

Biomass Heating Projects

Opportunities and Economics

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Innovative Natural Resource Solutions LLC



Innovative Natural Resource Solutions LLC

- Based in New Hampshire and Maine, a region with 25+ years of continuous biomass power experience, and pellet mills for 15+ years
- Based in the forest industry – work at the intersection of forest industry, energy and economic development
- My focus is on feedstock supply for biomass electric, thermal, pellet and liquid fuel projects
- Structured a dozen long-term supply agreements
- Clients include utilities, merchant generators, investors, developers, and industries
- Conducted work in all regions of North America
- www.inrsllc.com



Why Biomass Thermal?

- Heat Local – biomass is a renewable, local, and supports the economy
- Every time a truckload of heating oil enters Maryland, a truckload of money leaves
 - About 85% of dollars spent on heating oil (and propane) leaves the state*
 - Money spent on biomass fuel stays local, and supports the local economy
- Study by Biomass Energy Resource Center in Vermont
 - State spends \$1.7 billion annually in fossil fuels – money that leaves Vermont and does not help the local economy
 - Heating 19% of homes in the state (~62,000 homes) would create 7,000 jobs



* Based on work conducted in New England

A Quick Look at Biomass Thermal Projects

- From a wood chip boiler on a college campus to the pellet stove in my house
- All located in Maine – a state with significant reliance on oil for home heating
 - Lessons to be learned here, but...at current pricing it is hard to compete with pipeline natural gas
- All based upon public information, and all projects received some level of public support
- Assumes that all fuel prices (pellets and oil) stay flat forever (probably not true, but allows clear comparison)
 - There is a case to be made that pellets escalate at a rate lower than oil; this would make projects much more attractive – not part of this analysis
- Helpful in thinking about how we design capital subsidies for biomass projects >> **what is it you want to accomplish?**



Biomass Boiler at Colby College

Chiptec

- \$11.25 million project, \$750,000 grant
- Waterville, Maine
- Stand-alone greenfield boiler facility
- Chiptec Wood Energy System
- Replaces 90% of 1.1 million gallons #2 oil per year
- Wood delivered as chips, live floor trucks
- Completion January 2012
- Saves an estimated \$1.5 million in heat costs annually



Colby College

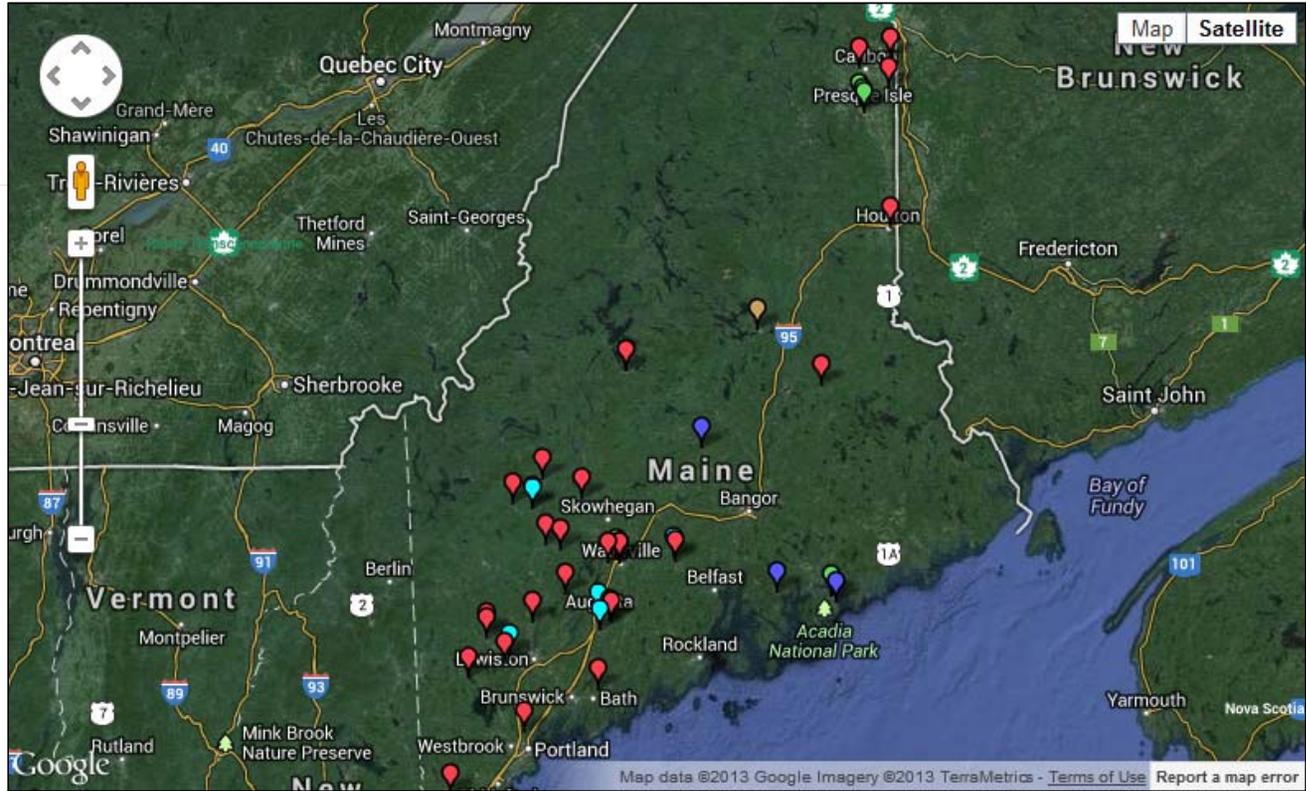
Key Metrics

Project	Colby College
Biomass Fuel Type	Chips (green)
Capital Cost	\$11.25 million
Customer Capital Cost	\$10.5 million
Annual Fuel Savings	\$2.97 million
20-Year Savings	\$23.95 million
30-year Savings	\$47.8 million
Payback Period (years, full cost)	6.4 years
Subsidy / 20 year savings	3%





Maine's Institutional Wood Energy Facilities
Via wood2energy.org database

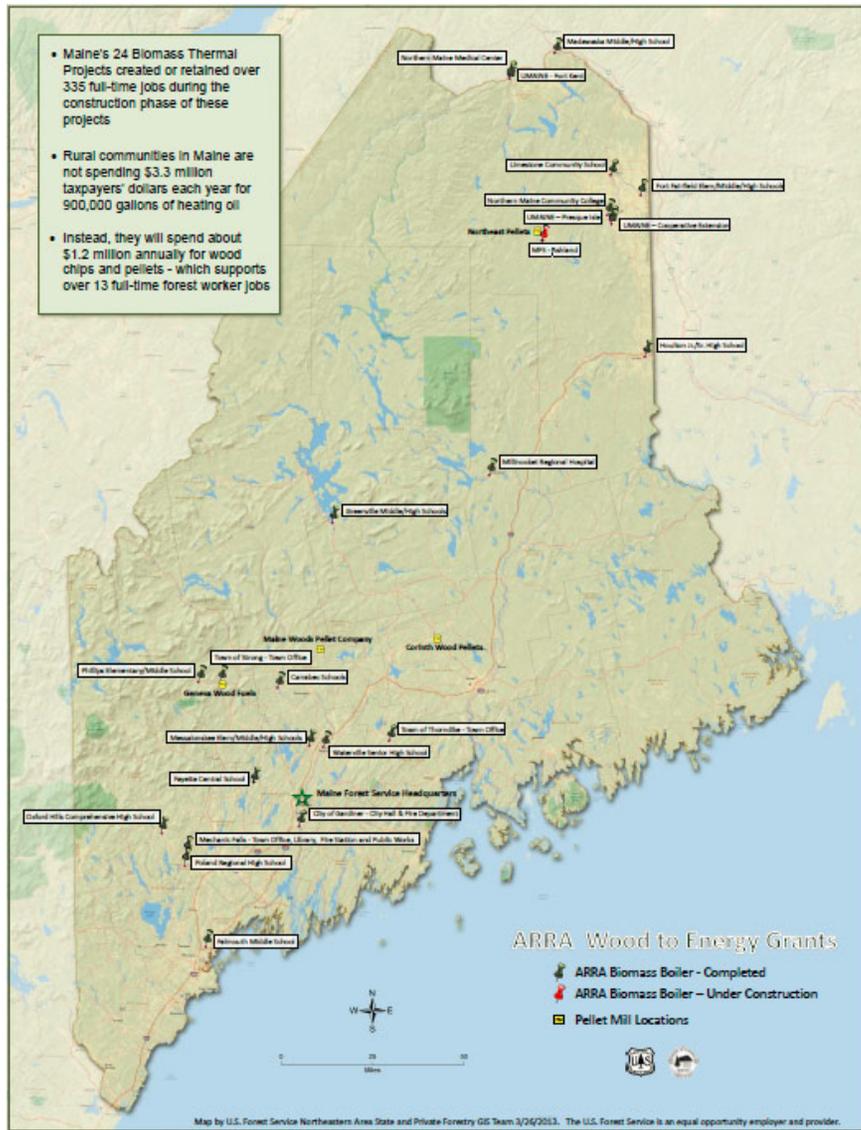


Community facility	Correctional facility	Hospital / Medical center	Military	Public administration / Government facility	Public housing
School	University / College	Other			

22 Projects in Maine Supported with ARRA \$

- Criteria for the project selection included:
 - the number of jobs created and preserved;
 - unemployment rates;
 - the size and scope of the project;
 - community support; and
 - amount of community funding
- Save the recipients between 1/2 to 2/3 on their annual heating bills
- Total project cost \$23.9 million
- Total subsidy \$10.5 million
- Funding from USDA Forest Service, administered by Maine Forest Service

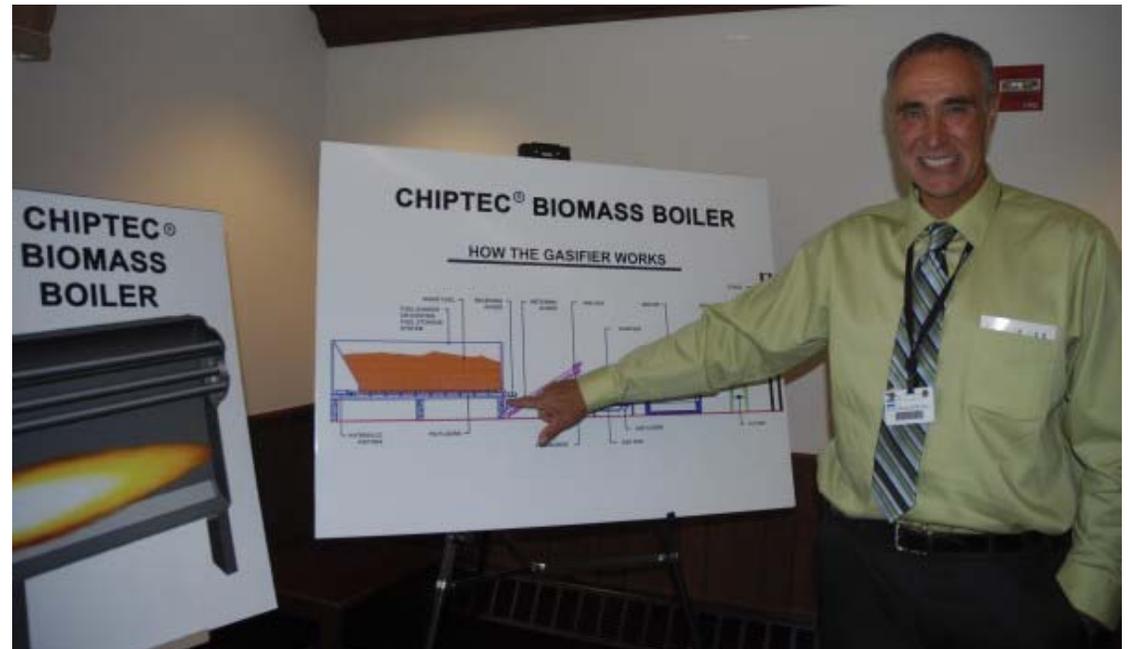




Falmouth Middle School

Maine

- 53 beds
- 6.7 MMBTU chip boiler
- 142,000 square feet



Falmouth Middle School

Key Metrics

Project	
Biomass Fuel Type	Wood Chips
Capital Cost	\$1,494,500
Customer Capital Cost	\$994,500
Annual Fuel Savings	\$81,214
20-Year Savings	\$1.6 million
Payback Period (years, full cost)	18.4 years
Payback Period (w/ subsidy)	12.2 years
Subsidy / 20 year savings	385%



Northern Maine Medical Center

Maine

- 739,000 students
- 4.3 MMBTU chip boiler
- 106,000 square feet



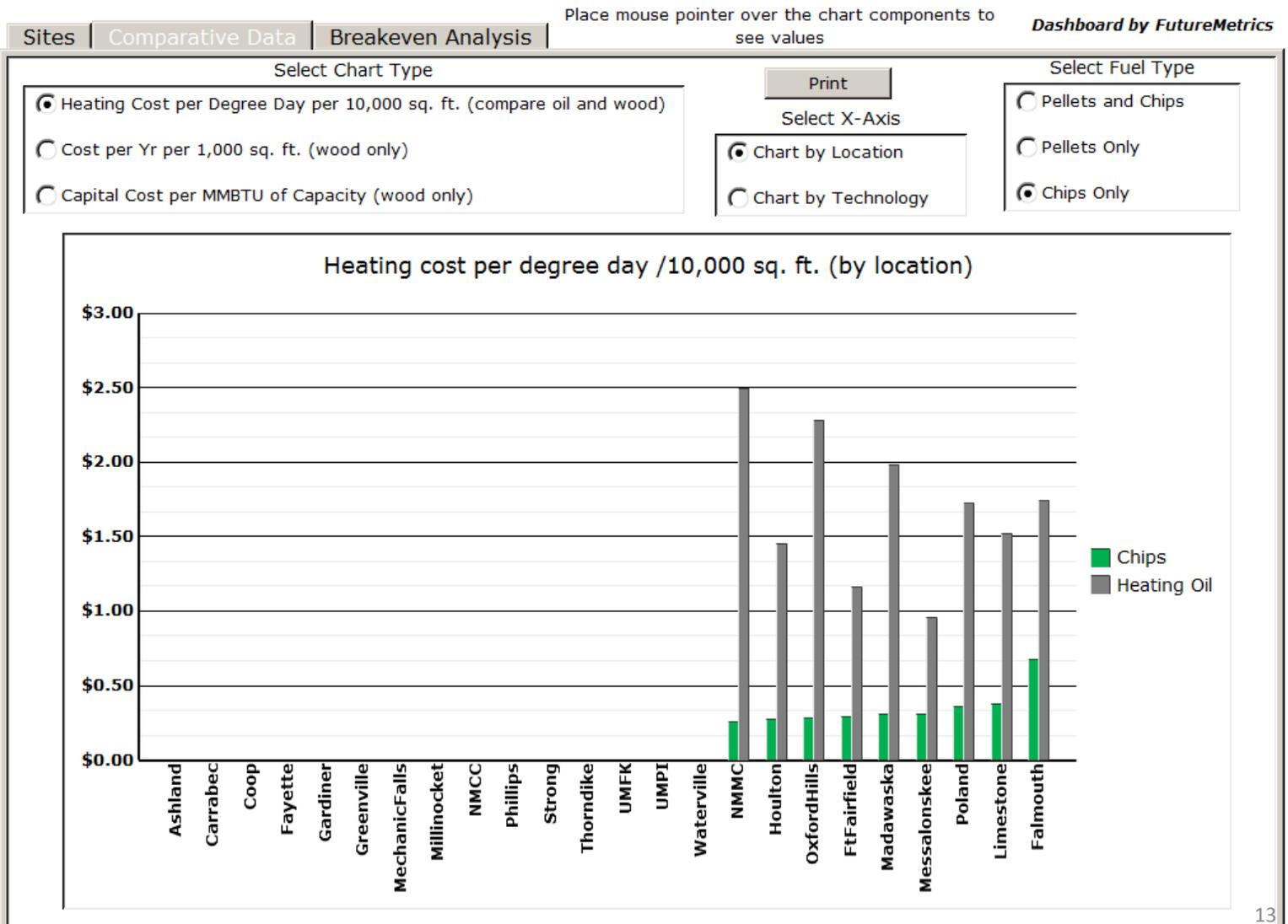


A "Dashboard" for All Projects

Developed by FutureMetrics LLC

Information on projects, capital cost, payback, etc.

<http://mfs.nmcc.edu>





Sites | Comparative Data | Breakeven Analysis | see values | *Dashboard by FutureMetrics*

Choose Site
Northern Maine Community College

Maine Biomass Heating Projects Data Dashboard

Summary Data
Northern Maine Community College

Public School building
33 Edgmont Drive
Presque Isle, ME, 04769
Building Size = 125,500 Square Feet
New Boiler: Schmid Model USTR 900
Boiler Capacity = 3.07 MMBTU/hr
Fuel Type is Pellets
Grant Amount = \$500,000
Owner Amount = \$485,726
Total Cost = \$985,726
Capital Cost per MMBTU = \$320,979
Completion Date: December 31, 2012

2012-2013 Actual	
2012-2013 Wood Cost	\$61,446.00
2012-2013 Heating Oil Cost	\$35,475.70
2012-2013 Savings	\$55,867.69
Projected in Grant	
Prior Oil Cost	\$152,789.39
Estimated Wood Cost	\$61,600.00
Estimated Oil Cost	\$24,876.00
Estimated Savings	\$66,313.39
Savings Variance from Grant (+ is good)	(\$10,445.70)

Northern Maine Community College, 2012-13 Actual

2012-2013 Savings = \$55,868

Category	Cost (\$)
Prior Oil	~\$152,789
Wood	\$61,446
Oil	\$35,476
Savings	\$55,868

Heating cost per degree day / 10,000 sq. ft.

Fuel Type	Cost (\$)
Heating Oil	~\$1.00
Wood	~\$0.37

Print

Wood Fuel Cost per 1000 Square Feet

\$360.86

Northern Maine Medical Center

Key Metrics

Project	
Biomass Fuel Type	Wood Chips
Capital Cost	\$1,845,627
Customer Capital Cost	\$1,095,627
Annual Fuel Savings	\$159,750
20-Year Savings	\$3.2 million
Payback Period (years, full cost)	11.6 years
Payback Period (w/ subsidy)	6.9 years
Subsidy / 20 year savings	56%



Kingsley Family Stove

Portland, Maine

- Technology: Quadrafire - Castine
- Total project cost - \$3,400
- Federal tax credit - \$1,000 (no longer)
- Supplemental heat – primary heat from natural gas (unlike most homes in Maine)
 - For comparison purposes, we'll substitute #2 oil
 - Displaces about 245 gallons of oil
- Wood pellets delivered to my garage on pallets
- Storage in basement
 - 2 tons per year
- Simple payback 8.7 years (6.2 years with subsidy)
- In winter (6 months), the most popular spot in the house



Kingsley Family Stove

Key Metrics

Project	
Biomass Fuel Type	Pellets
Capital Cost	\$3,400
Customer Capital Cost	\$2,400
Annual Fuel Savings	\$390
20-Year Savings	\$4,403
30-year Savings	\$8,305
Payback Period (years, full cost)	8.7 years
Payback Period (w/ subsidy)	6.2 years
Subsidy / 20 year savings	12%



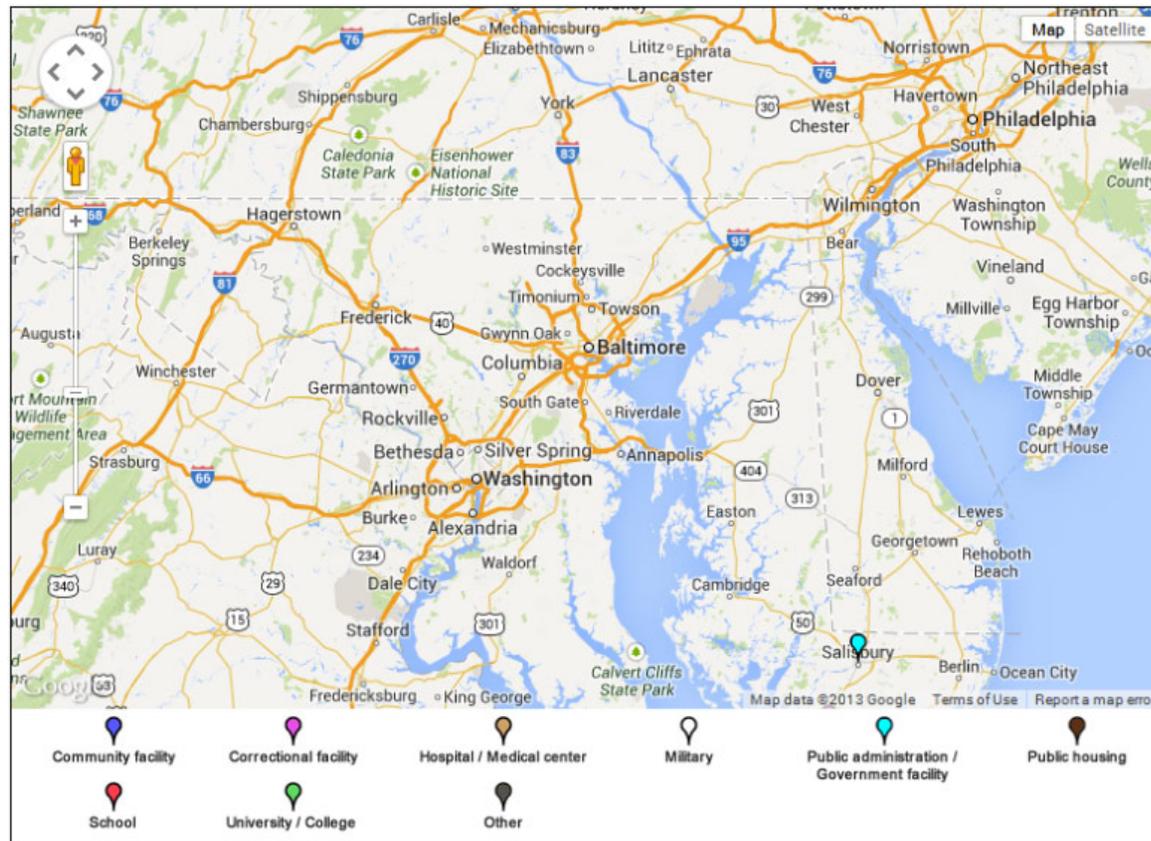
Comparing Biomass Heating Projects

Key Metrics

Project	Colby College	Northern Maine Med	Falmouth Middle School	Kingsley
Biomass Fuel Type	Chips (green)	Chips (green)	Chips (green)	Pellets
Capital Cost	\$11.25 million	\$1,845,627	\$1,494,500	\$3,400
Customer Capital Cost	\$10.5 million	\$1,095,627	\$994,500	\$2,400
Annual Fuel Savings	\$2.97 million	\$159,750	\$81,214	\$390
20-Year Savings	\$23.95 million	\$3.1 million	\$1,624,280	\$4,403
Payback Period (years, full cost)	6.4 years	11.6 years	18.4 years	8.7 years
Payback Period (w/ subsidy)	6.0 years	6.9 years	12.2 years	6.2 years



Maryland has lots of “blank spots on the map” for biomass projects (via wood2energy.org)



My Take-Away Messages

- You have limited resources
 - Think about what you are trying to accomplish, and design public support systems that support this goal
 - You can't do everything – and you shouldn't want to
 - If you “over-fund” demonstration projects – **MAKE THEM DEMONSTRATE**
- A fact-based, comparable set of metrics can help determine what is a “good” project
 - If a competitive solicitation, methodology and metrics should be the same for all projects
- Biomass makes economic sense in places that currently use oil, propane and trucked natural gas as fuel
 - Focus on those spots where you have the greatest likelihood of success



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