Multi-Tiered Preemption: Regulating Fracking at the Federal, State, and Local Levels

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The current shale gas boom is creating substantial benefits and costs that fall across multiple tiers of political jurisdictions. Thus, there is an ongoing debate about what level of government should regulate the extraction of shale gas. This paper argues that shale extraction should be regulated based on the "matching principle" and the concept of regulatory economies of scale. Various aspects of extraction should therefore be regulated at the level of polity upon which the full benefits and costs fall, unless substantial efficiencies can be achieved by regulating at a higher level of polity. This paper analyzes the costs and benefits of various aspects of shale gas extraction and identifies the proper level of government to regulate each aspect. Ultimately, this paper suggests that Congress allocates regulatory authority over three tiers of government: federal, state, and local. In order to so allocate regulatory authority, Congress must preempt state law at two levels: (1) Preserving federal authority over interstate aspects of fracking, and (2) Carving out protected municipal authority over local aspects of fracking. While it would be controversial for Congress to preempt state authority over municipal matters, this paper argues that such preemption would be constitutional.

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I. ROBINSON TOWNSHIP: THE FIGHT OVER WHO GETS TO REGULATE FRACKING

Hydraulic fracturing, or "fracking," is a method of extracting hydrocarbons that have been trapped in small pockets deep under the surface of the Earth, usually in shale formations. The basic process of fracking involves pumping fluids into wells at high pressure to fracture a target rock formation and release trapped hydrocarbons.[1] Fracking has been used for over sixty years in over a million wells;[2] however, in recent years, it has been combined with "horizontal drilling" to unlock deposits of natural gas and other hydrocarbons that had previously been uneconomical to recover.[3]

Fracking with horizontal drilling can be thought of as a multi-step process. First, wells are drilled vertically, usually thousands of feet below the surface.[4] Once sufficient depth has been achieved to reach the targeted rock formation, the drills are turned horizontally, boring laterally in multiple directions.[5] Horizontal drilling therefore allows extraction over a large area using a single vertical well, eliminating the need to drill numerous deep vertical wells. Once drilling is completed, fluid mixed with chemicals and some kind of "proppant" (such as sand) is injected into a given well at high pressure, creating fractures in the hydrocarbon-bearing rock.[6] The fluids are then pumped out of the well, and the proppant remains behind, holding the fractures open and allowing the hydrocarbons to flow into the well.[7]

Fracking with horizontal drilling has made it possible for drillers to reach vast

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[1] *See* NYDEC, REVISED DRAFT SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT, §§ 1.1, 5.3, 5.4 (2011) [hereinafter NY DRAFT SGEIS], http://www.dec.ny.gov/data/dmn/rdsgeisfull0911.pdf.

[2] *Hydraulic Fracturing Technology*, U.S. DEP'T OF ENERGY, http://energy.gov/fe/hydraulic-fracturing-technology (last visited March 31, 2015).

[3] Fracking with horizontal drilling was first used in Texas to extract gas from the Barnett Shale, and the process then began seeing use to extract gas from the Marcellus Shale in the northeastern United States in 2003. *See* Sorell E. Negro, *Fracking Wars: Federal, State and Local Conflicts over the Regulation of Natural Gas Activities*, 35 No. 2 ZONING AND PLANNING LAW REPORT 1 (Feb. 2012), http://www.rc.com/documents/Negro_FrackingWars_2012.pdf.

[4] *See* NY DRAFT SGEIS, *supra* note 1, at 6-38 fig. 6.4; *The Process of Hydraulic Fracturing*, U.S. EPA, http://www2.epa.gov/hydraulicfracturing/process-hydraulic-fracturing (last visited March 31, 2015).

[5] *The Process of Hydraulic Fracturing*, *supra* note 4.

[6] NY DRAFT SGEIS, *supra* note 1, at 5-5.

[7] *Id.*

quantities of natural gas.[8] Yet some communities are concerned with the potential health and environmental impacts of fracking, resulting in some municipalities banning the procedure outright.[9] States, as well as the federal government, claim interests in the costs and benefits of fracking; therefore, various levels of government have come into conflict over the right to regulate fracking.[10]

This conflict has come to a head in *Robinson Township.*[11] The Commonwealth of Pennsylvania passed a statute[12] in 2012 that would have harmonized the rules for drilling projects throughout the Commonwealth,[13] as well as eliminated local power to veto fracking projects.[14] Local municipalities challenged the statute, eventually arguing in front of the Pennsylvania Supreme Court. The Commonwealth argued that it had to preempt local control of oil and gas approval in order to prevent "local efforts to derail industry development" and also to avoid "a 'balkanization' of legal regimes with which the industry would have to comply."[15] In other words, Pennsylvania argued that it was better situated than localities to evaluate the costs and benefits of fracking and that there would be significant advantages to harmonizing the regulatory regime over fracking. The Court disagreed, holding[16] that the statute violated the Commonwealth's Environmental Rights Amendment.[17] With respect to the section of the statute that would have eliminated local zoning power, the Court stated that the Commonwealth has a fiduciary duty under its Constitution to protect its environment, and that the statute would "disabl[e] local government from mitigating the impact of oil and gas development at a local level."[18] The Court went on to explain that this would "prohibit[] local government from tailoring protections for water and air quality (e.g., through increased setbacks) and for the natural, scenic, and esthetic characteristics of the environment (e.g., through increased setbacks, screening, fencing, reduced hours of operation requirements) in the affected areas within a municipality."[19] In essence, the Pennsylvania Supreme Court addressed a state constitutional question with a policy answer. The Court interprets the State's constitution to require a balance

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[8] *See* Negro, *supra* note 3, at 1-2.

[9] *Id.*

[10] *Id.*

[11] Robinson Twp. v. Pennsylvania, 83 A.3d 901, 919-20 (Pa. 2013).

[12] Act No. 13 of Feb. 14, 2012, P.L. 87, Apr. 16, 2012, 58 PA. CONS. STAT. §§ 2301–3504.

[13] *See generally* 58 PA. CONS. STAT. § 3304(b).

[14] The statute commanded that all political subdivisions of the State "[s]hall authorize oil and gas operations . . . as a permitted use in all zoning districts." *Id.* at § 3304(b)(5).

[15] *Robinson Twp.*, 83 A.3d at 981.

[16] *Id.* at 1000.

[17] PA. CONST. art. I, § 27.

[18] *Robinson Twp.*, 83 A.3d at 980.

[19] *Id.*

between development and environmental protection,[20] and the Court felt that municipalities were best positioned to do some of that balancing.

This paper seeks to answer that policy question in more detail. In Part II, I outline a framework by which to determine what level of polity should regulate various economic activity. My framework is based on two concepts: (1) the "matching principle," proposed by Henry Butler and Jonathan Macey, and (2) the concept of regulatory economies of scale. I argue that in general, an economic activity should be regulated at the smallest level of polity at least large enough such that all of the activity's costs and benefits fall upon that polity. Sometimes, however, it will be appropriate to regulate at a higher level of government if significant regulatory costs can be saved.

In Part III, I discuss the various costs and benefits of fracking. Basing my research on analyses produced by various government agencies, I determine that different aspects of fracking should be regulated by different levels of government. In particular, I recommend that air emissions be regulated by the federal government, water impacts should be regulated by the states with some federal oversight, and local impacts such as noise, visual disturbances, and traffic should be left to local regulation. Localities should also be free to reject fracking as they choose.

In Part IV, I argue that Congress should allocate the authority to regulate fracking to the appropriate levels of government. Thus, Congress should preempt state authority to regulate the costs and benefits of air emissions from fracking. More controversially, Congress should also preempt state authority to regulate purely local impacts. In other words, Congress should preempt some of the legislation that was at issue in *Robinson Township*.

The United States Supreme Court has not directly spoken on the issue of whether Congress can carve out regulatory authority for municipalities as exempt from state control. I argue that such a carve-out would be constitutional.

II. THE MATCHING PRINCIPLE AND REGULATORY ECONOMIES OF SCALE

In this Part, I outline a framework for evaluating what level of government should regulate a given economic activity. I argue that, in general, an activity should be regulated at the smallest level of polity that can fully internalize the relevant costs and benefits. Sometimes, however, it will be appropriate to regulate at a higher level of government if significant regulatory costs can be saved.

[20] *Id.* at 953 ("The Environmental Rights Amendment does not call for a stagnant landscape; nor, as we explain below, for the derailment of economic or social development; nor for a sacrifice of other fundamental values. But, when government acts, the action must, on balance, reasonably account for the environmental features of the affected locale, as further explained in this decision, if it is to pass constitutional muster.").

A. The Matching Principle

In their research on environmental externalities, Henry Butler and Jonathan Macey argue that government should regulate at the level of polity where the costs and benefits are fully internalized.[21] Butler and Macey call their proposal the "matching principal," and their argument is grounded in the basic economic theory that externalities distort markets.[22] According to economists, social surplus is maximized in a market when the marginal cost of the last unit produced equals the marginal benefit of that unit.[23] The concept is simple. If the benefit of the next unit of production outweighs its cost, then producing that unit leads to a net gain for society. Conversely, if the cost of the next unit outweighs its benefit, society stands to suffer a net loss from its production. Externalities—in other words, hidden costs—prevent marginal costs from aligning with marginal benefits. If markets produce up to the point where visible marginal costs equal marginal benefits, and there are additional hidden costs associated with that level of production, then actual marginal costs will be higher than marginal benefits at that production level.

For example, the average price of electricity in the United States in 2010 was 9.65 cents per kilowatt-hour (kWh).[24] Yet under the current U.S. regulatory regime, any given kWh of electricity produced will have an additional hidden cost, depending on how the power was generated. Coal, for example, has a high hidden cost relative to the market price of electricity. According to the National Academy of Sciences (NAS), the median estimate for the hidden cost of greenhouse gas emissions from coal plants was 3 cents per kilowatt-hour in 2010.[25] The NAS also estimated that coal-fired electricity imposed another 3.2

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[21] Henry N. Butler & Jonathan R. Macey, *Externalities and the Matching Principle: The Case for Reallocating Environmental Regulatory Authority*, 14 YALE L. & POL'Y REV. 23, 25, 36-37 (1996) ("The Matching Principle suggests that, in general, the size of the geographic area affected by a specific pollution source should determine the appropriate governmental level for responding to the pollution.").

[22] *Id.* at 29 ("The economic goal of government regulation of pollution is to force polluters to bear the full costs of their activities. In economic jargon, the regulatory goal should be to force the internalization of externalities. Externalities are costs and benefits that are not directly priced by the market system. Since individuals in a market system respond only to the benefits and costs that they actually receive and pay for, the market system may be inadequate to deal with externalities. The market failure that results when market participants do not internalize the external costs of their activities causes resources to be misallocated.").

[23] *See, e.g.*, WILLIAM A. MCEACHERN, ECONOMICS: A CONTEMPORARY INTRODUCTION 194 (9th ed. 2012).

[24] U. S. ENERGY INFO. ADMIN., DOE/EIA-0383, ANNUAL ENERGY OUTLOOK 2013, 138 tbl.A8 (April 2013), http://www.eia.gov/forecasts/archive/aeo13/pdf/0383(2013).pdf (The price is 10.03265 cents per kWh in 2011 U.S. Dollars. In order to remain consistent with the National Academy of Sciences estimates of the hidden costs of coal-fired electricity, I deflated the price to 2007 Dollars. To deflate the price, I used the GDP deflator provided by the Federal Reserve Bank of St. Louis, *available at* http://research.stlouisfed.org/fred2/series/GDPDEF/).

[25] COMMITTEE ON HEALTH, ENVIRONMENTAL, AND OTHER EXTERNAL COSTS AND BENEFITS

cents per kWh, due to the impacts of particulate matter, sulfur dioxide, and nitrogen oxides.[26] The NAS did not estimate the impacts from mercury, other heavy metals, or acid gases.[27]

Thus, the actual average cost of a kWh of electricity produced by coal in 2010 was more than 15.85 cents,[28] which is 64 percent larger than the price paid by electricity consumers. Since electricity markets do not account for these extra costs imposed by coal, the market does not maximize social surplus. The marginal costs of coal-fired electricity were greater than its marginal benefits.

Butler and Macey point out that one goal of regulation is to force markets to internalize these types of externalities.[29] In order to fully internalize these types of hidden costs however, regulation should occur at a level of polity that bears all of the costs. After all, if a polity creates hidden costs that it does not actually bear, then it could maximize its own social surplus by ignoring any costs that fall on other polities.

For example, consider two towns, one of which is near a coal-fired power plant and the other of which is far away. Assume that both towns purchase electricity from the plant, but the distant town is so far away that it does not face any health impacts from the plant. Aside from some differences in distribution costs, both towns will face the same non-health marginal costs from the plant. If each community seeks to regulate at the town-level while internalizing its own externalities, then the nearby town will recognize its healthcare costs and choose a level of electricity consumption such that the marginal benefit of the electricity purchased equals the true marginal cost of the electricity that it purchases. However, the distant town does not face marginal healthcare costs. Thus, it would choose a level of electricity that ignores the health impacts that it is imposing on the town near the coal plant. In the aggregate, society loses because the distant town over-consumes coal-fired electricity, imposing hidden costs on the other town.

Note that this concept could justify a theory that most regulation should be done at the national level. After all, the larger the polity, the less likely it is that

OF ENERGY PRODUCTION AND CONSUMPTION& NATIONAL RESEARCH COUNCIL, HIDDEN COSTS OF ENERGY: UNPRICED CONSEQUENCES OF ENERGY PRODUCTION AND USE 307 (2010) (The NAS estimate was in 2007 U.S. Dollars).

[26] *Id.* at 149.

[27] U.S. EPA, EPA-452/R-11-011, REGULATORY IMPACT ANALYSIS FOR THE FINAL MERCURY AND AIR TOXICS STANDARDS 4-64 to 4-66 (December 2011), http://www.epa.gov/ttn/ecas/regdata/RIAs/matsriafinal.pdf (discussing the health and ecological effects of coal-fired mercury emissions); *id.* at 4-73 to 4-79 (discussing the health impacts of coal-fired emissions of other heavy metals and acid gases).

[28] Actual price + greenhouse gas cost + PM, SO_2, NO_X costs + unknown costs from mercury, other heavy metals, and acid gases = 9.65 + 3 + 3.2 + ? = 15.85+.

[29] Butler & Macey, *supra* note 21, at 29 ("The economic goal of government regulation of pollution is to force polluters to bear the full costs of their activities. In economic jargon, the regulatory goal should be to force the internalization of externalities.").

the costs of an action will fall outside the polity. However, Butler and Macey disagree, arguing that there are disadvantages to regulating at too large a level of government. Specifically, they argue that regulating at the federal level can prevent localities from developing their own innovative solutions.[30] Furthermore, they argue that the federal government is insensitive to local costs and benefits.[31] Thus, Butler and Macey propose the matching principle, by which regulation is conducted by the "governmental unit most conterminous with the area subjected to the externalities."[32] In essence, this argument boils down to a question of proximity. If a polity is closer to the costs and benefits of an activity, then that polity will have an easier time recognizing and regulating externalities.[33]

B. Regulatory Economies of Scale

Butler and Macey also ground their arguments for the matching principle in theories of regulatory competition, which generally hold that smaller political jurisdictions lead to more efficient regulatory outcomes. In particular, they argue that: (1) "[c]ompetition among political jurisdictions is likely to generate optimal laws," (2) citizens and economic entities can switch jurisdictions if they desire, assuming that there are no externalities, and (3) lawmakers are forced to respond to adverse events.[34] This regulatory competition theory has a rich history, beginning with Charles Tiebout's 1956 article in which he argued that decentralized, horizontally arrayed governmental jurisdictions would compete to attract residents on the basis of tax and benefit regimes.[35] According to Tiebout, local governments would be disciplined by market forces and ultimately provide efficient levels of taxation and public goods for their residents.[36] In essence,

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[30] *Id.* at 28.

[31] *Id.* ("[F]ederal preemption centralizes many environmental decisions in Washington, where interest groups dominate decisionmaking, and economic consequences, particularly at the local level, often are ignored. Related to this insensitivity to economic consequences is a third problem with federal preemption: it fails to provide sufficient funding for required local actions.").

[32] *Id.* at 41.

[33] Daniel Esty comes to a similar conclusion, noting that "[w]henever the scope of an environmental harm does not match the regulator's jurisdiction, the cost-benefit calculus will be skewed and either too little or too much environmental protection will be provided." Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 MICH. L. REV. 570, 587 (1996). Esty therefore would prefer "a spectrum of regulatory entities. . . . driven by the diversity of scales on which public health and ecological harms arise." *Id.* at 653; *see also* Robert L. Glicksman & Richard E. Levy, *A Collective Action Perspective on Ceiling Preemption by Federal Environmental Regulation: The Case of Global Climate Change*, 102 NW. U. L. REV. 579, 592 (2008) ("Federal power is most appropriate when the cost-benefit analysis of state policymakers is distorted by collective action problems.").

[34] Butler & Macey, *supra* note 21, at 31-32.

[35] Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416, 418 (1956).

[36] *Id.* at 420.

theories of regulatory competition attribute a market mechanism to regulation. Just as competition between firms leads to more efficient markets for goods and services, competition between regulatory jurisdictions should lead to more efficient markets for regulation.

While it is true for firms that competition produces more efficient outcomes, it is not true that all firms should be of minimal size in all markets. After all, there are often economies of scale to be had by increasing the size of an operation. In other words, sometimes if the scale of an operation is increased, costs per unit of output will fall. The same can be true for regulation because there are at least three types of economies of scale. First, as Damien Geradin and Joseph McCahery point out, "some aspects of regulation are more technically complicated or analysis-intensive, making them susceptible to economies of scale that might overwhelm any benefits from multiple jurisdictions with diverse regulatory approaches."[37] In other words, if it is difficult or costly to develop expertise, then it may be more efficient to develop one expert institution instead of numerous institutions. Second, sometimes facts do not vary with geography. In such cases, regulating once instead of repeating analyses in multiple jurisdictions could generate substantial efficiency gains.[38] Third, there can also be significant advantages to businesses that operate across jurisdictions if those jurisdictions harmonize their regulatory regimes. Geradin and McCahery cite Alan Sykes for the idea that if a market has numerous legal regimes, then producers may need to expend significant resources on lawyers to spell out the particularized rules of each jurisdiction, and then expend further resources tailoring products to local requirements.[39] For example, in the 1970s, appliance manufacturers began pressuring Congress for nationwide harmonization of energy efficiency standards after becoming "fearful that they might have to meet fifty different state standards."[40] In cases such as this, regulatory harmonization can lead to more efficient outcomes.

By combining the matching principle with the concept of regulatory economies of scale, we can develop a coherent framework for assigning regulatory authority over the various aspects of fracking. Specifically, each aspect of fracking should be regulated at a level of polity such that the costs and benefits are fully internalized. In general, the smallest such polity should be chosen. However, larger levels of polity may be appropriate if there are

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[37] Damien Geradin & Joseph McCahery, *Regulatory Co-Opetition: Transcending the Regulatory Competition Debate*, *in* THE POLITICS OF REGULATION: INSTITUTIONS AND REGULATORY REFORMS FOR THE AGE OF GOVERNANCE 90, 102 (Jacint Jordana & David Levi-Faur eds., 2004).

[38] *Id.*

[39] *Id.* at 103 (citing ALAN O. SYKES, PRODUCT STANDARDS FOR INTERNATIONALLY INTEGRATED GOODS MARKETS (1995)).

[40] MICHAEL J. GRAETZ, THE END OF ENERGY: THE UNMAKING OF AMERICA'S ENVIRONMENT, SECURITY, AND INDEPENDENCE 198 (2011).

substantial regulatory economies of scale to be achieved.

III. THE COSTS AND BENEFITS OF FRACKING

In this Part, I analyze the major costs and benefits associated with various aspects of fracking. I apply the framework developed in Part II and argue that air emissions should be regulated by the federal government, water impacts should be regulated by the states with some federal oversight, and local impacts such as noise, visual disturbances, and traffic should be left to local regulation. Localities should also be free to reject fracking if they so choose.

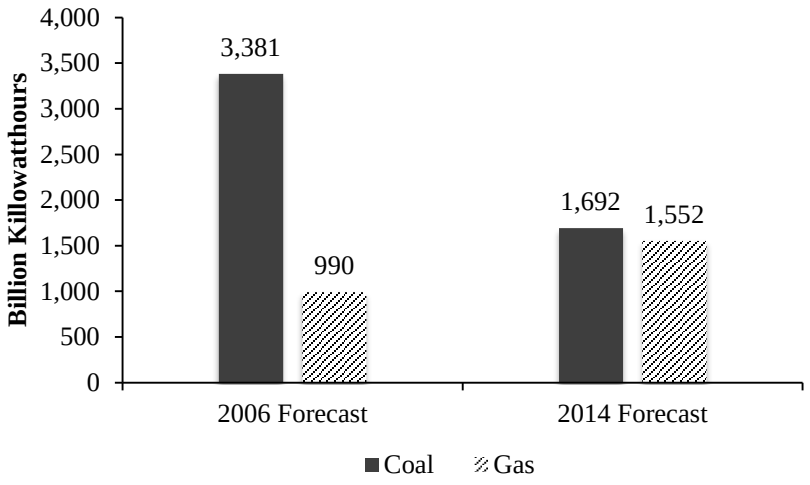
A. Air emissions from drilling operations

The fracking revolution has helped drive natural gas prices down, allowing gas to become more competitive with coal as a source of fuel in power plants.[41] Gas-fired electricity is therefore expected to displace a substantial amount of coal-fired electricity in the coming years. Figure A displays two forecasts from the United States Energy Information Administration (EIA). The figure shows electricity generation by gas- and coal-fired plants for the year 2030. One forecast was completed in 2006 in the early days of the fracking revolution and the other forecast was completed in 2014. In the early forecast, coal-fired plants were expected to generate more than three times the electricity produced by gas-fired plants. Now however, coal is expected to generate half of what previous forecasts indicated. While some of the decline in coal is due to new environmental regulations and changes in forecasted electricity demand, the newly competitive price of gas accounts for a large portion.[42]

[41] U.S. ENERGY INFO. ADMIN., DOE/EIA-0383, ANNUAL ENERGY OUTLOOK 2012, 45 (June 2012), http://www.eia.gov/forecasts/archive/aeo12/pdf/0383(2012).pdf [hereinafter US EIA 2012 AEO] ("The decrease in coal's share of total generation is offset primarily by increases in the shares of natural gas and renewables. Key factors contributing to the shift away from coal are sustained low natural gas prices, higher coal prices, slow growth in electricity demand, and the implementation of Mercury and Air Toxics Standards (MATS) and Cross-State Air Pollution Rule (CSAPR). These factors influence how existing plants are used, which plants are retired, and what types of new plants are built.").

[42] *Id.*

Figure A. Forecasted Net Electricity Generation by Fuel Type for 2030[43]



While coal and natural gas are both fossil fuels, they have very different potentials for pollution. Coal-fired power plants emit heavy metals, such as mercury and arsenic,[44] but emissions of these types of hazardous metals are negligible from natural gas plants.[45] Coal-fired plants also emit acid gases, such as hydrogen chloride and hydrogen fluoride, while natural gas does not emit measurable quantities of such gases.[46]

Furthermore, because natural gas is a gaseous fuel, gas-fired plants emit negligible particulates, whereas coal-fired plants produce substantial particulate matter. Indeed, an EIA report states that without pollution controls, gas plants emit seven pounds of particulates per billion Btu of energy, while coal plants

[43] This information was compiled using data from the 2006 and 2014 EIA Annual Energy Outlooks (AEO). *See* U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2006, tbl.8 Electricity Supply, Disposition, Prices, and Emissions (2006) [hereinafter 2006 AEO Data], *available at* http://www.eia.gov/oiaf/archive/aeo06/aeoref_tab.html (last visited April 11, 2015); U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2014, tbl.8 Electrical Supply, Disposition, Prices, and Emissions, Reference Case (2014) [hereinafter 2014 AEO Data], *available at* http://www.eia.gov/forecasts/AEO/data.cfm (last visited April 11, 2015).

[44] National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 76 Fed. Reg. 24,976, 24,982 tbl.2 (May 3, 2011) [hereinafter EGU NESHAPS & NSPS].

[45] *Id.*

[46] *Id.*

produce 2,744 pounds of particulates for the same energy output.[47] Particulate air pollution has been associated with numerous circulatory and respiratory conditions, such as bronchitis, heart attacks, and asthma,[48] and numerous studies demonstrate a relationship between particulates and premature mortality.[49]

Natural gas plants also emit less than a third as much nitrogen oxides, and one percent as much sulfur oxides relative to coal plants.[50] Nitrogen and sulfur oxides contribute to ambient particulate matter in the atmosphere.[51] Nitrogen oxides also contribute to ambient ozone concentrations, which impose respiratory impacts that lead to hospitalizations and premature death.[52]

Importantly from a global warming perspective, natural gas plants emit half as much carbon dioxide per unit of energy produced relative to coal plants.[53]

Figure B displays two EIA forecasts of U.S. greenhouse gas emissions. One forecast was conducted in 2006, and the other was conducted in 2014. As of 2014, the United States is projected to produce 2.6 billion fewer metric tons of carbon dioxide equivalents in 2030 relative to what was expected in the 2006 projection. Some of this improvement is due to increased fuel economy standards and electricity efficiency improvements, but a large portion is due to the substitution of gas for coal induced by the fracking revolution. Indeed, the greenhouse gas emissions from coal alone are expected to be 1.4 billion metric tons lower in 2030 relative to what had been expected in the 2006 forecast.[54] Conversely, the 2030 greenhouse gas emissions from natural gas are expected to be only 120 million metric tons higher than the 2006 forecast indicated.[55] Thus, as gas replaces coal, the reduction in greenhouse gas emissions from coal is more than ten times larger than the increase in greenhouse gas emissions from natural gas.

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[47] U.S. ENERGY INFO. ADMIN., DOE/EIA-0560, NATURAL GAS 1998: ISSUES AND TRENDS 58 tbl.2 (April 1999), http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/natural_gas_1998_issues_trends/pdf/it98.pdf.

[48] U.S. EPA, REGULATORY IMPACT ANALYSIS FOR THE FINAL MERCURY AND AIR TOXICS STANDARDS, 5-4 to 5-5 tbl.5-2 (Dec. 2011), http://www.epa.gov/ttn/ecas/regdata/RIAs/matsriafinal.pdf [hereinafter MATS RIA].

[49] *Id.* at 5-24 tbl.5-6.

[50] *Clean Energy*, U.S. EPA, http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html (last visited March 31, 2015).

[51] MATS RIA, *supra* note 48, at 5-1.

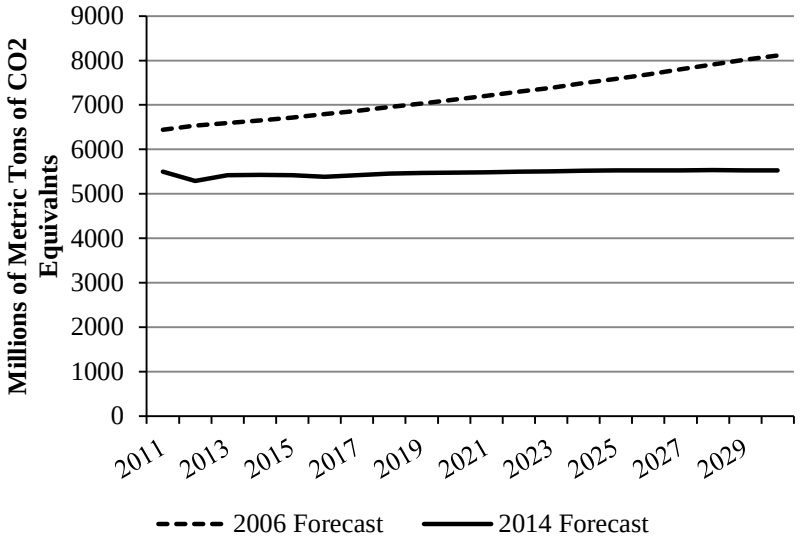
[52] *Id.* at 5-1, 5-4 tbl. 5-2.

[53] *Clean Energy*, *supra* note 50.

[54] 2014 AEO Data, *supra* note 43, at tbl. 18 Energy-Related Carbon Dioxide Emissions by Sector and Source – United States; 2006 AEO Data, *supra* note 43, at tbl.18 Carbon Dioxide Emissions by Sector and Source.

[55] 2014 AEO Data, *supra* note 43, at tbl. 18 Energy-Related Carbon Dioxide Emissions by Sector and Source – United States; 2006 AEO Data, *supra* note 43, at tbl. 18 Carbon Dioxide Emissions by Sector and Source.

Figure B. Forecasts of U.S. Greenhouse Gas Emissions in 2006 and 2014[56]



Many of these benefits are interstate in nature. The benefits of reduced greenhouse gas emissions accrue to the entire planet in the form of reduced global warming potential.[57] The mercury-related health and ecosystem benefits can accrue anywhere on the planet.[58] Nitrogen and sulfur oxide impacts occur across large regions of North America because those pollutants can be transported long distances from their sources.[59]

Because many of these costs and benefits are interstate in nature, the federal government must be involved in the effort to internalize these externalities. In order to do so regarding coal and gas combustion, a government must have the power to add a tax or regulatory burden to the firing of coal and gas such that there would no longer be hidden costs. Such an action would probably induce markets to substitute even more gas for coal, resulting in an efficient balance of

[56] 2014 AEO Data, *supra* note 43, at tbl.18 Energy-Related Carbon Dioxide Emissions by Sector and Source – United States; 2006 AEO Data, *supra* note 43, at tbl.18 Carbon Dioxide Emissions by Sector and Source.

[57] *See* MATS RIA, *supra* note 48, at 5-6 tbl.5-3 (listing the "[g]lobal climate impacts from CO_2" as a benefit of a rule that induces gas plants to replace coal plants); *see also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: SYNTHESIS REPORT SUMMARY FOR POLICYMAKERS 3 fig.SPM.1 (2015), https://www.ipcc.ch/report/ar5/syr/ (comparing global CO2 emissions, global greenhouse gas emissions, and global temperature increases).

[58] MATS RIA, *supra* note 48, at 4-3 (noting that elemental mercury deposits contribute on a global scale, while oxidized mercury and methylmercury have more localized impacts).

[59] MATS RIA, *supra* note 48, at 5-68.

energy production versus health and environmental impacts.

Butler and Macey argue that the matching principle can be applied to certain types of interstate emissions without resort to regulation at the national level.[60] In particular, Butler and Macey argue that states could form regional compacts between affected states, thus regulating at the level of polity at which damages occur. However, Butler and Macey's plan is unworkable without federal power for two reasons. First, states face collective action problems. States that export the most pollution would have no incentive to join such a compact without pressure from the national government. For Butler and Macy's suggestion to work, we would need a piece of federal legislation like Cross State Air Pollution Rule,[61] which requires states to reduce emissions from plants that cause air pollution in other states. Second, interstate compacts are not an effective way to address problems of national or international scale, like global warming.

For example, consider the global warming impacts of methane leaks during the fracking process. Natural gas is mostly methane,[62] and it is a powerful greenhouse gas if it is released into the atmosphere prior to combustion.[63] Indeed, some anti-fracking researchers have claimed that methane leaks cause fracked natural gas to have more life-cycle global warming potential than coal.[64] This claim has been rebutted by an in-depth study by the National Renewable Energy Laboratory at the Department of Energy, which analyzed the life-cycle greenhouse gas emissions attributable to fracked gas. That study concluded that even with methane leaks, the lifecycle greenhouse gas emissions from fracking for electricity are less than half the emissions that result from mining and burning coal for electricity.[65] The important point, however, is that methane

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[60] Butler & Macey, *supra* note 21, at 53.

[61] *See* discussion *infra* note 66.

[62] *Overview of Greenhouse Gases: Methane Emissions*, U.S. ENVIRONMENTAL PROTECTION AGENCY http://epa.gov/climatechange/ghgemissions/gases/ch4.html (last visited April 10, 2015). ("Methane is the primary component of natural gas").

[63] Robert W. Howarth, et al., *Methane and the greenhouse-gas footprint of natural gas from shale formations*, 106 CLIMATE CHANGE 679, 679 (2011) ("Methane is a powerful greenhouse gas, with a global warming potential that is far greater than that of carbon dioxide, particularly over the time horizon of the first few decades following emission").

[64] *See id.* ("Compared to coal, the footprint of shale gas is at least 20% greater and perhaps more than twice as great on the 20-year horizon and is comparable when compared over 100 years.").

[65] JEFFREY LOGAN ET AL., JOINT INSTITUTE FOR STRATEGIC ENERGY ANALYSIS, NATURAL GAS AND THE TRANSFORMATION OF THE U.S. ENERGY SECTOR: ELECTRICITY 36 (2012), *available at* http://www.jisea.org/publications.cfm ("Furthermore, this report's estimate of life cycle GHG emissions is less than half of the median of published estimates for coal-fired electricity generation. . . . It should be noted that the estimate of life cycle GHG emissions developed here is not strictly applicable to other locations or years, and that several important aspects of uncertainty in the methods of this research should be improved through additional research. However, the broad agreement between the estimate developed here and those published independently for both unconventional and conventional gas increases confidence in our understanding of life cycle GHG emissions of natural gas used for electricity generation.").

leaks exist, and they undo some of the global warming benefits of the fracking revolution. Because methane leaks contribute to global warming, the cost of any unit of leaked methane is borne by the entire world. Any locality or state bears only a small portion of those costs, while they gain a much larger portion of the economic benefit from fracking. Thus, any locality or state is likely to under-regulate methane leaks. Barring the possibility of international regulation for international harms, the federal government is the best level of polity at which to regulate methane leaks.

Most air emissions related to coal and gas production are regulated (or soon will be regulated) by the Environmental Protection Agency (EPA) pursuant to the Clean Air Act (CAA).[66] Congress should continue to regulate air emissions related to fracking at the federal level, even if that means enforcing regional solutions with federal power. Methane leaks are now indirectly regulated by the EPA pursuant to the CAA.[67] Some states regulate venting (releasing) and flaring (burning off) of excess gas,[68] yet these procedures release greenhouse gases (mostly methane and carbon dioxide, respectively). States are not the proper level of polity to regulate these global greenhouse gas emissions. Congress should preempt state authority to regulate venting and flaring and ensure that all life-cycle greenhouse gas emissions from fracking are regulated by federal agencies.

B. Water impacts from drilling operations

EPA is currently conducting an extensive study on the potential impacts of fracking on groundwater.[69] In particular, the agency is examining the effects on

[66] EPA sets "National Ambient Air Quality Standards" for the following air pollutants: Sulfur Dioxide, 75 Fed. Reg. 35,520 (June 22, 2010); Particulate Matter, 78 Fed. Reg. 69,806 (Nov. 21, 2013); Nitrogen Oxide, 75 Fed. Ref. 6,474 (Feb. 9, 2010); Ozone 73 Fed. Reg. 16,436 (Mar. 27, 2008); Carbon Monoxide, 76 Fed. Reg. 54,294 (Aug. 31, 2011); and Lead, 73 Fed. Reg. 66,964 (Nov. 12, 2008). EPA also promulgated the "Cross-State Air Pollution Rule" (CSAPR) in order to further control interstate emissions of sulfur and nitrogen oxides. 76 Fed. Reg. 48,208 (Aug. 8, 2011); 77 Fed. Reg. 34,830 (June 12, 2012). CSAPR is currently being challenged at the Supreme Court. Heavy metals and acid gases will be regulated by the Mercury and Air Toxics Standards. 77 Fed. Reg. 9,304 (Feb. 16, 2012); 78 Fed. Reg. 38,001 (June 25, 2013). Methane leaks from hydraulically fracked wells are controlled as a co-benefit to oil and gas sector regulations that target leaks of volatile organic compounds. 77 Fed. Reg. 49,490, 49,513 (Aug. 16, 2012). EPA is monitoring greenhouse gas leaks in order to determine whether additional controls are needed. *Id.* at 49,513 to 49,514.

[67] Methane leaks from hydraulically fracked wells are controlled as a co-benefit to oil and gas sector regulations that target leaks of volatile organic compounds. 77 Fed. Reg. 49,490; 49,513 (Aug. 16, 2012). EPA is monitoring greenhouse gas leaks in order to determine whether additional controls are needed. *Id.* at 49,513 to 49,514.

[68] Nathan Richardson, et al., *The State of State Shale Gas Regulation*, RESOURCES FOR THE FUTURE § 5.5 (June 2013), http://www.rff.org/rff/documents/RFF-Rpt-StateofStateRegs_Report.pdf [hereinafter RFF State Shale Regs].

[69] U.S. EPA, STUDY OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING

drinking water from: (1) large volume withdrawals of water to be used in the fracking process, (2) spills of fracking fluid near drinking water resources, (3) the injection and fracturing process, (4) fracking wastewater spills near drinking water resources, and (5) potentially inadequate treatment and disposal of fracking wastewater.[70] EPA's final report will be available for public comment soon,[71] but for now, we can examine the jurisdictional scope of these impacts in two broad categories. First, we have potential impacts from the injection and fracturing process. These impacts are directly associated with the construction and operation of specific wells in specific locations. Second, the other impacts are all related to the management of various fluids at the surface, whether those fluids are fracking fluids, wastewater, or local water needed to conduct fracking.

1. Potential Impacts from the Injection and Fracturing Process

Groundwater is found at depths shallower than 1,000 feet below the Earth's surface.[72] The vertical wellbore of a fracked well extends through this depth, continuing on for thousands of feet before reaching recoverable gas.[73] A given vertical wellbore is protected by steel casings and cement to prevent leakage from the well into local water sources.[74] Gases and fluids are not likely to migrate thousands of feet up from fracked rock formations.[75] Therefore, the injection and fracking process is only likely to contaminate local water sources if the casings fail.

In order to protect water during the injection and fracturing process we must determine the appropriate level of polity to regulate well casings. There may be a matching principle argument to be made for regulating well casings at the municipal level; however, larger jurisdictions may be able to achieve significant regulatory economies of scale. In particular, it would be difficult for each municipality to develop expertise regarding the costs and benefits of incremental casing improvements. Yet state agencies already develop such expertise.[76] It

WATER RESOURCES: PROGRESS REPORT 1 (Dec. 2012), http://www2.epa.gov/sites/production/files/documents/hf-report20121214.pdf.

[70] *Id.* at 8.

[71] *EPA's Study of Hydraulic Fracturing and its Potential Impact on Drinking Water Resources*, U.S. EPA, http://www2.epa.gov/hfstudy (last visited March 31, 2015).

[72] NY DRAFT SGEIS, *supra* note 1, at 2-23; *see also* U.S. DEP'T OF ENERGY, NAT'L ENERGY TECH. LAB., SHALE GAS: APPLYING TECHNOLOGY TO SOLVE AMERICA'S ENERGY CHALLENGES 5 (March 2011), http://www.netl.doe.gov/file%20library/research/oil-gas/Shale_Gas_March_2011.pdf.

[73] *Id*.

[74] *Id*.

[75] *See generally* NY DRAFT SGEIS, *supra* note 1, at § 6.1.6; *see also* Robert B. Jackson et al., *Increased Stray Gas Abundance in a Subset of Drinking Water Wells Near Marcellus Shale Gas Extraction*, 110 PROCEEDINGS OF THE NAT'L ACADEMY OF SCIENCES, no. 28, at 11254 (2013).

[76] Pennsylvania has been regulating its oil and gas extraction industry since 1891. Kristin M. Carter, et al., *Unconventional Natural Gas Resources in Pennsylvania: The Backstory of the Modern Marcellus Shale Play*, 18 ENVTL. GEOSCIENCES 217, 225 (Dec. 2011). The Commonwealth

could also be costly and time consuming for gas extraction firms to monitor and comply with different casing requirements in each locality. Therefore, firms could experience significant cost savings from a harmonized regulatory regime for casings.

EPA currently regulates the safety of drinking water pursuant to the Safe Drinking Water Act (SDWA).[77] Under the authority of the SDWA, EPA regulates subsurface emplacement of fluids under the Underground Injection Control Program;[78] however, fracking is excluded from the program unless diesel fuel is used in the fracking process.[79] Casings are regulated at the state level for both conventional and shale gas extraction.[80] Some states also require some form of fracking fluid disclosure.[81] Regulatory authority over casings is therefore relatively well distributed. Congress should leave primary authority to regulate casings at the state level, providing some kind of backstop for any potential water impacts that could cross state lines.

2. Potential Impacts from the Mismanagement of Fluids at the Surface

Even though good casings should protect local water resources during the drilling and fracturing process, fracking does pose additional risks due to potential mismanagement of fracking fluids, wastewater, and local freshwater used for fracking. The New York State Department of Environmental Conservation (NYDEC) expects the fracturing process to require 2.4 million to 7.8 million gallons of water for each well.[82] Typical "slickwater" fracking fluid is composed of ninety-eight percent freshwater and sand, and two percent chemical additives.[83] After fracturing, much of this water is extracted from a given well as "flowback water."[84] This flowback often contains salt, as well as other solids and gases in addition to many of the chemicals that are added to the

modernized its statutory regime in 1984 with the Coal and Gas Resource Coordination Act, 58 PA. CONS. STAT. §§ 501-518 (1984), and the Oil and Gas Act, 58 PA. CONS. STAT. §§ 601.101-601.605 (repealed 2012), which allowed the executive branch to adopt Chapters 78 and 79 of the Pennsylvania Code regulating the oil and gas extraction industry. Thus, the Pennsylvania Department of Environmental Protection has had 30 years to learn how to regulate the oil and gas extraction industry.

77 42 U.S.C. §§ 300f to 300j-25 (2012).

78 40 C.F.R. §§ 144-48 (2013).

79 Safe Drinking Water Act of 1974 § 1421(d)(1), 42 U.S.C. § 300h(d)(1) (2012).

80 *See* RFF State Shale Regs, *supra* note 68, at § 5.2.

81 *See id*. at § 5.3.2.

82 NY DRAFT SGEIS, *supra* note 1, at 5-92 to 5-93.

83 *Id*. at 5-40.

84 The NYDEC expects between 9 and 35 percent of fracturing fluid to be recovered as flowback water. Thus, the agency expects each well to generate 216,000 gallons to 2.7 million gallons of flowback water, based on a pumped fluid estimate of 2.4 million to 7.8 million gallons. *Id.* at 5-99.

fluid for the fracking process.[85] The drilling process also produces rock cuttings that may contain radioactive elements.[86]

The risks associated with management of surface water can be grouped into three basic categories: spills, transport, and usage of freshwater resources. The scope of these risk categories all extend beyond local municipalities; therefore, these risks should be regulated at least at the state level. Consider spills, for example. The NYDEC notes that surface spills could reach aquifers in a short amount of time "due to the permeable character of the soils above the aquifers, and the shallow depth to the aquifers (generally 0-20 feet below the ground)."[87] To the extent that a given aquifer serves more than one municipality, municipal regulation would undervalue the risks of spills. For example, the Bath valley-fill aquifer in southern New York is in the Marcellus Shale area and serves multiple communities, including Bath and Savona.[88] The aquifer also contacts the Cohocton River.[89] Thus, a spill at any one community could contaminate the water of multiple communities. The same holds true for watersheds. For example, New York City is supplied with drinking water from a watershed located on portions of eight different counties.[90]

Since municipalities do not face all of the potential costs of spills on their own, spills should be regulated at a higher level of polity. Indeed, because spills can contaminate aquifers and watersheds, spill damage can cross state lines. Therefore, there should be some federal involvement in the management of spill risks. Yet, spills are unlike air pollution because any single spill is unlikely to cause harms beyond a particular region. In other words, even when a spill crosses state lines, it is more contained that air emissions of pollutants like greenhouse gases. Thus, while the federal government should be involved in the regulation of interstate water pollution, it does not need to take a lead role.

The federal government and the states currently share regulatory authority over the potential impacts of spills and discharges. EPA regulates the disposal of flowback into surface waters of the United States pursuant to the Clean Water Act. Direct discharges are regulated under the National Pollutant Discharge

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85 *Id.* at 5-101. For details on the contents of flowback water, *see id.* at 5-100 to 5-116.

86 For details on cuttings at the Marcellus Shale and the potential contaminates associated with those cuttings, *see id.* at 5-33 to 5-39.

87 *Id.* at 6-39.

88 For maps and details of the Bath valley-fill aquifer, *see* TIMOTHY S. PAGANO ET AL., U.S. GEOLOGICAL SURVEY, GEOHYDROLOGY OF THE VALLEY-FILL AQUIFER IN THE BATH AREA, LOWER COHOCTON RIVER, STEUBEN COUNTY, NEW YORK, USGS WATER-RESOURCES INVESTIGATIONS REPORT: 85-4095 (1984), *available at* http://pubs.er.usgs.gov/publication/wri854095 (plate 1 displays Bath and Savona situated on the aquifer).

89 *Id.*

90 NY DRAFT SGEIS, *supra* note 1, at 2-22 ("The NYC drinking water supply watershed (NYC Watershed) is located in portions of Delaware, Dutchess, Greene, Putnam, Schoharie, Sullivan, Ulster and Westchester Counties.").

Elimination System (NPDES) permit program,[91] and wastes sent to publicly owned treatment works are subject to General Pretreatment Regulations.[92] Most states are authorized to manage their respective NPDES programs.[93] Thus, discharges are managed at the state level against a federal backstop. Regulatory authority over the water impacts of spills therefore seems to be reasonably well allocated.

Waste transport and disposal should also be considered at a greater-than-local level of polity. After all, most of the potential externalities involved with waste transport would occur outside of a given municipality. A municipality that generates waste will bear no costs if its transporters spill or improperly dispose of contaminants in other communities. Furthermore, there are likely substantial economies of scale to be gained by harmonizing transportation regimes across municipalities. At the state level, for example, one expert body could set the rules, and transporters would only need to expend resources learning and complying with a single set of regulations.

Waste transport and disposal should therefore be regulated mostly at the state level. A number of states already regulate wastewater storage, disposal, and transportation.[94] Congress should maintain some federal authority to provide a backstop to these state regulations in order to ensure that states to not impose externalities on each other, but otherwise regulatory authority over transport and disposal should remain with the states.

The use of local freshwater for fracking should also be considered at a level of polity greater than local municipalities. As is true with spills, waterways are interconnected. No single municipality should be able to extract water without considering the costs imposed on other communities. Many states already regulate water withdrawals under general regulations, and several have discussed drafting rules specific to the fracking industry.[95] As noted with the other water impacts discussed in this Part, Congress should leave this regulatory authority to the states while providing a backstop regulating interstate water withdrawals.

C. Other Costs and Benefits of Fracking

The remaining prominent impacts associated with fracking relate to purely local issues like noise, visual impacts, and increased traffic. Fracking is louder than conventional drilling due to the high volumes of water that must be pumped

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[91] 40 C.F.R. § 122-25 (2013).

[92] 40 C.F.R. § 403 (2013).

[93] *National Pollutant Discharge Elimination System State Program Status*, U.S. EPA, http://water.epa.gov/polwaste/npdes/basics/NPDES-State-Program-Status.cfm (last visited March 31, 2015).

[94] *See* RFF State Shale Regs, *supra* note 68, at § 5.4.

[95] *See id. at* § 5.3.1.

at high pressure into a given well.[96] Fracking also creates a noise impact of longer duration because horizontal wells can take four to five weeks of drilling at twenty-four-hours-per-day to complete, whereas conventional wells can be completed in less than a week.[97] Fracking with horizontal drilling also imposes more of a visual impact than conventional gas extraction because fracking rigs are taller and need more supporting equipment.[98] Fracking also entails substantial truck traffic, which can inconvenience local commuters, damage local infrastructure, and increase the risks associated with driving on local roads.[99]

These impacts are all local and require more local knowledge than technical expertise to best regulate. Thus, these types of impacts can be dealt with through municipal zoning ordinances. Municipalities have every incentive to bargain with drillers for conditions mitigating some of these impacts. For example, localities can bargain to prevent drilling in areas with sensitive land uses, as well as demand larger setbacks, berms, noise limits, and traffic limits. To the extent that these types of mitigation will not make up for a certain amount of local damage, drillers can compensate local residents. If the state and federal governments have done their jobs and created regulations that internalize all of the social costs and benefits of fracking, then drillers should be willing to pay residents up to a socially optimal amount. In such a case, the value of drilling would reflect costs and benefits that communities do not normally face, like the global warming costs and benefits associated with methane leaks and reduced coal usage. In such a scenario, if a driller is unwilling to pay these costs, then the social value of drilling is less than the social value of not drilling. In these cases, localities should have the power to reject fracking.

Congress should carve out authority for municipalities to make these local decisions, free from state interference. Currently, some states regulate setbacks from buildings and/or surface water sources.[100] To the extent that setbacks exist to protect water sources, states should be involved because water impacts can extend beyond a single municipality. However, states should leave it to localities to determine setbacks from buildings because the associated impacts are purely local. As was demonstrated in *Robinson Township*, states may also try to regulate the local decision to accept or reject fracking. Congress should preempt state authority to override local preferences in this manner. In Part IV *infra*, I argue that such preemption would be constitutional.

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[96] NY DRAFT SGEIS, *supra* note 1, at 6-289; *see generally, id.* at § 6.10 for details on the noise impacts of fracking.

[97] *Id.*

[98] *Id.* at 6-264; *see generally, id.* § 6.9 for details on the visual impacts from fracking.

[99] *See id.* § 6.11 for details on the traffic impacts from fracking.

[100] *See* RFF State Shale Regs, *supra* note 68, at § 5.1.2.

IV. MULTI-TIERED PREEMPTION

Thus far, I have applied the matching principle and the concept of regulatory economies of scale to argue that various aspects of fracking should be regulated across three levels of political jurisdiction: municipal, state, and federal. Congress should therefore attempt to maximize social surplus in the nation by allocating regulatory authority across these three levels of government.[101] However, in order to allocate regulatory authority across multiple tiers of government, Congress must preempt state authority on two ends—some state authority must be preempted for federal power and some must be preempted for local power. While it would be controversial for Congress to preempt state authority over certain municipal matters, I argue in this Part that such preemption *would be* constitutional.

It is clearly constitutional for Congress to delegate certain authority to municipalities, shielded from state interference. For example, Congress can distribute funds to local governments, delegating authority to those governments to spend the money at their own discretion without interference from state governments. In *Lawrence County v. Lead-Deadwood*,[102] Congress had distributed funds to local governments under a federal provision requiring payment for entitlement lands.[103] South Dakota passed a statute dictating how localities were to spend those funds.[104] However, the Supreme Court found that "Congress intended local governments to have more discretion in spending federal aid than the State would allow them;" therefore, the Court struck down the state law.[105] Thus, Congress can at least protect municipalities from state interference when it comes to spending federal money.

The Supreme Court touched on the broader issue of a carve-out for local power in *Nixon v. Missouri Municipal League*.[106] In *Nixon*, Missouri had passed a statute preventing municipalities from providing telecommunications services. Local municipalities sought a ruling that the Telecommunications Act of 1996[107] preempted the Missouri statute[108] because the Act explicitly barred states from passing laws "prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service."[109] The Court held that the federal statute

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[101] *See generally* Part II, *supra*. The matching principle is meant to maximize social surplus by ensuring that hidden costs are internalized and local preferences are met the greatest extent possible. The concept of regulatory economies of scale is also meant to increase social surplus by regulating at a cost-minimizing level of polity.

[102] Lawrence Cnty v. Lead-Deadwood, 469 U.S. 256 (1985).

[103] 31 U.S.C. § 6902 (2012).

[104] S.D. CODIFIED LAWS § 5–11–6 (1980).

[105] *Lead-Deadwood*, 469 U.S. at 258.

[106] Nixon v. Mo. Municipal League, 541 U.S. 125 (2004).

[107] Pub. L. 104-104, 110 Stat. 70 (codified at 47 U.S.C. § 253 (2012)).

[108] MO. REV. STAT. § 392.410(7) (2012).

[109] Pub. L. 104-104, 110 Stat. 70 (codified at 47 U.S.C. § 253(a) (2012)).

did not preempt state law in favor of the municipalities. However, the Court reached its conclusion through statutory construction, not constitutional analysis.[110] The Court did believe that it would be a "strange and indeterminate result[to use] federal preemption to free public entities from state or local limitations . . . ."[111] However, nowhere did the Court suggest that such a use of preemption would be unconstitutional. Instead, the Court would require an "unmistakably clear" statement from Congress to read a statute to preempt state power in favor of municipal power.[112] Implicitly, therefore, the Court accepted the potential constitutionality of such a provision.

Additionally, Professor Roderick Hills argues that it is constitutional for Congress to use federal law in this way to free municipalities from control of state legislatures.[113] Hills provides at least one example of federal preemption of state control over a municipality. Specifically, he cites the battle between the City of Tacoma and the State of Washington in the 1950s, when the Federal Power Commission licensed Tacoma to build a dam on the Cowlitz River.[114] The State of Washington sought to prevent the construction of the dam under state law, but the U.S. Court of Appeals for the Ninth Circuit held that the city's federal license preempted state law.[115] Thus, federal law can license municipalities to act, shielded from state interference.

Hills presents two other affirmative arguments to support his position. First, he points to the Supreme Court's Eleventh Amendment "arm-of-the-state" jurisprudence, which holds that while states are immune from lawsuits under the Eleventh Amendment, counties and cities are not so protected because they are independent corporations, not agents of the state.[116] Hills argues that if local governments are independent corporations, "then the federal government should be able to delegate federal responsibilities to them just as it delegates federal duties to private nonprofit corporations (for example, Howard University, the Red Cross, etc.), preempting in the process all state legislation that might

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[110] *Nixon*, 541 U.S. at 133 ("To get at Congress's understanding . . . it helps if we ask how Congress could have envisioned the preemption clause actually working if the FCC applied it at the Municipal respondents' urging.").

[111] *Id.*

[112] *Id.* at 141 (quoting Gregory v. Ashcroft, 501 U.S. 452, 460 (1991)).

[113] *See generally* Roderick M. Hills, Jr., *Dissecting the State: The Use of Federal Law to Free State and Local Officials from State Legislatures' Control*, 97 MICH. L. REV. 1201 (1999).

[114] *Id.* at 1272-80.

[115] *Id.*at 1272-3; *see* Wash. Dep't of Game v. Federal Power Comm'n, 207 F.2d 391, 396 (9th Cir. 1953). The Washington Supreme Court ruled in favor of the State in *City of Tacoma v. Taxpayers of Tacoma*, 262 P.2d 214, 229 (Wash. 1953), but the U.S. Supreme Court reversed on the grounds that it was precluded by the Ninth Circuit's earlier decision. *See* City of Tacoma v. Taxpayers of Tacoma, 357 U.S. 320, 340 (1958).

[116] Hills, *supra* note 113, at 1210; For an overview of the arm-of-the-state doctrine, see Alex E. Rogers, Note, *Clothing State Governmental Entities in Sovereign Immunity: Disarray in the Eleventh Amendment Arm-of-the-State Doctrine*, 92 COLUM. L. REV. 1243 (1992).

interfere with the federal license of the federal agent."[117]

Hills also argues that carve-outs for municipal authority are constitutional because they preserve municipal autonomy, as opposed to mandating affirmative duties. Hills notes that in *New York v. United States*[118] and *Printz v. United States*,[119] the Court struck down federal laws that imposed affirmative duties on nonfederal officials—to take title to radioactive waste, and to regulate gun sales.[120] Yet Hills also points to *Missouri v. Jenkins*[121] to argue that while federal law may not be used to force state officials to take a given action, it can "liberate [state] officials from the constraints of state law by authorizing them to do what state law forbids[.]"[122] In *Jenkins*, a district court increased local property taxes in order to cover the costs of a judicially imposed desegregation program. The Court struck down the judicially imposed tax;[123] however, the Court stated that the district court had an alternative option that would not exceed its powers.[124] In particular, the district court could have authorized the willing locality to raise its own property taxes and enjoined the state from interfering.[125]

Nestor Davidson has come to a similar conclusion, also basing his analysis on the Court's arm-of-the-state jurisprudence[126] and *City of Tacoma*.[127] In particular, Davidson argues in favor of a concept that he names "cooperative localism," in which the federal government works with local governments, independent from the states.[128] Davidson argues that local governments are, legally speaking, not undifferentiated instrumentalities of the state.[129] Therefore, the law should protect cooperation between the federal government and localities, and it should not allow states to preempt that cooperation.[130]

As was true in *City of Tacoma*, Congress should license municipalities to

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117 Hills, *supra* note 113, at 1210.

118 New York v. United States, 505 U.S. 144 (1992).

119 Printz v. United States, 521 U.S. 898 (1997).

120 Hills, *supra* note 113, at 1211.

121 Missouri v. Jenkins, 495 U.S. 33 (1990).

122 Hills, *supra* note 113, at 1212.

123 *Jenkins*, 495 U.S. at 58.

124 *Id*. at 51.

125 *Id*.

126 Nestor Davidson, *Cooperative Localism: Federal-Local Collaboration in an Era of State Sovereignty*, 93 VA. L. REV. 959, 991 (2007) ("[T]he Court has expanded significantly the concept of state immunity from suit, articulating a preconstitutional doctrine of immunity neither derived from, nor limited by, the Eleventh Amendment. As the Court has carved out this expansive immunity doctrine, it has continued categorically to refuse to extend the same sovereignty-based protection to political subdivisions that are not arms of the state.") (citing Alden v. Maine, 527 U.S 706, 713 (1999)).

127 *Id*. at 997-98.

128 *Id*. at 960.

129 *Id*. at 1000.

130 *Id*. at 1033-34.

regulate the purely local impacts of fracking. This could be a blanket license scheme, and it should guarantee that municipalities have the power to reject local drilling. Such a license scheme appears to be constitutional, and it would help align regulatory authority in a manner that would better account for the local costs and benefits of drilling.

V. CONCLUSION

In this paper, I argue that various aspects of fracking should be regulated by various levels of government. In particular, I recommend that air emissions be regulated by the federal government, water impacts be regulated by the states with some federal oversight, and local impacts such as noise, visual disturbances, and traffic be left to local regulation. Localities should also be free to reject fracking if they choose to.

Congress should allocate the authority to regulate fracking to the appropriate levels of government. Thus, Congress should preempt state authority to regulate the costs and benefits of air emissions from fracking. Congress should also preempt state authority to regulate purely local impacts. While it would be controversial for Congress to preempt state authority over localities in such a manner, it appears that such a carve-out would be constitutional.

Environmental problems are difficult to solve. They are even more difficult when a regulating government does not face all of the costs and benefits of a particular polluting activity. By employing multi-tiered preemption, Congress can at least ensure that the polities that bear certain costs are also the polities that decide what to do about those costs.