Compressed Natural Gas Conversion Project

Johannesburg Metropolitan Bus Services SOC Limited (Metrobus)
Presentation to SABOA Conference & Exhibition
CSIR International Convention Centre, Pretoria
31 July 2019
Presentation Outline

- Background
- Milestones Achieved
- Return on Investment
- Assessment of DDF Converted Buses;
- Lessons Learnt
- Way-forward
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 ±40% on diesel consumption;
- CNG reduces maintenance costs;
- CNG costs R7/ litre equivalent vs R14 litre of diesel

<table>
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<tr>
<th>Bus Type</th>
<th>Q1 Opacity %</th>
<th>Q2 Opacity %</th>
<th>Q3 Opacity %</th>
<th>Q4 Opacity %</th>
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<td>21%</td>
<td>18%</td>
<td>14%</td>
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<tr>
<td>1725/DDF</td>
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<td>Weighted Average</td>
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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!!