

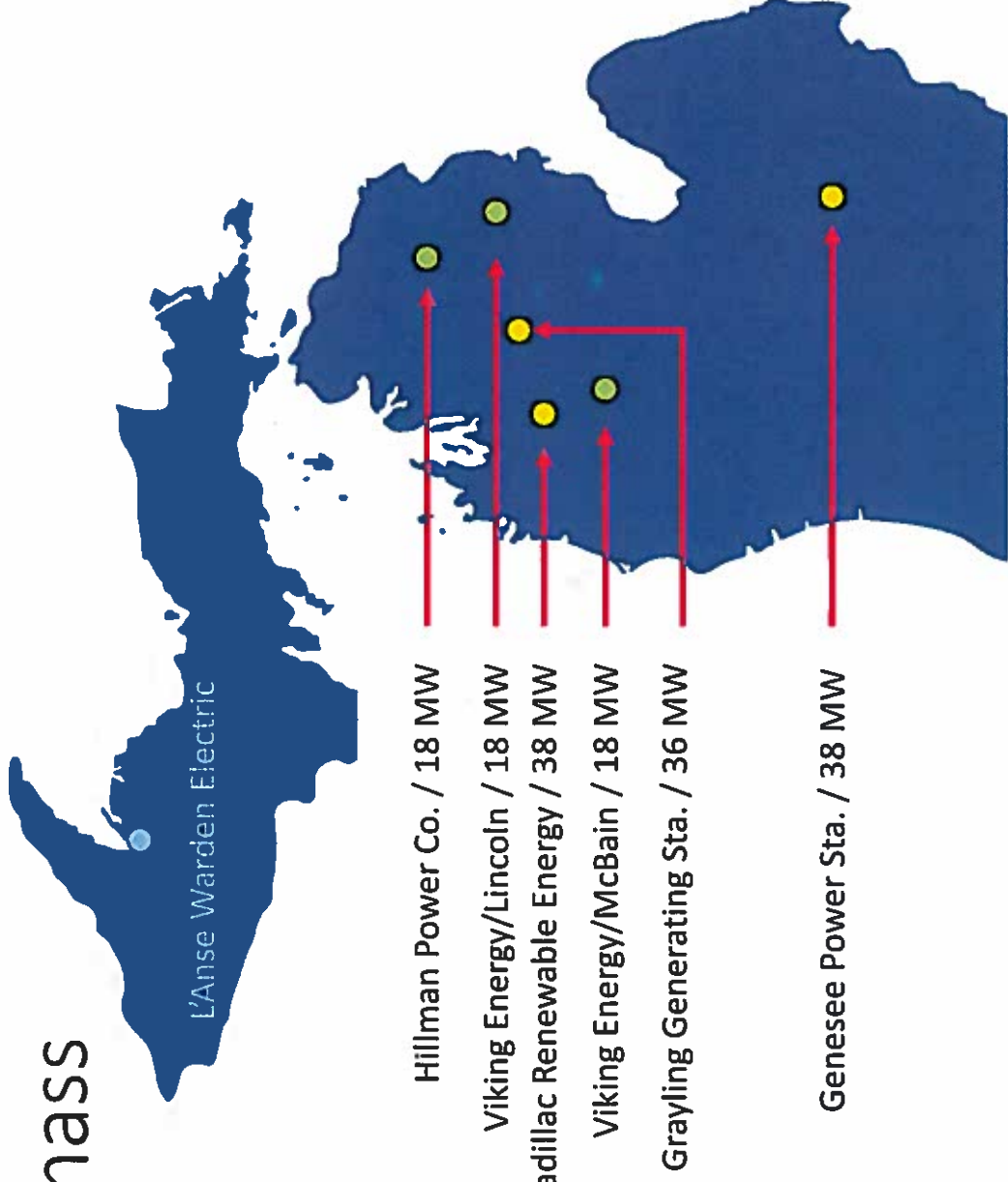
Biomass Power in Michigan

Michigan House Natural Resources & Outdoor Recreation Committee

April 16, 2019

Michigan
Biomass

Michigan Biomass



162 MW

Economics

- \$200 million total economic activity
- \$28 - \$45 million fuel market
- \$34 million labor
- 686 FTEs

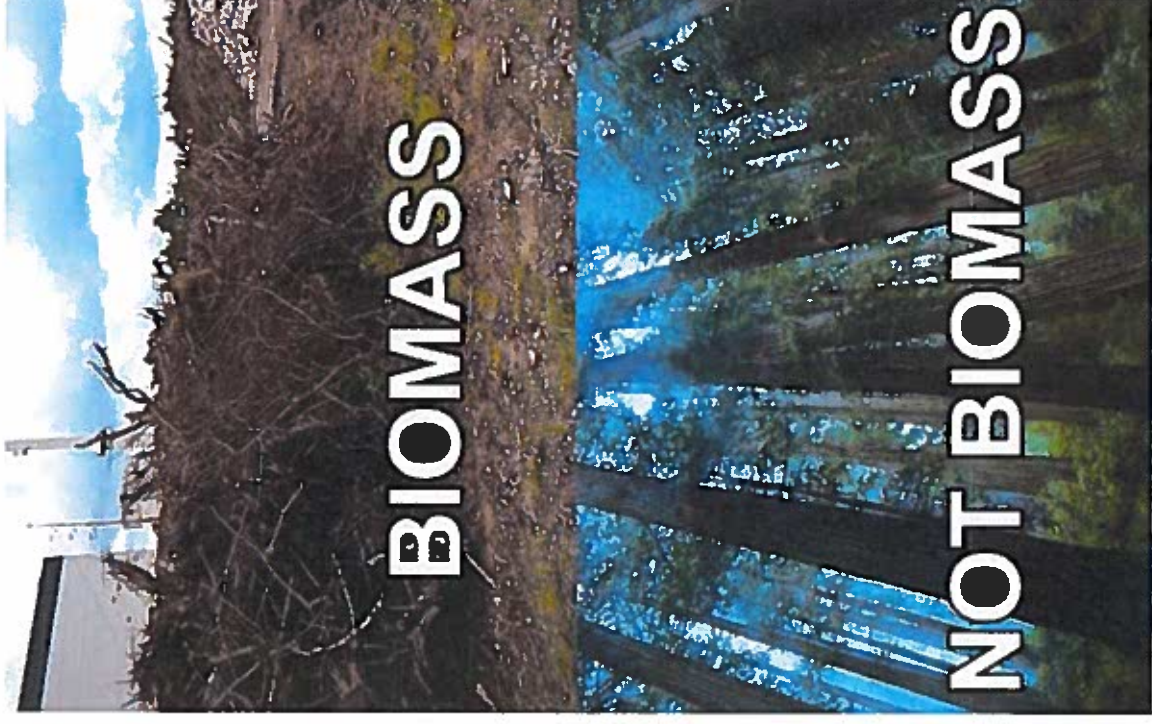


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Source: MDNR study, 2013 and ongoing

Fuel resources

We do not cut trees specifically for biomass power!



Fuel resources

“Cradle to grave utilization”

- Forest value chain
- Ancillary, “low value” market
- Offsets costs
 - Forest management
 - Manufacturing/consumer goods

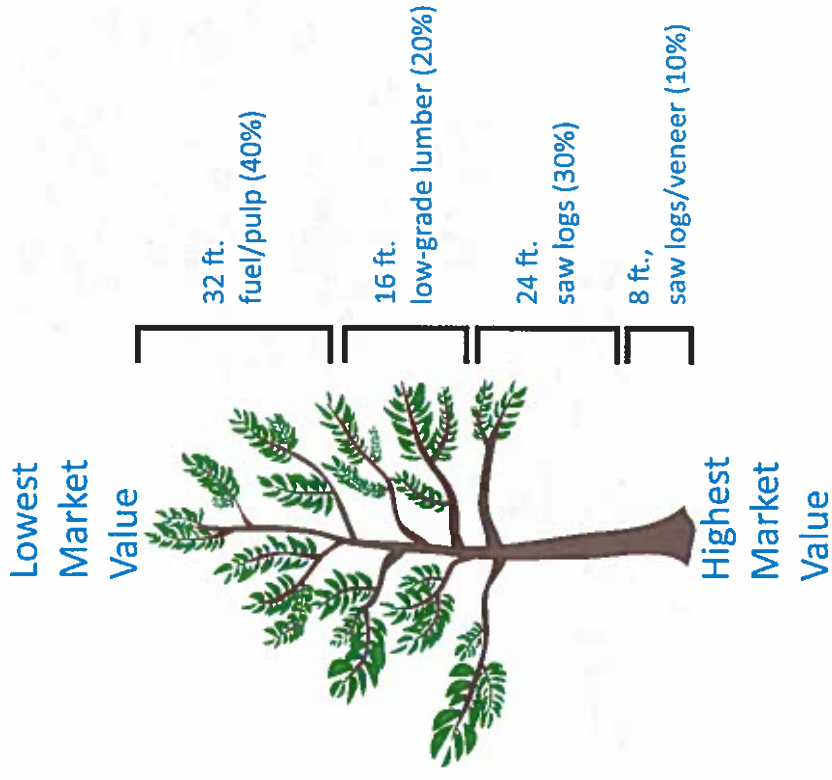


2 M tons/yr = 86,000 truckloads (604 miles)

Fuel resources

Wood fiber value chain

- 50% forest residues
 - Precommercial thinning
 - Harvest residuals
 - Habitat work
 - Disease/infestation/sanitation
- 50% wood wastes
 - Mill, manufacturing wood byproducts
 - Landfill diversions
 - Fuel supplements
 - Scrap tires, railroad ties



Fuel resources

- “Urban” fuel shed
- Landfill diversions
- Land clearing, development
- Landscaping debris
- Storm cleanup
- ROW maintenance
- Clean, industrial wood



Baseload, renewable power generation

Source: Michigan Public Service Commission 2018 RPS Report

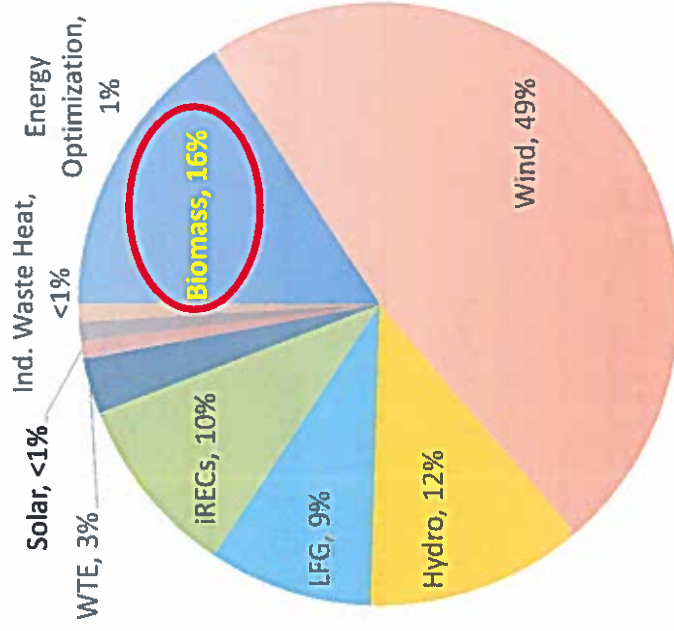


Fig. 1: 2017 Compliance RECs

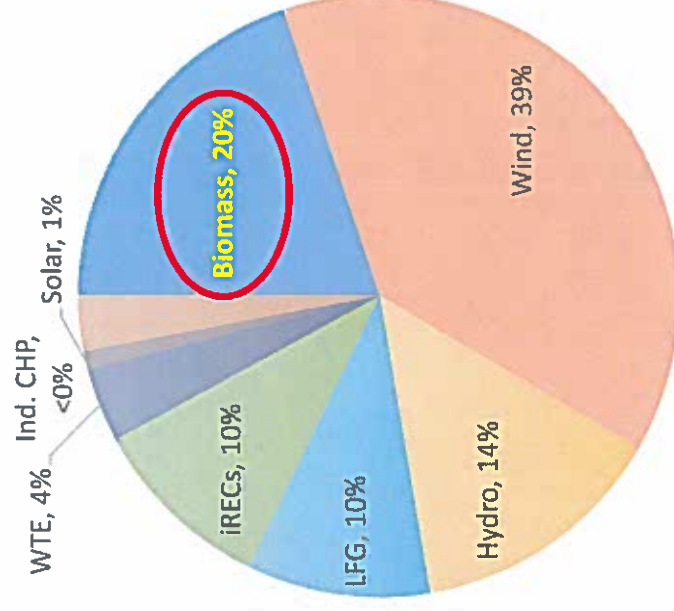


Fig. 2: 2009-17 Total REC Inventory

Everything is better with bacon!



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Summary

It's not the power we make, but how we make that power that matters

1. Sustainable forest resources / management
2. Rural economics
3. Robust fiber markets = fuel resources
4. “Beneficial use” fuels from waste materials
5. Baseload, dispatchable renewable energy
6. Diversifies energy portfolio
7. Renewable electric & thermal energy
8. Grid support / reliability / security



Questions?

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BIOMASS

LOCAL RESOURCES, LOCAL COMMUNITIES, LOCAL JOBS

Biomass power provides local jobs because the source of our energy - wood fiber - is locally produced. All the fuel used by Michigan's wood-fired power plants - about \$50 million annually - comes from within 50 miles of the power plants, so those dollars stay in those communities. This translates to more than 600 full-time jobs processing, handling and transporting fuel wood. These biomass plants are located in or near small towns and villages where there are often none of the broad

BIOMASS / LOCAL RESOURCES

LOCAL RESOURCES

ENVIRONMENTAL BENEFITS

BIOMASS BENEFITS



An Overview of Biomass Power in Michigan

February 2019

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Biomass

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Summary statements

Biomass power is “homegrown, Michigan-made” energy from local forest resources and industrial wood byproducts. It has, and can continue to be, a major contributor to a “most reasonable and prudent energy future for Michigan:

- It supports nearly 700 jobs and \$34 million in economic support to rural communities.
- It helps maintain healthy forest with support for stewardship and sustainable management practices.
- It uses “alternative fuels” such as scrap tires and railroad ties that manage these wastes and byproducts and improves power plant performance and air emissions.
- It reduces waste stream volume and preserves landfill space.
- It turns production costs into revenues for producers of wood waste, improving their bottom line and reducing the cost to consumers for these goods and services.
- It provides dispatchable, baseload power that can offset capacity losses from the shutdown of coal and nuclear plants, and avoid the need for building new ones.
- Sound policy recognizes the values of biomass as a “most” reasonable and prudent energy solution for Michigan.

Biomass and energy policy

One of the chief components of Michigan’s new energy model is the Integrated Resource Plan⁷ (IRP), which is now working its way through the regulatory processes at the Michigan Public Service Commission (PSC). It’s a comprehensive approach to finding the “most reasonable and prudent” course for the state’s energy future through a decision-making process that goes beyond simply justifying the cost of proposed power generation.

The full value of biomass makes it a “most” reasonable and prudent source of energy, and these values need to be fully and fairly considered in this process, and Michigan Biomass and its member facilities are engaged in that process.

6. Transmission upgrades and expanded deployment of intermittent energy resources cannot replace biomass power and the benefits it provides.

Under PA 341 of 2016, regulated utilities will begin filing their IRPs in June 2018 and must consider the broader impacts of power supplies on the environment, system reliability, and electric customers. All options to reduce costs and add value to the electric portfolio must be considered before the plan is approved – things like reducing consumer demand through energy efficiency programs and load management, energy storage, renewables, and eliminating energy “wasted” at the point of generation and through long-distance transmission.

Biomass meets all these criteria and the IRP process must preserve the critical grid support and other benefits biomass provides. Transmission upgrades cannot replace biomass benefits like voltage stabilization and distributed generation. Fossil fuel plants cannot replace the impact biomass has on local economics, forest resources, waste management, and the environment.

Michigan regulators must ensure that its regulatory processes account for the unique values of biomass power generation in its outcomes.

⁷ PA 341 of 2016: MPSC dockets U-

2. *Fuel diversity:* Wood and other biomass fuels are byproducts and provide a hedge against the volatility of commodity fuel pricing, such as natural gas.
3. *Diversity of use:* Unlike most other renewables, biomass co-generation can provide thermal energy simultaneously with electricity, on an industrial scale suitable for manufacturing or district heat and power. Wind and solar can't do that.

The value proposition

Michigan energy policy adopted in 2016 set new standards by which state regulators determine the course of Michigan's energy future. Power generation and delivery must now be the "most" reasonable and prudent solutions for the state's electricity customers. It's no longer just about the cheapest energy resource, but the total value of that resource realized by the citizens of Michigan, with an eye toward affordable, adaptable, environmentally friendly energy resources. Biomass power meets all those standards through the economic, technical, and environmental attributes it brings to Michigan's energy portfolio.

5. The "locally grown, locally produced" attribute of biomass power makes it a reasonable and prudent energy resource for Michigan.

Biomass is adaptable in its ability to adjust to shifts in the fuel supply brought on by changes in the wood fiber market and can provide electricity *and* heat energy. It brings reliability to the generation, transmission, and distribution systems with its baseload, dispatchable power. It is affordable; proven to be cost competitive with utility baseload generation, and it protects the environment by improving forest health, reducing the volume of the waste stream and resulting greenhouse gas emissions, and offsetting the air quality impact of fossil fuel power plants.

In short, biomass power is a high-value energy proposition. Few other energy resources can make this claim, especially renewable resources like wind and solar, and fossil fuel generation that sends Michigan's energy dollars to states that produce those fuels.

Ultimately, it's the locally-sourced fuel supply that makes biomass power special and worth pursuing in a "most reasonable and prudent" energy strategy. Biomass power produces cost effective, baseload power that optimizes the value of, and care for, Michigan's forest resources. It exists because it helps mills operate more efficiently, which lowers the cost of wood products. It exists because it provides major support to the power grid and diversifies the state's energy portfolio. It exists because there is a need for the wisely management resources and solid wastes.

The environment

Energy from biomass resources benefits the environment on several fronts:

1. **Waste elimination:** It reduces wastes and recovers its energy. The fuel is reduced to ash, some of which has further use for soil nutrients, or as daily cover at landfills. It mitigates the environmental impacts posed by scrap tires and puts byproducts to good use.
2. **Forest health:** Biomass energy encourages sustainable forest management by promoting the capture and use of woody debris removed during treatment and silvicultural practices. Managed forests are healthy forests that are diverse, resist disease and infestation, and are highly productive at capturing and sequestering carbon from the atmosphere.
3. **Climate:** Biomass as practiced in Michigan and in most of the country is carbon neutral⁶ because it's made from wood that, had it not gone to the power plant, would have decomposed into methane and had a greater impact on the atmosphere. Biogenic carbon is not a fossil fuel and is not "additional" carbon in the atmosphere and is not regulated the same as carbon from fossil fuels.

4. *The biomass plants are brick-and-mortar capacity that bring the same value to the power infrastructure as coal, nuclear or natural gas plants.*

Michigan's portfolio

CAPACITY: "Capacity," or the ability to make power when it's most needed, is a big part of the energy world. Without enough "capacity" electric providers can't ensure the lights will stay on during times of peak use. Because biomass is dispatchable like natural gas, it's has the same capacity to ensure a reliable supply of power, offset the impact of coal plant closures and avoid the need for new power plants.

RELIABILITY: Michigan's biomass plants are utility-scale, wholesale electric generators. That means they fit seamlessly into the transmission and distribution grid. And that means more reliability. System operators love biomass plant, that for more than 30 years have provided day-to-day needs like voltage stabilization and dispatchability. In some cases, biomass power plants have isolated and maintained service to tens of thousands of customers during planned and unplanned transmission outages.

DIVERSITY: Biomass power is diverse in on a variety of fronts:

1. *Economic diversity:* It's "homegrown, Michigan-made" and an investment that keeps energy dollars working in this state, not going to states that produce coal and natural gas.

⁶ Memo, Nov. 19, 2014, Janet McCabe, Acting Asst. Admin., Office of Air and Radiation, U.S. EPA.

In 2015, 77% of the 13 million tires collected through the scrap tire program was converted to energy; 53% – nearly 7 million tires – were used by biomass power plants.⁴

RAILROAD TIES: Each year, U.S. railroads replace millions of wooden railroad ties along their tracks. While they are not specifically banned from landfills like scrap tires, railroad ties are suitable for fuel under state and federal “beneficial use of secondary materials” designations, which aims to put usable waste materials into a market, keeping them out of landfills.

Like other wood wastes, the biomass fuel market offsets the cost of replacing railroad ties, helps preserve limited space at landfills, and like TDF when blended with raw wood, reduces overall air emissions.

There are three biomass power plants in Michigan permitted to use railroad ties for fuel and they consume 200,000 tons of railroad ties a year.

3. Biomass power uses local resources that supports rural economies while benefiting the environment.

Michigan’s biomass power industry is uniquely situated in the 21st Century energy market that emerged with state legislation in 2008. That’s because the biomass industry developed decades ago under federal energy policy that doesn’t neatly mesh with today’s market where customer expectations and regulatory changes promote development of zero emissions technologies such as wind and solar.

Economics

Nonetheless, biomass remains relevant because it provides technical benefits that intermittent sources can’t. It is homegrown energy that keeps Michigan energy dollars in Michigan communities, supporting local forests and wood industries. Its economic contributions are substantial. (See Table 3.)⁵

Table 3: Economic Contribution

- \$205 million total output**
- 686 jobs
 - \$34.5 million labor
 - \$28 million on fuel

These are resource-based jobs that can’t be outsourced or exported. About 130 of these jobs are in the biomass plants directly. They are skilled and highly skill positions that provide livable wages and benefits. Biomass plants are significant taxpayers in these communities and are good corporate citizens. The balance of jobs supported by the industry are in the procurement of fuels.

⁴ Scrap Tire End Use Data Report, MDEQ http://www.michigan.gov/documents/deq/DEQ-END-USER_USAGE_CAPACITY_417737_7.pdf

⁵ Forest Products Industries’ Economic Contributions to Michigan’s Economy in 2013, Larry A. Leefers, Associate Professor Emeritus, Department of Forestry, Michigan State University

removal of underbrush on U.S. Forest Service lands to reduce the risk of wildfire to neighboring private property.

2. Biomass power provides solutions for disposing of high volume, hard-to-manage solid wastes.

Wood isn't the only waste that biomass power generation helps manage. While raw wood makes up about 95% of the fuel going into a biomass plant, other materials that present difficult or costly disposal challenges can be used as wood fuel supplements, which helps to properly manage those wastes and reduces biomass plant air emissions.

TIRE-DERIVED FUEL: Nearly all of Michigan's biomass plants add small amounts of scrap tire chips, called tire-derived fuel (TDF), to their wood fuel, in amounts to less than 10%. It's used widely around the country, and has been used in Michigan as a wood-fuel supplement since the 1990s.

TDF is the principal management tool for scrap tires in Michigan and across most of the country.

Scrap tires are banned from landfills because they trap air and don't stay buried. Over time, they "float" to the surface. As a result, by the 1990s, tens of millions of tires had been stockpiled across the Michigan landscape, leading to creation of the [Scrap Tire Management Program](#) under direction of the Michigan Department of Environmental Quality (DEQ), which regulates and manages the roughly 8 million tires that come off Michigan roadways every year.

These giant piles of scrap tires are more than eyesores; they collect stagnant water that breeds disease-carrying mosquitos, and when ignited by lightning strikes or arsonists, will burn uncontrollably for months, forming plumes of thick smoke, and taxing firefighting resources.

Using TDF in a biomass boiler makes all these problems go away.

When blended with wood in the oxygen-rich, high temperature of a biomass boiler, none of these compounds form, and the particulate matter (smoke) is collected by the plant's environmental controls. The tire is reduced to ash along with the wood and properly disposed of in conventional type II landfills that accept non-hazardous wastes.

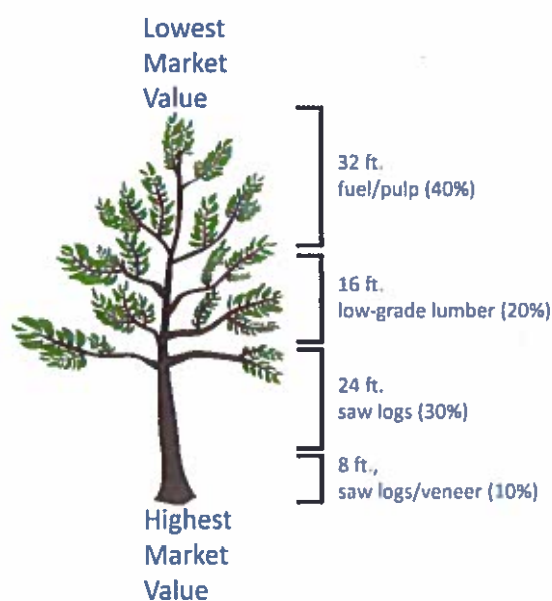
These supplemental fuels improve combustion efficiency, reduce total air emissions, and provide a market for materials that would otherwise be considered wastes.

Simply put, biomass power exists because these materials exist.

1. *Biomass power would not exist without forest-related industries providing an affordable, sustainable supply of fuel.*

A sustainable supply of these materials exists today. Michigan is home to 19 million acres of quality forests and a \$20 billion-per-year forest products industry. About half of the state’s biomass fuel supply comes directly from the forest, like the tops and limbs left over from commercial harvesting. The rest is largely bark, sawdust, chips and shavings from milling and manufacturing operations. Clean “industrial wood” like discarded crates and pallets, and urban “green” wood like storm debris and right-of-way clearing also find their way into this fuel market.

Biomass markets are a substantial part of sustainable forestry practices. Between 20% and 40% of a tree harvested for forest products is unmerchantable. This material needs to be removed from the forest floor to promote regeneration and reduce the risk of wildfire. The biomass fuel market turns these production *costs* into *revenues* and adds significantly to the bottom line for loggers, and ultimately reduces the cost of retail wood goods sold to consumers.



Biomass fuel markets play a big role in offsetting the cost of forest health and stewardship activities. Removal of dead, dying or infested trees and wood is often the first step in managing forest health. As most of this material is unsuitable for wood products, biomass is often the only market available to offset treatment costs. For example, ash trees removed in attempts to eradicate the invasive emerald ash borer were burned as fuel at Genesee Power Station to ensure that the exotic beetle was destroyed.

Michigan biomass energy supports a wood fuel market of about 2 million tons annually.

Many of the jack pine stands cut to manage breeding habitat for the endangered Kirtland Warbler have little commercial value other than biomass fuel.

Biomass markets also support forest management activities that *don't* involve commercial timber harvests, such as thinning of red pine plantations to promote quality stand development and the

year². While those numbers may appear small, our contributions to the state’s energy portfolio and the electrical grid is enormous by comparison:

The RPS: While biomass power made up 7% of the state’s renewable generating *capacity* in 2017, it accounted for 16% of the renewable power Michigan utilities used to comply with the RPS. Biomass power accounts for 20% of the 80 million Renewable Energy Credits (RECs) that have been inventoried since starting in 2009.³ (See Fig. 1 & 2.)

Grid Reliability: Biomass power generators are baseload, utility-scale electricity providers that bring more than just renewable attributes to Michigan’s energy portfolio:

- They are baseload generators, which means they can offset the generation capacity being lost to the closure of coal and nuclear plants being closed by economics, age and efficiency, and changes in regulatory structures and markets.
- They are dispatchable, providing power precisely where and when it’s needed.
- They provide voltage stabilization and other technical benefits to remote areas of the grid, improving system efficiency and reliability, and easing overall grid operation.

Fuel & resources

Biomass energy producers *do not* harvest trees specifically for energy. That makes no economic sense, no resource sense, and it makes no environmental sense. The environmental, habitat and timber value of a whole tree is higher than that for energy. Our fuel is sourced from wherever clean, sustainable wood *waste* is generated, forest to factory, cradle to grave. Biomass power generation provides a market for wood and alternative fuels that wouldn’t exist otherwise. *We turn forest wastes into revenue and reduce or eliminate disposal costs for generators of wood wastes, such as forest products and other industries.*

Fig. 1: 2017 Compliance RECs

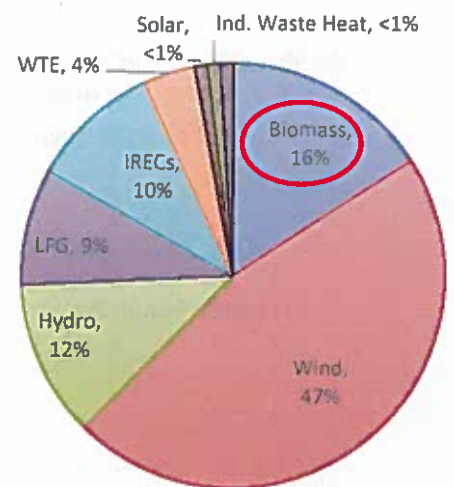
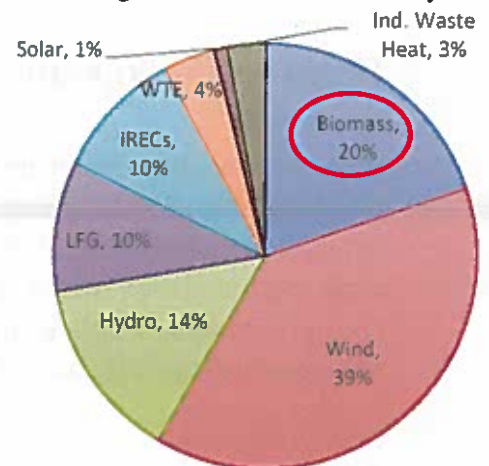


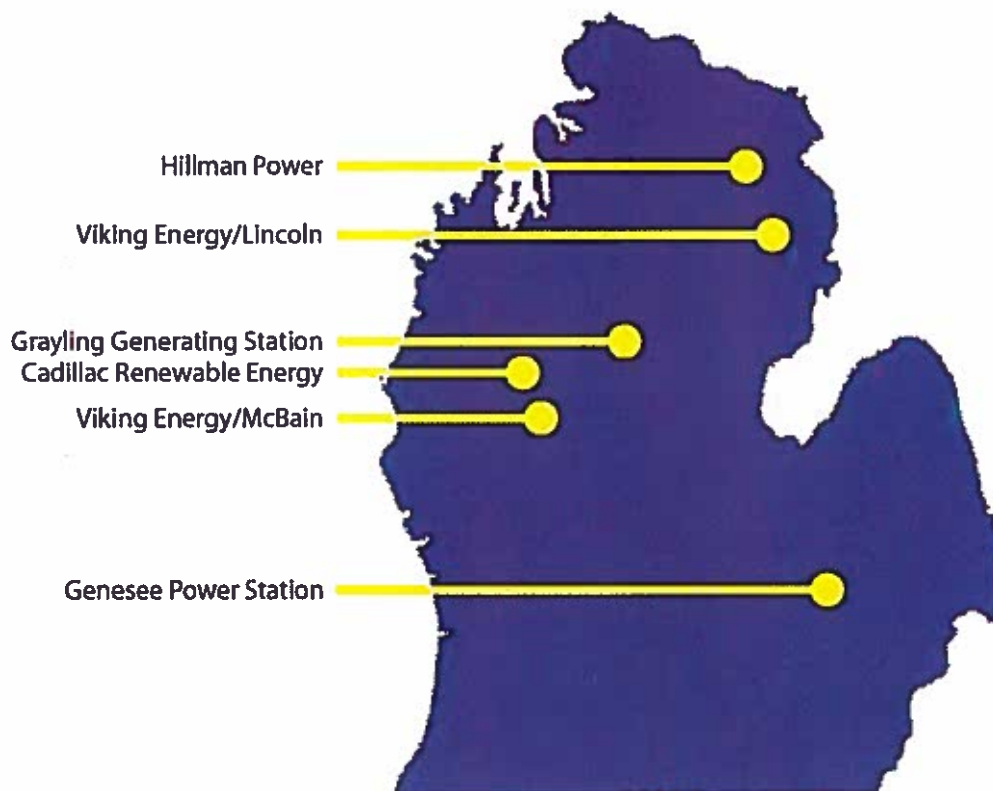
Fig. 2: 2009-18 REC Inventory



² Source: U.S. Energy Information Administration 2017, preliminary

³ [Report on the Implementation of the P.A. 295 Renewable Energy Standard and the Cost Effectiveness of the Energy Standards](#), Michigan Public Service Commission 2018

Fig. 1: Member facility location



Biomass Background

Our origins

Wood has long been a principal energy source for mankind and helped fuel the industrial age by powering steam-driven engines. It wasn't until 1978 when Congress passed the Public Utility Regulatory Policies Act (PURPA) that wood became a viable source of *grid-connected*, stand-alone electric power, mostly generated by IPPs. PURPA's intent was to diversify the nation's energy resources, which it did, promoting the development of six biomass power plants in Michigan between 1985 and 1994.

Our energy role

Michigan ranks fourth nationally in grid-connected electricity produced from biomass. (See Table 2.) It produced 0.75% of the state's total power generation in 2017 and 0.89% of the non-utility power made that

Table 2: 2018 Production (MWh)

State	Total Biomass	Nat'l. Rank
CA	1,697,361	1
NH	1,182,502	2
ME	1,135,787	3
MI	839,967	4
GA	536,551	5

Biomass power is a renewable alternative to conventional forms of electric generation, and helps diversify the state’s renewable energy portfolio, which is dominated by intermittent wind and solar energy resources. In the process, biomass power generation contributes to sustainable and healthy forests, technically supports the electric grid with 24/7 power, and provides a market for organic materials that would otherwise go to waste.

Michigan’s biomass power plants are independent power producers¹ that have supplied reliable, affordable wholesale electricity to Michigan’s regulated utilities for more than 30 years. It is a mature, robust industry that optimizes the value of the state’s vast wood resources. It is home-grown, Michigan-made energy that keeps a portion of Michigan’s ratepayer energy dollars in the communities that rely on these local resources for economic prosperity and quality of life.

This document presents information and perspectives on biomass power generation in Michigan: its environmental and economic contributions, value to the electrical system, and how it intersects state policies.

About Michigan Biomass

Michigan Biomass is a business coalition that advocates for the state’s grid-connected, wood-fired power plants. It was formed in 2007 as the state began work on renewable portfolio standards. Its members are six of the state’s wood-fired, grid-connected power facilities. Member facilities total 168 megawatts (MW) of installed capacity, all selling wholesale electricity under long-term power purchase agreements (PPAs) signed during the 1980s and 1990s. (See Table 1 and Fig. 1.)

These facilities have successfully generated electricity from wood fuel for three decades under federal energy policy, and have navigated state energy policy changes in 2000, 2008 and 2016. Despite the many challenges of a changing energy landscape, they continue to provide jobs for generations of families, economic benefit to their communities, and services to users of the state’s forest resources.

Table 1: Michigan Biomass member facilities

Facility	Location	Size (MW eq.)	Start date	PPA Type	Holder
1. Cadillac Renewable Energy	Cadillac	38	1992	Dispatched	CECo.
2. Genesee Power Station	Flint	38	1994	Dispatched	CECo.
3. Grayling Generating Station	Grayling	38	1992	Dispatched	CECo.
4. Hillman Power Co.	Hillman	18	1986	Baseload	CECo.
5. Viking Energy of Lincoln	Lincoln	18	1987	Baseload	CECo.
6. Viking Energy of McBain	McBain	18	1988	Baseload	CECo.

¹ Michigan’s IPPs sell wholesale power to investor owned utilities under long-term power purchase agreements.

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*“Biomass power is Michigan-grown,
Michigan-made renewable power
that provides resource, environmental,
technical and economic benefit that no
other form of energy can.”*

An Overview of Biomass Power in Michigan

Michigan 
Biomass

February 2019

Baseload renewable

Local resources, local jobs, local
communities

Data and perspectives on, and characterizations about,
biomass power generation in the state of Michigan.

