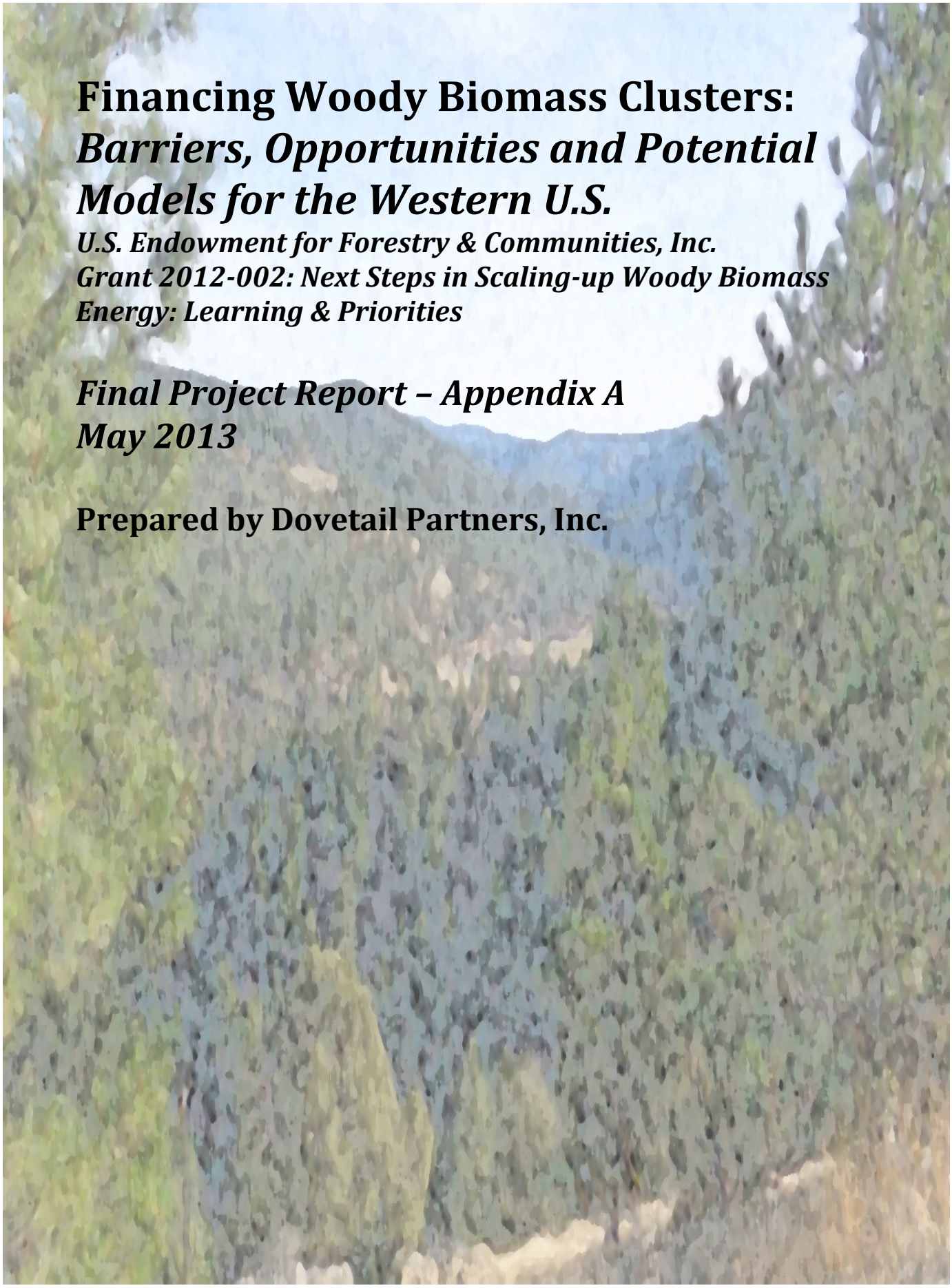

Financing Woody Biomass Clusters: *Barriers, Opportunities and Potential Models for the Western U.S.*

U.S. Endowment for Forestry & Communities, Inc.
Grant 2012-002: Next Steps in Scaling-up Woody Biomass Energy: Learning & Priorities

Final Project Report – Appendix A
May 2013

Prepared by Dovetail Partners, Inc.

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Table of Contents

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Appendix A. Interview Results

Introduction

Opportunities and Barriers Highlighted by Biomass Expert Interviews
During mid-July 2012, Dovetail Partners conducted interviews of biomass experts representing various fields and located in different geographical regions of the U.S. The goal of the interviews was to quickly gather useful information in order to advance the main project goals as follows

- Identify the primary gaps and barriers to larger scale, clustered bioenergy growth.
- Determine economic factors critical to success of biomass projects
- Define public/private collaborative approaches to enhancing viability of biomass projects, and
- Ascertain critical errors that the biomass industry should learn from and avoid. Below is a summary of interview results.

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Primary Gaps and Barriers to Larger-Scale, Clustered Bioenergy Growth

Interview Question: What are the primary gaps/barriers that need to be addressed to help biomass facilities move beyond demonstration projects at institutions and into the scale of operations (i.e., clusters) that address bulk-delivery and production systems that require larger scales?

Overview of Findings

The main barriers and recommended solutions that were most frequently identified by interviewees are related to project financing, policies/incentives, fuel supply, and a lack of understanding regarding biomass and related technology.

Gaps and Barriers: Funding/Financing

- Barrier - For many schools and public institutions, funding is a main roadblock. It is less expensive to put in a propane or oil system.
- Potential Solution - Schools need a revolving fund to pay for biomass project investments to help fund these projects (even if it covers around 50% of the costs).

- Barrier - The comparatively high capital cost of system installations remains the primary hurdle. Bulk fuel delivery infrastructure represents another challenge and a significant barrier to entry–especially for advanced pneumatic delivery trucks (high capital cost and low/long return on investment).
- Potential Solution - Costs will come down as the market scales up, as more vendors get into the market and bring greater competition, and when creative financing options are utilized.

- Barrier - Consumer financing is a major barrier. Resident level, oil boilers cost about $8,000 to install whereas pellet boilers cost around $20,000. Up front capital is a big issue and there is a lack of incentive to help finance this. Finance is not as much an issue in the commercial arena, but perception and a lack of understanding are challenges.

- Barrier - Up-front capitalization presents economic challenges for projects. Biomass energy systems are more capital intensive than traditional fuels (i.e., heating oil and natural gas), and the relatively small market penetration has prevented the industry from achieving economies of scale. Biomass energy systems may have lower annual operating costs which will lead to significant energy savings on an annual basis, but the owners of systems may expect a shorter payback than can be achieved without low interest financing.

- Barrier - Capital costs are the main barrier. How are people going to pay for the big upfront costs despite the long-term gains? There is a lot of uncertainty surrounding the payback periods associated with biomass energy systems. Any time there is uncertainty like this, it becomes more difficult to justify the investment to the public and private interests to install biomass systems.

- Barrier - Finance is a huge issue—especially for small facilities. Large biomass projects never pencil out in the West.
- Potential Solution – A more integrated focus is needed. The focus should be more on facilities that integrate value-added manufacturing and wood products with energy utilization. You need to add value with low value wood. It is important to consider how heat could be utilized with electricity generation.

- Barrier - It is all about the numbers. The cost of a biomass furnace is a barrier for anyone who lives from car lease payment to car lease payment. Biomass has no near-term future anywhere that has close access to natural gas. There are no companies in the biomass energy sphere [that the interviewee can think of] who are making money right now; this is all being developed on a hope and a prayer.
- Potential Solution - When more Americans get in the habit of saving, then biomass heat will be successful at sites that are dependent on fuel oil or electricity for heat. Until that happens, biomass will not experience much growth.

- Barrier - Intermediate financing is a primary challenge (i.e., getting over the "valley of death").

Gaps and Barriers: Policy

- Barrier - Transportation subsidies are not a good pull for building additional capacity because they do not seem to create additional utilization.
- Potential Solution - A lot more attention needs to be paid to where incentives are placed in the supply chain.

- Barrier - At least for the next few years (even if we're talking about something like a carbon tax), the old model of subsidizing or incentivizing renewables with the tens of billions of dollars necessary to make them competitive with fossil fuels is dead.
- Potential Solution - Until there is a national energy policy, there is not going to be much capital flowing in the direction of biomass businesses other than perhaps organizations with the most promising routes to drop-in biofuels.

- Barrier - Existing policies or incentives may drive decision makers to other systems. The U.S. does not have a coherent biomass energy policy and many existing incentives drive projects toward electricity or fuel production. Additionally, the biomass industry is not solidified enough to lobby for a coherent policy. It is difficult for the biomass industry to state that these systems save money and are economical while (at the same time) saying they need additional incentives.

- Barrier - Woody biomass is not treated on par with other renewable energy sources from the standpoint of renewable energy portfolio standards and credits.

- Barrier - Permitting, even on smaller units, can be a barrier. There is a hesitancy to push through permits on newer biomass tech technologies such as torrefaction.

Gaps and Barriers: Fuel Supply

- Barrier - Natural gas accessibility and prices act as barriers to biomass development.
- Potential Solution - Areas with high-heating-need-days and use of propane and oil heating are prime areas for biomass expansion. With clear programmatic support, access to study tours, and technical expertise, these areas could successfully develop biomass energy markets similar to those in Vermont.

- Barrier - A lack of available timber sales, harvesting infrastructure, and a non-existent value-added industry to support the wood energy value chain are primary gaps and barriers in the Western U.S.

- Barrier - In the West, barriers to biomass development include the dominance of federal land and the problem with accessing it. Access to material is a bureaucratic nightmare; getting contracts to access a biomass supply is the biggest issue in the Western U.S.

Gaps and Barriers: Lack of Understanding

- Barrier - There is a lack of understanding regarding biomass energy systems within the design community (i.e., architects, project developers). These people generally are more familiar with traditional energy systems (i.e., heating oil, natural gas, solar) and do not have good information or experience regarding how to carry out biomass projects.

- Barrier - Consumers (residential, building operators, commercial building owners) may not understand biomass systems from an economic or technical perspective and may be intimidated by the operational differences (or perceived differences) of these systems.

- Barrier - There are issues related to public perception and a lack of understanding of biomass technology. Generally, wood is perceived as an old technology, cooling water vapor is mistaken for smoke, and carbon neutrality is debated. Trade barriers have hindered the availability of superior European technology.

- Barrier - There is a basic marketing/public outreach and education challenge with widespread public ignorance about utilizing advanced wood combustion systems as a heating alternative. The biomass industry is still small and not yet in a position to fund comprehensive marketing initiatives.

Gaps and Barriers: Other

- Barrier - There are three primary obstacles to biomass development—particularly for smaller-scale projects at community facilities like schools or hospitals:
    1. Understanding the fuel source: wood supply/availability/reliability, cost, history of cost, etc.
    2. Understanding the technology.
    3. Financing: how to pay for the conversion, what sources of capital are available for conversion, cost-benefit analyses, etc.

- Barrier - There seems to be great concern about competition for wood fiber. For example, paper company representatives express concern about competing for fiber with pellet producers.
- Potential Solution - It comes down to getting comfortable with the technology and fuel source, transaction costs, and the ultimate financial benefit to the facilities. This may not be as much of a problem in the West where overstocked lands are more prevalent.

- Barrier - The range of system sizes and applications currently on the market may not be able to meet all user needs. An increasing number of systems are manufactured in the US or imported from Europe, but the market penetration is minimal.

- Barrier - Risk is a primary barrier.
- Potential Solution - An attempt to mitigate risk could be made through information sharing and public support. Because biomass is heavily used in public institutions, fostering public awareness and growing support of biomass utilization is critical.

Key Economic Factors Determining the Success of Biomass Projects

Interview Question: What do you believe are the critical economic factors determining the success of a woody biomass project?

Overview of Findings

The main economic factors that the interviewees identified are related to fuel supply, alternative energy costs/supply, financing, infrastructure, and policy.

Key Economic Factors: Fuel Supply

- Successful projects need a reliable and consistently high quality fuel supply

- There are a number of key economic factors:
    1. The fuel supply should come from within 30 to 50 miles.
    2. The price for whole tree chips should be between $25 and $35.
    3. The price for bole chips should be between $45 and $65.
    4. Interest rates should be below 6% and/or grants should be made available.

5. Institution scale projects benefit from the existence of a network of larger chip consumers.

- 20,000 tons of fuel annually is the threshold of aggregated demand needed to anchor fuel supply as a primary business.

- Fuel costs and the ability to provide savings or become cost neutral are important. Biomass cannot compete against natural gas at the moment.

- Location is key in terms of the availability of alternative resources and also in regards to having access to an affordable supply of biomass fuels.

- Intermediate to long-term feedstock procurement and off-take agreements are two important economic factors.

- A sufficient supply of wood within a reasonable distance that can be sustainably managed and harvested are important considerations.

Key Economic Factors: Alternative Energy Fuel Costs/Supply

- The type of fuel being replaced is a primary economic consideration.
    - If a facility is using oil or propane, then biomass has a much better chance of succeeding.

- From the standpoint of feasibility, how biomass systems stack up against other fuel options should be examined.
    - If a site has access to natural gas, then biomass probably is not a good option, but much of the NE region is using oil or propane, which is much more viable for biomass utilization.

- Significant operating (heat) cost savings relative to conventional fossil heating fuels is a key factor.

Key Economic Factors: Financing

- Financing the upfront cost of biomass conversions is a key factor, which is true regardless of scale.
    - For institutional projects, upfront financing can be a problem, but public institutions have been more successful because they can easily get access to bonds financed through taxpayers.

- Determining if the project can be done with an acceptable payback or ROI without subsidy is an important consideration.
    - Subsidies would be helpful, but it is easier to sell a project if you can make the case without them.

- Projects need a reasonable investment horizon or payback expectations.

- Having access to capital and a small level of cost share incentive is important.

Key Economic Factors: Infrastructure

- One of the critical factors in the Northeast is that they already have infrastructure in place for biomass facilities since, for better or worse, they have been very dependent for a long time on the forest (surrounded by forest) and wood industry.

- Available harvesting infrastructure, value-added industries to support transportation costs, and high cost fossil fuels compared to delivered woody biomass costs are all key.

Key Economic Factors: Policy

- A more even playing field should be created where environmental benefits of biomass are recognized/internalized versus fossil fuels.
    - Policy drivers and incentives are needed to drive the purchase of renewable energy because people will just go with cheap fossil fuels otherwise.

Key Economic Factors: Other

- The three most important questions determining biomass viability are:
    1. Are you located near a natural gas pipeline? If answered yes, then biomass is not a good option. Biomass cannot compete against cheap, available natural gas. Biomass is just not as competitive alongside other renewables. If a site's next best fuel option is propane, oil, or electricity, then there is a possibility that biomass would be a good option.
    2. Do you have a local source of wood fuel supply? If answered no, then biomass is not a good option.
    3. Is your annual electricity/heating bill greater than roughly $100,000? If answered no, then biomass is not a good option. If your bill is not greater than $100,000, then it generally doesn't make economic sense to install a biomass system because the savings won't be sufficient to offset the costs of installing and operating the system. A building(s) needs to be big enough in scale for biomass to be a good option.

- There needs to be a clear connection between using wood bioenergy and the quality and integrity of forest management necessary to source the fuel in a sustainable manner, with additional clear connections to local jobs and opportunity.

- Should find a project champion and committed project supporters that can shepherd a project through the development and operational phases.

Public/Private Collaborative Approaches to Increase the Viability of Bioenergy Projects

Interview Question: What are some approaches that the private and public sectors could use to collaborate to increase the viability of bioenergy projects (e.g. stewardship projects)?

Overview of Findings

The main approaches that experts suggested that private and public sectors could collaborate on to increase the viability of bioenergy projects are related to aggregated/clustered collaboration, fuel supply collaboration, policy incentives, and consumer education.

Collaborative Approaches: Aggregated/Clustered Development

- Aggregation or bundling of smaller projects may be necessary to attract investors. Larger district heating projects have bigger price tags but often have lower rates of return than smaller heating projects.
    - The majority of projects are below the $25 million threshold that most private capital investors look for.

- Almost all projects have a private/public relationship, but this needs to happen at a bigger/aggregated scale where buildings are combined together in one investment.

- A robust inventory of cluster opportunities should be made and targeted funds or assistance provided in order to help support the early development needs of projects.
    - The state of Oregon is beginning a project to do this in cooperation with the Forest Service and Bureau of Land Management.

- Projects could be aggregated together to lower the transaction costs associated with accessing financing.
    - A larger pool of projects and funds would be more attractive to lenders and would lower the overall risk versus trying to fund single projects one at a time.

- Locate biomass energy facilities at underutilized business/industrial parks or downtown districts to supply electricity, heat, cooling, and process steam (mimic European community heating districts).

- In regards to the utilization and development side of things, county lands could be used as an industrial site for a facility. County level equity could be used for financing opportunities.

- New financial models should be developed rather than using building owner owned and financed or energy savings performance contracting approaches.

- For example, models could be developed to lease a heating system or purchase biomass energy while a third party owns and operates the system.

Collaborative Approaches: Fuel Supply

- On the harvesting side, perhaps public and private landowners could help by providing longer-term contracts to loggers.
  - This could help loggers invest in the type of equipment required to harvest biomass material.

- Major land managing agencies (e.g. Forest Service, Bureau of Land Management) should commit to a major initiative to replace fossil heating systems with biomass heating systems in their thousands of facilities across the country.
  - In other words, leading by example. The Forest Service could devote more resources within its National Biofuels Strategy to advance demonstration projects throughout Forest Service facilities. The Forest Service's leadership could eventually be extended to all federal agencies with facilities providing heat and power, especially in rural areas with access to biomass feedstocks for fuel.

- On the supply side, if you do not have collaboration through restoration activities, then you do not have supply.

- A system could be developed that matches people who need the heat with people that want to develop systems (i.e. matching people who have technical expertise with people who need to utilize it; like a biomass industry "dating system").

Collaborative Approaches: Policy Incentives

- Public policy can play a critical role.
  - For example, public policy strategies might include: tax credits for purchase of highly efficient boilers or renewable energy more generally; renewable energy credits; use things like PACE loan programs and their other programs to support more efficient energy sources; loan programs (some existing but maybe tailored new ones) to support further development of the entire wood-to-energy value chain; or other tools to support conversion.

- Develop a public awareness/marketing campaign focused on job creation/economic opportunity, local wealth retention and energy security from reduced fossil fuel imports, and connection to forest health and rural communities.

- Support the development of Biomass Renewable Energy Credits.

- Develop financial support systems for wood energy like solar and wind energy systems.

Collaborative Approaches: Consumer Education

- More attention should be paid to increasing consumer education about biomass energy systems and applications, operations, and technical/economic feasibility. A trade network could be developed that is readily available to potential consumers.

Critical Errors that the Biomass Industry Should Learn From and Avoid

Interview Question: What are some critical errors that the biomass industry as a whole can learn from and avoid in the future? Specific cases that could we could look into?

Overview of Findings

The primary critical errors that the experts identified include specific biomass projects examples, large-scale biomass electricity, system planning and design, policy actions, missed collaborative opportunities, and perception molding.

Critical Errors: Specific Biomass Project Errors

- According to the interviewee, the Jemez Mountain School in Galina, New Mexico was a "horrible project" that killed the expansion of wood energy in New Mexico for several years. The project was bad for a number of reasons. The Nederland, Colorado project also comes to mind as a failed project.

- Additional project failures, according to the interviewee, that can be learned from are as follows: First Energy plans to convert a 100 MW power station in southern Ohio from coal to wood. Dominion Energy plans to develop over 263 MW of new power generation capacity in Virginia over the next 5-10 years based on wood costs of $25/green ton. Failure of the University of South Carolina wood energy system installation by Johnson Controls, Inc.

Critical Errors: Large-Scale Biomass Electricity

- Large-scale electricity biomass plants should be avoided.
    - They "scare environmental groups" and can create a downward spiral of publicity/support.

- The idea that people can pursue the stand-alone electrical facilities is false.
    - These facilities do not work in the west/northwest. Should instead promote an integrated system approach to biomass development/expansion.

Critical Errors: System Planning and Design

- Do not cut corners and try to save money on sophisticated machinery and engineering.
    - Spend more capital to build it right the first time in order to save on operating expense down the line. Pay very careful attention regarding safety and quality. There have been some projects that have been oversold or people have been scammed (for example, there was a school that bought a very high quality boiler, but then could not get the necessary biomass supply

with the right moisture content to feed it within a reasonable fuel supply radius).

- Know your market before you build. Do a complete market analysis and know where you are going to sell your product before starting a project.
    - Too many plants have been built and failed because of a lack of viable markets, simply because the project developers (and their financial backers) did not do thorough research regarding the market. Know your wood supply. Too many project developers get into biomass without a clear understanding of the true cost and unique challenges of sourcing woody biomass.

- There is a great need to reduce unnecessary feasibility study costs.
    - There are many projects where it does not make sense to perform a feasibility study, but communities invest in them anyway and waste their money just to have someone say that a project is not feasible. Feasibility studies generally cost around $50,000 to complete.

Critical Errors: Policy

- Do not fight OSHA and air regulators. Accept the stringent expectations of regulators and go the extra mile to comply. You will save money in the long run.

- The debate surrounding the carbon impacts (i.e. the carbon neutrality) of biomass use is damaging.

- While public support is critical to the development of renewable energy resources, the biomass industry has probably relied too heavily on public subsidies when there is probably often a straightforward economic argument.

Critical Errors: Missed Collaborative Opportunities

- Invest as a company in collective efforts to grow the market and the industry. Do not wait for the other guy to do it. Recognize the importance of trade organizations and collaborative problem-solving and market development.

- There is an error on Forest Service's side expecting biomass companies to start up without a guaranteed supply.

- There have been missed opportunities to make a case, raise awareness, and increase public engagement.
    - Many people are just trying to run a pellet plant and not trying to transform the industry or move it forward. All innovation is coming from the public sector and there just isn't that much collaboration or thought going on in the private sector.

Critical Errors: Perception Molding

- Perhaps there have been errors on the side of caution.
    - The pulp and paper industry has operated with limited contracts for biomass—not huge yearly contracts. Banks are only willing to finance biomass with 10-15 year supply contracts. It could be erroneous believing that this is necessary, and if it is not erroneous, it is definitely a big challenge.

- There is no coherent message coming from the industry.
    - In many ways they are stuck in the past and not fully embracing the changes to the economy or emerging opportunities. This is a generality, but there is a lot of complaining coming from the forest products industry and not a lot of vision about what the future looks like and where they fit into it.

- There is a need to key into public perceptions regarding harvesting forest biomass.
    - There is a fundamental difference between solar panel and biomass. There needs to be a better appreciation for public perception regarding large scale biomass use. Answers are needed regarding how much removal is too much and be able to have answers regarding biomass harvesting impacts on environment, habitat, watersheds, etc.

- There should be more of an emphasis on the payback period of biomass versus fossil fuels.

- Learn from the energy efficiency sector.
    - In that sector, people assumed that the benefits would be obvious to consumers; however, until relatively recently, no one was thinking about how to overcome the obstacles for consumers, such as understanding who the good contractors are, how to secure good financing, and so on. This is all laid out in a report from the Lawrence Berkeley Labs at: http://drivingdemand.lbl.gov/

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