

ENERGY REPORT 35

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ENERGY INVENTORY OF HAWAIIAN SUGAR PLANTATIONS—1995

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SUMMARY

With the closure of two sugar operations on the island of Hawaii in late 1994 and another one on Oahu in early 1995, the amount of dry prepared cane processed in 1995 dropped by 25.9% from that of 1994. Correspondingly, the amount of bagasse produced dropped by 27.4%, commercial sugar by 25.3% and final molasses by 17.4% .

Because all three closed operations were net exporters of electricity, total generated electricity in 1995 dropped by 25.8% while total usage dropped by only 8.6%. As a result, electricity sold to the utilities dropped 40.5%. Electricity generated from fossil fuels dropped 7.5% while that generated from renewable sources dropped 31.3%.

The industry's percentage share of the electricity produced within the State declined from 7.0% in 1994 to only 5.0% in 1995.

INTRODUCTION

All sugarcane factories cogenerate steam and electricity. Most have the capacity to export excess power to the public utility companies for consumption on a firm, standby, or unscheduled basis. This report summarizes information provided by the sugarcane plantations and the Public Utilities Commission for the State of Hawaii.

Not for citation except as "unpublished HARC data."

To ensure proper interpretation of data presented, a glossary is included in this report.

SUMMARY OF DATA

Figures 1 through 4 present power production trends beginning with the 1980 crop year. Figure 5 summarizes the material and energy balances for 1995 based on data presented in Tables 1 through 4 and Table 6. For comparative purposes, statewide totals for 1994 and 1995 are shown at the bottom of each table. Percentages mentioned in the discussion of this report reflect changes from the previous year.

DISCUSSION

Hilo Coast Processing Company and Hamakua Sugar Company on the island of Hawaii ceased sugar operations after the 1994 season, while Oahu Sugar Company on the island of Oahu ceased operations in early 1995. Three more sugar operations are scheduled to cease in 1996, after which Kauai and Maui will be the only sugar-producing islands in the State.

The amount of prepared cane processed dropped by 25.9% with corresponding drops in the amounts of produced bagasse, sugar and molasses of 27.4%, 25.3% and 17.4%, respectively.

Total electricity generated by the plantations dropped accordingly by 25.8%. However, total usage dropped by only 8.6% because the closed operations were net exporters of electricity. Consequently, the amount of electricity sold to the utilities dropped 40.5% despite a 6.5% increase in outside purchase. Electricity generated from fossil fuels dropped slightly by 7.5%; and from biomass and hydro by 31.3%.

With decreased sugar operations and increased electricity production by utility companies and independent producers, the sugar industry's percentage share of the total electricity produced within the State declined significantly from 7.0% in 1994 to only 5.0% in 1995.

GLOSSARY

The following definitions are the terminology used throughout this report in order of appearance in tables to clarify data presented.

Operating Time. Actual days in which the factories are processing sugarcane into commercial sugar.

Field Cane. Crop material as harvested, including field trash as received in the millyard.

Prepared Cane. Harvested material after preparation for extraction, including field trash not removed in the wet cane cleaner and adhering water.

Net Cane. The clean cane stalks, from which sugar can be recovered, from the stool to the growing point (the region at the distal end of the stalk where new leaves and new internodes are being formed by cell division).

Bagasse. Fibrous residue remaining after extraction of juice from cane.

Commercial Sugar. Sucrose crystals, including adhering mother liquor, remaining after centrifugation of high-grade massecuite and enters into commerce.

96 DA Sugar. A value for reporting commercial sugar on a common basis (relative to 96% pol), calculated from an empirical formula issued by the United States Department of Agriculture. It is a product of a factor shown below and the weight of commercial sugar.

$$96 \text{ DA Factor} = 1 + 0.0175 \times (\text{Commercial Sugar Pol\%} - 96)$$

Wet Ton. Weight of material with no adjustments.

Dry Ton. Weight of material with moisture removed. Includes both soluble and insoluble inorganic and organic fractions.

Bagasse, Total Produced. Weight of bagasse, either weighed or inferentially calculated on a fiber basis from incoming material (typically, ^a 45-50% moisture).

Bagasse, To Filter Cake. Weight of screened, small bagasse particles (bagacillo) used at the rotary filters as filter aid.

Bagasse, To Boilers. Weight of bagasse sent to boilers as fuel for cogeneration of process steam and electricity.

Bagasse, Exported. Weight of excess bagasse transferred to another factory to be used as boiler fuel.

Pol. The value determined by single polarization of the normal weight of a sugar product made

up to a total volume of 100 ml at 20°C, clarified when necessary, with dry lead subacetate or another suitable clarifying agent and read in a tube 200 mm long at 20°C, using the Bates-Jackson saccharimeter scale. The term is used as if it were a real substance and used often interchangeably with sucrose content.

Trash Discarded. Dry weight of material removed from incoming sugarcane by the cane cleaner which is discarded.

Liquid Boiler Fossil Fuels.

Waste Oil. Used motor oil from mechanical equipment, equivalent to No. 2 oil in gross heat value in computations.

No. 2 Oil. Grade of fuel oil meeting certain specifications developed by the American Society for Testing and Materials (ASTM) made by fractional distillation of crude oil.

No. 6 Oil. Grade of residual oil from fractional distillation column, diluted with anywhere from 5 to 20% distillate for commercial use. Also known as “Bunker C” oil in marine applications.

Gross Heat Values. Assumed values for various boiler fuels per unit volume or weight (on dry basis) as shown below.

Bagasse fiber:	8,350 Btu/lb
Bagasse pol:	7,110 Btu/lb
No. 2 fuel oil:	5.9 x 10 ⁶ Btu/bbl
No. 6 fuel oil:	6.3 x 10 ⁶ Btu/bbl
Waste oil:	5.9 x 10 ⁶ Btu/bbl
Coal:	10,500 Btu/lb
Leafy trash:	8,350 Btu/lb
Waste wood:	8,600 Btu/lb
Woodchips:	9,000 Btu/lb

Heat Transferred to Steam. Total heat converted to steam from all fuels, assuming certain boiler efficiencies for the different fuels burned.

Nameplate Generating Capacity. Manufacturer’s designed generating capacity for steam turbogenerator, hydrogenerator, or diesel generator.

Typical Power Generation:

Field and Factory. Internal power requirements necessary to normally operate electrical equipment in the field and factory.

Utility. Excess power normally available to be exported to utility company which includes transmission losses and electricity used to operate power plant auxiliary equipment.