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# LAMNET

## *Joint Workshop – South Africa*

**19<sup>th</sup>-21<sup>st</sup> August 2002**

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PGBI Engineers and Constructors (Pty) Ltd  
*Engineering the Future*

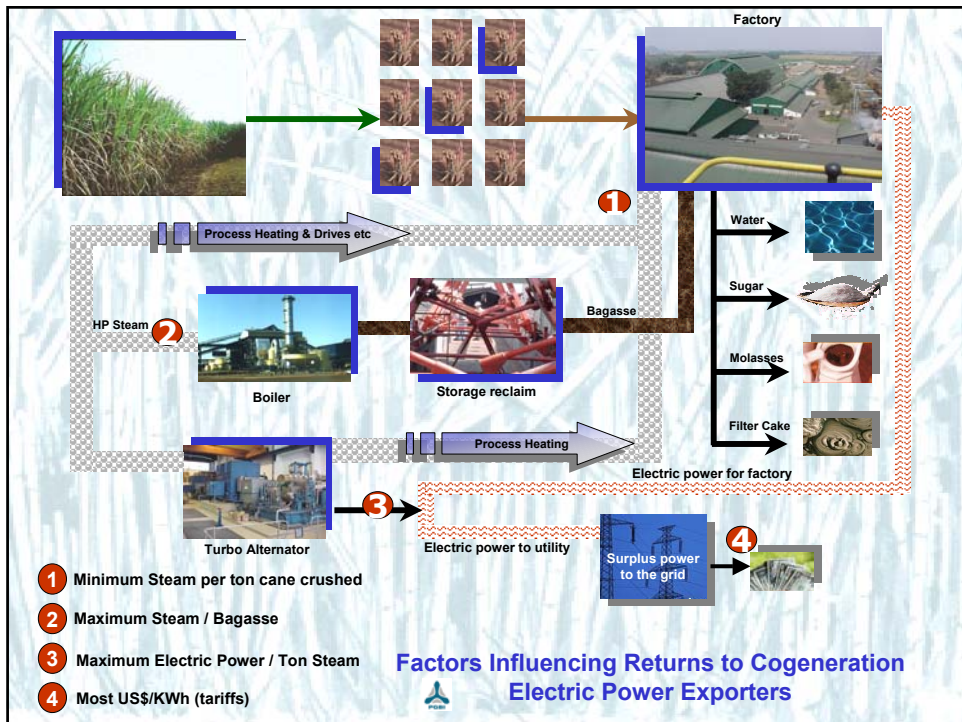


# ABSTRACT

## *Co-generation*

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General overview of the use of turbine alternators in sugar mills and the factors that could influence the sustainability and balance of fuel, sugar production and sales of electrical power.



## Energy in Fuel Supply

- ✘ Crush rate (tch)
- ✘ Varieties planted and area
- ✘ Fiber % Bagasse  $\approx 16\%$
- ✘ GCV = 9 000 kJ/Kg @ 50% MC
- ✘ GCV = f (moisture % + ash%)

# Steam Production

- ✘ Old boilers; specific steam production = 1,8 t steam/ton of bagasse (52% MC and 2% ash)
- ✘ Efficiency improvements – (heat recovery equipment)
- ✘ Modern boilers; specific steam production = 2,2 t steam/ton of bagasse
- ✘ Operating Pressures

# Effect of HP Steam

	30 bar, 400° C	45 bar, 440° C	60 bar, 500° C
Steam Flow t/h	80	77	74
Electrical Power MW	9.4	10.8	12
Evaporative Capacity MW	49	47.7	46.5

## Factory Efficiency

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- ✘ Single wheel turbines – inefficient
- ✘ Electrical drives – more efficient (1MW in steam replaced by electrical drive = 1MWe available for export)
- ✘ Electrical drives reduces LP steam supply for evaporative duty
- ✘ Increase evaporative capacity – reduce steam on cane from 50 to 40% (quintuple)

## Efficient Turbo Alternator

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- ✘ Modern machines (back pressure) 6,7 t/MWe
- ✘ More efficient turbines
  - Less steam required/MW
  - Less bagasse required
  - Less exhaust steam for evaporative duty

# Correct Solution?

ACTION	ADVANTAGES	DISADVANTAGES
Boiler with heat recovery equipment	Increased bagasse generation Less coal / oil in off-crop	Additional capital cost Double handling of bagasse - more storage needed.
TA with condensing facility	Improved cycle productivity and flexibility	Additional capital cost.
Balance Power Station with sugar process requirements	Increased bagasse generated power sales Reduced capital cost	Double handling of bagasse - more storage needed. Reduced power sales.
Utilise (burn) all bagasse in crop	Reduced double handling of bagasse. Increased power sales over reduced period	Reduced total percentage of bagasse generated power. Increased capital cost

## Demand, Distribution & Tariffs

### ✘ Demand

- Stop days and Off-crop - an issue to plan for

### ✘ Distribution

- Wheeling of power for own use
- Own network to consumers
- Sell to utility

### ✘ Tariffs

- Eskom sell at < 2 U\$c
- Is co-generation viable at < 5 U\$c?