Regardless of Constraints, Many See Good Setting for Biomass Ventures

Mark Riedy

The American Recovery and Reinvestment Act of 2009 (ARRA), a $787 billion stimulus package enacted on February 17, 2009, extended and/or expanded upon a number of existing renewable energy tax credits and federal government funding programs. It also created various new tax incentives and government stimulus financing programs. Through the ARRA, President Obama seeks to double the percentage of renewable energy from 7.5 percent to 15 percent and create 5 million new jobs in the next three years.

The ARRA and other forms of government funding aim to make the United States the world leader of the clean energy economy. This is one of the administration's top priorities, as evidenced by increasing levels of government funding for clean technology and the central role energy policy played in the State of the Union address.

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STATUS OF THE BIOMASS-TO-BIOFUELS INDUSTRIES

At mid-year 2010, U.S. ethanol capacity was about 13.5 billion gallons a year, and it is on pace to produce 12.8 billion gallons this year, up from 10.75 billion gallons in 2009. 2010 biodiesel installed capacity was approximately 3 billion gallons per year. However, the vast majority of that capacity is idled. In 2009, production was less than 200 million gallons, or approximately 10% of capacity, due to a significant countervailing duty in the European market. These biofuels predominantly are first generation, with principal feedstocks consisting of food-grade grain (corn) for ethanol and edible oils (soy, canola, and palm), animal fats, and recycled greases for biodiesel.

Second-generation biofuels, or advanced biofuels, have feedstocks that are inedible. These advanced and cellulosic biofuels' feedstocks will consist principally of cellulose, lignocelluloses, and hemicellulose for cellulosic ethanol (e.g., switchgrass, wood chips, and similar materials), municipal solid waste-to-fuel and other combustion-to-fuel products, and biodiesel (algae- and jatropha-based).

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Effect of EPA's Renewable Fuels Standards

In February 2010 the Environmental Protection Agency (EPA) issued final rules for the National Renewable Fuel Standard program. These require that life-cycle greenhouse gas (GHG) emissions for advanced biofuels be at least 50 percent lower than the same GHG emissions for petroleum-based fuels (from a 2005 baseline) in

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order to qualify for the monetizable federal renewable fuel standard (RFS) credit. The cellulosic biofuels component of advanced biofuels will be required to meet a more stringent standard of life-cycle GHG emissions—at least 60 percent lower than the same GHG emissions for petroleum-based fuels (again, from a 2005 baseline) to qualify for the monetizable RFS credit.

The RFS for 2010 has been set at 12.95 billion gallons a year, with 950 million gallons a year for advanced biofuels, 650 million gallons a year for biomass-based diesel, and 100 million gallons a year for cellulosic biofuel. However, very small amounts of cellulosic ethanol are currently in commercial production, and there is a low likelihood of meeting the 2010 target.

In response, the EPA has set the 2010 cellulosic biofuel standard at 6.5 million annual ethanol-equivalent gallons, and 17.1 million gallons in 2011. Thus, in each year, the EPA reduction has resulted in the application of a statutory formula to take effect for valuing each cellulosic credit: the greater of $3.00 less the rack price of gasoline, or $0.25. While this volume is significantly less than that set forth for 2010 and 2011 originally, a number of companies and projects appear to be poised to expand production over the next several years. The EPA also will make cellulosic credits available to obligated parties for end-of-year compliance, should they need them, at a price of $1.56 a gallon.

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Industry Facing Challenges

Some of the challenges for advanced biofuels (including cellulosic biofuels) are the ability to do the following:

- Comply with life-cycle GHG emissions standards in order to obtain the RFS credit
- Finance these new second-generation biofuel technologies with debt during a period of time without demonstrable historical revenue-producing examples for each new technology—the so-called valley-of-death period (which federal financing must address) and, thus, making substantial equity percentages and/or government-guaranteed debt a must
- Obtain technology construction and performance guarantees (or "project wraps") when engineering and construction companies have little to no track record in developing such projects, and thus, the traditional engineering, procurement, and construction option is generally not viable for emerging-technology projects
- Provide the required acquisition, transportation, and storage of new and dense feedstocks for production purposes
- Overcome the expected "blend-wall" constraint by 2013 at EPA's 10 percent gasoline-blend volume waiver with approximately 140 billion annual gallons of U.S. gasoline consumption (by increasing EPA's blend waiver to E-12, E-15, or higher blends and/or increasing the number of E-85 vehicles and E-85 dispensing pump infrastructure, which may occur in late 2010)
- Develop new markets or demonstrate the ability to economically survive the European antidumping duties imposed on U.S.-subsidized and -exported biodiesel in its traditional strongest marketplace of Europe

Needs Investment Tax Credit

Biofuel projects would benefit immensely from the establishment of a new percentage investment tax credit similar to that accorded to renewable power applications, as discussed later. Such a credit could do both of the following:

Biofuels projects would benefit immensely from the establishment of a new percentage investment tax credit.

- Be used either as a tax credit in the year that the project is placed in service or taken as a cash grant/equity contribution at financial closure of the project financing instead of at the date of commercial operation
- Avail government financing without any penalty

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Biomass-to-Power Industry Status

Biomass-to-power plants burn organic wastes to produce steam that turns generators to produce electricity. Their typical size is approximately 20 megawatts. Small producers operate most such projects and sell the power to large utilities.

This power source rivals wind power.

Biomass-to-power projects (11,153 megawatts in the United States) currently constitute approximately 1 percent of U.S. power capacity and approximately 11 percent of U.S. renewable power. As such, this power source rivals wind power, which most recently is growing faster than biopower at a 39 percent annual growth rate. Still, biomass-to-power grew by approximately 14 percent in 2009. It is significantly more prevalent than solar and geothermal power projects.

Biomass-to-power grew by approximately 14 percent in 2009.

Of the current U.S. biomass-to-power capacity, wood-fired power projects represent nearly 60 percent of that capacity, while municipal solid waste (about 89 plants), landfill gas (approximately 300 plants), animal waste (a large number, including anaerobic digestion-to-power plants), and agricultural refuse (several cornstalks-/sunflower-shells-to-power plants) make up the remaining capacity of approximately 40 percent.

Wood-fired power projects represent nearly 60 percent of [current] capacity.

Like the RFS and monetizable credits thereto for biofuels, the renewable portfolio standard (RPS) (for the purchase and use of green power) and its monetizable renewable energy credits (RECs) for biomass-to-power (and other renewable power applications) are expanding the industry substantially. Indeed, RPS requirements are established in approximately 60 percent of U.S. states. As a result of the RPS growth and potential expanded federal emissions restrictions, coal-fired power plants are being converted to biomass-to-power projects and thus increasing their normal megawatt size significantly.

Organic feedstocks for biomass-to-power emit approximately the same amount of carbon whether combusted in a power plant or allowed to decay in a landfill or simply on the ground. Thus, biomass-to-power plants are relatively carbon-free. Furthermore, landfill decay can produce methane, which is much more harmful than CO_2 from a GHG emissions perspective. Also, biomass-to-power plants can emit relatively high levels of NO_x and particulate emissions.

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Constraints Exist in Technology and Economics, and From Uncoordinated Government Activity

Some of the challenges for biomass-to-power are the following:

- The energy value in a pound of coal is approximately 50 percent to 66 percent greater than that produced from a pound of wood chips or household trash, requiring transportation of large amounts of biomass within an approximate 75-mile radius of a plant to be economic when including transportation costs.
- The 20-megawatt biopower projects generally are less cost-efficient than a 500-megawatt coal-fired power plant.
- The cost to produce biomass-to-power (approximately $3 million to $5 million a megawatt in capital investment) generally is 90 percent greater than coal and 25 percent greater than wind.
- Feedstock availability and conversion can be problematic.
- Unclear or conflicting definitions of "biomass" in federal legislation may adversely impact financing: at the time of this writing, 16 biomass definitions appear in federal statutes, regulations, notices, and guidances, with many of them in direct conflict.

Industry Growth Continues in Spite of Obstacles

Nevertheless, even in the current depressed economic environment, many biomass technologies are being funded by angel, venture, and

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private equity participants principally located in the areas surrounding Silicon Valley, Northern Virginia, New York, New Jersey, and Boston.

Because the capital markets are generally unavailable, these technologies are pursuing additional private placement rounds. I recently completed venture capital and private equity funding, as applicable, on two biodiesel projects and ethanol projects in India, and a Series A finance and a bridge loan for a biomass compaction technology company in the United States, and a follow-on Series A round of each funding, and have commenced a Series B funding for the same technology provider. I additionally recently have closed a Series A round for a U.S. jatropha feedstock manufacturer developing a plantation in Guatemala. I also have closed two recent biopower plant acquisitions in India, one for 1.5 megawatts and the second for 18 megawatts. I am working on the development and acquisition of biopower facilities in the Philippines, Ghana, and Guyana, and have filed more than $1.5 billion in advanced biofuels/biopower loan guarantee applications for U.S. integrated biorefineries at the USDA and DOE. Finally, we have completed the first biopower initial public offering (IPO) for a major biopower company.

The hope is that the lending community will recover, as these technologies are developed, to then pursue larger biofuels and biomass-to-power projects on a project finance basis. International markets still offer project finance opportunities for these projects, with multilateral and bilateral finance institutions taking the lead funding roles. I have completed solar-powered water treatment projects in Greece, Turkey, Haiti, India and Bangladesh; wind projects in India; and small hydro power projects in India. At present, I have been engaged for more than 1,500 megawatts of solar, wind, and biopower projects in India; approximately 500 megawatts of biopower projects in the Philippines; approximately 100 megawatts of biopower projects in Ghana and Guyana; and approximately 1,500 megawatts of geothermal projects in Chile, the Dominican Republic, India, Jamaica, Kosovo, the U.S. Virgin Islands, and the states of California and Texas.

Further, biomass-to-power and biofuel tax incentives and federal government funding mechanisms provide significant opportunities for the funding of these types of renewable energy projects. The Obama administration is placing a tremendous emphasis on these projects as part of its program to rebuild the American economy and remove the United States from its reliance upon imported foreign energy.

CORPORATE INVESTMENT ON THE RISE

Not only in biomass-related projects but also in clean energy in general, companies are increasingly getting involved in clean tech through direct investment, including mergers, joint ventures, and venture capital investment. They are also applying clean-tech solutions to their core operations to deliver operational and cost efficiencies, new revenue streams, and climate change and sustainability goals.

In a recent Ernst & Young survey of corporations worldwide, 85 percent of respondents reported "significantly or moderately accelerating the pace of their company's strategic response to climate change compared with two years ago." The majority of respondents also indicated that recovering from effects of the financial crisis will speed the implementation of their company's clean-tech strategy rather than hinder it.

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A shift in corporate focus will help provide emerging clean-tech companies with the opportunity to bring their products from the development stages to the wider commercial marketplace.

Key examples are the following:

- ExxonMobil's $600 million investment in Synthetic Genomics to develop biofuels
- Florida Power & Light, Cisco, and GE partnering with Silver Spring Networks to develop a Smart Grid for Miami
- Total's $45 million investment in solar cell manufacturer Konarka
- Chevron's feedstock processing and supply agreement with biofuels developer Mascoma
- Morgan Stanley contracting with EnerNOC to manage energy consumption at New York headquarters
- Intel leading a $3.5 billion fund designed to invest in early-stage clean-tech companies.

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