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# Table of Contents

## Terms of Reference

## Overview

## Recommendations

## Chapter 1. Introduction

## Chapter 2. Conduct of the Review

## Chapter 3. Royalties in Western Australia

## Chapter 4. Review Principles

## Chapter 5. Ad valorem Tiers and Level of Processing

## Chapter 6. The Benchmark

## Chapter 7. Royalties in other Jurisdictions

## Chapter 8. Economic Conditions

## Chapter 9. Anomalies and Variations

## Chapter 10. Assessment of Royalty Rates

### Iron Ore

### Gold

### Alumina

### Nickel

### Heavy Mineral Sands

### Diamond

### Coal

### Base Metals (Copper, Lead and Zinc)

### Salt

### Basic Raw Materials

### Silica and Silicon

### Uranium

### Vanadium Pentoxide

### Rare Earth Elements

### Lithium

## Chapter 11. Commonwealth Grants Commission

## Chapter 12. Implementation

## Chapter 13. Rate Recommendations and Effect on State Revenue

## Appendices

### Appendix 1: Financial Modelling

### Appendix 2: Western Australian Royalty Rates

### Appendix 3: Australian Royalty Rates by State and Territory

### Appendix 4: Royalty Structures in International Jurisdictions

## Glossary

## Bibliography
Index of Figures

Figure 1: Western Australia’s *ad valorem* royalty rates ............................................ 16
Figure 2: Royalty system principles .................................................................................. 30
Figure 3: Mineral commodity price index for Western Australia .................................... 37
Figure 4: Mining industry profits and output price changes in Western Australia ......... 38
Figure 5: Inputs and Outputs in the Australian Mining Industry (2002-03 = 100) ....... 39
Figure 6: Iron ore price .................................................................................................... 49
Figure 7: Gold price ........................................................................................................ 55
Figure 8: Aluminium and alumina price ........................................................................ 63
Figure 9: Australian bauxite and Western Australian alumina prices (nominal) ........... 64
Figure 10: Nickel price .................................................................................................. 68
Figure 11: Heavy mineral sands: Australian export prices .......................................... 72
Figure 12: Queensland coal price 2004 – 2014 ............................................................. 81
Figure 13: Copper, lead and zinc prices (nominal) ....................................................... 84
Figure 14: Western Australian salt price (nominal) ...................................................... 89

Index of Tables

Table 1: Summary of recommended *ad valorem* royalty rate changes ....................... 6
Table 2: Implementation by commodity ............................................................................ 7
Table 3: Specific-rate royalties, 2013-14 ....................................................................... 12
Table 4: Royalties accrued in 2013-14 by legislative mechanism ($ millions) .......... 14
Table 5: Royalty cash receipts in 2013-14 by commodity ($ millions) ......................... 18
Table 6: Royalty revenue collected in 2013-14 in Australia ($ millions) ....................... 34
Table 7: Royalty Assessment Framework ..................................................................... 47
Table 8: Iron ore royalties accrued in 2013-14 by legislative mechanism ................. 50
Table 9: Royalty rates for iron ore used as a feedstock for further processing .......... 51
Table 10: Iron ore royalty rates in Australian states and territories .............................. 52
Table 11: Gold royalty rates in Australian states and territories .................................... 57
Table 12: Gold royalty rates in the top ten gold producing nations ................................ 57
Table 13: Alumina royalties in major competing jurisdictions ...................................... 65
Table 14: Nickel royalties in other countries .................................................................. 69
Table 15: Mineral sands royalties in other Australian states and territories ............... 74
Table 16: Annual coal production in Australian states (million tonnes) ................. 81
Table 17: Salt royalty rates in State Agreements ......................................................... 90
Table 18: Royalty rates for basic raw materials, 2013-14 ............................................ 93
Table 19: *Ad valorem* tiers by commodity ................................................................. 111
Table 20: The effect of rate changes on royalty revenue ($ millions) ......................... 112
Terms of Reference

The Mineral Royalty Rate Analysis will evaluate the structure of the State’s mineral royalty rates and make recommendations to Government on possible improvements.

1) It will:
   a) examine the ongoing efficacy and appropriateness of the policy that revenue returned from royalties is broadly equivalent to 10% of the total mine-head value of the mineral;
   b) if a benchmark based on 10% of mine-head value is retained, examine the extent to which the current royalty rates structure produces revenue that differs from the benchmark, and identify appropriate adjustments that would take revenues closer to the benchmark;
   c) if an alternative benchmark is proposed, examine royalty rate structures that would achieve the new benchmark;
   d) address any anomalies identified in the royalty structure; and
   e) produce a report for Government, including recommendations.

2) In preparing the report for Government and shaping recommendations, the Review will take into account:
   a) the equity and efficiency implications of any proposed changes to royalty rates;
   b) the effect of any changes in royalty rates on State revenue;
   c) royalty arrangements in other States and countries;
   d) economic conditions in different industry sectors; and
   e) the changing economic viability of commodity sectors.

3) The Royalty Rate Analysis will not:
   a) consider major changes to royalty arrangements, but will focus on addressing any anomalies identified in the current royalty structure;
   b) propose changes to the *ad valorem* basis of State royalties;
   c) consider changes that could have detrimental effects on the State’s revenue base; or
   d) include consideration of magnetite.
Overview

In Western Australia, the State Government owns most mineral resources. Private companies mine, process and sell those resources, and pay royalties to the Government for the minerals they extract. A royalty is a purchase price, not a tax. A royalty compensates the community for the removal of its minerals.

Western Australia’s royalty system has evolved over many decades and has successfully delivered a return to the community while providing industry with a straightforward, transparent and predictable cost structure. The Review found a high level of acceptance of the State’s basic royalty structure in both industry and the wider community.

The Mineral Royalty Rate Analysis (the Review) was announced in the 2012-13 budget. The Terms of Reference were released by the Government on 19 August 2013.

This Review has sought to build on the proven strengths of the existing system. The Review evaluated the appropriateness of the principles that underlie the royalty structure, and considered whether variations from the standard royalty system are appropriate. In framing its recommendations, the Review considered royalty rates in other jurisdictions, economic conditions in the industry, and the effect of proposed changes on the Government’s revenues.

Western Australia’s three-tiered royalty system was introduced in 1981. It applies one of three royalty rates depending on the form in which the mineral is sold (ore, concentrate or final form), and the extent to which it is processed. The Review concluded that the structure of the system should be refined to better accommodate modern mining practices, products and processes through the introduction of a new tier at 3.75%. The tiered system should explicitly link the level of processing to one of four royalty rates. Tier 1 is for ‘primary treatment’ and attracts a rate of 7.5%. Tiers 2 and 3 are for ‘secondary treatment’ and attract either a rate of 5% for concentration or the new rate of 3.75% for metallurgical processing. Tier 4 is for ‘final treatment’ and attracts a rate of 2.5%.

The addition of the new royalty tier, at a rate of 3.75%, will more closely align royalty payments with levels of processing for some commodities. Other changes to the design and operation of the system recommended by the Review include how to accommodate adverse conditions in an industry, and factors other than the level of processing that can influence the royalty rate assigned to a commodity.

Western Australia’s royalty system was designed to return to the community about 10% of the mine-head value of the ore, regardless of the commodity or the level of processing. During consultation, no stakeholders argued that 10% is too high or too low in principle, though some argued their particular industries should pay less.

The calculation and application of the 10% benchmark attracted great attention both in submissions and in consultations with industry. In part, this was because the use of the benchmark and its relationship to the three-tiered royalty structure were not well understood. When the benchmark was set in 1981, it was not envisaged that the benchmark would be the only basis for setting royalties, or that rates would be adjusted regularly to deliver the benchmark.

The Review considers that, in a tiered ad valorem system, the main benefit of the benchmark is to allow comparison of royalties within and between industries, and over time. It also gives the community a readily understood gauge of the return it makes from the use of the State’s resources. The Review recommends that the benchmark is retained as a consideration when assigning a royalty tier to a new commodity, or when the overall royalty system is reviewed.
The Terms of Reference required the Review to consider anomalies in the royalty structure. The Review considered all minerals with royalties consistently and materially different from the standard royalty system. The four main categories of variation examined were:

1. rates which differed from the standard, established three-tiered *ad valorem* rates;
2. rates where a mineral appeared to be treated differently to other comparable minerals;
3. rates where the basis for the calculation of the royalty is not the sales value (except specific-rate royalties); and
4. rates that did not align with the level of processing.

In most cases, the Review determined that there are good reasons for the variations it examined – for example, basing the nickel royalty on the quantity of nickel contained in a product rather than on the level of processing used to produce the product, more fairly reflects different processing techniques in the industry. However, in some cases, the Review found that some minerals should be moved onto the tiered *ad valorem* rate structure, or to a different tier within that structure. The most significant of these is gold, which the Review recommended be moved onto the proposed new tier of 3.75%, in order to make a return to the community comparable with contributions from other mineral sectors.

The Terms of Reference stipulate that the Review must consider economic conditions and international competitiveness in making its recommendations. Economic conditions are poor in some parts of Western Australia’s resource industry and have deteriorated markedly in the past year. For these industries, the Review has recommended no change until economic circumstances improve.

Western Australia’s royalty system has supported the development of a diverse and competitive mining industry. The *ad valorem* system provides a simple, transparent and predictable framework and has delivered substantial increases in royalty revenues. The inherent volatility of commodity prices means that Government’s royalty revenues rise and fall quite markedly over the commodity cycle, but revenues are significantly less volatile and unpredictable than under alternative royalty regimes such as profit taxes. The Review’s recommendations recognise and reinforce the system’s strengths.
Recommendations

Recommendation 1

The ad valorem royalty rate applied to a commodity should be determined by how much the commodity has been processed, whether the rate delivers a fair return to the community and Western Australia’s competitiveness as an investment destination.

Recommendation 2

An additional ad valorem rate of 3.75% should be introduced for minerals subject to more intensive processing than is typically used to produce concentrates. Four ad valorem tiers explicitly linked to the level of processing are recommended:

Tier 1, primary treatment (7.5%).
Tier 2, secondary treatment (concentration) (5%).
Tier 3, secondary treatment (metallurgical) (3.75%).
Tier 4, final treatment (2.5%).

Recommendation 3

The 10% benchmark should be retained as a gauge of fair return to the community. The benchmark is one of several factors to be considered when new minerals are brought into the royalty structure, or when the overall royalty system is reviewed. When such reviews are undertaken in future, the benchmark calculation should include an estimated return on capital.

Recommendation 4

Low value basic raw materials such as clay and talc should continue to attract specific-rate royalties.

Recommendation 5

The practice of not specifying royalty rates in new State Agreements should continue. Royalty concessions in existing State Agreements should continue to be removed and royalty rates set according to the Mining Act 1978. This should be addressed over time by agreement with the relevant parties, as opportunities to renegotiate the agreements arise.

Recommendation 6

As and when the opportunity arises, the Iron Ore (Yandicoogina) Agreement Act 1996 and the Iron Ore Processing (Mineralogy Pty. Ltd.) Agreement Act 2002 should be amended to remove discounted royalty rates for iron ore that is used as a feedstock for pellets, iron and steel processing.

Recommendation 7

The ad valorem rate of 2.5% for gold should be changed to 3.75%.

Recommendation 8

Projects producing more than 2,500 ounces a year should not be eligible for the gold royalty exemption on the first 2,500 ounces.
Recommendation 9

An ad valorem rate of 3.75% for alumina should be added to the Mining Regulations 1981. This will not affect existing producers immediately, as their royalties are set by State Agreements. When economic circumstances in the alumina industry improve, and an opportunity arises to negotiate amendments to the State Agreements, each Agreement should change to reference the Mining Act 1978.

Recommendation 10

The ad valorem rate of 7.5% for diamond in the Mining Regulations 1981 should be changed to 5%.

Recommendation 11

When economic circumstances in the coal industry improve, the specific rate for domestic coal should be removed so that a single ad valorem rate of 7.5% applies to all coal sales.

Recommendation 12

For reasons of equity, salt State Agreements should be amended as and when the opportunity arises so that they refer to the Mining Act 1978. The single indexed rate specified in the Mining Regulations 1981 should apply to all salt production.

Recommendation 13

An ad valorem rate should be introduced for silicon metal in consultation with the silica sand and silicon metal industries.

Recommendation 14

The ad valorem rate of 5% for uranium in the Mining Regulations 1981 should be changed to 3.75%.

Recommendation 15

The ad valorem rate of 5% for vanadium contained within ore concentrates and for oxides of vanadium should be changed to 3.75% of the vanadium pentoxide price.

Recommendation 16

The Mining Regulations 1981 should include an ad valorem rate of 3.75% for lithium carbonate.

Recommendation 17

Royalty rates should be set on an objective basis without regard to distribution of GST revenue grants. The State Government should continue to engage directly with the Commonwealth Government to promote a fair treatment of mining revenues in calculations of states' GST shares.

Recommendation 18

Where practicable, implementation of royalty changes should be co-ordinated so that changes take effect at the same time for all producers in a sector.
Summary of Recommendations and Implementation by Commodity

Table 1 and Table 2 below list the commodities for which a new royalty rate is recommended, and the process and timing for implementation.

**Table 1: Summary of recommended *ad valorem* royalty rate changes**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Processing tier and rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tier 1 (7.5%)</td>
</tr>
<tr>
<td>Alumina</td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td></td>
</tr>
<tr>
<td>Diamond</td>
<td></td>
</tr>
<tr>
<td>Gold</td>
<td></td>
</tr>
<tr>
<td>Lithium</td>
<td></td>
</tr>
<tr>
<td>Silicon</td>
<td></td>
</tr>
<tr>
<td>Uranium</td>
<td></td>
</tr>
<tr>
<td>Vanadium products</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tier 2 (5%)</td>
</tr>
<tr>
<td>Alumina</td>
<td>Alumina</td>
</tr>
<tr>
<td>Coal</td>
<td>Coal</td>
</tr>
<tr>
<td>Diamond</td>
<td>Diamond</td>
</tr>
<tr>
<td>Gold</td>
<td>Gold doré/fine gold</td>
</tr>
<tr>
<td>Lithium</td>
<td>Lithium carbonate</td>
</tr>
<tr>
<td>Silicon</td>
<td></td>
</tr>
<tr>
<td>Uranium</td>
<td>Yellowcake (U₃O₈)</td>
</tr>
<tr>
<td>Vanadium products</td>
<td>Titanium slag, vanadium pentoxide</td>
</tr>
</tbody>
</table>

1. Commodities listed should be subject to *ad valorem* royalty rates. A rate change is also recommended for salt. Multiple specific rates for salt should be amended so that there is one single specific royalty rate.
### Table 2: Implementation by commodity

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Mechanism</th>
<th>Amendment</th>
<th>Time frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alumina</td>
<td>State Agreements</td>
<td>Amend State Agreements to remove royalty clause and refer to the <em>Mining Act 1978</em></td>
<td>When economic circumstances improve and an opportunity arises</td>
</tr>
<tr>
<td></td>
<td><em>Mining Regulations 1981</em></td>
<td>Insert a rate of 3.75% for alumina in the <em>Mining Regulations 1981</em></td>
<td>Regulatory amendment by 1 July 2015</td>
</tr>
<tr>
<td>Coal</td>
<td><em>Mining Regulations 1981</em></td>
<td>Replace the 'not exported' and 'exported' rates for coal with a single <em>ad valorem</em> rate of 7.5%</td>
<td>When conditions in the industry are appropriate</td>
</tr>
<tr>
<td></td>
<td>State Agreements</td>
<td>Replace the rate of 7.5% for diamond with 5%</td>
<td>Regulatory amendment by 1 July 2015</td>
</tr>
<tr>
<td>Diamond</td>
<td><em>Mining Regulations 1981</em></td>
<td>Amend State Agreements to remove royalty clauses and refer to the <em>Mining Act 1978</em></td>
<td>As opportunity arises</td>
</tr>
<tr>
<td></td>
<td>State Agreements</td>
<td>Replace the rate of 7.5% for diamond with 5%</td>
<td></td>
</tr>
<tr>
<td>Gold</td>
<td><em>Mining Regulations 1981</em></td>
<td>Replace the rate of 2.5% for gold with 3.75%</td>
<td>Regulatory amendment by 1 July 2015</td>
</tr>
<tr>
<td>Lithium</td>
<td><em>Mining Regulations 1981</em></td>
<td>Insert a rate of 3.75% for lithium carbonate in the <em>Mining Regulations 1981</em></td>
<td>Regulatory amendment by 1 July 2015</td>
</tr>
<tr>
<td>Salt</td>
<td>State Agreements</td>
<td>Amend State Agreements to remove royalty clauses and refer to the <em>Mining Act 1978</em></td>
<td>As opportunity arises</td>
</tr>
<tr>
<td>Silicon</td>
<td><em>Mining Regulations 1981</em></td>
<td>Introduce an <em>ad valorem</em> rate for silicon metal.</td>
<td>To be determined in consultation with the silicon metal and silica sands industries.</td>
</tr>
<tr>
<td>Uranium</td>
<td><em>Mining Regulations 1981</em></td>
<td>Replace the rate of 5% for uranium with 3.75%</td>
<td>Regulatory amendment by 1 July 2015</td>
</tr>
<tr>
<td></td>
<td>State Agreement</td>
<td>Amend State Agreement to remove royalty clauses and refer to the <em>Mining Act 1978</em></td>
<td>As opportunity arises</td>
</tr>
<tr>
<td>Vanadium products</td>
<td><em>Mining Regulations 1981</em></td>
<td>Replace the rate of 5% for vanadium contained within ore concentrates and for oxides of vanadium to 3.75%</td>
<td>Regulatory amendment by 1 July 2015</td>
</tr>
</tbody>
</table>
Chapter 1. Introduction

Western Australia is one of the most important and technically competent mining jurisdictions in the world. It currently produces significant percentages of the world’s minerals and petroleum. In 2013, it supplied almost 30% of global iron ore, 14% of global alumina, 12% of global nickel, 6% of global gold and 6% of global liquid natural gas (LNG). Collectively it produced minerals to the value of $95 billion, with an additional $26 billion in value from the petroleum sector.

For more than a decade, Western Australia has enjoyed high prices and demand for its major resource exports. This has supported strong growth in employment, investment, output and royalty revenues. In the ten years to 2013-14, the value of the State’s mineral and petroleum production rose from $33 billion to $121 billion, while the contribution of royalties to Government revenue rose from 5.5% to 25%. This growing revenue has helped to fund community services and infrastructure. Royalty revenues are volatile, however, and Western Australia’s growing reliance on royalties has increased the exposure of the State’s finances to a changeable and unpredictable revenue source.

The Mineral Royalty Rate Analysis (the Review) was announced in the 2012-13 budget. The Terms of Reference were released by the Government on 19 August 2013.

The Terms of Reference to this Review do not anticipate major revisions to Western Australia’s royalty structure. The Review’s main objectives were to evaluate whether the underlying settings of the royalty system are delivering a fair and reasonable return to the community, and to identify any anomalies that may need to be addressed. The Terms of Reference specify that the ad valorem basis of royalties must be retained.

*Ad valorem* royalties have a number of advantages over profit-based systems. They are comparatively stable and predictable, qualities important for both industry and government when planning expenditure and income. They have low administrative and compliance costs. They return revenue to the community regardless of economic conditions in the industry, consistent with royalty payments being considered a price, not a tax. They are paid whenever commodities are being produced, while profit based schemes typically do not return royalties for several years in the early stages of major projects.

The last time the State's royalty structure was subject to a systematic evaluation was between 1984 and 1986. The Government did not implement the recommendations of that review so the rates in effect today are those put in place in 1981. In the three decades since, Western Australia has operated a stable and predictable royalty regime that has delivered a return to the community for the sale of its minerals, while the State has been an attractive and low-risk destination for resource investments.

The desirability of stable, consistent and predictable royalty arrangements was a strong and repeated message from resources companies and industry bodies consulted during this Review. However, the Government should also review its royalty arrangements from time to time to ensure that they are operating properly and delivering an appropriate return to the community and the State.

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4. *Ad valorem* is Latin for ‘based on value’. *Ad valorem* royalties apply as a percentage of the value of the mineral.
return for the sale of Western Australia's mineral assets, while not unduly impeding the efficiency and competitiveness of the resources sector.

Western Australia’s resources industry is larger and more diverse than in the 1980s, in many cases mining more difficult reserves, with lower grade ores at sites further from ports and markets. But the industry is also more sophisticated and technologically advanced, and able to mine resources that would once have been uneconomic. The industry continues to explore and find new, world-class deposits. The industry adapts to changing economic conditions, expanding production and exploiting higher cost, often lower quality resources when prices and demand are strong, and consolidating when conditions deteriorate.

During consultations with industry, the issue that generated the most discussion was the policy that revenue returned from royalties should be broadly equivalent to 10% of the total mine-head value of the mineral. It is a principle not widely known or used in determining royalty rates, but was used to explain the three-tiered system in 1981.

Both the merits of this benchmark and the method used to calculate it were the subject of spirited debate. Its rationale and application as a basis for setting and reviewing royalties had not previously been articulated or defined. While not accepting all of industry’s arguments, the Review considered industry’s position when assessing the efficacy and appropriateness of the benchmark, and proposes changes that it hopes will retain the benefits of a benchmark for future reviews.

The Review considered only mineral royalties and excluded petroleum royalties, most of which are shared between State and Commonwealth Governments.

Mineral royalty rates in this Review are covered by the Mining Act 1978 and Mining Regulations 1981 and various State Agreements.

The Review team acknowledges the assistance of industry in helping it to conduct its analysis, particularly those companies and organisations that made submissions, met the Review and contributed to the Industry Reference Group.
Chapter 2. Conduct of the Review

The Department of State Development and the Department of Mines and Petroleum conducted the Review in consultation with the Department of Treasury, industry and other stakeholders.

Consultation

The Review’s consultation process sought to capture the community and industry’s views on the Western Australian royalty system and technical information regarding industry structure and economic conditions. Consultation consisted of public consultation, including a public submission period and facilitated public discussion forums, one-on-one meetings and an Industry Reference Group.

Information about the Review was posted on the websites of both Departments, initially containing the Terms of Reference and a stakeholder consultation paper.

Interested parties, organisations and members of the community were invited to provide written submissions to the Review from 19 August to 31 October 2013. The Review placed advertisements inviting public submissions in The West Australian and regional newspapers.

Submissions were received from industry bodies, community groups, members of the public, local government, an academic, and several mining companies. The Department of State Development posted submissions and a submissions summary, which outlined key themes from the submissions, on its website.

After the public submissions period, the Review team met several industry stakeholders on a confidential basis. The purpose of these meetings was to discuss the stakeholders’ written submissions and their views on the royalty system, its strengths and weaknesses, and any royalty issues specific to their operations, industry or community.

The Review held a community discussion forum on 4 April 2014 to discuss what constitutes a fair return to the community. The forum included representatives of industry, development commissions, academia, social services and trade unions.

An industry discussion forum was held on 21 March 2014 to discuss what constitutes a fair return to the community. A second industry discussion forum, held on 11 April 2014, focused on the method of calculating the mine-head value of a mineral. Representatives of the Chamber of Minerals and Energy and Association of Mining and Exploration Companies and industry attended both industry discussion forums.

As required by the Terms of Reference, the Review established an Industry Reference Group consisting of representatives of the Chamber of Minerals and Energy, the Association of Mining and Exploration Companies, the Department of State Development and the Department of Mines and Petroleum. The Industry Reference Group met eight times during the Review to discuss issues such as the efficacy and appropriateness of the benchmark, mine-head calculations, anomalies in the current system, economic conditions and industry viability. The main discussion points were the benchmark and the netback calculation method.

In addition to the Industry Reference Group meetings, the Review also received presentations from the Association of Mining and Exploration Companies, the Chamber of Minerals and Energy, consultancies and industry representatives. During these presentations, stakeholders discussed industry data and analysis, issues within each industry and the current royalty system.
The public submissions, Industry Reference Group and forums helped the Review to focus on matters affecting the whole royalty system, such as how a benchmark should be used. It also enabled the Review to identify the strengths and weakness of the royalty system from a range of perspectives, such as equity and the value of attributes such as simplicity and stability. The Review also benefited greatly from information provided about conditions in the industry and for individual commodities. Commercially sensitive and confidential material provided to the Review also helped with its analysis, though it is not cited directly in this Report.

Data and Analysis

The Chamber of Minerals and Energy and the Association of Mining and Exploration Companies provided detailed industry data aggregated by commodity to the Review. Negotiating access to the data was difficult and time consuming due to the data’s commercial sensitivity and the Review appreciates the efforts peak bodies made to supply data. The peak bodies provided information on a confidential basis that the Review found helpful, but in the end were unable to supply data to the level of detail that the Review would have liked. The difficulty of obtaining detailed cost information by commodity was one factor (though not the only one) which led to the Review’s conclusion that the method of calculating the mine-head value should use only data that is relatively easy to obtain or estimate (see Chapter 6).

Due to data limitations and the need to use analysis that can be made public, the Review relied mainly on cost information provided by the Australian Mineral Economics Group consultancy, though supplemented by the data supplied by industry. The Department of Mines and Petroleum has purchased information from this consultancy for a number of years, allowing a consistent time series of costs to be analysed. The information mainly covered operational costs and contained some engineering estimates for some commodities. Information was not available for all commodities produced in Western Australia.

The Review developed a model to assess royalty revenue against a benchmark of 10% of the value of a commodity at the mine head using different netback calculation methods. It also modelled the effects any royalty rate changes would have on Government revenue. Quantitative analysis was not used in isolation to assess royalty rates. Analysis of downstream processing and royalty rates in other jurisdictions also informed the Review.

The Association of Mining and Exploration Companies, the Chamber of Minerals and Energy and the Gold Royalties Response Group (an industry group formed to represent gold producers) provided the Review with some analysis derived from industry data. This analysis informed the Review, and was used as a point of comparison with the Review’s modelling.

An overview of the data analysis is in Appendix 1.

Peer Review

The model used by the Review was peer reviewed by the Western Australian Treasury Corporation. The final report was peer reviewed by Stuart Booker, former Deputy Director General of the Department of Mines and Energy, Queensland.
Chapter 3. Royalties in Western Australia

Resource Tenure

In Western Australia, the Crown owns most minerals, and producers must pay royalties to extract them. This applies throughout the State, except where private freehold land was alienated before 1899. At that time, freehold title included rights to subsurface minerals, except for gold, silver and precious metals.

Royalty Legislation

Mineral royalty rates are applied through the Mining Act 1978 (and Mining Regulations 1981), in State Agreements that refer to the rates in the Mining Act 1978 (and Mining Regulations 1981), or in State Agreement Acts with specified royalty rates.

The definition of minerals in the Mining Act 1978 excludes some resources obtained from land owned by private landowners. These are limestone, rock, gravel, shale (other than oil shale), sand (other than mineral sands, silica sand or garnet sand), and clay (other than kaolin, bentonite, attapulgite, or montmorillonite).

Mineral royalties levied under the Mining Act 1978 and reflected in the Mining Regulations 1981, as well as under State Agreements, are either a specific rate per tonne of production, or ad valorem (a percentage of the resource’s value).

Specific-rate royalties apply to basic raw materials such as clay, gypsum and sand, but also extend to some industrial minerals, notably salt and talc. The rates are specified in the Mining Regulations 1981 for each tonne produced and are indexed every five financial years according to the Non-Metallic Minerals Producer Price Index published by the Australian Bureau of Statistics.

Table 3: Specific-rate royalties, 2013-14

<table>
<thead>
<tr>
<th>Royalty rate</th>
<th>Commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td>62 cents a tonne</td>
<td>Limestone-lime earth, salt, clay, dolomite, gypsum, construction materials</td>
</tr>
<tr>
<td>$1.00 a tonne</td>
<td>Silica, limestone-lime earth, talc</td>
</tr>
<tr>
<td>$1.00 a tonne</td>
<td>Coal – not exported</td>
</tr>
<tr>
<td>$1.50 a tonne</td>
<td>Ilmenite feedstock that is not of marketable quality</td>
</tr>
</tbody>
</table>

1. This indexed rate applies to production between 1 July 2010 and 30 June 2015. The rate is indexed to the Non-metallic Mineral Products Price Index, for the quarter ending on the 31 March before the beginning of the relevant period, published by the Australian Bureau of Statistics in Catalogue 6427.0 Producer Price Indexes. The next relevant period begins 1 July 2015 and ends 30 June 2020. See Mining Regulations 1981 (WA) reg 86(2a)-(2d).
2. Used in agriculture or construction.
3. Used for metallurgical purposes.
4. This is the un-indexed rate. The rate is adjusted each year on 30 June by the percentage increase in the average ex-mine value of Collie coal for the year ending on that date when compared with the corresponding value of Collie coal for the year ending on 30 June 1981.
5. This is the un-indexed rate. The rate was last calculated and used in 2005 at the indexed rate of $3.13 a tonne.

Ad valorem royalties apply to metallic minerals and generally higher value industrial minerals. The royalty is calculated as a percentage of sale value (or metal value). There are three ad valorem rates, which reflect processing costs after the mineral is mined: 7.5% applies to bulk material, 5% for mineral concentrates and 2.5% for minerals in metallic form or equivalent.

See, Mining Act 1978 (WA) s 8.
See, Mining Regulations 1981 (WA) reg 86(2a)-(2d). The current indexed rates are for the period beginning on 1 July 2010 and ending on 30 June 2015.
The royalty for nickel, rare earths and vanadium pentoxide is calculated as 2.5% of the contained mineral value. Further detail on this approach is provided in Box 1. A schedule of all royalty rates is provided in the appendices.

**State Agreements**

State Agreements are contracts between the State Government and companies seeking to establish or operate major resource projects, and are ratified by an Act of State Parliament. They specify rights, obligations, terms and conditions for the development of a project, and establish a framework for co-operation between the parties to the agreement. Royalties were important negotiation issues in the earlier State Agreements, and many still contain specific royalty clauses. Later State Agreements typically refer to royalty rates in the *Mining Act 1978*.

State Agreements exist for major mineral projects that produce alumina, coal, copper, diamonds, iron ore, mineral sands, nickel, salt, silicon and uranium. Royalty rates vary between State Agreements and in some cases do not match the rates in the *Mining Act 1978*. For example, all alumina production in Western Australia is administered under State Agreements, which specify an *ad valorem* royalty of 1.65%.

State Agreements have been used to develop major resources projects in Western Australia since the 1950s. They provided certainty, and in some cases incentives, to investors developing capital intensive large-scale mineral and mineral processing operations. Clauses in State Agreements are changed by negotiation and mutual agreement between the parties. Royalty rates in State Agreements that differ from the *Mining Act 1978* can add complexity and inequity to the royalty system.

In 2013-14, 73% of the State’s royalties (including petroleum) were collected through rates specified in State Agreements, mostly from iron ore. Many of the State’s iron ore State Agreements date back to the 1960s (such as Hamersley Range, Mount Goldsworthy, Mount Newman and Robe River).

Of the remaining royalties collected in 2013-14, 14% were collected under State Agreements that link royalty rates to the *Mining Act 1978*, and 13% were collected under the Act itself. Table 3 lists the legislative basis for the collection of royalties by commodity in 2013-14.

Royalty rates in State Agreements are within the scope of this Review. Where the Review recommends a change to a rate specified in a State Agreement the rate change should be by agreement of the parties to the Agreement. In practice, this may mean that rate changes take time to implement, as changes may be deferred until both parties to the Agreement Act agree that a revision of the State Agreement is warranted.
Box 1: Contained minerals

Some minerals are processed and sold as intermediate products. For example, there are several nickel concentrate products including nickel matte. A royalty system that includes a royalty for all intermediate products would be difficult to design and administratively complex to implement. It is simpler to apply a single rate of 2.5% to the metal contained in the product sold, which could be in any form.

Processing increases the concentration and decreases the volume of the product. A contained mineral method of calculating royalties is simple, as only one rate is applied. It means the royalty remains constant at any level of processing as the value of the contained mineral is unchanged, whether the product sold is a concentrate, matte or metal. The method can only apply to minerals for which there is a single metal price for a standard grade of metal.

Contained mineral royalties apply to nickel, rare earth oxides and to vanadium pentoxide where vanadium rich ore concentrates are sold without claiming the vanadium value.

The royalty paid per tonne is calculated by multiplying the concentration of the mineral in the final product sold (concentrate, matte or metal) by the ad valorem rate of 2.5%, and multiplying this by the metal price per tonne:

$$ R = \frac{U \times 2.5}{100} \times P $$

Where:

- $R$ = the royalty value per tonne
- $U$ = contained units of the metal
- $P$ = the gross metal price per tonne, free on board, in Australian currency

Table 4: Royalties accrued in 2013-14 by legislative mechanism ($ millions)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Mining Act 1978</th>
<th>State Agreements referring to Mining Act 1978 rates</th>
<th>State Agreement rates</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ore</td>
<td>389.3</td>
<td>803.7</td>
<td>4,150.5</td>
<td>5,333.5</td>
</tr>
<tr>
<td>Gold</td>
<td>234.5</td>
<td></td>
<td></td>
<td>234.5</td>
</tr>
<tr>
<td>Alumina</td>
<td></td>
<td></td>
<td>70.4</td>
<td>70.4</td>
</tr>
<tr>
<td>Nickel</td>
<td>65.2</td>
<td>24.6</td>
<td></td>
<td>89.2</td>
</tr>
<tr>
<td>Base metals (copper, lead, zinc)</td>
<td>Included in total</td>
<td></td>
<td></td>
<td>60.4</td>
</tr>
<tr>
<td>Mineral sands</td>
<td>0.9</td>
<td>13.2</td>
<td></td>
<td>14.1</td>
</tr>
<tr>
<td>Diamonds</td>
<td>3.7</td>
<td>15.4</td>
<td></td>
<td>19.1</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td>63.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>5,885.3</td>
</tr>
</tbody>
</table>

Note: Royalty data is aggregated by project based on the major commodity produced. The royalties collected from by-products are included in the royalty total for the primary commodity. For example, the royalty collected for copper produced as a by-product at a gold mine is included in the gold royalty, and is not accounted for in the base metals royalty.

Source: Western Australian Department of Mines and Petroleum.
**Historical development of the royalty system**

Before 1981, royalties were administered by the *Mining Act 1904*, which initially only included low rates for gold and coal.

In 1958, the Government introduced *ad valorem* rates and specific rates (based on a fixed rate per ton) on most other minerals produced in the State. These remained largely unchanged until 1981. During this period, when new industries such as mineral sands emerged, royalty rates were established either by regulation under the *Mining Act 1904* or through State Agreements. An *ad valorem* rate of 7.5% of the free on board value was included in the first iron ore export agreement for Mount Goldsworthy in 1962, and this became a major influence on subsequent royalty rates.

The first variation in the established royalty system was in 1968, when nickel was shifted to the contained mineral system. A further departure occurred in 1976, when a combination of *ad valorem* and specific rates was used to set a maximum and minimum royalty for mineral sands products. In 1981, a profit-based royalty was negotiated for the Argyle Diamond Project. The royalty was changed to an *ad valorem* rate of 5% with the move to underground diamond mining on 1 January 2006.

In 1981, the State Government completed a detailed review of mineral royalties. The review examined existing *ad valorem* rates for iron ore, nickel, bauxite-alumina and other State Agreements, such as the 7.5% rate for direct shipping iron ore and the 2% rate for nickel.

It concluded that a common point in all mining developments was the ore ex mine prior to processing or concentration, and that a return to the State amounting to approximately 10% of the value ex mine offered a basis for a ‘consistent and logical approach’ to setting royalty levels.\(^7\)

Western Australia’s current royalty system (presented diagrammatically in Figure 1) is based largely on the principles and design recommended in the 1981 review, and approved by Cabinet. The agreed rates were applied to the *Mining Act 1904* in December 1981 and moved into the *Mining Regulations 1981* in 1982. The decision established that:

- a three tier *ad valorem* system be applied to most commodities using the rates of 7.5%, 5% and 2.5%;
- the return to the State should amount to ‘in the order of 10%’ at the ‘ore ex mine’;
- the actual level of a royalty for a particular mineral should take into account factors other than this benchmark, such as profitability;
- royalties should be applied to the minerals ‘in their first saleable form’;
- royalties should be set ‘for each particular mineral’ rather than on a ‘mine-by-mine basis’;
- special arrangements may be necessary to determine the basis of the value for calculating the royalty;
- ‘the effect of any increased royalties’ should be taken into account to determine if a rate increase can be implemented immediately or in the future; and
- a per tonne rate should apply to construction materials.

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The system was designed to strike ‘an acceptable balance between giving a fair return to the community and at the same time not imposing an unacceptable burden on the industry’.\(^8\) It was designed to be easy to administer, and ‘that the people of Western Australia should be properly recompensed for the development of its mineral resources...’\(^9\)

In 1984 to 1986, the State Government undertook a Mineral Revenue Inquiry. The Inquiry was to review state royalty systems and the royalties collected under these systems, and examine alternative systems to the Western Australian model. The major recommendation of the Mineral Revenue Inquiry was to replace the \textit{ad valorem} system with a royalty based on the net resource value. The State Government did not implement the Inquiry’s recommendations, after considering the trade-offs between the principles of stability, predictability and return to the community.

Few significant changes have occurred to the system since 1981. A royalty rate of 1.25\% was applied to gold from 1 July 1998, and increased to 2.5\% from 1 July 2000. From 2010 to 2013, the concessional rates for iron ore fines and beneficiated iron ore in the \textit{Mining Regulations 1981} were removed. Following agreement between the Government and the State Agreement companies, the concessional rates for iron remaining in State Agreements were phased out. In April 2013, the State Government announced the Magnetite Royalty Rebate, which reimburses up to 50\% of royalty payments to magnetite producers until April 2016. The \textit{ad valorem} rate of 5\% applies to magnetite.

A summary of the main historical developments of the royalty system is provided in Box 2.

Figure 1 is a simple illustration of the current design of the \textit{ad valorem} royalty system in Western Australia.

\textbf{Figure 1: Western Australia’s \textit{ad valorem} royalty rates}

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\(^9\) Ibid.
Box 2: Timeline of the development of the Western Australian royalty system

1904: The *Mining Act 1904* was enacted, which included royalty provisions for gold and coal under certain circumstances.

1952: An iron ore royalty was introduced for Yampi Sound production under the *Broken Hill Proprietary Steel Industry Agreement Act 1952*.

1958: *Ad valorem* and specific rates were introduced for most minerals.

1962: An *ad valorem* rate of 7.5% was included in the first iron ore export agreement for Mount Goldsworthy; the direct shipping ore rate still exists today.

1963: A concessional rate was negotiated on fine iron ore across a number of State Agreements, including the *Iron Ore (Mount Goldsworthy) Agreement Act 1964*.


1981: The State Government conducted a detailed review of the mineral royalty system. The resulting Cabinet decision established the current royalty system and the general principles for the application of royalties. Three *ad valorem* rates of 7.5%, 5% and 2.5% were included in the *Mining Regulations 1981*. Specific-rate royalties of 30 and 50 cents a tonne were applied to basic raw materials and some industrial minerals.

1981: A specific rate of $1.00 a tonne was introduced for coal sold domestically, except for coal sold to the State Energy Commission, which attracted a specific rate of 5 cents a tonne. An *ad valorem* rate of 7.5% was adopted for exported coal.

1981: The *Diamond (Argyle Diamond Mines Joint Venture) Agreement Act 1981* commenced. In anticipation of high profits, the Agreement introduced an accounting profit-based royalty for Argyle diamonds mine and a base *ad valorem* rate of 7.5%.

1982: The *Mining Act 1978* commenced in January with the three rates.

1986: The State Government commissioned the Mineral Revenues Inquiry between 1984 and 1986. The Inquiry recommended significant changes to the *ad valorem* system; however, these were not implemented.

1987: An *ad valorem* rate of 1.65% was introduced for alumina produced under State Agreements. Prior to this, a specific rate of 25 cents a tonne applied to bauxite used to produced alumina.

1990: The State Government removed the specific rate of 5 cents a tonne for coal sold to the State Energy Commission.

1998: A royalty for gold was introduced from 1 July at a rate of 1.25%, with a provision for this to increase to 2.5% from 1 July 2000, provided the price exceeded $450 an ounce. The first 2,500 ounces from a project was exempt.

2006: The Argyle Diamond State Agreement was varied to implement a lower *ad valorem* rate of 5%, to assist in the transition to higher cost underground mining.

2009: The *Mining (Ellendale Diamond Royalties) Regulations 2002* commenced. The Regulations applied an *ad valorem* rate of 5% to the Ellendale diamond operation.

2010: In June 2010, the State Government and iron ore producers agreed to phase out the concessional rates for fines and beneficiated iron ore from the Rio Tinto and BHP Billiton iron ore State Agreements. The concessional rates were also phased out of the *Mining Regulations 1981*. The rate for iron ore fines was progressively increased from 3.75% in 2009-10 to 7.5% from 1 July 2013.

2012: The Mineral Royalty Rate Analysis was announced in the 2012-13 State Budget.
Royalty Revenue

In 2013-14, the State collected royalties from minerals and petroleum of $6.025 billion. Over 90% of the mineral royalties paid came from iron ore, which has increased as a share of mineral royalties from around 45% in 2003-04. Table 5 lists royalty revenue for minerals in 2013-14. A detailed breakdown of royalties by commodity is provided in the Overview of State Taxes and Royalties available at www.treasury.wa.gov.au.

Table 5: Royalty cash receipts in 2013-14 by commodity ($ millions)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Mineral royalty revenue ($ million)</th>
<th>Proportion of mineral royalty revenue (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ore</td>
<td>5,308</td>
<td>90.6</td>
</tr>
<tr>
<td>Gold</td>
<td>216</td>
<td>3.7</td>
</tr>
<tr>
<td>Nickel</td>
<td>78.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Alumina</td>
<td>70.4</td>
<td>1.2</td>
</tr>
<tr>
<td>Diamonds</td>
<td>20.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Mineral sands</td>
<td>16.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Other¹</td>
<td>150</td>
<td>2.6</td>
</tr>
<tr>
<td>Total</td>
<td>5,859</td>
<td>100</td>
</tr>
</tbody>
</table>

1. Includes minerals such as copper, zinc and coal.

Source: Western Australian Department of Mines and Petroleum.

Chapter 4. Review Principles

The guiding principles for this Review are:

- **Equity:** the royalty system should return fair and appropriate compensation to the community for the loss of its resources, and treat producers equitably so that similar projects are required to make similar royalty payments.
- **Efficiency:** the royalty system should not reduce the productive capacity of the economy, or unduly deter or distort employment and investment decisions.
- **Adequacy:** the royalty system should return sufficient revenue to support Government spending on services and investment.
- **Stability and predictability:** the royalty system should provide stable and predictable revenue to allow Government to plan and deliver services sustainably, and to provide proponents with a stable and competitive royalty framework when planning projects.
- **Transparency and simplicity:** the royalty system should be simple for Government to administer, and for proponents to comply with, and understand.

First Sale

Royalties compensate the community for the use and loss of mineral resources. They are a price paid for the transfer of the mineral from the community to the miner. That price must be a fair approximation of the value of the mineral.

The Cabinet decision from 1981 that established the royalty system in place today stated that ‘royalties should be applied to minerals in their first saleable form’.[11] In practice, there is not always a transparent price or a price that reflects a fair value of the mineral in its first saleable form. For these reasons, Western Australian royalties are presently estimated using the first sale price. This has generally provided a sound, consistent basis for a royalty system that is transparent, simple to administer and provides a fair return to the community. This approach works where:

- A transparent sale price exists between unrelated parties (an arm’s length sale).
- The mineral is sold into a large and appropriate market, usually an export market.
- The sale price is a gross value, not net of other transactions, discounts or costs.
- The value is consistently and reliably obtained, providing certainty and predictability for both industry and government.

Transactions that reflect the gross international market price, such as an export invoice or an invoice with reference to a relevant international spot or average product value, would satisfy these criteria. International spot and average prices reflect many transactions in liquid and competitive international markets and provide the most reliable means to establish a product’s value.

In some situations, prices will not meet these criteria. For example, vertically integrated operations where a mineral may be exported or used in manufacturing before being sold would not satisfy the first criterion. In other instances, the often complex commercial transactions between mineral producers, tenement holders and mineral purchasers can make it difficult to identify an appropriate arm’s length sale price. In these cases, use of a deemed mineral sales value determined using an international benchmark price (such as

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Platts’ prices) or other relevant reference prices is appropriate for calculating royalty payments.

Where feedstock values are set in competitive markets they provide a viable price for setting royalties for downstream products. Where this is feasible, it reduces the risk of inadvertently creating incentives or disincentives for downstream production.
Chapter 5.  
**Ad Valorem Tiers and Level of Processing**

The three *ad valorem* tiers were appropriate for the range of products produced by the mining industry when the current system was adopted in 1981. The mining sector now produces a wider variety of minerals and products, yet the structure of the royalty system remains unchanged. The Review considered whether the current structure of *ad valorem* rates needs updating to accommodate modern mining practices, products and processes. This section describes the analysis and the findings.

The three tiers of *ad valorem* royalty rates are designed so that, as the value of the product increases as it undergoes processing, the royalty rate decreases as a proportion of the price to keep the royalty level roughly consistent. In principle, the royalty paid should be the same regardless of the level of processing. In practice, a tiered royalty system can only approximate this, as there can never be an exact relationship between costs and rates. As the Chamber of Minerals and Energy noted, the likelihood of *ad valorem* rates delivering exactly 10% of the mine-head value is small. This is because 'the amount by which royalty rates are reduced to account for costs downstream of the ROM [run of mine] ore stockpile and the higher value received for downstream product is determined on a theoretical basis rather than by imputing the actual costs associated with each stage of downstream processing.'

The Review conducted a detailed examination of Western Australia’s current and future mining products, and the processes used to produce them, but did not attempt to link these directly to the costs used to calculate the mine-head value.

The assessment determined that a gap exists between the current rates of 5% for concentrates and 2.5% for finished products. For simplicity, the Review is proposing a new rate of 3.75%, halfway between the existing rates of 5% and 2.5%. Some products are more processed than a concentrate but less processed than a finished form such as a metal. Alumina, for example, is neither a concentrate nor a metal, while lithium carbonate undergoes more processing than a lithium concentrate.

Substantial changes to the royalty system are outside of the Review’s Terms of Reference. An additional tier is not a major change to the existing system as it is consistent with the principles used to establish the royalty system and with the structure of tiered rates. Precedents for a rate between 2.5% and 5% include the 3.5% rate for uranium in the *Uranium (Yeelirrie)* Agreement Act 1978, the rate of 3.75% that once applied to fine iron ore, and the rate of 3.25% that once applied to beneficiated iron ore. The additional rate will provide greater flexibility to accommodate different processes and value adding. This reflects the evolution of Western Australia’s mining industry since the original framework was implemented. It will bring existing variations to the royalty system in line with the royalty framework.

The Review recommends that an additional *ad valorem* rate of 3.75% be introduced for minerals subject to more intensive processing than is typically used to produce concentrates. The four broad categories of processing and corresponding royalty rates are listed below. Box 3 provides further details on the processes in each tier.

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Chamber of Minerals and Energy, Submission to the Department of State Development, Western Australian Government, *Mineral Royalty Rate Analysis*, 7 November 2013, 18; Run of mine (ROM) is where the resource is placed after extraction ready for the next unit of production.
• Tier 1, primary treatment (7.5%).
• Tier 2, secondary treatment (concentration) (5%).
• Tier 3, secondary treatment (metallurgical) (3.75%).
• Tier 4, final treatment (2.5%).

In its submission to the Review, the Association of Mining and Exploration Companies argued that ‘the lack of any agreed transparent definition on what constitutes “bulk”, “concentrate” and “metal” has exacerbated uncertainty and created disputes.’

In the four-tiered ad valorem system recommended by the Review, the rate applied to a new product of mineral, will be guided by the level of processing a product undergoes, rather than the nature of the final product. The terms bulk, concentrate and metal are replaced by primary treatment, secondary treatment (concentration), secondary treatment (metallurgical) and final treatment (Box 3).

The level of processing is not the only consideration when selecting a royalty rate for new products or minerals, or when the royalty system is reviewed. Others are delivering a fair return to the community, which is examined in the next Chapter (Chapter 6), and rates in other jurisdictions as part of an assessment of Western Australia’s competitiveness (Chapter 7).

Recommendation 1

The ad valorem royalty rate applied to a commodity should be determined by how much the commodity has been processed, whether the rate delivers a fair return to the community and Western Australia’s competitiveness as an investment destination.

Recommendation 2

An additional ad valorem rate of 3.75% should be introduced for minerals subject to more intensive processing than is typically used to produce concentrates. Four ad valorem tiers explicitly linked to the level of processing are recommended:

Tier 1, primary treatment (7.5%).
Tier 2, secondary treatment (concentration) (5%).
Tier 3, secondary treatment (metallurgical) (3.75%).
Tier 4, final treatment (2.5%).

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13 Association of Mining and Exploration Companies, Submission to the Department of State Development, Western Australian Government, Mineral Royalty Rate Analysis, October 2013, 13.
Box 3: A four-tiered royalty system, based on the level of processing

Mineral processing stages can be broadly categorised based on the degree of waste removal, concentration, chemical extraction and treatment of a mineral. The level of processing outlined below is a general guide and may not apply to all commodities.

**Tier 1: Primary treatment (7.5%)**

Primary treatment generally occurs after mineral extraction and prepares the material for further processing, which may occur on site or elsewhere. Primary treatment processes - such as crushing, screening, blending and product handling - improve product consistency for marketability and supply a consistent feedstock for further processing.

**Tiers 2 and 3: Secondary treatment (concentration, 5% and metallurgical, 3.75%)**

Secondary treatment is characterised by two forms of processing – concentration (ore dressing) and metallurgical processing (chemical treatment). Ore dressing involves particle size reduction and concentration through largely physical processes, such as gravity separation or flotation, depending on the ore characteristics. Some minerals undergo further intermediate ‘metallurgical processing’ involving combinations of biological, chemical and heat treatments prior to final treatment. Metallurgical processing stages can require high temperatures and/or pressure treatment with a variety of chemical and energy inputs.

**Tier 4: Final treatment (2.5%)**

Advanced intermediate products (products subject to metallurgical processing) are more intensive to produce and may be more homogeneous than a concentrate. However, they require final treatment before they can be used in the manufacture of consumer goods. Final treatment is generally referred to as refining. Refining takes intermediate products to a stage suitable for their major end uses.
Chapter 6. The Benchmark

History of the Benchmark and the Three-tier System

In 1981, the Western Australian Government decided that royalty rates should return ‘in the order of’ 10% of the value of the ore ‘ex mine’ and established three primary ad valorem royalty rates of 7.5%, 5% and 2.5%. The three rates were expected to result in royalty payments roughly equivalent to 10% of the mine-head value. This system remains in place today.

Very few mines sell raw ore at the mine head, but it is a point common to all mining operations. In principle, the mine-head value of the raw ore can be estimated at any point downstream of the mine head by deducting from the sale price the costs of processing and transporting the mineral. The three primary rates apply to mineral products at different points in the downstream process. The highest rate applies upstream (closest to the mine head) with the rates declining as the level of processing increases. In principle, this means that the royalty paid for a mineral should be about the same regardless of the level of processing, although in practice the relative royalty level may vary with different levels of processing and changes in prices and costs.

Figure 1 in Chapter 3 illustrates the relationship between rates and levels of processing.

The 1986 Mineral Revenue Inquiry suggested that the upper and lower rates of the tiered system were ‘aligned closely to the previously established ad valorem rates of 7.5% for iron ore (as a bulk commodity) and 2% for nickel metal.’ In 1981, all iron ore production in Western Australia was administered through State Agreements that set a royalty rate of 7.5% for lump iron ore. The 7.5% rate in the Agreements can be traced to the first negotiated iron ore export agreement: the Mount Goldsworthy Agreement 1964-1971. Similarly, the 2% rate for nickel ‘can be traced to negotiations between the State and WMC that culminated in the Nickel Refinery Agreement, which came into force in 1968.’

The 7.5% rate for iron ore became the bulk material rate, and the 2% rate for nickel became the rate for metals, adjusted in 1981 to 2.5%. The 5% rate was based on the level of processing of mineral sands concentrates, although at the time a concessional rate of 2.5% was applied due to unfavourable economic conditions in the industry. These rates may have broadly equated to 10% of the mine-head value of the ore in 1981, but changes in prices, costs and industry structures means the relationship does not always still apply.

Application of the Benchmark

The Review considers that, in a tiered ad valorem system, the main benefit of a benchmark is to enable comparison of royalties within and between industries at a point in time, and over time. Other considerations, such as economic conditions and level of processing, should also be taken into account.

The benchmark also gives the community a readily understood gauge of the return it makes on the sale of the State’s mineral resources. Rio Tinto’s submission stated that ‘the mine-head value is an effective and appropriate conceptual base for determining

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15 Ibid, 2–3.
17 Nickel Refinery (WMC) Agreement Act 1968; Western Mining Corporation Resources Limited (WMC) is now a subsidiary of BHP Billiton.
18 Bradley, Mineral Revenues Inquiry volume 1, above n 16, 104.
mineral royalty rates which, importantly, is consistent with the notion of mineral royalties representing the “price” paid to the community’.  

Ad valorem rates are fixed over time and deliver royalty returns that vary with commodity prices but not costs. Commodity prices, input costs, the exchange rate and many other factors determine mine-head value. These factors vary between minerals and mines, and are constantly changing. This is reflected in modelling undertaken by the Review, which examined royalty payments as a percentage of mine-head value over time and by commodity (see Appendix 1). The results show that royalties as a percentage of mine-head value vary substantially between commodities and from year to year. For this reason, average or aggregated mine-head returns can be misleading. For example, the whole mining sector paid royalties equivalent to 8.9% of the mine-head value in 2013, close to the result of 9.1% for iron ore, which contributes over 90% of the State’s mineral royalties. In the same year the mine-head return for gold, which contributes around 3% of the State’s royalties, was 4.8%.

Royalty rates would need to be adjusted regularly, and to vary between and within commodity groups, in order to return 10% of mine-head value consistently. It is not possible to do this while simultaneously maintaining the stability, simplicity, predictability and certainty of the tiered ad valorem royalty system. It would also add undue complexity and volatility to State budgets. The trade-offs between these objectives are illustrated in Figure 2.

Level of the Benchmark

Return to the community

The benchmark is a gauge of whether royalty rates provide a fair return to the community. A fair return should reflect the value of the commodity the community owns. This point was raised in some submissions such as by the Chamber of Minerals and Energy, which argued ‘…royalties should be levied on the primary resource value only, and not on the value added in downstream transport logistics and processing’. The benchmark is the mechanism used to estimate that value, approximated as 10% of the value of the commodity at the mine head.

Any significant change in the benchmark would flow through to changes in royalty rates. For example, a benchmark level of 15% would require an ad valorem rate for lump and fines iron ore of more than 12%, and for gold of around 8%.

Few submissions commented on the appropriateness of the level of the benchmark as a fair return to the community. Rio Tinto said there are ‘cogent reasons why it [10%] should be retained as the benchmark’. Some submissions, including Cement Concrete and Aggregates Australia, discussed the need to provide a return to the community, and the Shire of Ashburton defined a fair return as relative to ‘the cost to the State Government of suitably servicing the community from within the areas the royalties are secured’. However, submissions to the Review did not comment on whether the level of 10% was meeting this need, other than Community Alliance for Positive Solutions which proposed

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19 Rio Tinto, Submission to the Department of State Development, Western Australian Government, Mineral Royalty Rate Analysis, 31 October 2013, 6.
20 Chamber of Minerals and Energy, above n 12, 16.
21 Rio Tinto, above n 19, 6.
22 Cement Concrete and Aggregates Australia, Submission to the Department of State Development, Western Australian Government, Mineral Royalty Rate Analysis, October 2013, 1.
23 Shire of Ashburton, Submission to the Department of State Development, Western Australian Government, Mineral Royalty Rate Analysis, 14 October 2013, [4].
that rates for iron ore and alumina should be increased so the commodities are sold at ‘realistic prices’.24

**Competitiveness and economic effects**

International competitiveness was a focus of most submissions that addressed the level of the benchmark. For example, Dr Guj stated that ‘whether the 10% benchmark is an appropriate share of the rent generated by mining today is a function of the attractiveness of WA’s fiscal regime to globally mobile exploration and development capital’.25 Western Australia’s international competitiveness is discussed in detail in Chapter 7.

Some submissions considered the benchmark inappropriate in some industries. These comments were typically from stakeholders producing commodities that pay royalties significantly below the benchmark, and most argued that the unique circumstances of their sector made the benchmark inappropriate. These generally argued either that the benchmark penalised their sector unfairly, for example because their mining costs are higher or that raising the royalty for their commodity would have negative economic consequences such as mine closures and unemployment.26 These issues are considered in Chapter 10, which assesses the royalty rates that apply to each commodity.

Several submissions addressed the broader economic effects of royalties. The Association of Mining and Exploration Companies suggested that the benchmark and corresponding rates should be set to a level to ‘ensure that existing mines remain open and new mines are developed for the benefit of all Western Australians’.27 This could mean, however, that the resource owner bears all of the impact of a decline in industry competitiveness or efficiency, and at the extreme could mean that some commodity producers pay no royalties. Conversely, many participants in the community consultation forum argued that Government should obtain full compensation for the extraction of a non-renewable resource.

**Benchmark levels**

While *ad valorem* royalty systems are stable and easy to administer, they are less responsive to businesses' profitability than systems that link payments more directly to the producer’s economic circumstances. The 1986 Mineral Revenue Inquiry found that the rates in an *ad valorem* system need to be relatively low to minimise the likelihood of negative effects on economic efficiency.28 Both the benchmark level and Western Australia’s *ad valorem* rates are relatively low when compared to the rates in profit-based royalty systems, such as the Commonwealth’s Petroleum Resource Rent Tax of 40% and the rate of 20% that applies to profits from commodities mined in the Northern Territory. The higher rates in a profit-based system apply to a smaller tax base and often return no payments at all. Western Australia’s rates are also broadly comparable with *ad valorem* rates in other Australian states.

The Review considers that the 10% benchmark and *ad valorem* rates in Western Australia strike a reasonable balance between equity, efficiency, a fair return to the community, and competitiveness.

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27 Association of Mining and Exploration Companies, above n 13, 5.
28 Bradley, above n 16, 178.
Calculating the Benchmark

In submissions and consultations, industry raised several concerns about how the benchmark is calculated, which the Review considered in detail. Two issues were raised frequently. First, setting the calculation point at the mine head might penalise mines that typically incur a relatively large proportion of costs during mining, before the ore reaches the mine head. Second, many stakeholders objected to the method by which Government calculates mine-head value, arguing that it takes into consideration too few costs.

To evaluate these concerns the Review modelled and considered five methods for calculating the benchmark, and two alternative calculation points – the mine head and the value of the ore in the ground, or in situ. Appendix 1 gives the modelling results.

Benchmark calculation point

Two calculation points were considered in detail by the Review: after extraction when the ore is first stockpiled (the mine head), and in the ground (in situ).

Mine head

The mine head is the first point common to all minerals in the mineral processing chain, upstream of the point of sale. It is an established reference point in the minerals industry and is used by some governments to levy royalties. New South Wales levies a royalty of 4% of the ex-mine value for commodities including gold, and Argentina levies a royalty of up to 3% of the mine-head value. It was Rio Tinto’s view that the ‘use of the mine-head value is an effective and appropriate conceptual base for determining mineral royalty rates which, importantly, is consistent with the notion of mineral royalties representing the “price” paid to the community for the acquisition of its non-renewable mineral resources’. The Chamber of Minerals and Energy argued that, if a benchmark is to be retained, it should be estimated at the mine head. The Chamber stated that ‘the ROM ore stockpile [run of mine stockpile, equivalent to the mine head] represents the earliest valuation point in the minerals production chain where a value can be assigned to the resource with a reasonable degree of precision’. Being close to the point of sale, relatively few costs need to be deducted to estimate mine-head value.

In situ

An alternative benchmark reference point is the value of the mineral in the ground, or in situ. This is arguably the most appropriate point to calculate the benchmark, as the ore in the ground is what the community owns, and a royalty is the price paid for that ore. Like the mine head, in situ is a common point for all minerals. It is calculated by deducting from the mine-head value the cost of mining the ore.

Many submissions from industry argued that a mine-head benchmark penalises industries where a large proportion of costs is incurred before the mine head, during mining. For example, the Chamber of Minerals and Energy said ‘this translates to significant variability in pre ROM ore stockpile capital and operating costs, rendering the current benchmark and netback scale inappropriate for some sectors.’ The Gold Royalties Response Group argued ‘unlike other minerals such as iron ore where the bulk of their costs are post mine head, gold production often incurs most of its costs pre mine-head.’ Confidential analysis supplied by industry for the Review indicated that the

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29 Rio Tinto, above n 19, 6.
30 Run of mine (ROM), Chamber of Minerals and Energy, above n 12, 17.
31 Ibid, 17.
32 Gold Royalties Response Group, above n 26, 5.
proportion of upstream costs for gold projects can vary between 30% and 60% although this didn’t appear to be to unique to gold.

There are, however, difficulties in calculating in situ value, which the Chamber of Minerals and Energy discussed in its submission to the Review. The Chamber noted that, theoretically, the in situ value is the valuation point at which the royalty charge should be determined, and by not deducting back to the in situ value, mining value-add to the resource between in situ and the mine head is being ‘taxed by the royalty.’

However, the Chamber pointed at the following difficulties in determining the value of an in situ resource with any degree of precision:

- ‘The total recoverable volume of the in situ ore, the ratio of waste to ore and the grade of the ore can only be estimated from exploration data...’;
- ‘The volume of ore that a project operator extracts and recovers in any given time period is likely to be variable...’; and
- ‘A transparent and efficient market mechanism for valuing in situ resources does not exist.’

Therefore, the Chamber concluded that the mine head is the ‘earliest valuation point in the minerals production value chain where a value can be assigned to the resource with a reasonable degree of precision’, and for this reason, the Chamber was supportive of the mine head as the valuation point.

In situ is not a commonly used reference point for royalty or any other calculations in the resources industry. This is because the large number of costs deducted in the netback process makes the estimates highly sensitive to errors and changes in price and costs. Because in situ value is calculated as a residual, the resource owner bears most of the brunt of changes in costs and revenue. This also makes in situ value more volatile and unpredictable than mine-head value. Poor economic conditions or bad business management can even result in the estimated in situ value of a mineral being negative.

The Review considers that the mine head is a better calculation point for the benchmark than the in situ value. This is because of the difficulty of calculating the in situ value of all of Western Australia’s minerals accurately, the greater volatility and lower predictability of revenues that an in situ benchmark would produce, and the possibility that this method would return a value of zero for the community’s resources.

Calculating the Mine-head Value

In Western Australia, there are typically no arms-length sales at the mine head. To estimate the value of a mineral at the mine head, costs incurred between the mine head and the first point of sale are deducted from the sale price. The costs included in the calculation, referred to as a netback calculation, were a major point of contention during consultations with industry. In particular, industry argued that the method used internally by the Department of Mines and Petroleum to calculate mine-head value omits a number of significant costs and therefore over estimates the mine-head value.

Modelling

The netback method used by the Department of Mines and Petroleum for internal analysis prior to the Review included direct costs and a straight-line depreciation allowance (return of capital). In submissions and during consultation industry argued that additional costs should be included in the netback calculation, including:

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33 Chamber of Minerals and Energy, above n 12, 17.
34 Ibid.
35 Ibid.
- Return on capital.
- Corporate costs.
- Downstream feedstock sustaining costs.
- Restoration and decommissioning costs.

The Review modelled the netback method used in the past by the Department of Mines and Petroleum, and four additional netback methods, including one that includes all material costs (similar to the method proposed by the Chamber of Minerals and Energy). The purpose of the modelling was to determine the effect additional deductions have on the mine-head value estimate, and whether additional deductions provide a fairer basis for comparison within and between commodities. Appendix 1 provides detailed modelling results.

**Royalty structure and netback method**

The appropriate method for calculating mine-head value depends partly on how the value estimate is used.

Figure 2 illustrates the trade-offs between the simplicity and transparency of *ad valorem* royalty systems and the greater equity and economic efficiency expected of systems that link payments more directly to producers’ costs.

The Chamber of Minerals and Energy stated that ‘accurately determining the economic costs associated with processing and transporting mine product downstream from the ROM [run of mine] ore stockpile is critical in accurately determining the efficacy of the current royalty regime in achieving the State’s 10 per cent of mine-head value benchmark in any given sector.’

For the royalty system to deliver precisely 10% of mine-head value at all times and for all commodities, all downstream costs would have to be deducted to calculate the value exactly. Royalty rates would have to be set on a mine-by-mine basis and adjusted frequently. The result would be similar in effect to a profits tax, and indeed this approach was used to determine the base for the Commonwealth’s Minerals Resource Rent Tax.

This is not how Western Australia’s royalty system works. Royalty payments are set by a simple set of *ad valorem* royalty rates that apply to most minerals and are fixed and stable over time. The mine-head value estimate does not directly determine royalty rates. It is used to establish relativities between minerals and over time, and to gauge whether royalties provide an appropriate return to the community. This Review recommends that the benchmark continues to be used in this way and as one of several factors to be considered when new minerals are brought into the royalty system, or when the overall structure of the royalty system is subject to a review such as this. When the benchmark is used in this way, precise estimates of the mine-head value are less critical, as they will not affect the outcomes for businesses materially.

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36 Ibid, 19.
Including an exhaustive list of costs in the netback calculation is difficult. There is no reliable and accessible source of information on some costs for some commodities, and model-based estimates were used for some costs and sectors in the Review’s analysis. While the Government could require companies to provide comprehensive cost data, this would greatly increase compliance and administration costs for Government and industry, for little benefit.

The Review concludes that only relatively large costs that will have a significant effect on the mine-head value, or costs that vary substantially between commodities, should be included as deductions in the benchmark calculation. Relatively minor costs will not have a material effect on the value at the mine head, and costs that are relatively consistent across commodities will not affect comparisons within or between commodities or over time. Only operational costs incurred downstream, such as processing and transport costs, should be included. Sustaining costs are excluded as they are incurred up stream of the mine head; and restoration and decommissioning costs are excluded, as they are not incurred directly in operations. Corporate costs and overheads are excluded as they are not incurred directly in producing the mineral and are difficult to estimate.

**Depreciation**

Industry argued that depreciation should be calculated using market value, rather than book value, and suggested the Review consider the depreciated optimised replacement cost method used by the Commonwealth Government to estimate the Mineral Resource Rent Tax (MRRT). The Review considers the market value method is more appropriate for calculating mine-head value at a particular point in time, whereas the benchmark guides fixed royalty rates over many years. Estimates of market value can be volatile, subjective and imprecise, especially for assets with no transparent and liquid market. Market value estimates would be difficult to compile and verify.

The Gold Royalties Response Group indicated that gold mines have a shorter life than other commodities. Capital must be recovered over a shorter period, making capital
costs a higher proportion of unit output. This argument is considered in Chapter 10, which discusses royalties for particular commodities.

**Return on capital**

The method used in the past to calculate the mine-head benchmark included depreciation of post mine-head assets but no return on capital. Many stakeholders criticised this omission, including the Chamber of Minerals and Energy.

Of the five calculation methods considered in the modelling for this Review, four included a return on capital (see Appendix 1 for the calculation methods).

The Review acknowledges that a return on capital is a normal and expected component of industry’s value estimates, and that excluding a return on capital suggests that all returns are earned upstream of the mine head. For these reasons, the Review concludes that a return on capital should be part of the netback calculation. However, the return on capital varies significantly between mines and over time. The estimated deduction for a return on capital will necessarily only approximate the actual circumstances of individual projects.

**Netback method**

The Review sought to strike a balance between ease of estimation, equity and accuracy when selecting how to estimate the benchmark value. The Review recommends any future review of royalty uses the following netback method to calculate the mine-head value:

Royalty value, less:
- processing costs (e.g. crushing and screening, concentrating and smelting);
- depreciation of downstream capital;
- project administration (including offsite administration allocation to operations allocated post mine head); and
- return on capital (allocated post mine-head).

The modelling showed that, if the mine-head benchmark of 10% had been achieved in 2013, royalty revenue would have been $6.8 billion rather than realised revenue of $5.5 billion. To deliver $6.8 billion using different netback calculations the benchmark would need to be increased to 11%, 10.8%, 11.9% and 13% for netback methods two, three, four and five, respectively. Netback method two is the Review’s preferred method for calculating the benchmark, as this includes a return on capital and material costs or those that vary significantly between commodities. However, the Review has not recommended that the benchmark increases, as the difference between the historical calculation method and netback method two is small. Appendix 1 contains further details of the modelling and results.

**Recommendation 3**

The 10% benchmark should be retained as a gauge of fair return to the community. The benchmark is one of several factors to be considered when new minerals are brought into the royalty structure, or when the overall royalty system is reviewed. When such reviews are undertaken in future, the benchmark calculation should include an estimated return on capital.
Chapter 7. Royalties in other Jurisdictions

Western Australia’s future economic growth is tied to the State’s ability to retain and attract foreign investment and to compete in global markets for our goods and services. To do this, the State must be internationally competitive. Royalty costs are one of many factors that contribute to the competitiveness of an export orientated economy such as Western Australia’s, and which must be taken into account when determining an appropriate royalty system.

This chapter examines royalty systems elsewhere in Australia, and to a lesser extent those from overseas, to determine whether Western Australia’s royalty system is broadly comparable. The Review finds that a combination of ad valorem and specific-rate royalties is common across Australia and overseas. Specific-rate royalties typically apply to low-value basic raw materials and some industrial minerals. Ad valorem royalties are common, but their application varies across Australia. Western Australia is the only state with several ad valorem rates linked to a benchmark. In Queensland, variable ad valorem rates apply in increments depending on average metal prices and in New South Wales, royalty rates for coal are linked to the type of mine, with higher-cost underground mining attracting lower rates. For these reasons, as well as the different approaches to the calculation of the royalty base (the sales value less deductions), comparison of the ad valorem rates between Australian jurisdictions is very difficult.

Chapter 10 provides detailed information about the royalties that apply to minerals in other jurisdictions, although in most cases the rates cannot be directly compared. For example, the royalty base may be the net of different costs, or the level of production may be relatively low resulting in less scrutiny of the rates. The 1986 Mineral Revenues Inquiry noted that ‘royalty payments must be viewed in conjunction with other government levies, in particular, Commonwealth Corporate Income Tax’, which was the major form of business tax at the time.\(^{37}\) The 1986 Mineral Revenues Inquiry also noted that it is difficult to compare royalty systems, even once differences in calculations are taken into account, as information, especially cost data, is not available to enable comparison.\(^{38}\)

For these reasons, the Review’s consideration of rates in other jurisdictions is approximate and used mainly to check whether rates in Western Australia are substantially above or below rates in comparable jurisdictions. Competitiveness was considered along with other criteria, such as the return to the community, when assessing whether the royalty for that commodity is appropriate.

Where appropriate, the Review looked at royalties that apply to major overseas producers of minerals mined in Western Australia. However, the unique structure of taxes, duties and incentives in each country make comparison difficult. The comparisons are approximate and focus on instances where the royalty level in Western Australia is significantly out of step with levels elsewhere. International royalty systems are discussed in more detail later in this chapter.

Royalties in other Australian States and Territories

Royalty regimes vary within and between Australian states. Ad valorem rates are the most common, applying to most minerals in Western Australia, Queensland, New South Wales, Victoria and South Australia. Ad valorem royalty rates vary between 1.65% and 12.5% depending on the nature of the product. A lower rate typically applies to mineral

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\(^{38}\) Ibid, 107.
products that have undergone processing. It is difficult to compare *ad valorem* rates as the calculation of the royalty base - the sale value less deductions – differs between the states. Where possible, some broad comparisons are provided by commodity in Chapter 10.

In the Northern Territory, a profit-based system applies a flat rate of 20% to the net value of all minerals, with the first $50,000 not liable for a royalty. Tasmania applies a hybrid profit and *ad valorem* system to most minerals, where a royalty of 1.9% applies to the value of net sales, plus a profit royalty, up to a maximum total royalty of 5.35% of net sales. A rebate of 20% applies to the production of a metal. In Queensland, the *ad valorem* rates increase with price. These systems are designed to gain a share of industry profits as the value of the resource increases. A summary of the *ad valorem*, profit and hybrid regimes in Australian states and territories is provided in Appendix 3.

Some states apply specific-rate royalties to low value basic raw materials and some industrial minerals. Specific-rate royalties apply in Western Australia, Queensland, New South Wales, Tasmania and South Australia. A summary of specific-rate royalties in Australian states and territories is provided in Appendix 3.

Western Australia is the only state that has a royalty benchmark as a measure of the return to the community underlying its rate structure.

The appropriate design of a royalty system will depend in part on the revenue base of the jurisdiction where it applies. For example, the greater volatility and unpredictability of profit-based royalties are likely to be more problematic for governments that rely heavily on royalty income than for those where royalties contribute only a small proportion of income. Western Australia derives a larger proportion of its revenues from royalties than any other Australian jurisdiction (Table 6).

The Mineral Resource Rent Tax was in effect in Australia from 1 July 2012 to 30 September 2014. It was a tax on profits generated from the extraction of coal and iron ore to share the returns from the resources sector with the community. The Commonwealth Government originally predicted that the tax would increase net revenue by $10.5 billion in 2012-13 and 2013-14. The estimate was progressively revised down, the last being $300 million (for the same two years) in the 2014-15 Commonwealth Budget. Under-estimation of this magnitude caused significant challenges for the Commonwealth Budget, as the tax was intended to fund $17.1 billion of expenditure. This illustrates the volatility and unpredictability of profit-based royalties and taxes.

In Western Australia, where royalties account for 21% of revenue, the consequences of revenue shortfalls of this magnitude would be much greater. Having a royalty system that provides a comparatively stable, predictable and adequate revenue stream is essential to budget planning.

A royalty system must also be designed so as not to provide a disincentive to investment or adversely affect international competitiveness. Comparing royalty systems between

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39 Mineral Royalty Act 1982 (NT) s 10(1).
40 Mineral Resources Regulations 2006 (Tas) reg 7(3).
41 Ibid, reg 9.
45 Western Australian Department of Treasury, *2014-15 Budget Paper No. 3: Economic and Fiscal Outlook* (Presented to the Legislative Assembly, 8 May 2014) 89, 111; Includes petroleum royalties.
jurisdictions is difficult due to large variations and the complexity of fiscal regimes. For example, when the Mineral Resource Rent Tax was in effect, the competitiveness of Western Australia as a mining jurisdiction was influenced by a combination of factors, including state royalty rates and state and federal taxes.

**Table 6: Royalty revenue collected in 2013-14 in Australia ($ millions)**

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty revenue ($ millions)</th>
<th>Proportion of state revenue (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>1,513</td>
<td>2</td>
</tr>
<tr>
<td>Victoria</td>
<td>51</td>
<td>0.1</td>
</tr>
<tr>
<td>Queensland</td>
<td>2,451</td>
<td>5.5</td>
</tr>
<tr>
<td>South Australia</td>
<td>295</td>
<td>2</td>
</tr>
<tr>
<td>Tasmania</td>
<td>49</td>
<td>1</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>155</td>
<td>2.7</td>
</tr>
<tr>
<td>Western Australia</td>
<td>5,911</td>
<td>21</td>
</tr>
</tbody>
</table>

Note: All values are 2013-14 estimated actuals from states’ 2014-15 budgets.

1. General government operating revenue.
8. Western Australian Department of Treasury, 2014-15 Budget Paper No. 3: Economic and Fiscal Outlook (Presented to the Legislative Assembly, 8 May 2014) 89. Petroleum royalty revenue included.

Reliance on a single commodity can exaggerate the volatility of royalty revenue. Iron ore in Western Australia and coal in New South Wales and Queensland contributed 90.4%, 46 92.7%47 and 82.4%48 of total royalty revenue respectively in 2013-14.

**Royalties in other Countries**

Research undertaken by the Review suggests that in most countries *ad valorem* rates are commonly applied to coal, metallic minerals and gemstones. Profit-based royalties are used in some developed economies, including Canada. As in Australia, specific-rate royalties tend to apply to low value, high-volume, non-metallic commodities, particularly construction materials.

Appendix 4 highlights the main features of the royalty regimes in selected countries and includes comparisons with Australia’s major mineral producing states and territories.

Argentina is the only major resource producing country where a royalty is levied on mine-head value. Argentina’s constitution vests mineral ownership to the province in which they occur, but gives power to the national government to levy taxes and royalties.49 Under the country’s Mining Investment Law, the federal government has delegated its power to charge royalties but imposed a maximum royalty rate of 3%.

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Some provinces have opted to levy the maximum rate, while others do not impose any royalties at all.\textsuperscript{50} Under Argentina’s Mining Investment Law, the mine-head value is the value obtained in the first commercialisation less all direct and/or operating costs incurred moving the ore from the mine head to its sale point (excluding depreciation of fixed assets).\textsuperscript{51} Some provinces, such as San Juán, have changed their provincial legislation so that royalties are levied on revenue rather than the mine head.\textsuperscript{52} The Argentinian Government also levies an export tax of 5\% on ore extracted, processed or refined to a metal.\textsuperscript{53}

\textbf{International Comparison of Mining Taxation and Competitiveness}

The Chamber of Minerals and Energy noted in its submission that comparing royalty regimes internationally can be problematic, as many jurisdictions capture revenue from mineral resources through the broader taxation system as well as royalties.\textsuperscript{54} A report by PricewaterhouseCoopers found that the competitiveness of a jurisdiction is determined by a combination of royalties, taxes and other contributions, and any comparison must take these into account.\textsuperscript{55}

Some submissions advocate this approach. For example, the Association of Mining and Exploration companies stated ‘The State Government must therefore recognize….. mining companies already pay significant other revenues to the State in the form of stamp duties, payroll tax, tenement rents and other fees and charges’.\textsuperscript{56} The Association also stated ‘it is essential that a stable, reliable, simple and competitive taxation and royalty framework exists in order for WA to be a preferred investment destination.’\textsuperscript{57}

While the Review recognises that Western Australia’s competitiveness is influenced by taxes and levies, this does not remove the need for producers to pay a royalty as a purchase price of the resource. The royalty payment must provide a fair return to the community.

Western Australia’s tax and royalty regimes are ranked highly compared to other jurisdictions. The 2013 Fraser Institute Survey of Mining Companies ranked Western Australia highest for investment attractiveness out of 112 jurisdictions.\textsuperscript{58} This survey result suggests that the commencement of the Commonwealth’s Mineral Resources Rent Tax in July 2012 and the announcement of the Review in the 2012-13 State budget did not affect Western Australia’s investment attractiveness significantly. The Behre Dolbear Group produced similar results, ranking Australia equal top of 25 countries for competitiveness of a country’s tax policy, with one of the highest ranked political systems and the least corruption.\textsuperscript{59} Minor changes to Western Australia’s royalty regime are unlikely to affect the State’s international competitiveness. Dr Pietro Guj noted that many competing jurisdictions are contemplating future royalty rates increases.\textsuperscript{60} Other considerations that influence the attractiveness of a jurisdiction include sovereign risk, access to infrastructure and proximity to market. Australia is well-placed in these areas,

\textsuperscript{50} Ibid.
\textsuperscript{52} Ibid.
\textsuperscript{53} Ibid.
\textsuperscript{54} Chamber of Minerals and Energy, above n 12, Appendix 2, 5.
\textsuperscript{55} Ralbovsky (ed), above n 51, 2.
\textsuperscript{56} Association of Mining and Exploration Companies, above n 13, 5.
\textsuperscript{57} Ibid, 9.
\textsuperscript{60} Guj, above n 25, 6.
and ranks in the top 20% of the World Economic Forum global competitiveness index, which includes a range of indicators in addition to fiscal regime. ⁶¹

Many submissions to the Review noted that royalty regimes are an important aspect of a jurisdiction’s international competitiveness. For example, Rio Tinto stated in its submission that under the current royalty regime, ‘Western Australia has remained a highly competitive destination for minerals investment with a resource base that is still very prospective and regulatory system that is stable, predictable and based on the rule of law. The royalty regime, which possibly considered high by some standards, is comparable to most equivalent competitor jurisdictions and applied with a strong focus on compliance and efficacy.’ ⁶² Rio Tinto also noted that the ‘maintenance of a stable, efficient and competitive royalty regime is critical to retaining the future competitiveness of the Western Australian minerals industry’, because mineral prospectivity alone is no longer a guarantee of success. ⁶³

In recent years, several countries have reviewed their mining royalty regimes and taxation laws. These include Australia, New Zealand, Canada, South Africa, the United Kingdom, Brazil, Zimbabwe and India. PricewaterhouseCoopers found that ‘The trend is that countries have increased royalty rates’, ⁶⁴ which could be due to economic conditions - increased demand has increased the scarcity premium placed on non-renewable resources. The recent review of the royalty system in New Zealand was undertaken due to significant increases in commodity prices and to increase transparency. ⁶⁵

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⁶² Rio Tinto, above n 19, 10.
⁶³ Ibid.
⁶⁴ Raibovsky (ed), above n 51, 3.
Chapter 8. Economic Conditions

This section outlines the main factors affecting recent and forecast economic conditions in the Western Australia resources sector.

Expansion of the Western Australian Mining Industry

The rapid urbanisation and industrialisation of China and other Asian economies over the past two decades has increased the demand for many of the State’s mineral commodities. Prices for Western Australia’s mineral exports almost quadrupled in Australian dollar terms from the March quarter 2000 to peak in the September quarter 2011 (Figure 3). This followed a period of comparatively flat prices over the preceding two decades. Price increases occurred across many minerals, although price increases for iron ore and gold were particularly large.

Figure 3: Mineral commodity price index for Western Australia

Note: 2011-12 = 100.
Source: Western Australian Department of Treasury.

The rise in commodity prices encouraged minerals exploration and investment in new production capacity. Minerals exploration expenditure rose from $415 million in 1999-00 to a high of $2.1 billion in 2011-12, and mining industry new capital expenditure rose from $2.2 billion in 1999-00 to a high of $48.2 billion in 2012-13.

Western Australia has a reputation for providing a relatively stable and certain investment environment. The Fraser Institute’s ‘Annual Survey of Mining Companies’ ranked Western Australia as the most attractive exploration investment among

112 jurisdictions in 2013, and has ranked the State in the top ten jurisdictions since 2010-11.\textsuperscript{67}

High prices and investment in the State’s minerals sector led to the value of Western Australia’s mineral sales rising from $15.8 billion in 2000 to $89.1 billion in 2013, at an annual average growth rate of 14%.\textsuperscript{68} This was mostly due to prices – the volume of production rose less quickly, at 6% a year. Expansions in productive capacity are still under way, and the volume of production will continue growing even if weaker prices affect sales values.

The Expansion

The mining industry’s profits rose in line with prices and production volumes (Figure 4). The Gross Operating Surplus of the Western Australian mining industry rose from $9.9 billion in 1999-00 to a high of $65.2 billion in 2010-11. In 2010-11, when mining industry prices rose by 48%, mining industry profits were $2.8 billion higher than the profits in all other industries in Western Australia combined.

Figure 4: Mining industry profits and output price changes in Western Australia

![Figure 4](http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5220.02012-13?OpenDocument)

During the period of price, production and profit growth, productivity declined. Figure 5 shows that the increase in labour and capital inputs in the Australian mining sector since 2002-03 has outpaced the increase in output (measured as gross value added). From 2002-03 to 2012-13, mining industry multifactor productivity – the ratio of output to the ratio of labour and capital inputs – declined by over 40%. Although multi-factor productivity estimates are not published by state, Western Australia’s mining industry is

\textsuperscript{67} Cervantes, above n 58.
likely to have followed similar trends, as it is affected by similar influences and accounted for around 50% of the national industry over this period.\footnote{This was the Western Australian mining industry’s average share of the Australian mining industry from 2002-03 to 2012-13 in value-added terms.}

**Figure 5: Inputs and Outputs in the Australian Mining Industry (2002-03 = 100)**

![Graph showing inputs and outputs in the Australian mining industry from 1989-90 to 2012-13.](image)

The decline in productivity partly reflects the rational decisions of mining companies to devote more resources to increase production to capitalise on high prices. As Figure 5 shows, from an industry perspective, it was profitable to do this, even though competition for labour and capital forced up wages and other input costs.

The decline in productivity may also reflect the lag between increasing inputs (notably new capital investment) and increasing outputs; and resource extraction becoming more difficult (as the easier mineral deposits are generally the first ones to be discovered and exploited).

In its submission to the Review, the Chamber of Minerals and Energy noted that productivity in the Western Australian mining industry had declined, and that lower productivity will damage its international competitiveness in capital markets.\footnote{Chamber of Minerals and Energy, above n 12, 10-11.}

**Current and Forecast Economic Conditions**

Western Australia’s mineral commodity price index remains high compared to historical levels, but has declined since 2011, largely reflecting increases in global supply (including from Western Australian producers). The spot price of iron ore fell from $135 a tonne in January 2014 to $74 a tonne in November 2014.\footnote{The World Bank, *Monthly Historical Data* (December 2014), http://econ.worldbank.org/WEBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,_contentMDK:21574907~menuPK:7859231~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html.}
Mining investment in Western Australia peaked in 2012-13, with mining new capital expenditure down 3% to $46.8 billion in 2013-14.\textsuperscript{72} With prices falling, the outlook for new major mineral project investment is subdued. Exploration expenditure is also falling. Since its peak in 2011-2, minerals exploration expenditure in Western Australia has fallen 44% to $1.2 billion in 2013-14.\textsuperscript{73} The recent fall in minerals exploration expenditure appears to be a direct response to declining commodity prices. In the medium to long term, a turnaround in exploration activity will depend on stronger commodity prices and investors’ views on whether high-quality mineral reserves in Western Australia can continue to be exploited profitably.

While investment and exploration activity are falling, mineral exports from Western Australia are forecast to increase strongly over the next five years, initially driven by large increases in iron ore production. Iron ore exports are forecast to increase by almost a third between 2013-14 and 2017-18, from around 600 to 780 million tonnes, although lower iron ore prices means that even with higher production, revenues have fallen.\textsuperscript{74}

The profitability of individual producers will be affected by their capacity to manage their production costs. The market is consolidating, and some businesses are leaving the industry. From the start of 2010-11 to the end of 2012-13, the number of business fell in mining support services (down 39 to 650), non-metallic mineral mining (down 38 to 296) and gold mining (down 16 to 286).\textsuperscript{75}

The exchange rate is a significant factor affecting current and future economic conditions. Past episodes of falling commodity prices (such as the global financial crisis) often coincided with the value of the Australian dollar falling against the US dollar, mitigating falls in export revenue in local currency terms. From early 2011 to mid-2013 however, the link between commodity prices and the exchange rate appears to have weakened, with the value of the Australian dollar increasing despite lower commodity prices. Since May 2013, this trend has reversed, with the value of the Australian dollar falling from above parity to an average of less than 78 cents in January 2015.\textsuperscript{76}

Many producers have shifted their focus from increasing revenue through expansion to reducing costs through productivity improvements. An example of this is Rio Tinto pursuing lower-cost brownfield expansions, rather than greenfields projects, to meet its production targets.\textsuperscript{77}

While growing production and the pressure of falling prices should see mining industry productivity increase, there is a limit to how much some producers can cut costs, particularly where resource quality is declining.

\textsuperscript{74}Western Australian Department of Treasury, 2014-15 Budget Paper No. 3, above n 45, 32.
Chapter 9. Anomalies and Variations

What is an Anomaly?

The Terms of Reference require the Review to examine anomalies in the current royalty system. This chapter outlines a framework to identify and assess variations from the standard royalty arrangements set out in the Mining Act 1978, which includes the three ad valorem rates, and the schedule of specific rates that apply to basic raw materials, some industrial minerals, silica and coal that is sold domestically. This analysis is used to assess individual commodities in Chapter 10.

Not all variations in the royalty system are anomalous. Considerations such as administrative simplicity or calculation problems may result in methods other than the three ad valorem rates being used to set royalties. Government sometimes chooses to apply a non-standard royalty for policy reasons, such as to support a new industry. This was often the rationale for specifying different royalty rates in State Agreements. Successive governments have indicated that these should be renegotiated as opportunities arise to bring them into line with the Mining Act 1978.

However, some variations in royalty arrangements were introduced for reasons that no longer apply.

The Review considered all minerals with royalties consistently and materially different from the standard royalty system. The four main categories of variation examined were rates:

1. Which were different from the standard, established three tiered ad valorem rates or the specific rates in the Mining Act 1978;
2. Where a mineral appears to be treated differently to other comparable minerals;
3. Where the basis for the calculation of the royalty is not sales value (except specific-rate royalties); and
4. That did not align with the level of processing of the ore.

Stakeholders also identified different cost structures and different levels of processing as variations or anomalies. The Review has considered the cost structures of individual commodities and concluded that there are no commodities where the variation in cost structure, compared to other commodities, is of a level to warrant a change in royalty rate. The Review identified several commodities as variations due to the current royalty rate not being consistent with the level of processing, including coal, vanadium pentoxide, uranium and diamonds. These variations are discussed in Chapter 10.

Specific Rates

Less than 3% of Western Australia’s mineral royalty revenue is collected using royalties that apply a monetary value (specified in the Mining Regulations 1981) for each unit of production, referred to in this report as specific-rate royalties. Industries where specific rates apply are relatively small with high-volume, low-value product generally used for domestic consumption, such as basic raw materials like clays or gravel. The materials typically undergo minimal processing and value adding. The 1986 Mineral Revenue Inquiry stated that specific rates apply where ‘product value cannot be readily assessed ... or where the value of the total output is not great...’

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79 Bradley, Mineral Revenues Inquiry volume 2, above n 37, 2.
Most Australian jurisdictions apply specific-rate royalties to the same types of materials. Many jurisdictions apply a higher royalty rate to differentiate between basic raw materials used for higher value processes such as for metallurgical or chemical purposes. For example, in Tasmania, dolomite used for chemical or metallurgical uses attracts a specific rate that is double the rate that applies to dolomite used in other ways. The rates themselves vary between jurisdictions from 35c to $1.80 a tonne. South Australia is an exception where a number of materials subject to specific rates are deemed ‘industrial minerals’ and attract a 3.5% ad valorem rate.

The royalty rates that apply in Western Australia to basic raw materials are provided in Chapter 3, Table 3. A comparison of rates for basic raw materials that apply in Western Australia, Queensland, South Australia, New South Wales and Tasmania is provided in Appendix 3.

Some commodities, such as coal and silicon, are not low-value basic raw materials and in these instances, the Review has recommended that these be moved onto ad valorem rates. A mine-head benchmark analysis was not considered appropriate for basic raw materials. Alternative quantitative analysis of the level of the rates and the formula for indexation was not undertaken and for this reason, the Review has not recommended any change to the rates that apply to basic raw materials.

Further information about the assessment undertaken for basic raw materials and commodities such as coal and silicon is provided in Chapter 10.

**Recommendation 4**

Low value basic raw materials such as clay and talc should continue to attract specific-rate royalties.

**Negotiated rates and State Agreements**

The royalty system has sometimes been used to assist companies, usually through a lower royalty rate than would apply if the rates in the Mining Act 1978 were used. In the past, negotiation of State Agreements often included lower royalty rates, particularly where a company invested in a new project with high up-front costs, or to foster downstream processing or the development of a new product.

Lower royalty rates discount the community’s return from the sale of its minerals, which can lead to inconsistent treatment of similar projects and reduce the integrity of the system. For these reasons the practice of negotiating lower royalty rates has ceased in favour of other forms of assistance, where needed. Royalty concessions can be difficult to remove, particularly where they are contained in State Agreements. The 1981 Cabinet decision that established the current royalty regime recommended aligning royalties specified in State Agreements with the three-tiered ad valorem system. Over the past two decades, the Government has sought to remove royalty concessions from State Agreements and provide industry assistance through other mechanisms, such as the Magnetite Financial Assistance Program and the Exploration Incentive Scheme. However, some concessions remain such as discounted royalty rates for the production of pellets, iron and steel from iron ore.
Recommendation 5
The practice of not specifying royalty rates in new State Agreements should continue. Royalty concessions in existing State Agreements should continue to be removed and royalty rates set according to the *Mining Act 1978*. This should be addressed over time by agreement with the relevant parties, as opportunities to renegotiate the agreements arise.
Chapter 10. Assessment of Royalty Rates

This chapter analyses royalties for most of Western Australia’s mineral commodities and in some cases recommends changes. The principles and recommendations in the previous chapters of the Report underpin the analysis. Collectively these principles form the Royalty Assessment Framework used by the Review, summarised in Table 7 below. The Framework helped the Review to determine what type of royalty is appropriate for each mineral, or group of minerals, and what needs to be considered when setting the royalty rate.

The commodities assessed were iron ore, gold, alumina, nickel, heavy mineral sands, diamond, coal, base metals (copper, lead, zinc), salt, basic raw materials and industrial minerals (such as talc), silica and silicon, uranium, vanadium pentoxide, rare earth elements and lithium.

For minerals where a specific-rate royalty was deemed appropriate, such as basic raw materials, a detailed quantitative assessment of the level of the royalty and the indexation formula was not undertaken. Specific rates were compared with rates elsewhere in Australia, with the comparison provided in Appendix 3.

Review Principles and the Terms of Reference

Chapter 4 described the principles used to evaluate Western Australia’s royalty system: equity, efficiency, adequacy, stability, predictability, transparency and simplicity. These were published in the ‘Mineral royalty analysis stakeholder consultation paper’ at the beginning of the Review as the core principles that should guide the design of an effective royalty system.80

The Review’s Terms of Reference state that ‘The Royalty Rate Analysis will not consider changes that could have detrimental effects the State’s revenue base’. The Review took this to address the principle of adequacy, and mean that the combined effect of all changes it recommends should not result in less revenue than would have been if rates were not changed.

Terms of Reference 2c also required the Review to take into account ‘royalty arrangements in other States and countries’. These were considered in Chapter 7 in the context of the State’s competitiveness as an investment destination. The analysis of rates for individual commodities considers the comparability of rates in Western Australia with rates elsewhere in Australia, and where relevant, rates overseas. Where a meaningful comparison is possible, this is provided.

Rates and the Level of Processing

Chapter 5 described the need to include an additional rate within the tiered ad valorem structure and assign rates according to the nature and level of processing. The analysis of the individual commodities compares the processes used against the four ad valorem rates. In some cases, the fourth rate of 3.75% is a better match for the level of processing than the current rate applied to a commodity.

The Mine-head Benchmark and a Fair Return

The Review’s analysis of individual commodities considered whether royalty arrangements deliver a fair return to the community. It concluded that some royalty discounts and concessions are no longer justified, or should be addressed outside of the

royalty system. A fair return linked to the value of an asset precludes incentives or royalty relief in the form of discounted royalty rates. Royalty discounts mean that the royalty paid no longer reflects the value of the mineral.

Chapter 6 also recommends retention of the mine-head benchmark at 10%. Where data exists, the analysis considers the return to the community over time from each commodity against the benchmark level of 10%, and returns from other commodities. A key challenge for the Review was obtaining sufficient good-quality data to enable a mine-head calculation for all commodities. In some cases, this was not possible and in these instances, the Review’s assessment was limited to the level of processing and comparable royalty rates elsewhere, such as in other Australian states or overseas. Mine-head calculations were possible for iron ore, gold, alumina, nickel, copper, mineral sands and diamonds. These commodities represent around 97% of the State’s mineral royalties. Mine-head analysis requires reliable estimates or data on costs and sale price, which was not available for every commodity produced in Western Australia.

Implementation

The Review considered when and how to implement changes in the royalty rate or type. This analysis took into account the economic conditions described in Chapter 8, and the market for the individual commodity such as prices and industry structure. In some cases the Review recommends that any increase to the royalty rate should only be implemented when economic conditions improve for the affected commodity.

Where amendments to State Agreements are required, a change in rate should come into effect for all producers simultaneously, where possible. More information about the recommended process and timing of the implementation of changes to royalty rates is provided in Chapter 12.

Future Revisions to Royalty Rates

The Review has used three main criteria in shaping its main recommendations. First, the ad valorem rate applied to a particular mineral should be guided by the level to which it is processed. Second, the royalty system should return revenue to the community broadly in line with the benchmark of 10% of the mine-head value, between commodities and over time. Third, royalties should be set with a view to conditions in the industry, including whether royalties are out-of-step with charges in comparable jurisdictions, where meaningful comparisons are possible.

During consultations and in submissions, industry repeatedly emphasised the value of simplicity, predictability and stability in Western Australia’s royalty regime. Mining projects often operate over many decades, and unpredictable royalties add to risk and uncertainty. Western Australia’s stable royalty arrangements contribute to its reputation as a favoured destination for mining investment. Rio Tinto stated in its submission that ‘the stability of [the] State’s regulatory system (including royalties) has enabled Western Australia to make the most of the previous eight years of record investment and substantial economic growth as a result of the commodity price boom.’ A stable ad valorem royalty structure also helps the Government to predict its revenues.

Without limiting the prerogative of future governments to adjust royalties as they choose, the Review recommends that the royalty rates it proposes remain in place unchanged for many years. It is not the Review’s intention that the broad criteria it has adopted – level of processing, the 10% benchmark, and competitiveness – should be used to adjust royalties for particular commodities as conditions change, as they invariably do in a highly cyclical industry like mining. The benefits of predictability and stability would be

81 Rio Tinto, above n 19, 8.
lost if royalties change regularly to try to match these criteria. Inequities could arise if royalties are reviewed for some commodities but not others.

The Review expects that the criteria it has adopted will be used to assist in determining the appropriate royalty rate for new minerals, not in adjusting royalties for existing commodities. Miners may in future use the Review’s criteria to try to make a case for royalty reductions, but this would not be consistent with the Review’s recommendations.

Stability and predictability are important, but it is also prudent for Government to review its royalty structure occasionally to ensure that it is fair and efficient. This Review is the first detailed examination of Western Australia’s royalty system for almost 30 years. The Review has no firm view on how often the State’s royalties should be subject to comprehensive analysis, but suggests a period of at least ten years between reviews unless circumstances change markedly. Future evaluations may take into account the principles and criteria used in this Review.
<table>
<thead>
<tr>
<th>Royalty type</th>
<th>Properties</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad valorem</td>
<td>Ad valorem rates should apply to commodities that are high value.</td>
<td>Iron ore</td>
</tr>
<tr>
<td>Ad valorem – contained minerals</td>
<td>A contained minerals system can apply to a high value commodity where there is a single grade of finished product with a single price. The system is useful if there is a high degree of vertical integration and/or toll treating, or where multiple minerals are sold within a single concentrate.</td>
<td>Nickel</td>
</tr>
<tr>
<td>Specific rate</td>
<td>Specific-rate royalties are appropriate for low-value basic raw materials or industrial minerals. Often a specific-rate royalty will apply where the absolute industry value is small or a market price does not exist or is not accessible.</td>
<td>Salt, gravel</td>
</tr>
</tbody>
</table>

**Step 2: What is the appropriate royalty rate?**

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Policy position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of processing</td>
<td>The same rate should apply to products of similar level of processing.</td>
</tr>
<tr>
<td>A fair return to the community</td>
<td>The royalty return for the community should not be persistently and significantly above or below the mine-head benchmark, or the returns from other commodities. <em>Due to data constraints, mine-head analysis was only possible for iron ore, gold, alumina, nickel, copper, mineral sands and diamonds.</em></td>
</tr>
<tr>
<td>Competitiveness</td>
<td>Considered in isolation, the level of the royalty should not be detrimental to the State’s investment attractiveness. Where comparable, Western Australia’s royalty rates are considered against rates elsewhere in Australia or overseas.</td>
</tr>
</tbody>
</table>

**Step 3: How will changes in the royalty rate or type be implemented?**

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Policy position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing</td>
<td>Some rate changes will apply from 1 July 2015 and others will only apply once economic conditions improve for the relevant commodity.</td>
</tr>
<tr>
<td>Economic conditions</td>
<td>The effect of rate change may be delayed due to difficult economic conditions in the industry, such as low prices and/or very high costs, over which the industry has limited control.</td>
</tr>
<tr>
<td>Equity</td>
<td>Any rate changes should be consistent between royalty rates set in the <em>Mining Act 1978</em>, other regulations and State Agreement acts. Where practicable, a change in rate should come into effect for all producers of a commodity simultaneously. However, in the case of Agreement Acts, this may be difficult.</td>
</tr>
</tbody>
</table>
Iron Ore

Overview of the iron ore industry

China’s strong economic growth in recent years has led to a significant increase in demand for Western Australia’s iron ore since the early 2000s. Iron ore is the State’s most valuable mining export, accounting for 53% of the State’s merchandise exports by value and 76% ($68 billion) of total mineral production by value in 2013. Western Australia produces 97% of Australia’s iron ore.

Three Western Australian producers account for 25% of global supply: Rio Tinto, BHP Billiton and Fortescue Metals Group. This means that any significant change in Western Australia’s production may have some influence on international spot prices for iron ore.

These three established producers account for more than 90% of Western Australia’s iron ore production, but in recent years another large producer (Roy Hill) and several smaller iron ore producers have emerged. The Chamber of Minerals and Energy noted there is ‘unprecedented diversity of business models’ and ‘cost profiles differ considerably between the major Pilbara producers and the emerging Pilbara and non-Pilbara projects’. The smaller iron ore producers generally have higher break-even points compared to the larger companies and are more susceptible to falling prices and rising costs. The Association of Mining and Exploration Companies argues that Australian iron ore companies have lost their operating cost advantage, except for the established producers.

Iron ore prices have been volatile since the annual pricing system broke down in 2008. For example in 2012-13, the spot price for iron ore fines exported to China fluctuated between US$87 and US$159 a tonne. This volatility has continued with monthly average prices in 2014 peaking at US$128 a tonne in January and then falling to US$74 a tonne in November. Spot sales and short-term contracts linked to spot prices are an increasing share of market transactions for iron ore. Rapid growth in production has placed downward pressure on prices.

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85 Chamber of Minerals and Energy, above n 12, Appendix 3, 2.
86 Ibid, 16.
87 Association of Mining and Exploration Companies, above n 13, 6.
88 62% iron ore content, including cost of freight and insurance; Western Australian Department of Treasury, 2014-15 Budget Paper No. 3, above n 45, 114.
89 World Bank’s Commodity Markets, iron ore fines, spot, 62% Fe, from any origin to China, CFR.
90 Western Australian Department of Treasury, 2014-15 Budget Paper No. 3, above n 45, 114.
**Royalty administration**

In 2013-14, royalty payments for iron ore producers in Western Australia were administered in one of three ways, through:

- the *Mining Act 1978* and the *Mining Regulations 1981*;
- State Agreements referring to the *Mining Act 1978*; and
- royalty rates prescribed in State Agreements.

Under the *Mining Regulations 1981* and iron ore State Agreements, an *ad valorem* rate of 7.5% applies to lump and fine ore, and an *ad valorem* rate of 5% applies to beneficiated ore (including magnetite concentrate).

Beneficiated iron ore is ‘iron ore that has been concentrated or upgraded otherwise than by crushing, screening, separating by hydro-cycloning or a similar technology, washing, scrubbing, trammelling or drying, or by a combination of two or more of those processes.’

BHP Billiton and Rio Tinto Iron Ore have beneficiation plants at their Newman and Tom Price operations to treat marginal, low grade iron ore mined in the recovery of high grade direct shipping ore.

In 2013-14, iron ore producers paid $5.3 billion in royalties. Table 8 provides the percentage of iron ore royalties paid in 2013-14 by legislative mechanism.
Table 8: Iron ore royalties accrued in 2013-14 by legislative mechanism

<table>
<thead>
<tr>
<th>Legislative basis for royalty payable</th>
<th>Percent of total iron ore royalty (%)</th>
<th>Royalty ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining Act 1978</td>
<td>7.1</td>
<td>379</td>
</tr>
<tr>
<td>State Agreement</td>
<td>77.8</td>
<td>4,150</td>
</tr>
<tr>
<td>State Agreement referring to Mining Act 1978</td>
<td>15.1</td>
<td>804</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>5,333</td>
</tr>
</tbody>
</table>

Source: Western Australian Department of Mines and Petroleum.

Royalty concessions

The State Government has two royalty rebate schemes in place for the iron ore industry. In December 2014, an ‘iron ore relief package’ was announced subject to the iron ore price remaining below an average of $90 a tonne. The 50% royalty rebate applies to junior iron ore miners for up to a year, repayable over two years after the rebate period ends. It is similar to the Magnetite Royalty Rebate scheme introduced in April 2013. Under the Magnetite Royalty Rebate scheme, producers are reimbursed up to 50% of royalty payments until April 2016, although the rebate is not repayable. An ad valorem rate of 5% applies to magnetite, however the Review did not assess the rate as magnetite is beyond the scope of the Terms of Reference.

Before June 2010, concessional rates of 3.75% applied to iron ore fines and 3.25% to beneficiated iron ore. From July 2010, these rates increased to 5.625% and 5% respectively. The fines rate increased to 6.5% in July 2012 and 7.5% in July 2013. Following agreement between the Government and the State Agreement companies, the concessional rates in State Agreements were phased out.

In 1996, the State Government introduced discounted royalty rates for iron ore used to produce pellets, iron and steel. The royalty rates for iron ore used to produce pellets was reduced by 0.5 percentage points, 1 percentage point for iron and 2 percentage points for steel. The discounts were adopted in anticipation of the possible re opening of the Robe River Pellet Plant and new processing operations. The objective was to provide an incentive for these projects.

Two State Agreements, the Iron Ore (Yandicoogina) Agreement Act 1996 and Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act 2002 contain the royalty discounts for iron ore. No pellets, iron or steel are produced from operations covered by these Agreements, or any other operation in Western Australia. For this reason and reasons of equity, the royalty discounts should be removed from the State Agreements as and when the opportunity arises. Other mechanisms outside of the royalty system better serve industry policy objectives such as encouraging further processing.

The royalty rates, with the discounts applied, are provided in Table 9.


Table 9: Royalty rates for iron ore used as a feedstock for further processing

<table>
<thead>
<tr>
<th>Level of processing</th>
<th>Royalty rate for feedstock type</th>
<th>Lump ore</th>
<th>Fines</th>
<th>Beneficiated</th>
<th>Magnetite</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td>7.5%</td>
<td>7.5%</td>
<td>5.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Low (pellets)</td>
<td></td>
<td>7.0%</td>
<td>7.0%</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Medium (iron)</td>
<td></td>
<td>6.5%</td>
<td>6.5%</td>
<td>4.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>High (steel)</td>
<td></td>
<td>5.5%</td>
<td>5.5%</td>
<td>3.0%</td>
<td>3.0%</td>
</tr>
</tbody>
</table>

Recommendation 6
As and when the opportunity arises, the Iron Ore (Yandicoogina) Agreement Act 1996 and the Iron Ore Processing (Mineralogy Pty. Ltd.) Agreement Act 2002 should be amended to remove discounted royalty rates for iron ore that is used as a feedstock for pellets, iron and steel processing.

Royalties for iron ore in other jurisdictions
It is difficult to compare Western Australia’s iron ore royalties with those in the rest of Australia as the State produced over 97% of the nation’s iron ore in 2013-14 and iron ore royalties accounted for 19% of the State Government’s revenue. Iron ore in Western Australia has more in common with coal in Queensland and New South Wales, than it does with the iron ore production in other States. Coal in these States represents a significant proportion of royalties, and they are the major Australian producers of coal. Coal royalties in Queensland are collected using *ad valorem* rates linked to the realised price, and range from 7% to 15%. *Ad valorem* rates also apply in New South Wales, where rates range between 6.2% and 8.2% depending on the type of mine. Western Australia’s rates for direct shipping iron ore are comparable to coal royalty rates in these States. Further detail on coal royalty rates is provided in the coal section of this chapter.

After Western Australia’s production of 661 million tonnes, South Australia was the next largest producer of iron ore, mining approximately 11 million tonnes in 2013-14. South Australia’s iron ore royalty rate is 5% of the net market value, which means that if South Australian royalties applied to Western Australia’s production, the royalties collected would be lower. This would be the case even for Western Australia’s beneficiated iron ore, which pays a royalty of 5%, as in South Australia the costs of transporting the ore from the mine to the point of sale are deducted from the sales value to which the royalty is applied. The Northern Territory was the third-largest producer of iron ore in Australia, mining 3 million tonnes in 2013-14. The Northern Territory has a profit-based royalty system, so it is difficult to compare the rate of 20% it applies to iron ore to royalty rates in Western Australia.

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95 *Mining Act 1971 (SA) s 17(4).*
### Table 10: Iron ore royalty rates in Australian states and territories

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty rate</th>
<th>Royalty system</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>4.0% of the ex-mine value (value less allowable deductions)</td>
<td><em>Ad valorem</em></td>
</tr>
<tr>
<td>Victoria</td>
<td>2.75% of net market value</td>
<td><em>Ad valorem</em></td>
</tr>
<tr>
<td>Queensland</td>
<td>$1.25 per tonne plus 2.5% of value above $100 a tonne¹</td>
<td><em>Hybrid</em></td>
</tr>
<tr>
<td>South Australia</td>
<td>5.0% of net market value²</td>
<td><em>Ad valorem</em></td>
</tr>
<tr>
<td>Tasmania</td>
<td>1.9% on net sales plus profit royalty up to a maximum of 5.35% of net sales²</td>
<td><em>Hybrid</em></td>
</tr>
<tr>
<td>Northern Territory</td>
<td>20.0% of net value of mine’s production value⁴</td>
<td><em>Profit</em></td>
</tr>
<tr>
<td>Western Australia</td>
<td>Beneficiated: 5.0%, Fines: 7.5%¹, Lump 7.5%⁵</td>
<td><em>Ad valorem</em></td>
</tr>
</tbody>
</table>

1. A discount of 20% is available if the mineral is processed and the metal produced is at least 95% iron ore.
2. New mines may qualify for a concessional rate of 2.0% for the first five years. A concessional rate of 1.5% may apply to mines that were operating prior to 1 July 2011, for a period of up to five years.
3. A 20% rebate is available for production of the metal.
4. The first $50,000 of net value is exempt.
5. From 1 July 2013 the royalty rate increased from 6.5% to 7.5% for iron ore ‘fines’.


China is the world’s largest iron ore producer, followed by Australia and Brazil. A comparison between Western Australia and these countries is difficult for a number of reasons, including differences in underlying tax structures, grades and types of iron ore, and transport costs. A 2% *ad valorem* rate applies to iron ore in Brazil although this is under review. New mining regulations could include an increase in the royalty rates from the current 1-2% to 2-5%.

**Royalty rate**

*Lump and fines ore*

The *ad valorem* rate of 7.5% that applies to lump and fines ore is appropriate for the level of processing. It is similar to the royalty paid by similar commodities such as coal in Queensland and New South Wales, and delivers a return to the community close to the benchmark of 10%.

High-grade haematite is a direct shipping ore that undergoes primary processing such as crushing and blending to produce lump and fines ore. The processing level is comparable with other ores and coal, and is a lower level of processing compared to other commodities that are processed to concentrate or finished form. The value adding from the mine head to the point of sale is minimal.

In 2012 and 2013, the royalty return for lump and fines ore as a percentage of the mine-head value was 9.2% and 9.1% respectively. Analysis by the Association of Mining and Exploration Companies and the Chamber of Minerals and Energy shows a return of between 11% and 15%, although more costs are included in these calculations than the netback method adopted by the Review (netback method two – see Chapter 6 and Appendix 1). Based on the Review’s analysis, and on the analysis provided by the peak industry groups, the Review concludes that iron ore is consistently achieving a fair return to the community.

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**Beneficiated iron ore**

The *ad valorem* rate of 5% that applies to beneficiated iron ore reflects the secondary treatment undertaken to concentrate the ore. The level of processing is a more intensive than other bulk direct shipping ore as beneficiation involves waste separation beyond primary ore treatment and enables lower grade ores to be brought to market.

In 2011-12 and 2012-13, beneficiated iron ore provided a royalty return of approximately 6% of the mine-head value. While this is lower than the return provided by lump and fines ore, based on the intensity of processing, a higher rate would unfairly penalise producers of beneficiated ore and act as a disincentive to extract and process low-grade ore. The Review therefore considers a rate of 5% appropriate for beneficiated iron ore. Not all lower-grade ores are beneficiated: many ores are simply washed, sized or deslimed. Where this occurs, the ore attracts a royalty rate of 7.5%.

**Analysis summary**

An *ad valorem* rate of 7.5% should continue to apply to lump and fines ore and a rate of 5% should continue to apply to beneficiated ore:

- Lump and fines ore is subject to primary processing, indicating royalty Tier 1 should apply. Beneficiated ore is subject to secondary (concentration) processing, indicating royalty Tier 2 should apply.
- The rates applied to iron ore in Western Australia are comparable with royalties that other Australian jurisdictions apply to other bulk commodities.
- The royalty return for lump and fines ore as a percentage of the mine-head value was 9.2% in 2012 and 9.1% in 2013; these commodities are consistently providing a fair return to the community.
- The royalty return for beneficiated ore as a percentage of the mine-head value was roughly 6% in 2011-12 and 2012-13; although this return is lower than lump and fines ore, a lower *ad valorem* is appropriate for beneficiated ore to reflect the level of processing.
Gold

Overview of the gold industry

Gold is a homogenous product with a single international gold price. The Western Australian gold industry has approximately 65 producers of varying sizes and cost structures. In 2013, Western Australia was the origin of 6% of world gold production. From 2006, the gold price rose rapidly, peaking at US$1,672 an ounce in 2011-12. The price increase was due to the global financial crisis, when investors sought the safety of gold as other markets lost value. Since that time prices have fallen but remain high by historical standards. In 2013-14, prices averaged US$1,296.

Historically, average margins in the gold industry have been more stable than in other mineral sectors (see the historical data analysis in Appendix 1). The industry is less capital intensive than industries such as iron ore, so producers respond relatively quickly to changes in price.

As the gold price increases, producers tend to shift production to costlier or lower quality deposits that would otherwise not be profitable to mine. When prices fall, producers target higher ore grades and productivity improvements to reduce costs. This also means that in the gold sector, there are usually mines where margins are tight, even when prices are high by historical standards.

However, the Gold Royalties Response Group argued that a ‘decrease in operating costs’ did not occur in the first half of 2013 when the gold price fell and that many ‘gold producers are now marginal’. This was echoed by the Chamber of Minerals and Energy which stated that the ‘rapid decline in gold prices in the first half of 2013 affected the profitability of Australian gold operations’ and that ‘Australia has become an extremely high cost producer over the past decade’. The Chamber states that ‘most Western Australian producers are outside of the first quartile of costs’ and some operations are approaching ‘all in costs’ of $1,700 an ounce. According to Newmont Asia Pacific, in the second half of 2012-13 ‘all in sustaining costs’ for the Boddington gold mine were US$1,224. High costs and lower gold and copper prices led to a write-down of its Australian assets at Boddington and Tanami in 2013.

In addition to write-downs, some mines are under care and maintenance, and asset sales have occurred. For example in 2013, Barrick Gold sold the Granny Smith, Lawlers and Darlot mines as part of its divestment from Australia. The Chamber of Minerals and Energy argued that a further consequence of high costs and declining profitability is that ‘gold companies are reviewing production plans, cutting exploration activities, delaying expansions and looking for opportunities to reduce their costs’.

This restructuring has affected support industries. For example, the Australian Drilling Industry Association argued that decreased exploration activity as a cost cutting measure

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101 Gold Royalties Response Group, above n 26, 6.
102 Chamber of Minerals and Energy, above n 12, Appendix 3, 18.
103 Newmont Asia Pacific, Submission to the Department of State Development, Western Australian Government, Mineral Royalty Rate Analysis, 31 October 2013, 3.
104 Ibid.
105 Chamber of Minerals and Energy, above n 12, Appendix 3, 18.
106 Ibid.
has resulted in ‘rig utilisation below 50%’ and ‘adversely affect[ed] the financial welfare of the support industry as well as regional communities’.  

**Figure 7: Gold price**

![Figure 7: Gold price](image)


**Royalty administration**

Royalties paid by gold producers in Western Australia are administered through the *Mining Act 1978*. The *Mining Regulations 1981* prescribe an *ad valorem* royalty rate of 2.5% for all gold projects. There are no active State Agreements for gold mining projects that prescribe a royalty rate.

In 2013-14, the State Government collected $215.8 million in royalty payments from gold mines, and an additional $18.7 million from gold produced as a by-product. This accounted for 4% of the State’s royalty revenue.

**Royalty concessions**

Until July 1998, gold mining did not attract a royalty. From July 1998, a rate of 1.25% applied, increasing to 2.5% from July 2000, providing the gold price was above $450 an ounce.

In the *Mining Regulations 1981* a gold miner that produces gold from one or more tenements using a common facility (or facilities) is defined as a gold royalty project. The first 2,500 ounces per year produced from a gold royalty project is exempt from royalties. The Government provided this concession to gold producers when the gold

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108 Ibid, 1.
110 A gold royalty project is all mining tenements from which anyone produces or obtains gold bearing material that is treated or processed at a common treatment facility or combination of treatment facilities, or such other arrangement as designated by the Minister; See *Mining Regulations 1981* (WA) reg 86AA(11).
Mineral Royalty Rate Analysis

Royalty was introduced in 1998. The concession is worth approximately $3 million to $4 million a year and was established to eliminate the administrative burden of processing royalties for prospectors and small miners.\(^{111}\)

**Other jurisdictions**

Every Australian state and territory produces gold. Western Australia is the largest producer, accounting for 69% of national gold production in 2013-14.\(^{112}\) New South Wales (the second largest producer) and South Australia levy royalties based on the examine value of 4% and 3.5% respectively. In Queensland, a variable rate of between 2.5% and 5% of the sales value applies depending on price. The maximum rate of 5% applies for any quarter with an average gold price of $890 an ounce or higher. Due to relatively high prices, in 2013-14 the maximum rate of 5% applied throughout the year. As a percentage of sales value, the gold royalty in Western Australia was marginally below the gold royalty in New South Wales and South Australia in 2012 and 2013 and materially below the royalty paid in Queensland.

The New South Wales gold royalty has not changed since 1981. Queensland increased its gold royalty from 2% to 2.5%-5% (depending on price) from 1 January 2011.\(^{113}\) South Australia increased its gold royalty from 2.5% of sale value to 3.5% of the net market value on 1 January 2006.\(^{114}\)

A royalty free threshold of the first $50,000 of net value applies to most minerals in the Northern Territory, including gold.\(^{115}\) Where the net value exceeds $50,000, the royalty payable is reduced by $10,000, so that the first $50,000 in net value is royalty free. In 2013-14, the Northern Territory accounted for 5% of Australia’s gold production.\(^{116}\)

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\(^{111}\) Western Australian Department of Mines and Petroleum analysis based on the reported gold production.


\(^{114}\) Mining Act 1971 (SA) s 17 as amended by Mining (Amendment) Act 2005 (SA) s 4.

\(^{115}\) Net value is calculated as sales value less operating costs, capital deduction, eligible exploration expenditure and any other allowable deductions.

Table 11: Gold royalty rates in Australian states and territories

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty rate</th>
<th>Royalty system</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>4.0% of the ex-mine value (value less allowable deductions)</td>
<td>Ad valorem</td>
</tr>
<tr>
<td>Victoria</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Queensland</td>
<td>Variable rate (between 2.5% and 5.0%)1 depending on average metal prices</td>
<td>Hybrid</td>
</tr>
<tr>
<td>South Australia</td>
<td>3.5% of net market value if in a metal form, concentrates at 5%2</td>
<td>Ad valorem</td>
</tr>
<tr>
<td>Tasmania</td>
<td>1.9% on net sales plus profit royalty up to a maximum of 5.35% of net sales3</td>
<td>Hybrid</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>20.0% of net value of mine’s production value4</td>
<td>Profit</td>
</tr>
<tr>
<td>Western Australia</td>
<td>2.5% of royalty value5</td>
<td>Ad valorem</td>
</tr>
</tbody>
</table>

1. Producers are advised of the applicable variable rate each quarter. No royalty is payable on the first $100,000 per year. Prices below $600/oz attract the minimum rate, prices above $890/oz attract the maximum rate.
2. New mines may qualify for a concessional rate of 2.0% for the first five years. A concessional rate of 1.5% may apply to mines that were operating prior to 1 July 2011, for a period of up to five years.
3. A 20% rebate is available for the production of the metal in Tasmania.
4. A 20% rebate is available for the production of the metal in Tasmania.
5.Royalty value is calculated for each month by multiplying the total gold metal produced during that month by the average of the gold spot prices for the month.


**Error! Not a valid bookmark self-reference.** summarises royalty arrangements in the world’s ten largest gold producing countries. The Russian Federation and Ghana provide the most relevant points of comparison for Western Australia, as these countries use *ad valorem* rates, although as discussed in Chapter 7, comparisons of royalty rates between countries is difficult due to the unique taxation structures that exist from one country to the next. A high level of state ownership in China and Uzbekistan make direct comparisons difficult. China’s variable *ad valorem* system based on metal recycling rates further complicates the comparison.
### Table 12: Gold royalty rates in the top ten gold producing nations

<table>
<thead>
<tr>
<th>Country</th>
<th>Share of global production</th>
<th>Royalty rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>15</td>
<td>0.5% to 4% <em>ad valorem</em> rate, adjusted for the ratio of new to recycled material. A mining resource tax per tonne of production and an exploration royalty fee based on the mining area are also payable.²</td>
</tr>
<tr>
<td>Australia</td>
<td>10</td>
<td>Western Australia comprises nearly 70% of national gold production.³ An <em>ad valorem</em> rate of 2.5% applies in Western Australia.</td>
</tr>
<tr>
<td>United States of America</td>
<td>9</td>
<td>Depending on the state, the rate varies between 2% and 5% of pre-tax profit. It is deductible from corporate tax.²</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>7</td>
<td>6% <em>ad valorem</em>.²</td>
</tr>
<tr>
<td>Peru</td>
<td>6</td>
<td>Profit-based mining royalty of between 1% and 12%, depending on profit margin.²</td>
</tr>
<tr>
<td>South Africa</td>
<td>6</td>
<td>A profit-based system applies. The rate varies with the level of production. A rate of 0.5% applies to fine gold, while a rate of 5% applies to ore.²</td>
</tr>
<tr>
<td>Canada</td>
<td>4</td>
<td>Royalty rates vary by Province. Quebec: 16% of the adjusted profit before tax. British Columbia: the greater of 2% of revenue (less certain operating costs) or 13% of net revenue (net current proceeds less capex, exploration, pre-production development costs and investment allowance). Ontario: profit-based rates, varying between 5% for remote mines and 10% for non-remote mines.²</td>
</tr>
<tr>
<td>Mexico</td>
<td>4</td>
<td>No royalty.²</td>
</tr>
<tr>
<td>Ghana</td>
<td>4</td>
<td>5% <em>ad valorem</em>.²</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>3</td>
<td>5% <em>ad valorem</em>.⁴</td>
</tr>
</tbody>
</table>


**Royalty rate**

Gold produced in Western Australia is typically highly processed but semi-refined in the form of gold doré: a metallic, low purity alloy typically consisting of 70-80% gold and 10-15% silver.¹¹⁷ Miners produce gold doré through a series of steps commencing with mining from open-pit and underground mines, primary treatment of ore grinding, secondary leaching and metallurgical extraction processes and final smelting into gold doré. The Perth Mint completes the final treatment by refining the gold doré into fine gold that meets international trading standards.

The cost of extraction and processing is increasing as the gold industry mines lower grade ores with high stripping ratios, a process encouraged by historically high prices.

Productivity improvements have seen the quality of ore that is economical to produce declining steadily over time.

In submissions and during consultation, the gold industry argued that it has a higher proportion of upstream (mining) costs than other commodities and that the absence of these costs from the mine-head value benchmark calculation means that the royalty return from gold appears artificially low. Confidential analysis supplied by industry to the Review showed varying estimates of mining costs as a proportion of total costs, ranging from an average of 30% to 60%. The Review’s internal analysis showed that these levels are comparable with other commodities and that the mine-head analysis can provide an appropriate basis for comparison between commodities when used appropriately.

The gold industry has consistently provided a return to the community that is materially less than the benchmark and the return provided by other major commodities. The return for all minerals other than gold varied between approximately 6% and 9% of the mine-head value in the five years analysed. Over the same period, gold provided a return of approximately 4.6% of the mine-head value. Given the strong correlation between costs and price over time for the gold industry – costs increase as the gold prices increase due to changes to cut-off grades – the mine-head value is a relatively stable proportion of the sale price. This was evident in 2010, 2012 and 2013 when the gold price was significantly higher than a decade earlier, but the royalty paid remained a relatively constant proportion of the mine-head value. In 2013, gold’s royalty return as a percentage of the mine-head value was around half that provided by the iron ore industry.

With the exception of Victoria, which has no gold royalty, Western Australia’s gold royalties are relatively low. The difference is most notable when compared with Queensland, which would collect double the royalties if its rates applied to Western Australian production. Although the royalty rate in New South Wales is higher, this is offset by more generous deductions, including depreciation and post-mine processing costs. Consequently, applying New South Wales’ royalties approach to Western Australia’s production would collect only marginally more revenue than using the Western Australian rate of 2.5%. Conversely, the South Australian royalty rate applied to Western Australian production would increase gold royalties by around 45%.

Many miners have shifted their focus from increasing revenue through expansion to reducing costs through productivity improvements (see Chapter 8). The Review considers this a normal business response to lower prices after a period of sustained and significant price growth. The gold industry is no exception. Lower revenues and higher production has led to cost cutting, some mine closures, asset sales and write-downs. Conditions remain relatively favourable with prices remaining above the long-run average price of US$1,031.

The Review recommends that the royalty rate for gold should change from the Tier 4 rate of 2.5% to the Tier 3 rate of 3.75%. Gold has consistently delivered a return to the community significantly lower than the benchmark of 10% of mine-head value, and lower than most other commodities. If the benchmark was the only criterion, gold should be on the 5% royalty rate. However, gold is a relatively highly processed product, and on processing alone, it would be closer to the Tier 4 rate of 2.5%. Inter-jurisdictional comparisons suggest Western Australia’s gold royalty is a little lower than in other

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118 Average return weighted by value of production.
120 Average of monthly nominal prices, July 2004 to June 2014. Western Australian Department of Mines and Petroleum, Gold, above n 100.
States. The Review considers that a rate of 3.75% strikes the best balance between the criteria it evaluated.

In 2013, a rate of 3.75% would have produced a mine-head return of approximately 7%, compared to the 4.8% return actually delivered at a royalty rate of 2.5%. Using the December 2014 gold price of AU$1,464 an ounce, the additional revenue raised from increasing the royalty rate from 2.5% to 3.75% would be around $18.30 an ounce. That is relatively small compared to the average monthly variation in the price of gold that for the past decade has been around $48 an ounce.

The Review considers the concession that applies to gold appropriate for small producers and prospectors as it eases their compliance burden. The concession currently applies to all projects that produce gold, including projects that produce more than 2,500 ounces a year. As larger producers pay a royalty only on production above 2,500 ounces, the exemption for these operations has no effect on decreasing administrative or compliance costs. For this reason, the Review recommends that the exemption be removed for projects that produce more than 2,500 ounces a year.

Implementation

The Review considers a rate of 3.75% appropriate for gold. The Mining Regulations 1981 require amending for the rate to take effect. This should occur before 1 July 2015 at the same time as rates for other commodities are changed.

Analysis summary

An ad valorem rate of 3.75% should apply to gold:

- The gold industry argued that its mining costs were a higher proportion of its total costs than other commodities. The Review found that mining costs in the gold industry vary from project to project but that on average gold industry mining costs are no higher than other commodities. For this reason, the Review considers the mine-head return an appropriate measure of the level of royalties for gold.
- The gold industry has consistently provided a return to the community that is materially less than the benchmark and the return provided by other commodities. In each of the five years analysed by the Review, the return for gold as a percentage of the mine-head value was roughly 4.6%. The Tier 2 rate of 5% would bring the return to the community closer to the benchmark of 10%.
- The relatively stable return of roughly 4.6% reflects the fact that the industry can adjust project costs in response to price.
- Western Australian gold royalties are relatively a little lower compared to gold royalties in other Australian jurisdictions.
- Based on level of processing alone, Tier 4 would be appropriate.
- A rate of 3.75% strikes the best balance between the criteria evaluated.

Recommendation 7

The ad valorem rate of 2.5% for gold should be changed to 3.75%.
**Recommendation 8**
Projects producing more than 2,500 ounces a year should not be eligible for the gold royalty exemption on the first 2,500 ounces.
Alumina

Overview of the alumina industry

The alumina industry is dominated by a small number of large producing countries. Australia is the largest bauxite producer contributing around 30% of global supply and the second largest producer of alumina (22%). Major international alumina producers include China (39%) and Brazil (11%). Indonesia is also an important supplier of bauxite (12%).

Margins in Western Australia’s alumina industry have decreased since 2012 in response to rising costs and falling prices. The State’s two alumina producers - Alcoa and Worsley Alumina - operate three mines and four refineries in the State’s south-west where there are large reserves of relatively low quality bauxite. Most of the State’s alumina is exported to countries such as the United States of America and China for smelting into aluminium, while some is transported to Alcoa’s smelter in Victoria.

The Chamber of Minerals and Energy stated in its submission that ‘the processing of bauxite into alumina is an energy and reagent intensive process’. Gas costs account for roughly a third of the cash costs of alumina production, and are expected to continue to rise. Industry considers Western Australia to be a high cost location to process alumina relative to China and South America, where large amounts of the world’s alumina are produced. The Chamber of Minerals and Energy argued ‘the relatively high cost associated with energy and reagents in Western Australia, combined with the low grade ore input, renders alumina manufacturing in Western Australia a low margin business.’

Australia’s alumina export price increased to a high of US$342 a tonne in 2006, driven by increased aluminium consumption by China. The prices of aluminium and alumina fell in 2009 as a result of the global financial crisis. There was a temporary recovery in 2011, however prices have since declined due to rising inventories. The outlook for the industry is uncertain. The Chamber of Minerals and Energy stated in its submission that ‘price volatility in alumina markets has translated to volatility in revenues for Western Australian operations.’

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122 Ibid.
123 Ibid.
124 Chamber of Minerals and Energy, above n 12, Appendix 3, 5.
125 Ibid, 5.
126 Ibid, Appendix 3, 5.
Royalty administration

Royalties paid by alumina producers in Western Australia are administered by State Agreements. The Mining Act 1978 does not include a royalty rate for alumina (although it includes a royalty rate of 7.5% for bauxite). In 2013-14 alumina producers paid $70.4 million in royalties.

The alumina royalty is an ad valorem rate of 1.65%, initially applied in 1987 following the transition from the 25 cent specific rate on bauxite. When the ad valorem rate for alumina was introduced, it was indirectly related to the crushed and screened bauxite ad valorem rate, calculated to be equivalent to 7.5% of the quality adjusted bauxite price.

The rate was calculated as:

\[ R \% = (7.5\% \times EP) \times \frac{B}{P} \]

Where:

- \( R \) is the royalty rate
- \( EP \) is the average export bauxite price (AUD)
- \( B \) is the number of tonnes of bauxite consumed to produce one tonne of alumina
- \( P \) is the alumina price for the preceding year

The State Government set the rate of 1.65% to be equivalent to a bauxite royalty of 7.5%. The rate reflected the relationship between the level of processing and product values at the time. The rate was calculated using the bauxite price, amongst other variables. However, from the early 2000s the correlation between the bauxite price and alumina price was negative. Mid-decade the alumina price rose approximately 30%, whilst the bauxite price declined slightly. This relationship is illustrated in Figure 9.
Royalty rates in other jurisdictions

Western Australia is the largest bauxite producer in Australia, producing approximately 47 million tonnes of bauxite and accounting for 58% of Australia’s production in 2013-14. The other Australian jurisdictions to mine bauxite are Queensland, accounting for 32% of production, and the Northern Territory, accounting for 9% of production. For bauxite not refined domestically, Queensland applies the higher of an \textit{ad valorem} rate of 10% of the bauxite value and a specific rate of $2.00 a tonne. If the bauxite is refined domestically, the higher of 75% of the non-domestic rate and a specific rate of $1.50 applies.\textsuperscript{127} The Northern Territory levies a profit based royalty of 20%.\textsuperscript{128} The Review estimates the Western Australian royalty rate for alumina provides a lower return to the community compared with the other producing jurisdictions in Australia.

China is the largest alumina producer, however given its economic and political structure and taxation regime, a royalty rate comparison is not appropriate. Brazil and Indonesia are also substantial bauxite and alumina producers. Indonesia levies an \textit{ad valorem} royalty rate of 3.75% on bauxite and Brazil levies an \textit{ad valorem} royalty rate of 3% on bauxite.\textsuperscript{129}

\textsuperscript{128} \textit{Mineral Royalty Act 1982} (NT) s 10(1).
### Table 13: Alumina royalties in major competing jurisdictions

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty rate</th>
<th>Royalty system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Australia</td>
<td>Bauxite: 7.5%</td>
<td>Ad valorem</td>
</tr>
<tr>
<td></td>
<td>Alumina: 1.65%</td>
<td></td>
</tr>
<tr>
<td>Queensland</td>
<td>Non domestic: the higher of 10% of the bauxite value or $2.00 a tonne</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Domestic: the higher of 7.5% calculated rate a tonne for non-domestic bauxite or $1.50 a tonne</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ad valorem with specific-rate price floor</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>20% of the net value of a mine’s production(^1)</td>
<td>Profit</td>
</tr>
<tr>
<td>Brazil</td>
<td>Bauxite: 3%(^2)</td>
<td>Ad valorem</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Bauxite: 3.75%(^3)</td>
<td>Ad valorem</td>
</tr>
</tbody>
</table>

1. First $50,000 of net value is exempt.

### Royalty rate

The rate for alumina is a variation in the royalty system. It is not one of the three ad valorem rates and it is calculated with reference to the bauxite price, not the alumina price, even though a transparent alumina price exists. There is no positive relationship between the prices for bauxite and alumina evident in the price data in Figure 9, which suggests that the bauxite price is not an accurate basis for calculating royalties for alumina.

The process to refine bauxite to alumina is a secondary treatment that is ‘metallurgical’ in nature,\(^{130}\) and involves digestion, clarification, precipitation and calcination.\(^{131}\) Processing is less intensive than the processing of commodities that attract an ad valorem rate of 2.5%, such as copper metal. Alumina is similar to products that attract an ad valorem rate of 5%, such as mineral sands concentrates, however processing of alumina is more intensive than these products. Based on the intensity of processing, alumina is comparable to vanadium pentoxide and uranium, and therefore a similar royalty rate should apply.

In its submission to the Review, the Chamber of Minerals and Energy stated ‘given that the determination of the rate that applies to alumina under the State Agreements seems to pre-date the determination of an in-principle benchmark return of 10 per cent of the mine head value, this benchmark should not be used to evaluate the appropriateness of the royalty rate that applies to alumina’.\(^{132}\) As described in Chapter 6, the benchmark is useful to enable comparison of the royalty return within and between commodities and determine if a royalty is providing a fair return to the community. The specific royalty rate that applied to bauxite was implemented prior to the 1981 Mineral Revenue Inquiry. However, the ad valorem rate of 1.65% for alumina was implemented in 1987, which, as discussed earlier in this section, was indirectly related to the crushed and screened bauxite ad valorem rate, calculated to be equivalent to 7.5% of the quality adjusted bauxite price. The Review has not been presented with a compelling reason why the benchmark should not be considered when reviewing the alumina royalty rate. The benchmark is only one of several factors the Review considered when assessing the

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1. See Chapter 5.
royalty rate for a commodity, and should be considered when setting royalty rates where cost data is available and it provides a meaningful comparison.

A similar level of processing is required to produce alumina as is required to produce uranium or vanadium pentoxide, which suggests a rate of 3.75% is appropriate. This would bring the royalty rate more in line with the rates in other jurisdictions.

The royalty return, as a proportion of mine-head value, has been volatile due to conditions in the industry. In 2001, 2004 and 2010, the return was materially below the return provided by other commodities. The relatively low return was due to higher margins in the alumina industry at the time. In 2012, the royalty return compared to the mine head increased significantly compared to previous years, and in 2013, the return was materially above the return provided by other commodities. The increased return in 2012 and 2013 was due to higher costs, such as energy costs, increasing the value of the costs included in the netback calculation, resulting in a lower mine-head value.

The increased return in recent years indicates that economic conditions due to high input costs mean that the timing is not right for rate adjustment. However, historical results indicate that the rate of 1.65% provides a return to the community less than comparable commodities.

**Implementation**

The Review considers an *ad valorem* rate of 3.75% appropriate for alumina. However, the alumina price is volatile and the industry is facing increased costs, especially energy costs. Materially increasing the alumina royalty rate in current economic conditions may cause significant detriment to the industry. The Review recommends that changes to the alumina rate in State Agreements be delayed until economic conditions of the industry improve, and an opportunity arises to negotiate amendments to the Agreements.

**Analysis summary**

The royalty rate for alumina should be 3.75% *ad valorem*:

- Alumina is subject to secondary (metallurgical) processing indicating royalty Tier 3 should apply.
- The Western Australian royalty rate for alumina provides a lower return to the community compared with other producing Australian jurisdictions.
- Minehead analysis demonstrates that alumina is facing difficult economic conditions. Historical analysis indicates that the alumina has not always provided a return to the community comparable to that of other commodities.
- Implementation of a rate change should be delayed until conditions in the industry improve.

**Recommendation 9**

An *ad valorem* rate of 3.75% for alumina should be added to the *Mining Regulations 1981*. This will not affect existing producers immediately, as their royalties are set by State Agreements. When economic circumstances in the alumina industry improve, and an opportunity arises to negotiate amendments to the State Agreements, each Agreement should change to reference the *Mining Act 1978*. 
Nickel

Overview of the nickel industry

Global nickel demand is driven by stainless steel consumption, primarily from China, with stainless steel accounting for 65% of nickel use. Western Australia is the only Australian jurisdiction producing nickel. There are seven nickel producers in Western Australia, which account for approximately 11% of world nickel production and are price takers in the world market.

Western Australia's nickel producers have faced growing competition from Chinese nickel pig iron producers. Nickel pig iron is more costly than nickel metal to produce however, nickel pig iron becomes a viable substitute for nickel metal and scrap in steel production when the price of nickel metal rises above the cost of nickel pig iron. With most of China's laterite ore input sourced from Indonesia, the recent export ban has resulted in decreased nickel pig iron production. According to First Quantum Minerals, the global nickel industry is 'watching economic and policy developments in China and Indonesia to understand the future role of nickel pig iron supply in the market'.

Western Australia's Ravensthorpe and Murrin Murrin nickel deposits are lateritic ore, which require more energy and chemicals to produce than sulphide ore. Laterite ore can be processed into nickel or nickel pig iron if it is of sufficient grade. As the nickel price increases or nickel pig iron production costs fall, lower ore grades from lateritic sources may become more viable.

A surplus of global nickel production in recent years has placed downward pressure on nickel prices. The Chamber of Minerals and Energy forecasts the nickel price to 'remain low and subdued for the short to medium term as a consequence of rapid substitution with nickel pig iron in the global market', however this substitution could ease because of the Indonesian export ban.

Rising stainless steel production in China and constrained global nickel ore production saw prices rise to record levels in 2007 (US$37,203 a tonne). Prices fell in response to the global financial crisis and have remained below peak levels. Global nickel production is expected to decline by around 4% in 2015 followed by annual growth of 1.6% from 2016 to 2019.

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138 First Quantum Minerals, Submission to the Department of State Development, Western Australian Government, Mineral Royalty Rate Analysis, 31 October 2013, [4].
140 Chamber of Minerals and Energy, above n 12, Appendix 3, 20.
High operating costs in Western Australia mean nickel producers must contain costs and improve productivity to remain competitive.\(^{143}\) Profitability varies between producers. The Chamber of Minerals and Energy expects Western Australian nickel producers to remain marginal, with cost pressures affecting the viability of the sector.\(^{144}\)

**Royalty administration**

All royalty payments for nickel producers in Western Australia are administered under the *Mining Act 1978* and the *Mining Regulations 1981*. Nickel State Agreements reference the *Mining Act 1978* and regulations for mineral royalties. In 2013-14 nickel producers paid $89.8 million in royalties.

The structure of nickel royalties differs from other *ad valorem* royalties in Western Australia. Nickel royalties are paid on the nickel contained in the product sold and references the London Metal Exchange’s nickel price. Refer to Box 1 (Chapter 3).

**Royalty rates in other jurisdictions**

All Australian nickel is mined in Western Australia so comparison of nickel royalty rates with other Australian jurisdictions is not useful. Comparisons to the Russian Federation, Indonesia and the Philippines are most useful. Only one Canadian jurisdiction uses an *ad valorem* component to its royalty system.

The Russian Federation applies an 8% royalty to non-ferrous ores including nickel allowing for transport deductions.\(^{145}\) The quantity is determined as the ‘chemically pure’

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\(^{143}\) Western Australian Department of Mines and Petroleum, *Statistics Digest 2012-13*, above n 133, 33.

\(^{144}\) Chamber of Minerals and Energy, above n 12; Appendix 3, 20.

form of the mineral.\textsuperscript{146} The tax code does not appear to recognise value adding and only allows adjustment for processing losses.\textsuperscript{147}

The Republic of Indonesia applies a variable royalty of 4-5%.\textsuperscript{148} The royalty value base is the higher of the deemed benchmark price or the realised sales value. ‘Special Mining Business License’ holders are also required to pay an additional 10% profit-based royalty.\textsuperscript{149}

The Republic of the Philippines applies a 5% gross value royalty on minerals extracted from operations within mineral reservations.\textsuperscript{150} This royalty only applies to minerals extracted from defined mineral reservation areas. All minerals are also subject to a 2% excise tax on the gross value of the mineral.\textsuperscript{151}

Table 14: Nickel royalties in other countries

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty rate</th>
<th>Royalty system</th>
<th>Proportion of global supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Australia</td>
<td>2.5% of contained nickel value</td>
<td>Ad valorem</td>
<td>11%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>4-5%</td>
<td>Ad valorem</td>
<td>21%</td>
</tr>
<tr>
<td>Philippines</td>
<td>5.0% within mineral reservations plus 1% ad valorem royalty to indigenous peoples\textsuperscript{1}</td>
<td>Ad valorem</td>
<td>14%</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>8% of the recovery of non-ferrous ores</td>
<td>Ad valorem</td>
<td>13%</td>
</tr>
<tr>
<td>Canada (Quebec)</td>
<td>1-20%</td>
<td>Hybrid profit and ad valorem</td>
<td>9%</td>
</tr>
</tbody>
</table>


Royalty rate

The Review modelled laterite and sulphide nickel separately due to their different cost structures. Nickel laterite mines have considerably lower mining costs than sulphide mines but higher downstream processing costs. Due to the higher downstream processing costs for laterite nickel, the netback calculation approximates a lower mine-head value compared to sulphide nickel. Therefore, the royalty return compared to the mine head is higher for laterite nickel as the same \textit{ad valorem} rate applies to nickel regardless of process type. In 2012 and 2013, the laterite nickel return was negative as the netback deductions exceeded price. This means that the mine-head analysis does not provide a useful comparison of the royalty return provided by nickel.

Reported costs from Western Australian operations indicate that direct mining and processing costs for laterite and sulphide ores are similar for ores of comparable grade. In Western Australia, most laterite ore is low grade and therefore average total costs are


\textsuperscript{147} Ibid.


\textsuperscript{149} Ibid, 31.


\textsuperscript{151} \textit{Philippine Tax Code}, Chapter VII, s 151(A)3(a), http://www.bir.gov.ph/index.php/tax-code.html#VIIcVII.
higher compared to sulphide mines. The Review concluded that evidence does not suggest laterite and sulphide nickel should pay different royalty rates.

Analysis of the level of processing of nickel metal indicates that the royalty tier is appropriate. The Review considered whether the contained mineral system should be maintained for intermediate products. The contained mineral system is a variation in the royalty system as it operates differently to the specific rate and *ad valorem* structures that apply to most commodities in Western Australia. The reasons for adopting the contained mineral system are less evident today as there are more producers, less vertical integration, transparent transactions and a wide range of nickel products from ores through intermediate products and nickel metal in the market.

While the conditions that prompted the contained mineral system are largely gone, the system is efficient and well suited to the nickel industry. The contained mineral system also ensures that the royalties for the wide range of intermediate products pay a comparable royalty.

**Analysis summary**

An ad valorem rate of 2.5% is appropriate for nickel metal. The contained mineral system is appropriate for intermediate products:

- Nickel metal is subject to final processing, indicating royalty Tier 4 should apply.
- The contained minerals system is efficient and well suited to the nickel industry and should apply to intermediate products.
- The Review concluded that the evidence does not suggest laterite and sulphide nickel should pay different royalty rates.
- The Review undertook a mine-head analysis, but the results were not used in the analysis. Returns were negative because netback deductions exceeded price.
- The Review could only compare Western Australia’s nickel royalty rate with international jurisdictions.
Heavy Mineral Sands

Overview of the heavy mineral sands industry

Western Australia is a major producer of heavy mineral sands, accounting for 15% of the world’s zircon production and 7% of titanium feedstock. There are four producers of ilmenite, leucoxene, rutile and zircon and one garnet sand producer. Iluka Resources and Tronox Management Pty Ltd have dominated mineral sands production in the State, and accounted for approximately 82% of all mineral sands production in 2012-13.

The Chamber of Minerals and Energy stated in its submission that ‘the remaining deposits in Western Australia’s traditional mineral sands mining areas in the South West or the North Perth Basin are either small and/or low grade most likely deeming them uneconomical to develop.’ Similarly, an anonymous submission stated ‘the grade of the ore in the ground that we mine is very low by world standards further putting pressure on our international competitiveness’ and ‘titanium minerals are a low margin industry.’

According to Gunson Resources, a number of mines have closed and the industry is in decline, and is at risk of disappearing altogether in the medium term. In February 2013, Iluka announced the idling of mining activities at its Eneabba and Tutunup South operations, which will significantly reduce mineral sands production in the State. MZI Resources’ proposed zircon and leucoxene project at Keysbrook has been granted all environmental, development and extractive industry licence approvals, and first production is planned for December 2015.

Mineral sands prices fluctuate due to temporary supply and demand imbalances from a market with relatively few producers and a concentration of sales to specialist industries. Demand is also sensitive to fluctuations in economic and construction activity. For example, the price of zircon fell from a high of $920 a tonne in 2006 to $281 a tonne in 2013, due to high stock levels as well as substitution and Chinese tile manufacturers using less zircon in production.

Continued urbanisation and industrialisation is expected to sustain the demand for mineral sands products.

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153 Chamber of Minerals and Energy, above n 12, 17.
154 Anonymous, Submission to the Department of State Development, Western Australian Government, Mineral Royalty Rate Analysis, October 2013, 1.
155 Gunson Resources Ltd, Submission to the Department of State Development, Western Australian Government, Mineral Royalty Rate Analysis, October 2013, 2.
160 Western Australian Department of Mines and Petroleum, Statistics Digest 2012-13, above n 133, 38.
161 Porter, above n 158, 11, 20, 25.
Royalty administration

The Mining Act 1978 administers royalties paid by heavy mineral sands producers in Western Australia. There are three mineral sands State Agreements, however these State Agreements refer to the Mining Act 1978 for royalties payable. The Mining Regulations 1981 apply an ad valorem rate of 5% to all mineral sands concentrates.\(^\text{162}\) The exceptions are ilmenite feedstock not deemed to be of marketable quality,\(^\text{163}\) which attracts a specific rate. This has not been used since 2005 as the quality of the ilmenite has been marketable. In 2013-14 heavy mineral sands producers paid $14.1 million in royalties. For ilmenite processed into synthetic rutile and rutile processed into titanium dioxide, a royalty of 5% is applied to the feedstock (concentrate) prior to processing.

Royalty concessions

In 1978, the introduction of the Mining Act 1978 set an ad valorem rate for mineral sands of 2.5%, and a concessional rate of 50 cents a tonne for low quality ilmenite feedstock. In 1982, the rate for mineral sands was increased to 3% to take into account the industry’s increased economic viability. From 1987 the rate was further increased to 5% and the rate applying to ilmenite feedstock become subject to a yearly review and adjustment. From 2005 to 2008, the rate applying to ilmenite feedstock of marketable quality was progressively increased from 3.5% to 5%.

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\(^{162}\) Mineral sands products include ilmenite, leucoxene, rutile and zircon.

\(^{163}\) The rate of royalty payable for ilmenite feedstock that is not of marketable quality is $1.50 per tonne adjusted each year on 30 June. Currently all ilmenite feedstock produced in Western Australia is of marketable quality, and subject to an ad valorem rate of 5%.
Royalty rates in other jurisdictions

In 2013, Western Australia produced 15% of the world’s zircon and 7% of the world’s ilmenite and rutile. In the rest of Australia produced 52% of the world’s rutile, 2% of the world’s zircon and 5% of the world’s ilmenite. All states and territories produce mineral sands but the major producers are Western Australia, South Australia, Queensland and Victoria.

In South Australia, heavy mineral sand ores and concentrates attract a rate of 5% of the mineral value. An ad valorem rate of 3.5% applies to industrial minerals, which include ilmenite, leucoxene, rutile and zircon. In Queensland, the royalty rate for mineral sand concentrates is 5% of the concentrate value. No royalty is defined for refined mineral sand products. A rate of 2.75% of the net market value applies to all minerals in Victoria.

Other major producers are South Africa, China and Canada. South Africa applies a variable profit-based royalty rate based on whether the mineral is defined as refined or unrefined. The rate for a refined mineral varies from 0.5% to a maximum of 5%, while the rate for an unrefined mineral varies from 0.5% to a maximum of 7%. Ilmenite, rutile and zircon are defined as unrefined minerals. Each jurisdiction in Canada has a differing mineral royalty rate system. Most provinces have a profit royalty system, with rates ranging between 10% and 20%. It is difficult to compare China’s royalty rates with Western Australia’s royalty rates as China has a complex royalty and resource taxation system, which operates within a different political and economic system.

China applies an ad valorem rate of 2% to titanium products and 3% to zirconium products. In China, a mining resource tax per tonne of production and an exploration royalty fee based on the mining area are also payable. A high level of state ownership in China and the variable nature of its ad valorem system make it difficult to directly compare Western Australia’s royalty system with China’s.

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164 Western Australian Department of Mines and Petroleum, *Western Australia versus Australia*, above n 98.
169 Porter, above n 158, 6.
171 Ibid, sch 2.
174 Ibid, Article 22.
175 Ralbovsky, above n 51, 22-23.
Table 15: Mineral sands royalties in other Australian states and territories

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty rate</th>
<th>Royalty system</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>4.0% ex-mine value (value less allowable deductions)</td>
<td>Ad valorem</td>
</tr>
<tr>
<td>Victoria</td>
<td>2.75% of net market value</td>
<td>Ad valorem</td>
</tr>
<tr>
<td>Queensland</td>
<td>Mineral sand concentrate: 5.0%</td>
<td>Ad valorem</td>
</tr>
<tr>
<td>South Australia</td>
<td>Industrial minerals: 3.5% Mineral ores and concentrates: 5.0%</td>
<td>Ad valorem</td>
</tr>
<tr>
<td>Tasmania</td>
<td>1.9% on net sales plus profit royalty up to maximum of 5.35% of net sales</td>
<td>Hybrid</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>20.0% of the net value of mine’s production³</td>
<td>Profit</td>
</tr>
<tr>
<td>Western Australia</td>
<td>5.0%</td>
<td>Ad valorem</td>
</tr>
</tbody>
</table>

1. New mines may qualify for a concessional rate of 2.0% for the first five years. A concessional rate of 1.5% may apply to mines that were operating prior to 1 July 2011, for a period of up to five years.
2. A rebate of 20% is available for the production of a metal within Tasmania.
3. First $50,000 of net value is exempt.

Note: No rate is specified for ilmenite feedstock in New South Wales, Queensland and South Australia.

**Royalty rate**

With the exception of synthetic rutile and titanium dioxide, the Review has relied primarily on the level of processing to determine the appropriate royalty rate to apply to mineral sands. The level of processing undertaken by Western Australian mineral sands producers indicates that the 5% *ad valorem* rate is appropriate for separated mineral sand concentrate products, for example zircon.

The Review did not consider the mine-head analysis when assessing royalty rates for mineral sands. The royalty return provided by mineral sands was variable for the two years modelled. In 2012, the royalty return was 81% of the mine-head value. This high return reflects the low margins in the industry resulting in a low mine-head value. In 2013, the deductions were greater than revenue so the mine-head value was negative. This means that the mine-head analysis does not provide a useful comparison for assessing royalty rates.

The mineral sands industry presented two key arguments in submissions. Firstly, Gunson Resources argued that the mineral sands royalty is an anomaly as both heavy mineral and finished heavy mineral sands are assessed as concentrates,¹⁷⁶ and that ‘charging the same royalty rate … is driving emerging producers away from the additional capital and operating expensive of building heavy mineral separation facilities...’.¹⁷⁷ Doral Mineral Sands presented a similar argument, stating that the Heavy Mineral Concentrate, is the first saleable product, and the royalty should be applied at this point.¹⁷⁸ Doral recommended that the royalty be levied ‘further upstream of the point where HMC [heavy mineral concentrate] is produced.’¹⁷⁹

As discussed in Chapter 4, the intent of the policy is for the royalty to be applied at the point of sale. In Western Australia, it is uncommon for heavy mineral sands concentrate

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¹⁷⁶ Gunson Resources, above n 155, 1.
¹⁷⁷ Ibid, 2.
¹⁷⁸ Doral Mineral Sands, Submission to the Department of State Development, Government of Western Australia, Mineral Royalty Rate Analysis, 7 November 2013, 2-3.
¹⁷⁹ Ibid, 4; heavy mineral concentrate.
to be sold, and it typically undergoes further processing to separate the ilmenite, leucoxene and zircon. In most circumstances, the royalty applies to the individual mineral concentrates.

The rate of 5% applies to the ilmenite feedstock that undergoes further value adding into synthetic rutile and titanium dioxide. The Review considered whether to replace the feedstock royalty with rates for synthetic rutile and titanium dioxide to be consistent with the principle of first sale in Chapter 4, but concluded that this would create substantial distortions. For this reason, the Review supports a deviation from the principle of first sale, and that the mineral sands royalty should continue to apply to the concentrate feedstock.

The second key argument presented by industry is that the 5% rate is not appropriate for finished mineral sands products. Gunson Resources Limited stated that ‘assessing finished zircon product as concentrate is not consistent with the three tiered system or the State Government policy to encourage downstream processing’ and that zircon should attract a royalty rate of 2.5% because the finished heavy mineral concentrate is similar to a metallic product. Similarly, an anonymous submission to the Review stated that ilmenite undergoes four major upgrading operations. The company claims that the degree of value-adding imparted is an order of magnitude higher than the base mineral, and therefore, ‘deserves recognition’. Doral presented a similar argument in its submission.

Analysis of the level of processing shows that, with the exception of titanium dioxide pigment and synthetic rutile, mineral sands products undergo secondary (concentration) processing. Zircon does not undergo the same level of processing as commodities on the 2.5% rate, such as copper and nickel metal. Processing for mineral sands products is comparable to that of other minerals on the 5% rate, such as base metal concentrates. Evidence presented and subsequent analysis did not support allocation to a different tier. A rate of 5% is appropriate for separated mineral sand concentrates.

Analysis summary

An ad valorem rate of 5% should continue to apply to separated mineral sand products (e.g. zircon):

- The primary consideration of the Review when assessing mineral sands royalties was the level of processing. Product separation processes are secondary (concentration) in nature, indicating royalty Tier 2 is appropriate.

- Mine-head analysis was not useful for assessing royalty rates for mineral sands because the royalty return for the two years modelled was too variable. In 2012, the royalty return as a percentage of the mine-head value was 81% because of low margins in the industry, and in 2013, the mine-head value was negative because deductions were greater than revenue.

- Queensland applies a royalty rate of 5% ad valorem to a mineral sand concentrate, which is comparable to Western Australia. South Australia applies a rate of 5% ad valorem to the heavy mineral sand concentrate. Some submissions to the Review argued for an approach similar to South Australia’s, however, the Review’s analysis of mineral sand processing indicates that a rate of 5% for a heavy mineral sand concentrate is appropriate.

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180 Gunson Resource, above n 155, 1.
181 Ibid, 2.
182 Anonymous, above n 154, 1.
Diamond

Overview of the diamond industry

Western Australia’s two diamond operations, Rio Tinto’s Argyle mine and Kimberley Diamonds’ Ellendale mine, operate in the Kimberley region of the State. Argyle produces primarily industrial grade diamonds and Ellendale produces rare and vivid yellow stones.

Both producers are facing tight or non-existent margins. For example, Rio Tinto submitted to the Review that Argyle has recorded material losses in five of the last six reported years. IBIS World expects revenue from Australia’s diamonds industry to rise 24% in 2014, largely as a result of Argyle’s underground mine shifting from mine development to diamond production. Diamond prices are also expected to increase in response to growth in demand for luxury goods and because there are no significant new diamond discoveries. However, this may not improve profits in the industry as Rio Tinto argues that ‘increasing costs are a genuine risk to operations’.

Royalty administration

The Mining Regulations 1981 specify an ad valorem rate of 7.5% for diamonds; however, this rate does not currently apply to any diamond mines in the State. Royalties for the Argyle diamond mine are administered under the Diamond (Argyle Diamond Mines Joint Venture) Agreement 1981 (Argyle State Agreement), while royalties for the Ellendale diamond mine are administered under the Mining (Ellendale Diamond Royalties) Regulations 2002 (Ellendale Regulations). Both the Argyle State Agreement and the Ellendale Regulations set an ad valorem rate of 5%. Diamond producers paid a total of $20.5 million in royalties in 2013-14.

Royalty concessions

Until 1 January 2006, Argyle’s diamond royalty under the Argyle State Agreement was the greater of either 22.5% of the above-zero profit or 7.5% ad valorem. To assist in the transition to underground mining, Argyle and the State Government negotiated a variation to the Argyle State Agreement to implement a concessional ad valorem rate of 5% for diamond produced from underground mining operations. The concessional arrangement came into effect in 2006. As highlighted by Rio Tinto ‘[t]he State acknowledged explicitly in the amendment bill that the royalty concession arose from its support for a continuation of the mining operations, noting they would have ceased without the underground expansion…’ From 1 January 2009, an ad valorem rate of 5% was applied to Ellendale’s diamond operations through the Ellendale Regulations.

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183 Rio Tinto, above n 19, 13.
186 Rio Tinto, above n 19, 13.
188 Ibid, cl 29(2a)-(2c).
189 Rio Tinto, above n 19, 13.
**Royalty rates for diamond in other jurisdictions**

Western Australia and Northern Territory are the only Australian jurisdictions that produce diamonds.\(^{190}\) A profit-based royalty of 20% applies in the Northern Territory, so it is difficult to compare it with Western Australia’s *ad valorem* rate.\(^{191}\)

The Western Australian *ad valorem* rate for diamonds is broadly aligned with, or above, the diamond royalty in other major diamond producing international jurisdictions with comparable royalty systems. Key producers internationally include Central and Southern Africa, Canada, India and Brazil. The royalty rates for diamonds is 0.2% of the adjusted revenue value in Brazil, 4.2% of the sales value in India and 5% of the sales value in Tanzania.\(^{192}\) Each jurisdiction in Canada has a differing mineral royalty rate system; most provinces have a profit-based royalty system, with rates ranging between 10% and 20%.\(^{193}\)

**Royalty rate**

The Review assessed the royalty return provided by diamonds. However, due to the conditions in the industry in the years analysed, the costs included in the netback calculation exceeded price and therefore provided a return of less than zero. Therefore, the diamond mine-head analysis was not considered in the royalty rate assessment, as it does not provide a meaningful comparison.

The Review concludes that Western Australian diamond should attract an *ad valorem* rate of 5%. This reflects the level of processing, which although physical rather than chemical in nature, is intensive; it involves crushing, screening, a number of separation processes, washing, x-ray sorting and acid cleaning. The level of processing is comparable to commodities paying a royalty of 5%, such as base metal concentrates. The rate of 7.5% in the *Mining Regulations 1981* is not in step with rates in other jurisdictions. This rate could affect the competitiveness of Western Australian operations.

**Implementation**

The diamond royalty of 7.5% in the *Mining Regulations 1981* should be amended to 5%, to be consistent with the rate in the Argyle State Agreement and the Ellendale Regulations. Reducing the rate to 5% is not a concession. As the royalty rate of 7.5% in the *Mining Regulations 1981* does not apply to any diamond operations in Western Australia, amending the *Mining Regulations 1981* to 5% will not affect the established diamond industry. However, for consistency and in case a third diamond producer is established, the *Mining Regulations 1981* should be amended to include a rate of 5% for diamonds.

**Analysis summary**

An *ad valorem* rate of 5% is appropriate for diamond:

- Diamonds are subject to secondary (concentration) processing, indicating royalty Tier 2 is appropriate.
- A royalty rate of 5% is broadly aligned with, or above, the diamond royalty rate in other comparable international jurisdictions.

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\(^{191}\) Mineral Royalty Act 1982 (NT) s 10(1).  
\(^{192}\) Ralbovsky (ed), above n 51, 17, 28, 43.  
• Mine-head analysis was not used by the Review for diamond because in the years analysed, the costs included in the netback calculation exceeded price, therefore provided a return of less than zero.

Recommendation 10

The *ad valorem* rate of 7.5% for diamond in the *Mining Regulations 1981* should be changed to 5%.
Coal

Overview of the coal industry

Western Australia’s two coal producers, Yancoal Australia Limited (Premier coal mine) and Lanco Resources Australia Limited (Griffin coal mine), operate in the Collie Basin in the South West of the State. About 50% of the electricity generated in the Wholesale Electricity Market servicing Perth and the South West, is generated from Collie Basin coal.\(^\text{194}\) Coal from the Premier mine supplies about 48% of the energy sold by the wholesale electricity market’s dominant electricity generator, Synergy.\(^\text{195}\) In 2013-14, Yancoal and Lanco mined 6.4 million tonnes of coal, with all but a small portion used in Western Australia.\(^\text{196}\) Coal also has metallurgical uses in the mineral sands and silicon metal industries.\(^\text{197}\)

Western Australian coal reserves are predominantly sub bituminous and of lower quality than most international benchmark coal quality standards.\(^\text{198}\) There is limited international demand for Western Australian coal due to its low quality and energy content. Coal exports from Western Australia are currently small. Lanco plans to establish a 15 million tonne per year coal export facility at Bunbury port, and could start exporting in 2016, and reach full capacity by 2020.\(^\text{199}\)

Yancoal and Lanco provide coal through long-term contracts to Synergy, and the Bluewaters 1 and 2 power stations. Both companies are reported to have faced financial difficulties.\(^\text{200}\) In October 2014, the State Government negotiated an amended supply agreement with Yancoal to provide greater security of energy supply and help improve the sustainability of the sector.

Royalty administration

Both coal producers in Western Australia operate under State Agreements that commenced operation in 1979 and refer to the royalty provisions in the Mining Act 1978. The Mining Regulations 1981 specify two rates for coal. Exported coal attracts an ad valorem rate of 7.5%. The base rate of $1.00 a tonne for domestically consumed coal is adjusted each year in accordance with the percentage increase in the average ex-mine value of Collie coal for the year ending on [30 June] when compared with the corresponding value of Collie coal for the year ending on 30 June 1981".\(^\text{201}\)

Royalty concessions

In 1981, the State Government introduced an ad valorem rate of 7.5% for exported coal and increased the specific rate for coal sold to the State Energy Commission (the State

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\(^\text{195}\) Hon Mike Nahan MLA, State reaches agreement to secure future energy (14 October 2014) Media Statements http://www.mediastatements.wa.gov.au.


\(^\text{197}\) Western Australian Department of Mines and Petroleum, Statistics Digest 2012-13, above n 133, 42.


\(^\text{199}\) Subscriber data from the Australian Bureau of Statistics.


\(^\text{201}\) Mining Regulations 1981 (WA) reg 86.
Government-owned electricity generator, distributor and retailer) from 2.5 cents a tonne to 5 cents a tonne.

The 1981 Cabinet submission included a new *ad valorem* rate of 5% for domestic coal, however this was never implemented. An annually indexed specific rate of $1.00 a tonne was adopted instead, in response to industry concerns that a royalty of 5% would act as a disincentive for deep-mined coal. In 2013-14, the indexed rate was roughly equivalent to an *ad valorem* rate of 5.5%.

In the early 1990s, the State Government removed the specific rate of 5 cents a tonne for coal sold to the State Energy Commission. An energy green paper from 1989 outlines the historical context for coal policy and the differential royalty system. It argues that coal policy (including export policy) was driven by a belief that coal reserves were limited, half of the coal should be reserved for the State Energy Commission of Western Australia and no coal should be exported.

Improvements in open and deep coal mining technology and the information on the size State’s coal resources provided the justification to unwind the royalty concession to the State Energy Commission of Western Australia.

**Royalty rates for coal in other jurisdictions**

Compared to the States of Queensland, New South Wales and Victoria; Western Australia is a very small coal producer. In 2012-13, Western Australia produced less than 1% of the nation’s 527 million tonnes of coal. The largest producer was Queensland (271 million tonnes), followed closely by New South Wales (246 million tonnes). Both States produce black coal, primarily for export.

The New South Wales royalty system attempts to respond to differences in costs with a lower royalty rate for underground mining, which is typically more expensive. An *ad valorem* rate of 8.2% applies to open cut mines, 7.2% to underground mines and 6.2% to deep underground mines (below 400 metres). Queensland coal royalties use an inclining block *ad valorem* system with rates linked to the realised price. The rates commence at 7% for the first $100, rising to 12.5% for the next $50 increment and for the balance above $150 per tonne, the incremental royalty rate is 15%. Metallurgical coal has attracted prices above $100 since 2005-06 and prices for thermal coal exceeded $100 in 2008-09 and 2011-12 (Figure 12). In comparison to Queensland and New South Wales, Western Australia’s 2013-14 specific rate for domestic coal (which is about 5.5% *ad valorem*) is relatively low.

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202 $1 per tonne, to be adjusted each year at 30 June in accordance with the percentage increase in the average ex-mine value of Collie coal for the year ending on that date when compared with the corresponding value of Collie coal for the year ending on 30 June 1981.


204 Ibid, 14.


206 Ibid.

207 Mining Regulation 2010 (NSW) reg 63.

Table 16: Annual coal production in Australian states (million tonnes)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Coal produced1 (million tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2008-09</td>
</tr>
<tr>
<td>New South Wales</td>
<td>182.18</td>
</tr>
<tr>
<td>Queensland</td>
<td>249.88</td>
</tr>
<tr>
<td>South Australia</td>
<td>4.73</td>
</tr>
<tr>
<td>Western Australia</td>
<td>8.75</td>
</tr>
<tr>
<td>Tasmania</td>
<td>0.64</td>
</tr>
<tr>
<td>Victoria</td>
<td>68.25</td>
</tr>
</tbody>
</table>

1. New South Wales, Queensland, South Australia, Western Australia and Tasmania produce black coal. Victoria produces lignite.
Note: Raw coal production.

Figure 12: Queensland coal price 2004 – 2014

Source: Queensland Department of Natural Resources and Mines.

Victorian coal is predominantly lignite (brown coal)\(^\text{209}\) with high moisture content,\(^\text{210}\) and average net energy content less than half that of Collie coal.\(^\text{211}\) The Victorian government applies specific rates to coal of 5.88 cents a gigajoule indexed against the general consumer price index for Victoria.\(^\text{212}\) After accounting for differences in energy content, the Victorian per unit royalty is less than half the Western Australian domestic coal

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\(^\text{212}\) Mineral Resources (Sustainable Development) Act 1990 (Vic) s 12A.
royalty. Coal was Victoria’s second largest mineral produced (after mineral sands) in 2011-12, accounting for 33% of the State’s mineral production by value.\textsuperscript{213}

The Tasmanian system is a hybrid between an \textit{ad valorem} and profit system. An \textit{ad valorem} rate of 1.9\% of net sales applies, with a 40\% profit royalty adjusted by the ratio of profit to net sales.\textsuperscript{214} The royalty is capped at 5.35\% of net sales.

\textbf{Royalty rate}

The assessment of the rates in place for coal took into account the type of royalty, the level of processing and rates in Queensland, New South Wales and Victoria. The royalty return for coal over time was not assessed as cost and price data is not available or is commercially sensitive. The Review concludes that all coal in Western Australia should attract an \textit{ad valorem} royalty of 7.5\%. This reflects the level of processing, which is comparable to iron ore, and that a specific-rate royalty for domestic coal is a significant variation in the Western Australian royalty system, and out-of-step with the type of royalty and rates in other states. After the coal is mined, it is screened, crushed, washed and stockpiled - a process similar to that used for iron ore. Commodities that attract specific rates are typically basic raw materials where the product value is difficult to assess, or the value of total output is not great.

\textbf{Implementation}

The Review recommends that an \textit{ad valorem} rate of 7.5\% should apply to all coal production in the State. Retaining the specific rate for domestic coal equates to the continuation of an anomaly in the Western Australian royalty system, and is out of step with the royalties for coal elsewhere in Australia. However, as discussed previously, Yancoal and Lanco are experiencing financial difficulty because their long-term contracts lock in fixed prices. In October 2014, this lead to a negotiated amended supply agreement between the State and Yancoal. Therefore, the Review recommends that the rate change be delayed until conditions in the industry improve.

The Review expects an increased coal royalty rate to have minimal effect on electricity prices. Gas fuelled generation sets the price for the majority of generation within the wholesale electricity market. During periods of low load, competition from industrial cogeneration and wind affects the bidding strategies of market participants as indicated by negative market clearing prices.\textsuperscript{215}

To give effect to these changes the royalty rate for ‘coal – not exported’ in the \textit{Mining Regulations 1981} should be removed, and ‘coal – exported’ changed to ‘coal’.

Amendments to coal State Agreements will not be required because both State Agreements refer to the royalty provisions of the \textit{Mining Act 1978}.

\textbf{Analysis summary}

An \textit{ad valorem} rate of 7.5\% should apply to all coal produced in Western Australia:

- There is no material difference in the level of processing between export and domestically used coal justifying a different royalty structure or level.
- Coal is subject to primary processing indicating that royalty Tier 1 is appropriate.


\textsuperscript{214}A financial ratio that indicates the relative profitability of a given industry or operations within an industry sector.

Compared to coal royalty rates in Queensland and New South Wales, Western Australia’s 2013-14 specific rate for domestic coal is relatively low.

The Review did not assess the royalty return for coal because cost and price data was unavailable or commercially sensitive.

Implementation of the rate change should not occur until conditions in the coal industry improve.

Recommendation 11
When economic circumstances in the coal industry improve, the specific rate for domestic coal should be removed so that a single ad valorem rate of 7.5% applies to all coal sales.
Base Metals (Copper, Lead and Zinc)

Overview of the base metals industry

For the purposes of this section, ‘base metals’ refers to copper, lead and zinc. Nickel has been addressed separately as it has a number of unique issues.

In 2012-13, base metals accounted for 2% of the State’s total mineral and petroleum production. The 19 base metal producers in Western Australia account for a relatively small proportion of Australia’s base metal production. Co-product mines are common in Western Australia. For example, the Golden Grove mine produces copper, lead and zinc, and some gold and nickel mines produce copper as a by-product.

Price and demand forecasts for base metals are positive, expected to be driven by increased consumption by China and emerging economies. The large number of producers and the relatively homogenous product means that Western Australian producers are price takers. The Chamber of Minerals and Energy stated: ‘[t]here is significant variability amongst the profitability, production and cost structures of base metal mines in Western Australia’.

Figure 13: Copper, lead and zinc prices (nominal)

![Graph showing铜, lead and zinc prices over time]


Zinc

Western Australia’s two zinc mines, Minerals and Metals Group’s Golden Grove mine and Independence Group’s Jaguar mine, accounted for approximately 3.7% of total zinc production in Australia in 2012-13.

The zinc price has increased steadily over the past few decades, with the exception of the mid 2000’s where the price spiked to an average of US$3275 a tonne. The price remains high by historic levels and is expected to increase in the coming years. China

216 Chamber of Minerals and Energy, above n 12, Appendix 3, 13.
drives global zinc demand, accounting for approximately 45% of global zinc consumption in 2012-13.\textsuperscript{217} The Bureau of Resources and Energy Economics forecasts that the increased use of galvanised steel in infrastructure development in emerging and Asia-Pacific economies, will support zinc consumption to grow at an average annual rate of 4% to total 16.3 million tonnes in 2019.\textsuperscript{218}

**Lead**

Western Australia’s two lead mines, Golden Grove mine and Paroo Station mine, accounted for 1.9% of total lead production in Australia in 2012-13. Paroo Station mine is the world’s largest lead carbonate mine.

The lead price is volatile and is well above historic levels. Vehicle batteries account for 80% of the world’s total lead consumption.\textsuperscript{219} An increase in the use of large storage batteries could result in global demand for lead remaining strong.\textsuperscript{220} Demand for primary mine lead production is affected by recycling, as more than half of the lead currently used is recycled.

**Copper**

Western Australia’s 15 copper mines accounted for approximately 20% of total copper production in Australia in 2012-13. The majority of these mines produce copper as a by-product or co-product.

China has been a strong driver of growth in copper demand. Emerging economies are expected to add additional demand in the coming years with increased consumption of motor vehicles and consumer electronics, and construction activity and electricity networks associated with urbanisation.\textsuperscript{221}

The copper price is volatile.\textsuperscript{222} The Bureau of Resource and Energy Economics forecasts the price of copper to fall 7% in 2015 due to higher world copper production and market pessimism about China’s economic growth. After 2015, prices are expected to rise steadily due to slower growth in copper production and stronger growth in consumption in emerging economies.

**Royalty administration**

The *Mining Regulations 1981* set an *ad valorem* rate of 2.5% for base metals sold as a metal, and an *ad valorem* rate of 5% for base metals sold in concentrate form. The Nifty copper mine is the only base metal project to operate under a State Agreement. The State Agreement refers to the *Mining Act 1978* for the royalty rate. In 2013-14, base metal producers paid $77.9 million in royalties to the State.\textsuperscript{223}

**Royalty rates in other jurisdictions**

Australia’s largest base metal producer is Queensland. In 2013-14, it accounted for 66% of Australia’s production of lead, 65% of zinc and 29% of copper. The Northern Territory is a significant zinc miner, producing 13% of the nation’s zinc in 2013-14, and it also produces a small quantity of lead. South Australia is Australia’s second largest copper producer.\textsuperscript{225}

\textsuperscript{217} S Cowling, ‘Zinc’ in Bureau of Resources and Energy Economics, Resources and Energy Quarterly (March 2014), 100.

\textsuperscript{218} Ben Witteveen, Zinc in Bureau of Resources and Energy Economics, Resources and Energy Quarterly (September 2014), 107.


\textsuperscript{222} Chamber of Minerals and Energy, above n 12, Appendix 3, 11.

\textsuperscript{223} Includes royalties paid on copper, lead and zinc produced as by products.
producer, accounting for 29% of Australia’s production in 2013-14, while it also produces very small quantities of lead and zinc. New South Wales is a significant producer of all base metals, being the nation’s second largest producer of lead (13% of Australian production in 2013-14) and third largest zinc producer (10% of Australian production in 2013-14). Tasmania accounted for 7% of Australia’s zinc production in 2013-14, and it also produces small quantities of copper and lead. In comparison, Western Australia is the nation’s third largest copper producer (21% of Australian production in 2013-14) and Australia’s third largest lead producer (10% of Australia’s production in 2013-14). The State also accounted for 5% of Australia’s zinc production in 2013-14.

Like Western Australia, other Australian jurisdictions apply the same royalty to zinc, lead and copper. The Northern Territory has a profit-based royalty system, while Tasmania has a hybrid royalty system, meaning it is difficult to compare Western Australia’s base metal royalties with these jurisdictions. Queensland applies to the metal concentrate a variable ad valorem rate of between 2.5% and 5.0% depending on the average metal prices, while New South Wales has an ad valorem rate of 4% of the ex-mine value (sales value less allowable deductions). South Australia applies an ad valorem rate of 3.5% of the net market value if the mineral is in a metal form, and a rate of 5% if it is in a concentrate. Western Australian royalty rates for base metals are in line with or higher than rates in other jurisdictions.

China is the world’s largest zinc and lead producer, accounting for 36% and 54% of global annual mined production of these base metals respectively. It is difficult to compare China’s royalty rates with Western Australia’s base metal royalty rates as China has a complex royalty and resource taxation system, which operates within a different political and economic system. Chile is the world’s largest copper producer meeting 30% of global supply. It has a variable ad valorem royalty of up to 14% of the sales value depending upon the size of the mine.

**Royalty rate**

The assessment of the rates in place for base metals took into account the level of processing and rates in other jurisdictions. The mine-head analysis was undertaken to assess the return provided by the royalty levied on copper concentrate. The royalty return for lead and zinc was not assessed as they represent a small proportion of State revenue, cost data was not readily available and stakeholders did not identify any issues that relate to these commodities.

The Review concludes the current rates that apply to base metals in concentrate form and metallic form are appropriate. The processing of base metals to concentrate form is of a similar intensity to other minerals on the 5% rate, such as mineral sands. The processing to metallic form is a similar level of intensity to other minerals on the 2.5% rate, such as nickel. The ad valorem rates that apply to base metals are also comparable to the rates that apply to these minerals in other Australian jurisdictions.

The return provided by the copper concentrate royalty was 9.2% and 8.3% in 2012 and 2013 respectively. This is in line with the return provided by other commodities and provides a fair return to the community.

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224 A discount of 20% for copper, 25% for lead and 35% for zinc is available if the mineral is processed in Queensland and the metal produced is at least 95% base metal. No royalty is payable on the first $100,000 worth of copper produced each year.

225 New mines may qualify for a concessional rate of 2.0% for the first five years. A concessional rate of 1.5% may apply to mines that were operating prior to 1 July 2011, for a period of up to five years.

226 Armitage, above n 205, 97 [Table 104]. 150 [Table 158].


228 Armitage, above n 205, 63 [Table 68].

229 Ralbovsky, above n 51, 21.
Analysis summary

An *ad valorem* rate of 5% should continue to apply to base metal concentrates, and an *ad valorem* rate of 2.5% should continue to apply to base metals:

- Base metal concentrates are subject to secondary (concentration) processing indicating royalty Tier 2 is appropriate. Metallic base metals are considered to have undergone final treatment and royalty Tier 4 is appropriate.

- Western Australia’s royalty rates for base metals are in line with, or higher than, rates in other Australian jurisdictions.

- A mine-head analysis was only undertaken for copper concentrate, because cost data was not available for other base metals. The return for copper concentrate as a percentage of the mine-head value was 9.2% in 2012 and 8.3% in 2013; this commodity is providing a fair return to the community.
Salt

**Overview of the salt industry**

There are three salt producers in Western Australia (Rio Tinto, Mitsui and WA Salt Supply Ltd), with six operations in the Mid West and Pilbara. In 2013-14, total production was just under 13 million tonnes, accounting for approximately 85% of Australia’s salt production. The majority of Western Australia’s salt is exported. Compared to other commodities, global demand for salt is relatively predictable, contracting and expanding in line with the chemical industry and economic activity.

There are a large number of salt producers globally, with over 110 countries producing salt. Western Australia accounts for approximately 5% of global supply and therefore producers are price takers.

Salt does not attract a scarcity premium like non-renewable mineral resources. The supply of sea salt is plentiful and is a substitute for lake salt, which is more limited in supply. Other unique features of the industry include low margins, high production risk and low barriers to entry.

The salt price rose sharply to $44 a tonne in 2009, due to depreciation of the Australian dollar and a shortage of supply. The price fell to $27 a tonne in 2011 largely due to changes in the exchange rate. Since 2011, the price has steadily increased. According to Rio Tinto (on behalf of Dampier Salt), Western Australian salt producers face high costs compared to their international competitors, and therefore any cost increase is material.

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230 Western Australian Department of Mines and Petroleum, *Quantity and Value 2013-14*, above n 2; Western Australian Department of Mines and Petroleum, *Western Australia versus Australia*, above n 98.


232 Western Australian Department of Mines and Petroleum, *Western Australia versus Australia*, above n 98.

233 Rio Tinto, above n 19, 12.


236 Rio Tinto, above n 19, 12.
Royalty administration

Royalties paid by salt producers in Western Australia are administered by the Mining Act 1978 and State Agreements. There are five State Agreements for salt operations:

- Leslie Solar Salt Industry Agreement Act 1966
- Dampier Solar Salt Industry Agreement Act 1967
- Evaporites (Lake McLeod) Agreement Act 1967
- Shark Bay Solar Salt Industry Agreement Act 1983
- Onslow Solar Salt Agreement Act 1992

The remaining salt project, Lake Deborah East Salt, is administered under the Mining Act 1978.

In 2013-14 salt producers paid $4.8 million in royalties. The Mining Regulations 1981 outline a rate of 62 cents for salt, indexed every five years with the next indexation date being 1 July 2015. Each State Agreement outlines three tiers of rates depending on the level of production, indexed every seven years. The rates and escalation dates vary between State Agreements but in all cases the rates are lower than the 62 cents a tonne in the Mining Regulations 1981. In some cases the State Agreement rates are significantly lower the rate in the Mining Regulations 1981, for example, the highest rate in the Dampier Solar Salt Industry Agreement Act 1967 is about one third of the rate in the Mining Regulations 1981. The aggregate average royalty rate for salt in 2013-14 was roughly 37 cents a tonne. Table 17 provides the salt royalty rates for each State Agreement.
### Table 17: Salt royalty rates in State Agreements

<table>
<thead>
<tr>
<th>State Agreement</th>
<th>Tonnes</th>
<th>Rate/tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dampier Solar Salt Industry Agreement Act 1967</strong></td>
<td>1-508,024</td>
<td>$0.144430</td>
</tr>
<tr>
<td></td>
<td>508,025-1,016,047</td>
<td>$0.180530</td>
</tr>
<tr>
<td></td>
<td>1,016,048 &amp; over</td>
<td>$0.216640</td>
</tr>
<tr>
<td><strong>Evaporites (Lake MacLeod) Agreement Act 1967</strong></td>
<td>1-508,024</td>
<td>$0.389030</td>
</tr>
<tr>
<td></td>
<td>508,025-1,016,047</td>
<td>$0.486290</td>
</tr>
<tr>
<td></td>
<td>1,016,048 &amp; over</td>
<td>$0.583550</td>
</tr>
<tr>
<td><strong>Leslie Solar Salt Industry Agreement Act 1966</strong></td>
<td>1-508,024</td>
<td>$0.254703</td>
</tr>
<tr>
<td></td>
<td>508,025-1,016,047</td>
<td>$0.318379</td>
</tr>
<tr>
<td></td>
<td>1,016,048 &amp; over</td>
<td>$0.382055</td>
</tr>
<tr>
<td><strong>Onslow Solar Salt Agreement Act 1992</strong></td>
<td>1-500,000</td>
<td>$0.317978</td>
</tr>
<tr>
<td></td>
<td>500,001-1,000,000</td>
<td>$0.397472</td>
</tr>
<tr>
<td></td>
<td>1,000,001 &amp; over</td>
<td>$0.476967</td>
</tr>
<tr>
<td><strong>Shark Bay Solar Salt Industry Agreement Act 1983</strong></td>
<td>1-500,000</td>
<td>$0.339150</td>
</tr>
<tr>
<td></td>
<td>500,001-1,000,000</td>
<td>$0.423940</td>
</tr>
<tr>
<td></td>
<td>1,000,001 &amp; over</td>
<td>$0.508730</td>
</tr>
</tbody>
</table>

1. Originally in imperial tonnes.
Source: Department of Mines and Petroleum.

In its public submission to the Review, Rio Tinto questioned if salt should attract a royalty as it is a renewable resource.\(^{237}\) Salt is similar to other raw materials that pay a specific-rate royalty in that it does not attract scarcity rent.

Timber sets a precedent for applying royalties to renewable resources that come from the land. Timber royalties for hardwoods are specified in the *Forest Management Regulations 1993*. These are considerably higher (on a per tonne basis) than specific-rate mineral royalties.

**Royalties for salt in other jurisdictions**

Western Australia’s highest salt royalty rate, currently paid by one producer, is substantially lower than in other Australian jurisdictions. In South Australia, Australia’s second largest salt producing State, an *ad valorem* rate of 3.5% applies.\(^{238}\) This equates to a specific rate of roughly $1.13 a tonne. Queensland is a minor producer, and has a royalty rate of $1.50 a tonne.\(^{239}\)

The United States of America, Canada and Mexico are major international salt producing jurisdictions. An example of a salt royalty rate in the United States is US$0.50 (A$0.46)\(^{240}\) per dry ton in Utah.\(^{241}\) These rates are in line with the specific rate in the Western Australian *Mining Regulations 1981*. Canada has a tiered mining tax structure, which means it is difficult to compare with the Western Australian royalty regime.\(^{242}\) Mexico does not levy a royalty on mineral extraction, including salt.\(^{243}\)

**Royalty rate**

A specific rate should apply to salt as it is a high volume, low value basic raw material and does not attract a scarcity premium. The Review did not undertake a mine-head analysis to assess the royalty return provided by salt as cost data was not available, salt

\(^{237}\) Ibid, 13.
\(^{238}\) *Mining Act 1971* (SA) s 17.
\(^{239}\) *Mineral Resources Regulation 2013* (Qld) sch 3 reg 3.
\(^{243}\) Ralbovsky (ed), above n 51, 3.
pays a specific-rate royalty and there is not a clearly identifiable mine head for salt operations.

Rio Tinto argues that if a royalty on salt continues to apply, the royalty that applies must be ‘effective and appropriate’ and that its operations are ‘vulnerable to anything that could further impact competitiveness’. While the Review acknowledges that the salt industry can be a low margin industry there is substantial inequity within the royalty structure. Rates paid by all but one salt producer in Western Australia depend on State Agreements and are low relative to the Mining Regulations 1981 and rates in other States. The salt industry is now well established, much of the capital is depreciated and there is no longer a compelling reason for lower rates tied to lower levels of production. For these reasons, the Review recommends that the inconsistency in the royalty rates for salt be addressed as and when the State Agreements are reviewed or renegotiated.

Royalty clauses in each of the State Agreements should be replaced with a reference to the Mining Act 1978 so that a single rate applies to all salt production.

The salt State Agreements provide for the escalation of royalty rates. The escalation rate and the years in which escalation is to occur vary with each Sate Agreement. There are limited opportunities to review the royalty rate clauses in salt agreements, and it may also be difficult to implement change across all State Agreements simultaneously.

**Analysis summary**

All salt production in Western Australia should attract the same specific rate, being Amount A under the Mining Regulations 1981:

- A specific-rate royalty is appropriate for salt because it is low value and does not attract a scarcity premium.
- A mine-head analysis was not undertaken because cost data was not available.
- All specific rates for salt in Western Australia are substantially lower than salt royalty rates in other Australian jurisdictions.
- No two salt producers pay the same specific rate resulting in inequities in the salt royalty framework.

**Recommendation 12**

For reasons of equity, salt State Agreements should be amended as and when the opportunity arises so that they refer to the Mining Act 1978. The single indexed rate specified in the Mining Regulations 1981 should apply to all salt production.

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244 Rio Tinto, above n 19, 12.
Basic Raw Materials

Overview of basic raw materials

Basic raw materials are generally low value products used for construction or agricultural purposes. Materials in this category include clays, dimension stone products, gravels, rock, sand and other aggregates. With the exception of silicon feedstock (quartzite), these materials are generally not subject to any metallurgical processing but in some instances are used as inputs to other processes. The vast majority of basic raw materials are used domestically.

Cement Concrete and Aggregates Australia argues that ‘basic raw materials are strategic resources generally consumed by the communities that produce them and are essential to sustain local, community, industrial, housing and urban development’. It is of the view that royalty rates for basic raw materials should not be increased as royalty payments are ‘passed directly onto the local construction industry’ and ‘end user costs’.

Royalty administration

A specific-rate royalty applies to basic raw materials that are used predominantly in construction and agriculture, for example sand, rock and building stone. Two indexed rates in the Mining Regulations 1981 apply to these basic raw materials. For the period beginning 1 July 2010 and ending 30 June 2015, Amount A was $0.62 and Amount B was $1.00.

Basic raw materials that attract an ad valorem rate under the Mining Regulations 1981 are generally commodities that are used as inputs into higher value products. For example, kaolin and attapulgite, which are industrial clays, attract an ad valorem rate of 5%. Kaolin is used in the paper industry (as a filler and coating agent), and also in ceramics, fibreglass, paint, plastic, pharmaceuticals and cosmetics. Attapulgite is used in suspending agents, drilling fluids, paper, animal feed, pet litter and pharmaceuticals. Other basic raw materials that attract an ad valorem rate are garnet, feldspar and spongolite.

Table 18 outlines the royalty rates applicable to basic raw materials under the Mining Regulations 1981.

There are two State Agreements that apply to basic raw materials. The Cement Works (Cockburn Cement Limited) Agreement Act 1971 states a royalty is to be paid consistent with the Mining Act 1978 rate. The Silicon (Picton) Agreement Act 1987 does not refer to a royalty rate so the Mining Act 1978 rate applies.

As discussed in Chapter 9, under the Mining Regulations 1981, not all commodities that attract a specific rate are basic raw materials, for example silicon and domestically sold coal. As discussed elsewhere in this Chapter, the Review has recommended these two commodities be moved onto ad valorem rates.

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245 See the Silica and silicon section of Chapter 10 for further discussion on these commodities.
246 Cement Concrete and Aggregates, above n 22, 1.
247 Ibid, 2.
248 Mining Regulations 1981 (WA) reg 86(2a)-(2b).
### Table 18: Royalty rates for basic raw materials, 2013-14

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Royalty rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate</td>
<td>Amount A</td>
</tr>
<tr>
<td>Attapulgite</td>
<td>5%</td>
</tr>
<tr>
<td>Building stone&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Amount B</td>
</tr>
<tr>
<td>Clays</td>
<td>Amount A</td>
</tr>
<tr>
<td>Dolomite</td>
<td>Amount A</td>
</tr>
<tr>
<td>Feldspar</td>
<td>5%</td>
</tr>
<tr>
<td>Garnet (usual grades)</td>
<td>5%</td>
</tr>
<tr>
<td>Garnet (technology grades)</td>
<td>2.5%</td>
</tr>
<tr>
<td>Gravel</td>
<td>Amount A</td>
</tr>
<tr>
<td>Gypsum</td>
<td>Amount A</td>
</tr>
<tr>
<td>Kaolin</td>
<td>5%</td>
</tr>
<tr>
<td>Limestone (agricultural or construction)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Amount A</td>
</tr>
<tr>
<td>Limestone (metallurgical)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Amount B</td>
</tr>
<tr>
<td>Rock</td>
<td>Amount A</td>
</tr>
<tr>
<td>Sand</td>
<td>Amount A</td>
</tr>
<tr>
<td>Spongolite</td>
<td>5%</td>
</tr>
<tr>
<td>Talc</td>
<td>Amount B</td>
</tr>
</tbody>
</table>

1. Including granite, marble and sandstone.
2. Including lime sand and shell sand.

Note: Amount A is $0.62 a tonne and Amount B is $1.00 a tonne. These indexed rates apply to production between 1 July 2010 and 30 June 2015. Amount A and Amount B are indexed to the Non-metallic Mineral Products Price Index number, for the quarter ending on the last 31 March before the beginning of the relevant period, published by the Australian Bureau of Statistics in Catalogue 6427.0 Producer Price Indexes. The next relevant period begins 1 July 2015 and ends 30 June 2020. See Mining Regulations 1981 (WA) reg 86(2a)-(2d).

### Royalty rates

The Review did not estimate the royalty return as a proportion of the value at the mine head for basic raw materials in Western Australia. Quantitative analysis was not undertaken because the Review did not have access to reliable cost and price data for many of these commodities. In addition, basic raw materials represent a small proportion of the State’s royalty revenue.

Dr Guj noted in his submission to the Review that ‘the desirability of including low-value, non-metallic commodities (e.g. sand, gravel, aggregate, gypsum, limestone etc.), currently under specific (volume or weight-based) royalties should be balanced against the increased administrative complexity and cost of moving them to an *ad valorem* royalty system.’<sup>251</sup> The 1986 Mineral Revenue Inquiry found that specific rates were appropriate for basic raw materials where the product value is difficult to assess or the value of total output is not great.<sup>252</sup> This Review concludes that specific rates are appropriate for products such as sand, rock and gravel. One factor not directly applied by the 1986 Mineral Revenue Inquiry is scarcity, although minerals that attract a scarcity premium are typically high value. Basic raw materials that currently attract a specific-rate royalty should not attract a scarcity premium.

The Review compared the rates that apply to basic raw materials in Western Australia to other Australian jurisdictions (Appendix 3). In general, Western Australian rates are broadly in line with rates elsewhere in Australia.

The Review considers silica used to produce high purity silicon metal to be a variation in the system. This is discussed in the section below. Evidence was not presented to suggest other basic raw material products are variations in the royalty system.

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251 Guj, above n 25, 2
252 Bradley, Mineral Revenues Inquiry volume 2, above n 37, 2.
**Analysis summary**

Low value basic raw materials should continue to attract a specific-rate royalty. Higher value basic raw materials should continue to attract an *ad valorem* rate:

- Mine-head analysis was not undertaken for basic raw materials because the Review did not have access to reliable cost and price data for many of these commodities.
- Specific-rate royalties are appropriate for basic raw materials that are low value.
- Western Australian royalty rates for basic raw materials are broadly in line with rates for these commodities in other Australian jurisdictions.
Overview of the silicon industry

Silicon Metal Company of Australia Operations (SIMCOA) operates Australia’s only silicon smelting operation. Silica (lump quartz) is mined at Moora and smelted into high grade silicon ingots at a smelter at Kemerton. The plant commenced operations in the late 1980’s and expanded capacity between 2009 and 2013.

Economic conditions for the silicon metal industry are difficult to gauge due to material and widespread price distortions in high-grade silicon manufacture. The extent to which export opportunities are constrained by these distortions is unknown. SIMCOA sells silicon on the international market, with strong competition from China. China dominates the global silicon industry, producing around two thirds of global silicon supply. Western Australia produces around 1.3% of global supply of silicon metal.253

One of SIMCOA’s export markets, the United States of America, has countervailing tariffs in place of approximately 140% on silicon metal (of grades between 96% and 99.9%) imported from China.255 Similar measures are in place in the European Union.256 There have been complaints of market dumping of Chinese silicon metal. A Canadian investigation found that the Chinese Government ‘substantially determined’ domestic silicon prices.257 It also found that product was dumped at a ‘not insignificant’ margin.258 This has the potential to distort prices and put the sole Australian producer at a commercial disadvantage. At the time of drafting, SIMCOA had a case before the Australian Government’s anti-dumping commission regarding exports of Chinese silicon.259 A recommendation for a ruling is expected by April 2015.260

Silicon smelting is an energy intensive industry. SIMCOA claims that energy comprises around 30% of production costs.261

Royalty administration

SIMCOA operates under the Silicon (Kemerton) Agreement Act 1987, however the Agreement does not specify a royalty rate. Royalties paid by SIMCOA are administered by the Mining Act 1978.

A specific-rate royalty of $1.00 a tonne, escalated every five years, applies to silica. If the silica is processed to silicon, the royalty is applied to the silica feedstock. Analysis of

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254 Ibid.
256 European Union (2010) ‘Council Implementing Regulation (EU) No. 467/2010 Imposing anti dumping duty of silicon originating from China as extended to imports of silicon consigned from the People’s Republic of Korea, whether declared as originating in the Republic of Korea or not, following an expiry review pursuant to Article 11(2) and a partial interim review pursuant to Article 11(3) of Regulation (EC) No 1225/2009’ in Official Journal of the European Union L131/1.
258 Ibid, 38.
material flows indicate approximately five tonnes of quartz (a type of silica) is smelted into one tonne of silicon. The royalty for one tonne of silicon is approximately $5. Some quartz that does not meet smelter specifications is sold for use in landscaping and as concrete aggregate.\(^{262}\)

**Royalties for silicon in other jurisdictions**

China is the world’s primary producer of silicon. A comparison with royalty rates in China is difficult due to the complex royalty and taxation system which operates within a different political and economic system.

**Royalty rate**

The Review considers silicon to be a variation in the royalty system as a specific-rate royalty is not appropriate for a high value product like silicon, which based on publicly available information on grades produced by SIMCOA sells for above $2,000 a tonne. The 1986 Mineral Revenue Inquiry stated that specific rates are used ‘either where product value cannot readily be assessed … or where the value of total output is not great…’\(^{263}\) The Review concludes that an *ad valorem* rate should apply to silicon and a specific rate to silica. There is an international market for silicon and the value of the product is high. *Ad valorem* rates already apply to attapulgite and garnet, which in both cases have high and low value uses. Attapulgite has uses ranging from cat litter, jet fuel clarification and pharmaceuticals. Garnet is used to make gemstones and industrial abrasives.

The current specific rate of $1.00 a tonne provides a return to the community of approximately 0.25% of the sale value (based on a conservative price of $2,000 a tonne).\(^{264}\) This is well below the return to the community provided by other high value commodities and is not considered a fair return to the community.

The assessment of the silicon royalty rate took into account the level of processing. Data was not available to undertake a mine-head analysis. Based on the level of processing, the Review considers an *ad valorem* rate of 2.5% of the silicon value would provide a fairer return to the community and is consistent with the return provided by other commodities. A rate of 2.5% would increase the royalties collected from silicon production by approximately $3.5 million a year. The processing of silica to silicon is a similar intensity to commodities such as copper metal and titanium dioxide pigment.

Scarcity of the material processed by SIMCOA differentiates it from silica used in lower value applications. Silica mined by SIMCOA that does not meet its physical specifications is sold to landscaping and concrete aggregate companies.\(^{265}\) The specific-rate royalty of $1.00 a tonne should continue to apply to silica used for low value applications.

**Implementation**

Silicon metal production should attract an *ad valorem* royalty rate. Based on the level of processing a rate of 2.5% should apply however this represents a substantial increase from the current rate of $1.00 a tonne and the Review did not receive any submissions from the silicon industry, and the industry. Silicon was not represented through the Industry Reference Group or in one-on-one stakeholder meetings. The Review recommends consultation with the silicon industry prior to implementation of a rate.

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\(^{263}\) Bradley, *Mineral Revenues Inquiry volume 2*, above n 37, 2.

\(^{264}\) Estimated by the Department of Mines and Petroleum.

\(^{265}\) SIMCOA Operations, above n 262.
change. Any rate change implemented after consultation should be staged to ease the burden on industry and provide sufficient time to adjust.

**Analysis summary**

An *ad valorem* rate of 2.5% should apply to silicon metal. A specific-rate royalty of $1.00 a tonne should continue to apply to silica used for low value applications.

- A specific rate for low value commodities, such as silica is appropriate. Silicon metal however, is a high-value product with a very high level of processing considered to be final treatment indicating royalty Tier 4 should apply.

- A mine-head analysis was not undertaken for silicon metal as cost and price data was not available to the Review. However, based on a conservative price of $2,000 per tonne for high purity silicon, the Review estimates the commodity is returning roughly 0.25% of the sales value. This is not considered a fair return to the community.

- Comparison of Western Australia’s silica and silicon royalty rates with other jurisdictions was not possible.

**Recommendation 13**

An *ad valorem* rate should be introduced for silicon metal in consultation with the silica sand and silicon metal industries.
Uranium

Overview of the uranium industry

Uranium is predominantly used for power generation in nuclear reactors. Since 2004, global uranium consumption has been fairly flat, between 65,000 and 70,000 tonnes a year. There has been a decline in electricity generated from nuclear sources since 2011 due to the idling of 48 of Japan’s 50 reactors. The United States of America (USA) and France generate half the world’s nuclear sourced electricity, followed by the Russian Federation, South Korea, China and Germany.

Mine production accounts for 85% of global uranium supply. The remaining 15% is recovered from decommissioned nuclear arsenals (15% of supply). The agreement to reprocess nuclear warheads into nuclear fuel between the USA and the Russian Federation accounted for approximately one third of the USA’s uranium for fuel enrichment. The program concluded December 2013 creating opportunities for new suppliers.

Australia has around 30% of the world’s uranium resources with three producing uranium mines: Ranger mine in the Northern Territory and the Olympic Dam and Beverly mines in South Australia. Western Australia accounts for approximately 6% of Australia’s uranium deposits. There are four prospective mines at Yeelirrie, Kintyre, Wiluna and Mulga Rock. Australia places strict controls on the uses to which uranium can be used to prevent nuclear arms proliferation. Australia is establishing arrangements to enable Australian companies to export uranium to India.

The majority of uranium is sold by long-term contracts. An oversupply of uranium on the world market saw the spot price of uranium halve between March 2011 and November 2012 to a quarter of the 2007 peak. The price fell to a nine-year low of US$28 a pound in May 2014. The International Atomic Energy Agency forecasts world nuclear electricity generating capacity to increase at an annual average of between 0.3% and

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2.9% to 2035, due to increased capacity in East Asia and non-European Union states on the European continent, which may lead to upward pressure on price.

Royalty administration

The Mining Regulations 1981 apply an ad valorem rate of 5% to uranium sold as a uranium oxide concentrate (yellowcake). The Uranium (Yeelirrie) Agreement Act 1978 (Yeelirrie State Agreement) sets an ad valorem rate of 3.5% for uranium oxide sold in the first seven years after the treatment plant comes into operation. The Yeelirrie State Agreement provides a royalty review mechanism after the first seven years of operation, and every five years thereafter.

Royalties for uranium in other jurisdictions

In South Australia, uranium oxide concentrate has been declared a mineral ore or concentrate, therefore an ad valorem rate of 5% applies. In the Northern Territory, by agreement between the Commonwealth and the Northern Territory Governments under the Uranium Royalty (Northern Territory) Act 2009 (Cth), the Mineral Royalty Act 1982 (NT) profit-based royalty regime applies to new uranium mining operations or any expansions to existing uranium mining operations.

Royalty concessions

The Review considers the royalty of 3.5% in the Yeelirrie State Agreement to be a variation in the royalty system as it is inconsistent with the rate applied to other materials with a comparable level of processing. The reduced rate was included in the State Agreement to reflect ‘the circumstances relating to the project’, and is considered a concession.

Royalty rate

The Review considers an ad valorem rate of 3.75% to be appropriate for uranium. The assessment of the uranium royalty rate took into account the level of processing. The Review was unable to undertake a mine-head analysis, as there are no uranium mines operating in the state.

Uranium processing is more intense than commodities on the 5% rate, but less intensive than commodities on the 2.5% rate. When the Mining Regulations 1981 were amended to include a royalty rate for uranium in 2011, submissions from industry confirmed this view. An intermediate rate is appropriate for uranium oxide concentrate based on the level of processing.

Implementation

The Mining Regulations 1981 should be amended to revise the royalty rate for uranium from 5% to 3.75% in recognition of the level of processing. This rate will not take effect for the Yeelirrie mine until seven years after the treatment plant comes into operation, as a royalty concession is prescribed in the Yeelirrie State Agreement.

Analysis summary

An ad valorem rate of 3.75% should apply to uranium.


279 Mining Act 1971 (SA) s 17(4)(b)(i); Minister for Mineral Resources Development (SA), Mining Act 1971 Notice by the ‘Minister’ in South Australia, South Australian Government Gazette, No 44, 30 June 2011, 2739, 2773

280 Uranium Royalty (Northern Territory) Act 2009 (Cth) s 7; Mineral Royalty Act 1982 (NT) s 10.

281 Uranium (Yeelirrie) Agreement Act 1978 (WA) cl 25(1).
- The level of processing for uranium is considered to be secondary (metallurgical) indicating royalty Tier 3 should apply.
- A mine-head analysis was not undertaken because there are currently no operating uranium mines in Western Australia.

**Recommendation 14**

The *ad valorem* rate of 5% for uranium in the *Mining Regulations 1981* should be changed to 3.75%.
Vanadium Pentoxide

Overview of the vanadium pentoxide industry

Vanadium is a valuable byproduct from the production of iron ore. Approximately 90% of world vanadium production is used in the high performance steel industry to strengthen steel and titanium. 282 Growth in steel production and the substitution of low strength carbon steel with high strength steel, drive demand for vanadium.

The Western Australian Windimurra project, the only operating vanadium project in Australia, is one of the largest proven vanadium reserves in the world, and at full production capacity of 6,300 tonnes a year, could meet around 7% of world demand. 283 The operator, Atlantic Ltd, expects growth in global vanadium production in the near future to match increases in vanadium demand. 284 The Windimurra project currently produces ferrovanadium, however the project can produce high purity vanadium pentoxide, vanadium trioxide and vanadium carbonitride alloy. 285 The ferrovanadium price has remained around US$20 to US$30 a kilogram since 2010. 286

Royalty administration

The Windimurra project operates under the Mining Act 1978. The Mining Regulations 1981, apply the following ad valorem rates to vanadium products:

1. if sold as a vanadium oxide concentrate, 5% of the vanadium pentoxide price.
2. if sold in metallic form (ferrovanadium), 2.5% of the ferrovanadium price.
3. for vanadium not realised on contained vanadium from a product (such as magnetite) where the average grades of vanadium are over 0.275%, and a vanadium circuit is not installed, 5% of the vanadium pentoxide price.

Royalty rate

Vanadium pentoxide is a highly processed product and can be an intermediate stage in the production of ferrovanadium for steel manufacture. 287 The current royalty rate of 5% for vanadium oxide concentrate does not reflect the level of processing. A rate of 3.75% more closely reflects the level of processing.

The rate of 2.5% for ferrovanadium appears to be appropriate and provides a fair return to the community. The assessment of the royalty rates was based on the level of processing. A mine-head analysis was not undertaken due to lack of data. An assessment of rates in other jurisdictions was not undertaken as there was not a comparable jurisdiction.

Applying royalties to the realised value of the ores and concentrates is not a viable proposition as there is no transparency on the value of the vanadium. For this reason the value must reflect a downstream reference point, in this instance the vanadium pentoxide form.

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283 Western Australian Department of Mines and Petroleum, Statistics Digest 2012-13, above n 133, 45.


285 Ibid.


Regulation 86(c) of the *Mining Regulations 1981* deems a marketable threshold for vanadium within ores and concentrates. These regulations were established in response to proposed magnetite projects that had sought to market a beneficiated iron ore product without recognising the value of the vanadium content. This was to improve the marketability of its product by discounting the value of the vanadium content. As regulation 86(c) of the *Mining Regulations 1981* references the vanadium pentoxide price, the royalty rate in this regulation should be changed from 5% to 3.75%.

The Russian Federation, South Africa and China are the largest producers of mined vanadium. The Russian Federation deems vanadium to be a rare mineral and is subject to an *ad valorem* rate of 8%. South Africa applies a variable profit-based royalty. China’s mineral taxation system is complex applying a 2% *ad valorem* rate, a specific rate of between $0.1 and $6 per tonne. A high level of state ownership in China and the variable nature of its *ad valorem* system make it difficult to directly compare Western Australia’s royalty system with China’s.

**Implementation**

The royalty rates in the *Mining Regulations 1981* should be amended to insert an *ad valorem* rate of 3.75% for vanadium pentoxide powder, distinct from vanadium oxides contained within concentrates. There are no timing sensitivities.

**Analysis summary**

An *ad valorem* rate of 3.75% should apply to vanadium pentoxide powder and vanadium oxides contained with concentrates.

- Vanadium pentoxide is subject to secondary (metallurgical) processing indicating royalty Tier 3 is appropriate. Ferrovanadium is considered to be subject to final processing and royalty Tier 4 is appropriate.
- Vanadium contained within vanadium rich ores and concentrates may not be subject to transparent pricing and a contained mineral approach is appropriate referencing the vanadium pentoxide price and royalty level.
- A mine-head analysis was not undertaken for vanadium pentoxide as cost and price data was not available to the Review.
- The Review has not compared Western Australian vanadium pentoxide royalties with rates in other jurisdictions, as there are no comparable jurisdictions.

**Recommendation 15**

The *ad valorem* rate of 5% for vanadium contained within ore concentrates and for oxides of vanadium should be changed to 3.75% of the vanadium pentoxide price.

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Rare Earth Elements

**Overview of the rare earth elements industry**

Rare earth elements are used in a range of technological applications such as magnets, batteries, automotive catalytic converters, ceramics and glass. China supplies approximately 95% of the global rare earth element market, and is the dominant processor and user of refined compounds.\(^{289}\)

The Mount Weld operation in Western Australia is currently the only commercially viable reserve of significant size outside of China. Ore is mined and concentrated at the vertically integrated operation and exported to Malaysia for separation by an affiliated company. China accounts for 50% of rare earth element reserves, followed by Russia (17%), the United States (12%) and Australia (2%).\(^{290}\)

**Royalty administration**

Royalties paid by rare earths producers in Western Australia are administered through the *Mining Regulations 1981* using the contained mineral system (refer to Box 1: Contained minerals). An *ad valorem* rate of 2.5% applies to the rare earth oxide price multiplied by the proportion of the rare earth oxide contained within the product. A transparent market price for the rare earth concentrate does not exist in Australia due to the vertically integrated nature of the industry. The Department of Mines and Petroleum estimates the market price for each rare earth oxide based on the Chinese market price.\(^{291}\)

**Royalty rate**

The Review has not undertaken a mine-head assessment for rare earths due to the lack of reliable data and that rare earths account for a relatively small proportion of the State’s mineral production. The processing of individual rare earth oxides is a similar intensity to the metallic form of base metals such as copper and nickel. Based on the level of processing, the Review considers a rate of 2.5% appropriate for individual rate earth oxides. As there is not a transparent price for intermediate products, the contained mineral system remains appropriate.

**Analysis summary**

A rate of 2.5% *ad valorem* is appropriate for individual rare earth oxides. The contained mineral system should continue to apply.

- The only rare earth producer in the State is vertically integrated preventing arms-length product valuation. Without a transparent price for rare earth concentrates exported to Malaysia for refining, the contained mineral system referencing international finished product pricing (royalty Tier 4) is appropriate.
- A mine-head analysis was not undertaken for rare earth elements as cost and price data was not available to the Review.
- An assessment of rates in other jurisdictions was not undertaken as there are no comparable jurisdictions that produce rare earth elements.

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\(^{290}\) Ibid, 45.

\(^{291}\) China accounts for 95% of world rare earths production.
Lithium

Overview of the lithium industry

Global demand for lithium is expected to increase by about 50% from 2013 to 2017 due to the development of rechargeable batteries for electric cars, which will increase demand for lithium chemicals for battery production. Lithium is also used in the glass and ceramics industry.

There are two lithium operations in Western Australia; Talison Resources’ Greenbushes mine and Galaxy Resources’ Mount Cattlin mine. The Greenbushes mine contains the largest hard-rock lithium mineral resource in the world and Talison is the world’s largest producer of spodumene concentrate, accounting for one-quarter of global lithium supply. Galaxy Resources shipped spodumene concentrate to its lithium carbonate plant in China, however the mine is currently under care and maintenance. A Reed Resources Limited and Mineral Resources Limited joint venture has proposed a lithium mine development south of Kalgoorlie.

Royalty administration

Royalties paid by lithium producers in Western Australia are administered through the Mining Regulations 1981. An ad valorem rate of 5% applies to lithium concentrate. If the concentrate is processed to lithium carbonate or lithium cathode, the royalty applies on the lithium feedstock.

Royalty rate

The Review considers the lithium royalty to be a variation in the system as the royalty rate is applied to the value of the concentrate feedstock, even if it is further processed into lithium carbonate. The royalty should apply to the product sold.

The Review has not undertaken a mine-head assessment for lithium due to the lack of reliable data and that lithium accounts for a relatively small proportion of the State’s mineral production. The Review has considered the level of processing in setting the ad valorem rate for lithium. The level of processing of lithium concentrate is similar to the level of processing of concentrate products such as mineral sands and copper so the ad valorem rate of 5% is appropriate.

Lithium carbonate is processed at a similar intensity to vanadium pentoxide and uranium. Based on the level of processing, the Review considers a rate of 3.75% to be appropriate.

Implementation

The Mining Regulations 1981 should be amended so that an ad valorem rate of 3.75% applies to lithium carbonate.

Analysis summary

An ad valorem rate of 5% should continue to apply to lithium concentrate, while a rate of 3.75% ad valorem should apply to lithium carbonate.

- Lithium concentrates are subject to secondary (concentration) processing indicating royalty Tier 2 is appropriate. Lithium carbonate is subject to secondary (metallurgical) processing indicating royalty Tier 3 is appropriate.

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292 Ibid, 44.
293 Ibid, 43, 44.
294 Ibid, 43.
• A mine-head analysis was not undertaken for lithium as cost and price data was not available to the Review.
• An assessment of rates in other jurisdictions was not undertaken as there are no comparable jurisdictions that produce lithium.

Recommendation 16
The Mining Regulations 1981 should include an ad valorem rate of 3.75% for lithium carbonate.
Chapter 11. Commonwealth Grants Commission

There is a risk that some of the additional revenue resulting from any increase in royalty rates may be lost through reductions in Western Australia’s GST grants.

The Commonwealth Grants Commission (CGC) recommends the distribution of GST revenue grants among the states each year using a ‘fiscal equalisation’ principle, which takes account of states’ capacity to raise their own revenues.

Mining royalty revenue capacity is assessed using a national average royalty rate (calculated for each royalty category as national royalty collections divided by national mineral production). Under the current methodology, when one state holds a large share of national production in a specific category, a change in its royalty rate will affect the national rate significantly.

If Western Australia increases its royalty rates, it will be assessed as having a higher revenue capacity and will consequently lose a proportion of GST grants. However, the percentage that would be lost in GST varies widely depending on how mining revenue is assessed by the CGC. There is considerable uncertainty in this, as the CGC is currently undertaking a review of its methods, reporting in 2015.

Under the existing assessment method it is possible for a state to lose more in GST from an increase in the royalty rate than the state stands to gain in increased royalty revenues.\(^{295}\)

However, reflecting the significant effect that the current CGC process can have on the net royalty collections retained by Western Australia, it is generally agreed that the CGC’s mining assessment is flawed and needs to be reformed to reduce the chances of anomalous outcomes. As such, the mining revenue assessment has been identified as a priority issue for consideration in the CGC’s 2015 methodology review.

The likely changes from the 2015 Review will not be clear until sometime between early March and early May 2015. It is also possible that there will be more fundamental reform to the GST distribution process as part of the Commonwealth Government’s White Papers on tax reform and reform of the federation.

As an example, if an outcome of the White Paper processes was the 75% GST floor reform option advocated by the Western Australian Government, any increase in royalties would be fully retained by Western Australia.

Ideally, royalty rates should be able to be set (as they have in the past) without regard to possible GST implications. In fact, one of the CGC’s principles is that the methods should be policy neutral. That is, a state’s own policies or choices in relation to the revenues it raises should not directly influence the level of GST grants it receives and the CGC’s choice of methods should not create an incentive (or disincentive) for a state to choose one policy over another.

Given the uncertainties in how the CGC will assess mining revenues in the 2015 Review or future reviews, it is recommended that royalty rates be set on an objective basis without regard to the distribution of GST revenue. The Western Australian Government should continue to engage with the Commonwealth Government to promote a fair treatment of mining revenues. This approach would accord with the CGC’s policy neutrality principle and would also provide a greater degree of stability in royalty rates and certainty for industry.

\(^{295}\) This was potentially the case with Western Australia increasing the iron ore fines royalty rate, but the Commonwealth Treasurer has to date instructed the CGC to avoid this result.
Recommendation 17
Royalty rates should be set on an objective basis without regard to distribution of GST revenue grants. The State Government should continue to engage directly with the Commonwealth Government to promote a fair treatment of mining revenues in calculations of states’ GST shares.
Chapter 12. Implementation

Process
Changes to both regulations and State Agreements will be needed to implement the recommendations of this Review. State Agreements are typically changed by mutual agreement, but regulations can be changed at the Government’s discretion.

In the case of State Agreements, each agreement specifies the process for making a change. An example of an amendment process is:

- The State and the proponent will negotiate changes, and draft a variation agreement executed;
- The Minister tables the variation agreement before each House of Parliament;
- If neither House of Parliament passes a resolution disallowing the variation agreement, it comes into effect.

Where changes are recommended to royalty rates contained in State Agreements, the Agreements should be amended to refer to the Mining Act 1978.

Considerations
The most equitable application of the royalty system is to use a single regulatory instrument, such as the Mining Act 1978 and associated regulations. The use of different mechanisms or several State Agreements to apply royalties can lead to different royalty rates applying to the same commodity.

Most commodities affected by the Review’s recommendations are administered under a single mechanism such as the Mining Act 1978. Diamond is the only exception. In this instance, changes to royalties would be effected through changes to regulations to align with the rates in the State Agreement.

In the case of silicon, the Department of Mines and Petroleum should work with the silicon metal and silica sands industries to determine the transition to an ad valorem rate.

Where practicable, a change in rate should come into effect for all producers of a commodity simultaneously. For example, when conditions are conducive to an increase in the royalty rate for alumina, the process would need to align the rate increase across the five State Agreements and two companies. In the case of Agreement Acts, this may be difficult, but equity should continue to be a priority to the best extent possible.

Table 2 summarises the regulatory instruments, timing and nature of amendments required to give effect to the Review’s recommendations.

For the minerals with royalty rates specified in the Mining Act 1978, the new rates can be implemented by 1 July 2015 through changes to the Mining Regulations 1981. This would apply to the rate change recommended for gold. State Agreements requiring amendment include salt and alumina when economic conditions in the industry improve.

The Chamber of Minerals and Energy stated in its submission to the Review ‘Changes in taxation and royalties should not undermine the basis upon which long-run investment decisions have been made, nor compromise the principles of equity and efficiency. The impost of new tax regimes should be limited to apply only to new investments where final investment decisions are yet to be made.’ The Review dismisses this argument based

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297 It must be tabled within 12 sittings days following execution of the variation agreement by both parties.
298 Both Houses of Parliament can disallow the variation agreement within 12 sitting days.
299 Chamber of Minerals and Energy, above n 12, 15.
on the principle of equity. Applying rate changes to new mines only would lead to two different sales values and royalty incidences for the minerals. It would also disadvantage greenfields development relative to brownfields expansion. It would unduly favour established producers and could discourage future exploration and investment in greenfields projects.

**Recommendation 18**

Where practicable, implementation of royalty changes should be co-ordinated so that changes take effect at the same time for all producers in a sector.
Chapter 13. Rate Recommendations and Effect on State Revenue

The royalty system adopted in 1981 and largely in place today is sound and should be retained. The Review has sought to provide further clarification on how the 10% benchmark should be calculated and used; and has recommended an additional *ad valorem* tier of 3.75% to update the system to reflect the processing stages that typically exist within the mining industry today. The Review has examined each commodity in detail, and in some instances recommended changes to rates. The *ad valorem* rates that are considered appropriate for each commodity and product are provided in Table 19.

The new rates under the *Mining Regulations 1981* could be implemented from 1 July 2015 in full. However, the State Government may consider delaying implementation of rate changes for some commodities until economic conditions improve. The Review also finds that a single specific rate for salt should be implemented as and when the State Agreements for salt are amended.
Table 19: *Ad valorem* tiers by commodity

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Processing tier and rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tier 1 (7.5%)</td>
</tr>
<tr>
<td>Coal</td>
<td>Coal</td>
</tr>
<tr>
<td>Iron</td>
<td>Iron ore (lump and fines) Pellets produced from lump and fines ore</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Gold</td>
<td>Gold doré/ fine gold</td>
</tr>
<tr>
<td>Nickel</td>
<td></td>
</tr>
<tr>
<td>Base metals</td>
<td>Base metal ore</td>
</tr>
<tr>
<td>Uranium</td>
<td></td>
</tr>
<tr>
<td>Rare earth elements</td>
<td></td>
</tr>
<tr>
<td>Aluminium</td>
<td>Bauxite</td>
</tr>
<tr>
<td>Lithium</td>
<td>Lithium ore</td>
</tr>
<tr>
<td>Silica</td>
<td></td>
</tr>
<tr>
<td>Mineral sands</td>
<td>Heavy mineral sands concentrates, ilmenite, leucoxene, zircon and monazite concentrates</td>
</tr>
<tr>
<td></td>
<td>Feedstock to produce synthetic rutile or titanium dioxide pigment</td>
</tr>
<tr>
<td>Vanadium complexes</td>
<td>Magnetite, hematite, titan dioxide concentrates</td>
</tr>
<tr>
<td></td>
<td>Titanium slag, vanadium pentoxide</td>
</tr>
<tr>
<td>Diamond</td>
<td>Diamond</td>
</tr>
</tbody>
</table>

¹. As defined by the *Mining Regulations 1981*.
². Subject to consultation with the silicon metal and silica sand industries.
The effect on State revenue is dependent on the rate of implementation of the new rates. Table 20 lists the revenue implications of full implementation of any new rates by 1 July 2015. The figures use Department of Treasury budget assumptions for December 2014.

**Table 20: The effect of rate changes on royalty revenue ($ millions)**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>2015-16</th>
<th>2016-17</th>
<th>2017-18</th>
<th>2018-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase the gold royalty rate from 2.5% to 3.75%</td>
<td>120.8</td>
<td>111.6</td>
<td>92</td>
<td>82.1</td>
</tr>
<tr>
<td>Remove the gold concession for the first 2,500 ounces where annual production exceeds 2,500 ounces</td>
<td>5.8</td>
<td>6</td>
<td>4.8</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>126.6</strong></td>
<td><strong>117.6</strong></td>
<td><strong>96.8</strong></td>
<td><strong>86.0</strong></td>
</tr>
</tbody>
</table>
## Table of Contents

Appendix 1: Financial Modelling ................................................................. 115  
Appendix 2: Western Australian Royalty Rates ........................................ 130  
Appendix 3: Australian Royalty Rates by State and Territory .................. 132  
Appendix 4: Royalty Structures in International Jurisdictions .................... 134  
Glossary .................................................................................................. 136  
Bibliography ............................................................................................ 140
Index of Figures

Figure A: Benchmark level required for each netback method to avoid a fall in revenue, 2013 data, mine head and in situ ................................................................. 124
Figure B: Average mine-head return for iron ore, gold, nickel and alumina .......... 125
Figure C: Iron ore royalty payments and the iron ore price .................................. 126
Figure D: Gold royalty payments and the gold price ............................................. 127
Figure E: Nickel royalty payments and the nickel price ....................................... 128
Figure F: Alumina royalty payments and the alumina price ................................ 129

Index of Tables

Table A: Netback methods .................................................................................. 116
Table B: Scenarios modelled ............................................................................. 117
Table C: Capital costs ......................................................................................... 120
Table D: Useful life/mine life assumptions ......................................................... 120
Table E: Sensitivity of the royalty return by commodity as a proportion of the mine-head value, 2013 data, netback method 2 ......................................................... 122
Table F: Mine-head return for selected commodities ...................................... 123
Table G: Royalty rates required to achieve the 10% mine-head benchmark for selected commodities .................................................................................. 123
Table H: Royalty rates administered under the Mining Act 1978 .................... 130
Table I: Royalties administered under State Agreement Acts ......................... 131
Table J: Salt royalties administered by State Agreement Acts ......................... 131
Table K: Australian royalty rates by state and territory, excluding basic raw materials .......... 132
Table L: Australian royalty rates for basic raw materials by state and territory .... 133
Table M: Royalty structures in North America ................................................. 134
Table N: Royalty structures in South America .................................................. 134
Table O: Royalty structures in Africa .................................................................. 135
Table P: Royalty structures in Asia .................................................................... 135
Appendix 1: Financial Modelling

Introduction

In Western Australia, a benchmark of 10% of the value of the ore at the mine head was used in 1981 to explain the relationship between the State’s three-tiered ad valorem rates. The benchmark can be used to assess the equity and fairness of the ad valorem rates across and within industries and over time. In practice, the efficacy and appropriateness of the benchmark as a measure of equity and fairness depends on how it is used and estimated. It is very sensitive to changes in variables such as price and cost and dependent on the availability and reliability of data.

The Review considered the efficacy and appropriateness of the use of a mine-head benchmark by drawing on the principles outlined in Chapter 4, and the views of stakeholders. Another element, which is the focus of this section of the Report, is the financial modelling used by the Review to explore the effects of changes to the benchmark.

The results of the financial modelling are provided in two parts. The first section explores the mine-head return using different netback methods for the years 2012 and 2013. The second part provides the mine-head return in five years for which data was available for iron ore, gold, nickel and alumina.

This paper is limited to the results of financial modelling used to estimate the relative return to the community.

Modelling Overview

The model enabled the Review to investigate issues raised by industry about how the benchmark should be calculated, such as the effects of using an alternative benchmark calculation point (mine head or in situ) and including more costs such as cost of capital. These issues were explored in the context of the Government’s revenue objectives. Specifically, the model was designed to enable the Review to:

- Examine the extent to which the current royalty rates structure produces revenue that differs from the benchmark. (Terms of Reference 1b).
- Identify appropriate adjustments that would take revenues closer to the benchmark. (Terms of Reference 1b).
- If an alternative benchmark is proposed, examine royalty rate structures that would achieve the new benchmark, without detrimental effects on the State’s revenue base. (Terms of Reference 1c and 3c).
Estimates

The model estimated the royalty return by commodity at the mine head and in situ, by deducting costs from the sale price – known as a ‘netback’ calculation. Five sets of costs (or netback calculations) were modelled, ranging from a limited number of costs (netback method one) through to all the costs that would be incurred by a company producing the mineral (netback method five). Table U below lists the costs included in each netback method. These are further explained in Chapter 6.

Table U: Netback methods

<table>
<thead>
<tr>
<th>Costs downstream of the mine head (deductions)</th>
<th>Netback method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ore transport</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Milling costs</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Concentrator costs</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Smelting costs</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Refining costs</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Final product transport and handling costs</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Project marketing costs</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Depreciation of downstream capital</td>
<td>Book value</td>
</tr>
<tr>
<td>Project administration costs, including offsite administration allocation to operation</td>
<td>Borrowing costs only</td>
</tr>
<tr>
<td>Weighted average cost of capital</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Sustaining costs, e.g. project exploration studies, mine life extension studies</td>
<td>Project only</td>
</tr>
<tr>
<td>Corporate costs, e.g. legal, governance allocated to operation</td>
<td>Project only</td>
</tr>
<tr>
<td>Completion costs e.g. restoration and decommissioning</td>
<td>1  2  3  4  5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Costs upstream of the mine head (deductions)</th>
<th>Netback method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining costs</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Depreciation of mining capital</td>
<td>Book value</td>
</tr>
<tr>
<td>Project administration costs, including offsite administration allocation to operation</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Weighted average cost of capital</td>
<td>Borrowing costs only</td>
</tr>
<tr>
<td>Sustaining costs, e.g. exploration studies, mine life extension studies</td>
<td>Project only</td>
</tr>
<tr>
<td>Corporate costs, e.g. legal, governance allocated to operation</td>
<td>Project only</td>
</tr>
<tr>
<td>Completion costs e.g. restoration and decommissioning</td>
<td>1  2  3  4  5</td>
</tr>
</tbody>
</table>

Costs included in netback calculation for mine head and in situ (deductions) Costs included in netback calculation for in situ only (deductions)

**Estimation parameters and scenarios**

The model estimates the following parameters:

- the return on the mine-head value by commodity;
- royalty rates; and
- royalty revenue.

The model estimated the return on mine-head value for each commodity using the current ad valorem royalty rates. The return is the royalty paid as a proportion of the mine-head value. The result is compared to the benchmark of 10%.
The model estimated the *ad valorem* rates required for the return on the mine-head value to be broadly in line with the 10% benchmark for five netback methods and two benchmark calculation points (mine head and *in situ*).

The model also estimated royalty revenue. This enabled the Review to see how, with revenue held constant, the level of the benchmark changes depending on the calculation point and the netback method.

**Scenarios modelled**

The scenarios modelled derive from the Terms of Reference and are summarised in Table V.

### Table V: Scenarios modelled

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Royalty return</th>
<th>Parameters</th>
<th>Ad valorem rates</th>
<th>Terms of Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the return on the mine head for each commodity?</td>
<td>Fixed at 2012 and 2013 levels</td>
<td>Determined by the model</td>
<td>Fixed at 2014 levels</td>
<td>1(b)</td>
</tr>
<tr>
<td>What royalty rates would be required for each commodity to achieve the 10% benchmark?</td>
<td>Determined by the model</td>
<td>Fixed at 10%</td>
<td>Determined by the model</td>
<td>1(b)</td>
</tr>
<tr>
<td>For each netback method, what would the level of the benchmark need to be to avoid a fall in revenue?</td>
<td>Fixed at 2012 and 2013 levels</td>
<td>Determined by the model</td>
<td>Determined by the model</td>
<td>1(c)</td>
</tr>
</tbody>
</table>

**Equations**

The model incorporated the following equations.

The royalty base:

\[
Royalty\ base = \left( \frac{Price\ (USD)}{Direct\ exchange\ rate} \times Volume \right) - Allowable\ deductions
\]

Allowable deductions include freight, insurance, logistic charges and import taxes.

The royalty paid:

\[
Royalty = Royalty\ base \times Royalty\ rate
\]

The royalty return:

\[
Return\ on\ mine\ head = \frac{Royalty}{Mine\ head\ value}
\]

\[
Return\ on\ in\ situ = \frac{Royalty}{In\ situ\ value}
\]
The mine head or *in situ* value:

*Mine head value = Royalty base − Netback deductions*

*In situ value = Royalty base − Netback deductions*

Netback methods two and four include a cost of capital. A pre-tax weighted average cost of capital (WACC) was estimated as follows:

\[
WACC = \frac{(rf + \beta e \times MRP)}{(1 - T(1 - \gamma))} \times \left( \frac{E}{V} \right) + (rf + DRP) \times \left( \frac{D}{V} \right)
\]

Where:

- \( WACC \) is the weighted average cost of capital
- \( rf \) is the risk free premium
- \( \beta e \) is the non-diversifiable risk
- \( MRP \) is the market risk premium
- \( E \) is the equity value of the firm
- \( D \) is the debt value of the firm
- \( DRP \) is the debt risk premium
- \( V \) is the value of the firm
- \( T \) is the prevailing corporate tax rate
- \( \gamma \) is the adjustment for imputation credits

The capital base for the WACC:

*Capital base = Depreciation × Estimated useful life*

Deduction for borrowing costs (netback method three):

\[
Borrowing \ costs = \frac{Capital \ base \times Debt \ to \ value \ ratio \times Interest \ rate}{Volume}
\]

Some costs, such as corporate costs, were allocated upstream and downstream of the mine head using the following formula:

\[
\left( \frac{Cash \ operating \ costs - Mining \ costs}{Total \ cash \ costs} \right) \times Corporate \ costs \ (for \ the \ project)
\]

This method was also applied to sustaining costs and completion costs.

Per unit corporate, completion, capital costs and depreciation costs for each commodity were determined as follows:

\[
Total \ cash \ operating \ costs \times Ratio \ applied \ divided \ by \ Volume
\]
Data

The Review undertook modelling for the years 2012 and 2013 for iron ore,\(^{300}\) gold, nickel,\(^{301}\) alumina, mineral sands, diamonds and copper. These commodities represented 98.6% of the State’s mineral resources royalty revenue in 2013-14. For each commodity the model used data on royalties paid, quantities sold, prices and costs of production.

The Department of Mines and Petroleum extracted royalties paid, quantities sold and price data in Australian dollars from its Royalties Management System.

Australian Mineral Economics (AME) and industry representatives on the Industry Reference Group supplied production cost data in Australian dollars, with the exception of sustaining, corporate and completion costs. Only the Industry Reference Group supplied these. The data provided through the Industry Reference Group was limited to high-level aggregate data or charts for iron ore, nickel and gold.

AME provided data on a mine by mine basis and aggregated it to estimate average unit costs for each commodity (e.g. cost per tonne) for cost categories such as mining, processing, transport, overheads and depreciation. The availability of data varied between commodities. For example, comprehensive data existed for iron ore and gold, whereas for mineral sands supplementary data from other jurisdictions was used.

Major assumptions

Royalty rates

The model used royalty rates that applied in 2014, although the actual rate for fine iron ore in 2012 and 2013 was 6.25% (not 7.5%) as a concessional rate applied until 30 June 2013.

Capital

Through consultation with the Industry Reference Group, and in submissions to the Review, industry argued that the netback calculation should include a return on capital in recognition of the return on investment for operations downstream of the mine head. The return on capital is a significant component of value and the model applied a benchmark pre-tax nominal weighted average cost of capital, estimated using benchmark costs of equity and debt and weighted using a benchmark capital structure. Table W below lists the values for each.

---

300 Iron ore was divided into two categories; lump and fines ore, and beneficiated ore due to variations in the grade of the ore, cost structures and level of processing.
301 Nickel was divided into nickel laterite and nickel sulphide.
### Table W: Capital costs

<table>
<thead>
<tr>
<th>Cost</th>
<th>Rate</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighted average cost of capital (pre-tax)</td>
<td>12.1%</td>
<td>Agreed between the Review and the Western Australian Treasury Corporation. Consistent with the industry standard.</td>
</tr>
<tr>
<td>Cost of equity</td>
<td>10.74%</td>
<td>Estimated using the Capital Asset Pricing Model.</td>
</tr>
<tr>
<td>Cost of debt</td>
<td>7.32%</td>
<td>Supplied by the Western Australian Treasury Corporation. Equal to the effective annual interest rate on BBB rated ten-year treasury bonds (averaged over ten years).</td>
</tr>
<tr>
<td>Debt to equity ratio</td>
<td>11.1%</td>
<td>A weighted average of debt to equity ratios for the Western Australian mining sector sourced from the Commonwealth Bank.</td>
</tr>
</tbody>
</table>

The depreciation timeframes used to determine the capital base for each commodity were estimated by taking the lower of the average useful life of the mining equipment and the average mine life. The useful asset lives were estimated based on Australian Tax Office tax ruling TR2013/4 – Income tax: effective life of depreciating assets.\(^{302}\) Mine lives were determined using a survey of existing Western Australian mining operations. For most commodities, the average mine-life exceeded 18 years, so the useful life was used. Table X lists the useful life and mine life assumptions for each commodity.

### Table X: Useful life/mine life assumptions

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Measure used</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ore</td>
<td>Useful life</td>
<td>18</td>
</tr>
<tr>
<td>Gold</td>
<td>Useful life</td>
<td>18</td>
</tr>
<tr>
<td>Nickel laterite</td>
<td>Useful life</td>
<td>18</td>
</tr>
<tr>
<td>Nickel sulphide</td>
<td>Mine life</td>
<td>12</td>
</tr>
<tr>
<td>Alumina</td>
<td>Useful life</td>
<td>18</td>
</tr>
<tr>
<td>Minerals sands</td>
<td>Useful life</td>
<td>18</td>
</tr>
<tr>
<td>Diamonds</td>
<td>Useful life</td>
<td>18</td>
</tr>
<tr>
<td>Copper</td>
<td>Useful life/mine life</td>
<td>18</td>
</tr>
</tbody>
</table>

---

Results

Table Z below outlines the royalty return as a percentage of the mine-head value for 2012 and 2013. The 2013 results show that where the fewest deductions are included (netback method one) the current *ad valorem* rates are providing a return of roughly 8% of the mine-head value on an industry weighted average by production value. As more costs are included in the netback method, the return against the mine head increases, reaching 10.5% for netback method five.

If the netback calculation point was further upstream, where the minerals are in the ground (*in situ*), then the return in 2013 equates to 10.9% using netback method one. However, a different calculation point would require a different benchmark rate to maintain a fair return to the community. The benchmark would need to be 13.5% to achieve a 10% return on the mine head. Using 2013 figures revenue would be $6.8 billion.

Using netback method one, royalty revenue would increase to $6.8 billion to achieve the mine-head benchmark of 10% in 2013. Figure O shows that, to maintain this level of revenue as more costs are included in the netback method, the benchmark level would increase to 11%, 10.8%, 11.9% and 13% for netback methods two, three, four and five respectively. The Review’s preferred netback method, netback method two, provided a benchmark return of 8.7%.

Table AA shows the royalty rates required to deliver the increased revenue to meet the 10% benchmark. Rates are provided for each commodity, rather than by tier. In all cases, the royalty rates decline as more costs are included in the netback method thereby reducing the revenue required to achieve a 10% benchmark.

For iron ore the rate is the highest in 2013 for netback method one, at 8.7% (compared to the current rate of 7.5%), and falls to 7.2% in 2012 for netback method five. For gold the rate peaks at 7.1% for 2012 using netback method one, and falls to 3.1% in 2013 using netback method five. The results for alumina and nickel are well above the current rates for these commodities, at 3.6% and 3.9% respectively, for netback method one using 2012 data.

Iron ore and beneficiated iron ore provided the most consistent returns to mine head over the five netback methods due to higher profit margins in the industry. Including more costs in the netback calculation decreases the mine-head value. This affects industries with lower profit margins more than those with higher profit margins.

For nickel laterite, diamond and mineral sands there were many instances where the costs included in the netback method exceeded revenue, resulting in a negative return. For this reason, the Review did not consider the mine-head results for diamond and nickel laterite when assessing the royalty rates for these commodities.

Small mine–head values result in the return greatly exceeding 10%, even for netback method one. This is due to the sum of the costs upstream of the mine head being close to revenue.

For 2012 and 2013, the lowest mine-head return for iron ore was 8.7% for netback method one using 2013 data. The highest mine-head return was 10.4% for netback method five using 2012 data. These results are closest to the return for the overall sector for each netback method. This illustrates the influence iron ore has on mine-head returns due to its size relative to the sector as a whole.

The distribution of costs upstream and downstream of the mine head affected the mine-head return. For example, the proportion of costs to mine nickel laterite are low relative to the costs upstream of the mine head. This means that a greater proportion
of costs are netted-off to estimate the mine-head value, resulting in a lower
mine-head value and higher mine-head return. The reverse applies to nickel
sulphide, where mining costs are high relative to the costs of production upstream of
the mine head. This is illustrated in Table Z, where for nickel in 2013, the mine-head
return was 6.5% using netback method one and 9.7% using netback method two.

**Sensitivity analysis**

A sensitivity analysis was undertaken to determine how the return on the mine head
altered in response to changes in costs, price and the exchange rate. Table E
presents the results of some selected parameters and illustrates considerable
variability between commodities.

The relationship between costs and price and the mine-head return is non-linear,
with marginal commodities more sensitive to changes in costs and price. This means
that regular calibration of rates using the benchmark would be at the expense of
stability and certainty. Chapter 6 contains a more detailed discussion of this issue.

**Table Y: Sensitivity of the royalty return by commodity as a proportion of the
mine-head value, 2013 data, netback method 2**

<table>
<thead>
<tr>
<th></th>
<th>10% increase in price</th>
<th></th>
<th>10% increase in cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mine head</td>
<td>In situ</td>
<td>Mine head</td>
</tr>
<tr>
<td>Iron ore</td>
<td>-1.9%</td>
<td>-6.1%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Beneficiated iron ore</td>
<td>-2.1%</td>
<td>-7.2%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Gold</td>
<td>-7.4%</td>
<td>-128.4%</td>
<td>10%</td>
</tr>
<tr>
<td>Alumina</td>
<td>-46.2%</td>
<td>-52.8%</td>
<td>1,678%</td>
</tr>
<tr>
<td>Nickel laterite</td>
<td>-183.8%</td>
<td>87.3%</td>
<td>-70.7%</td>
</tr>
<tr>
<td>Nickel sulphide</td>
<td>-11.5%</td>
<td>-103.9%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Copper</td>
<td>-5.7%</td>
<td>-40.1%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Mineral sands</td>
<td>185.2%</td>
<td>19.4%</td>
<td>-41.7%</td>
</tr>
<tr>
<td>Diamond</td>
<td>76.3%</td>
<td>18.3%</td>
<td>-32.3%</td>
</tr>
</tbody>
</table>
### Table Z: Mine-head return for selected commodities

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.8%</td>
<td>8.7%</td>
<td>9.2%</td>
<td>9.1%</td>
<td>9.1%</td>
<td>8.9%</td>
<td>9.6%</td>
<td>9.4%</td>
</tr>
<tr>
<td>Beneficiated iron ore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.9%</td>
<td>5.9%</td>
<td>6.2%</td>
<td>6.2%</td>
<td>6.1%</td>
<td>6.0%</td>
<td>6.4%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Gold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.5%</td>
<td>3.7%</td>
<td>4.4%</td>
<td>4.8%</td>
<td>4.6%</td>
<td>5.2%</td>
<td>6.1%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Alumina</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.6%</td>
<td>5.9%</td>
<td>10.6%</td>
<td>17.2%</td>
<td>5.1%</td>
<td>6.8%</td>
<td>12.4%</td>
<td>23.4%</td>
</tr>
<tr>
<td>Nickel laterite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel sulphide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.2%</td>
<td>5.0%</td>
<td>6.5%</td>
<td>6.1%</td>
<td>12.4%</td>
<td>10.1%</td>
<td>22.6%</td>
<td>15.3%</td>
</tr>
<tr>
<td>Nickel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.5%</td>
<td>6.5%</td>
<td>10.3%</td>
<td>9.7%</td>
<td>25.8%</td>
<td>21.6%</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.1%</td>
<td>7.2%</td>
<td>9.2%</td>
<td>8.3%</td>
<td>9.2%</td>
<td>10.1%</td>
<td>12.9%</td>
<td>12.1%</td>
</tr>
<tr>
<td>Mineral sands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13.8%</td>
<td>15.2%</td>
<td>80.8%</td>
<td>NA</td>
<td>16.1%</td>
<td>18.6%</td>
<td>185.0%</td>
<td>NA</td>
</tr>
<tr>
<td>Diamond</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All commodities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.94%</td>
<td>8.08%</td>
<td>8.76%</td>
<td>8.87%</td>
<td>8.71%</td>
<td>8.73%</td>
<td>9.65%</td>
<td>9.59%</td>
</tr>
</tbody>
</table>

1. Iron ore as a whole (not split into lump and fines and beneficiated ore) returns 9.01% for netback method three.
2. When modelled as a whole nickel (i.e. not split into laterites and sulphides) returns 9.31% for netback method three.
3. Weighted average by value of production.

### Table AA: Royalty rates required to achieve the 10% mine-head benchmark for selected commodities

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Current royalty rate</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>2012</th>
<th>2013</th>
<th>2012</th>
<th>2013</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ore</td>
<td>7.5%</td>
<td>8.6%</td>
<td>8.7%</td>
<td>8.1%</td>
<td>8.2%</td>
<td>8.2%</td>
<td>8.4%</td>
<td>7.8%</td>
<td>8.0%</td>
<td>7.2%</td>
<td>7.5%</td>
<td></td>
</tr>
<tr>
<td>Beneficiated iron ore</td>
<td>5.0%</td>
<td>8.4%</td>
<td>8.5%</td>
<td>8.1%</td>
<td>8.1%</td>
<td>8.1%</td>
<td>8.3%</td>
<td>7.8%</td>
<td>7.9%</td>
<td>7.2%</td>
<td>7.4%</td>
<td></td>
</tr>
<tr>
<td>Gold</td>
<td>2.5%</td>
<td>7.1%</td>
<td>6.7%</td>
<td>5.7%</td>
<td>5.2%</td>
<td>5.4%</td>
<td>4.8%</td>
<td>4.1%</td>
<td>3.4%</td>
<td>4.0%</td>
<td>3.1%</td>
<td></td>
</tr>
<tr>
<td>Alumina</td>
<td>1.65%</td>
<td>3.6%</td>
<td>2.8%</td>
<td>1.6%</td>
<td>1.0%</td>
<td>3.3%</td>
<td>2.4%</td>
<td>1.3%</td>
<td>0.7%</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>2.5%</td>
<td>3.9%</td>
<td>3.9%</td>
<td>2.4%</td>
<td>2.6%</td>
<td>1.0%</td>
<td>1.2%</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>5.0% or 2.5%</td>
<td>7.0%</td>
<td>6.9%</td>
<td>5.4%</td>
<td>6.0%</td>
<td>5.4%</td>
<td>5.0%</td>
<td>3.9%</td>
<td>4.1%</td>
<td>3.9%</td>
<td>3.6%</td>
<td></td>
</tr>
</tbody>
</table>

1. 2.5% of the contained nickel
Figure O: Benchmark level required for each netback method to avoid a fall in revenue, 2013 data, mine head and \textit{in situ}
Royalties Compared to the Benchmark Over Time

Since 2001, the Department of Mines and Petroleum has compared the royalty return for some commodities against the mine-head benchmark. This internal analysis was limited to the years 2001-02, 2004-05, 2010, 2012 and 2013. For ease of calculation, and based on data availability, the mine-head value was calculated by netting off direct costs and an allocation for a straight-line depreciation charge (netback method one). Cost data was extracted from company reports, estimated or adjusted using data from other jurisdictions.

The Review re-estimated the Department of Mines and Petroleum’s analysis for iron ore, gold nickel and alumina using the preferred netback method. These commodities were selected because reliable data on them was available. The average return for the four commodities for the five years was 7.8%. The lowest return was 5.75% in 2004, while the highest return was 8.9% in 2013 (see Figure P). The results for each commodity are illustrated in the graphs below. Additional analysis is included in Chapter 10 of the Report.

Figure P: Average mine-head return for iron ore, gold, nickel and alumina
**Iron ore**

For the five years examined by the Review, on average the royalty paid by producers was approximately 8% of the mine-head value.

In 2001, prices and margins in the iron ore industry were relatively low, meaning the royalty paid was a higher percentage of the mine-head value and exceeded the benchmark level of 10%. After 2004, the increase in iron ore prices outpaced cost increases with downstream costs forming a smaller proportion of the sale price than in 2001. As a result, the royalty paid was a lower percentage of the mine-head value and below the benchmark level of 10%.

The concessional royalty rates that applied to iron ore until July 2013 resulted in a lower royalty return as a percentage of the mine-head value for the five years examined by the Review. The lighter bars in Figure Q demonstrate the royalty that producers would have paid if a rate of 5% applied to beneficiated iron ore and a rate of 7.5% applied to iron ore fines.

**Figure Q: Iron ore royalty payments and the iron ore price (nominal)**

![Figure Q: Iron ore royalty payments and the iron ore price (nominal)](source: Western Australian Department of Mines and Petroleum.)
**Gold**

The 2.5% *ad valorem* rate that applies to gold has provided a relatively consistent return of approximately 4.3% of the mine-head value in the five years. A persistent correlation between costs and price in the gold industry means that the mine-head value is a relatively constant proportion of the sale price. This was evident in 2010, 2012 and 2013 when the gold price was significantly higher than a decade earlier, but the royalty paid remained at about 4.6% of the mine-head value (Figure R).

For the five years examined, the return to the community provided by the gold industry was consistently below the return provided by other commodities. For example, the average industry return, weighted by value of production, varied between approximately 6% and 9%.

**Figure R: Gold royalty payments and the gold price (nominal)**

**Nickel**

Nickel has undergone significant price fluctuations over the past 13 years, and costs have risen steadily. The nickel price rose from around $11,000 a tonne in 2001 to around $18,000 a tonne in 2005. Within two years, the price increased by around 230% to around $43,000 a tonne in 2007, before halving in the following year (Figure S). In 2001, 2004 and 2010 costs rose at about the same rate as price, resulting in a consistent return of between 4% and 6% of the mine-head value. From 2010, the lower nickel price was not accompanied by decreased costs, increasing the netback deductions as a proportion of price resulting in a relatively low mine-head value. This meant the royalty return increased to close to 10% of the mine-head value.

**Figure S: Nickel royalty payments and the nickel price (nominal)**

**Alumina**

The 1.65% *ad valorem* rate for alumina has provided a varied royalty return compared to the mine-head value over the five years examined by the Review (Figure T). In 2001 and 2010, the royalty return was materially below the return provided by other commodities. The relatively low return up to 2010 was due to higher margins in the alumina industry at the time. In 2012, the return increased and in 2013, the return was materially above the return provided by other commodities. The higher return in 2012 and 2013 was due to rising costs increasing the value of deductions in the netback calculation, resulting in a decreased mine-head value.

**Figure T: Alumina royalty payments and the alumina price**

Source: Bureau of Resource and Energy Economics.
## Appendix 2: Western Australian Royalty Rates

Table BB: Royalty rates administered under the *Mining Act 1978*

<table>
<thead>
<tr>
<th>Royalty rate</th>
<th>Royalty system</th>
<th>Commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.62 a tonne&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Specific rate</td>
<td>Limestone&lt;sup&gt;2&lt;/sup&gt;, salt, clay, dolomite, gypsum, construction materials</td>
</tr>
<tr>
<td>$1.00 a tonne&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Specific rate</td>
<td>Silica, limestone-lime earth&lt;sup&gt;3&lt;/sup&gt;, talc</td>
</tr>
<tr>
<td>$1.00 a tonne&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Specific rate</td>
<td>Domestically sold coal</td>
</tr>
<tr>
<td>$1.50 a tonne&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Specific rate</td>
<td>Ilmenite&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>2.5%&lt;sup&gt;7&lt;/sup&gt;</td>
<td>Ad valorem</td>
<td>Gold, silver, copper, lead, zinc, nickel, tin, cobalt, platinoids, garnet, ferrovanadium</td>
</tr>
<tr>
<td>5.0%&lt;sup&gt;8&lt;/sup&gt;</td>
<td>Ad valorem</td>
<td>Copper, iron ore (beneficiated) lead, zinc, mineral sands (ilmenite,&lt;sup&gt;9&lt;/sup&gt; leucoxene, rutile, zircon), kaolin, magnetite, chromite, cobalt, manganese ore, lithium minerals, attapulgite, tantalum, uranium oxide, garnet, feldspar, ochre, vanadium oxide</td>
</tr>
<tr>
<td>7.5%&lt;sup&gt;11&lt;/sup&gt;</td>
<td>Ad valorem</td>
<td>Export coal, bauxite, gemstone, iron ore (lump and fines), manganese ore, diamond&lt;sup&gt;12&lt;/sup&gt;</td>
</tr>
<tr>
<td>2.5%</td>
<td>Contained minerals</td>
<td>Nickel, rare earth elements, tin&lt;sup&gt;13&lt;/sup&gt;</td>
</tr>
<tr>
<td>5.0%</td>
<td>Contained minerals</td>
<td>Contained vanadium where the vanadium value is not realised</td>
</tr>
</tbody>
</table>

Note: Any other mineral not specifically listed in the *Mining Regulations 1981*, if sold as crushed or screened material, the rate is 7.5% of the royalty value, or if sold as a concentrate, the rate is 5% of the royalty value.

1. This indexed rate applies to production between 1 July 2010 and 30 June 2015. The rate is indexed to the Non-metallic Mineral Products Price Index, for the quarter ending on the 31 March before the beginning of the relevant period, published by the Australian Bureau of Statistics in Catalogue 6427.0 Producer Price Indexes. The next relevant period begins 1 July 2015 and ends 30 June 2020. See *Mining Regulations 1981 (WA)* reg 86(2a)-(2d).
2. Used for agricultural or construction purposes.
3. Used for metallurgical purposes.
4. This is the un-indexed rate. The rate is adjusted each year on 30 June by the percentage increase in the average ex-mine value of Collie coal for the year ending on that date when compared with the corresponding value of Collie coal for the year ending on 30 June 1981.
5. This is the un-indexed rate. The rate was last calculated and used in 2005 at the indexed rate of $3.13 a tonne.
6. Feedstock that is not of marketable quality.
7. Sold in metallic form.
8. The first 2500 ounces of production are exempt from royalty.
10. Feedstock that is of marketable quality.
11. Sold as bulk, crushed or screened.
12. Diamonds produced at the Ellendale diamond mine are subject to *Mining (Ellendale Diamond Royalties) Regulations 2002*.
### Table CC: Royalties administered under State Agreement Acts

<table>
<thead>
<tr>
<th>Commodity</th>
<th>State Agreement Acts</th>
<th>Royalty rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alumina</td>
<td>Alumina Refinery Agreement Act 1961</td>
<td>1.65%</td>
</tr>
<tr>
<td></td>
<td>Alumina Refinery (Pinjarra) Agreement Act 1969</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alumina Refinery (Worsley) Agreement Act 1973</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alumina Refinery (Wagerup) Agreement Act 1978</td>
<td></td>
</tr>
<tr>
<td>Uranium</td>
<td>Uranium (Yeelirrie) Agreement Act 1978</td>
<td>3.5%</td>
</tr>
<tr>
<td>Diamonds</td>
<td>Diamond (Argyle Diamonds Mines Joint Venture) Agreement Act 1981</td>
<td>5%</td>
</tr>
<tr>
<td>Iron ore</td>
<td>Iron Ore (Channar Joint Venture) Agreement Act 1987</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Goldsworthy-Nimingarra) Agreement Act 1972</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Hamersley Range) Agreement Act 1963</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Hamersley Range) Agreement Act Amendment Act 1968</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Hope Downs) Agreement Act 1992</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Marillana Creek) Agreement Act 1991</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Mount Bruce) Agreement Act 1972</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Mount Goldsworthy) Agreement Act 1964</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Mount Newman) Agreement Act 1964</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Robe River) Agreement Act 1964</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Wittenoom) Agreement Act 1972</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore (Yandicoogina) Agreement Act 1996</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act 2002</td>
<td></td>
</tr>
</tbody>
</table>

Note: State Agreement Acts prescribing salt royalty rates are detailed in Table DD.

### Table DD: Salt royalties administered by State Agreement Acts

<table>
<thead>
<tr>
<th>State Agreement Act</th>
<th>Production tiers (tonnes)</th>
<th>Rate/tonne</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dampier Solar Salt Industry Agreement Act 1967</td>
<td>Below 508,025</td>
<td>$0.144430</td>
<td>Dampier Salt (Dampier)</td>
</tr>
<tr>
<td></td>
<td>508,025-1,016,047</td>
<td>$0.180530</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 1,016,047</td>
<td>$0.216640</td>
<td></td>
</tr>
<tr>
<td>Evaporites (Lake MacLeod) Agreement Act 1967</td>
<td>Below 508,025</td>
<td>$0.389030</td>
<td>Dampier Salt (Lake MacLeod)</td>
</tr>
<tr>
<td></td>
<td>508,025-1,016,047</td>
<td>$0.486290</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 1,016,047</td>
<td>$0.583550</td>
<td></td>
</tr>
<tr>
<td>Leslie Solar Salt Industry Agreement Act 1966</td>
<td>Below 508,025</td>
<td>$0.254703</td>
<td>Dampier Slat (Port Hedland)</td>
</tr>
<tr>
<td></td>
<td>508,025-1,016,047</td>
<td>$0.318379</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 1,016,047</td>
<td>$0.382055</td>
<td></td>
</tr>
<tr>
<td>Onslow Solar Salt Agreement Act 1992</td>
<td>Below 508,025</td>
<td>$0.317978</td>
<td>Onslow Salt</td>
</tr>
<tr>
<td></td>
<td>508,025-1,016,047</td>
<td>$0.397472</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 1,016,047</td>
<td>$0.476967</td>
<td></td>
</tr>
<tr>
<td>Shark Bay Solar Salt Industry Agreement Act 1983</td>
<td>Below 508,025</td>
<td>$0.339150</td>
<td>Shark Bay Salt</td>
</tr>
<tr>
<td></td>
<td>508,025-1,016,047</td>
<td>$0.423940</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 1,016,047</td>
<td>$0.508730</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix 3: Australian Royalty Rates by State and Territory

Table EE: Australian royalty rates by state and territory, excluding basic raw materials

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty type</th>
<th>Ad valorem or profit rate (%)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Australia¹</td>
<td>Specific/ad valorem</td>
<td>1.65-7.5</td>
<td>Mainly <em>ad valorem</em>: in general, ores 7.5%, concentrates 5%, and metals 2.5%. Gold is 2.5% based on price. Export coal is 7.5%, specific royalty on coal not exported.</td>
</tr>
<tr>
<td>Queensland²</td>
<td>Specific/ad valorem</td>
<td>2.5-12.5</td>
<td>Coal 7-12.5%, other minerals – fixed rate option 2.7%, variable rate option 2.5-5% based on price.</td>
</tr>
<tr>
<td>New South Wales³</td>
<td>Specific/ad valorem</td>
<td>4.0-8.2</td>
<td>Coal – deep underground 6.2%, other underground 7.2%, open cut 8.2%; other minerals 4% ex-mine; exception is profit royalty for specified Broken Hill mines.</td>
</tr>
<tr>
<td>Northern Territory⁴</td>
<td>Profit</td>
<td>20</td>
<td>Based on net value of production where the first $50,000 is not liable to royalty.</td>
</tr>
<tr>
<td>Victoria⁵</td>
<td>Ad valorem</td>
<td>2.75</td>
<td>Maximum total royalty is 5.35% of net sales. A rebate of 20% is available for the production of a metal within the State.</td>
</tr>
<tr>
<td>Tasmania⁶</td>
<td>Specific/hybrid</td>
<td>1.9% on net sales plus profit royalty</td>
<td></td>
</tr>
<tr>
<td>South Australia⁷</td>
<td>Specific/ad valorem</td>
<td>3.5-5.0</td>
<td>Refined products and industrial 3.5%, ores and concentrates 5%, extractive 55 cents a tonne. New mines may qualify for a concessional rate of 2.0% for the first five years. A concessional rate of 1.5% may apply to mines that were operating prior to 1 July 2011, for a period of up to five years.</td>
</tr>
</tbody>
</table>

---

¹. Mining Regulations 1986 (WA).
². Mineral Resources Regulation 2013 (Qld).
³. Mining Regulation 2010 (NSW).
⁵. Mineral Resources (Sustainable Development) Act 1990 (Vic).
⁷. Mining Act 1971 (SA).
<table>
<thead>
<tr>
<th>Commodity</th>
<th>WA</th>
<th>Qld</th>
<th>SA</th>
<th>NSW</th>
<th>Tas</th>
<th>Vic</th>
</tr>
</thead>
</table>
| Aggregate                          | $0.62    | n/a | $0.55| n/a  | n/a  | 2.75%
| Building stone                     | $1.00    | $1.00| $0.55| Dimension stone is 3.5% of sales value | $0.70 | Dimension stone and marble are $3.23 |
| Building stone                     |          |     |      |      |      |      |
| Clays                              | $0.62    | $0.50| $0.55| $0.35| $1.32| 2.75%
| Dolomite                           | $0.62    | $1.00| 3.5% of sales value | $0.40 | chemical and metallurgical use - $1.32; other uses - $0.66 |
| Feldspar                           |          |     | 5%   | $0.75| $0.70| 2.75%
|                              |          |     |      |      |      |      |
| Gravel                             | $0.62    | $0.50| $0.55| n/a  | $0.66| 2.75%
| Gypsum                             | $0.62    | $0.50| 3.5% of sales value | $0.35 | 1.9% on net sales plus profit royalty |
| Kaolin                             |          | $1.00| 3.5% of sales value | $0.70 | $1.32 | 2.75%
| Limestone - lime earth (agricultural or construction) | $0.62 | $0.50| 3.5% of sales value | $0.35 | $0.66 | 2.75%
| Limestone - lime earth (metallurgical) | $1.00 | $0.50| 3.5% of sales value | limestone is $0.40 | $1.32 | 2.75%
| Rock                               | $0.62    | $0.50| $0.55| quartzite is $0.70 | 1.9% on net sales plus profit royalty |
|                                  |          |     |      |      |      |      |
| Salt                               | $0.62    | $1.50| 3.5% of sales value | $0.40 | crushed and broken stone - $0.66 | Stone is $0.87 |
| Sand                               | $0.62    | $0.50| $0.55| n/a  | $0.66 | 2.75%
| Silica                             | $1.00    | $0.90| 3.5% of sales value | ores of silicon are 4% of ex mine value | $0.66 | metallurgical use - $1.32 or 5.35% of sales value, whichever is greater; other uses - $0.66 |
| Talc                               | $1.00    | n/a | 3.5% of sales value | $0.70 | 1.9% on net sales plus profit royalty | 2.75%

1. Mining Regulations 1986 (WA) reg 86.
2. Mineral Resources Regulation 2013 (Qld) sch 3 cl 3.
5. Mineral Resources Regulations 2006 (Tas) reg 7 and sch 1; Note, 1.9% on net sales plus profit royalty of up to a maximum of 5.35% of net sales.
### Appendix 4: Royalty Structures in International Jurisdictions

**Table GG: Royalty structures in North America**

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty type</th>
<th>Ad valorem or profit rate</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>Ad valorem/profit</td>
<td>2%/13%</td>
<td><em>Ad valorem</em> is minimum tax (fully deductible against profit royalty); losses can be carried forward under profit royalty.</td>
</tr>
<tr>
<td>Northwest Territories</td>
<td>Profit</td>
<td>5-14%</td>
<td>Sliding scale; no tax if income below CAN$10,000.</td>
</tr>
<tr>
<td>Ontario</td>
<td>Profit</td>
<td>105</td>
<td>No tax if income below CAN$500,000; tax reductions for mines in remote regions.</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>Ad valorem/profit</td>
<td>5%/10%</td>
<td>Mainly profit royalty; 5% rate increases to 10% rate when production threshold is exceeded, capital recovery based on 150% of expenditures; exceptions are <em>ad valorem</em> on coal (15% less 1% resource credit) and uranium (5% less 1% resources allowance).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty type</th>
<th>Ad valorem or profit rate</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>Ad valorem</td>
<td>2% or higher</td>
<td>Commissioner to set rate.</td>
</tr>
<tr>
<td>Michigan</td>
<td>Ad valorem</td>
<td>2-7%</td>
<td>Sliding scale.</td>
</tr>
<tr>
<td>Nevada</td>
<td>Profit</td>
<td>2.5%</td>
<td>Sliding scale.</td>
</tr>
</tbody>
</table>

**Table HH: Royalty structures in South America**

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty type</th>
<th>Ad valorem or profit rate</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td><em>Ad valorem</em></td>
<td>0-3%</td>
<td>Most jurisdictions do not apply a royalty; federal government imposes a maximum rate of 3% of mine-head value.</td>
</tr>
<tr>
<td>Bolivia</td>
<td><em>Ad valorem</em></td>
<td>1-6%</td>
<td>Sliding scale based on price; rate is 60% lower for domestic use.</td>
</tr>
<tr>
<td>Brazil</td>
<td><em>Ad valorem</em></td>
<td>0.2-3%</td>
<td>Rates for copper with sliding scale based on annual sales; other rates not available.</td>
</tr>
<tr>
<td>Chile</td>
<td><em>Ad valorem</em></td>
<td>0-5%</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td><em>Ad valorem</em></td>
<td>1-3%</td>
<td>Sliding scale based on annual sales in US dollars; 1% if no international price; small miners exempt.</td>
</tr>
<tr>
<td>Venezuela</td>
<td><em>Ad valorem</em></td>
<td>3-4%</td>
<td></td>
</tr>
</tbody>
</table>
### Table II: Royalty structures in Africa

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty type</th>
<th>Ad valorem or profit rate</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botswana</td>
<td><em>Ad valorem</em></td>
<td>3-10%</td>
<td>Precious stones 10%, precious metals 5%, other 3%.</td>
</tr>
<tr>
<td>Ghana</td>
<td><em>Ad valorem</em></td>
<td>3-12%</td>
<td>Rate graduated on operating profit.</td>
</tr>
<tr>
<td>Mozambique</td>
<td><em>Ad valorem</em></td>
<td>3-12%</td>
<td>Diamonds 10-12%, other 3-8%; rate negotiable; artisanal miners exempt.</td>
</tr>
<tr>
<td>Namibia</td>
<td><em>Ad valorem</em></td>
<td>5-10%</td>
<td>Uncut precious stones 10%, other maximum 5%.</td>
</tr>
<tr>
<td>South Africa</td>
<td><em>Ad valorem</em></td>
<td>1.5-4%</td>
<td>Lower rates apply to refined product.</td>
</tr>
<tr>
<td>Tanzania</td>
<td><em>Ad valorem</em></td>
<td>0-5%</td>
<td>Diamonds 5%, cut and unpolished gemstones 0%, other 3%.</td>
</tr>
<tr>
<td>Zambia</td>
<td><em>Ad valorem</em></td>
<td>2%</td>
<td>Small miners exempt, no royalty for local processing.</td>
</tr>
</tbody>
</table>

### Table JJ: Royalty structures in Asia

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Royalty type</th>
<th>Ad valorem or profit rate</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td><em>Ad valorem</em> and specific</td>
<td>1-4%</td>
<td>Combined royalty, specific rate vary.</td>
</tr>
<tr>
<td>India</td>
<td><em>Ad valorem</em> and specific</td>
<td>0.4-20%</td>
<td>Specific rates vary.</td>
</tr>
<tr>
<td>Indonesia</td>
<td><em>Ad valorem</em> and specific</td>
<td>2.5-13.5%</td>
<td>Specific royalty mainly applies and rates vary; <em>ad valorem</em> applies to gold, 2.5% (placer gold, 7.5%) and coal, 13.5%.</td>
</tr>
<tr>
<td>Mongolia</td>
<td><em>Ad valorem</em></td>
<td>2.5%</td>
<td>Exception is placer gold, which a rate of 7.5% applies.</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td><em>Ad valorem</em></td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td><em>Ad valorem</em> and specific</td>
<td>2%</td>
<td><em>Ad valorem</em> generally applies with specific royalty on coal; small miners exempt.</td>
</tr>
</tbody>
</table>
**Glossary**

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequacy</td>
<td>The royalty system should return sufficient revenue to support Government spending on services and investment.</td>
</tr>
<tr>
<td>Ad valorem</td>
<td>Latin for 'based on value'. <em>Ad valorem</em> royalties apply as a percentage of the value of the mineral.</td>
</tr>
<tr>
<td>Basic raw materials</td>
<td>Typically low value products used for construction and agricultural purposes.</td>
</tr>
<tr>
<td>Benchmark calculation point</td>
<td>The point in the production chain where the benchmark is applied. For example, mine head or in situ.</td>
</tr>
<tr>
<td>Beneficiated ore</td>
<td>Iron ore that has been concentrated or upgraded otherwise than by crushing, screening, separating by hydrocycloning or a similar technology, washing, scrubbing, trammelling or drying, or by a combination of two or more of those processes.</td>
</tr>
<tr>
<td>Bulk commodity</td>
<td>A mineral that is transported in large quantities. For example, coal and iron ore.</td>
</tr>
<tr>
<td>By-product</td>
<td>A secondary product resulting from the extraction or processing (or similar) of the primary product.</td>
</tr>
<tr>
<td>Capital base</td>
<td>The value of the capital assets of a business or operation.</td>
</tr>
<tr>
<td>Commonwealth Grants Commission</td>
<td>An independent statutory authority that recommends how to allocate general revenue assistance between the States and Territories. The Commission presents recommendations to the Commonwealth Government.</td>
</tr>
<tr>
<td>Concentrate</td>
<td>A material that has undergone physical or chemical processing to increase the concentration of useful mineral(s) and remove waste.</td>
</tr>
<tr>
<td>Concessional royalty rate</td>
<td>A royalty rate that is lower than would typically apply due to government policy.</td>
</tr>
<tr>
<td>Contained mineral system</td>
<td>A royalty calculation method where the royalty is calculated based on the value of mineral within the product. Refer to Chapter 3 for calculation formula.</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>The cost of the funds used to finance a business or operation.</td>
</tr>
</tbody>
</table>

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304 Ibid, 3.

305 *Mining Regulations 1981 (WA)* reg 86.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct shipping ore</td>
<td>Ore that is of sufficient quality to be exported without processing.</td>
</tr>
<tr>
<td>Downstream</td>
<td>Any point in the production chain that occurs after a specified reference point.</td>
</tr>
<tr>
<td>Efficiency</td>
<td>The royalty system should not reduce the productive capacity of the economy, or unduly deter or distort employment and investment decisions.</td>
</tr>
<tr>
<td>Equity</td>
<td>The royalty system should return fair and appropriate compensation to the community for the loss of its resources, and treat producers equitably so that similar projects are required to make similar royalty payments.</td>
</tr>
<tr>
<td>Ex mine</td>
<td>The Review considers this to mean the mine head.</td>
</tr>
<tr>
<td>Feedstock</td>
<td>The mineral product used as an input to a production process. For example, ilmenite is a feedstock for synthetic rutile production.</td>
</tr>
<tr>
<td>Fines ore</td>
<td>Iron ore of a maximum size of 6.3 millimetres.</td>
</tr>
<tr>
<td>Free-on-board</td>
<td>The value of the mineral when placed on the ship for export at the company’s wharf.</td>
</tr>
<tr>
<td>Horizontal fiscal equalisation</td>
<td>The transfer of payments or grants across States and Territories with the aim of offsetting differences between a jurisdiction’s revenue raising capacity and expenditure needs.</td>
</tr>
<tr>
<td>Hybrid royalty system</td>
<td>A royalty system combining ad valorem and profit-based royalty rates.</td>
</tr>
<tr>
<td>In situ value</td>
<td>The value of the ore in the ground prior to extraction.</td>
</tr>
<tr>
<td>Lump ore</td>
<td>Iron ore of a size between 6.3 and 31.5 millimetres.</td>
</tr>
<tr>
<td>Metallurgical purposes</td>
<td>A mineral used primarily for its metallurgical content.</td>
</tr>
<tr>
<td>Mine-head return</td>
<td>The royalty return as a percentage of the mine head value.</td>
</tr>
<tr>
<td>Mine head</td>
<td>The first point at which the ore could be stockpiled once extracted from the mine.</td>
</tr>
<tr>
<td>Mine-head value</td>
<td>The value of the ore at the first point at which the ore could be stockpiled once extracted from the mine.</td>
</tr>
<tr>
<td>Metallic form</td>
<td>A mineral that has been processed to a metal.</td>
</tr>
<tr>
<td>Multi-factor productivity</td>
<td>The efficiency at which combined labour and capital inputs are transformed into outputs.</td>
</tr>
</tbody>
</table>

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307 Ibid, 1.
308 Ibid.
310 Ibid.
312 Geoscience Australia, above n 309.
313 Western Australian Department of State Development, Stakeholder Consultation Paper, above n 303, 3.
Netback calculations
The process of deducting a set of costs from the royalty value to approximate the value of the mineral at the benchmark calculation point (mine head or in situ).

Netback deductions
The costs deducted from the royalty value to approximate the value of the benchmark calculation point (mine head or in situ).

Netback method
The set of netback deductions used to approximate the value of the benchmark calculation point (mine head or in situ).

Price takers
A producer that does not have the market power to influence prices. For example, there are many competing producers or the demand for the good is sensitive to changes in price.

Return of capital
Provision of funding for the replacement of assets depleted in the course of their useful operational life.

Return on capital
A return on funds invested by the equity and debt holders.

Royalty
A payment made to the owner of a resource to compensate for the extraction of the resource.315

Royalty return
The value of the royalty payment.

Royalty value
The value of the minerals to which the royalty rate is applied for calculating the royalty payable.

Run of mine stockpile
Where the resource is placed after extraction ready for the next unit of production.316

Sale point
The point in the production chain where an arm’s length sale of minerals occurs.

Saleable form
A product that is marketable

Specific-rate royalties
A royalty payable at a fixed amount per tonne.

Spot prices
The price at which a product can be traded immediately that is not subject to ongoing pricing contracts.

Stability and predictability
The royalty system should provide stable and predictable revenue to allow Government to plan and deliver services sustainably, and to provide proponents with a stable and competitive royalty framework when planning projects.317

314 Australian Bureau of Statistics, Productivity (9 October 2012) 1370.0.55.001 – Measures of Australia’s Progress: Summary Indicators
http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0.55.001~2012~Main%20Features~Productivity~2
316 Western Australian Department of State Development, Stakeholder Consultation Paper, above n 303, 3.
317 Western Australian Department of State Development, Stakeholder Consultation Paper, above n 303, 3.
State Agreements

Contracts between the Government of Western Australia and proponents of major resources projects which are ratified by an Act of the State Parliament. They specify rights, obligations, terms and conditions for development of the project and establish a framework for ongoing relations and cooperation between the State and the project proponent.\textsuperscript{318}

State Energy Commission

The organisation responsible for electricity and gas supply in Western Australia from 1975 to 1995.

Transparency and simplicity

The royalty system should be simple for Government to administer, and for proponents to comply with and understand.\textsuperscript{319}

Upstream

Any point in the production chain that occurs before a specified reference point.

Value-adding

The act of processing, refining, treating or similar to increase the value of the product.

Well-head value

The value of the petroleum at the first point of extraction from the ground.

\textsuperscript{318} Ibid.
\textsuperscript{319} Ibid.
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*Mining Act 1971*

*Mining Regulations 2011*

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