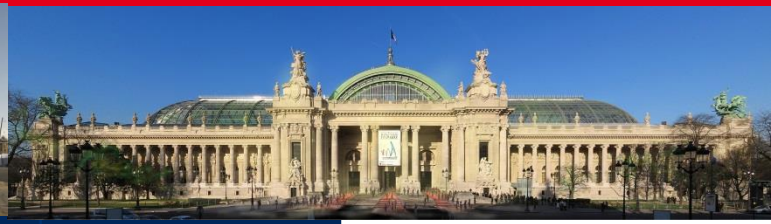
26th World Gas Conference

1 – 5 June 2015, Paris, France



Gas to Power: An African Perspective with Case Studies

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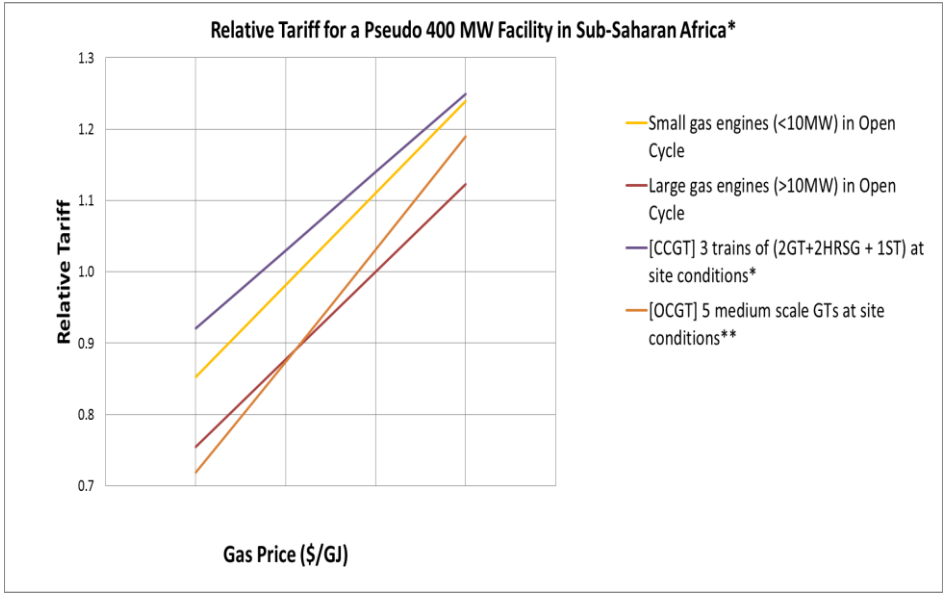
WGCPARIS2015

WORLD GAS CONFERENCE

General Selection Criteria

- Plant Capacity
- Delivered gas price
- Off taker requirements
  - Mid merit/baseload/peaking
- Site Conditions
  - High temperatures/ high altitude (derating), cyclones (construction delays)
- Water
  - Quality and Quantity



*Mid-merit operation
**High ambient temperature
Altitude derating

African Specific Issues?

- Available infrastructure and remoteness of site
- Skills
  - Requirement for local labor contingent
  - Training and development
- Conflicts
  - Landmines
  - Disruptions/productivity impacts
- Compensation
- Communication – Language and Culture

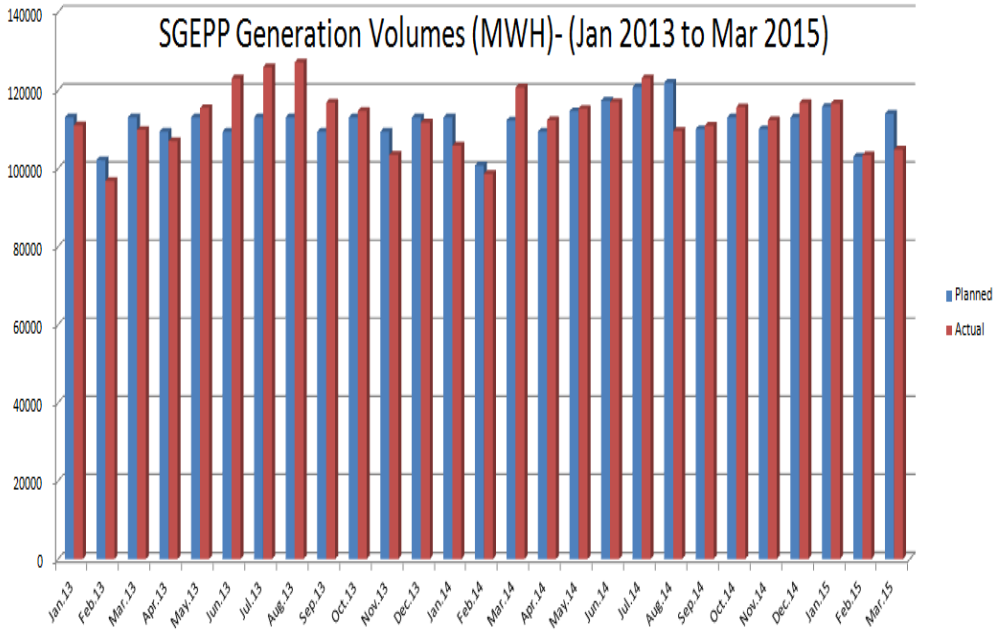
Case Study 1: Sasolburg Gas Engine Plant

- Gas Engines - First of a Kind for Sasol (W*ä*rtsil*ä* engines used)
  - Altitude >1500m and high ambient temperatures
- Largest Gas Engine based power plant in Africa (at the time) = 175 MW (installed)
  - N+2 sparing => high degree of flexibility
  - *Construction – 12% ahead of schedule
  - *Costs - 17% under budget
  - Safety
    - *RCR (construction) slightly above the industry norm but has been at 0 since commissioning

*information from IPA assessment

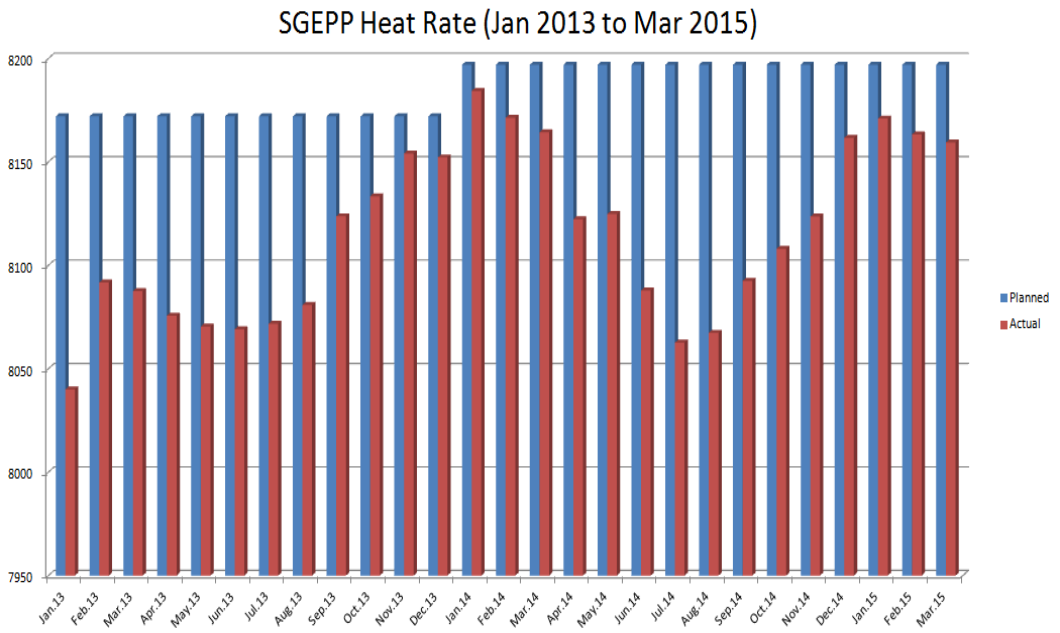
SGEPP Generation

- Contracted to run 16 engines but regularly run more.
  - Supporting the Eskom (national electricity provider) grid
  - Where actual < plan this is due to the upsets at the gas supplier (SGEPP is last in line and first affected).



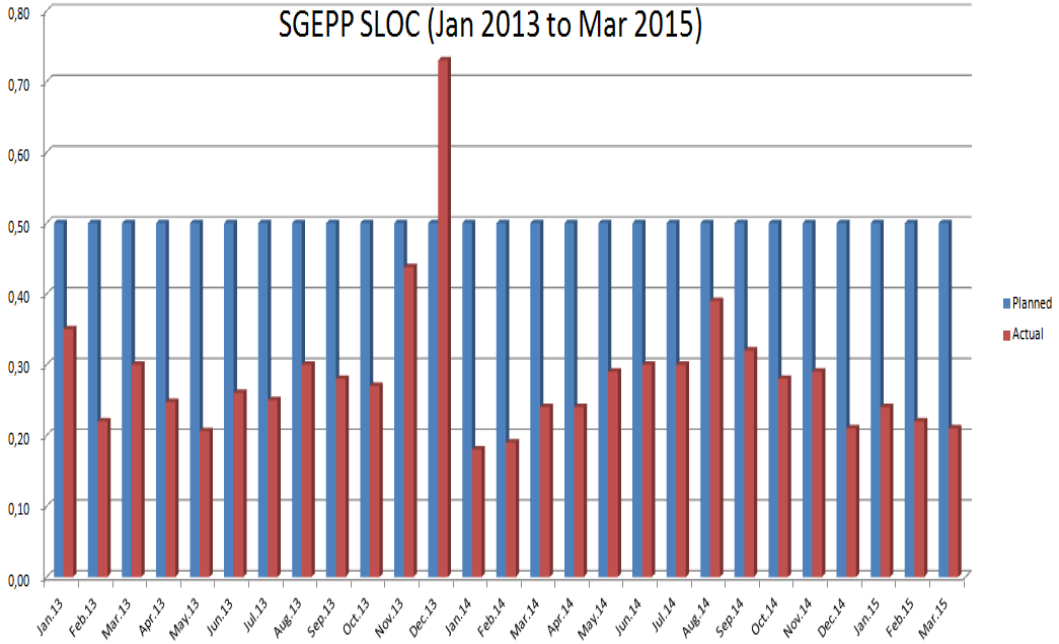
SGEPP Heat Rate and Maintenance

- Successful completion of major overhauling of 17/18 engines at 16 000 hours interval.
- Continuous learning has helped reduce the major overhauling downtime from planned 18 days to 9-10 days



SGEPP Lube Oil Consumption

- Lube oil change out in Dec 13.



Case Study 2: CTRG

- W*ä*rtsil*ä* Gas Engines - First of a Kind in Mozambique
- Same number and size of engines as SGEPP
- Plant started up in February 2015
- Construction – 44% behind original plan but 0% on re-baselined plan
- Costs - 7% under budget
- Safety
    - *RCR during construction was lower than Sasol average.*

CTRG Performance Test Run Results

- Average power at site conditions = 152 MW (16/18 engines)
- Average LHV heat rate = 8222 kJ/kWh (gas quality has changed and heat rate slightly above (<0.5%) guarantee)
- Performance overall is better than guaranteed
- No major issues since start-up.

Conclusions

- Growth in electricity demand in Africa is expected to be significant. Gas will be used more frequently to generate electricity.
- Gas to Power projects within Africa are not without their challenges.
  - Many site and location specific factors need to be considered
- The gas turbine only paradigm should be challenged as there clearly is a place for large scale gas engine based facilities for plants <400 MW.
- However, with advances in both gas engines (ie. larger sizes) and gas turbines (ie. more efficient and more flexible at smaller capacity), the choice is not always obvious.
- **Ultimately a techno-economic evaluation is required for decision making**

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