Public Perceptions of Bioenergy

INTRODUCTION. Opportunities for converting biomass to biofuels are strong, and ongoing research is continually leading to improved technologies. Despite these advancements and the potential environmental, economic, and social benefits to the American public, members of the "bioenergy web" (e.g., biomass producers and consumers; employees of the bioenergy, forestry, and transportation sectors; members and leaders of rural communities; policymakers), have varying – and sometimes conflicting – opinions about the use of biomass for bioenergy development. Understanding these different perceptions and the potential beliefs behind them is important for overcoming barriers to the continued development of a strong biofuels economy.

WHY ARE PERCEPTIONS IMPORTANT? The bioenergy industry involves conversion of a bio-based product such as wood or switchgrass to a biofuel product such as ethanol or chips or pellets. It includes coordination of a complex web of actors and sectors. Perceptions of bioenergy will influence how responsive people are to purchasing and consuming bioenergy products; opposition can directly disrupt bioenergy markets, while support can strengthen bioenergy markets (Figure 1). Therefore, understanding influences on public perceptions is vital for continued biofuel development.

Policymakers at all levels need to understand the benefits and costs of bioenergy and associated community impacts. Public investments in bioenergy facilities and direct citizen and stakeholder participation in public policies have a powerful role in shaping public opinions on bioenergy. This is especially important in the biofuels arena. Typically, bioenergy facilities are sited and located in rural areas, near existing or potential agriculture or woody biomass sources. This results in a smaller, more geographically dispersed population receiving the benefits or bearing the costs.

WHO IS "THE PUBLIC"? In discussing public attitudes toward bioenergy, it is important to identify who actually constitutes "the public." Table 1 lists some of the groups of people who could be included. Within this public, people occupy different tiers of involvement based on perceived impact. Individuals such

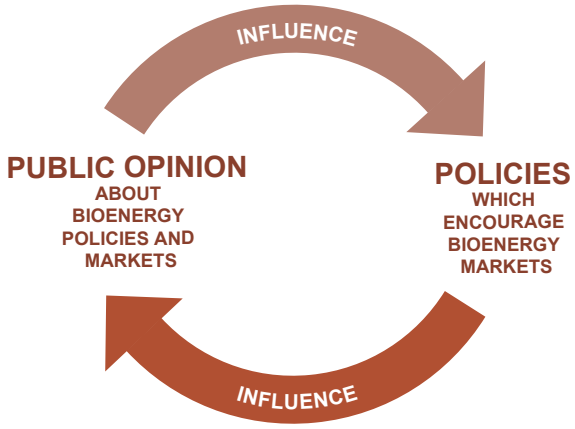

Figure 1. Public perceptions and policies about bioenergy and markets interact over time.

TABLE 1. BIOENERGY STAKEHOLDERS

- *State and national governments and international governance institutions*
- *Environmental and social NGOs*
- *Local leaders and planners*
- *Local community members*
- *Forest landowners and farmers*
- *Potential employees of facilities, such as havesters or loggers*
- *Transportation and logistics personnel*
- *General public*
- *Investors (potential or current)*

as facility developers, producers and growers of bioenergy, harvesting contractors, transportation and logistics personnel, potential employees, and members of the local community where a facility may be sited all have attitudes and perceptions with regard to how such a facility will affect them personally and as a community. For example, individuals with a large plant operating near them will be concerned about direct effects such as noise, deterioration of air or water quality, road damage and increased traffic. In addition, the general public also includes citizens that are not directly affected, such as potential investors in bioenergy, government institutions, non-governmental organizations, and larger industries (such as the forestry industry).

PUBLIC AND LANDOWNER PERCEPTIONS OF BIOENERGY.

Perceptions of bioenergy vary widely and are dependent on context and location, demographics, knowledge, personal and shared experiences, and expectations of direct benefits or costs of bioenergy development. It is therefore difficult to make sweeping generalizations that encompass the entire "public." In one 2013 survey of the general public, researchers found that people were most concerned about the price of biofuels and the effects of biofuels on the operation and maintenance of their vehicles. Within this same survey, viewpoints were polarized, with some respondents expressing significant opposition to the bioenergy industry and others conveying support. Other surveys have shown, that in general, people are favorable (78% positive responses) toward the adoption of bioenergy to some degree and that many would be willing to pay a modest price increase for biofuels. However, in other studies, respondents have expressed concerns regarding the use of food crops for biofuels, (although in agriculture-dependent areas such as the rural Midwest, there is generally strong support for biofuels). Respondents have also voiced concerns about forestland loss, soil and water quality and quantity degradation, and other environmental impacts. Several environmental groups have active campaigns against wood-based feedstocks for bioenergy, based on their long term concern for forest conditions, while other interest groups oppose government subsidies and mandates as interfering in free markets.

Direct participants in bioenergy, such as forest landowners and bioenergy developers, have in particular ranked wood-based bioenergy because of its contribution to energy security, the considerable availability of forest biomass, the potential to

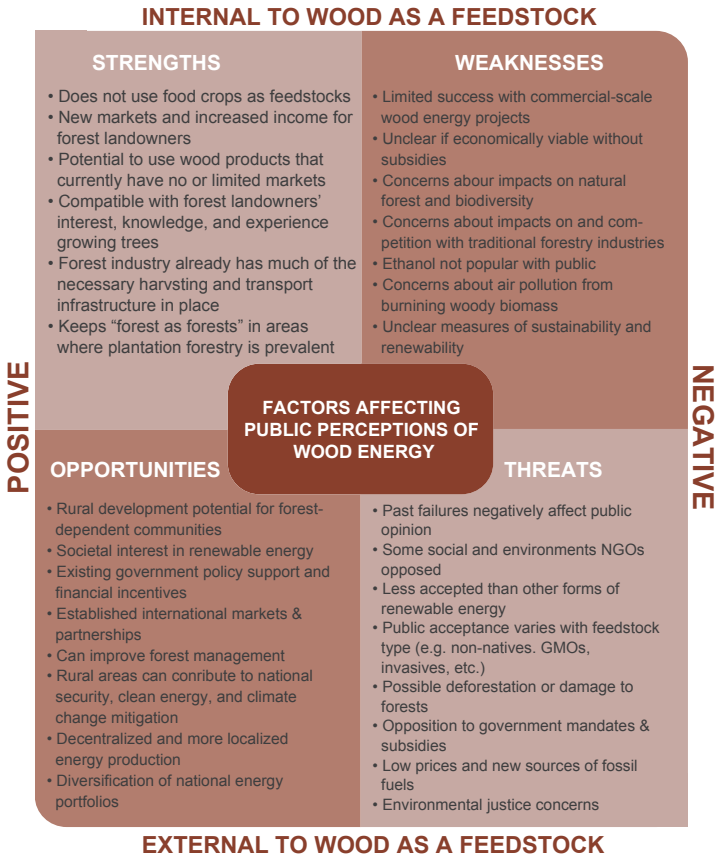

Figure 2. Strengths, weaknesses, opportunities and threats (SWOT) analysis for factors affecting public perceptions of wood energy (Hitchner et al. 2014)

Pine plantations, like this one from southern Georgia, are a potential source for biomass for bioenergy.

reduce wildland fire risk and improve forest health, and the fact that it does not compete with food production (Figure 2). Among landowners, the largest barrier to the supply of forest-based or agriculture-based biomass for energy was lack of knowledge about bioenergy economics, markets and cost share and other economic incentives. Family forest owners generally do not rank timber production highly on their reasons for owning forests, so it seems logical that they will only produce woody biomass at levels compatible with other important forest management goals such as wildlife, aesthetics, or improved forest health and diversity. Members of communities around bioenergy facilities have expressed mixed opinions on the positive and negative local impacts of bioenergy development. They are generally supportive of new economic opportunities and wood markets, but may also be concerned with safety, aesthetic, and environmental impacts.

INFORMATION SOURCES ARE CRITICAL TO INFORMING PERCEPTIONS. Public opinions on bioenergy are strongly influenced by the media in its various forms: television, internet news sources, newspapers, magazines, radio shows, and blogs are the most common sources of information. These venues often contain a range of facts and opinions ranging from conceptual and expert knowledge to practical information and news. Many popular media stories about bioenergy are decidedly negative (Hitchner et al., 2014). These stories focus on possible adverse effects on global food supply, potential threats to arable land, and general sustainability concerns relating to soil, air, and water. The media has also played a role in encouraging support for or opposition to bioenergy projects in particular communities. The government is a source of information on bioenergy as well, but its information is not necessarily trusted by the general public (Dasmohapatra et al. 2015). Other sources of information include websites and mailings from utility companies, word of mouth (social networks), industry representatives, civic clubs, municipal and regional leaders, and non-profit organizations (Figure 3). Many non-profit organizations have taken stands for and against bioenergy, and these groups can be highly influential. In some cases, opinions on bioenergy are influenced more by contentious broader social and political debates, such as the appropriate role of government in developing new industries, climate change, and environmental policy, rather than by careful analysis of bioenergy developments themselves.

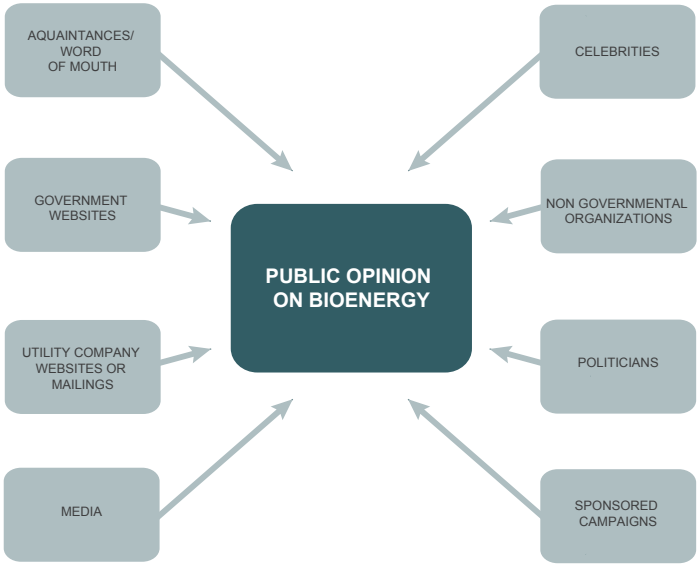

Figure 3. Multiple sources of influence shape public opinions on bioenergy.

WHY ARE SOME PEOPLE OPPOSED TO BIOENERGY?

As stated, some people worry about negative impacts of biofuels on their vehicles, while others question the environmental sustainability of bioenergy, Table 2 lists some of the positive and negative arguments for bioenergy. Others may oppose bioenergy because they feel excluded from the decision-making power structure. Many people have questioned issues related to environmental justice, distributions of the costs and benefits of bioenergy development, and ultimately the fairness and equity of various bioenergy policies, incentives, and mandates. Additionally, some people feel negatively toward bioenergy development because there have been many promises made

TABLE 2. POSITIVE AND NEGATIVE ARGUMENTS FOR BIOEN-

Positives (Potential)	Negatives (Potential)
- *Renewable energy*	- *"Renewable" questioned*
- *Carbon neutral or negative (does not produce carbon or absorbs carbon)*	- *Carbon positive (produces carbon)*
- *Energy security*	- *Soil compaction and erosion, impacts on water quality and quantity, and air quality*
- *Rural development*	- *Food vs. fuel*
- *Recycling waste materials*	- *Invasive/exotic species*
- *Green jobs*	- *Landscape fragmentation*
- *New forest products markets*	- *Environmental justice concerns*
- *Keeping forests as forests*	- *High subsidy inputs*
- *Improving forest health*	- *High-risk economic ventures*

regarding development in rural communities that have failed to materialize (such as jobs and opportunities to participate in planning processes). There are communities in Georgia, Alabama, and Mississippi that made significant commitments, such as preparing industrial sites and providing financial incentives, only to have plants go unbuilt or operate for only a very short time. The lost opportunities when this happens are particularly difficult for economically depressed communities that have little or no other industrial development. Even when projects are deemed successful, some people benefit considerably more than others, who may not benefit at all and instead bear the costs.

A limited public understanding of bioenergy technologies has contributed to misunderstanding and perceptions of higher levels of risk around bioenergy development and implementation. Additionally, the term "bioenergy" is associated with many confusing terms that the media weaves together, including climate change, sustainability, food crisis, greenhouse gas emissions, agriculture and forest biomass, oil imports, and rural development; this increases public confusion and illustrates the importance of education to increasing social acceptance of bioenergy.

CONCLUSION. From a supply perspective, woody and agricultural biomass has the current capacity to provide for a significant bio-based energy solution for the Southern United States. Technological improvements will no doubt increase this potential. This industry, as is common with many young industries, faces considerable challenges from the court of public opinion. Understanding how the public perceives bioenergy, who the main stakeholders are, and where they obtain their information is critical to the continued development of the industry. Public perceptions and beliefs also influence how future bioenergy policies will develop and whether individual projects may succeed. Informed public debate and deliberation in communities may be a crucial step towards clarifying and addressing concerns. For more information on how to include public participation in bioenergy development projects, please see our companion factsheet "Including Public Participation in Bioenergy Development." In the end, educational campaigns that address all positive and negative impacts of proposed bioenergy plants are necessary to allay fears and inform stakeholders. These campaigns can include publications, fact sheets, videos, webinars, public forums or a variety of traditional and new educational delivery technologies.

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