Forest Fuels: Equity, Environment, and Woody Biomass Energy Technologies in Michigan

Project Summary. Biofuels currently contribute 50% of the world's renewable energy, yet the development of each type of biofuel technology is complicated by a constellation of political, social, and economic factors. This research examines the socioecological implications of differently-scaled woody biomass energy technologies in Michigan, including residential woodstoves, community-scale boilers, and biomass power plants. The project combines spatial analysis with approaches from science and technology studies (STS) and environmental history to understand how these different technologies have distributed benefits and burdens since the late twentieth century. Using archival analysis, semi-structured interviews, a survey, and spatial analyses, researchers will investigate the sociopolitical factors that have led to adoption of biofuel technologies. This research offers collaborative new approaches for thinking about the relationship between renewable energy development and environmental justice.

Intellectual Merit. This research helps to fill four significant research gaps. First, historical scholarship on energy has tended to focus on large-scale energy systems powered by fossil fuels or nuclear energy. This project will help to reveal some of the hidden human dynamics involved in the development of one particular form of renewable energy—woody biomass. Second, research on biofuels has tended to focus on technical, physical, and economic dimensions. This research will extend knowledge and research on the human dimensions of using forests for fuel, and will illuminate the broader political and social landscapes in which different woody biomass energy technologies were developed. Third, this project advances the field of spatial history by showing how the tools of STS, environmental history, and the spatial sciences can be combined to understand how issues of equity and the environment have shaped technological development. Finally, most definitions of sustainability include three spheres including economic, environmental, and social dimensions. Yet, research on sustainable energy technologies typically focuses on economic and environmental aspects. This project will shed light on some of the deeper cultural barriers to developing renewable power systems. By combining historical research, quantitative social science methods, and spatial analysis, this project will help to reveal how political and social dynamics from the past constrain technological development in the future.

Broader Impact. This research will have direct impacts on energy planning and policy. As the US continues to transition to the clean energy economy, biofuels will play an increasingly important role in both regional and national energy portfolios. This project will provide deeper understandings of the social acceptability of using wood for energy in Michigan. Having a more nuanced understanding of the cultural carrying capacity for woody biomass energy systems will help policy-makers determine which technologies may be appropriate for particular landscapes and communities. The results of this research will be disseminated broadly though professional activities with Michigan's Statewide Wood Energy Team and the national Alliance for Green Heat, media outreach activities such as regional radio (MSU/WKAR, WNMU) and newspaper interviews. By unveiling the often hidden human dimensions of woody biomass development, this research will help ensure that the transition to a more sustainable energy future is not only economically and environmentally viable, but it is also socially equitable and culturally appropriate. The project will also provide opportunities for training undergraduate students in historical and social science research methods, including the design and implementation of interviews, documentary analysis, focus groups, and surveys. These sorts of methods are increasingly recognized as critical for developing realistic and useful models of decision-making, and for integrating into coupled social and ecological systems modeling; it is important that we train future researchers in their use. The MSU Department of Forestry has received three diversity-focused training grants and investigators will recruit students from underrepresented populations to serve as research assistants on this project. Researchers will communicate the results of the research through scholarly publications, public outreach efforts, and instructional activities in our classrooms.