ELECTRICITY AND NATURAL GAS IN INDIA: AN OPPORTUNITY FOR INDIA'S NATIONAL OIL COMPANIES

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> *We are energy secure when we can supply lifeline energy to all our citizens irrespective of their ability to pay for it . . . .*
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> – Planning Commission, Government of India[1]

I. INTRODUCTION

Electricity in India is "one of the key drivers for rapid economic growth and poverty alleviation."[2] The Indian government recognizes electricity as a "basic human need."[3] The goals of India's National Electricity Policy include providing power to all households and meeting the demand for electricity in full.[4] The Policy has met with great success with regard to delivering electricity to India's population, in terms of both increased power generation capacity, as well as transmission capability to deliver the electricity generated: in 2001 44% of the Indian population did not have electricity, but by 2012 only about 25% of the Indian population was without electricity.[5] As of December 2013, India had installed electrical capacity of 232 gigawatts generating electricity from coal (58.8% of installed electricity generation capacity), renewable hydro-electric sources (17.2% of installed electricity generation capacity), renewable sources (12.7% of installed electricity generation capacity), natural gas (8.8% of installed electricity generation capacity),

1. PLANNING COMM'N, GOV'T OF INDIA, INTEGRATED ENERGY POLICY: REPORT OF THE EXPERT COMMITTEE 54 (2006) [hereinafter INTEGRATED ENERGY POLICY].

2. National Electric Policy, 2005, No. 23/40/2004-R&R (Vol.II) 1.3 (India).

3. *Id.* at 1.2.

4. *Id.* at 2.0.

5. *See id.* (indicating that 44% of India's citizens were without electric service in 2001). *But see* SUN-JOO AHN & DAGMAR GRACZYK, INT'L ENERGY AGENCY, UNDERSTANDING ENERGY CHALLENGES IN INDIA: POLICIES, PLAYERS AND ISSUES 29 (2012) (indicating that 25% of India's citizens were without electric service in 2012).

and nuclear reactors (2.1% of installed electricity generation capacity).[6]

Because "increased dependency on imported sources threatens India's energy security"[7] and India has large coal reserves,[8] it likely comes as no surprise that India relies on coal as a mainstay to meet its energy needs for electricity generation.[9] However, burning coal to generate electricity has detrimental health and environmental effects.[10] Consequently, India may be obligated to find sources of fuel for electricity generation other than coal to supply the majority of its electricity needs as the Indian Constitution recognizes that "a clean and healthy environment" is a right for all of India's citizens.[11] Financing difficulties and regional differences in both availability and policy mean that supplying electricity to the remaining 25% of India's population (289 million people) cannot rely solely on further development of renewable energy sources.[12] Nuclear power development is also limited as a source of future development, both by a limited supply of domestic uranium and a negative view of nuclear power plants in the wake of the Fukushima Daiichi meltdown.[13] For electricity generation, natural gas is

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6. MINISTRY OF POWER CENT. ELEC. AUTH., GOV'T OF INDIA, EXECUTIVE SUMMARY: POWER SECTOR DECEMBER-2013, at 31 (2013). For reference, one gigawatt of electricity is enough to power a city of 500,000 people in the United States. Brice Smith & Arjun Makhijani, *Nuclear Is Not the Way*, WILSON Q., Autumn 2006, at 64, 64.

7. Deepa Badrinarayana, *India's Integrated Energy Policy: A Source of Economic Nirvana or Environmental Disaster?*, 40 ENVTL. L. REP. NEWS & ANALYSIS 10706, 10707 (2010).

8. *See* MINISTRY OF FIN., GOV'T OF INDIA, ECONOMIC SURVEY 2012–2013, at 233 (2013) (noting that India has 286 billion tons of coal reserves).

9. Badrinarayana, *supra* note 7, at 10707.

10. *See infra* note 36.

11. *See* Vahbiz P. Karanjia, Comment, *Why India Matters: The Confluence of a Booming Economy, an Activist Supreme Court, and a Thirst for Energy*, 20 VILL. ENVTL. L.J. 49, 51–52 (2009) (citing India Const. art. 48A: amended by the Constitution (Forty-Second Amendment) Act, 1976, "amending Part IVA of Indian Constitution to include environmental concerns and improvements.").

12. *See* DAVID NELSON ET AL., CLIMATE POLICY INITIATIVE, MEETING INDIA'S RENEWABLE ENERGY TARGETS: THE FINANCING CHALLENGE 18 (2012) (summarizing India's renewable energy project investment and policy environment). *See* discussion *infra* Part II.B.1.

13. *See* discussion *infra* Part II.B.2.

relatively more environmentally friendly than coal.[14] India also has a large supply of domestic natural gas.[15] Furthermore, recent developments in the natural gas industry, particularly in natural gas reservoirs in North America, have increased the global supply of natural gas, reducing the per-unit price of natural gas on the world market.[16] India should increase the role of natural gas as an energy source for electricity generation by further capitalizing on its domestic reserves and seeking an increased stake in international supplies.[17] India's national oil companies ("NOCs") are uniquely positioned to improve India's energy security by increasing the supply of natural gas that is available to India, provided they behave less like state actors and more like China's NOCs.[18]

Part II of this Comment presents India's energy security concerns with a focus on securing adequate sources in sufficient quantity to satisfy India's growing demand for electricity while meeting its energy security goals. Part II points out the shortcomings of India's reliance on coal, renewable, and nuclear power sources in achieving these goals, while identifying the under-utilization of natural gas as an opportunity for India to meet its electrical generation goals using its NOCs. Part III provides a brief overview of the role and functions of three of India's NOCs. Part IV discusses the problems faced by India's NOCs as the Indian government executes its social agenda through these companies, distracting them from their stated

14. *Clean Energy: Natural Gas*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html (last updated Sept. 25, 2013) ("[T]he burning of natural gas produces nitrogen oxides and carbon dioxide, but in lower quantities than burning coal or oil.").

15. *See* MINISTRY OF FIN., GOV'T OF INDIA, *supra* note 8, at 233 (noting that India has an estimated 1241 billion cubic meters of domestic natural gas reserves).

16. INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2011, at 53–54 (2011) (noting that global gas supply has "doubled over the past 30 years" and that production of unconventional gas in North America doubled between 2002 and 2010).

17. *See* discussion *infra* Part VI; *see also* discussion *infra* Part II.C.1–2 (elaborating on India's underdeveloped natural gas reserves and limited access to international gas markets).

18. *See* discussion *infra* Part IV (elaborating upon the ways that Indian NOCs are utilized by the Indian government to pursue its social policy agenda); *see also* discussion *infra* Part V (detailing the ways Chinese NOCs have distanced themselves from government control).

goals of securing adequate energy resources for India, and suggests that the Chinese NOCs could serve as a model in overcoming this challenge. Part V describes some of the ways that China's NOCs have been able to extricate themselves from state influence while achieving the goal of securing energy and technology resources for China. Part VI suggests ways that India could incorporate aspects of the Chinese NOC model by increasing transparency, aggressively entering new markets through acquisition, and further developing its infrastructure for securing and delivering natural gas.

II. ELECTRICITY AND ENERGY SECURITY IN INDIA

India represents one of the fastest growing countries in the world in terms of population and economic growth. The population of India increased from 1.028 billion in 2001 to 1.21 billion in 2011.[19] While the recent global economic downturn appears to have slowed India's economic growth, India has remained one of the fastest growing economies in the world.[20] In addition to its growing economy and population, India is also becoming an increasingly urban country.[21] The confluence of growth, development, and urbanization has contributed to an increased demand for electricity.[22]

Electricity in India is subsidized and even provided free of charge to some users.[23] Nonetheless, about 25% of India's

19. UNITED NATIONS DEV. PROGRAMME, INDIA FACTSHEET: ECONOMIC AND HUMAN DEVELOPMENT INDICATORS 1 (2012).

20. *See id.* (showing a 9.5% GDP growth rate from 2005–06 and an 8% GDP growth rate from 2009–10). *But see India Still Second Fastest Growing Economy: Chidambaram*, HINDU (July 27, 2013, 5:05 PM), http://www.thehindu.com/business/Economy/india-still-second-fastest-growing-economy-chidambaram/article4959820.ece (quoting India's Finance Minister, who claims that India is the second fastest growing economy behind China).

21. UNITED NATIONS DEV. PROGRAMME, HUMAN DEVELOPMENT REPORT 2013, at 196 (2013) (stating that the percentage of India's population that is considered "urban" has risen from 27.7% of the population in 2000 to 31.6% in 2012).

22. *See generally Demand Side Determinants*, DUNN & BRADSTREET, http://www.dnb.co.in/IndiasEnergySector/demand.asp (last visited Apr. 10, 2015) (citing growth of economy, population, and middle class, as well as urbanization as demand drivers for electricity in India through 2007).

23. ENERGY & RES. INST. & INT'L INST. FOR SUSTAINABLE DEVS., A CITIZENS' GUIDE TO ENERGY SUBSIDIES IN INDIA 24 (2012) (noting that in some Indian states, electricity is provided free of charge to farmers).

population (289 million people) was without electricity in 2012.[24] Even though electricity reaches only three-quarters of India's population, India is unable to meet the current demand for electricity without importing source fuels.[25] Recognizing the need for an energy policy that could sustain India's rapid growth, the Committee of Experts on Integrated Energy Policy was formed on August 12, 2004 and asked to submit a report with energy policy recommendations by February 11, 2005.[26] This Committee was comprised of academics, industry representatives, and government officials from India's natural resource Ministries.[27] The Committee developed the Integrated Energy Policy ("IEP"), which was released in its final form in 2006.[28] The IEP defines energy security for India by stating:

> We are energy secure when we can supply lifeline energy to all our citizens irrespective of their ability to pay for it as well as meet their effective demand for safe and convenient energy to satisfy their various needs at competitive prices, at all times and with a prescribed confidence level considering shocks and disruptions that can be reasonably expected.[29]

Operating under this definition, the IEP goes on to make several recommendations for securing adequate supplies of energy to sustain India's growth and discusses the role of coal in India's energy mix.

A. Using Coal to Generate Electricity in India

The IEP recognizes the importance of coal in fueling India's growing need for electricity.[30] Coal is the largest single fuel used to

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24. AHN & GRACZYK, *supra* note 5, at 29.

25. *See India's Economic Growth Is Driving Its Energy Consumption*, U.S. ENERGY INFO. ADMIN. (Apr. 1, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=10611 (noting that India has a "dependence on imported energy resources")*; see also* INTEGRATED ENERGY POLICY, *supra* note 1, at xxiv, 45 (stating that India is likely to depend on energy imports).

26. INTEGRATED ENERGY POLICY, *supra* note 1, at vii.

27. *Id.* at iii (listing members of the Expert Committee and providing their titles and affiliations).

28. *Id.* at i.

29. *Id.* at 54.

30. *See id.* at 46 (predicting that that coal would account for 51% of electricity generation even in a scenario focused on renewable energy sources).

supply India's electrical power generation needs.[31] India's coal is nationalized with a price set by the government that is structured to favor use of coal in electricity generation and agriculture.[32] In spite of low prices and significant domestic reserves,[33] India still imported 14% of the coal that was burned in 2009, and coal is expected to continue to play a significant role as a source of fuel for electricity generation in India.[34]

Subsidized electricity disguises the true price of energy, but it may also disguise the true cost of coal-fired power plants.[35] The pollution generated from coal-fired power plants in India may be detrimental to the health of India's population, especially in dense urban areas.[36] India's transmission and use inefficiencies, as well as theft of electricity, further contribute to pollution as more coal is burned to generate the electricity that is wasted and stolen rather than dedicating these resources to beneficial

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31. MINISTRY OF FIN., GOV'T OF INDIA, *supra* note 8, at 233 (noting that coal accounts for 52% of India's electricity generation); *see* AHN & GRACZYK, *supra* note 5, at 26 (noting that coal accounted for 42% of India's power generation fuel in 2009*).*

32. *See Functions and Responsibilities*, MINISTRY COAL, http://www.coal.nic.in/content/functions-and-responsibilities (last updated Sept. 19, 2014) (stating that the ministry is charged with "[a]ll matters relating to production, supply, distribution, and prices of coal."); *see also* COAL INDIA LTD., PRICE NOTIFICATION NO CIL: S&M: GM(F): PRICING: 235 DATED 27.05.2013, at 2–4 (2013) (setting out prices for coal based on grade and application with lower rates for end uses in power and agriculture applications), *available at* http://cgdemo.nic.in/seclportal/writereaddata/PRICE%20NOTIFICATION.pdf.

33. *See* MINISTRY OF FIN., GOV'T OF INDIA, *supra* note 8, at 233 (indicating India has coal reserves of 286 billion tons).

34. *See* AHN & GRACZYK, *supra* note 5, at 53 (voicing that, driven mostly by demand in the power sector, "India will become the second largest coal consumer around 2025" and India's overall coal demand will more than triple by 2035); *see also* MINISTRY OF FIN., GOV'T OF INDIA, *supra* note 8, at 234 (concluding that India's coal imports expected to reach 22.4% by 2016–17).

35. *See infra* note 36.

36. *See, e.g.*, Maureen Cropper et al., *The Health Effects of Coal Electricity Generation in India* 13–14 (Res. for the Future, RFF DP 12-25, 2012) (estimating that 650 deaths in 2008 were attributable to particulate matter, sulfur dioxide and nitrous oxide emitted from coal-fired power plants); *see also* John Vidal, *Indian Power Plants Kill 120,000 People a Year, Says Greenpeace*, GUARDIAN (Mar. 10, 2013, 5:03 PM), http://www.theguardian.com/world/2013/mar/10/india-coal-plants-emissions-greenpeace (revealing the results of a Greenpeace study of 111 power plants finding that 80,000 to 120,000 deaths and 20 million cases of asthma were due to pollution from coal-fired power plants).

uses.[37] While government programs make coal in India cheap and domestic supply makes it convenient, the health and environmental risks associated with using coal as a primary fuel for electricity generation likely fails the IEP's goal of providing safe energy.[38]

B. Alternatives for Generating Electricity in India

As of December 2013 India's total installed capacity for electrical generation was just over 232 gigawatts.[39] Anticipating the increased demand for energy and electricity to power a growing economy, the IEP projects India's capacity to generate electricity to increase from just under 1,000 billion kilowatt hours to between 4,000 and 5,000 billion kilowatt hours by 2032.[40] Supplying this power is predicted to require installed capacity to generate between 778 and 960 gigawatts of electricity.[41] India already imports fuel for electricity generation to meet current energy demand, so it must either further develop domestic resources or seek importation of additional fuel for electricity generation in the future.[42] To meet the growing fuel needs for increased capacity the IEP calls for developing a mix of energy sources and supplies that includes renewable, nuclear, oil, and gas sources.[43] Obstacles impeding the development of renewable and nuclear resources limit the viability of these sources in

37. Dhananjay Mahapatra, *27% of Power Goes to Waste: Moily*, TIMES INDIA (Aug. 11, 2012, 2:45 AM), http://articles.timesofindia.indiatimes.com/2012-08-11/india/33152599_1_power-sector-at-c-losses-power-generation-capacity (stating that "27,000 [megawatts] of electricity, which could ensure uninterrupted power supply to Delhi for four days in peak summer" is wasted each day in India).

38. *See* INTEGRATED ENERGY POLICY, *supra* note 1, at 33–41 (noting that India is "not well endowed with natural resources" and presenting the full gamut of domestic supply options); *see also* Badrinarayana, *supra* note 7 (noting that India's reliance on coal and other traditional energy products energy may have adverse environmental effects).

39. MINISTRY OF POWER CENT. ELEC. AUTH., GOV'T OF INDIA, *supra* note 6, at 24.

40. *See* INTEGRATED ENERGY POLICY, *supra* note 1, at 20–21 (showing the demand for energy and growth of projected electricity generation at 8% and 9% GDP growth).

41. *See id.* at 20 (showing installed electricity generation capacity required at 8% and 9% GDP growth).

42. *See* AHN & GRACZYK, *supra* note 5, at 52 (noting that as recently as 2010, India imported 14% of the coal that it used).

43. INTEGRATED ENERGY POLICY, *supra* note 1, at 45–48 (describing each supply option and its implications).

meeting India's current and future electricity generation needs, and developing India's natural gas resources and infrastructure may be India's best alternative to coal.[44]

1. Development Obstacles for Renewable Energy in India

Recognizing the need for alternative energy sources, the Indian government formed the Commission for Additional Sources of Energy in 1981.[45] By 2006, the Commission evolved into the Ministry of New and Renewable Energy, which is responsible for "all matters relating to new and renewable energy" in India.[46] In 2013, after thirty-two years of development, renewable energy sources in India account for only about thirty gigawatts (approximately 12%) of India's current electrical production.[47] Nonetheless, even the most optimistic outlook from the IEP provides for only 5.6% of India's energy needs from renewable sources in 2032, at which time the IEP projects that India will require up to three times its current production capacity.[48] However, geographic disparities in availability and development incentives, coupled with a troubled investment environment and high startup costs, may prevent renewable energy sources from reaching this goal.

India's geography plays a major role in the availability of renewable resources that are fit for development, as renewable sources are not evenly distributed in India with "some states hav[ing] more renewable potential than others."[49] For instance, Rajasthan and Gujarat have the highest solar potential and a high deployment of photovoltaic generating capacity installed.[50]

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44. *See* discussion *infra* Part II.B.

45. *Introduction*, MINISTRY OF NEW & RENEWABLE ENERGY, GOV'T OF INDIA, http://www.mnre.gov.in/mission-and-vision-2/mission-and-vision (noting that the commission was created due to the "price of oil, uncertainties associated with its supply and the adverse impact on the balance of payments") (last visited Apr. 10, 2015).

46. *Id.*

47. MINISTRY OF POWER CENT. ELEC. AUTH., GOV'T OF INDIA, *supra* note 6, at 24.

48. INTEGRATED ENERGY POLICY, *supra* note 1, at 48 (2006) (stating that even with the addition of 1,000,000 megawatts of renewable-sourced electricity, renewables will contribute at most 5.6% of total energy required in 2032.).

49. NELSON ET AL., *supra* note 12, at 24.

50. *Id.*

The availability of potential renewable sources is not the sole determining factor in developing electrical generation capacity in a given region, as Gujarat also has the highest potential for wind energy but only has half the installed capacity of Tamil Nadu.[51] The incentive policies selected by India's national and state governments are driving development disparities as well.

Renewable energy projects in India are being adversely affected by ineffective national policies and disparate renewable energy policies among Indian states.[52] At the national level, the Government of India's 2011 market-based policy of issuing tradeable Renewable Energy Certificates is operating at less than 4% of its capacity.[53] The low level of utilization in the Renewable Energy Certificate market shows that the Renewable Energy Certificates "are not considered viable financial instruments by investors" and are unlikely to deliver the desired results in their current form.[54] At the state level, each state in India is free to set its own level of obligation to purchase power from renewable sources, but the obligations vary widely, and some states have no set obligations.[55]

Finally, the continued growth of renewables as an energy source in India may be disadvantaged relative to coal and gas projects due to disproportionately higher financing costs that result from a relatively higher initial investment being required in renewable energy projects.[56] Geographic disparities, inconsistent and potentially flawed government incentive programs, a troubled investment environment, and high startup costs present obstacles which may prevent renewable sources from reaching the target set by the IEP, but the IEP also calls

51. *See id.* (noting a disparity in potential and distribution of wind power generation capacity in Gujarat and Tamil Nadu).

52. *See id.* (describing a disparity of incentives among Indian states).

53. *Id.* at 22.

54. *See id.* at 22–23; *see also* GIREESH SHRIMALI ET AL., CLIMATE POLICY INITIATIVE, FALLING SHORT: AN EVALUATION OF THE INDIAN RENEWABLE CERTIFICATE MARKET 1 tbl.ES 1 (2012) (summarizing findings of the effectiveness of India's Renewable Energy Certificates program).

55. *See* NELSON ET AL., *supra* note 12, at 24.

56. *Id.* at 4.

for expanding the role of nuclear power in electricity generation.[57] Like renewable sources, nuclear power also faces significant obstacles impeding further development.[58]

2. Development Obstacles for Nuclear Energy in India

As of September 2013, nuclear power accounted for 4.78 gigawatts (approximately 2%) of electrical power generation capacity in India.[59] Under one possible scenario the IEP calls for up to 375 billion kilowatt hours of nuclear-powered electricity (approximately 7.5% of predicted demand) to be supplied by nuclear power by 2032.[60] Recognizing the scarcity of domestic uranium, India's IEP suggests developing thorium-based nuclear power plants.[61] India has ample thorium reserves, but a thorium-based nuclear reactor is still in the development stage.[62] Further, anti-nuclear public sentiment was reinvigorated by the 2011 disaster at Japan's Fukushima Daiichi power plant, resulting in public protests of nuclear reactors.[63] Furthermore, a 2012 audit of India's Atomic Energy Regulatory Board revealed that despite a 1986 directive to develop a comprehensive nuclear energy safety policy, no such policy had been developed.[64]

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57. INTEGRATED ENERGY POLICY, *supra* note 1, at 21–22 (showing demand for energy and growth of electricity generation at 8% and 9% GDP growth and calling for 375 billion kilowatt hours of power generation from nuclear sources).

58. *See* discussion *infra* Part II.B.2.

59. MINISTRY OF POWER CENT. ELEC. AUTH., GOV'T OF INDIA, *supra* note 6, at 24.

60. INTEGRATED ENERGY POLICY, *supra* note 1, at 22.

61. *Id.* at 63 (recommending research and development of a thorium nuclear reactor).

62. Roger Harrabin, *Thorium Backed as "Future Fuel"*, BBC NEWS (Oct. 31, 2013), http://www.bbc.co.uk/news/science-environment-24638816 (stating that the UK's National Nuclear Laboratory is helping Indian authorities develop a Thorium reactor).

63. Joydeep Gupta, *The View from Jaitapur*, BUS. SPECTATOR (Mar. 29, 2011, 10:53 AM), http://www.businessspectator.com.au/article/2011/3/29/smart-energy/view-jaitapur (quoting a Jaitapur resident questioning the safety precautions of the Jaitapur nuclear mega-power plant under construction); *see also* Imtiaz Jaleel et al., *Politics Add Danger to Jaitapur Nuclear Plant Protests*, NDTV (Apr. 19, 2011, 11:24 PM), http://www.ndtv.com/article/india/politics-add-danger-to-jaitapur-nuclear-plant-protests-99937 (stating that Jaitapur's anti-nuclear protests turned riotous and a local villager was shot by police).

64. Kabir Taneja, *Lessons from Japan for India on Nuclear Energy*, DIPLOMAT (Dec. 13, 2013), http://thediplomat.com/2013/12/lessons-from-japan-for-india-on-nuclear-energy.

The IEP calls on India to raise its nuclear power generation capacity from the current level of 4.5% of India's 289 gigawatts of generation capacity to 7.5% of the 778–960 gigawatts of generation capacity that are expected to be required in 2032.[65] However, a combination of obstacles to nuclear development—a lack of thorium reactor technology, insufficient domestic uranium, poor government regulations to ensure public and environmental safety, and negative public sentiment toward nuclear reactors—may make it difficult for nuclear power to assume the role prescribed in the IEP.[66] Consequently, expanding the use of natural gas for electricity generation in India may be a more attractive option for meeting India's energy security goals than expanding nuclear power.

C. Using Natural Gas to Generate Electricity in India

For India to be energy secure the IEP requires procuring "safe and convenient energy" available at "competitive prices" with confidence that "shocks and disruptions" will not affect energy supply.[67] Unlike nuclear reactors, natural gas power plants are not subject to meltdown and burning natural gas is less harmful to public health than coal, India's current predominant fuel.[68] Further, natural gas is available domestically in India, plentiful on the world market, and available from a diversity of suppliers.[69] However, the current role of natural gas in India's electricity generation mix is limited by an inadequate supply of natural gas to fuel its natural gas-fired power plants.[70]

The IEP, which was published in 2006, in one possible scenario calls for natural gas to make up at most 11% of India's total energy mix and 16% of power generation fuel by 2032.[71]

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65. *See* INTEGRATED ENERGY POLICY, *supra* note 1, at 21–22 (Tables 2.6 and 2.7).

66. *See supra* notes 61–63.

67. INTEGRATED ENERGY POLICY, *supra* note 1.

68. *See* U.S. ENVTL. PROTECTION AGENCY, *supra* note 14 (noting that natural gas-fired power plants produce less pollution than coal-fired power plants).

69. *See* MINISTRY OF FIN., GOV'T OF INDIA, *supra* note 8, at 233 (noting proved domestic reserves of 1.241 trillion cubic meters of natural gas in India); *see also* INT'L ENERGY AGENCY, *supra* note 16 (noting recent increases in availability of natural gas).

70. *See* discussion *infra* Part II.C.

71. INTEGRATED ENERGY POLICY, *supra* note 1, at 48.

Natural gas already accounts for 8–11% of India's energy supply basket for electricity generation.[72] A concomitant reduction of coal and further expansion of natural gas beyond 16% may also be warranted, as natural gas can meet the energy security goals set out in the IEP as well as or better than coal while providing a cleaner-than-coal power source.[73] Studies have shown that using natural gas for electricity generation emits less pollution than coal-fired power plants.[74] Pollution reductions from natural gas-fired power plants lower the public health costs of generating electricity, making natural gas a more environmentally friendly and safer energy choice than coal.[75] Given India's constitutional commitment to a clean environment for all citizens, natural gas is likely preferable to coal in this regard.[76] Additionally, recent increases in the global natural gas supply create an abundant supply from a diversity of suppliers, making the supply of natural gas less expensive, more reliable, and more convenient.[77]

Regardless of the role of coal in India's energy mix, India's natural gas-fired electrical generation capacity will need to increase in order to meet the goals of the IEP.[78] However, as recently as March 2012, India was struggling to secure sufficient gas to meet the need at existing natural gas-fired power plants, as only 54% of the existing plant load factor at natural gas-fired power plants was utilized due to a lack of fuel to supply the

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72. *See* MINISTRY OF POWER CENT. ELEC. AUTH., GOV'T OF INDIA, *supra* note 6, at 24 (indicating that natural gas comprises 8.8% of electrical generation capacity); *see also* MINISTRY OF FIN., GOV'T OF INDIA, *supra* note 8, at 233 (indicating that natural gas comprises 11% of India's electrical generation fuel).

73. *See generally* INTEGRATED ENERGY POLICY, *supra* note 1 (setting forth India's energy security goals through 2032).

74. *See, e.g.*, WORLDWATCH INST., COMPARING LIFE-CYCLE GREENHOUSE GAS EMISSIONS FROM NATURAL GAS AND COAL 20 (2011) (indicating that from source to use, natural gas emits 47% fewer greenhouse gases than coal).

75. *See* Douglas Fischer, *Switch to Natural Gas Slashes Power Plant Pollution*, SCI. AM. (Jan. 9, 2014), http://www.scientificamerican.com/article/switch-to-natural-gas-slashes-power-plant-pollution (noting that natural gas-fired power plants emit significantly fewer pollutants than coal-fired power plants).

76. *See* Karanjia, *supra* note 11 (describing India's constitutional commitment to a clean environment).

77. *See* INT'L ENERGY AGENCY, *supra* note 16, at 53–54 (noting marked increases in global natural gas supply).

78. *See supra* notes 72–73.

plants.[79] India will also need to increase the supply of natural gas to fuel its gas-fired power plants, which may be done by developing domestic reserves and increasing international market share.

1. Limited Development of Domestic Reserves

Domestic natural gas is relatively scarce in India, but the gas that is available in India is woefully underdeveloped.[80] India's domestic reserves of natural gas are estimated to be 1.241 trillion cubic meters.[81] By way of comparison, the Barnett Shale in Texas had proved reserves of approximately 671.1 billion cubic meters of natural gas in 2012.[82] The Association of Oil and Gas Operators of India notes that despite domestic basins of 3.14 million square kilometers, India has a well density of less than 1 well per 250 square kilometers.[83] Further, "[a] substantial part is unexplored or poorly explored."[84] The United States is comparatively more densely developed. For example, just one Texas county over the Barnett Shale, which is just less than 13,000 square kilometers in size, has a well density of 337 wells per 250 square kilometers.[85] Further, production of gas in India's largest natural gas field, the Krishna-Godavari, has leveled off since 2010.[86] India has been

79. AHN & GRACZYK, *supra* note 5, at 71.

80. *See infra* notes 82–86.

81. MINISTRY OF FIN., GOV'T OF INDIA, *supra* note 8, at 233.

82. *See* U.S. ENERGY INFO. ADMIN., U.S. CRUDE OIL AND NATURAL GAS, PROVED RESERVES, 2013, at 9 tbl.2 (2014) (describing the amount of reserves in various shale formations in the United States from 2012 to 2013).

83. *Introduction*, ASS'N OIL & GAS OPERATORS INDIA, http://www.aogo.in/introduction.html (last visited Feb. 13, 2015).

84. *Id.*

85. *See What Is the Barnett Shale?*, NPR, http://stateimpact.npr.org/texas/tag/barnett-shale (last visited Apr. 10, 2015) (stating that the Barnett Shale covers 5,000 square miles); *see also* N.Y.C. DEP'T. OF ENVTL. PROT., IMPACT ASSESSMENT OF NATURAL GAS PRODUCTION IN THE NEW YORK CITY WATER SUPPLY WATERSHED 23 fig.3-2 (2009), http://www.nyc.gov/html/dep/pdf/natural_gas_drilling/12_23_2009_final_assessment_report.pdf. (showing well density of approximately 3500 wells per 1,000 square miles in Johnson County, Texas).

86. *See* Bhamy Shenoy, *Shocking Decline of Gas Production in Krishna-Godavari Basin*, DECCAN HERALD (May 21, 2011), http://www.deccanherald.com/content/162982/shocking-decline-gas-production-krishna.html (noting a declining production in the Krishna Godavari basin since 2010).

unable to participate significantly in the recent unconventional natural gas boom that featured development of natural gas reserves from gathering operations in shale and tight gas reservoirs because its programs to develop reserves in these areas have been on hold pending the implementation of a national policy which, as of 2013, was not finalized.[87]

2. Limited Access to International Supply

The role of natural gas in India's energy basket is also hindered by limited access to international gas supply. There is currently no pipeline supplying international gas to India.[88] While the idea of a pipeline supplying gas to India from Iran was floated in the 1990s, and India still appears to be interested, no agreement has been reached.[89] To date the most promising international pipeline supply for India is a Turkmenistan-Afghanistan-Pakistan-India endeavor, which is expected to come online by 2018.[90] Without a pipeline connected to international natural gas supplies, India's only access to international markets comes through LNG terminals in the Arabian Sea at Dahej and Hazira.[91]

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87. MINISTRY OF FIN., GOV'T OF INDIA, *supra* note 8, at 238 (noting that the policy has been published and is open for comment).

88. *See Map of Gas Pipelines in India*, MAPSOFINDIA.COM, http://www.mapsofindia.com/maps/oilandgasmaps/gaspipelines.htm (last updated Mar. 26, 2012) (showing that India has no international pipelines and LNG terminals are India's only connections to international natural gas markets).

89. *See* Zeeshan Haider, *Pakistan, Iran Sign Deal on Natural Gas Pipeline*, REUTERS (Mar. 17, 2010, 8:34 AM), http://uk.reuters.com/article/2010/03/17/us-pakistan-iran-idUSTRE62G12C20100317 (noting India's withdrawal from the Iran-Pakistan-India pipeline in 2009). *But see Tehran Confirms India Still Part of Iran-Pak Gas Pipeline Project*, INDIA TODAY (Nov. 7, 2013, 6:03 PM), http://indiatoday.intoday.in/story/tehran-confirms-india-still-part-of-iran-pak-gas-pipeline-project/1/322067.html (indicating that India is still involved in negotiations to receive gas through the Iran-Pakistan pipeline).

90. *See TAPI Pipeline Gas Sale Agreement Signed*, HINDU (May 23, 2012, 11:54 PM), http://www.thehindu.com/business/Economy/tapi-pipeline-gas-sale-agreement-signed/article3449588.ece (indicating that the TAPI pipeline is planned to come online by 2018 to supply India with 38 million cubic meters of gas per day for 30 years).

91. *See India: International Energy Data and Analysis*, U.S. ENERGY INFO. ADMIN. 13, http://www.eia.gov/beta/international/analysis_includes/countries_long/India/india.pdf (last updated June 26, 2014) (noting that terminals owned by a GAIL and ONGC joint ventures are planned for expansion).

India's domestic natural gas service pipelines have recently been expanded, but most of the domestic pipelines serve western India, leaving eastern India largely unserved.[92] Deficiencies in access to international natural gas supplies through transnational pipelines coupled with developments in the global market for natural gas present an opportunity for India to make use of three of its NOCs, IndianOil, Oil and Natural Gas Corporation ("ONGC"), and GAIL Limited ("GAIL") to make strides in the development of India's natural gas supply and infrastructure.[93]

III. INDIA'S NATIONAL OIL COMPANIES

For India, energy security includes the ability to "supply lifeline energy to all [its] citizens irrespective of their ability to pay."[94] Subsidies and price controls in India keep energy prices artificially low, discouraging efficiency and supply development.[95] What's more, the same government responsible for these subsidies and price control policies is also the majority owner in three NOCs that could be used to unlock the potential for natural gas to be a major component of India's energy security: IndianOil, ONGC, and GAIL.

A. IndianOil

IndianOil Corporation Ltd. ("IndianOil") is "India's flagship national oil company" and provides services ranging from exploration and production to refining and delivery.[96] IndianOil

92. *Asia Pacific Countries—Map B*, CAL. ENERGY COMMISSION, http://www.energy.ca.gov/lng/worldwide/maps/Asia_Pacific_Map-B.pdf (last visited Apr. 10, 2015) (showing locations of Dahej and Hezira LNG terminals); *see* GOV'T OF INDIA: MINISTRY OF FIN., *supra* note 8, at 239 (noting that India has 11,274 kilometers of natural gas pipeline with 14,889 kilometers planned for completion by 2015); *see also* U.S. ENERGY INFO. ADMIN., *supra* note 91, at 14 (showing a map of India's major natural gas pipelines).

93. *See* MAPSOFINDIA.COM, *supra* note 88 (showing deficiencies in India's access to international gas supply through pipelines); *see also* INT'L ENERGY AGENCY, *supra* note 16, at 53–54 (describing recent developments in the global natural gas market).

94. INTEGRATED ENERGY POLICY, *supra* note 1, at 54.

95. *See* William F. Pedersen, *Breaking Out of Poverty Through Greenhouse Gas Controls*, 39 ENVTL. L. REP. NEWS & ANALYSIS 10099, 10099 (2009) (noting that in India "subsidies and price controls keep energy prices so low that neither measures to increase efficiency nor to increase supply will pay").

96. *Corporate Overview*, INDIANOIL, http://www.iocl.com/AboutUs/Profile.aspx (last

is involved in developing domestic natural gas resources and securing both long-term and short-term contracts for LNG imports to meet India's growing energy needs.[97] Though traded only on India's National Stock Exchange and the Bombay Stock Exchanges, IndianOil is nearly 79% owned by India's government.[98]

B. Oil and Natural Gas Corporation

Oil and Natural Gas Corporation ("ONGC") is "the only fully-integrated petroleum company in India" and has operations that run from exploration through refining to delivery.[99] ONGC is publicly traded on both of India's stock exchanges, the Bombay Stock Exchange and the National Stock exchange, but is not traded in any other markets.[100] On behalf of the Government of India, the President of India is the largest shareholder of ONGC, holding 69.23% of ONGC's shares.[101]

C. GAIL Limited

GAIL was initially responsible only for India's natural gas-pipeline infrastructure but now also manages seven gas-processing plants and has an interest in thirty-one exploration

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visited Apr. 10, 2015).

97. *See Natural Gas*, INDIANOIL, http://www.iocl.com/Products/NaturalGas.aspx (last visited Apr. 10, 2015) (noting that IndianOil "is in the process of procuring LNG from [the] world market on [a] long term as well as [a] short term basis.").

98. *Statement Showing Shareholding Pattern in Clause-35*, INDIANOIL, http://www.iocl.com/download/IOC_Clause_35_31_12_2013.pdf (last visited Apr. 10, 2015).

99. *See Profile*, OIL & NAT. GAS CORP. LIMITED, http://www.ongcindia.com/wps/wcm/connect/ongcindia/Home/Company/Profile (follow "ONGC Represents India's Energy Security Through its Pioneering Efforts" hyperlink) (last visited Apr. 10, 2015) (describing the functions of ONGC).

100. Manoj Singh, *An Introduction to the Indian Stock Market*, INVESTOPEDIA (Nov. 9, 2009), http://www.investopedia.com/articles/stocks/09/indian-stock-market.asp; *see Oil and Natural Gas Corporation Ltd.*, BOMBAY STOCK EXCHANGE, http://www.bseindia.com/stock-share-price/oil-and-natural-gas-corporation-ltd/ongc/500312 (last visited Apr. 10, 2015) (showing stock listing information for ONGC); *see also Oil & Natural Gas Corporation Limited*, NAT'L STOCK EXCHANGE INDIA, http://www.nseindia.com/live_market/dynaContent/live_watch/get_quote/GetQuote.jsp?symbol=ONGC&illiquid=0 (last visited Apr. 10, 2015)(showing stock listing information for ONGC).

101. OIL & NATURAL GAS CORP. LTD., EXPLORING NEW HORIZONS: ANNUAL REPORT 2012–13, at 117 (2013).

and production blocks.[102] In addition to natural gas, GAIL is also involved in the development of some renewable energy projects in India.[103] GAIL is wholly owned by India's government.[104]

IV. CHOOSING SOCIAL POLICY OR ENERGY SECURITY

India's NOCs have been somewhat successful in developing domestic resources, but inefficiencies that may be inherent to NOCs have reduced their effectiveness in achieving the IEP's vision of energy security for India.[105] NOCs often suffer from "non-core, non-commercial obligations" which "have diluted the incentive to maximize profits."[106] ONGC and GAIL are typical NOCs in this regard.[107] For example, one of the stated goals of the ONGC is to "focus on domestic and international oil and gas exploration and production business opportunities."[108] In spite of this stated mission, a March 2013 Memorandum of Understanding between ONGC and India's Ministry of Petroleum & Natural Gas ("MoPNG") includes "corporate social responsibility projects" and "sustainability projects" that require ONGC to develop a Mobile Medicare Unit and the installation of a 102 megawatt wind power project.[109] Furthermore, the five research and development projects listed in the ONGC/MoPNG Memorandum

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102. *Gail Success Story*, GAIL (INDIA) LIMITED, http://www.gail.nic.in/final_site/successstory.html (last visited Jan. 3, 2015) (noting GAIL's participation stakes "in 20 E&P blocks, including 2 blocks overseas.").

103. *Id.* (indicating that GAIL has successfully commissioned wind energy power projects of 118 MW in the Indian states of Gujarat, Tamil Nadu and Karnataka).

104. *See Statement Showing Shareholding Pattern*, GAIL (INDIA) LTD., http://www.gail.nic.in/final_site/pdf/Shareholding_Pattren_as_on_31-12-2013.pdf (last visited Jan. 3, 2015) (showing full ownership by India's government).

105. Matthew E. Chen & Amy Myers Jaffe, *Energy Security: Meeting the Growing Challenge of National Oil Companies*, 8 WHITEHEAD J. DIPL. & INT'L REL. 9, 16 (2007) (noting that "many governments use NOCs as a tool to achieve wider socio-economic policy objectives").

106. *Id.*

107. *See infra* notes 109–14.

108. *Vision & Mission*, OIL & NAT. GAS CORP. LIMITED, http://www.ongcindia.com/wps/wcm/connect/ongcindia/Home/Company/Vision_Mission (last visited Apr. 10, 2015).

109. OIL & NATURAL GAS CORP. LTD. & MINISTRY OF PETROLEUM & NATURAL GAS (GOV'T OF INDIA), MEMORANDUM OF UNDERSTANDING 2013–2014 (2013), *available at* http://www.ongcindia.com/wps/wcm/connect/36fa538e-3e5c-4402-8cde-0a14fd3e39ca/MOU_2013.pdf?MOD=AJPERES.

of Understanding appear to make no attempt to capitalize on existing developments in the oil and gas sector, relying instead on ONGC to, in some cases, reinvent the wheel.[110] For example, one project requires characterizing source rock in exploratory wells in the Krishna-Godavari basin, while another calls for the development of high temperature and high pressure drilling fluid.[111] Expertise in these areas has already been developed in oil and natural gas shale plays in the United States, but there is no evidence in the Memorandum of Understanding that either ONGC or MoPNG is attempting to collaborate with other companies or otherwise capitalize on existing technological developments.[112] Further, GAIL Limited, India's NOC responsible for the processing of delivery and natural gas, has become involved in projects for wind-based renewable energy and laying fiber-optic cable.[113] While these programs may provide social goods, expending time and money on these non-core projects shows that the NOCs' profit motive has been diluted and should be re-concentrated if India is to utilize its NOCs to achieve its energy security goals.[114]

Modern concepts of "energy security" focus on "interdependence of countries, good relationships among producers, consumers and suppliers, open and competitive markets, and private investment supplanting government investment."[115] Achieving the IEP's goal of energy security for India in this environment will likely require the Indian NOCs to shift focus away from fulfilling the Indian government's social policy agenda and toward securing additional energy resources

110. *Id.*

111. *Id.*

112. *See* HALLIBURTON, U.S. SHALE GAS 2–4 (2008) (noting that analysis and coring is the first step in developing a shale play and describing the company's experience in high-pressure/high-temperature Haynesville Shale gas fields in Texas and Louisiana).

113. *See* GAIL (INDIA) LTD., *supra* note 104 (noting that GAIL set and leases bandwidth on 13,000 kilometers of fiber optic cable and participates in several wind energy projects).

114. *See* Chen & Jaffe, *supra* note 105, at 16.

115. David J. Jhirad, *An Energy Policy for the 21st Century*, 28 CAN.-U.S. L.J. 315, 321 (2002).

by behaving more like private companies.[116] The first steps should be to increase effectiveness in securing energy resources by becoming more transparent, aggressively acquiring stakes in new markets, investing in natural gas infrastructure, and improving contract stability.[117] China's NOCs have been effective in developing these features, and may provide an instructive model for India's NOCs.[118]

V. THE CHINESE NATIONAL OIL COMPANY MODEL

China's NOCs may provide a model for India's NOCs to follow in separating themselves from state functions and improving efficiencies.[119] Much like India, China has a large, rapidly growing economy and makes use of NOCs to secure the energy supplies needed to keep that economy growing.[120] However, China is a larger country that needs more energy than India to sustain its growth.[121] As of 2009, only about eight million people in China were without electricity, compared to India's 289 million.[122] By 2013 China had an estimated installed capacity of 1,145 gigawatts of electricity generation capacity.[123] China has

116. *See* Chen & Jaffe, *supra* note 106, at 16 (stating that NOCs' focus on "non-core, non-commercial obligations" combined with "close and interlocking relationships" with its national government results in "stagnation in capacity growth.").

117. *See* discussion *infra* at Part VI.

118. *See* discussion *infra* at Part V.

119. *See* discussion *infra* Part V.

120. *China: International Energy Data and Analysis*, U.S. ENERGY INFO. ADMIN. 2, 15, http://www.eia.gov/beta/international/analysis_includes/countries_long/China/china.pdf (last updated May 14, 2015); *see The Fastest-Growing Economies of 2013*, ECONOMIST (Jan. 2, 2013, 4:07 PM), http://www.economist.com/blogs/theworldin2013/2013/01/fastest-growing-economies-2013 (noting that China is predicted to be the fourth fastest-growing economy in the world in 2013).

121. *See Energy Use (KT of Oil Equivalent)*, WORLD BANK, http://data.worldbank.org/indicator/EG.USE.COMM.KT.OE (last visited Apr. 10, 2015) (noting that in 2012 China used 2,727,727.6 kilo-tons of oil equivalent while India used only 749,446.7 kilo-tons of oil equivalent).

122. *See Access to Electricity*, INT'L ENERGY AGENCY, http://www.worldenergyoutlook.org/resources/energydevelopment/accesstoelectricity (last visited Apr. 10, 2015) (linking to database providing aggregated data for 2009 global electrification rates); *see also* AHN & GRACZYK, *supra* note 5, at 29 (discussing electrification rate in India).

123. U.S. ENERGY INFO. ADMIN., *supra* note 121.

capacity to generate electricity from coal (66% of installed capacity), renewable energy sources (27.2% of installed capacity is hydro-electric, wind, and solar), natural gas (3% of installed capacity), and nuclear sources (1% installed capacity).[124] The United States Energy Information Administration anticipates that China's electrical generation capacity will double by 2040, led by coal and natural gas-fired power plants.[125] Although the relative capacity to generate power from natural gas in China is only 3% compared to India's 8.8%, China is capable of generating 34.4 gigawatts of electricity from natural gas whereas India is only capable of generating 20.4 gigawatts of electricity from natural gas.[126]

A. Chinese NOCs: Reducing State Influence

China's three major NOCs include China National Petroleum Corporations ("CNPC"), China Petroleum and Chemical Corporation ("Sinopec"), and China National Offshore Oil Company ("CNOOC").[127] While China's NOCs are not completely free from state control, they may still provide models that India's NOCs can follow to reduce state influence. For example, CNPC and Sinopec have pressured the Chinese government to raise domestic prices for refined products by reducing the availability of crude oil.[128] Additionally, each of these companies has a subsidiary traded on the New York Stock Exchange.[129] Subjecting these subsidiaries to the requirements

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124. *Id.*

125. *Id.*

126. *Id.* (listing China's electrical power generation capacity by fuel type); *see also* MINISTRY OF POWER CENT. ELEC. AUTH., GOV'T OF INDIA, *supra* note 6, at 24 (listing India's electrical power generation capacity by fuel type).

127. ENERGY SECURITY: ECONOMICS, POLITICS, STRATEGIES, AND IMPLICATIONS 74 (Carlos Pascual & Jonathan Elkind eds., 2010) [hereinafter ENERGY SECURITY].

128. *Id.* at 77.

129. *See PetroChina Company Limited ADS*, N.Y. STOCK EXCHANGE, https://www.nyse.com/quote/XNYS:PTR (last visited Apr. 10, 2015) (showing trading information for stock in CNPC's subsidiary PetroChina Company Limited); *see also Sinopec Shangai Petrochemcial Co. Ltd.*, N.Y. STOCK EXCHANGE, https://www.nyse.com/quote/XNYS:SHI (last visited Apr. 10, 2015) (showing trading information for stock in Sinopec's subsidiary Sinopec Shainghai Petrochemical); *see also CNOOC Limited*, N.Y. STOCK EXCHANGE, https://www.nyse.com/quote/XNYS:CEO (last visited Apr. 10, 2015) (showing trading

of the U.S. Securities Exchange Commission has required the Chinese NOCs to increase transparency, resulting in an influx of capital from foreign investors.[130] These foreign investors may be choosing wisely by betting on China's NOCs as NOCs control a large portion of remaining oil reserves and are predicted to "overwhelmingly dominate world oil production and pricing in the coming decades."[131]

Furthermore, China's NOCs are aggressive in acquiring private companies to gain technical expertise.[132] After purchasing a 16.69% stake in Canada-based MEG Energy through a subsidiary in 2005, CNOOC Chairman and CEO Fu Chengyu noted that the acquisition "provides a good chance for us to exploit the advanced technology and expertise of oil sand development . . . [which] may help facilitate the exploitation of oil sand and shale in China."[133] China's NOCs also pursue corporate acquisitions to gain access to new markets and additional exploration and production opportunities. For example, in 2011, Sinopec gained access to Canadian oil and shale gas reserves by purchasing Daylight Energy Limited of Canada for $2.1 billion.[134]

Another example of China's NOCs aggressively pursuing acquisition in the interest of expanding exploration and production holdings as well as its technical knowledge base comes from CNOOC's hotly debated 2013 acquisition of Canadian energy company Nexen, which was made to "further [CNOOC's] overseas business," add new reserves and exploration opportunities, and add Nexen's "high quality talented employees"

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information for stock in CNOOC's subsidiary CNOOC Ltd.).

130. ENERGY SECURITY, *supra* note 127, at 75.

131. Chen and Jaffe, *supra* note 105, at 10.

132. *See* ENERGY SECURITY, *supra* note 127, at 80 (stating that China's NOCs invested in overseas assets to gain technical expertise).

133. *CNOOC Ltd Acquires Stake in Canada-Based MEG Energy*, OILVOICE (Apr. 22, 2005), http://www.oilvoice.com/n/CNOOC-Ltd-Acquires-Stake-in-CanadaBased-MEG-Energy/e15bbae4.aspx.

134. Colin McClelland & Bradley Olson, *Sinopec Gains Canada Shale Gas in $2.1 Billion Daylight Deal*, BLOOMBERG BUS. (Oct. 10, 2011, 2:29 PM), http://www.bloomberg.com/news/2011-10-09/sinopec-agrees-to-buy-daylight-energy-for-2-1-billion-to-meet-fuel-demand.html.

to CNOOC in the process.[135] In a move that shows China is not committed to installing only Chinese nationals as heads of its NOC subsidiaries, Nexen's CEO remained in charge of the new CNOOC subsidiary after the acquisition.[136] The Nexen purchase also gave CNOOC access to crude oil and natural gas exploration and production opportunities in the North Sea, the Gulf of Mexico, Nigeria, and Alberta.[137] While the ultimate success of China's NOCs in acquisitions may be attributable in part to the support of state-owned commercial banks, the effects of these strategic acquisitions have built up China's energy reserves as well as its technical expertise.[138]

B. Chinese NOCs: Securing Adequate Supply

China also has a number of international agreements, which allow natural gas to enter the country through pipelines.[139] China's first international gas pipeline, the Central Asia Gas Pipeline, was built to supply 30 billion cubic meters of natural gas from Turkmenistan annually for thirty years.[140] In October 2013, gas started flowing through a pipeline built to supply China with 12 billion cubic meters of natural gas from Myanmar.[141] The first

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135. *CNOOC Limited Completes Acquisition of Nexen Inc.*, PR NEWSWIRE (Feb. 25, 2013), http://www.prnewswire.com/news-releases/cnooc-limited-completes-acquisition-of-nexen-inc-193131911.html.

136. *Id.*

137. Aibing Guo & Jeremy Van Loon, *CNOOC Buys Nexen for in China's Top Overseas Acquisition*, BLOOMBERG BUS. (July 23, 2012), http://www.bloomberg.com/news/2012-07-23/cnooc-to-buy-canada-s-nexen-for-15-1-billion-to-expand-overseas.html (listing Nexen's oil and gas assets).

138. Mitchell Silk & Richard Malish, *Are Chinese Companies Taking Over the World?*, 7 CHI. J. INT'L L. 105, 115–16 (2006) (noting CNOOC's $6 million bridge loan from a state-owned commercial bank).

139. *See infra* notes 141–43.

140. *See Central Asia-China Gas Pipeline*, CNPC, http://www.cnpc.com.cn/en/CentralAsia/CentralAsia_index.shtml (last visited Apr. 10, 2015) (describing the Central Asia-China Gas Pipeline and gas supply).

141. *See* Saibal Dasgupta, *China-Myanmar Gas Pipeline Becomes Operational*, TIMES INDIA (Oct. 21, 2013, 5:00 AM), http://articles.timesofindia.indiatimes.com/2013-10-21/china/43249282_1_gas-pipeline-myanmar-naypyitaw (detailing the China-Myanmar gas pipeline).

leg of another pipeline supplying gas from Kazakhstan to China was completed in 2013.[142]

In addition to accessing global gas markets through transnational pipelines, China has also secured additional reserves through LNG import contracts. China's demand for LNG is driven in part by an increased demand for natural gas as China emphasizes changing over power plants from coal to natural gas in an effort to reduce air pollution caused by burning coal to generate electricity.[143] In an effort to further secure natural gas resources, CNOOC recently petitioned the Canadian government through its new Canadian subsidiary Nexen to construct an LNG terminal in British Columbia that would begin delivering LNG between 2021 and 2023, showing that it intends to fully capitalize on its acquisitions as a vehicle to supply natural gas to China.[144]

C. Chinese NOCs: Developing Infrastructure

China's domestic pipeline infrastructure is also fairly well-developed.[145] China has a large pipeline network connecting both its international pipelines and LNG terminals through major transmission lines operated by NOCs to deliver the imported natural gas to end users.[146] In addition to the relatively large and diverse supply of gas from international pipelines, China has five

142. *See China, Kazakhstan Complete First Stage of New Gas Pipeline*, PLATTS (Sept. 9, 2013, 3:46 AM), http://www.platts.com/latest-news/natural-gas/singapore/china-kazakhstan-complete-first-stage-of-new-27386568 (noting the completion of the Kazakhstan-China pipeline and detailing planned supply).

143. Chen Aizhu & Nidhi Verma, *China, India Gas Price Reforms Open Door to More LNG Imports*, REUTERS (July 3, 2013, 11:46 PM), http://www.reuters.com/article/2013/07/04/lng-china-india-idUSL3N0F81ZX20130704; Nick Cunningham, *China Increases Purchases of LNG on Spot Market*, DIPLOMAT (Dec. 5, 2013), http://thediplomat.com/2013/12/china-increases-purchases-of-lng-on-spot-market.

144. *China State-Owned Energy Giant Draws Up Plans for Massive LNG Project in B.C.*, VANCOUVER NEWS (Nov. 29, 2013), http://vancouverne.ws/?p=42793.

145. *See* U.S. ENERGY INFO. ADMIN., *supra* note 120 (showing map of Chinese pipeline infrastructure).

146. *See id.* (describing the role of China's NOCs with regard to pipeline management).

LNG import terminals along its eastern coast.[147] A floating LNG import terminal was slated to receive gas in December 2013.[148]

VI. A WAY FORWARD FOR INDIA'S NATIONAL OIL COMPANIES

To fully realize the potential for natural gas to secure energy for India's future the Indian NOCs should seek to increase foreign investment by increasing transparency and should rely not only on domestic joint ventures but seek acquisitions aggressively. The model set out by the Chinese NOCs may be one that can be emulated by India's NOCs. First, IndianOil, ONGC, and GAIL may each better attract foreign investment by increasing transparency. Additionally, IndianOil and ONGC may be uniquely positioned to follow the acquisition model set out by the Chinese NOCs. Finally, GAIL can bolster the Indian natural gas delivery infrastructure to increase the delivery of natural gas to potential customers.

A. Increased Transparency

As the Chinese NOCs have shown, listing on a foreign exchange can lead to increased transparency, which may in turn generate greater foreign investment.[149] One way to improve transparency while allowing direct foreign investment might be for the Indian NOCs to, like the Chinese NOCs mentioned above, begin trading shares of common stock on a foreign stock exchange.[150] Dual listing on domestic and foreign exchanges can increase both the investor base and the transparency of the listed company.[151] For example, trading on a U.S. stock exchange may

147. *See id.* (listing nine operational and five under construction/planned LNG terminals at Key LNG Terminals section); *see also* CAL. ENERGY COMMISSION, *supra* note 92 (showing locations of China's LNG terminals).

148. *See China's First Floating LNG Terminal to Receive Gas in Dec—Report*, REUTERS (Nov. 6, 2013, 12:57 AM), http://www.reuters.com/article/2013/11/06/china-gas-idUSL3N0IR1HT20131106 (noting that the terminal will have an annual receiving capacity of 3 billion cubic meters and will begin receiving gas in December 2013).

149. *See* ENERGY SECURITY, *supra* note 127, at 75 (noting that the ownership of Chinese NOCs that are listed on stock exchanges include both the Chinese government and institutional investors).

150. *Id.* at 77 (noting that being listed on a U.S. stock exchange exposes NOCs to influence from actors outside of the state, including the stock exchange itself, as well as the U.S. Securities and Exchange Commission, auditors, and independent shareholders).

151. Thomas J. Chemmanur et al., *Competition and Cooperation Among*

increase investor interest as U.S. securities trading laws provide "some legal guarantee of disclosure . . . and legal recourse for dishonest representations or omissions."[152] The transparency created by disclosures contained in regular financial reports helps the market to value publicly traded businesses.[153] At present, each of the Indian NOCs currently publishes a report for investors.[154] Further, shares of both IndianOil and ONGC are publicly traded on the National Stock Exchange and Bombay Stock Exchange.[155] However, the majority shareholder in each of these companies is the Government of Indian.[156] Nonetheless, as state-owned enterprises traded only on India's domestic exchanges, India's NOCs are not as accountable to shareholders as other publicly traded corporations that are not majority-owned by a national government.[157] Cross-listing the Indian NOCs on international stock exchanges may function to encourage additional participation by investors by assuaging fears of potential abuse by state-controlled business enterprises, such as NOCs.[158] Consequently, increased privatization of India's NOCs, including subjecting their shares to trade on a U.S. or other

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Exchanges: Effects on Corporate Cross-Listing Decisions and Listing Standards, 20 J. APPLIED CORP. FIN. 76, 83 (2008).

152. Frank B. Cross & Robert A. Prentice, *The Economic Value of Securities Regulation*, 28 CARDOZO L. REV. 333, 364 (2006).

153. *See* D. Daniel Sokol, *Competition Policy and Comparative Corporate Governance of State-Owned Enterprises*, BYU L. REV. 1713, 1743 (2009) ("The market cannot accurately value a firm if there is insufficient transparency.").

154. *See e.g.*, OIL & NATURAL GAS CORP. LTD., *supra* note 101, at 117 (providing annual report of operations as well as legal and investment disclosures).

155. *See* BOMBAY STOCK EXCHANGE, *supra* note 100 (providing ticker symbol and quote information for ONGC on the Bombay Stock Exchange and National Stock Exchange).

156. INDIANOIL, *supra* note 98; OIL & NATURAL GAS CORP. LTD., *supra* note 101, at 117; GAIL (INDIA) LTD., *supra* note 104 (providing state ownership information for IndianOil, ONGC, and GAIL).

157. *See* Sokol, *supra* note 153, at 1730 ("[T]he accountability problems of board and management are more severe in [state-owned enterprises]" than publicly traded firms.).

158. Mariana Pargendler et al., *In Strange Company: The Puzzle of Private Investment in State-Controlled Firms*, 46 CORNELL INT'L L.J. 569, 587 (2013) (stating that cross-listing a state-owned company on foreign exchanges "provide[s] an extra layer of comfort to private investors of SOEs by raising the costs of engaging in abusive practices.").

foreign stock exchange, may serve to increase transparency and shareholder accountability.[159]

B. Acquisitions

IndianOil and ONGC have significant and important roles to play in entering new markets to secure the natural gas and expertise needed to meet India's energy security needs. One of the stated objectives of IndianOil is "[t]o achieve higher growth through mergers, acquisitions, integration and diversification by harnessing new business opportunities in oil exploration & production, petrochemicals, natural gas and downstream opportunities overseas."[160] Despite this stated goal, in the seventeen joint ventures where IndianOil is currently a partner, only two are related to obtaining equity natural gas.[161] Nonetheless, IndianOil is at least partially fulfilling its mission by negotiating LNG purchase contracts to supply natural gas to India.[162]

Similar to IndianOil, ONGC lists among its goals a "[f]ocus on domestic and international oil and gas exploration and production business opportunities."[163] However, most of its joint ventures are domestic projects, and while its international subsidiary is involved in thirty projects in fifteen countries, only two involve natural gas.[164] These traditional joint ventures have secured some

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159. *See* ENERGY SECURITY, *supra* note 127, at 77 (stating that influence from a foreign stock exchange, the U.S. Securities and Exchange Commission, auditors, and independent shareholders can increase transparency).

160. *Objectives & Obligations*, INDIANOIL, http://www.iocl.com/AboutUs/Objectives.aspx (last visited Apr. 10, 2015).

161. *See Joint Ventures (As on 31.03.2014)*, INDIANOIL, http://www.iocl.com/AboutUs/JointVentures.aspx (last visited Apr. 10, 2015) (cataloging joint ventures and listing a regasification joint venture with Petronet LNG limited and "investments" in upstream gas sector with Suntera Nigeria).

162. *See* Oleg Vukmanovic & Edward McAllister, *Exclusive: World Buyers Line Up to Buy U.S. Natural Gas*, REUTERS (Jan. 24, 2014, 8:18 AM), http://www.reuters.com/article/2014/01/24/us-lng-sales-idUSBREA0N0XS20140124 (noting that Mitsubishi is in talks with IndianOil to sell 1 million tonnes per year of LNG from the U.S. terminal at Cameron to the Ennore terminal in India).

163. OIL & NAT. GAS CORP. LIMITED, *supra* note 108.

164. *ONGC Videsh Limited*, OIL & NAT. GAS CORP. LIMITED, http://www.ongcindia.com/wps/wcm/connect/ongcindia/Home/SubsidiariesJVs/Subsidiaries/ONGC+Videsh+Limited (last visited Apr. 10, 2015) (indicating participation in a gas project

natural gas for India's growing energy needs, but there may be an opportunity to, like China's NOCs, pursue acquisitions focused not merely on participation in exploration and production activities, but rather technical expertise to improve secondary and unconventional recovery of India's domestic natural gas reserves.[165] Developing technical resources through acquisition may be advantageous in developing domestic natural gas supplies. For example, at least two of the five Research and Development projects identified in a recent ONGC/MoPNG MOU fail to capitalize on foreign expertise, which could be obtained through an acquisition.[166] The MOU also contemplates a study of the correlations between known rock types in the Krishna-Godavari basin and petrochemical availability as well as the formulation of drilling fluid for high-temperature and high-pressure applications.[167] Rather than starting fresh, ONGC may be able to benefit from the purchase of a company with expertise in this area, as the study of subsurface geology and development of drilling fluids for high-temperature and high-pressure applications are the very essence of what led to the shale gas boom in the United States.[168]

C. Developing Infrastructure

GAIL has a dual opportunity within India to develop both natural gas supply through imports and to improve India's domestic natural gas delivery infrastructure.[169] With respect to imports, GAIL has already taken an affirmative step in the right

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in Vietnam and a 25% participation in offshore exploration in Kazakhstan) .

165. *See* ENERGY SECURITY, *supra* note 127, at 80 (stating that "some of the overseas assets in which China's NOCs are invested were purchased to gain technical expertise").

166. *See* OIL & NATURAL GAS CORP. LTD. & MINISTRY OF PETROLEUM & NATURAL GAS (GOV'T OF INDIA), *supra* note 109.

167. *Id.*

168. *See* HALLIBURTON, *supra* note 112, at 2–4 (noting that analysis and coring is the first step in developing a shale play).

169. *See* GAIL (INDIA) LIMITED, *supra* note 102; *see also Cheniere and GAIL India Sign 20-Year LNG Sale and Purchase Agreement*, PR NEWSWIRE (Dec. 11, 2011), http://www.prnewswire.com/news-releases/cheniere-and-gail-india-sign-20-year-lng-sale-and-purchase-agreement-135404888.html (indicating that GAIL has entered into a long-term contract to purchase LNG from a supplier in the United States).

direction by securing a long-term contract to increase India's natural gas supply over the next twenty years by entering into an LNG import contract with a supplier in the United States.[170] This contract will import approximately 3.5 million tons of natural gas.[171]

With respect to improving natural gas delivery infrastructure, GAIL has a unique opportunity.[172] GAIL is presently responsible for over 10,900 kilometers of natural gas pipelines in India.[173] However, one look at a map of domestic natural gas delivery pipelines in India shows that the natural gas pipeline delivers to a fairly limited portion of the country.[174] Examining a similar map of natural gas delivery pipelines in China shows that, though much larger than India, China has significantly better natural gas delivery pipeline coverage, with pipelines running north and south along the east coast, as well as east to west through the country.[175] The current map of natural gas delivery pipeline in India shows that LNG terminals and major urban areas in the western half of the country are connected and able to receive delivery of natural gas, but the majority of the eastern portion of the country is almost completely cut off from supply of natural gas via pipeline.[176] Both the Indian government and GAIL Limited have taken note of India's imbalance in the delivery of natural gas through the country's pipeline system, and the expansion of the natural gas service pipeline has been

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170. *See* PR NEWSWIRE, *supra* note 171 (stating that the sale and purchase agreement GAIL and Cheniere for the import of LNG "has a term of twenty years commencing upon the date of the first commercial delivery.").

171. *See id.* (stating that "GAIL has agreed to purchase approximately 3.5 million tonnes per annum ('mtpa') of LNG" from Cheniere's fourth train at Sabine Pass).

172. *See* GAIL (INDIA) LIMITED, *supra* note 102 (noting that GAIL is responsible for 10900 kilometers of pipeline in India).

173. *See id.*

174. *See* MAPSOFINDIA.COM, *supra* note 88 (showing that only eight of India's states are connected to a natural gas pipeline).

175. *See* U.S. ENERGY INFO. ADMIN., *supra* note 120, at 11–12 (showing map of Chinese natural gas pipelines spanning the country east to west, connecting international pipelines and LNG terminals throughout the country).

176. *See* MAPSOFINDIA.COM, *supra* note 88 (showing that eighteen of India's states have no natural gas pipeline infrastructure).

authorized by the Government of India through GAIL Limited.[177] As a result, India may be getting on the right track of expanding natural gas delivery pipelines, since plans are in the works for expanding natural gas pipeline infrastructure by as much as 30,000 kilometers.[178]

D. Contract Stability

In addition to the measures described above, India's NOCs should also make contract stability a priority, as the failure of state-owned entities to honor the terms of its contracts may cause investors to avoid investing in foreign state-owned enterprises.[179] The Government of India has a history of enacting disjointed energy policies, which may contribute to a perception of contract instability within the India, such as when simultaneous decisions by the Indian government in 1996 to allocate surplus government-owned natural gas condensate to new power plants while deregulating natural gas prices pulled the rug out from beneath investors and nearly doubled prices within the course of a year.[180] Investors in the power plant projects had difficulty passing along the price increase to consumers and had to absorb a portion of subsequent price shocks.[181] Private contracts that were not affiliated with the government fared better, as they were able to

177. *Natural Gas Transmission*, GAIL (INDIA) LIMITED, http://www.gail.nic.in/final_site/naturalgas_transmission.html (stating that in 2007 the Indian government took note of regional imbalances in gas supply across the country and authorized expansion of the pipeline infrastructure) (last visited Apr. 10, 2015).

178. *India to Have Natural Gas Pipeline Grid of 30,000-KM by 2017: Jaipal Reddy*, ECON. TIMES (Apr. 2, 2012, 5:25 PM), http://articles.economictimes.indiatimes.com/2012-04-02/news/31275385_1_pipeline-grid-gas-pipeline-city-gas-distribution (quoting India's Oil Minister that India is "looking at the emergence of a National Gas Grid of nearly 30,000 km" by 2017).

179. *See* Susan E. Turner & Gary S. Wigmore, *The Disappearing PPA: Moving to Merchant Power in Asia*, 19 J. ENERGY NAT. RES. & ENVTL. L. 72, 73 (2001) (noting that state-owned utilities that do not honor their contracts "erode investor and lender confidence in a host nation's commitment to the rule of law," making investors cautious and increasing interest rates).

180. *See* Erik J. Woodhouse, *The Obsolescing Bargain Redux? Foreign Investment in the Electric Power Sector in Developing Countries*, 38 N.Y.U. J. INT'L L. & POL. 121, 162–63 (2006).

181. *Id.* at 162.

absorb some of the shock resulting from shifts in government policies.[182]

Some investors may avoid investing in or partnering with India's NOCs because they are wary of their investment being subject to the whim of the Government of India or, perhaps worse, that their investment would be at risk of expropriation.[183] Thus, India's NOCs may be losing potential investors because they are either majority- or wholly-owned by the Government of India, and the Government of India can affect contracts of its state-owned NOCs through passing new laws or enacting new policies which fundamentally change contracts from their original terms.[184] Nonetheless, India's NOCs may be able to assuage any fears of government abuse that potential investors may have by guarding against such abuse through cross-listing their company on a foreign stock exchange.[185] Increasing contract stability by honoring the terms of the original contract or listing on a foreign exchange would likely function to increase investor interest in India's NOCs.

VII. CONCLUSION

To timely meet the energy security goals set out in the IEP[186] in a manner that is harmonious with the commitments to a clean environment contained in the Indian Constitution[187] India must expand the role of natural gas. India's existing NOCs are the right tool for India to use in securing adequate natural gas reserves to meet this need.[188] However, the Indian government

182. *Id.* at 162–63.

183. *See* Michael J. Meehan, *Outsourcing Information Technology to India: Explaining Patterns of Foreign Direct Investment and Contracting in the Software Industry*, 2 B.Y.U. INT'L L. & MGMT. REV. 285, 292 (2006) (noting that fixed infrastructure installed by foreign investors is at a heightened risk of expropriation).

184. *See, e.g.*, *supra* text accompanying notes 181–82.

185. *See* Pargendler et al., *supra* note 158 (stating that state-owned enterprises "may pursue cross-listings as a way to tie the hands of the controlling shareholder," the government).

186. *See* INTEGRATED ENERGY POLICY, *supra* note 1, at 54 (defining energy security for India).

187. *See* Karanjia, *supra* note 11, at 51–52 (describing India's constitutional commitment to a clean environment).

188. *See* discussion *supra* at Part III.

diverts energy from the NOCs pursuit of their core objectives by using India's NOCs as tools to execute public policy objectives.[189] The distractions caused by this interference have undermined the profit motive of India's NOCs, and India now lags behind other developing countries such as China with respect to natural gas infrastructure, information, and technology, and must catch up to meet the IEP's energy security goals. Lacking a well-developed domestic pipeline network, India is unable to accurately gauge its domestic demand potential, as power generation projects that might prefer to use natural gas over coal, renewable, or nuclear sources may not be constructed without a pipeline to service their natural gas needs. Additionally, without access to a transnational natural gas pipeline network India will continue to be a hostage of the LNG market where it will remain a price-taker. Furthermore, India's NOCs are technologically ill-equipped to develop the full potential of domestic natural gas reserves.

However, by modeling their actions after the Chinese NOCs, India's NOCs may be able to reduce or entirely sever distracting government influences and re-focus their efforts toward securing the natural gas supply and technological resources that India needs to be energy-secure. The Chinese NOCs have grown stronger by acting more like private corporations: trading stock publicly and cross-listing on foreign exchanges,[190] obtaining new technological capabilities through aggressive corporate acquisition,[191] and seeking a stake in new supply sources.[192]

Whether India's NOCs are successful in throwing off the yoke of government interference and meeting the IEP's energy security goals may be measured by how closely their acquisition and transparency efforts mirror those of China's NOCs. If the Chinese model is an accurate predictor of success, ONGC's participation in foreign stock exchanges will cause an increase in transparency that leads to foreign investment. This particular change would have the effect of increasing capital available for ONGC to invest in new international plays to secure supply of raw energy

189. *See* discussion *supra* at Part IV.

190. *See PetroChina Company Limited ADS*, *supra* note 129.

191. *See supra* notes 133–38.

192. *See* discussion *supra* at Part V.B.

products while easing the strain that is caused by India's petroleum product price controls. Even if the behavior of India's NOCs does not exactly parallel that of China's NOCs, India will be able to more fully enjoy the benefits of recent developments in the global natural gas market[193] if IndianOil, ONGC, and GAIL act more independently, as this would help attract additional foreign investment[194] that could be used to further develop access to new natural gas supply and technologies, as well as improvements to India's natural gas pipeline infrastructure.

193. *See generally* INT'L ENERGY AGENCY, *supra* note 15 (describing recent developments in global natural gas leading to increased supply and predicting an expanded role for natural gas as an energy source in the near term).

194. *See* discussion *supra* at Part VI.A.