### WOODY BIOMASS PROGRAMMATIC INVESTMENTS

AN INDEPENDENT REVIEW AND RECOMMENDATIONS

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### Overview

The U.S. Endowment for Forestry and Communities (the Endowment) commissioned five experts to review past investments in woody biomass and offer opinions regarding its on-going inclusion as a sustainable, renewable energy source in the Endowment's program portfolio, with special emphasis on the <u>Woody Biomass Joint Venture Fund</u>, a partnership between the Endowment and USDA Forest Service (USFS).

The Woody Biomass Joint Venture Fund (JV) was designed to advance sustainable uses of woody biomass through promising technologies and new procurement model development. Learn more about the JV at <a href="http://www.usendowment.org">www.usendowment.org</a> under Programs.

Woody biomass has the ability to meet a range of energy needs – electric, thermal and transportation – with a domestic and renewable fuel. To reach full potential, best technologies must be developed and matched with the right settings in terms of resource and markets.

While the JV is still a new endeavor, it is clear that the Endowment and USFS partnership offers opportunities to fill unmet niches. The Endowment especially brings a spirit of neutrality and credibility to each step taken so far through the JV. Beyond communication efforts, reviewers concluded that the Endowment, through the JV in particular, should focus the majority of resources on facilitating the deployment of woody biomass technology and delivery models. This recommendation issues from the fact that the road to technological development is long and costly and many public dollars have previously been channeled toward research and development, with little set aside for deployment.

The USFS, through the USDA Forest Products Lab, runs a competitive grants program also aimed at wood biomass. This program is currently focused on engineering design and a push to make both electric and thermal projects commercially viable. Yet, many valuable areas of inquiry remain without a matching pool of funds and could be addressed by the JV. Reviewers agreed that the search for innovation across the spectrum needs to continue, with the following suggested areas for analysis that might inform future JV projects:

•What's been done with past federal biomass dollars, with an eye for gleaning accomplishments and learning nationally and internationally?

- Summation of the evolving science and debate around the "carbon footprint" of wood.
- •Where are the emerging market opportunities at home and abroad?
- •Where are creative financial arrangements and business models showing promise?

The reviewers also agreed that some form of direct link between promising start-ups and small capital pools is useful. Participating companies emphasized the vital bridge to working capital,

leverage of existing resources, and credibility with other funders the JV offers. Each has successfully used their involvement with the JV in marketing and fund raising materials.

With consideration for the limited pool of resources and the existing stated objectives of the fund, the reviewers have focused recommendations on ideas closer to the market place.

# **Screens Each Project Should Pass Prior to Consideration**

- 1. Technologies should have successfully completed lab and pilot-scale production (or have reason to believe these are not necessary, e.g. bringing a proven foreign technology to the U.S. market) and are ready for early commercial or scale-up production.
- **2.** Require projects include a third-party customer, such as a utility (for electricity or torrefied wood), demonstrating that the project has been vetted and holds near-term technical promise.
- **3.** Project principals should be subject to a vetting process among the relevant "industry," Endowment networks, and be required to submit references.
- 4. Avoid feasibility studies.

### **Categories of Engagement**

Reviewers suggest that further project selection fall into one of the categories listed here. Any of the measures below could be leveraged by efforts to coordinate peer-to-peer mentoring and/or field trips ranging from facility managers to local government officials as well as targeted advertising initiatives coupled with technical assistance opportunities in partnership with federal, state, and local entities (i.e. energy offices).

### **Technology Deployment**

The Review Team suggests identifying and addressing barriers to developing the market for biomass technologies and projects by helping demonstrate them.

- **1**. Find and support the best potential co-firing project in the U.S., foster its success and promote it nationally as a case example. One project, one success.
- **2**. Offer to pay for purchase of an adequate amount of torrefied wood product to run and test commercially with a large utility. Facilitate signing of an MOU between a willing and ready torrefied wood supplier and utility.
- **3**. Promote wood pellet or chip fuel boilers for heating use in residential, commercial and community scale applications where either can be bulk delivered.
- 4. Through state data bases, identify and demonstrate an industrial boiler that can combine heat and power opportunities to support the electrical, thermal heat, and process steam needs of a manufacturing facility with biomass.
- **5**. Demonstrate biomass district heat or combined heat and power (CHP) applications, such as college campuses, office parks, cement plants, pulp and paper facilities, large breweries,

industrial parks and clusters of commercial and residential buildings where natural gas is not readily available. This could involve renovation to provide both heat and power.

### Procurement

An honest-broker niche needs to be filled to help develop new procurement patterns and business models as well as encourage experimentation to help utilities and other third-party producers reach into the forest efficiently and sustainably.

This work could be as simple as sharing successful business practices and project development approaches, but as the industry matures, introducing more advanced conversion technologies and increased demand, there's a need to facilitate the following:

- 1. Standardization of biomass fuel specifications such as for high quality chips into institutional boilers versus pellets to increase direct use of forest thinnings and reduce the delivered costs, and raw material going into torrefaction and other end uses (The NC State project shows promise for advancing pricing mechanisms).
- 2. Prototype improvements in supply chain logistics, integration, and efficiency.

### **Connecting Technology Developers with Outside Funding Opportunities**

The Endowment could use its position to bring biomass technologies and projects together with a variety of funders ranging from "meet 'n greets" with venture capital firms to sitting down with commercial bankers and a vetted developer and crafting multi-funded packages that lead to success. By hosting forums where funders of all types (venture, angle, private equity, debt, etc.) could interact and evaluate promising biomass technologies and companies, the Endowment may make a significant contribution to the development of this space (physical and cyber). At this time, the Review Team is not aware of any targeted events for this industry and believes that such an effort could result in significant opportunities and increased awareness of biomass.

The event idea works best with early to mid-stage companies looking for growth capital, not at the project level (project level is more debt focused, and really a different set of lenders, needs and risk profiles).

# Solicitation of Projects

The Endowment's strength is in its strong national network and credibility among a wide range of interests. This network should be utilized to solicit and to a certain extent screen projects. For example, work closely with the USDA Forest Products Lab to benefit from the vetting process associated with their Woody BUG grants.

Creating a pipeline of projects that are tracked and winnowed over time may make future investments easier to pick and more likely to succeed - perhaps a tier 1 and tier 2 list of projects. Principles could maintain a contact status with JV even if not funded yet, making them eligible for additional JV undertakings.

Companies or other entities proving ability to perform and maintaining solid documentation of finances and progress might be considered for increased shared risk via the JV.

The Review Team did not reach consensus on an appropriate project solicitation process going forward, thus two veins of thought emerged.

- A. Abandon the traditional open-RFP for a very targeted, concepts-based RFP or invitation process that fully utilizes knowledge gained and networks to identify most promising players, technologies and settings. This approach would rely heavily on state and national networks and some degree of coordination among external partners.
- **B**. Cast a wide net with a competitive, open-RFP so as not to miss "a diamond in the rough." May follow three-steps: two-page pitch, interviews, and selection after in-depth due diligence.

Whatever the approach, reviewers felt it important for the JV to avoid some of the pitfalls other government programs run into e.g., trade-off of "smart" selections in the name of "transparency" or selection of those with greatest media attention or strongest political backers.

# Funding Deployment Ideas

The Endowment appears situated to provide some level of bridge financing for companies on their way to becoming more "bankable" in traditional terms. The question at hand is what kind of risk should the Endowment take and what is the best instrument(s)?

\* Cautionary note: Federal rules and regulations remain attached to dollars, even as pass through to a foundation. While some leniency occurs in deferment to the particular by-laws and rules setout by the foundation, it is important to fully investigate how federal requirements might affect each proposal below.

- 1. An Equity Acquisition Fund (like the North Star Energy project model) could provide investment in exchange for an equity position in a company, therefore providing a "seed." Endowment monies would be recycled at a liquidity event or on distribution. This position would give the Endowment incredible insight into emerging areas.
- 2. Loan guarantees are attractive to cash-strapped start-ups in this arena. If well selected, these would never need to be exercised, so there would be no draw on the Endowment. There would likely be some losses, but it provides a unique experiment and useful role currently not being filled. Two paths were suggested partnering with USDA Rural Community Development fund and/or working with USDA Farm Bill coalition on upcoming authorization to create a risk pool for biomass development. Unpredictable politics makes this approach time consuming and risky. In addition, only projects that pass a traditional cash flow and engineering sound test should be considered.
- **3.** A Capital Fund could fill a niche with communities needing \$500K \$2 million that possess the passion, the biomass resource, and widespread support, but lack the upfront capital to act on projects with a payback period of 10-15 years.
- 4. Loans are deemed a sound investment strategy because the Endowment is supporting projects that have a harder time securing financing, and the payback encourages business solvency and serves to spread limited JV dollars further. But, companies report that loans,

even the low interest option offered by the Endowment, can prove complex as they seek additional funding.

**5. Grants** offer more flexibility to the recipient but no ability for the Endowment to carry the JV on into the future and limit the accountability for project performance. Market development or research are most likely grant candidates, but another option may be to work with a promising candidate and their banker to craft an appealing package that might bundle grants and loans, even going so far as to split federal monies out from Endowment monies to avoid federal interest rules.

## **Performance Measures**

- 1. Given the limited number of projects, consider measuring performance by specific project objectives and contract award detail versus across portfolio.
- 2. Create a "Success Rate" metric to normalize project outcomes. Define success individually for each project and then report at regular intervals on a progress scale. Report the collective progress bi-annually with analysis as to the "why" overall. This type of analysis would be useful to other entities such as banks, federal or state programs, etc.

# **Critique of Background Investments**

Prior to entering the JV, the Endowment commissioned a number of efforts in order to better understand the woody biomass arena. In addition to evaluation of the JV portfolio, reviewers were asked to comment on the background pieces below.

Each reference can be found under Publications at <u>www.usendowment.org</u>.

### 1. Wood2Energy: State of the Science and Technology Report

While this report confirms and synthesizes key "knowns" and conventional wisdoms of the technology, it didn't produce any new information. Though admittedly its intent was to report on "the state of science." Some of the information was reportedly outdated. Reviewers reported nothing new learned from this report and felt the cost excessive.

### 2. Wood2Energy.org - database

Information in the database was deemed incomplete, dated, and lacking an effective interface. The cost seemed high for the product.

### 3. Biomass Energy at Work

The case studies are useful in working with communities, if they can lead to peer-to-peer learning or demonstration type field trips. But, most communities need close comparable in terms of partners, setting, technology, etc., making generic case studies only nominally effective.

Distribution of products is the key. The concern is that such products tend to languish on shelves or websites without being used unless knowledgeable people know they exist and how to

use them. More effort might be spent on communicating the successes and challenges revealed in the studies. The price for this product seemed more on par with the output.

#### 4. Targeted round table discussions

While face-to-face meetings garner great networking opportunities and can, with the right facilitation, unearth new ideas, the cost and time may not be warranted, except on a limited basis.

When the participants do not "really" know each other, they are much less likely to share "crazy" ideas or to honestly critique ideas. The conference call approach, as used with this review, was effective and saved time and money. It was suggested that due to the Endowment's credibility among a wide range of interests, regular "weigh-in" type calls with diverse opinion leaders could prove very informative and help steer future investments.

#### 5. Developing a Business Case for Sustainable Biomass Generation

No comments.

#### 6. Communication efforts based on Facebook, e-lists and Issues in the Forest, etc.

The type of specialized marketing that this type of endeavor requires does not lend itself to social media such as Facebook. However, e-lists and certain forms of "discussion forums" such as LinkedIn can be effective ways of communicating learning and gathering a wide range of input.

### **Team Members**

Academic/Research:	Dennis Becker, University of Minnesota, Dept. of Forestry
Economist:	Roger Sedjo, Resources for the Future
Community:	Dan Bihn, Bihn Systems
State/regulatory:	Matt Kraumenauer, Oregon Dept. of Energy
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### JV participants interviewed

Greg Stangl, Phoenix Energy Michael Kuehner, Greenwood Energy Hiroshi Morihara, HM3 Energy.