



# Utilizing Sugar Cane Residues



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Gerben Timmer | June 2014 | SP Brazil



- Brazil leading country for sugar cane ethanol
- Main sugar cane residue: Bagasse;
- Bagasse mainly used as biofuel for cogeneration;
- Byproduct of ethanol: Vinasse. A watery substance with 5-11% solids, including organics and minerals (mainly Pottasium)
- Vinasse used for Ferti-irrigation



- With the vinasse Pottasium (K) taken from the soil by the cane is returned. However:
- There is a problem of (mal) distribution
- When the cane field is far away, transportation costs come in to play;
- Washing out can contaminate surface water as well as ground water.
- Vinasse is odorous;



- Ethanol Brazil, volume of vinasse:
  - Ethanol production: ~16 million m<sup>3</sup>/year;
  - Byproduct: 12 x 16 mio m<sup>3</sup> = 192 million m<sup>3</sup>/year of Vinasse
  - equivalent of 5,000,000 tanker trucks



- In order to reduce the environmental Impact of Vinasse:
  - It can be used for co-generation of power and steam;
  - Close to the ethanol refineries;
  - No transportation.





- The NEM solution:
  - Vinasse cogeneration plant;
  - Can operate stand alone with only concentrated vinasse as fuel (aux. fuel for start up only).
  - > 30 years of successful experience.
  - NEM proprietary burner technology based on vinasse only!





Biomass Liquid Waste Steam and Power Boilers

**2014 !**

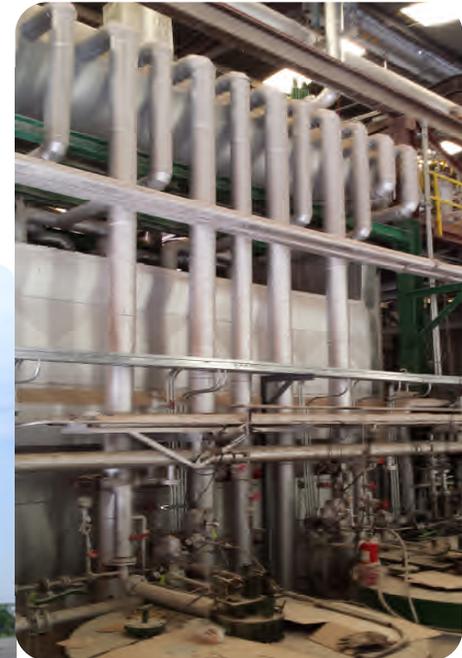
**Project:** Bang Yi Kan  
**Location:** Bangkok, Thailand  
**Owner:** Thai Bev  
**Product:** Vinasse Incinerator Power Plant  
**Commercial operation:** 1986

**Technical features**

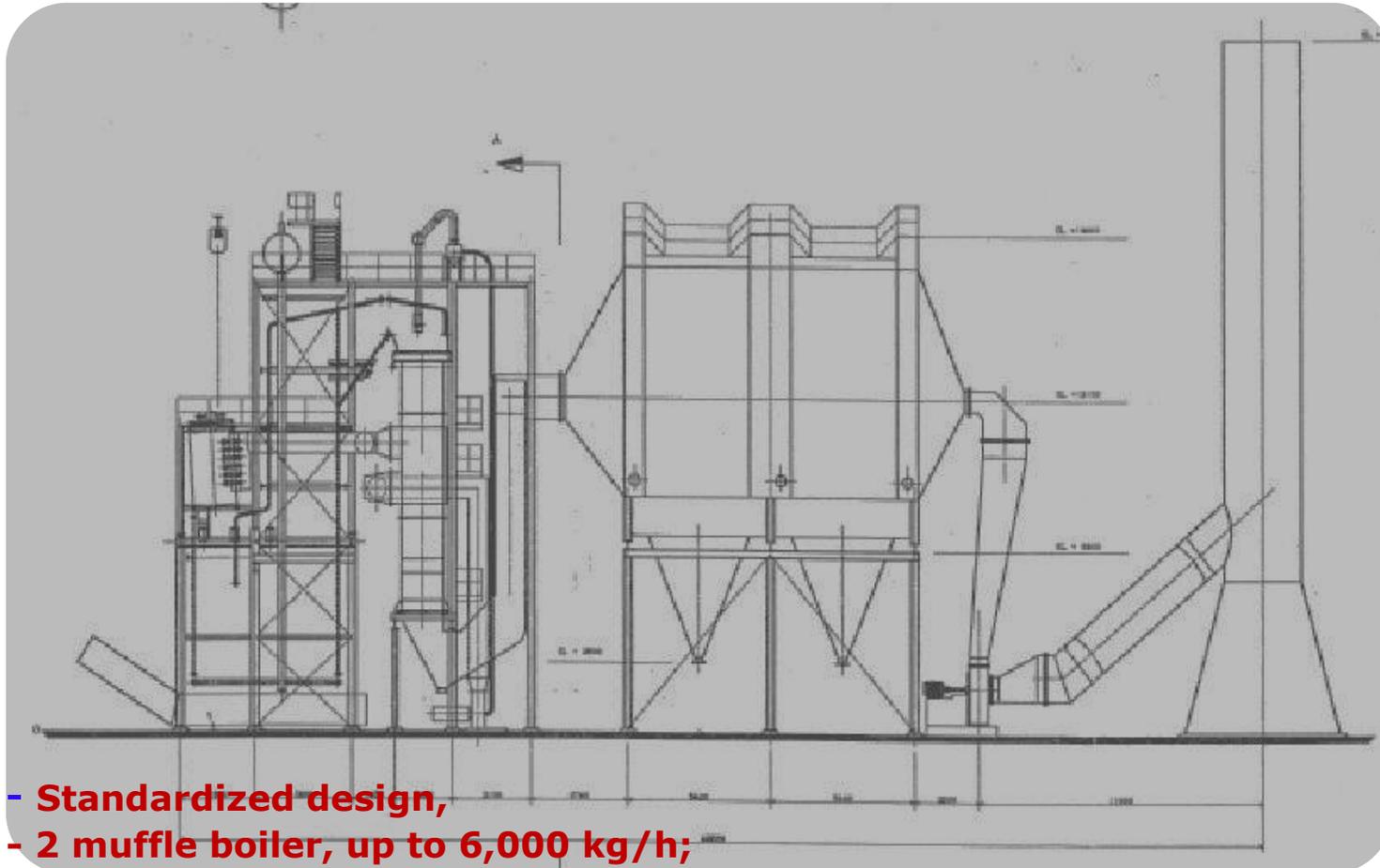
**Quantity:** Two  
**Technology:** Combustion  
**Fuel:** Vinasse

**2004**

**1986**



Vinasse Incineration plant Bang Yikhan  
Distillery, Bangkok, Thailand, 1986



- Standardized design,
- 2 muffle boiler, up to 6,000 kg/h;
- Design ensures self cleaning of burner muffle;



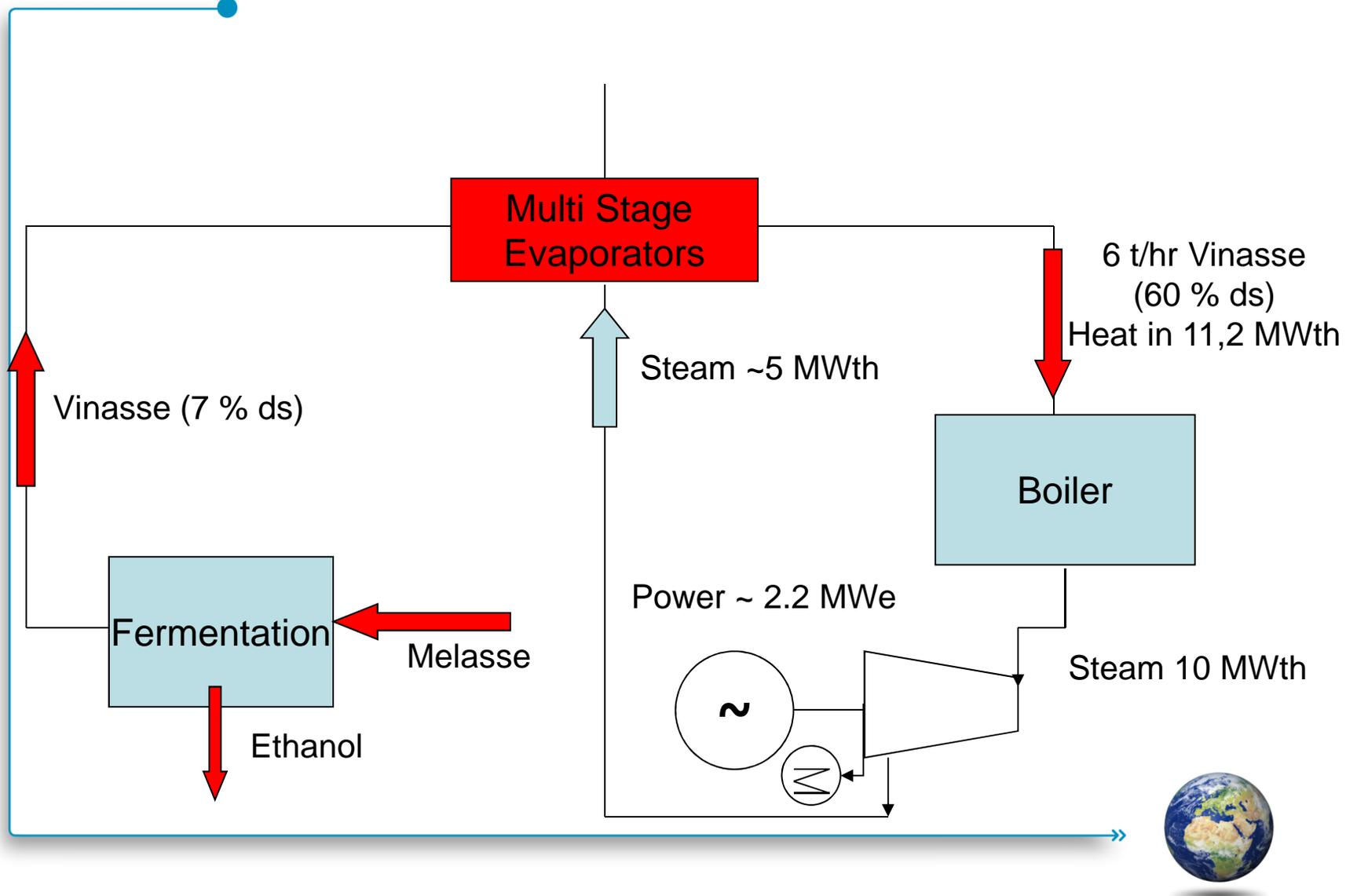
- Why do this?
  - Produce renewable energy;
  - No more transportation;
  - No more contamination of surface water and ground water;
  - Exact distribution of Pottasium on the land



Bagging of ash, sold as fertilizer



# Basic Process



- Savings:
  - Sale of Energy and CO<sub>2</sub> premium
  - Sale of Ash
  - Gate Fee vinasse (from saving on transportation)
  
- Costs:
  - Investment
  - Operation & Maintenance
  - Start up fuel



- Comparison with e.g. Biogas (digestion):
  - Biodigestion generates **0.02** kWh/m<sup>3</sup> vinasse (7% DS)<sup>1</sup>
  - NEM solution generates **45** kWh/m<sup>3</sup> vinasse (7% DS)
  - No difficulties to handle digestate, just powdered fertilizer.

- 1 taken from

*World Renewable Energy Congress 2011 – Sweden  
8-13 May 2011, Linköping, Sweden*

*Bioenergy Technology (BE)*

**Brazil's potential for generating electricity from biogas from stillage**

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## To Conclude



- Vinasse is a substance that can create a problem
- NEM has technology to change from problem to renewable energy cogeneration.
- At the same time neutralize the environmental impact of vinasse.



- Thank you for your attention.

