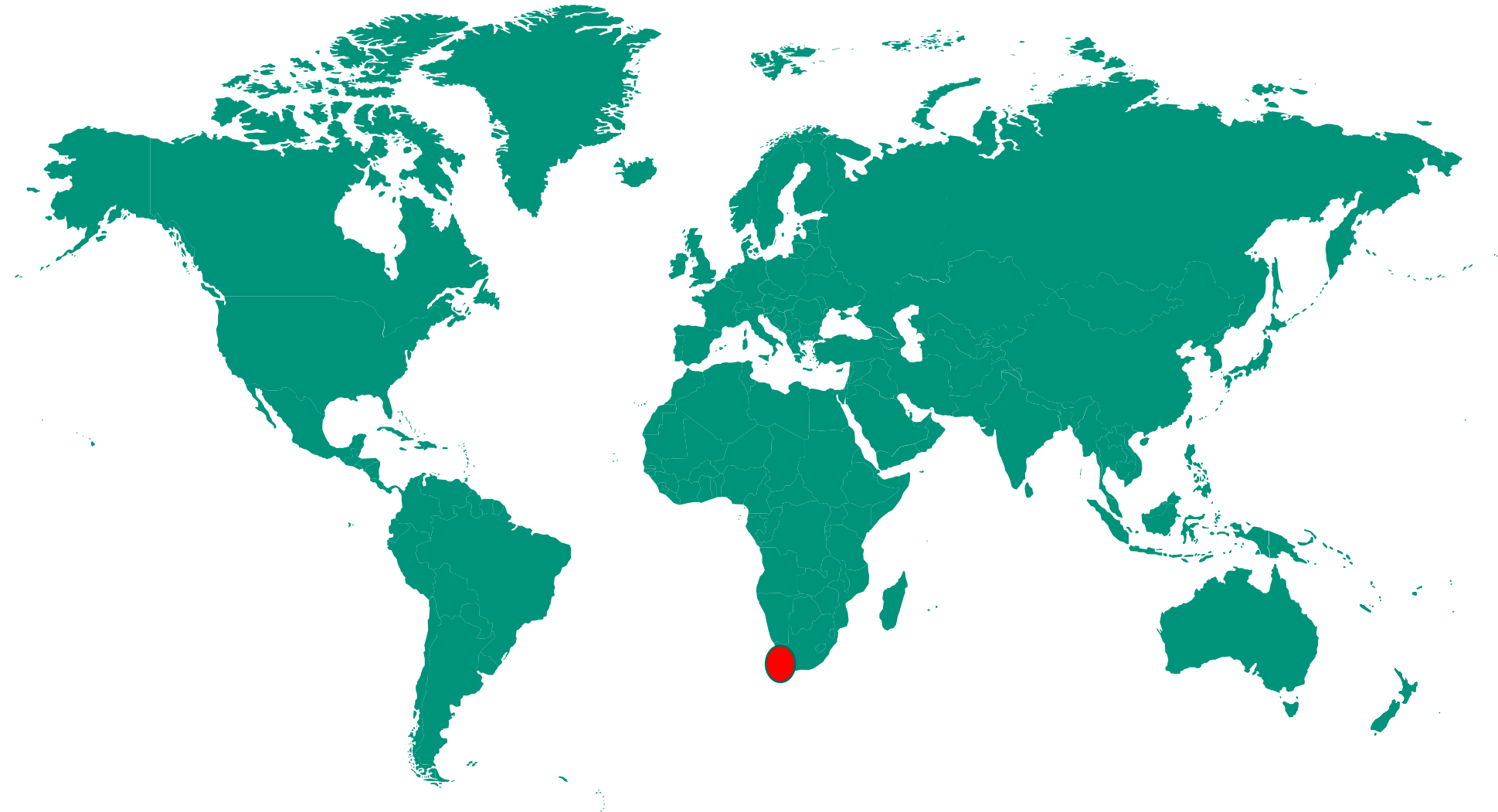


Challenges In Transforming A Large Fleet To Electric Buses



Golden Arrow Bus Services, Cape Town, South Africa



Agenda



Background To Golden Arrow



- Based in Cape Town
- Fleet of 1 100 Buses
- Operate 65 000 000Km Annually
- Consume 25 000 000Lt Diesel Annually

Initiatives to Reduce Carbon Footprint



- Fleet Renewal Programme Of >60 Buses Per Year Since Calendar Year 2000
- New Technology Engines = Improved Fuel Consumption
- 9% Fuel Consumption Improvement In 10 Years From 2010 to 2020
- 1.4 MWp Solar Generating Capacity Installed Since 2017

Electric Bus Challenges In South Africa



- No Or Limited Support From Government
- High Import Taxes On Electric Vehicles
- No Active Electric Vehicle Manufacturers In SA
- Unreliable Electricity Supply With Above Inflation Increases

General Concerns Regarding Electric Vehicle



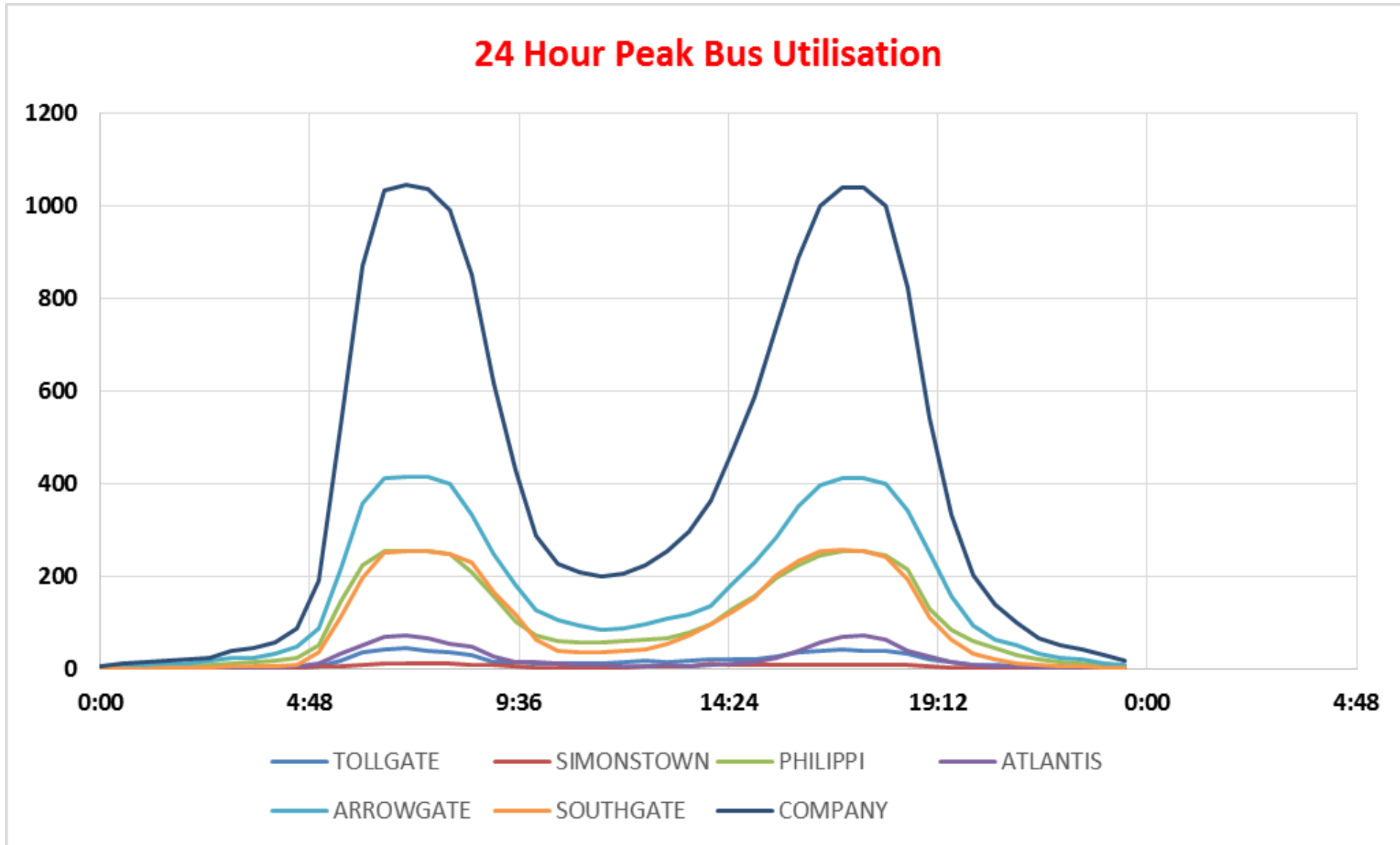
- Capital Cost
- Battery Life
- Energy And Maintenance Costs
- Charging Infrastructure

Electric Bus Test Objectives

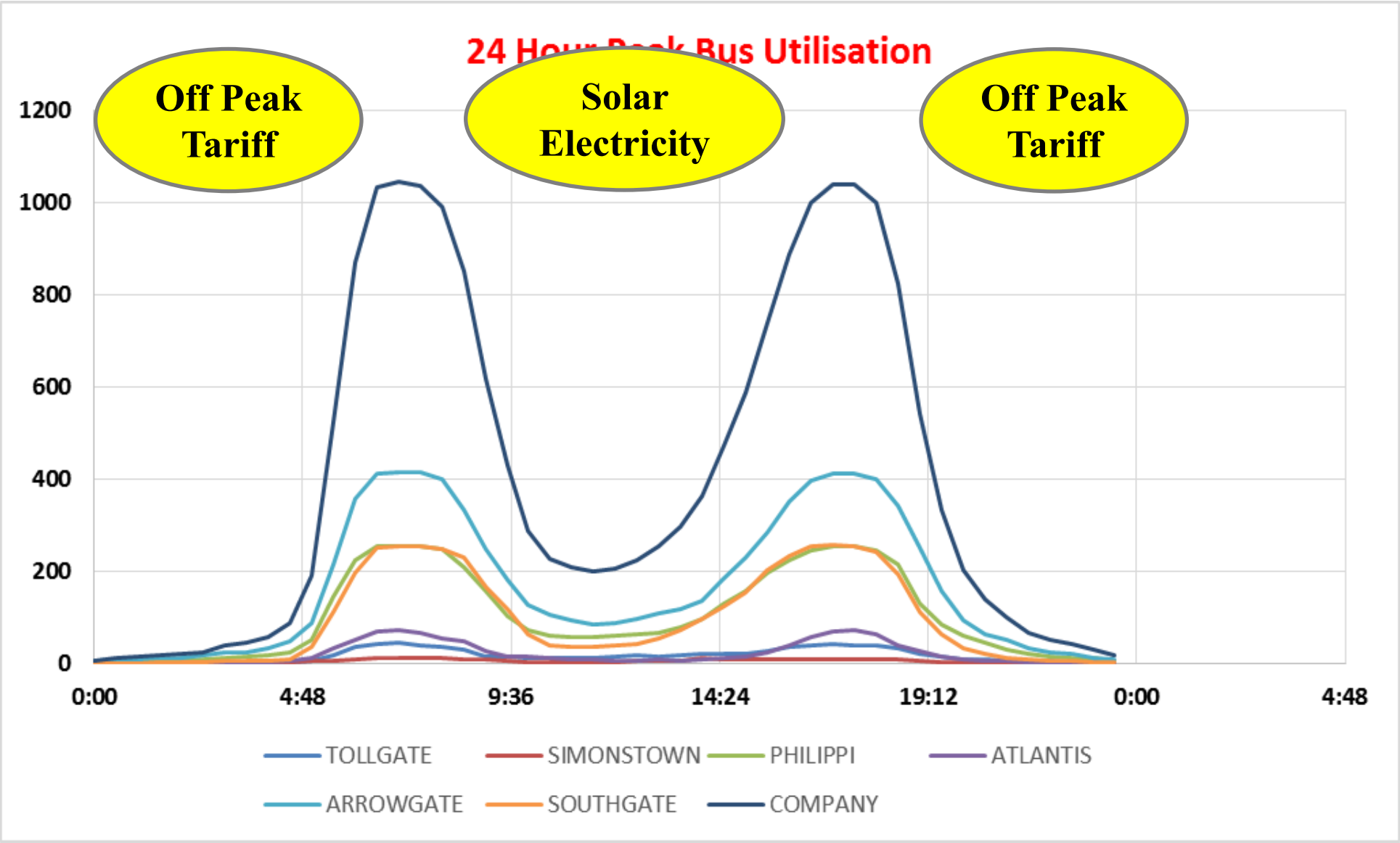


- Document Real Figures In South African Conditions
 - Off Spreadsheet Onto Tar
- Energy And Maintenance Costs Per Kilometer
- Charging Challenges
- Develop Feasibility For Introduction Of Electric Buses In South Africa

Charging Opportunities



Charging Opportunities



Electric Bus Test - Early Results



- Close To 30 000 Testing Kilometers Travelled
- Really Positive Response From Passengers And Drivers
- Energy Cost Reduction > 65%
- Maintenance Cost Reduction Require Longer Test Period
- Biggest Challenge Probably = Electricity Distribution

Next Steps - Government?

- Reduce / Remove Import Taxes on EV's → Short Term
- Incentives For EV Purchases → Short Term
- Incentives For EV Production → Long Term
- Support Renewable Energy Production → Long Term

Next Steps - Golden Arrow Bus Services



- “Golden Arrow Specification” 65 Seater Bus Ordered → Delivery Late 2021
- 2021 → Testing 2 x 37 Seater Electric Buses
- 2022 → Testing 2 x 37 and 1 x 65 Seater Electric Buses
- 2022 → Electric Bus Feasibility Study
- 2022 → Decision Regarding Number Of Electric Buses In 2023 Purchases
- 2022 → Local Production To Reduce Or Eliminate Import Taxes?

Thank you!



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