Seagirt Marine Terminal – Container Yard Electrification Plan

Maryland Grid Modernization Retreat
November 07, 2019
Seagirt Marine Terminal

- 2010 Successful PPP with the MPA -> Long Term Concession
- Since start of concession container volumes have almost doubled.
- Equivalent to a > 8% CAGR
Terminal Specifications

- 50’ (15.2m) channel, berth and turning basin
- 185’ (56.4m) of air draft
- Four berths totaling 4,352’ (1,326m) of linear wharf
- 11 Cranes (4 super post-Panamax and 7 post-Panamax)
- Crane productivity averaging 33 moves per hour
- Available berth, gate, and yard capacity
- 14,000 TEU ship ready

Seagirt Marine Terminal

• Empty Depot
• Gates
• On-Dock Rail
• Expansion
• Berths 1-4
• 321 Total Acres
• 14,000 TEU ship ready
Seagirt Electrical Master Plan

- In 2012 Seagirt Installed 4 new SPPX Electric Quay Cranes on Berth 4
- Total Number of QC increased to 11
- In 2018 the new cranes moved 63% of all containers
- With the addition of the new cranes utility company indicated that capacity of main electrical substation was close to capacity → improvements may be required to add more electrical equipment
Seagirt Electrical Master Plan

• Seagirt is ordering 4 new SPPX Cranes to arrive 2021.
• In 2018 PAC commissioned an Electrical Master Plan study to better understand existing capacity and future demand which should include the new QC and additional terminal electrification.
• This results of this study show:
  – The measured peak electrical demand for entire site in 2018 (provided by BGE) is 2.9 MVA
  – In 2010, prior arrival of new cranes measured demand was 5.1 MVA
  – Site Peak Demand went down with introduction of new cranes (at double the terminal cargo throughput)
  – The new QC are highly efficient
  – Due to new electrical efficiencies, there’s enough headroom in the current substation to allow additional electrification of the terminal (container yard)
eRTG Cranes – Container Yard Electrification

WHY using eRTG cranes

**ECONOMIC**
Reduction of OPEX
- Fuel
- Maintenance
- Downtimes

**ENVIRONMENTAL**
Reduction of Diesel Emissions
Reduction of Noise Pollution
Reduction of chances of spills

**FUNCTIONAL**
Work Simplification
Better Resource utilization
Safer
Electrification of eRTG’s By 2028

Today’s Operation
• 22 Diesel RTG’s
• 0 Electric RTG’s

2019 Diesel RTG

Capacity:
• 1,200,000 TEU Year

The 2028 Operation
• 54 Electric RTG’s
• 0 Diesel RTG’s

2028 eRTG

Capacity:
• 2,400,000 TEU Year
Volume is trending up...

- PAC has developed a nine-stage strategy to stay ahead of this trend.
- Significant infrastructure changes will be required for the immediate four phases.
- Electrification of yard cranes, trucks, and future shuttle carriers should be part of this strategy.
# RTG Emissions Profile by Phase

### NOx

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**TOTAL Annual NOx Tons per year:**

- **Phase 1:** 65.32
- **Phase 2:** 53.45
- **Phase 3:** 33.75
- **Phase 4:** 22.75

**% reduction from phase 1 to phase 2:** 18%

**% reduction from phase 2 to phase 3:** 56%

**% reduction from phase 3 to phase 4:** 100%

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**TOTAL Annual CO2 Tons per year:**

- **Phase 1:** 2277.00
- **Phase 2:** 1863.00
- **Phase 3:** 1863.00
- **Phase 4:** 828.00

**% reduction from phase 1 to phase 2:** 18%

**% reduction from phase 2 to phase 3:** 56%

**% reduction from phase 3 to phase 4:** 100%
eRTG Equipment Cost to Migrate

Freerider eRTG Cost:

- Phase 1: $27,500,000 (11 eRTG’s)
- Phase 2: $17,500,000 (7 eRTG’s)
- Phase 3: $45,000,000 (18 eRTG’s)
- Phase 4: $45,000,000 (18 eRTG’s)

Total eRTG (54 Units) investment: $135,000,000
Phase 1 Electrification Cost Estimates

- Large scale civil and electrical infrastructure investment of ~$15 million
- Additionally, we will make IT infrastructure investment of ~$5 million and ~$3 million in stack infrastructure
- eRTG equipment procurement of $27.5 million for eleven cranes
- Phase 1 investment is ~$51 million

Phases 1 – 4 will be an investment of ~$200 million
The cost of this project will be ~$200 million

- The Civil, IT & Medium Voltage components are ~$65 million
- The equipment cost to enable the migration from Diesel to eRTG’s are $135 million
  - This includes 54 new electric RTG’s with a unit cost of $2.5 million, totaling $135 million
  - A Diesel RTG alternate unit cost is $2.24 million, with 54 units totaling $121 million with significantly less Civil, IT & Medium Voltage cost
The migration of Marine Terminal Electrification:

- eRTG’s
- eTerminal Trucks
- eShuttle Carriers
- RMG
Electrified Horizontal Transport

As the eRTG Phases are realized-

PAC will begin utilizing electrified terminal trucks and shuttle carriers for transport inside the terminal. ---> Less emissions, fumes & noise

Battery Electrific Terminal Trucks are being successfully tested in marine terminal environments

Fully Electric Shuttle Carriers and fast charging stations are being tested in marine terminals
Conclusions and comments

- Electrification presents incredible opportunities
- PAC is ready to start terminal electrification
- Will allow expansion of terminal capacity minimizing our environmental footprint
- Electrification requires a huge initial capital investment.
- Key component of this electrification includes additional efficiencies of container handling equipment
- How do we ensure reliability of the supply?
- What mechanism exist to streamline the process of increasing capacity and resiliency of the Grid?
- Are micro-grids the solution?
- Who should pay for this?