PORT HOUSTON

THE INTERNATIONAL PORT OF TEXAS℠

Port Electrification: Growth and Opportunity

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Port Houston: Environmental Policy

5 'C's of Port Houston Environmental Policy

Comply with all applicable environmental laws and regulations

Create business practices that prevent pollution and support sustainability

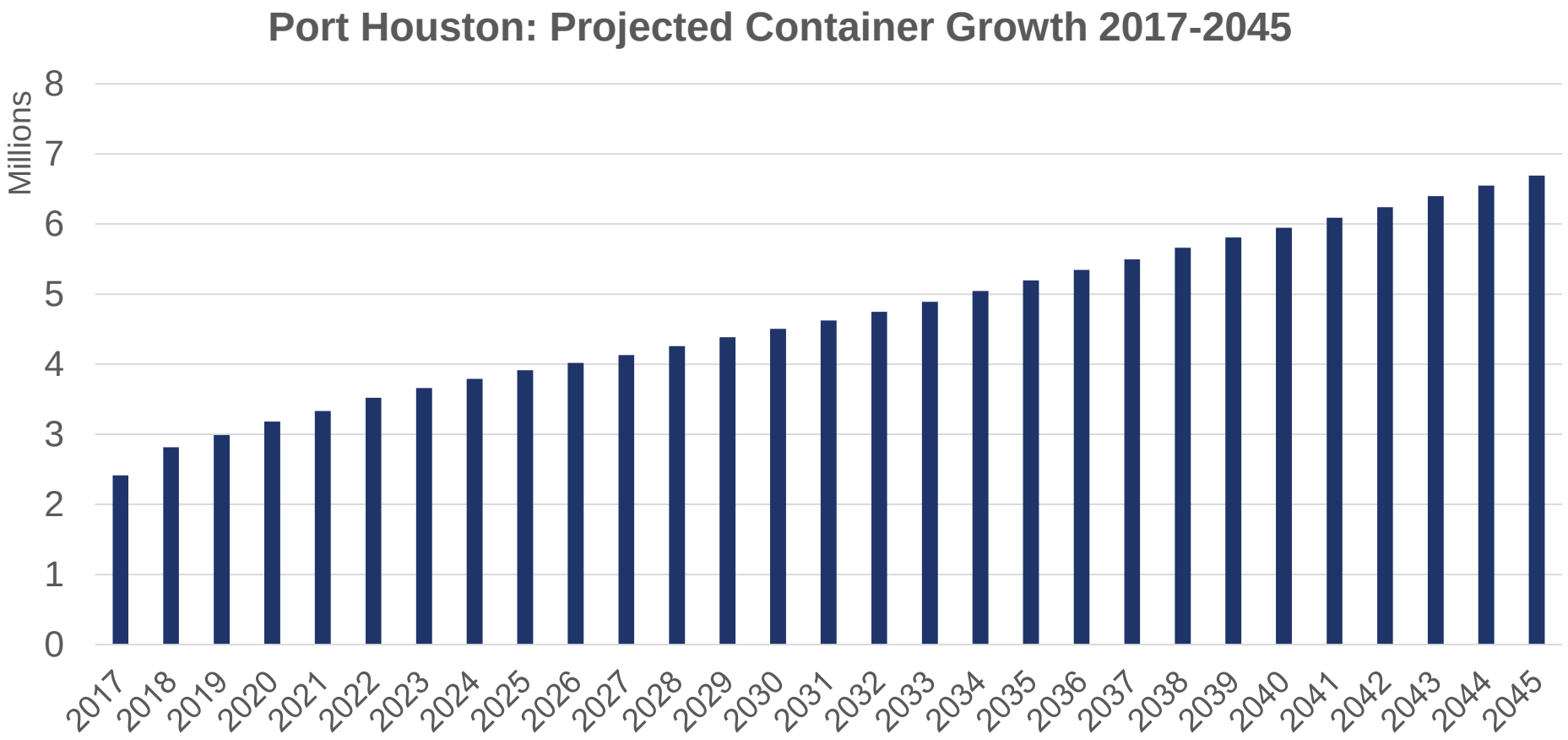
Communicate, engage, and collaborate with stakeholders

Commit to being a recognized maritime industry leader in environmental stewardship

Continuously improve environmental performance

The 5Cs guide Infrastructural and Operational Decisions at Port Houston

Port Houston: Projected Growth



By 2045, volume of containers handled at Port Houston is expected to grow by 2.8 times

Environmental Leadership Objective: Lower CO_2 Emissions per Ton Cargo Handled

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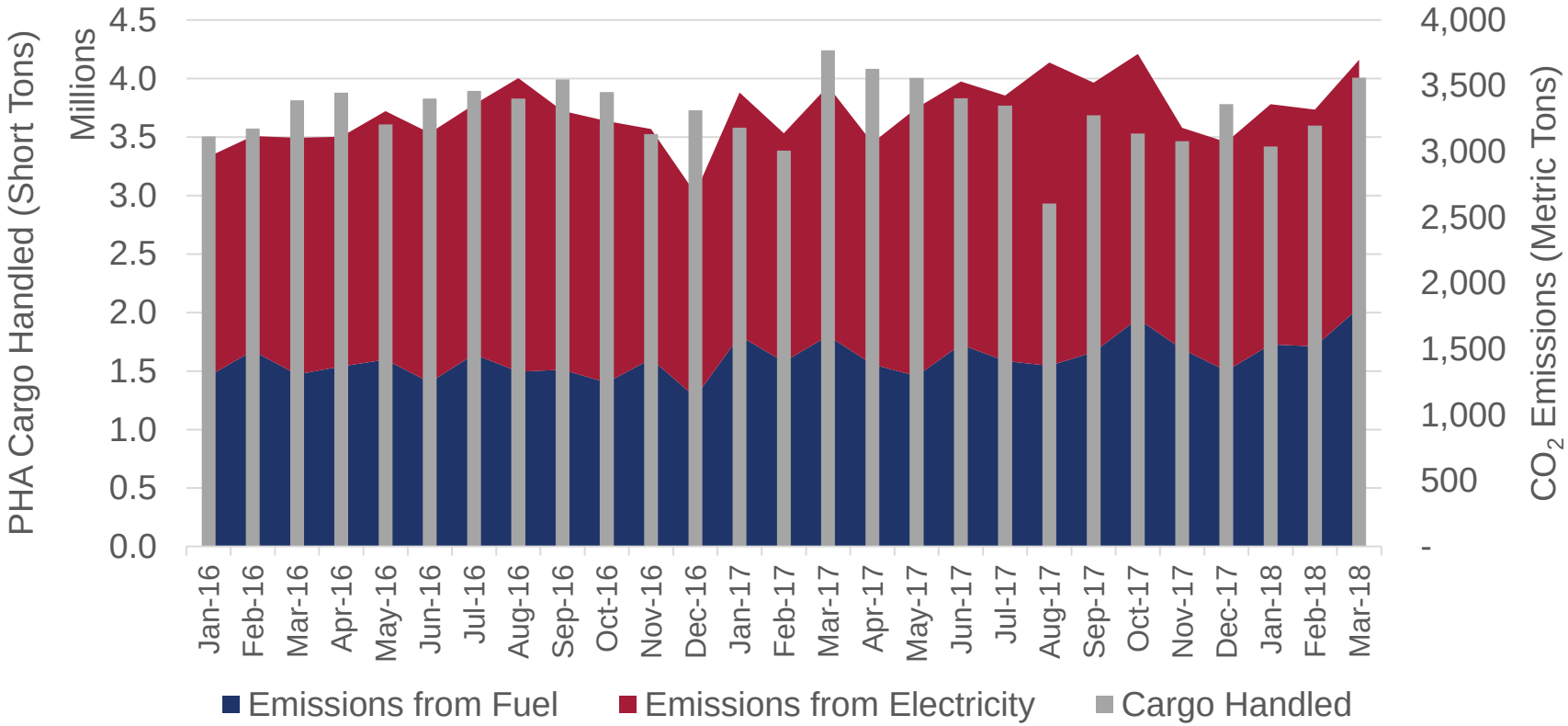
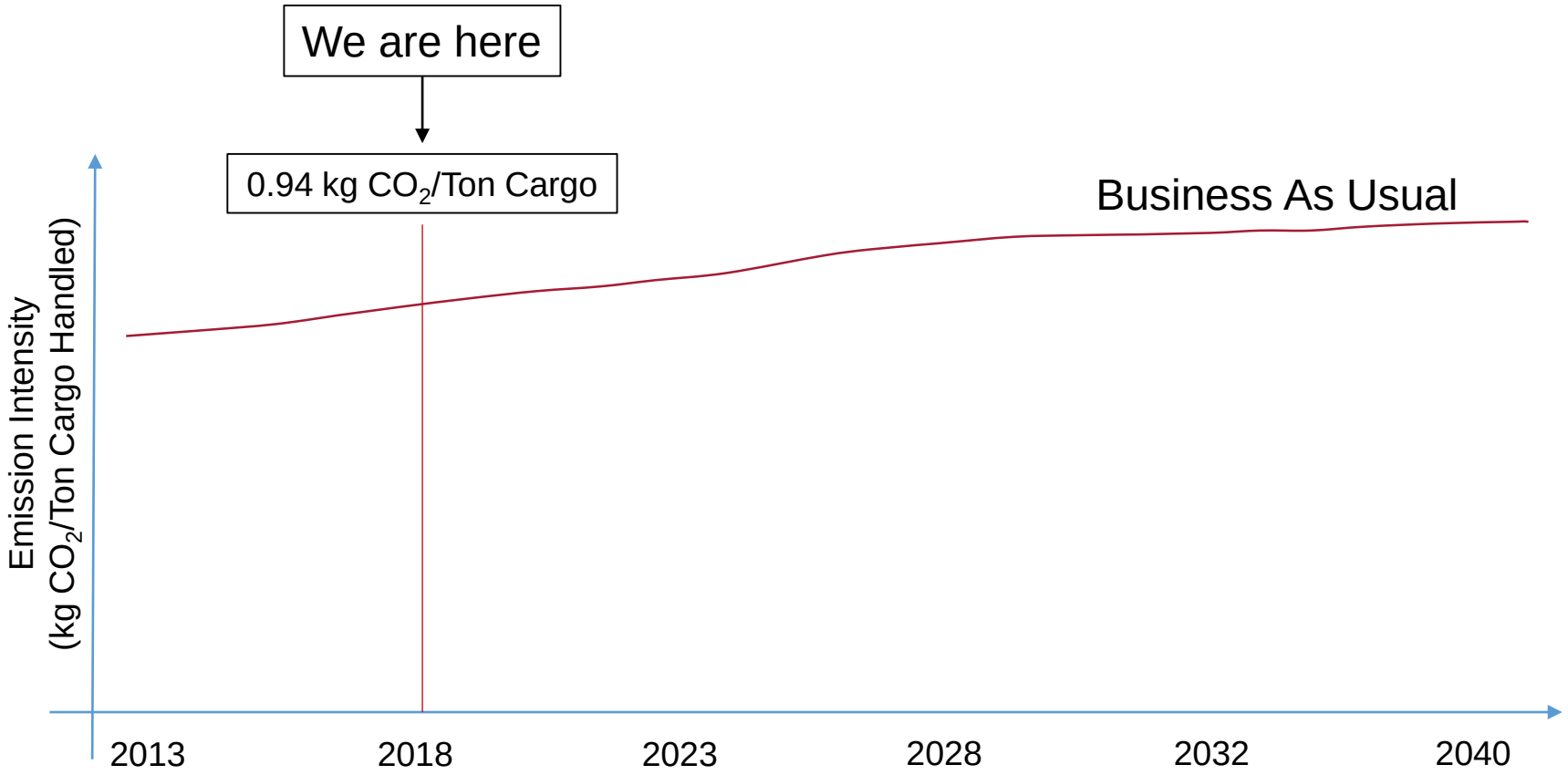
PHA Monthly Cargo Handled and Operational CO_2 Footprint: 2016-Present



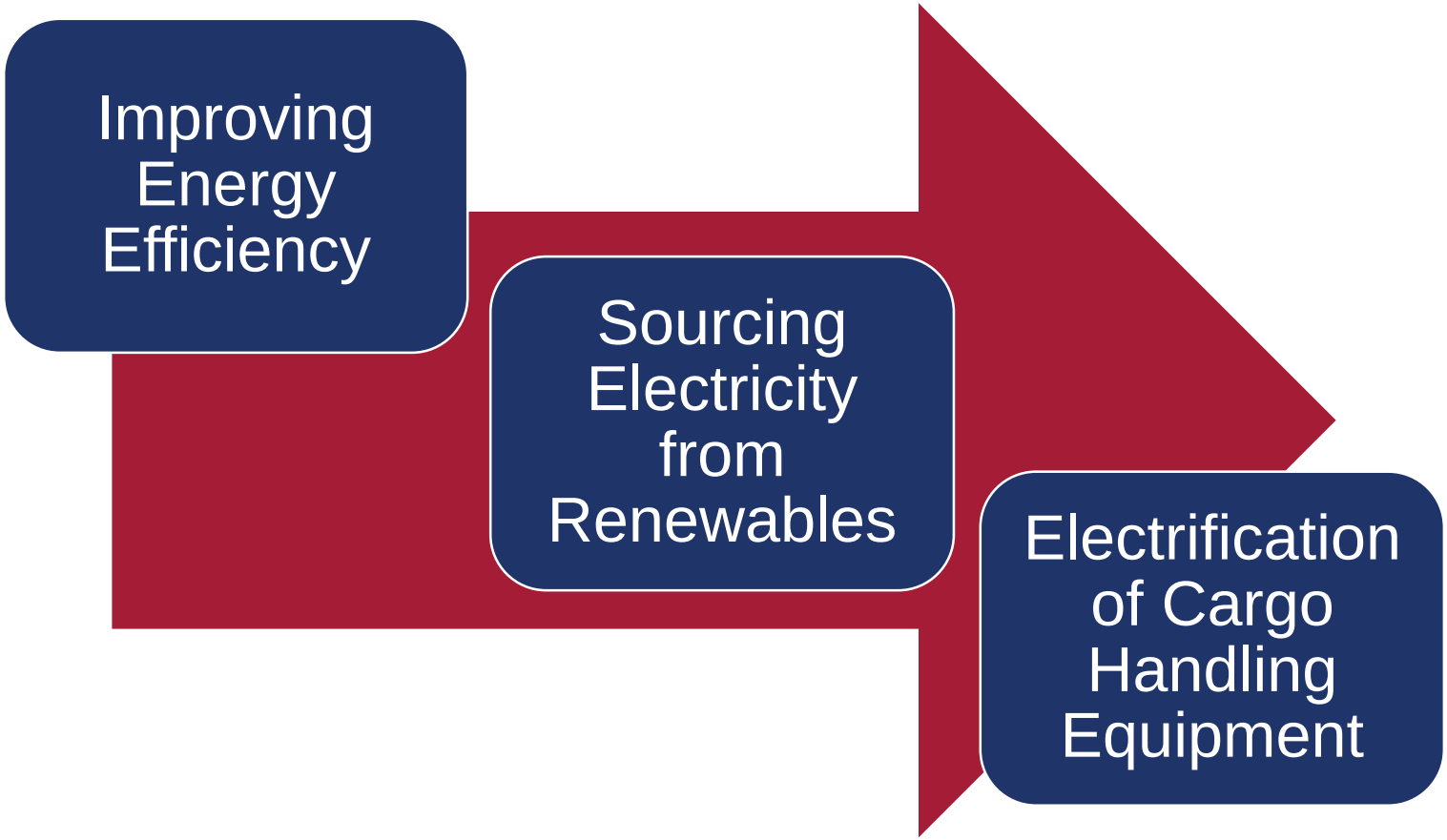
For reference, Port Houston's annual CO_2 footprint (41,000 Metric Tons) is 0.1% of that of the City of Houston (33,400,000 Metric Tons CO_2)

Projected CO_2 emissions: 2016-2045



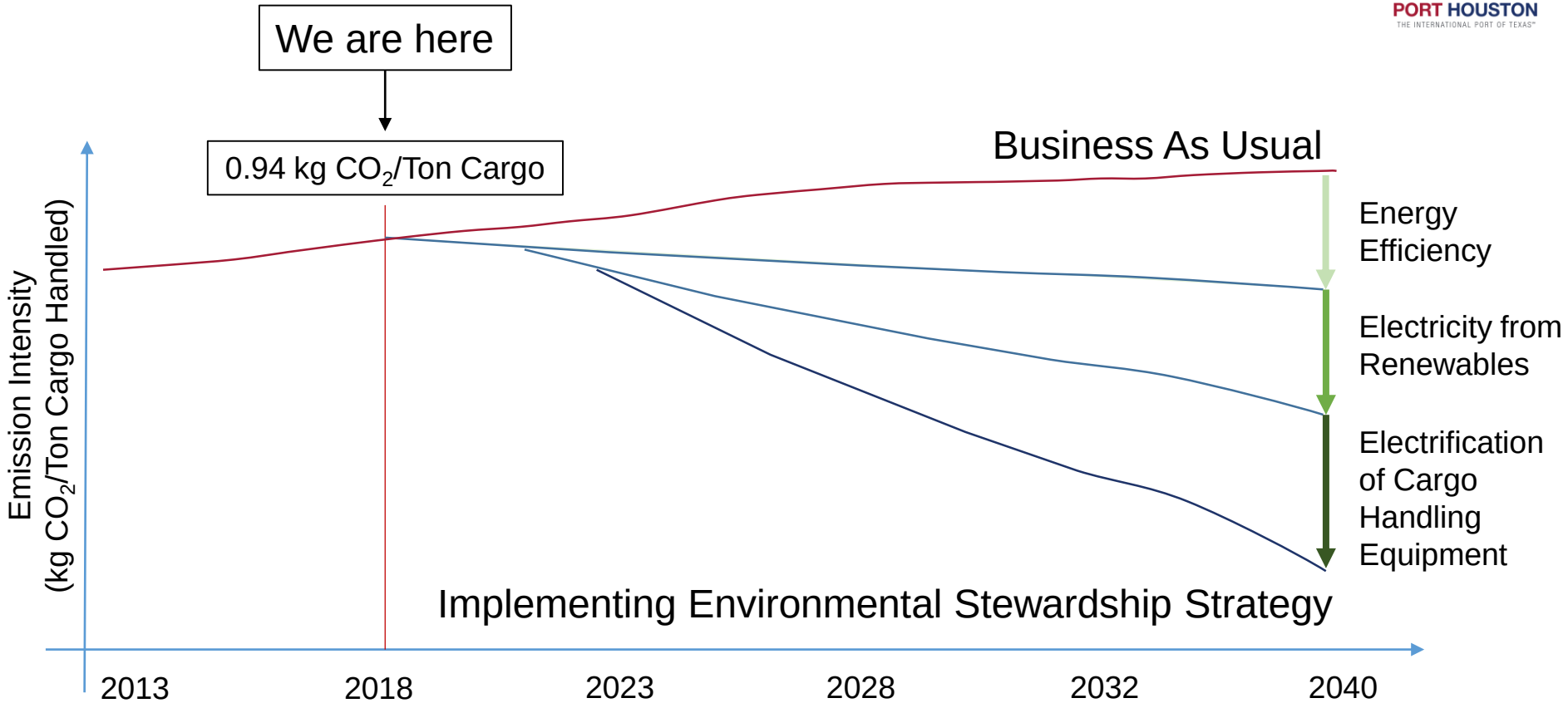
Creating cargo capacity through traditional means can increase emissions by 3 times

Port Houston: 3 Levers of Sustainability



The Port is developing strategies to reduce emissions over the long-term

Leadership for the long-term



80% reduction in emission intensity by 2045 would bring emissions to 2000 level

The Business Opportunity of Sustainability

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Key Equipment

Equipment type	#	Avg. Engine Capacity (HP)
Ship to Shore Cranes	26	800
Rubber Tire Gantry Cranes	80	600
Terminal Tractors	70	450
Passenger & Spl Vehicles	360	260

Annual energy spending

Energy source	$MM
Electricity (50 GWH)	3.2
Fuel	2.8

The Port's Ship to Shore cranes are all electric.
Future electrification opportunity lies with RTGs and Terminal Tractors.

RTGs: The Business Opportunity of Sustainability

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Example case of RTG electrification

Barriers

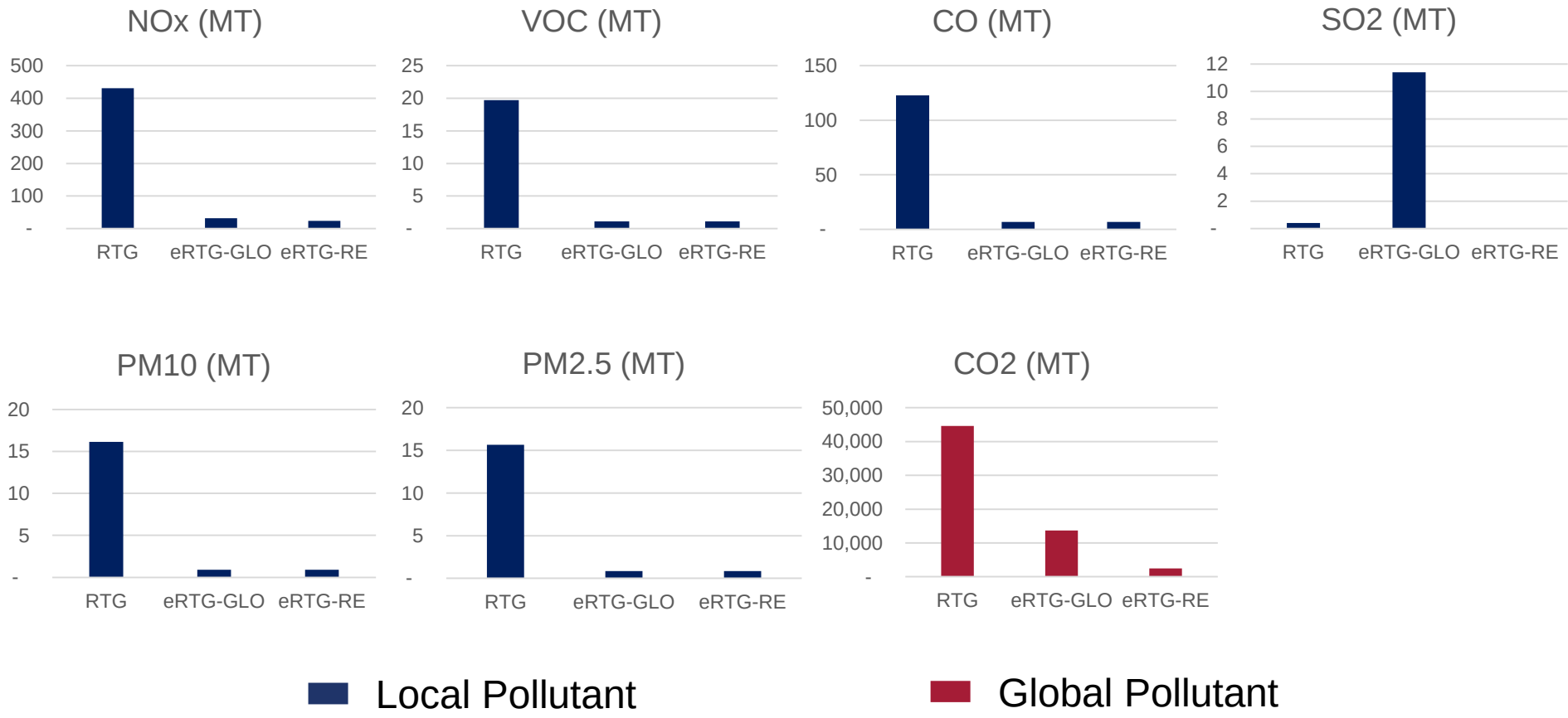
Installed infrastructure
High Capex Cost
Space Constraints
Personnel Training

Opportunities

Lower lifecycle costs
Mitigate emissions
Reduce operational down-time

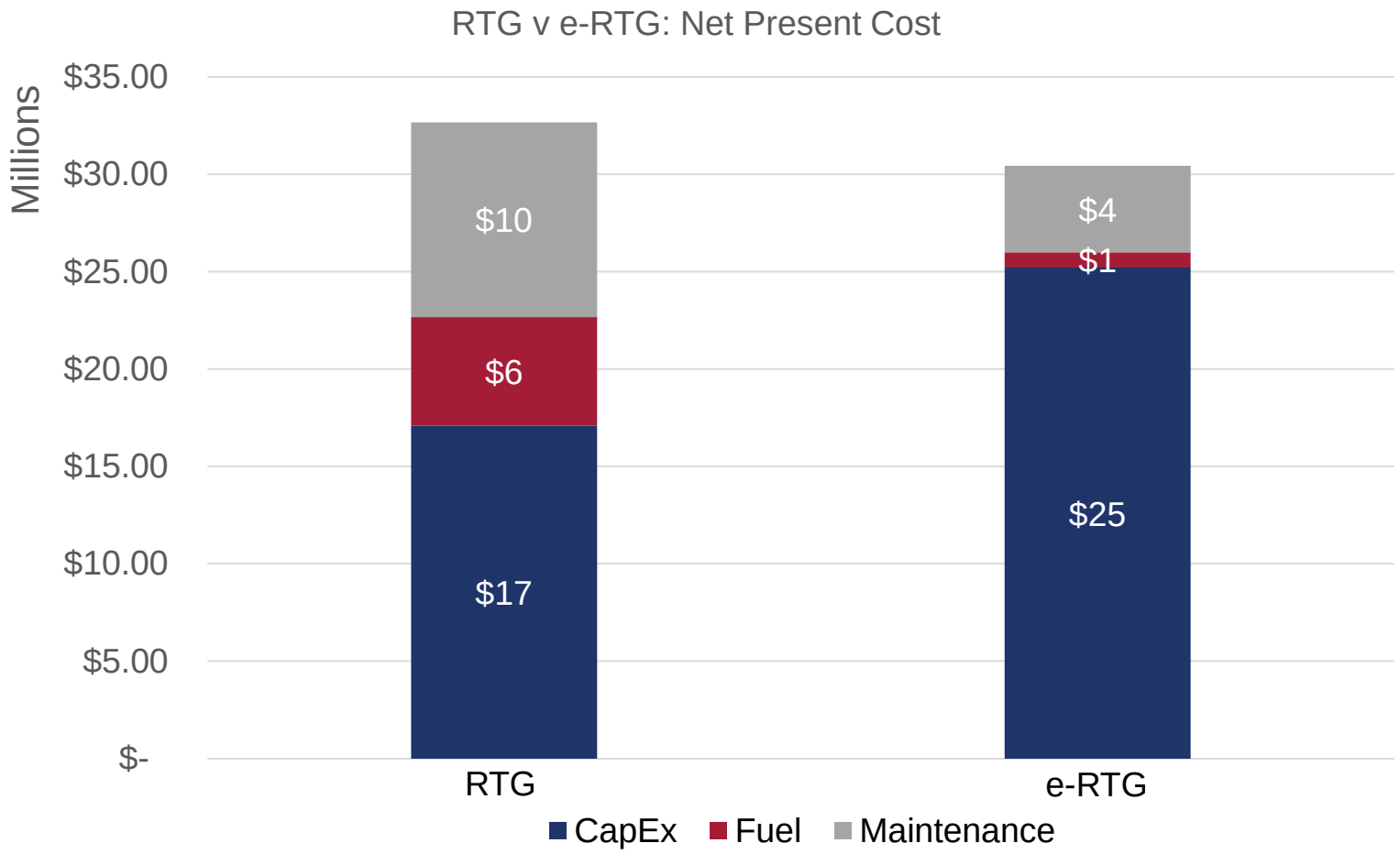
Given the value of installed infrastructure, electrification is a long-term opportunity

Lifetime Operational Emissions: RTGs vs eRTGs for a container yard



Electrification can reduce onsite RTG emissions by 95%

Lifecycle Cost:
RTG vs e-RTG for a container yard



With lower lifecycle cost, e-RTGs can offer reliable & lower future costs

THANK YOU

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Questions?

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