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Cross-Jurisdiction Unitization Agreements: A Legal Solution to the Issue of Cross- Jurisdiction Petroleum Reserves Between Iran and Iraq

Nawzad Mirali Yasin

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CROSS-JURISDICTION UNITIZATION AGREEMENTS: A LEGAL SOLUTION TO THE ISSUE OF CROSS-JURISDICTION PETROLEUM RESERVES BETWEEN IRAN AND IRAQ

NAWZAD MIRALI YASIN*

Table of Contents

PREFACE 626
CHAPTER ONE: ENERGY SECURITY AND GLOBAL APPROACHES TO RESOLVE ENERGY CRISES 627
I. Introduction 627
II. The Modern Overview of Energy Security 628
A. Customary Definitions of Energy Security 632
B. Concept Evolution and Elements of Energy Security 635
1. Physical Elements: Availability and Accessibility 635
a) Accessibility 636
b) Availability 639
2. Economic Element: Affordability 641
3. Environmental Element: Acceptability 643
III. The Gravity of Energy Crisis 645
A. Energy Crises in History 646

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1. The 1956 Suez Canal Crisis 647
2. The 1973-1974 Oil Crisis 649
3. The 1979-1980 Oil Crisis 650
B. Standing Descriptions of Energy Crisis 653
C. The Pathology of Energy Crises 655
1. Unavailability and Energy Crises 658
2. Inaccessibility and Energy Crises 662
a) Intrastate and Interstate Conflicts 664
b) Authoritarian Governments 665
c) Terrorism and Cyber-Attack 665
IV. The Global Structure for Energy Security 666
A. Intergovernmental Energy Organizations 670
1. Organization of the Petroleum Exporting Countries (OPEC) 671
2. The International Energy Agency 674
3. The International Energy Forum 676
B. Energy Treaties 678
1. The Energy Charter Treaty (ECT) 680
2. The North American Free Trade Agreement ("NAFTA") 683
3. Bilateral Investment Treaties 685
C. Unitization Agreements 686
CHAPTER TWO: UNITIZATION OF PETROLEUM RESERVES 689
I. Introduction 689
II. Technical Setting of Unitization 690
A. Characteristics of Petroleum Reservoirs 690
B. Dynamics of Petroleum Reservoirs 692
C. Oil and Gas Recovery Levels 696
1. Primary Recovery 696
2. Secondary Recovery 696
3. Enhanced Oil Recovery 697
D. Technical Necessities of Unitization 697
III. Economic Advantages of Unitization 698
A. Prevent Waste 698
B. Promote Production 700
IV. Legal Aspects of Unitization 700
A. Legal Framework of Unitization 703
B. Legal Effects of Unitization 707
1. Cross-Assignment Theory 707
2. Contract Theory 708
V. Conclusion 710
CHAPTER THREE: MODES OF UNITIZATION AGREEMENTS 711
I. Introduction 711

II. The Categorization of Unitization Agreements 711
A. Categorizing Unitization Agreements Based on Implementing Methods 711
1. Voluntary Unitization Agreements 712
2. Compulsory Unitization Agreements 715
B. The Categorization of Jurisdiction Based on Location of Unit Area 717
1. Sole-Jurisdiction Unitization Agreements 718
2. Cross-Jurisdiction Unitization Agreements 719
III. The Superiority of Jurisdiction in Classifying Unitization Agreements 720
A. Comparison Between Jurisdiction and Border 720
B. Comparison Between Jurisdiction and Sovereignty 723
IV. The Determination of Jurisdictional Authority Over Hydrocarbon Deposits 726
A. Jurisdictions and Terrestrial Hydrocarbon Deposits 727
1. Hydrocarbon Deposits Within Lands 727
2. Hydrocarbon Deposits Within Internal Waters 729
B. Jurisdictions and Marine Hydrocarbon Deposits 729
1. Hydrocarbon Deposits Within Territorial Seas 729
2. Hydrocarbon Deposits Within the Continental Shelf 731
CHAPTER FOUR: SOLE-JURISDICTION UNITIZATION AGREEMENTS 734
I. Introduction 734
II. Sole-Jurisdiction Unitization Agreements in the United States 734
A. The Legal Background of Unitization in the United States 735
1. Mineral Ownership in the United States 736
2. The Rule of Capture 737
3. Conservation Policy in the United States 738
B. Pooling of Oil and Gas Reservoirs 740
1. The Community Lease 741
2. The Pooling Clause 742
3. Pooling Agreements 743
a) Voluntary Pooling Agreement 743
b) Compulsory Pooling Order 743
C. Procedures to Draft Unitization Agreements in the United States 744
1. Negotiation Procedures of Unitization Agreements 747
a) The Feasibility of Unitization 747
b) The Participation Formula 749
2. Conservation Procedures of Unitization Agreements 749
3. Documenting Unitization Agreements 750
a) Model Forms 751

b) Minimum Percentage of Participating 751
c) Unitization Agreements and Unit Operating Agreements 752
III. Sole-Jurisdiction Unitization Agreements Outside of the United States 752
A. Overview of Mineral Rights and Unitization Outside of the United States 753
1. Mineral Ownership Outside the United States 754
2. The Historical Background of Unitization Outside of the United States 755
3. The Importance of Unitization Outside of the United States 757
B. Host Governments and Unitization Agreements 757
1. Unit Interests of Host Governments 757
2. The Conservation Role of Host Governments in Unitization Agreements 760
C. Documenting Unitization Outside of the United States 762
1. Pre-Unitization Agreements 762
2. The Unitization and Unitization Agreement 763
3. Redetermination of Unit Interests 765
IV. Conclusion 766
CHAPTER FIVE: CROSS-JURISDICTION UNITIZATION AGREEMENT: A LEGAL SOLUTION TO THE ISSUE OF CROSS-JURISDICTION PETROLEUM RESERVES BETWEEN IRAN AND IRAQ 767
I. Introduction 767
II. Energy Relationship of Iraq and Iran 767
A. Iran 767
B. Iraq 772
1. The Kurdistan Region of Iraq 775
C. Energy Cooperation Between Iran and Iraq 778
1. Electricity and Natural Gas 779
2. The Global Oil Market 781
III. Cross-Jurisdiction Petroleum Reserves Between Iran and Iraq 781
A. Shared Oil Fields Between Iran and Iraq 782
1. Naft Khana/Naft Shahr 783
2. Badra/Azar 783
3. Abu Ghraib/Dehloran 784
4. Fakka/West Paydar 784
5. Majnoon/Azadegan 785
6. Sinbad/Yadavaran 786
7. South Abu Ghraib/Arvand 787
B. Disputes Between Iran and Iraq Over Joint Oil Fields 787
1. Initiatives 788

a) Sanctions Against Iran: 789
b) Lack of Mutual Trust: 790
c) Iraq-Kurdistan Disputed Areas: 791
d) Lack of Oil and Gas Law and Affable Contract Model 792
2. Incidents & Conflict 792
IV. Cross-Jurisdiction Unitization Agreement between Iran and Iraq 794
A. Legal Support 795
1. National Hydrocarbon Laws 795
2. Model Contracts 796
B. Unitization Agreements 797
1. Unitization Treaty 797
2. Unit Operating Agreement 798
V. Conclusion 800
PROPOSED CONCLUSION 801
I. Reiterating Key Research Points 801
II. Implementing Cross-Jurisdictional Unitization Agreements Between Iraq and Iran 804
EDITORIAL ADDENDUM 809
I. Iranian Developments 809
II. Iraqi Developments 810

PREFACE

This S.J.D. dissertation, written by Nawzad Yasin, is being published posthumously with the permission of his widow. Jill Nehrkorn. Nawzad died on March 6, 2020, following a battle with cancer. He received his L.L.B. degree from Salahaddin University College of Law in 2003, his LL.M. degree from the University of Oklahoma College of Law in 2014, and his S.J.D. degree from Southern Methodist University in 2020. He had completed his studies and his dissertation except for a final bibliography and conclusion. Ms. Piper B. Hampton,[1] Editor in Chief of ONE-J, completed the final bibliography and edited the dissertation. Ms. Hampton and Professors John S. Lowe,[2] Nawzad's dissertation supervisor, and Owen L. Anderson,[3] Nawzad's LL.M. supervisor and member of Nawzad's dissertation committee, prepared the conclusion.

Nawzad's dissertation, which focuses on cross-border unitization, is important to the future prosperity of both Iraq, especially the Kurdish region, and Iran. More importantly, cross-border unitization can serve as a catalyst for peace between Iraq and Iran. Nawzad intended to return to Iraq and devote himself to teaching and to the peace and prosperity for the Kurdish region and for all of Iraq. This dissertation is dedicated to these goals, which were Nawzad's first and foremost desires and to which he was singularly committed.

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CHAPTER ONE: ENERGY SECURITY AND GLOBAL APPROACHES TO RESOLVE ENERGY CRISES

I. Introduction

Energy has been a prerequisite for humans to obtain life necessities since the beginning of mankind. Abraham Maslow generated the theory of the Hierarchy of Needs in 1943, emphasizing both "physiological needs" and "safety needs" as the foundations of the human hierarchical needs pyramid.[4] Among these needs, energy has been a primary source for human survival, holding the same value as water and air. Food is the primary energy source for humans; however, it was fire that enabled early humans and their small groups to promote to the modern generation. The discovery of fire by early species of hominids, *Homo erectus*, allowed for various developments. The hominids could prepare healthier food with a higher source of energy through cooking, develop social behaviors through regular meetings around campfires, facilitate survival in cold climates, and protect themselves from predators.[5] Human civilizations and modern societies would not have developed if the early hominids had not ensured energy supply and resources.

Today, human life ultimately depends on energy supply to generate required services, such as electricity, transportation, air conditioning, cultivation, and manufacturing.[6] On the other hand, energy deprivation could easily cause a dramatic increase in morbidity and mortality rates worldwide.[7] As a result, modern governments need to access adequate energy supplies for their economic development. Governments, to guarantee such procurements, construct and employ energy policies primarily aimed at ensuring energy security.[8]

In the first section of this chapter, the researcher presents a thorough description of the energy security concept and how the main elements of energy security have evolved. The second sub-chapter addresses the

4. Abraham H. Maslow, *A Theory of Human Motivation*, 42 & 103 (Kindle ed., Start Publishing 2012).

5. Juli G. Pausas & Jon E. Keeley, *A Burning Story: The Role of Fire in the History of Life*, 59 Bioscience 593 (2009).

6. Benjamin K. Sovacool & Marilyn A. Brown, *Competing Dimensions of Energy Security: An International Perspective*, 35 Ann. Rev. Envtl. Resources. 77, 79 (2010).

7. Benjamin K. Sovacool, *An International Assessment of Energy Security Performance*, 88 Ecol. Econ. 148, 148 (2013).

8. *See* Janusz Bielecki, *Energy Security: Is the Wolf at the Door?* 42 Q. Rev. Econ. & Fin. 235, 235-36 (2002).

magnitude of energy crises' impact on the global economy and ends with a study of the cause and effects of energy conflicts in the world. Finally, the research covers the legal structure created by the international community to resolve energy discord among sovereign countries. The last sub-chapter analyzes the importance of energy-related intergovernmental agencies and energy treaties to manage energy crises. In addition, the researcher introduces unitization agreements as helpful instruments to resolve fairness concerns regarding the distribution of energy deposits straddling borders of neighboring states.

II. The Modern Overview of Energy Security

Energy security is one of the most important goals of human security because modern civilization depends upon energy to ensure the quality of life.[9] For example, the modern existence of food, shelter, and transportation would not exist without energy. Economic statistics show that the need for energy supplies will increase by forty-five percent through 2030, and by more than 300 percent by the end of the century.[10] At the same time, energy security is accepted as an essential matter for governments and businesses who will severely suffer when energy supply interrupts.[11] Energy institutes and scholars have correspondingly investigated the concept of energy security.

Many scholars have studied energy security since the beginning of the Twenty-First Century, and numerous definitions were offered for the concept of energy security.[12] That said, the concept of energy security has not been defined unanimously,[13] because the concept of energy security is "dynamic" in nature.[14] The reason for the dynamic nature of the concept of energy security has probably stemmed from continuous conversions in modern human life.[15] The conversation is of importance because there is a close relationship between a countries' energy security and its political and

9. Sovacool & Brown, *supra* note 6, at 79.

10. Sovacool, supra note 7.

11. B.W. Ang et al., *Energy Security: Definitions, Dimensions and Indexes*, 42 Renew. Sustainable Energy Rev. 1077, 1078 (2015).

12. *Id.* at 1077 (analyzing and comparing 104 studies that were published on the concept of energy security from 2001 to 2014).

13. *Id.* at 1078.

14. André Månsson et al., *Assessing Energy Security: An Overview of Commonly Used Methodologies*, 73 Energy 1, 2 (2014).

15. B.W. Ang, *supra* note 11, at 1078.

economic status.[16] Daniel Yergin, a famed expert in the global energy security, believed that a central element to describe the idea of energy security was the interconnection between energy consuming countries and energy-producing states to remove primary threats of energy supply.[17] Factors such as developments in technology and social consciousness implicating efficiency and environmental protection, directly impact the definition of energy security.[18] Thus, the elastic nature of the energy security concept allows it to comport with new practical factors. However, a profound drawback of the dynamic nature of the concept is that scholars and institutes have been unable to agree on an abstract definition of energy security.

Energy researchers explained that the lack of consensus on a single definition of energy security derived from the distinctive nature of the energy security concept. For example, Bert Kruyt stated that the nature of energy security is "elusive" and "highly context-dependent" because there is a strong relationship between energy security and other energy policy issues.[19] Lynne Chester expressed that the slippery feature of energy security likely generated several definitions because energy security was "polysemic in nature" and various dimensions impacted on the concept of energy security.[20] Andreas Loschel said that the concept of energy security was "blurred" which made it complicated for researchers to provide a coherent delineation of energy security.[21] André Månsson confirmed that "multiple, vague and often diverging meanings" of the energy security concept prevented researchers from providing a single description of the concept.[22] Finally, Professor Ang and his colleague from National University of Singapore say that "[t]he definition and dimensions of energy security appear to be dynamic, and evolve as circumstances change over time."[23]

It should also come as no surprise that each energy player: energy-exporting countries, energy-importing countries, energy-transit countries,

16. *See, e.g.*, Bielecki, *supra* note 8, at 235.

17. Daniel Yergin, *Ensuring Energy Security*, 85 Foreign Affairs no.2 69 (2006).

18. B.W. Ang, *supra* note 11, at 1078.

19. Bert Kruyt et al., *Indicators for Energy Security*, 37 Energy Pol'y 2166 (2009).

20. Lynne Chester, *Conceptualizing Energy Security and Making Explicit its Polysemic Nature*, 38 Energy Pol'y 887, 893 (2010).

21. Andreas Loschel et al., *Indicators of Energy Security in Industrialised Countries*, 38 Energy Pol'y 1665 (2010).

22. Månsson, *supra* note 14, at 1.

23. B.W. Ang, *supra* note 11, at 1078.

and energy companies, as well as energy organizations and scholars, developed a version of the definition for energy security in the Twenty-First Century. "Security of demand" play a pivotal role in describing energy security for exporting countries since their economy entirely depends on energy revenue.[24] For energy-importing countries — e.g., China and India — energy security patently means better management of their energy dependence.[25] Transit states — e.g., Tunisia and Turkey — describe their energy security based on the stability of energy resources in exporting countries, the unceasing economic development of importing countries, and the security of pipelines in their own countries, through the imposition of a transit fee as a source of revenue and the access to a portion of the transiting energy for their own economic needs.[26]

The longevity of energy projects last up to forty years: and the installment and management of energy projects in all different stages — upstream, midstream, and downstream — require colossal amounts of capital.[27] For energy investors and companies, a stable and high energy price in the market certifies the security of their investment in energy sectors.[28] Many scholars have introduced the notion of energy security as "security of energy supply," "security of supply," or in an abbreviated term of "SOS."[29] These studies on energy security concur with the view that energy security deals with threats to energy supply.[30] Nonetheless, the concept of energy security, in the form of security of energy supply, probably will not include pervasive influences of energy on the modern human lifestyle. Many scholars reason that security of supply cannot represent the term "energy security" completely; because the notion of security of supply is limited in physical aspects of energy.[31] These scholars propose that any description of energy security should also involve impacts

24. Yergin, *supra* note 17, at 71.

25. *Id.*

26. Richard Wheeler, *Energy Security and Intergovernmental Organizations*, 12 OGEL no. 2, Apr. 2014, at 3.

27. *Id.*

28. Asia Pacific Energy Research Centre (APERC), *A Quest for Energy Security in the 21st Century*, p. 35 (2007), https://aperc.or.jp/file/2010/9/26/APERC_2007_A_Quest_for_Energy_Security.pdf.

29. A. F. Alhajji, *What is Energy Security? Definitions and Concepts*, 6 OGEL, no. 3, Nov. 2008, at 2.

30. S*ee e.g.*, Christian Winzer, *Conceptualizing Energy Security*, 46 Energy Pol'y 36, 36 (Jul. 2012).

31. B.W. Ang *supra* note 11, at 1078.

of energy on downstream aspects of human life, such as the "economic and social welfare."[32]

Energy security or security of supply traditionally implied "security of oil supply" until natural gas started playing an essential role in the energy market in the late Twentieth Century.[33] During World War I and II, governments focused on their armies and military demands. Among the demands, oil supply and its refined fuels were recognized as the most significant military need in both wars.[34] Oil remained an essential supply for the economic and industrial development of Western countries until the late 1970s.[35] The great importance of oil supply in the first three-quarters of the Twentieth Century restricted governments' objective of energy security to dispelling threats of oil disruptions.[36] In 2014, crude oil and natural gas constituted thirty-one percent and twenty-one percent of the global energy demand.[37] Moreover, oil and natural gas together supply the majority of the global energy market. Approximately sixty-four percent of oil and twenty-nine percent of natural gas supply were traded in the global market in 2014.[38] This research will level the focus of energy security into the security of oil and natural gas supplies.

Energy security, in its traditional notion, concentrated only on the physical safety of supply and "diversification of energy fuels and services."[39] Over different eras, the definition of energy security evolved with three dominant outlooks: political, technical, and economic.[40] In the late Twentieth Century, the environmental factor became a fundamental element of energy security because activities of the petroleum industry

32. *Id.*

33. Alhajji, supra note 29.

34. Aleh Cherp & Jessica Jewell, *The Three Perspectives on Energy Security: Intellectual History, Disciplinary Roots and the Potential for Integration*, 3 Curr. Opin. Envtl. Sustainability 202 (2011).

35. *Id.*

36. Asia Pacific Energy Research Centre (APERC), *supra* note 28 (stating that the definition of energy security has changed over time).

37. International Energy Agency (IEA), *Key World Energy Trends – Excerpt From: World Energy Balances* 4 (2016), http://www.iea.org/publications/freepublications/publication/KeyWorldEnergyTrends.pdf.

38. British Petroleum (BP), *BP Statistical Review of World Energy June 2015*, 19 & 29 (June 2015) http://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf.

39. Sovacool & Brown, *supra* note 6.

40. Cherp, *supra* note 34.

harmed the environment, engendering health and economic side-effects.[41] Energy institutions and scholars have presented many definitions for the concept of energy security.[42] Some of these delineations have become prevalent in the industry and academia; nonetheless, they only include limited elements of the energy security concept.

A. Customary Definitions of Energy Security

A definition for the concept of energy security from the International Energy Agency (IEA) has become popular among scholars needing an institutional reference to use in their energy security research. The IEA was founded after the 1973-1974 oil crisis by the world's most developed countries to plan a better strategy for securing energy demands of Western countries.[43] The IEA defines energy security as "the uninterrupted availability of energy sources at an affordable price."[44] Any threats to the quantity and rate of energy supplies are considered major energy policy concerns for the IEA members. For instance, most European countries who are members of the IEA import petroleum, and any supply interruption — even for a short time — is critical for European economic development.[45] Furthermore, ensuring energy supplies requires being commensurate with the purchasing power of private and public entities of an economy.[46]

With little modifications, other intergovernmental institutes such as the Asia Pacific Energy Research Centre (APERC) and the European Commission have endorsed the IEA's definition of energy security. The APERC, a research center of the Asia-Pacific Economic Cooperation (APEC) forum, described the concept of energy security as "securing adequate energy supplies at reasonable and stable prices to sustain economic performance and growth."[47] The Asian-Pacific countries believe that the price stability of energy supply along with the availability of supply are two crucial factors for ensuring their economic development.

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41. A. F. Alhajji, What is Energy Security? Economic, Environmental, Social, Foreign Policy, Technical and Security Dimension, 6 OGEL, no. 3, Nov. 2008, at 2.

42. B.W. Ang *supra* note 11, at 1078.

43. International Energy Agency (IEA), *Our History* (Sep. 10, 2016), http://www.iea.org/about/.

44. International Energy Agency (IEA), *What Is Energy Security?* (Feb. 2, 2016), http://www.iea.org/topics/energysecurity/subtopics/whatisenergysecurity/.

45. Eur-Lex, *Green Paper – Towards A European Strategy for The Security of Energy Supply* (Nov. 2000), http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52000DC0769#document1.

46. Sovacool & Brown, *supra* note 6, at 85.

47. .Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 4.

The European Commission, the executive organ of the European Union (EU), in early the 2000s added a new element to the definition of energy security. Considering Articles 2 and 6 of the Treaty of European Union, the Europeans included environmental concerns within their energy security policy.[48] A primary reason the European amendment originated from the fact that a rapid growth of energy industry caused environmental disasters, such as the global climate change, water and land contamination, and waste, threatening the global energy security.[49] In addition, the world was appalled by man-made environmental catastrophes, for instance, the 1991 oil spill in the Persian/Arabian Gulf, when the Iraqi Army poured up to 10 million barrels of oil into the Persian Gulf in 1991 while retreating from their invasion of Kuwait.[50] To prevent the same failures in the future, the European Union, proffered an environmental element by defining energy security as: "the uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial), while respecting environmental concerns and looking towards sustainable development, ..."[51] Since then, the environmental element became an important factor in defining energy security, along with original elements of energy security.

Slightly different than the definition of energy security from the European Commission, the World Bank Group depicted three critical pillars in the concept of energy security; (1) energy efficiency, (2) diversification, and (3) price stability of energy supplies.[52] The World Bank Group suggested that international cooperation on these three aspects of energy is required to assure a long-term global energy security.[53] The World Bank Group alleged that a comprehensive plan to develop efficiency in all levels of energy industry would be a pivotal factor to overcome the environmental challenges and at the end, to guarantee long-term energy security.[54]

In addition to the active intergovernmental institutes, many scholars have studied energy security and provided recommendations to governments on

48. Eur-Lex, *supra* note 44.

49. Sovacool & Brown, *supra* note 6, at 84.

50. Mark Tutton, *Lessons Learned from the Largest Oil Spill in History*, CNN (Jun. 4, 2010), http://www.cnn.com/2010/WORLD/meast/06/04/kuwait.oil.spill/ (stating that the Iraqi troops also set fire to the giant oil fields of Kuwait and opened the valves on the oil rigs and pipelines).

51. Eur-Lex, *supra* note 44.

52. The World Bank Group, *Energy Security Issues* 1 (Dec. 5, 2005).

53. *Id*. at 5.

54. *Id.* at 7-8.

ensuring their energy supply security. In the early 21st Century, some intellectuals concentrated on elements and dimensions of energy security besides the physical availability of energy supply sources. Janusz Bielecki, Energy Charter Secretariat, mainly focused on the economic aspect of oil supply security. For instance, Bielecki tried to answer the question of how to avoid impacting the early 2000 oil price increase on the global energy security.[55] Daniel Yergin, who presented new points in the evaluation of the energy security concept, argued that both market and politics have the most influence on the energy security.[56] Correspondingly, many energy scholars viewed that the notion of energy security was embossed with a close relationship between energy policy and national security.[57]

Parallel to energy institutes, energy researchers have also presented multiple definitions of energy security. In 2004, Barry Barton, an energy law researcher, defined energy security "as a condition in which a nation and all, or most, of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from the serious risk of major disruption of service."[58] Along with the physical and economic aspects, the environmental aspect appeared in studies of scholars to define the energy security concept in the early 21st Century. By combining the definitions provided by the IEA and the Europeans, Sascha Muller-Kraenner — an environment expert in the energy industry — defined energy security in his 2007 book as "the provision of reasonably priced, reliable and environmentally friendly energy."[59] Finally, energy scholars came up with multi-dimensional definitions for energy security. To illustrate, Anas F. Alhajji indicated that the notion of energy security was comprised of economic, environmental, social, foreign policy, technical, and security dimensions.[60] Containing all these dimensions, Alhajji offered the following elaborate definition of energy security: "[t]he steady availability of energy supplies in a way that ensures economic growth in both producing and consuming countries with the lowest social cost and the lowest price volatility."[61]

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55. Bielecki, *supra* note 8, at 235.

56. Yergin, *supra* note 17, at 71.

57. See e.g., Barry Barton et al., Introduction to Energy Security: Managing Risk in a Dynamic Legal and Regulatory Environment, 3 & 4 (2004).

58. *Id.* at 4.

59. Sascha Müller-Kraenner, *Energy Security: Re-Measuring the World*, xi (Earthscan Publications 2008).

60. Alhajji, *supra* note 41, at 2.

61. *Id.* at 3.

Major disasters and crises of the Twentieth Century prompted a variety of conceptual modifications in energy security.[62] These changes also introduced new elements and dimensions which evolved the definition of energy security conception over time. Next, the author will explicate how geopolitical, economic, and natural events in the last century developed the notion of energy security, and what the main elements and dimensions of energy security are.

B. Concept Evolution and Elements of Energy Security

With the massive growth in the human population and political systems, the significance of energy security has been emphasized to assure the fundamental needs of human societies and their economies. The notion of energy security, like most socioeconomic conceptions, gradually evolved over the past century. Starting with the physical elements, the concept of energy security has been growing with the economic and environmental elements in the last three decades. Through adding and analyzing new elements over time, institutes and scholars discovered various descriptions of energy security. In conjunction with these definitions, this paper explores the main elements of energy security appended to the concept of energy security over previous decades.

1. Physical Elements: Availability and Accessibility

Until the mid-twentieth century, governments narrowed the definition of energy security to exclusively the physical supply. Adherence to such a limited definition in the energy policy was likely a primary factor in triggering conflicts of interest between European colonialists in previous centuries. Super-power governments deliberated over securing sufficient and efficient fuels to prepare for such ineluctable collisions.[63] Therefore, the ability of governments to access energy supplies became an original element to describe the energy security concept. Daniel Yergin explained that physical energy security attempted to eliminate threats to the adequacy of energy supply in the market.[64] Physical energy security encompasses both geopolitical and geological concerns over energy supply, and the ability to reduce "accessibility" and "availability" risks.[65]

62. Sovacool & Brown, *supra* note 6, at 80.

63. *Id.* at 81.

64. *See* Daniel Yergin et al., *Energy and Security: Strategies for a World in Transition*, 69, 74 (2nd ed. 2013).

65. Kruyt, supra note 19, at 2167.

a) Accessibility

Energy consumers need to maintain their ability to possess the required volume of energy supply for their economic development and consistency. Accessibility is the ability of an economy to ensure continuous access to energy supply to meet their expected demand.[66] For that, governments have aimed to secure access to diversified energy sources. Daniel Yergin expounded that "diversification" of energy supplies had been a primary objective of the global energy policy since World War I.[67] The competition between governments to acquire oil resources located in different regions of the world inevitably generates geopolitical concerns. The accessibility element of energy security seeks to obviate the geopolitical concerns of energy policy to secure economic growth through diversification of energy supply. Today, scholars and institutes apply "accessibility" or "reliability" to illustrate the geopolitical element within the security of energy supply.[68]

Accessibility to various oil resources, as one of the elements of physical energy security, is identified as a classic view of governments over the concept of energy security.[69] Perhaps, Winston Churchill, the First Lord of Admiralty of the British Empire in World War I, was a political leader who had highlighted the first element of energy security.[70] After Churchill decided to switch the British Navy's power source from coal to oil, he stated that "safety and certainty in oil lie in variety and variety alone."[71] It is inferable from Churchill's statement that the government's ability to ensure diverse oil resources was a crucial element of energy security during World War I.[72] States targeted oil-producing regions to secure oil supply for their armies and governments. Since WWI, the central element to define the energy security concept has been the ability to remove geopolitical threats. Pascual and Elkind described the geopolitical element of energy security as

66. *See* Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 6.

67. Yergin, *supra* note 17, at 76.

68. See e.g., Jonathan Elkind and Carlos Pascual, *Energy Security: Call for a Broader Agenda*, *Energy Security: Economics, Politics, Strategies, and Implications*, 119, 124 (2010); see e.g., World Economic Forum, *Energy Access and Security* (Jan. 18, 2016) http://reports.weforum.org/global-energy-architecture-performance-index-report-2016/energy-access-and-security/.

69. Sovacool & Brown, *supra* note 6, at 81.

70. Yergin, *supra* note 17.

71. *Id.*

72. *Id.*

the management of "the energy-related relationships that exist among states."[73]

The concept of physical energy security evolved after WWI. In 1939, Adolf Hitler planned to use his close relationships with Reza Shah Pahlavi, the Shah of Iran (from1925-1941), to access the enormous Iranian oil resources and subsequently control the assets of the Anglo-Persian Oil Company to inflict major harm to the energy security of the British Empire.[74] The Allied Powers prevented Hitler from accessing the Middle Eastern oil supplies by overthrowing Reza Shah and his pro-Nazi followers in 1941.[75] The failure to secure the Middle Eastern oil supplies was probably a reason why Hitler's army invaded the Soviet Union to take over the Azeri oil fields of Baku and meet German petroleum demand.[76] On the Asian side, in 1942, Japan attacked the Dutch East Indies — now Indonesia — to secure their petroleum demand. During WWII, not only was the physical safety of oil reservoirs an urgent priority for countries, but the security of oil transportation and storage facilities also became an important part of energy security.[77] The Allied members were only able to stop the Nazi Army on several occasions by attacking their fuel supply storages.[78]

After WWII in the 1950s, geopolitical tensions in the Middle East, especially in Iran, put the oil security of Western nations in jeopardy. Western countries with major oil enterprises intensively reacted to the Middle Eastern events to eliminate threats to their petroleum security. The U.S. and British intelligence agencies managed a plot to overthrow Mohammad Mossadegh, the Iranian Prime-Minister from 1951 to 1953, after he nationalized the Iranian oil industry in 1951.[79] Mossadegh terminated the absolute ownership and control of the Anglo-Iranian Oil

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73. Carlos Pascual & Jonathan Elkind, *Energy Security: Economics, Politics, Strategies, and Implications* 2, 2-3 (Carlos Pascual & Jonathan Elkind eds. 2010).

74. See Robert Mabro, On the Security of Oil Supplies, Oil Weapons, Oil Nationalism and All That, 32 OPEC ENERGY REV. 1, 4 (2008).

75. Ervand Abrahamian, *Iran Between Two Revolutions*, 164 (Princeton University Press 1982).

76. See Daniel Yergin, The Prize: The Epic Quest for Oil, Money & Power, 319 (Free Press 2011).

77. *Id.*

78. *Id.*

79. Saeed Kamali Dehghan & Richard Norton-Taylor, *CIA Admits Role in 1953 Iranian Coup*, The Guardian (Aug. 19, 2013), http://www.theguardian.com/world/2013/aug/19/cia-admits-role-1953-iranian-coup.

Company (now British Petroleum or BP) over giant oil fields in Iran.[80] Western countries built VLCCs and ULCCs supertankers to ship crude oil to Europe around the Cape of South Africa after Gamal Abdel Nasser, the President of Egypt from 1956-1970, removed a joint British-French company from controlling one of the essential oil transportation lines by nationalizing the Suez Canal Company in 1956.[81]

However, developed countries with traditional energy security policies were unable to cope with the next petroleum crisis in the 1970s. The developed countries' economies faced major crises in 1973 when Arab oil-producing countries embargoed the exportation of oil to the U.S. and Holland for about six months.[82] The 1973-1974 Oil Embargo proved how oil could be used as a weapon to strain the economies of the U.S., Europe, and Japan. Developed countries, which already established the Organization for Economic Cooperation and Development (OECD) in 1961,[83] realized that their complete reliance on the Middle East oil supply imperiled their economic development.[84] As a result, OECD members decided to assess and implement new precautionary settings for any future oil crises.[85] More recently, European countries faced a similar crises when Russia stopped exporting its natural gas to Ukraine and Europe in 2008.[86] Additionally, global energy security encountered serious threats to the safety of oil tankers in major water choke points, particularly when Iran in 2011-2012 threatened to block the Strait of Hormuz, in which about forty percent of the world oil exports pass through.[87]

Many political crises and wars have occurred since the beginning of the twentieth century because governments were determined to ensure accessibility to the oil supply by any means necessary. States traditionally presumed that their energy policy had to be considerably constricted by geopolitical concerns to access diverse oil resources. With that traditional perspective of energy security, Western countries aimed to reduce energy threats through oil diversification when enough oil supply was provided

80. *Id.*

81. Mabro, *supra* note 74, at 4.

82. *Id.*

83. The Organisation for Economic Co-Operation and Development (OECD), *About the OECD* (Sep. 10, 2016) http://www.oecd.org/about/.

84. Chester, supra note 20, at 888.

85. Yergin, *supra* note 17, at 75.

86. Mabro, *supra* note 74, at 7.

87. *See* BBC News, *Iran Threatens to Block Strait of Hormuz Oil Route* (Dec. 28, 2011), http://www.bbc.com/news/world-middle-east-16344102.

without any disruption.[88] At the same time, governments attempted to reduce their foreign energy reliance.[89]

The geopolitical risks are not the only physical concern of the energy security concept. The physical threats to the security of energy supplies also consist of geological risks over energy resources which are classified under the "availability" element of energy security.[90]

b) Availability

Intellectuals and institutes introduced the term "availability" primarily to cover geological threats within energy security.[91] The fearsome idea of the world approaching the maximum rate of oil production, or "peak oil," has been one of the principal concerns oil consumers have struggled with since the end of WWI.[92] That fundamental concern impelled both oil-exporting and oil-importing countries to deliberate on an independent element in their energy security policy. That element was the availability of energy resources. Availability was distinguished from the accessibility element in a definition that scholars presented for energy security: "maintaining and enhancing access to where the oil exists in such obvious abundance."[93]

Discoveries of giant oil fields in Iraq (during the 1920s) and Texas (during the 1930s), however, eliminated global concerns respecting the depletion of the world's oil reservoirs for two to three decades.[94] After World War II, the world resumed worrying about the depletion of the main oil reservoirs due to the increase in oil demand by the global economic powers who were developing quickly. Additionally, the growth of the car industry in the United States resulted in a forty-two percent increase in gasoline demand in 1950 from its previous record in 1945.[95] The post-war reconstruction of Europe and a shortage in coal production during the longest and coldest winter in Europe (1946-47) rapidly made European countries more dependent on the Middle East oil reservoirs.[96]

88. Yergin, *supra* note 17, at 76.

89. Chester, *supra* note 20, at 888.

90. See, e.g., Bert Kruyt et al., Indicators for Energy Security, 37 ENERGY POL'Y 2166, 2167 (2009); *see also* Asia Pacific Energy Research Centre (APERC), *supra* note 25, at 6.

91. *See e.g.*, Sovacool, *supra* note 7, at 151.

92. Mabro, *supra* note 74, at 7.

93. Alhajji, *supra* note 29, at 3.

94. Mabro, *supra* note 74, at 7.

95. Yergin, *supra* note 76, at 391.

96. *Id.* at 404.

In the 1960s, the Japanese economy astonishingly developed eleven percent per year, during which Japanese oil demand had increased ten times compared to demand in the 1950s.[97] In the 1990s, the dramatic economic development of China and India generated substantial growth in global oil demand.[98] For instance, energy consumption of China was about twenty-seven quadrillion British thermal units (BTU) in 1990.[99] In 2013, Chinese energy usage increased to about 100 quadrillion BTUs.[100] The Cambridge Energy Research Associates (CERA) projected that oil "demand shock" would continue in upcoming years due to the development of the Asian economy, and that it would subsequently demand for more than half of total global oil production.[101] Furthermore, the Asia-Pacific Economic Cooperation (APEC) — through its research center, the APERC — expressed concern regarding the future availability of oil supply because the global reliance on oil has grown rapidly, and adequate oil reservoirs have yet to be discovered.[102] The APERC projected that energy demand in the Asia-Pacific region would increase about "three-fold, growing at an annual rate of 2.1% to reach 6,759 Million Tons of Oil Equivalent (Mtoe) by 2030."[103]

The geological concern became apparent to the world when Professor King Hubbert, in his 1956 *Theory of Peak Oil*, used a bell-shaped logistic curve to illustrate that the world had already produced half of its oil resources.[104] In 1972, the Club of Rome, an international think tank studying global crises, endorsed the theory of natural resources depletion in the world.[105] However, a growing amount of optimistic perspectives on global oil reserve depletion claimed that the depletion was closely interconnected with the market and technology.[106] For instance, advanced

97. *Id.* at 527.

98. Yergin, *supra* note 17, at 71.

99. See Michael T. Klare, *Rising Powers, Shrinking Planet: The New Geopolitics of Energy*, 71 (Kindle ed. Metropolitan Books 2008).

100. *See* U.S. Energy Information Administration (EIA), *International Energy Statistics* (Jul. 8, 2016) https://www.eia.gov/beta/international/data/browser/#?iso=CHN&c=00000002&ct=0&ord=CR&cy=2013&v=H&vo=0&so=0&io=0&start=1980&end=2013&vs=INTL.44-1-CHN-QBTU.

101. *See* Yergin, *supra* note 17, at 72.

102. Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 7.

103. *Id.* at pg. 5.

104. *Id.* at pg. 9.

105. Mabro, *supra* note 74, at 4.

106. *See* Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 9.

techniques in the exploitation of Canadian tar sand, an unconventional oil supply, dramatically increased the world's oil resources capacity.[107]

Today, energy security does not only focus on geological matters but also addresses the lack of capital investments, lack of advanced technologies to develop the supply resources, and lack of appropriate governmental regulations for the energy industry, which also constitute the availability element of energy security.[108] Furthermore, the global refining capacity is slight compared to the extraordinary demand for "middle distillates," while many oil reserves in the world produce heavy oil.[109] The physical energy security, consisting of both accessibility and availability elements, exclusively depicted the concept of energy security until the 1980s when energy market crises expanded the notion of energy security to include an economic factor.

2. Economic Element: Affordability

In the 1980s, an economic perspective emerged to diminish the traditional influence of the political outlook in the energy market.[110] Repetitious disruptions of energy supply based on political impetus was a principal reason for opponents of the economic outlook to "depoliticize energy supply" and thus, evaluate energy supply as a mere trade commodity.[111] The economic viewpoint changed the traditional focus from the physical elements of energy security to the price of stocks,[112] and modified the traditional definition of energy security to "securing adequate energy supplies to sustain economic performance and growth."[113] As a result of that modification, the concepts of "economic welfare," "price," and "affordability" were embedded in the definition of energy security in the 1980s.[114]

An objective definition of energy security appeared as "the uninterrupted availability of energy sources at an affordable price" was pronounced by the International Energy Agency (IEA) to be their official definition of

107. Yergin, *supra* note 17, at 74.
108. Elkind & Pascual, *supra* note 68, at 123.
109. Yergin, *supra* note 17, at 73.
110. Cherp, *supra* note 34, at 205.
111. *Id.*
112. *Id.*
113. Asia Pacific Energy Research Centre (APERC), *Energy Security Initiative: Some Aspects of Oil Security*, p. 4 (2003), https://aperc.or.jp/file/2010/9/26/Energy_Security_Initiative_2003.pdf. .
114. Cherp, *supra* note 34, at 205.

energy security.[115] The primary meaning of the economic element of energy security is that energy consumers have access to energy at a price they can afford.[116] Producing and consuming countries, however, conferred different interpretations on the affordability of energy prices given their economic interests in energy transactions.[117] In general, the global energy market sets prices of energy supply based on the demand and supply balance as well as supply cost.[118]

"Reasonability" of oil prices was an initial interpretation identified through the affordability element of energy security.[119] Alhajji, however, rebutted the idea of using "reasonable prices" because it was unclear since the prices might be "volatile," and the interpretation of reasonable prices might differ between oil producers and consumers.[120] The price volatility could constrict the energy policy to propose their short-term economic growth based on a determined energy price.[121] Moreover, unstable prices make it highly problematic for companies to invest in ultra-expensive long-term plans such as unconventional and Liquefied Natural Gas (LNG) projects.[122] That is probably why the World Bank accented "mitigation and efficient management" of price volatility as one of three main pillars of energy security.[123] The 1986 crude oil price collapse, which evolved out of an inactive economic status of developing countries and market oversupply, intensified the discussion over the importance of the economic element of energy security.[124] The 1986 oil market shock, as a significant threat to the economy, impelled both oil exporting and oil importing countries to pay more attention to securing price stability of supplies.[125]

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115. International Energy Agency, *supra* note 44.

116. Sovacool & Brown, *supra* note 6, at 82-83.

117. Yergin, *supra* note 17, at 70-71.

118. Bielecki, *supra* note 8, at 236.

119. See e.g., Chester, *supra* note 20, at 891.

120. Alhajji, *supra* note 29, at 4.

121. B.W. Ang *supra* note 11, at 1082.

122. *See* Sovacool and Brown, *supra* note 6, at 80; *see also* Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 36.

123. *See* The World Bank Group, *supra* note 52, at 1 (recommending that the global community to focus on three main pillars of "energy efficiency," "diversification of energy supplies," and "dealing with volatility" to elevate the global energy security).

124. *See* U.S. Energy Information Administration (EIA), *Petroleum Chronology of Events 1970-2006* (May 2002), http://www.eia.gov/pub/oil_gas/petroleum/analysis_publications/chronology/petroleumchronology2000.htm (stating that in July 1986, the oil price fell from $23.29 in December 1985 to under $10 per barrel).

125. Cherp, *supra* note 34, at 205.

Daniel Yergin recommended that a "large, flexible, and well-functioning" market could generate the security of both demand and supply which would survive at any price shock.[126] Alhajji advocated that a collaborative relationship between energy-producing and energy-consuming countries was an essential factor to decrease price volatility and to stabilize energy prices.[127] APERC, the research center of the Asia-Pacific Economic Cooperation (APEC), suggested the Asia-Pacific countries deal with all risks creating an uncertain energy market within the economic element of energy security.[128] At last, a more comprehensive definition of energy security — "that of securing adequate energy supplies at reasonable and stable prices to sustain economic performance and growth" — including both physical and economic elements became customary in the mid-1990s.[129] This definition was, however, proclaimed even more expandable later at the end of the 1990s when a new aspect, environmental protection and sustainability, was debated as being in a firm interconnectedness with the concept of energy security.

3. Environmental Element: Acceptability

In the early 1990s, the global concern increased over crucial environmental issues such as global climate change, along with the pollution and the waste of water and land, which subsequently bashed the traditional structure of energy security.[130] The world community, through the United Nations, took many steps to combat devastating consequences of global warming and climate change. The United Nations proposed a draft of the international treaty, the United Nations Framework Convention on Climate Change (UNFCCC), to the governments on the climate change and environmental issues at the Earth Summit in Rio de Janeiro in 1992.[131] Until today, 197 countries have signed the UNFCCC treaty that applied for "precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects."[132] To achieve the

126. Yergin, *supra* note 17, at 79.

127. A. F. Alhajji, *What is Energy Security? Definitions and Concepts*, 6 OGEL, no. 3, Nov. 2008, at 4.

128. Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 35.

129. *Id.*

130. Sovacool & Brown, *supra* note 6, at 84.

131. The United Nations Framework Convention on Climate Change, *First Steps to a Safer Future: Introducing the United Nations Framework Convention on Climate Change* (Sep. 20, 2016), http://unfccc.int/essential_background/convention/items/6036.php.

132. United Nations Framework Convention on Climate Change (New York, 9 May 1992) 1771 U.N.T.S.

objectives of the UNFCCC, the United Nations issued the Kyoto Protocol in 1997 to commit the signatory members to reduce the emission of greenhouse gases (GHGs).[133] Correspondingly, the 2000 Green Paper of the European Union identified energy supply damages — whether they occur by accident such as oil slicks, nuclear accidents, and methane leaks or they directly cause pollution — as extremely hazardous to the environment.[134] Notably, the ecological disasters stemmed from human-made oil spills such as the Exxon Valdez oil spill in 1989 and the Persian/Arabian Gulf oil spill in 1991 enhanced the global consciousness on the necessity of environmental protection plans and policy in the petroleum industry worldwide.[135]

Among energy supplies, the health and economic side effects of fossil fuels, from production to consumption levels, on the environment have been measured highly critical to the extent that many governments, predominantly the European Union, apply their energy policy in compliance with environmental protection standards.[136] Many energy academics and institutes expressed that the "acceptability" element was a term representing the admixture of energy security and environmental stewardship objectives.[137] Among energy-emphasized scholars and organizations, "sustainability" is another common term representing the ecological and social concerns within energy security.[138] The APERC, the research center of Asia-Pacific Economic Cooperation (APEC), described "environmental sustainability" as the method of employing energy supply that an economy applied to grow in a way that method would also ensure future generations to benefit from that environmental resource.[139]

Energy scholars presented many reasons for the importance of environmental sustainability features in the modern form of energy security.

107, 31 I.L.M. 849 (1992), at 4.

133. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, The United Nations (Dec. 11, 1997), https://unfccc.int/resource/docs/convkp/kpeng.pdf.

134. Eur-Lex, *supra* note 44.

135. *See* U.S. Energy Information Administration, *supra* note 124.

136. See A. F. Alhajji, What is Energy Security? Economic, Environmental, Social, Foreign Policy, Technical and Security Dimension, 6 OGEL no. 3, Nov. 2008, at 2.

137. *See e.g.*, Bert Kruyt et al., *Indicators for Energy Security*, 37 ENERGY POL'Y 2166, 2167 (2009); *see e.g.*, Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 27.

138. *See e.g.*, Eur-Lex, *supra* note 44; *see e.g.*, B.W. Ang et al., *Energy Security: Definitions, Dimensions and Indexes*, 42 RENEW. SUSTAINABLE ENERGY REV. 1077, 1082 (2015).

139. Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 6..

Jonathan Elkind, the International Affairs Assistant to the U.S. Secretary of Energy 2009-present, explained that most energy projects would last a prolonged period and impact the environment and social life in the long term.[140] Whereas, the assessment of the Asia-Pacific Economic Cooperation (APEC) confined the environmental concerns of the energy industry to coal, nuclear, and unconventional projects,[141] the energy policy of the European Union includes environmental protection plans for a broad category of energy infrastructures in the different stages of production, transportation, and consumption.[142] To ensure the economic and environmental elements of energy security, Alhajji proposed incorporation between technology and energy sectors in the energy policy as a requirement to build up a high level of efficiency in modern accouterments.[143]

Considering hitherto provided elements of energy security, many definitions of energy security emerged with the arrival of the 21st century. Sascha Müller-Kraenner, in *Energy Security: re-measuring the world*, summarized modern energy security as "the provision of reasonably priced, reliable and environmentally friendly energy."[144] The European Union's stance on the security of energy supply in the 21st century embodied one of the most comprehensive descriptions of energy security. The 2000 Green Paper of the European Union stated that "[t]he European Union's long-term strategy for energy supply security must be geared to ensuring, for the well-being of its citizens and the proper functioning of the economy, the uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial), while respecting environmental concerns and looking towards sustainable development."[145]

III. The Gravity of Energy Crisis

The expression "energy crisis" appeared for the first time as the principal concern of Western countries in 1973 when Arab oil-producing countries in the Middle East decided to stop exporting oil to developed countries,

140. Elkind & Pascual, *supra* note 68, at 129.

141. Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 27.

142. *See e.g.*, Eur-Lex, *supra* note 44.

143. A. F. Alhajji, What is Energy Security? Economic, Environmental, Social, Foreign Policy, Technical and Security Dimension, 6 OGEL no. 3, Nov. 2008, at 3.

144. Müller-Kraenner, *supra* note 59, at xii.

145. Eur-Lex, *supra* note 44.

particularly the United States. However, long before the 1973 oil crisis, energy convulsions had troubled Western countries, dating back to the end of World War II. In 1947, Europe suffered from a post-war energy crisis and the unavailability of coal terrified all of Europe, especially Britain.[146] For decades, coal was the primary energy source — more than seventy-five percent of usage — in Western Europe.[147] Later, in the 1950s, environmental concerns and economic motivations incited Europeans to shift their primary energy source from coal to oil.[148] As a result of this energy source conversion, European countries, notably in West Europe, reveled in their "Golden Age" of economic growth; between 1950 and 1973, real GDP per person increased by more than four percent per year.[149] The Northwest quadrant of the world owed their significant economic development to the cheap and abundant oil input into their economy. Nonetheless, the consequences of the 1973 oil crisis appalled Western countries when their economic growth shrank by about fifty percent.[150]

The concept of oil crisis has projected energy crises since the 1950s due to the reliance on oil supply for economic growth in developed countries. However, natural gas started taking part in the global economic growth in the late Twentieth Century.[151] Today, crude oil supplies one-third of the world's energy usage.[152] A sudden interruption in the accessibility of crude oil would devastate the global economy. Therefore, developed and emerging economies consider any crisis in the security of oil supply as a severe world energy crisis.

A. Energy Crises in History

In this section, the author discusses three oil crises that occurred in the Twentieth Century. Each crisis has its specific criteria and effects on global economic development. The 1956 Suez Canal crisis, despite being indirectly related to the oil market, its consequences directly affected the

146. Yergin, *supra* note 76, at 525.

147. *Id.* at 526.

148. *Id.*

149. *See* Nicholas Crafts, *Fifty Years of Economic Growth in Western Europe*, 5 World Econ. 131, 133 (2004).

150. *Id.*

151. U.S. Energy Information Administration (EIA), *Global Natural Gas Consumption Doubled from 1980 to 2010* (Apr. 12, 2012), https://www.eia.gov/todayinenergy/detail.php?id=5810 (stating that the global consumption of natural gas increased from 53 trillion cubic feet (Tcf) to more than 113 Tcf between 1980 to 2010).

152. *See* British Petroleum, *supra* note 38, at 41(stating that that crude oil provided 4,211.1 Mtoe share of the total global energy consumption, 12,928.4 Mtoe, in 2014).

security of oil supply, particularly the security of oil transportation from the Middle East. Predominantly to the United States, an oil interruption derived from the 1973-74 oil crisis proved how global economic development depended on the preservation of geopolitical interests of the OPEC countries. Both the 1956 Suez Canal crisis and the 1973-74 oil crisis substantiated a claim that the lack of physical elements of energy security could lead to devastating energy crises around the globe. In both circumstances, the Middle East had deprived Western countries of accessing the oil supply. Finally, the 1979 and 1980 oil crises surprised all international oil players, proving that politics would not be the only factor to manipulate the oil industry, but the global market and its economic feature could concern the oil security of both producing and consuming countries.

1. The 1956 Suez Canal Crisis

For the first time in the Twentieth Century, the Western world confronted an oil crisis during the 1956 Suez Canal crisis. However, the 1938 nationalization of the oil industry in Mexico and later, the 1951 oil nationalization in Iran had previously deprived American and British oil companies of lucrative concessions.[153] At that time, the United States and British governments did not face any challenging oil crises due to their oil companies having access to abundant oil supplies within giant oil fields in other parts of the world.[154] However, the 1956 Egyptian nationalization of the Suez Canal caused a severe oil crisis in Europe which led to a military confrontation as well. The Suez Canal is an artificial waterway in Egypt that connects the Red Sea to the Mediterranean Sea; it was an essential element of national security for the British Empire to have closer access to India for decades.[155] After World War II, the post-war reconstruction in Europe demanded a large quantity of crude oil from the Middle East, and two-thirds of crude oil supplied from Persian/Arabian Gulf was transferred to Europe through the Suez Canal by 1955.[156]

Inspired by the nationalization of the Iranian oil industry in 1951, the Egyptian ruler, Colonel Gamal Abdel Nasser, started challenging Britain

153. Mabro, *supra* note 74, at 4; see also Yergin, *supra* note 76, at 437.

154. *See* Clayton R. Koppes, *The Good Neighbor Policy and the Nationalization of Mexican Oil: A Reinterpretation*, 69 J. Am. His. 62 (Oxford University Press 1982). *See also* Yergin, *supra* note 76, at 446.

155. Yergin, *supra* note 76, at 461.

156. *Id.* at 462.

and France on the ownership of the Suez Canal and its revenue.[157] Nasser, who had grabbed the power through a military coup in 1956, initially claimed a one-half revenue share of the Anglo-French Suez Canal Company in 1955.[158] Following the British and French denial of profit-sharing with Egypt, Nasser's army expropriated the Suez Canal on July 26, 1956.[159] When British, French, and Israeli armies attacked Sinai — the Egyptian Peninsula — in November 1956, Nasser blocked the Suez Canal with dozens of Egyptian ships, and then closed the Canal.[160] At the same time, sabotage on the Iraqi Petroleum Company pipeline, which was transporting oil from Iraq to Israel, interrupted exports of crude oil from the Middle East to Europe.[161] As a result, Europe encountered an oil crisis in December 1956.[162]

The Petroleum Emergency Group, under the Organization for European Economic Cooperation (the predecessor to the OECD), announced an emergency oil supply program, the "Oil Lift;" it required intensive cooperation among the United States and European governments and companies to combat the 1956-1957 oil crisis.[163] The Oil Lift ordered a decrease in oil usage to the pre-Suez level in Europe.[164] Most importantly, Western countries decided to improve their oil tankers which led to the invention of the VLCC and ULCC supertankers to carry hundreds of thousands of tons of crude oil around the Cape of Good Hope to Europe.[165] The Oil Lift program rescued the European countries from the 1956-1957 oil crisis by supplying almost ninety percent of the interrupted oil during the Suez Canal crisis.[166] At the end of the Suez Canal crisis in April 1957, Egypt kept the ownership right of the Suez Canal and the European tankers resumed transporting crude oil through the Suez Canal.[167]

157. *Id.* at 467.
158. *Id.* at 464.
159. *Id.*
160. *Id.* at 472.
161. *Id.*
162. *Id.* at 475.
163. *Id.*
164. *Id.*
165. Mabro, *supra* note 74, at 4.
166. Yergin, *supra* note 76, at 476.
167. *Id.* at 477.

2. The 1973-1974 Oil Crisis

For the first time, the world perceived the dramatic and acute effects of the "oil weapon"[168] on global economic development in the 1973 Arab-Israel War (known as the "Yom Kippur War"). The 1973 Arab oil embargo against the United States and Holland also disrupted the economy of Western Europe and Japan, similar to the way that the sudden oil shortage had stopped the post-World War II pace of their economic development.[169] The sudden drop in oil production and exports to developed countries instigated an oil crisis that slumped Gross Domestic Product (GDP) and generated economic recession and high unemployment.[170]

Years before 1973, Arab members of the Organization of Petroleum Exporting Countries (OPEC) made a common political retort against Western countries who were sponsoring the State of Israel during the 1967 Arab-Israel War.[171] Arab oil-exporting countries withdrew from the 1967 Oil Embargo because Arab countries noticed that the prolonged interruption of the Arabian Light Oil export was considerably diminishing their revenue.[172] In 1967, the Arabian Light Oil was traded at less than 3.5 USD per barrel,[173] and non-OPEC members — particularly the United States — were producing the majority oil in the world.[174]

The 1973-74 Arab oil embargo, on the other hand, generated a severe global energy crisis. On October 16, 1973, Arab members of the OPEC agreed to no longer export oil to the United States and the Netherlands due to their support of the State of Israel during the Yom Kippur War.[175] Moreover, the Saudi-led oil embargo contained an oil production cut plan, "an initial [ten percent] cutbacks, and then an additional five percent each month."[176] The significant shortage of the Arabian Light Oil virtually

168. Mabro, *supra* note 74, at 2.

169. Yergin, *supra* note 76, at 598.

170. Bielecki, *supra* note 8, at 236.

171. *See* M.S. Daoudi & M.S. Dajani, *The 1967 Oil Embargo Revisited*, 13 J. Palestine Stud. 65, 69 (University of California Press 1984).

172. Yergin, *supra* note 76, at 525 Yergin, *supra* note 76, at 596.

173. Colin J. Campbell & Jean H. Laherrère, *The End of Cheap Oil*, 278 Sci. Am. 78, 81 (1998).

174. Daoudi & Dajani, *supra* note 171, at 84.

175. *See* Yergin, *supra* note 76, at 595 (stating that the 1973-74 Arab oil embargo, later, included Portugal, South Africa, and Rhodesia).

176. *Id.*

quadrupled oil prices in the oil market.[177] As a result, Western Europe and Japan also confronted a critical economic crisis which impaired their important post-World War II economic development.[178] The 1973 Arab oil embargo traumatized the United States economy, especially in the fuel section.[179]

The second Arab oil embargo in 1973-1974 was more successful in breaking the economy of developed countries than the 1967 Arab oil embargo. There were many reasons for the success of the 1973 oil embargo. As the developed nations doubled their oil consumption by 1973,[180] Arab countries increased their oil production and exports considerably.[181] Moreover, the developed countries' oil stock was very small when they encountered the sudden oil shortage in 1973.[182] Destructive socioeconomic effects of the 1973 oil crisis led the United States government to plot to seize oil fields in Arab countries.[183]

3. The 1979-1980 Oil Crisis

A series of interrelated global economic and political affairs in 1979 and 1980 helped trigger two consecutive oil shocks that created a distinctive oil crisis. The 1979-80 oil crisis not only appalled developed countries but also jeopardized the economy of oil-exporting countries for the first time.[184] The first oil shock appeared in 1979 as a direct consequence of the revolution that overthrew the thirty-eight-year reign of Mohammad Reza Pahlavi, the Shah of Iran.[185] Besides the fact that Iran was the second-largest oil producer in the OPEC in 1978, the Western bloc valued the Shah of Iran as

177. Yergin, *supra* note 76, at 597 (stating that on October 16, 1973, the posted oil price of the OPEC was US $5.40 per barrel which was increased to over US $22 a barrel a few weeks after the embargo).

178. *Id.* at 598.

179. *Id.* at 599.

180. *Id.* at 573 (stating that the United State had doubled its oil import to 6.2 million barrels of oil per day (b/d) in the middle of 1973).

181. *Id.* at 596 (stating that Arab countries were exporting more than twenty million b/d in 1973).

182. *See* A.F. Alhajji & James L. Williams, *The Coming Energy Crisis? Keep Current on the Oil and Gas Industry*, 1 OGEL, no. 2, Mar. 2003, Fig. 4 (showing that the U.S. oil stock had covered less than 150 days in 1973 while, ten years later, the U.S increased its oil stock capacity to more than five hundred days in 1983).

183. *See* Glenn Frankel, *U.S. Mulled Seizing Oil Fields in '73*, Washington Post (Jan. 1, 2004), https://www.washingtonpost.com/archive/politics/2004/01/01/us-mulled-seizing-oil-fields-in-73/0661ef3e-027e-4758-9c41-90a40bbcfc4d/?utm_term=.7dcfd215ef1d.

184. Yergin, *supra* note 76, at 667.

185. *Id.* at 656.

an essential ally in the Middle East for decades.[186] In the early days of the 1979 Iranian revolution, Iranian oil production had declined to about two million barrels per day, due to the commotion and labor strikes in the Iranian oil industry.[187] Despite Saudi Arabia increasing its oil exports to fulfill the two-million-barrel-per-day shortage from Iran, the panic of an oil shortage completely engulfed the global oil market.[188] Subsequently, the oil price rocketed from thirteen to thirty-four dollars per barrel at the end-1979.[189]

The post-1974 updated energy policy of the OECD was unable to help developed countries overcome the extreme consequences of the 1979 oil shock. A savage race among the OECD members over their economic development spectacularly augmented the global oil demand.[190] At the same time, the United States, the world's largest economy and oil consumer, had lost twenty-seven percent of its proven reserves by 1976.[191] As a result of the loss in reserves, the United States imported fifteen percent more crude oil in 1978 than it did in 1973.[192] Learned from the 1973-74 oil crisis, the OECD members had established the International Energy Agency (IEA) to prepare for impending oil crises.[193] According to advisory reports of the IEA, the OECD governments had been cooperating closely to control the 1979 oil shock.[194] Nevertheless, the OECD members were unsuccessful because their oil companies acted impatiently by bidding against each other for oil supply, causing a price surge; this approach contradicted the energy policy of their governments and the IEA approvals.[195]

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186. *Id.* at 27. (stating that due to the close relationships between Iran and the United States, Shah had disagreed to join Arab members of the OPEC to embargo Western countries in 1973, and the Soviet Union never accessed the Persian/Arabian Gulf via Iran).

187. *Id.* at 667.

188. *Id.* at 666.

189. *Id.*

190. *See* Alhajji & Williams, *supra* note 182, at 4 (stating that for example, the US petroleum consumption reached 17.1 million b/d in 1978 which it was eight percent higher than in 1973).

191. Yergin, *supra* note 76, at 647.

192. *See* Alhajji & Williams, *supra* note 182, at 4 (stating that "[the United States oil] imports as a percentage of petroleum supply increased at a more or less steady rate to 42% in 1978 from 35% in 1973 and exceeded 50% for a few months during that time span").

193. International Energy Agency (IEA), *Our Mission (*Sep. 10, 2016), http://www.iea.org/about/ (stating that "the IEA is an autonomous organisation which works to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA has four main areas of focus: energy security, economic development, environmental awareness and engagement worldwide").

194. Yergin, *supra* note 76, at 667.

195. *Id.*

Besides oil-importing countries, Saudi Arabia was the only oil-exporting country that was warry of the 1979 spike in oil price.[196] Overwhelmed by the joy of capturing the unexpected oil revenue, other oil-exporting countries never envisaged that the 1979 oil shock would jeopardize their energy security and economy.[197] Soon, the flame of the 1979 oil shock was fanned by another oil price shock in September 1980, when the Iraqi Army invaded the largest oil-producing province in Iran.[198] In the early months of the Iraq-Iran War, the global oil market lost four million barrels per day, eight percent of the total oil demand in the world; accordingly, the price per barrel of Arabian Light Oil abruptly soared to forty-two dollars.[199] OECD countries, who had suffered from the 1979 oil shock due to the uncoordinated actions of their oil companies, had become more skilled at combating the 1980 oil shock through closer collaboration with their oil companies.[200]

The 1979 and 1980 oil price shocks had together caused an oil crisis from which oil-importing countries suffered economically due to the oil price surge during the crisis, and after the surge, oil-exporting countries — particularly OPEC members — experienced an unfortunate reality in the oil market for the first time. Perhaps, the most considerable consequence of the 1979-1980 oil crisis was the end of the OPEC imperium in the global oil market.[201] Only one year after the 1979-1980 oil crisis, the oil "mini-glut" caused a twenty-seven percent decline in OPEC's oil exports.[202] OPEC's position never improved in the 1980s, and even worsened in the oil glut of 1986, when the output of OPEC was halved.[203] After the 1979-80 oil crisis, the global market witnessed an oil glut when production of new oil discoveries in Mexico, Britain, Norway, Alaska, and other non-OPEC countries started oversupplying the market.[204] Yamani, then-Saudi Arabia's

196. *Id.* at 685 (stating that Ahmed Zaki Yamani, Saudi Oil Minister 1962-1986 had warned OPEC members that oil price shock would generate recession in the global economy, and that would damage the OPEC countries).

197. *Id.*

198. *Id.* at 691.

199. *Id.* at 693.

200. *Id.* at 695 (stating that the global oil demand fell, and high inventories convinced oil companies to follow a guidance issued by their member counties in the IEA to avoid overbidding the OPEC's oil supply).

201. *Id.*

202. *Id.* at 696.

203. Bielecki, *supra* note 8, at 236.

204. *See* Alhajji & Williams, *supra* note 182, at 3 (stating that Alaskan production, for instance, increased from 464,000 b/d in 1978 to 1.6 million b/d in 1980).

Oil Minister, confessed that the insatiable voracity of OPEC members was the main reason for the creation of the oil glut in the 1980s.[205]

All three of these energy crises — the 1956 Suez Canal crisis, the 1973-74 oil crisis, and the 1979-80 oil crisis — had detrimental impacts on socio-economic aspects and national security of both developed and emerging countries. All of those energy crises ended in speculation, recession, inflation, and higher unemployment in the world.[206] They also restrained the diplomatic maneuver of political superpowers, such as the United States, against the oil-importing countries whose actions might be considered a threat to the national security of the United States.[207] Thus, delicate studies and analyses of earlier energy crises likely present beneficial experiences to impede parallel threats against energy security in the future.

B. Standing Descriptions of Energy Crisis

Since the 1970s energy crisis, energy scholars have provided substantial literature examining energy supply crises, particularly oil crises. In doing so, many studies on oil crises concentrated on specific and limited causes and effects of energy crises that had occurred in specific regions or countries. For instance, James L. Smith, an energy scholar at Southern Methodist University, focused on the economic aspect of oil supply and the impacts of oil price instability on the global oil market, which creates energy crises.[208] Michael L. Ross strove to discover obvious correlations between natural resources, predominantly oil and gas and civil wars in energy-exporting countries.[209] Furthermore, Peter Toft investigated whether intrastate conflicts in oil-exporting countries threatened the oil market and caused severe energy crises.[210] Many energy scholars, however, sought to dispense a comprehensive definition by covering all critical aspects that shape an energy crisis.

Among them, Alhajji and Williams defined an energy crisis as "a situation in which the nation suffers from disruption of energy supplies (in

205. *See* Yergin, *supra* note 76, at 695 (stating that Ahmed Zaki Yamani was the long-run Saudi Oil Minister from 1962 to 1986).

206. Alhajji & Williams, *supra* note 182, at 2.

207. *Id.* at 3.

208. James L. Smith, *World Oil: Market or Mayhem?*, 23 J. Economic Perspectives 145, 146 (2009).

209. Michael L. Ross, *What Do We Know about Natural Resources and Civil War*?, 41 J. Peace Res. 337 (2004).

210. Peter Toft, *Intrastate Conflict in Oil Producing States: A Threat to Global Oil Supply?*, 39 Energy Pol'y 7265 (2011).

the US case, oil) accompanied by rapidly increasing prices that threaten economic and national security."[211] Alhajji and Williams jointly expressed that an energy crisis causes economic and national threats when a country is unable to access to energy supplies.[212] To illustrate, Alhajji and Williams referred to the 1970's energy crises when a sudden disruption of oil imports from the Middle East rocketed energy prices.[213] Moreover, they explained how the 1970's energy crises, both the 1973-74 oil crisis and the 1979-80 oil market crisis, confined the capability of active international players in their foreign policy affairs, in addition to the direct impacts on the economic growth of a country.[214]

Later, in a separate article, Alhajji expounded that both "a decline in GDP growth and a threat to national security" was measured as two elements of an energy crisis.[215] Alhajji explained that energy crises most likely restrict the foreign diplomatic power of the United States; he introduced this as a real threat to the U.S. national security.[216] To analyze the concept of energy security, Alhajji tried to depict a distinct line between the terms "energy crisis" and "threat to energy security."[217] For example, Alhajji elucidated that "energy insecurity," one form of a threat to energy security, would enlarge the possibility of an energy crisis; but, it would not necessarily end in an energy crisis.[218]

Alhajji and Williams, in their article defining the concept of the energy crisis, introduced the disruption of energy supply as a leading cause of an energy crisis or an environment in which an energy crisis could grow.[219] However, they did not explain what factors could initiate the disruption of the energy supply. The section below will examine the pathology of an energy crisis to analyze and clarify primary sources of supply disruption, particularly physical casualty.

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211. Alhajji & Williams, *supra* note 182, at 2.
212. *Id.*
213. *Id.*
214. *Id.*
215. A. F. Alhajji, *What is Energy Security? Definitions and Concepts*, 6 OGEL, no. 3, Nov. 2008, at 6.
216. *Id.* at 3.
217. *Id.*
218. *Id.*
219. *See* Alhajji & Williams, *supra* note 182, at 4.

C. The Pathology of Energy Crises

An energy policy aims to prevent an energy crisis and provide security of energy supply.[220] To that end, energy policy strives to assure that all elements of energy security are protected.[221] The most updated view — on which the first section of this chapter has expounded — has structured the concept of energy security using the elements of availability, accessibility, affordability, and acceptability. However, energy security is naturally termed: a status in which energy supply is continuously available at a price that a country can afford.[222] Thus, incomplete elements of energy security could generate a substantial shortage of energy supply. Moreover, energy scholars have indicated that energy supply interruption, particularly oil, leads countries to energy crises and economic downturns.[223] Developed countries experienced a sudden shortage of crude oil during the 1970s oil crisis, and their economies collapsed because of the oil price surge.[224] Therefore, an energy crisis appears when the absence of the energy security elements concludes in the disruption of the energy supply.

Through explaining three central energy crises from the previous century — the 1956 Suez Canal crisis, the 1973-74 oil crisis, and the 1979-80 oil crisis — the author discovered that the energy security of the economically-suffered countries missed more than one of the elements before the crises started. Nonetheless, more energy crises occurred in the aftermath due to the paucity of elements of energy security. Along these lines, this study illustrates how the absence of each element of energy security has produced energy crises in the world.

Starting with the most modern element of energy security, the acceptability of energy security requires countries to apply environmental protection standards to their energy policy.[225] Environmental sustainability strives to ensure that current consumers and future generations will uninterruptedly benefit from natural energy resources with no harm to the environment.[226] Due to the combustion of fossil fuels, the increasingly-

220. *See, e.g.*, Bielecki, *supra* note 8, at 235.

221. Kruyt, *supra* note 19, at 2166.

222. International Energy Agency, *supra* note 44.

223. *See* Alhajji & Williams, *supra* note 182, at 2.

224. *See* Bielecki, *supra* note 8, at 236; *see also* Alhajji & Williams, *supra* note 182, at 2 (stating that in both oil crises of the 1973 and the 1979, Western countries suffered from economic recessions, the Gross Domestic Product (GDP) drop, and high unemployment).

225. See A. F. Alhajji, *What is Energy Security? Economic, Environmental, Social, Foreign Policy, Technical and Security Dimension*, 6 OGEL no. 3, Nov. 2008, at 2.

226. *See* Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 6.

populated world has been suffering from palpable climate change, derived from temperature increases and the atmosphere's "greenhouse gases accumulation," in addition to regional air pollution.[227] Many statistics prove that the unprecedented heatwave and natural disasters — including floods, drought, and storms — have negatively affected human health and contributed to environmental degradation.[228] A large segment of the damaging effects of natural disasters stemmed from the destruction of underlying energy infrastructure in the past decade.

For example, Hurricanes Katrina and Rita, which made landfall in the Gulf of Mexico and surrounding states in August and September of 2005, significantly disrupted oil and natural gas production, as well as refinery capacity in the United States.[229] Another dreadful event in March 2011, a powerful earthquake and tsunami, hit the Fukushima Daiichi nuclear power plant in Northern Japan; as a result, tens of thousands of Japanese citizens were forced to evacuate the radioactive-contaminated areas.[230] Furthermore, the environment has endured many human-made catastrophes due to oil spills, notably the 1989 Exxon Valdez oil spill, the 1991 Persian/Arabian Gulf oil spill, and the 2011 Macondo oil spill.[231]

From the economic element of energy security, some energy scholars claim that the flexibility and productivity of the global energy market contribute to the security of energy supply, in addition to political interactions between energy-related countries.[232] This statement noticeably evolved after the 1986 collapse of oil price.[233] Since then, price fluctuations

227. A. Haines et al., *Climate Change and Human Health: Impacts, Vulnerability and Public Health*, 120 Public Health 585, 594 (2006).

228. *Id.*

229. Yergin, *supra* note 17, at 74. (stating that both Hurricanes Katrina and Rita shot down up to 27 percent of oil production and 21 percent of refinery capacity in the US).

230. *See* Mark Holt et al., *Fukushima Nuclear Disaster Specialist in Energy Policy*, Cong. Res. Serv., Jan. 18, 2012, at 2 (stating that the tsunami destroyed the backup power system of Fukushima Daiichi nuclear power plant, and Japanese government forced more than 100,000 residents to evacuate their houses, up to 25 miles far from the nuclear power plant).

231. *See* Daniel Yergin, *The Quest: Energy, Security, And the Remaking Of The Modern World*, 249 (Penguin Putnam 2011); *See also* U.S. Energy Information Administration, *supra* note 124.

232. *See e.g.*, Yergin et al., *supra* note 64, at 87.

233. *See* Bielecki, *supra* note 8, at 238; see also Aleh Cherp & Jessica Jewell, *The Three Perspectives on Energy Security: Intellectual History, Disciplinary Roots and the Potential for Integration*, 3 Curr. Opin. Envtl. Sustainability 202, 205 (2011).

resulting from considerable gaps between supply and demand have fabricated shocking crises in the world.[234]

Global oil consumption in the 1980s was about six million barrels per day less than the 1979 level, and at the same time, non-OPEC producers were delivering an extra four million barrels of oil per day to the market.[235] The United States' dependency on oil imports, for example, declined to its lowest level from 1983-86 (figure 1). Thus, the price of OPEC crude oil dropped from $23.29 in December 1985 to $9.85 in July 1986.[236] The 1986 oil glut resulted in a shocking energy crisis, the third oil shock, for both OPEC and non-OPEC oil producers. Some of the OPEC countries, Iran and Libya, lost up to forty-two percent of their oil revenue due to the 1986 oil price collapse.[237] Many strip oil wells in the United States, the most significant non-OPEC producer, were shut down; subsequently, the national oil production suffered the loss of one million barrels per day, and the United States' oil import dependency doubled in 1987.[238]

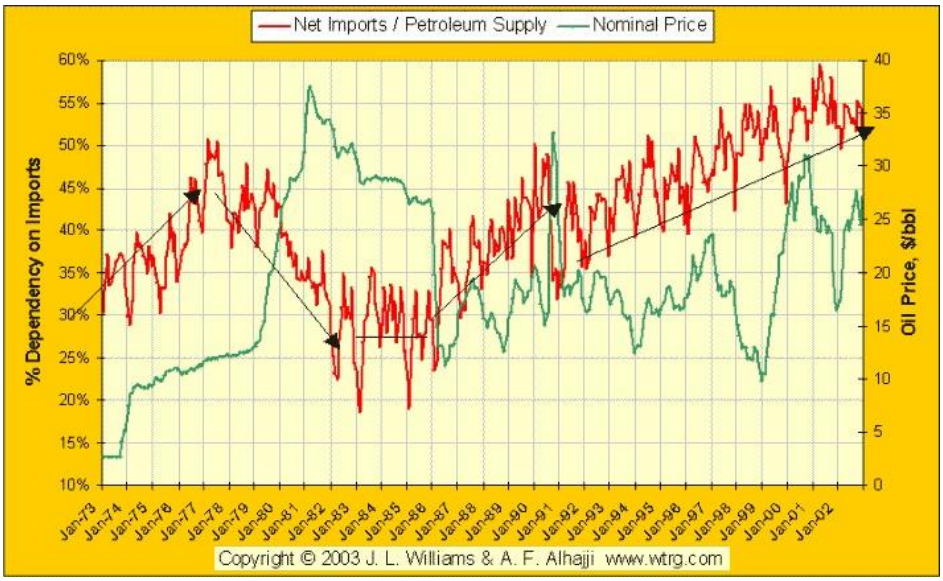

Figure 1: US Petroleum Import Dependency[239]

234. *See* Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 35.
235. Yergin, *supra* note 76, at 700.
236. *See* U.S. Energy Information Administration, *supra* note 124.
237. Yergin, *supra* note 76, at 741.
238. *See* Alhajji & Williams, *supra* note 182, at 4.
239. *Id.* at fig. 2.

One decade later, in 2008, another oil shock appalled the global energy market. The early years of the Twenty-First Century coincided with a substantial reduction in global oil production, particularly in the United States, Mexico, and the North Sea.[240] At the same time, the significant economic growth of China and India, containing one-third of the global population, rocketed oil demand in the world.[241] Overall, the real global GDP increased an extra 10.1% in 2006 and 2007.[242] As a result, oil prices noticeably rose from 2001 to 2007, and then the global oil market was shocked by a dramatic oil price surge in 2008. Oil prices increased from $25 per barrel in 2001 to $70 per barrel in July 2007 and then rapidly jumped to the high of $145 per barrel in July 2008.[243] The 2008 oil price shock diminished purchasing power in the United States and cut the profit of the United States automobile industry significantly.[244] The 2014 oil price shock was another financial consequence of an oil oversupply in the global market.[245]

Finally, the geological and geopolitical concerns over the adequacy of energy supply have been categorized as the physical aspect of energy security, which is represented by two elements: availability and accessibility.[246] A lack of these two factors limits the capability of a country to benefit from energy supply, leading to the country falling into a severe energy crisis. The following research explains the nexus between energy crises; and the unavailability and inaccessibility of energy supply.

1. Unavailability and Energy Crises

The availability of energy supply has traditionally covered the geological concerns over energy supply.[247] Both the 1956 King Hubbert's Peak Oil Theory and the 1972 Club of Rome publication, "The Limits to Growth,"

240. *See* James D. Hamilton, *Causes and Consequences of the Oil Shock of 2007-08* (Working Paper No. 15002, Nat'l Bureau of Eco. Res., May 2009) 57.

241. *See* Klare, *supra* note 99 (stating that China oil consumption increased over 200 percent, from 2.3 million b/d to 7.4 million b/d, between 1990 and 2006).

242. Hamilton, *supra* note 240, at 11.

243. Organization of the Petroleum Exporting Countries (OPEC), *OPEC Annual Report 2008* (2009) at 21.

244. Hamilton, *supra* note 240, at 36.

245. Organization of the Petroleum Exporting Countries (OPEC), *OPEC Annual Report 2015* (2016) at 21 (stating that in 2015, more than two million barrels of oil per day has been oversupplied in the market).

246. Kruyt, *supra* note 19, at 2167.

247. *See e.g.*, Sovacool, *supra* note 7, at 151.

anticipated that the depletion of oil reservoirs would demolish the modern lifestyle of humankind.[248] These two anticipations, along with a few others, were incorrect about the exact time the world would run out of oil.[249] Oil production has even grown in many parts of the world since the beginning of the Twenty-First Century due to the discovery and development of unconventional oil reservoirs.[250] The Theory of Peak Oil and its endorsing viewpoints accurately apply to the depletion of the conventional oil reservoirs in the world.[251] Conventional oil reservoirs, unlike unconventional reservoirs, require less capital and controversial technology.[252]

In the United States, oil production from conventional reservoirs decreased to its lowest rate at the beginning of the Twenty-First Century (figure 2), while oil consumption was at its highest level.[253] In other words, United States oil imports averaged ten to eleven million barrels a day in the 2000s, the highest rate of oil imports globally.[254] That status was of great concern to the United States Administration on national security in the 2000s.[255] The increasing import trend would have continued if the United

248. *See* Yergin, *supra* note 76, at 237; *see also* Mabro, *supra* note 74, at 4.

249. *See* Yergin, *supra* note 76, at 231 (stating that the concept of oil reservoirs' depletion has been mentioned five times totally).

250. *See* U.S. Energy Information Agency (EIA), *U.S. Field Production of Crude Oil* (Sep. 30,2016), https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRFPUS2&f=A (stating that oil production rate of the US has almost doubled since 2008 when the U.S. was only producing five million b/d).

251. *See* Colin J. Campbell & Jean H. Laherrère, *The End of Cheap Oil*, 278 SCI. AM. 78, 78 (1998).

252. Nick A. Owen et al., *The Status of Conventional World Oil Reserves—Hype or Cause for Concern?*, 38 Energy Pol'y 4743, 4745 (Elsevier BV 2010).

253. *See* U.S. Energy Information Administration (EIA), *U.S. Crude Oil Production in 2015 Was the Highest Since 1972, But Has Since Declined* (Nov. 7, 2016), http://www.eia.gov/todayinenergy/detail.php?id=28672 (stating that the US oil production was reduced to less than five million b/d in 2008 when the US was consuming more than twenty million b/d).

254. *See* U.S. Energy Information Agency (EIA), *U.S. Net Imports of Crude Oil and Petroleum Products* (Sep. 30, 2016), https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mttntus2&f=a.

255. *See e.g.*, *President Bush's State of the Union Address*, Washington Post (Feb. 1, 2006), http://www.washingtonpost.com/wp-dyn/content/article/2006/01/31/AR2006013101468.html (stating that George W Bush, the 43d President of the United States, in his 2006 State of the Union Address declared that the United States had faced "a serious problem" due to its oil addiction imported from "unstable" countries).

States had not developed its unconventional oil reservoirs, particularly tight oil, in the late 2000s (figure 3).

Figure 2: The United States Oil Production[256]

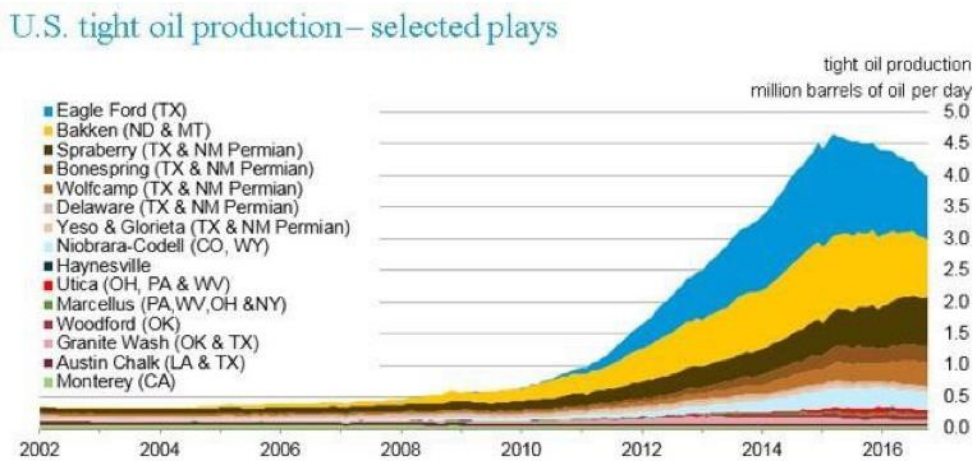

Figure 3: U.S. Tight Oil Production[257]

256. *See* Alhajji & Williams, *supra* note 182, at Fig. 1.

257. U.S. Energy Information Agency (EIA), *Shale in the Unites States* (Aug. 15, 2016), Tbl. 3, https://www.eia.gov/energy_in_brief/article/shale_in_the_united_states.cfm.

As conventional oil reservoirs depleted, increasing global oil consumption led the world to depend on challenging unconventional oil discoveries, namely oil shales and oil sands, which ultimately relied on enhanced technology and astronomical capital investment.[258] Additionally, uncertainty regarding the safety aspects of unconventional infrastructure has continually frightened the world concerning environmental catastrophes. Perhaps, this fear permeated the world in 2011 when an explosion on the BP Deepwater Horizon platform in the Gulf of Mexico created the most massive offshore oil spill in the world.[259]

The availability element of energy security also involves non-geological aspects of the energy industry because of the growing global demand for unconventional oil production. Adequate capital investment, advanced technology, appropriate regulations, and refining capacity are considered crucial factors to fulfill the availability element of energy security.[260] Shortage of these factors has even generated dire predicaments in oil-rich countries. Venezuela, which owns the world's largest proven oil reserves, has been importing oil due to its highly restrictive governmental regulations and a deficiency in foreign investment in its national oil industry that prominently contains unconventional oil reservoirs.[261] Nigeria, due to its low refining capacity, can only supply twenty percent of its gasoline demand, despite the nation producing over 2.5 million barrels of oil per day.[262]

The unavailability of non-geological factors threatens the development progress of unconventional oil and gas reservoirs and causes the

258. Yergin, *supra* note 76, at 243.

259. *Id.*

260. Elkind & Pascual, *supra* note 68, at 123.

261. *See* Patrick Gillespie, *Oil-Rich Venezuela is Now Importing U.S. Oil*, CNN MONEY (Feb. 3, 2016), http://money.cnn.com/2016/02/03/news/economy/venezuela-imports-american-oil/ (stating that Venezuela imported half million barrels of oil from the US in late January 2016); *see also* Matt Egan, *Why Venezuela's Oil Production Plunged to a 13-Year Low*, CNN MONEY (Jul. 12, 2016), http://money.cnn.com/2016/07/12/investing/venezuela-crisis-oil-production-plunges/ (stating that the proven oil reserves in Venezuela are estimated 298 billion barrels, and its oil production was decreased from 3.5 million b/d in 2003 to 2.1 million b/d in 2016).

262. *See* Julia Payne, *Nigeria Aims to Supply 20 pct of Gasoline Demand Itself*, Reuters (Jul. 10, 2015), http://www.reuters.com/article/nigeria-oil-refineries-idUSL8N0ZQ37O20150710 (stating that the refining capacity of Nigeria has been decreasing to under forty percent, lack of maintenance and security as well as corruption issues were identified as main reason); *See also* Organization of the Petroleum Exporting Countries (OPEC), *Nigeria Facts and Figures* (May 3, 2016), http://www.opec.org/opec_web/en/about_us/167.htm.

productivity of conventional reservoirs to dwindle. A proper example of this statement is Iran, home of the world's largest proven reserves of natural gas[263] and OPEC's third-largest proven oil reserves.[264] Because the Iranian "buy-back" model for oil and gas contracts has not attracted foreign investors, Iran is currently struggling to develop its oil and natural gas fields because of the lack of capital investment and advanced technology.[265] A similar situation is threatening an Iranian neighbor — Iraq. Southern Iraqi super-giant oil fields, Rumaila and West Qurna, desperately need an adequate water supply for injection operations to protect reservoir pressure and guarantee the required development plan.[266] Due to the scarcity of freshwater in its southern area, Iraq had to build a high-cost seawater treatment plant, the Common Seawater Supply Facility (CSSF).[267] The 2012 ExxonMobil withdrawal from the CSSF project has led to Iraqi concerns regarding the unavailability of water for the development of its oil fields, which linger on until today.[268]

Many non-geological factors covered by the availability element of energy security are closely related to the accessibility element of energy security. Therefore, the availability and accessibility elements make up the physical aspect of energy security.

2. Inaccessibility and Energy Crises

Energy crises are also engendered by human activities involving the acquisition, administration, and utilization of energy supply. Human-made energy crises are easily distinguishable distinguished from natural or geological oil and gas crises because of the depletion of oil and gas reservoirs. The preceding section explained that the discovery of unconventional oil and gas resources reduced the global concern over the availability of energy supply. However, this section will revise the human-

263. British Petroleum (BP), *BP Statistical Review of World Energy June 2016*, Jun. 2016, 20, https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2016/bp-statistical-review-of-world-energy-2016-full-report.pdf. (ranking Iran on the top of largest proved natural gas reserves in the world).

264. Organization of the Petroleum Exporting Countries (OPEC), *OPEC Share of World Crude Oil Reserves* (Mar. 5, 2016), http://www.opec.org/opec_web/en/data_graphs/330.htm.

265. Paul Stevens, *Prospects for Iran's Oil and Gas Sector*, Chatham House: Royal Inst. of Int'l Affairs, Research Paper, pg. 8 (Mar. 2015).

266. *See* International Energy Agency (IEA), *World Energy Outlook Special Report 2012 – Iraq Energy Outlook* (2012), at 66.

267. *Id.* at 62, 102.

268. *Id.* at 68.

made or non-natural factors, predominantly geopolitical features, which create energy crises.

The ability of a country to secure continuous access to available energy supply for its economy constituted the second physical element of energy security: accessibility.[269] Energy-consuming countries pursue "diversification" to provide different sources of oil supply to reduce the substantial consequences of oil interruptions on their economy.[270] The high dependency of energy-consuming countries, e.g., the United States, on imported energy from unstable oil regions, makes the national security of Western nations vulnerable.[271] By galvanizing the accessibility element of their energy security, energy-consuming states aim to reduce their supply reliance on producing countries. The accessibility element has traditionally covered the geopolitical concerns of consuming countries over energy supply in producing regions.[272]

On the other hand, an absence of accessibility or inaccessibility may push energy-consuming countries toward severe energy crises. In the 1973-74 oil crisis, for example, the United States was highly dependent on oil imports from Arab countries.[273] At the same time, regional political tension in the Middle East spiraled into a regional war between Arab countries and the State of Israel, and the Arab members of the OPEC stopped exporting oil to the United States and other countries who supported Israel in the war.[274] That is to say, the high oil import dependency of consuming countries, along with supply interruptions due to political turmoil in oil-producing countries, constrained the consuming world from having access to oil supply and subsequently led them to an energy crisis.

More than two-thirds of the global oil supply is produced in the Middle East, Africa, Latin America, Southeast Asia, and post-Soviet states.[275] Additionally, many of the oil-producing regions are struggling with substantial political instability, internal turmoil, terrorism, a feeble rule of

269. *See* Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 6.

270. Yergin, *supra* note 17, at 76.

271. *See* Alhajji & Williams, *supra* note 182, at 5.

272. *See e.g.*, Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 19.

273. *See* Alhajji & Williams, *supra* note 182, at 4.

274. Yergin, *supra* note 76, at 595.

275. British Petroleum, *supra* note 263, at 8 (stating that the mentioned regions produced more than sixty million barrels of oil per day out of 91.67 million barrels of oil per day, the total global oil production, in 2015).

law, and pervasive official corruption.[276] The instability of oil-producing regions may, at any moment, cause supply interruption, which could halt global economic development. Thus, the oil-consuming countries are concerned about the geopolitical sources of supply interruptions. The following research discerns three primary sources of geopolitical concerns over energy security.

a) Intrastate and Interstate Conflicts

The main geopolitical concern of the consuming world noticeably arises from intrastate and interstate conflicts in producing countries. Starting with intrastate conflicts, many scholars, such as Collier and Hoefler, believe substantial that oil rents, along with other natural resources, motivate the belligerents to start clashes to oust the government.[277] Identifying this financial incentive of rebellions as a direct cause of intrastate armed confrontations, Peter Toft asserted that a weak governing body to provide security represented an indirect cause for oil production reduction.[278] Using the post-2011 Libyan internal conflict as an example, Toft also stated that the Libyan oil interruption threatened the energy security of energy-importing countries.[279] In sub-Saharan Africa, rebellions in the Niger Delta caused a significant supply disruption by attacking on-shore Nigerian oil infrastructure in 2008.[280] Based on the 2010 dataset from the Correlates of War ("COW") Project, 133 intrastate wars occurred globally between 1965 and 2007, with 42 of 133 civil wars occurring in oil-exporting countries.[281] The 1980-88 Iraq-Iran war and the Iraqi invasion of Kuwait in 1990 epitomized the robust link between interstate conflicts and oil interruptions.[282]

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276. *See* The World Bank, *Worldwide Governance Indicators* (Apr. 21, 2016), http://Info.Worldbank.Org/Governance/Wgi/Index.Aspx#Reports (stating that these regions ranked among countries with the lowest political and governance stability in the world in 2015).

277. Paul Collier & Anke Hoeffler, *Greed and Grievance in Civil War*, 56 Oxford Econ. Papers 563, 588 (Oxford University Press 2004).

278. *See* Toft, *supra* note 210, at 7266.

279. *Id.*

280. See Carlos Pascual & Evie Zambetakis, The Geopolitics of Energy From Security to Survival, in Energy Security: Economics, Politics, Strategies, and Implications, 9, 13-14 (2010).

281. *The Correlates of War Project (COW)*, Cow War Data, 1816 - 2007 (V4.0) - Cow War List - Appendix A Chronological List of All Wars (2010), http://www.correlatesofwar.org/data-sets/COW-war/cow-war-list.

282. Yergin, *supra* note 76, at 755.

b) Authoritarian Governments

Another geopolitical concern of OECD members concerning energy security is the growth of authoritarianism in three countries that are the world's major oil and gas producers. Iran, Venezuela, and Russia, altogether, possess more than one-third of the world's total proven oil and natural gas reserves and produce about one-fifth of the total oil supply on the global market.[283] Contending for regional authority and influence, Iran, Venezuela, and Russia have employed oil and gas weapons against neighboring countries and consumers to confound the OECD countries, particularly the United States.[284] Despite the imposition of many U.S.-led international sanctions and UN Security Council resolutions to prevent or suspend the Iranian nuclear weapon program in the last decade, Iran has insisted on developing its nuclear weapons, sponsored by its oil export revenue.[285] By expanding its military operations in the Persian/Arabian Gulf, Iran has often threatened to shut the Strait of Hurmuz, through which about forty percent of total oil exports pass.[286]

To disperse his revolutionary ideology in Latin America, former President of Venezuela, Hugo Chavez, utilized a policy that restricted Western countries and their energy companies from investing in the oil industry of Venezuela and other Latin American countries.[287] In Europe, the dependency of the OECD members on Russian natural gas has led Russia to use its abundant natural gas as a weapon against the European members who refuse to accept Putin's authoritarianism.[288]

c) Terrorism and Cyber-Attack

Lastly, terrorism and cyber-attacks on the global energy industry have threatened the energy security of energy-producing and energy-consuming countries. Identified as an "economic jihad," Al Qaeda targeted oil and gas

283. British Petroleum, *supra* note 263, at 20 (stating that Iran, Venezuela, and Russia own more than 560 billion barrels of proven oil reserves out of the world's total 1.67 trillion barrels. These countries possess 2,538 trillion cubic feet (tcf) natural gas proven reserves when the total natural gas proven reserves in the world is 6,600 tcf. Total oil production of these countries is 17.5 million b/d out of the total global oil production: 91.6 million b/d).

284. *See* Pascual & Zambetakis, *supra* note 280, at 7.

285. *Id.*

286. *Id.* at 14-15.

287. *Id.* at 19.

288. *Id.* at 20-21 (stating that on the pretext that Ukraine disagreed to pay for its gas, Russia shut down all gas supply on Ukraine and other European countries in winters of 2006 and 2008).

infrastructure in the Middle East to make a "powerful revenge" against their enemies according to the religious fatwa "Judgment on Targeting Petroleum Interests" issued in 2006 by an Al Qaeda scholar, Shaikh Abdullah bin Nasser Al-Rashid.[289] In two failed attacks in 2006 and 2015, Al Qaeda fighters attempted to destroy one of the essential Saudi Arabian oil export terminals in Abqaiq city, in which forty-six pipelines transport more than seven million barrels of Saudi crude per day to the Arabian/Persian Gulf.[290] Terrorist groups also targeted the oil pipelines in other countries and foreign oil supertankers.[291] After controlling outsized oil-rich territories in Syria and Iraq in mid-2014, the Islamic State of Iraq and Syria (ISIS), an Islamic jihadist group, earned billions of dollars from trading produced oil to subsidize their unrecognized state and terrorist operations.[292]

Cyber-attacks are another threat to the energy security of both international oil and gas producers and consumers. The 2012 cyber-attack on Saudi Aramco, the world's largest oil-producing company, damaged the computer network of Aramco for two weeks and concerned Saudi's oil consumers, particularly the United States.[293]

IV. The Global Structure for Energy Security

As principal owners of energy resources, states had unliterary undertaken the task of protecting their energy security and relied on their national law to

289. Nicole Stracke, *Economic Jihad: A Security Challenge for Global Energy Supply*, Security & Terrorism Res. Bull., 27 (Aug. 2007).

290. Alessandria Masi, *Saudi Arabia Thwarts "Terrorist" Attack in Abqaiq, World's Largest Oil Processing Facility*, International Business Times (Sept. 4, 2015), http://www.ibtimes.com/saudi-arabia-thwarts-terrorist-attack-abqaiq-worlds-largest-oil-processing-facility-2083386.

291. *See e.g.*, Frank Umbach, *Global Energy Security and the Implications for the EU*, 38 Energy Pol'y 1229, 1233 (2010) (Al-Qaeda has attacked oil infrastructures of Iraq since 2004. Terrorist groups committed a suicide attack against a French oil supertanker, Limburg, in October 2002).

292. Howard Koplowitz, *ISIS Oil Revenue: Islamic State Makes Money by Selling Gas to Bashar Assad, New BBC2 Documentary Claims*, International Business Times (Apr. 22, 2015), http://www.ibtimes.com/isis-oil-revenue-islamic-state-makes-money-selling-gas-bashar-assad-new-bbc2-1892370.

293. Christopher Bronk & Eneken Tikk-Ringas, *The Cyber Attack on Saudi Aramco*, 55 Survival, no. 2, pg. 82 (May 01, 2013) (stating that regarding the 2012 cyber-attack on Aramco, Leon Panetta, then US Secretary of Defense expressed that the incident made a "tremendous concern" for the oil consuming world. From his statement, many speculated that Iran was behind the attack).

confront energy crises for many decades.[294] However, states' unilateral measures to secure their energy demand generated conflicts and wars among them in the Twentieth Century. Post-World War II globalization and development compelled governments to prepare a legal framework to settle common challenges over investment and supply.[295] In pursuit of this objective, states applied two legal procedures to promote active collaboration and resolve disputes amidst them. Governments signed treaties to regulate their commercial interactions and established organizations to implement the rules outlined in the signed agreements. At the outset, the intergovernmental approach aimed to create organizations and target broad subjects, such as trade in goods, within a region, or globally. The global and regional communities have been unable to ease energy challenges, despite the efforts of these intergovernmental organizations and agreements covering the energy sector.

As an overarching intergovernmental organization, the United Nations has played a pivotal role in implementing international law within many different areas since its establishment, and its members have signed several treaties — e.g., the General Agreement on Tariff and Trade (GATT)/World Trade Organization (WTO) — to legalize their interactions in the wide-ranging field of commerce.[296] As the principal organization regulating intergovernmental connections, the United Nations has not been supported with sufficient technical, financial, and administrative resources to cope with challenges in specific commercial sectors, such as the energy market.[297] Furthermore, some scholars argue that the United Nations' multilateral trading system was unable to handle global energy challenges because the WTO/GATT did not use a distinctive marketing feature to distinguish energy supplies and regulated energy products according to the same trade rules as general goods.[298] That is probably why many top oil and gas exporting countries — including Iran, Iraq, Algeria, and Libya — have

294. *See* A. Konoplianik, *Energy Security: The Role of Business, Governments, International Organisations and International Legal Framework*, 6 OGEL, no. 3, Nov. 2008, at 10 (stating that foreign investment on the energy sector was an example that states had managed through their national law until the second World War).

295. *Id*. at 9.

296. Melaku G. Desta et al., *The Organization of Petroleum Exporting Countries, the World Trade Organization, and Regional Trade Agreements*, 37 J. World Trade 523 (2003).

297. Wheeler, *supra* note 26, at 5.

298. Desta et al., *supra* note 296, at 529.

not joined the WTO so far.[299] The United Nations played a pivotal role — through its active agencies, the UN Economic Commission for Europe (UNECE), the UN Industrialized Development Organization (UNIDO), the World Bank, the UN Development Program (UNDP), and the UN Environment Program (UNEP) — in directing the global energy industry to operate less aggressively towards the global environment and develop sustainability and efficiency measures within the energy usage stage.[300]

The United Nations is not the only intergovernmental organization involved in global governance. Leaders of the super-economic powers in the world formed two other global governance organizations — the Group of Eight (G8) and its expanded version, the Group of Twenty (G20) — in the third quarter of the Twentieth Century to enhance global economic coordination. The Heads of Governments in seven countries — the United States, the United Kingdom, Japan, France, Germany, Italy, and Canada — established the Group of Seven in the mid-1970s to present and deploy a joint economic policy against the global challenge of energy disruption at that time.[301] When Russia, as a significant oil producer, joined the organization in 1997, the Group of Eight was fully established.[302] At the outset of the Twenty-First Century, the G8 started to become more actively involved in the energy sector. In the aftermath of the 1997 Kyoto protocol on climate change, the G8 gathered at the 2000 Summit and the 2005 Summit to augment renewable energy usage in developing countries.[303] In 2004's G8 Summit, the members concentrated on the physical security of energy supply in the Middle East and oil price increases.[304] Although energy was the impetus of the G8's establishment, this organization has not made any strenuous efforts to involve itself in the global energy challenges; instead, the G8 handed over responsibilities to other world agencies such as

299. The World Trade Organization, *Understanding the WTO: The Organization - Members and Observers* (Oct. 10, 2016), https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm.

300. Wheeler, *supra* note 26, at 16-19 (stating that the United Nations cooperates with independent and intergovernmental agencies, e.g., the Global Environmental Facility (GEF) and the International Renewable Energy Agency (IRENA)).

301. Ann Florini & Benjamin K. Sovacool, Who Governs Energy? The Challenges Facing Global Energy Governance, 37 Energy Policy 5239, 5239 (2009).

302. *Id.*

303. *See id* (stating that in the 2000 G8 Summit, Japan posited a renewable energy task force to augment the renewable energy usage in developing countries, but the initiative never grew due the United States' lack of interest).

304. *Id.*

the IEA and the World Bank.[305] One explanation for the G8's passive stance on global energy security is the lack of an administrative mechanism in the organization; for instance, there is no permanent secretary or headquarters for the G8.[306] The G8 Records Act shows that the organization is predominantly engaged in political matters. In March 2014, seven members of the G8, along with the presidents of the European Council and European Commission, suspended Russia's membership in the G8 due to their military action in Ukraine, in violation of Ukrainian sovereignty.[307]

In Asia, the Association of Southeast Asian Nations ("ASEAN"), was founded in 1967 as a multi-purpose organization to enhance intergovernmental cooperation among its ten members — Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam — and hasten economic development in Southeast Asia.[308] ASEAN has also shown a keen interest in the security of energy supply, leading its members to sign the ASEAN Petroleum Security Agreement ("APSA") in 1986.[309] One of the main achievements of the APSA was creating an emergency mechanism, the ASEAN Emergency Petroleum Sharing Scheme, which jointly combats oil disruption among members.[310] ASEAN energy demand will be growing considerably in the two upcoming decades, and its members rely on the energy imports for their economic development.[311] Unsurprisingly, ASEAN is incapable of unilaterally influencing global energy supply security trends.

Today, no single governance organization facilitates international energy conflicts. The current experiment ensues from a dearth of global consensus on the security of energy supply. Every international organization targeting a broad range of objectives has subsequently constructed some effective mechanisms for ensuring energy supply globally. Nonetheless, the matter of energy security urges the discrete attention of all energy players through an

305. *Id.*

306. *Id.*

307. Zachary Laub, *The Group of Eight (G8) Industrialized Nations*, Council on Foreign Relations (Oct. 16, 2017).

308. The Association of Southeast Asian Nations, *About ASEAN: Overview* (Jan. 10, 2017), https://asean.org/about-us/.

309. *See* Bielecki, *supra* note 8, at 241.

310. The Association of Southeast Asian Nations, *ASEAN Petroleum Security Agreement Manila, 24 June 1986* (Jan 10, 2017), http://asean.org/?static_post=asean-petroleum-security-agreement-manila-24-june-1986.

311. International Energy Agency (IEA), *Southeast Asia Energy Outlook* (2015), 30 (stating that the IEA anticipated that energy demand of the ASEAN would increase 80% by 2040).

energy-centered organization that covers the most important, if not all, aspects of energy security.

A. Intergovernmental Energy Organizations

All governments value their energy sector "as crucial to national security and national power" because energy resources are predominantly owned by governments, and energy services play a decisive role in their economic development.[312] Additionally, most energy challenges ensue from conflicts of interest among states over energy supply. Yet, no substantial progress appears in the energy business absent direct government involvement. This reality persuaded governments to be the leading participants in the energy industry. Many scholars and institutes, through some independent energy-related foundations, have been acting vigorously for many decades to proffer practical energy guidance. For example, since 1923, the World Energy Council ("WEC") has diligently directed the gathering of thousands of individual and institutional energy leaders to enhance "an affordable, stable and environmentally sensitive energy system for the greatest benefit of all."[313] The WEC is only "the UN-accredited global energy body," and it is not a governance agency in which governments need to display their leading characters in energy tasks.[314] Demand for international rules to manage energy missions convinced governments to become collectively involved in the decision-making process through an intergovernmental organization.

On the other hand, the divisive approach of empowering overarching intergovernmental organizations, such as the United Nations, to settle global energy challenges disappointed leading energy players in the second half of the Twentieth Century. In the energy sector, both oil-exporting and oil-importing states understood that the traditional energy system was incapable of ensuring the requisite energy security needed to facilitate their ideal economic development, most notably when post-WWII Reconstruction generated an oil demand shock in Europe. It became apparent that only a close collaboration among members of each energy group could ensure their common energy interests. That objective is only reachable using an exclusive energy organization among each energy group.

312. Florini & Sovacool, *supra* note 301, at 5239.

313. World Energy Council, *About the World Energy Council* (Jan. 11, 2017), https://www.worldenergy.org/about-wec/.

314. *Id.*

The structure of energy-centered organizations has gradually advanced with the evolution of the energy security concept since the beginning of the Twentieth Century. A good case in point is the debate among some energy scholars about whether "global energy governance has remained largely elusive."[315] In the first section of this chapter, Bert Kruyt described the nature of energy security as "elusive" and "highly context dependent."[316] In the same way, as most energy scholars and institutes who intentionally highlight one or two aspects of energy security in their definitions, nearly all energy organizations have calibrated their institutional mandate to ensure only one or two aspects of energy security. Intergovernmental organizations, the North Atlantic Treaty Organization ("NATO") and the Organization for Security and Cooperation in Europe ("OSCE") take a leading part in the physical aspect of energy security.[317] As mentioned previously in this research, other global governance organizations — for instance, the UNDP and the UNEP — had energetically engaged in the environmental facet of energy security under the auspices of the United Nations.[318] While both collections of agencies are categorized as the all-encompassing range of global governance organizations, there are distinguished intergovernmental energy bodies — the Energy Charter Conference ("ECC"), the IEA, OPEC, and the International Energy Forum (IEF) — who genuinely pursue the economic and commercial outlook of energy security.[319] The following section will examine the historical and modern position and functions of three main energy organizations, OPEC, the IEA, and the IEF in the global energy industry. ECC's role is discussed later in the section that discusses the importance of energy treaties in the global security of supply. The reasoning for this characterization is that the ECC is commonly identified as a vehicle used to implement the leading energy treaty, the Energy Charter Treaty, which will be exclusively highlighted in the section on energy treaties.

1. Organization of the Petroleum Exporting Countries (OPEC)

In the 1950s, rampant socialism and anti-imperialism fever in third-world countries, especially in the Middle East, overthrew many pro-

315. Wheeler, *supra* note 26, at 5.
316. Kruyt, *supra* note 19.
317. Wheeler, *supra* note 26, at 4.
318. *Id.* at 16-19.
319. *Id.* at 4.

Western rulers through violent coups.[320] The pro-Arab nationalistic rulers already viewed international oil companies as arms of imperialism in their region.[321] The international oil companies, the "Seven Sisters," who possessed long-term oil concessions in the Middle East included British Petroleum ("BP"), Gulf Oil (later Chevron), Standard of California (later Chevron), Standard of Jersey (later Exxon), Standard of New York (later Mobil), Texaco (subsequently merged into Chevron), and Royal Dutch Shell.[322] Soon, the greed of the Seven Sisters sparked outrage in the Middle East and South America. The 18-cent-per-barrel cut off "posted" oil price by British Petroleum in 1959 raised the ire of leaders of oil-exporting Arab countries and Venezuela.[323] In September 1960, Venezuela, Iraq, Saudi Arabia, Kuwait, and Iran gathered in Baghdad to establish an intergovernmental organization, the Organization of the Petroleum Exporting Countries ("OPEC"), "to coordinate and unify petroleum policies among Member Countries, in order to secure fair and stable prices for petroleum producers."[324]

OPEC, with its thirteen member countries, currently holds more than seventy percent of the world's proven crude oil reserves.[325] Both the 2016 OPEC Annual Statistical Bulletin and the 2016 BP Statistical Review of World Energy confirmed that OPEC produced more than forty-two percent of the total oil supply in the world in 2015.[326] Because the oil demand of OPEC members is less than twelve percent of total world oil demand,

320. *See* Yergin, *supra* note 76, at 490 (stating that inspired by a successful coup of the Army against the King of Egypt in 1952, pro-Arab military officers of Iraq slaughtered strung up the body of the King of Iraq and slaughtered the pro-Western Prime Minister of Iraq in 1958).

321. *Id.* at 485.

322. *Id.*

323. *Id.* at 497.

324. Organization of the Petroleum Exporting Countries (OPEC), *Brief History* (Jan. 10, 2017), http://www.opec.org/opec_web/en/about us/24.htm.

325. *See* BP, BP Statistical Review of World Energy June 2016 6 (2017) (stating that OPEC members owned 1.211 trillion barrels of the total crude oil proved reserves (about 1.7 trillion barrels) in the world. OPEC, on the other hand, claimed the total global proven reserves was 200 billion barrels less than the BP report which it increased the percentage of total OPEC proven reserves to more than 80 percent); *see* Organization of the Petroleum Exporting Countries (OPEC), *OPEC Annual Statistical Bulletin 2016* (2016) at 22.

326. *See* Organization of The Petroleum Exporting Countries (OPEC), OPEC *Annual Statistical Bulletin 2016*, *supra* note 325, at 28; *see also* BP, BP Statistical Review of World Energy June 2016 8 (2017).

OPEC members export most of their production.[327] Also, OPEC has produced a considerable amount of oil as spare capacity and delivers it to the market in the event of a sudden shortage of oil supply.[328] So long as crude oil remains the primary source of global energy demand, OPEC will continue to play a crucial role in global economic development.[329] Furthermore, its members believe that OPEC can control oil prices and the market as long as it possesses the majority of oil production.[330]

The objectives and strategies of OPEC evolved throughout different energy crises since its establishment in 1960. OPEC unilaterally regulated oil prices for more than a decade and never negotiated with other oil market players, such as oil companies or consuming countries.[331] In 1973, OPEC utilized its oil asset against Western countries to bolster its political power in the world.[332] During the 1980's-oil glut, OPEC members adopted a new strategy to manage the quantity of oil supply in the global oil market to alleviate the effects of an oil price drop.[333] Today, OPEC members recognize the increased role of non-OPEC producers in the market, and they prefer to collaborate with those non-OPEC producers, principally Russia, who have "a direct governmental administrative control over its oil production," to ensure the oil price stabilization in the world.[334] The late 2016 oil deal between OPEC members to cut oil output ended in the 2017 oil price stabilization because Russia had already agreed to cut 300,000 of its oil output.[335] Notwithstanding the recent cooperation with other producers, OPEC rejects the concept of free trade recommended by the WTO for all international players of petroleum market, including international oil companies and significant consuming countries; and,

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327. *See* OPEC *Annual Statistical Bulletin 2016*, *supra* note 325, at 42 (stating that OPEC members consume less than 11 million barrels p/d out of the total global oil demand (93 million barrels p/d) in 2015).

328. Bielecki, *supra* note 8, at 242.

329. Wheeler, *supra* note 26, at 8.

330. Catherine Redgwell, *International Energy Security in Energy Security: Managing Risk in a Dynamic Legal and Regulatory Environment*, 17, 34 (2004).

331. *Id.*

332. *Id.*

333. Desta et al., *supra* note 296, at 526.

334. Dr. Kent Moors, *OPEC Needs This One Country to Boost Oil Prices – and They're About to Cave In*, Oil And Energy Investors (Sep. 6, 2016), https://oilandenergyinvestor.com/2016/09/opec-needs-this-one-country-to-boost-oil-prices-and-theyre-about-to-cave-in/.

335. Vladimir Soldatkin et al., *OPEC, Non-OPEC Agree First Global Oil Pact Since 2001*, Reuters (Dec. 10, 2016), http://www.reuters.com/article/us-opec-meeting-idUSKBN13Z0J8.

OPEC insists on an exclusive control of oil exporting countries to stabilize the global market.[336]

2. The International Energy Agency

In response to the Arab oil embargo, the oil-consuming countries in the western hemisphere recognized that programmed cooperation among their states was the only way to alleviate the deleterious consequences of the 1973-74 oil crisis on their economic development.[337] The developed countries — formerly seventeen members — who were members of the Organization for Economic Co-operation and Development ("OECD") gathered in Paris, France, in November 1974 to sign the "Agreement on an International Energy Program."[338] The Agreement created the International Energy Agency, one of the most active intergovernmental energy organizations in the world, and established a legal framework for the decision-making process among its members.[339] Today, twenty-nine member countries of the International Energy Agency ("IEA") work together on "security of supply, long-term policy, information 'transparency,' energy and the environment, research and development and international energy relations."[340]

Perhaps, "an emergency oil-sharing system" was one of the IEA's most valuable devices in the early years of its existence that allowed its members to more effectively benefit from their "oil stockpiling" through the use of an energy information-sharing program.[341] The IEA members nevertheless presented a feeble response to the 1979 oil shock because they disagreed with the advisory recommendation of the IEA Secretariat regarding how best to operate their oil stock.[342] Conversely, during the 1980 oil shock and later energy crises, the OECD members of the IEA successfully coordinated with one another to implement the IEA's advice.[343] The key to this achievement stemmed from the IEA members controlling their fear of oil disruption and avoiding unnecessary and detrimental competition to

336. Desta et al., *supra* note 296, at 525.
337. Yergin, *supra* note 76, at 612.
338. International Energy Agency, *supra* note 43.
339. *Id.*
340. *Id.*
341. Florini & Sovacool, *supra* note 301, at 5242.
342. *Id.*
343. *Id.*

purchase supply.[344] Furthermore, the four-million-barrel capacity of the "strategic petroleum reserves" among the IEA members became a substantial aid to OECD oil consumers to ensure that they experienced reduced damage during the 1990 Gulf War when the global oil market suddenly lost the supply of Kuwait and Iraq, two of the world's major oil producers.[345] Today, the IEA members are committed to hoarding crude oil, to the extent of at least ninety days of their oil demand, to maintain their oil security.[346]

The IEA also obliges its members to confine their oil demand, from seven to more than ten percent, given specific conditions of each member county.[347] The IEA has recommended three measures for implementing such principle: "persuasion and public information, administrative and compulsory measures, and allocation and rationing."[348] Mixing the demand restraint principle with oil stockpiling to combat oil disruption is termed CERM, or the Coordinated Emergency Response Measure, which the IEA members deployed during the 1991 Gulf War.[349]

Besides setting principles for governments to collaborate to reduce the consequences of oil disruption, the IEA has been active in enlightening energy companies, institutes, and scholars by publishing statistics and analyses of the energy sector of the world and its members.[350] The IEA issues ninety publications each year; the *World Energy Outlook* and *Key World Energy Statistic* are considered the most informative periodicals on the global energy supply and demand that the IEA distributes annually.[351]

The limited membership of the IEA has raised doubts about its competence to handle future energy crises, particularly oil shocks.[352] The IEA only consisted of the OECD countries in the 1970s and 1980s that were significant oil consumers.[353] Today, new oil-consuming members of

344. *See* Yergin, *supra* note 76, at 695 (stating that the global oil demand fell, and high inventories convinced oil companies to follow a guidance issued by their member counties in the IEA to avoid overbidding the OPEC's oil supply).

345. Florini & Sovacool, *supra* note 301, at 5242.

346. Redgwell, *supra* note 330, at 30.

347. *Id.*

348. *Id.*

349. *Id.* at 31.

350. Florini & Sovacool, *supra* note 301, at 5243.

351. International Energy Agency (IEA), *Publications* (Sep. 10, 2016), http://www.iea.org/publications/.

352. Florini & Sovacool, *supra* note 301, at 5243.

353. *See Membership*, International Energy Agency (IEA), https://www.iea.org/about/faqs/membership/#d.en.20933 (last visited Feb. 8, 2017).

the OECD — including Chile, Israel, Mexico, and Iceland — are yet to join the IEA.[354] The rationale for establishing the IEA in 1974 was because the OECD countries constituted a large proportion of the world's major oil consumers at that time. Since the beginning of the Twenty-First Century, the oil-consuming non-OECD countries have weighed heavily on the global energy market. Brazil, Russia, India, China, and South Africa — which created an intergovernmental organization ("BRICS") to enhance their economic development — consume about one-fourth of the world's crude oil and are not IEA members.[355] Many believe that the active participation of BRICS in IEA strategies is essential "to increase energy policy coordination and to reduce the environmental impact of global oil demand."[356]

Another reason for the limited future capacity of the IEA is its refusal to allow certain oil-producing countries to attend the meetings of its governing board. Global energy security and environmental protection necessitate close collaboration between oil-consuming countries and major oil-producing countries. Yergin states that "well-functioning markets" will be supported by "high-quality information."[357] Such information about the rate of energy demand and supply will not be attained without the close coordination of both oil-consuming and oil-producing countries.

3. The International Energy Forum

After the Gulf War I, oil-producing and consuming countries gathered in Paris, France in July 1991 to institute a new inter-governance energy organization, the International Energy Forum ("IEF"), that included all national energy players to exchange their views on global energy challenges and to promote productive understanding of their collective energy interests.[358] At present, the IEF is considered to be the most inclusive inter-governmental energy organization, with seventy-two member countries that make up more than ninety percent of global oil and gas demand and supply.[359] This distinguishing feature has helped the IEF to create

354. *Id.*

355. *See* BP, *BP Statistical Review of World Energy June 2016*, 9 (2017) (stating that the BRICS consumed about 23 million barrels p/d out of the total global oil demand (95 million barrels p/d) in 2015).

356. Florini & Sovacool, *supra* note 301, at 5243. *See also*, Yergin, *supra* note 17, at 78.

357. Yergin, *supra* note 17, at 76.

358. International Energy Forum (IEF), *Twenty Years Of Producer-Consumer Dialogue* (Feb. 10, 2017), https://www.ief.org/about-ief/history.aspx.

359. *Id.*

constructive trust and interchange of ideas among the IEA countries and OPEC countries, as well as other energy-consuming and transit countries, including Argentina, Brazil, China, India, Mexico, Oman, Russia, and South Africa.[360]

The IEF founders identified two large fissures in the structure of other energy organizations that precluded global energy actors from devising a common world energy policy. First, there was a small amount of accurate energy data for governments to construct their energy policy, so major energy decisions were made based on estimations from before the 1990s.[361] That was because every other energy organization, predominantly the IEA and OPEC, represented distinct factions of the energy industry, either energy-consuming or energy-producing, and there was no legal connection between them to share information. Access to accurate data on energy demand and supply is a required factor for energy-consuming and producing players to efficiently resolve modern energy challenges. For that purpose, only an inter-governmental energy organization, which embraces both energy-consuming and producing countries, could encourage both factions to jointly prepare energy data. Today, the IEF organizers exult over the establishment of the Joint Oil Data Initiative ("JODI"), which was created from a fruitful dialog between both oil-producing and consuming countries to provide timely and reliable information among energy players.[362]

Second, major global energy governance agencies declined to embrace new energy players, such as China, India, Russia, and Brazil.[363] These new energy players, with large populations, were rapidly taking decisive roles in the global energy industry due to their active economic development in the early 1990s. For instance, the crude oil consumption in China and India doubled between 1973-1990, which meant these two non-OECD countries held a substantial role in the global energy market.[364] By the early 1990s, the IEA no longer represented all energy-consuming countries, and its share

360. Wheeler, *supra* note 26, at 9.

361. Enno Harks et al., *The International Energy Forum and the Mitigation of Oil Market Risks, Global Energy Governance: The New Rules of The Game*, 247, 249 (Andreas Goldthau & Jan Martin Witte eds. 2010).

362. *See* International Energy Forum, *supra* note 358.

363. Harks et al., *supra* note 361, at 249.

364. International Energy Agency (IEA), *IEA Energy Atlas* (Feb. 10, 2017), http://energyatlas.iea.org/#!/tellmap/-1920537974/0 (stating that China oil consumption rose from about 52 Million tons of oil equivalent (Mtoe) in 1973 to about 115 Mtoe in 1990. China became the top second oil consumer in the world (504 Mtoe) in 2014. Also, India's oil consumption increased from 23 Mtoe in 1973 to 58 Mtoe in 1990).

of global oil demand was considerably reduced due to the appearance of new giant energy consumers, China and India.[365] On the production side, Brazil quadrupled its crude oil production rate between 1973-1990, and Brazil, along with Russia, diminished the superior position of OPEC in the oil market.[366] By involving all global energy players, the IEF strives to narrow "the differences among energy producing, consuming and transit Member States on global energy issues."[367]

Despite the broad membership of the IEF, which includes many major energy players from six continents, the IEF weight has never reached a level that could properly resolve energy issues.[368] In 2011, the IEF Charter authorized, in Section VII, its Secretariat to administrate affairs of the Forum.[369] The IEF Secretariat, with its small staff, is likely unable to accomplish and manage the numerous delegated activities.[370] More importantly, the IEF meetings are informal, and decisions are merely advisory. The IEF Charter, in Section I, points out that [t]he Forum is an intergovernmental arrangement that serves as a neutral facilitator of informal, open, informed, and continuing global energy dialogue among its membership of energy-producing and energy-consuming States, including transit States."[371] In the same section, the IEF Charter clarifies that "[t]he Charter does not create any legally binding rights or obligations between or among its members."[372] IEF's legal limitation stems from the fact that the IEF is not bound by a treaty, unlike other energy-related organizations; thus, the IEF has never granted a binding decision.[373]

B. Energy Treaties

The inability of the World Trade Organization ("WTO") to address global energy security concerns compelled significant energy-involved

365. Harks et al., *supra* note 361, at 249 (stating that the IEA members, who were consuming 75 percent of global oil demand in 1970s, their demand share declined to 57 percent by 2008).

366. International Energy Agency, *supra* note 364 (stating that Brazil crude oil production increased from 8.6 Mtoe in 1973 to 33.39 Mtoe in 1990. In 2014, Brazil oil production rate reached 122.76 Mtoe).

367. International Energy Forum (IEF), *International Energy Forum Charter* (Feb. 22, 2011) at 5.

368. Wheeler, *supra* note 26, at 9.

369. International Energy Forum, *supra* note 364, at 13.

370. Wheeler, *supra* note 26, at 9.

371. International Energy Forum, *supra* note 364, at 4.

372. *Id.*

373. Harks et al., *supra* note 361, at 257.

countries to create specific regional energy agreements, both multilateral and bilateral treaties, to provide more efficient legal structures for energy commodities.[374] The 1995 WTO and its original 1947 agreement version, the General Agreement on Tariff and Trade ("GATT"), provided the disciplines and rules of the trade that included all merchandised goods at large "to ensure that trade flows as smoothly, predictably, and freely as possible."[375] The WTO also covers other fields of business, such as services, intellectual property, transfer of technology, finance, investment, and the environment.[376] While energy supplies, namely petroleum, have been the largest traded commodity in the world, many major oil-producing countries — Iran, Iraq, Algeria, and Libya — have not joined the WTO.[377] One possible reason is that the oil-producing countries believed that competition among oil producers, inspired by the free trade theory of the WTO, would damage the oil industry and, subsequently, the energy security of both oil-producing and oil-consuming states.[378] Furthermore, the WTO trading system focuses on market access, which does not cover the central aspect of energy security which was the guaranteed supply access.[379] That gap over energy security in the WTO pushed energy-concerned countries to create regional organizations and treaties that more directly engaged in the energy sector, such as OPEC, the North Atlantic Free Trade Agreement (NAFTA), and the European Energy Charter Treaty (ECT). Regulations and objectives of these energy organizations and treaties allowed member countries to disobey the WTO principles, for example, the prohibition of quantitative restrictions by the trade parties.[380] In contrast to the WTO principles, oil-producing countries, particularly OPEC, aimed to control the energy market through a supply restriction device.[381] The 1973-74 oil crises, engendered by the supply restrictions device deployed by the Arab members of OPEC, proved to industrialized countries that the WTO trading system would be unable to provide a desirable trade environment for

374. Wen-Chen Shih, *Energy Security, GATT/WTO and Regional Agreements*, 49 Nat. Resource J. 433, 466 (2009).

375. World Trade Organization (WTO), *The WTO in Brief* (Feb. 10, 2017), https://www.wto.org/english/thewto_e/whatis_e/inbrief_e/inbr00_e.htm.

376. Desta et al., *supra* note 296, at 525.

377. *See* World Trade Organization (WTO), *Members and Observers* (Feb. 10, 2017), https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm.

378. Desta et al., *supra* note 296, at 525.

379. *Id.* at 532.

380. *Id*. at 534 (stating that both OPEC members and non-OPEC members, Mexico and Norway, deployed the oil supply restrictions device in the 1980s and 1990s).

381. *Id.* at 533.

energy-consuming countries in the same manner that the security of other tradable goods is guaranteed.[382]

Due to the complete reliance on energy production for capital-intensive operations, the security of energy supply could only be obtained through the "right investment decisions."[383] In other words, only uninterrupted energy investment could assure international energy security in the long term.[384] For that reason, the protection and promotion of foreign investments in the energy sector were probably the principal motives for both energy-producing and energy-consuming countries to establish specific energy agreements. Additionally, energy-related treaties protect an open and competitive energy market that ensures short term energy supply.[385]

The need to establish legally binding regional agreements to provide better cooperation than the WTO in the energy sector could potentially terminate several multilateral and bilateral treaties. Among these treaties, the Energy Charter Treaty was formulated to focus on the energy sector specifically.[386] The role and objectives of the Charter are discussed in the next section. There are other regional treaties, such as the OECD, NAFTA, and MERCOSUR (signed among some of the South American countries) that are considered to be general trade agreements because they govern all tradable goods, including energy supply.[387] NAFTA, for example, includes a disciplined energy division, Chapter XI, that has generated distinctive cooperation among its three member countries in the energy field.[388] Chapter XI of NAFTA is discussed in the second section of this subchapter. Finally, this research will examine the role of bilateral treaties in global energy security.

1. The Energy Charter Treaty (ECT)

The 1990 European initiative to establish an effective energy treaty among energy-producing countries, energy-transit countries and energy-consuming countries in Eurasia benefited from a unique situation during the end of the Cold War.[389] Most states of the former Soviet Union ("FSU"),

382. *See* Shih, *supra* note 374, at 434.

383. Andrei Konoplyanik & Thomas Walde, *Energy Charter Treaty and Its Role in International Energy*, 24 J. Energy & Nat. Resources L. 523, 529 (2006).

384. *Id.* at 530.

385. *Id.* at 531.

386. *Id.* at 526.

387. *Id.*

388. *See* Shih, *supra* note 374, at 468.

389. Konoplyanik & Walde, *supra* note 383, at 525.

including Russia, Kazakhstan, Azerbaijan, and Turkmenistan, possessed abundant oil and gas resources but lacked the capital and advanced technology to develop these energy resources. At the same time, the energy security of West Europe was in jeopardy due to its dependence on the Middle East.[390] The collapse of the Soviet Union provided an opportunity for both the energy-producing states of FSU and energy-consuming countries in Western Europe to enter a mutual arrangement over the energy sector to ensure their economic development. Additionally, the role of transit countries, like Ukraine, was essential to guarantee the energy security of Eurasia. Given these circumstances, the Energy Charter Treaty ("ECT") was created in December 1994 and entered into legal force in 1998, accompanied by the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects ("PEEREA").[391] The Energy Charter Treaty, with a total number of fifty-four signatories, including fifty-two states and the European Union and Euratom, is recognized as the top energy treaty covering the largest geographical framework.[392]

The Energy Charter Treaty is the only "legally binding multilateral" agreement that has deliberately set up rules and an intergovernmental institution to ensure active cooperation in the energy sector.[393] The Energy Charter Treaty carefully handles three essential fields — investment, transit, and trade — and provides an efficient dispute settlement mechanism among all different energy players.[394] The Energy Charter Treaty also concentrates on developing "energy efficiency" to diminish the damaging environmental impacts of energy operations.[395] Andrei Konoplyanik and Thomas Walde, two energy scholars, described the Energy Charter Treaty as "a multilateral framework for energy cooperation that is unique under international law, and the strategic value of these rules is likely to increase in the context of efforts to build a legal foundation for global energy security, based on the principles of open, competitive markets and sustainable development."[396] The principles of improving open and competitive

390. *Id.*

391. *Id*. at 524-525.

392. International Energy Charter, *The Energy Charter Treaty 1994* (Feb 18, 2017), http://www.energycharter.org/process/energy-charter-treaty-1994/energy-charter-treaty/.

393. Konoplyanik & Walde, *supra* note 383, at 526.

394. Andreas Goldthau & Jan Martin Witte, The Role of Rules and Institutions in Global Energy: An Introduction to Global Energy Governance: The New Rules of The Game, 1, 9 (Andreas Goldthau & Jan Martin Witte eds. 2010).

395. Konoplyanik & Walde, *supra* note 383, at 529.

396. *Id.* at 527.

markets and sustainable development ensure an available, accessible, affordable, and acceptable energy supply and subsequently protect global energy security.[397]

In contradistinction to the central objective of other energy-related organizations, the Energy Charter Treaty was not designed to dominate the global energy market and supply.[398] Instead, the Energy Charter Treaty promises to prepare a robust and stable business ground for energy investors, in addition to promoting transparency in energy operations while respecting the sovereignty of member states.[399] The energy security of European consumers depends on the an assurance of adequate and reliable energy supply; this assurance will only be, in the long term, obtained through persistent global investment and a legally-secured trade process in the energy sectors.[400] Reducing risks related to energy investments and trade through an applicable legal outline and substantive participation of member countries is the main objective of the Energy Charter Treaty.[401] For this purpose, the Energy Charter Treaty achieves its primary objectives via its peculiar institution, the Energy Charter Conference, which was instituted by the Energy Charter Treaty in 1994.[402] As a global governance energy-related agency, the Energy Charter Conference manages the Energy Charter process, implements the Energy Charter rules, as well as makes decisions on potential modifications to the Energy Charter Treaty and the membership applications in annual meetings of all participating countries.[403]

The Energy Charter Treaty features an accommodating structure that allows qualified non-member states, who accept the obligations of the Energy Charter Treaty, to attend the Charter after the Energy Charter Conference approves their membership application.[404] At the same time, each member has the right, based on Article 47 of the Energy Charter Treaty, to leave the Charter "after five years from the date on which the

397. *Id.* at 531.
398. *Id.* at 554.
399. *Id.* at 554.
400. *Id.* at 529-530.
401. *Id.* at 528.
402. International Energy Charter, *The Energy Charter Conference* (Feb. 18, 2017) http://www.energycharter.org/who-we-are/energy-charter-conference/.
403. Konoplyanik & Walde, *supra* note 383, at 548.
404. *Id.* at 550.

ECT has entered into force for this Contracting Party."[405] Besides membership status, the Energy Charter Treaty provides two more forms of participation, "Observership" and "Association Agreements" in the Charter process.[406] To date, nineteen observer countries — including China, South Korea, Iran, and Iraq — have signed the Charter, giving them the right to attend international forums to exchange their opinions and concerns and reach a potential common understanding regarding the global energy challenges.[407] However, the observer countries are not bound by the Charter's rules and annual budget subscription.[408] Twelve international organizations — for instance, IEA, WTO, The World Bank, and the OECD — are observers in the Charter.[409]

2. The North American Free Trade Agreement ("NAFTA")

The substantial commercial dependence between the United States, Canada, and Mexico, led these countries to negotiate and create an agreement providing an effective legal framework to facilitate free trade and promote foreign investment among themselves.[410] The United States, Canada, and Mexico formally signed NAFTA, composed of twenty-two Chapters and ten Annexes, in 1992, which entered into force in 1994.[411] NAFTA is recognized as a general trade treaty that regulates all tradeable items and has considerably increased the volume of trade among the North American partners.[412] However, oil and natural gas specifically have played a significant role in shaping the provisions of NAFTA. Canada and Mexico have been the primary sources of oil and natural gas demand for the United

405. International Energy Charter, The International Energy Charter Treaty Consolidated Energy Charter Treaty with Related Documents, Energy Charter Secretariat (Jan. 15, 2016), at 103.

406. *See* Energy Charter, *The Energy Charter Treaty - a Reader's Guide*, 2 OGEL, no. 5, Dec. 2004, at 66-8.

407. *See* International Energy Charter, *Constituency Of The Energy Charter Conference* (Feb. 18, 2017), http://www.energycharter.org/who-we-are/members-observers/. *See also*, Energy Charter, *supra* note 406, at 67.

408. Energy Charter, *supra* note 406, at 67.

409. International Energy Charter, *supra* note 407.

410. Shih, *supra* note 374, at 467.

411. *See* Nafta Secretariat, *North American Free Trade Agreement* (Feb. 10, 2017), https://www.nafta-sec-alena.org/Home/Legal-Texts/North-American-Free-Trade-Agreement.

412. Office of the United States Trade Representative, *U.S.-Canada Trade Facts* (Feb 10, 2017), https://ustr.gov/countries-regions/americas/canada (stating that in 2015, the United States exports to Canada was up to 179% up from 1993 (pre-NAFTA)).

States. In 2015, the United States imported 48% of its petroleum demand from Canada and Mexico, and more than 96% of the U.S. imported natural gas was from Canada.[413]

Provisions of NAFTA removed "many of the lingering energy trade barriers that had existed between Canada, Mexico, and the United States."[414] Chapter XI of NAFTA includes nine Articles and five Annexes, dealing with "Energy and Basic Petrochemicals" trade in North America.[415] Article 602.2 of NAFTA distinguished its scope from the GATT/WTO by defining energy goods and labeling energy products under their Harmonized Commodity Description and Coding System ("HS") codes.[416] Nevertheless, Article 603 of NAFTA adopted the principle of the prohibition on "Export and Import Restrictions," originally introduced by the 1994 GATT/WTO treaty.[417] Other provisions of NAFTA present explanatory measures to the parties on regulating cross-border energy trade. Article 604 of NAFTA obligates member countries to impose a tax on the export of an energy product only if there was a domestic tax on that energy supply.[418] Annex 602.3 grants Mexico an exception to one of the main principles of the agreement, which was the deregulation of energy trade by partners. For instance, Annex 602.3(1) recognized the right and authority of Mexico to regulate up to fifty percent of its total oil export due to a requirement by the Mexican Constitution to exercise its sovereign power over national natural resources.[419]

NAFTA has faced multi-faceted criticism since its inception. Some scholars believe that NAFTA restricts the liberalization to regulate the energy trade, similar to the GATT/WTO principle on the prohibition of energy export control.[420] Some Canadians view NAFTA as an inherently exploitative agreement that increased the cost of Canadian fuel and depleted national fossil fuel resources.[421] They argue that NAFTA should grant

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413. The U.S Energy Information Administration (EIA), *How Much Petroleum Does the United States Import and Export?* (Feb. 10, 2017), http://www.eia.gov/tools/faqs/faq.cfm?id=727&t=6; *see also* The U.S Energy Information Administration, *U.S. Natural Gas Import by Country* (Feb 10, 2017), https://www.eia.gov/dnav/ng/ng_move_impc_s1_a.htm.

414. John Fohr, *How NAFTA Can Increase Global Energy Security*, 22 Wis. Int'l L.J. 741, 756 (2004).

415. Shih, *supra* note 374, at 468.

416. *Id*. at 468-469.

417. *Id*. at 469.

418. *Id*.

419. Fohr, *supra* note 414, at 759.

420. Shih, *supra* note 374, at 471.

421. Fohr, *supra* note 414, at 758.

Canada a similar exception that Mexico received to conserve its natural resources.[422] The NAFTA authorization for Mexico to reserve some of its strategic energy operations, on the other hand, discouraged foreign investors from offering the required capital in the energy development of Mexico.[423] Some scholars recommend that NAFTA should include "greater deregulation approaches" to increase private shares in the state-owned oil company of Mexico ("PEMEX") for that purpose.[424]

3. Bilateral Investment Treaties

The development of different stages in the petroleum industry, especially upstream, and the stability of the oil and gas market requires intensive capital investment, which could be guaranteed through the participation of major petroleum companies.[425] Since the 1950s, many host countries have presented discriminatory policies and regulations, along with asset expropriation and devaluation of the foreign direct investment ("FDI").[426] To protect the FDI, major petroleum companies and their original countries demanded a legal structure for the section of international investment under international economic law.[427] The emerging countries that require FDI also recognize that bilateral investment treaties are a key element to promote their economic development.[428] Mere modification of domestic regulations in the emerging countries has not been sufficient to attract foreign investors because the national laws are unstable, and only treaties are thought to be sufficient to ensure the protection of the FDI.[429] The failure of intergovernmental organizations to conclude a multilateral agreement on investment has also compelled countries to sign bilateral and regional agreements.[430] Developed, developing, and emerging economies benefited

422. *Id.*

423. Shih, *supra* note 374, at 471.

424. Fohr, *supra* note 414, at 761-762.

425. *See* Asia Pacific Energy Research Centre (APERC), *supra* note 28, at 35.

426. *See* Emily A. Witten, *Arbitration of Venezuela Oil Contracts: A losing Strategy?* 4 Texas J. Oil, Gas, And Energy L. 55, 57-8 (2008) (stating that the last notorious case occurred in Venezuela in the end twentieth century and the early 21st century when Chavez regime imposed prejudicial regulations on ExxonMobil, by doubling its tax revenue and devaluating of its assets in Venezuela).

427. Efraim Chalamish, *The Future of Bilateral Treaties: A De Facto Multilateral Agreement?*, 34 Brook J. Int'l L. 303, 307 (2009).

428. Kenneth J. Vandevelde, *Bilateral Investment Treaties: History, Policy, And Interpretation*, 2 (Oxford University Press 2010).

429. *Id.* at 4.

430. *See* Chalamish, *supra* note 427, at 304-305.

from the end of the Cold War in 1989, in terms of promotion and protection of foreign investment, which is identified as "the principal engine of sustainable growth and development" in the global economy.[431] Today, over 2,900 bilateral investment treaties have been signed.[432]

Bilateral investment treaties (BITs), unlike general trade agreements, are considered to be legal instruments covering "specific circumstances" in business transactions between the state from which the investment originates (the home state) and the state in which the investment is devoted (the host state).[433] BITs are characterized by six main clauses: "access, reasonableness, security, nondiscrimination, transparency, and due process."[434] The strong disposition of the host states to honor its contractual liabilities shapes the first clause of BITs, "access."[435] The reasonability clause of BITs prohibits the host state from issuing arbitrary directives that are not "reasonably related to a legitimate host-state regulatory objective."[436] The security clause of BITs protects the FDI against infamous treatments of the host states, such as "exchange control or wrongful expropriations."[437] The non-discriminatory provision discourages the host state from influencing FDI through political intervention; instead, the clause allows the market to extent of investment flow.[438] By diminishing corruption, the transparency clause of BITs aims to improve the role of governance in the development of investment projects.[439] Finally, disputes that arise between the host state and foreign investors are resolved by agreed-upon legal tools, such as arbitration, under the due process provision of BITs.[440]

C. Unitization Agreements

Every state possesses the exclusive authority over its natural resources "in the soil and subsoil of their land territory and territorial sea to an

431. *See* Chalamish, *supra* note 427, at 308.

432. Investment Policy Hub: United Nations UNCTAD, *International Investment Agreements* (Mar. 15, 2017), http://investmentpolicyhub.unctad.org/IIA.

433. Vandevelde, *supra* note 428, at 1.

434. *Id.* at 2.

435. *Id.*

436. *Id.* at 189.

437. *Id.* at 233.

438. *Id.* at 337.

439. *Id.* at 397.

440. *Id.* at 430.

unlimited depth."[441] This exclusive right or "territorial sovereignty" of the state also includes untouched oil and gas deposits within its territories and borders.[442] Hydrocarbon deposits have an elusive quality; as a result, they "do not conform to property lines, licensing demarcations, or political boundaries."[443] The management and development of transboundary oil and gas reservoirs, without the consent and cooperation of all sovereign owners, likely distress global energy security. Unilateral operations of sovereign owners decrease the maximum recovery of hydrocarbons and causes energy waste.[444] Subsequently, a serious energy conflict among neighboring states will lead to a breach of physical security in the world. The 1990 invasion of Kuwait by the Iraqi regime became an unforgettable example that disturbed global security as a result of an energy conflict between two sovereign states.[445] Similar energy conflicts, for instance, the disagreement over the ownership of natural resources in the South China Sea, could potentially disturb the physical security of the most populated region.[446]

Providentially, geological and engineering advancements provided the oil industry with the technique of "unitization" to resolve the conflict of operatorship over transboundary oil and gas reservoirs.[447] Unitization is "the joint, coordinated operation of a petroleum reservoir by all the owners of rights in the separate tracts overlying the reservoir."[448] Unitization of a joint oil and gas reservoir, shared by numerous individuals or more than one government with different jurisdictions, involves complex issues, such

441. Rainer Lagoni, *Oil and Gas Deposits Across National Frontiers*, 73 Am. J. Int'l. L. 215, 216 (1979).

442. *Id.*

443. Albert E. Utton & Paul D. McHugh, *On an Institutional Arrangement for Developing Oil and Gas in the Gulf of Mexico*, 26 Nat. Resources J. 717, 722 (1986).

444. Raymond M. Myers, *The Law of Pooling and Unitization: Voluntary – Compulsory*, 7-8 (Banks and Company 1957).

445. R.W. Apple Jr., *The Iraqi Invasion; Invading Iraqis Seize Kuwait and Its Oil; U.S. Condemns Attack, Urges United Action*, N.Y. Times (Aug. 3, 1990), https://www.nytimes.com/1990/08/03/world/iraqi-invasion-invading-iraqis-seize-kuwait-its-oil-us-condemns-attack-urges.html.

446. *See* Bielecki, *supra* note 8, at 243; *see also* Renato De Castro, *The Philippines Confronts China in the South China Sea: Power Politics vs. Liberalism-Legalism*, 39 Asian Perspective 71, 95 (2015).

447. Baxter D. Honeycutt, *Petroleum Engineering*, Encyclopedia Britannica (Aug. 31, 2017), https://www.britannica.com/technology/petroleum-engineering.

448. Jacqueline L. Weaver & David F. Asmus, *Unitizing Oil and Gas Fields Around the World: A Comparative Analysis of National Laws and Private Contracts*, 28 Hous. J. Int'l L. 3 (2006).

as determining the participation formula.[449] After unitization is agreed upon, the involved parties draft and sign unitization and unit operation agreements to cover all technical, fiscal, and legal aspects of unitization. Unitization agreements are legal instruments protecting property rights through determining liabilities of the mineral and working rights of owners of the reservoir.[450] Internationally, unitization agreements successfully delivered a peaceful resolution to the conflict between South Korea and Japan over the exploitation of natural resources in the disputed area of the Korean Strait in 1974.[451]

The succeeding chapters will expand on the technical concept, modes, and drafting procedures of unitization agreements.

449. *Id.* at 81.
450. Myers, *supra* note 444, at 100.
451. Lagoni, *supra* note 441, at 224.

CHAPTER TWO: UNITIZATION OF PETROLEUM RESERVES

I. Introduction

The primary objective of both mineral interest owners and working interest owners is to recover the maximum rate of oil and gas deposits from a petroleum reservoir. Since the early Twentieth Century, most experts in the fields of petroleum engineering and economics have averred that only unitization of the entire petroleum reservoir — field-wide unitization — could guarantee the maximum ultimate production of hydrocarbons from the reservoir. Unitization, in addition to a technical work program, requires a legal instrument (such as a Unitization Agreement) to regulate the entire operation and determine the property rights and operational obligations of each participant. The construction of a legal framework for unitization requires an advanced understanding of the technical and economic backgrounds of unitization. For instance, the lawyers who draft unitization agreements need to recognize many technical terms and operational responsibilities of all parties.

To cover these prerequisites, this chapter starts with the technical background of unitization, which contains geological features of petroleum reservoirs, dynamics of oil and gas reservoirs, different stages of hydrocarbon recovery, and finally, technical necessities of unitization. This section will illustrate that the primary technical objective of unitization is to control and utilize the energy drives of the petroleum reservoir to obtain the maximum efficient rate ("MER") of oil production. Moreover, the technical nature of petroleum reservoirs strongly encourages the owners of mineral and working interests to unitize the entire petroleum reservoir and cooperate in the primary stage of oil and gas recovery.

In the second section of this chapter, the author discusses the economic benefits of unitization which play a crucial role in preventing and resolving energy crises around the world. For this purpose, the second part of this chapter primarily focuses on two economic advantages of unitization: preventing waste of hydrocarbons and promoting the rate of petroleum production.

Finally, the last section discusses the legal aspects of unitization in both privately-owned and state-owned mineral regimes. This section examines the common legal frameworks of unitization and explains why unitization agreements are the best legal instrument for regulating complex and multi-faceted unit operations by protecting property rights and establishing the operational obligations of the participants. Furthermore, this section

addresses how different legal theories impact the unit title and the legal nature of property interests after the unitization agreement is signed. Lastly, the researcher challenges the legal classification of unitization agreements using geopolitical measures, such as borders and countries. Instead, the research proposes the use of jurisdiction as a legal measure to divide unitization agreements into single-jurisdiction unitization agreements and trans-jurisdiction unitization agreements.

II. Technical Setting of Unitization

Petroleum geology and petroleum engineering are two crucial modern sciences that expound upon "the physical nature of oil and gas reservoirs and the engineering requirements for efficient production," because without an understanding of these two fields, legal comprehension of unitization would be unfeasible.[452] This section covers relevant aspects of the technical background to the unitization of oil and gas reservoirs. The details include a technical definition of oil and gas reservoirs, characteristics of petroleum reservoirs, dynamics of petroleum reservoirs and their energy drives in different stages of hydrocarbon recovery, as well as the oil and gas recovery stages and technical advantages of unitization.

A. Characteristics of Petroleum Reservoirs

A geological trap is "an impermeable rock layer such as shale or salt" that is recognized by a geologic feature such as a dome, fold, or fault.[453] Operators trace rich deposits of oil and gas within a reservoir encased by geologic traps. An oil and gas reservoir is described as "a subsurface body of rock with sufficient void space ('porosity') to store hydrocarbons and connectivity between those void spaces ('permeability') to allow hydrocarbons to flow."[454] This definition highlights critical geologic characteristics of a petroleum reservoir: porosity and permeability.

The porosity level of the reservoir rock is "the ratio of the pore volume to the total rock volume;" reservoir rocks are geologically attractive if they have a porosity level of at least thirty percent.[455] The permeability of a reservoir rock, which is the level of interconnectedness of pore spaces

452. Jacqueline L. Weaver, *Unitization of Oil and Gas Fields in Texas*, pg. 9 (Resources for The Future 1986).

453. John S. Lowe et al., *Cases and Materials on Oil and Gas Law*, 7 (West Academic Publishing, 6th ed. 2012).

454. *Id.* at 8.

455. *Id.*

within the rock, is calculated in millidarcy ("md") units, and a reservoir rock with higher levels of millidarcy units allows hydrocarbons to flow among pore spaces of the rock freely.[456]

Another physical feature of a petroleum reservoir is the "viscosity" of contained hydrocarbons. Viscosity is the consistency grade of fluids in the reservoir rock. A low viscosity level in hydrocarbons, such as in "light oil," causes the fluids to have a higher gravity level, allowing them to flow easily through the pores of the rock.[457] On the other hand, "heavy crude," with higher viscosity levels, resists flowing through pore spaces of the rock; therefore, heavy crude requires the reservoir rock to have a high permeability level.[458]

Scientific developments in petroleum engineering and geology convinced the petroleum industry that reservoirs are not homogenous. Instead, a reservoir may contain different volumes and types of hydrocarbons, in addition to having variable levels of porosity, permeability, and viscosity.[459] The hydrocarbon deposits in a reservoir could be crude oil, natural gas, or both. Due to its complex composition, oil is denser than natural gas; as a result, oil is found under natural gas deposits.[460] In comparison, the density of water is higher than oil and natural gas; hence, water deposits are found beneath oil and gas deposits.[461]

The extraction of oil and natural gas is feasible either together or separately.[462] Natural gas deposits, due to the substance's low density, can be extracted much easier than crude oil from a reservoir. The natural gas dissolved in crude oil is identified as "associated gas," whereas gas that contains little or no crude oil is called "non-associated gas."[463] Alternatively, "[t]he efficient recovery of crude oil is technically rather complicated."[464] Crude oil, due to its minimal compressibility, is unable to drive itself out of the reservoirs up to the surface.[465] Understanding the

456. *Id.* at 7.

457. *Id.*

458. *Id.*

459. Owen L. Anderson & Ernest E. Smith, *Exploratory Unitization Under the 2004 Model Oil and Gas Conservation Act: Leveling the Playing Field*, 24 J. Land Resources & Envtl. L. 277, 281 (2004).

460. Lowe et al., *supra* note 453, at 24-26.

461. *Id.* at 7.

462. *Id.* at 25.

463. *See* Saeid Mokhatab & William A. Poe, *Handbook of Natural Gas: Transmission and Processing* (Gulf Professional Publishing, 2nd ed. 2012).

464. Weaver, *supra* note 452.

465. *Id.* at 10.

dynamics of the reservoir is a vital task before starting petroleum operations.

B. Dynamics of Petroleum Reservoirs

Production of crude oil occurs when an area of low pressure, created by a penetrated well, expands the compressed natural gas and water within the reservoir and, as a result, crude oil is expelled towards the surface.[466] The expansion of natural gas and water act as energy drives or associated displacement mechanisms for producing oil.[467] There are three types of oil energy drives that, "either alone or in combination," can lead a reservoir to produce oil: (1) the gas-cap drive, (2) the dissolved gas drive, and (3) the water drive.[468]

Gas-cap drives are divided into two parts, consisting of natural gas in the upper part and crude oil at the bottom of the reservoir (*see* figure 3-1).[469] The pressure of the reservoir falls if a well penetrates the reservoir, and the natural gas will push towards the crude oil if the well is drilled into the lower part of the reservoir.[470] As a result, crude oil will be expelled through the wellbore towards the surface until the compressed gas fills the entire reservoir.[471] In the end, a considerable rise in the gas-oil ratio of the produced substances indicates a loss in the natural pressure that was driving the crude from the depths of the reservoir and may lead to complications in recovering the residual oil.[472] A gas-cap drive could be an effective displacement mechanism if the operator drills his well into the "down-dip," the lowest part of the oil reservoir.[473] This may enable the operator to recover up to fifty percent of the crude oil from the reservoir.[474]

466. *Id.*

467. Research Associates Incorporated, *The Unit Operation of Oil and Gas Fields*, 27 (1957).

468. Weaver, *supra* note 452, at 10.

469. *Id.*

470. *Id.*

471. *Id.* at 12.

472. *Id.*

473. *Id.*

474. *Id.* at 12 (stating that the operator should, however, take advantage of the natural energy of gravity drainage in the reservoir to obtain such oil recovery rate).

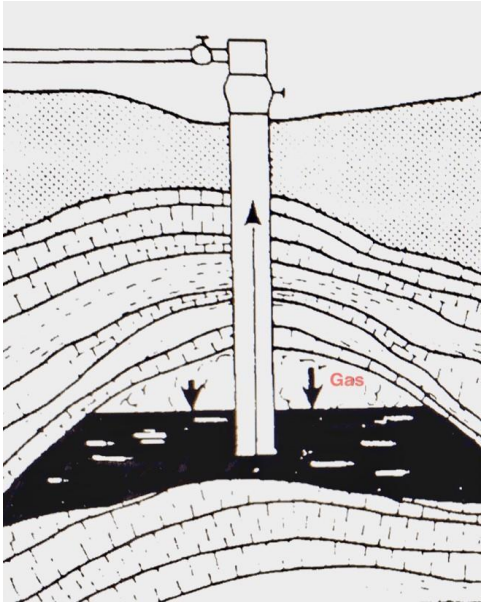

Figure 3.1: The Gas-Cap Drive[475]

The most common reservoir type is the dissolved gas drive, in which the oil is in solution with the dissolved natural gas in the reservoir (*see* figure 3-2).[476] When the well is drilled into the reservoir, the reservoir reduces the pressure, and the dissolved gas within the crude oil escapes from the solution; as a result, the oil viscosity is reduced, and the oil flows easily.[477] However, the natural gas will be "exhausted before all the oil can be produced, and the oil cannot expel itself."[478] Only one-fourth of the oil can be produced if the reservoir contains the dissolved gas drive; consequently, petroleum engineers consider the dissolved gas mechanism to be the least productive reservoir drive.[479]

475. Lowe et al., *supra* note 453, at 22.
476. Weaver, *supra* note 452, at 10.
477. Myers, *supra* note 444, at 24.
478. Weaver, *supra* note 452, at 10.
479. Lowe et al., *supra* note 453, at 22 (stating that the American Petroleum Institute has estimated that solution-gas drive reservoirs yield maximum recovery rates between ten and twenty-five percent (10-25%) of the oil originally found in the reservoir, increasing to twenty-five to fifty percent (25-50%) when augmented by a gas cap).

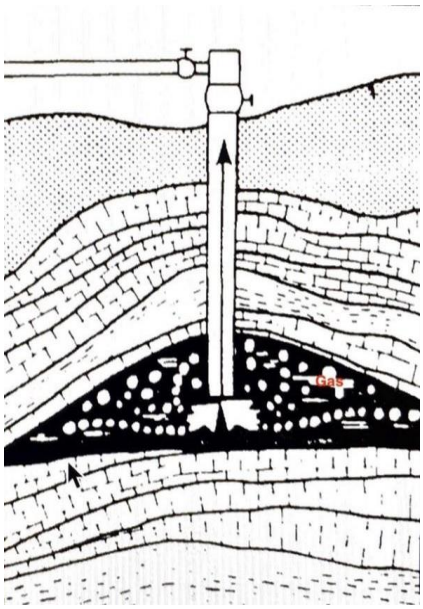

Figure 3.2: The Dissolved-Gas Drive[480]

The final oil displacement mechanism is the water drive, which is the most effective reservoir type because water directly provides an oil reservoir with the best-pushing energy.[481] In this type of reservoir, the oil is found atop a water deposit (*see* figure 3-3). When the operator drills a well into this type of reservoir, the compressed water, having more weight and being more viscous than oil, moves upwards towards the oil and expels the crude oil up through the wellbore.[482] An operator will abandon this type of reservoir if the water-oil ratio is high because the cost of production will likely outweigh the benefits of oil production.[483] A down-dip well will not increase oil recovery in water drive reservoirs, in contrast with gas drive reservoirs.[484] The operator should drill in the upper part of a water drive reservoir.[485]

480. *Id.*
481. *Id.* at 23 (stating that the water drive could recover more than fifty percent of oil from the reservoir).
482. Weaver, *supra* note 4452, at 13.
483. *Id.*
484. *Id.*
485. *Id.*

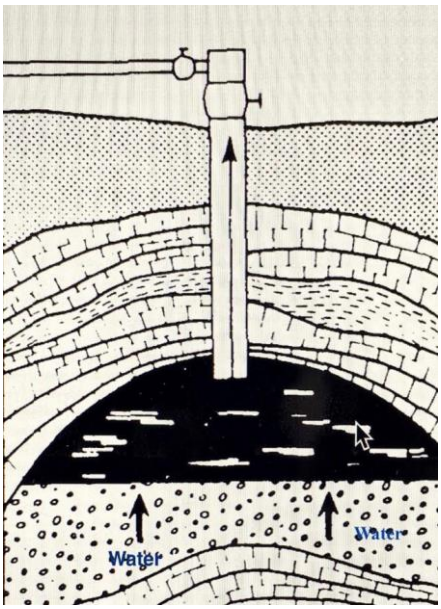

Figure 3.3: The Water Drive[486]

All three types of reservoirs use the natural energy of gas and water to displace and push crude oil toward the surface. However, to take advantage of the natural energy drives, the unit operator must control two key factors: (1) the rate of production and (2) the location of wells.[487] The operator can control the rate of oil recovery through the maintenance of pressure in the pool.[488] One pressure preservation method is to inject the reservoir with natural gas or water in the early stage of operations before the natural pressure diminishes.[489] Additionally, petroleum engineers study and estimate a reservoir's maximum efficient rate (MER) of oil production by identifying the most effective types of energy drives in the reservoir to assist the operator in controlling the rate of production.[490] Next, the unit operator needs to control the location of wells. In a gas-cap drive reservoir, the operator should avoid drilling wells into the upper part of the field to

486. Lowe et al., *supra* note 453, at 23.
487. Weaver, *supra* note 452, at 13.
488. *Id.* at 13-14.
489. Myers, *supra* note 444, at 25.
490. Weaver, *supra* note 452, at 14.

maintain the reservoir pressure.[491] On the other hand, the operator should not penetrate the lower part of an oil pool in a water drive reservoir to ensure there is a low water-oil ratio in pursuit of the maximum rate of crude oil production.[492]

C. Oil and Gas Recovery Levels

1. Primary Recovery

The process of production using "the pressure caused by the overlying strata" and the natural energy drives of the reservoir is known as *Primary Recovery*.[493] At the end of the primary recovery period, a considerable amount of crude oil remains in the reservoir due to the diminishing effectiveness of the reservoir's natural energy drives.[494] To produce the residual oil from the pool, the unit operator may utilize artificial means to increase reservoir pressure at the end of the primary recovery period.[495] These operations are known as *Secondary Recovery*.

2. Secondary Recovery

In secondary recovery operations, the unit operator could reinject recycled natural gas or water into the reservoir after the completion of the primary recovery to maintain or enhance the reservoir pressure.[496] For example, the unit operator could, at the surface, remove liquid hydrocarbons from produced wet gas through the "cycling" process and then reinject the residual dry gas into the reservoir.[497] Alternatively, the unit operator can utilize external sources of gas or water for the secondary recovery process.[498]

While secondary recovery serves the same purpose as the pressure maintenance operations in primary recovery;[499] the timing of the operations differentiates the two recovery operations.[500] Primary pressure maintenance

491. *Id* (stating that the operator should drill no well that is going to produce gas from the gas cap, since this would dissipate the reservoir's pressure source).

492. *Id.*

493. *Id.* at 15.

494. Lowe et al., *supra* note 453, at 22 (stating that Up to fifty percent of oil in the water drive, up to seventy five percent of oil in the gas-cap drive, and up to ninety percent of oil in the dissolved-gas drive could be unrecovered).

495. Weaver, *supra* note 452, at 14; Lowe et al., *supra* note 453, at 25.

496. Weaver, *supra* note 452, at 14.

497. Bruce M. Kramer & Patrick H. Martin, *The Law Of Pooling And Unitization*, §2.03 (LexisNexis Matthew Bender 2016).

498. Weaver, *supra* note 452, at 14.

499. Kramer & Martin, *supra* note 497, at § 2.03.

500. *Id*.

occurs in the early stages of operation, whereas the secondary recovery operations, involving the reinjection of water or gas, happen when the natural pressure is exhausted at the end of the primary recovery period.[501] To increase oil production during secondary recovery, the unit operator must consider many engineering factors, such as the optimal amount and placement of injection wells.[502] One such consideration of the unit operator should be to drill the injection wells based on a systematic pattern; for example, a five-spot pattern, in which four water input wells are placed at the corners of a square, effectively pushes oil towards the production well in the center.[503]

3. Enhanced Oil Recovery

Enhanced Oil Recovery ("EOR") is an advanced form of oil recovery that takes place after secondary recovery, which introduces essential substances other than water or gas into the reservoir to increase the volume of oil production.[504] EOR includes "[the] thermal process, carbon dioxide miscible flooding; and chemical flooding."[505] During thermal operations, the unit operator injects heat and steam into the reservoir to vaporize the oil and reduce its viscosity, thereby increasing production.[506] Carbon dioxide miscible flooding injects carbon dioxide to fill the reservoir's pore spaces which pushes oil to the surface by increasing reservoir pressure and by dissolving carbon dioxide into the oil, the oil becomes less viscous and can flow to the surface.[507] Unit operators can also inject chemical supplements, such as surfactants, polymers, or alkaline, and utilize water flooding "to scrub the reservoir rock more thoroughly," and push the oil toward the surface.[508]

D. Technical Necessities of Unitization

This examination of the physical nature and dynamics of reservoirs proves that reservoirs should be treated as a single operational pool to maintain their pressure and conserve the required geological features of the reservoir. To prevent oil and gas waste, the unit operator must apply a

501. *Id.*
502. Weaver, *supra* note 452, at 16.
503. Kramer & Martin, *supra* note 497, at § 2.03.
504. *Id.*
505. Weaver, *supra* note 452, at 17.
506. *Id.* at 16
507. *Id.*
508. *Id.*

single engineering plan to the entire reservoir. The executive of that plan must be able to control the rate of water, gas, and oil production and select the optimal surface locations for drilling input wells without restrictions based on the property lines.[509] Alternatively, unilateral oil and gas operations, based on fragmented ownership or operatorship, will diminish the maximum production of energy resources from the entire reservoir.[510]

III. Economic Advantages of Unitization

The unitization of oil and gas reservoirs has, taking a broad view, resolved energy crises that generate from the imbalance between energy supply and demand in the oil and gas market.[511] Additionally, the unitization of oil and gas reservoirs, taking a narrow view, economically benefits the owners of royalty interests and working interests. Although the transactional cost of unitization seems high, the parties of an oil and gas agreement consider two main economic reasons to pursue a unitization plan. The first reason is to prevent waste of energy, capital, and surface area; the second reason is to increase the production rate.

A. Prevent Waste

Raymond M. Myers, in his distinguished book on *The Law of Pooling and Unitization* in the United States, described the term "waste" generally, using eleven geological and economic waste factors.[512] The eleven factors included in this description of waste are:

1) Allowing the escape of oil or gas from one stratum to another;
2) Operating an oil well with an inefficient gas-oil-ratio;
3) The drawing with water of any startup capable of producing oil or gas in paying quantities;
4) Surface waste or loss, however, caused;
5) Underground waste, including the operation of wells in excess of their maximum efficient recovery (MER);
6) Creating of fire hazards;

509. Myers, *supra* note 444, at 39.
510. Research Associates Incorporated, *supra* note 467, at 36.
511. Paula C. Murray & Frank B. Cross, *The Case for a Texas Compulsory Unitization Statute*, 23 St. Mary's L. J. 1099, 1101 (1991).
512. Myers, *supra* note 444, at 7-8.

7) Permitting any gas well to burn wastefully;

8) Physical waste incident to drilling, equipping or operating wells;

9) Escape of casing head gas from an oil well;

10) Production of oil or gas in excess of transportation or market facilities or reasonable market demand; and

11) The use of gas for a wasteful purpose such as in the manufacture of carbon black.[513]

The waste of natural gas is considered to be a type of economic loss because the natural gas has economic value.

University of Texas Professor Stephen L. McDonald further explained that oil and gas recovery requires "unnecessary investment in wells with correspondingly higher production costs" in the absence of unitization.[514] Professor McDonald also states that secondary recovery would only be "economically feasible" if unit operators start unitization in the early stages of recovery.[515] Additionally, the waste of capital during petroleum operations will discourage investors from exploring new oil discoveries.[516] On the other hand, unitization usually offers friendlier economic terms, which encourage further exploration.[517]

Unitization can also prevent surface waste. Competition between multiple operators to produce hydrocarbons from a common reservoir causes unnecessary surface usage and land conflicts due to the drilling of superfluous wells.[518] Instead, unitization enables the unit operator to easily employ "a variety of modern technologies, including 3-D seismic surveying and hydraulic fracturing, with less risk of trespass claims."[519] This minimizes the risk of conflicts between third parties and the unit operator because all surface owners are parties to the field-wide unitization.[520]

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513. *Id.*

514. Stephen L. McDonald, Unit Operation of Oil Reservoirs as an Instrument of Conservation, 49 Notre Dame L. 305, 307 (1973).

515. *Id.* at 305-07 (stating that the early unitization prevents the natural pressure of reservoir being fully exhausted; otherwise, it would be economically infeasible to produce the residual unrecovered hydrocarbons through the enhanced recovery).

516. *Id.*

517. Murray & Cross, *supra* note 511, at 1101.

518. Anderson & Smith, *supra* note 459, at 284.

519. *Id.*

520. *Id.*

Lastly, petroleum operations cause reduced environmental damage when conducted under a unitization agreement than in the absence of unitization.[521] Unitization protects the environment by decreasing the likelihood of unnecessary drilling and minimizing the need to install additional machinery, pipes, and tanks on the surface.[522] Unitization may also promote development sustainability "through the prevention of waste and the conservation of oil and gas for use by future generations."[523]

B. Promote Production

Through studies of the physical nature and dynamics of petroleum reservoirs, it is evident that unrecovered oil in reservoirs at the end of primary operations can be as much as ninety percent of the initial reserves.[524] The operator may not even be able to recover the investors' Capital Expenditures ("CapEx") from primary recovery operations unless certain techniques utilized raise the production to a much higher rate. Secondary recovery and enhanced recovery techniques can dramatically increase the recovery rate, sometimes by over one hundred percent.[525] This increase in production can stabilize the investors' income stream.[526] However, operators will be unable to achieve this ideal recovery rate in the absence of unitization during the early stages of recovery operations.

IV. Legal Aspects of Unitization

Unit operators and interested parties cannot utilize the recommended techniques for pressure maintenance and enhanced recovery to increase the maximum rate of production in a reservoir without unitization.[527] In addition to technical encumbrances, the operator will assume severe legal burdens — including the liability to the regulatory authority, lessors, and third parties — by unilaterally implementing pressure maintenance and enhanced recovery techniques without unitization.[528]

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521. McDonald, *supra* note 514, at 307.
522. Murray & Cross, *supra* note 511, at 1102.
523. Strudwick M. Rogers, *Fieldwide Unitization*, 68 Ark. L. Rev. 425, 432 (2015).
524. *Id.*
525. *Id.*
526. *Id.*
527. Myers, *supra* note 444, at pg. 43 (stating that the pressure maintenance and enhanced recovery will likely cause some drainage of hydrocarbons across property lines, which their owner rights could only be secured through unitization of the reservoir).
528. *Id.* at 29-37.

Unitization is defined as "the joint, coordinated operation of a petroleum reservoir by all the owners of rights in the separate tracts overlying the reservoir."[529] Although unitization is a type of joint or cooperative operation to develop an oil and gas reservoir, the contractual features of unitization agreements differ from typical joint or cooperative development agreements.[530] Usually, cooperative development agreements lack the contractual characteristics of unitization agreements, such as the sharing of property interests, production, and costs.[531]

Unitization requires a legal instrument to protect property interests and allocate the liabilities of the mineral and working rights owners.[532] The legal instrument, drafted by lawyers, predicts and resolves legal issues arising in the unit area.[533] Understanding the legal nature and framework of unitization requires familiarization with the definitions of the following terms.

The term "Unitization"[534] refers 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."[535] Moreover, Professor Kramer and Professor Martin describe unitization, or unit operations, as "the consolidation of mineral or leasehold interests covering all or part of a common source of supply . . . to maximize production by efficiently draining the reservoir, utilizing the best engineering techniques that are economically feasible."[536]

The "unit" or "unit area" is the total land that has been unitized for production operations to develop the reservoirs. The 2015 Manual of Oil and Gas Terms defines a "unit area" as "an area of land, deposit, or deposits of minerals, stratum or strata, or pool or pools, or a part or parts thereof, as to which parties with interests therein are bound to share minerals produced on a specified basis and as to which those having the right to conduct

529. Weaver & Asmus, *supra* note 448, at 6.

530. This research will discuss the legal difference between unitization agreements and cooperative development agreements in the section 3.4.2.

531. Robert E. Sullivan, *Handbook of Oil and Gas Law* (Prentice-Hall, Inc. 1955).

532. Myers, *supra* note 444, at pg. 100.

533. *Id.*

534. The European spelling of this term is "unitisation."

535. Weaver & Asmus, *supra* note 448, at 11.

536. Kramer & Martin, *supra* note 497, at §1.02.

drilling or mining operations therein are bound to share investment and operating costs on a specified basis."[537]

A "field" is "a geographic area situated over several separate oil and gas reservoirs which are vertically or horizontally separated from each other, or which are overlapping, contiguous, or superimposed on each other."[538] When there is only one hydrocarbon reservoir, the terms "field" and "pool" will have the same meaning; however, a field can contain many pools.[539] The "Unitized substances" are hydrocarbon products found within the reservoir and required materials — such as water, carbon dioxide, and diluent — that are used in the enhanced recovery operation.[540] In a more detailed definition, the American Petroleum Institute's model Unitization Agreement named these substances as "all oil, gas, gaseous substances, sulphur contained in gas, condensate, distillate, and all associated and constituent substances other than Outside Substances within or produced from the unitized formation."[541]

The "Unitization Agreement" is the legal vehicle that effectuates the technical recommendations of engineers by utilizing pressure maintenance and enhanced recovery techniques through unitization.[542] In a comprehensive description, Professor Kramer and Professor Martin define a unitization agreement as "[a]n agreement or plan of development and operation for the recovery of oil and gas made subject thereto as a single consolidated unit without regard to separate ownership and for the allocation of costs and benefits on a basis as defined in the agreement or plan."[543] The signatory parties to this agreement are all owners of the mineral and royalty interests in the unit area.[544]

The "Unitization Operating Agreement (UOA)" is the agreement that regulates the rights and obligations of the working-interest owners or

537. Patrick H. Martin & Bruce M. Kramer, *Williams & Meyers Manual of Oil and Gas Terms* 1111 (LexisNexis, 16th ed. 2015) (stating that the definition of unit area provided in Article 213 of the Louisiana Mineral Code R.S. 31:213 (1975)).

538. Weaver & Asmus, *supra* note 448, at 17.

539. Robert E. Hardwicke, *Antitrust Laws, Et Al. V. Unit Operation of Oil or Gas Pools* (Society of Petroleum Engineers of AIME, Revised ed. 1961).

540. Weaver & Asmus, *supra* note 448, at 76-78.

541. Kramer & Martin, *supra* note 497, at § 17.032, FN. 18.

542. Myers, *supra* note 444, at pg. 43.

543. Martin & Kramer, *supra* note 537.

544. Weaver & Asmus, *supra* note 448, at 17 (stating that the parties of the unitization agreement could be individual owners in the United States due to its private ownership system of minerals).

licensees in "the actual operation of the unit."[545] The use of a UOA, which contains daily details of the unit operation, is widespread — along with unitization agreements — in both the United States and Canada.[546] However, internationally, a unitization agreement will often contain the contents of an American or Canadian agreement.[547] This is likely because a UOA is very similar to a Joint Operating Agreement, which is an essential document in the international oil and gas practice.[548]

The author will continue to delineate relevant terminologies throughout this section and the rest of this dissertation. In the forthcoming sections, the paper will discuss the legal nature and framework of unitization and the two main types of unitization.

A. Legal Framework of Unitization

The legal instrument that effectuates unitization grants the lessor and lessee the authority to consolidate their leased land with adjacent tracts to efficiently develop and produce oil and gas from the reservoir or reservoirs. This legal arrangement is either included in specific provisions of the oil and gas lease or as a stand-alone unitization agreement.[549]

In both the public and private ownership regime, it is common for parties to include provisions in their oil and gas contracts that allow their tracts to be unitized if the underground oil and gas reservoirs are naturally shared among contiguous tracts.[550] These unitization provisions within oil and gas contracts provide the lessee with advance authority to create a unit operation that will benefit both the lessor and lessee as well as the overarching oil industry.[551] For example, a typical U.S. unitization provision found within the oil and gas lease could be drafted as follows:

> Lessee shall have the right to unitize, pool, or combine all or any part of the above-described lands with other lands in the same general area by entering into a cooperative or unit plan of development or operation approved by any governmental authority . . . and, from time to time, with like approval, to modify, change or terminate any such plan or agreement and, in

545. *Id.* at 17-22.
546. *Id.* at 69.
547. *Id.* at 70.
548. *Id.* at 17.
549. Sullivan, *supra* note 531, at 369-370.
550. Weaver & Asmus, *supra* note 448, at 27.
551. Sullivan, *supra* note 531, at 373-374.

> such event, the terms, conditions, and provisions of this lease shall be deemed modified to conform to the terms, conditions, and provisions of such approved cooperative or unit plan of development or operation and, particularly, all drilling and development requirements of this lease, express or implied, shall be satisfied by compliance with the drilling and development requirements of such plan or agreement, and this lease shall not terminate or expire during the life of such plan or agreement.[552]

Outside of the United States and Canada, many countries have embraced unitization provisions in their model forms of oil and gas contracts. In their comprehensive study on unitization outside of the United States, Jacqueline Lang Weaver and David F. Asmus selected twelve countries that are active in the petroleum industry and thoroughly analyzed unitization provisions in their model petroleum contracts and national laws.[553] Because this dissertation will focus on unitization in Iraq, the researcher includes Article 34.1 of the 2007 Kurdistan model Production Sharing Contract (below) to discuss how the Kurdistan Regional Government handles potential unitization situations.

> In the event, a Reservoir extends beyond the Contract Area into an adjacent area which is the subject of another Petroleum Contract . . . the GOVERNMENT shall require the CONTRACTOR and the contractor of the Adjacent Contract Area to agree upon a schedule for reaching an agreement of the terms of the unitisation of the Reservoir.[554]

Unitization provisions in oil and gas leases usually state only basic and broad instructions of the unitization process. In other words, oil and gas leases, including unitization provisions, are unable to fairly and fully encompass every essential aspect of the unitization process due to the complexity of unitization, particularly field-wide unitization.[555] To more fully govern other aspects of unitization, the parties draft and sign a "Unitization Agreement." In the United States, this agreement is also recognized as a "Royalty Owners Unitization Agreement" because the

552. *Phillips Petroleum Co. v. Peterson*, 218 F.2d 926, 928 (10th Cir. 1954) (resolving a dispute over the unitization of an oil and gas lease in the United States). a

553. Weaver & Asmus, *supra* note 448, at 27.

554. Model Production Sharing Contract, Art. 34.1, (2007) (The Kurdistan Region of Iraq).

555. Sullivan, *supra* note 531, at 373.

royalty-interest owners or lessors are the first party who signs this agreement with the working-interest owners.[556] The American and Canadian private ownership systems allow for both individual parties and federal or state governments to become signatory parties of unitization agreements as owners of royalty interests or as the lessor.[557]

The unit parties obtain another legal instrument to "primarily govern the rights between those who will bear the cost of the operation of the unit."[558] This legal instrument, known as the "Unit Operating Agreement" or simply "Operating Agreement" in the United States, only covers the operational features of unitization.[559] The unit operating agreement is signed only by lessees and operators who possess the working interests within the unit area.[560] The American Petroleum Institute and Rocky Mountain Mineral Law Foundation provided the oil industry with two different model forms for unit agreements and unit operating agreements in the United States.[561] However, "the unit agreement and unit operating agreement are typically combined into a single document which may be referred to as a 'unitization and unit operating agreement' or simply as a 'unitization agreement.'"[562]

In most countries, other than the United States and Canada, the host government is the sole lessor, meaning it "holds title to all valuable oil, gas, and mineral deposits, including deposit locates beneath what may otherwise be privately-owned land".[563] Outside of the United States and Canada, only Ecuador owns a specific model form Unitization Agreement.[564] To "incorporate maximum flexibility, given the myriad of situations in which unit agreements are used" in international practice, the Association of International Petroleum Negotiations ("AIPN") presented a model form

556. Wendell J. Doggett, *Practical Legal Problems Encountered in the Formation, Operation and Dissolution of Fieldwide Oil and Gas Units*, 16 Okla. L. Rev. 1, 23 (1963).

557. *See* Cynthia Nickerson et al., *Major Uses of Land in the United States, 2007*, 89 Eco. Res. Ser. (2011) https://www.ers.usda.gov/publications/pub-details/?pubid=44630 (stating that about 60 percent of the land in the United States is privately owned. The Federal Government owns 29 percent of the land base, mostly in the West. State and local governments own nearly nine percent, and Indian trust land accounts for about 2 percent).

558. Doggett, *supra* note 556.

559. *Id.*

560. *Id.*

561. Kramer & Martin, *supra* note 497, at § 29.1-7.

562. Weaver & Asmus, *supra* note 448, at 70.

563. Lowe et al., *supra* note 453, at 54.

564. Weaver & Asmus, *supra* note 448, at 25.

international unitization and unit operation agreement (unitization agreement) in 2006.[565]

The unitization provisions in both the oil and gas lease and the unitization agreement are required to adhere to "special field rules and regulations which are promulgated by the conservation agency and which are adopted pursuant to the purposes of the unit agreement and the unusual drilling and operating practices necessitated thereby."[566] In America, most states have state unitization statutes.[567] In 2004, the Interstate Oil and Gas Compact Commission ("IOGCC") — a multi-state government agency representing thirty oil and gas producing states[568] — provided its members with several regulations regarding unitization through a model Oil and Gas Conservation Act.[569] These regulations apply to unit operations on private lands because all unitization agreements require the approval of conservation agencies to force uncooperative lessors or lessees into unit operation and comply with anti-trust law.[570] In the international context, some countries — including Azerbaijan, Brazil, and Ecuador — have substantive laws that govern unit operations through regulations.[571] The Kurdistan region similarly regulates unit operations through Articles 48 and 49 of the aforementioned 2007 Oil and Gas Law.[572]

When oil and gas deposits straddle the borders of two or more sovereign countries, the unit operations may be regulated using international legal instruments, like treaties, conventions, and international customs.[573] However, international law instruments, such as unitization treaties,

565. Association of International Petroleum Negotiations (AIPN), *Guidance Note to the AIPN 2006 Model Form International Unitization and Unit Operation*, https://www.aipn.org/forms/store/ProductFormPublic/unitization-and-unit-operating-agreement-2006.

566. Sullivan, *supra* note 531, at 369.

567. Weaver & Asmus, *supra* note 448, at 6 (stating that Texas has not enacted a compulsory unitization statute yet).

568. *Member States*, The Interstate Oil and Gas Compact Commission (IOGCC), http://iogcc.ok.gov/member-states (last visited on September 15, 2017).

569. Lowe et al., *supra* note 453, at 755-58 (stating that Sections 13-19 cover regulations concerning compulsory unitization).

570. Weaver & Asmus, *supra* note 448, at 17.

571. *Id.* at 25.

572. Oil and Gas Law of the Kurdistan Region - Iraq No. 22 of 2007 (The Kurdistan Region – Iraq) Art. 48 & 49.

573. Weaver & Asmus, *supra* note 448, at 9.

"generally follow the same practice used in domestic unitization agreements."[574]

B. Legal Effects of Unitization

This section discusses the legal nature of the unit title and how unitization may affect the property rights of parties over mineral or working interests in various tracts in the unit. Do the parties of unitization merely intend to coordinate through "an economic and efficient operation," or do they agree to assign their interests?[575] Two separate property-law legal theories have materialized these options, particularly in private ownership regimes followed in the United States and Canada.

Two theories — "the cross-assignment (cross-conveyance)" and "the contract" — are used to define the parties' property rights over the unitized title.[576] The adoption of a theory generates critical and different outcomes, clarifying potential disputes, such as who is a legitimate party in litigation, the rights, and obligations of assignees, and income tax disagreements.[577] States may have different views on the legal effect of unitization agreements and may adopt either the cross-assignment theory or the contract theory to define unit titles.

1. Cross-Assignment Theory

The parties to unitization, under the cross-assignment theory, agree to exchange their property interests, including production and cost, when they enter into the unitization agreement.[578] The lessee or the lessor of one tract will be granted a property interest, either a royalty interest or working interest, in other tracts "in proportion to his contribution to the unit measured on a surface acreage basis or any other participation basis the agreement employs."[579] Under the "cross-conveyance theory, the lessors would each own an undivided interest in the others' interest, and each would thereby have conveyed to the others a similar interest in the premises originally owned."[580] In the U.S., some states — including California, Illinois,

574. Ana E. Bastida et al., *Cross-Border Unitization and Joint Development Agreements: An International Law Perspective*, 29 Hous. J. Int'l L. 355, 391 (2006).

575. Doggett, *supra* note 556, at 7.

576. Kramer & Martin, *supra* note 497, at § 19.01.

577. Doggett, *supra* note 556, at 8; Kramer & Martin, *supra* note 497, at § 19.01.

578. Doggett, *supra* note 556, at 8.

579. Leo Hoffman, *Some Problems in Pooling and Unitization*, 7 Proc. Ann. Inst. On Oil & Gas L. & Tax'n 219, 246 (1956).

580. Kramer & Martin, *supra* note 497, at § 19.02.

Mississippi, and Texas — interpret the unitization agreement to create a property-based combination, wherein the participants share the unit title and property interests in proportion to their contributions to the surface area and other property interests in the unit.[581]

Outside of the United States and Canada, the cross-assignment theory describes the legal nature of the unitization title and regulates the participants' interests because no private owners are claiming any interest or making any legal issues from merging the tracts. In international practice, "[o]nce a unit is formed, each separately owned tract that participates in the unit will be entitled to an undivided percentage [tract interest] of unitized production obtained in any unit operation, regardless of the tract from which it is produced, and will be liable for that same undivided percentage of costs and liabilities incurred in any unit operation, regardless of the tract to which they relate."[582]

In his well-known handbook, the *Handbook of Oil and Gas Law*, Professor Robert E. Sullivan highlighted that the feature of cross-assignment of property interests among unit parties could only distinguish the unitization agreement from other types of joint development agreements.[583]

2. Contract Theory

The owner of a royalty interest or a working interest in a tract will not acquire a property interest in other tracts when he enters into the unitization agreement based on contract theory. In other words, this theory refuses to accept that the unit parties intend to share their property interests merely by creating a unit. Instead, the jurisdictions that follow this theory — such as Kansas, Oklahoma, Utah, and West Virginia — explain that the unit parties intend to enter into "a mere operating arrangement."[584] These jurisdictions describe the unitization agreement as a legal instrument to simply engage in "a joint operation and that no conveyance of interests has been affected."[585] Nevertheless, the parties are entitled to a share of production from the whole unit area, calculated based on their contributions to the unit in surface acreage or other property interests.[586]

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581. *Id.*
582. Weaver & Asmus, *supra* note 448, at 78.
583. Sullivan, *supra* note 531, at 358.
584. Kramer & Martin, *supra* note 497, at § 19.02.
585. Doggett, *supra* note 556, at 9; Kramer & Martin, *supra* note 497, at § 19.02.
586. Leo Hoffman, *Voluntary Pooling and Unitization: Oil and Gas* (Matthew Bender & Company 1954).

This contract theory likens the unitization agreement to other types of voluntary agreements that are signed to develop oil and gas reservoirs productively. For example, a cooperative development agreement regulates the operations "in which individual producers retain management of their leases but a joint committee has authority to regulate the rate and character of development and production from the entire pool."[587] The cooperative development operation is described as "a type of joint venture wherein the individual owners retain title to their tracts and develop them by a preconceived and pre-agreed plan which has been adopted by all operators in the pool."[588] Moreover, the only characteristic that differentiates it from the contract theory of unitization is that "the separate ownership units are independently operated without allocation of production" in the co-operative development agreement.[589]

In the famous article *Unitizing Oil and Gas Fields Around the World*, Jacqueline L. Weaver and David F. Asmus argue that a cooperative development operation, wherein the unit parties "independently operat[e] without allocation of production between them, . . . [may] prevent physical and economic waste, but it is not as effective as unitization in securing these goals."[590] However, Weaver and Asmus go on to describe unitization agreements in the international context, except those involving the United States and Canada, as a "Super Joint Operating Agreement" because a large surface area of the reservoir is combined to help all interest owners proceed "cooperative development" operations.[591] The article offered no further explanation of how the two concepts of unitization and cooperative development operations differ between the U.S. and Canada and the international practice. This dissertation acknowledges that unitization agreements, with their two critical contractual features of the cross-assignment property interests and a share allocation of production and costs among the unit parties, should be distinguished from cooperative development agreements. Unit operations are considered one type of cooperative method to develop the oil and gas reservoir. Thus, this dissertation assumes that Professor Weaver and David Asmus also intended to describe the unit operations as cooperative development operations. Particularly, Weaver and Asmus refer to the six features that James G. Ross, Senior Group Advisor, Gaffney, Cline & Associates (London), named to

587. Sullivan, *supra* note 531, at 361.
588. *Id.* at 359.
589. *Id.* at 417.
590. Weaver & Asmus, *supra* note 448, at n. 34.
591. *Id.* at 22.

distinguish between the cross-border unitization agreements and cooperative development agreements.[592] Among these features, the share of production and costs, as well as the lack of borderline dispute, are marked qualities of cross-border unitization agreements.[593]

Most unitization scholarship explicitly confirms that the property interests of the whole unit area are shared among the participants in the unit, except those in a few American states that adopted the contract theory. Nevertheless, unitization scholars have not written much, if any, regarding the legal effect of unitization agreements between two or more sovereign nations on the unit title. Will a country assign the title of its territories to the neighboring state? How does the internationally recognized principle of sovereignty of a country over its territories and natural resources impact the legal effects of cross-border unitization agreements? Moreover, which theory of mineral property rights, cross-assignment or contract, best fits the different types of unitization agreements based on the location of the unit? The author will discuss potential solutions to these questions in the coming two chapters.

V. Conclusion

Petroleum technicians and economists provided extensive evidence to verify that consolidation of the entire oil and gas reservoir, through field-wide unitization in the early stages of production operations, is a necessity to prevent waste of hydrocarbons and to increase the rate of oil and gas recovery in petroleum reservoirs. To effectively regulate complex unit operations, minimal unitization provisions in the oil and gas lease will not suffice. Lawyers consider unitization agreements as the best legal instruments to govern different parts of unitization, protect the property interests of the participants, and define operational liabilities of the unit parties.

Unitization agreements in private and public ownership regimes result in specific legal effects on the participants' property rights, which differ from other voluntary or statuary joint operations to develop reservoirs, such as cooperative development agreements. All states distinguish unitization agreements through a contractual feature that provides a share of the unit production among participants in proportion to their contributions to the surface area or other property interests. The next chapter discusses the modes of unitization agreements and presents evidence to apply a legal concept while disregarding geopolitical concepts of border and sovereignty to classify a unitization agreement.

592. *Id.* at 14-15.
593. *Id.*

CHAPTER THREE: MODES OF UNITIZATION AGREEMENTS

I. Introduction

Unitization agreements can be categorized on two separate bases. The first basis is whether the implementing method of the unitization agreement is voluntary or compulsory. Second, unitization agreements can be differentiated based on the location of the unit area. This research concludes that the concept of jurisdiction is more accurate in differentiating unitization agreements based on unit location than geopolitical alternatives. As a result, this dissertation introduces two types of unitization agreements: sole-jurisdiction unitization agreements and cross-jurisdiction unitization agreements. To justify this categorization, the researcher compares the legal term jurisdiction to geopolitical concepts, such as borders, sovereignty, and country. Finally, this thesis interprets potential dimensions of jurisdictional authority over hydrocarbon deposits in both terrestrial and marine ecosystems.

II. The Categorization of Unitization Agreements

This research will study modes of unitization agreements based on implementing methods of drafting unitization agreements and location of units. The unit operation may be formed through the unanimous consent of all unit parties; otherwise, the host government may force recalcitrant parties to enter into a unitization agreement with original unitization applicants. The author will examine these two methods in more details below. In addition to characterizing the geological and geophysical structures, the location of the unit area determines the legal configurations and challenges that confront lawyers while drafting unitization agreements. The oil and gas reservoirs may straddle across the borderline and as a result, two or more different jurisdictions might transpire to control and regulate the unit area. Consequently, this research prefers to apply the jurisdictional legal measurement to classify unitization agreements based on the location of units. This chapter introduces sole-jurisdiction and cross-jurisdiction unitization agreements, which will be detailed in separate chapters.

A. Categorizing Unitization Agreements Based on Implementing Methods

Unitization agreements are divided into categories based on the methods through which the unit parties accomplish the agreements.[594] If the unit

594. Doggett, *supra* note 556, at 6; Sullivan, *supra* note 531, at 360.

operation is necessary, the unitization agreement will be achieved through either voluntary or compulsory means.[595]

Initially, in most cases, mineral interest owners will attempt to voluntarily agree upon the formation of a unit and approve legal and technical details of future unit operations.[596] Voluntary unitization agreements have become commonplace in the international oil industry. On the other hand, legal regimes with private ownership of property rights, such as in the United States, have applied the compulsory unitization. In the case of the United States, numerous individuals may own minerals rights in a field, and the likelihood of disputes arising among them in the context of voluntary unitization is high. Compulsory unitization is "the consequence of a failure to agree to unitize voluntarily" in most cases.[597] To carry out compulsory unitization, the requisite governmental entity, through specific statutes, obliges the related parties to create a unitization agreement to combine their mineral rights and subsequently regulates the unit operation.[598]

1. Voluntary Unitization Agreements

After related parties recognize a need for creating a unit operation, unitization can be accomplished through an agreement signed by the participants voluntarily.[599] In voluntary unitization agreements, "the owners of interests in a pool agree that all, or a large part thereof, will be operated as a single producing unit, irrespective of leased property lines, in accordance with the terms of the agreement."[600] What makes a voluntary unitization "a difficult and prolonged matter" is that all owners of mineral rights in the field must unanimously concur with the formation of unit and unit operation.[601] In the United States, the unanimous agreement must be reached among all working-interest holders and owners of non-working interests.[602] There are many justifications behind the intricacies within

595. *Id. see also* Sullivan, *supra* note 531, at 360.

596. Kramer & Martin, *supra* note 497, at § 17.01.

597. Weaver & Asmus, *supra* note 448, at 19.

598. Sullivan, *supra* note 531, at 361; Kramer & Martin, *supra* note 497, at § 18.01.

599. Doggett, *supra* note 556, at 23.

600. Sullivan, *supra* note 531, at 361.

601. Kramer & Martin, *supra* note 497, at § 17.01; Sullivan, *supra* note 531, at 361; Owen L. Anderson, *Mutiny: The Revolt Against Unsuccessful Unit Operations*, 30 Rocky Mt. Min. L. Inst. 13 (1984).

602. Anderson, *supra* note 601, at 13-14; Sullivan, *supra* note 531, at 368-69 (all "diverse surface owners, lessees, and royalty owners" need to consolidate their mineral rights to form a voluntary unitization agreement in the United States).

voluntary unitization agreements among the respective unit parties.[603] The essential excuse is that many parties — numerous mineral owners in the case of the United States — are usually involved in a vast area of the unit.[604] The process of guaranteeing a "final agreement on all of the vital terms of the unitization agreement and the unit operating agreement" is a complex goal to achieve.[605] That is in addition to "substantial amounts of geological, geophysical, economic, financial, and other data must be collected and digested to see if the unitization project is feasible."[606]

During the negotiation process among parties, a time-consuming dispute arises over "the participation formula" that determines the precise share of each party involved in the unit after unitization is operated.[607] The unit parties may present various interpretations regarding a fair and equitable allocation of production in the unit.[608] The main factor used to calculate the participation formula is the exact proportion of each tract's contribution to the unit.[609] Additionally, in the United States, "fear of prosecution under the anti-trust laws" may diminish the likelihood that interested parties of unitization would voluntarily agree on consolidating their mineral interests.[610]

In the international practice, the same pattern as the United States is implemented to create unitization agreements voluntarily. Almost all countries have designed a legal plan to encourage the working-interest owners to prepare a draft of the voluntary agreement and submit it for approval.[611] The most conspicuous international example is found in

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603. Anderson *supra* note 601, at 13-14.

604. Kramer & Martin, *supra* note 497, at § 17.01; Anderson *supra* note 601, at 13-14.

605. Kramer & Martin, *supra* note 497, at § 17.01.

606. *Id.*

607. *Id.* at §17.02 (stating that "the formula determines the portion of the unitized substances each participant is to receive, and it is usually arrived at after long and laborious negotiation").

608. Anderson *supra* note 601, at 13-14 (stating that "[m]any interest owners, especially those with highly productive wells in the heart of a field, may believe that their interests are best served by refusing to share any production with outlying properties. Some interest owners are simply suspicious of unitization plans and characterize them as a ploy by lessees to hold on to leased acreage without having to fully develop the fields").

609. Myers, *supra* note 444, at pg. 77; Weaver & Asmus, *supra* note 448 (stating that "[t]he most common bases for determining tract interests in unitizations outside of the United States and Canada seem to be (i) relative quantities of oil or gas in place under each tract, and (ii) relative quantities of recoverable reserves attributable to each tract").

610. Sullivan, *supra* note 531, at 360; Anderson *supra* note 601, at 13-14 n. 11.

611. Weaver & Asmus, *supra* note 448, at 25 (stating that out of twelve countries that Weaver and Asmus studied their unitization provisions, eight countries — including Angola,

Azerbaijan that exclusively allows for voluntary unitization agreement.[612] Despite involving fewer engaging parties in the international practice, it is technically difficult to determine reasonable shares of participants in voluntary unitization agreements.[613] The reason for such difficulty is that unitization in the international practice "usually involve larger prospects, bigger sums of money, and unitization at an early stage of a field's development."[614] Furthermore, most host governments require the unit parties to enter into a unit agreement within a limited time voluntarily.[615] The Kurdistan Region of Iraq, for instance, requires the contractors of adjacent blocks to operate unitization after signing a unitization of a common oil and gas reservoir agreement "within a reasonable period."[616]

A comprehensive assessment of the voluntary method reveals that this type of unitization agreement may be inaccurate because most provisions of the agreements, in the U.S. or the international practice, confirm that a voluntary unitization agreement will not be effective unless a governmental entity approves the prepared draft.[617] Additionally, the involved parties of the voluntary unitization agreements must follow the required terms, such as limited time and specified procedure, to prepare the draft of the unitization agreement.[618]

Finally, almost all oil and gas producing states mandate compulsory unitization if unit parties fail to reach the voluntary unitization agreement with the specified time.[619]

Brazil, China, Colombia, Ecuador, Egypt, Nigeria, and United Kingdom — require that the unit parties first attempt to secure unitization by voluntary agreement. Among other countries, Russia and Yemen did not have unitization provisions at the time that research was published. Azerbaijan only recognizes voluntary unitization agreements. Russia and Yemen did not have unitization provisions in their laws).

612. *Id.* at 35 (citing Appendix I, The Oil and Gas Law of the Azerbaijan Republic: Parliament Commission Draft, art. 13 (2000) (Barrows Supp. No. 43, Russia & NIS)).

613. *Id.* at 34.

614. *Id.* at 23.

615. *Id.* at 51-52 (stating that the Egyptian Decree 758 of 1972, under Article 45, requires parties to reach agreement within six months of being notified by the Egyptian General Petroleum Corporation, otherwise the Corporation will issue binding rules for the unitization).

616. Oil and Gas Law of The Kurdistan Region – Iraq No. 22 of 2007 (The Kurdistan Region – Iraq) art. 47.

617. Sullivan, *supra* note 531, at 360.

618. Weaver & Asmus, *supra* note 448, at 51-52.

619. *Id.* at 34 (stating that in the international practice, Azerbaijan is the sole country and in the United States, Texas, is the only state that only recognize voluntary unitization agreement).

2. Compulsory Unitization Agreements

The compulsory method of unitization is performed entirely "under statutory authority."[620] Based on a specific law, a relevant governmental entity will direct the parties of a particular field to combine their mineral rights in order to form a unit to produce hydrocarbons through a unified operations.[621] Most oil and gas producing countries wait to invoke the compulsory method until the working-interest and royalty owners fail to voluntarily agree upon terms for a necessary unit operation within a specified time limit.[622] The language of compulsory unitization legislation can differ between states or countries. For instance, the Kurdistan 2007 Oil and Gas Law No. 22, Article 47.2, authorizes the Kurdistan's Ministry of Natural Resources to operate a compulsory unitization via the following language: *"*[I]f no joint agreement has been reached within a reasonable period of time from receipt of written notice . . . the Minister shall decide on the unitization.*"*[623]

In the United States, the compulsory method developed as a practical approach to prevent waste and to increase production after a significant amount of oil and gas producing states recognized that achieving unanimous approval for unitization among various unit parties would often be unfeasible.[624] Oklahoma became the first state to adopt legislation allowing for compulsory unitization in 1945.[625] Texas, the largest petroleum producing state in the United States, and Pennsylvania are surprisingly the only states without compulsory unitization laws.[626]

The compulsory method of unitization does not mean that unit parties are without authority regarding the drafting of the agreement. In the United States, compulsory unitization combines the voluntary and statutory methods.[627] For example, the governing state oil and gas agencies will allow working-interest owners and royalty owners to voluntarily, with a

620. Sullivan, *supra* note 531, at 360.

621. *Id.* at 361.

622. Weaver & Asmus, *supra* note 448, at 34.

623. Oil and Gas Law of The Kurdistan Region – Iraq No. 22 of 2007 (The Kurdistan Region – Iraq) art. 47.

624. Weaver & Asmus, *supra* note 448, at 34.

625. Sullivan, *supra* note 531, at 362; Kramer & Martin, *supra* note 497, at § 18.01 (stating that "Louisiana had the first compulsory unitization statute, but it was limited to recycling of gas. Oklahoma was the first state to have a generally applicable compulsory unitization law, which was enacted in 1945 and was substantially amended in 1951").

626. Kramer & Martin, *supra* note 497, at § 18.01.

627. Doggett, *supra* note 556, at 6.

certain (non-unanimous) percentage of consent vote, approve the unitization proposal.[628] However, a formal request of working-interest owners usually triggers the involvement of a conservation agency to compel mineral-right holders of the field to combine their interests and form a unitization.[629] The rational explanation of this involvement is to prevent "recalcitrant lessees and royalty owners" from obstructing the productive partnership plan of the majority of unit parties for increasing production and avoiding waste.[630]

The United States' model of compulsory unitization is not, however, an absolute version of the government's police power. The governmental agencies, under statutory provisions, can compel unwilling parties to participate in a unit operation only if the recalcitrant parties hold a minority percentage of interests in the unit.[631] In other words, the compulsory acts of most states require the unit parties, who apply for unitization, to successfully collect a specified percentage of both the working and nonworking-interests owners which varies from 63% to 85%.[632]

In the event of a failure to unitize through both voluntary and compulsory means in the United States, either each party will operate the block based on the rule of capture, in which it would be subject to well spacing rules, or the government will restrict the production volume of each block by implementing a "no waste" rule.[633]

In the international practice, like the United States, most oil and gas producing countries invoke the compulsory method after their contractors failed to reach a voluntary unitization agreement over a certain time period.[634] Unlike in the United States, the jurisdictional authority of most countries may disregard any minimum percentage of voluntary approval of the unitization plan by the contractors.[635]

Finally, the compulsory method of unitization does not apply on common petroleum reservoirs that are jointly owned by more than one

628. Lowe et al., *supra* note 453, at 754-755.(stating that "[a]mong the major oil and gas producing states, the required percentage specified in the acts varies from 63% to 85% of each of the working and nonworking-interests").

629. *Id.* at 752-53; *see also* Doggett, *supra* note 556, at 6.

630. Sullivan, *supra* note 531, at 401.

631. Weaver & Asmus, *supra* note 448, at 19.

632. Lowe et al., *supra* note 453, at 755.

633. Weaver & Asmus, *supra* note 448, at 50.

634. *Id.* at 25 (stating that Azerbaijan is the sole country operating only per voluntary form of unitization).

635. *Id.*

country.[636] No rule of international customary law has been established to compel sovereign countries to form unitization agreements over joint oil and gas reservoirs.[637] In fact, a sovereign country can reject any rule of international law that requires compulsory unitization.[638]

B. The Categorization of Jurisdiction Based on Location of Unit Area

The location of the unit, either in one or in more than one country, forms another category of unitization. Based on the location factor, scholarship distinguishes between "sole-country" and "cross-border" unitization agreements.[639]

Unitization scholars define the "sole-country unitization agreement" as an agreement unitizing the relevant oil and gas reservoir that entirely underlies beneath two or more blocks and different leases in one country whose laws and regulations govern the entire unitization operations.[640] Alternatively, "cross-border unitization" is the unit operation of transboundary hydrocarbon deposits.[641] In other words, cross-border unitization occurs when there is "a reservoir underlying two or more countries that have a delimited border between them."[642]

The author, however, believes that these two labels inadequately represent the modes of unitization agreements. This research doubts that political measures, such as borders or sovereign countries, are capable of classifying unitization agreements based on the location of the unit. This dissertation, instead, prefers to consider the legal measure of governing jurisdiction to categorize unitization agreements. For that reason, this dissertation has modified the respective types of unitization agreements and alternatively marks them as "sole-jurisdiction unitization agreements" and "cross-jurisdiction unitization agreements."[643]

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636. Ernest E. Smith et al., *Materials on International Petroleum Transactions* 167 (Denver: Rocky Mountain Mineral Law Foundation, 3d ed. 2010).

637. Bastida et al., *supra* note 574, at 380.

638. *Id.*

639. Weaver & Asmus, *supra* note 448, at 34; see also Smith et al., *supra* note 636, at 167.

640. *Id.* at 13.

641. Smith et al., *supra* note 636, at 167.

642. Weaver & Asmus, *supra* note 448, at 14.

643. This dissertation will explicate these two types of unitization, sole-jurisdiction unitization and cross-jurisdiction unitization, in separate chapters.

1. Sole-Jurisdiction Unitization Agreements

When unitization becomes a necessary operation within a reservoir that is entirely located beneath a region governed by only one jurisdiction, the parties will draft a sole-jurisdiction unitization agreement.[644] A sole-jurisdiction unitization agreement may "extend underneath the boundaries of different license areas," but does not straddle the boundary of another jurisdiction authority.[645] The sole-jurisdiction unitization agreement is regulated by the laws and regulations of a sovereign state or an administrative division that has authority over the territory in which the respective hydrocarbon reservoir is found.[646]

A governmental entity may need to approve drafts of unitization agreements and will enact statutes to grant this power. For instance, the Directorate General of Oil and Gas in the Indonesian government regulates unitization agreements under Decree No. 402 of l967.[647] Similarly, the conservation agencies of each state in the U.S. regulate the unit operations that take place exclusively within its borders.[648] The majority of other countries apply a similar approach. The Kurdistan regional government, under the provisions of the 2005 Iraqi constitution, is authorized to regulate and control unit operations and agreements that take place entirely within Kurdistani territories, which is almost completely different than the federal government of Iraq.[649]

A unique example of sole-jurisdiction unitization agreements may occur in transboundary petroleum reservoirs when two or more sovereign states agree upon cooperatively managing petroleum operations within their joint development zone; they enact "a single set of petroleum regulations and fiscal terms" to regulate the unit operation within the zone.[650] This dissertation will explicate sole-jurisdiction agreement in chapter four.

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644. Weaver & Asmus, *supra* note 448, at 13.

645. *Id.*

646. *Id.*

647. *Id.* at 33; July Usman, *Unitization Practices in Indonesia*, in the Fifteenth Annual Convention of Indonesian Petroleum Association, vol.2, pp. 335-349 (Oct. 1986).

648. Weaver & Asmus, *supra* note 448, at 10.

649. CONSTITUTION OF IRAQ (2005) Arts. 112, 114, 115, 117, and 121 (recognizing the administrative authority of the Kurdistan region along with jurisdictional authority of the region over its natural resources); Oil and Gas Law of The Kurdistan Region – Iraq No. 22 of 2007 (The Kurdistan Region – Iraq) Art. 47 (stating that The Ministry of Natural Resources is the approval and regulatory authority over unitization in the Kurdistan region).

650. Weaver & Asmus, *supra* note 448, at n. 18.

2. Cross-Jurisdiction Unitization Agreements

One definition of cross-border unitization describes it to exist when one or more working-interest owners possess a license to operate on each side of the border.[651] Inspired by this definition, this dissertation states that a cross-jurisdiction unitization agreement appears when an oil and gas reservoir that needs to be unitized, exists within an area with two or more separate jurisdictional authorities. A cross-jurisdiction unitization agreement usually includes "two or more different licensees."[652] Moreover, a cross-jurisdiction unitization agreement may involve international treaties and various national laws and regulations.[653] Each implicated jurisdiction may have different tax laws, environmental protection regulations, and safety instructions than other jurisdictions.[654] Jurisdictions may also apply different granting instruments or fiscal regimes, such as concession agreements, production sharing contracts, service contracts, and joint ventures.[655] National or international borders may also differentiate jurisdictional authority from each other. That means the jurisdictional authorities could be under different sovereign states or administrative divisions. As a result, a unitization agreement may involve two or more host governments in addition to many petroleum companies.

If the unit extends across an international borderline dividing two or more sovereign states, the cross-jurisdiction unitization agreement will typically require the unit parties to draft two types of agreements. Initially, the implicated host governments will sign a unitization agreement among each other and then the engaged licensees or petroleum companies will enter into a unit operating agreement.[656] The impacted host governments will also enter into a treaty agreement to enhance cooperation.[657] For example, the United Kingdom and Norway signed a unitization treaty in 1976 to develop their joint Frigg gas field in the North Sea.[658]

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651. *Id.* at 14.

652. *Id.*

653. *Id.*

654. George Burn et al., *Legal Issues in Cross-Border Resource Development*, 8 J. World Energy L. & Bus. 154, 159 (2015).

655. Weaver & Asmus, *supra* note 448, at 9.

656. Bastida et al., *supra* note 574, at 380, 370; Smith et al., *supra* note 636, at 167.

657. Smith et al., *supra* note 636, at 168; Weaver & Asmus, *supra* note 448, at 14 (E-mail from James G. Ross, Senior Group Advisor, Gaffney, Cline & Associates (London), to Jacqueline Lang Weaver, A.A. White Professor of Law, University of Houston Law Center (on file with Author)).

658. Bastida et al., *supra* note 574, at 370; Smith et al., *supra* note 636, at 169.

This dissertation will expound cross-jurisdiction agreement in chapter five.

III. The Superiority of Jurisdiction in Classifying Unitization Agreements

The classification of unitization agreements based on the location of the unit area establishes the fundamental substance of what lawyers need to consider during the preparation of the unitization agreement. Among that substance, the lawyers concern is more about the legal measures to draft a unitization agreement. Any contract needs to comply with the legal authority of the relevant territory. On the other hand, mere geopolitical measures — such as country, sovereignty, and borderlines — bear no legal impact on contracts. The legal language that dictates how to control and regulate unitization agreements is not embedded within the geopolitical measurements. In addition to the fact that "political and social identities" are products of "territorial jurisdiction,"[659] jurisdictions regulate the legal relationships of contractual parties in agreements.

Another integral argument in support of the thesis that classifying unitization agreements based on jurisdiction is best, is that more than one jurisdiction may exist within a distinct political system, such as federalism. Consequently, the drafters, in some cases, may need to invest the same amount of time, energy, and capital to confront the authoritative differences within a single country. These challenges are similar to the challenges of drafting a unitization agreement between two sovereign countries. Therefore, the dominance of the concept of jurisdiction would be more palpable than the geopolitical dimensions of border and sovereignty among the drafters to classify unitization agreement based on the location of the unit.

A. Comparison Between Jurisdiction and Border

A border or a boundary is a geographic phenomenon determining the territory line of a geopolitical entity, such as a country. The terms "border" and "boundary" interchangeably refer to "a cartographically identifiable line marking the territorial limits of states."[660] Anderson and O'Dowd define borders as "political divides or social constructions that are a product

659. Richard T. Ford, *Law's Territory (A History of Jurisdiction)*, 97 Mich. L Rev. 843, 844 (1999).

660. Sabri Ates, The Ottoman-Iranian Borderlands: Making A Boundary 1843-1914, 8 (Cambridge University Press 2013).

of modern state-building and the global state system."[661] Moreover, borders, as political lines, show "the territorial consolidation of state" and "the actual power that states wielded over their own societies."[662] From the perspective of international law, Black's Law Dictionary defines a boundary as "[a] line marking the limit of the territorial jurisdiction of a state or other entity having an international status."[663] Buad and Van Schendel posit that boundary is a term that is mostly applied among diplomatic milieu to refer to "the precise location of borders" as well as "the dividing line between different peoples or cultures."[664] Therefore, borders and boundaries are recognized as geopolitical markers to divide states and their authorities, and not to classify contracts.

The classification of unitization agreements based on borders is an inaccurate measure because the geopolitical concept of border is unable to regulate unitization agreements. Even international petroleum companies do not limit their business activities based on "defined boundaries and precisely measurable territory" because "[t]here is . . . no rule that the land frontiers of a state must be fully delimited and defined."[665]

When a hydrocarbon reservoir extends across the boundary line of a contract area and partially underlies a non-contract area, the unitization agreement determines interests and liabilities of all parties involved in the contract area and the non-contract area.[666] The unit parties could utilize the same legal instrument when the oil and gas reservoir straddles across the borderlines of two or more countries.[667] Perhaps, the boundary or borderlines are the main reason that involved parties need to draft unitization agreements. Borderlines are also used to measure the property rights of all legitimate parties on each side in unitization agreements.[668] However, these lines take no roles in regulating the unitization agreements. Therefore, the border and boundary lines will be inaccurate measures to

661. James Anderson & Liam O'Dowd, Borders, Border Regions and Territoriality: Contradictory Meanings, Changing Significance, 33.7 Reg. Studies 593, 603 (1999).

662. Michiel Baud & Willem Van Schendel, *Toward a Comparative History of Borderlands*, 8 J. World History 211, 214-5 (1997).

663. *Boundary*, Black's Law Dictionary (10th ed. 2014).

664. Baud & Van Schendel, *supra* note 662, at 213.

665. Smith et al., *supra* note 636, at 74 (stating that some jurisdictions have applied an extraterritorial authority to cover activities beyond their boundaries).

666. Martin & Kramer, *supra* note 537.

667. Weaver & Asmus, *supra* note 448, at 14.

668. *Boundary*, Black's Law Dictionary (10th ed. 2014).

classify unitization agreements, and the category of cross-border unitization agreements may not be appropriately named.

Just as the mere concept of border is unable to govern unitization agreements when the oil and gas reserves extend across the border, the concept of the country cannot regulate unitization agreements when the reservoirs are fully recoverable inside of one country. The logic behind that statement is that "the regulatory and taxing authority" in some federal countries are shared among the federal governments and provincial or regional governments.[669] More than one jurisdiction would be subject to regulating natural resources within those countries. As a result, this research believes that the category of sole-country unitization is also unable to accurately represent unitization agreements within one country.

Unitization agreements are only governed by the jurisdictions, laws, and regulations of countries that own royalties or working interests as well as the police power to regulate the petroleum operations within their territories.[670] The concept of jurisdiction is the proper measure for dividing unitization agreements because jurisdictions regulate all oil and gas contracts and operations that take place entirely within the territorial authority. Therefore, the modes of sole-jurisdiction unitization agreements and cross-jurisdiction unitization agreements are more accurate.

The sole-jurisdiction unitization is an agreement that is only subject to one jurisdiction because the entire unit area and unit operations take place within a territory, either an administrative division or a country that is run by one jurisdiction. On the other hand, cross-jurisdiction unitization agreements transpire when the oil and gas reservoirs extend across the borderlines of two or more neighboring countries that have different jurisdictions than each other. This category would also embrace the unitization agreement that might be subject to two or more jurisdictions within a country with a non-central governing system, for example, a country such as the United States or Iraq, whose states and regions have their own, deferent jurisdictions. The Kurdistan region of Iraq, for instance, owns a different jurisdiction than another part of Iraq.

669. FORUM OF FEDERATIONS: THE GLOBAL NETWORK ON FEDERALISM AND DEVOLVED GOVERNANCE, FEDERAL COUNTRIES, http://www.forumfed.org/countries/ (last visited September 15, 2018) (stating that "[t]here are 25 federal countries in the world today, which together represent 40 per cent of the world's population"); Smith et al., *supra* note 633, at 191 (stating that the exact authority of provinces might be even ambiguous in some federal regimes).

670. Weaver & Asmus, *supra* note 448, at 36.

B. Comparison Between Jurisdiction and Sovereignty

The notions of jurisdiction and sovereignty represent similarly essential aspects of a government's authority over its territories. However, this research trusts that the concept of jurisdiction prevails over the concept of sovereignty to cover the full and exclusive power of authority regarding the oil and gas development in a territory. To clarify the reasons supporting such preference, the researcher highlights the distinction between the concepts of sovereignty and jurisdiction in more details below.

Many types of literature use the term "sovereignty" in reference to the legal authority of states over their territories and territorial seas. Such an inference arises from an inaccurate description of the term because sovereignty is "the supreme political authority of an independent state,"[671] and it will not directly influence substances of its territory. However, modern literature introduced a more appropriate term, "territoriality," to describe the exclusive legal authority of a state over its territory.[672] The principle of territoriality could be tangible and operative through the state's power arm, which is "jurisdiction." Black's Law Dictionary dissects the connection of this term with territoriality and sovereignty through two definitions of jurisdiction. In one definition, jurisdiction is described as "[a] government's general power to exercise authority over all persons and things within its territory."[673] Alternatively, Black's Law Dictionary also describes jurisdiction as "[a] geographic area within which political or judicial authority may be exercised."[674] Hannah L. Buxbaum, Professor at Indiana University Maurer School of Law-Bloomington, affirms that "[j]urisdiction is an aspect of sovereignty, it is coextensive with and, indeed, incidental to, but also limited by, the State's sovereignty."[675]

Public international law acknowledges "sovereignty" as a fundamental notion that, along with territory and boundary, describe "essential attributes of a state, the primary subject of international law."[676] In other words,

671. *Sovereignty*, Black's Law Dictionary (10th ed. 2014).

672. Saskia Sassen, *When Territory Deborders Territoriality*, 1 Territory, Politics, Governance 21, 24 (2013) (stating that "territoriality as a legal construct that marks the state's exclusive authority over its territory has become the dominant mode of understanding territory").

673. *Jurisdiction*, Black's Law Dictionary (10th ed. 2014).

674. *Id.*

675. Hannah L. Buxbaum, *Territory, Territoriality, and the Resolution of Jurisdictional Conflict*, 57 Am. J. Comp. L., no. 3, 2009, at 631, 632 (citing Frederick A. Mann, *The Doctrine of Jurisdiction in International Law,* 111 RECUEIL DES COURS 1, 30 (1964)).

676. Bastida et al., *supra* note 571, at 362.

sovereignty epitomizes "the basic constitutional doctrine of the law of nations, which governs a community consisting primarily of states having a uniform legal personality."[677] Sovereignty, in the international system, is the most recognized concept representing the full or exclusive authority of a government over its territories.[678] Nevertheless, some international law scholars, including Saskia Sassen, Professor of Sociology at Columbia University, favor the notion of "territoriality" to introduce the authority of the government over its territories.[679] The international system recognizes the concept of sovereignty to grant states or countries "jurisdiction, *prima facie* exclusive, over a territory and the permanent population living there."[680] This description of public international law highlights four main components of sovereignty: (1) a state, (2) a uniform legal system, (3) a territory, and (4) a permanent population. Similarly, public international law considers a state to include the following four fundamental elements: "a defined territory, a permanent population, a government, a capacity to conduct international relations."[681] Because of these similar elements between the concepts of sovereignty and state, Black's Law Dictionary described the expression of "sovereign" as "a state vested with independent and supreme authority."[682] The authority of a sovereign includes "legal dominion over its geographical area, including its natural resources."[683] However, the concept of sovereignty includes the element of a uniform legal system or jurisdiction that the international law did not mention among the elements of a state. Meanwhile, a state is comprised of a government that the international system does not recognize as a critical element of sovereignty.

Based on the definition above, public international law grants a sovereign state the authority over its territories, including natural resources. However, this description is not accurate because many essential instances attest to the fact that the authority of petroleum deposits does not exclusively belong to the sovereign states. In federal systems and English common law regimes, constitutions or national laws grant the governorates

677. Ian Brownlie, *Principles of Public International Law* 287 (4th ed. 1990).

678. Bastida et al., *supra* note 571, at 362.

679. Sassen, *supra* note 669, at 24 (stating that that territoriality, as "a powerful innovation, and it has worked well to legitimate and cement the power of the modern state over a territory").

680. Bastida et al., *supra* note 571, at 362.

681. Smith et al., *supra* note 633, at 74.

682. *Sovereignty*, Black's Law Dictionary (10th ed. 2014).

683. Smith et al., *supra* note 633, at 30.

of states, regions, or provinces with the independent authority to exercise their rights to operate natural resources within their territories.[684] For instance, in the United States, seventeen states were not originally formed out of federal territories, wherein these states or their residents, not the federal government, own their territories and natural resources.[685] Also, the U.S. federal government awarded the rest of states, particularly those on the West Coast, federal lands through a series of laws which were passed by Congress to earn enough revenue for the states to run their governorates in the 19th Century.[686]

Per *ad coelom* doctrine, the Common Law perspective over property interests in the United States grants the states the right to own the natural resources under their territories or lands.[687] Even offshore areas may be divided between the central and provincial governments. For example, the provincial government may have sovereignty over the territorial sea in some federal systems, while the federal government may keep the ownership and control of sovereignty over the exclusive economic zone or continental shelf seaward of the territorial sea.[688] Besides the federal regimes, countries with unitary systems may still bestow the right to have local jurisdiction over their territories, including natural resources, upon their administrative divisions.[689] Moreover, the private ownership regimes in some countries, including the United States and Canada, have granted individuals — who are not sovereigns or subjects to the international law — with the right to own and operate natural resources located beneath their property.[690] Governments, as the executive authority, don't represent mere legal control over territories; instead, jurisdiction is an accurate measurement to rule territory in general and to categorize the petroleum contracts in particular.

Alternatively, one of the descriptions that the Black's Law Dictionary includes for the concept of jurisdiction is "[a] government's general power

684. *Id.* at 74.

685. Lowe et al., *supra* note 450, at 1285 (stating that these states include the original 13 colonies, plus Maine, Texas, West Virginia, and parts of Tennessee).

686. *Id.* at 1285, n. 442 (stating that the United States Congress issued many Acts, such as, 9 Stat. 352 (1824), 10 Stat. 634 (1855), 11 Stat. 3, 12 Stat. 3 (1860), and 13 Stat. 3 (1860), allowed states to own swamp lands. The 1894 Carey Act allowed states to own desert lands, and the 1862 Morrill Act granted stated with land to build agricultural colleges).

687. *Id.* at 54.

688. Bastida et al., *supra* note 571, at 363.

689. Smith et al., *supra* note 633, at 75.

690. Lowe et al., *supra* note 450, at 54.

to exercise authority over all persons and things within its territory."[691] Furthermore, the concept of government is defined as "[t]he structure of principles and rules determining how a state or organization is regulated.**"**[692] These two definitions of jurisdiction and government share a strong connection between them. A government regulates objects and populations residing within its territories through its jurisdiction. In other words, jurisdiction is a necessary device to sustain a government's competence.

IV. The Determination of Jurisdictional Authority Over Hydrocarbon Deposits

Oil and gas deposits, like other "mineral resources in the soil and subsoil of land territory and territorial see to an unlimited depth," belong to a sovereign state or an administrative division with jurisdictional authority over its territory.[693] However, this statement is not entirely accurate because individuals have owned petroleum deposits since the petroleum industry has started in the United States and Canada based on the principle of private ownership of property.[694] Despite different ownership regimes over oil and gas, the jurisdiction of the territory regulates legal rights and obligations of all parties — governments, individuals, and public or private companies — involved in daily petroleum operations.[695] This section tries to answer the question of how the authority of jurisdiction over petroleum deposits is legally determined in a territory.

Oil and gas investors usually look to both national and international law to find language that determines the authority of jurisdiction over petroleum deposits in a sovereign state of an administrative division.[696] On a national level, foreign investors will examine articles of the constitution and legislation to find such language. Petroleum companies may detect the framework in administrative orders awarding provinces, regions, or other administration divisions a right to regulate petroleum operations within

691. *Jurisdiction*, Black's Law Dictionary (10th ed. 2014). (defining also that jurisdiction is "[a] geographic area within which political or judicial authority may be exercised").

692. *Government*, Black's Law Dictionary (10th ed. 2014).

693. Lagoni, *supra* note 438, at 216.

694. Eugene Kuntz, A Treatise on the Law of Oil and Gas, § 2.1 (Matthew Bender, Rev. Ed.).

695. *Id.* at §65.1.

696. Smith et al., *supra* note 633, at 72.

their territories.[697] Furthermore, intergovernmental entities and resolutions are additional important references that international oil and gas companies will closely follow to verify the authority of jurisdiction over petroleum deposits, particularly in disputed territories that multiple ownership claims raised by different countries or regions are considered as a significant political risk for investors. Among intergovernmental institutions, the United Nations and other cooperative regional councils have presented many resolutions and multilateral treaties determining the jurisdictional authority over disputed territories and the rights of members over petroleum deposits.[698] Additionally, bilateral treaties among sovereigns may establish jurisdictional authority over common or disputed mineral rights.[699]

The jurisdictional territory of a sovereign state or an administrative division contains both terrestrial and marine ecosystems. Petroleum investors prefer to conduct their onshore operations on lands that are entirely or exclusively controlled by an identified jurisdiction. However, oil and gas investors are aware that "a 'defined territory' does not require precisely defined boundaries and precisely measurable territory."[700] The same jurisdiction would regulate oil and gas operations in internal waters, such as rivers and bays, within the territory. Offshore petroleum operations also extend over the outer continental shelf, which includes territorial seas and exclusive economic zones.[701] Oil investors will verify the jurisdictional authority of alleging states or administrative divisions before commencing their costly operations within the outer continental shelf.

A. Jurisdictions and Terrestrial Hydrocarbon Deposits

1. Hydrocarbon Deposits Within Lands

An international principle, issued by the United Nations in 1962, recognizes the rights of sovereign states and their people to benefit from their natural resources.[702] Jurisdiction, as "an aspect of sovereignty,"

697. *Id.* at 191 (stating that foreign investors may encounter ambiguous provisions regarding the jurisdiction authority of provinces).

698. *Id.* at 36 (stating the United Nations Resolutions on Permanent Sovereignty over Natural Resources, U.N.G.A. Res. 1803 (XVII), reprinted in 2 I.L.M. 223 (1963)).

699. *Id.* at 223.

700. *Id.* at 74.

701. Owen L. Anderson, *Federalism: Onshore and Offshore Public Lands in the United States*, 4 OGEL, no. 4, Nov. 2006, at 12.

702. G.A. Res. 1803 (XVII), ¶ 1 (Dec. 14, 1962) (declaring that "[t]he right of peoples and nations to permanent sovereignty over their natural wealth and resources must be

regulates operations of natural resources, such as oil and natural gas, within a territory.[703] In addition to the United Nations General Assembly Resolution No. 1803 of 1962, most sovereign states affirm their jurisdictional authority over natural resources within their territories through domestic laws and constitutions. For example, the Constitution of Brazil sets forth that the federal government controls and regulates petroleum resources, both onshore and offshore.[704] Furthermore, the Petroleum Act of the United Kingdom states that The UK Board of Trade is the jurisdictional authority regulating onshore petroleum activities within its territories.[705]

Many countries around the world, particularly centralized administration regimes, recognize sole-jurisdiction authority over their hydrocarbon deposits. However, decentralized regimes, especially federal governments, subdivide sovereignty and jurisdiction, between the central and regional governments."[706] For instance, the United States allows its states to regulate their titled lands.[707] Similarly, the Constitution of Iraq has granted petroleum producing governorates and the Kurdistan regional government with the authority to manage and regulate petroleum fields that have been developed after 2006.[708] As a result, the jurisdiction of the Kurdistan

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exercised the interest of their national development and of the wellbeing of the people of tile State concerned").

703. Buxbaum, supra note 672, at 632 (citing Frederick A. Mann, The Doctrine of Jurisdiction in International Law, 111 RECUEIL DES COURS 1, 30 (1964)).

704. CONSTITUIÇÃO FEDERAL [C.F.] [CONSTITUTION] art. 20(V) & (IX) (Braz.).

705. Petroleum (Production) Act 1934, 24 & 25 GEO. Ch. 36, § 2 (UK).

706. Smith et al., *supra* note 633, at 76.

707. Lowe et al., *supra* note 450, at 1285-1286 (stating that in addition to the original 13 colonies, Maine, Texas, and West Virginia that were allowed to hold the title of their lands, the United States federal government "granted lands at statehood [to other states] to use as a source of income to defray the costs of establishing and funding public schools, colleges, universities, and institutions, and for the costs of constructing various internal improvements." As a result, states kept their rights to regulate oil and gas substances within their lands).

708. CONSTITUTION OF IRAQ 2005, art. 112 (Iraq). James Crawford, Legal Opinion: The Authority of the Kurdistan Regional Government over Oil and Gas under the Constitution of Iraq (Jan. 29, 2008) at 7, available at http://mnr.krg.org/images/pdfs/James_R_Crawford_Kurdistan_Oil_Legal_Opinion_English2008.pdf (accessed November 10, 2017) (stating that Article 112 of the Iraqi Constitution granted the Kurdistan Regional Government with an exclusive right to explore and manage its petroleum fields that would be operated after 2006 without the involvement of the Iraqi federal government).

Region of Iraq, under the Oil and Gas Law of The Kurdistan Region – Iraq No. 22 of 2007, regulates the petroleum operations within its territories.[709]

2. Hydrocarbon Deposits Within Internal Waters

In addition to the land, sovereign states own their internal waters. Black's Law Dictionary defines internal water as "[a]ny natural or artificial body or stream of water within the territorial limits of a country, such as a bay, gulf, river mouth, creek, harbor, port, lake, or canal."[710] The United Nations Convention on the Law of the Sea 1982 similarly describes internal waters as "waters on the landward side of the baseline of the territorial sea form part of the internal waters of the State."[711] Internal waters, such as lakes, that are completely located within territories of a sovereign country are subject to the jurisdiction of that sovereign state. For example, a federal law of the Russian Federation protects and regulates Lake Baikal, the world's largest freshwater lake and the world's deepest lake which is fully located within Russian territories in southern Siberia.[712] In a federal regime, such as the United States, the federal government allows states to "hold sovereign title to the beds of internal navigable waters" within their respective boundaries.[713] However, some internal saltwater and freshwater waters, such as the Kiel Canal, the Suez Canal, and the Panama Canal, are subject to the international river regime, and are exclusively regulated under general customary law because of their navigational importance for international transportation.[714]

B. Jurisdictions and Marine Hydrocarbon Deposits

1. Hydrocarbon Deposits Within Territorial Seas

Sovereign countries, in addition to owning natural resources "in the soil and subsoil of their land territory," own and possess the right to regulate

709. Oil and Gas Law of The Kurdistan Region - Iraq No. 22 of 2007 (The Kurdistan Region – Iraq).

710. *Internal Waters*, Black's Law Dictionary (10th ed. 2014) (stating that "inland waters" is another term to introduce internal waters).

711. United Nations Convention on the Law of the Sea, art. 8, Dec. 10, 1982, 1833 U.N.T.S. 397.

712. Darima B. Dabaeva et al, *Peculiarities of Lake Baikal Water Level Regime*, 48 IOP Conf. Ser.: Earth Environ. Sci., no. 1, 1 (2016); The Federal Law of The Russian Federation on Protection of Lake Baikal No. 94-FZ of 1999 (Russ.) art. 1.

713. Anderson, *supra* note 698, at 16-17.

714. Kaare Bangert, *Internal Waters*, Oxford Public International Law ¶ 1 (Feb. 2018), http://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1968.

hydrocarbon deposits within their "territorial seas to an unlimited depth."[715] Other states have no right to benefit from these oil and gas deposits unless the sovereign territorial permits.[716] Otherwise, the intruding state violates the public international law principle of territorial integrity which is "[a] necessary corollary to the principle of territorial sovereignty."[717]

For centuries, coastal states have argued over the sovereignty limit of their coastal waters. In 1703, the Dutch established a legal doctrine, which became internationally-recognized as "the cannon-shot rule" to resolve sovereignty disputes over territorial lands and territorial seas.[718] In the 18th Century, French jurists added a concrete interpretation to the cannon-shot rule by clarifying that "the effective range of a cannon-shot was approximately three nautical miles."[719] Although the three-nautical-mile rule was recognized and adopted by many naval powers until the early Twentieth Century, many states and legal scholars argued that the cannon-shot rule had to be expanded from three to twelve nautical miles due to the advancement of artillery fire range.[720] The twelve-mile language first appeared in the 1930 Hauge Convention, and later became a principle of customary international law due to the pressure of sovereign members of the United Nations in the 1940s and 1950s.[721]

Today, "the territorial sea of a sovereign state," under the 1982 United Nations Convention on the Law of Sea (UNCLOS), is "up to a limit not exceeding 12 nautical miles, measured from baselines."[722] The UNCLOS delineates that "normal baseline . . . is the low-water line along the coast as

715. Lagoni, *supra* note 438, at 216 (citing 2 L. OPPENHEIM, INTERNATIONAL LAW 462 (8th ed. R Lauterpacht, 1955); I, 2 P. FAUCHILLE, TRAITE DE DRROIT INTERNATIONAL PUBLIC 99 (8th ed. H. Bonfils, 1925)).

716. *Id.*

717. *Id.* at 217.

718. William L. Schachte Jr., *The History of the Territorial Sea from a National Security Perspective*, 1 Terr. Sea J. 143, 148-9 (1990) (stating that in 1610 the Dutch introduced the implication of naval power, shooting cannons, to resolve their maritime disputes over sovereignty of coastal water with Britain. In 1703, the Dutch judge Bynkershoek created the legal doctrine of "the cannon shot" based on his argument that "the dominion of the land ends where the power of arms terminates").

719. *Id.*

720. *Id.* at 155 (citing D. O'CONNELL, THE INTERNATIONAL LAW OF THE SEA 125 (1982).

721. Schachte Jr., *supra* note 715, at 155; Bastida et al., *supra* note 571, at 364; Henry M. Arruda, *The Extension of the United States Territorial Sea: Reasons and Effects*, 4 Conn. J. Int'l L. 697, 702 (1989).

722. United Nations Convention on the Law of the Sea, *supra* note 708, at art. 3.

marked on large-scale charts officially recognized by the coastal State."[723] The majority of parties to the UNCLOS, more than one hundred states, accepted the twelve-nautical-mile rule after the Reagan administration announced that the U.S. would respect the Convention's principle regarding the extension limit of territorial seas to protect its national security interests.[724]

Because some federal governments shared a part of land sovereignty and revenue from mineral interests with their provincial governments, the respective provinces in the federal regimes also granted the ownership of territorial seas in a limited extension. For instance, the 1953 Submerged Lands Act (SLA) of the United States recognized the right of its coastal states to hold title over the territorial sea, with a limit distance from their baseline.[725] In the United States, Texas and Florida own up to nine nautical miles of the territorial water from their baseline in the Gulf of Mexico, and other coastline states hold title to up to three nautical miles of the territorial seas from their coastline in the Pacific and Atlantic Oceans.[726]

2. Hydrocarbon Deposits Within the Continental Shelf

A seaside country, after the twelve-nautical-mile limit of the territorial sea, may own another extent of seabed that is known as the continental shelf. The UNCLOS, in Article 76.1, defines the continental shelf as below:

> The continental shelf of a coastal State comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance.[727]

The decision of most seaside countries to claim sovereignty rights over the continental shelf began after World War II, when the United States, under the Truman Administration, declared that the jurisdiction of the United States would control the natural resources beneath the continental

723. *Id.* at art. 5.

724. Schachte Jr., *supra* note 715, at 164; Arruda, *supra* note 718, at 718.

725. Robert Jay Wilder, The Three-Mile Territorial Sea: Its Origins and Implications for Contemporary Offshore Federalism, 32 VA. J. INT'L L. 681, 682 (1992).

726. Anderson, *supra* note 698, at 17; Arruda, *supra* note 718, at 710; Wilder, *supra* note 722, at 738 n.61.

727. United Nations Convention on the Law of the Sea, *supra* note 708, at art. 76.1.

shelf adjacent to the United States' coastlines.[728] The 1945 Truman Proclamation later became an essential principle of international law to demarcate maritime boundaries.[729] Later, the 1958 Geneva Convention on the Continental Shelf stated that coastal states would be entitled to exclusive sovereignty rights over mineral deposits in the continental shelf.[730] Additionally, the International Court of Justice used the Truman Proclamation as a fundamental principle to resolve disputed maritime boundaries in the North Sea Continental Shelf Cases in 1969.[731] Finally, the 1982 UNCLOS, as the dominant intergovernmental law of the sea, clearly determined the boundary of the continental shelf and the exclusive jurisdictional authority of coastal states over the exploration of natural resources in the continental shelf.[732]

The continental shelf of a coastal state may contain an area known as the Exclusive Economic Zone (EEZ). The EEZ, under the 1982 UNCLOS, is "an area beyond and adjacent to the territorial sea," but it "shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured."[733] Like the territorial sea, the continental shelf-EEZ is subject to the jurisdictional authority of the coastal state for the purpose of "the economic exploitation and exploration" activities.[734] Nevertheless, this exclusive right of the coastal states in the continental shelf, particularly the EEZ, does not include the pipeline sector as the 1982 UNCLOS states that all countries, including land-locked countries, may exercise their "freedom to lay submarine cables and pipelines" in the continental shelf.[735]

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728. Bastida et al., *supra* note 571, at 364 (citing Press Release, White House, Proclamation [No. 2667] by the President with Respect to the Natural Resources of the Subsoil and Sea Bed of the Continental Shelf (Sept. 28, 1945) reprinted in Official Documents, 40 AM. J. INT'L L. SUPP. 45, 46 (1946)).

729. Lagoni, *supra* note 438, at 234 & n. 89 (stating that for instance, Saudi Arabia and Kuwait in 1949 as well as Iran in 1955 proclaimed their sovereignty over oil resources in their continental shelf).

730. United Nations Convention on the Continental Shelf, art. 2, Apr. 29, 1958, 449 U.N.T.C 311.

731. North Sea Continental Shelf Cases (F.R.G. v. Den.; F.R.G. v. Neth.), Judgment, 1969 I.C.J. Rep. 3, ¶ 47, 86, 97, 100 (Feb. 20).

732. United Nations Convention on the Law of the Sea, *supra* note 708, at art. 79-85.

733. *Id.* at art. 55 & 57.

734. *Id.* at art. 56.

735. *Id.* at art. 79 & 87 (stating that the freedom of all states in the continental shelf also includes navigation, overflight, fishing, etc.).

The exclusive right of coastal states to explore and exploit natural resources beneath the continental shelf does not, however, delimit within the EEZ. The 1982 UNCLOS allows the coastal states to claim an additional area beyond the EEZ, which is known as "the outer limit of the continental shelf."[736] The outer limit of the continental shelf, under the 1982 UNCLOS, may "not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured or shall not exceed 100 nautical miles from the 2,500-metre isobath."[737]

After the International Court of Justice used the 1982 UNCLOS to determine the disputed boundary of the continental shelf in a case between Malta and Libya in 1985, the 200-nautical mile limit of the continental shelf became well-respected in the international community.[738] The respective rule of the International Court of Justice includes the right of the United States, a non-signatory party to the 1982 UNCLOS, to the continental shelf of the Gulf of Mexico.[739] It is noteworthy that the United States federal government, besides the 1945 Truman Proclamation and the 1953 Outer Continental Shelf Lands Act, reserves its exclusive rights over its continental shelf for exploitation of natural resources under the 1983 Presidential Proclamation No. 5030.[740]

736. *Id.* at art. 76.5.

737. *Id.*

738. Bastida et al., *supra* note 571, at 367 (citing Continental Shelf (Libya v. Malta), Judgment, 1985 I.C.J. 13, ¶ 55-56 (June 3)).

739. Alberto Szekely, The International Law of Submarine Transboundary Hydrocarbon Resources: Legal Limits to Behavior and Experiences for the Gulf of Mexico, 26 Nat. Resources J. 733, 768 (1986).

740. Anderson, *supra* note 698, at 13 n. 38.

CHAPTER FOUR: SOLE-JURISDICTION UNITIZATION AGREEMENTS

I. Introduction

The legal measurement of jurisdiction, instead of political dimensions, could properly categorize unitization agreements based on the location of the unit area. After considering such legal measurement, this research establishes two new classifications, sole-jurisdiction unitization agreements, and cross-jurisdiction unitization agreements. A sole-jurisdiction unitization agreement is when the entire unit area and unit operations take place within a geographic territory under one particular jurisdiction. Compliance for a unitization agreement taking place in only one jurisdiction is much less complicated than cross-jurisdiction unitization agreements, where the unit area or operations extend across two or more separate jurisdictions.

This chapter will focus exclusively on sole-jurisdiction unitization agreements and their legal features, like the mineral ownership patterns and property laws, the conservation policy, and the documentation procedure that shapes the unitization agreement. The author provided a separate section in this chapter for sole-jurisdiction unitization agreements in the United States because the specified legal features of sole-jurisdiction unitization agreements in the U.S. are quite distinct from the rest of the world. In addition to a significant amount of unit operations, the model fiscal regime in the United States — concession contracts — differs from the use of production sharing contracts that other major oil-producing countries use to develop their oil and gas reservoirs. This chapter will also discuss how the different ownership and fiscal systems could impact different roles and authorities for each unit party, especially for mineral-interest owners who are often individuals in the United States but host governments in the rest of the world.

II. Sole-Jurisdiction Unitization Agreements in the United States

The United States is nicknamed the world's "unitization capital" due to the abundance of unit operations and unitization laws and regulations that exist in the country.[741] To further explain this qualification, the author will provide an overview of the U.S. oil and gas conservation revolution. Next, the dissertation examines oil and gas pooling, a common conservation tool, which is incorrectly introduced as an identical term for unitization in the United States and perhaps overseas. Lastly, this section analyzes the

741. Weaver & Asmus, *supra* note 448, at 7.

documenting procedures for unitization agreements and unit operating agreements that occur in the territories of one jurisdiction either in individual states or fall exclusively under the jurisdiction of the U.S. federal government.

A. The Legal Background of Unitization in the United States

The 1858 and 1859 North American implementation of the salt-boring marks the beginning of the modern oil and gas industry in the world.[742] Additionally, the late Nineteenth Century creation of petroleum engineering as a scientific field in the United States contributed to the development of useful techniques for developing reservoirs.[743] Accordingly, the United States enjoyed significant oil discoveries in the early Twentieth Century, such as the Lucas gusher on Spindletop Hill in Beaumont, Texas, in 1901.[744] Moreover, the concentration of petroleum engineers studying reservoir dynamics and how to best exploit natural energy drives[745] facilitated substantial oil recovery in the world, particularly in East Texas in the 1930s.[746] By then, the United States was producing two-thirds of world oil production.[747] Perhaps, the United States could have obtained these

742. *See* John B. Ballem, *The Oil and Gas Lease in Canada*, pg. 4 (University of Toronto Press 1973) (stating that the first, modern oil well was drilled by Colonel E.L. Drake in Titusville, Pennsylvania in June 1859. However, some scholars claim that the "honor" of the first oil well in North America belongs to Petrolia in the Province of Ontario, Canada in 1858); *See also* Kramer & Martin, *supra* note 494, at § 1.01.

743. Honeycutt, *supra* note 444 (stating that the foundations of petroleum engineering were established during the 1890s in California. Petroleum technology courses were first taught at the University of Pittsburgh, Pennsylvania in 1910, and the University of Pittsburgh granted the first degree in petroleum engineering in 1915. By 1920, petroleum engineers presented solutions to drilling challenges and designed advanced mechanical techniques for the drilling operations and well pumping).

744. Yergin, *supra* note 76, at 68.

745. Honeycutt, *supra* note 444.

746. Yergin, *supra* note 76, at 230 & 282.

747. Charles G. Haglund, *The New Conservation Movement with Respect to Petroleum and Natural Gas*, 22 KY. L. J. 543, 575 n. 68 (1933) (stating that in 1929, the total oil production in the world was estimated about 1.48 billion barrels, and the United States produced more than one billion barrels. The rest of oil was produced in Venezuela (138.9 million barrels [MMb]), Russia (98 MMb), Mexico (44.7 MMb), Persia(43 MMb), Dutch East Indies (36 MMb), Rumania 33 (MMb), Columbia (20.4 MMb), Peru (12.5 MMb), Argentina (10 MMb), Trinidad (8.7 MMb), India (8.3 MMb), Sarawak (West Borneo, Malaysia) (5.3 MMb), Poland (4.7 MMb), Japan (2 MMb), Egypt (1.9 MMB), Sakhalin (1.2 MMb), Canada (1.1 MMb), Ecuador (1 MMb), Germany (0.7 MMb), Iraq (0.5 MMb), France (0.5 MMb), Czechoslovakia (0.17 MMb), Italy (0.043 MMb), and others (0.022 MMb)).

achievements much earlier if the petroleum industry had not faced an internal barrier. While other parts of the world lacked access to modern techniques and adequate capital investment, the major hindrance to the U.S. petroleum industry was its legal system, which failed to adapt its regulations to the technical advances preventing waste and promoting oil production. In 1916, William F. McMurray and James O. Lewis from the United States Bureau of Mines, were the first technicians to criticize the American "drill-and-produce-as-you please system" and proposed a compulsory version of unit operations could prevent severe consequences of the current legal regime.[748]

In the United States, private individuals and entities own the majority of land.[749] Moreover, the private ownership system of property rights in the United States, and Canada, exceptionally includes ownership rights to oil, gas, and other minerals.[750] U.S. mineral ownership is regulated by English common law, both at the federal and state levels.[751] Among the doctrines of English Common Law, the "rule of capture," also known by many in the early years as "the rule of piracy" or "the role of jungle," was the most troublesome principle until it was modified in the Twentieth Century.[752] To prevent disorder in the American oil and gas industry, the federal and state governments, through their conservation agencies, took a more active role in governing the industry.

1. Mineral Ownership in the United States

In the United States, approximately sixty percent of the land is owned by private individuals and entities.[753] Furthermore, the United States legal system has long protected the exclusive right of private owners to benefit from the substances found below their lands, including oil, gas, and other

748. Hardwicke, *supra* note 536, at 13 (stating that Long before that, Chester E. Gilbert and Joseph E. Pogue recommended the integration of lands "at least up to the point where each geological unit is occupied by a single producing activity" to prevent over-production and waste in 1918).

749. Nickerson et al., *supra* note 554 (stating that the United States Department of Agriculture, in a report in 2011, confirmed that sixty percent of the land in the United States was privately owned).

750. *See* Lowe et al., *supra* note 450, at 54; *see also* Ballem, *supra* note 739, at pg. 8.

751. Lowe et al., *supra* note 450, at 54 (stating that the State of Louisiana exceptionally follows the French civil law in the US. Also, the English common law of the State of Texas has been under impact of the Spanish Mexican civil law has impacts).

752. Robert E. Hardwicke, *The Rule of Capture and Its Implications as Applied to Oil and Gas*, Aba Sec. Mineral & Nat. Res. L. Proc. 1, 4 (1935).

753. Nickerson et al., *supra* note 554.

minerals.[754] As a result, the federal and state governments have no sovereignty privilege over the mineral substances underlying private lands in the United States, in contrast to governments in other countries.[755] The unique private ownership system has complicated the status of mineral ownership in the United States.[756] Such complexity has also affected the "mineral development" and industry in the United States.[757]

In the United States, only forty percent of U.S. land is considered public land; twenty-nine percent is owned by the federal government, mostly in the West, about nine percent is owned by state and local governments, and about two percent is held in Indian trust.[758] Each year, the U.S. federal government makes money by awarding oil and gas licenses on federal and Indian land.[759] The mineral deposits on federal onshore land, along with Indian land, are managed by the Bureau of Land Management (''BLM''); the Bureau of Ocean Energy Management (''BOEM'') controls the mineral substances in the federal offshore lands.[760] Moreover, each state autonomously regulates its mineral rights through a specific governmental entity.

2. The Rule of Capture

In the early years of oil and gas development in the United States, the common law courts adopted the rule of capture to determine hydrocarbon ownership due to the fugacity of oil and gas deposits.[761] The U.S. courts, for that purpose, analogized the rules for ownership of wild animals and groundwater to formulate the rule of capture for oil and gas ownership.[762]

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754. Kuntz, *supra* note 691, at § 2.1.

755. *Id. see also* Weaver & Asmus, *supra* note 448, at 12.

756. Kuntz, *supra* note 691, at § 2.1.

757. Lowe et al., *supra* note 450, at 54.

758. The United States Department of the Interior, *Public Land Statistics* (Oct. 14, 2017), https://www.blm.gov/public_land_statistics/pls15/pls2015.pdf.

759. Lowe et al., *supra* note 450, at 1081 (stating that "in Fiscal Year 2011, the federal government generated over $11.2 billion in bonuses, rents, royalties, and other revenues from mineral leasing activities on federal (onshore and offshore) and Indian lands").

760. *Id.* at 1082.

761. Bruce M. Kramer & Owen L. Anderson, The Rule of Capture-An Oil and Gas Perspective, 35 Envtl. L. 899, 906-07 (2005); Westmoreland & Cambria Natural Gas Co. v. De Witt, 18 A. 724 (Pa. 1889) (adopting the rule of capture); Brown v. Spilman, 155 U.S. 665 (1895) (adopting the rule of capture).

762. Kramer & Martin, *supra* note 494, at § 2.01 (stating that the Pennsylvania Court, in the *De Witt* case, adopted the analogy of ownership of wild animals to apply the rule of capture on the oil and gas ownership. Also, the court in *People's Gas Co. v. Tyner*, 131 Ind. 277, 31 N.E. 59 (1892) applied the analogy of groundwater).

Describing a potentially adverse outcome from the rule of capture, Professor Kramer and Martin (two famous unitization intellectuals), deduced that an interest owner could obtain ownership to extracted hydrocarbons from his tract, even if there was evidence that the hydrocarbons initially migrated from neighboring tracts.[763]

Another adverse consequence of the rule of capture was "the offset well or self-help protection rule" in which the court granted the neighbors the right to implement the same chaotic strategy of drilling a well to protect against drainage.[764] As a result of the rule of capture and the offset well rules, the U.S. oil and gas industry encountered the following two controversial issues: over-drilling and early exhaustion of reservoir energy drives.[765] The oil price dropped from $3.06 per barrel to $1.60 per barrel because of overproduction in 1920.[766]

The economically devastating consequences of overproduction provoked severe criticism from oil investors and petroleum technicians in the United States. Among these voices, Henry L. Doherty valiantly disapproved of the rule of capture and warned about the consequences of the legal regime on the industry.[767] Doherty strongly recommended that the U.S. government immediately utilize its regulatory authority to prohibit the waste of hydrocarbons.[768] In particular, Doherty proposed a formula for unit operations upon the entire oil and gas reservoir to be imposed by federal authority.[769] Proponents of federal or state government involvement, like Doherty, alleged that limited instructions from conservation agencies were inadequate to prevent waste and over-drilling.[770]

3. Conservation Policy in the United States

The common law had, however, made efforts to limit the rule of capture and the power of individuals to damage the reservoir and trample their neighbors' rights. In the early years of the Twentieth Century, the common law doctrine of "correlative rights" obliged the owners of mineral interests

763. *Id.*

764. *Id.* (stating that the Court used the similar language and the offset-drilling rule in the case of *Barnard v. Monongahela Natural Gas Co.*, 216 Pa. 362, 65 A. 801 (1907)).

765. *Id.*

766. Hardwicke, *supra* note 536, at 15.

767. Myers, *supra* note 441, at pg. 13.

768. Hardwicke, *supra* note 536, at 6-7 (stating that in 1924, Mr. Doherty had expressed his sever concern in a letter to President Coolidge stated that the United States would run out of oil if the government did not intervene).

769. Kramer & Martin, *supra* note 494, at § 2.02.

770. Hardwicke, *supra* note 536, at 13.

to operate reasonably without disturbing adjacent mineral rights owners.[771] In 1900, the Supreme Court of the United States decided to apply the doctrine of correlative rights in *Ohio Oil Co. v. Indiana*, as one of the early attempts to prevent the waste of oil and gas.[772]

Both the federal and state governments issued laws and regulations to conserve oil and gas and prevent waste because crude oil and natural gas directly benefited the public interest.[773] For example, in 1919, the Railroad Commission — the oil and gas conservation agency in Texas — modified the rule of capture by issuing a "well-spacing" rule to prevent over-drilling.[774] Similarly, the conversation agencies in many states passed rules of "proration" to limit oil and gas recovery based on market demand and the storage availability to prevent waste and overproduction.[775]

Every major producing state formed an independent conversation agency to regulate oil and gas production in the early years of petroleum development.[776] Also, the Bureau of Mines of the United States, the federal conversation agency, began publishing monthly advisory reports regarding each state's petroleum demand in 1933.[777] The growing inclination of the U.S. federal government to centrally conserve oil and gas pushed oil-

771. Lowe et al., *supra* note 450, at 60.

772. Kramer & Martin, *supra* note 494, at § 2.01; *Ohio Oil Co. v. Indiana*, 177 U.S. 190 (1900).

773. Myers, *supra* note 441, at pg. 4.

774. *Id.* at pg. 11 (stating that the Rule 37, the well-pacing rule, prohibited the drilling of wells less than 300 feet apart and less than 150 feet from property lines).

775. *Id.* at pp. 9-10 (stating that the proration rate could not exceed the maximum efficient rate (MER) of the well. Also, the proration rule did not apply to the marginal wells that needed to produce oil in their full capacity, otherwise it would "cause their premature abandonment with resultant waste.").

776. The Railroad Commission of Texas, *History of the Railroad Commission* (Sep. 15, 2017), http://www.rrc.state.tx.us/about-us/history/ (stating that the Railroad Commission of Texas was established in 1891 to regulate the rail industry of the 1800s, but it has been given the responsibility for overseeing the activities of many different industries, such as oil and gas); The Oklahoma Corporation Commission, *Oklahoma Corporation Commission History* (Sep. 15, 2017), http://www.occeweb.com/Comm/commissionhist.htm (stating that the Oklahoma Corporate Commission has been conserving oil and gas since 1914).

777. The United States Department of Energy, *Our History* (Sep. 15, 2017), https://energy.gov/fe/about-us/our-history (stating that the United States federal government also established the Petroleum Administration for War during the World War II and later the Petroleum Administration for Defense to conserve oil and gas. MYRES, THE LAW OF POOLING, at 9-10. The Bureau of Mines, which was under supervision of the US Department of Interior, was abolished in 1996 and merged into the US Department of Energy in 1996).

producing states to establish a regional conversation agency, "the Interstate Oil Compact Commission," in 1935 to "prevent the encroachment of the federal government."[778]

One of the essential conservation policies designed by major oil-producing states and the federal government to limit the rule of capture and protect correlative rights was "pooling" the mineral reservoir, which also assisted in the implementation of the rule of spacing.[779] More importantly, the concepts of pooling and unitization are very similar in the United States.[780]

B. Pooling of Oil and Gas Reservoirs

Pooling and unitization are two effective methods used by conservation agencies to prevent waste and promote production. Both pooling and unitization aim to consolidate mineral and working interests to conserve the oil and gas industry. This link between pooling and unitization can lead to misidentifying the concepts, like how the U.S. courts and the oil industry unexpectedly applied pooling and unitization interchangeably.[781] For example, the court confused the term "compulsory pooling" with unitization in *Energy Development Corp. v. Moss*.[782]

Regardless of the close connection between the terms pooling and unitization, these two terms have different meanings and purposes.[783] To distinguish the definitions and objectives of pooling and unitization, Professor Kramer and Martin note that pooling takes place when two or

778. Myers, *supra* note 441, at pg. 5; The Interstate Oil and Gas Compact Commission (IOGCC), *About the Interstate Oil and Gas Compact Commission* (Sep. 15, 2017), http://iogcc.publishpath.com/about-us (stating that the Interstate Oil Compact Commission later became the Interstate Oil and Gas Commission Corporate (IOGCG)).

779. Kramer & Martin, *supra* note 494, at § 3.02.

780. *Id.*

781. *See* Martin & Kramer, *supra* note 534, at 794; *see also* Kramer & Martin, *supra* note 494, at § 1.02

782. *Energy Development Corp. v. Moss*, 214 W. Va. 577, 591 S.E.2d 135 (2003); Kramer & Martin, *supra* note 494, at § 1.02 (stating that "in Energy Development Corp. v. Moss, 214 W. Va. 577, 591 S.E.2d 135, 161 O.&G.R. 918 (2003), the court analyzed the West Virginia Coalbed Methane Act, W. Va. Code § 21-21-1 et seq., reproduced at § 30.48D, as encompassing the "unitization" of CBM. In reality, the structure and organization of the Act is clearly a compulsory pooling regulatory regime because the basic building block for the regime is the creation of individual drilling units. The Act itself on numerous occasions describes the actions of the Coalbed Methane Review Board as entailing pooling not unitization. . . . Fortunately, the mislabeling did not have an impact in the court's resolution of the underlying issue relating to the ownership of coalbed methane gas").

783. *Id.* at §3.02.

more interest owners combine their small tracts, entirely or partially, to create the required acreage to drill one well in compliance with well-spacing laws.[784] Alternatively, unitization requires the combination of mineral and working interests in several tracts that contain the entire or a part of a joint petroleum reservoir.[785] In other words, unitization parties merely concentrate on the hydrocarbon reservoir and plan to utilize the natural energy drives of the reservoir efficiently, whereas pooling parties typically aim to form an area with limited acreage to conform with conservation agency regulations and to drill one well.

One of the early laws that the conservation agencies implemented to prevent waste and over-drilling was the rule of well spacing. The well-spacing rule consequently required the owners of small tracts to pool their interests and form a pooling unit or drilling unit.[786] The conservation agency in all oil and gas producing states, except Kansas, adopted forced pooling to implement the well-spacing regulation.[787] Primary producing states began adopting compulsory pooling rules when the oil price increase contributed to significant upheaval in the global market in conjunction with the Arab oil embargo in the 1970s.[788]

In the United States, lessees and lessors of smaller tracts voluntarily form pooled units through "the community lease," a pooling clause in the oil and gas lease, or a separate pooling agreement.[789] Additionally, a court or conservation agency can order parties to create a pooled unit.[790]

1. The Community Lease

In the United States, mineral-interest owners can create a pooled unit by voluntarily participating in a "community lease."[791] The community lease is defined as "a single lease [granted to a lessee] covering two or more tracts

784. *Id.* at §1.

785. *Id.*

786. Sullivan, *supra* note 528, at 356; Kramer & Martin, *supra* note 494, at § 1.02 (stating that "without minimum well spacing requirements, pooling as such would not have developed).

787. Kramer & Martin, *supra* note 494, at § 3.02

788. *Id.*

789. *Id.* at §7.

790. *Id.*

791. *Id; see also* Hoffman, *supra* note 1, at (stating that the terms "joint" and "community" lease are frequently applied synonymously to this type of conveyance; however, the concept of "community" is somewhat more descriptive of precise situation).

executed by the separate owners as if they were joint owners."[792] Most jurisdictions do not apply the theory of "cross-conveyancing" to the community lease; instead, many states, including Texas, recognize the community lease as a temporary contract between parties to apportion royalties.[793] Additionally, most jurisdictions interpret the signature of a lessor on a community lease to be evidence of an intention to pool his mineral interest with other signatory lessors.[794] However, there have been different legal approaches regarding the courts' ability to look for language showing "a contrary intent" of the lessors to enter a pooling arrangement by signing the community lease.[795]

2. The Pooling Clause

The pooling clause in the oil and gas lease is the most popular instrument in the United States oil and gas industry to implement spacing and proration rules issued by conservation agencies.[796] The lease pooling clause grants a working interest owner with the right and authority to consolidate small tracts and mineral interests to create a drilling unit and allocate oil production to tract owners.[797] Lease pooling clauses are drafted to take many forms, some include detailed provisions, and others are briefer.[798] Pooling by the lessee under a lease pooling clause is considered "voluntary pooling" because the pooling clause proffers the lessee the right to elect whether to pool or not.[799] Nevertheless, the content of the pooling clause limits the lessee's legal authority; more importantly, the lessee must use the

792. *See* Kramer & Martin, *supra* note 494, at § 7.03; *see also* Martin & Kramer, *supra* note 534, at 175.

793. Lowe et al., *supra* note 450, at 444

794. *See* Kramer & Martin, *supra* note 494, at § 7.03; *see also* Lowe et al., *supra* note 450, at 443 (stating that New Mexico is the only exceptional jurisdiction that does not presume an intention to pool or not pool by reason of a community lease).

795. Kramer & Martin, *supra* note 494, at § 7.03 (stating that Texas jurisdiction requires that the community lease must include a language clearly stating that they do not intend to pool their mineral interests. Some other states, such as California, Louisiana, and Oklahoma have adopted the second approach that "extrinsic evidence is admissible to determine the true intent of the lessors, and the court is free to look at matters outside the express language of the community lease").

796. Hoffman, *supra* note 583, at 87 (stating that the pooling clause has also been added in the amendment of the oil and gas lease after the lessee obtained adequate information confirming the necessity of pooling).

797. Lowe et al., *supra* note 450, at 279.

798. Hoffman, *supra* note 583, at 91-92.

799. Lowe et al., *supra* note 450, at 279.

pooling power in "good faith."[800] Many oil and gas law scholars point out that a "separate" voluntary pooling agreement would be an alternative for a lessee to seek if the oil and gas lease lacks a pooling clause.[801] However, the lessee will likely be unable to obtain the right to pool through a voluntary pooling agreement if the lessors reject the addition of a pooling clause in the original lease or its amendments, particularly if the lessee desires to draft a brief pooling clause.

3. Pooling Agreements

a) Voluntary Pooling Agreement

The mineral interest and working interest holders sign a separate and independent voluntary pooling agreement to acquire "a well-drilling permit under applicable spacing rules" issued by the conservation agency.[802] The lessors and lessees agree to sign "separate" and "independent" voluntary pooling agreements, which are "special" and "exclusive" contracts to pool a specified area that is subsequently entered into if the original oil and gas lease lacks a pooling clause.[803] However, the pooling agreement, in contrast to the unitization agreement, is considered to be a simple and short document because, in most cases, it aims to form "a single-well unit" on a limited amount of land.[804] The negotiation between the parties to reach a voluntary pooling agreement might be unsuccessful due to their disagreements over many matters, including "the desirability of drilling, the timing of drilling, the allocation of production and drilling costs, the location of the well, the designation of the operator, and the particular acreage to be included in the unit."[805] If the parties fail to agree on pooling, the lessee or lessor may unilaterally apply for the conservation agency to intervene and issue a compulsory pooling order.[806]

b) Compulsory Pooling Order

The conservation agency can issue a compulsory or forced pooling order after one of the "authorized" parties of the oil and gas lease applies for the mandate to pool the drilling unit, and the agency completes a hearing to

800. *Id.* at 280.
801. *See id*; *see also* Hoffman, *supra* note 583, at 87.
802. Martin & Kramer, *supra* note 534, at 795.
803. Hoffman, *supra* note 583, at 139.
804. *See* Kramer & Martin, *supra* note 494, at § 7.05; *see also* Hoffman, *supra* note 583, at 141.
805. Lowe et al., *supra* note 450, at 697.
806. *Id.*

discuss the pooling proposal.[807] The Manual of Oil and Gas Terms describes the concept of compulsory pooling as "[t]he bringing together, as required by law or a valid order or regulation, of separately owned (or separate interest in) small tracts sufficient for the granting of a well drilling permit under applicable spacing rules."[808] Almost all United States jurisdictions embrace regulations authorizing forced pooling.[809] Moreover, the Interstate Oil and Gas Compact Commission presented various compulsory pooling provisions in Section 11 of the 2004 Model of Oil and Gas Conservation Act.[810] However, a compulsory order will not force "non-consenting" lessees of the pooling operation to bear their share of the drilling costs before determining the commerciality of the well.[811] The pooling operator and participating lessees, who paid the non-consenting parties' share of the cost, will be reimbursed from the oil profit share.[812] The non-consenting parties are not responsible for any operating cost payments in the case of "dry hole" or non-commercial production.[813]

In the United States, the courts may also issue compulsory pooling orders known as "equitable pooling" or "judicial pooling."[814] The pooling agreement on federal lands is called "the Communitization agreement" and is governed by the Mineral Leasing Act.[815]

Conservation agencies are unable to adequately protect correlative rights and eliminate waste and over-drilling through statutory pooling because this approach does not prohibit the non-consenting parties or other lessees from drilling wells on adjacent tracts that are not subject to the pooling contract.[816]

C. Procedures to Draft Unitization Agreements in the United States

Well spacing and proration rules, as well as the compulsory pooling approach, do not comply with the technical and geological

807. *Id*. *see also* Kramer & Martin, *supra* note 494, at § 6.01.

808. Martin & Kramer, *supra* note 534, at 184.

809. Lowe et al., *supra* note 450, at 697 (stating that Kansas is the only state has not enacted the forced pooling yet).

810. The Interstate Oil And Gas Compact Commission (IOGCC), *Model Statutes: 2004 Model Oil and Gas Conservation Act* (Oct. 15, 2017), http://iogcc.ok.gov/Websites/iogcc/docs/ModelAct-Dec2004.pdf.

811. Kramer & Martin, *supra* note 494, at § 6.01.

812. *Id.*

813. *Id.*

814. *Id.* at §6.02.

815. *Id.* at §16.04.

816. Anderson & Smith, *supra* note 456, at 281.

recommendations to cover and control the entire oil and gas reservoir.[817] Therefore, conservation agencies are unable to eliminate waste and over-drilling, as well as adequately protect the correlative rights of mineral and working interest owners.[818]

The optimal approach to protect correlative rights and prevent waste is to unitize the entire reservoir at a primary phase of operations, such as exploration because it would significantly save capital and reduce the number of redundant wells.[819] Unitization scholars label these types of unitization as "field-wide" and "exploratory" unitization.[820] Two advantages of unitization over other conservation methods are uniformity and consistency across producing states.[821] For instance, the Interstate Oil and Gas Compact Commission ("IOGCC"), a joint conservation agency that represents most producing American states, presented many sections covering the exploratory unitization in the 2004 Model of Oil and Gas Conservation Act.[822] Exploratory unitization has not been a widely-used conservation mechanism on privately-owned land in the United States because most conservation laws expect applicants to demonstrate that unit operation is the only way to succeed in conducting "enhanced recovery or pressure maintenance operations."[823] The conservation agency narrowed beneficial capacities of unitization to enhanced recovery operations in the development stages of the field.[824] Besides, field-wide unitization has not been common in many states, particularly Texas — the largest oil-producing state in the U.S. that does not force unitization.[825] Mineral and working interest owners often reject potential unit operations; therefore, many lessees could continue recovering oil from reservoirs underlying tracts outside of the unit.[826]

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817. *Id.* at 280.

818. *Id.* at 281.

819. *Id.* at 284.

820. *See* Doggett, *supra* note 553, at 3; *see also* Anderson & Smith, *supra* note 456, at 286.

821. Anderson & Smith, *supra* note 456, at 284.

822. The Interstate Oil and Gas Compact Commission (IOGCC), *supra* note 807.

823. Anderson & Smith, *supra* note 456, at 285.

824. *Id.*

825. U.S. Energy Information Administration (EIA), *Crude Oil Production – 2016* (Oct. 20, 2017), https://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbblpd_a.htm.

826. Weaver, *supra* note 449, at 319.

In the 1920s and 1930s, long before the first American forced unitization statute was enacted in 1945,[827] most petroleum engineers, geologists, and investors recognized the necessity of unitization. However, voluntary agreements were rarely reached because numerous parties often owned interests in any given field, making it unlikely for all, or an absolute majority, of the owners to agree on consolidating their interests.[828] Additionally, the decision regarding the viability of the unit operation entails gathering and analyzing a considerable volume of technical and economic figures.[829] Perhaps, the lack of accurate information in the United States in the early Twentieth Century was the main reason that landowners and investors were not confident enough to enter into the unit operation. Although conservation laws in almost all states, except Texas and Pennsylvania, authorize forced unitization,[830] the conservation agencies are unable to issue compulsory orders unless "a significant percentage of" tract owners and lessees voluntarily sign a unitization agreement and submit it to the related conservation agency.[831]

Furthermore, two legal issues have concerned the oil and gas industry in the United States since the beginning of unitization. First, the parties may incur liability under federal antitrust law once they sign the voluntary unitization agreement.[832] Federal antitrust law, particularly the Sherman Act, targets any cooperative agreement signed by individuals who "unreasonably" affect "fixing prices" and deprive others of the business.[833] This body of law would not apply to a voluntary unitization agreement whose signatory parties' intentions are only to prevent waste and promote production.[834] For example, many unitization laws prohibit joint oil marketing or refining, with some exceptions for natural gas, to avoid

827. Kramer & Martin, *supra* note 494, at § 17.01 (stating that Oklahoma was the first state that pass "a generally-applicable compulsory unitization law" in 1945).

828. *Id.*

829. *Id.*

830. Rogers, *supra* note 520, at 427 (citing e.g., Ala. Code§§ 9-17-80 to -88 (2015); Ark. Code Ann. §§15-72-308-310, 15-72-313-315 (Repl. 2009); Okla. Stat. Ann. tit. 52, §§ 287.1-13, 287.15 (West 2015)); *see also*, Kramer & Martin, *supra* note 494, at § 17-18.

831. Anderson & Smith, *supra* note 456, at 285

832. Chiawen C. Kiew, *Contracts, Combinations, Conspiracies, and Conservation: Antitrust in Oil Unitization and the Intertemporal Problem*, 99 Nw. Ul Rev. 931, 934 (2004).

833. Sullivan, *supra* note 528, at 365.

834. Kramer & Martin, *supra* note 494, at § 26.03.

violations of federal antitrust laws.[835] Moreover, forced unitization is considered "a sovereign act of states;" therefore, the Sherman Act does not apply to compulsory unitization agreements.[836]

Another traditional concern of landowners and lessees is that the tax authority could recognize their unit cooperation as a new legal entity, either in the form of a corporation or a partnership; accordingly, this new entity would be subject to its own taxation, in addition to the income tax of the individual participants.[837] However, both legal scholars and the government tax entity confirmed that this investor concern was resolvable. The element of taking profit in kind in the unitization agreement stops the Internal Revenue Service from recognizing voluntary unitization to form a corporation.[838] Also, the signatory parties to voluntary unitization would be waived from additional tax payment if they merely state that their unit operation is not a form of partnership.[839] In the United States, the consenting parties of unitization typically take three main steps — negotiation, approval, and documentation — to accomplish unitization and unit operation agreements.

1. Negotiation Procedures of Unitization Agreements

a) The Feasibility of Unitization

Working-interest owners or lessees are usually the first parties to propose the idea of unit operations to other interest owners of adjacent tracts.[840] It is critical to contact all working interest owners of adjacent tracts overlying the targeted reservoir to consider the most significant recovery possible.[841] Parties can't make a final decision on unitization unless a temporary committee collects required technical and fiscal information as well as a legal evaluation, verifying the feasibility and commerciality of the unit

835. Weaver & Asmus, *supra* note 448, at 39 (stating that joint marketing of gas can enable producers to negotiate better terms with buyers, which in turn can result in higher recoveries of gas).

836. Sullivan, *supra* note 528, at 368.

837. Myers, *supra* note 441, at pp. 252-253.

838. Doggett, *supra* note 553, at 30-31 (stating that if the partners take their profit in cash, their unit cooperation most will probably create a corporation, which would be subject to anti-trust law as well).

839. *Id.* at 34 (stating that the 1954 Internal Revenue Code allows the unit parties to elect to be excluded from partnership treatment).

840. Kramer & Martin, *supra* note 494, at § 17.01 (stating that the royalty interest owners could also introduce a unitization proposal).

841. *Id.*

operation.[842] By then, the lessees should notify royalty-interest owners and inform them of the unitization proposal to help them decide whether to participate with their full interest or exclude a part of their right.[843] This negotiation procedure may take a significant amount of time because every involved party may propose a different method on complex issues.

Moreover, it is difficult to attain an absolute majority of interest owners to voluntarily agree on unitization because the "fractionalized ownership pattern" of property rights in the United States has created too many individual interest owners.[844] A common way to alleviate this fractionalization problem is for the consenting parties to apply for forced unitization. However, the conservation agency will require the unit applicants to guarantee and submit their application confirming that a certain percentage of both mineral-interest and working-interest owners agree to join the agreement.[845] Across the United States, the minimum percentage of consenting parties varies from approximately sixty-five percent to eighty-five percent.[846]

The private ownership system in the United States is also the main reason that negotiations between consenting parties bifurcate into two separate agreements.[847] At first, royalty-interest owners and working-interest owners agree to operate within a unit by signing a unit agreement (UA).[848] Then, only working-interest owners of separate tracts sign a unit operating agreement (UOA) to regulate the day-to-day operational details of unitization.[849] Perhaps, the traditional desire of lessors to deal with "a short and less complicated" draft of oil and gas contracts, including unit agreements, encouraged the American oil industry to formulate a separate UOA to avoid bothering lessors with technical and operational aspects of unitization.[850]

Another essential part of the initial negotiation among the working-interest owners relates to the designation of the unit operator and the extent

842. *See id*; *see also* Myers, *supra* note 441, at pg. 76.

843. Kramer & Martin, *supra* note 494, at § 17.01; Sullivan, *supra* note 528, at 370 n. 6 (stating that "in most cases, an educational program is undertaken to show the purpose and the advantages of the unit operation").

844. Kramer & Martin, *supra* note 494, at § 17.01

845. *Id.* at 18.

846. *Id.*

847. Weaver & Asmus, *supra* note 448, at 17.

848. *Id.*

849. *Id.*

850. Sullivan, *supra* note 528, at 370.

of the operator's authority. A conventional approach is to appoint the lessee owning the greatest interest in the unit area as the operator.[851]

b) The Participation Formula

The implicated parties, especially lessees, will not sign the unitization agreement or unit operating agreement unless they negotiate and agree on a formula to determine their share of the unitized substance.[852] The determination of the formula is a prolonged and challenging process, but many scholars highlight the participation formula as "the heart of the unitization agreement" because of its outstanding significance in the unitization agreement.[853] The share of production allocated to each party should be equal to the value of their contribution to the unit.[854] The value is assessed using many factors, including the "productive acre-feet of oil and gas in place," the position of the contributed interest in the unit area, the volume of the previous recovery, the "number of existing wells," and the facilities valuation.[855] Nowadays, lessees and operators can quickly evaluate their initial unit production share through advanced computers and software.[856] The parties will often include a provision to allow modifications to the initial allocation formula when they discover new information subsequently.[857]

The federal or state governments will attend negotiations and the signing of the agreement if they own a property interest in the unit.[858] More importantly, the vital role that the conservation entities play in approving the UA and UOA signifies the magnitude of the states' involvement in these agreements.[859]

2. Conservation Procedures of Unitization Agreements

The conservation acts in almost all states grant the conservation agency the authority to intervene in both voluntary and compulsory unitization

851. Kramer & Martin, *supra* note 494, at § 17.02.
852. *See* Myers, *supra* note 441, at pg. 77; *see also*, Kramer & Martin, *supra* note 494, at § 17.02.
853. *See* Myers, *supra* note 441, at pg. 77; *see also*, Kramer & Martin, *supra* note 494, at § 17.02.
854. Kramer & Martin, *supra* note 494, at § 17.02.
855. *Id.*
856. *Id.*
857. *Id.*
858. Sullivan, *supra* note 528, at 370.
859. *Id.*

agreements.[860] Conservation agencies intervene in cooperative operations of the oil and gas development to ensure that the agreement does not violate the federal's and state's anti-trust laws.[861] Furthermore, the state commission requires non-consenting owners, who arbitrarily refuse a unitization proposal of the majority of adjacent interest owners, to prevent waste and promote recovery.[862] The conservation agencies of the various states have designed unique procedures for approving voluntary unitization agreements than the process for compulsory unitization agreements.[863] In voluntary unitization agreements, most conservation agencies provide a notice to the parties to attend public hearing sessions, then issue the approval.[864] In the compulsory unitization context, an interested owner should apply or file a petition in some states to commence the procedure.[865] After delivering notice and conducting the hearing sessions, lawyers, petroleum geologists, and engineers may testify to help the agency reach the required "findings" before issuing the forced unitization order.[866] Finally, some conservation agencies, like in Alaska, could terminate the unit operation if an "incurable default" occurs.[867] The Interstate Oil and Gas Compact Commission ("IOGCC") includes a similar procedure in Part VI of the 2004 Model of Oil and Gas Conservation Act.[868]

3. Documenting Unitization Agreements

Lawyers will prepare drafts of unitization agreements after all interest owners approve the technical, financial, and legal terms to operate their joint oil and gas reservoirs in a unitization plan. The unitization agreement is the "vehicle" of unit operation.[869] The United States regime of private property ownership has probably been the main reason that numerous parties end up signing two different unitization agreements.[870] The royalty-interest owners or lessors sign a UA with working-interest owners or

860. Kramer & Martin, *supra* note 494, at § 18 (stating that the conservation agencies of Texas and Pennsylvania are not allowed to issue a compulsory unitization order).

861. Weaver & Asmus, *supra* note 448, at 17.

862. *Id.*

863. Kramer & Martin, *supra* note 494, at § 17.03 (stating that Texas and Pennsylvania have no compulsory unitization statutes and are the exceptions).

864. *Id.*

865. *Id.* at §18.02.

866. *Id.*

867. *Id.*

868. The Interstate Oil and Gas Compact Commission (IOGCC), *supra* note 807.

869. Myers, *supra* note 441, at pg. 100.

870. Weaver & Asmus, *supra* note 448, at 17.

lessees, and a UOA is only signed between lessees to control the operational matters of unitization.[871] The reason that lessors are not typically signatory parties to the UOA is that royalty-interest owners are not interested in the daily operational activities that are covered by the UOA.[872]

a) Model Forms

The United States oil and gas industry, via active organizations, has furnished several model forms to facilitate the composition of unit agreements and unit operating agreements. Among them, the Rocky Mountain Mineral Law Foundation presented two model forms of unit operating agreements; Form 1 is for undivided interests, and Form 2 is for divided interests.[873] Additionally, the American Petroleum Institute has prepared two model forms for unit agreements and unit operating agreements, which have become very popular in the industry and have provided many revisions since 1957.[874]

b) Minimum Percentage of Participating

A unit agreement, which is engaged in by both lessors and lessees, is the legal document that generates a unit and unambiguously allocates "the basis for sharing costs and production."[875] To issue a compulsory unitization order, the conservation agency requires a voluntary unit agreement to be signed by a supermajority of lessees and lessors.[876] In addition to regulating the interests of signatory parties, the unit agreement may influence non-signatory parties, particularly non-consenting lessors.[877] However, only signatory lessors may file claims under the unit agreement.[878] Because the unit agreement involves both lessors and lessees, its language prevails over any potentially ambiguous or contradictory language in unit operating agreements.[879]

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871. *Id.*

872. *Id.* at 70.

873. Myers, *supra* note 441, at pp. 37-38 (placing the original version of both model forms of the Rocky Mountain Mineral Law Foundation in the last sections of his book).

874. Weaver & Asmus, *supra* note 448, at 17.

875. *Id.* at 69.

876. *Id.* at 70.

877. Kramer & Martin, *supra* note 497, at § 17.02.

878. *Id.*

879. *Id* (stating that the API Model Form Unit Operating Agreement expressly provides that if there is a conflict between the terms of it and the Unit Agreement, the language of the Unit Agreement prevails).

c) Unitization Agreements and Unit Operating Agreements

On the other hand, a unit operating agreement, which is only signed by lessees, allocates the cost of drilling and operation and designates one lessee or more to control the operation and determine the authority of the unit operator.[880] Furthermore, the UOA regulates the "day-to-day operations of the unit" and grants the designated unit operator-specific authorities.[881] Most model forms of UOAs bestow complete authority to possess and sell the share of production upon each lessee.[882] The UOA has similar provisions to a Joint Operating Agreement (JOA).[883] However, the JOA is designed for a cooperative agreement among lessees to jointly operate in one specific lease, while the UOA includes many parties and leases related to the entire oil and gas reservoir.[884]

III. Sole-Jurisdiction Unitization Agreements Outside of the United States

The ownership regime of mineral rights in each country has a discrete influence on mineral development, including unitization procedures. The United States, as well as Canada, to a limited extent, recognize the private ownership system of mineral rights.[885] In Canada, eleven percent of the land and its mineral substances are considered freehold or privately owned, while the rest is owned by the Canadian government (referred to as the Crown).[886] The private ownership regime of minerals in Canada has played a crucial role in the early economic growth of Canada by discovering and developing oil and gas reservoirs in the privately possessed lands.[887] However, the majority of oil and gas laws and leases, as well as unitization procedures and regulations in Canada have been imported from major oil and gas producing states in the United States.[888]

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880. *Id.* at §17.01

881. *Id.* at §17.02.

882. *Id.*

883. Weaver & Asmus, *supra* note 448, at 17.

884. *See id*; *See also* Eduardo G. Pereira, *Joint Operating Agreements: Risk Control for The Non-Operator*, 34 (Globe Business Publishing Ltd. 2013).

885. *Id*. at 12.

886. Cameron Wyatt, *Mineral Rights in Canada*, Pipeline News (Nov. 10, 2015), http://www.pipelinenews.ca/opinion/columnists/mineral-rights-in-canada-1.2102451.

887. Michael Crommelin, *Government Management of Oil and Gas in Alberta*, 13 Alta. L. Rev. 146 (1975).

888. *See* Ballem, *supra* note 742, at pg. 6; see *also* C. T. Mullane & A. P. G. Walker, *The Pooling Clause and the Effects of Unitization on the Oil and Gas Lease*, 4 Alberta L. Rev. 250, 266 (1965).

In the rest of the world, the government of a country maintains the ownership of mineral interests, including oil and gas in its territories. Moreover, the governments are the only mineral-interest owners who collect "production shares, royalties, taxes, and other contractual benefits from all license areas."[889] This section will examine unitization agreements in jurisdictions that adopted the "sovereign" ownership regime of mineral rights, meaning the oil and gas are owned and run by the governments, especially in major oil-producing countries.[890]

To examine the pertinent mineral rights of these governments, this dissertation will only focus on the model of production sharing contracts, ("PSCs") because the PSC is the most common model of oil and gas upstream contract among major producing regions,[891] except in the United States and Canada.

A. Overview of Mineral Rights and Unitization Outside of the United States

Decades before the discovery of oil in North America, the crude oil industry began in Baku, Azerbaijan, in the 1820s.[892] However, the development of petroleum geology and engineering, along with the advanced design of well-boring equipment, such as cable drilling rigs, in the United States, made North America the forerunner of the modern oil industry in the world.[893] Major oil companies soon benefited from the advanced techniques and tools in the United States to discover and recover oil and gas from petroleum reservoirs in other regions of the world.[894]

Nevertheless, the growth of the oil and gas industry in the United States was not as rapid as the rest of the world in the early Twentieth Century

889. Weaver & Asmus, *supra* note 448, at 12.

890. This research will mainly benefit from the seminal analysis that Professor Jacqueline Weaver and David Asmus jointly drafted in 2006 and compared the unitization legal framework of twelve oil-producing countries — including Angola, Azerbaijan, Brazil, China, Colombia, Ecuador, Egypt, Indonesia, Nigeria, Russia, United Kingdom, and Yemen — in their 2006 comparative analysis. Jacqueline Lang Weaver & David F Asmus, *Unitizing oil and gas fields around the world: A comparative analysis of national laws and private contracts*, 28 HOUS. J. INT'L L. 3, 10 (2006).

891. Kirsten Bindemann, *Production-Sharing Agreements: An Economic Analysis*, Oxford Institute for Energy Studies, p. 17 (Oct. 1999), https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM25-ProductionSharingAgreementsAnEconomicAnalysis-KBindemann-1999.pdf.

892. *See* Yergin, *supra* note 76, at 41 (stating that eighty-two oil pits had been hand-dug in Baku, Azerbaijan by 1829. At that time, Azerbaijan was part of the former Soviet Union).

893. *See* Ballem, *supra* note 772, at 6; *see also* Honeycutt, *supra* note 447.

894. *Id.*

because most American jurisdictions inhibited the progress of the petroleum industry through legal restrictions, such as the private ownership system of minerals and the rule of capture.[895] Outside of the United States, there were minimal legal hindrances restricting the oil and gas industry. The jurisdictions of the producing regions avoided adopting the private ownership system or any legal doctrine that would complicate local mineral development.

1. Mineral Ownership Outside the United States

Outside of the United States, oil, gas, and other minerals "belong to the state itself, or to a nominal figure, such as the British Crown, or else they may be vested in a state-owned entity such as the state oil company."[896] The right of mineral ownership and control for the states "stems from the internationally recognized principle of permanent sovereignty over natural resources" on their national lands and continental shelves.[897] The states may assign their mineral ownership rights to a foreign enterprise through the concession contract model, which is a granting instrument to develop petroleum.[898] In the PSC model, in which the states take royalties, tax, rentals, and a share of the profit, the foreign investors will not own the underground minerals "in situ or even in the wellhead."[899] However, most PSCs allow the foreign oil contractors to take their cost oil and share of profit oil in kind after the produced hydrocarbons are delivered to the points which are designated to export the products.[900]

This dissertation will use the term "government," instead of "state," to avoid confusion with the fifty states within the United States. Black's Law Dictionary defines government as "the sovereign power in a country or state;" more importantly, it "refers collectively to the political organs of a county regardless of their function or level, and regardless of the subject matter they deal with."[901] This conception of government allows the author, in contrast to the terms "state" and "country," to include the jurisdiction of more oil-producing governments, which are not sovereign states, in this

895. Myers, *supra* note 444, at pp. 18-20.

896. Mohammad Alramahi, *Oil and Gas Law in the UK*, §1.30 (Bloomsbury Professional Ltd 2103).

897. *Id.* at §1.31 (stating that the UN General Assembly, in the 1194th plenary meeting, issued Resolution 1803 (xvii) regarding the Permanent Sovereignty over Natural Resources in 1962).

898. *Id.* at §1.33.

899. Smith et al., *supra* note 636, at 464.

900. *Id.*

901. *Government*, Black's Law Dictionary (10th ed. 2014).

research to survey their unitization provisions. For instance, this research analyzes the Kurdistan region, which is one of the substantial oil and gas producing regions in Iraq and the world, while the petroleum law and fiscal regime of Kurdistan are distinct from the Federal Government in Iraq.[902]

2. The Historical Background of Unitization Outside of the United States

While the United States oil industry was reluctant to accept field-wide unitization in the early stage of operation, the international oil firms and their licensors implemented many unit operations in the rest of the world, especially in the Middle East, Europe, East Asia, and Latin America in the 1920s. For instance, two giant Venezuelan oil fields, the Mene Grande and El Mene, were operated through unitization in 1928.[903] In Europe, most oil pools were unit operated, such as Pechelbronn, France in 1924-25, and in 1928 in Baku and Grozny, which were in the Soviet Union.[904] In the Middle East, the Anglo-Persian Oil Company (APOI) operated the unitized Masjid Suleiman oil field in Iran and the Baba Gurgur oil field in Kirkuk, Iraq in the 1920s.[905]

Two main factors helped the oil and gas industry outside of the United States, and Canada accomplish field-wide unitization in the early stages of operation. First, the majority of governments conceded their mineral rights as a single license block to one or a few international oil companies. For instance, in 1901, the Shah of Persia offered the exclusive right to William Knox D'Arcy to search for oil in all of Persia.[906] Additionally, the size of each license block was over one hundred thousand acres in the Turkish territories.[907] Similar concession licenses were offered to one or two oil

902. Article 121, Dustūr Jumḥūrīyat al-'Irāq [The Constitution of the Republic of Iraq] of 2005 (authorizing the Kurdistan region to issue its own laws and regulations through its regional parliament). Oil and Gas Law of The Kurdistan Region - Iraq No. 22 of 2007 (The Kurdistan Region – Iraq). The Kurdistan region has passed its own oil and gas law in 2007 while the Iraqi federal government has yet to issue such law in Baghdad.

903. Haglund, *supra* note 747, at 576-577 (stating that the oil production of the Mene Grande oil field was over fifteen million barrels in 1928).

904. *Id.* (stating that the total oil production of Baku and Grozny was over eighty-five million barrels in 1928).

905. Yergin, *supra* note 76, at 130 (stating that the Masjid-i-Suleiman oil field in Iran was the first oil discovery in the Middle East in 1908, and the Baba Gurgur oil field was discovered in Kirkuk, Iraq in 1927); *see also* Haglund, *supra* note 747, at 576-577.

906. Yergin, *supra* note 76, at 120 & 131 (Kindle ed. Free Press 2011) (stating that after the oil was discovered in Masjid-i-Suleiman in 1908, the Anglo-Persian Oil Company was fully assigned the D'Arcy Concession in 1909).

907. Weaver & Asmus, *supra* note 448, at 7 n. 6.

companies in Latin America, Europe, North Africa, and Asia.[908] Due to the generous policy of the governments in those regions, the awarded oil companies were able to operate the entire potential oil and gas reservoirs efficiently. As a result, the operating plans of oil companies experienced minimal third-party disputes, neither over the surface interests nor the mineral rights.

Second, international oil companies, supported by their colonialist governments, made pacts to avoid competing with each other in most regions. As a result, these international oil companies pledged to operate in those regions jointly, like "sisters."[909] To illustrate, the Anglo Persian Oil Company, Royal Dutch Shell, and the French Oil Company (later Total) signed "the Red Line Agreement," to jointly discover oil in the former territories of the Ottoman Empire in 1928.[910] Under these arrangements, no competition regarding unilateral operations in a reservoir emerged among the licensees.

The unitization process was transformed in these regions due to the dramatic modification of their countries' policies and economic status, beginning in the 1960s. The spread of socialist-nationalist regimes and oil nationalization in the 1960s, as well as the rapid rise of oil prices in the 1970s, propelled international oil companies to be content with applying for small licenses in those regions.[911] Furthermore, the international oil firms were contractually obligated to relinquish their working rights to part, or all of the concession area not exploited through oil operations to the government. Governments started providing international investors with smaller blocks to maximize their resource rent in the 1980s and the 1990s.[912] Due to the increasing number of contractors, the development of oil and gas reservoirs through unitization evolved into a more extensive procedure, but still not as long as the American process.

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908. Haglund, *supra* note 747, at 576-577.

909. Yergin, *supra* note 76, at 120 & 485 (stating that the "Seven Sisters" included Standard of New Jersey (Exxon), Standard of New York (Socony-Vacuum, later Mobil), Standard of California (Chevron), Texaco, Gulf Oil, Royal Dutch Shell, and Anglo-Persian Oil Company (BP)).

910. *Id.* at 180.

911. Weaver & Asmus, *supra* note 448, at 8.

912. *Id.* (stating that many smaller blocks became available by the relinquishment of larger blocks in the 1980s and 1990s).

3. The Importance of Unitization Outside of the United States

Outside of the United States, host governments, as the sole mineral owners, will not suffer drainage if one of their licensees drains hydrocarbon from another tract within their territories.[913] As a result, the host governments, unlike in the United States and Canada, do not pursue unit operations to protect the correlative rights of lessors or licensors. However, two main factors since the 1970s have encouraged host governments outside of the United States and Canada to treat unitization favorably. Competitive operations between licensees and over-drilling have caused the depletion of natural energy drives of reservoirs, the increase in operational cost, and surface and environmental damages.[914] The prevention of "physical and economic waste" through unitization has not only become a significant objective of producing governments to increase their resource rents, but it has also become important for consuming countries whose economic growth and energy security depend on the available, accessible, and affordable hydrocarbon deposits.[915]

B. Host Governments and Unitization Agreements

Outside of the United States and Canada, mineral rights do not belong to private individuals and bodies, but rather to governments.[916] When host governments award licenses to investors to develop oil and gas reservoirs, such as through the PSC model, the host governments reserve various benefits through their interests, including the oil and gas contracts. When unitization is utilized on the adjacent licenses, the participation interests of the host governments in each license are converted to unit interests. Additionally, the jurisdiction of the host government regulates the petroleum licenses and the unitization agreements between two or more licensees that are located entirely within its territories.[917]

1. Unit Interests of Host Governments

All host governments that award oil and gas licenses to foreign enterprises, either through direct negotiations or bidding rounds, will retain a share of interests in the signed PSCs. The host governments, like the individual lessors in the United States, take "production shares, royalties, taxes, and

913. *Id.* at 12.
914. *Id.*
915. *Id.* at 7-13.
916. *Id.* at 7 & 12.
917. *Id.* at 13.

other contractual benefits from all license areas."[918] The host government's amount of interests retained in a PSC may differ significantly from contract to contract. For example, some Indonesian PSCs provide the host government with five percent of participation interests while Indonesia received over fifty percent of participation interests in another set of signed PSCs.[919] However, the most common rate of governments' interests ranges from fifteen percent in Malaysia and Vietnam to 25 percent in Angola.[920]

In most PSCs models, the host governments guarantee their participation right in the oil and gas operations through their National Oil Companies ("NOC"s).[921] For instance, the 2007 Kurdistan Model PSC states that the Kurdistan Regional Government ("KRG") would maintain an "option" of "participating" in the contract through a "public company" anytime during the contract term.[922] The host governments can also opt to have carried interests, like the private lessors in the United States and Canada who only own the carried interests. The host governments who prefer carried interests do not want to participate in the petroleum operations or pay the operational costs.[923] Therefore, host governments holding carried interests do not participate in the Joint Operating Agreement ("JOA"), which "sets out the rights and obligations of the parties" involved in the operations.[924] The Kurdistan region, for instance, has selected only to have carried interests in its PSCs because the region has yet to establish its own public oil company.[925] Furthermore, a host government that wants to participate in the operation through a public firm could structure the arrangement to hold a

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918. *Id.* at 7 & 12.

919. Bindemann, *supra* note 891, at 17.

920. *Id.*

921. *Id.* (stating that PSAs without participation can be found e.g. in Egypt, Oman, Qatar, Yemen, the Philippines, Nigeria and Turkmenistan).

922. The Kurdistan Regional Government (KRG) – The Ministry of Natural Resources, *Model Production Sharing Contract 2007*, art. 4.1, http://mnr.krg.org/images/pdfs/KRG_Model_PSC_production_sharing_contract_20071112.pdf.

923. Martin & Kramer, *supra* note 537, at 128 (defining the 'carried interest" as "a fractional interest in oil and gas property, usually a lease, the holder of which has no personal obligation for operating costs, which are to be paid by owner or owners of remaining fraction, who reimburse themselves therefore out of production").

924. Eduardo G. Pereira, *Joint Operating Agreements: Risk Control for The Non-Operator*, 34 (Globe Business Publishing Ltd. 2013).

925. The KRG has published the majority of its signed PSCs. The Krg - Ministry Of Natural Resources, PSCS Signed, (Nov. 5, 2017) http://mnr.krg.org/index.php/en/the-ministry/contracts/pscs-signed.

carried interest during the exploration stage to avoid bearing the operational risks and costs.[926]

When unitization of the oil and gas reservoir between two or more license blocks is required, the participation interests of the host governments, including the working interests of the foreign oil companies, in a license will be documented as "unit interests" in unitization agreements.[927] Outside of the United States and Canada, each license block or tract contributes a certain percentage share of petroleum deposits in the unit area, based upon "either hydrocarbon in place or recoverable reserves."[928] The unit parties rely on geological, geophysical, and engineering analyses of reservoirs to obtain accurate data and figures to ascertain the tract interests.[929] The determination of tract participation in the unit is considered a key component in the calculation of unit interests of both the host government and the IOC. The unit interests of a host government, in the sole jurisdiction unitization of two or more tracts, could be calculated by multiplying its participating interests in each tract by that tract's interest in the unit and then adding up the results.[930] Table (4.1) illustrates how the unit interests of a host government ("HG") are determined when the HG owns different participation interests in two tracts forming a unit.

Tract	Tract Participation in Unit (Y)	HG Interest in Tract (Z)	Unit Interest (Y x Z)
#1	40%	20%	8%
#2	60%	30%	18%
	Total Unit Interest of HG =		26%

Table (4.1): The calculation of unit interests of a host government (HG)[931]

926. Bindemann, *supra* note 891, at 17.

927. Paul F Worthington, Contemporary Challenges in Unitization and Equity Redetermination of Petroleum Accumulations, 34th Annual Convention & Exhibition of Indonesian Petroleum Association (2010).

928. Weaver & Asmus, *supra* note 448, at 80-81.

929. *Id.* at 81.

930. *Id.* at 83.

931. *Id.*

2. The Conservation Role of Host Governments in Unitization Agreements

Host governments, through a governmental entity, execute the conservation laws and regulations to regulate the unitization of oil and gas reservoirs that are located entirely within their territory. The role of the conservation agency may differ from one host government to another, especially in the United States and Canada. For instance, the protection of correlative rights has not been a primary task of the conservation agencies in host governments, except in the United States and Canada, where the protection of correlative rights was one of the leading reasons behind the establishment of conservation agencies.[932] The conservation laws of all host governments, however, use unitization of oil and gas reservoirs to prevent "physical waste" and "economic waste."[933] Due to physical and economic waste, in the absence of unitization, producing host governments will earn less revenue while foreign enterprises benefit from low tax payments and high-cost recovery.[934] Therefore, unitization is a preeminent instrument to increase the "resource rent" of the producing host governments.[935]

The relevant conservation body to approve unitization could be the hydrocarbons related ministry or agency, or the national oil company in some countries.[936] The public oil companies of Angola, China, and Ecuador are the only authorized entities to approve unit operations.[937] In other countries, such as Brazil, Colombia, and Egypt, a petroleum agency is responsible for unitization approval.[938] The hydrocarbon-related ministries or the ministry councils in Azerbaijan, Nigeria, Russia, the United

932. *Id.* at 36.

933. *Id.* at 35.

934. *Id.* at 13.

935. Martin & Kramer, *supra* note 537, at 911 (defining resource rent as the profits of an investment that remain after deducting that income which corresponds to the minimum return necessary to attract investment to the project in the first place. Such rent is a function of the quality of the resource, its location and the numerous other variables that affect the rate of return necessary to attract investment).

936. Weaver & Asmus, *supra* note 448, at 53.

937. *Id.* at 53-55 (stating that Sonangol in Angola, PetroEcuador in Ecuador, the China National Petroleum Corporation (CNPC) for onshore unit, and the China National Offshore Oil Corporation (CNOOC) for offshore unit are the authorized organs of these countries who approve unitization).

938. *Id.* 54-55 (stating that the National Petroleum Agency (ANP) in Brazil, the National Hydrocarbons Agency (ANH) in Colombia, and the General Petroleum Corporation in Egypt are the authorized agencies to approve unitization).

Kingdom, Yemen, and the Kurdistan region of Iraq manage unitization procedures.[939]

Most host governments expect foreign contractors to voluntarily agree, within a reasonable period, on the unitization of petroleum reservoirs that extend across their contract boundary lines.[940] Unitization in the Kurdistan region of Iraq applies to the same conservation requirement.[941] However, most host governments do not have a required minimum percentage of participating parties in their voluntary agreements.[942] Like in the United States, the agreed parties have to submit their draft of unitization agreements to the conservation agencies for the host governments' approval.[943] The jurisdiction of host governments requires the IOCs to apply for such approval to monitor the economic benefits that their countries will obtain within the unit plan.[944] In Indonesian, for instance, the conservation entity has the right of "complete discretion over the approval or disapproval of the unitized exploitation."[945] In the event of the parties' failure to agree on unitization, all host governments, except Azerbaijan, will intervene to force unitization.[946] Because many IOCs may object to such a compulsory unitization order, some PSCs, including the 2007 Kurdistan region model of PSCs, explicitly recognize the right of the objecting IOCs to apply for arbitration.[947] Besides, the conservation agency reaffirms the obligations of the unit operator to support the domestic supply and the local content in the unitization agreement.[948]

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939. *Id.* at 53-57; *see also* Oil and Gas Law of The Kurdistan Region - Iraq No. 22 of 2007 (The Kurdistan Region – Iraq) art. 47.

940. Weaver & Asmus, *supra* note 448, at 34 (stating that the governments of Angola, Brazil, China, Colombia, Ecuador, Egypt, Nigeria, and the United Kingdom clearly obliged the contract parties to try to agree on unitization voluntarily).

941. Oil and Gas Law of The Kurdistan Region - Iraq No. 22 of 2007 (The Kurdistan Region – Iraq) art. 47.1.

942. Weaver & Asmus, *supra* note 448, at 51.

943. *Id.* at 22.

944. *Id.* at 73.

945. *Id.* at 33 (stating that the Decree 402 of 1967 offered such right to the Indonesian Director General of Oil and Gas).

946. *Id.* at 34-35; *see also* Oil and Gas Law of The Kurdistan Region - Iraq No. 22 of 2007 (The Kurdistan Region – Iraq) art. 47.2.

947. Weaver & Asmus, *supra* note 448, at 33; *see also* Oil and Gas Law of The Kurdistan Region - Iraq No. 22 of 2007 (The Kurdistan Region – Iraq) art. 47.3.

948. *Id*. at 22.

C. Documenting Unitization Outside of the United States

Outside of the United States, the documentation process begins when the parties are negotiating the terms and issues of the unit agreement. The negotiation procedures among international parties are not subject to the same legal obstacles as the United States, such as various interest holders and the minimum percentage of voluntary agreements.[949] However, the unitization negotiation outside of the United States is still considered a time-consuming and complicated process because the unit typically consists of substantially large blocks in which the data may be conflicting.[950] A recommended strategy to avoid the prevalence of such conflicting data is to have the parties start their negotiations in the early stage of operations in their blocks so that the unit parties can analyze upcoming data in the field together.[951]

Outside of the United States, the documentation of unitization contains three main stages during which the unit parties either prepare new unitization agreements or present amendments to the signed unitization agreements. First, the unit parties prepare a draft of the "pre-unitization agreement," which consists of many initial studies and preliminary agreements. Next, the agreed parties provide comprehensive and multifaceted details of unitization in a formal agreement. Later, the parties will amend the unitization agreement by adding redetermined terms and figures.

1. Pre-Unitization Agreements

The initial objective of the consenting parties to the unit operation is to sign pre-unitization agreements, which are recognized as "preliminary contracts," such as a letter of intent (LOI) or a memorandum of understating (MOU), in the petroleum industry.[952] Because most host governments require licensees to conduct unitization during the early development phases of the field, the parties will prefer the preliminary measures, such as "joint technical studies," to be regulated by pre-unitization contracts, which cover the essential and complicated prospects

949. Kramer & Martin, *supra* note 497, at § 17.

950. Weaver & Asmus, *supra* note 448, at 67; *see also* Owen L. Anderson & John S. Lowe, *Unitization Agreements* (Chulalongkorn University, Thailand 2012).

951. Anderson & Lowe, *supra* note 950.

952. Peter Roberts, *Petroleum Contracts: English Law and Practice*, 3.09, 4.06 (Oxford University Press, 2nd ed. 2016) (stating that parties of a transaction sign a preliminary contract to make a temporary arrangement, "which acts as the precursor to their later entry into a further, more detailed, fully termed contract").

and principles of unitization agreement within a time-consuming negotiation process.[953] Typically, the unit parties sign a pre-unitization agreement "at the time of discovery (or appraisal) of a common reservoir, generally before commerciality is declared."[954]

In the preparation process of pre-unitization agreements, the unit parties are not restricted by standard model forms, and the drafter may choose different sizes or scopes of the contracts.[955] The unit parties may draft several pre-unitization agreements to cover separate matters, such as confidentiality, data exchange, group study of seismic and operations, sharing data acquisition costs.[956] In the pre-unitization agreement of Papua New Guinea, for instance, the participating parties included the authority, work program, and budget of a pre-unitization committee, along with many annexes regarding other pre-unitization concerns.[957] The pre-unitization agreement is no longer valid once the host government approves a final unitization and unit operating agreement.[958]

2. The Unitization and Unitization Agreement

The unit parties do not sign the principle unitization agreement once the seismic data confirms the necessity of unit operation because the parties need to accumulate extensive information regarding the reservoir and the most suitable methods of the field's development and production.[959] Unlike in the United States and Canada, most host governments favor a single unitization and unit operating agreement (UUOA), which includes all technical, operational, economic, and legal matters.[960] The preference for drafting one agreement, the UUOA, stems from the fact that the host government, within its territories, is the only mineral rights owner in all licenses awarded to investors, in contrast to the United States and Canada, where too many lessors are involved in a potential unit area.[961] The UUOA, in all likelihood, will not contain conflicting provisions that may arise from

953. Weaver & Asmus, *supra* note 448, at 23, 67-68.

954. *Id.* at 23.

955. *Id.* at 68 (stating that the Indonesian pre-unitization agreements contained fourteen pages, and the one in Papua New Guinea was drafted in fifty pages in addition to many annexes).

956. *Id.*

957. *Id.* at 69.

958. *Id* (stating that in other words, pre-unitization agreements terminate upon execution by the parties of a definitive unitization agreement).

959. *Id.* at 28, n. 57.

960. *Id.* at 70.

961. *Id.*

two separate agreements.[962] Most importantly, the conservation bodies need to examine operating details to approve the development plan of unitization.[963]

Outside of the United States and Canada, the unit parties, particularly the host government, highlight that the UUOA is only a contract; therefore, the unit parties will not transfer their property interests among themselves.[964] The UUOA grants each participating tract an undivided percentage of interest, which is also called tract interest, from the production of unit operations, even if all production is recovered from one tract.[965] In exchange, the UUOA requires each tract interest owner to bear the operational costs, with undivided percentage, and other responsibilities that are already determined in the unit operation.[966]

Before the formation of a unit, foreign oil firms already entered into a JOA to regulate the daily operational concerns of each block.[967] Also, the jurisdiction of the host government may allow the NOC to participate in the JOA for a fixed limit, for instance, only in the development stage.[968] Therefore, a few parties typically enter into the JOA. However, the UUOA is known as a "super Joint Operating Agreement" that merges all blocks of interests in one or more common reservoirs, and several operators and non-operating parties subsequently become involved in the UUOA.[969] The UUOA regulates the necessary cooperative operations among the licensees and also authorizes the unit operator to interact with operators of other JOAs in the participating blocks regarding their interfering operations.[970]

Outside of North America, the host governments do not select various model forms of unitization agreements. Very few host governments have a model form UUOA to facilitate the process of drafting. Ecuador has a model form unitization agreement called "the Operating Agreement for the Unified Production of the Common Deposit."[971] Nevertheless, the Ecuadorian model fails to embrace many required provisions, such as the

962. *Id.*
963. *Id.*
964. Anderson & Lowe, *supra* note 950.
965. *Id.* at 78.
966. *Id.*
967. Pereira, *supra* note 924, at 34 (stating that parties of a JOA are either the operator, who leads the joint venture and non-operators, who take responsibility to contribute their share of operational costs).
968. *Id.* at 40.
969. Weaver & Asmus, *supra* note 448, at 22.
970. *Id.*
971. *Id.* at 59.

procedure for operator removal and the interest sharing adjustment.[972] The Association of International Petroleum Negotiators ("AIPN"), a Houston-based petroleum institute, presented a model form of the sole-jurisdiction UUOA in 2006, named the "Model Form International Unitization and Unit Operating Agreement," containing twenty-one Articles and seventeen Exhibits.[973] The AIPN scholars are revising the 2006 model form of UUOA, which includes required provisions of the cross-border international unitization and unit operating agreement.[974]

3. Redetermination of Unit Interests

Before signing the UUOA, it is unlikely that the unit parties will have sufficient technical data on the reservoir to determine the unit interests because most unit operations begin at the early development phases of the reservoir.[975] During production, the unit operator obtains more data, which may be different from the initially relied-upon data, to create the "unit area" and "unit substances" in each tract.[976] The new data will affect the share of unit parties in the operational costs and the volume of unit production, particularly the overall host government's takes, such as royalty and tax.[977] The unit operator will present information to the unit parties to negotiate for a potential adjustment of tract interests once new data comes to light. The expression of "redetermination" detonates any modification of tract interest that may occur after signing the UUOA.[978] The redetermination may require the expansion of the unit area to include a more substantial subsurface of participating tracts or new tracts.[979]

One of the main features of the redetermination of unit interests in the UUOA is that the adjustment of tract interests will not establish a new value; instead, it only modifies the determined value of interests.[980] Although there is no restriction on the total number of redeterminations, the

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972. *Id.*

973. Association of International Petroleum Negotiations (AIPN), *Model Form International Unitization and Unit Operation Agreement* (2006), https://www.aipn.org/forms/store/ProductFormPublic/unitization-and-unit-operating-agreement-2006.

974. Association of International Petroleum Negotiations (AIPN), *Model Contract: International Unitization and Unit Operation Agreement – Revision Of 2006 Model Form*, https://www.aipn.org/model-contracts/ (last viewed on November 15, 2017).

975. Weaver & Asmus, *supra* note 448, at 84.

976. *Id.* at 74-80.

977. *Id.* at 84-95.

978. *Id.* at 84.

979. *Id.*

980. *Id.*

unit operator is practically able to apply for one or two redeterminations of unit interests.[981] Also, the unit operator will usually not apply for redetermination in the end life of the reservoir because of possible low recovery and high operational costs.[982] Finally, the unit parties may not be able to agree on the redetermination bases, and in such case, the unit parties could turn to expert determination, arbitration, or litigation to resolve their disputes.[983]

IV. Conclusion

Sole-jurisdiction unitization agreements in the United States entail more complicated and time-consuming procedures than in the rest of the world, despite the high degree of host government involvement in the unit operations elsewhere. Although the United States has successfully operated numerous unit operations for decades in comparison to other countries, many legal characteristics, predominantly the private ownership system of mineral rights and the rule of capture, have inhibited the potential for more unitization in the United States. Outside of the United States, sole-jurisdiction unitization agreements have primarily confronted the common challenges of determination and redetermination of tract interests during the development stage of oil and gas reservoirs.

981. *Id.* at 85.
982. *Id.* at 86.
983. *Id.*

CHAPTER FIVE: CROSS-JURISDICTION UNITIZATION AGREEMENT: A LEGAL SOLUTION TO THE ISSUE OF CROSS-JURISDICTION PETROLEUM RESERVES BETWEEN IRAN AND IRAQ

I. Introduction

Together, Iraq and Iran share the greatest number of significant joint oil reserves than any of their other neighbors. Neither country has developed the majority of these joint oil fields, which means there is less information about the geography and technical matters of these fields. As a result, Iraq and Iran are incentivized to closely cooperate in unitizing their joint fields without much concern about dissimilar information about the reservoirs. The majority of these joint oil fields between Iraq and Iran are located in the central and southern frontier lands. Some of these joint fields hold more than tens of billions of barrels of oil, particularly those near the Persian Gulf. Since the establishment of a new Iraqi government after the fall of the Saddam regime in 2003, the countries have discussed the joint management of their shared oil fields. However, various political, economic, and technical factors prevented the unitization of the joint fields. This chapter will discuss the position of both countries in the global energy market, the level of energy cooperation between them, the joint initiatives to negotiate unitization, and the incidents and military confrontations over these joint oil fields between Iraq and Iran. Finally, the chapter focus on the necessity of and potential steps toward a cross-jurisdiction unitization treaty and unit operating agreement between Iraq and Iran.

II. Energy Relationship of Iraq and Iran

A. Iran

The vast fossil fuel deposits in Iran, amassing 157 billion barrels of proven oil reserves and about 1,200 trillion cubic feet (Tcf) of proven natural gas reserves, has contributed to Iran establishing a significant role in the global energy market and economy.[984] Iran, a founding member of OPEC, has continuously increased production of and exports of natural gas, leading to its rank as the world's third-largest producer of dry natural gas

984. U.S. Energy Information Administration (EIA), *Country Analysis Executive Summary: Iran*, 1 &5 (Jan. 2019). (stating that Iran is the world's fourth largest and second largest reserve holder of oil and natural gas, respectively).

after the U.S. and Russia.[985] The majority of producing oil fields in Iran are located onshore in the southwest portion of the country, near its border with Iraq, whereas the Persian Gulf holds the majority of Iranian natural gas reserves (*see* figure 5.1).[986] Currently, Iran produces less than one-third of its peak crude oil production rate, which occurred in 1976.[987] On the other hand, Iran successfully enlarged its natural gas sector and produced about 9.5 Tcf natural gas in 2017 (10% more than its 2016 output).[988] However, increasing domestic consumption of hydrocarbons prevented Iran from achieving its potential revenue from the natural gas sector.[989]

985. Organization of the Petroleum Exporting Countries (OPEC), *2018 Annual Statistical Bulletin* (2018); U.S. Energy Information Administration, *supra* note 984, at 5. Iran increased its natural gas production from 199 billion cubic meter (bcm) in 2013 to 238 bcm in 2017. In 2017, the natural gas production of the U.S. and Russia were 762 bcm and 649 bcm, respectively.

986. U.S. Energy Information Administration, *supra* note 984, at 7 &15 (stating that 55% of gas production of Iran is produced from its largest field, South Pars, which is jointly shared with Qatar in the Persian Gulf).

987. Hossein Akhavi-Pour et al., *The Economy, Iran: a Country Study* 162 (5th ed. 2008) (stating the peak production of Iranian crude oil, 6.6 MMB/D, occurred in 1976); Org. Petroleum Exporting Countries [OPEC], *2018 Annual Statistical Bulletin*, *supra* note 985, at 32; U.S. Energy Information Administration (EIA), *Iran Has Produced and Exported Less Crude Oil Since Sanctions Announcement* (Oct. 23, 2018), https://www.eia.gov/today inenergy/detail.php?id=37352. (the oil production rate of Iran was 3.86 MMB/D in 2017, which sank to 2.7 MMB/D in June 2018.)

988. U.S. Energy Information Administration, *supra* note 984, at 14 (stating that the gross dry natural gas production of Iran was about 7.3 Tcf in 2017. After the U.S. and Russia, Iran is the third-largest producer of dry natural gas in the world).

989. *Id.* at 11 & 14 (stating that the crude consumption of Iran was 1.7 MMB/D in 2017. Also, Iran is the fourth-largest consumer of natural gas in the world by consuming 6.9 Tcf natural gas,)

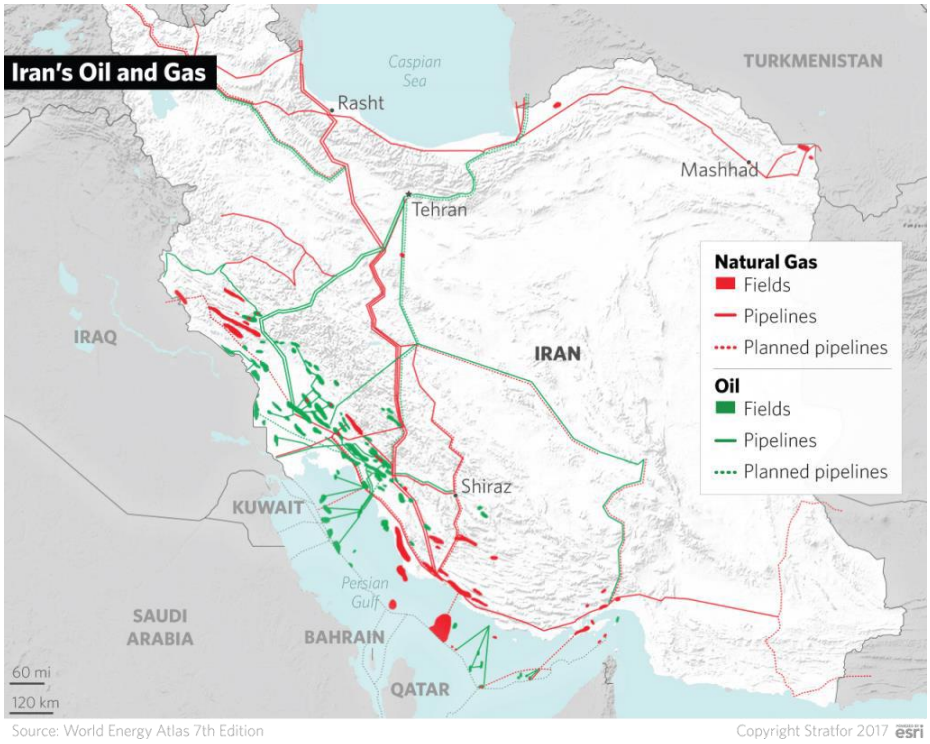

Figure (5.1): Proven Oil & Gas Reservoirs of Iran[990]

The investment in developing the Iranian oil sector began in the late 19th Century[991]. The commercial production of Iranian crude oil commenced because of an oil concession by the Shah of Persia to William Knox D'Arcy in 1901.[992] The first Persian oil discovery occurred in Chia Surkh (Red

990. *The Biggest Obstacle to Iran's Energy Makeover is Itself*, Worldview Stratfor, https://worldview.stratfor.com/article/biggest-obstacle-irans-energy-makeover-itself.

991. *See* G. M. Lees, *The Oilfields of the Middle East*, 3 World Petroleum Congress 94 (1951) (stating that in 1855, the British geologist, William Loftus, had presented "the first scientific description of the oil occurrences of Iran (Persia) and Iraq, and the first project for mineral and petroleum development in Iran by British interests dates from 1872." A joint British-German company conducted the first exploration operation in South (Qishm Island) and Southwest (Daliki, Bushihr) Iran in 1891-93); *see also* Yergin, *supra* note 76, at 119 (stating that Shah of Persia provided Baron Julius de Reuter, founder of the Reuters news agency, with a concession in 1872 and again in 1889 to exploit and produce oil in Iran).

992. Yergin, *supra* note 76, at 120-21 (stating that D'Arcy was able to convince Muzaffar al-Din Shah Qajar of Persia to award a sixty-year concession allowing him to exclusively develop oil and gas in the whole Iran; in exchange, Shah of Persia received

Mountain) in the Northwest of Qasr Shirin, Kermanshah, near the frontier of Persia with the Ottoman Empire (present Iraq) in 1903.[993] Five years later, D'Arcy's firm, which later merged into the Anglo-Persian Oil Company, was surprised by a massive oil discovery in Masjid Suleiman.[994] The Iranian oil industry, which was the largest oil producer in the Middle East in the 1940s, supported Britain and the allies during and after World War II.[995]

The Iranian oil industry has been influenced by two major political incidents. First, the absolute ownership and control of the British firm over Iranian oil fields ended when the Prime Minister of Iran, Mohammad Mossadegh, nationalized oil in 1951.[996] The 1979 Islamic revolution, along with its subsequent crises, including the U.S. embargo, also affected the Iranian oil industry.[997] As a result, the Iranian oil and gas sector — after golden decades of high production — suffered over the last four decades because of political turning points, including the 1979 revolution,[998] the 1980-88 Iran-Iraq War,[999] and the U.N. and American economic sanctions against the Islamic Republic of Iran.[1000] Due to recent sanctions of the U.S.

"twenty thousand pounds in cash, with another twenty thousand pounds' worth of shares, as well as 16% of 'annual net profits.'").

993. Lees, *supra* note 991, at 94; E. Willard Miller, *The Role of Petroleum in the Middle East*, 57 Sci. Monthly, no. 3, Sep. 1943, at 240, 242; غربی، روزنامه دنیای اقتصاد شماره ٤٥٦٣ میادین مشترک نفت در سرحدات.

994. Lees, *supra* note 991, at 94 (stating that the oil production of "Masjid-i-Sulaiman reached nearly 900,000 tons in 1918," and its peak production rate of more than 112 million tonnes occurred in 1951); *see also* Yergin, *supra* note 76, at 130-31 (stating that in 1909, the Burmah Oil Company and the Glasgow Branch of the Bank of Scotland agreed to financially enhance the oil Concession of Persia through a new public enterprise, the Anglo-Persian Oil Company, and D'Arcy "received shares worth a market value of £895,000.").

995. *See* E. Willard Miller, *The Role of Petroleum in the Middle East*, 57 Sci. Monthly, no. 3, Sep. 1943, at 240, 242; *see also* Lees, *supra* note 991, at 95 (stating that the Anglo-Persian Oil Company doubled its production in Iran, from 16.8 million tonnes in 1945 to 31.75 million tonnes in 1950 to help the post-war re-construction of the Europe).

996. Yergin, *supra* note 76, at 525437 (2011), (Kindle ebook).

997. *Id.* at 682-85 (stating that the 1979 Islamic revolution removed the pro-western regime of Shah in Iran; soon, the followers of Ayatollah Khomeini invaded the U.S. Embassy in Tehran and took more than sixty American hostages for more than 15 months. At the same year, hundreds of pilgrims, sympathized by the Iranian Islamic revolution, seized the Great Mosque in Mecca, Saudi Arabia to protest the Saudi link to the West.).

998. *Id.* at 685.

999. *Id.* at 688.

1000. Ashish Kumar Sen, *A Brief History of Sanctions on Iran*, ATLANTIC COUNCIL (May 8, 2018), https://www.atlanticcouncil.org/blogs/new-atlanticist/a-brief-history-of-sanctions-on-iran (stating that in sixteen different years, either the U.N. or the U.S. have

government against Iran in May 2018,[1001] the Iranian oil export is expected to drop drastically, from 3.8 MMB/D in 2017 to less than one MMB/D by the end of 2019.[1002]

Currently, the Iranian oil industry is aiming to raise adequate capital and have access to modern technology to increase its oil and gas production rate to the targeted level.[1003] However, the previous "buy-back" petroleum contract model failed to attract foreign investors, and Iran is currently struggling to develop its oil and natural gas fields because of the lack of capital investment and advanced technology.[1004] Over the last five years, the Iranian government attempted to attract foreign investment in its oil and gas sectors by modifying the petroleum contract model.[1005] Nevertheless, major foreign enterprises refrained from taking risks of investing in the Iranian market and its oil industry due to the recent U.S. sanctions against Iran.[1006]

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declared substantial economic, military, and scientific sanctions against the Islamic Republic of Iran since 1979).

1001. U.S. Energy Information Administration, *supra* note 984, at 2 (stating the U.S. government withdrew from the 2015 Joint Comprehensive Plan of Action (JCPOA), which was an intranational agreement regarding the Iranian nuclear program and declared hefty sanctions against Iran in May 2018).

1002. Patti Domm & Tom DiChristopher, *US Sees Room to Be More Aggressive on Sanctions and Take Iran Oil Exports to Zero*, CNBC (Mar. 13, 2019), https://www.cnbc.com/2019/03/13/us-thinks-it-can-be-more-aggressive-in-taking-iran-oil-exports-to-zero.html.

1003. Nima Nasrollahi Shahri, *The Petroleum Legal Framework of Iran: History, Trends and the Way Forward*, 8 China & Eurasia F. Q. 111, 125 (2010) (stating that Iran needs more than 70 billion USD to raise its oil production to seven MMb/d by 2020.).

1004. Paul Stevens, *Prospects for Iran's Oil and Gas Sector*, CHATHAM HOUSE: ROYAL INST. OF INT'L AFFAIRS, Research Paper (Mar. 2015), at 8.

1005. Rania El Gamal et al., *As Iran Oil Tenders Near, Investors Still in the Dark on Terms*, Reuters (Oct. 20, 2016), https://www.reuters.com/article/us-iran-oil-contracts/as-iran-oil-tenders-near-investors-still-in-the-dark-on-terms-idUSKCN12K1M1 (stating that Iran presented a new model of petroleum contract, Iranian Petroleum Contract [IPC], set aside the Iranian Buy-Back contract model, which had not provided the IOCs with a friendly terms since 1990s).

1006. Stephanie Segal, *The Economic Impact of Iran Sanctions*, Ctr. Strategic & Int'l Stu. [CSIS] (Nov. 5, 2019), https://www.csis.org/analysis/economic-impact-iran-sanctions; *see also* Cyril Altmeyer, Total tells Iran it's quitting South Pars gas project, REUTERS (Aug. 20, 2018, 10:06 AM), https://www.reuters.com/article/us-iran-france-total-gas/total-tells-iran-its-quitting-south-pars-gas-project-idUSKCN1L51LH (stating that the French oil firm, Total exited form the multi-billion-dollar project of South Pars, the largest natural gas reserve of Iran in 2018); *see also* U.S. Energy Information Administration, *supra* note 984, at 7 & 15 (stating that 55% of gas production of Iran is produced from its largest field, South Pars, which is jointly shared with Qatar in the Persian Gulf).

B. Iraq

As the western neighbor of Iran, Iraq also owns significant onshore oil fields totaling more than 145 billion barrels of proven oil, which places Iraq as the world's fifth-largest owner of proven oil reserves.[1007] Since late 2017, Iraq increased its crude oil production to 4.5 MMB/D, making Iraq the second-largest oil producer in the OPEC.[1008] The oil export revenue accounts for more than 85% of the Iraqi government's total revenue.[1009] Despite the considerable volume of proven natural gas in Iraq,[1010] the country has been unable to produce more than 10.5 billion cubic meters ("bcm") of natural gas per year.[1011]

The Iraqi oil industry was instituted shortly after the discovery of oil in Iran in 1908. The successful production of crude oil in Iran by Anglo-Persian Oil encouraged Britain to expand its ambitions to control the southern areas of the Ottoman Empire, particularly the area that later became Iraq, which was "laying in a continuation of [the] proved structural zone of Iran."[1012] After creating Iraq as a new state in 1920, the British mandate of Iraq established the Iraq Petroleum Company ("IPC"), whose major shareholders were the Anglo-Persian Oil Company and the Shell Group, as well as French and American oil firms.[1013] The 1927 discovery of

1007. *2018 Annual Statistical Bulletin*, *supra* note 985, at 32; U.S. Energy Information Administration, *supra* note 984, at 1.

1008. *Id.*

1009. International Monetary Fund (IMF), *Staff report for the 2017 Article IV Consultation with Iraq*, IMF Country Report no. 17/251 (Aug. 9, 2017), Table 3, page 34 (stating that out of USD79 billion of the total Iraq revenue in the mid-2017, about USD69 billion was earned from crude oil export, which is about 86% of the total GDP).

1010. *See* British Petroleum (BP), *2018 Statistical Review of World Energy*, at 26 (Jun. 2018), https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2018-full-report.pdf (stating that the estimated proved natural gas of Iraq in 2017 was more than 3.5 trillion cubic meter (Tcm), which it places Iraq as the world's 11th largest proved gas reserves); *see also 2018 Annual Statistical Bulletin*, *supra* note 985, at 32 (stating that Iraq holds more than 3.7 tcm).

1011. *See id*. at 28; *2018 Annual Statistical Bulletin*, *supra* note 985, at 115; *see also* Luay J. Al-Khatteeb, Natural Gas in the Republic of Iraq, 37-38 (2013) (stating that the lack of governmental policy and supporting legal framework for international investors to inject foreign capital to develop the sector of natural gas in Iraq are the main reasons for such devastating status of natural gas development in Iraq).

1012. Lees, *supra* note 991, at 94.

1013. *See* Yergin, *supra* note 76, at 188 (stating that the IPC was a new name that Britain and its allies chose for the Turkish Petroleum Company (TPC) after the creation of Iraq. Before 1920, British firm and its French and German partners was conducting oil

oil in North Iraq emboldened Britain and its allies to sign "the 1928 Red Line Agreement," of which the IPC was awarded an exclusive concession to discover and produce oil from Iraq and other areas of the dismembered Ottoman Empire.[1014]

For more than two decades, the giant oil fields of Kirkuk in northern Iraq were the main source of revenue for building the new state of Iraq.[1015] Later, the discovery of giant oil fields in southern Iraq, including the Rumaila and West Qurna oil fields in the 1950s and 1970s, considerably increased the importance of Iraq's role in the global energy market.[1016] Before the invasion of Iran in 1980, Iraqi oil production reached 3.8 MMB/D.[1017] The reckless aggression of Saddam Hussain — the President of Iraq from 1979 to 2003 — towards neighboring countries of Iran and Kuwait cost the Iraqi oil industry a significant amount of money during and after the 1980-88 Iran-Iraq war and the 1990 Iraqi invasion of Kuwait.[1018] Even after overthrowing Saddam's regime in 2003, and the Iraqi government was provided with considerable foreign funding, Iraq operated far below its economic objectives, producing less than 2.5 MMB/D for

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exploration in the southern territories of Ottoman Empire through the TPC which had been awarded an oil concession by the Ottoman Emperor).

1014. *Id*. at 265 (stating that Britain had already excluded Kuwait from being part of the consortium with other British allies. Later in 1940s, the U.S. "ruled out Saudi Arabia and Bahrain").

1015. Willard Miller, *supra* note 995, at 246-248 (stating that by the time the Iraq oil pipeline was completed in 1935 to transport Kirkuk's oil to Europe through the Mediterranean Sea, the production of Kirkuk oil was quadrupled [up to 27 MMB per year]. In 1940s and 1950s, the oil revenue from Kirkuk, and Khanaqin oil fields were the main source of public fund for major Iraqi projects, including, but not limited to, the irrigation system of the middle and southern parts of Iraq, for instance the Habbaniya Lake project, and the railroad project. Also, the Kirkuk fields was an important source of oil and fuel for the British Army and its allies during and after the World War II).

1016. Mahendra K. Verma et al., Petroleum Reserves and Undiscovered Resources in the Total Petroleum Systems of Iraq: Reserve Growth and Production Implications, 9 GEOARABIA 51, 53 (2004); see also Kamil Al-Mehaidi, Geographical Distribution of Iraqi Oil Fields and Its Relation with The New Constitution (Revenue Watch Institute 2006) (stating that the southern oil reserves form more than 70% of the total proved oil reserves of Iraq).

1017. Robert E. Ebel, Geopolitics and Energy in Iraq: Where Politics Rule, 18 (2010).

1018. Abdul Jaleel Oda Hussain, *The Oil Industry and Missed Opportunities in Iraq*, 2 Eur. J. Acc. Auditing & Fin. Res., n. 6, (Aug. 2014), at 1, 9 (stating that Iraq's oil export decreased to 861,000 B/D in 1985, and after the invasion of Kuwait was less than 300,000 B/D in 1995).

many years.[1019] However, the oil sector in Iraq has remarkably grown to produce over 4.6 MMB/D since 2014.[1020] Despite the 2014 invasion of the Islamic State of Iraq and al-Sham (ISIS) and the 2015 collapse of oil prices, the Iraqi central government was able to establish a less corrupt environment for its oil industry.[1021]

The Iraqi government plans to produce up to 6.5 MMB/D by 2022.[1022] Such a high objective will require general political and economic reform in Iraq and legal and technical improvements to the Iraqi oil industry. The lack of "power-sharing arrangements" among the main ethnic groups of Iraq — the Shi'ites, Sunnis, and Kurds — has been the main source of political instability in Iraq since 2003.[1023] To improve political, economic, and security, the leadership of major political parties in Iraq, needs to reach a consensus over the constitutional rights and obligations of the Iraqi central government, the Kurdistan regional government, and other local governorates.[1024] The Iraqi Parliament also needs to pass its 2007 draft of hydrocarbon law and modify its current petroleum fiscal regime of Technical Service Contracts in a way that encourages major international oil firms to invest in the oil and gas fields of Iraq.[1025] Furthermore, Iraq needs to fix technical issues facing its oil industry, including, but not

1019. *See* Ebel, *supra* note 1017 (stating that after the in 2003 invasion of Iraq, the U.S. had provided the Iraq oil sector with $2.7 billion fund. However, the 2007 report of the U.S. Government Accountability Office informed the Congress that "the oil production [of Iraq] had consistently fallen below U.S. program goals." The report stated that such failure had stemmed from many internal reasons, including, but not limited to, the lack of adequate metering system, corruption, theft, sabotage, and brain drain); *see also* Ahmed Mehdi, *Iraqi Oil: Industry Evolution and Short and Medium-Term Prospects*, The Oxford Institute for Energy Studies, 8-9 (2018) (stating that the al-Maliki government, 2006-2014, was unable to increase the oil export capacity of Iraq more than 2.5 MMB/D).

1020. Ahmad Mahdi, *Changing Fortunes for Iraq in 2019*, Petroleum Economist (Jan. 31, 2019), https://www.petroleum-economist.com/articles/politics-economics/middle-east/2019/changing-fortunes-for-iraq-in-2019 (stating that the oil export of Iraq was 3.58 MMB/D in August 2018).

1021. Mehdi, *supra* note 1019, at 8 (stating that the Abadi Administration, 2014-2018, revealed many cases of corruption authorized by the former Prime Minster al-Maliki. Also, Abadi took many initiatives to fix the mismanagement in the oil industry and reduce the bureaucratic delay in facilitating the IOCs' personnel in Iraq).

1022. Maher Chmaytelli, *Iraq Cabinet Approves Raising Crude Oil Output Capacity*, Reuters (Apr. 02, 2018), https://www.reuters.com/article/us-iraq-oil/iraq-cabinet-approves-raising-crude-oil-output-capacity-idUSKCN1H81FL.

1023. Meghan O'Sullivan, Iraqi Politics and Implications for Oil And Energy, 4 (2011).

1024. *Id.* at 11.

1025. Christopher Clement-Davies, *Iraq's Oil and Gas Framework*, 4 Int'l Energy L. Rev. 138, 146-47 (2009).

limited to, the shortage of required water or gas supply for injection purposes, as well as the inadequacy of midstream and onshore storage sectors to increase production from all oil fields of Iraq (*see* figure 5.2) to accomplish its production rate objective by 2022.[1026]

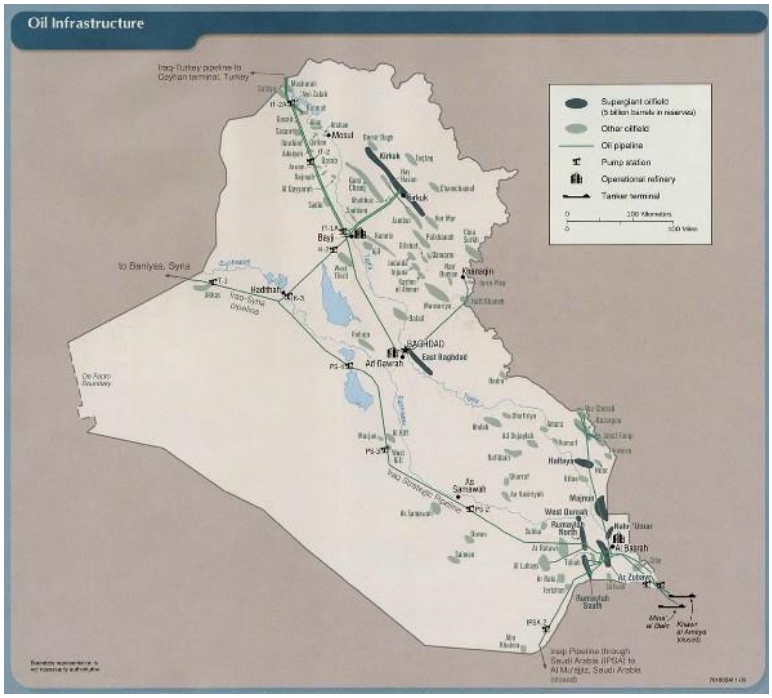

Figure (5.2): Oil Reservoirs of Iraq[1027]

In addition to the Iraqi the central government, Iraqi Kurdistan has played a semi-autonomous and noted role in the world energy market for more than a decade.

1. The Kurdistan Region of Iraq

Iraqi Kurdistan is one of four main parts of the Great Kurdistan or the land of the Kurds, that was gerrymandered by France and Britain after

1026. Mehdi, *supra* note 1019, at 15-21.
1027. Ebel, *supra* note 1017.

World War I.[1028] In ignorance of the Kurdish "self-determination" right and in contradiction to the international pledge to establish a Kurdish state, Iraqi Kurdistan came to be under the Mandate of Britain and then was annexed by Iraq.[1029] For more than eight decades, the Iraqi Central Government ("ICG"), particularly during Saddam's regime from 1979 to 2003, violently suppressed the Kurdish resistance in Iraq.[1030] Eventually, the 2005 Iraqi Constitution recognized the establishment of a federal region for Iraqi Kurds, the Kurdistan Region of Iraq ("KRI") (*see* figure 5.3).[1031] However, the ICG and the Kurdistan Regional Government ("KRG") quarreled over two major disagreements, which caused armed conflicts between the two governments. The fate of the disputed territories between the ICG and the KRG has sowed extreme dissension between the two governments for many

1028. M. R. Izady, *Kurds and the Formation of the State of Iraq, The Creation of Iraq, 1914–1921*, 95-96 (Reeva Spector Simon & Eleanor H. Tejirian eds., 2004) (stating that following the entrance of the Ottoman Empire into the World War I, Britain and France gerrymandered Ottoman Kurdistan per the 1916 Sykes-Picot Agreement.).

1029. *Id.* at 98-102.

1030. *Id.* at 105 (stating that the aggressive answer of the British and Iraqi governments to the Kurdish question in Iraq expanded the unrest of Kurdish tribes to major nation-wide revolts of Kurds. During 1920-1932, the Britain Royal Air Force, brutally exterminated several Kurdish tribes and villagers); Michael J. Kelly, *The Kurdish Regional Constitutional within the Framework of the Iraqi Federal Constitution: A Struggle for Sovereignty, Oil, Ethnic Identity, and the Prospects for a Reverse Supremacy Clause*, 114 Penn St. L. Rev. 707, 717-26 (2010) (stating that a major nation-wide rebellion of Kurds, led by General Mustafa Barzani, forced the Iraqi central government to accept the Kurdish terms and to declare establishing the autonomous Kurdistan Region of Iraq (KRI) in 1970. However, the Iraqi central government broke the peace deal and resumed the war with the Kurds in 1974. The Iraqi central government, under leadership of Saddam Hussain, had never planned to fully implement the 1970 peace agreement, particularly the restoration of oil-rich Kurdish areas of Kirkuk and Khanaqin to the KRI. Later, the 1975 Algiers Accord allowed Saddam and Shah of Iran to collude in thrashing the Kurds. From 1975 to 1988, the Iraqi government committed genocide against the Kurds and destroyed thousands of Kurdish villages. To change the demography of the KRI, Saddam's regime removed hundreds of thousands of Kurds from the KRI, particularly the oil-rich areas, and operated the Arabization campaigns — thousands of Arab families from South Iraq moved to the KRI. In 1991, the defeat of the Iraqi Army in the Second Gulf War provided the Kurds with an opportunity to rise against the Saddam's regime to liberate major parts of the KRI, formed a functioning semi-autonomous administration with no control from Baghdad till 2003. After the removal of the Saddam's regime in 2003, the Kurdish request of "self-determination" was again denied by the international and regional powers, forcing the Kurds to be content with "autonomy and regionalism within a federal structure" in 2003).

1031. Article 117, Section 1, Dustūr Jumḥūrīyat al-'Irāq [The Constitution of the Republic of Iraq] of 2005.

years.[1032] The ICG and the KRG have also had a legal dispute over the constitutional authorities of Kurdistan to develop oil and gas resources within the Kurdish region and in disputed territories.

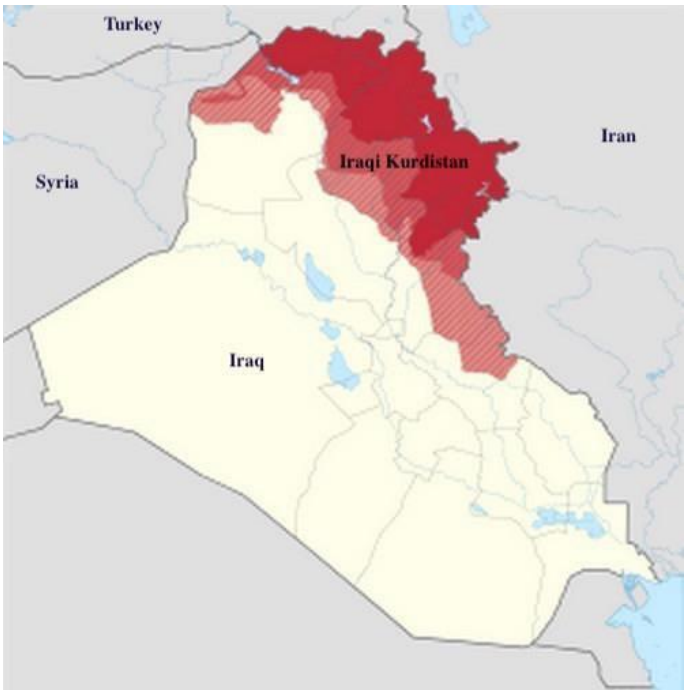

Figure (5.3): Iraqi Kurdistan[1033]

Since the establishment of the KRI, the KRG has entered into petroleum exploration contracts with several regional and international oil companies.[1034] In 2007, the KRI issued a local hydrocarbon law[1035] and

1032. Larry Hanauer et al., *Managing Arab-Kurd Tensions in Northern Iraq After the Withdrawal of U.S. Troops* (Rand National Defense Research Institute 2011) (referring to a quote by General Raymond Odierno, former commander of Multi-National Force–Iraq (MNF-I), considering Arab-Kurdish tensions "as the greatest single driver of instability in Iraq.").

1033. Samuel Helfont, *Homage to Kurdistan*, Foreign Policy Research Institute (April 13, 2016), https://www.fpri.org/article/2016/04/homage-to-kurdistan/.

1034. Robin Mills, *Under the Mountains: Kurdish Oil and Regional Politics*, Oxford Inst. for Energy Stud., 8-9 (2016) (stating that the KRG signed oil contracts with many oil companies, including Turkey's Genel Energy/Petoil in 2003, Addax in 2005, Norway's DNO in 2004, Canada's Western Zagros in 2006, and the UAE's Crescent Petroleum/Dana Gas in 2007.).

model Production Sharing Contract ("PSC"),[1036] which attracted investments from major oil companies — including Chevron, Total, ExxonMobil, Marathon, Hess, and Gazprom — in the inchoate Kurdistan petroleum industry.[1037] By 2012, the KRG signed over forty-five PSCs to explore, produce, and develop its oil and gas reserves.[1038]

The KRG estimates the total oil reserves of Kurdistan, excluding disputed territories, to be about forty-five billion barrels of oil.[1039] Ignoring the ICG's order to deliver the total oil production of Kurdistan, the KRG built its pipeline to export its crude to the global market through Turkey in 2013.[1040] The current crude production of the KRG is more than 400,000 b/d.[1041] The KRG claims that the Kurdish crude production rate can reach two million barrels per day if the international oil enterprises invest more in the development of the currently producing oil fields in the KRI.[1042] Additionally, the KRI holds a considerable amount of natural gas.[1043]

C. Energy Cooperation Between Iran and Iraq

The political and economic relations between Iran and Iraq have gradually improved since the fall of the Saddam regime in 2003 and led to increased cooperation. The Islamic Republic of Iran, which is substantially inhabited by the Shi'a denomination, has aimed "to preserve the unity of

1035. Oil and Gas Law of The Kurdistan Region - Iraq No. 22 of 2007 (The Kurdistan Region – Iraq).

1036. Model Production Sharing Contract (2007) (The Kurdistan region – Iraq).

1037. Mills, *supra* note 1034, at 11.

1038. The Kurdistan Regional Government (KRG) – The Ministry of Natural Resources, http://mnr.krg.org/index.php/en/oil/vision.

1039. *Id.*

1040. *See* Reuters, *Iraqi Kurdistan Poised to Pipe Oil to World via Turkey* (Apr. 17, 2013), https://www.reuters.com/article/us-iraq-kurdistan-oil/iraqi-kurdistan-poised-to-pipe-oil-to-world-via-turkey-idUSBRE93G08Q20130417 (stating that the KRG upgraded the delivery capacity of its pipeline to one million barrels in 2018).

1041. Patrick Osgood, *Iraqi Kurdistan Begins its Recovery After a Difficult Year*, Petroleum Economist (Jan. 3, 2019), https://www.petroleum-economist.com/articles/politics-economics/middle-east/2019/iraqi-kurdistan-begins-its-recovery-after-a-difficult-year.

1042. The Kurdistan Regional Government (KRG) – The Ministry of Natural Resources, http://mnr.krg.org/index.php/en/oil/vision.

1043. *See* Oil & Gas Journal, *Worldwide Look at Reserves and Production*, (Jan. 7, 2014), https://www.ogj.com/home/article/17211002/worldwide-look-at-reserves-and-production (stating that Iraq holds about 112 Tcf of proven natural gas reserves); *see also* Javier Blas, *Natural Gas: North Looks to Tap into Long-Term Export Potential of Vast Reserves*, Financial Times (Dec. 6, 2011) (referring to the U.S. Geological Survey that estimated the proven natural gas reserves of Kurdistan up to 60 Tcf).

the Shi'a political groups to ensure Shi'a dominance in the Iraqi political system."[1044] Iran has also sought to eliminate Iraq's economic and cultural dependence on Turkey and Arab countries.[1045] The "cultural-societal commonalities" between Iran and Iraq have allowed for a dramatic shift in Iran's "economic and cultural-political" position in post-2003 Iraq.[1046] With such an opportunity, Iran plans to increase its trade worth with Iraq by up to $20 billion (USD) per year in upcoming years.[1047] Additionally, the majority of Iranians — who are Shi'a believers — and the Iranian government sought to maintain a stable, friendly, and long-term relationship with Iraq in order to easily visit the most sacred Shi'a cities, Karbala and Najaf, which are both in Iraq.[1048]

Given the considerable level of economic exchange between the two neighboring states, Iraq has grown to be remarkably dependent on Iranian natural gas and electricity in recent years.

1. Electricity and Natural Gas

The most indispensable commodity offering efficiency and comfort to the daily life of Iraqis living in a desert environment — reaching temperatures of 122 degrees Fahrenheit during summer — is "the steady and reliable supply of affordable electricity."[1049] However, the majority of Iraqis have suffered from a lack of affordable electricity for many years.[1050] The ineffective Iraqi electricity industry has encountered three significant challenges. First, the electricity infrastructure in Iraq suffers from "aging and inefficient physical" conditions.[1051] In fact, the Iraqi transmission grid

1044. Luay J. Al-Khatteeb, *Natural Gas in the Republic of Iraq*, 21 (2013).

1045. Kayhan Barzegar, *Iran's Foreign Policy in Post-Invasion Iraq*, XV Middle East Pol'y, no. 4, 54-55, Harvard Kennedy School Belfer Center for Science and International Affairs (2008).

1046. *Id.* at 55.

1047. Ahmed Twaij, *U.S. Sanctions on Iran Will Harm Iraq*, Foreign Pol'y, 21 Dec. 2018, *available at* https://foreignpolicy.com/2018/12/21/u-s-sanctions-on-iran-will-harm-iraq/ (stating that Iran has dominated the Iraqi market with "cheap and affordable product," and its current trade with Iraq worth more than USD 12 billion. The Iranian President, Hassan Rouhani, announced that Iran would double its trade with Iraq up to USD 20 billion in upcoming years).

1048. Barzegar, *supra* note 1045, at 50.

1049. Ebel, *supra* note 1017, at 47.

1050. *Id.*

1051. Mins Read, *Iraq's Electricity Sector Is Caught in the U.S.-Iran Power Struggle*, STRATFOR, Dec. 11, 2018, https://worldview.stratfor.com/article/iraqs-electricity-sector-caught-us-iran-power-struggle (stating that the electricity generation facilities of Iraq include "old-style turbine and steam turbine power plants").

system loses up to fifty percent of the generated power due to its decrepit state.[1052] Second, its electricity infrastructure has suffered from theft, embezzlement, sabotage, and war destruction.[1053] Finally, the electricity generation capacity of Iraq is only 16 GW, which cannot fulfill the country's current electricity demand of 24 GW.[1054] Furthermore, due to uncontrolled population growth in the country, the Iraqi government forecasts that it will need to generate up to 42 GW of electricity to meet domestic demand by 2030.[1055]

To improve electricity capacity, Iraq has depended on the import of electricity and natural gas from Iran. Iraq currently imports about 1.2 GW of electricity from Iran.[1056] Since 2013, Iran has provided Iraq with 9.1 bcm of natural gas per year "to feed three Baghdad-area power plants." Meanwhile, Iraq loses more than 18 bcm of natural gas each year as a result of flaring.[1057] To capture the flared natural gas, Iraq needs billions of dollars in foreign direct investment and modern technology to develop its petroleum reservoirs.[1058]

On the other hand, Iran relies on close cooperation with Iraq to facilitate its mid-stream project to transport Iranian natural gas to the regional and European markets. Initially, Iran plans to transport its natural gas to the

1052. *Id*; *see also* International Energy Agency, *supra* note 266, at 32-33 (stating that Iraq holds the highest rate of electricity losses among the Middle East countries).

1053. Ebel, *supra* note 1017, at 47 (stating that after the fall of Saddam's regime, "thieves took down power lines and stripped out the copper wiring that was to be sold on the black market. Saboteurs blew up pylons carrying the power lines in order to disrupt electricity flows. Electric power–generating plants were stripped of equipment, including computers and documentation, rendering the plants inactive."); *see also* Worldview Stratfor, *Iraq's Electricity Sector Is Caught in the U.S.-Iran Power Struggle*, Worldview Stratfor (Dec. 11, 2018), https://worldview.stratfor.com/article/iraqs-electricity-sector-caught-us-iran-power-struggle (stating that Iraq estimated USD 7 billion damages done by the Islamic State's on its electricity infrastructure in 2014.).

1054. Worldview Stratfor, *Iraq's Electricity Sector Is Caught in the U.S.-Iran Power Struggle*, Worldview Stratfor (Dec. 11, 2018), https://worldview.stratfor.com/article/iraqs-electricity-sector-caught-us-iran-power-struggle.

1055. *See* Al-Khatteeb, *supra* note 1044, at 28 (referring from an Iraqi Ministry of Electricity Consultant that the KRI needs 6 GW and other parts of Iraq demands 36 GW of electricity by 2030.).

1056. Worldview Stratfor, *supra* note 1054.

1057. *Id.*

1058. *Id* (stating the Iraq signed a 17-billion USD joint venture with Shell and Mitsubishi to capture the flaring gas from southern oil fields of Iraq in 2013).

European market through two different pathways — one is through Iraq, Syria, and Lebanon; the other one through Iraq and Jordan.[1059]

2. The Global Oil Market

After the dominance of the Shi'a faction within the Iraqi government, Iraq and Iran largely agreed on the necessity of controlling the global oil market per their common interests and policy. Both Iran and Iraq are unhappy with the Saudi-led OPEC policy of low oil prices and decreased levels of oil production.[1060] The traditional approach of Saudi Arabia, the largest oil producer among OPEC members, is to maintain "oil prices to a reasonable and balanced level for Western markets to retain market share and prevent importers from adopting alternative sources of energy."[1061] However, both Iran and Iraq need to raise oil revenue as quickly as possible, which is only obtained through a higher oil price.

Moreover, both Iran and Iraq want to be able to increase their production volume as much as possible.[1062] For that purpose, Iran relies on the support of the Iraqi Shi'a political faction to guarantee its active role in Iraq and to be able to have Iraq as its closest ally to fulfill its political and economic agenda in the region and the world.[1063]

III. Cross-Jurisdiction Petroleum Reserves Between Iran and Iraq

In addition to "the Arabian foreland zone," the Middle East contains oil fields located "in the foothill zone along the mountain front of Iraq and South-west Iran."[1064] Modern geology recognizes this area as "the Mesopotamia foredeep basin" and "the Zagros mountain fold belt."[1065]

1059. *See* Al-Khatteeb, *supra* note 1044, at 45 (stating that "the Iraqi Council of Ministers authorized the Minister of Oil to sign the project of the gas pipeline across Iran, Iraq, Syria, Lebanon and Europe on February 19, 2013." Also, Iraq and Jordan agreed on the construction of 1700-kilometer pipeline to transport Iranian natural gas from Basra, Iraq to the Jordanian city of Aqaba on the Red Sea and ship it to the Europe in April 2013.)

1060. Sujata Ashwarya, Post-2003 Iran–Iraq Cooperation in the Oil and Gas Sector: Initiatives, Challenges, and Future Scenarios, 4(1) Contemp. Rev. The Middle East 84 (2017).

1061. *Id.*

1062. *Id.*

1063. Barzegar, *supra* note 1045, at 55.

1064. Lees, *supra* note 991, at 97-98.

1065. International Energy Agency, *supra* note 266, at 50 (stating that the Zagros foldbelt includes the oilfields located in the KRG, Kirkuk, Khanaqin, and the major oil producing of Southwest Iran. Also, the Mesopotamian basin contains supergiant oil fields of Basra, Kuwait, Iran, and Saudi Arabia).

Between these two zones, Iran and Iraq share a 900-mile border, starting from Dalanper Mountain — the tripoint border between Turkey, Iran, and Iraq — and reaching the coast of the Persian Gulf.[1066] Through this distant frontier land, several oil reserves — containing a considerable volume of recoverable crude oil — cross the border between Iran and Iraq. Both states are considering increasing petroleum revenue through a practical joint plan to develop these shared oil fields. At the same time, such a highly beneficial opportunity could end in a conflict between the two neighboring states if they do not act jointly and the dispute remains unresolved.

A. Shared Oil Fields Between Iran and Iraq

Throughout their long borderline, Iran and Iraq share seven major oil reserves that hold approximately 14 billion barrels of recoverable oil.[1067] All seven shared oil fields between Iraq and Iran are located inland, which usually feature lower risk and lower cost of operations, compared to offshore fields.[1068] More importantly, some of these shared on-shore oil fields between Iran and Iraq have remained intact — including the Sohrab oil field, with some in phase one of production — including the Neft Shar oil field, and some shared oil fields are in the development phase — such as the Azadegan oil field.[1069] An important point to note when describing these shared oil fields is that each state uses a different name for the part of the oil reserves located on their side. For instance, Iraq refers to one of the major shared fields on its side as the "Majnoon" oil field, whereas the same oil field is referred to as the "Azadegan" oil field on the Iranian side.[1070]

1066. World Atlas, *Which Countries Border Iraq?*, https://www.worldatlas.com/articles/which-countries-border-iraq.html.

1067. Ashwarya, *supra* note 1060, at 86.

1068. Abbas Maleki et al., *Reviewing the Status of Common Squares and Strategies for Exploiting Them*, Terjarat Farda Weekly Issue No. 191, http://icmstudy.ir/wp-content/uploads/2016/09/FILE.pdf?_x_tr_sl=fa&_x_tr_tl=en&_x_tr_hl=en&_x_tr_pto=sc&_x_tr_sch=http (in Persian). Author's original citation: عباس‌ملکی، محمد صادق کریمی، نیما شمساپور نگاهی به وضعیت مشترک نفت وگاز ایران وسیاستگذاری بهینه برای برداشت :ومحسن شالباف، گنج های مشترک میادین مشترک نفتی، شماره ۱۹۱، ۱۳ شهریور ۱۳۹۵، صفحه ۳۸–آنها، مجله اقتصاد سیاسی

1069. Abbas Maleki & Mohsen Shalbaf, *Policy Management of Joint Oil and Gas Reservoirs: A Case Study of Iran-Iraq Joint Fields*, Journal of Public Policy, pp. 49-51 (Feb. 2016), https://jppolicy.ut.ac.ir/article_58175.html?lang=en (in Persian). Author's original citation: مطالعه موردی میادین :محسن‌شالباف وعباس ملکی، سیاستگذاری اداره مخازن مشترک نفتی گازی مشترک ایران وعراق،
پژوهشی سیاستگذاری عمومی، دوره ۱، شماره ٤، زمستان ١٣٩٤، صفحه ٤٩، ٥١–فصلنامه علمی

1070. Ashwarya, *supra* note 1060, at 87; *see also* Najemeh Ghaedizadeh & Hadi Khalili Dizaji, *Status of Iran's Common Oil and Gas Reservoirs from the Perspective of*

This research describes each of the shared oil fields in order of their location from North to South.

1. Naft Khana/Naft Shahr

The Naft Khana oil field is one of the oldest oil fields in Iraq, which continuously produced oil from 1924 until the 1980s when it was shut down during the Iraq-Iran War.[1071] Naft Khana is located in Diyala Governorate, which is one of the disputed territories between the Iraqi central government and the Kurdistan regional government.[1072] The total volume of recoverable oil from the Naft Khana oil reserve on the Iraqi side is 430 million barrels,[1073] and its production capability is estimated to be up to 16,000 barrels of oil per day.[1074] The Iraqi Ministry of Oil offered a Chinese oil company to resume exploration and production in 2018.[1075]

This oil reserve crosses the Iranian border, where it is recognized as "the Naft Shahr" oil field. Uninterruptedly, Iran has transported oil production from the Naft Shahr through a pipeline to Kermanshah Province since 1935.[1076] Naft Shahr oil field on the Iranian side holds approximately 700 million barrels of recoverable oil, and its current production is more than 15,000 barrels per day.[1077]

2. Badra/Azar

Badra oil field is located in the Wasit Governorate in Iraq and holds three billion barrels (bbl) of recoverable oil on the Iraqi side.[1078] The operator of the Badra oil fields, Gazprom Neft, has been producing 85,000 barrels of oil per day, which is expected to double during the development phase in

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International Law, Mon. Oil Gas Explor. Prod. (2014). Author's original citation: قائدی نجمه زاده وهادی
ترویجی اکتشاف و -خلیلی دیزجی، وضعیت مخازن مشترک نفت و گاز ایران از منظر حقوق بین الملل، ماهنامه علمی تولید نفت و
فروردین ۱۳۹۳، صفحه ٤- اسفند ۱۳۹۲/ شماره ۱۱۰ /گاز

1071. Ashwarya, *supra* note 1060, at 97.

1072. Delshad Anwar, *Exploiting Oil Potential While Baghdad Fights Kurds, Iran Wins*, NIQASH (Aug. 30, 2012), https://www.niqash.org/en/articles/economy/3109/.

1073. Mahendra K. Verma et al., *Petroleum Reserves and Undiscovered Resources in the Total Petroleum Systems of Iraq: Reserve Growth and Production Implications*, 9 Geoarabia 51 (2004).

1074. Ashwarya, *supra* note 1060, at 97.

1075. Oil & Gas J., Iraq Awards Border-Field Rehab Contracts, (2018).

1076. Ashwarya, *supra* note 1060, at 97.

1077. *Id.*

1078. *Id.* at 93.

upcoming years.[1079] Azar is the name of the same oil reserve on the Iranian side in the Ilam Province, which contains 2.5 bbl of recoverable oil and is currently producing about 30,000 barrels per day.[1080]

3. Abu Ghraib/Dehloran

The Abu Ghraib oil field is located in the Maysan Governorate on the Iraqi side, was discovered in 1971, and contains approximately 1.5 bbl of recoverable oil.[1081] The Missan Oil Company, a subsidiary of the Iraqi Ministry of Oil, manages the Abu Graib oil filed.[1082] Before the Iraq-Iran War in 1980, Abu Ghraib was producing about 40,000 bpd.[1083] On the Iranian side of the border, it is described as "the Dehloran oil field" because it is located within the territories of Dehloran City, Ilam Province.[1084] The volume of recoverable oil from the Dehloran field is more than four bbl, much larger than the Iraqi side, and the Iranian oil company has been producing about 25,000 bpd from this oil field.[1085]

4. Fakka/West Paydar

Missan Oil Company of Iraq also owns the Fakka oil field, which contains approximately 2.5 bbl of recoverable oil on the Iraqi side.[1086] Missan Oil Company has not published the exact volume of oil production from the Fakka field. However, the released data shows that the Chinese oil enterprise, CNOOC — the operator of all three major oil fields of Missan

1079. John Lee, *Gazprom Neft Halves Badra Production Target*, Iraq-Business News (Jan. 12, 2018), https://www.iraq-businessnews.com/2018/01/12/gazprom-neft-halves-badra-production-target/.

1080. Review of the Situation of the Iraqi Oil Industry and Potentials of the Country's Oil Cooperation with Iran, Deputy of Infrastructure Research and Production Affairs Office: Energy, Industry and Mining Studies, https://perma.cc/RNH8-VL49. Author's original citation: بررسی وضعیت صنعت نفت عراق و پتانسیل های همکاری نفتی این کشور با ایران، مرکز پژوهش های مجلس شورای انقلاب
اسلامی ایران، شماره مسلسل ۱٤۷٦۰، اسفند ۱۳۹٤،

1081. Ashwarya, *supra* note 1060, at 98.

1082. Missan Oil Company, *History of Company*, https://moc.oil.gov.iq/index.php?name=Pages&op=page&pid=131 (last accessed on June 3, 2019).

1083. Ashwarya, *supra* note 1060, at 98.

1084. *Dehloran Oil Field*, Petro Energy Information Network, https://www-shana-ir.translate.goog/news/277318/%D9%85%DB%8C%D8%AF%D8%A7%D9%86-%D9%86%D9%81%D8%AA%DB%8C-%D8%AF%D9%87%D9%84%D8%B1%D8%A7%D9%86?_x_tr_sl=fa&_x_tr_tl=en&_x_tr_hl=en&_x_tr_pto=sc. Author's original citation: شبکه اطلاع رسانی نفت و انرزی شانا، میدان نفتی دهلران، ۳۱ خرداد ۱۳۹٦

1085. Ashwarya, *supra* note 1060, at 98.

1086. *Id.*

Oil Company, Abu Ghraib, Fakka, and Buzurgan oil fields — and its Turkish partners, TPAO, pledged to increase the production rate in all three of Missan's oil fields to 450,000 bpd by 2017.[1087] Approximately 190 million barrels of oil reserves cross the Iranian border and enter the frontiers of the Khuzestan Province, where the oil field is called West Paydar.[1088] After presenting the new draft of the Iran Petroleum Contract (IPC) model, the Iranian Ministry of Oil offered a Russian state-owned oil firm, Zarubezhneft, the right to start developing the West Paydar oil field and increase production to 15,000 bpd in upcoming years.[1089]

5. Majnoon/Azadegan

This shared oil reserve between Iraq and Iran is considered to be one of the largest on-shore oil fields in the world, holding more than 50 bbl of crude oil in place and about 19 bbl of recoverable oil from both sides in total.[1090] This super-giant oil reserve is called Majnoon on the Iraqi side, where Royal Dutch Shell serves as the main operator, holding forty-five percent of the contract's shares.[1091] Due to a disagreement with the Iraqi government over the development budget plan, Shell announced its intention to withdraw from the Majnoon oil field in 2018 after production reached 235,000 bpd.[1092]

On the Iranian frontier, this giant oil field is referred to as "the Azadegan oil field."[1093] The Iranian portion is divided into two parts, North Azadegan

1087. Chen Zhu, *Cnooc Seals Deal on Iraq Oil Field*, MarketWatch (May 18, 2010), https://www.marketwatch.com/story/chinas-cnooc-set-for-20-years-in-iraq-2010-05-18.

1088. Ashwarya, *supra* note 1060, at 98.

1089. PressTv, *Russian firm to Re-Develop Iranian Oil Fields* (Mar. 14, 2018), https://www.presstv.com/Detail/2018/03/14/555477/Russian-firm-to-redevelop-Iranian-oil-fields.

1090. Ashwarya, *supra* note 1060, at 95 (stating that Majnoon oil field contains 23-25 bbl of crude oil in place, in which up to 13 bbl of that is recoverable from the Iraqi side); see also FINANCIAL TRIBUNE, Iran's Largest Joint Oil Field to Be Tendered by Summer 2018, Dec. 15, 2017, https://financialtribune.com/articles/energy-economy/77909/irans-largest-joint-oil-field-to-be-tendered-by-summer-2018 (stating that Azadegan oil field holds more than 33 bbl of crude oil in place and about 6 bbl of that could be recovered from the Iranian side).

1091. Ashwarya, *supra* note 1060, at 95 (stating that this contract aimed to reach the production plateau of 1.8 million barrels of crude oil).

1092. Aref Mohammed Ahmed Rasheed, *Shell to Hand Over Iraq's Majnoon Oilfield by End June 2018: Iraqi Oil Officials*, Reuters (Nov. 8, 2017), https://www.reuters.com/article/us-iraq-oil-shell/shell-to-hand-over-iraqs-majnoon-oilfield-by-end-june-2018-iraqi-oil-officials-idUSKBN1D817D.

1093. Ashwarya, *supra* note 1060, at 96.

and South Azadegan.[1094] A Chinese oil firm, CNPC, received a license to operate the Azadegan oil field; however, CNPC withdrew from the contract in 2014 as a result of the international sanctions imposed against Iran over its nuclear program.[1095] The overall current production of both the northern and southern sections of the Azadegan oil field is 160,000 barrels of crude oil per day.[1096]

6. Sinbad/Yadavaran

This joint oil field is shared between the Basra Governorate in Iraq and the Khuzestan Province in Iran.[1097] The exact volume of recoverable oil from the Iraqi section of this joint field, Sindbad, is unknown, but the Iraqi government offered a license to resume exploring the field in 2018 to a Chinese enterprise.[1098] According to the presented data by the Iraqi South Oil Company, the Sindbad oil field holds a large volume of associated gas.[1099] A different appraisal of this oil field by the Iranian partner has established that this joint field contains more than 34 bbl of crude in place, and the Iranian section of this joint field, recognized as Yadavaran, holds the majority of recoverable oil of this joint field.[1100] In 2007, two international oil firms obtained a license to develop the Yadavaran oil field in Iran to reach the production plateau of this field up to 300,000 bpd.[1101]

1094. Financial Tribune, *Iran's Largest Joint Oil Field to Be Tendered by Summer 2018*, Dec. 15, 2017, https://financialtribune.com/articles/energy-economy/77909/irans-largest-joint-oil-field-to-be-tendered-by-summer-2018.

1095. John Daly, *Iran Tears up Azadegan Contract with China*, Oil Price (May 3, 2014), https://oilprice.com/Energy/Energy-General/Iran-Tears-Up-Azadegan-Contact-With-China.html.

1096. Arvandan Oil and Gas Company, NAFTOnline News Agency, https://www-naftonline-ir.translate.goog/vsnah4h9g%5Egcn.kic6149nw.t745,.5kcl4b4x6.66kgw.html?_x_tr_sl=fa&_x_tr_tl=en&_x_tr_hl=en&_x_tr_pto=sc. Author's original citation: شرکت نفت وگاز اروندان، معرفی میدان نفتی آزادگان، ۱۹ آبان ۱۳۹۸

1097. Financial Tribune, *Iran Solo Producer of Joint Oilfield* (Jan. 07, 2015), https://financialtribune.com/articles/energy/8506/iran-solo-producer-of-joint-oilfield.

1098. OIL & GAS J., *Iraq Awards Border-Field Rehab Contracts*, June 07, 2018, https://www.ogj.com/exploration-development/article/17296684/iraq-awards-borderfield-rehab-contracts.

1099. Ashwarya, *supra* note 1060, at 97.

1100. *Id.*

1101. Tehran Times, *Sinopec Still Negotiating to Develop Iran's Yadavaran Oilfield* (Aug. 18, 2019), https://www.tehrantimes.com/news/439379/Sinopec-still-negotiating-to-develop-Iran-s-Yadavaran-oilfield (stating that SINOPEC, a Chinese oil firm, along with PEDEC had signed a contract with Iran to develop Yadavaran oil field in 2007 but have not been able to fulfil their commitment to reach the 300,000-bpd plateau yet. The current production rate of Yadavarn is 85,000).

7. South Abu Ghraib/Arvand

This joint field is also located within the frontiers of the Basra Governorate in Iraq and Khuzestan Province in Iraq. The recoverable volume of crude oil from the Iraqi side of this field, South Abu Ghraib, is still unknown.[1102] However, the operator of the Iranian section of this field — which is called Arvand in Iran — estimates that about 150 million barrels of oil are recoverable from the approximately 1 bbl crude in place in the Arvand oil field.[1103]

B. Disputes Between Iran and Iraq Over Joint Oil Fields

Both Iraq and Iran value their joint oil fields as an economic opportunity that will raise their petroleum revenue considerably. According to the descriptions of the joint oil fields, the total recoverable volume of crude oil from the fields between Iraq and Iran is more than 37 bbl.[1104] The recovery costs of these shared oil fields are much lower than the other petroleum operations that these states run in other parts of their territories, particularly the offshore ones, due to the uncomplicated geology and surface structure of these fields.[1105] Only a united development plan, which stems from close cooperation between the neighboring states, can guarantee the maximum

1102. Ashwarya, *supra* note 1060, at 98.

1103. Bloomberg, *Iran's Arvandan sign agreement to develop oil field* (Aug. 19, 2012), https://gulfnews.com/business/markets/irans-arvandan-sign-agreement-to-develop-oil-field-1.1063737 (stating that Iran signed a 135-million-dollar contract to increase the production rate of this field up to 20,000 bpd.).

1104. The Naft Khana/Naft Shar joint oil field with 1.2 bbl, Badra/Azar with 5.5 bbl, Abu Ghraib/Dehloran with 5.5 bbl, Fakka/West Paydar with 2.7 bbl, Majnoon/Azadegan with 19 bbl, Sindbad/Yadavaran with 3.5 bbl, and South Abu-Ghraib/Arvand with 0.2 bbl.

1105. *See* International Energy Agency, *supra* note 266, at 54 (stating that most Iraqi oil fields, for instance, "are often located in relatively unpopulated and flat terrain, reducing the costs of wells, pipelines and other facilities. The oil produced is of a medium grade, requiring no specialist upgrading, and can be pumped and handled quite easily"); Nima Shamsapour et al., Common Treasures: A Look at the Situation of Iran's Joint Oil and Gas Fields and Optimal Policies for their Extraction, Terjarat-e-Farda Weekly, https://www-tejaratefarda-com.translate.goog/%D8%A8%D8%AE%D8%B4-%D8%A7%D9%82%D8%AA%D8%B5%D8%A7%D8%AF-%D8%B3%DB%8C%D8%A7%D8%B3%DB%8C-13/922-%DA%AF%D9%86%D8%AC-%D9%87%D8%A7%DB%8C-%D9%85%D8%B4%D8%AA%D8%B1%DA%A9?_x_tr_sl=fa&_x_tr_tl=en&_x_tr_hl=en&_x_tr_pto=sc. Author's original citation:

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recovery and economic value of the joint oil fields. However, Iraq and Iran have been unable to reach an agreement to develop these fields jointly, despite many political attempts and initiatives.[1106] Unsurprisingly, Iraq and Iran have accused each other of taking alternative steps, provoking violence between the two states and leading to energy waste.

1. Initiatives

For decades, Iraq and Iran struggled for possession of more frontier land and water in the areas between them, particularly on the southern frontiers surrounding a majority of the joint fields.[1107] Even the 1937 Treaty of Tehran and the 1975 Algiers Agreement could not prevent the two countries from entering into a long aggressive war that demolished the majority of economic resources of both States from 1980 to 1988.[1108] After the fall of Saddam's regime in 2003, Shi'a political groups — the majority of the Iraqi population and supported by Iran — have run the Iraqi government. Since then, the governments have experienced a peaceful period of diplomatic relations.

To resolve the issue of the joint oil fields, Iraq and Iran approached each other with initiatives for joint operations over shared oil reserves. In 2007, the Iraqi government officially addressed the Iranian government with a proposal for a shared "Border Committee" to inspect the geological structure of all joint oil fields between Iraq and Iran.[1109] In mid-2009, the Iranian side showed its first initiative by discussing with Iraq, through expert groups, the initial steps that petroleum officials could take to jointly develop the shared reserves.[1110] After five meetings between the expert groups, the two countries signed their first memoranda of understanding

1106. Ashwarya, *supra* note 1060, at 87.

1107. Randall Lesaffer, *The Iran-Iraq Border: A Story of Too Many Treaties*, Oxford Pub. Int'l L. Online (2015), https://opil.ouplaw.com/page/iran-iraq-border (stating that Iraq and Iran disputed for many decades on "the 'thalweg' – the line formed by the lowest points in the valley and the river – in the Shatt al-Arab," which officially divides the southern frontiers of Iraq and Iran.).

1108. *Id.* (stating that the Iraqi government, under Saddam's leadership 1979-2003, had rejected the agreed resolution of the 1975 Agreement and started a war with Iran in 1980, which was ended in 1988 with no agreement over the border dispute until 1990 days before the invasion of Kuwait).

1109. Ashwarya, *supra* note 1060, at 88 (Referring from Wikileaks, Iraqi Oil Ministry Negotiating Unitization Of Cross-Border Fields, Cable Number 388 -Secret, (2009b, March 1), accessed on Mar. 23, 2015, https://www.wikileaks.org/plusd/cables/09BAGHDAD530_a.html).

1110. *Id.*

("MOU") "on the management of cross-border oil fields and bilateral energy issues, including research, training, and drilling services."[1111] The MOU proposed the joint nomination of a neutral oil enterprise to develop the shared reserves.[1112] In May 2010, after the Fakka incident,[1113] both States agreed on "a Master Development Plan ("MDP")" for five of their joint reserves.[1114] Iraq and Iran agreed to establish "expert committees" to issue a technical and financial report regarding the joint oil fields in January 2011.[1115] In Baghdad in 2013, the Iranian President, Mahmoud Ahmadinejad, signed many agreements — including the settlement of "territorial and ownership differences" and the institution of "joint ventures" for joint petroleum reserves — with his Iraqi counterpart.[1116] Since then, Iraq and Iran have invigorated their agreed development plan for the joint fields almost every year.[1117]

Nevertheless, none of the MOUs or bilateral agreements between Iraq and Iran have concluded unitization or joint operations of the shared oil fields between the two neighboring states. The failure to unitize stems from four principal reasons.

a) Sanctions Against Iran:

U.S. sanctions against the Iranian economy have prevented international oil enterprises from investing and implementing modern technology in the nation's oil and gas industry since the Iranian revolution in 1979, when the Islamic Republic of Iran became antagonistic towards the U.S. government.[1118] Major oil companies resumed investing in the highly

1111. *Id.* at 90 (referring from Kate Dourian, *Oil Prices Surge as Iran Moves on Disputed Iraqi Oilfield,* The Asia Petrochemical Industry Conf. (APIC) (Dec. 21, 2009).

1112. *Id.*

1113. *Id.* at 87.

1114. *Id.* at 90-91.

1115. *Id*.

1116. *Id.* at 91.

1117. PressTv, *Iraq Eyeing Development of Joint Fields* (Mar. 14, 2015), https://www.presstv.com/Detail/2015/03/14/401852/Iraq-eyeing-development-of-joint-fields (stating that the Iraqi government emphasized the importance of joint development of shared fields with Iran and Kuwait); Financial Tribune, *Iran, Iraq Set to Jointly Develop Shared Oilfields* (Jan. 24, 2018), https://financialtribune.com/articles/energy-economy/80689/iran-iraq-set-to-jointly-develop-shared-oilfields; Reuters, *Iran Says Reaches Understanding with Iraq to Develop Two Oilfields* (Apr. 07, 2019), https://www.reuters.com/article/us-iran-iraq-oilfields/iran-says-reaches-understanding-with-iraq-to-develop-two-oilfields-idUSKCN1RJ06U (stating that Iraq and Iran agreed on the joint development of two joint oil fields, including Naft Khana/Naft oil field).

1118. Yergin, *supra* note 17.

remunerative Iranian oil and gas industry in 2015, during the brief lift of American and European sanctions.[1119] The resumption of U.S. sanctions against the Iranian oil and gas industry in 2018 compelled major oil companies to quit multi-billion-dollar operations in Iran.[1120] Furthermore, the ongoing sanctions against Iran have targeted all international enterprises investing in any sector of the Iranian oil and gas industry, including exploration, production, development, transportation, and marketing.[1121] Accordingly, the major international oil companies that obtained licenses in Iraq are unable to enter into unitization agreements with neighboring Iranian oil and gas interests because it would require investing on the Iranian side of the joint oil field.[1122]

b) Lack of Mutual Trust:

Despite the post-2003 dominance of Iran over the Shi'a-led government of Iraq, deep mistrust is still present between Iraq and Iran, which has impacted the relationship between the two governments. Iraq and Iran disputed their borderline for decades and entered into a bloody war in the 1980s.[1123] The majority of Iraqi Sunnis and Kurds, along with "a bare

1119. Cameron Glenn, *After Sanctions: Iran Oil & Gas Boom?*, U.S. Inst. Peace (May 08, 2015), https://iranprimer.usip.org/blog/2015/may/08/after-sanctions-iran-oil-gas-boom (stating that European oil companies, including Total SA of France, ENI of Italy, Royal Dutch Shell, and British Petroleum (BP) showed their high interest, investing in the Iranian oil and gas industry after the U.S. and its European partners lifted their sanctions against Iran in 2015 due to the nuclear deal); *see also* Najmeh Bozorgmehr et al., *Iran Aims for More Foreign Oil and Gas Investment After Total Deal*, FIN. Times (Nov. 08, 2016), https://www.ft.com/content/9db5e152-a5a9-11e6-8b69-02899e8bd9d1 (stating that Iran and Total entered into a USD 4.8-billion contract to develop the South Pars gas field in 2016.).

1120. Cyril Altmeyer et al., *Total Tells Iran It's Quitting South Pars Gas Project*, REUTERS (Aug. 20, 2018), https://www.reuters.com/article/us-iran-france-total-gas/total-tells-iran-its-quitting-south-pars-gas-project-idUSKCN1L51LH.

1121. Parisa Hafezi, *U.S. Will Sanction Whoever Purchases Iran's Oil*, REUTERS (Sep. 8, 2019), https://www.reuters.com/article/us-usa-iran-oil/u-s-will-sanction-whoever-purchases-irans-oil-official-idUSKCN1VT0H2 (stating that for instance, the U.S. Department of Treasury blacklisted all oil tankers that ship the Iranian oil products).

1122. Ashwarya, *supra* note 1060, at 91-92 (referring to the cables of the U.S. Embassy in Iraq, published by Wikileaks, stating that international oil companies in Iraq have avoided entering into the development of cross-border oil fields between Iraq and Iran due to the U.S. sanctions).

1123. Ian Black, *Iran and Iraq Remember War That Cost More Than a Million Lives*, The Guardian (Sep. 23, 2010), https://www.theguardian.com/world/2010/sep/23/iran-iraq-war-anniversary (stating that "the death toll [of the Iraq-Iran War], overall, was an estimated 1 million for Iran and 250,000-500,000 for Iraq").

majority of Iraqi Shi'as view Iran unfavorably."[1124] The Iraqi Shi'as, in their nationwide protests against failure and corruption in the Iraqi government, denounced Iranian dominance and interference in Iraq.

On the other hand, the similar nationalistic affiliation of the majority of Iraqis — who are Arabs — with other Arab neighboring countries, including Iran.[1125] For decades, "the Iranian interest" and their "pan-Islamic and pragmatic views" have been in complete contrast with Arab states of the Persian Gulf.[1126] More importantly, any Iraq-Iran deal over their joint fields may escalate "the regional tension" among major oil-producing countries.[1127]

c) Iraq-Kurdistan Disputed Areas:

Besides the ongoing disputes between the Iraqi central government and the KRG over the budget share and the petroleum authority of the local governorates, a major internal controversy between the two governments in Iraq over disputed territories has remained unresolved, which continues to threaten the stability and integrity of Iraq.[1128] Among the joint oil fields of Iraq and Iran, a few of them are located in the disputed areas between Iraq and the KRG.[1129] Notably, the territories — which contain Naft Khana and Badra oil fields — are recognized as disputed areas between the Iraqi government and the KRG.[1130] Both the Iraqi central government and the KRG have warned the international oil companies not to enter any investment deal with one of the two governments over oil fields that are located in the disputed areas.[1131] The ongoing conflict between the KRG

1124. Ashwarya, *supra* note 1060, at 91-92 (stating that more than two-thirds of the Iraqi population hold a strong view of mistrust against Iran).

1125. *Id.* at 106.

1126. Barzegar, *supra* note 1045, at 48.

1127. Ashwarya, *supra* note 1060, at 106.

1128. *See* Hanauer et al., *supra* note 1032.

1129. Ashwarya, *supra* note 1060, at 105.

1130. Sean Kane, *Iraq's Disputed Territories: A View of The Political Horizon and Implications for U.S. Policy*, 35 & N. 86 U.S. Ins. Of Peace (2011) (stating that the disputed areas between the Iraqi government and the KRG includes, but not limited to, the District of Khanaqin in the Diyala Governorate — which contains Naft Khana oil field — and the District of Badra in the governorate of Wassit, containing Badra oil field).

1131. *See* Guy Chazan, *BP Warned Off Oilfield Plans in Northern Iraq*, Financial Times (Jan. 29, 2013), https://www.ft.com/content/c824a016-6a36-11e2-a7d2-00144feab49a (stating that the KRG declared that it would not accept and recognize any physical entering of BP into an agreement with Baghdad to work in the oil fields in the disputed areas, especially, in Kirkuk.); *see also,* Andrew E. Kramer, *Iraq Criticizes Exxon Mobil for Its Deal with the Kurds*, The New York Times (Nov. 13, 2011), https://www.nytimes.

and Baghdad over disputed areas has a significant impact on the development of the disputed oil fields that are also shared with Iran, meaning the IOCs will face substantial risk in investing in those joint oil fields.

d) Lack of Oil and Gas Law and Affable Contract Model

The post-2003 Iraqi central government still relies on the oil and gas law promulgated in the 1980s by the Saddam regime to run its petroleum activities. The Iraqi government delivered a draft of a hydrocarbon law in 2007 to the Iraqi Parliament. However, the Iraqi political factions representing Shi'a, Sunni, and Kurdish ethnic groups in the Parliament, have not agreed to pass the law yet.[1132] The main disagreements between the parties include "the mode of distribution of privileges" and the petroleum authority of the federal government and the local governorates.[1133] The lack of hydrocarbon law, which also influences the "relationship between the government and operating companies," is one of the main concerns of foreign investors in the Iraq oil industry.[1134]

2. Incidents & Conflict

None of the initiatives between Iraq and Iran have resulted in joint operations and development of their shared oil fields. These initiatives have created a peaceful relationship between the two neighboring states for continuing diplomatic dialogs, precluding them from hostile conduct towards one another in the short term. However, the lack of any final agreement resulting from these initiatives, along with the substantial economic potential in the joint fields and growing need for both states to generate more oil revenue, has induced both states to implement unfriendly methods. The hostile actions have the potential to escalate into another long-term war between the neighboring states and diminish the physical security of the whole region.

One of these unfriendly methods implemented by Iraq and Iran is the "unliteral development of shared oil fields."[1135] On the Iraqi side, top

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com/2011/11/14/world/middleeast/iraq-criticizes-exxon-mobil-for-its-deal-with-the-kurds.html (stating that the Iraqi government announced that the KRG oil deal with ExxonMobil were illegal, particularly in the disputed areas).

1132. *See* Al-Khatteeb, *supra* note 1044, at 34.

1133. Ashwarya, *supra* note 1060, at 105.

1134. Nick Butler, *The Dangers of Iraq's Oil Law,* FIN. TIMES (Apr. 29, 2018), https://www.ft.com/content/da2b5cae-46d7-11e8-8ee8-cae73aab7ccb.

1135. Ashwarya, *supra* note 1060, at 92.

government officials view unilateral operations as an alternative if the two neighboring states cannot agree on unitization.[1136] Additionally, the Iraqi Ministry of Oil offered IOCs the opportunity to invest in and develop many oil fields that cross the Iranian border without Iran's permission or cooperation. Three joint oil fields — Abu Ghraib, Fakka, and Majnoon — were subjects of the two bidding rounds held by Iraq in 2009.[1137] Since then, Iraq has conducted unilateral operations in many oil fields that are shared with Iran, including the Badra oil field,[1138] Fakka oil field,[1139] Majnoon oil field,[1140] and Sindbad oil field.[1141] Iran also conducted unliteral operations in its portion of the joint oil field with Iraq despite the durable and strict sanctions imposed by the U.S. Through domestic oil companies, Iran started developing its oil fields that are shared with Iraq, including the Naft Shahr oil field,[1142] Azar oil field,[1143] Azadegan oil field,[1144] and Arvand oil field.[1145] In 2014, a national law required the Iranian government to increase oil production of common fields to a rate that is no less than the production volume of the neighboring state.[1146] Both Iraq and Iran are wasting valuable joint natural resources through unilateral operations. As a result, both countries, and the global oil market, suffer from energy waste.

Another hostile approach considered by Iraq and Iran was military confrontation to control their joint oil fields. In late 2009, the Iranian Army crossed the Iraqi border, seized one of the Iraqi oil wells in the Fakka field, and claimed ownership of the oil well.[1147] Iraq rejected the Iranian claim,

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1136. *Id*.

1137. *Id*.

1138. *Id.* at 98.

1139. *See* Presstv, *supra* note 1089.

1140. *See* Financial Tribune, *Iran's Largest Joint Oil Field to Be Tendered by Summer 2018* (Dec. 15, 2017), https://financialtribune.com/articles/energy-economy/77909/irans-largest-joint-oil-field-to-be-tendered-by-summer-2018.

1141. Tehran Times, *supra* note 1101.

1142. Lee, *supra* note 1079.

1143. Missan Oil Company, *supra* note 1082.

1144. Oil & Gas Journal, *Iraq Awards Border-Field Rehab Contracts*, (June 07, 2018), https://www.ogj.com/exploration-development/article/17296684/iraq-awards-borderfield-rehab-contracts.

1145. *See* International Energy Agency, *supra* note 266, at 54 (stating that most Iraqi oil fields, for instance, "are often located in relatively unpopulated and flat terrain, reducing the costs of wells, pipelines and other facilities. The oil produced is of a medium grade, requiring no specialist upgrading, and can be pumped and handled quite easily.").

1146. Ashwarya, *supra* note 1060, at 93.

1147. Ranj Alaaldin, *Iran's Mini-Incursion into Iraq*, The Guardian (Dec. 21, 2009), https://www.theguardian.com/commentisfree/2009/dec/21/iran-incursion-iraq-oil-field.

deployed troops to confront the Iranian soldiers, and asked them to pull back.[1148] The Fakka incident signified that significant disputes between the two neighboring states over border demarcation and joint oil fields have the potential to trigger another bloody war in the region.[1149] In 1990, the Saddam regime accused Kuwait of siphoning off the Iraqi oil from the joint Zubair/Abdali oil field and then invaded Kuwait.[1150] Hydrocarbons in the Zubair oil field, which is located in South Basra Governorate of Iraq, cross the border of Kuwait to form the Abdali and Ratqa oil fields in North Kuwait.[1151] As a result, the majority of Arab countries in the region, along with their western allies, quickly fell into a broad regional war, which ended in the complete defeat of the Iraqi Army and widespread destruction of oil infrastructure in both Kuwait and Iraq. Such precedent, along with the unsuccessful initiatives between Iraq and Iran and the 2009 Fakka incident, could trigger military clashes between Iraq and Iran in upcoming years if the issue of cooperative development of joint oil fields remains unresolved.

IV. Cross-Jurisdiction Unitization Agreement between Iran and Iraq

Implementing joint development operations over the oil and gas reservoirs that straddle the borderlines between Iran and Iraq is the only peaceful solution that could prevent the neighboring countries from entering into another aggressive confrontation. Close cooperation between the two countries to reach a legal agreement for joint development operations over their shared oil reserves could avoid the escalation of military confrontations between the two states. Furthermore, through cooperation, both Iraq and Iran could minimize energy waste that results from the unilateral operation, providing both countries with greater recovery of hydrocarbons and increased revenue. Iraq and Iran can focus on cross-jurisdiction unitization — one of the models for joint development of hydrocarbons — because the countries have already established a borderline, and no significant dispute exists between the two states over boundary demarcation. For that purpose, both countries need to resolve all political obstacles that preclude the two countries from signing joint development operations. For instance, the U.S. sanctions against the Iranian

1148. Aref Mohammed, *Iraqi and Iranian Forces Stand Off in Oil Well Row*, Reuters (Dec. 26, 2009), https://www.reuters.com/article/us-iraq-oil/iraqi-and-iranian-forces-stand-off-in-oil-well-row-idUSTRE5BP10420091226.

1149. Ashwarya, *supra* note 1060, at 88.

1150. *Id.* at 87.

1151. *Id.*

oil and gas industry have been an enormous obstacle, preventing Iran from obtaining the financial and technical support to jointly develop its shared reserves with Iraq. On the Iraqi side, the greatest political challenge to address before joint development can commence is settling the disagreement between the Iraqi government and KRG over disputed territories.

Reaching an agreement for cross-jurisdiction unitization and unit operation will require each country to implement adequate legal support in advance, including the drafting of or modifying domestic hydrocarbon laws and regulations, and entering into a treaty. Moreover, the technical, financial, and legal sectors of each government will need to draft the details of the unit operating agreement.

A. Legal Support

To implement the cooperative method of jointly operating oil fields, opposed to the aggressive approach, both Iraq and Iran will need to adjust their legal systems to facilitate the use of a cross-jurisdiction unitization agreement. This type of conditional deal requires a legal system that bestows both governments with the full authority to enter into a unitization agreement. To that end, each government needs to amend its laws and regulations so that it holds the legal authority to start negotiations with its counterpart over shared oil fields and to implement primary steps toward signing a unitization treaty. Each country's law and model contracts need to address the issue of transboundary oil fields, emphasize the necessity of utilizing the cooperative approach, and grant a government body the authority to carry out the joint development process. Subsequently, the countries need to ratify an official agreement or treaty to implement the cross-jurisdiction unit operations of joint fields.

1. National Hydrocarbon Laws

No existing legal support for joint management of shared oil fields exists in the national oil and gas laws in Iran or Iraq. The Iraqi Parliament has not passed its hydrocarbon law due to the conflict of interest among its political parties and ethnic factions since 2007.[1152] The Iranian oil law[1153] does not address the issue of transboundary oil fields, and there is no clarification as to which part of the government holds authority over the shared fields.[1154]

1152. Clement-Davies, *supra* note 1025, at 146-147.
1153. Oil Law of 2001 (The Islamic Republic of Iran).
1154. *Id.*

2. Model Contracts

The current Iraqi technical service contract[1155] and the previous buy-back model used by Iran[1156] fail to clarify the issue of unitization and transboundary oil fields. However, in 2015, Iran discussed the issue of joint oil fields and unitization in its new version of the model contract, which is known as the Iranian petroleum contract (IPC).[1157] Based on the previous Iranian model contract, the Ministry of Oil signed separate contracts with oil companies for exploration, production, and development, giving the Ministry the ability to combine the blocks and operate it as one field.[1158] The new IPC does not have such feature and the Ministry will grant contractors a license to explore, produce, and develop in one block, which may be later discovered as a part of the shared oil field with another contractor.[1159] The Public does not have access to the details of transboundary oil fields and cross-jurisdiction unitization in the new IPC of Iran.

The silence and ambiguity of national laws and model contracts in both Iran and Iraq, regarding cross-jurisdiction unitization and the joint fields, presents a significant challenge for the governments, that desperately need to increase revenue, and the well-equipped oil enterprises who are willing to invest on the giant oil reservoirs between Iran and Iraq. Therefore, both countries need to present and draft clear language in their laws and model contracts in a way that encourages international enterprises to invest in the development of the oil fields that straddle the border between Iran and Iraq. One of the models that Iran and Iraq could implement to adjust their national laws and model contracts is the legal model of the Kurdistan region.

The Kurdistan hydrocarbon law devoted three separate Articles to unitization matters.[1160] Among them, Article 49 discusses the issue of cross-jurisdiction unitization.

> *If a Reservoir lies across a Region border into areas that are part of the domain of a neighbouring country, the Reservoir shall be unitised in coordination with the Federal Government*

1155. Technical Service Contract of Iraq – 2009 (The Republic of Iraq).
1156. Buy-back Contract of Iran – 1995 (The Islamic Republic of Iran).
1157. *Id.*
1158. *Id.*
1159. *Id.*
1160. Oil and Gas Law of The Kurdistan Region - Iraq No. 22 of 2007, Art. 47-49 (The Kurdistan Region – Iraq).

> *according to the provisions of the Federal Constitution and by agreement with the concerned neighbouring country to ensure a complete equitable benefit for both parties from the development of Petroleum from the Reservoir, and subject to the approval of the Kurdistan Parliament.*[1161]

The Kurdistan model production sharing contract further clarifies as follows:

> For clarification and the avoidance of doubt . . ., in the event that a Reservoir extends beyond the boundaries of the Contract Area into an adjacent area which is not the subject of another Petroleum Contract (as defined by the Kurdistan Region Oil and Gas Law), the **GOVERNMENT** shall, upon the **CONTRACTOR**'s request, take the necessary steps to extend the boundaries of Contract Area so as to include the entire Reservoir within the Contract Area, provided that the **CONTRACTOR** can offer the **GOVERNMENT** a competitive minimum work program for such adjacent area.[1162]

B. Unitization Agreements

Similar to the international practice, the unitization parties — which are the neighboring states, their national oil companies, and international oil enterprises — enter into a two-phase agreement to unitize the shared oil and gas fields.[1163] In the first phase, the neighboring states sign a unitization treaty, which involves their national oil companies and, if necessary, one or more international enterprises involved in the technical, financial, and legal details of the cross-jurisdiction unit operation.[1164]

1. Unitization Treaty

The management and control of the implicated governments' "property" is considered a sovereignty issue; consequently, they want to ensure that the unitization treaty respects and recognizes the ownership and control of the frontier land and reservoirs located within their borders.[1165]

1161. *Id.*

1162. The Kurdistan Regional Government (KRG) – The Ministry of Natural Resources, *Model Production Sharing Contract 2007*, art. 34.2.

1163. *See e.g.* Association of International Petroleum Negotiations, *supra* note 565, at 1-2.

1164. Weaver & Asmus, *supra* note 448, at 70.

1165. Nigel Bankes, *Recent Framework Agreements for the Recognition and Development of Transboundary Hydrocarbon Resources*, 29 Int'l J. Marine & Coastal L. 666, 678 (2014).

Iraq and Iran share seven oil fields that extend from the middle of the frontier to the Persian Gulf on the southern borders. This allows the countries to follow the model used in the 2005 United Kingdom-Norway Framework Agreement,[1166] which "facilitates the development of marginal fields located close to the maritime boundary" in the North Sea.[1167] The U.K. and Norway created a sixty-kilometer "cooperation corridor" located near the median line in the North Sea to cover all hydrocarbon deposits located in the sea between the two states. The 2005 United Kingdom-Norway Framework Agreement could be a practical model for several shared oil fields between Iran and Iraq, even though all of the joint fields between Iraq and Iran are located inland. Following this model would allow the governments to save time because they will not need to negotiate and develop a separate agreement for each joint field.

Alternatively, Iraq and Iran could include all their joint oil fields in a framework treaty. Border demarcation concerns exist in the Fakka area, where a military accident occurred between Iran and Iraq in 2009,[1168] could also be resolved through a framework treaty between Iraq and Iran. Shalbaf and Maleki present another opinion, suggesting that Iran and Iraq could start unitizing their small joint oil fields to establish a precedent for unitizing their larger and more complicated oil fields in the future.[1169]

The unitization treaty between Iraq and Iran needs to address various factors, including the identification of cross-jurisdiction reservoirs, the commencement of production in the transboundary fields after signing the unit operating agreement, the establishment of joint entities, and procedures for dispute resolution.[1170]

2. Unit Operating Agreement

The Unit Operating Agreement (UOA) manages the rights and responsibilities of the parties during the different phases of unitization

1166. Framework Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the Kingdom of Norway concerning Cross-Boundary Petroleum Co-Operation, Apr. 4, 2005, U.K.-Nor., UK T.S. No. 20 (2007) (Cm. 7206).

1167. Bankes, *supra* note 1165, at 669-670 (citing from U.K.- Norway North Sea Cooperation Workgroup, Unlocking Value Through Closer Relationships, August 2002, available at http://www.regjeringen.no/upload/kilde/oed/rap/2002/ooo5/ddd/pdfv/159318-report-uk-norway workgroupfinal.pdf; accessed 15 September 2014).

1168. Alaaldin, *supra* note 1147.

1169. Mohsen Shalbaf & Abas Maleki, *Best Interaction Policy in Joint Fields Governance between States; the case of Iraqi-Iranian Joint Fields*, Public Policy (2016).

1170. *Id.* at Ch. 4. P. 56-64.

operations.[1171] Many parties, either as participants or licensees, are involved in the UOA. Technical, financial, and legal teams from each state will negotiate, discuss, and decide the terms of the UOA. Each team needs to share its full technical and geological information about their unit side with other teams.[1172] In the case of Iraq and Iran, both states own national oil companies that will participate in the UOA. The National Iranian Oil Company and the two Iraqi national oil companies — Missan Oil Company and South Oil Company — will be the primary participants in the UOA. Both governments and their national oil companies will need to involve international enterprises because they need the investments and technology to successfully unitize the giant oil fields.

The first step that participants and licensees need to take is to draft a UOA that complies with the terms of the signed unitization treaty. Then, the parties need to either identify a Unit Operator to control and manage operations in all seven of the joint oil fields or choose a separate Unit Operator for each individual field. In addition to selecting the Unit Operator, "approval of the development plan, initial apportionment ratio and any redeterminations thereof, and changes to the unit area," in the UOA, need to be approved by both States.[1173] Because licensees are not parties to the unitization treaty and the terms of the treaty would not impact licensees, the countries could follow the model of the 2005 United Kingdom-Norway Framework Agreement by signing "deeds with their respective Licensees to undertake the obligations placed on them by the treaty."[1174] Other factors that the parties must consider in the UOA include the identification of unit area, determination of parties' share, a redetermination of parties' share, and the establishment of a joint operating committee. Both governments will need to approve all of these factors in the UOA.

1171. Unit Operating Agreement, Oil and Gas Drilling Glossary, IADC Lexicon, https://iadclexicon.org/unit-operating-agreement/.

1172. Jacqueline L. Weaver & David F. Asmus, *Unitizing Oil and Gas Fields Around the World: A Comparative Analysis of National Laws and Private Contracts*, 28 Hous. J. Int'l L. 3 (2006) (citing from Bruce M. Kramer & Gary B. Conine, Joint Development and Operations, in INTERNATIONAL PETROLEUM TRANSACTIONS 561-62 (Rocky Mountain Mineral Law Foundation, 2d ed. 2000)); see also Bastida et al., *supra* note 574, at 398 (defining the cross-jurisdiction unitization agreements as "inter-licensee Unitization Agreements.").

1173. Bastida et al., *supra* note 574, at 355.

1174. *Id.* at 399 (citing John Wilkinson, Introduction to Oil and Gas Joint Ventures, 51 (1997)).

V. Conclusion

Iraq and Iran have considerable capacity to increase oil recovery and budget revenue by unitizing their shared oil fields in the frontier land. The unit operation of these joint fields would also strengthen the positions of Iran and Iraq in the global energy market, particularly among the OPEC members. Despite the bloody history between the two countries, the Iraqi and Iranian governments resumed excellent diplomatic relations after the fall of Saddam in 2003, as a result of close cooperation between the Iraqi Shi'a parties and the Islamic Republic of Iran. This diplomacy could lead the governments to quickly enter into a unitization treaty and unit operating agreement. However, political obstacles, such as the U.S. sanctions against the Iranian oil and gas industry, have prevented the two countries and international oil enterprises — including those that are still active in Iraq — from commencing serious negotiations concerning potential unitization. Nevertheless, it appears that the withdrawal of sanctions and the resolution of Article 140 in the 2005 Iraqi Constitution relating to disputed territories between Baghdad and Erbil, which include a couple of the joint fields, will facilitate the unitization process over seven joint oil fields that are located on the frontier lands of Iran and Iraq.

CONCLUSION[1175]

I. Reiterating Key Research Points

The need for energy and energy security remains a top concern for many countries. Indeed, access to sustained, stable, and affordable energy is a top priority of humankind. Absent the physical elements of proper access and availability, and in modern time, absent ancillary elements of affordability and acceptability, energy security is not achievable. Access to energy, as an element of energy security, requires countries to ensure that their energy consumption needs are met, thus promoting economic development, a higher standard of living, and political stability.

Assured access to petroleum energy depends on availability and on global geopolitical stability, especially among leading energy-producing countries. Availability, as an element of petroleum energy security, focuses first on geology favorable to petroleum exploitation, second, on the ability of investors to profit from exploitation, which implicates a producing country's petroleum fiscal terms, and third, on acceptable surface risk. To prosper from petroleum exploitation, the producing country must promote the use of modern and efficient petroleum technology while regulating the use of the technology to protect health, safety, and environmental protection and while capturing economic rents. To assure a durable economy, the producing country should invest most of the rents in assets that are at least as important as the petroleum resources that are being depleted. From an importing country's perspective, petroleum supplies must be secure but affordable, but concerns over climate change will require additional costs to reduce carbon emissions.

Taken together, the elements of energy security promote global economic development. Satisfying these elements is not always achievable, however. Countries supplying energy and countries dependent upon receiving supply are not always friendly. Conflict stemming from international energy disputes and geopolitics often make energy security elusive. These problems can be partially ameliorated by intergovernmental energy organizations and international energy treaties. At a most basic level, energy conflicts between neighboring states have been resolved with unitization agreements, the focus of this dissertation.

1175. Nawzad passed away before he was able to write a conclusion. This conclusion was written by Piper B. Hampton, Professor John S. Lowe, Nawzad's supervising professor, and Professor Owen L. Anderson, Nawzad's supervising LL.M. professor and member of his dissertation committee.

Unitization agreements serve a purpose to recover maximum oil and gas deposits from petroleum reservoirs through joint development on behalf of interest holders that share control over a common reservoir. Unitization promotes production while also preventing waste resulting in economic loss. Unitization agreements do not just benefit the immediate producers. They benefit humankind by avoiding conflict and wasteful competition that would lessen overall recovery and by supplying the unitized petroleum resources to the market in an orderly fashion.

Unitization agreements fit into multiple categories. Two common categories of unitization are the method of implementation and the location of the unit. Categorizing a unitization agreement by implementation refers to whether the unitization is voluntary or compulsory. In most countries, IOC investors are encouraged to unitize voluntarily and then seek government approval; however, if the investors fail to agree, then the host government will order unitization. Categorizing a unitization agreement by location refers to jurisdiction. If the unitization is subject to only one sovereign, jurisdiction is sole. If unitization is subject to two or more sovereigns, jurisdiction is shared on a cross-border basis. In other words, sole-jurisdictional unitization agreements contemplate joint unit operation by two or more IOC investors within a single jurisdiction. Compared to cross-jurisdictional unitization agreements, sole-jurisdiction agreements are simple because only one government is involved.

Cross-jurisdiction unitization is inherently more complicated than unitization in a single jurisdiction. The degree of complexity turns foremost on whether the involved countries have amicable or unfriendly relations. Is one country a member of OPEC but not the other country? Variations in regulation, fiscal terms, taxation, and bidding parameters can further complicate unitization. Further, differences of opinion over the location and extent of petroleum resources to be unitized can be very contentious. Conflict can also arise over how best to exploit the unitized reserves, e.g., the number and location of wells, the rate of production, whether (and what) enhanced recovery techniques should be utilized. Disputes can arise over the allocation of sunk costs due to differences of opinion about whether such costs added value to the petroleum asset.

The United States, unlike most other countries, adheres the accession theory of ownership and control, which allows for private mineral ownership of those petroleum resources that have been transferred from government title. State conservation agencies regulate petroleum development of privately-owned petroleum to prevent waste and protect correlative rights, but both federal and state agencies manage petroleum

resources owned respectively by federal or state governments. American states prevent waste and protect correlative rights primarily through compulsory "pooling" regulation, somewhat similar to small-scale unitization. Pooling combines small tracts and interests to form a pooled unit to avoid drilling unnecessary wells that could lead to wasteful production. Unitization develops an entire (or most of a) reservoir, which may underlie multiple tracts of land over a large area, most often to facilitate enhanced recovery operations. Because the law of most states require a specified level of voluntary agreement among the tract and interest owners, unitization is fairly rare in the United States. Where federal lands are involved, developers can seek "exploratory unitization," which may also include private lands.

Executing a unitization agreement in America is a lengthy process. Interest owners must be willing to work an entire reservoir owned by multiple parties. Once an owner is interested in unitizing an area, data gathering occurs, and mineral interest owners are solicited into participating in the unitization project with their ownership interest. Again, because America allows private mineral ownership, mineral ownership tends to be intensively subdivided and fractionalized. Thus, achieving the necessary level of voluntary agreement is unlikely, which prevents unitization. The usuals stumbling block to achieving the necessary threshold of voluntary agreement is the allocation of costs and production. Calculating each owner's share of costs and production is a necessary component of unitization, whether it is among private owners in America or between two countries.

Unlike the United States, nearly all countries, except to a limited extent, Canada and Trinidad & Tobago, adhere to a domanial theory of mineral control or ownership. A few may adhere to a regalian theory. In either case, this means government control or ownership of valuable minerals, including petroleum. Often, these governments contract with private enterprises, both foreign and domestic, to develop petroleum resources. Also, unlike the United States, many countries have national (government-owned or controlled) oil companies that participate in petroleum exploitation in varying degrees, ranging from monopoly control to carried participation, including competition with private investors. Because of government ownership and control, unitization is more common and has been more successful international than in the United States. The success of unitization is due to a country licensing petroleum exploitation rights, through direct negotiation or bid rounds, to a relatively small number of IOCs, premised on regulations that require unitization of a common

reservoir that crosses a block boundary. Some countries, however, have complex petroleum regimes, multiple forms of contracts, and varying bid round fiscal terms and bidding parameters that make unitization more complex and difficult because the government's interest in unitization includes not only efficient and maximum production but an allocation of production that will maximize government take.

If all blocks are awarded based on identical forms of contract and fiscal terms, the government's interest in unitization primarily concerns efficient and maximum recovery of resources. IOCs may still quarrel over how to allocate costs and production, but the government's interest is unaffected. Thus, a significant advantage to government ownership that differs from private ownership in the United States is that most other countries have only to protect the correlative rights of "working interest" investors; there are no competing mineral-interest owners. A government with the same "take" across blocks to be unitized will not be concerned about drainage. Much of the detail will be left to the IOC investors who will typically enter into a pre-unitization agreement, engage in technical research, determine the unit operator, and agree on cost and production allocation. While the government will reserve approval rights, it has little concern for details, unless the IOC investors are stalemated on some issues.

A more complex unitization process occurs when mineral reservoirs go beyond a country's borders. Cross-jurisdictional unitization agreements potentially implicate international norms and treaties. Accounting for the potential legal implications, cross-border agreements, typically executed by host governments, are usually accompanied by unit operating agreements executed by each country's affected IOC investors. A cross-border unitization agreement better assures that each country will receive a fair share of petroleum-development benefits and more efficient and less wasteful petroleum recovery. Indeed, although not requiring that countries to agree to unitize, international law strongly encourages cross-border unitization as a means of promoting peaceful and efficient mineral development.

II. Implementing Cross-Jurisdictional Unitization Agreements Between Iraq and Iran

Iraq and Iran that collectively sit atop several substantial but undeveloped petroleum reserves. Large undeveloped reserves underlie both countries along their shared inland border. Iraq and Iran have considerable capacity to increase oil recovery and revenues by unitizing their common

petroleum reservoirs. By implementing cross-jurisdictional unitization agreements, both countries can capitalize on immense reserves that underlie both countries. The unit operation of these joint fields would also strengthen the positions of Iran and Iraq in the global energy market, particularly among OPEC members. To achieve this result, however, the countries must have a positive relationship, which until recently has been elusive.

Despite decades of bloodshed and acrimonious relations, the Iraqi and Iranian governments restored diplomatic relations after the fall of Saddam Hussein and the Sunni dominated Baathist Party in 2003, resulting from closer cooperation between the Iraqi Shi'a parties and the Islamic Republic of Iran. The continued improvement in political and economic relations has heightened diplomacy between them. The heightened diplomacy is largely due to the shifting perception of cultural commonalities after 2003 owing to Iraq's divergence from Turkish and Arabian cultural and economic influences. Both countries have further improved diplomatic relations through a mutual desire by both governments to promote the visitation of sacred Shi'a cities in Iraq.

Improved diplomatic ties between Iraq and Iran have also sparked increased commodity trading between the countries, resulting in growing Iraqi dependence on Iranian energy. Receiving a stable supply of Iranian energy has allowed the Iraqi government to mitigate inefficiencies in its electricity infrastructure, address unrestrained population growth in the country, and improve its own electricity capacity. Further, the improved relationship between the countries has allowed Iran to utilize Iraq as a pathway to transport Iranian natural gas to European markets.

Through improving relations, both countries have developed disdain for OPEC's current policies that maintain low oil prices[1176] and reduce global oil production. They should take their cooperation further. In a mutual desire and joint effort to increase production volume and petroleum revenues, the Iraqi and Iranian governments should enter into unitization treaties and unit operation agreements over the seven oil reservoirs along their inland borderline. The countries could negotiate terms similar to the 2005 UK/Norway Framework Agreement, which collectively groups multiple shared petroleum reservoirs into one agreement, rather than separate agreements on a per-reservoir basis. Alternatively, Iraq and Iran could negotiate a framework treaty, or by recommendation of the Shalbaf and Malaki regions, to agree to unitize oil reservoirs incrementally, starting

1176. Nawzad's dissertation predates the high oil prices of early 2022.

with smaller ones, followed by unitizing the larger and likely more contentious reservoirs.

Although both countries desire to gain petroleum revenues through joint operations and agreements, these agreements have yet to occur for several reasons. One reason for the absence of progress stems from international sanctions imposed on Iran and Iranian oil. The United States and the European Union have imposed trade restrictions on Iran that prevent foreign investment directly into Iranian energy. These sanctions also ban foreign investment in unitization projects with Iran's neighbors to exploit common reservoirs. These restrictions date back to the 1970s. The inability of either country to agree on joint unitization is deeply rooted in unfavorable opinions held by the people of both countries about each other.

Internally, Iraq's conflicts between the Iraqi Government and the KRG have also prevented any form of progress on unitizing common reservoirs in the Kurdish Region of northern Iraq along its border with Iran. The internal conflict threatens not only Iraq's political stability but also deters any investment from international oil companies due to the risk of opposition and violence. Foreign investors are also equally dissuaded from investment due to Iraq's absence of a new and up-to-date petroleum code.

Though Iraq and Iran's relationship has drastically improved within the last twenty years, the inability to strike a deal to develop jointly their shared petroleum reserves continues to escalate tensions, leading to hostile actions between the two countries. Situations like the 2009 Fakka incident provoked by the Iranian military and the unilateral development operations of shared reservoirs by Iraq pose the risk of war between the two countries. If the countries wage war over their petroleum reserves, the global oil market inevitably suffers due to the likelihood of waste generated from hostile sabotage of fields and heightened political tensions.

In the interest of Iraq, Iran, and the global oil market, peaceful cooperation must occur over the joint development of petroleum reserves common to both countries. Resorting to violence, military involvement, and evasive production tactics will not accomplish the shared goal of improving petroleum revenue for either country. Instead, these actions undermine any progress made by either country to maintain a stable relationship with each other. These actions also undermine any remedial efforts made with other countries in hopes of obtaining foreign investment for joint energy projects. Absent efforts to cooperate, these countries may put themselves on a collision course with each other, resulting in waste, war, and depletion of resources required for mutual prosperity and peace.

Iran and Iraq's collision course is avoidable through pursuing joint development through cross-jurisdictional unitization agreements. These agreements promote peace and avoid any destructive tactics to obtain dominance in over petroleum production. These agreements also prevent unnecessary over-drilling resulting in waste. By reducing waste through excess drilling, both countries can maximize production efficiency and generate a high likelihood of substantial returns.

Nevertheless,[1177] pursuing unitization agreements present significant challenges for both countries, including overcoming political obstacles, ensuring adequate legal support, drafting or changing existing hydrocarbon laws, and treaty negotiations. To even consider such agreements requires both countries to remedy present political obstacles. Iran must continue to advocate and negotiate for the removal of U.S. sanctions on Iranian oil. Doing so will allow other countries to invest in the joint development of Iraq and Iran's cross-jurisdictional petroleum reservoirs. On the other hand, Iraq must resolve internal conflicts between its government and the KRG over disputed territories.[1178]

Because both countries do not presently have adequate petroleum laws concerning joint development, both countries must amend their laws and regulations to promote unitization negotiations and unitization operations on a cross-border basis. Only then can the real work of negotiating and implementing unitization agreements occur. Such laws must designate a ministry within each government to hammer out unitization details and implement unitized operations. These steps forward will potentially lead to negotiating a unitization treaty and, eventually, unit operating agreements to facilitate joint development.

Ultimately, the joint development of shared petroleum reservoirs between Iraq and Iran provides far more benefits than detriments to both countries. Agreement for joint development will promote a peaceful and prosperous relationship between the countries and an opportunity to capitalize on the shared resources in a noncompetitive and nonwasteful manner. The revenues generated from jointly developing resources will allow investment in infrastructure and economic development that will provide long-term employment opportunities and prosperity for Iraqis and Iranians. The benefits of joint unitization between Iraq and Iran go far

1177. Nawzad's dissertation research predates renewed efforts to resolve sanctions against Iran due to the Russian invasion of Ukraine.

1178. Nawzad's dissertation research predates the 2022 decision of the Iraq Supreme Court declaring the Kurdish petroleum law and resulting contracts with petroleum investors to be unconstitutional.

beyond their borders. By facilitation and cooperation, two countries with some of the world's largest oil reserves can become leading market players. Generating new production from these untapped reserves will ensure greater international energy security and promote global economic development in the future.

EDITORIAL ADDENDUM

I. Iranian Developments

After the election of Joe Biden in 2020, the United States and Iran resumed discussions concerning U.S. sanctions re-imposed on Iran during the Trump administration.[1179] In 2021, the United States and Iran engaged in negotiations to revive the Joint Comprehensive Plan of Action ("JPCOA") passed under the Obama administration, which effectively imposed restrictions on Iranian nuclear energy in exchange for sanction relief.[1180] On February 4, 2022, The United States declared the intent to restore Iranian sanction waivers.[1181] These waivers "allow third-party participation in nuclear non-proliferation and safety projects, in particular with respect to rising stockpiles of enriched uranium in Iran."[1182]

During this time, the price of oil increased to over $90 a barrel.[1183] In response to the increasing prices, Iran's Oil Minister Javad Owji called on the U.S. to withdraw sanctions imposed on Iranian oil to balance the global oil markets.[1184] While no decision to lift sanctions has been made, pressure to act is elevating. Within the same month, Russia invaded Ukraine, causing oil prices to climb well above $100. In response to this attack numerous countries, especially NATO members, including the United States, imposed increasingly tough sanctions on Russia, including the United States. The United States imposed an outright ban the importation of Russian oil, liquefied natural gas, and coal.[1185] This ban also extended to new investments in Russia's energy sector by American businesses and financial parties. Though the U.S. does not rely heavily on Russian oil, the effect of its absence is observable elsewhere in the world. Because of Russia

1179. Humerya Pamuk, *U.S. Restores Sanctions Waiver to Iran with Nuclear Talks in Final Phase*, Reuters (Feb. 4, 2022), https://www.reuters.com/world/middle-east/biden-administration-restores-sanctions-waiver-iran-talks-final-phase-2022-02-04/.

1180. *Id.*

1181. Meghan Gordon & Aresu Eqbali, *Iran Deal with Oil Sanctions Relief Not a Sure Bet Despite Latest US Waiver: Analysts*, S & P Global (Feb. 7, 2022), https://www.spglobal.|com/commodity-insights/en/market-insights/latest-news/oil/020722-iran-deal-with-oil-sanctions-relief-not-a-sure-bet-despite-latest-us-waiver-analysts.

1182. *Id.*

1183. *Id.*

1184. *Id.*

1185. FACT SHEET: United States Bans Imports of Russian Oil, Liquified Natural Gas, and Coal, The White House Statements and Releases (Mar 8, 2022), https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/08/fact-sheet-united-states-bans-imports-of-russian-oil-liquefied-natural-gas-and-coal/.

invading Ukraine and the subsequent ban of Russian oil leading to soaring oil prices, the need to remove Iranian sanctions is becoming more urgent than ever.[1186] Many foreign investors, including oil and gas companies have left, or announced an intention to leave, Russia.

The added urgency created by the Russia-Ukrainian war may result in the United States waiving sanctions on Iranian oil.[1187] While this waiver would not necessarily lift America's ban on imports of Iranian oil, it could potentially mean that Iran could seek investment from other countries without risk of secondary sanctions.[1188] Thus, the potential to commence and successfully facilitate joint development of Iraqi and Iranian shared petroleum reserves now seems somewhat more likely.

II. Iraqi Developments

Since 2020, Iraq has seen dramatic shifts in its oil and gas landscape. In response to the global fears surrounding the COVID-19 pandemic, global demand for oil came to a screeching halt.[1189] The lack of demand for oil coupled with increases in global supply due to an oil price war between Russia and Saudi Arabia caused oil prices to plunge.[1190] As a result of the plunge, many oil-exporting countries suffered economically. The Kurdish economy was among the many that were heavily and negatively impacted.[1191]

To make matters worse for the Kurdish region, in February 2022, the Iraqi Federal Supreme Court held that a 2007 law that gave the Kurdistan Regional Government ("KRG") authority over the petroleum resources, was unconstitutional and warranted annulment.[1192] Production-sharing contracts entered into by the KRG with foreign petroleum investors were

1186. Golnar Motevalli, *How an Iran Nuclear Deal Could Affect Oil, Trade and Security*, Bloomberg News (Mar. 7, 2022), https://www.bloomberg.com/news/articles/2022-03-07/how-an-iran-nuclear-deal-could-affect-oil-trade-and-security.

1187. *Id*.

1188. *Id*.

1189. *From the Barrel to the Pump: The Impact of COVID-19 Pandemic on Prices for Petroleum Products*, The Bureau of Labor Statistics Monthly Labor Review (Oct. 2020), https://www.bls.gov/opub/mlr/2020/article/from-the-barrel-to-the-pump.htm.

1190. *Id*.

1191. Simon Martelli, *Iraq's Supreme Court Rejects KRG Oil Autonomy*, Energy Intelligence (Feb. 15, 2022), https://www.energyintel.com/0000017e-fe8a-df96-a1fe-ffeeb4760001.

1192. *Baghdad Initiates Proceedings to Implement Supreme Court's Decision on KRG's Oil Autonomy*, Kurd Press (Feb. 16, 2022), https://kurdpress.com/en/news/2147/Baghdad-initiates-proceedings-to-implement-Supreme-Court's-decision-on-KRG's-oil-autonomy/.

declared illegal. Additionally, the court held the KRG must "hand over all the oil production from the oil fields in the Kurdistan region, and other regions which the KRG's Ministry of Natural Resources produces oil from, to the federal government."[1193] The KRG condemned the court's ruling as unjust because it "violates the rights and constitutional authorities of the Kurdistan region."[1194] If carried out, the court's ruling will bear substantial negative consequences for Iraq and the KRG and Kurdish region, especially regarding foreign investment.

1193. *Id.*

1194. Alex MacDonald, *Iraq: Kurds Denounce 'unjust' Oil and Gas Ruling as Energy Feud Escalates*, Middle East Eye (Feb. 16, 2022), https://www.middleeasteye.net/news/iraq-kurds-denounce-unjust-oil-gas-ruling-energy-feud.

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Table of Contents

A 812
B 815
C 816
D 817
E 818
F 818
G 819
H 819
I 820
J 821
K 822
L 823
M 823
N 824
O 825
P 826
R 827
S 829
T 830
U 831
V 832
W 832
Z 833

A

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