

Biogas from Industrial Wastewater

Berni Chapman

© Copyright
Waste Solutions Ltd 2008



Waste Solutions

- **New Zealand company**
- **Specialist knowledge and experience in energy from waste**
- **Track record of technology excellence and innovation**

Waste Solutions



Waste is a valuable resource

- Energy/fuel
- Nutrients/fertilizers
- Organic matter
- Carbon Credits
- Water

Methane Recovery Opportunities

Typical Applications

- Municipal sewage
- Feedlot manure
- Dairy shed effluent
- Primary processing effluent
- Industrial sludges (flotation foams)

New Applications

- Post consumer waste
- Food residuals
- High fat waste
- High nitrogen waste
- Energy crops
- Biofuels waste

A wide-angle photograph of a large body of water, possibly a reservoir or a wide river. The water is calm and greyish-blue. In the foreground, the shoreline is covered with dark, wet earth and numerous small, white, foamy bubbles that appear to be rising from the ground. The background is a dense line of green trees under a pale, overcast sky. The text is overlaid on the left side of the image.

**At Sanguan Wongse Industries, Khorat,
(Thailand) 1,000 tonnes of carbon equivalent
went up in the air, every day !**



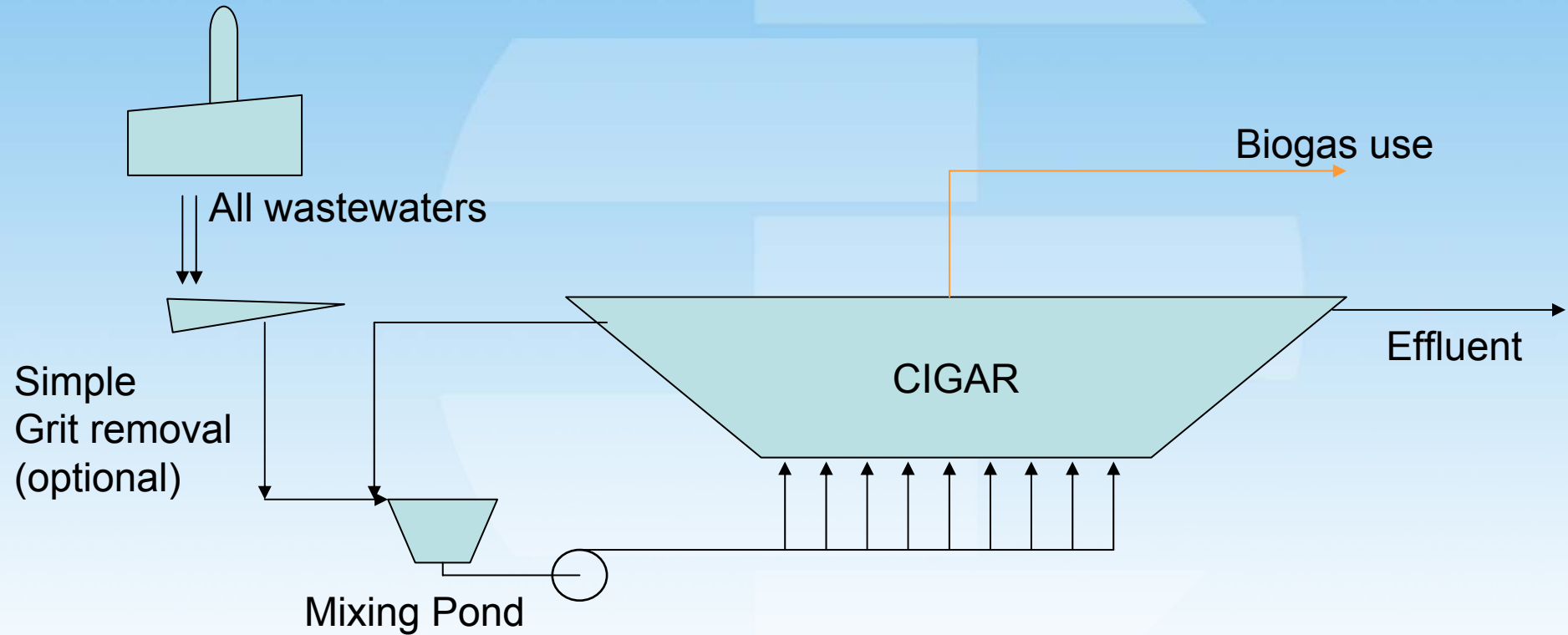


- Covered In Ground Anaerobic Reactor
- System Developed by WSL
- Significant advance an anaerobic lagoons

Competitive Advantages

- **Technology cheaper than competing in-tank based technology**
- **Much of the European and US based technology focuses on space savings and is unnecessarily expensive**
- **Technology is affordable and suitable for application in developing countries**
- **Technology suitable for 'complex' wastewater, high in fat, solids and proteins.**

CIGAR schematic



CIGAR



Before



After



Before



After



Powerplant



Cigar[®] Plants in Operation (or Construction)

- **Starch Wastewater (Cassava, Wheat)**
- **Palm Oil Processing Waste**
- **Feedlot Manure**
- **Piggery Manure**
- **Ethanol Distillation Wastes**

Ethanol Production Facility



Incoming fresh distillery slops



- 140,000 mg/L COD
- 6,400 mg/L SO₄
→ High Sulphide
- Phenolics and refractory carbon
- pH 4 - 4.5
- 100°C

Laboratory Trials

- **Successful**
- **Good source of energy**
- **Yield: 230 m³ CH₄/tonne COD loaded**



On-site Pilot Evaluation

Full Scale Cigar[®]



- 40,000 m³
- COD concentration
150,000 – 210,000 mg/L
- 64% methane
- Biogas to boilers

The Way Forward

- **Single waste supplier projects**
- **Lower capital (US\$ 1-5 million)**
- **Return on investment >1 to 5 years**
- **Khorat Waste to Energy project**
 - US\$ 3.4 million capital
 - Energy sales US\$ 2.2 million/year (60% of capital)
 - Carbon credits US\$ 1.75 million/year (pending approval)