

The background features abstract, overlapping green shapes in various shades, creating a modern, geometric aesthetic. The shapes are primarily triangular and polygonal, with some appearing as thin, elongated bands.

Michigan Society of American Foresters

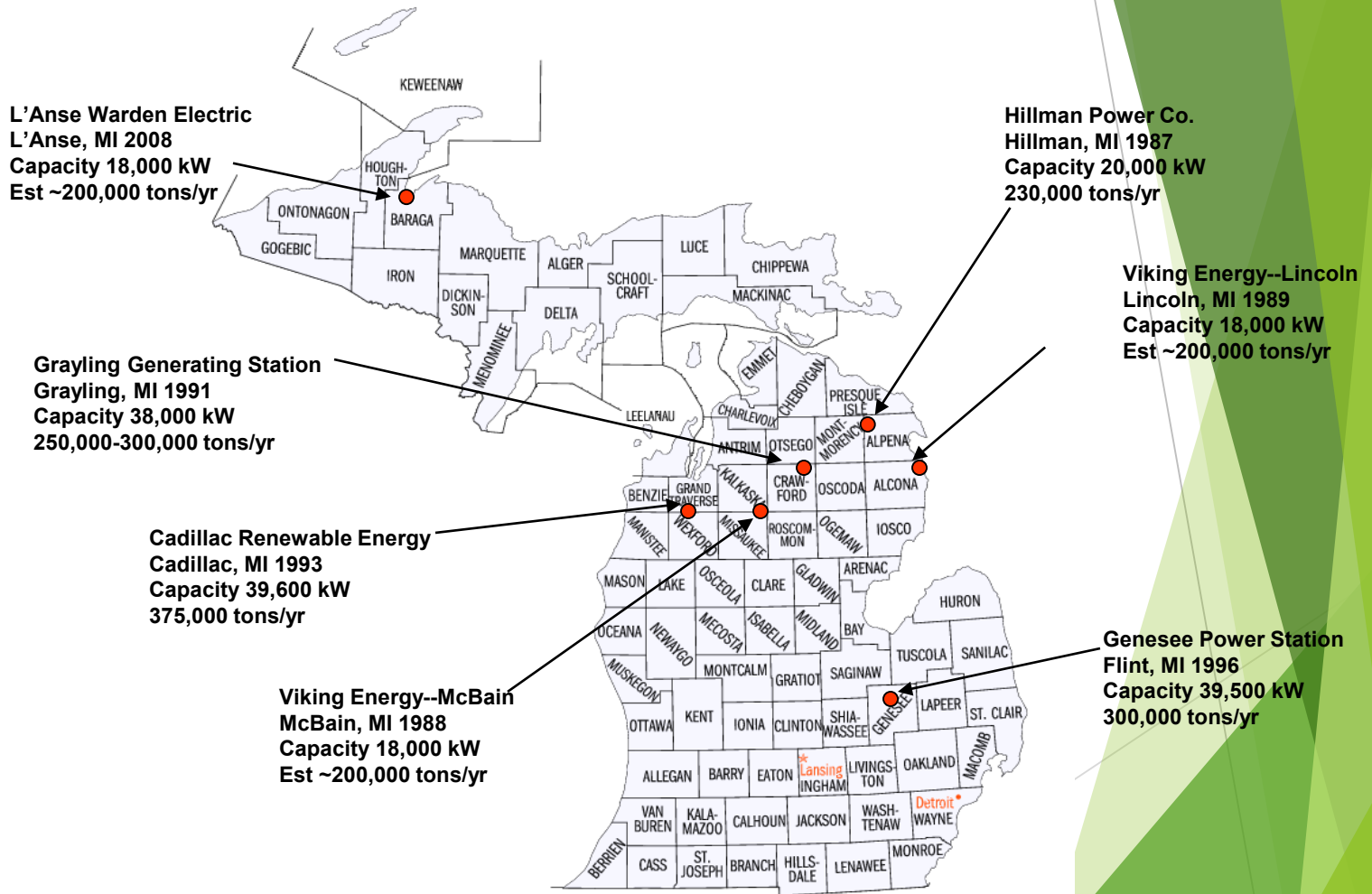
Biomass

Don Adams, Viking Energy

Forestry to Biomass



Michigan Biomass Energy Facilities Energy Grade Wood-Users





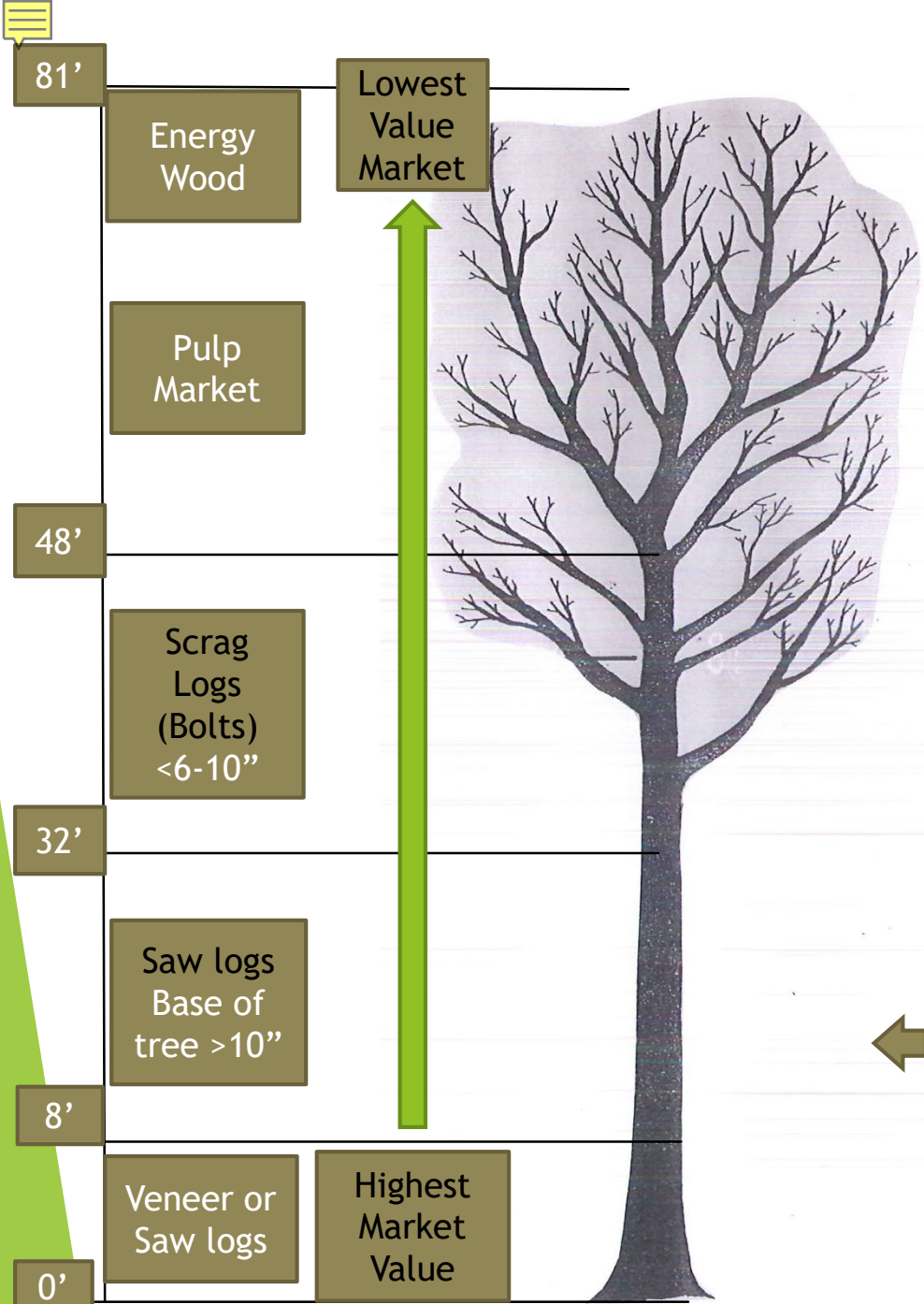
Viking Energy Lincoln and McBain

- ▶ Engie owns and operates two Biomass facilities located within Michigan's lower peninsula. These facilities are located in McBain and Lincoln Michigan.
- ▶ Both Facilities are in their 29th year of commercial operation under a 30 year power purchase agreement with Consumers Energy.
- ▶ Both Unit are 18 MW units, which mean they generate 18MWh per hour (MWh) of base load renewable energy. It take approximately 1.45 tons to produce 1 MW.
- ▶ Each facility employs 20 full time employees.
- ▶ These facilities have an average historical availability factor of over 97% which, far exceeds the industry average.
- ▶ These facilities together have produced approximately 8.3 million MWh of base load renewable power.
- ▶ Both projects have consumed approximately 10 million tons of Michigan's Natural Renewable resources resulting from timber and sawmill operations.
- ▶ They have purchased approximately \$200 million dollars of wood fiber from the timber industry.

Fuel Procurement Practices

- ▶ These facilities operate with an Air Operation Permit Issued by the Michigan Department of Environmental Quality. Under their current operating permit each facility is allow to operate 8600 hours per year.
- ▶ These facilities have historical run within 99% of their allowable operating hours.
- ▶ Being a base load renewable facility, they have been able to provide a very stable outlet to timber related industries.
- ▶ Both facilities try and purchase their fuel from sources within a 50 mile radius.
- ▶ All fuel is purchased on a green ton basis.
- ▶ Fuel contracts are annual, and are based on weekly quotas.

Biomass Interface



The Tree

Historical Use of a Tree

From the largest diameter of the tree to 10" diameter, used for veneer and saw logs.

From 10" to 6" would be used scrag logs (bolts).

From 5" to 0" energy chips.

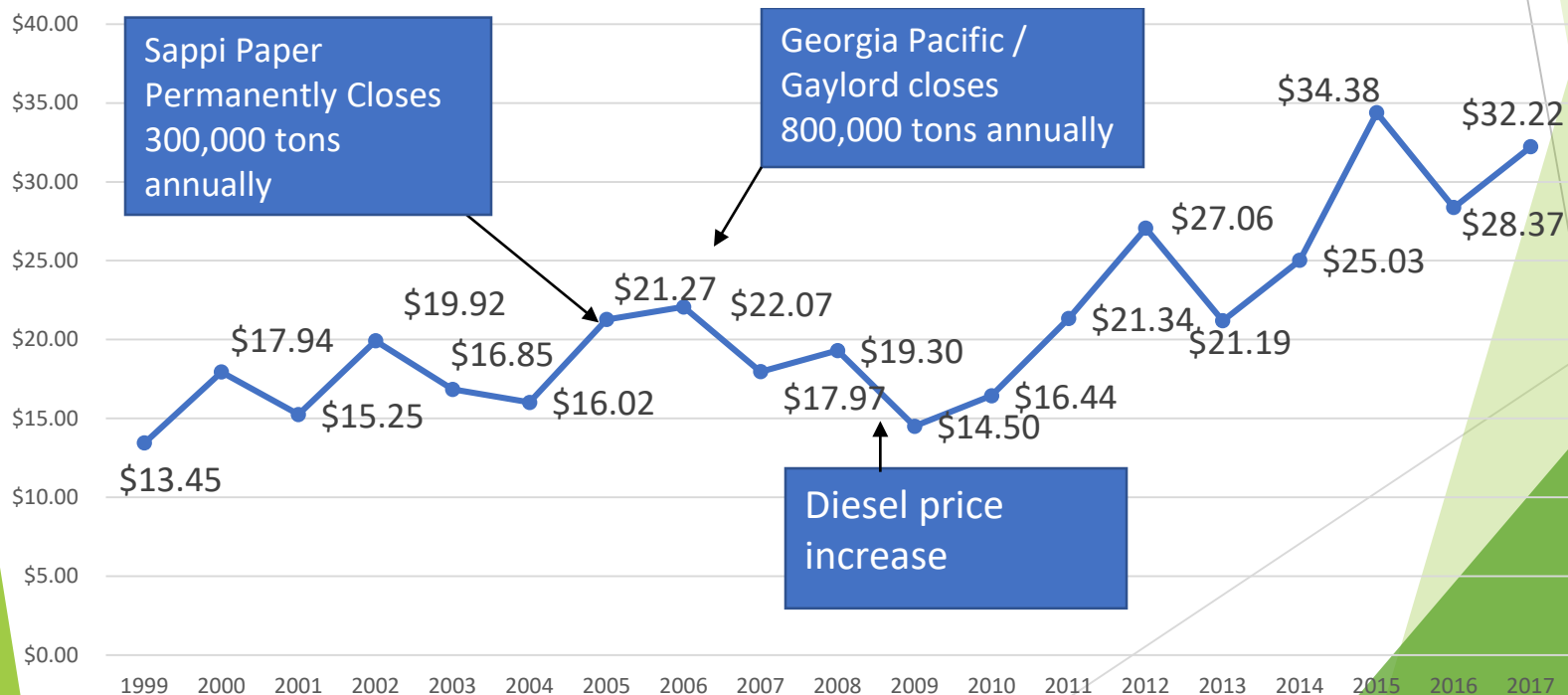


Biomass and Forestry

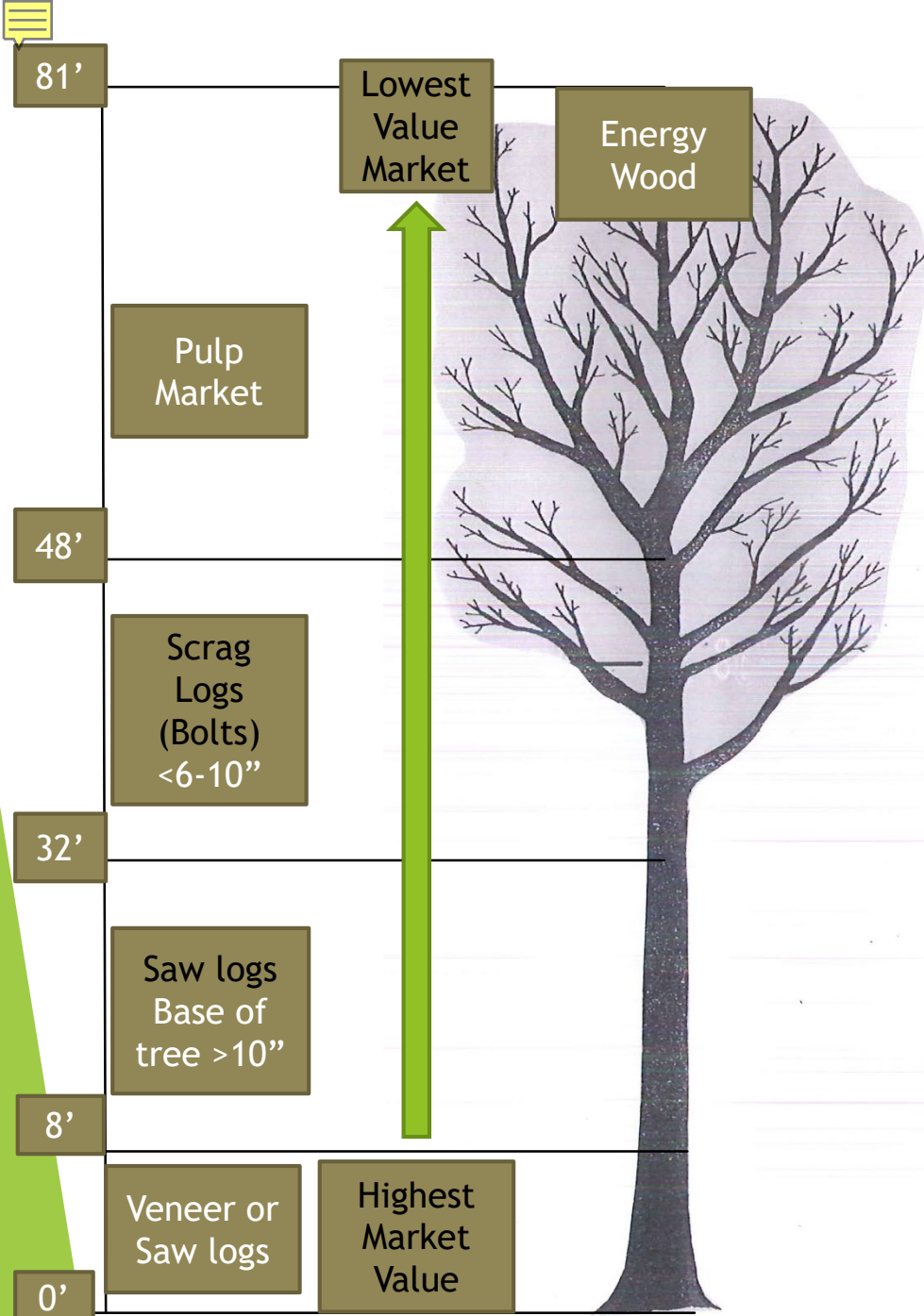
- ▶ In the late 1980 to mid 90s biomass facilities were constructed and placed into commercial operations.
- ▶ During early years of biomass operation, the infrastructure was lacking to supply energy grade chips. By helping producers and mills secure additional processing and hauling equipment were where able to closed the gap between supply and demand.
- ▶ 2005 Sappi Paper in Muskegon MI, closed. The plant consumed approximately 300,000 ton annually.
- ▶ 2006 Georgia Pacific in Gaylord MI Closed it's particle plant. The plant consumed approximately 800,000 tons annually.
- ▶ With the closure of Georgia Pacific and Sappi Paper, the paradigm between supply and demand had shifted.
- ▶ The loss of these major markets also resulted in a substantial decrease of forest harvesting infrastructure.

Market Cycle and Biomass

- ▶ Additionally during the late 2000s all of the United States experienced a rapid increase in diesel fuel prices
- ▶ Although there was a huge down turn for the pulp market, one of the largest remaining pulp wood users in lower Michigan curtailed it's operation from 24hr/7day to 8hr/5 days a week.
- ▶ More recently, over the last 36 months, several larger sawmills have had to curtail operations because of outlet for the residuals.



View From the Top of the Tree



The View

- The View from the top of the tree has allowed use to realize you can not expect to get the true value of the whole tree, if all markets do not remain strong.
- Although Biomass Energy chips has the lowest value to the tree, it has become very clear over the last thirty years, that biomass energy has tremendous value to the timbering industry. Biomass has hedged and upheld the value of the tree against the fluctuations in all other markets.