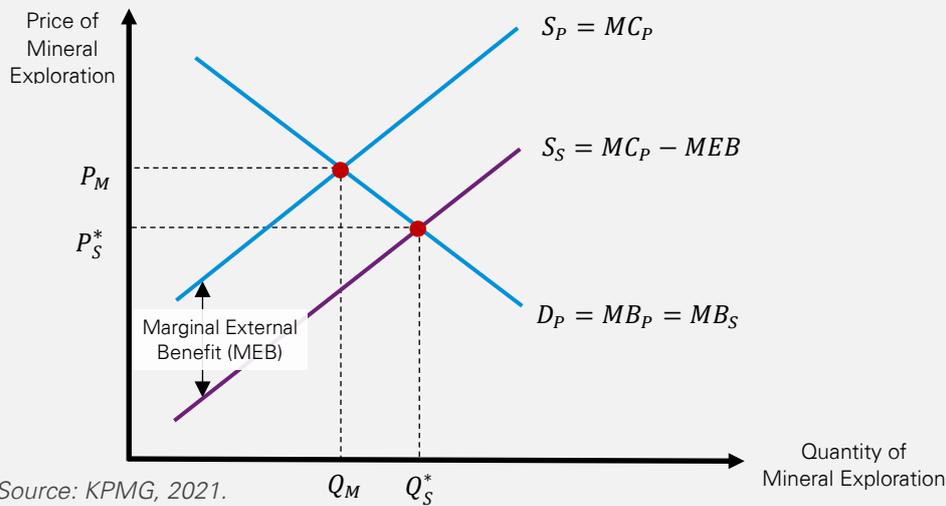
¹⁴ (IBISWorld, 2020)

¹⁵ (Cairns, Hronsky, & Schodde, 2010)

Box A: Market failure in minerals exploration

Figure 2-5 is a stylised representation of market conditions confronting exploration businesses. The free market generates mineral exploration output Q_M at price P_M . Under these conditions the supply curve S_P reflects the marginal costs of private businesses supplying mineral exploration services and the demand curve D_P reflects the marginal benefit of using mineral exploration services. This example assumes that the marginal private benefit and the marginal social benefit of using mineral exploration services are the same. If the private businesses that supply mineral exploration services generate benefits that they cannot capture (e.g., through information spillovers) then there will be an undersupply of mineral exploration services relative to the socially optimal level. In this situation the government can increase economic well-being by providing a subsidy or grant to private businesses equal to the value of the external benefit. This effectively reduces production costs, shifting the supply curve to the right S_S . With government intervention, minerals exploration output increases to the socially optimal level Q_S , and the price of these services falls to P_S^* .

Figure 2-5: The market failure in mineral exploration



3 The CEI program

3.1 CEI overview

The Queensland Government’s mineral exploration program (the Collaborative Exploration Initiative) was originally introduced in 2007 as the Collaborative Drilling Initiative (CDI). The program has been funded through the Strategic Resources Exploration Program and New Economy Minerals Initiative with an overarching objective to stimulate new discoveries that may not otherwise be occurring. The program is administered by the Geological Survey of Queensland within the Department of Resources. Since its inception in 2007, it has awarded a 112 grants at a total investment of \$9.8 million. An additional \$11.5 million has been set aside for future rounds, extending the program until 2024. Up until CEI Round 2, applicants were required to at least match funding (i.e. grants covered no more than 50% of total costs). As of CEI Round 3 onwards (2020) this requirement was removed, meaning that in some cases grants can cover 100 percent of project costs.

The Strategic Resources Exploration Program (SREP)¹⁶

The SREP was a \$27 million program that supported the implementation of the Strategic Blueprint for Queensland's North West Minerals Province between 2017 and 2021. Specifically, it funded Rounds 1 and 2 of the CEI (\$1.8 million total), as well as various other initiatives.^{17,18}

The New Economy Minerals Initiative (NEMI)^{19,20}

The NEMI is a \$13 million program launched in November 2019 that aims to unlock QLD’s New Economy Mineral potential. It has funded Rounds 3 and 4 of the CEI (\$2.4 million total) as well as other projects.^{21,22} The initial CEI funding has been complemented with an additional \$10 million, which has been allocated to co-fund Round 4 and fully fund Rounds 5-7 of the CEI until 2024.

In its current form, the CEI provides two types of support to the Queensland minerals sector:

- 1) Grants are given to private industry for mineral exploration projects through the Collaborative Exploration Initiative (supporting the exploration stage of the value chain); and
- 2) The geoscience information gathered by these grant projects are published to the public in order to further encourage exploration (supporting the data assessment stage of the value chain).

Pre-competitive geoscience information

Geoscience information refers to data that describes the physical and chemical properties of the earth. This can be obtained through drilling and sample assaying (analysis), geophysical survey (e.g. magnetotelluric, aeromagnetic, seismic, gravity) and geochemistry study. This information that results from exploration has positive externalities (other actors derive benefits from accessing information on top of the benefit to the explorer themselves) meaning that individual explorers do not capture the full benefits of exploration and as such free market exploration will tend to be underprovided below the socially-optimal level. By providing pre-competitive geoscience information and grants, the government intervention lowers the marginal cost for explorers and subsequently increases exploration activity towards the socially-optimal level.

¹⁶ (Department of Natural Resources, Mines and Energy, 2019)

¹⁷ (Department of Resources, 2021)

¹⁸ Department of Resources internal data

¹⁹ (Queensland Government, 2020)

²⁰ (Knight, 2020)

²¹ (Department of Resources, 2021)

²² Department of Resources internal data

Grants are paid at the end of exploration, which means that companies can only receive the funds if they complete the project and provide data to GSQ (see data requirements in Table 3-1). This aligns key success factors between applicants and the Queensland Government and ensures grant-receiving explorers have some level of maturity and competence.

The following table (Table 3-1) provides an overview of the CEI’s current key configuration factors.

Table 3-1: Current configuration of the CEI

Factor	Description
Eligibility	<p>Exploration for all minerals is supported by the CEI, except coal. Petroleum and gas are also ineligible. Gold is supported but is a low priority compared to other New Economy Minerals. Explorers must have either a Minerals Exploration Permit, Mining Lease, or Mineral Development Licence. The CEI funds projects QLD-wide but emphasises the North West and North East Mineral provinces.</p> <p>The main criteria for assessment are:</p> <ul style="list-style-type: none"> • Proposal has demonstrable technical merit; • Proposal concepts/activities are innovative, address significant knowledge gaps and/or critical uncertainties in key areas, particularly for New Economy Minerals in Queensland; and • Potential to increase exploration activity in under-explored areas or increase exploration investment particularly for New Economy Minerals.
Grant assessment	<p>Applications are considered by an independent expert panel which provides a recommendation to the Department. Successful applicants will be approved for funding for individual activities, not programs of work. Grants may only fund a portion of the project costs or requested amount. Grants are paid upon evidence of project completion. This aligns interests between applicants and the Department and ensures grant-receiving explorers have some level of maturity and competence.</p>
Data requirements	<p>Grant recipients must provide all data gathered through their CEI-funded project to the Department shortly after completion. This data remains confidential for six months after invoicing before it is published. This contrasts with the standard confidentiality period of 5 years that applies to all other non-CEI funded exploration.²³ Drill core and rock chip samples must also be submitted to the Mount Isa Core Library or the Zillmere Exploration Data Centre within a year of invoicing.</p> <p>Geoscience data is made available to download on the GSQ Open Data Portal.²⁴ No registration is required to access the Portal and data can be viewed with GeoResGlobe - a geospatial tool/interactive map. Prior to the Portal, data was stored in outdated computer databases and in the form of physical samples and available to the public on the QDEX Data system.²⁵</p>

²³ Prior to regulatory changes made in 2020, data was confidential for the entire tenure (i.e. only released for expired tenures). The 2020 changes have led to almost 20,000 new reports from the past 50 years adding to the 60,000 existing reports made available to the public – (Department of Resources, 2021), (Stewart, 2021).

²⁴ Data is available from a single online database as of August 2020 (Geoscience Data Modernisation Project).

²⁵ (Department of Resources, 2021)

3.2 Grant program review

The Queensland Government’s CEI is a pre-competitive geoscience program run by the Department’s Geological Survey of Queensland (GSQ) team. In its current form, it provides grants of up to \$200,000 to businesses for mineral geological exploration activities, and publishes all data obtained by funded projects. The following provides the historical summary of the grants awarded under the scheme from its inception as the CDI through to its current form as the CEI.

CDI – August 2007 to March 2017

The CDI was established in 2007 to provide grants for mineral exploration. The program was limited in its scope to only support the cost of drilling and related activities (including mobilisation, and geochemistry analysis and core scanning of drill samples).

A summary of the CDI-funded projects can be found in Table 3-2, with 89 completed projects total and a cost of \$7.1 million.

Table 3-2: CDI Summary Statistics

CDI Round	1	2	3	4	5	6	7	8	9	NWQ
Contract sign date	Aug 2007	Jul 2008	Jun 2009	Mar 2010	Mar 2011	Jul 2011	Mar 2012	Jul 2014	Jul 2015	Mar 2017
Total grant paid (\$M)	\$1.27	\$1.01	\$0.99	\$0.22	\$1.14	\$0.38	\$0.55	\$0.64	\$0.46	\$0.43
Total industry costs (\$M)	\$3.05	\$3.39	\$2.63	\$0.68	\$5.02	\$1.02	\$1.51	\$1.33	\$1.02	\$1.00
Leverage Industry ÷ Govt cost	2.40	3.36	2.66	3.08	4.38	2.67	2.75	2.46	2.22	2.34
Applications	48	61	48	33	56	23	22	36	38	21
Successful applications	22	26	20	11	21	9	10	16	16	8
Projects completed	16 (73%)	12 (46%)	12 (60%)	5 (46%)	11 (52%)	4 (44%)	7 (70%)	11 (69%)	6 (38%)	5 (63%)
Technical successes²⁶	11 (69%)	8 (67%)	8 (67%)	3 (60%)	6 (55%)	1 (25%)	4 (57%)	4 (36%)	2 (33%)	0 (0%)

Source: QLD Department of Resources, 2021.

Over the life of the CDI, the number of applications lodged and approved decreased. The project completion rate remained fairly constant, however the technical success rate declined markedly over the ten rounds.

²⁶ Technical success refers to the proving of a site as containing mineralisation or not. It does not necessarily mean a promising finding has been made, nor does it mean a mineralisation is economically feasible to extract (i.e. is not analogous to commercial success).

CEI – December 2017 to current

In December 2017, the CEI replaced the CDI and expanded funding to non-drilling activities. This includes:

- Seismic surveys;
- Airborne geophysics;
- Ground geophysics;
- Geochemical sampling and assaying; and
- Other analysis techniques (including machine learning and artificial technology).

A summary of the CEI-funded projects can be found in Table 3-3, with 23 completed projects total and a cost of \$2.7 million. Overall, CEI-funded activities comprise 42 percent drilling, 44 percent geophysics, 6 percent geochemistry and 8 percent assaying/re-assaying.²⁷

Table 3-3: CEI Summary Statistics

CEI Round	1	2	3	4	Total
Date (Contract sign)	Dec 2017	Dec 2018	Feb 2020	Jul 2020	
Proportion of costs covered	50%	50% ¹	100%	100%	
Maximum \$ per grant	\$200k ²	\$200k ²	\$200k	\$200k	
Grant paid (\$M)	\$1.09	\$0.69	\$0.93	\$3.96*	\$6.67[#]
Total industry costs (\$M)	\$2.05	\$1.31	\$1.08	\$5.22*	\$9.66[#]
Leverage <small>(Industry cost ÷ Govt cost)</small>	1.87	1.89	1.17	1.32*	1.45[#]
Applications	19	28	61	145	253
Successful applications	12	15	7	25	59
Projects completed	9 (75%)	7 (47%)	7 (100%)	–	23 (74%)
Technical successes	7 (78%)	5 (71%)	7 (100%)	–	19 (83%)

Source: QLD Department of Resources, 2021.

Notes:

¹ up to 75% if the project was completed by a certain date

² up to \$300k if the project was completed by a certain date

*budgeted/estimated amounts; #including Round 4 and 5 estimated amounts

Rounds 1-3 of the CEI are similar to the CDI in terms of applications made, approved and total grant paid, however after the matched funding requirement was removed for Round 4 these figures all significantly increased. The leverage of CEI grant money is on average less than for CDI grant money.

²⁷ Adapted from Internal Department of Resources spreadsheet.

The technical success rate is far higher on average for the CEI than for the CDI, especially considering the CDI's downward trend in technical success rate over time.

Prior to the removal of the matched funding requirement, approved projects only had half of their costs reimbursed, whereas now the CEI can cover up to the full project costs. Costs excluded from funding are:

- Corporate/administrative costs;
- Site overheads;
- Land access costs;
- Cultural heritage costs; and
- Environmental costs.

Round 5 closed for submissions in May 2021, while Rounds 6 and 7 are scheduled to open for application in April of 2022 and 2023, respectively. \$10 million has been allocated to Rounds 4-7 of the CEI (CEI Extension).

The CEI has delivered strongly against its objective to promote the discovery and development of 'new economy' minerals. Across Rounds 1-4 of the CEI, all 59 projects²⁸ either targeted or found new economy minerals. Table 3-4 shows the distribution of minerals targeted across CEI projects, the most common being copper which was found by two thirds of all projects. The vast majority of minerals targeted were new economy minerals.

Table 3-4: Targeted minerals of all CEI projects

Mineral targeted/found	Projects	Proportion of projects	New economy mineral?
Copper	32	67%	✓
Gold	23	48%	✓
Silver	19	40%	✓
Zinc	18	38%	✓
Cobalt	12	25%	✓
Lead	11	23%	✗
Rare earth elements (REEs)	11	23%	✓
Molybdenum	7	15%	✓
Tin	7	15%	✓
Tungsten	6	13%	✓
Nickel	4	8%	✓
Indium	4	8%	✓
Other non-NEMs	10	21%	✗

Source: QLD Department of Resources, 2021.

²⁸ Including CEI Round 4 projects that are currently underway and thus yet to receive grant funding.

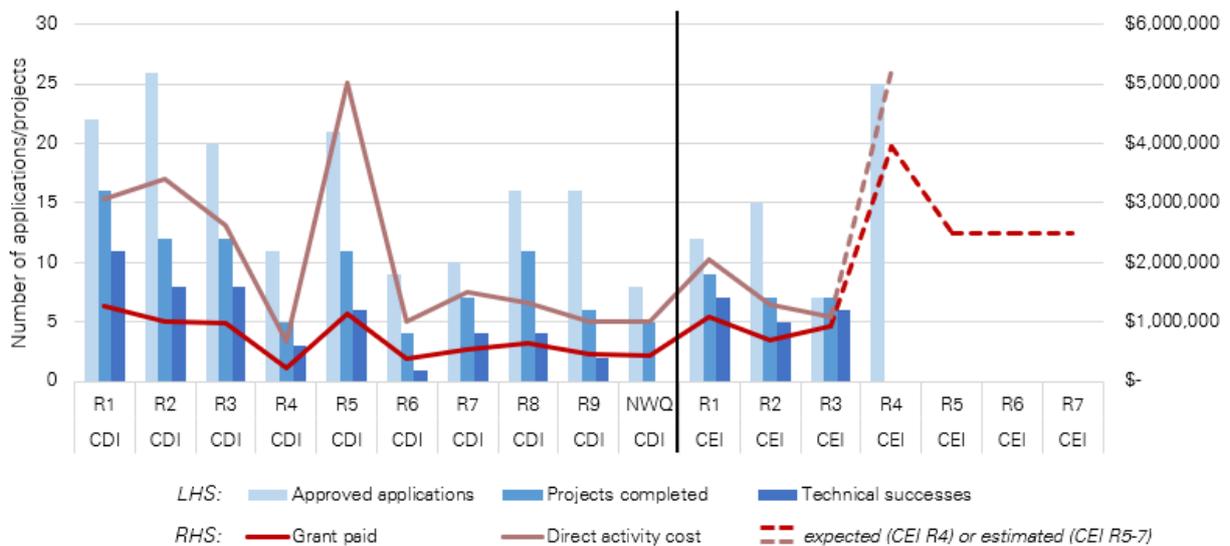
3.3 Key observations

Since 2007 the Queensland Government has awarded 112 grants for exploration projects (89 under 10 rounds of the CDI, 23 under 3 rounds of the CEI). Of these, 65 have been technical successes, that is, they have sufficiently explored a site to determine presence of mineralisation. This gives an overall technical success rate of 58 percent. Figure 3-1 presents an overview of the CDI and CEI programs, including government funding allocated towards projects, and project costs, completion rates and success rates.

The total amount of grant funding that has been paid is \$9.8 million (CDI: \$7.1 million, CEI: \$2.7 million), with up to \$4.0 million allocated for successful CEI Round 4 projects and an additional \$7.5 million allocated for CEI Rounds 5-7 up until FY24. If this is borne out, this will mean that the CDI and CEI have collectively cost \$21.3 million to fund between 2007 and 2024.

This grant funding has supported projects that have cost in total \$25.1 million (CDI: \$20.6 million, CEI: \$4.4 million). Together with the expected cost of \$5.2 million from CEI Round 4, this gives a total of \$30.3 million and an overall leverage ratio of 2.2. This means that on average \$1 spent by the Queensland Government on the program enabled \$2.20 from private expenditure in exploration. Historically, this leverage ratio has been underpinned by the matched funding, however this requirement has been removed in favour of funnelling funding towards a more diverse set of exploratory techniques.

Figure 3-1: Overview of the CDI and CEI



Source: QLD Department of Resources, 2021.

Some projects have built on this technical success following receipt of CEI grants. Examples of projects that have progressed further along the value chain are summarised in Box B.

Box B: CEI success stories

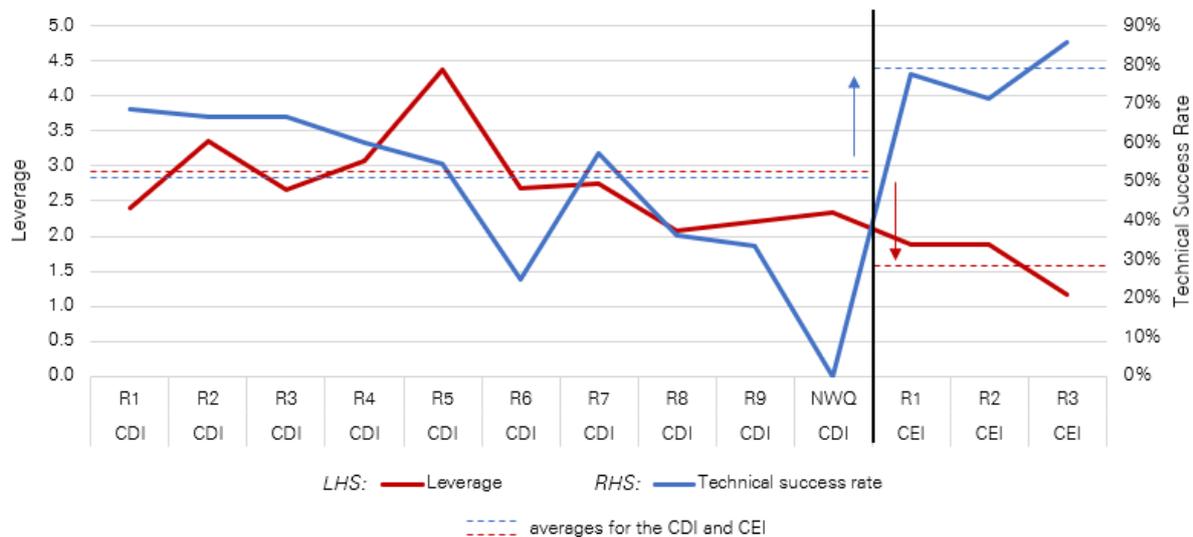
Since the inception of the CDI/CEI program, a range of recipient projects have begun to progress beyond initial technical success to commercial production or on-sale to extraction companies.

- **Walford Creek** (Cu-Co) – CDI R8 – pre-feasibility study expected to be completed by Q1 2021.
- **Lorena** (gold) – CDI R5 – ore shell mined out by November 2020, ore is now being treated.
- **Agate Creek** (gold) – CDI R6 – production underway in 2019 with first processing in late 2020.
- **Mt Dromedary** (graphite) – CDI R9 – at feasibility stage with mining to start in late 2023.
- **Charters Towers Deeps** (gold) – CDI R1 – one of QLD’s deepest mineral exploration drillholes.
- **Maronan** (silver) – CDI R5 – one of the largest undeveloped silver resources in Australia.
- **Triumph** (gold) – CDI R7 – site sold and now a flagship project for Sunshine Gold’s 2020 IPO.
- **Champ/Mirrica Bore** (copper, gold) – CDI R2 – both subject to Plutonic Limited’s 2020 IPO.
- **Saxby** (gold) – CDI R7 – discovery of under cover extension of the Mt Isa Province.
- **Koppany** (rare earth elements) – CDI R3 – one of the most significant deposits in Mt Isa area.

Source: QLD Department of Resources, 2021.

As noted above, for the CEI, leverage decreased, and as a result of broadening funding to alternative exploration techniques the technical success rate increased from the CDI, as illustrated in Figure 3-2.

Figure 3-2: Trends across the CDI and CEI



Source: QLD Department of Resources, 2021.

These trends indicate that the exploration stimulated under the CDI was not as productive as exploration enabled by the CEI. This could indicate that non-drilling activities are inherently more likely to result in a technical success compared to drilling activities, or at least have demonstrably delivered this in the instances where these activities have been funded by the CDI/ CEI.

Since the CEI has been allocated increased funding in future rounds and application numbers have responded strongly to the removal of the matched funding requirement, the Department of Resources should consider how to continue the high technical success rate to ensure CEI funding is maintaining its value. At the least, continuing to fund non-drilling activities appears to be a cost-effective way of generating high quality pre-competitive data (through a higher rate of technical success).

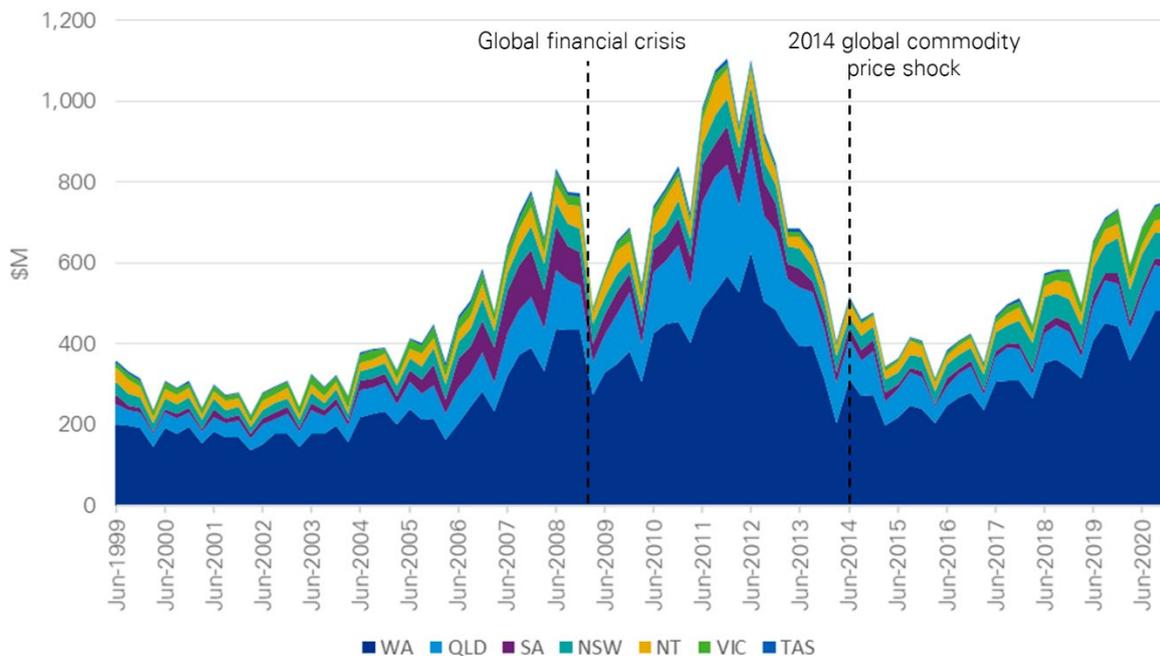
4 Interjurisdictional comparison

4.1 Overview

This section provides an overview of various government support programs for the minerals sector across Australian jurisdictions, including a high level comparison of key programs and detailed evaluations against the assessment framework established in Section 4.

Figure 4-1 shows mineral exploration expenditure across Australian jurisdictions. Expenditure is largest in WA which reflects its geography, resource endowment, recognised prospectivity and the maturity of its local resources industry. Exploration expenditure in Queensland is comparable to NSW, smaller than WA and significantly larger than all other jurisdictions. For the purpose of completeness, we have considered the breadth of programs currently deployed in WA, SA, NSW, the NT, VIC and TAS. Taking mineral exploration expenditure as a potential indicator of the effectiveness of exploration programs, the CEI should be benchmarked against equivalent programs from WA, which could be considered the standard for a mature market, as well as those deployed in SA, NSW and the NT.

Figure 4-1: Mineral exploration expenditure by state, quarterly, real, 2020 \$M



Sources: ABS. 2021. 8412.0 Mineral and Petroleum Exploration, Australia: Table 4 Mineral Exploration, (Other than for petroleum) - Expenditure by state and territory (original data); ABS. 2021. 6427.0 Producer Price Indexes, Australia. Table 11 Input to the Coal mining industry, index numbers and percentage changes; and, RBA Index of Commodity Prices; Non-rural component; A\$.

Table 4-1: Indicative mineral exploration funding metrics across jurisdictions, FY20²⁹

	QLD	WA	NSW	VIC*	NT	SA	TAS
Mineral exploration expenditure (real)	\$181M	\$1,693M	\$249M	\$74M	\$123M	\$85M	\$11M
Mineral exploration funding p.a.**	\$2.7M	\$13M†	\$1.1M	\$2M	\$1M	\$3.3M	\$0.5M
Minerals royalties	\$475M	\$6,367M	\$163M	\$12M	n/a	\$192M	n/a
Total land area (sqkm)	1,729,742	2,527,013	801,150	227,444	1,347,791	984,321	68,401
Funding (\$) per exploration expenditure (\$)	0.0147	0.0077	0.0042	0.0266	0.0081	0.0391	0.0455
Funding (\$) per minerals royalties (\$)	0.0056	0.0021	0.0064	0.1659	n/a	0.0174	n/a
Funding (\$) per sqkm	1.54	5.17	1.31	8.61	0.74	3.39	7.31

Sources: Mineral exploration expenditure: ABS. 2021. 8412.0 Mineral and Petroleum Exploration, Australia: Table 5. Mineral Exploration, (Other than for petroleum) – Expenditure by mineral sought; Mineral exploration funding and minerals royalties: various state and territory government treasury annual reports; Land area: Geoscience Australia. Minerals royalties could not be delineated from total mining royalties for NT or TAS.

*Victorian values are for FY18 as this was the latest round of funding.

†EIS funding, a portion of which supports geoscience programs in addition to private sector exploration.

**Average funding per annum over the life of the funding program.

Analysis of indicative metrics in Table 4-1 shows that Queensland generally underinvests in minerals exploration compared to other Australian jurisdictions. Relative to WA, Queensland invests less in exploration funding relative to minerals exploration expenditure, minerals royalties and total land area. Queensland is generally comparable to or below NSW, SA and the NT across the same funding ratios.

Regardless of their relative degrees of investment, all jurisdictions³⁰ support minerals exploration through grants or co-funding programs which illustrates the importance of such schemes across all market sizes. Table 5-2 provides a high-level comparison of key programs in each jurisdiction and these are profiled individually throughout this section.

²⁹ The funding ratios presented are indicative and for the purpose of allowing a high level comparison of the quantum of similar funding between jurisdictions.

³⁰ Except the Australian Capital Territory, which is too small to support large-scale resource exploration or mining.

Table 4-2: Interjurisdictional comparison of government support for the minerals sector

	Australia	QLD	WA	NSW	VIC (FY18)	NT	SA	TAS
<i>Overview</i>								
Mineral exploration expenditure (FY20)	\$2,772M	\$181M	\$1,693M	\$249M	\$74M	\$123M	\$85M	\$11M
Responsible agency	Geoscience Australia	Geological Survey of QLD	Geological Survey of WA	Geological Survey of NSW	Geological Survey of Victoria	NT Geological Survey	Department for Energy & Mining	Mineral Resources Tasmania
Exploration program	Exploring for the Future (EFTF)	Collaborative Exploration Initiative (CEI)	Exploration Incentive Scheme (EIS)	New Frontiers Cooperative Drilling	TARGET Minerals Exploration Initiative	Geophysics & Drilling Collaborations (GDC)	Accelerated Discovery Initiative (ADI)	Exploration Drilling Grant Initiative (EDGI)
Years funded	2016-2024	2017-2024	2009-2021	2014-2021	2016-2018	2008-2021	2020-2022	2018-2022
Grant cap	n/a	\$200k	\$200k	\$200k	\$500k	\$125k	\$300k	\$50k
Matched funding requirement	n/a	n/a	50%	50%	50%	50%	50%	50%
Total funding (annual average)	\$225.5M (\$28.2M p.a.)	\$21M (\$2.7M p.a.)	\$170M (\$13M p.a.)	\$8.4M (\$1.1M p.a.)	\$5.9M (\$2M p.a.)	\$14M (\$1M p.a.)	\$10M (\$3.3M p.a.)	\$2M (\$0.5M p.a.)
<i>Evaluation</i>								
Exploration activity	✓	✓	✓	✓	✓	✓	Unclear	✓
Greenfield focus	✓	✓	✓	✓	✗	✓	✓	✓
Innovation	✓	✓	✓	✗	✓	✓	✓	✓
Led to discoveries of new economy minerals	✗	✓	✓	✗	✓	✓	✗	✓
Knowledge gaps	✓	✓	✓	✓	✓	✓	✓	✓
Public value	✓	✓	✓	✓	✓	✓	✓	✓
Industry development	Indirect	Indirect	✓	✗	✗	✗	✓	✗

4.2 Findings and relevance to the CEI

The CEI works to ensure that Queensland appears no less favourable, in terms of government support for mineral exploration, than other Australian jurisdictions. In particular, the CEI's current grant cap appears consistent with comparable states and territories. Stakeholder consultations revealed that grant recipients believe the CEI signalled the Government's commitment to supporting the resources sector and was a key contributing factor in their decision to initiate exploration activity in Queensland, relative to other prospective areas.

An examination of relative quantities of state exploration funding and program-level case studies identified commonalities that provide insight into the relative strengths and shortcomings of the CEI. These are discussed below.



Funding – *the State contribution to the CEI grant program is relatively lower than the exploration incentives offered in other jurisdictions.*

- When evaluating relative quantities of exploration funding, there is evidence that the Queensland Government invests less in minerals exploration compared to other Australian jurisdictions in terms of dollars invested per dollar of exploration expenditure, per dollar of minerals royalties and per land area. In terms of dollars invested per annum, Queensland invests significantly less than Western Australia. Victoria and South Australia also invest more in their exploration programs.
- All jurisdictions support minerals exploration through grants or co-funding programs which illustrates the importance of such schemes regardless of market size or degrees of funding.
- WA additionally encourages exploration through a long-term funding commitment whereby funding is tied to tenement rents as opposed to budget setting. This provides clarity of funding and signals long-term government support for the sector which improves confidence in the local exploration market.



Exploration activity – *the CEI prioritises greenfield exploration activity in line with top interjurisdictional programs, while others also support broader exploration in brownfield areas or areas with deep cover. Some jurisdictions charge rents that increase on a tenure basis for the use of awarded tenements which incentivises explorers to speed up exploration activity.*

- In the CEI's current form, it does not appear to be leading to sub-par exploration outcomes, although there is opportunity to further stimulate exploration activity due to Queensland's expansive geography and prospectivity.
- All programs stimulate greenfield exploration activity although some programs also extend to brownfield exploration and exploration in areas with deep cover.
- It is challenging to measure the relative effectiveness of the CEI in increasing exploration due to difficulties in delineating the impact of programs from other drivers such as commodity prices and low discovery rates.



Innovation – most Australian exploration incentive programs support conventional drilling activities. To this extent, the CEI prioritises innovative exploration techniques to a greater degree than most interjurisdictional programs. International programs demonstrate that some innovative exploration can be directly undertaken by government agencies to support public pre-competitive data.

- Most Australian exploration programs support conventional drilling activities. Some programs including the CEI favour applications that use exploration techniques beyond traditional drilling and core sampling or those that use innovative drilling techniques.
- International case studies indicate that pre-competitive geoscience information programs utilising non-drilling techniques can be wholly undertaken by government geoscience agencies. There may be opportunity for the State government to support the sector by undertaking its own innovative exploration activities.



New economy minerals – the CEI encourages exploration for new economy minerals more explicitly than most programs. Most inter-jurisdictional programs encourage exploration for all mineral types however some programs target specific minerals, such as the PACE Copper program in SA.

- Most programs encourage exploration for all minerals whereas others target specific minerals such as the PACE Copper program in SA.
- Across Australian jurisdictions, most programs have demonstrated success at leading to discoveries of new economy minerals although these have not been major. There is potential for the CEI to further stimulate exploration activity to increase the probability of a major discovery occurring in QLD.



Knowledge gaps – the reduction of knowledge gaps and consolidation of historical data with new pre-competitive data are common objectives of all programs including the CEI.

- All programs including the CEI aim to improve the depth and breadth of pre-competitive data, the consolidation and reanalysis of historical data and improved public access to data.



Public value – all programs including the CEI deliver public value to taxpayers other than royalties in the form of the publicly available pre-competitive data. Some programs have secondary social objectives.

- An objective of all programs including the CEI is the improvement of the public endowment of knowledge by improving the availability and accessibility of pre-competitive data to the public. Some programs have secondary social objectives such as providing indigenous employment opportunities or supporting regional and rural communities.



Industry development – incentivising industry development beyond exploration activity is not a primary objective of most programs including the CEI.

- Most programs including the CEI focus on exploration and do not directly support development in other aspects of the value chain such as detection, extraction and processing technology, logistics and downstream processing or post-mining remediation.

5 Stakeholder consultation findings

Previous CEI participants, applicants and peak industry bodies considered the CEI to be beneficial to the sector and successful in achieving its objectives. Insights identified through consultation with industry stakeholders include:



Exploration activity – *The CEI is important in sustaining exploration activity during periods of low market sentiment when the flow of private capital to the sector reduces. Additionally, the receipt of CEI grants is a positive signal to the market and likely improves the ability of recipients to raise capital.*



Innovation – *The CEI is effective in encouraging non-drilling exploration (e.g. geophysical and geochemical surveying) and is recognised as a leading program in encouraging innovative methods.*



New economy minerals – *Industry proponents are aligned with the QLD Government’s strategic objective to support new economy minerals exploration, noting that some new economy minerals are increasingly becoming attractive prospects despite relatively unknown methods of economic extraction.*



Knowledge gaps – *The CEI improves the value of QLD’s pre-competitive data, either increasing appetite for new exploration or expediting existing plans. Larger companies are generally reluctant to use CEI grants for frontier exploration due to intellectual property concerns. Additionally, larger companies generally prefer brownfield areas since they generate more stable returns, which keeps frontier exploration beyond their current investment cycles until market conditions change.*



Public value – *The CEI demonstrates value to taxpayers other than royalties due to the resulting pre-competitive data providing spillover benefits that have increased exploration. However, proponents indicated various issues that could be addressed to maximise its effective delivery of public value. These included:*

- Application/approval timing does not always align with ideal exploration conditions (i.e. outside of the wet season). Better alignment could increase the number of applicants and therefore chances of a successful resource being identified and developed. This would also mitigate the risk of potential cost implications that hamstringing the intention of the grant e.g. equipment shortages inflating project costs.
- Misalignment of program timeframes plus delays in land access can result in exploration and data submission not being delivered in time to obtain the approved grant.
- The CEI is only funded for a fixed number of years – availability on a more permanent basis could provide greater certainty to industry and increase engagement.
- A one-size-fits-all framework may not be the best approach to cater for explorers of different scales and maturities. Different structures and funding limits could be considered which could lead to increased CEI applications and exploration activity.



Industry development – *Proponents indicated that the CEI supports broader industry development, although could be improved by delineating funding for construction of processing as well as exploration projects, which may have more nuanced objectives despite being measured against the same criteria in the CEI application process. Alternatively, the CEI may be improved by favouring applications that target minerals with poorly understood processing methods.*

5.1 Considerations for the CEI

The challenge in quantifying the true economic benefit of additional investment in the minerals exploration sector is to quantify how an additional unit of exploration activity ultimately translates into additional minerals production. The reason this is challenging is that a very small proportion of the mineral exploration projects commenced are ultimately successful in leading to an operating mine. This is not to say that exploration projects are not valuable unless they transition to operating mines. Rather, that significant investments must be made across many exploration projects to get one operating mine. The risks are high for individual projects, but the returns are potentially very large for the projects that ultimately succeed. We do not have sufficient data relevant to the Queensland minerals industry to estimate the relationship between the amount invested in minerals exploration and the value of the resource discovered.

Comparing to the WA Assessment of the Exploration Incentive Scheme (EIS), 2021

Fogarty (2021) in evaluating the EIS found that for every \$1m invested by the WA government, a further \$25m was invested by the private sector that would otherwise not have been invested.³¹ Fogarty also found that a \$1m investment in the EIS improved discovery probabilities from between 0.0008 for iron ore and 0.0198 for small gold mines. These results provide some guidance on how additional investments in exploration (whether private or public) flow through to mine development and operation. However, care must be taken in translating these results to the Queensland situation, especially as the Western Australian study relates mainly to gold and bulk commodities such as iron ore, and geological and regulatory environments significantly differ.

In the absence of any market failure, investment by government in the minerals exploration industry would simply crowd out private investment and the returns to government investment would be captured by private businesses (e.g., businesses that received a grant), effectively a transfer from taxpayers to minerals exploration businesses. Where there are market failures (see Section 2.2.3), government intervention can generate economic benefits that are shared by Queenslanders.

The return to government investment via the CEI can be conceptualised by considering a baseline for the economy where the government does not invest in the CEI program. If the amount of investment in exploration is less than is socially optimal then there will be public benefits that will be foregone. Over the longer term the key foregone public benefits will include:

- Lower royalties because the mineral reserves that can be extracted are smaller than would be the case if the socially optimal investment in exploration is made;
- Less activity in the minerals industry and its supply chain, which will reduce household incomes if the jobs supported by the minerals industry generate more value added than the average of jobs in other sectors of the economy.

In the shorter term, a smaller minerals industry may also have material economic impacts, including less mine construction activity and less opportunity for resources (e.g., workers, intellectual property, physical capital, infrastructure) currently supported by the coal and gas mining industry to transition to alternative activities with minimal economic disruption, particularly in regional economies where opportunities for re-deployment are limited.

The presence of market failures in the mineral exploration market means that government investment through the CEI program has the potential to increase the economic welfare of Queenslanders. This increase can largely be captured by the minerals production multipliers reported above. The key to quantifying the economic benefit through these multipliers is deriving an estimate of how much the government investment increases the probability of finding a new mineral deposit of a particular size.

³¹ In consultation, stakeholders suggested that the CEI brought forward riskier projects that most likely would have occurred eventually. Accordingly, it can be inferred that a benefit is acceleration of potential investment.

6 Considerations for government

6.1 Key findings

Queensland’s resource industry is a significant contributor to the state’s economic prosperity. The economic return generated from the State’s resources – in the form of royalties – has, and is expected to continue to, underpin the economic performance of the state. This study has provided an evidence-based overview of the resource industry and in particular the minerals exploration sector in Queensland. It has found that the economic return from the industry is significant, and that there are sufficient market failures present that warrant government intervention.

The assessment undertaken by engaging with industry stakeholders and comparing the State’s mineral exploration program with similar programs from other jurisdictions has revealed a number of key findings. These have been summarised below:



The CEI provides two key support mechanisms that are both well received and utilised by industry participants:

- The pre-competitive data made available through the program serves as the first contact point for any key investment decision by explorers within the state. The quality and availability of the data supplied through the platform serves to increase the likelihood of generating a return from the state’s assets by guiding and de-risking exploration activity towards the most prospective regions.
- Equally, the grant funding serves to broaden the exploration activity beyond the typical investment cycle of explorers into new frontier areas, making use of new technology, and improving the quality of the pre-competitive data it ultimately contributes to.



There are efficiency gain opportunities in how the current program is operated.

- Previous participants indicated that the program could better align to industry cycles (i.e. when commodity prices are not conducive to attracting capital market funding to exploration activity) to sustain businesses, providing more certainty in the funding program (with respect to timing so participants can secure critical inputs, such as land access, and equipment), addressing policy misalignments, and existing exploration bottlenecks (such as the delays in accessing laboratories and access to drilling rigs).



Stakeholders also indicated that broader geoscience exploration would be highly valuable as part of the pre-competitive geoscience data made publicly available.

- Investing in greenfield exploration has the greatest potential to de-risk and incentivise subsequent exploration activity, building a cumulative probability of making more significant discoveries from the investment in the CEI program.

6.2 Key considerations

This study finds that there are strong merits in continuing to provide government support to the minerals exploration industry to both:

- 1) address the market failure in the supply of exploration information/data; and
- 2) generate a potentially significant public benefit return from the state's natural resource assets.

On the basis of existing royalties generated from resources alone, the quantum currently applied is readily justifiable. The questions then become:

- What is the right amount of funding for resource exploration activities?
- Is the funding mechanism appropriate?
- Are there opportunities to improve support to the resources sector?

While the answers to these questions can be inherently subjective, the following key considerations attempt to guide policy towards the most efficient outcomes based on the findings from this study.

As outlined within this study, risk capital for exploration activity exists within the capital market. However, the risk capital available in capital markets is skewed towards investments that are likely to yield short-term outcomes (more often than not in areas where there is some pre-existing information). This leads to a sub-optimal level of investment in longer term frontier exploration activities, which is where government support is best channelled towards. The level of funding towards this activity should consider:



The public benefit from exploration can increase the likelihood of significant economic returns:

The analysis contained within the return to government intervention section highlights that the critical outcome from funding exploration over time is that the probability of finding a new deposit increases cumulatively with each investment in a new exploration project. In doing so, the investment in the CEI program has the potential to increase the well-being of Queenslanders.



There is justification for increasing the funding pool: The comparator analysis reveals that on both a funding per area (square km) and funding per total exploration expenditure spend Queensland tends to underinvest in exploration. On this basis, new benchmarks could be established to bring Queensland closer to parity with other major resource producing regions such as Western Australia, New South Wales, and the Northern Territory.



The opportunity to be directive with exploration: the CEI program could consider being more directive with its funding allocation. This may mean that a fixed amount of grant funding is allocated towards areas that the government (through GSQ) deems to be the most prospective for drilling exploration. In this, there may be opportunities to enable new triggers through tenement applications that fall in these areas that notify applicants they could be eligible for grant funding. However, to get the most out of this activity earlier pre-drilling exploration would be advisable to identify areas with the appropriate characteristics to be considered a priority frontier area.

The current program configuration of providing grants to targeted frontier exploration activity appears to be fit-for-purpose. Alternative funding mechanisms have merits where the size of the funding pool changes, the grant size increases, and/or intervention is targeted further along the value chain. Additionally, in its current form, there are opportunities for the program to improve its efficiency in its delivery. These ideas are covered in the following:



Fit-for-purpose funding: given the size of the current program, grants are well suited to funding the activity as they are relatively low effort to administer and limit the exposure to the State. Should a case for intervention arise further along the value chain (i.e. beyond supporting exploration) alternative funding mechanisms could be considered.



Efficiency improvements for the CEI: through the consultation process participants and peak bodies identified a number of potential efficiency improvements for the grant program. These include: improving the timing and predictability of the scheme so that participants can better plan and invest in line with their business cycle, attempt to time funding allocations with market fluctuations to mitigate the implications of cyclical impacts, and enable the period that grant funding is available to be claimed by recipients to flow over consecutive years (to mitigate the rare instances where access to equipment or land impacts the time required for the exploration activity to complete, or alternatively to enable a multi-year exploration program).

The resource sector is faced with a variety of unique challenges. Beyond the persistence of a market failure in the supply of exploration activity, the industry is also faced with public perception challenges, an industry perception of restrictive environmental and safety requirements, a significant regulatory burden, and an undersupply of skills and supporting services. Addressing these challenges has the potential to yield additional efficiency improvements to the CEI program and benefits beyond the exploration phase. Some opportunities include:



Addressing bottlenecks in exploration supporting services: Alternative support/investment could be targeted at existing bottlenecks in the industry, which include access to testing facilities, exploration activity and skills. In particular, stakeholders suggested that supporting the expansion of testing labs and/or access to drills could lead to immediate performance improvements (as currently there is a limited amount of core samples that can be extracted and tested within a given exploration period due to the limited supply of drill rigs).



Streamlining regulatory requirements in accessing land: explorers indicated that there may be some efficiency improvements available with gaining access to land. They sighted the conduct and compensation agreements in particular, noting that it can impact timeframes. However, the Department of Resources noted that there are mechanisms in place to address this within the Act. Additionally, safety requirements were also noted as an impediment to activity as explorers were held to the same safety requirements as established mining operations. There may be an opportunity to address disconnects within industry and regulation to better communicate mechanisms available to explorers to improve access to land and exploration outcomes.



Countering a negative public perception by advocating for the wider benefits of resources, direct and indirect: explorers indicated that there may be a role for government in helping them articulate to public the benefits associated with extracting our natural endowments. This can help to address some of the increasingly firmly held views that all mining activity generates a negative impact on our environment and communities. By improving public understanding relating to mining and resource activity, explorers believe that this can support attract new skills to the industry and attracting funding from traditional sources (which have more recently shifted away from investing in exploration activity).

In addition, the ongoing monitoring and improvement of data associated with the CEI program should remain a priority. In particular, care should be taken in identifying tenements that have had CEI funding attached to them such that future benefit realisation assessments can be well informed. This will enhance future funding decisions when considering potential investments along the resource value chain. Further, should there be the opportunity to quantify whether public information has assisted in informing an application to the state (through a check-box measure on application), this would further provide a quantitative measure against which future impact assessment studies could be conducted.

Measuring success from the CEI (how might success be measured in 5 years)

Success from the CEI program can take a number of forms dependent on how the program objectives evolve to reflect government strategic priorities along with economic outcomes. A key next step in the continued refinement of this program will involve updating existing data collection techniques to ensure that the data collected is appropriate to measuring success in the future. At a minimum, this should ensure that data captured includes:

- Grants awarded by tenement
- Mineralisation successes associated with grants
- Tenement valuations (does a tenement increase in value after a grant has been awarded nearby or on the tenement?)
- Production by tenement
- Number of tenement applications surrounding grant award recipients

Using these data points, success indicators could be established that measure:

- Changes to tenement valuations
- Production generated at tenements associated with grant recipients
- Number of new economy mineral deposits identified

Additionally, grant program summaries can be used to inform indicators that may include:

- Grant funding per new economy mineral deposit identified
- Grant funding per production output (if outputs identified)
- Typical change to tenement value following grant award

It is recommended that following this work a more targeted planning exercise is undertaken to both: catalogue the data currently being collected as part of tenement applications and grant funding recipients; and establish a progress reporting and monitoring program to support and guide the CEI into the future.

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