

Compressed Natural Gas Conversion Project



**Johannesburg Metropolitan Bus Services SOC
Limited (Metrobus)
Presentation to SABOA Conference & Exhibition
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Presentation Outline

- **Background**
- **Milestones Achieved**
- **Return on Investment**
- **Assessment of DDF Converted Buses;**
- **Lessons Learnt**
- **Way-forward**

Background

- In 2013 The City of Johannesburg approved a Turnaround Plan for Metrobus;
- Turnaround Plan included procurement of buses and use of alternative fuel technologies including compressed natural gas, biogas or bioethanol

Ways to achieve alternative fuel technology

- After market conversions – retrofitted by a qualified system retrofitter
- Prepped vehicles factory installed engine prep packages converted by a qualified vehicle modifier

Milestones Achieved

- 2014: Started a pilot with 30 buses retrofitted with Italian DIGIT conversion system;
- Fitted with 4x 100 litre water equivalent;
- In 2014 Attempted to procure biogas buses not successful;
- 2015 Procured 150 DDF buses fitted with 3 type carbon fibre cylinder;
- 2015 – Procured a daughter CNG station for one of our depots to reduce non-service kilometres

Milestones Achieved (cont...)

- 150 Dual Diesel Fuel Buses



Return on Investment

- Initially substitution rate was 30%/70% gas to diesel; average saving of $\pm 40\%$ on diesel consumption;
- CNG reduces maintenance costs;
- CNG costs R7/ litre equivalent vs R14 litre of diesel

Bus Type	Q1 Opacity %	Q2 Opacity %	Q3 Opacity %	Q4 Opacity %
1725/59	21%	18%	14%	15%
1725/DDF	21%	18%	24%	35%
Euro 5	5%	7%	9%	8%
Euro 3	28%	26%	27%	
VOLVO B7L	38%	52%	28%	69%
VOLVO B7R	26%	35%	21%	57%
Weighted Average	16%	18%	16%	15%

Assessment of 30 DDF Converted Buses

Findings

- Certificate of Compliance;
- Gas Filling and Usage;
- Maintenance of DDF buses; and
- Over reliance on service providers

Lessons Learnt

- Limited understanding of the technology across the board;
- Initial cost of Investment is high;
- Life cycle costing approach is important
- Fill Rate- If the buses do not fill gas constantly then the benefits and cost savings of having DDF buses is greatly reduced;
- Training of the operators on the gas system, how it works and what the benefits are as well training on general maintenance for the mechanics/technicians
- Proper profiling of routes- Which routes to operate and the substitution rate per route
- Limit bus operators choice
- Focus on enterprise development and skills transfer programs;
- On-going engagement with the market players;
- Create awareness and assure our customers of the safety gas buses

Way-forward

- Launched a collaborative research with University of Johannesburg Process Energy and Environmental Technology Station; German Development Agency (GIZ) as well as International Council on Clean Transportation (ICCT)



OBJECTIVES

- Define the base line performance anticipated for the buses and compare to the present performance;
- Develop approach towards improving existing processes to ensure maximum benefits obtained from the DDF buses both on technical, environmental and economic performance metrics.
- assess the current Metrobus DDF fleet in comparison to other alternative drive systems and fuels for the years 2020 and 2030;
- Assess economic and environmental benefits has diesel dual-fuel technology delivered in Johannesburg;
- Determine technology pathways in the Metrobus fleet that can deliver equal or greater economic and environmental impact.



*Let's preserve
our resources for
future
generations*

*THANK
YOU
ALL!!*

