

## **INTRODUCTION: SPECIAL ISSUE ON SOCIAL ISSUES ASSOCIATED WITH UNCONVENTIONAL NATURAL GAS DEVELOPMENT**

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Energy is vastly produced and consumed in the United States. Between 1949 and 2009, energy production in the United States increased nearly 130 percent (from 31.722 quadrillion Btus to 72.970 Btus), while U.S. energy consumption increased by approximately 196 percent (from 31.982 Btus to 94.578 Btus) (EIA 2010a). The vast majority of the roughly 94.6 quadrillion Btus of energy consumed in the United States in 2009 (approximately 83 percent) came from the combustion of fossil hydrocarbon fuels. In 2009, petroleum provided roughly 37 percent of the nation's energy. Natural gas was responsible for one quarter (25 percent) of the nation's energy supply, while coal contributed about 21 percent. Nuclear energy supplied about 9 percent. Renewable sources in the United States totaled about 8 percent.<sup>1</sup>

From the late 1950s onward, as energy consumption continuously outpaced domestic production, the United States began to import energy to meet its demand (EIA 2010a). Net imported energy accounted for 24 percent (22.849 Btus) of all energy consumed in 2009 (EIA 2010a). Since President Nixon launched Project Independence in November of 1973, one prominent theme in discussions of energy has been that of energy independence. In the vernacular, energy independence is often equated with freeing the United States from dependence on foreign oil. University researchers and mainstream pollsters routinely survey the American public on ways that would make America less dependent on foreign oil. In 2008, for example, a Quinnipac University national poll found that most Americans believed the best way to help solve the energy crisis and make American less dependent on foreign oil is to develop renewable energy sources (Quinnipac University Polling Institute 2008). That same year, in a study in the State of Texas, my associate and I asked sampled respondents to indicate whether they supported or opposed 15

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<sup>1</sup> Biomass is currently the largest U.S. renewable energy source, contributing roughly 50 percent of the renewable sources' overall 8 percent. Other renewable sources include: hydropower (35 percent of the renewable sources' 8 percent); wind (9 percent of the renewable sources' 8 percent); geothermal (5 percent of the renewable sources' 8 percent); and solar (1 percent of the renewable sources' 8 percent) (EIA 2010a).

ways the United States might reduce reliance on foreign oil (Theodori and Lyke-Ho-Gland 2008). Four of the top 15 ways garnering support included: (1) invest in research and development of solar power energy sources (94 percent of respondents supported); (2) invest in research and development of wind power energy sources (91 percent of respondents supported); (3) increase production of oil and gas in the United States (82 percent of respondents supported); and (4) invest in research and development of biofuels (79 percent of respondents supported) (Theodori and Lyke-Ho-Gland 2008). Three of those four ways dealt directly with renewable energy sources.

As noted above, estimates for 2009 show that renewable energy currently makes up about 8 percent of the total energy mix in the United States. By 2035, the use of renewable fuel is projected to increase to 13 percent (EIA 2011). The reality is, that in 2035, renewable sources will still comprise a very small portion of the overall energy mix. Therefore, as we transition from a fossil fuel economy to a more renewable economy – relatively speaking, of course – we will need energy sources for electric power and for transportation in the interim. The question becomes: with what will this power be generated?

One potential energy source receiving increased attention is natural gas. For power generation efficiency, natural gas – compared to oil or coal – is less wasteful (EIA 1999). When burned, natural gas emits lower quantities of greenhouse gases and criteria pollutants per unit of energy produced than the other fossil fuels (Bryce 2010; EIA 1999). And, what has really captured the attention of many stakeholders lately is that estimates indicate an abundance of natural gas onshore in the United States and across the globe, with substantial amounts in unconventional reservoirs (i.e., tight gas, coal bed methane, and shale gas formations) (Bryce 2010; EIA 2010b; Ridley 2011).

Presently, tight gas formations account for the largest share of unconventional natural gas production in the United States (Stowers 2009). In 2009, tight gas production amounted to roughly 28 percent of the total U.S. production (NETL 2011). Shale gas, which accounted for about 14 percent of the total U.S. production in 2009 (NETL 2011), is the “fastest-growing source” (Stowers 2009:38) of unconventional natural gas production. The EIA estimates that shale gas production will constitute almost half (47 percent; 12.2 tcf) of the projected 26.3 tcf total U.S. natural gas production in 2035 (EIA 2011).

As exploration, drilling, and production activities quickly spread across the U.S. gas shale basins (e.g., Barnett, Fayetteville, Haynesville, Marcellus, New Albany, Eagle Ford, etc.) and across the globe (e.g., Poland, Ukraine, China, India, Australia,

etc.), engineers and geologists are continuously calculating the amounts of known, undeveloped, and technically recoverable natural gas in these reservoirs (Ambrose, Potter, and Briceno 2008; Bowker 2003, 2007; Engelder and Lash 2008). Economists are evaluating the potential economic impacts of these shale plays at the local, state, and federal levels (Considine et al. 2009; Considine, Watson, and Blumsack 2010; The Perryman Group 2007, 2008, 2009; Weinstein and Clower 2004, 2006). Sociologists and other social scientists are assessing the vast array of social issues associated with the developments that occur in urban, suburban, and rural areas (Anderson and Theodori 2009; Gentry et al. 2011; Jacquet 2009; Theodori 2008, 2009; Theodori and Jackson-Smith 2010).

This special issue of the *Journal of Rural Social Sciences* reflects recent research on the social issues associated with unconventional natural gas development. In the first article, Brooklynn Wynveen extends the research that she and I conducted in the Barnett Shale (Anderson and Theodori 2009; Theodori 2009). Wynveen analyzed open-ended comments collected in a general population survey from a random sample of individuals in two Texas counties – Wise County and Johnson County. Wynveen’s detailed analysis uncovered numerous economic, social, and environmental themes, “some of which overlapped between Wise and Johnson Counties, and others of which were unique to one or the other” (pp. 15-16). As Wynveen noted, “The themes identified in the comments shared by Wise and Johnson County survey respondents offer added insight that could not be obtained from quantitative responses alone” (p. 24).

The second and third articles provide thematic analyses of interview data collected in the Marcellus Shale. The article by Kathryn Brasier, Matthew Filteau, Diane McLaughlin, Jeffrey Jacquet, Richard Stedman, Timothy Kelsey, and Stephen Goetz uses data collected from key informants in three counties in Pennsylvania (Bradford County, Lycoming County, and Washington County) and one county in New York (Steuben County) to document the perceptions of the preliminary impacts associated with shale gas development. Their paper provides a description of “community-level impacts as reported by formal and informal leaders within four counties in the Marcellus Shale region and describes how factors such as level of development and previous extractive histories affect those perceptions” (p. 34). Brasier et al.’s findings and discussion are organized around the following six themes: (a) overall awareness; (b) local economic impacts; (c) social impacts; (d) aesthetic quality, amenities, and environmental quality; (e) agriculture; and (f) physical infrastructure.

The article by Jeffrey Jacquet and Richard Stedman describes the emergence and organization of landowner coalitions in the Southern Tier of New York State in response to the exploration of natural gas resources. Jacquet and Stedman then interpret these coalitions using existing collective natural resource management frameworks. According to the authors, “The coalitions are primarily concerned with the advancement of private member benefits, while public benefits of the collective action are poised to accrue indirectly” (p. 62).

Although not related directly to the call for papers on social issues associated with unconventional natural gas development, the next two articles deal with natural gas-related topics. The article by Mona Avalos, David Burnett, John Veil, and me is a replication of published research on the public perception of desalinated produced water from oil and gas field operations (Theodori et al. 2009). Our findings paralleled those uncovered in the original investigation. The results revealed that: (a) small percentages of respondents are extremely familiar with the process of desalination and extremely confident that desalinated water could meet human drinking water quality and purity standards; (b) respondents are more favorably disposed toward the use of desalinated water for purposes where the probability of human or animal ingestion is lessened; and (c) individuals with higher levels of familiarity with the process of desalination are more likely than those with lower levels of familiarity to agree that desalinated water from oil and gas field operations could safely be used for each of nine proposed purposes.

The fifth article in this issue, by Lazarus Adua and Jeff Sharp, focuses on how residential location and race are related to residential natural gas consumption. After analyzing four waves of the Residential Energy Consumption Surveys, Adua and Sharp reported “that natural gas consumption differs by residential location only to the extent that investment in energy efficiency and weather conditions are not taken into consideration” (p. 107). With respect to race, the authors found that African Americans consume more natural gas per year than whites.

I anticipate that the research articles in this special issue of *JRSS* will be of interest and value to fellow academicians, as well as to community leaders, government and regulatory agency personnel, representatives of non-governmental organizations, oil and gas industry affiliates, members of the public, and other stakeholders. Ultimately, my hope is that the papers portrayed in this special issue will encourage future theoretical and empirical research on the social issues associated with unconventional natural gas development.

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