



FLEXENERGY
SOLUTIONS

FlexEnergy GT333S vs. Competition

PREPARED FOR BAXTER & WOODMAN -
DOWNERS GROVE SANITARY DISTRICT

FLEXENERGY ADVANTAGES OVER COMPETITION



- Lower Emissions
- Greater Fuel Flexibility
- Large Motor Starting for Grid Isolated Operation
- Closed Transition from Grid Parallel to Grid Isolated and Back
- Cold Weather Advantage
- 8-12 hours of Annual Planned Service
- Footprint & Sound

GT333S ADVANTAGES OVER COMPETITION

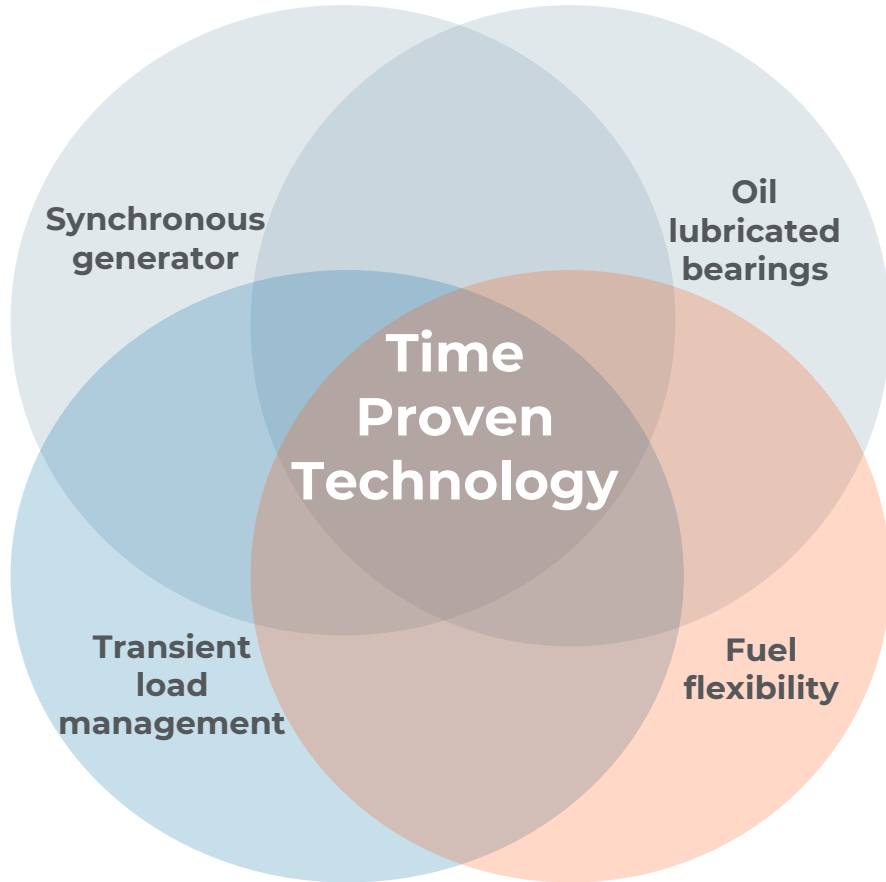


Comparison to Competitors:

	Flex Turbines	Diesel Gensets	Gas-Fired Recip Engine	Other Micro-Turbine
Low annual maintenance (Very few "Touches")	✓			✓
Ability to consistently absorb and shed large power loads	✓	✓	✓	
Robust oil lubricated bearings	✓	✓	✓	
Rugged synchronous generator can start 125HP loads	✓	✓	✓	
Utilizes resistive load bank to manage highly transient and cyclic loads associated with artificial lift sites	✓			
Use of field gas vs. need to import expensive fuel (Diesel or LNG + transportation) AND eliminates expensive, difficult fuel delivery logistics	✓		✓	✓
Low emissions allows for easier permitting and ensures emissions limits are not exceeded	✓			✓

MATCHING TECHNOLOGY TO APPLICATION

Trusted large gas turbine technology in a smaller package



	Generator Technology	Speed reduction gearbox?	Bearings	Inverter based system w/ batteries
Rolls Royce	SYNCHRONOUS	YES	OIL LUBRICATED	NO
GE	SYNCHRONOUS	YES	OIL LUBRICATED	NO
Siemens	SYNCHRONOUS	YES	OIL LUBRICATED	NO
Solar	SYNCHRONOUS	YES	OIL LUBRICATED	NO
Dresser Rand	SYNCHRONOUS	YES	OIL LUBRICATED	NO
Flex	SYNCHRONOUS	YES	OIL LUBRICATED	NO
Capstone	HIGH SPEED ALTERNATOR	POWER ELECT.	AIR LUBRICATED	YES

**Capstone is the only turbine provider using batteries, air bearings, high speed alternator and power electronics.*

FLEXENERGY SOUND & VIBRATION ADVANTAGE

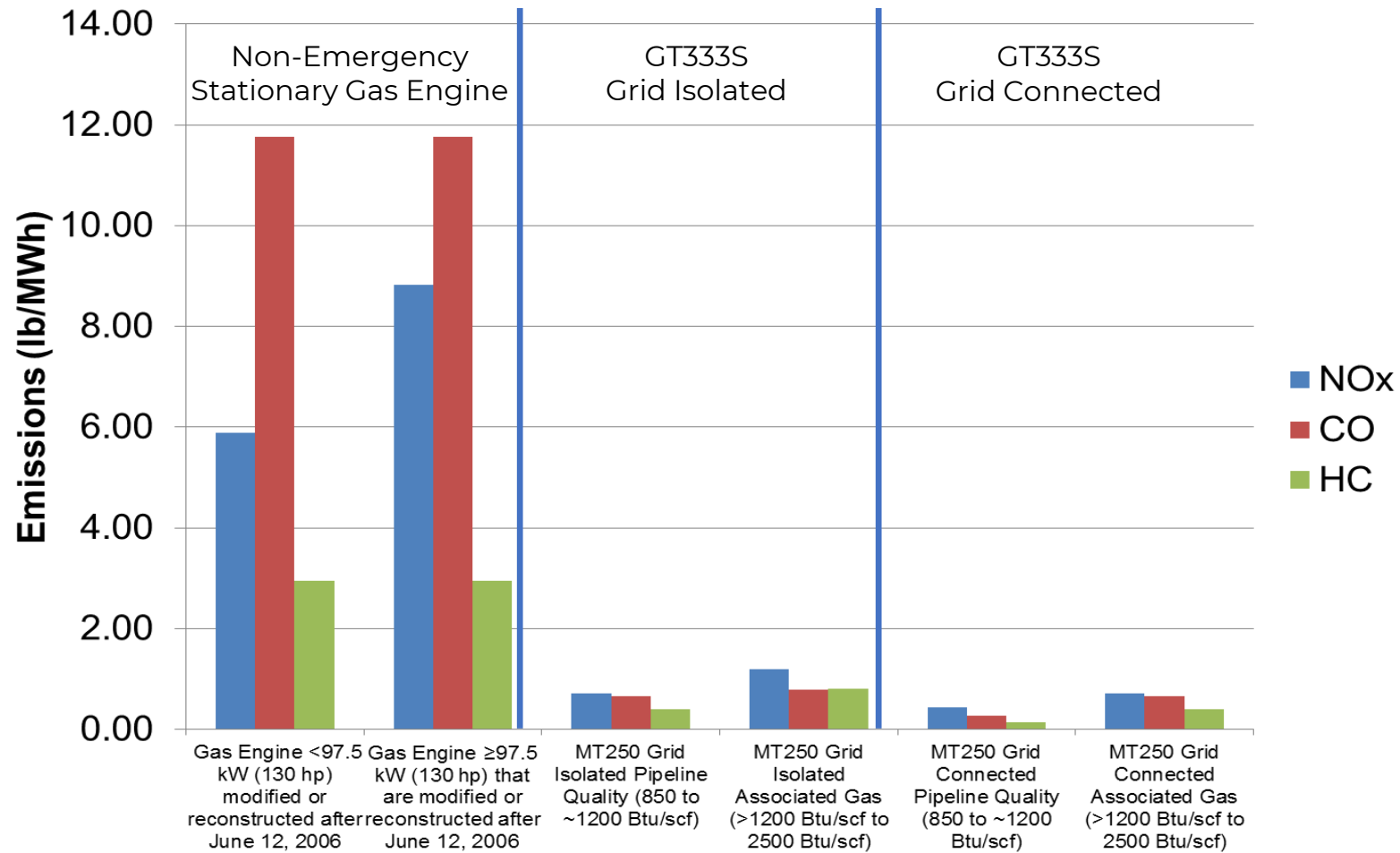


- Reciprocating engine sound levels significantly higher than GT333S
 - Often require sound-reducing enclosures or special rooms
- Engines can produce significant vibration
 - May require vibration dampening
- **GT333S is low sound and produces very little vibration**
 - Rotating instead of reciprocating components

GT333S Sound (dBA)		Reciprocating Engine Sound (dBA)	
Standard	Low	Standard	Low
82	77	90 to 115	83 to 98

Measured at 1 m; levels at 10 m are 20 dB(A) lower

FLEX TURBINE® EMISSIONS VS GAS GENSETS



Power: reliable, clean, and simple.

GAS ENGINES CAN BE CHALLENGED BY ASSOCIATED GASES



- Heavier alkanes can cause knock issues in spark-ignition internal combustion engines
- Knock (detonation) degrades piston materials, causes erosion
- Methane number (MN) is common indicator of knock susceptibility
- MN = 100 has same knock behavior as methane
- MN = 0 has same knock behavior as hydrogen
- Lower MN = higher knock probability
- Heavier alkanes reduce MN; CO₂ & N₂ increase MN

Gas	Methane Number
Methane	100
Ethane	44
Propane	34
Butane	10

SAMPLE SURVEY OF SMALL ENGINE MN LIMITS

- GE Jenbacher :
 - Type 2 (240-350 kW): min MN = 70
 - Type 3 (500-1100 kW): min MN =70
 - Type 4 (800-1500 kW): min MN =70
 - Type 6 (1.8-3MW): min MN =80
- Guascor FG-FGLD series (180-800kW) min MN=75
- Cummins C1100 N6C (1132 kW) min MN=64
- Caterpillar 3412 (341 kW) min MN=70

GAS TURBINES DO NOT HAVE KNOCK ISSUES

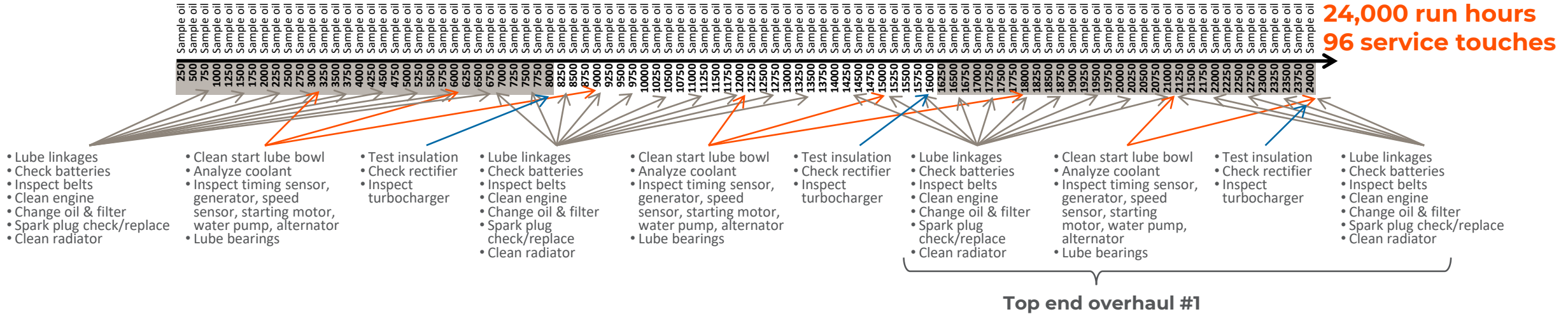
- Turbine power is NOT de-rated with heavier alkanes
- Turbines operate at design intent regardless of Methane Number
- **No special initial setup or tuning is required**
- Do not require any follow-on adjustment due to gas composition change
- Are robust against changes in fuel composition over time

INCREASED UPTIME – LOWER MAINTENANCE

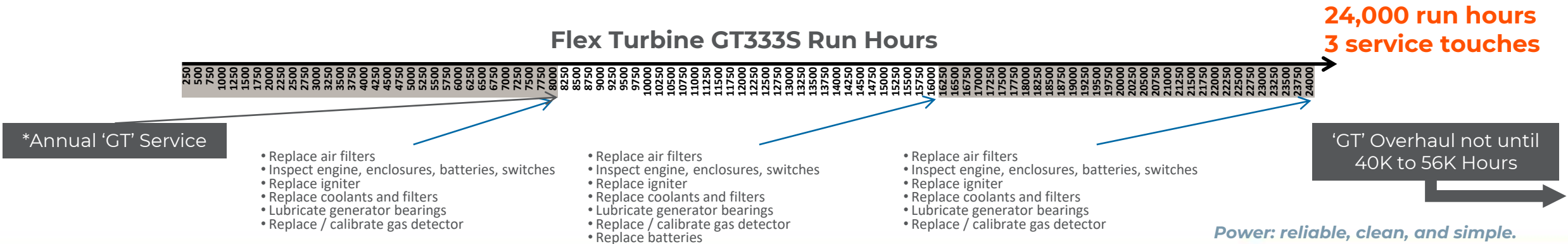


Scheduled service: reciprocating engine vs Flex Turbine

375 kW Reciprocating Engine Generator Run Hours



Flex Turbine GT333S Run Hours



*Annual 'GT' Service

Power: reliable, clean, and simple.

LOW MAINTENANCE / HIGH UPTIME

Scheduled GT333S Annual Service Scope

- Replace air filters
- Inspect engine, enclosures, batteries, switches
- Replace igniter
- Replace coolants and filters
- Lubricate generator bearings
- Replace / calibrate gas detector

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GT333S Run Hours



*Annual 'GT' Service – 6-8 hours

'GT' Overhaul not until 40K to 56K Hours



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