BOWMAN TG80 SG
Baggeridge Brickworks

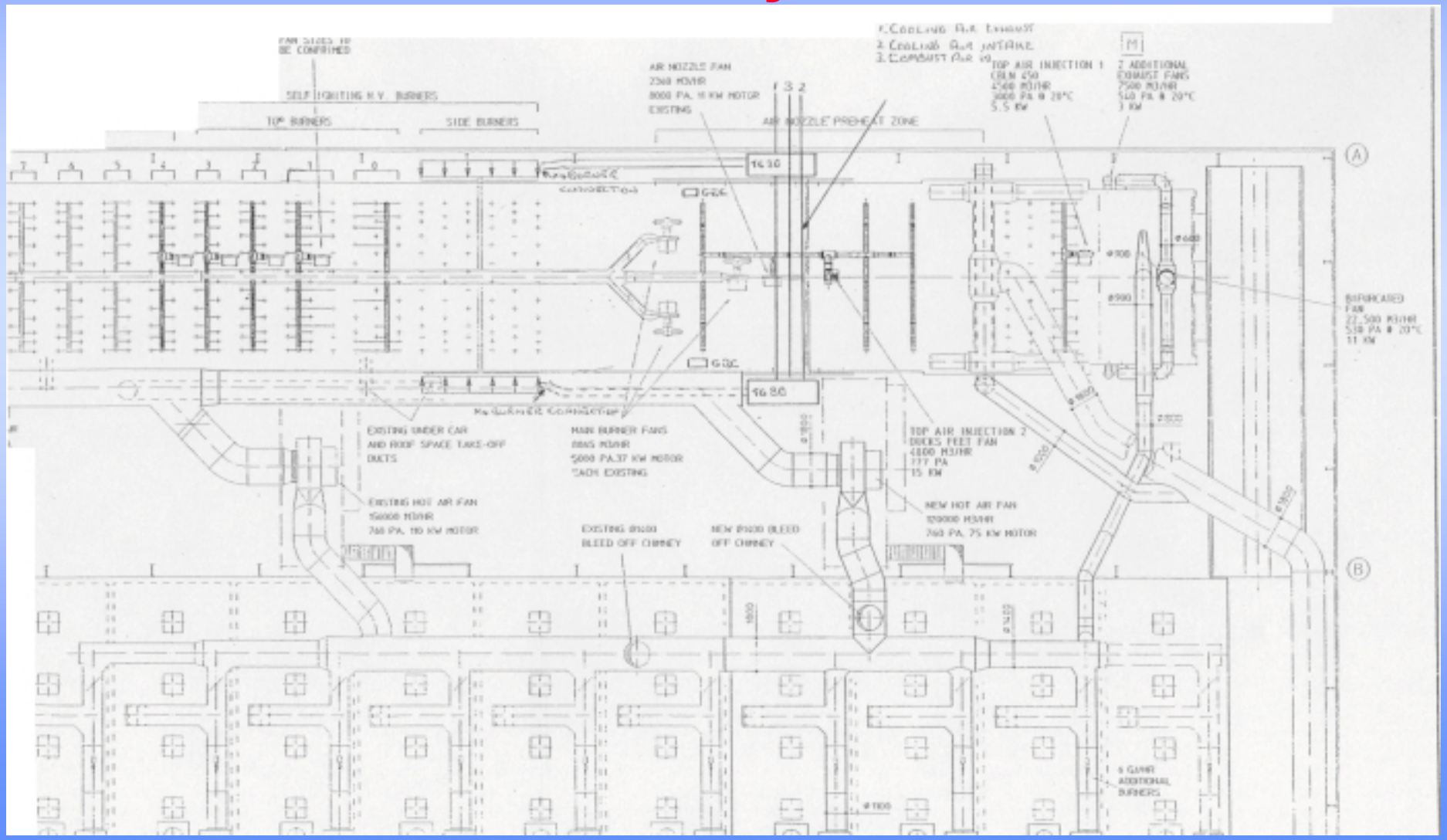
Paul Lambert

Kohler Power Systems

Bowman Power Systems

- Project Manager – Tony Bullin
- Funding Partners – Bowman acting as an ESCO
- Engineer – Bill Featherstone
- Project plan Vs actual dates
  - Equipment Delivery August 2001
  - System Commissioned September 2001
  - Monitoring Underway September 2001

Kiln Layout


SELF IGNITING N.V. BURNERS
TOP BURNERS
SIDE BURNERS
AIR NOZZLE FAN
2360 M3/HR
8000 PA, 11 KW MOTOR
EXISTING
AIR NOZZLE PREHEAT ZONE
TOP AIR INJECTION 1
KILN 250
4500 M3/HR
2000 PA @ 20°C
5.5 KW
2 ADDITIONAL
EXHAUST FANS
7500 M3/HR
540 PA @ 20°C
3 KW
BIFURCATED
FAN
22,500 M3/HR
530 PA @ 20°C
11 KW
EXISTING UNDER CAR
AND ROOF SPACE TAKE-OFF
DUCTS
MAIN BURNER FANS
8845 M3/HR
5000 PA 37 KW MOTOR
EACH EXISTING
TOP AIR INJECTION 2
DUCKS FEET FAN
4800 M3/HR
777 PA
15 KW
EXISTING HOT AIR FAN
56000 M3/HR
760 PA, 110 KW MOTOR
EXISTING Ø600
BLEED OFF CHIMNEY
NEW Ø600 BLEED
OFF CHIMNEY
NEW HOT AIR FAN
120000 M3/HR
760 PA, 75 KW MOTOR
5 GAMR
ADDITIONAL
BURNERS

Project Overview
First UK use of micro-turbine CHP in a Brickworks

- **Two simple cycle gas turbines installed in a brickworks**
- **Waste heat used directly in kilns**
- **Power used onsite**
- **24 hour availability**
- **Installed system efficiency > 90%**
- **Harsh process environment**

Cost Table in US$

Item		
Turbine		$112,000
Gas Boost Compressor		$10,000
Mechanical*		$7,000
Electrical		$7,000
Civil		$7,000
Project Mangement	(absorbed by BPS)	_____
TOTAL		$143,000

Electrical Performance

- 5,000 operating hours on two units
- Average Electrical performance 15%
  - Delivering a combined 160 kWe
- Parasitic Losses by GBC 2.5-3 kW each
- Power Quality is 3% THD

Thermal Performance

- Thermal Output - 400 kW each
- Total Installation Efficiency – 90%

Emission Performance

- NOx - 19.9 ppm / 2.73 g/kWh
- CO - 74.1 ppm / 0.79 g/kWh
- THC - not measured
- Are emissions in line with equipment suppliers estimates?

O&M Performance

- Availability
  - The systems have been available 99% of the time required.
- O&M costs - $0.0075 kW/hr
- Cost to end-user $0.03 kW/hr

Institutional Experience

- Since this was a pioneer project, no CE or Gastech certification was required.
- The procurement of such permitting varies according to location.
- The installation did require a G59 Relay panel to satisfy Electric Utility standards. This panel is required to prevent backfeed of power to the grid and prevent net metering.

Supplier Support

- Gas temperatures are critical to a kiln operation. In this case, needed to be over 600C (1100F). Also need sufficient turbulence in furnace from gas jets.
- Technical Support – can be supplied by any competent MTG tech.
- Costs of Spare parts is represented in the O&M costs of $0.0075 kWh, figure is adjusted to $0.013 to accommodate engine replacement at 25K hours.
- As BPS was acting as an ESCO, all warranty costs are built into billing price to end user.

General Experience

- Areas to be improved
  - **After burner is required to produce sufficient heat output**.
- What is the opinion of the future market opportunities
  - **Great application for all drying processes**
- Are there any R&D or development areas that should be looked at
  - **BPS is developing after burner with major burner developer Neway**