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ARTICLE

Does Unconventional Gas Require Unconventional Ownership? An Analysis of the Functionality of Ownership Frameworks for Unconventional Gas Development

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ABSTRACT

The implementation of a responsive and coherent property framework, capable of effectively supporting the progression of a rapidly expanding unconventional gas industry is proving to be a complex and intricate process for many countries.[1] The theory of mineral ownership that underpins any regulatory framework represents its point of departure.[2] It is increasingly

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[1] Some of the problems experienced in the United States are outlined by Mikal C. Watts & Emily C. Jeffcott, *Does He Who Owns the Minerals Own the Shale Gas? A Guide to Shale Mineral Classification*, 8 TEX. J. OIL, GAS & ENERGY L. 27, 36 (2013) (the authors explain the different ways in which states have attempted to maneuver around ownership restrictions). *See also* Sarah Kathryn Farnell, *Methane Gas Ownership: A Proposed Solution for Alabama*, 33 ALA. L. REV. 521 (1982) (where the author concludes that the major barrier to the commercial production of coal bed methane has been the failure of the legal system to adequately resolve conflicting claims of ownership).

[2] The principles underpinning mineral ownership inform and facilitate the structure of the regulatory framework. *See* Nicholas J. Campbell Jr., *Principles of Mineral Ownership in the Civil Law and Common Law System*, 31 TUL. L. REV. 303, 304 (1956–1957) (arguing that the theoretical study of the ownership of minerals belongs to natural law, whilst the study of legal norms for their exploitation belongs to administrative, public and commercial law).

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clear that the problems associated with the expansion of unconventional gas development have challenged both private and state-based models.[3] *This article examines how the core principles that form the foundation for land and mineral ownership in both the United States and Australia have responded to the rapid expansion of the unconventional gas industry. The conventional inertia associated with institutionalized property frameworks has meant that the frameworks are largely resistant to external change.*[4] *Hence, whilst the transformation that has occurred in the energy industries following the advent of unconventional gas development has been remarkable,*[5] *ownership frameworks have struggled to cope.*[6] *Many principles that evolved in a period when unconventional gas was inconceivable are now proving ill-equipped and non-responsive to the new energy environment. This Article argues that the stasis that afflicts ownership frameworks has precluded many of the conventional principles from adapting to meet the needs of this new energy revolution. This has generated an increasing imperative, in both the United States and Australia, to develop and*

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[3] *See* Jeff L. Lewin, Hema J. Siriwardane, Samuel J. Ameri & Syd S. Peng, *Unlocking the Fire: A Proposal for Judicial or Legislative Determination of the Ownership of Coalbed Methane*, 94 W. VA. L. REV. 563 (1992) (where the authors argue that in the United States, the common law ownership principles relating to coal bed methane involve greater complexity than legislative initiatives).

[4] *See generally* Michael Heller, *The Boundaries of Property*, 108 YALE L.J. 1163, 1166 (1999) (where the author argues that in well-functioning property regimes, legislatures and courts draw internal boundaries that constrain excessive fragmentation and keep resources well-scaled for productive use).

[5] *See* Ross H. Pifer, *A Greener Shade of Blue?: The Technology and Shale Revolution*, 27 NOTRE DAME J.L. ETHICS & PUB. POL'Y 131, 134 (2013) (arguing that the use of shale will be primarily responsible for re-shaping the United States energy economy).

[6] *See* Troy A. Rule, *Property Rights and Modern Energy*, 20 GEO. MASON L. REV. 803, 836 (2013) (where the author argues that new ownership strategies and policies are required for energy innovation).

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implement legislative initiatives that revise or alter the way in which the schema of orthodox ownership principles applies to unconventional gas.[7] *Focused legislative development will promote adaptable, consistent, and structured principles, which in turn will allow ownership frameworks to respond to the operational demands of a new energy era.*[8]

[7] *See also* Shelley Ross Saxer & Carol M. Rose, *A Prospective Look at Property Rights*, 20 GEO. MASON L. REV. 721, 723 (2013). *See also* Rule, *supra* note 6, at 805 (arguing that the use of statute based, liability rules rather than property rules may help to balance new energy entitlements with existing property entitlements). *See also* Farnell, *supra* note 1, at 532 (noting that legislative determination of ownership would alleviate problems of uncertainty which would, in turn, facilitate production and utilization).

[8] *See* Ronald K. Olson, *Coalbed Methane: Legal Considerations Affecting Its Development as an Energy Resource*, 13 TULSA L.J. 377, 382–83 (1978).

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I. INTRODUCTION

In the United States, where land and minerals are sourced in a private ownership framework, many of the common law principles that have evolved to support the control and possession of natural gas have experienced difficulties adjusting to the rapid expansion of unconventional gas.[9] This has produced some complicated outcomes. For example, in some states, courts have sought to draw fine distinctions between different forms of unconventional gas and to apply different ownership principles on the basis of this distinction.

In Pennsylvania, the Supreme Court expanded core ownership principles to allow the owner of coal to claim possession and ownership over any coal bed methane residing within the coal.[10] Until recently, however, there had been limited discussion as to whether this principle could also be extended to shale gas. The Pennsylvania Supreme Court recently considered this issue and sought to distinguish shale gas from coal bed methane by holding that shale gas constituted natural gas and coal bed methane did not.[11] The effect of this distinction was that the owner of the shale was unable to assert ownership rights over any shale gas residing within that shale in the same way that the owner of coal had been able to assert ownership over the coal bed methane residing in the coal.

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[9] *Id.* at 385–90 (where the author argues that the applicability of many of the ownership theories for fugacious minerals depends upon the characterization of unconventional gas as natural gas and this is debatable in the context of coal bed methane).

[10] *See* U.S. Steel Corp. v. Hoge, 468 A.2d 1380, 1383 (Pa. 1983) (where the court concluded that "[A]s a general rule, subterranean gas is owned by whoever has title to the property in which the gas is resting").

[11] See *Butler v. Powers Estate ex rel. Warren*, WL 1749828 (Pa. Apr. 24, 2013) where the court evaluated the nature of "natural gas" and "shale natural gas."

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Improvised distinctions between the characteristics of coal bed methane and those of shale gas have contributed to a deepening schism between the way in which ownership principles apply to conventional minerals as opposed to unconventional gas. These categorisations have generated inexorable problems for the progression of the industry because it is unclear which conventional ownership rules will apply to which form of unconventional gas. These problems have highlighted the need for broad based legislative intervention. The new energy landscape needs to be supported by a comprehensive and consistent ownership framework that is responsive to existing social, environmental and technological developments. These concerns should not be eclipsed by obsolete and compartmentalised property rules.[12]

In Australia, where mineral ownership resides with the state, the exploitation of unconventional gas has generated considerable landowner antagonism, prompting a fundamental re-evaluation of the core division between surface and mineral ownership.[13] The legislature has responded by introducing greater regulatory protections for landowners.[14] These initiatives have, however, created dense, multi-layered review processes and complex jurisdictional variations that have thwarted industry progression and increased community unease. This has exacerbated the need for further

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[12] *See* Timothy M. Mulvaney, *Foreground Principles*, 20 GEO. MASON L. REV. 837, 842 (2013) (arguing that antiquated common law principles often overshadow foreground issues relating to property, safety and the environment).

[13] *See* Susan Johnston, *Whose Right—The Adequacy of the Law Governing CSG Development in Queensland*, 20 AUSTRALIAN MINING & PETROLEUM L.J. 259, 262 (2001) (where the author considers the expansion of regulatory conflicts that have emerged in Australia due to the granting of overlapping exploration and production titles and the creation of intersecting ownership interests).

[14] *See, e.g.*, *Code of Practice for Coal Seam Gas Well Integrity 2012* (NSW) (Austl.), *Aquifer Interference Policy 2012* (NSW) (Austl.).

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deliberation on how to improve the involvement of landowners in resource exploitation and resource conflict processes.[15]

The absence of an overarching ownership taxonomy for unconventional gas in both Australia and the United States is derived from the fact that, whilst coal bed methane, shale and tight gas are all widely recognized today, in previous decades they were not regarded as commercially viable because the technology to extract them did not exist.[16] The relatively recent development of extraction technology, particularly for shale gas, which has a much lower permeability than natural gas, has revolutionized the industry.[17] The legal response to this technological revolution has been sporadic and disjointed. Jurisprudence across different states in America has evolved in an extemporized and individualistic manner that has generated significant conflict and uncertainty between different land and mineral interest holders.[18]

This Article argues that the effective progression of the unconventional gas industry in both the United States and Australia depends upon the

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[15] One such initiative is the Land Access Code introduced in Queensland which seeks to promote consistent behavioral standards for CSG operators when exercising access entitlements.

[16] *See* Pifer, *supra* note 5, at 134 (where the author notes that "the Shale Revolution has been unleashed not because of a geologic discovery, but rather because extraction technology finally has developed to the point where economical extraction of long-known resources has become possible").

[17] For a detailed outline of the nature of shale gas *see, e.g.*, HOWARD R. WILLIAMS & CHARLES J. MEYERS, MANUAL OF OIL AND GAS TERMS 700 (14th ed. 2009).

[18] *See* Saxer & Rose, *supra* note 7, at 724 ("We must use common law and legislation in focused ways, to promote concepts of ownership that encourage investment, innovation and prudent uses of resources"). *See also* Jason P. Webb, *Pennsylvania & Coalbed Methane: Reviving the Traditional Willingness to Protect Surface Owners*, TEMP. J. SCI. TECH. & ENVTL. L. 35 (2008) (where the author outlines the diversity of opinion in the cases that have emerged in Pennsylvania).

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introduction of new and innovative approaches to conventional ownership assumptions. This is a challenging task for both private and state-based ownership frameworks given their predilection for constancy.[19] Deeper and more informed consideration must therefore be given to the utility of targeted legislative intervention and its capacity to provide greater clarity and direction.

This Article explores the different common law principles that regulate land and mineral ownership in the United States. It evaluates some of the responses that have emerged to the development of unconventional gas interests and considers the scope and ongoing utility of these developments. The Article goes on to examine the state or "dominial" mineral ownership framework that exists in Australia. It considers the utility of the state ownership model following the rapid expansion of unconventional gas and examines some of the difficulties that have emerged in this context.

Part I of the Article outlines the core principles that inform land and mineral ownership within the United States. Consideration is given to the rule of capture, the doctrine of severance, whereby mineral estates are severed from land ownership, the rules of construction that support the interpretation of mineral deeds and the way in which these principles have been applied pursuant to the ownership and non-ownership theories. The response of these fundamental common law principles to the expansion of unconventional gas is examined and the overall ability of the rules to adapt to emergent concerns is scrutinized.

Part II of the Article comprehensively evaluates the state framework for mineral ownership in Australia. It considers the nature and scope of statutory mineral ownership, the interface between public mineral ownership and private land ownership and the impact of the dramatic expansion of unconventional gas, particularly in the eastern states, upon this framework. It

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[19] *See generally* Francis Philbrick, *Changing Conceptions of Property Law*, 86 U. PA. L. REV. 691 (1938) (for a broader discussion on the difficulties associated with adapting established property concepts to new circumstances).

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also considers the utility of some of the legislative responses to unconventional gas development that have been introduced to date.

Part III examines possible options for reform in both the United States and Australia. In this Part it is argued that both the courts and the legislatures need to adopt a more engaged and collaborative approach to resolving the ownership concerns underpinning unconventional gas expansion. Legislative initiatives are urgently required, particularly in circumstances where existing common law ownership principles are no longer functional or cogent. Whether the ownership framework is private or state based in nature, an engaged and reactive approach to the ownership questions relevant to unconventional gas development is vital.

Unconventional gas has emerged as a crucial component of global energy production.[20] This valuable new energy market needs to be properly supported by reliable, coherent and justifiable ownership models that adequately support the demands of a new energy era. Conventional ownership principles that relate to a different epoch and pre-date the technological advancements connected with unconventional gas exploitation may ultimately prove incapable of adapting efficiently to this pivotal shift in energy modernism.

II. LAND AND MINERAL OWNERSHIP IN THE UNITED STATES

A. THE *AD COELUM* MAXIM

The framework for land and mineral ownership in the United States stems from the fundamental common law maxim, *cujus est solum*, *ejus est usque ad coelum et ad inferos* meaning whoever owns the soil also owns up

[20] In the United States alone it is estimated that by 2035, shale gas will comprise more than half of all domestic production. *See* U.S. Energy Info. Admin., *Annual Energy Outlook 2013, Early Release Overview*, DOE/EIA-0383ER (2013) at 2, 15 (2012), *available at* http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2013).pdf.

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to the sky and down to the depths.[21] The rule functions as a core tenet of common law land and mineral ownership.[22] Whilst the maxim has been described as a "fanciful phrase" and an "outworn medievalism" land ownership in the United States continues to bear the "ineradicable marks" of its application.[23]

The maxim focuses on the scope of surface estate ownership. The infinite range of the maxim has been qualified by particularized statutory provisions. In most states, however, the maxim continues to function as the primary legal foundation for surface estate ownership over static, *in situ* sub-surface minerals such as coal.[24]

The *ad coelum* principle is premised upon the fundamental assumption that the surface estate owner retains rights to minerals in the sub-surface strata on the grounds of corporeal proximity. The minerals reside in the soil that constitutes the physicality of land and therefore ownership of the land necessarily constitutes ownership of the minerals. As outlined by William Blackstone, "downwards, whatever is in a direct line, between the surface of any land and the center of the earth, belongs to the owner of the surface."[25]

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[21] *See generally* John Sprankling, *Owning the Centre of the Earth*, 55 UCLA L. REV. 979, 1000–01 (2008) (discussing the scope of the *ad coelum* doctrine as it applies to the sub-strata).

[22] *See* Stuart S. Ball, *The Jural Nature of Land*, 23 ILL. L. REV. 45, 48 (1928).

[23] For a detailed discussion on the nature and scope of the modern application of the *ad coelum* principle *see generally* Owen L. Anderson, *Lord Coke, the Restatement and Modern Subsurface Trespass Law*, 6 TEX. J. OIL, GAS & ENERGY J. 203 (2011).

[24] *See id.* at 206.

[25] WILLIAM BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND—1969, Book 2, at 17.

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The continuity of this maxim has been crucial for the evolution of the ownership framework in the United States as it justifies the integration of land and mineral ownership and gives the surface estate owner control over *in situ* sub-surface minerals.[26] In this respect, the *ad coelum* principle invests the surface estate owner with the capacity to sever the sub-surface minerals from the surface estate and create a separate mineral estate.[27]

The transitory nature of oil and gas, including unconventional gas, has meant, however, that the maxim provides little ownership guidance for these minerals. Oil, gas and water whether alone or in combination may be found in a variety of different geological formations. Where oil and gas is trapped by the pressure of the earth it will not move, but after having drilled into an oil well, the reservoir of oil, gas and water loses its equilibrium and begins to move in the permeable rocks that contain them.[28]

A change in the naturally imposed pressure activates the migratory capacity of oil, gas and water as they move towards the drill. The migratory nature of oil and gas has meant that these minerals have been subjected to different ownership principles, which are activated when the minerals have

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[26] *See generally* Terry D. Ragsdale, *Hydraulic Fracturing: The Stealthy Subsurface Trespass*, 28 TULSA L.J. 311 (1993); *see also* Colleen E. Lamarre, *Owning the Centre of the Earth: Hydraulic Fracturing and the Subsurface Trespass in the Marcellus Shale Region*, 21 CORNELL J.L. & PUB. POL'Y 457, 462 (2011).

[27] EUGENE O. KUNTZ, A TREATISE ON THE LAW OF OIL AND GAS § 3.1, at 83 (1987) (discussing the landowners ability to sever his mineral estate from the surface estate).

[28] *See* Harry Cohen, *Property Theories Affecting the Landowner in a New Oil and Gas Producing State*, 10 ALA. L. REV. 323, 326 (1958).

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been physically controlled.[29] It is not possible to determine the ownership of migratory minerals purely on the basis of surface estate ownership.[30]

B. THE RULE OF CAPTURE

In the United States, the ownership of natural gas is amenable to the common law principle known as the rule of capture.[31] The fugacious character of gas means that it needs to be controlled before ownership may be asserted.[32] The rule of capture is the fundamental ownership principle on which the entire framework for oil and gas law is constructed in the United States.[33] It has been judicially recognized since 1886[34] and continues to have an application to oil and gas, including coal bed methane, despite being

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[29] *See* Bruce M. Kramer & Owen L. Anderson, *The Rule of Capture: An Oil and Gas Perspective*, 35 ENVTL. L. 899, 935–36 (2005).

[30] *See* Lamarre, *supra* note 26, at 463 ("State adoption of policies encouraging commercial oil and gas production drove courts to interpret laws in favour of production and to limit landowners' individual property rights").

[31] This has been confirmed in the seminal decision of *Westmoreland & Cambria Gas Co. v. De Witt*, 18 A. 724 (1889) (where the court noted that "Possession of the land . . . is not necessarily possession of the gas").

[32] *See* GEORGE BRYAN, THE LAW OF PETROLEUM AND NATURAL GAS § 43 (1898) (describing gas as a mineral *ferae naturae*); *see generally* D. Goble, *Commons, Capture, the Public Trust and Property in Land*, 35 ENVTL. L. 807, 813 (2005) (where the author notes that the rule of capture applied to allow wild animals to be owned once captured, possessed and controlled).

[33] *See* Farnell, *supra* note 1; *see also* Lewin, Siriwardane, Ameri & Peng, *supra* note 3, at 563 (where the authors outline a range of potential ownership options for CBM if it is not characterized as a component of coal); *see also* W. Summers, *Property in Oil and Gas*, 29 YALE L.J. 174 (1919) (for the impact of the rule of capture as an ownership principle).

[34] *See generally* Wood Cnty. Petroleum Co. v. W. Va. Transp. Co., 28 W. Va. 210 (W. Va. 1886).

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described, one the one hand, "as the most important single doctrine of oil and gas law" and on the other, as "absurd," and "almost idiotic."[35]

In its application to gas, the rule of capture allows a landowner who has induced the gas to his possession to claim the gas even though it may have formerly been deposited under another's land. Once captured, the holder will retain full common law ownership of the gas subject only to public policy obligations and regulatory restrictions.[36]

In substance, the rule of capture restricts the liability of landowners in circumstances where they have depleted reservoirs that extend across their property lines. As outlined by the court in *Eliff v. Texon Drilling Co.*,

> The owner of a tract of land acquires title to the oil and gas that he produces from wells on his land, though part of the oil or gas may have migrated from adjoining lands. He may thus appropriate the oil and gas that have flowed from adjacent lands without the consent of the owner of those lands, and without incurring liability to him for drainage.[37]

In its early days, the rule resulted in an extraordinary wastage of oil and gas resources because landowners would lease oil rights to lessees who would then rush to drill and exploit the high natural reservoir pressures that would

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[35] *See* ERNEST E. SMITH & JACQUELINE LANG WEAVER, TEXAS LAW OF OIL AND GAS § 1.1(A) (2d ed. 1998) ("The rule of capture may be the most important single doctrine of oil and gas law"); *see generally* AILEEN MCHARG, BARRY BARTON, ADRIAN BRADBROOK & LEE GODDEN, PROPERTY AND THE LAW IN ENERGY AND NATURAL RESOURCES 140 (2010); *see generally* JOHN ISE, THE UNITED STATES OIL POLICY 217 (1926) (referencing to the "absurd and idiotic").

[36] Hague v. Wheeler, 157 Pa. 324, 341 (1893).

[37] Eliff v. Texon Drilling Co., 210 S.W.2d 558, 561–62 (Tex. 1948).

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drive the oil and gas to the surface.[38] The unmitigated application of the rule of capture eventually prompted the emergence of a body of correlative rights, to limit and qualify the application of the rule and take account of emergent conservation principles.[39] The current correlative rights doctrine may be summarized as follows: (1) the owner only has the right to capture the natural flow of gas; (2) only reasonable means may be used to capture flowing gas and conservation rules may not be breached; (3) there must be no injury caused to the common source of supply; and (4) the common source of supply must not be destroyed through intentional or negligent behaviour.[40]

The rule of capture has also been qualified by unitization initiatives which amount to the joint, coordinated operation of an oil or gas reservoir by all the owners of rights in the separate tracts overlying the reservoir or reservoirs.[41] Unitization protects correlative rights because it gives all owners of the common reservoir a fair share of production. Voluntary unitization has always been difficult to achieve; today, however, most states apart from Texas have introduced some form of compulsory unitization legislation.[42] Finally, an overriding qualification to the rule of capture lies in the capacity of legislation to alter or restrict the scope and application of the rule.[43]

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[38] *See* SMITH & WEAVER, *supra* note 35.

[39] G.D. Libecap & J.L. Smith, *The Economic Evolution of Petroleum Property Rights in the United States*, 31 J. LEGAL STUD. S589, S592 (2002).

[40] Kramer & Anderson, *supra* note 29, at 916.

[41] Jacqueline L. Weaver & David F. Asmus, *Unitizing Oil and Gas Fields Around the World: A Comparative Analysis of National Law and Private Contracts*, 28 HOUS. J. INT'L L. 3, 11 (2006).

[42] 2 ROBERT BRADLEY JR., OIL, GAS AND GOVERNMENT: THE U.S. EXPERIENCE 200–02 (Rowman & Littlefield Publishers, Inc. 1996).

[43] *See* Kramer & Anderson, *supra* note 29, at 903.

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The rule of capture has been analogized with *ferae naturae*, the ownership principle that governs wild animals.[44] It has, however, been suggested that this analogy is forced because wild animals are public property and everyone has an equal right to possession and ownership of them, whereas the oil and gas that exists beneath private land is private property, meaning that the landowner retains exclusive ownership of the right to capture these resources.[45]

In states where the ownership in place theory is upheld, natural gas that exists *in situ* will continue to belong to the surface estate owner or, in the context of unconventional gas, may be found belong to the owner of the coal or, presumably, the shale.[46] The fact that the gas has the capacity to migrate does not mean that the scope of surface or mineral estate ownership is automatically diminished. As outlined in *Texas Co. v. Daugherty*:

> If these minerals are a part of the realty while in place, as undoubtedly they are, upon what principle can the ownership of the property interest, which they constitute while they are beneath or within the land, be other than the ownership of an interest in the realty?[47]

The *prima facie* claim of a surface estate owner to sub-surface *in situ* gas does not preclude the right of an adjoining landowner to exercise a lawful right to capture the gas in its migratory state. As has been outlined by Professor Kuntz, land boundaries are not inviolate, and the cost and effort

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[44] Rance L. Craft, *Of Reservoir Hogs and Pelt Fiction: Defending the* Ferae Naturae *Analogy between Petroleum and Wildlife*, 44 EMORY L.J. 697 (1995).

[45] Texas Co. v. Daugherty, 176 S.W. 717, 720 (Tex. 1915).

[46] Watts & Jeffcott, *supra* note 1, at 36 (in reviewing the different principles applicable to shale gas ownership, the authors predict that Kentucky courts would apply the same principles to shale gas as they have to coal bed methane).

[47] *Daugherty*, 176 S.W. at 720.

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associated with gas extraction justifies upholding the rule of capture for migrating gas.[48]

In this respect it is important to distinguish oil and gas from other static minerals. Gas, in particular, has "the power and the tendency to escape without the volition of the owner."[49] The fugitive nature of the resource necessarily means that *in situ* ownership can only continue for as long as the gas remains on or in that land.[50]

Despite its origins, when applied to oil and gas, the rule of capture amounts to an ownership principle that is inherently connected with land because it permits landowners to claim any oil and gas they have captured *via* vertical wells on their land. This means that the owner of a tract of land acquires title to the oil and gas which he produces from wells drilled on that land despite the fact that, "it may be proven that part of such oil and gas migrated from adjoining lands."[51] In this respect, where no specific gas lease has been issued, surface estate owners holding land which is reasonably proximate to the common source are best positioned to exercise the rule of capture.[52]

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[48] Eugene Kuntz, *The Rule of Capture*, 10 OKLA. L. REV. 406, 407 (1957).

[49] Westmoreland & Cambria Natural Gas Co. v. De Witt, 18 A. 724, 725 (Pa. 1889).

[50] Westmoreland & Cambria Natural Gas Co. v. De Witt, 18 A. 724 (Pa. 1889).

[51] Robert E. Hardwicke, *The Rule of Capture and its Implications as Applied to Oil and Gas*, 13 TEX. L. REV. 391, 393 (1935).

[52] Dean Lueck, *The Rule of First Possession and the Design of the Law*, 38 J.L. & ECON. 393, 405 (1995) (arguing that the rule of capture has the capacity to create classic open access dissipation however, where common property applies (which is an intermediary between open access and private property), dissipation is reduced).

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It has been held that the rule of capture should be extended to apply to coal bed methane gas that is trapped within a coal bed. In *Continental Res. of Ill., Inc. v. Ill. Methane, L.L.C.*, the Illinois Court of Appeal concluded:

> Under the rule of capture, gas that migrates from one property to another is subject to recovery and possession by the holder of the gas estate on the property to which the gas migrates. Because coalbed is similar to and migrates in the same manner as other natural gas, there is no reason that the rule of capture and the laws governing the ownership of migratory natural gas should not apply to coalbed methane as well.[53]

The issue in this context is whether the owner of the coal retains the right to capture the coal bed methane residing within that coal or whether that right is exercisable by adjacent landowners. In *Bowles v. Hopkins Cnty. Col., L.L.C.* the Kentucky Court of Appeal held that the owner of coal retained a right to capture the coal bed methane. This right was, however, qualified by the *Bowles* court which held that once the methane had escaped, the right of capture was automatically transferrable to other adjacent land owners.[54] The court stated:

> . . . the owners of the coal estate may produce the CBM while it is present in the coal seam or vein, but that it is subject to capture by the owner of the mineral estate in the event that it should migrate from the coal seam or vein.[55]

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[53] Con't Res. of Illinois, Inc. v. Illinois Methane, LLC, 847 N.E.2d 897, 901 (Ill. App. Ct. 2006) (courts have not yet extended this principle to shale but presumably a similar rationale would apply).

[54] Bowles v. Hopkins Cnty. Coal, LLC, 347 S.W.3d 59, 61 (Ky. Ct. App. 2011).

[55] Heller, *supra* note 4, at 1165.

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The decisions that have extended the rule of capture to coal bed methane assume the threshold classification of methane as a natural gas.[56] There is support for this categorisation because methane has been described as the "lightest and most abundant" of the many hydrocarbons that make up natural gas.[57] The fact that coal bed methane may be captured and possessed also makes it akin to natural gas.

In those states where the non-ownership principle is upheld, until natural or unconventional gas is "captured" and possessed, it will not be subject to ownership.[58] States upholding the non-ownership principle have held that a right to capture natural gas, including coal bed methane, confers upon the holder an incorporeal interest in the form of a *profit a préndre* which gives the holder an exclusive right to explore and develop the property so as to reduce methane to possession.[59]

The right to capture shale gas would also seem to come within the scope of this right given the migratory status of shale gas.[60] This issue was explored in the recent decision of the Pennsylvania Supreme Court in *Butler v. Charles Powers Estate*. In that case the court distinguished coal bed methane from

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[56] Olson, *supra* note 8, at 385 ("the tendency of coal bed methane to migrate through coal and porous rock to areas of reduced pressure or to exposed surfaces which make the *ferae naturae* analogy particularly appropriate").

[57] WILLIAMS & MEYERS, *supra* note 17, at 261.

[58] Hardwicke, *supra* note 51, at 395.

[59] Nunez v. Wainoco Oil & Gas Co., 479 U.S. 925, 962 (1986) (quoting the Louisiana Supreme Court that "Ownership of land does not include ownership of oil, gas and other minerals, occurring naturally in liquid or gaseous form" but that the "landowner has the exclusive right to explore and develop his property for the production of such minerals and reduce them to possession and ownership").

[60] *See generally* Bernard D. Goldstein, Elizabeth F. Bjerke & Jill Kriesky, *Challenges of Unconventional Shale Gas Development: So What's the Rush?*, 27 NOTRE DAME J.L. ETHICS & PUB. POL'Y 149 (2013).

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other forms of natural gas, such as shale gas.[61] The court opined that the genesis for this distinction lay in its earlier decision in *U.S. Steel Corp. v. Hoge* where coal bed methane was not treated as a natural gas but rather a dangerous gas that coal owners should be entitled to ventilate. The court ruled in *Butler* that, in contrast to coal bed methane, shale gas was a natural gas and the fact that hydro-fracking technology is required to extract it does not alter this status.[62] As a form of natural gas, shale gas comes within the application of the rule of capture and, therefore, within the scope of the *profit a préndre* entitlement.

By contrast, the *Butler* court suggests that coal bed methane may now be outside the scope of the rule of capture, at least in a non-ownership state such as Pennsylvania because it does not constitute a natural gas. The complexity of this distinction, and its implications for the application of ownership rights to different forms of unconventional gas highlights some of the fundamental concerns associated with the adaption of orthodox property rules.

A further, more fundamental concern connected with the exercise of the rule of capture over shale gas lies in the fact that the hydro-fracturing technology which is utilized to extract shale gas has the potential to generate "trespass" liability where it extends into adjoining sub-surface strata. It has been argued that sub-surface entry into a neighbouring gas formation, for the purpose of capture, could potentially result in liability on the basis of trespass, conversion, nuisance or negligence.[63]

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[61] Butler v. Charles Power Estate *ex rel.* Warren, 65 A.3d 885, 896–97 (Pa. 2013).

[62] *Id.*

[63] Terry D. Ragsdale, *Hydraulic Fracturing: The Stealthy Subsurface Trespass*, 28 TULSA L.J. 311, 316 (1993); *see also* Aaron Stemplewicz, *The Known Unknowns of Hydraulic Fracturing: A Case for a Traditional Subsurface Trespass Regime in Pennsylvania*, 13 DUQ. BUS. L.J. 219, 227 (2011) (arguing that legal questions remain as to the exact extent to which the rule of capture modifies common law trespass in the context of hydraulic fracturing activities).

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In those states where the non-ownership principle has been adopted, it has been argued that the capture of shale gas through fracture stimulation comes within the scope of the *profit a préndre* right and will, therefore, not generate a trespass claim where the only injury asserted involves the drainage of hydrocarbons.[64]

This approach was confirmed in *Coastal Oil & Gas Corp v. Garza Energy Trust*, where the court concluded that the rule of capture gives a mineral rights owner title to the oil and gas produced from a lawful well, bottomed on the property, even if the oil and gas flowed to the well from beneath another owners tract. According to this interpretation, the rule of capture is broad enough to preclude any recovery of damages for a drainage resulting from a fracture stimulation crossing property lines.

Significantly, the court in *Coastal Oil* did not expressly decide whether a fracture stimulation that crossed property lines would actually constitute a trespass. Instead, the court made it clear that historically in Texas the Railway Commission was responsible for regulating the rule of capture and this function should not be allowed to be usurped by trespass principles. The court concluded that without the rule of capture, "drainage would amount to a taking of a mineral owner's property—*the* oil and gas below the surface of the property—thereby limiting the Commission's power to regulate production to assure a fair recovery by each owner."[65]

The re-articulation of the rule of capture to preclude damages for sub-surface trespass has resulted in the expansion of a fundamental common law property principle to meet the demands of new hydraulic fracturing techniques. Arguably, this expansion distorts the core objective of the rule of capture which originated as an efficiency principle, limiting liability in circumstances where fugacious minerals which were possessed and controlled had been diverted from adjoining land.

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[64] *See generally* Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1 (Tex. 2008).

[65] *Id.*

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The proprietary foundation of the rule of capture should not mean that all exploration activities necessarily avoid surface estate liability.[66] Shale gas extracted *via* hydraulic fracturing techniques should continue to be cognizant of the entitlements of surface estate owners to sub-surface strata. The *ad coelum* principle mandates the extension of surface ownership into the sub-surface strata. The relationship between *ad coelum* and the rule of capture has been described as a "grand inconsistency."[67] Where sub-surface ownership rights are violated by extraction techniques exercised in accordance with the rule of capture, a collision between corporeal and incorporeal ownership ensues. The *profit a préndre* interest generated by the rule of capture disturbs the *ad coelum* entitlements of the surface estate owner and greater clarity regarding boundary violations becomes imperative.[68]

In the past, such ownership violations have been largely moderated by the correlative rights doctrine.[69] A state that upholds the correlative rights of owners over a common reservoir must necessarily mitigate against a strict application of the rule of capture in favour of giving each owner a "reasonable opportunity to produce his proportionate part of the oil and gas from the entire pool and to prevent operating practices injurious to the

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[66] *See* Theresa D. Poindexter, Note, *Correlative Rights Doctrine, Not the Rule of Capture Provides Correct Analysis for Resolving Hydraulic Fracturing Cases*, 48 WASHBURN L.J. 755 (2009) for a discussion of surface estate liability.

[67] *See* David E. Pierce, *Carol Rose Comes to the Oil Patch: Modern Property Analysis Applied to Modern Reservoir Problems*, 10 PENN ST. ENVTL. L. REV. 241, 248 (2011) (describing the relationship between the *ad coelum* principle and the rule of capture in this context as a grand inconsistency").

[68] *See* KUNTZ, *supra* note 27, § 4.3, 120 (arguing that the conduct of owners must be qualified by the particular conditions of this special community).

[69] *See* Poindexter, *supra* note 66, at 758.

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common reservoir."[70] The correlative rights doctrine, therefore, upholds the right of each landowner to take oil and gas on his land through lawful operations and the privilege may not be exercised in an injurious manner.[71]

A determination of what is and what is not consistent with the correlative rights doctrine will depend upon whether the activity is deemed socially acceptable under the circumstances.[72] In this respect, the correlative rights doctrine has been found to preclude rights against waste, spoilage and malicious damage and, arguably, may be the most appropriate common law principle to evaluate whether sub-surface incursions resulting from hydraulic fracturing operations constitute a trespass.[73]

Longer term, however, it has become increasingly imperative to ensure that common law ownership principles are responsive to the physical environment in which unconventional gas interests exist. Orthodox ownership concepts premised upon the notion of absolute exclusivity are increasingly inappropriate in the context of multiple, overlapping sub-surface rights in oil and gas. These issues have been exacerbated following the expansion of unconventional gas interests because the multiplicity of rights has significantly increased the potential for sub-surface conflict and incursion.[74]

Allowing a landowner to assert formal, tort based rights in the context of unconventional gas expansion has the potential to significantly increase the liability of gas licensees. Arguably, a preferable approach is to treat the

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[70] Eliff v. Texon Drilling Co., 210 S.W.2d 558, 562 (Tex. 1948).

[71] *Id.*

[72] KUNTZ, *supra* note 27, § 4.3, at 120.

[73] *See* Poindexter, *supra* note 66, at 781 (arguing that the court must use the doctrine of correlative rights to cases involving hydraulic fracturing that cross property lines because it is a more appropriate principle to utilize when evaluating complex reciprocal property rights of landowners over a common reservoir).

[74] *See* Poindexter, *supra* note 66.

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ownership interests arising in the sub-surface strata as "limited common property," held as "commons" among the members of the group or, in the case of oil and gas, the "special ownership community."[75] This approach would allow each owner within the group to make "acceptable uses" of the reservoir in order to extract oil and gas.[76] It would also preclude owners within the group from conducting "unreasonable" and therefore "unacceptable" uses of their common property interests. This type of ownership recalibration is likely to work more effectively for unconventional gas interests as it would encourage reciprocal interaction.

C. SEVERANCE OF THE MINERAL ESTATE FROM THE SURFACE ESTATE

A central tenet in the taxonomy of land and mineral ownership in the United States lies in the ability of a surface estate owner to sever or "split" the mineral estate from the surface estate. Where a legal severance is effected, the mineral estate may be sold, leased or retained by reservation or exception in a sale of the land. The creation of a mineral estate does not result in any renouncement of title by a surface estate holder, as the severance of sub-surface minerals will not affect the title of a surface estate. As outlined by the court in *Del Monte Mining & Milling Co v. Last Chance Mining & Milling Co.*, "unquestionably, at common law the owner of the soil might convey his interest in minerals beneath the surface without relinquishing his title to the surface."[77]

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[75] *See* Pierce, *supra* note 67, at 244 (arguing that where overlapping rights exist, and each can impact the community and vice versa, a common ownership framework along the lines espoused by Professor Carol Rose works more effectively).

[76] *See* Carol M. Rose, *Property as the Keystone Right?*, 71 NOTRE DAME L. REV. 329, 351 (1996) (arguing that the rigid ownership boundaries connected with conventional property do not work effectively with common property).

[77] Del Monte Mining & Milling Co. v. Last Chance Mining & Milling Co., 171 U.S. 55, 60 (1898).

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The right of a surface estate holder to sever a mineral estate is derived from the common law concept of accession, which assumes, in line with the *ad coelum* maxim, that minerals contained within the subsoil are regarded as a part of the subsoil and are therefore owned by the landowner. As such, the landowner has the capacity to deal with them separately. The doctrine of severance has, however, been criticized because the sub-surface is not divisible in the same way as the surface; there are no boundaries between sub-surface strata and sub-surface minerals as they are both fully integrated.[78]

When properly created, a mineral estate owner will acquire an interest in the land giving them the right to use the land in any way that is reasonably necessary for the development of the mineral estate.[79] This effectively means that when the mineral owner's activities conflict with a use by the surface owner, the claims of the mineral owner will prevail.[80]

Mineral estates in the United States are subject to two different ownership theories: the ownership in place theory and the non-ownership theory. According to the ownership-in-place theory, which has been adopted in many states, fugacious minerals form a constituent of the strata of the earth and must therefore be treated as a part of the realty while they remain *in situ*.[81] A mineral estate created pursuant to the ownership in place theory will

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[78] *See* Campbell, *supra* note 2, at 304–06 (acknowledging the historical criticism of this approach, whereby it was argued that the surface is divisible but a mine is not; that a mine is never coextensive with the surface and that the system was destined to lead to confusion over the ownership of the mine and its exploitation).

[79] *E.g.*, Brown v. Lundell, 162 Tex. 84, 344 S.W.2d 863, 872 (Tex. 1961).

[80] Herbert C. Manning, *Mineral Rights versus Surface Rights*, 2 NAT. RESOURCES LAW. 329, 331 (1969).

[81] This ownership theory is followed in Texas, Montana, Colorado, Kansas, Maryland, Michigan, Mississippi, New Mexico, Tennessee, North Dakota, Washington, Arkansas and West Virginia. *See* WILLIAMS & MEYERS, *supra* note 17, § 203.

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produce a horizontal severance of sub-surface strata. This type of estate is to be treated as a determinable fee simple and is subject to the same real property laws and rules as other land estates.[82]

The difficulty with mineral estates created pursuant to the ownership in place theory is that they are not consistent with the transitory nature of gas, which does not necessarily adhere to a particular land boundary. Some states have resolved this by holding that the surface estate owner owns the oil and gas underlying the boundaries of their property, but that such gas is not "the subject of actual possession until brought to the surface" because until that occurs there is no way to determine whether oil and gas exists within a particular land boundary.[83] This means that mineral estates created pursuant to the ownership in place theory will apply to transitory minerals, such as unconventional gas, but ownership can only be verified where it is possessed and controlled.[84]

By contrast, according to the non-ownership principle, fugacious minerals such as oil and gas are not regarded as a part of the underlying strata and may only be owned separately where they are reduced to possession.[85] According to this theory, no person owns oil or gas until it has been produced. The only interest that can be owned prior to possession, is the right to capture the oil and gas. This right amounts to an incorporeal estate and has been defined as a *profit a préndre*.[86]

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[82] *See* Olson, *supra* note 8, at 387; *see also* A.W. Walker Jr., *The Nature of the Property Interest Created by an Oil and Gas Lease in Texas*, 7 TEX. L. REV. 1, 1 (1928).

[83] Boggess v. Milam, 34 S.E.2d 267, 269–70 (W. Va. 1945).

[84] *See* Olson, *supra* note 8, at 387 (quoting Boggess v. Milam, 34 S.E.2d 267, 270 (1945)).

[85] The non-ownership principle has been adopted in Pennsylvania.

[86] WILLIAMS & MEYERS, *supra* note 17, § 203.1.

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The proprietary difference between a mineral estate arising pursuant to the ownership in place theory and a mineral interest arising pursuant to the non-ownership theory is fundamental. The former confers upon the holder physical ownership of the strata in which the minerals are located. This estate includes all ancillary rights necessary to support the extraction of the minerals, including rights of access and rights to construct drilling and other extraction operations. The latter confers upon the holder an incorporeal right, in the form of a right to capture oil and gas from the land. This entitlement does not include any physical ownership and therefore does not include any right of access.[87]

An important concern for unconventional gas lies in the question of whether, pursuant to the ownership in place theory, a mineral estate includes ownership of the gas that may be contained within that mineral. This issue raises classification difficulties and the resolution depends largely upon whether unconventional gas should be treated as an independent mineral or a component of the mineral reservoir in which it resides.[88] For example, if you own the sub-surface strata in which shale or coal resides, does that also mean that you own the shale or coal bed methane gas that resides within the shale or coal? It has been argued that the owner of the strata in which coal exists should, logically, also own the coal bed methane that resides within that coal.[89] If this is not the case, ownership of *in situ* unconventional gas may reside with the surface estate owner. Where a drill has stimulated migration, ownership may be verified where the gas is captured and produced.

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[87] *See generally* Drake D. Hill & P. Jaye Rippley, *Split Estate: Communication and Education versus Legislation*, 4 WYO. L. REV. 585 (2004).

[88] *See* Farnell, *supra* note 1, at 523 (arguing that the owner of a coal-bearing stratum would also be the owner of coal bed gas found in that stratum).

[89] *See* Olson, *supra* note 8, at 388 (arguing that the most obvious idea underlying the ownership in place theory is that if the coal bed owner owns not only the coal but the strata, his claim to the methane which is incidental to the coal is "greatly enhanced").

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Alternatively, ownership of unconventional gas may reside with the holder of a specifically created gas lease.

In those states where the non-ownership theory is upheld, these issues do not apply. According to the theory upheld in those states, unconventional gas, including both coal bed methane and, logically, shale gas, belong to the holder of a specific "gas" interest, because he retains an exclusive right to search for and capture sub-surface, migratory gas.[90]

The existence of a multiplicity of sub-surface mineral rights can generate a complex array of competing interests. This makes determining the boundaries of each interest and the reciprocal duties owed by each mineral owner imperative, particularly in the context of unconventional gas development. For example, if coal bed methane is owned separately from the owner of coal, the coal owner may have responsibilities toward the coal bed methane owner, to ensure that coal bed methane gas is not wastefully ventilated during the process of coal mining. Similar issues may arise in the context of shale gas, particularly given the need to utilize hydro-fracturing to extract the gas.[91]

D. INTERPRETING THE MINERAL DEED

A crucial issue underlying a determination of the nature and scope of a mineral estate and its application to unconventional gas, is how the wording in the mineral deed creating the estate is to be interpreted. As a general rule, the parties define their respective rights and obligations within the deed. This means that the deed usually confers rights to explore, drill, mine, operate,

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[90] Michelle D. Baldwin, Note, *Ownership of Coalbed Methane Gas: Recent Developments in Case Law*, 100 W. VA. L. REV. 673, 676 (1998).

[91] *See* Olson, *supra* note 8, at 388; *see also* Baldwin, *supra* note 90, at 676 (where the author discusses the two different interpretations of the ownership in place theory and considers the implications for the ownership of coal bed methane).

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produce, survey, lay pipelines, and utilize surface facilities for the disposal of salt water, construct bridges, build tanks, etc.[92]

Where, however, a mineral reservation or grant does not include these rights, or where the language of the deed lacks specificity, the common law will generally hold in favour of the mineral estate.[93] The rationale for this lies is that the inherent value of the mineral estate is only truly apparent where mineral production is facilitated.[94] Hence, the holder of a mineral estate should have their reasonable rights to the extraction and production of minerals granted pursuant to the doctrine of severance supported and prioritized. These core rights may be explicitly outlined within the deed or pursuant to an access agreement entered into with the surface owner but where they are not, common law will assume their incorporation.[95]

An important issue in this context is the scope that should be given to a bare reference to "minerals" within a deed. In particular, should a reference to "minerals" be taken to incorporate unconventional gas? One of the seminal cases to assess this issue with respect to coal bed methane was the decision of the Supreme Court of Pennsylvania in *United States Steel Corporation v. Hoge*.[96] The central issue in this case was whether the holders of a mineral

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[92] *See* Leslie Moses, *The Evolution and Development of the Oil and Gas Lease*, 2 INST. ON OIL & GAS L. & TAX'N 1, 10 (1951) (where the author discusses the derivation of the lease form for oil and gas interests).

[93] *See* Sun Oil Co. v. Whitaker, 483 S.W.2d 808, 810 (Tex. 1972).

[94] Andrew C. Mergen, *Surface Tension: The Problem of Federal/Private Split Estate Lands*, 33 LAND & WATER L. REV. 419, 432 (1998).

[95] *See* Douglas R. Hafer, R. Daniel & Logan W. Simmons, *Practical Guide to Operator/Surface Owner Disputes and the Current State of the Accommodation Doctrine*, 17 TEX. WESLEYAN L. REV. 47, 51 (2010) (noting that despite the court's clear articulation of the priority of the mineral owner's surface use rights, surface owners often resist an operator's attempts to enter their property).

[96] *See generally* U.S. Steel Corp. v. Hoge, 468 A.2d 1380 (Pa. 1983).

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estate in coal also had title to the coal bed methane gas located within that coal. The deed setting up the mineral estate in the coal conferred all title to the coal, but reserved "the right to drill and operate through said coal for oil and gas without being held liable for any damages." The surface estate owners subsequently conveyed the reserved gas rights to a new gas lessee. The new gas lessee commenced drilling, utilizing hydro-fracturing procedures. The coal interest holder sought to terminate this intrusion into the coal and argued that the coal mineral estate also conferred the right to develop and produce coal bed methane.[97]

The Pennsylvania Supreme Court held that in Pennsylvania, where the non-ownership theory is upheld, the surface estate owner owns a right to capture fugacious minerals such as coal bed methane. That title is lost as soon as fugacious minerals leave the land and are brought under the control of another. Accordingly, the court concluded that whoever owns the property in which the gas resides must also owns the gas. Hence, whilst the coal bed methane remained within the coal seam, it "must necessarily belong to the owner of the coal."[98] Once the coal bed methane migrates from the seam and enters the surrounding property however, the surface estate owner may claim title as it is then regarded as forming a component of the sub-surface strata and the surface estate owner is entitled to exercise a right of capture. Justice Zappala stated:

> When a landowner conveys a portion of his property, in this instance coal, to another, it cannot thereafter be said that the property conveyed remains as part of the former's land, since title to the severed property rests solely in the grantee. In accordance with the foregoing principles governing gas ownership, therefore, *such gas as is present in coal must necessarily belong to the owner of the coal*, so long as it remains within his property and subject to his exclusive dominion and control. The landowner, of course, has title to the

[97] *Id.*

[98] *Id.* at 1383.

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> property surrounding the coal, and owns such of the coalbed gas as migrates into the surrounding property.[99]

Applying these principles to the construction of the mineral deed, the *Hoge* court concluded that the express reservation of "the right to drill and operate through said coal for oil and gas without being liable for any damages" applied only to natural gas and not to coal bed methane. The court considered the intention of the parties at the time when the deed was executed and held that at that time, coal bed methane gas was not commercially viable and was regarded as a dangerous gas that was usually ventilated from the coal seam to prevent the possibility of explosion. Hence, the idea that the parties could have intended to reserve a right to exploit a gas of this nature was unlikely. According to the court, the better interpretation was that the parties intended to reserve a right to exploit any natural gas that may be been discovered deeper into the strata, but that the coal bed methane continued to belong to the coal owner who could ventilate it to prevent explosions.[100]

This decision suggests, at least within non-ownership states, that mineral deeds intend to confer upon the holder rights to all minerals commonly regarded as such, including any unconventional gas that may be residing within those minerals.

More recently however, the Supreme Court of Pennsylvania in *Butler v. Charles Powers Estate* evaluated this issue with respect to shale gas and came to a contrary conclusion to that of *Hoge*, holding that mineral estates that describe "minerals," without specific reference to natural gas, do not include the shale gas found in the Marcellus shale formation. This means that shale gas, unlike coal bed methane, does not belong to the owner of the shale

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[99] *Id.*

[100] *Id.* at 1385.

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mineral but will belong to the surface estate owner whilst it is *in situ* or a gas lessee.[101]

On the facts of the case, Charles Powers sold 244 acres of land in 1881 to the predecessors of the defendants and reserved to himself and his heirs, "one half the minerals and Petroleum Oils." In 2009, the surface estate owners filed a complaint to quiet title due to shale gas extraction. The heirs of Charles Powers filed for a declaratory judgment that the reservation included Marcellus shale formation and gas contained within that formation and that as such, the surface estate owners had no ownership claim to the gas.

The *Butler* court distinguished the *Hoge* decision, arguing that the characteristics of coal bed methane and the circumstances associated with that decision could be contrasted to the nature and characteristics of shale gas. Two broad grounds for distinction were articulated. First, unlike shale gas, at the time when the mineral estate was created in *Hoge*, coal bed methane was regarded as a dangerous gas, which was not commercially viable. Coal bed methane gas had to be ventilated to promote safety during the process of coal mining. This made it imperative for the coal owner to retain ownership rights in the coal bed methane.

Second, the *Butler* court argued that the *Hoge* decision, whilst recognizing the chemical similarities between coal bed methane and natural gas, nevertheless made an inherent legal distinction between the two when it upheld the right of the landowner, pursuant to their reservation, to drill through the coal seam to obtain natural gas. The *Butler* court argued that the gas found in Marcellus shale was best defined as natural gas that had become trapped within the Marcellus Shale instead of rising to the more permeable sand formations below the surface.[102] This meant that, as in *Hoge*, the surface estate owner rather than the owner of the mineral estate retained ownership rights.

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[101] *See* Butler v. Charles Powers Estate *ex rel.* Warren, 65 A.3d. 885, 892–98 (Pa. 2013).

[102] *Id.* at 899.

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A further important issue relevant to the *Butler* decision was the issue of whether the mineral estate included rights to shale gas, despite their being no explicit conferral of those rights. This required an evaluation of the ongoing relevance of what is known in Pennsylvania as the *Dunham* rule. This old common law interpretational rule, unique to Pennsylvania, assumes that a reference to minerals does not, in the absence of any express indication to the contrary, include natural gas.

E. THE *DUNHAM* RULE

Where a mineral estate holder is seeking to explore and/or produce unconventional gas, it is necessary to determine whether a mineral grant or reservation that refers only to a transfer of "minerals" may be taken to include a transfer of gas and whether it includes unconventional gas. Whilst shale and coal bed methane are widely accepted as minerals, the approach taken to this issue will depend upon the State in which the deed is reviewed.

In Pennsylvania, one of the ancient rules relevant to this determination is the *Dunham* rule. The rule is derived from the decision of the Supreme Court of Pennsylvania in *Dunham & Shortt v. Kirkpatrick* where it was held that a reservation in a deed of "all minerals" did not include oil because the plain, ordinary and popular meaning of the term "minerals" does not include oil and refers only to metallic minerals.[103] This decision has come to be referred to as the *Dunham* rule and has been consistently applied as an established rule of property to exclude natural gas where the deed of grant or reservation refers only to "minerals." The *Dunham* decision was subsequently expanded in *Silver v. Bush*, where the Pennsylvania Supreme Court specifically concluded

[103] Dunham v. Kirkpatrick, 101 Pa. 36, 40 (Pa. 1882). The *Dunham* rule had its genesis in the decision, Gibson v. Tyson, 5 Watts 34, 41 (Pa. 1836), where the court concluded that in interpreting the intent of the parties when creating a minerals deed, "to people entirely destitute of scientific knowledge in regard to such things . . . [n]othing is thought by them [minerals] to be such unless it be of a metallic nature, such as gold, silver, iron, copper, lead [etc.]."

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natural gas was another mineral which did not come within the meaning of the term used in reservations and grants.[104]

The *Dunham* rule is well established and over the years has acquired the status of a firmly entrenched rule of property, automatically binding in all cases where a deed of reservation or grant does not expressly include oil or natural gas.[105] The ostensible rationale is that a reference to minerals should only be assumed to include those minerals which come within the "ordinary sense" or "popular estimation" of the word. At the time when the *Dunham* and the *Silver v. Bush* decisions were handed down, it was felt that natural gas was not a resource popularly regarded as a mineral.

The *Dunham* rule been consistently upheld in Pennsylvania, despite dramatic social changes and some clear and cogent evidence that natural gas is now commonly regarded as a mineral.[106] Natural gas has, for example, been expressly included within the legislative definition of a mineral in specific Pennsylvania statutes.[107] Subsequent cases have articulated the *Dunham* rule as a principle of construction, however this appears forced

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[104] Silver v. Bush, 62 A. 832, 833–34 (1906).

[105] Highland v. Commonwealth, 161 A.2d 390, 398–99 (Pa. 1960).

[106] *See, e.g.*, Preston v. S. Penn Oil Co., 86 A. 203, 204 (Pa. 1913) (holding that the *Dunham* rule "has been the law of this state for 30 years, and very many titles to land rest upon it"); *see also* Bundy v. Myers, 94 A.2d 724, 726 (Pa. 1953) where the *Dunham* rule was upheld.

[107] *See, e.g.*, the Pennsylvania Municipalities Planning Code Act of 1968, Pub. L. No. 805, 53 PA. STAT. ANN. § 10107 (West 2013) which expressly includes natural gas within the definition of "minerals." In *Charles Powers Estate*, 65 A.3d at 890, the court concluded that scientifically, natural gas comes within the definition of a mineral because "the world of science has three "kingdoms" of material—animal, plant, and mineral—and oil and gas are obviously not animals or plants."

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when consideration is given to the fact that sub-surface minerals are capable of evolving in line with technological advancements.[108]

The court in *Butler v. Charles Powers Estate* continued this tradition and firmly upheld the *Dunham* rule, concluding that where the terms "oil" or "natural" gas are not specifically included within a private deed of reservation for mineral rights, they will not be encompassed without clear and convincing parol evidence indicating otherwise.[109] The *Butler* court held that there was no justification for overruling or limiting the *Dunham* rule and that it had formed "the bedrock for innumerable private, real property transactions for nearly two centuries."[110] Justice Baer reasoned, that too many settled expectations rest upon this rule for the courts to upset it retroactively, and that it amounted to an "unaltered, unwavering rule of property law for 131 years" which should not be overthrown in the absence of good reason.[111]

The *Butler* court therefore concluded that all forms of natural gas, including unconventional shale gas, are to be presumptively regarded as beyond the ordinary definition of a "mineral" for the purposes of private deeds.[112] The court further concluded that even if the shale in which the gas resides could be regarded as a mineral in itself, "there is no merit in any

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[108] *See, e.g.*, Silver v. Bush, 62 A. at 833 (where the court held that the "crucial question . . . is what was the sense in which the parties used the word?").

[109] *Charles Powers Estate*, 65 A.3d at 896. In this respect, the court argued at 897 that the *Dunham* rule has been an "unaltered, unwavering property rule for 131 years." In this respect the court quoted from *Highland v. Commonwealth*, noting that "a rule of property long acquiesced in should not be overthrown except for compelling reasons of public policy or the imperative demands of justice." *Id.* at 897 (quoting *Highland*, 161 A.2d at 399 n.5).

[110] *Id.* at 897.

[111] *Id.*

[112] *Id.* at 899.

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contention that this consequentially renders the natural shale gas a mineral coming within the scope of the grant or reservation."[113]

Whilst the *Dunham* rule is ostensibly a rule of construction, devised to assist in the interpretation of mineral deeds, the established and well-entrenched nature of the rule has meant that Pennsylvania courts articulate it more as a property concept than a canon of construction.[114] This appears to have become the case despite the fact such an application is inconsistent with the original judgment in *Dunham*. The actual *Dunham* decision was motivated by a desire to avoid interpreting the particular deed of reservation too broadly for fear that it might be found to be void for repugnancy on the grounds that it was as extensive as the actual grant.[115]

The consequence of extending the *Dunham* rule to include Marcellus shale gas is that in Pennsylvania today, all mineral estates that do not expressly refer to natural or unconventional gas will have no ownership claim over the gas. This means that the ownership of shale gas will, where a gas interest has been bifurcated from a mineral estate, reside with the holder of a gas lease or, where this has not occurred, with the surface estate owner where the owner has captured and produced the gas.

The decision of the *Butler* court to reinforce the *Dunham* rule as a rule of property is largely a consequence of its entrenched status. The decision ignores the fact that this common law rule evolved within a social context that preceded the unconventional gas boom. Whilst many property deeds may

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[113] *Id.*

[114] Daniel B. Kostrub & Roger S. Christenson II, *Canons of Construction for the Interpretation of Mineral Conveyances, Severances, Exceptions and Reservations in Producing States*, 88 N.D. L. REV. 649, 686–88 (2012) (arguing that the settled nature of the Dunham rule has meant that the Pennsylvania courts have not relied heavily on canons of deed construction).

[115] Bernerd A. Buzgon, *The Highland Case: An Extension of the* Dunham *Rule to Grants*, 65 DICK. L. REV. 159, 159 (1961).

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have been issued in Pennsylvania in reliance on the rule, its ongoing relevance in a contemporary context is questionable.

The shale gas revolution could not have been anticipated in the late nineteenth and early twentieth century when the *Dunham* rule first emerged. Back in this era, the concept of a mineral had a strong corporeal sensibility within the community.[116] In the United States today, the advent of unconventional gas has become so widespread, it is nonsensical to perpetuate a presumptive rule of construction based upon outdated social assumptions that relate to a different era.[117] Whilst rules of interpretation may mandate a temporal evaluation of the intention of the parties at the time when the mineral deed was created, where no such intention is apparent, as is often the case, it is appropriate to focus upon the presumed "general" intent of the parties.[118] Such an approach allows for a greater degree of judicial and contextual discretion.[119]

The concept of a "mineral" is not static and therefore should not be interpreted as an inert concept. The definition of a mineral must necessarily be demarcated by reference to the social, environmental and scientific circumstances in which it is placed. In the absence of an explicit intention by the original parties creating the deed, a reference to a "mineral" should be taken to include the general intentions of the parties. These may be assessed through an examination of the subject matter, context and circumstances of

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[116] *See generally* Buzgon, *supra* note 115.

[117] Christopher S. Kulander, *The Common Law Aspects of Shale Oil and Gas Development*, 49 IDAHO L. REV. 367–68 (2013) (discussing the dramatic increase in tension between surface estate owners and mineral estate owners following the expansion of unconventional gas development).

[118] David E. Pierce, *Evaluating the Jurisprudential Basis for Ascertaining or Defining Coalbed Methane Ownership*, 4 WYO. L. REV. 607, 608–09 (2004).

[119] *See* Pierce, *supra* note 118, at 613 (arguing that an evaluation of the general intent of the parties from contractual rules of construction often involves judicial discretion and manipulation).

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the mineral deed. This broad based assessment should not overlook the inexorable transition that physical landscapes experience over time. Nor should it ignore social and technological advancements that allow for the extraction of resources that would not have been possible at the time when the deed was created.[120]

The *Dunham* rule was originally intended to function as a rule of construction, giving a common sense definition to the concept of a "mineral" within a non-specific deed of reservation or grant. Unfortunately, the strict application of the rule has resulted, in the words of Professor Kuntz, in a nonsensical approach, as the rule seeks to determine whether the parties intended to include or exclude a specific substance rather than evaluating a more generalized intention. This confined application does not give effect to the substantial purpose of the rule and prevents it from adapting to accommodate future substances, unknown or without commercial value, at the point when the mineral reservation was created.[121]

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[120] *See* Kostrub & Christenson, *supra* note 114, at 697 (where the authors note that, in the absence of clear intentions, who can say that the meaning finally determined to the parties "intent" was what those individuals had in mind when executing the deed decades ago).

[121] *See* Eugene Kuntz, *The Law Relating to Oil and Gas in Wyoming*, 34 OKLA. L. REV. 28, 34 (1981). Professor Kuntz suggests that a better test would be as follows:

> . . . the severance should be construed to sever from the surface all substances presently valuable in themselves, apart from the soil, whether their presence is known or not, and all substances which become valuable through development of the arts and sciences, and that nothing presently or prospectively valuable as extracted substances would be intended to be excluded from the mineral estate.

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The reification of the *Dunham* rule effectively means that Marcellus shale gas in Pennsylvania will continue to remain with the surface estate owner, unless and until an express gas lease is created. This will invariably result in a proliferation of sub-surface estates with overlapping rights and the potential for multitudinous conflicts. Any gas lease issued will need to take account of an existing mineral estate and accommodate the rights of that mineral estate. It also means that surface estate owners need to be cognizant of the increasing pressure from mining companies to issue such leases.[122]

The *Dunham* rule has not been adopted in other states. A number of Tennessee decisions have actually formed fundamentally different conclusions to the *Dunham* rule and these decisions have come to be known as the "majority rule."[123] In *Murray v. Allard*, the Tennessee Supreme Court concluded that the definition of a mineral did include oil and gas and that the bulk of mankind would consider oil and gas to be minerals.[124] Many other states have followed this conclusion.[125] To date, the Tennessee courts have not reached a determination as to whether shale gas comes within the definition of "minerals" within a private deed of reservation. It would seem, however, given the broad approach of the majority rule, that a non-specific conveyance in that state would necessarily include shale and shale gas.[126]

The dramatic expansion of unconventional gas in the United States needs to be supported by innovative institutional development. Many

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[122] *See* Laura C. Reeder, *Creating a Legal Framework for Marcellus Shale Gas*, 34 WM. & MARY ENVTL. L. & POL'Y REV. 999, 1007 (2010) (where the author notes that surface owners will increasingly need to be protected from exploitation by drilling companies).

[123] KUNTZ, *supra* note 121, at 32.

[124] Murray v. Allard, 43 S.W. 355 (1897); *see also* J.M. Huber Corp. v. Square Enters, 645 S.W.2d 410, 416 (Tenn. Ct. App. 1982) ("[T]he word mineral encompasses not only oil and gas but hard minerals.") (internal quotation omitted).

[125] KUNTZ, *supra* note 121, at 32.

[126] *See* Watts & Jeffcott, *supra* note 1, at 37–38.

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established common law property rules are weighed down by historical baggage and have little continuing relevance, particularly where they have their genesis in assumptions regarding the physical characteristics of resources and the limits of technology which have since been discredited by science.[127]

The extension and adaptation of core ownership principles to unconventional gas has generated complexity and uncertainty. Much of the concern stems from the irregular location of the gas and its particular extraction requirements. The development of advanced technological extraction processes has generated liability issues that could not have been envisaged with orthodox drilling processes. Further, courts have failed to apply conventional ownership principles to unconventional gas in a consistent and rational manner. This has generated a strong imperative for targeted statutory provisions to be introduced in all relevant states, which define the nature, scope and boundaries of unconventional gas ownership and identify the reciprocal obligations owed between adjoining sub-surface interest holders.

3. THE AUSTRALIAN FRAMEWORK

A. STATE OWNERSHIP OF UNCONVENTIONAL GAS

Unlike the United States, in most Australian states and territories, ownership of natural gas, including unconventional gas, has either been reserved or vested in the state pursuant to specific statutory provisions enacted pursuant to state mining and petroleum legislation.[128] The

[127] *See* Rule, *supra* note 6, at 805 (arguing that courts and legislatures will need to adjust existing property rules to accommodate new forms of energy development).

[128] *See Petroleum (Onshore) Act 1991* (NSW) § 6; *Petroleum and Gas (Production and Safety) Act 2004* (Qld.) § 26; *Mineral Resources (Sustainable Development) Act 1990* (Vic.) § 9; *Petroleum and Geothermal Energy Resources Act 1967* (WA) § 10.

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introduction of these provisions has significantly diminished the rights of the surface estate owner under the common law *ad coelum* doctrine.[129] For the most part, the common law right to minerals that used reside with the surface estate owner have now been abrogated in favour of public or state-based mineral ownership.[130]

A state-based ownership framework depends upon a fundamental distinction between ownership of the surface and ownership of the subsoil. 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.[131] This type of framework is known as the *dominial* or *regalian* system and it originates from the right imposed by the sovereign monarch, upon the owner of the mining fields, to secure payment or participation in the extracted mining product.[132]

A state-based ownership regime depends upon the constitutional legitimacy of the legislative provisions that confer ownership in sub-surface minerals upon the state. In Australia, the mining and petroleum legislation has a state focus and this precludes the vesting provisions from being subject to any application of the Commonwealth Constitution. In particular, it

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[129] *See* Adrian J. Bradbrook, *Relevance of the* Cujus Est Solum *Doctrine to the Surface Landowner's Claims to Natural Resources Located above and beneath the Land*, 11 ADEL. L. REV. 462, 464 (1988).

[130] Tina Hunter & Michael Weir, *Property Rights and Coal Seam Gas Extraction: The Modern Property Law Conundrum*, 2 PROP. L. REV. 71, 77 (2012).

[131] *See* Campbell, *supra* note 2, at 307.

[132] *See generally* James K. Boyce, *From Natural Resources to Natural Assets*, *in* NATURAL ASSETS: DEMOCRATIZING ENVIRONMENTAL OWNERSHIP (James K. Boyce & Barry G. Shelley eds., 2003).

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precludes the surface estate owner seeking compensation pursuant to the just terms provision under § 51(xxxi).[133]

The statutory vesting provisions effect a statutory severance of the mineral ownership from the surface estate. This means that in Australia, minerals coming within the scope of the vesting provisions do not form a component of a ownership rights held by a surface estate owners. Hence, unlike the United States, a surface estate owner is unable to create a separate, private mineral estate.[134] The definition given to minerals or petroleum within most mining and petroleum acts is extremely broad. For all effects and purposes this means that the state now owns most commercially viable sub-surface minerals, including coal, oil, petroleum, metals, iron ore, hydro-carbons and natural gas.[135]

The distinction between common law mineral ownership and statutory mineral ownership is important in a dominial framework and this is the core divergence between mineral ownership in Australia and the United States. As discussed above, in the United States, under common law, accession framework mineral ownership stems from the fundamental entitlement of a

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[133] *See* Simon Evans, *When is an Acquisition of Property not an Acquisition of Property*, 11 PUB. LAW REV. 183 (2001).

[134] *See generally* Yinka Omorogbe & Peter Oniemola, *Property Rights in Oil and Gas Under Dominial Regimes in* PROPERTY AND THE LAW IN ENERGY AND NATURAL RESOURCES 115, 118 (Aileen McHarg et al. eds., 2010); *see also* Patrick Wieland, *Going Beyond Panaceas: Escaping Mining Conflicts in Resource-Rich Countries Through Middle-Ground Policies*, 20 N.Y.U. ENVTL. L.J. 199, 204 (2013).

[135] *See, e.g.*, the definition of "petroleum" in the *Petroleum (Onshore) Act 1991* (NSW), (Austl.) § 3 which means: "(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."

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surface estate owner to sever the minerals from the land by executing a legally valid mineral interest.[136] The nature and scope of a common law mineral estate depends upon the rights and interests conferred within the deed and how those rights are subsequently constructed, in accordance with established common law principles.[137]

By contrast, statutory mineral ownership is derived completely from the terms of the legislative provisions. Where a statute creates a property interest, there are different ways in which it may be construed.[138] The statute may validate a preconceived interest, by vesting title in the state, or the statute may be treated as creating a completely new property expression, whose internal characteristics bear little resemblance to the common law form.[139] Where, however, a statute vests a property interest it is assumed that a pre-existing interest exists.

The provisions vesting ownership of minerals in the state are derived from two fundamental assumptions: (i) that minerals have the capacity to be divested from the sub-surface strata in which they are located and (ii) that the ownership rights that vest in the state are ownership rights in the mineral rather than ownership of the corporeal strata in which the minerals are

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[136] *See generally* Westmoreland & Cambria Natural Gas Co. v. DeWitt, 18 A.725 (1889) (discussing that oil and gas that exist in the subsurface strata belong to the surface owner and will continue to do so until they are severed from the freehold. The capacity of the surface estate owner to create a mineral estate is often referred to as the "doctrine of severance").

[137] *See* Kostrub & Christenson, *supra* note 114.

[138] *See generally* Anthony Scott, *Property Rights and Property Wrongs*, 16 CAN. J. ECON. 555 (1983) (discussing the different roles that statute and common law have played in the evolution of property).

[139] For different ways in which statutory mining rights may be expressed are see Mathew Storey, *Not of this Earth: The Extra-Terrestrial Nature of Statutory Property in the 21st Century*, 25 AUS. RES. & ENERGY L.J. 51, 54 (2006).

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located.[140] The vesting provisions seek to validate the transfer of pre-existing mineral ownership rather than actually generating a new ownership interest and in this sense rely implicitly on the doctrine of severance.[141]

The statutory vesting of mineral ownership gives the state the power to issue titles to mining companies over privately held freehold land, Crown leases and land that is subject to native title claims.[142] This has been described as the "concession system" whereby the state, as the original owner of mineral resources, grants rights for the exploration and exploitation of minerals to an applicant, provided the applicant meets objective and impersonal legal requirements.[143] The concession framework allows the state to confer permissory rights to extract sub-surface minerals to mining companies who, depending upon the character of the license issued, acquire cumulative rights to access, explore or produce sub-surface minerals. Mining licenses differ substantially to mining estates in that they confer permissory rights to enter, explore and produce sub-surface minerals but do not confer actual ownership rights in the mineral themselves.[144]

In this respect, mining licenses do not constitute ownership interests in the sub-surface strata nor do they constitute incorporeal hereditaments. Rather, they amount to statute based permissory entitlements, which allow the holder to carry out specific exploration, retention or production rights.[145] State ownership of sub-surface minerals will not be extinguished by the issuance of a statutory mining license. Any concession issued by a state is generally only a temporary right to exploit a mine or reservoir, the ownership

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[140] *See* Omorogbe & Oniemola, *supra* note 134, at 120.

[141] *Id.*

[142] *See, e.g.*, *Petroleum (Onshore) Act of 1991* (NSW) §§ 69A–D.

[143] *See* Wieland, *supra* note 134, n.35.

[144] *See generally* Michael Crommelin, *The Legal Character of Resources Titles*, 17 AUS. MINING & PETROLEUM L.J. 57 (1998).

[145] *Id.* at 62.

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of which remains in the state and will continue to be the property of the state after the concession has expired.[146] Once a sub-surface mineral is actually produced, however, ownership of that produced mineral is then transferred from the state to the license holder via statutory vesting provisions.[147] This type of provision is akin to the common law rule of capture, as it is exists in the United States, as the possession and production of the mineral confirms the transfer of ownership rights in the mineral.

The state ownership framework provides a solid foundation for the progression of the unconventional gas industry in Australia. The difficulties associated with non-responsive common law ownership principles, as experienced in the United States, do not exist in Australia because the framework is characterized by consistent and enduring state ownership. In this respect, the dominial framework avoids the difficulties associated with interconnecting mineral estate ownership and the innumerable problems connected with the interpretation and construction of private deeds by reference to common law principles.

The primary issue confronting unconventional gas development in Australia is the impact that issued mining licenses have had upon surface estate ownership.[148] When the state issues mining licenses that allow mining companies to explore for, retain or produce unconventional gas such as coal bed methane or shale, the ownership rights of surface estate holders are often

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[146] *See* Campbell, *supra* note 2, at 310 (noting that under a state ownership framework, any "concession" issued by the state usually only exists for a limited period of time).

[147] *See, e.g.*, *Petroleum and Gas (Production and Safety) Act 2004* (Qld.) §§ 11, 28 (wherein it sets out that where a person produces petroleum, it becomes the person's property. In this context, petroleum is expressly defined to include a natural gas and therefore would cover unconventional gas such as coal bed methane or shale).

[148] *See* Kate Galloway, *Landowner's versus Miner's Property Interests: The Unsustainability of Property as a Dominion*, 37 ALT. L.J. 77, 80 (2012) (outlining the conflict generated by this private/public ownership divide).

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significantly impacted. In the United States, surface owners retain control over sub-surface minerals and constitutional amendments reinforce the core integrity of these private ownership rights. This framework ensures landowners are directly involved in the development of extractive rights for unconventional gas development.

By comparison, the state ownership framework in Australia has disengaged the landowner from the development of extractive mining rights and this has generated significant landowner opposition. This opposition is largely sourced in misconceptions regarding the scope of land ownership and the impact of the statutory vesting provisions. It is difficult for many surface owners to comprehend that their land is now fully amenable to the legal entitlements of mining license holders. In this respect, the interface between the state ownership of minerals and the private ownership of the surface estate is complex because it disturbs the intuitive assumptions underlying the natural accession between sub-surface land and minerals.[149]

B. LAND ACCESS CONCERNS

The nature and scope of the access entitlements held by license holders is the source of much contention and debate in many states across Australia. In this respect, the mining legislation in most states fails to clearly articulate the relationship between land and mineral ownership. The common law framework is unburdened by these concerns because the *ad coelum* principle assumes that the surface owner is also the owner of sub-surface minerals unless those minerals are migratory. The separation of land and mineral ownership under a dominial framework necessitates the need for interposed

[149] *See generally* Wang Mingyuan, *Natural Gas Development and Land Use: Conflict Between Legal Rights and its Resolution*, PROPERTY AND THE LAW IN ENERGY AND NATURAL RESOURCES 165 (Aileen McHarg et al. eds., 2010) (arguing that ownership arrangements that separate land from mineral resources are good for state planning and administration but they lay the foundation for conflict between natural gas development and land rights).

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access entitlements.[150] These entitlements are usually statute based which means that their scope and focus may vary according to the jurisdiction in which they are recognized.

For example, in Queensland the *Petroleum and Gas (Production and Safety) Act 2004* (Qld.) sets out that the holder of a petroleum lease confers upon the holder the right to carry out exploration, production and storage activities, rights to construct and operate petroleum pipelines, rights to carry out the processing of petroleum in the area of the lease and to construct and operate a facility for the processing, storage or transport of petroleum in the area of the lease as well as rights to carry out activities which are reasonably necessary or incidental to these authorized activities.[151] These statutory entitlements anticipate land access but only for the purpose of conducting authorized statutory rights.

It is not possible for a surface estate owner to completely deny access to a mining license holder given the scope and range of the statutory entitlements conferred. However, the impact of increased access entitlements, as a result of the dramatic expansion in unconventional gas production, has prompted some states to the implement land access codes.[152] In Queensland, the access entitlements for all petroleum leases, petroleum being defined broadly to include unconventional gas, are subject to a comprehensive code of behavior that seeks to regulate the manner in which these entitlements are

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[150] *See generally* Omorogbe & Oniemola, *supra* note 134.

[151] *Petroleum and Gas (Production and Safety) Act 2004* (Qld.) §§ 109–112 (Austl.).

[152] A land access code has been introduced in Queensland and has been proposed for New South Wales as a consequence of increased coal bed methane development. *See* Department of Employment, Economic Development and Innovation, Land Access Code, Nov. 2010, at http://mines .industry.qld.gov.au/assets/land-tenure-pdf/land_access_code_nov2010 .pdf.

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enforced and thereby mediate the interface between surface and mineral ownership.[153]

The *Land Access Code* (Qld.) seeks to ensure that the landholder is properly and reasonably notified of the rights and activities of the license holder, that surface land damage is properly remediated, that adequate compensation is provided to the landholder as agreed between the parties and that the rights, and that privacy and activities of the landholder are properly respected.[154]

The Queensland code prescribes a range of mandatory provisions that reflect some of the core problems encountered by landholders subject to mining licenses. The mandatory provisions include the requirement that a license holder utilize an existing access point, road or track to enter a landholder's land, operate vehicles at reasonable speeds, repair any damage caused to such access tracks, use the land in a manner that minimizes disturbance to people, livestock and property, take reasonable steps to prevent the spread of declared pests, set up a camp where the location, plan and management has been agreed upon with the landholder or in a manner that minimizes landholder business or land use activities, collect rubbish and waste, close gates, repair grids and obtain consent prior to erecting any gate or cutting a fence on the landholders land.[155]

The recent introduction of this Code is illustrative of the significant impact unconventional gas expansion is having upon landowner activities. This is particularly the case in the eastern states of Australia, where unconventional gas has disturbed the established pattern of landowner

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[153] *Petroleum and Gas (Production and Safety) Act 2004* (Qld.), § 299 (Austr.) (defining coal seam gas (coal bed methane) as "petroleum"); *Petroleum and Gas (Production and Safety) Act 2004* (Qld.) § 24A (Austr.).

[154] *Department of Employment, Economic Development and Innovation: Land Access Code 2010* (Qld.) (Austr.) Part 2, § 4.

[155] *See generally Department of Employment, Economic Development and Innovation: Land Access Code 2010* (Qld.) (Austr.) Part 3.

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behavior, encouraging activitism and political mobilization.[156] Regulating the way in which land access is conducted provides some relief for aggrieved landholders but it cannot redress the core concern, exacerbated by the development of unconventional gas, that the segregation of land and mineral ownership creates irreconcilable ownership domains.

The conceptualization of discrete private and state ownership bundles for corporeal resources that reside together creates a transection of rights that are difficult to align.[157] Private landowners holding exclusive rights to control the land are necessarily qualified by the exclusive right of mineral holders to control the minerals. Whilst the qualification of land ownership by incorporeal encumbrances is well established, the idea that landownership precludes mineral ownership despite the physical assimilation of the two is perplexing and divisive.[158]

These problems highlight the impact that ownership frameworks can have upon individuals and the communities in which they reside. It is arguable that the dominial framework for mineral ownership undermines the capacity of property rights to shape and facilitate community life and to

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[156] *See generally* Tim Boisel, *Coal Seam Gas Exploration and Production in New South Wales: The Case for Better Strategic Planning and More Strategic Regulation*, 29 ENV. PLANNING L.J. 129 (2012) (outlining the political, strategic and planning tensions that CSG production has created in Australia).

[157] *See generally* Aileen McHarg, *Property and the Law in Natural Resources*, PROPERTY AND THE LAW IN ENERGY AND NATURAL RESOURCES 12 (Aileen McHarg et al. eds., 2010) (describing that ownership arrangements that separate land from mineral resources are good for state planning and administration but lay the foundation for conflict between natural gas development and land rights).

[158] *See* Daniel Fitzpatrick, *Evolution and Chaos in Property Rights Systems: The Third World Tragedy of Contested Access*, 115 YALE L.J. 996, 1000 (2006) (discussing that state property rights are disruptive and rely upon coercive agencies that have the potential to be ignored).

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respond effectively to what has been described as the "social-obligation norm" that underlies all property relationships.[159] Landowners, particularly those who have held the land for generations and who have established strong, productive surface industries, have come to perceive their ownership bundle as conferring a level exclusivity which is inconsistent with the feudal and statutory context in which it exists.

This perceptional incongruity is particularly manifest with the extensive expansion of unconventional gas interests into agricultural and residential areas. For the first time, private landowners have been forced to accept the qualified nature of their ownership. The resultant conflict suggests that in Australia, the dominial framework neither reflects nor engages community attitudes and that it exists to support the timely issuance of mining licenses and the acquisition of state mining royalties.[160]

The rapid introduction of legislative protections for landowners illustrates the increasing difficulties state governments face in upholding a strict dominial framework in the face of expanding unconventional gas interests.[161] State ownership of minerals is often rationalized on the grounds that minerals need to be articulated as public property so they may be conserved and managed for the welfare of all the citizens.[162] This argument

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[159] *See* Gregory S. Alexander et al., *A Statement of Progressive Property*, 94 CORNELL L. REV. 743, 744 (2009); *see also* Gregory S. Alexander, *The Social-Obligation Norm in American Property Law* 94 CORNELL L. REV. 745, 764 (2009).

[160] *See generally* Alan Randall, *Coal Seam Gas: Towards a Risk Management Framework for a Novel Intervention*, 29 ENVTL. PLANNING L.J. 152 (2012) (discussing of the conflict that has ensured in Australia following the progression of the coal bed methane industry).

[161] *See generally* Jedediah Purdy, *American Natures: The Shape of Conflict in Environmental Law*, 36 HARV. ENVTL. L. REV. 169 (2012).

[162] *See* Emeka Duruigbo, *The Global Energy Challenge and Nigeria's Emergence as a Major Gas Power: Promise, Peril or Paradox of Plenty?* 21 GEO. INT'L ENVTL. L. REV. 395, 440–41 (2009) (where the author raises the

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has little resonance for Australian rural industries and communities whose land and environment has been dramatically affected by the expansion of unconventional gas mining.[163] Arguably, the spectacular growth of unconventional gas illustrates how a private, common law property framework, despite the many internal constraints, has a more intrinsic and functional social and community utility than a state ownership framework.

C. REFORM PROPOSALS

Globally, the widespread exploitation of unconventional gas presents significant challenges for mineral ownership regimes. In the United States, the shale revolution has generated unprecedented policy concerns for energy development and the ownership framework has struggled to respond. Common law principles that originated in a different energy era have had difficulty responding to the scale and impact of unconventional gas development. Orthodox common law principles have evolved in an ad hoc and inconsistent manner creating a jurisdictional patchwork of laws. In Australia, the state ownership framework has encountered significant antagonism as landowners struggle to deal with the realization that the separation of land and mineral ownership has detached them from mining development that may devastate industries and livelihoods.

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public welfare argument of state owned minerals); *see also* Thomas W. Merrill, *Private Property and the Politics of Environmental Protection*, 28 HARV. J.L. & PUB. POL'Y 69, 76 (2005) (arguing that wealth, capitalization and accountability effects boost private law efforts to enhance environmental quality and creates conditions for its effective regulation); *cf.* PAUL COLLIER, THE PLUNDERED PLANET: WHY WE MUST—AND HOW WE CAN—MANAGE NATURE AND GLOBAL PROPENSITY 93 (2010) (noting that for many countries, the state ownership framework has provided very little welfare, with the record ranging from "poor to catastrophic").

[163] *See* Rural Affairs and Transport Reference Committee, *Interim Report: The Impact of Coal Seam Gas on the Management of the Murray Darling Basin* (Nov. 2011), *accessed at* http://www.basinsustainabilityalliance.org/cms-assets/documents/40741-577664.senate-interim-report-mdb.pdf.

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There is no simple resolution. The private ownership model in the United States has given landowners greater engagement, however this has been achieved through the creation of a complex array of overlapping mineral estates with interpretational and liability issues. The state ownership framework avoids these difficulties, but has had to deal with different concerns stemming from the opposition, resentment, and resistance of landowners who have been detached from the development process.

Reform proposals must focus upon the importance of increased regulatory intervention as a means of improving the transition to unconventional gas. In the United States, this is best achieved through the introduction of further legislation, in all relevant states, clarifying the unique status of mineral estates and gas leases as qualified and highly reciprocal interests. The introduction of legislation outlining ownership boundaries is vital as it will help to determine the validity of trespass claims for hydrofracturing. Common law principles do not have the institutional capacity to deal effectively with this issue. The correlative rights doctrine evolved to qualify the unmitigated application of the rule of capture. It cannot be relied upon to resolve the issue of trespass liability for hydro-fracturing activities.[164] Statutory clarification regarding the nature of subsurface trespass and the extent to which the rule of capture can justify the utilization of hydro-fracturing activities for the extraction of unconventional gas is desperately required. Whilst well-spacing regulations and proration orders in each state have helped parties "capture" their fair share of migratory minerals, further legislative articulation outlining the activities the rule of capture covers is necessary in order to properly elucidate liability issues.[165]

A further reform proposal for the United States lies in the possibility of introducing legislative provisions that expressly recognize the "shared" status of subsurface mining interests. This could feasibly be achieved by mineral

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[164] *See* Poindexter, *supra* note 66.

[165] *See* R.R. Comm'n of Tex v. Manziel, 361 S.W.2d 560, 572 (Tex. 1962) (In Texas, the Railroad Commission has general powers to regulate the oil and gas production.).

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estate owners agreeing on the percentage of ownership each would hold in mineral resources prior to drilling being undertaken.[166] Statutory provisions could make such private arrangements mandatory and could also compel a unified approach to the issue of when, where and how unconventional gas interests may be exploited.

Models suggested include the conferral of votes for sharing owners, which would be proportionate to the amount of unconventional gas predicted to reside in the subsurface of their property.[167] Regulatory control of such arrangements is crucial because the agreements would qualify and control ownership interests and this is best achieved through the implementation of clear and consistent legislation. The provisions could also outline relevant governance mechanisms in the event of ownership disputes arising.[168]

Finally, increased regulatory intervention outlining coherent and dependable rules for the construction of mineral deeds is critical for the United States. It is important to determine whether old mineral deeds, created in a different energy era, encompass unconventional gas interests and further, whether the orthodox common law principles supporting those deeds continue to apply.[169] The introduction of a uniform definition of the term "minerals" is particularly attractive in this context because of its capacity to

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[166] Peter M. Gerhart & Robert D. Cheren, *Recognising the Shared Ownership of Subsurface Resource Pools*, 63 CASE W. RES. L. REV. 1041, 1097 (2013) (where the authors note that the possibility of assigning shares to sharing owners has been made more feasible by the introduction of modern seismic technology).

[167] *Id.* at 1098.

[168] Gerhart & Cheren, *supra* note 166, at 1099 (discussing the preference of private agreements that are subject to judicial review to legislative regulation although accepting that a governance mechanism for disputes may be best mandated through legislation).

[169] *See* Kostrub & Christenson, *supra* note 114, at 697 (suggesting a need for consistency in the application of canons of construction to mineral deeds).

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promote greater consistency, especially where the actual intention of the parties is obscure and unclear.[170] Whilst different states may come to varying conclusions regarding how statutory principles may be introduced, defining the term "mineral" broadly, to include all forms of unconventional gas is advantageous as it would not only preclude the perpetuation of outdated and non-representatives common law rules of construction such as the *Dunham* rule, it would reinforce the broad and dynamic nature of mineral resources.[171]

Reform proposals in Australia must also revolve around targeted legislative intervention. Moderating the interface between surface ownership and mineral exploitation through the introduction of specific codes of behavior is particularly important. This is best achieved through the consistent introduction of detailed land access codes, akin to that which has been introduced in Queensland.[172] Whilst statutory provisions regulating the nature and scope of surface estate access cannot diminish the severity with which unconventional gas development has impacted landowners, it can at least ensure that the manner in which such access is conducted is efficient and qualified, thereby ensuring that any disruption caused is kept to an absolute minimum.

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[170] *See* Bruce M. Kramer, *Property and Oil and Gas Don't Mix: The Mangling of Common Law Property Concepts*, 33 WASHBURN L.J. 540, 565 (1994) (arguing that courts regularly choose from a range of inconsistent canons of construction to interpret a document and this has produced vast differences in outcome).

[171] *See, e.g.*, Spurlock v. Santa Fe Pac. R. R. Co., 694 P.2d 299, 308–09 (1984) (where the court concluded that a deed reservation for "other minerals" includes "oil and gas").

[172] *Supra* note 152. A Land Access Code has been introduced in Queensland (Department of Employment, Economic Development and Innovation, Nov. 2010, Land Access Code, http://mines.industry.qld.gov.au/assets/land-tenure-pdf/land_access_code_nov2010.pdf) and has been discussed as part of a reform package in New South Wales. See Petroleum (Onshore) Amendment Bill 2013 (NSW), Schedule 1, §§ 69DB, DC.

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A further possible statutory reform for Australia lies in the introduction of a specific regulatory framework focused exclusively on the issuance of unconventional gas licenses. Such a framework could be embedded within existing mineral and petroleum legislation and would include a broad range of conditional provisions allowing for the issuance of investigative and non-determinative mining licenses, capable of being extinguished on the happening of specified criteria. For example, statutory provisions could confer upon the state the capacity to extinguish an issued shale gas license in the event of unforeseen environmental impact flowing from the process of hydrofracturing or, in the event of significant and unreasonable impacts upon the livelihood or industry of landowners. Such a framework would mediate the impact of a dominial ownership framework by imposing ongoing welfare assessment obligations upon the state in the issuance of extractive entitlements.[173]

D. CONCLUSION

Unconventional gas, and more, particularly, shale gas has been described as "the most significant energy innovation this century."[174] The scale of the unconventional gas revolution has generated tensions in ownership frameworks across the world. The private and state ownership models that exist in the United States and Australia respectively have been slow to respond to the challenges of this expanding industry. In examining the fundamental principles underlying each ownership exemplar, and particularised common law and statutory developments, this Article argues that the existing property paradigms are ill equipped to deal with the demands

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[173] The possibility of introducing non-determinative mining licenses in New South Wales was discussed by Samantha Hepburn, *A Critical Evaluation of the New Regulatory Framework for Coal Seam Gas in New South Wales* (2013) U.N.S.W. L.J (forthcoming).

[174] *See Fueling North America's Energy Future: The Unconventional Gas Revolution and the Carbon Agenda*, HIS, Cambridge Energy Research Associates, Executive Summary, ES-1, *available at* http://www2/cera/com/docs/Executive_Summary.pdf.

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of this emergent industry in the absence of targeted legislative intervention. Neither the private, common law, accession based framework nor the public, state based, dominial frameworks have been able to effectively embrace the convergent social, environmental and technological issues associated with unconventional gas development.

Ownership frameworks must be responsive to the environment in which they function. There is no utility in the perpetuation of out-dated, non-receptive principles that cannot effectively transition into a modern environment. The propagation of established ownership conventions is non-sensical where they do not support, justify and explicate the landscape in which they operate. In both the United States and Australia, the exploitation of unconventional gas deposits has had a dramatic impact on communities and landscapes. In both countries, the ownership models support the severance of land and mineral ownership. Whilst the private framework for mineral ownership in the United States is markedly different to the state framework for mineral ownership in Australia, in both countries, the advent of unconventional gas has generated significant complications for ownership frameworks reliant upon the separation of land and mineral ownership. These issues are likely to be exacerbated without the introduction of swift, regulatory initiatives aimed at promoting legitimacy and transparency in the complicated process of balancing competing and proliferating surface and sub-surface ownership interests.

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