

The Bioenergy Boom from the Federal Stimulus: Outcomes and Lessons

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Partnership for Policy Integrity

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Contents

Introduction	3
Grants and loans to the 25 plants getting \$10 million or more from the 1603 program.....	5
Expensive and controversial power purchase agreements	6
Plants that struggle to compete with cheaper power generation	6
Plants burning potentially contaminated fuels that might not qualify for a 1603 grant.....	7
The biggest polluters.....	8
Facilities that overpromised on pollution limits	9
Plants violating environmental regulations	9
Plants impacting the community	10
Plants that had fires	11
Lessons learned.....	11
1603 Grant recipients receiving over \$10 million.....	13
1. Colorado: Eagle Valley Clean Energy, Gypsum	13
2. Connecticut: Plainfield Renewable Energy, Plainfield	15
3. Florida: Deerhaven Renewable Energy, Gainesville	17
4. Florida: INEOS Bio Indian River Biorefinery, Vero Beach	19
5. Georgia: Graphic Packaging Biomass, Macon.....	20
6. Georgia: Packaging Corporation of America Valdosta Plant, Clyattville.....	21
7. Georgia: Piedmont Green Power, Barnesville	22
8. Georgia: Pratt Recycling Center, Conyers	24
9. Maine: Bucksport Generation, Bucksport.....	25
10. Michigan: L’Anse Warden Electric Company, L’Anse.....	26

11. Michigan: Verso Quinnesec Biomass Plant, Quinnesec	28
12. Missouri: MU Energy Plant, Columbia	29
13. New Hampshire: Burgess BioPower, Berlin	30
14. New York: Black River Cogeneration, Fort Drum	32
15. New York: US Salt Facility, Watkins Glen	34
16. Oregon: Seneca Sustainable Energy, Eugene.....	35
17. Pennsylvania: Evergreen Community Power Plant, Reading.....	36
18. South Carolina: Dorchester Biomass, Harleyville.....	38
19. Texas: Aspen Power Biomass Plant, Lufkin.....	39
20. Texas: Rio Grande Valley Sugar Growers, Santa Rosa	40
21. Virginia: Halifax County Biomass, South Boston.....	42
22. Virginia: WestRock Covington Biomass Plant, Covington.....	43
23. Washington: Nippon Port Angeles.....	45
24. Washington: WestRock Tacoma Biomass Plant, Tacoma	46
25. Wisconsin: WE Energies Rothschild Cogeneration Plant, Rothschild	47
Endnotes	49

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Introduction

Despite the climate and air quality implications of burning wood in power plants, biomass energy has been widely promoted in the US as clean, renewable, carbon-neutral technology, deserving of hefty public subsidies and support. That support has led to a substantial increase in the size of the sector: from 2005 to 2017, the amount of installed capacity (MW) has increased about 40%.¹ However, despite the increase in capacity, generation has only increased about 12%.² New plants are being built, but they are not necessarily running, in part because lower natural gas prices and a steady decline in the cost of wind power have made it increasingly difficult for bioenergy plants to compete.³

One reason for the surge in capacity that occurred in the last ten years was increasing state mandates for renewable energy, which have been met in part with new bioenergy. Another was the availability of government grants to bioenergy projects under the 2009 American Recovery and Reinvestment Act (ARRA), also known as the federal “Stimulus” package. As part of efforts to increase economic activity and employment, the US Department of Treasury gave away billions of dollars in grants to renewable energy projects. The grants were made under a program that converted what had been the Investment Tax Credit (ITC), a credit given for up to 30% of the construction cost of certain qualifying renewable energy projects, into a cash grant. The program was formally known as section 1603 of ARRA, “Payments for Specified Energy Property in Lieu of Tax Credits.” The program distributed \$26.2 billion to solar, wind, geothermal, waste-to-energy, and biomass energy projects, along with other renewable technologies.⁴ Bioenergy was one of the smaller categories, funded at a cost of \$1.062 billion.⁵

PFPI has reported previously on the climate, air quality, and forest impacts from biomass power in the US, including the wood pellet industry that is exporting biomass fuel to the EU and Asia.⁶ For this report, PFPI analyzed outcomes for the 25 “open loop” biomass facilities that received \$10 million or more from the 1603 program, a group of facilities that collectively received \$856,701,874. Searching news articles, SEC filings, air permits, and air and water violation records,* we assembled a picture of operating status and environmental records for each facility, then summarized the findings on key metrics of interest – how many plants are still operating? How have they been received in their communities? Have they lived up to the standards required for receipt of the federal grants? This report summarizes main themes that emerged from our survey, as well as selected findings on each of the 25 facilities.

We believe our findings are timely. The recent report from the Intergovernmental Panel on Climate Change makes it clear that it is “all hands on deck” to reduce greenhouse gas emissions at an unprecedented rate over the next decade, as well as store more atmospheric carbon by restoring and expanding forests.⁷ Given the need to reduce emissions, wood-burning power plants should not be eligible for renewable energy subsidies, because they emit more CO₂ at the stack than fossil fuels, and achieving net sequestration of carbon in forests harvested for fuel takes decades to more than a century. Beyond this, we believe bioenergy is an expensive and distracting technology that diverts effort and funding from truly clean renewable energy.

* Our approach, which primarily relied on secondary sources, means we may have missed things – if events in the life of a facility occurred but were not reported upon, we may not know about them; if the reporting got it wrong, we might get it wrong, too. In other words, there are a number of “unknown unknowns.” We thus welcome additions (and corrections) to our reporting.

Yet the bioenergy industry keeps coming back for more support, and policymakers keep giving it to them. Three examples from the last two years show the desperation of this industry for more subsidies – and its influence in obtaining them.

1. Throwing bad money after ... bad. The biomass power industry in Maine has received over a quarter of a billion dollars in public money over the last ten years, but is still declining. Legislators voted another \$13.4 million bailout for the industry in 2017, which has done little but prolong the distress. More details can be found in PFPI's report, "Maine Biomass at the Crossroads."⁸
2. In New Hampshire, the legislature just overrode the Governor's veto of a bailout for that state's failing biomass plants, which will cost ratepayers an estimated \$75 million over the next three years. They also passed a law allowing the state's largest (and newest) biomass generator, Burgess BioPower, to continue to charge over-market rates for electricity after it blows through the \$100 million cap set forth in a 20-year power purchase agreement in only 5 or 6 years (the section on Burgess below contains more details).
3. In Washington DC, responding to EPA's commissioning of a science advisory panel to explore how to count bioenergy CO₂ emissions for air permitting and greenhouse gas reduction programs, certain lawmakers (including Sen. Susan Collins of Maine) inserted an amendment into the annual federal budget bill legislation that effectively forces EPA to treat forest biomass energy as having zero emissions.⁹ Biomass industry lobbyists openly took credit for the language of the amendment; in promoting the legislation, Sen. Collins repeated language from a bioenergy industry website almost verbatim.¹⁰

Overriding science by fiat, legislating expensive bailouts, and continually misleading policymakers and the public about the climate, air quality, and forest impacts of bioenergy are not the actions of a sustainable industry. The lessons learned from these 25 plants – plants that should have been the cream of the crop – show why bioenergy is an increasingly risky investment.

Grants and loans to the 25 plants getting \$10 million or more from the 1603 program

More than half of the plants covered in this report received grants and loans in addition to the federal grant. Details are provided in the sections for each plant.

Table 1. The 25 plants using solid biomass that received 1603 grants of \$10 million or more

#	City	State	Facility	Boiler Size (MMBtu)	Plant Size (MW)	1603 grant	Other grants & loans
1	Gypsum	CO	Eagle Valley Clean Energy	176	11.5	\$ 18,499,383	\$ 40,250,000
2	Plainfield	CT	Plainfield Renewable Energy	523.1	37.5	\$ 79,538,962	\$ 50,000
3	Gainesville	FL	Deerhaven Renewable Energy	1359	103	\$ 116,828,699	
4	Vero Beach	FL	INEOS Bio Indian River Biorefinery	NA	6	\$ 16,915,175	\$ 127,500,000
5	Macon	GA	Graphic Packaging Macon	620	80	\$ 26,945,328	
6	Clyattville	GA	Packaging Corporation of America Valdosta	unk	52	\$ 57,398,240	
7	Barnesville	GA	Piedmont Green Power	657	207	\$ 49,530,065	\$ 82,000,000
8	Conyers	GA	Pratt Recycling	380	8	\$ 18,530,971	
9	Bucksport	ME	Bucksport Generation	814	25	\$ 13,653,021	\$ 2,000,000
10	L'Anse	MI	L'Anse Warden Electric Company	324	20	\$ 11,690,566	
11	Quinnesec	MI	Verso Quinnesec	660	28	\$ 14,675,562	\$ 32,000,000
12	Columbia	MO	MU Energy Plant	227	unk	\$ 14,346,139	
13	Berlin	NH	Burgess Biopower	1013	75	\$ 80,649,000	\$ 72,500,000
14	Fort Drum	NY	Black River Cogeneration	852	58	\$ 11,110,471	
15	Watkins Glen	NY	US Salt	240	6	\$ 10,262,744	
16	Eugene	OR	Seneca Cogeneration	352.8	18.8	\$ 18,643,079	\$ 10,000,000
17	Reading	PA	Evergreen Community Power	482	33	\$ 39,226,475	\$ 55,000
18	Harleyville	SC	Dorchester Biomass	314	17.8	\$ 21,444,767	
19	Lufkin	TX	Aspen Power	692.5	50	\$ 29,854,913	\$ 750,000
20	Santa Rosa	TX	Rio Grande Valley Sugar Growers	unk	23.5	\$ 10,232,261	\$ 300,000
21	South Boston	VA	Halifax County Biomass	629	49.9	\$ 44,088,504	\$ 93,850,000
22	Covington	VA	WestRock Covington Biomass	987	82	\$ 38,881,758	\$ 1,000,000
23	Port Angeles	WA	Nippon Port Angeles	420	20	\$ 19,452,855	
24	Tacoma	WA	WestRock Tacoma	595	55	\$ 18,030,340	
25	Rothschild	WI	WE Energies Rothschild	800	50	\$ 76,272,596	

Expensive and controversial power purchase agreements

Some industrial biomass power plants provide heat and power “behind the meter” to a manufacturing facility such as a sawmill or paper mill. However, for plants selling electricity to the grid, securing a power purchase agreement (PPA) with a distribution company is essential to ensure continuing demand for the electricity they produce, the longer the duration, the better, particularly if the contracts allow price escalation as biomass costs rise or guarantee payment regardless of whether any electricity is produced. Plants that do not quickly secure agreements – for instance, the Aspen plant in Texas, reported on here– may close as grid operators meet demand with cheaper electricity generated by wind or natural gas. The terms of PPAs are often withheld from public scrutiny; when they do come to light, they sometimes spark furious opposition as costs and unfavorable terms are revealed.

Five of the plants stood out as having power purchase agreements of note.

Table 2. Plants with notable power purchase agreements

#	State	Facility	Expensive and controversial power purchase agreements
3	FL	Deerhaven Renewable Energy	30-yr PPA cost Gainesville \$70 million per year for plant that mostly sat idle. The city purchased the plant for \$754m and paid an over-market price to buy out the PPA.
13	NH	Burgess Biopower	20-yr PPA allows Eversource to pay \$100 million over market price for electricity from the plant; this cap will be exceeded just 5 - 6 yrs into agreement.
14	NY	Black River Cogeneration	20 year PPA with the Army to purchase half the power generated assures supply, but locks in polluting power and eliminates cheaper, cleaner options.
16	OR	Seneca Cogeneration	Terms of 15-yr PPA were finally brought to light after long legal battle, revealing electricity price paid is significantly higher than for other power sources.
18	SC	Dorchester Biomass	30-year PPA contains "all encompassing fuel cost pass-through" that escalates the price paid for power if biomass costs increase.

Plants that struggle to compete with cheaper power generation

While prices for wind power and natural gas have fallen, biomass energy prices are less flexible due to ongoing fuel expense and infrastructure maintenance costs. Receipt of renewable energy subsidies and other support is sometimes critical for keeping biomass power plants operating. A number of plants have faltered due to costs and inability to compete with less expensive electricity from wind or natural gas. Of the original list of 25, 7 plants (28%) are idled, partially idled, or closed. The Indian River cellulosic biorefinery project was not primarily an electricity generator and closed due to apparent unfeasibility of the technology.

Table 3. Plants having difficulty competing with cheaper power sources, or that closed for other reasons

#	State	Facility	Difficulty competing with cheaper power generation; closed.
3	FL	Deerhaven Renewable Energy	Plant mostly idled due to cheap natural gas, but cost ratepayers \$70 m per year
4	FL	INEOS Bio Indian River Biorefinery	Closed
9	ME	Bucksport Generation	Closed, along with mill
15	NY	US Salt	Low natural gas prices and high biomass prices made the plant uneconomic to run in 2015
17	PA	Evergreen Community Power	The plant was losing \$15 million a year from the beginning; it is now closing
19	TX	Aspen Power	Plant was idled almost immediately after construction, and is now closed. It was sold for pennies on the dollar.
25	WI	WE Energies Rothschild	By 2016, low natural gas prices had made it more economic to run the plant with natural gas than biomass.

Plants burning potentially contaminated fuels that might not qualify for a 1603 grant

Some of the plants receiving the federal grant stand out for their use or potential use as allowed by permit of contaminated fuels. Each plant that applied for the 1603 grants should have met the qualifications particular to its category. Each of the 25 of the plants in this report received grants as an “open-loop biomass facility (cellulosic waste material),” defined as using “solid, non-hazardous, cellulosic waste material or any lignin material derived from qualified sources described in section 45(c)(3)(ii) of the Internal Revenue Code to produce electricity” (see footnote for full definition from the IRS; essentially, the definition disqualifies contaminated biomass or biomass that is co-fired with fossil fuels).[†] The application asks the applicant to specify how much of its fuel meets the qualification: “If a portion of fuel is not open-loop biomass of this type, give the percentage of fuel, on an annual basis, that is open-loop biomass of this type:___”.

[†] From <https://www.law.cornell.edu/uscode/text/26/45> :

(3) Open-loop biomass

(A) In general The term “open-loop biomass” means—

(i) any agricultural livestock waste nutrients, or

(ii) any solid, nonhazardous, cellulosic waste material or any lignin material which is derived from—

(I) any of the following forest-related resources: mill and harvesting residues, precommercial thinnings, slash, and brush,

(II) solid wood waste materials, including waste pallets, crates, dunnage, manufacturing and construction wood wastes (other than pressure-treated, chemically-treated, or painted wood wastes), and landscape or right-of-way tree trimmings, but not including municipal solid waste, gas derived from the biodegradation of solid waste, or paper which is commonly recycled, or

(III) agriculture sources, including orchard tree crops, vineyard, grain, legumes, sugar, and other crop by-products or residues.

Such term shall not include closed-loop biomass or biomass burned in conjunction with fossil fuel (cofiring) beyond such fossil fuel required for startup and flame stabilization.

We noted 9 plants – 36% – that went on to burn or are allowed by their permits to burn materials that likely should not have qualified as “open-loop biomass” under the 1603 program. Based on our review¹¹ of air permits for new biomass plants in the US, which found that many permits allow burning of demolition debris with no means of determining whether wood is contaminated, the actual number is probably higher. Since we do not have access to the grant applications, we do not know if plants disclosed the percentages of fuel that were qualifying and non-qualifying when they applied, and they received the grants anyway, or whether the plants simply did not live up to the requirements of the program.

Table 4. Plants that are burning or are permitted to burn contaminated fuels that may not qualify as open-loop biomass under the 1603 grant program

#	State	Facility	Plants burning potentially contaminated fuels
2	CT	Plainfield Renewable Energy	Construction and demolition debris
7	GA	Piedmont Green Power	The permit allowed "clean" construction and demolition wood, but state staffers concluded the plant's unofficial policy on fuel contamination was "don't ask, don't tell," meaning the policy was unenforceable
8	GA	Pratt Recycling	Intended: Paper sludge, heavy rejects, dry scrap construction wood, tire derived fuel, and carpet remnants
9	ME	Bucksport Generation	Permitted: Fuel oil, waste oil, mill waste treatment sludge, paper core rolls and construction and demolition waste wood
10	MI	L'Anse Warden Electric Company	Actually burned: Tires, pentachlorophenol-treated railroad ties, industrial waste, construction debris; now, pellets made from waste.
14	NY	Black River Cogeneration	Permitted: "clean wood, unadulterated wood from C+D debris, glued wood creosote treated wood, tire derived fuel and non-recyclable fibrous material (waste paper)." Actually burning glued wood and creosote-treated wood along with "clean" wood.
15	NY	US Salt	The new boiler burns "coal, wood, or natural gas."
17	PA	Evergreen Community Power	Actually burned: plastic, debris, construction waste
24	WA	WestRock Tacoma	Permitted to burn: Construction and demolition waste

The biggest polluters

Biomass energy is often called “clean” but in fact, even burning forest wood can emit as much or more particulate matter, nitrogen oxides (NOx), carbon monoxide (CO) per megawatt-hour as coal, and far more than natural gas.¹² Wood tends to be low in sulfur, meaning biomass plants are not usually big sources of sulfur dioxide (SO₂). However, plants that burn black liquor, including some of the plants featured in this report, can be very large sources of both NOx and SO₂. The 2016 EPA emissions data¹³ in Table 5 are for all biomass being burned at the facilities, not just that burned in the particular boiler that may have received the federal grant. Four facilities – all paper and packaging mills – had unusually large emissions, particularly from their units burning black liquor, a waste product of the wood pulping process. Combined, these plants received over \$117 million from the federal grant program.

Table 5. Plants with notably large pollution emissions

#	State	Facility	The biggest polluters
5	GA	Graphic Packaging Macon	1,218 tons NOx, 2,368 tons SO ₂
6	GA	Packaging Corporation of America Valdosta	798 tons NOx, 2,300 tons SO ₂
11	MI	Verso Quinnesec	1,035 tons NOx, 2,390 tons SO ₂
24	WA	WestRock Tacoma	674 tons NOx, 1,921 tons SO ₂

Facilities that overpromised on pollution limits

Biomass power plants often have difficulty meeting the emission limits for air pollution specified in their permit. PFPI’s “Trees, Trash, and Toxics” report¹⁴ covers the main loopholes in US bioenergy permitting that allow biomass power plants to avoid tough pollution controls. Of the 25 plants covered by this report, 5 stood out for having unrealistically lowballed emissions. This probably underestimates the number of plants that are exceeding their allowable emissions in real life, as monitoring and enforcement of pollution emissions from the biomass industry is notably lax.

Table 6. Plants that were initially permitted with unrealistically low emissions levels

#	State	Facility	Facilities that overpromised on pollution limits
7	GA	Piedmont Green Power	State permitting of plant as "synthetic minor" to avoid more rigorous permitting led to EPA objecting to permit as unenforceable
16	OR	Seneca Cogeneration	The plant sought to avoid rigorous permitting but exceeded initial pollution limits, which required re-opening the permit.
17	PA	Evergreen Community Power	The plant failed early inspections with emissions of hydrogen chloride that were 30 times higher than allowed by the permit.
20	TX	Rio Grande Valley Sugar Growers	The new boiler emitted 100 times more SO ₂ than predicted, and underestimation of particulate matter emissions meant additional controls had to be retroactively installed.
24	WA	WestRock Tacoma	The original air permit for the plant did not include a requirement to install controls for nitrogen oxides (NOx), a significant component of air pollution leading to smog. The plant’s operating emissions of NOx were 50% higher than the original estimate.

Plants violating environmental regulations

We did not note all violations for mills burning biomass, since determining from EPA’s violations database whether the violations were from the biomass unit or other operations at the mill was beyond the scope of this report. Seventeen plants – 68 percent – had environmental violations of federal air and water laws.

Table 7. Facilities with Clean Water Act and Clean Air Act violations

#	State	Facility	Plants violating environmental regulations
1	CO	Eagle Valley Clean Energy	Failure to monitor effluent discharges ; several Clean Water Act violations and was reported out of compliance in 6 quarters of 2016 and 2017
2	CT	Plainfield Renewable Energy	Multiple Clean Water Act discharge violations
4	FL	INEOS Bio Indian River Biorefinery	Clean Air Act violation in 2016
7	GA	Piedmont Green Power	Several Clean Water Act violations in 2017 and 2018 and was subject to a consent order and fine from the Georgia EPD in 2014
10	MI	L'Anse Warden Electric Company	Multiple air violations; Consent Decree from EPA restricting fuel handling and contaminated fuels; \$108,700 fine in October 2016 for air violations.
12	MO	MU Energy Plant	Power plant as a whole had several Clean Water Act violations in recent years
13	NH	Burgess Biopower	Fined \$4,500 for Clean Air Act violations in 2016
14	NY	Black River Cogeneration	Both high priority Clean Air Act violations, and Clean Water Act violations, for every quarter since late 2015; fined \$11,200
16	OR	Seneca Cogeneration	Fined for violating emissions standards for carbon monoxide, opacity (smoke) and acetaldehyde, a hazardous air pollutant. The plant also ran seven months with its pollution controls for nitrogen oxides switched off
17	PA	Evergreen Community Power	Failed air inspections due to high HCl emissions; had Clean Water Act violation in 2017
18	SC	Dorchester Biomass	Clean Water Act violations in 2018
20	TX	Rio Grande Valley Sugar Growers	Repeated violations of air permit conditions on fuel use; EPA notes "compliance issues" with waste disposal issues, and a violation of Clean Water Act provisions in 2016
21	VA	Halifax County Biomass	Fined in 2015 for failure to monitor and test emissions and ash. Appears to have failed stack tests for nitrogen oxides and carbon monoxide in 2014, and had high priority violations of the Clean Air Act through 2016. Total fines were \$120,271.
22	VA	WestRock Covington Biomass	Excessive emissions of particulate matter in 2015 led to fines; failed stack test for several other pollutants.
23	WA	Nippon Port Angeles	Multiple Clean Air Act and Clean Water Act violations and associated fines; not clear if from biomass energy or other components of facility
24	WA	WestRock Tacoma	Multiple Clean Air Act and Clean Water Act violations; not clear whether these are connected to the biomass burner or other parts of the mill
25	WI	WE Energies Rothschild	Clean Air Act violations for nitrogen oxides and particulate matter in 2017 and 2018.

Plants impacting the community

Biomass plants are frequent sources of environmental complaints for noise, odor, and air quality, all issues that can be exacerbated by the stream of trucks delivering biomass. Even the most modern plants may have these problems. Four plants stood out because of their large impacts on their immediate

neighbors; one, Verso Quinnesec, in Michigan, was identified as contributing to air pollution hundreds of miles away in New York State by virtue of its large emissions.

Table 8. Facilities causing nuisance or unhealthy conditions for neighbors

#	State	Facility	Plants impacting the community
2	CT	Plainfield Renewable Energy	Dust, fine particles, smell, woodchips all over the road and in the wetland
3	FL	Deerhaven Renewable Energy	Complaints about roaring noise from plant led to efforts to retrofit and reduce noise. Residents also complained about strong odors from the fuel pile.
7	GA	Piedmont Green Power	People in the community complained of ongoing plant noise of over 60 decibels. One said, "They're destroying my life."
10	MI	L'Anse Warden Electric Company	Neighborhood near plant was covered in contaminated wood dust from fuel-handling operations; daily soot-blowing leads to clouds of dark emissions.
11	MI	Verso Quinnesec	Plant was one of several identified by New York State as emitting over 400 tons NOx per year and contributing to NY's ozone non-attainment

Plants that had fires

Biomass plants are prone to fires, in part because dust and debris from biomass fuels are highly combustible. The plants covered in this report were typical of the industry. Five plants – 20% – were noted as having had at least one fire.

Table 9. Plants with fires

#	State	Facility	Facility fires
1	CO	Eagle Valley Clean Energy	Conveyor belt fire shut down the facility for 11 months
3	FL	Deerhaven Renewable Energy	Fire in wood processing unit, Feb. 2018
17	PA	Evergreen Community Power	Two fires in a nine-month period, one occurring in the wood storage silo
24	WA	WestRock Tacoma	Conveyor plant fire in 2017
25	WI	WE Energies Rothschild	Fire in dust collector in 2014; Fire in conveyor belt in 2016

Lessons learned

The picture that emerges from this overview is mixed. There is no dispute that many of the biomass power projects that received Stimulus grants did create jobs, at least during construction – and so fulfilled one of the main goals of the Stimulus. However, even leaving aside all the objections to bioenergy on the grounds of impacts to climate and forests, the record does not suggest that the biomass plants were a good place to invest federal funds. Some plants closed or were idled when they couldn't compete with cheaper sources of energy, meaning that their infrastructure lost value. Many plants have violated air

and water regulations, and continue to do so. A number are significant polluters; the paper and packaging mills receiving tens of millions in federal funds are generating relatively small amounts of electricity, yet producing more pollution than a 1,500 MW coal plant. Many of the biomass plants are burning, or are permitted to burn, contaminated materials that should have disqualified them from receiving the federal funds at all, if the rules had been enforced. Finally, some plants – and probably more than we report here – cause odors, dust, and noise pollution, ruining the quality of life for those unlucky enough to have one built in their community. All energy projects have impacts – but bioenergy impacts are especially far-reaching. These elite plants – facilities that were vetted to ensure they qualified for public funds – turned out to be nothing special, except as a lesson in misguided investment.

1603 Grant recipients receiving over \$10 million



1. Colorado: Eagle Valley Clean Energy, Gypsum

Owner: Eagle Valley Clean Energy (Provo, Utah)

Construction Cost: \$56 million

Subsidies and Loans: \$18.5 million 1603 Grant

\$250,000 USDA Grant¹⁵

\$40 million USDA Electric Program Loan¹⁶

Capacity: 11.5 MW

Fuel Type: Woody Biomass, Waste Wood Solids, Forest Cuttings

Status: Operating

Eagle Valley Clean Energy burns wood and sells electricity to Holy Cross Energy, with which it has a 20-year PPA.

Key Points:

- The Eagle Valley Clean Energy biomass plant was advertised as producing “clean energy” from intensive regional “hazardous fuels” harvesting.¹⁷ Senator Gail Schwartz praised the Eagle Valley biomass plant, “We have 4 to 6 million acres of standing dead timber in our state. We have 175,000 slash piles in Colorado that we will burn anyway. This biomass plant will help clean our forest and mitigate wildfires as well as create jobs and electricity.”¹⁸ However, other reports found the plant only sourced about 20% of its fuel from beetle-killed forests.¹⁹
- Eagle Valley Clean Energy has several Clean Water Act violations and was reported out of compliance in 6 quarters in 2016 and 2017.²⁰
- In December 2014, a conveyor carrying wood chips into the biomass power plant sparked a three-alarm fire starting in the conveyer belt. Kelly Bretta, a local airport worker said, “If it happened in the summer when things are dry, it could be a catastrophe. We are concerned for the safety of our community.”²¹ Inspectors from the town of Gypsum later found that the

biomass plant's fire hydrants valves had been closed down to 15 percent of their capacity.²² The fire caused \$200,000 in damages and forced Eagle Valley to shut down for eleven months.²³

- Gypsum town officials complained that “The biomass plant had been operating for less than a year without a certificate of occupancy from Gypsum. Eagle Valley was testing the plant, but the tests somehow morphed into full-time operation.”²⁴

Legal issues:

- Eagle Valley was involved in a lawsuit with Wellons Inc., its building contractor. Wellons claimed the plant’s owners could have used stimulus money to pay bills but instead “funneled that money into companies owned by their wives and themselves.” Eagle Valley said they refused payment to Wellons until shoddy construction was fixed at the plant.²⁵ In 2017, Wellons won a \$10.8 million verdict against Eagle Valley Clean Energy, but Eagle Valley refused to make any payments, increasing their legal obligation to \$11.4 million.²⁶
- In 2016, the town of Gypsum filed an eminent domain petition to force Eagle Valley Clean Energy to sell the town sixty-nine acres of wetlands and waterfront property surrounding the plant.²⁷

Forest Issues:

- The delivery of “diseased” dead wood as renewable energy from surrounding National Forests and Bureau of Land Management (BLM) lands to Eagle Valley Clean Energy was authorized under the USDA’s Biomass Crop Assistance Program to “reduce the risk of forest fire.”²⁸
- As a preemptive disease and wildfire mitigation measure, the US Forest Service (USFS) awarded a contract to remove standing trees from the White River National Forest as fuel for Eagle Valley. West Range Reclamation was awarded an \$8.7 million, 10-year stewardship contract to remove trees susceptible to insects and disease on the White River, with plans to treat at least 1,000 acres annually. About 70 percent of the material was intended to be burned at the power plant.²⁹
- West Range Reclamation filed for bankruptcy in 2015, only two years after receiving a multi-million dollar USFS logging contract. The USFS reported: “In 2015, the principal contractor of the Front Range Long Term Stewardship Contract (LTSC), West Range Reclamation LLC (WRR), filed for bankruptcy. The uncertainty of the LTSC persists. We do not anticipate utilizing this contract as we have in the past.”³⁰



2. Connecticut: Plainfield Renewable Energy, Plainfield

Owner: Greenleaf Power (Sacramento, California)

Construction Cost: \$225 million

Subsidies and Loans: \$79.5 million 1603 Grant
\$50,000 State Grant – CCEF Project 150 Initiative³¹

Capacity: 37.5 MW

Fuel Type: Woody Biomass, Waste Wood Solids, Construction Debris Wood

Status: Operating

Plainfield Renewable Energy (PRE) burns wood waste and sells electricity to Connecticut Light & Power.

Key Points:

- After almost a decade of construction delays and public opposition, the Plainfield biomass plant finally came online. Local Plainfield residents protested the plant because of its request to use water from the Quinebaug River for its cooling system. The town reached a settlement, which allowed PRE to install underground pipelines from the river for plant cooling. In return, the town would receive \$3 million over 20 years.³²
- The plant was also controversial because it would burn potentially contaminated construction and demolition debris, which can contain copper-chromium-arsenate-treated wood and other chemical additives. Local opposition continued once the plant was built because of frequent fugitive dust and wood chips dropped by chip vans delivering fuel to the plant. Local residents kept a running log of incidents of wood dust being visible on buildings and snow. A typical email,³³ from August 29, 2016:

The Concerned Citizens of Plainfield (CCP) would like to file two (2) complaints against Plainfield Renewable Energy for air pollution episodes observed during the week of 8/22/2016 to 8/28/2016.

On Tuesday, August 23rd at 3:30 pm CCP observed a strong wood odor on Tarbox Road. The PRE facility was operating the horizontal conveyor with the dust suppression fogging system disabled. Wind was out of the north. Visible dust emissions were observed at the conveyor.

On Friday, August 26th at 5:58 pm CCP observed a strong wood odor on Tarbox Road. At 6:19 pm a strong rancid odor was observed on Route 12. At 6:35 pm the rancid wood odor was observed in the trailer park south of the PRE facility the PRE facility. Wind was light out of the north.

How can DEEP allow this to continue.

The pollution coming from Plainfield Renewable Energy's facility is getting worse. The new owners are worse than the previous owners. PRE has a horrific environmental compliance history and is unquestionably the dirtiest power plant in the State of Connecticut. Neighbors of the PRE plant can't open their doors or windows. This is an ongoing air pollution is impacting the environment, health and properties of Plainfield residents and businesses.

- The *Hartford Courant* reported in 2015 that the plant had not been profitable for Leidos, the owner, and had suffered numerous shutdowns over the last year. The plant reported \$6 million in operating losses in the fourth quarter of 2014.³⁴ A buyout by Greenleaf Power cemented a \$40 million loss for Leidos Holdings; Leidos characterized the plant as a “distressed asset.”³⁵
- Plainfield Renewable Energy violated the Clean Water Act in 2015, 2016, 2017, and 2018, with multiple water discharge violations into the Quinebaug River.^{36,37} In addition, the Plainfield biomass plant sits atop an EPA Superfund cleanup site with ongoing testing for groundwater and soil contamination.³⁸



3. Florida: Deerhaven Renewable Energy, Gainesville

Owner: Gainesville Renewable Utilities (GRU), a city owned utility

Construction Cost: \$500 million

Subsidies and Loans: \$116.8 million 1603 Grant

Capacity: 102.5 MW (gross 116 MW)

Fuel Type: Woody Biomass, Waste Wood Solids, Urban Wood Waste

Status: Operating/Idled

Deerhaven Renewable Energy Station (formerly the Gainesville Renewable Energy Center (GREC) burns woody biomass material to generate electricity for Gainesville Renewable Utilities (GRU).

Key Points:

- Initially known as Gainesville Renewable Energy, this plant received complaints as soon as it started up, with residents describing the sound as being like the roar of a jet engine. Strong odors from the plant could be smelled from up to two miles away.³⁹ Even after the Gainesville plant operators installed sound reducing panels, local Turkey Creek residents were still affected by the noise and smell of the biomass plant. Nearby resident, Larry Noegel told *The Gainesville Sun*, “It sounds like someone is power washing my house from the inside.”⁴⁰
- The City of Gainesville entered into a 30-year, \$2.1 billion PPA with GREC. Ratepayers were paying \$70 million a year for a plant that would sit mostly idle because natural gas was a cheaper source of fuel. GRU’s energy supply officer explained, “Whether the biomass plant is generating power or not, GRU is committed to paying GREC \$70 million a year to keep the plant poised to produce power.”⁴¹ An audit of GRU revealed that ratepayers were overcharged by GREC nearly \$900,000 from 2014 to 2015.⁴²
- The plant was taken out of “stand-by” mode and switched on when GRU’s local coal-fired plant had mechanical issues. GRU officials put the biomass plant back in stand-by mode shortly

afterward. Although the biomass plant came back online for only 10 days, its energy cost was an extra \$300,000.⁴³

- GRU was forced to save face while it pitched an “above-market-price” buyout from GREC. Ed Bielarski, GRE’s general manager wrote, “When I came to Gainesville just over two years ago, I came with a vision of restoring faith in a utility blemished by this lopsided agreement.”⁴⁴ GRE even installed a “real-time savings ticker” on its website, to lessen the public perception of loss from its biomass blunder.⁴⁵
- To avoid the long-term PPA costs, GRU bought out its existing 30-year power purchase agreement with GREC for \$754 million. Gainesville Renewable Energy Center made millions for a biomass plant that remained mostly idle for four years.⁴⁶ *The Gainesville Sun* summed it up: “The city of Gainesville has officially closed on one of the most expensive deals in its 148-year history.”⁴⁷
- In February 2018, the wood processing unit at the plant caught fire and was quickly put out.⁴⁸
- Deerhaven has a sister plant in Sacul, TX, the Nacogdoches plant, which was idled months after construction due to its inability to compete with cheaper power sources.⁴⁹ Like Gainesville’s utility, Austin Energy had entered into a 20-year power purchase agreement with the Nacogdoches plant, which cost the city of Austin about \$54 million annually to essentially keep the plant on standby.⁵⁰

Legal Issues:

- GREC was ordered to pay \$4.6 million to Wood Resource Recovery, a local wood supplier, when it failed to fulfill its 20-year contract. The wood supplier’s lawyer stated, “The judgment shows that you can’t use somebody for your own purposes to get a half-billion dollar bank loan and then toss them aside when the contract is no longer convenient.”⁵¹
- A long legal battle including three court filings persisted between GRU and GREC. The operators of the plant accused GRU of a desire to “break” the facility, which could be used as a means to weaken their ability to refinance costly construction loans. GREC claimed they learned of “statements and scheming by GRU and certain City Commissioners reflecting an intent to physically damage the GREC Facility.”⁵²

Forest Issues:

- The biomass plant increases local wood harvesting, especially whole tree removal for land clearing and thinning. Local wood was expected to supply the plant with about 500,000 tons of wood a year.⁵³ Vice President of the Southeastern Wood Producers Association Richard Schwab called in a 2012 Farm Bill Subcommittee hearing for a broad-based definition of renewable biomass, due to dependence on biomass harvesting: “This is very important to my business because two thirds of our production is now based on producing in-woods chips for renewable energy production.”⁵⁴
- GREC’s CEO asserted, “Gainesville Renewable Energy Center is proud to be the first biomass power generation facility to ever receive Forest Stewardship Council (FSC) certification.”⁵⁵ However, FSC certification does not take into account bioenergy carbon impacts.



4. Florida: INEOS Bio Indian River Biorefinery, Vero Beach

Original Owner: INEOS Energy (London, England)

Current Owner: Frakens Energy (Lufkin, Texas)

Construction Cost: \$130 million

Subsidies and Loans: \$16.9 million 1603 Grant

\$75 million USDA Loan Guarantee⁵⁶

\$2.5 million State of Florida Grant⁵⁷

\$50 million USDOE Grant⁵⁸

Capacity: 6 MW, 8 m gallons cellulosic ethanol⁵⁹

Fuel Type: Yard Waste, Woody Biomass

Status: Closed

INEOS Bio Indian River Biorefinery was a demonstration project to create ethanol from cellulosic material, such as yard waste and wood. The plant also generated electricity with a small gasification unit. The plant is currently closed.

Key Points:

- In July 2013, INEOS Biorefinery announced “We are producing commercial quantities of bioethanol from vegetative and wood waste, and at the same time exporting power to the local community – a world first.”⁶⁰ Six months later INEOS Bio acknowledged that “The facility would require certain modifications and upgrades to build its on-stream performance and reliability.”⁶¹ INEOS Bio remained idle until September 2014 performing these upgrades.
- The INEOS Bio plant was shut down in January 2015, when it overproduced hydrogen cyanide (HCN), a toxic gas. The Florida Department of Environmental Protection stated, “Although the facility is officially operating, very little fermentation or production of ethanol from the

production fermenter has occurred, primarily because of the sensitivity of the bio-organisms in the fermentation process to high levels of HCN in the syngas. As a result, installation of a HCN scrubber is essential.”⁶²

- The facility had a Clean Air Act violation in 2016.⁶³
- In September 2016, INEOS Bio put the plant up for sale. Coverage at the time noted that “INEOS spokesman Charles Saunders would not say whether the plant ever produced ethanol in significant quantity, or whether the technology actually works.”⁶⁴



5. Georgia: Graphic Packaging Biomass, Macon

Owner: Graphic Packaging International (Sandy Springs, Georgia)

Construction Cost: \$80 million

Subsidies and Loans: \$26.9 million 1603 Grant

Capacity: 38 MW

Fuel Type: Waste Wood Solids, Forest Biomass, Paper Mill Residues, Black Liquor

Status: Operating

Graphic Packaging Macon Biomass burns woody biomass for steam energy for its Graphic Packaging paper mill operations in Macon, Georgia.

Key Points:

- Graphic Packaging claimed that replacing coal with biomass and black liquor at the Macon mill would cut down on air pollution by reducing sulfur dioxide emissions. But under the new permit,

allowable emissions of other air pollutants, including particulate matter, volatile organic compounds, nitrogen oxide and carbon dioxide levels increased.⁶⁵

- The facility is a large polluter. Emissions data from EPA show burning wood and black liquor at the facility emitted 1,218 tons of NO_x in 2016, and 2,368 tons of SO₂.^{66,67}

Forest Issues:

- Local Georgia wood harvester, Twin Rivers Land & Timber (TRLT), expanded into a full-scale biomass harvesting operation that specializes in on-site wood chipping for biomass, which includes delivery to Graphic Packaging Biomass plant.⁶⁸ TRLT's promotional video⁶⁹ demonstrates the fossil fuel intensity of biomass harvesting.



6. Georgia: Packaging Corporation of America Valdosta Plant, Clyattville

Owner: Packaging Corporation of America (Lake Forest, Illinois)

Construction Cost: \$225 million

Subsidies and Loans: \$57.4 million 1603 grant

Capacity: 52 MW⁷⁰

Fuel Type: Waste Wood Solids, Paper Mill Residues, Black Liquor

Status: Operating

The biomass boilers at Packaging Corporation of America (PCA) Valdosta Containerboard Mill burn woody biomass material and black liquor to generate energy for paper mill operations.

Key Points:

- In 2009, Packaging Corporation announced it was upgrading its Valdosta mill location, with the Valdosta paper reporting that a new recovery boiler (which converts waste from pulp and paper-making to energy) would “replace three boilers built in 1953.” “The new equipment is deemed pollution-controlled and a large percentage of it produces self-sustained, green energy.”⁷¹ However, scrutiny of records from the Energy Information Administration and EPA, which track energy produced down to the boiler level, shows that the company has continued to utilize boilers built in 1953 and 1964. The facility as a whole is a large polluter, with the new recovery boiler being the largest source of pollution. Data on 2016 emissions from EPA show wood and black liquor burning at the facility emitted 745 tons of NOx in 2016, and 2,300 tons of SO₂.⁷²

Unit#	Boiler name	Year online ⁷³	NOx (tons)	SO ₂ (tons)
1005	Riley Combination Boiler	1964	237.5	31.0
1006	C.E. Combination Boiler	1953	79.6 ⁷⁴	9.7
7040	No. 4 Recovery Furnace	new	427.5	2,259.4

- The company has been adept at benefiting from federal subsidies and tax breaks for bioenergy. Receipt of the \$57.4 million federal grant for upgrading the recovery boiler at the Valdosta plant came in 2012. In 2011, the company’s 10-k noted that the company as a whole, comprised of six mills, had earned \$185.4 million from alternative fuel mixture tax credits awarded to fuel use of black liquor, a waste product of the pulp and paper industry.⁷⁵



7. Georgia: Piedmont Green Power, Barnesville

Owner: Atlantic Power Corporation (Dedham, Massachusetts)

Construction Cost: \$207 million

Subsidies and Loans: \$49.5 million 1603 Grant

\$82 million Construction Bridge Loan⁷⁶

Capacity: 60.5 MW

Fuel Type: Woody Biomass, Waste Wood Solids, Forest Biomass

Status: Operating

Piedmont Green Power burns woody biomass material and sells electricity to Georgia Power.

Key Points:

- The Piedmont plant was identified as one of the plants with unprotective, unenforceable air permits in PFPI's "Trees, Trash, and Toxics" report. The plant's air permit does not restrict air pollution emissions or fuel contamination in a meaningful way.
- PFPI petitioned the EPA in 2015 to re-open Piedmont's air permit.⁷⁷ PFPI contended that "The plant (Piedmont) has a history of high emissions and failed stack tests, suggesting it should be required to undergo the more rigorous and protective permitting required for "major" sources under the Clean Air Act."⁷⁸ The plant's permit allowed a variety of fuels to be burned, and while ostensibly prohibiting contaminated wood, had few enforceable provisions as required by the Clean Air Act. Regarding the permit allowance for use of "clean" construction and demolition wood, an email between Georgia Environmental Protection Division (EPD) staffers admitted that the permit's requirements to track contamination in fuels were unenforceable:

*"I am trying to figure out how PG is going to determine if fuel shipments meet the criteria. In this fuel specification, they say that fuel that contains chromate, etc. will not be accepted. The fuel supplier will sign the form in any event. Is PG going to test any shipments? People who sell fuel oil probably have a way to get something from a refinery. Forest thinnings from Nick and Eddy's tree service won't come with that data. It also says no more than 50% moisture and 5% ash. That sounds like a lab report. I expect that they have a bunch of suppliers, not one or two. It sounds good on paper, but **maybe don't ask don't tell would work better.**"(emphasis added).*

- The EPA agreed with some arguments in the petition and ruled that "The emissions permit granted to Piedmont Green Power, a 60.5 MW biomass plant in Barnesville, Georgia, does not enforce safe emissions limits."⁷⁹ However, EPD's subsequent changes made to the permit were cosmetic.
- The facility had several Clean Water Act violations in 2017 and 2018 and was subject to a consent order and fine from the Georgia EPD in 2014.⁸⁰
- The plant was a major noise polluter after it was built, leading to bitter complaints. One resident measured over 60 decibels with only the turbine and trucks running. "It's miserable," he said. "They're destroying my life." People could hear the noise from two miles away.⁸¹



8. Georgia: Pratt Recycling Center, Conyers

Owner: Pratt Industries (Conyers, Georgia)

Construction Cost: \$60 million

Subsidies and Loans: \$18.5 million 1603 Grant

Capacity: 7 MW⁸²

Fuel Type: Multiple Recycling Material Feedstocks, Woody Biomass

Status: Operating

Pratt Recycling Center is a waste-to-energy gasification plant that provides in-house energy and steam for recycling and paper mill operations at the Conyers, Georgia facility.

Key Points:

- In 2015, Pratt Industries opened its Material Recovery Facility, which included a 7 MW waste-to-energy gasification plant. Chairman Anthony Pratt explains, “the materials we can’t recycle can be used as fuel in our clean energy plant which is right next door.”⁸³
- The plant’s application states its fuels would be “natural gas (startup and flame stabilization only), paper sludge, heavy rejects, dry scrap construction wood, tire derived fuel, and carpet remnants.”⁸⁴
- The Atlanta metro area where the plant is located was in “severe” non-attainment of EPA’s ozone standard, meaning that even though the facility is relatively small, it had to go through Prevention of Significant Deterioration permitting, and even purchase offsets for NOx emissions.



9. Maine: Bucksport Generation, Bucksport

Former Owner: Verso Corporation (Miamisburg, Ohio)

Current Owner: Bucksport Generation, LLC (AIM Development USA), (Bucksport, Maine)

Construction Cost: \$45 million

Subsidies and Loans: \$13.6 million 1603 grant⁸⁵

\$2 million Efficiency Maine Grant⁸⁶

Capacity: 28 MW

Fuel Type: Woody Biomass, Waste Wood Solids, Pulp Mill Residues, Black Liquor

Status: Closed

Bucksport Generation (formerly Verso Bucksport) burned woody biomass and black liquor to generate heat and power for its paper mill operation, and sold excess electricity to the ISO New England power grid. The biomass plant and paper mill are now closed.

Key Points:

- The Bucksport biomass plant was permitted to burn fuel oil, waste oil, mill waste treatment sludge, paper core rolls and construction and demolition waste wood.⁸⁷
- In 2010, the State of Maine awarded Verso Paper a \$2 million “Energy Efficiency Grant” towards upgrading its mill to biomass energy.⁸⁸
- In January 2014, Verso Paper purchased Bucksport Energy LLC, which supplied the mill’s biomass energy, on the heels of Verso's decision to shut down its Bucksport mill temporarily in response to soft market demand for its paper and a spike in the cost of natural gas.⁸⁹ In October 2014,

Verso Paper announced the closure of the Bucksport Mill and biomass plant, only a year after it received millions of dollars in biomass subsidies and grants.⁹⁰

- Maine’s Public Utilities Commission promotes its “Maine Green Power” program, which charges ratepayers an additional premium for buying blocks of Maine-generated renewable energy.⁹¹ Most of Maine’s “clean energy” comes from biomass.⁹² Biomass power has typically received over 90 percent of renewable energy subsidies in Maine, amounting to over \$60 million in recent years, but the industry is struggling. In 2016, the state legislature voted to provide a \$13.4 million conditional bailout for four wood-burning power plants.⁹³



10. Michigan: L’Anse Warden Electric Company, L’Anse

Owner: Convergen Energy (Green Bay, Wisconsin)

Construction Cost: \$27.5 million (renovation of existing plant)

Subsidies and Loans: \$11.6 million 1603 Grant

Capacity: 20 MW

Fuel Type: Waste Wood Solids, Forest Biomass, Railroad Ties, Tire-Derived Fuel

Status: Operating

L’Anse Warden Electric Company (LWEC) burns various feedstocks for base-load energy, which it sells to Detroit Edison customers through its power purchase agreement. LWEC plant also supplies electricity and steam for the CertainTeed Plant nearby. The plant had previously burned coal, oil, then natural gas; the 1603 grant facilitated installation of equipment so it could burn biomass.

Key Points:

- The 1603 grant was for conversion of the plant, which had not operated since 2003, from natural gas to biomass. The company applied as an “open loop biomass facility (cellulosic waste

material)”. The application specified the various types of clean biomass that are allowed to be burned to qualify, and stated, “If a portion of fuel is not open-loop biomass of this type, give the percentage of fuel, on an annual basis, that is open-loop biomass of this type: 100%.”⁹⁴ However, immediately upon re-tooling for biomass, the plant began burning waste wood, tires, creosote-treated and pentachlorophenol (PCP)-treated railroad ties brought down from Canada (PCP is a banned pesticide in the US). It thus appears L’Anse Warden misled on its application for the federal grant.

- Fuel processing operations at the plant led to continual clouds of contaminated wood dust that were deposited on cars, gardens, and inside houses. Soot-blowing at the plant occurred multiple times a day, leading to black greasy deposits on snow.⁹⁵ The community’s protests against the plant were included as a section in a documentary on the biomass industry, “Burned.”⁹⁶
- EPA Region 4 responded to citizen complaints about dust, emissions, and contaminated fuels being burned at the L’Anse Warden plant. EPA action culminated in a Consent Order that restricted some but not all of the polluting activities by the plant.⁹⁷ In September 2016 the plant received a 5-year permit renewal in part by removing PCP-treated wood from its fuel mix,⁹⁸ although citizens reported that it continued to be burned. The plant had a \$108,700 fine in October 2016 for air violations.⁹⁹
- In November 2016, Convergen Energy purchased the L’Anse Warden Electric Company biomass plant from Traxys Power Group, a week after the new permit was granted.^{100,101} Convergen Energy is a “paper pellet” alternative fuel manufacturer.¹⁰² Ted Hansen, Convergen’s CEO has stated, “We call ourselves the nicotine patch for coal.”¹⁰³ Convergen Energy applied for a permit to burn its pellets, which are made from “non-recyclable industrial label and packaging materials, which are mostly paper, cardboard and plastics.” In response to concerns from residents, Michigan DEQ created a fact sheet on the pellets.¹⁰⁴



11. Michigan: Verso Quinnesec Biomass Plant, Quinnesec

Owner: Verso Corporation (Miamisburg, Ohio)

Construction Cost: \$45 million

Subsidies and Loans: \$14.6 million 1603 Grant

\$17 million New Markets Tax Credit¹⁰⁵

\$10 million Michigan Magnet Grant¹⁰⁶

\$5 million Great Lakes Capital Grant¹⁰⁷

Capacity: 28 MW

Fuel Type: Woody Biomass, Waste Wood Solids, Pulp Mill Residues, Black Liquor

Status: Operating

Verso Quinnesec burns woody biomass and black liquor for combined heat and power for its mill operations in Quinnesec, Michigan. Verso also sells renewable energy credits (REC) from the plant's biomass power.

Key Points:

- The Verso Quinnesec bioenergy project involved upgrades to the plant's boiler, installation of a new 28 MW steam turbine generator, and purchase and installation of biomass handling equipment. The upgrades brought the plant's generating capacity to 50 MW.¹⁰⁸
- Michigan Department of Environment Quality (DEQ) designated Verso Quinnesec as a "Clean Corporate Citizen."¹⁰⁹ However, the biomass burned at the mill is an unusually large source of pollution. EPA data from 2016 show that wood fuels burned at the plant emitted 445 tons of nitrogen oxides (NOx) and 52 tons of sulfur dioxide (SO₂), and black liquor burned at the plant

emitted 590 tons of NO_x and 2,337 tons of SO₂.¹¹⁰ The fact that the plant as a whole emitted more than 400 tons of NO_x qualified it as a source “significantly contributing to nonattainment [of air quality standards] and interfering with maintenance” of attainment in New York State, as highlighted in a 2017 New York Department of Environmental Conservation petition submitted to the EPA.¹¹¹

- In 2016, Verso Corporation filed for Chapter 11 bankruptcy, so its \$2.4 billion debt could be restructured.¹¹²



12. Missouri: MU Energy Plant, Columbia

Owner: University of Missouri (Columbia, Missouri)

Construction Cost: \$75 million

Subsidies and Loans: \$14.3 million 1603 grant

Capacity: 227 MMBtu CHP boiler

Fuel Type: Woody Biomass, Agricultural Residues

Status: Operating

Mizzou Energy's combined heat and power boiler came online in 2012. It burns woody biomass material to generate base-load electricity and steam for the University of Missouri campus in Columbia, Missouri.

Key Points:

- As a CHP plant the facility does not have a standard MW output rating. Data from the Energy Information Administration show the plant generating over 56,000 MWh in 2017, or the equivalent of about 6.4 MW if the plant were operating 24-7.¹¹³
- The plant “consumes 100,000 tons of regionally and sustainably sourced wood residues each year.”¹¹⁴ Mizzou Energy's superintendent claimed that converting from coal to “Using biomass is going to reduce emissions significantly, including greenhouse gas emissions.”¹¹⁵
- The addition of the biomass boiler to the university's power generation line-up was accompanied by typical talking points about the “need” for forest management. A now-unavailable publication from University of Missouri Agricultural Extension claimed, “With less wood in the forest, the risk of a catastrophic wildfire is reduced and removing the small-diameter trees allows for more light to reach the forest floor to help regenerate the forest.”¹¹⁶
- The power plant had several Clean Water Act violations in recent years.¹¹⁷



13. New Hampshire: Burgess BioPower, Berlin

Owner: Cate Street Capital (Portsmouth, New Hampshire)

Operated By: Berlin Station, LLC (owned by Cate Street Capital)

CEPS Power Provider: CS Berlin Ops, Inc. (owned by Cate Street Capital)

Construction Cost: \$274 million

Subsidies and Loans: \$80.6 million 1603 Grant

\$17.5 million (NMTC) New Markets Tax Credit

\$55 million Cash Grant Bridge Loan¹¹⁸

Capacity: 75 MW

Fuel Type: Woody Biomass, Waste Wood Solids, Forest Biomass

Status: Operating

Burgess BioPower burns woody biomass material and sells electricity to Eversource Energy in New Hampshire.

Key Points:

- One of the largest and most expensive biomass power plants in the country, Burgess BioPower is permitted to burn close to a million tons of wood a year. The plant's air permit allows it to burn "whole logs" at a rate of 113 tons per hour,¹¹⁹ the equivalent of clearcutting more than an acre of New Hampshire's forests every hour.
- The company was fined \$4,500 in 2016 for Clean Air Act violations.¹²⁰
- In 2011, the company (previously known as Berlin BioPower) signed a 20-year power purchase agreement (PPA) with Eversource Energy. The agreement, which was approved by the NH Public Utility Commission (PUC), allowed Eversource to pay Burgess up to \$100 million more ("overmarket") than if the electricity were purchased on the open market over the course of the 20-year contract period. Consumer advocates warned that the real cost to ratepayers would likely be far more than that.¹²¹ The plant became fully operational in 2014.
- In 2017 the PUC acknowledged that the Burgess deal would cost ratepayers \$100 million more in overmarket costs by as early as 2019 or 2020, only 5 or 6 years into the 20-year PPA.¹²²
- In June 2018, NH Governor Chris Sununu signed Senate Bill 577 into law, which would allow Burgess BioPower to continue to sell power to Eversource at above-market prices for up to three years *after* the \$100 million cap was reached, forcing ratepayers to continue to heavily subsidize the facility.^{123,124} That same week, Eversource announced a 19% rate hike that would go into effect August 1, 2018.¹²⁵
- Ironically, just days before signing SB 577, Governor Sununu had vetoed similar legislation that would require utilities to pay above market rates for electricity produced by NH's six smaller biomass power plants and sole remaining trash incinerator over the next three years, because he opposed "unjustly burdening the ratepayers of New Hampshire."¹²⁶ He noted that the bill would cost ratepayers an estimated \$25 million per year, on top of subsidies that the State Legislature had approved the previous year.
- The biomass and logging industries protested and, together with landowners and local government officials, successfully lobbied the state legislature to override the Governor's veto in September. Proponents of the biomass bailout bills contended they were necessary to preserve jobs and local economies in New Hampshire, while others, such as the NH Business and Industry Association, argued they would make NH's already high electric rates even more unaffordable for residential and business customers.¹²⁷
- In September, NH Consumer Advocate D. Maurice Kreis filed a motion requesting PUC to determine to what extent SB 577 allows Eversource to recover overmarket costs from its customers for power purchased from the Burgess BioPower plant. Kreis wrote in his petition, "SB 577 is a textbook example of a statute whose purpose is to extend a benefit to special interests."¹²⁸

Legal Issues:

- In April 2016 the Securities and Exchange Commission settled out of court for \$3 million dollars on charges that the original developer, Laidlaw Energy Group, “violated regulations, including misleading investors about the prospects and financial condition of his company.”¹²⁹
- The Laidlaw lawsuit is connected to a larger constellation of biomass lawsuits and bankruptcies. Capergy US, owner of Cate Street Capital, investors in the Burgess plant, have been under scrutiny due to involvement in several failed biomass projects in Maine,¹³⁰ which included a \$16 million scheme that tried but failed to resurrect the Great Northern Paper Mill as a biomass power plant.¹³¹



14. New York: Black River Cogeneration, Fort Drum

Owner: ReEnergy Holdings (Latham, New York)

Construction Cost: \$34 million (coal to biomass conversion)

Subsidies and Loans: \$11.1 million 1603 Grant

Capacity: 60 MW

Fuel Type: Waste Wood Solids, Forest Biomass, Glued Wood, Creosote-treated Wood

Status: Operating

Black River Cogeneration burns biomass to generate electricity, and is allowed by its permit to burn a variety of fuels, including glued wood. It has a 20-year PPA with the US Army base at Fort Drum, New York.

Key Points:

- In 2015 the plant entered a 20-year contract with BlueRock to provide 28 MW of power, half the plant's capacity, to the Army base at Fort Drum.¹³² The plant has a separate PPA with Niagara Mohawk Power Corporation for electricity it does not sell to the Army.¹³³
- The DOE supplemented ReEnergy's fuel mix with the addition of 7,300 tons of shrub willow provided by DOE's Bioenergy Technology Office. The DOE identifies short rotation willow crops as "important ecosystem services" that create wildlife habitat.¹³⁴
- The year the plant opened there was a firewood shortage across NY State. It was reported that some loggers were under pressure to convert firewood logs into wood chips to meet annual quotas established under contracts with ReEnergy.¹³⁵
- The Black River plant was originally a coal-burning plant, hence is subject to the requirements of New York's CO₂ Budget Trading Program (part of the multi-state Regional Greenhouse Gas Initiative). The plant's permit¹³⁶ specifies it can burn "clean wood, unadulterated wood from C+D debris, glued wood creosote treated wood, tire-derived fuel and non-recyclable fibrous material (waste paper)." Although the plant burns glued wood and creosote-treated wood,¹³⁷ the remainder of the wood and wood wastes burned at the plant have been determined to be "sustainably harvested" "eligible biomass" by the NYSDEC, therefore the plant does not have to purchase allowances for the CO₂ emissions from burning these fuels. The plant is required to purchase allowances for the other fuels it burns.
- The plant has had both high priority Clean Air Act violations and Clean Water Act violations for every quarter since late 2015, and has been fined \$11,200.¹³⁸



15. New York: US Salt Facility, Watkins Glen

Owner: Kissner Group (Overland Park, Kansas)

Construction Cost: \$30 million

Subsidies and Loans: \$10.2 million 1603 Grant

Capacity: 240 MMBtu/hr

Fuel Type: Waste Wood Solids, Forest Biomass, Construction Wood Debris

Status: Operating/Idled

The biomass boiler at the US Salt site is one of four boilers producing on-site energy for salt mining operations in Watkins Glen, New York. The other three boilers burn fossil fuels or combinations of biomass and fossil fuels.

Key Points:

- The current operating permit for the facility (issued in 2016) states that the facility has “three natural gas and oil fired process boilers,” and a “newer 240 million BTU per hour fluidized bed boiler, which can be fired by any combination of coal, wood, or natural gas.”
- A 2008 overview of the project stated the plant would “require 150,000 green tons of biomass each year, which will need to come from sources within 60 to 90 miles” which was supposed to be sourced with “tops, limbs, cull and rot.”¹³⁹
- According to a 2015 update on the NY State Energy Research and Development Authority’s website, the plant was “operating its cogeneration system by firing their existing boilers on natural gas, with the biomass boiler on standby. With the recent drop in the cost of natural gas

and the rise in the cost of local biomass has made it uneconomic to run the biomass fired boiler 24 hours per day, 365 days per year [sic].”¹⁴⁰

- The facility as a whole has several Clean Water Act violations.¹⁴¹



16. Oregon: Seneca Sustainable Energy, Eugene

Owner: Seneca Sustainable Energy (Eugene, Oregon)

Construction Cost: \$61 million

Subsidies and Loans: \$18.6 million 1603 Grant
\$10 million (State Tax Credit Subsidy)¹⁴²

Capacity: 19.8 MW

Fuel Type: Waste Wood Solids, Forest Biomass, Mill Wood Residues

Status: Operating

The Seneca facility burns woody biomass material and sells electricity to the Eugene Water and Electric Board (EWEB). It uses steam heat from the plant to help dry lumber at the adjacent sawmill.

Key Points:

- The EWEB refused to reveal the terms of its 15-year power purchase agreement with Seneca, but *The Register-Guard* sued to get some information released and won a \$70,000 settlement. According to the paper, “Under the settlement, EWEB will not disclose how much it pays Seneca each year for power. However, other EWEB documents, comments by EWEB officials, and records released separately by Seneca, indicate the binding contract is a money-sapping deal for EWEB

ratepayers.”¹⁴³ The agreement escalates the price each year, even as the cost of other sources of power has declined.

- The plant is located in an area that already has excessive air pollution problems. After startup, the Seneca biomass plant was fined for violating emissions standards for carbon monoxide, opacity (smoke) and acetaldehyde, a hazardous air pollutant. The plant also ran seven months with its pollution controls for nitrogen oxides switched off.¹⁴⁴ Despite these violations, the EPA database simply records that the plant received a letter of warning by the state in 2013.¹⁴⁵
- The plant bought “credits” under the state’s pollution-trading program to offset its particulate matter emissions, but the credits were from a reduction in emissions at International Paper that had occurred in the mid-2000’s, meaning no current reduction in particulate matter pollution occurred.¹⁴⁶
- Upon receipt of an updated air permit allowing greater emissions in 2015, the company complained that the process had given “certain activists the opportunity to agitate a situation to further their own agenda.”¹⁴⁷



17. Pennsylvania: Evergreen Community Power Plant, Reading

Owner: DS Smith (London, England)

Construction Cost: \$140 million

Subsidies and Loans: \$39.2 million 1603 Grant¹⁴⁸

\$15,000 Berks County Sustainable Energy Study Grant¹⁴⁹

\$40,000 Berks County Community Foundation Loan¹⁵⁰

Capacity: 33 MW

Fuel Type: Woody Biomass, Waste Wood Solids, Mill Wood Residues, Cardboard, Paper, Plastic and Other Waste

Status: Closing

Evergreen Community Power was built in 2008 to provide heat and power for the United Corrstack paper mill in Reading, Pennsylvania.¹⁵¹ The plant is currently preparing to close down its operations.

Key Points:

- The United Corrstack/Evergreen Community Power facility is located in Berks County, which at the time was designated as out of attainment with EPA's health standards for ozone and lead, and had high asthma rates.¹⁵² The plant was supposed to burn up to 1,000 tons per day of construction and demolition waste as well as "significant amounts of paper, plastic, and other foreign debris" imported from New England and New Jersey. At full operation the plant would generate 70,000 tons of toxic ash per year requiring special landfill disposal. The plant nonetheless avoided going through "Best Available Control Technology" permitting and was operating only under a state air pollution permit. The plant was reported as early as 2011 to be operating at a loss of \$15 million annually.¹⁵³
- The plant applied as a biomass burner for the federal \$39 million 1603 grant, but in fact burned so much other types of waste, it was questionable whether it should have qualified. If the plant had been regulated as an incinerator, rather than a biomass burner, it would have been held to more rigorous emission standards.¹⁵⁴
- Evergreen failed early DEP inspections because "the 30-day rolling average of hydrogen chloride emissions for the plant was 30 times higher than what its permit allows."¹⁵⁵
- The plant had a notice of a Clean Water Act violation in April of 2017.¹⁵⁶
- The facility had at least two fires. In January 2018, the Evergreen Community Power Plant caught on fire. *The Reading Eagle* reported, "For the second time in a little more than nine months, multiple shifts of city firefighters have been deployed to help put out a stubborn fire at a south Reading power plant."¹⁵⁷ The January fire occurred in the "massive silo where wood materials are stored before being burned."¹⁵⁸
- In February 2018, Evergreen's owner, DS Smith, announced plans to close the facility. "Due to challenging economic conditions for many years, we have taken the difficult decision to close the Reading Mill Power Plant."¹⁵⁹



18. South Carolina: Dorchester Biomass, Harleyville

Owner: EDF Renewable Energy (Paris, France)

Construction Cost: \$68million

Subsidies and Loans: \$24.1 million 1603 Grant

Capacity: 17.8 MW

Fuel Type: Forest Biomass, Resinated Wood, Waste Wood

Status: Operating

The Dorchester plant sells electricity to Santee Cooper customers in South Carolina.

Key Points:

- Dorchester and a sister plant in Allendale County both have 30-year power purchase agreements (PPAs) with Santee Cooper that end in 2043. The PPAs include an “all encompassing fuel cost pass-through”¹⁶⁰ that means the price of power can rise if biomass fuel costs increase.
- In 2011, SC Governor Nikki Haley praised the Dorchester County biomass project and announced Southeast Renewable Energy (the original owners) would receive a substantial \$50 million investment for the biomass plant. “Utilizing the county’s wood residue is not only sustainable but it will also save them money and create local jobs.”¹⁶¹
- The Dorchester and Allendale plants have been sold by EDF to Atlantic Power Corporation for \$13 million. The deal will be finalized in 2019.¹⁶²
- The Dorchester plant is noted by EPA as having Clean Water Act violations in the first two quarters of 2018.¹⁶³

Forest Issues:

- The Dorchester and Allendale plants were promoted by foresters as means of disposing of “low-value” trees: “A lot of landowners own property that doesn’t have quality trees on it. You can’t round wood or clean chip and so this will give them a fuel-chipping option.”¹⁶⁴ Pressure on forests is increasing as bioenergy expands. In a Coastal Carolina University research paper, authors revealed, “Elected officials are looking to shrink protected lands in Dorchester County.” They want to release some of the “coastal management” forests, to be used in logging and biomass operations.¹⁶⁵
- Utility company Santee Cooper weighed in on local forest health, “Like having too many hyenas in ‘The Lion King’ movie, our South Carolina forests can have too much of one type or age class of tree and get all out of kilter.”¹⁶⁶ Santee Cooper was bullish on bioenergy: “It’s conceivable that there could be a biomass plant in every county in South Carolina in a fully-developed biomass market.”¹⁶⁷



19. Texas: Aspen Power Biomass Plant, Lufkin

Owner: Private Investor

Construction Cost: \$140 million

Subsidies and Loans: \$29.9 million 1603 Grant

\$750,000 Texas Capital Fund Infrastructure Grant¹⁶⁸

Capacity: 50 MW

Fuel Type: Waste Wood Solids, Forest Biomass, Paper Mill Residues

Status: Closed

Aspen Power burned woody biomass material to generate electricity for the local Texas grid. Just months after commissioning in 2011, the plant was taken out of service and has largely sat idle since. It was sold for pennies on the dollar. A brief history of the plant is available at PFPI's BioMess101 site.¹⁶⁹

Key Points:

- The Aspen Power project had a number of air permit and technology issues during its construction. Community opposition was intense, and made more so by allegations that signatures of plant opponents had been forged on a document withdrawing opposition to the plant.^{170,171}
- In 2011, Aspen Power started generating power but by 2012 had been idled because of the high cost of biomass fuel. In 2013, the Aspen plant went into foreclosure and changed owners in 2014.¹⁷² The plant was later sold at public auction in 2014 for \$5 million to a private investor.¹⁷³ The plant never entered into a power purchase agreement, which contributed to its fate.¹⁷⁴



20. Texas: Rio Grande Valley Sugar Growers, Santa Rosa

Owner: Rio Grande Valley Sugar Growers, Inc. (Santa Rosa, Texas)

Construction Cost: \$23.5 million

Subsidies and Loans: \$10.2 million 1603 Grant

\$300,000 USDA Grant¹⁷⁵

Capacity: 23.5 MW

Fuel Type: Sugarcane Bagasse

Status: Operating

Rio Grande Valley Sugar Growers is a CHP gasification biomass plant that burns agricultural biomass for electricity and steam at its cooperative sugarcane mill. Rio Grande Valley Sugar sells its extra electricity to the regional grid.

Key Points:

- The 2009 1603 grant to Rio Grande Valley Sugar Growers (RGVSG) appears to be for capital costs of a project completed in 2005, the installation of a boiler to burn bagasse, the material left over after sugar cane is processed. RGVSG's CEO said, "These funds are a true lifeline for the co-op... The grant will shore up our company, allow us to reduce debt and will help mitigate substantial economic losses the co-op has endured as a result of recent natural disasters, low sugar prices and the larger global recession."¹⁷⁶ The company had five other boilers in addition to the newer one for which funds were received.

Environmental Violations

- The new boiler proved to be much more polluting than anticipated; for instance, the company's permit estimated emissions of 0.01 lb SO₂ per hour, but stack testing revealed emissions were actually 11 lb/hr. The new unit could not control particulate matter with its existing technology and had to retroactively install an electrostatic precipitator.¹⁷⁷
- The company repeatedly violated provisions limiting fuel input to the boilers, resulting in a 2012 consent order and fines from the Texas Department of Environmental Quality (TDEQ).¹⁷⁸ The company responded that it was impossible for it to comply with limits that had been present in the air permit which it helped write, and insisted that TDEQ revise the permit. Documents available from the TDEQ reveal neither the company, nor the air permitting engineers, nor the suppliers of the pollution control equipment were confident of how to control emissions at the plant.
- EPA notes "compliance issues" with waste disposal issues, and a violation of Clean Water Act provisions in 2016.¹⁷⁹



21. Virginia: Halifax County Biomass, South Boston

Owner: NOVI Energy (Novi, Michigan)

Construction Cost: \$180 million

Subsidies and Loans: \$44 million 1603 Grant

\$90 million USDA Rural Development Loan¹⁸⁰

\$3.1 million Virginia Tobacco Region Revitalization Commission State Grant¹⁸¹

\$650,000 Community Development State Grant¹⁸²

\$100,000 Halifax Chamber of Commerce Grant¹⁸³

Capacity: 49.9 MW

Fuel Type: Woody Biomass, Waste Wood Solids, Forest Biomass

Status: Operating

Previously known as the South Boston Energy Project, the Halifax County Biomass plant burns woody biomass material and sells electricity to the Northern Virginia Electric Cooperative (NOVEC).

Key Points:

- In 2015 the Virginia Department of Environmental Quality (DEQ) fined the Halifax County Biomass plant \$14,671 for not submitting quarterly emissions reports, not performing stack test analysis of the wood fuel and ash burned, and not submitting fuel and ash sampling results in quarterly reports.¹⁸⁴
- The facility appears to have failed stack tests for nitrogen oxides and carbon monoxide in 2014, and had high priority violations of the Clean Air Act through 2016. Total fines were \$120, 271.

Forest Impacts:

- Northern Virginia Electric Cooperative (NOVEC) explained that it chose Halifax County to build its biomass plant because “It’s in the ‘wood basket’ of Virginia. We realized that its thousands of forested acres could supply us with enough waste wood leftover from logging operations to fuel our plant for decades.”¹⁸⁵

- Repeating bioenergy talking points on why burning waste wood is more climate friendly than letting it decompose, a company brochure asserts that decomposing waste wood left on the ground emits methane.¹⁸⁶ In reality, wood waste is slow to decay and methane is not produced in upland areas where well-aerated logging residues are decomposing.¹⁸⁷



22. Virginia: WestRock Covington Biomass Plant, Covington

Owner: WestRock (Norcross, Georgia)

Construction Cost: \$285 million

Subsidies and Loans: \$38.8 million 1603 Grant

\$1 million Virginia Investment Partnership Grant¹⁸⁸

Capacity: 75 MW

Fuel Type: Waste Wood Solids, Forest Biomass, Paper Mill Residues, Black Liquor

Status: Operating

WestRock Covington's new biomass unit burns woody biomass material and black liquor to provide electricity for Dominion Power and steam energy for its WestRock paper mill operations in Covington, Virginia.

Key Points:

- In April 2015 WestRock sued the US government for \$47 million, claiming that their nearly \$40 million 1603 grant covered only half of the 30 percent of construction costs that the government was supposed to pay.¹⁸⁹ The courts later ruled in favor of the federal government, announcing that "only electricity production, but not steam production, was a qualifying activity under Section 1603."¹⁹⁰

- In 2015 during a routine stack test, the particulate matter (PM) was found to be three times higher than WestRock’s permit allows. When testers arrived, alarms were sounding on several bag-break detectors in the baghouse. It was later discovered that several of the bags had developed holes. The plant was fined \$28,788 for these violations.¹⁹¹
- EPA data show the facility appears to have failed stack tests in 2016 and 2017 for acetaldehyde, carbon monoxide, formaldehyde, methanol, nitrogen oxides, and volatile organic compounds. It is not clear whether the violations were connected to the biomass plant or to other functions of the mill. The company was fined \$43,398.¹⁹²
- WestRock Covington’s paper mill facility is the second largest air polluter in the surrounding zip code area, “releasing over 2.5 million pounds of pollution in 2016.”¹⁹³ The Center for Public Integrity revealed that WestRock paper mill is a top “super polluter, churning out nearly 3 million pounds of toxic release air emissions in 2014, according to the EPA, and over 1 million metric tons of direct greenhouse gas emissions.”¹⁹⁴ In 2014, the Sierra Club released a related report, “The 2,927,781 pounds of toxic pollutants released into Covington’s air made zip code 24426, where the MeadWestvaco (WestRock Covington) plant is located, the No. 1 most toxic zip code for air pollution in the State of Virginia.”¹⁹⁵

Forest Impacts:

- WestRock Covington Biomass is fueled in part by harvesting in the George Washington and Jefferson National Forest. A USDA writeup recounts, “Stakeholders representing the WestRock mill in nearby Covington, Virginia, suggested that some of the timber sales planned for the large-scale, multi-resource project include additional biomass removals to help fuel a state-of-the-art biomass boiler installed at the mill.”¹⁹⁶
- In a recent timber sale, the US Forest Service extracted “small-diameter” trees for WestRock Covington’s biomass fuel in George Washington and Jefferson National Forests as part of an “Ecosystem Restoration Research” project.¹⁹⁷



23. Washington: Nippon Port Angeles

Owner: McKinley Paper Company (U.S. subsidiary), Bio Pappel (Mexico City, Mexico)

Construction Cost: \$85 million

Subsidies and Loans: \$19.4 million 1603 Grant

Capacity: 20 MW

Fuel Type: Coal, Woody Biomass, Black Liquor

Status: Idled

The Port Angeles plant burns coal, wood, and black liquor for grid electricity and steam energy at the Nippon (now McKinley) Paper mill in Port Angeles, Washington. The plant is currently idled.

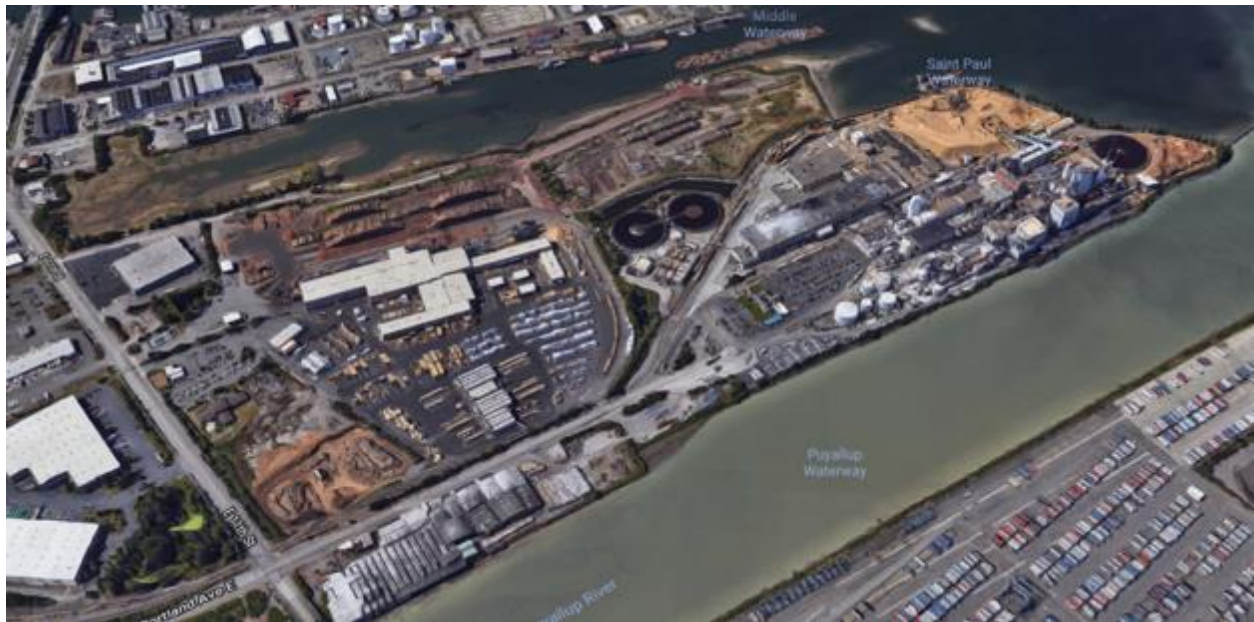
Key Points:

- Nippon Paper Industries USA, the original owner of the mill, announced that the biomass cogeneration plant “would use local forest residues that would otherwise be left in the woods or burned in slash piles.”¹⁹⁸
- The biomass plant was plagued with repeated operation delays, major equipment failure, legal issues and cost overruns that inflated the original construction price by \$14 million.¹⁹⁹
- The Nippon biomass plant came online November 2013; four months later it was temporarily shut down because of problems with the fuel system. According to a union official at the plant, the biomass material was not adequately feeding the new boiler and the boiler’s ash processing system was plugged up, requiring a “major reconfigure.”²⁰⁰
- In March 2017, the Nippon biomass plant caught fire. “A slipped belt which caused friction resulted in a fire that burned through a conveyor belt Thursday at the nearly dormant plant.”²⁰¹
- EPA data show multiple Clean Air Act and Clean Water Act violations and associated fines for the facility, though it is not clear whether these are related to the biomass energy component or other components of the facility.²⁰²

- The Nippon mill was sold in 2016 to Bio Pappel subsidiary, McKinley Paper Co, and then idled. Current plans are to re-open the mill in September 2019, including an upgrade to the cogeneration system to “efficiently produce green energy.”²⁰³

Legal Issues:

- Nippon Paper Industries and a Louisiana contractor clashed over multi-million dollar lawsuits that stemmed from a cracked boiler in the new biomass plant. The contractor contended, “Nippon repeatedly hosed down the empty, hot mud drum with cold water, causing stress fractures in it due to thermal shock.”²⁰⁴ Both parties later agreed to privately settle out of court.



24. Washington: WestRock Tacoma Biomass Plant, Tacoma

Owner: WestRock (Norcross, Georgia)

Construction Cost: \$90 million

Subsidies and Loans: \$18 million 1603 Grant

Capacity: 55 MW

Fuel Type: Fossil Fuels, Woody Biomass, Wood Residues, Black Liquor

Status: Operating

The WestRock Tacoma plant (previously Simpson Tacoma Kraft Company) burns black liquor and woody biomass, including construction waste, for combined heat and power (CHP) at its paper mill operations in Tacoma, Washington. The Tacoma Biomass plant has a 12-year power purchase agreement with Iberdrola Renewables, which supplies the Sacramento, California market.

Key Points:

- The facility is an unusually large polluter. Emissions data from EPA show burning wood and black liquor for energy at the facility emitted 674 tons of NOx in 2016, and 1,921 tons of SO₂.²⁰⁵

- The original air permit for the biomass plant did not include a requirement to install controls for nitrogen oxides (NOx), a significant component of air pollution leading to smog. The plant's operating emissions were 50% higher than the original estimate (0.3 lb/mmbtu rather than 0.2 lb/mmbtu), so the Washington Department of Ecology re-wrote the permit, increasing allowable NOx from 522 tons to 782 tons per year. By comparison, plants installing controls can achieve 0.07 – 0.08 lb/mmbtu, about a quarter of the emissions allowed at the Tacoma plant.²⁰⁶
- EPA data show multiple Clean Air Act and Clean Water Act violations, but it is not clear whether these are connected to the biomass burner or other parts of the mill.²⁰⁷

Legal Issues:

- Courts awarded the original owner (Simpson Tacoma Kraft) \$1.6 million in its dispute with WestRock over property taxes owed from the sale of the mill. "The court granted Seattle-based Simpson \$1.6 million, plus \$135,744 in prejudgment interest accrued."²⁰⁸



25. Wisconsin: WE Energies Rothschild Cogeneration Plant, Rothschild

Owner: We Energies (Milwaukee, Wisconsin)

Construction Cost: \$269 million

Subsidies and Loans: \$76.2 million 1603 grant²⁰⁹

Capacity: 50 MW

Fuel Type: Waste Wood Solids, Forest Biomass, Paper Mill Residues

Status: Operating

Rothschild Cogeneration burns woody biomass material to generate electricity for We Energies customers and steam energy for Domtar paper mill operations in Rothschild, Wisconsin.

Key Points:

- The Rothschild biomass plant came online in 2013, and in that time the plant only operated at 15 percent capacity. Between December 2014 and April 2015 the plant sent almost no electricity to the grid.²¹⁰
- By 2016, low natural gas prices made it uneconomic to run the plant, and We Energies announced its intent to burn natural gas at the plant for up to three months in the summer.²¹¹ EIA data indicate the plant operated at about 25% of capacity in 2016 and 2017.²¹²
- In 2014, the facility had a fire that started in the dust collector.²¹³ In 2016, the plant's conveyor system caught fire.²¹⁴
- EPA data show Clean Air Act violations for nitrogen oxides and particulate matter in 2017 and 2018.²¹⁵
- The Citizens' Utility Board, a public watchdog group, protested, "Electric ratepayers paid the bulk of the cost to build the thing and pay the bulk of the fuel costs, and it's just being run right now for the steam customer."²¹⁶ A local Sheboygan news station called out Rothschild's energy grid underperformance, while the steam supplied to Domtar's mill never slowed. "Domtar says it's happy with how the project has worked out for them, despite the plant's lack of usage."²¹⁷
- Advocates charged that bioenergy cost Wisconsin ratepayers 17 cents a kilowatt-hour, compared with less than 6 cents for wind power.²¹⁸

Endnotes

- ¹ U.S. Energy Information Administration. 2005 and 2017 Form EIA-860 data, Schedule 3, “Generator Data” (Operable Units Only). U.S. Department of Energy, Washington DC.
- ² U.S. Energy Information Administration (2001 - 2016). EIA-923 Monthly Generation and Fuel Consumption Time Series Files, 2001 - 2016. Sources: EIA-923 and EIA-860 Reports. U.S. Department of Energy, Washington DC.
- ³ Patel, Sonal. (2018, Oct 1). U.S. Biomass Power, Dampened by Market Forces, Fights to Stay Ablaze. Power Magazine. At <https://www.powermag.com/u-s-biomass-power-dampened-by-market-forces-fights-to-stay-ablaze/>
- ⁴ U.S. Department of the Treasury. 1603 Program: Payments for Specified Energy Property in Lieu of Tax Credits. List of awards. At <https://home.treasury.gov/policy-issues/financial-markets-financial-institutions-and-fiscal-service/1603-program-payments-for>
- ⁵ U.S. Department of the Treasury. 1603 Program: Payments for Specified Energy Property in Lieu of Tax Credits. Final program overview. <https://www.treasury.gov/initiatives/recovery/Documents/P%20Status%20overview%202018-03-01.pdf>
- ⁶ Bitov, K. and M. S. Booth (2014). Climate of Deception: Why electricity consumers who care about global warming and air pollution need FTC protection from biomass industry greenwashing. Pelham, MA, Partnership for Policy Integrity. At <http://www.pfpi.net/wp-content/uploads/2014/07/PFPI-report-to-FTC-on-biomass-power-greenwashing.pdf>
- Booth, M. S. (2014). Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal. Pelham, Massachusetts, Partnership for Policy Integrity. <http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>
- Booth, M. S. and K. Bitov (2013). Analysis of risks and corporate disclosures regarding environmental and climate considerations in the biomass power sector. Pelham, MA, Partnership for Policy Integrity. <http://www.pfpi.net/wp-content/uploads/2013/11/PFPI-report-to-SEC-on-bioenergy-Nov-20-2013.pdf>
- Partnership for Policy Integrity and Dogwood Alliance. 2016. Carbon emissions and climate change disclosure by the wood pellet industry - a report to the SEC on Enviva Partners LLC. Pelham, MA, Partnership for Policy Integrity. <http://www.pfpi.net/wp-content/uploads/2016/03/Report-to-SEC-on-Enviva-March-14-2016.pdf>
- ⁷ Booth, M.S. (2018, Oct. 7) The IPCC's Recipe for a Livable Planet: Grow Trees, Don't Burn Them. Partnership for Policy Integrity. At <http://www.pfpi.net/the-ipccs-recipe-for-a-livable-planet-grow-trees-dont-burn-them>
- ⁸ Booth, M. S. (2017). Maine Bioenergy at the Crossroads: Costs of a Failing Industry. Pelham, MA, Partnership for Policy Integrity. At <http://www.pfpi.net/wp-content/uploads/2017/04/PFPI-Maine-Biomass-Report-4-18-17.pdf>
- ⁹ Booth, M. S. (2016, June 23). Status of amendments that would force EPA to treat bioenergy as carbon neutral, and the urgent need for legislative opposition. At <http://www.pfpi.net/status-of-amendments-that-would-force-epa-to-treat-bioenergy-as-carbon-neutral-and-the-urgent-need-for-legislative-opposition>. The “Collins” amendment was ultimately enacted, though it was placed in a different bill than it initially had been.
- ¹⁰ Booth, M.S. (2016, Oct. 27). Biomass industry influence on Senate tree-burning bill shown in new video. BioMess101 website. At <http://biomess101.org/biomass-industry-influence-on-senate-tree-burning-bill-shown-in-new-video/>
- ¹¹ Booth, M. S. (2014). Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal. Pelham, Massachusetts, Partnership for Policy Integrity. <http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

-
- ¹² Booth, M. S. (2014). Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal. Pelham, Massachusetts, Partnership for Policy Integrity. <http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>
- ¹³ US EPA. eGRID2016 Unit, Generator, Plant, State, Balancing Authority Area, eGRID Subregion, NERC Region, U.S., and Grid Gross Loss (%) Data Files. February 15, 2018. At <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>
- ¹⁴ Booth, M. S. (2014). Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal. Pelham, Massachusetts, Partnership for Policy Integrity. <http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>
- ¹⁵ USASPENDING.gov (2012, Aug. 2). Grant Summary Award ID 12DG11020000066. *USASPENDING.gov*. At <https://www.usaspending.gov/#/award/41803530>
- ¹⁶ Clean Edge. USDA Announces Funding To Improve Electric Service In Rural Communities. At <https://cleanedge.com/resources/news/USDA-Announces-Funding-to-Improve-Electric-Service-in-Rural-Communities>
- ¹⁷ Eagle Valley Clean Energy (2017). Biomass – Unique Forest Health Tool. *Eagle Valley Clean Energy*. At <http://www.evergreencleanenergy.com/promoting-a-healthy-forest-by-working-closely-with-the-united-states-forest-service-and-the-sawmill-industry/>
- ¹⁸ Franz, D. (2013, Aug. 27). Sen. Udall Lauds Gypsum biomass plant. *Vail Daily*. At <https://www.vaildaily.com/news/eagle-valley/sen-udall-lauds-gypsum-biomass-plant/>
- ¹⁹ Wyrick, R. (2017, May 23). Millions of dollars on the line in Gypsum biomass plant district court case. *Vail Daily*. At <https://www.vaildaily.com/news/fraud-versus-defects-in-federal-court/>
- ²⁰ EPA ECHO (2018, March 21). Detailed Facility Report, EAGLE VALLEY CLEAN ENERGY. EPA Enforcement and Compliance History Online. At <https://echo.epa.gov/detailed-facility-report?fid=110054957409&redirect=echo>
- ²¹ Wyrick, R. (2014, Dec. 14). Fire shuts down Gypsum biomass plant. *Post Independent Citizen Telegram*. At <https://www.postindependent.com/news/local/fire-shuts-down-gypsum-biomass-plant/>
- ²² Wyrick, R. (2017, May 23). Millions of dollars on the line in Gypsum biomass plant district court case. *Vail Daily*. At <https://www.vaildaily.com/news/fraud-versus-defects-in-federal-court/>
- ²³ Wyrick, R. (2015, Nov. 16). Lawsuits, questions, accusations embroil biomass plant. *Vail Daily*. At <https://www.vaildaily.com/news/lawsuits-questions-accusations-embroil-biomass-plant/>
- ²⁴ Wyrick, R. (2015, Nov. 16). Lawsuits, questions, accusations embroil biomass plant. *Vail Daily*. At <https://www.vaildaily.com/news/lawsuits-questions-accusations-embroil-biomass-plant/>
- ²⁵ Wyrick, R. (2017, May 23). Millions of dollars on the line in Gypsum biomass plant district court case. *Vail Daily*. At <https://www.vaildaily.com/news/fraud-versus-defects-in-federal-court/>
- ²⁶ Wyrick, R. (2017, Aug. 20). Biomass plant owners may be garnished for failing to pay plant's builders. *Summit Daily*. At <https://www.summitdaily.com/news/local/biomass-plant-owners-may-be-garnished-for-failing-to-pay-plants-builders/>
- ²⁷ Blevins, J. (2016, Oct. 6). Gypsum using eminent domain to secure riverfront acreage used by biomass plant. *The Denver Post*. Retrieved by <https://www.denverpost.com/2016/10/06/gypsum-eminant-domain-riverfront-acreage-biomass-plant/>
- ²⁸ USDA (2014, July 23). USDA Selects 36 Energy Facilities to Accept Biomass Deliveries. *U.S. Department of Agriculture*. At <https://www.usda.gov/media/press-releases/2014/07/23/usda-selects-36-energy-facilities-accept-biomass-deliveries>
- ²⁹ Taylor, P. (2013, Dec. 17). Project Aims to turn beetle-ravaged trees into electricity. *E&E Greenwire*. At <https://www.eenews.net/stories/1059991961>

-
- ³⁰ U.S. Forest Service (2016, Sept. 28). 2015 CFLRP Annual Report - Colorado Front Range Project/CFLR004. *U.S. Forest Service*. At <https://www.fs.fed.us/restoration/documents/cflrp/2015AnnualReports/ColoradoFrontRange.pdf>
- ³¹ OpenEI (2011, May 24). CCEF – Project 150 Initiative (Connecticut) *National Renewable Energy Laboratory*. At [https://openei.org/wiki/CCEF - Project 150 Initiative \(Connecticut\)](https://openei.org/wiki/CCEF_-_Project_150_Initiative_(Connecticut))
- ³² Penney, J. (2014, Jan. 6). After decade of uncertainty, Plainfield biomass plant fires up. *The Bulletin*. At <http://www.norwichbulletin.com/article/20140106/News/140109826>
- ³³ PFPI was cc'd on these emails from Concerned Citizens of Plainfield.
- ³⁴ Dowling, B. (2015, March 25). Plainfield Biomass Plant Changes Hands Again. *Hartford Courant*. At <http://www.courant.com/business/hc-plainfield-biomass-plant-greenleaf-power-20150325-story.html#>
- ³⁵ Stoller, G. (2017, March 30). Few Polluters Penalized For Toxic Wastewater Violations, EPA Data Show. *Connecticut Health I-Team*. At <http://c-hit.org/2017/03/30/few-polluters-penalized-for-toxic-wastewater-violations-epa-data-show/>
- ³⁶ Stoller, G. (2017, March 30). Few Polluters Penalized For Toxic Wastewater Violations, EPA Data Show. *Connecticut Health I-Team*. At <http://c-hit.org/2017/03/30/few-polluters-penalized-for-toxic-wastewater-violations-epa-data-show/>
- ³⁷ <https://echo.epa.gov/detailed-facility-report?fid=110040594602#environ>
- ³⁸ EPA (2018, April update). Superfund Sites in Reuse in Connecticut. *U.S. Environmental Protection Agency*. At <https://www.epa.gov/superfund-redevelopment-initiative/superfund-sites-reuse-connecticut>
- ³⁹ Curry, C. (2013, Sept. 21). Turkey Creek residents complain about biomass plant noise. *The Gainesville Sun*. At <http://www.gainesville.com/news/20130921/turkey-creek-residents-complain-about-biomass-plant-noise>
- ⁴⁰ Kurland, R. (2014, Jan. 24). Biomass Plant Still Fuels Complaints From Residents. *WUFT*. At <https://www.wuft.org/news/2014/01/24/biomass-plant-still-fuels-complaints-from-residents/>
- ⁴¹ Caplan, A. (2016, Oct. 3). GRU switches to biomass after breakdown. *The Gainesville Sun*. At <http://www.gainesville.com/news/20161003/gru-switches-to-biomass-after-breakdown>
- ⁴² Williamson, H. (2015, Sep. 16). Audit finds GRU customers are overcharged. *The Independent Florida Alligator*. At https://www.alligator.org/news/local/audit-finds-gru-customers-are-overcharged/article_c2b7467e-5c2d-11e5-8b33-67d708bdfac1.html
- ⁴³ Caplan, A. (2016, Oct. 13). GRU: Biomass on back burner, city bills won't rise. *The Gainesville Sun*. At <http://www.gainesville.com/news/20161013/gru-biomass-on-back-burner-city-bills-wont-rise>
- ⁴⁴ Bielarski, E. (2017, Nov. 9). Ed Bielarski: Biomass plant purchase begins new era for GRU. *The Gainesville Sun*. At <http://www.gainesville.com/opinion/20171109/ed-bielarski-biomass-plant-purchase-begins-new-era-for-gru>
- ⁴⁵ Gainesville Public Utilities. *GRU.com*. . The website states: "GRU took ownership of the Deerhaven Renewable Generating Station at 1 p.m. on Nov.7, 2017. Since acquiring the plant the utility has saved \$_____". At <https://gru.com/dhrsavings.aspx>
- ⁴⁶ Compelo (2017, Nov. 8). GREC sells Gainesville biomass plant to GRU for \$750M. *Compelo Energy*. At <https://www.compelo.com/energy/news/newsgrec-sells-gainesville-biomass-plant-to-gru-for-750m-091117-5968024/>
- ⁴⁷ Caplan, A. (2017, Nov. 7). City owns GREC after \$754M deal. *The Gainesville Sun*. At <http://www.gainesville.com/news/20171107/city-owns-grec-after-754m-deal>
- ⁴⁸ Caplan, A. (2018, Feb. 2). GFR responds to biomass plant fire. *The Gainesville Sun*. At <http://www.gainesville.com/news/20180202/gfr-responds-to-biomass-plant-fire>
- ⁴⁹ Lisher, Mark. (2013, Feb. 14). Austin Energy customers foot bill – \$2 a month per customer for 19 years – for idled biomass plant. *Texas Watchdog*. At <http://www.texaswatchdog.org/2013/02/austin-energy-customers-foot-bill-for-biomass-plant-east-texas/1360884396.story>

-
- ⁵⁰ Editorial, Austin Statesman. (206, Sept. 4). It's time to probe details of billion-dollar power plant contract. At <https://www.statesman.com/news/20160904/its-time-to-probe-details-of-billion-dollar-power-plant-contract>.
- ⁵¹ Swirko, C. (2016, June 23). Biomass plant ordered to pay \$4.6 million in damages. *The Gainesville Sun*. At <http://www.gainesville.com/news/20160623/biomass-plant-ordered-to-pay-46-million-in-damages>
- ⁵² Anderson, M. (2016, July, 30). GRU, biomass plant battle gets uglier. *The Gainesville Sun*. At <http://www.gainesville.com/news/20160730/gru-biomass-plant-battle-gets-uglier>
- ⁵³ Curry, C. (2013, Dec. 13). Where is wood for biomass plant coming from? *The Gainesville Sun*. At <http://www.gainesville.com/news/20131215/where-is-wood-for-biomass-plant-coming-from>
- ⁵⁴ Business Wire (2014, Oct. 28). Gainesville Biomass Plant Earns Prestigious Forest Stewardship Council (FSC) Chain of Custody Certification. *BusinessWire.com*. At <https://www.businesswire.com/news/home/20141028006488/en/Gainesville-Biomass-Plant-Earns-Prestigious-Forest-Stewardship>
- ⁵⁵ Greenpeace International (2018, March 26). Greenpeace International to not renew FSC membership. *Greenpeace.org*. At <https://www.greenpeace.org/international/press-release/15589/greenpeace-international-to-not-renew-fsc-membership/>
- ⁵⁶ Gardner, T. (2011, Jan. 21). U.S. gives \$650 million loan aid for biofuels from waste. *Reuters*. At <https://www.reuters.com/article/us-biofuels-loans/u-s-gives-650-million-loan-aid-for-biofuels-from-waste-idUSTRE70K3AH20110121>
- ⁵⁷ Dixon, M. (2014, Oct. 3). For Charlie Crist, biofuels are an unfulfilled promise for now. *Naples Daily News*. At <http://archive.naplesnews.com/news/politics/for-charlie-crist-biofuels-are-an-unfulfilled-promise--for-now-ep-669148673-336341921.html>
- ⁵⁸ Gardner, T. (2011, Jan. 21). U.S. gives \$650 million loan aid for biofuels from waste. *Reuters*. At <https://www.reuters.com/article/us-biofuels-loans/u-s-gives-650-million-loan-aid-for-biofuels-from-waste-idUSTRE70K3AH20110121>
- ⁵⁹ Ethanol Producer Magazine. (2012, Nov. 1). INEOS Bio facility begins production of renewable power. At <http://ethanolproducer.com/articles/9255/ineos-bio-facility-begins-production-of-renewable-power>
- ⁶⁰ INEOS (2013, July 31). First facility in the world using new advanced bioenergy technology to convert waste to renewable fuel and electricity. *INEOS Holdings*. At <https://www.ineos.com/news/ineos-group/ineos-bio-produces-cellulosic-ethanol-at-commercial-scale/>
- ⁶¹ Voegele, E. (2016, Sept. 7). Ineos Bio to sell ethanol business, including Vero Beach plant. *Biomass Magazine*. At <http://biomassmagazine.com/articles/13662/ineos-bio-to-sell-ethanol-business-including-vero-beach-plant>
- ⁶² Baita, S. (2015, Jan. 15). INEOS Bio plant shut; produced excess deadly gas. *Vero Beach 32963*. At http://vb32963online.com/STORIES%202015/JANUARY%202015/VB32963_INEOS_Bio_Plant_Shut_Issue3_011515.html
- ⁶³ <https://echo.epa.gov/detailed-facility-report?fid=110001737229>
- ⁶⁴ Ivce, P. (2016, Sept. 2). INEOS Bio selling Indian River County biofuel plant. *TCPalm*. At <https://www.tcpalm.com/story/money/business/2016/09/02/ineos-bio-selling-indian-river-county-biofuel-plant/89823970/>
- ⁶⁵ Duncan, H. (2011, Sept. 15). Paper mill proposal would cut Macon air pollution. *The Telegraph*. At <https://www.macon.com/news/article28618174.html>
- ⁶⁶ US EPA. eGRID2016 Unit, Generator, Plant, State, Balancing Authority Area, eGRID Subregion, NERC Region, U.S., and Grid Gross Loss (%) Data Files. February 15, 2018. At <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>.
- ⁶⁷ Missing values for NOx emissions in the egrid database were estimated using boiler generation data times the emission factor for other similar boilers burning wood or black liquor.

-
- ⁶⁸ Wood Bioenergy (2017, Aug. 17). Biomass Leader: Twin Rivers Land & Timber. *Wood Bioenergy Magazine*. At <http://www.woodbioenergymagazine.com/magazine/2017/0817/article-twin-rivers.php>
- ⁶⁹ Twin Rivers Land and Timber (2018). TRLT A World Leader In Biomass Production. *Twin Rivers Land and Timber*. At <https://twinriverstimber.com/>
- ⁷⁰ Amec Foster Wheeler. "New recovery boiler and turbine generator." At <https://www.amecfw.com/aboutus/projects/new-recovery-boiler-and-turbine-generator>
- ⁷¹ Fulton, M. (2009, Oct. 9). PCA announces large renovation. *Valdosta Daily Times*. At http://www.valdostadailytimes.com/news/local_news/pca-announces-large-renovation/article_a4827e2d-d8ac-5f9a-8210-475656fa2a60.html
- ⁷² US EPA. eGRID2016 Unit, Generator, Plant, State, Balancing Authority Area, eGRID Subregion, NERC Region, U.S., and Grid Gross Loss (%) Data Files. February 15, 2018. At <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>.
- ⁷³ Year online data for PCA boilers 1005 and 1006 from EPA database, "Part1 Boiler MACT Code Lookup," with data from the 2008 Questionnaire for Boilers, Process Heaters, and other Combustion Units (ICR No. 2286.01). At <https://www.reginfo.gov/public/do/DownloadDocument?objectID=22887001>
- ⁷⁴ Missing values for NOx emissions in the egrid database were estimated using boiler generation data times the emission factor for other similar boilers burning wood or black liquor.
- ⁷⁵ U.S. Securities and Exchange Commission, 2012. Packaging Corporation of America. Form 10-K Annual Report for the fiscal year ended December 31, 2011.
- ⁷⁶ Atlantic Power Corp. (2018). Atlantic Power Corporation Announces Closing of Construction Financing for First Biomass Project. *Atlantic Power Corporation*. At <https://investors.atlanticpower.com/2010-10-21-Atlantic-Power-Corporation-Announces-Closing-of-Construction-Financing-for-First-Biomass-Project>
- ⁷⁷ EPA (2015, Aug. 31). Sixty Day Notice of Intent to File Clean Air Act Citizen Suit Based On Failure of EPA Administrator to Take Timely Final Action Regarding Petition to Object to Georgia Permit No. 4911-171-0014-V-02-0 (Title V). *U.S. Environmental Protection Agency*. At https://www.epa.gov/sites/production/files/2016-03/documents/ppi_noi_08252015.pdf
- ⁷⁸ PFPI (2015, May 27). PFPI petitions EPA to overturn permit for Piedmont Green Power, a 60.5 MW biomass plant in Georgia. Partnership for Policy Integrity. At <http://www.pfpi.net/pfpi-petitions-epa-to-overturn-permit-for-piedmont-green-power-a-60-5-mw-biomass-plant-in-georgia>
- ⁷⁹ PFPI (2016, Dec. 16). EPA Holds Piedmont Green Power Accountable for Air Pollution. Partnership for Policy Integrity. At <http://www.pfpi.net/epa-holds-piedmont-green-power-accountable-for-air-pollution>
- ⁸⁰ <https://echo.epa.gov/detailed-facility-report?fid=110037592469#history>
- ⁸¹ Geiger, Walter. (2013, May 16). Neighbors sick of noise from PGP plant. At <http://www.barnesville.com/archives/6080-Neighbors-sick-of-noise-from-PGP-plant.html>
- ⁸² Pratt brochure at <http://www.prattindustries.com/downloads/Pratt-Industries-Brochure.pdf>
- ⁸³ O'Regan, M. (2015, Sept. 24). Pratt Opens Newest Recycling Facility in Conyers. *Pratt Industries*. At <http://innovations.prattindustries.com/2015/09/24/pratt-opens-newest-recycling-facility-in-conyers/>
- ⁸⁴ Georgia Department of Natural Resources, Environmental Protection Division, Air Protection Branch. Prevention of Significant Air Quality Deterioration Review Of Pratt Industries (U.S.A.), Inc. – Visy Paper, Inc. Preliminary Determination SIP Permit Application No. 16655
October 2006. At https://epd.georgia.gov/air/sites/epd.georgia.gov/air/files/related_files/document/2470037fd.pdf
- ⁸⁵ Nevelyn, J. (2016, May 2). Section 1603 - Payments for Specified Renewable Energy Property in Lieu of Tax Credits. *U.S. Department of Treasury*. At <https://www.treasury.gov/initiatives/recovery/Documents/Section%201603%20Awards.xlsx>
- ⁸⁶ MaineBiz (2010, Jan. 7). State awards \$9M in energy grants. MaineBiz. At [http://www.mainebiz.biz/article/20100107/NEWS01/301079997/state-awards-\\$9m-in-energy-grants](http://www.mainebiz.biz/article/20100107/NEWS01/301079997/state-awards-$9m-in-energy-grants)

-
- ⁸⁷ Booth, M. S. (2014). Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal. Pelham, Massachusetts, Partnership for Policy Integrity. <http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>
- ⁸⁸ MaineBiz (2010, Jan. 7). State awards \$9M in energy grants. MaineBiz. At [http://www.mainebiz.biz/article/20100107/NEWS01/301079997/state-awards-\\$9m-in-energy-grants](http://www.mainebiz.biz/article/20100107/NEWS01/301079997/state-awards-$9m-in-energy-grants)
- ⁸⁹ MaineBiz (2014, Jan. 27). Verso acquiring Bucksport power plant. *MaineBiz.com*. At <http://www.mainebiz.biz/article/20140127/NEWS0101/140129960/verso-acquiring-bucksport-power-plant>
- ⁹⁰ Verso Paper Corp. (2014, Oct. 1). Verso Announces Closure of Bucksport, Maine Paper Mill. *Market Wired*. At <http://www.marketwired.com/press-release/verso-announces-closure-of-bucksport-maine-paper-mill-nyse-vrs-1952769.htm>
- ⁹¹ Maine Green Power (2018). Renewable Energy: Sponsored by MPUC. *Maine Public Utilities Commission*. At <https://megreenpower.com/>
- ⁹² EIA.gov (2018, June 21). MAINE State Profile and Energy Updates. *U.S. Energy Information Administration*. At <https://www.eia.gov/state/?sid=ME#tabs-1>
- ⁹³ Booth, M. (2017, April 18). Maine Bioenergy at the Crossroads Costs of a Failing Industry. *Partnership for Policy Integrity*. At <http://www.pfpi.net/wp-content/uploads/2017/04/PFPI-Maine-Biomass-Report-4-18-17.pdf>
- ⁹⁴ PFPI requested the L'Anse Warden application to the 1603 grant program with a Freedom of Information Request to the U.S. Treasury.
- ⁹⁵ PFPI (2015, Sept. 9). Groups Say U.P. Biomass Power Plant Blankets Community in Toxic Soot. At <http://www.pfpi.net/groups-say-u-p-biomass-power-plant-blankets-community-in-toxic-soot>
- ⁹⁶ <https://burnedthemovie.com/>
- ⁹⁷ EPA (2016, April 1). EPA in Michigan L'Anse Warden Power Plant. *U.S. Environmental Protection Agency*. At <https://www.epa.gov/mi/lanse-warden-power-plant>
- ⁹⁸ Michigan DEQ (2016, April 15). L'Anse Warden PCP Fuel Removal Permit Application – April 15, 2016. *U.S. Environmental Protection Agency*. At <https://www.epa.gov/sites/production/files/2016-04/documents/lanse-warden-penta-removal-application-20160415.pdf>
- ⁹⁹ <https://echo.epa.gov/detailed-facility-report?fid=110058240327>
- ¹⁰⁰ Content, T. (2016, Nov. 8). Green Bay company buys U.P. biomass power plant. *Journal Sentinel*. At <https://www.jsonline.com/story/money/business/energy/2016/11/08/green-bay-company-buys-up-biomass-power-plant/93490726/>
- ¹⁰¹ Simet, A. (2016, Nov. 15). Convergen Energy purchases Michigan biomass plant. *Biomass Magazine*. At <http://biomassmagazine.com/articles/13923/convergen-energy-purchases-michigan-biomass-plant>
- ¹⁰² Convergen Energy (2018). Convergen Energy, Our Fuels, Renewable & Sustainable Fuel. *Convergen Energy*. At <https://www.convergenenergy.com/our-fuels/>
- ¹⁰³ Content, T. (2011, March 11). Economic forces drive transition from fossil fuels. *Journal Sentinel*. At <http://archive.jsonline.com/business/117779793.html>
- ¹⁰⁴ Michigan DEQ (2017, July 26). Questions and Common Concerns L'Anse Warden Electric Company (LWEC) Proposed Permit to Install 53-17 and Renewable Operating Permit (ROP) Renewal. *Department of Environment Quality Michigan.gov*. At https://www.michigan.gov/documents/deq/deq-aqd-aac-public_hearings_sample_faq_606035_7.pdf
- ¹⁰⁵ LISC NEF Inc. (2011, June 11). Verso Paper Quinnesec Mill Equipment and Facility Upgrades. *LISC NEF Inc. New Markets Tax Credit Program*. At <http://nmtccoalition.org/wp-content/uploads/2017/10/LISC-57-Verso-Paper.pdf>
- ¹⁰⁶ LISC NEF Inc. (2011, June 11). Verso Paper Quinnesec Mill Equipment and Facility Upgrades. *LISC NEF Inc. New Markets Tax Credit Program*. At <http://nmtccoalition.org/wp-content/uploads/2017/10/LISC-57-Verso-Paper.pdf>

-
- ¹⁰⁷ LISC NEF Inc. (2011, June 11). Verso Paper Quinnesec Mill Equipment and Facility Upgrades. *LISC NEF Inc. New Markets Tax Credit Program*. At <http://nmtcoalition.org/wp-content/uploads/2017/10/LISC-57-Verso-Paper.pdf>
- ¹⁰⁸ US EPA. eGRID2016 Unit, Generator, Plant, State, Balancing Authority Area, eGRID Subregion, NERC Region, U.S., and Grid Gross Loss (%) Data Files. February 15, 2018. At <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>
- ¹⁰⁹ PENCERJ3 (2013, Sept. 19). C3 Verso Quinnesec Snapshot. *Michigan.gov*. At https://www.michigan.gov/documents/deq/Verso_Paper_Quinnesec_Snapshot_434341_7.pdf
- ¹¹⁰ US EPA. eGRID2016 Unit, Generator, Plant, State, Balancing Authority Area, eGRID Subregion, NERC Region, U.S., and Grid Gross Loss (%) Data Files. February 15, 2018. At <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>.
- ¹¹¹ Seggos, B. (2018, March 12). New York State petition for a finding pursuant to Clean Air Act Section 126(b). *New York Department of Environmental Conservation*. At <https://www.politico.com/states/f/?id=00000162-2043-df2f-a7e2-b74341450001>
- ¹¹² The Daily News (2016, Jan. 26). Verso files for bankruptcy. *The Daily News*. At <http://www.ironmountaindailynews.com/news/local-news/2016/01/verso-files-for-bankruptcy/>
- ¹¹³ Energy Information Administration. EIA-923 Monthly Generation and Fuel Consumption Time Series File, 2017 Data Early Release.
- ¹¹⁴ Potter, E. (2016, June). Aiming for Zero. *MIZZOU magazine*. At <https://mizzomag.missouri.edu/2016/05/aiming-for-zero/>
- ¹¹⁵ Yeung, K. (2011, Oct. 28). New MU boiler leads Missouri forest protection. *The Maneater*. At <https://www.themaneater.com/stories/campus/new-mu-boiler-leads-missouri-forest-protection>
- ¹¹⁶ University of Missouri (2017, May). Woody Biomass for Energy in Missouri. *University of Missouri, MU Extension*. At <https://extension2.missouri.edu/g5153>
- ¹¹⁷ <https://echo.epa.gov/detailed-facility-report?fid=110017986447>
- ¹¹⁸ Novogradac & Company (2013). 2013 Renewable Energy Power Award Financial Innovation Winner Burgess BioPower LLC. *Novoco.com*. At <https://www.novoco.com/2013-renewable-energy-power-award-financial-innovation>
- ¹¹⁹ Moore, T. New Hampshire Dept. of Environmental Services (2010, July 26). State Agency Final Decision, NHDES Air Resources Division – Air Permit Laidlaw Berlin BioPower, LLC SEC Docket No. 2009-02. *Des.nh.gov*. At http://pfpi.net/wp-content/uploads/2011/06/100726air_permit.pdf
- ¹²⁰ <https://echo.epa.gov/detailed-facility-report?fid=110057111995>
- ¹²¹ Jensen, C. (2014, Aug. 21). Berlin Biomass Plant Fully Operational, But At What Cost To Ratepayers? *New Hampshire Public Radio*. At <http://nhpr.org/post/berlin-biomass-plant-fully-operational-what-cost-ratepayers#stream/0>
- ¹²² Jensen, C. (2017, May 18). Biomass deal hits ratepayers; Eversource customers may foot extra \$100m bill for Berlin plant. *NH Business Review*. At <https://www.nhbr.com/May-26-2017/Biomass-deal-hits-ratepayers/>
- ¹²³ NH SB 577. At <https://legiscan.com/NH/bill/SB577/2018>
- ¹²⁴ West, N. (2018, April 12) Berlin Mayor Makes Case for Burgess BioPower Subsidies. *BusinessNH Magazine*. At <https://www.businessnhmagazine.com/article/berlin-mayor-makes-case-for-burgess-biopower-subsidies>
- ¹²⁵ Junkins, C. (2018, June 27). Eversource rates going up 19 percent. *The Telegraph*. At <http://www.nashuatelegraph.com/news/local-news/2018/06/27/eversource-rates-going-up-19-percent/>
- ¹²⁶ Sununu, C. (2018, June 19) Governor’s Veto Message Regarding Senate Bill 365 and Senate Bill 446. At <https://www.governor.nh.gov/news-media/press-2018/documents/20180619-veto.pdf>
- ¹²⁷ Camerato, T. (2018, Sept. 13) N.H. Legislature Overrides Sununu on Biomass Bill., *alley News*. At <https://www.vnews.com/House-Overrides-Sununu-on-Biomass-Bill-20148602>

-
- ¹²⁸ Rayno, G. (2018, Sept. 20). Consumer Advocate Asks PUC To Settle Questions Raised by Berlin Biomass Subsidy. InDepthNH.org. At <http://indepthnh.org/2018/09/20/consumer-advocate-how-much-over-market-costs-must-eversource-customers-pay-under-sb-577/>
- ¹²⁹ Jensen, C. (2016, Apr 4). Feds Fine Original Developer Of Berlin Biomass Plant \$3 Million. *New Hampshire Public Radio*. At <http://nhpr.org/post/feds-fine-original-developer-berlin-biomass-plant-3-million#stream/0>
- ¹³⁰ Fishell, D. (2017, June 19). Cate Street link is part of what's known about latest redeveloper of shuttered Maine mill. *Bangor Daily News*. At <http://bangordailynews.com/2017/06/19/business/the-cate-street-link-and-more-of-whats-known-about-latest-redeveloper-of-shuttered-maine-mill/>
- ¹³¹ Richardson, W. (2015, April 19). Payday at the mill. *Portland Press Herald*. At <https://www.pressherald.com/2015/04/19/payday-at-the-mill/>
- ¹³² BlueRock Energy (2015, Jan. 13). BlueRock Energy, ReEnergy enter services agreement. *Biomass Magazine*. At <http://biomassmagazine.com/articles/11425/bluerock-energy-reenergy-enter-services-agreement>
- ¹³³ PPA between Fort Drum and Niagara Mohawk Power Corporation at <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B59281DF1-2460-46DA-ABDC-787A136F71D3%7D>
- ¹³⁴ DOE (2017, May 8). Biomass Powering a Military Base in Upstate New York. *U.S. Department of Energy*. At <https://www.energy.gov/eere/bioenergy/articles/biomass-powering-military-base-upstate-new-york>
- ¹³⁵ Booker, T. (2014, Jan. 31). Firewood sellers blame Fort Drum biomass plant for lumber shortage. *Watertown Daily Times*. At <http://www.watertowndailytimes.com/article/20140131/NEWS03/701319888>
- ¹³⁶ New York State Department of Environmental Conservation. Air Title V Facility permit for ReEnergy Black River, LLC. Permit ID: 6-2240-00009/00007. Effective date 5/20/2013.
- ¹³⁷ Fuels report for Fort Drum plant from Peter Lister, Facility Manager, to Matthew Polge, NYS Dept of Environmental Conservation, July 13, 2016.
- ¹³⁸ <https://echo.epa.gov/detailed-facility-report?fid=110008035704>
- ¹³⁹ The Observer Review & Express (2008, Dec. 9). US Salt looks to wood chips. *Observer-Review.com*. At <http://www.observer-review.com/us-salt-looks-to-wood-chips-cms-153>
- ¹⁴⁰ New York State Energy Research and Development Authority (2018, Current Database) Wood Fuel in a Fluidized Bed Boiler (ST10822-1). *NYSERDA*. At <https://www.nyserdera.ny.gov/Researchers-and-Policymakers/Research-Project/Research-Projects/Research-Project-Search-Results/Project-Information?p=3444&%3Chtml%3E%3Cbody%3Esr=custom&cn=20441&city=&zip=&ps=Both%3C/body%3E%3C/html%3E>
- ¹⁴¹ <https://echo.epa.gov/detailed-facility-report?fid=110043970913>
- ¹⁴² Wihtol, C. (2016, June 18). Seneca wins suit over tax subsidy. *The Register-Guard*. At <http://www.registerguard.com/rg/news/local/34482435-75/seneca-wood-burning-power-plant-wins-additional-1-million-taxpayer-subsidy.html.csp>
- ¹⁴³ Wihtol, C. (2016, May 5). EWEB unveils most of its pact with Seneca biomass energy firm. *The Register-Guard*. At <http://www.registerguard.com/rg/news/local/34256741-75/story.csp>
- ¹⁴⁴ Dietz, D. (2013, July 17). Seneca power plant requests increase in pollution cap. *The Register-Guard*. At <http://projects.registerguard.com/rg/news/local/30136672-75/seneca-pollution-plant-company-source.html.csp>
- ¹⁴⁵ <https://echo.epa.gov/detailed-facility-report?fid=110040998114>
- ¹⁴⁶ Dietz, D. (2013, July 17). Seneca power plant requests increase in pollution cap. *The Register-Guard*. At <http://projects.registerguard.com/rg/news/local/30136672-75/seneca-pollution-plant-company-source.html.csp>
- ¹⁴⁷ Seneca. (2015, Feb. 4). Seneca Sustainable Energy Biomass Plant Receives Final Operating Permit. At <https://senecasawmill.com/news/2015/biomass-operating-permit/>

-
- ¹⁴⁸ Nevelyn, J. (2016, May 2). Section 1603 - Payments for Specified Renewable Energy Property in Lieu of Tax Credits. *U.S. Department of Treasury*. At <https://www.treasury.gov/initiatives/recovery/Documents/Section%201603%20Awards.xlsx>
- ¹⁴⁹ Rhen, B. (2018, Feb. 28). Evergreen Community Power plant to close. *Reading Eagle*. At <http://www.readingeagle.com/money/article/evergreen-community-power-plant-to-close>
- ¹⁵⁰ Rhen, B. (2018, Feb. 28). Evergreen Community Power plant to close. *Reading Eagle*. At <http://www.readingeagle.com/money/article/evergreen-community-power-plant-to-close>
- ¹⁵¹ U.S. Department of Energy (2011, Nov. 16). Evergreen Community Power Plant 33-MW CHP System. *U.S. DOE Mid-Atlantic Clean Energy Application Center*. At http://www.midatlanticchptap.org/profiles/evergreen_project_profile.pdf
- ¹⁵² Toxic Release Inventory data for Reading indicate that in 2008, pollutant emissions (in pounds) included HCl: 1,516,043; Hydrogen fluoride: 130,005; Sulfuric Acid: 24,005; Chromium compounds: 11,257; Arsenic: 176; Antimony: 597; Lead: 2,357; and Trichloroethylene: 87,693 (data can be obtained at <http://toxmap.nlm.nih.gov/toxmap/main/startOver.do>).
- ¹⁵³ United States Department of Energy, Mid-Atlantic Clean Energy Application Center. Evergreen Community Power Plant case study: 33 MW facility using biomass. November 16, 2011.
- ¹⁵⁴ Booth, M. S. (2014). Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal. Pelham, Massachusetts, Partnership for Policy Integrity. At <http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>
- ¹⁵⁵ Newberry, L. (2014, May 5). Research group, Reading power plant operator at odds over clean energy designation. *Pittsburgh Post-Gazette*. At <http://www.post-gazette.com/powersource/latest-alternative-energy/2014/05/05/Research-group-Reading-power-plant-operator-at-odds-over-clean-energy-designation/stories/201405050127>
- ¹⁵⁶ <https://echo.epa.gov/detailed-facility-report?fid=110041899808>
- ¹⁵⁷ Reading Eagle (2018, Jan. 4). Fire hits Reading power plant again. *Reading Eagle*. At <http://www.readingeagle.com/news/article/fire-hits-reading-power-plant-again>
- ¹⁵⁸ Rhen, B. (2018, Feb. 28). Evergreen Community Power plant to close. *Reading Eagle*. At <http://www.readingeagle.com/money/article/evergreen-community-power-plant-to-close>
- ¹⁵⁹ Rader, T. (2018, Feb. 27). Evergreen pulling the plug on power plant in south Reading. *69 News WFMZ.com*. At <http://www.wfmz.com/news/berks/evergreen-pulling-the-plug-on-reading-power-plant/708673331>
- ¹⁶⁰ Rural Development Partners. Southeast Renewable Energy. At http://www.ruraldevelopmentpartners.com/en/projects/completed_projects/southeast_renewable_energy/
- ¹⁶¹ South Carolina Dept. of Commerce (2011, May 5). Southeast Renewable Energy Announces New Facility In Dorchester County. *SCCommerce.com*. At <https://www.sccommerce.com/news/southeast-renewable-energy-announces-new-facility-dorchester-county>
- ¹⁶² Atlantic Power Corporation (2018, Sept. 20). Atlantic Power Corporation Announces Agreement to Acquire Two Contracted Biomass Plants in South Carolina. At <https://investors.atlanticpower.com/2018-09-20-Atlantic-Power-Corporation-Announces-Agreement-to-Acquire-Two-Contracted-Biomass-Plants-in-South-Carolina>
- ¹⁶³ <https://echo.epa.gov/detailed-facility-report?fid=110043432309#history>
- ¹⁶⁴ T&D Staff (2013, Nov. 24). Pinelands Biomass: Harleyville green power project also good for landowners, forester says. *The Times and Democrat*. At https://thetandd.com/business/pinelands-biomass-harleyville-green-power-project-also-good-for-landowners/article_22f2d074-53cc-11e3-aa08-0019bb2963f4.html
- ¹⁶⁵ Kohavi, C., Burr, S., Covino, S., Ferreira, C., Keenan, T., King, M., Wehrung, L. (2015, Spring). Conserving The Carolinas. *Coastal Carolina University*. At [https://www.coastal.edu/media/academics/collegeofhumanities/ilpp/policybriefs/Deforestationx%20\(1\).pdf](https://www.coastal.edu/media/academics/collegeofhumanities/ilpp/policybriefs/Deforestationx%20(1).pdf)

-
- ¹⁶⁶ Kress, E. (2016, Dec. 1). Forestry management important to South Carolina. *Santee Cooper*. At <https://secure.santeecooper.com/blog/authors/liz-kress/2016/forestry-management-important-to-south-carolina.aspx>
- ¹⁶⁷ Kress, E. (2014, March 18). Santee Cooper Blog: Observing the Creation of a New Industry. *South Carolina Biomass Council*. At <http://www.scbiomass.org/news/1520098>
- ¹⁶⁸ Thomas, M. (2010). \$750,000 from state grant heads to Lufkin for biomass energy plant. *KTRE.com*. At <http://www.ktre.com/story/12862290/750000-from-state-grant-heads-to-lufkin-for-biomass-energy-plant>
- ¹⁶⁹ BioMess101. Desperate displays by the failing biomass industry in Texas. January 1, 2017. At <http://biomess101.org/desperate-displays-by-failing-biomass-industry-in-texas/>
- ¹⁷⁰ The Lufkin News (2009, July 25). Judge recommends that TCEQ deny Aspen Power’s air permit. *The Lufkin News*. At http://lufkindailynews.com/news/article_bc36c431-0696-5b1c-9afc-abf621d49abe.html
- ¹⁷¹ Middleton, Rusty. (2010, April 22). Clearing the Air - How a working-class neighborhood fought a dirty industry and the TCEQ—and won. At <https://www.texasobserver.org/clearing-the-air/>
- ¹⁷² Southern Loggin’ Times (2014, July 25). Texas’ Aspen Power Could Be Back In Business. *Southern Loggin’ Times*. Retrieved by <http://www.southernloggintimesmagazine.com/texas-aspen-power-back-business/>
- ¹⁷³ AP Wire Services (2016, November). Aspen Power biomass plant in East Texas sold for \$5M. *Dallas News*. At <https://www.dallasnews.com/business/energy/2016/11/02/aspen-power-biomass-plant-east-texas-sold-nearly-5m>
- ¹⁷⁴ Portz, T. (2016, Aug. 30) Lessons from Aspen. *Biomass Magazine*. At <http://biomassmagazine.com/blog/article/2016/08/lessons-from-aspen>
- ¹⁷⁵ USASpending.gov (2008, Sept. 22). 10.771 - RURAL COOPERATIVE DEVELOPMENT GRANTS Grant Summary RIO GRANDE VALLEY SUGAR GROWERS INC. *USASpending.gov*. At <https://www.usaspending.gov/#/award/62912402>
- ¹⁷⁶ Raymondville Chronicle (2009, Sept. 30). Valley Sugar Growers get \$10.2 million expansion grant. *Raymondville Chronicle*. At http://www.raymondville-chronicle.com/news/2009-09-30/farm_ranch/038.html
- ¹⁷⁷ Documents dated 1/1/2009 at Content ID 1187326 at <https://bit.ly/2NU3zEI>
- ¹⁷⁸ Documents dated 1/1/2011 at Content ID 1187565 at <https://bit.ly/2NU3zEI>
- ¹⁷⁹ <https://echo.epa.gov/detailed-facility-report?fid=110017282000>
- ¹⁸⁰ NOVEC (2013, Oct. 31). Halifax County Biomass Plant Promo. *NOVEC*. At <https://www.youtube.com/watch?v=vx6GcrJTF8I>
- ¹⁸¹ NOVI Energy (2011, May 31). South Boston Energy Project (SBE). *NOVI Energy*. At <http://www.novienergy.com/south-boston-energy-project-sbe/>
- ¹⁸² Southside Planning District Commission (2013). South Boston Energy Project Southside PDC secures grant funds for a new wood waste-fired biomass electric generating facility. *Southside Planning District Commission*. At <http://www.southsidepdc.org/index.php/projects/featured-projects/90-south-boston-energy-project>
- ¹⁸³ SoVaNow.com (2010, Nov. 22). Proposed power plant moves closer to reality. *SoVaNow.com*. At http://www.thenewsrecord.com/index.php?/news/article/proposed_power_plant_moves_closer_to_reality/
- ¹⁸⁴ Ward, M., Paylor, D., Weld, R., (2015, July 27). State Air Pollution Control Board Enforcement Action - Order By Consent Issued To South Boston Energy. *Virginia Department of Environmental Quality*. At https://www.deq.virginia.gov/Portals/0/DEQ/Enforcement/FinalOrders/2015_July27%20South%20Boston%20Energy%20LLC%20dba%20.pdf
- ¹⁸⁵ Voegele, E. (2013, Nov. 26). NOVEC fires up Halifax County biomass plant. *Biomass Magazine*. At <http://biomassmagazine.com/articles/9728/novec-fires-up-halifax-county-biomass-plant>
- ¹⁸⁶ NOVEC (2013, May 1). NOVEC What’s Current Biomass Plant Now Receiving Fuel. *NOVEC*. At https://www.novec.com/About_NOVEC/upload/WC5-13.pdf

-
- ¹⁸⁷ Partnership for Policy Integrity (2011, March 17). Carbon emissions from biomass for energy, Waste argument part 2: the “Methane Myth”. *Partnership for Policy Integrity*. At <https://www.pfpi.net/carbon-emissions>
- ¹⁸⁸ The Port of Virginia (2011, June 28). Meadwestvaco Announces Plans for \$285M Biomass Boiler. *The Port of Virginia*. At <http://blog.portofvirginia.com/my-blog/2011/06/meadwestvaco-announces-plans-for-285m-biomass-boiler.html>
- ¹⁸⁹ US COURT OF FEDERAL CLAIMS (2015, April 8). Case 1:15-cv-00355-LB Document 1, MEADWESTVACO VIRGINIA CORP. V. THE UNITED STATES OF AMERICA. *US COURT OF FEDERAL CLAIMS*. At <https://richmondbizsense.com/wp-content/uploads/2015/04/meadwestvaco-v-usa1.pdf>
- ¹⁹⁰ Marzulla, N. (2018, Feb. 26). Lawsuit Runs Out of Steam. *Marzulla Law*. At <https://marzulla.com/lawsuit-runs-out-of-steam/>
- ¹⁹¹ Ward, M., Paylor, D., Weld, R. (2016, Feb. 18). State Air Pollution Control Board Enforcement Action - Order By Consent Issued To WestRock Virginia Corporation For The WestRock Virginia Corporation — Covington Registration No. 20328. *Virginia Department of Environmental Quality*. At <https://www.deq.virginia.gov/Portals/0/DEQ/Enforcement/FinalOrders/WestRock2016.pdf>
- ¹⁹² <https://echo.epa.gov/detailed-facility-report?fid=110000870031>
- ¹⁹³ Rothey, J. (2017, Dec. 20). Accomack County one of three in Virginia with most pollution per capita. *WTKR.com*. At <https://wtkr.com/2017/12/20/accomack-county-one-of-three-in-virginia-with-most-pollution-per-capita/>
- ¹⁹⁴ Cooper, C. (2016, Sept. 29). ‘Super Polluters’ tainting Shenandoah Valley air. *NewsLeader.com USA Today*. At <https://www.newsleader.com/story/news/local/2016/09/29/super-polluters-tainting-shenandoah-valley-air/91117110/>
- ¹⁹⁵ The Roanoke Star (2014, July 22). Covington Ranks #1 Among Most Toxic Zip Codes in VA. *The Roanoke Star*. At <http://theroanokestar.com/2014/07/22/covington-ranks-1-among-most-toxic-zip-codes-in-va/>
- ¹⁹⁶ Hoyle, Z. (2015, Nov. 19). Increasing Our Knowledge of Small Woody Biomass Harvesting. *CompassLive, USDA USFS Southern Research Station*. At <https://www.srs.fs.usda.gov/compass/2015/11/19/increasing-our-knowledge-of-small-woody-biomass-harvesting/>
- ¹⁹⁷ McNichols, E., USDA (2017, March 1). Lower Cowpasture Restoration and Management Project, George Washington and Jefferson National Forests. *USDA U.S. Forest Service*. At https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd535285.pdf
- ¹⁹⁸ The Associated Press (2010, Aug. 9). Paper plant to use biomass. *The Olympian*. At <https://www.theolympian.com/news/local/article25261051.html>
- ¹⁹⁹ Gottlieb, P. (2016, Aug. 12). Nippon paper mill, cogeneration plant in Port Angeles for sale. *Peninsula Daily News*. At <http://www.peninsuladailynews.com/news/nippon-paper-mill-cogeneration-plant-in-port-angeles-for-sale/>
- ²⁰⁰ EJNow (reposted), Gottlieb, P. (original post), (2014, March 27). Nippon Temporarily Shut Down Because of Biomass Fuel Problems at Power Plant. *Energy Justice Network* (reposted), *Peninsula Daily News* (original post). At <http://www.energyjustice.net/content/nippon-temporarily-shut-down-because-biomass-fuel-problems-power-plant>
- ²⁰¹ gHale, ISS Source (2017, March 13). Conveyor Belt Cause of WA Mill Fire. *Industrial Safety and Security Source*. At <http://www.isssource.com/conveyor-belt-cause-of-wa-mill-fire/>
- ²⁰² <https://echo.epa.gov/detailed-facility-report?fid=110010680370>
- ²⁰³ Ollikainen, R. (2018, Sept. 25). McKinley Paper plans to start production in September 2019 at Port Angeles mill. At <http://www.peninsuladailynews.com/news/mckinley-paper-plans-to-start-production-in-september-2019-at-port-angeles-mill/>
- ²⁰⁴ Gottlieb, P. (2015, Jan. 16). Multimillion dollar lawsuits filed over Nippon Paper’s Port Angeles biomass plant. *Peninsula Daily News*. At <http://www.peninsuladailynews.com/news/multimillion-dollar-lawsuits-filed-over-nippon-papers-port-angeles-biomass-plant/>

-
- ²⁰⁵ US EPA. eGRID2016 Unit, Generator, Plant, State, Balancing Authority Area, eGRID Subregion, NERC Region, U.S., and Grid Gross Loss (%) Data Files. February 15, 2018. At <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>.
- ²⁰⁶ Washington State Department of Ecology. Technical support document for prevention of significant deterioration PSD 06-02, Amendment 1. Steam turbine generator project WestRock Tacoma Mill, Tacoma, WA. January 28, 2016. At https://fortress.wa.gov/ecy/ezshare/AQ/PSD/PSD_PDFS/WestRock_Final_TSD_PSD-06-02_A1_03172016.pdf
- ²⁰⁷ <https://echo.epa.gov/detailed-facility-report?fid=110010680370>
- ²⁰⁸ Rosen, A. (2018, Jan. 22). Court Awards \$1.6M To Paper Mill Seller In Tax Refund Fight. *Law 360*. At <https://www.law360.com/articles/1004178/court-awards-1-6m-to-paper-mill-seller-in-tax-refund-fight>
- ²⁰⁹ Nevelyn, J. (2016, May 2). Section 1603 - Payments for Specified Renewable Energy Property in Lieu of Tax Credits. *U.S. Department of Treasury*. At <https://www.treasury.gov/initiatives/recovery/Documents/Section%201603%20Awards.xlsx>
- ²¹⁰ Lydersen, K. (2015, June 10). Wisconsin plant: A win for paper mill, a loss for ratepayers. *Energy News Network*. At <https://energynews.us/2015/06/10/midwest/wisconsin-plant-a-win-for-paper-mill-a-loss-for-ratepayers/>
- ²¹¹ Content, T. (2016, June 18). Low natural gas prices upend local utility sector. *Journal Sentinel*. At <http://archive.jsonline.com/business/low-natural-gas-prices-upend-utility-sector-b99740217z1-383513181.html/>
- ²¹² Energy Information Administration. EIA-923 monthly generation and fuel consumption time series files for 2016 and 2017.
- ²¹³ Energy Justice Network, reprinting from Wasau Daily Herald. "Fire at Brand New Biomass Incinerator in Rothschild, Wisconsin." April 11, 2014. At <http://www.energyjustice.net/content/fire-brand-new-biomass-incinerator-rothschild-wisconsin>
- ²¹⁴ Imrie, R. (2016, June 30). Fire erupts in biomass conveyer at Rothschild paper mill. *WAOW.com*. At <http://www.waow.com/story/32346083/2016/06/Thursday/fire-erupts-in-biomass-conveyer-at-rothschild-paper-mill>
- ²¹⁵ <https://echo.epa.gov/detailed-facility-report?fid=110054628729>
- ²¹⁶ Lydersen, K. (2015, June 10). Wisconsin plant: A win for paper mill, a loss for ratepayers. *Energy News Network*. At <https://energynews.us/2015/06/10/midwest/wisconsin-plant-a-win-for-paper-mill-a-loss-for-ratepayers/>
- ²¹⁷ Wheeler News Service (2015, June 16). Report: We Energies using central Wisconsin bio-mass plant far less than anticipated. *WHBL.com*. At <https://whbl.com/news/articles/2015/jun/16/report-we-energies-using-central-wisconsin-bio-mass-plant-far-less-than-anticipated/>
- ²¹⁸ Content, T. (2016, June 18). Low natural gas prices upend local utility sector. *Journal Sentinel*. At <http://archive.jsonline.com/business/low-natural-gas-prices-upend-utility-sector-b99740217z1-383513181.html/>