

CHAPTER

1

OWNERSHIP OF MINERALS AND NATURAL RESOURCES

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1.1 Introduction

Australia has a vast range of renewable and non-renewable energy resources. These resources generate energy for domestic and international consumers for a range of different residential and industrial purposes. The acceleration of climate change and the need to reduce anthropogenic greenhouse gas emissions has created new opportunities to generate energy in a less carbon-intensive manner. The shift away from carbon-intensive fossil fuel energy generation has accelerated markets for renewable energy generation from kinetic processes such as solar, wind and hydrogen.

Historically, the energy framework in Australia has been dominated by non-renewable energy generation. This is largely a consequence of the country's extensive coal and gas reserves. Black and brown coal reserves are particularly prevalent in the eastern states of New South Wales and Victoria. Australia's identified conventional gas resources are extensive and extraction has increased threefold over the past two decades despite the accelerating climate emergency. Most of the recoverable reserves of conventional gas are located off the west and north-west coasts.¹ Unconventional coal seam gas is located in the black coal deposits of Queensland and New South Wales, and some of the world's largest shale gas reserves are located in the Northern Territory and Central and Western Australia.²

The Gorgon natural gas project, on Barrow Island off the Pilbara coast in Western Australia, is one of the largest such projects in the world. This project, along with the North West Shelf, Pluto LNG and Darwin LNG, has made Australia one of the world's biggest producers of liquid natural gas (LNG). Companies turn natural gas into a pressurised liquid in order to transport it for overseas markets, making LNG a global commodity. In 2021, Australia surpassed Qatar to become the world's biggest exporter of LNG.³ On the other hand, it imports approximately 90 per cent of its transport fuels, such as crude oil and liquefied petroleum, and it has closed down much of its refinery capacity.⁴

Despite the dominance of fossil fuels, Australia also has a plentiful supply of renewable resources, derived from sunlight, wind, hydrogen, biomass, geothermal energy, hydro-power, ocean resources and biofuels.⁵ Renewable resources are pivotal to a decarbonising economy. Statistics from 2021 reveal that 24 per cent of Australia's electricity was derived from renewable energy in 2020, up from 21 per cent in 2019.⁶

- 1 Geoscience Australia indicates that Australia has identified resources of approximately 273 000 petajoules (PJ) and prospective and potentially recoverable gas resources of between 500 000 and 2 000 000 PJ. Australia currently produces approximately 5000 PJ a year. See Australian Government, Geoscience Australia, *Australia's Energy Commodity Resources 2021, Gas* <<https://www.ga.gov.au/digital-publication/aecr2021/gas>>.
- 2 The largest shale gas reserve is the Canning Basin in the north of Western Australia. The Georgina and Beetaloo basins in the Northern Territory are also extensive, as is the Cooper Basin in Central Australia.
- 3 J Lewis, 'Australia Remains World's Top LNG Exporter But it Could Lose its Crown this Year', *Upstream* (19 January 2022) <<https://www.upstreamonline.com/lng/australia-remains-worlds-top-lng-exporter-but-it-could-lose-its-crown-this-year/2-1-1147625>>.
- 4 Australian Institute of Petroleum, *Imports of Transport Fuels* (1 September 2017) <<https://www.aip.com.au/resources/imports-transport-fuels>>.
- 5 *Ibid.*
- 6 Australian Government, Department of Climate Change, Energy, the Environment and Water, *Australian Energy Update 2021* (14 September 2021) <<https://www.energy.gov.au/publications/australian-energy-update-2021>>.

The shift to renewable energy has been driven by the imperatives of the climate emergency. However, prior to the Industrial Revolution, renewable energy was the only viable energy option. Wind and water were utilised to power ships and to turn windmills and water wheels for mechanical purposes.⁷ It was only after the Industrial Revolution that energy requirements expanded, leading to a dramatic increase in the use of coal for steel and electricity. Black coal was first mined in 1799 from outcrops near Newcastle, and in 1801 the first export of Australian coal occurred when 150 tonnes was sent to India.⁸ Up until 1974, coal was extracted from underground mines. The advent of open-cut mines led to a dramatic expansion of the coal market in Australia, with coal eventually becoming Australia's second-largest resource export after iron ore. However, the global coal market is declining because it is no longer sustainable to generate energy from carbon-intensive fossil fuels. Eventually, once technology progresses, renewable generation will completely displace coal and gas.⁹

In Australia, the imperatives of climate change are driving the rapid commercialisation of energy resources with lower greenhouse gas emissions.¹⁰ However, this trend has been impeded by the underdevelopment of technology. In 2021, Australian energy consumption was still dominated by coal and gas, which accounted for approximately 40 per cent and 22 per cent, respectively, of electricity generation. Nevertheless, the share of renewable generation is gradually increasing. If it reaches 100 per cent by 2030, Australia will see a 44.5 per cent cut in carbon emissions on 2005 levels.¹¹

1.2 Ownership of the subsurface strata at common law

Fossil fuels that reside within the subsurface strata, and which are extracted to generate energy, are amenable to ownership and control. Most Australian states and territories have vested the ownership of fossil fuels in the government pursuant to statutory vesting provisions. This includes coal, gas and uranium. Legislation in most states deals with the ownership of coal, gas and uranium in separate legislation because of their different corporeal characteristics. Gas is an organic compound that consists primarily of hydrogen and carbon. Coal is a sedimentary rock formed from peat by the pressure of rocks laid down on top and is predominantly composed of carbon but can also contain hydrogen, sulphur, oxygen and nitrogen. Uranium is a heavy metal that occurs in both rocks and seabeds and is used as a concentrated source of energy from its slow radioactive decay.

- 7 See B Sorenson, 'A History of Renewable Energy Technology' (1991) (January/February) *Energy Policy* 8, 10–12. See also B Sorenson, *A History of Energy: Northern Europe from the Stone Age to the Present Day* (Earthscan, 2012).
- 8 RJ Cameron, *Year Book Australia No. 66, 1982* (Australian Bureau of Statistics, 1990); MB Huleatt, 'Bureau of Mineral Resources, Geology and Geophysics' (1981) *Australian Mineral Industry Quarterly* 34.
- 9 See D Kammen, 'The Rise of Renewable Energy' (2006) 295(3) *Scientific American* 82, 85. See also M Cunningham, L Van Uffelen and M Chambers, 'The Changing Global Market for Australian Coal', *Reserve Bank of Australia Bulletin*, September 2019 <<https://www.rba.gov.au/publications/bulletin/2019/sep/the-changing-global-market-for-australian-coal.html>>.
- 10 See D Gielen, F Boshell, D Morgan, D Bazilian, N Wagner and R Gorini, 'The Role of Renewable Energy in the Global Energy Transformation' (2019) 24 *Energy Strategy Reviews* 38.
- 11 Clean Energy Council, 'Roadmap to Net-Zero: Australia Can Be Powered by Renewable Energy by 2030' (Media Release, 30 September 2021) <<https://www.cleanenergycouncil.org.au/news/roadmap-to-net-zero-australia-can-be-powered-by-renewable-energy-by-2030>>.

In Queensland, the *Mineral Resources Act 1989* defines minerals in s 6 to include a ‘substance, normally occurring naturally as a part of the earth’s crust; or dissolved or suspended in water or within the earth’s crust; or capable of being extracted from’ the earth’s crust or water in the earth’s crust. This includes clay, sand, coal seam gas, limestone, marble, peat, salt, oil shale, and rock mined in slabs for building purposes. Soil, sand, gravel, rock, living matter, steam and water are explicitly excluded from the definition of a mineral. In Western Australia, the *Mining Act 1978* defines a mineral as a ‘naturally occurring substance which may be obtained from the land by mining operations, but which does not include, inter alia, soil, anything coming within the application of the *Petroleum and Geothermal Energy Resources Act 1967* (WA) or the *Petroleum (Submerged Lands) Act 1982* (WA), a meteorite or shale’. Both of these definitions are broad enough to include uranium. Other states have similar provisions.¹²

The *Petroleum and Gas (Production and Safety) Act 2004* (Qld) defines petroleum as ‘a substance consisting of hydrocarbons that occurs naturally in the earth’s crust’, a substance that is ‘extracted or produced as a by-product of ... hydrocarbon’, or a fluid that is extracted from coal or oil shale and consists of hydrocarbons. Section 10(3) excludes from the definition alginate, coal, lignite, peat, oil shale, torbanite and water. The section states that petroleum will not cease to be petroleum because ‘it is injected or reinjected into a natural underground reservoir’. In the *Petroleum and Geothermal Energy Resources Act 1967* (WA) (‘the PGERA’), petroleum is defined to include naturally occurring hydrocarbons or a mix of hydrocarbons in gaseous, liquid or solid state, and includes petroleum returned to a natural reservoir, but excludes oil shale.¹³ Other states also have definition provisions.¹⁴

The statutory vesting provisions, and any relevant reservations on title, confer public ownership of fossil fuels upon state governments.¹⁵ The introduction of these provisions diminishes the bundle of rights held by the surface estate owner. Under common law, the scope of the surface estate owner’s rights is encapsulated by the maxim *cuius est solum, eius est usque ad coelum et ad inferos* (the person who owns land owns it from the heavens above to the centre of the earth below).¹⁶ This is a fundamental common law maxim which presumes that ownership of the subsurface strata, including any fossil fuels residing in that strata, belongs to the surface estate owner.¹⁷ The maxim is well established in English law, derived from the 1586 decision of *Bury v Pope* where the Court

12 *Mineral Resources (Sustainable Development) Act 1990* (Vic) s 4 and sch 4; *Mining Act 1992* (NSW) Dictionary; *Mining Act 1971* (SA) s 6; *Mineral Resources Development Act 1995* (Tas) s 3; *Mineral Titles Act 2010* (NT) s 9.

13 *Petroleum and Geothermal Energy Resources Act 1967* (WA) (‘the PGERA’) s 5.

14 *Petroleum (Onshore) Act 1991* (NSW) s 6; *Petroleum Act 1998* (Vic) s 6; *Petroleum (Submerged Lands) Act 1982* (Tas) s 3; *Petroleum and Geothermal Energy Act 2000* (SA) s 4.

15 See, eg, *Petroleum and Gas (Production and Safety) Act 2004* (Qld) s 26; *Petroleum (Onshore) Act 1991* (NSW) s 6; PGERA s 10; *Mineral Resources (Sustainable Development) Act 1990* (Vic) s 9.

16 See the discussion on the nature of the maxim by P Butt, *Land Law* (Thomson Reuters, 6th ed, 2010) [2.05]–[2.07]. See also JG Sprankling, ‘Owning the Center of the Earth’ (2008) 55(4) *UCLA Law Review* 979, 988–92. The author argues that the maxim is simply a shorthand approach confirming ‘that a landowner owns the subsurface to the extent necessary to support normal and reasonable uses of the surface’.

17 See AJ Bradbrook, ‘The Relevance of the *Cuius Est Solum* Doctrine to the Surface Landowner’s Claims to Natural Resources Located Above and Beneath the Land’ (1988) 11(4) *Adelaide Law Review* 462, 462–3.

held that a property owner had the right to build against the window of his neighbour and that the scope of those rights extended upwards to heaven and downwards to the centre of the earth. This concept was inherited by Australia upon colonisation and the adoption of English land law.¹⁸

The maxim prescribes to a surface estate owner an infinite stretch of ownership in the airspace above the land and in the subsurface strata below the land. Taken literally, the maxim is unfeasible and, consequently, subsequent courts have confirmed that the ownership of surface estate owners extends down only to a reasonable level.¹⁹ Today, the maxim functions as a guide rather than a rule.²⁰ In *Commissioner for Railways v Valuer General*,²¹ the English Court of Appeal confirmed that the maxim 'is imprecise and it is mainly serviceable as dispensing with analysis'. Similarly, in *Bocardo Ltd v Star Energy UK Onshore Ltd*,²² the English Court of Appeal described the Latin '*brocard*' as having relevance purely as 'an imperfect guide' because the correct position was that the surface estate owner will own the substratum, including the minerals unless there has been an express or implied alienation to another.

On the facts of *Bocardo* the landowner plaintiff sued Star Energy Onshore Ltd in trespass because it had been drilling for petroleum under the plaintiff's land. The well-head was located on neighbouring land; however, the drilling pipelines descended to a depth of 2800 feet (854 m) into the plaintiff's land. The company had obtained a licence to extract petroleum which did not allow it to lay pipelines on the neighbouring land. By not seeking the plaintiff's permission, the company breached the common law ownership rights of the plaintiff. During the course of its judgment, the Court of Appeal examined the scope of the maxim, concluding that a literal application would lead to absurdities because if property rights continued down as far as the core of the earth, landowners would all have a 'lot of neighbours'.²³

Their Lordships held that 'the owner of the surface is the owner of the strata beneath it, including the minerals that are to be found there, unless there has been an alienation of them by a conveyance, at common law or by statute to someone else', but that this

18 *Bury v Pope* (1586) Cro Eliz 118; 78 ER 375. See also JRS Forbes and AG Lang, *Australian Mining and Petroleum Laws* (Butterworths, 2nd ed, 1987) ch 2.

19 See Sprankling (n 16) 1039, where the author concludes that 'productive human activity is only possible within the shallowest portion of the earth's crust' and that consequently, subsurface ownership should only extend down to a specified depth of 1000 feet. Cf J Howell, 'Subterranean Land Law: Rights Below the Surface of the Land' (2002) 53(3) *Northern Ireland Legal Quarterly* 268, 270, where the author rejects the concept of ownership to a specific depth, arguing: 'Any intrusion into land which is not sanctioned by some countervailing property right in the intruder, such as an easement, lease or licence, will be a trespass. It is true that the surface owner will not usually wish to or be able to utilise the ground below the surface, but he has rights in the land which could be valuable.'

20 In *Commissioner for Railways v Valuer General* [1974] 1 AC 382, the Court concluded that the maxim was imprecise. In *Bocardo SA v Star Energy UK Onshore Ltd* [2011] 1 AC 380, Lord Hope suggested that the Latin maxim, while flawed, nevertheless retained some utility as a general guide to subsurface ownership under common law. See also P Butt, 'How Far Down Do You Own? The Final Word' (2010) 84(11) *Australian Law Journal* 746.

21 *Commissioner for Railways v Valuer General* [1974] 1 AC 382, 351.

22 *Bocardo Ltd v Star Energy UK Onshore Ltd* [2010] 1 Ch 100 [26], [59] ('*Bocardo*'). See also *Hinkley v Star City Pty Ltd* [2010] NSWSC 1389 [226]. Ward J, in upholding *Bocardo*, noted that the paper titleholder of the surface estate is 'deemed' to have possession of the subsurface strata. See also Butt (n 20) 748.

23 *Star Energy Weald Basin Ltd v Bocardo SA* [2011] 1 AC 380 [60].

only extends down as far as ‘the point at which physical features such as pressure and temperature render the concept of the strata belonging to anybody so absurd as to be not worth arguing about’.²⁴

On the facts, licensees were entitled to use reasonable means to extract the resource, which included boring into the ground and laying down drilling pipelines but not drilling into the subsurface stratum of the neighbouring property. Hence, the Court of Appeal concluded that Star Energy Onshore Ltd had committed trespass. However, because the plaintiff had suffered no loss of enjoyment, damages were assessed nominally at £1000. The Supreme Court affirmed the decision of the Court of Appeal. Lord Hope held that the maxim, while not a literal tool, retained utility as a general guide for common law subsurface ownership and therefore remained ‘good law’. His Lordship stated:

There must obviously be some stopping point ... But the wells that are at issue in this case, extending from about 800 feet to 2,800 feet below the surface, are far from being so deep as to reach the point of absurdity. Indeed the fact that the strata can be worked upon at those depths points to the opposite conclusion. I would hold therefore that [Bocado’s] title extends down to the strata through which the three wells and their casing and tubing pass.²⁵

In addition to this reinterpretation of the *ad inferos* maxim, the scope of common law ownership has been qualified in a number of different ways. First, the maxim has no application to surface estate grants that are subject to express height or depth limitations or to any express reservation contained in a Crown grant that concerns minerals.²⁶ Second, the application of the maxim to airspace is severely limited because of its potential to interfere with air travel and satellite navigation.²⁷ Third, the royal prerogative vests gold and silver in the Crown. Fourth, a range of resources relevant to fossil fuel energy generation which reside within the substratum of land subject to common law ownership have now been vested in state and territory governments pursuant to specific statutory vesting provisions. Arguably, the range and scope of these qualifications has diminished the expectations of surface estate owners and generated structural conflicts between landowners and statutory resource owners.²⁸

24 Ibid [27].

25 Ibid [27]–[28]. See also *Finlay Stonemasonry Pty Ltd v JD & Sons Nominees Pty Ltd* (2011) 28 NTLR 183 [45], where Blokland J stated: ‘Lord Hope takes a generous view of the legitimacy of the maxim for ownership ... below the surface, it is suggested this must yield to contrary intention, and to relevant rules of construction, including here, the purpose of the lease and the objectively determined intention of the parties. In my view the maxim must be applied with some caution ... must yield to the reasonable construction of the lease.’ See also the general discussion by Bradbrook (n 17) 462.

26 Some Acts specifically incorporate this right. The *Western Lands Act 1901* (NSW) sch 4 cl 5 specifically sets out that the minister may ‘limit a grant to the surface of the land or to the surface and a stated depth below the surface’. Clause 5(2) then sets out that land ‘excluded by such a limitation is surrendered to the Crown’.

27 In *Bernstein v Skyviews & General Ltd* [1978] QB 479, 481, Griffiths J concluded that the rights of a surface owner to airspace should be restricted to ‘such height as is necessary for the ordinary use and enjoyment of his land and the structures upon it’.

28 See T Hunter and M Weir, ‘Property Rights and Coal Seam Gas Extraction: The Modern Property Law Conundrum’ (2012) 2 *Property Law Review* 71, 77. See also M Taylor and T Hunter, *Agricultural Land Use and Natural Gas Extraction Conflicts: A Global Socio-Legal Perspective* (Routledge, 2018) ch 1.

In Australia, land is conceptualised as three-dimensional, with surface, subsurface and airspace domains. This has generated ‘horizontal and vertical subdivisions’.²⁹ The subsurface has been both vertically and horizontally divided. Horizontal divisions allow different levels to be subject to multiple forms of ownership. This can include common law surface estate ownership as well as statutory rights vested in the state. This latter category covers fossil fuels such as coal and gas, incorporeal access and infrastructure development rights and, in some states, carbon storage reservoirs.³⁰ The existence of all of these interests can generate conflict, particularly where the interface between common law and statutory ownership entitlements is unclear and the curtailed and defined notion of land ownership under common law is inconsistent with the newly articulated statutory rights.³¹

1.3 Public resource ownership

Towards the end of the 19th century the private common law ownership of minerals and petroleum was rejected in Australia in favour of state ownership. Commencing in New South Wales, all states and territories passed legislation reserving all minerals in land for future Crown grants.³² This legislation operated prospectively, although some jurisdictions introduced retrospective vesting legislation.³³ Retrospective legislation vesting minerals in the state exists in South Australia, the Northern Territory and Victoria, and legislation vesting carbon storage reservoirs in the state retrospectively exists in Queensland.³⁴ The effect of the retrospective legislation is that the relevant minerals (with the exception

29 See *Walker Superannuation Fund v Clough Property Fairmont Pty Ltd* [2010] WASCA 232 [22], where Martin CJ quotes from Windeyer J in *Bursill Enterprises Pty Ltd v Berger Brothers Trading Pty Ltd* (1971) 124 CLR 73: ‘Therefore, at common law, [the freeholder] could dispose of a part of his holding by horizontal subdivision, just as by vertical subdivision. There were objections to this in mediaeval times: see HW Challis, *Challis’s Law of Real Property* (Butterworth, 3rd ed, 1911) 54. But by Coke’s time these had disappeared. He said: “A man may have an inheritance in an upper chamber though the lower buildings and soil be in another, and seeing it is an inheritance corporeal it shall pass by livery.”’

30 See, eg, *Greenhouse Gas Geological Sequestration Act 2008* (Vic) s 14(1), which sets out: ‘The Crown owns all underground geological storage formations below the surface of any land in Victoria; and s 14(4), which sets out: ‘The Crown is not liable to pay any compensation in respect of a loss caused by the operation of this section.’

31 See the issues raised by S Hepburn, ‘Carbon Rights as New Property: The Benefits of Statutory Verification’ (2009) 31(2) *Sydney Law Review* 239.

32 *Crown Lands Act 1884* (NSW) s 7; *Land Act 1891* (Vic) s 12; *Mines Act 1891 (No 2)* (Vic) s 3; *Mining on Private Land Act 1909* (Qld) ss 6, 21; *Crown Lands Act 1888* (SA) s 9; *Mining Act 1904* (WA) s 117; *Crown Lands Act 1905* (Tas) s 27. See also the discussion in Forbes and Lang (n 18) 17–26. According to S Christensen, P O’Connor, W Duncan and R Ashcroft, ‘Early Land Grants and Reservations: Any Lessons from the Queensland Experience for the Sustainability Challenge to Land Ownership’ (2008) 1 *James Cook University Law Review* 15, ‘The effect of a reservation is that the Crown retains all rights to something specifically excluded by the terms of the grant: *Doe d Douglas v Lock* (1835) 2 Ad & E 705; 111 ER 271.’

33 See Christensen et al (n 32) 26 on the gradual changes to the regulatory framework that dealt with mineral reservations. See also NJ Campbell Jr, ‘Principles of Mineral Ownership in Civil Law and Common Law Systems’ (1956–1957) 3(2) *Tulane Law Review* 303.

34 *Mining Act 1971* (SA) s 16; *Mineral Resources (Sustainable Development) Act 1990* (Vic) s 9; *Minerals (Acquisition) Act 1953* (NT) s 3; *Northern Territory (Self-Government) Act 1978* (Cth) s 69(4). The retrospective vesting of carbon storage reservoirs in Queensland is pursuant to the *Greenhouse Gas Storage Act 2009* s 27, which sets out that all greenhouse gas storage reservoirs located in land are the property of the state and are taken to have always been so.

of exempted minerals) are regarded as having always belonged to the Crown, rather than ownership being transferred to the Crown at the date when the legislation was introduced. In the states where prospective legislation has been introduced, some minerals continue to be owned privately, as a consequence of Crown grants issued in the 19th century. In Tasmania, under the *Mineral Resources Development Act 1995*, minerals held in private ownership at the commencement of the Act continue to be so held, but any minerals not held in private ownership vest in the Crown.³⁵ In Western Australia, rather than vesting minerals in the Crown, the *Mining Act 1978* sets out that private land other than that which is specifically exempted is open for mining and may be the subject of a mining tenement.³⁶

The shift from private ownership of subsurface minerals and petroleum to public ownership reflected the increasing awareness of the value and importance of fossil fuel resources. Under a public resource framework, commercial benefits that accrue from exploiting subsurface resources are expected to be redistributed by the state to the community as a whole.³⁷ The rationale is that state ownership of a public natural resource is optimum because the state can ensure that the economic benefits of exploiting subsurface resources are optimally managed and distributed for the welfare of all.³⁸ However, this rationale is increasingly questionable. First, the exploitation of fossil fuels has not necessarily generated significant wealth for Australian communities, as much is assumed by large multinational corporations with mining tenements that export resources into the international market and minimise their royalty and taxation payments. The burgeoning profits flowing to fossil fuel companies raise concerns that public resources are exploited without proper consultation and community engagement. Second, the implied assumption that public benefit obligations are met through state administration is questionable within an accelerating climate emergency, and the 'increased connectivity between ownership norms, ecological imperatives and market forces has fundamentally shifted public interest beyond economic imperatives'.³⁹ This raises deeper questions about the type of rights and responsibilities that should accompany state ownership and the limitations applicable to fossil fuel tenements.

State ownership of resources is derived from the regalian system, which originated under Roman law. Pursuant to this framework, the *dominium directum* (dominion of the soil) vested in the sovereign while the *dominium utile* (the right to use and profit from the soil) remained separate. Within a regalian system, sovereign monarchs were entitled to assume ownership of subsurface minerals extracted from *dominium directum*.⁴⁰

35 *Mineral Resources Development Act 1995* (Tas) s 6.

36 *Mining Act 1978* (WA) s 27.

37 See, especially, A Cox, 'Land Access for Mineral Development in Australia', in RG Eggert (ed), *Mining and the Environment: International Perspectives on Public Policy* (Resources for the Future, 1994) 21. See also the discussion by P Babie, 'Sovereignty as Governance' (2013) 36(3) *University of New South Wales Law Journal* 1075, 1103.

38 See the discussion by P Wieland, 'Going Beyond Panaceas: Escaping Mining Conflicts in Resource-Rich Countries through Middle Ground Policies' (2013) 20(2) *New York University Environmental Law Journal* 199, 210.

39 S Hepburn, 'Public Resource Ownership and Community Engagement in a Modern Energy Landscape' (2017) 34(2) *Pace Environmental Law Review* 379, 392. See also MJ Rizzo, 'The Mirage of Efficiency' (1980) 8(3) *Hofstra Law Review* 641 (arguing that the assumptions underlying state efficiency are oblique and unclear).

40 The term 'regalian' is in fact a reference to the right of the state, as represented by the Crown, to reserve to itself the entitlement to dispose of subsurface ownership as public property. See, further,

The concept was subsequently integrated into the domanial system, whereby the ownership of natural resources vests in the sovereign.⁴¹ Hence, while ownership of minerals and petroleum is vested in the state, the landowner is left with nothing apart from a right to compensation which is only enforceable where supported by an appropriate constitutional framework. Under the domanial system, natural resources are treated in contradistinction to the land estate and ownership of the minerals and petroleum is statutorily vested in the state. This framework fragments land and mineral ownership, despite their physical coalescence, through legislative intervention. That being said, ‘ownership of minerals contained in the subsoil is attributed to the state either as a juridical body or as the representative of the collective body’.⁴²

The validity of public resource ownership depends upon both the constitutional legitimacy of the vesting provisions and the effectiveness of the concession framework for granting of mining tenements and licences to third parties. In Australia, the vesting of all subsurface resources occurs pursuant to state and territory legislation. It is not achieved via Commonwealth legislation. This is largely due to the fact that state and territory constitutions are not subject to the just terms provision that exists under s 51(xxxi) of the *Australian Constitution*.⁴³ States and territories may therefore make laws regarding land and resources that exist within their jurisdictional domain without being required to provide compensation to deprived landowners.⁴⁴ As outlined by Latham CJ in *PJ Magennis Pty Ltd v Commonwealth*,⁴⁵ ‘state [governments] ... may acquire property on any terms which they may choose to provide in a Statute, even though the terms are unjust’.

Minerals vested in the state include all static and migratory minerals and, where expressly incorporated, coal seam gas.⁴⁶ Petroleum vested in the state includes all forms of hydrocarbons and, in most states, the definition is broad enough to incorporate unconventional gas, such as tight or shale gas.⁴⁷ These provisions effectively mean that commercially viable minerals and petroleum are now owned, and therefore controlled, by the

Y Omorogbe and P Oniemole, ‘Property Rights in Oil and Gas under Domanial Regimes’, in A McHarg, B Barton, A Bradbrook and L Godden (eds), *Property and the Law in Energy and Natural Resources* (Oxford University Press, 2010) 115, 118; JK Boyce, ‘From Natural Resources to Natural Assets’, in JK Boyce and BG Shelley (eds), *Natural Assets: Democratizing Environmental Ownership* (Island Press, 2003) 7.

41 See Omorogbe and Oniemola (n 40) 120.

42 S Hepburn, ‘Does Unconventional Gas Require Unconventional Ownership? An Analysis of the Functionality of Ownership Frameworks for Unconventional Gas Development’ (2014) 8(1) *Pittsburgh Journal of Environmental and Public Health Law* 1. See Campbell (n 33).

43 The assumption that private property should not be reduced or taken without just compensation was described by McTiernan J in *Ministry of the State for the Army v Dalziel* (1944) 68 CLR 261 as a ‘rule of political ethics’.

44 For a discussion of the non-application of the Commonwealth just terms provisions to state-based mining legislation, see S Evans, ‘When is an Acquisition of Property Not an Acquisition of Property?’ (2001) 11(3) *Public Law Review* 183, 186.

45 (1949) 80 CLR 382, 397–8. See also Australian Law Reform Commission (ALRC), *Traditional Rights and Freedoms: Encroachment by Commonwealth Laws* (Final Report, December 2015) 129 [20.21]. See also the discussion by L Finlay, ‘Environmentally Sensitive Areas in Western Australia: Highlighting the Limits of the Just Terms Guarantee’ (2016) 41(1) *University of Western Australia Law Review* 49.

46 See, eg, *Mineral Resources (Sustainable Development) Act 1990* (Vic) s 4.

47 See, eg, *PGERA* (n 13) s 5; *Petroleum and Gas (Production and Safety) Act 2004* (Qld) s 10.

states and territories without the payment of compensation to surface estate owners for the loss of that resource.⁴⁸

The vesting provisions disaggregate the minerals from the soil in which they reside by affecting a statutory severance of the mineral ownership from the surface estate. Minerals coming within the scope of the vesting provisions have a separate ownership status to the land and are therefore alienable. The disaggregation of subsurface resources from the land depends upon two core assumptions: first, that minerals are capable of being severed from the ownership rights of the surface estate owner; and second, that the ownership rights acquired by the state only relate to the minerals and do not confer upon the state rights to the land unless expressly stated.⁴⁹ This goes against both the fundamental assumptions of the *ad inferos* common law maxim and the principles that underlie the doctrine of accession, which presumes that where something resides within the ground and has no practical separability it forms a part of the land.⁵⁰

Public resource ownership operates in many countries around the world. However, most public resource countries have explicitly implemented the system within their constitutional framework. For example, Brazil has a public resource ownership framework and the *Constitution of Brazil* vests lands traditionally occupied by Indigenous peoples in the federal government.⁵¹ The removal of minerals and resources from the control of Indigenous peoples has been supported by international law, provided governments maintain appropriate consultative procedures with Indigenous communities before undertaking or permitting any programs for the exploration or exploitation of resources on Indigenous lands.⁵² In Australia, consultative rights with Indigenous communities will only exist where native title rights or cultural heritage protection operates.

The alternative to public resource ownership is an allodial framework, where private owners retain rights to subsurface resources and the state has no overriding power to remove or diminish those rights. In the United States, individual owners continue to retain full control over minerals residing within their land and may sever the minerals from the land to create legally valid mineral estates.⁵³ Some states have implemented

48 See, eg, *Petroleum (Onshore) Act 1991* (NSW) s 3, where petroleum is defined as: ‘(a) any naturally occurring hydrocarbon, whether in a gaseous, liquid or solid state; or (b) any naturally occurring mixture of hydrocarbons, whether in a gaseous, liquid or solid state; or (c) any naturally occurring mixture of one or more hydrocarbons, whether in a gaseous, liquid or solid state, and one or more of the following, that is to say, hydrogen sulphide, nitrogen, helium, carbon dioxide and water.’

49 But see the vesting of subsurface pore space for the storage of injected carbon pursuant to carbon capture and storage (CCS) projects in Victoria and Queensland: *Greenhouse Gas Storage Act 2009* (Qld) s 27; *Greenhouse Gas Geological Sequestration Act 2008* (Vic) s 14.

50 See generally A Hill, ‘The Accession of Identical Chattels’ (2016) 1 *Cambridge Law Review* 60. See also B McFarlane, *The Structure of Property Law* (Hart Publishing, 2008) esp at 163–4.

51 See *Constitution of Brazil* art 20(XI).

52 The *International Labour Organization Convention 169* art 15(2) states: ‘In cases in which the State retains the ownership of minerals or sub-surface resources or rights to other resources pertaining to lands, governments shall establish or maintain procedures through which they shall consult with these peoples ... before undertaking or permitting any programmes for the exploration or exploitation of such resources pertaining to their lands.’ See also the discussion by R Pereira and O Gough, ‘Permanent Sovereignty over Natural Resources in the 21st Century’ (2013) 14(2) *Melbourne Journal of International Law* 451, 476.

53 For a discussion of the nature of a common law mineral estate in the United States, see *Westmoreland and Cambria Natural Gas Co v DeWitt*, 130 Pa 235, 18 Atl 725 (1889), where the Court held that oil and