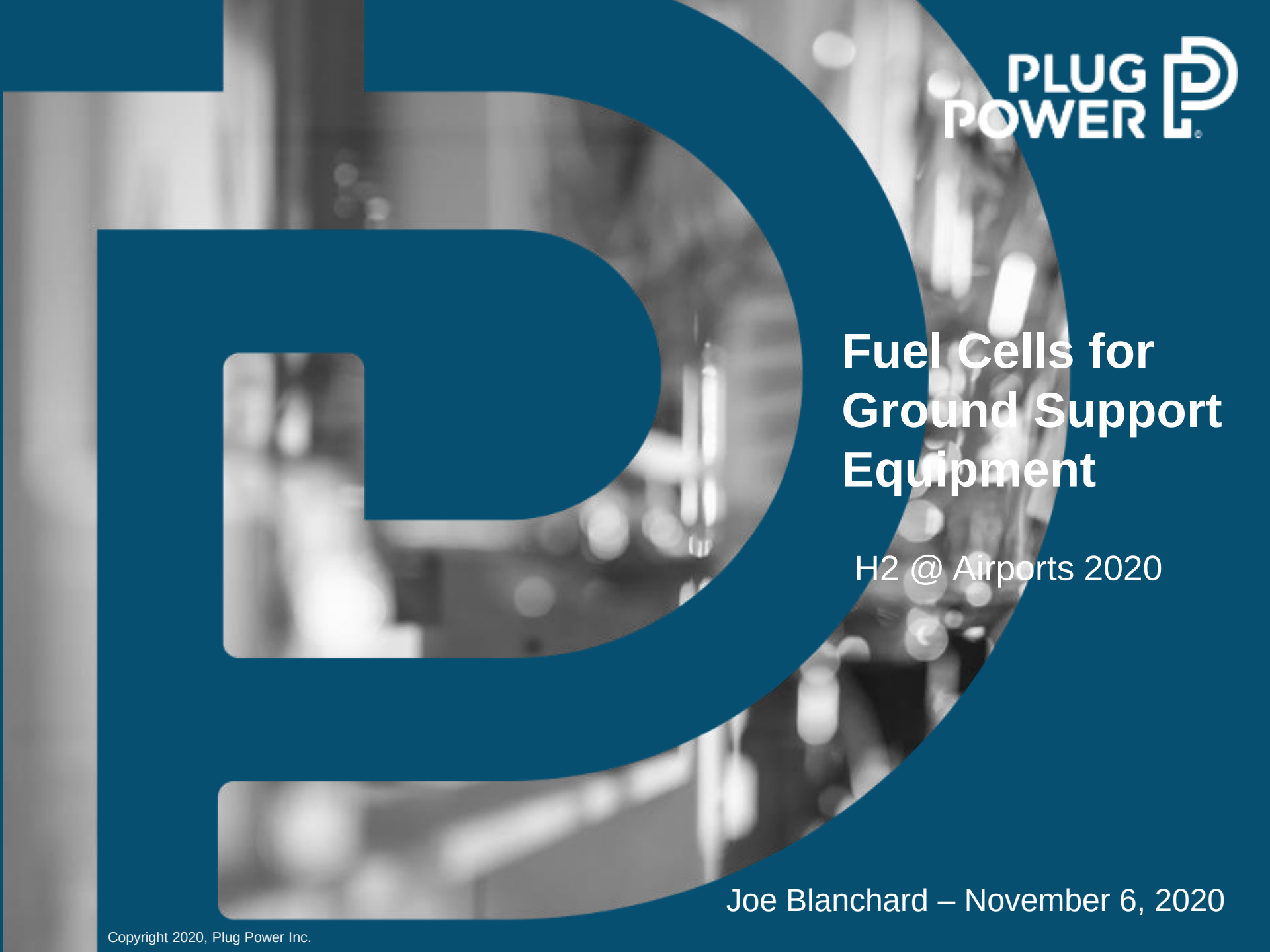


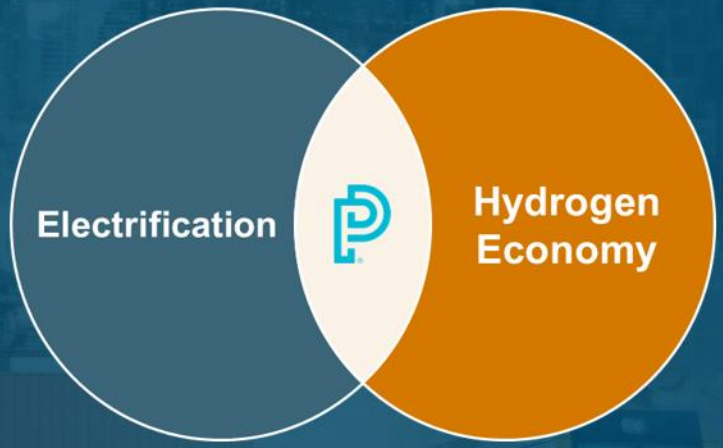
Fuel Cells for Ground Support Equipment

H2 @ Airports 2020

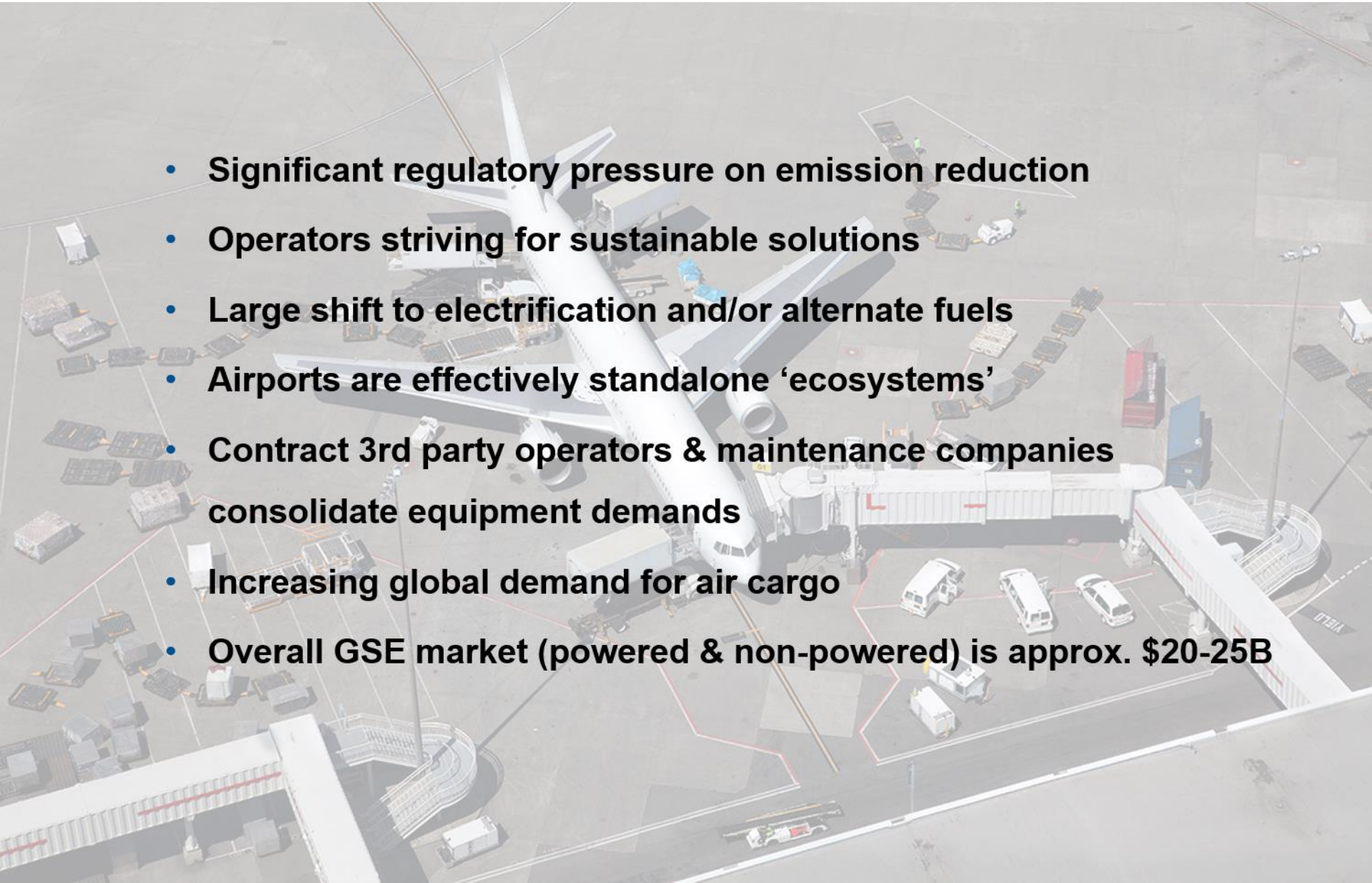
Joe Blanchard – November 6, 2020

Plug Power is a Leader in Hydrogen and Fuel Cell Technology

- 1st to create a market for HFC technology
- 31.9MM+ fuelings; 35T+ liquid H2 used daily
- 40,000 Units Deployed by Year End 2020
- GenKey end-to-end solution provides fuel and H2 infrastructure, fuel cells and service
- Expansion into electrolyzers and green hydrogen plants via acquisitions
- In-house capability to become one of the largest green hydrogen generators over the next several years



Why the GSE Market



- Significant regulatory pressure on emission reduction
- Operators striving for sustainable solutions
- Large shift to electrification and/or alternate fuels
- Airports are effectively standalone ‘ecosystems’
- Contract 3rd party operators & maintenance companies consolidate equipment demands
- Increasing global demand for air cargo
- Overall GSE market (powered & non-powered) is approx. $20-25B

Why Hydrogen

PLUG POWER

Value Prop Drivers – Similar to Material Handling
- Energy efficiency: 45% FC vs. 20% diesel
- Energy recovery via regenerative braking
- Decreased maintenance costs

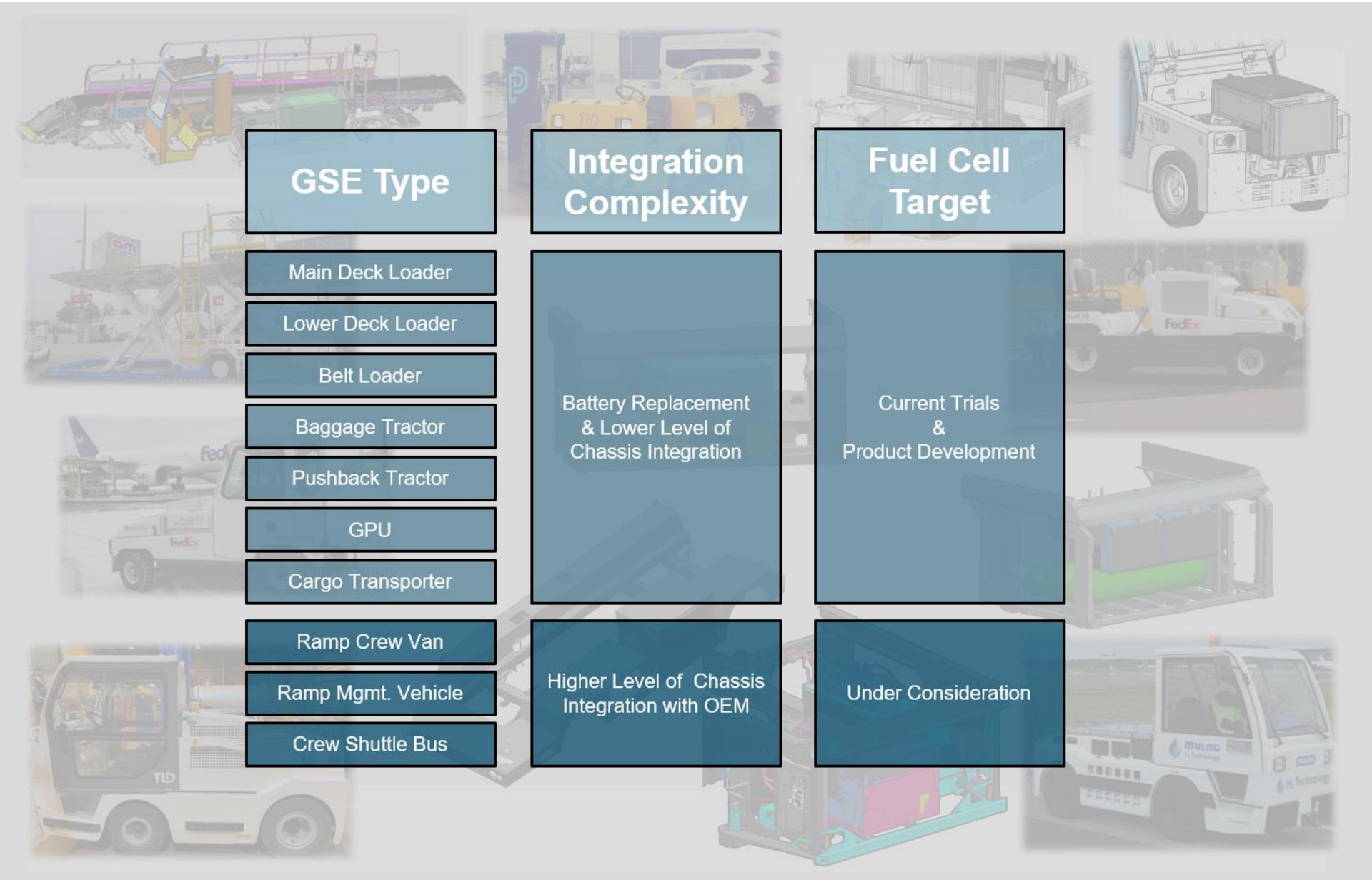
Ancillary Benefits
- Data to evaluate EV performance
- Prognostics - see issues before they happen, less downtime
- Lower noise and diesel emissions - operator health and satisfaction benefits

Market Drivers
- Zero emission regulations
- Cost of compliance, creating more costly exhaust abatement
- Trend toward EV autonomy

Elimination / Reduction of Diesel Tractor Maintenance Items
- Oil changes
- DPF (Diesel Particulate Filter) changes
- Starters (policy to turn off tractor when getting off)
- Brakes (Regenerative braking eliminates or minimizes replacement interval)
  - *Typical route is 1.8 miles including 10-12 stops.*
  - *Diesel tractors require heavy brake usage to stop 40,000 lbs. from 10-15 mph*

Battery vs. Hydrogen FC
- Charging infrastructure does not scale with fleet size
- Electrical infrastructure expensive to install – $30k/vehicle
- Demand charges can become significant given the energy needs of the vehicles.
- Fast charging is more costly to install and to charge.
- FC infrastructure scales very well from 10 to 1000 vehicles at a site. Incremental vehicles add little if any new cost.

Electric Ground Support Equipment



GSE Type	Integration Complexity	Fuel Cell Target
Main Deck Loader	Battery Replacement & Lower Level of Chassis Integration	Current Trials & Product Development
Lower Deck Loader		
Belt Loader		
Baggage Tractor		
Pushback Tractor		
GPU		
Cargo Transporter		
Ramp Crew Van	Higher Level of Chassis Integration with OEM	Under Consideration
Ramp Mgmt. Vehicle		
Crew Shuttle Bus		

Recent Publicly Announced GSE Fuel Cell Trials

Memphis & Albany – DOE/FedEX/Charlatte

- Electric - 80V, Mid-mount 1600 Fuel Cell
- Completed multi-year program at Memphis & Albany
- Albany cold weather testing – 41 days below freezing
- DOE Program reports are public

Hamburg Germany – MULAG Comet 4E

- Electric - 80V, Mid-mount 1600 Fuel Cell
- Completed 2 Month Trial at Hamburg Airport
- Exceptional Performance

Questions?

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