Vessel Electrification & DC Power Management Systems

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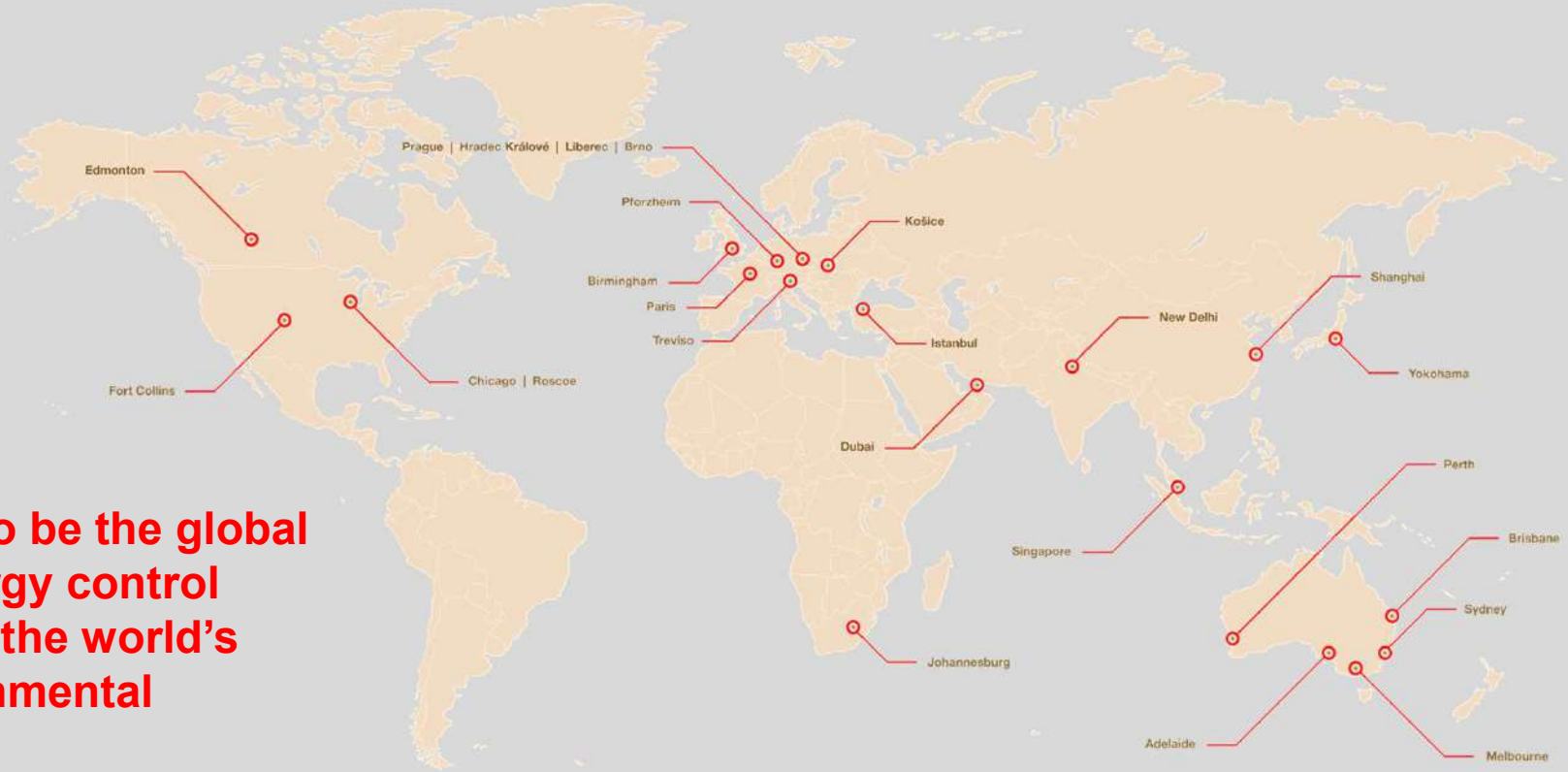
Ben Burnett, Application Engineer

Agenda

- ComAp Introduction
- Emissions Reduction Regulations
- Vessel Electrification Trends
- Marine DC Power Management Systems



ComAp's vision is to be the global leader in smart energy control solutions that drive the world's transition to environmental sustainability.

25
Offices including 4 development centers

70+
Distributors/Partners

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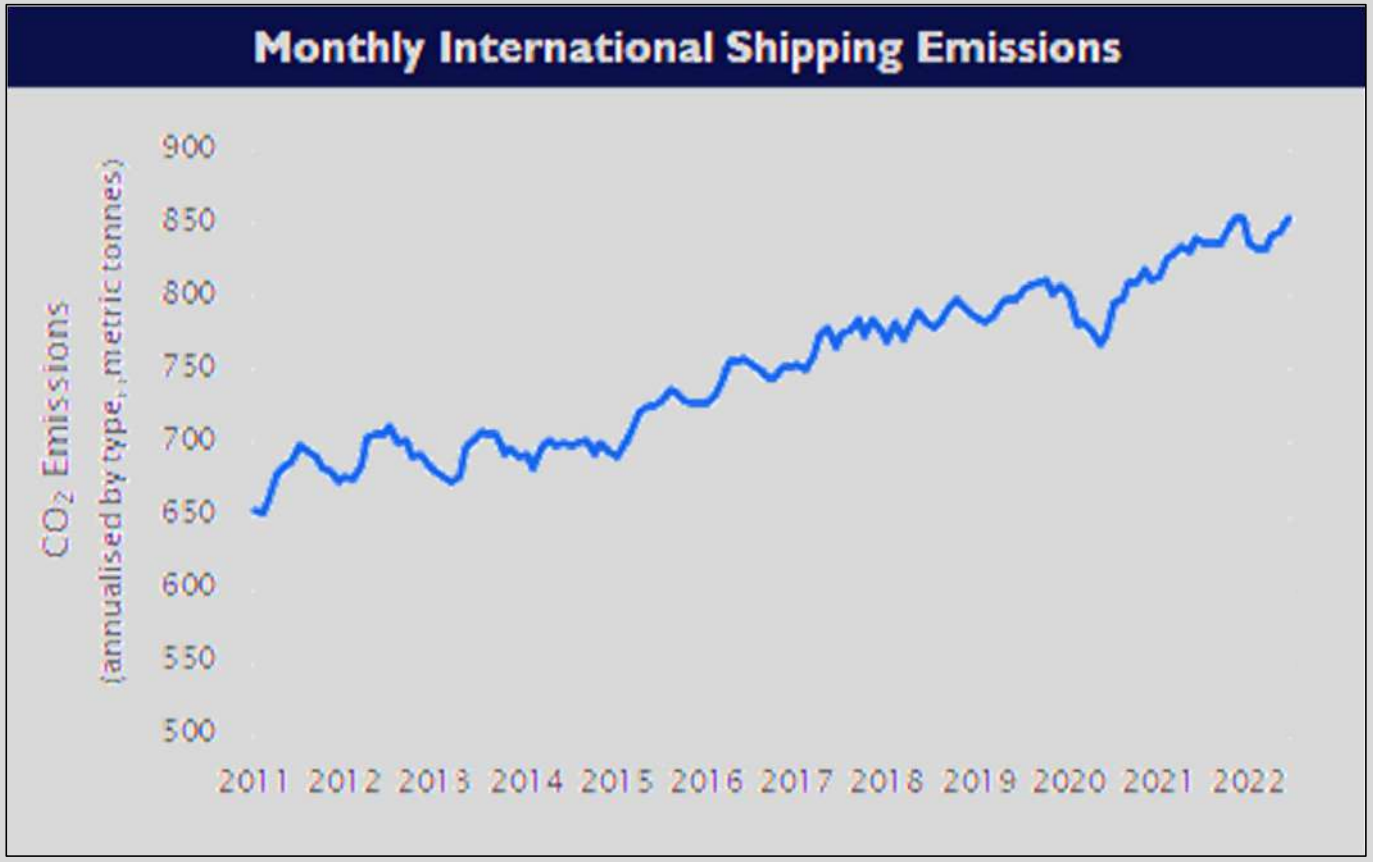
Shipping Emissions



Source: Marine Benchmark

- 850M tonnes of CO_2
- 3% of global GHG
- 130% increase by 2050

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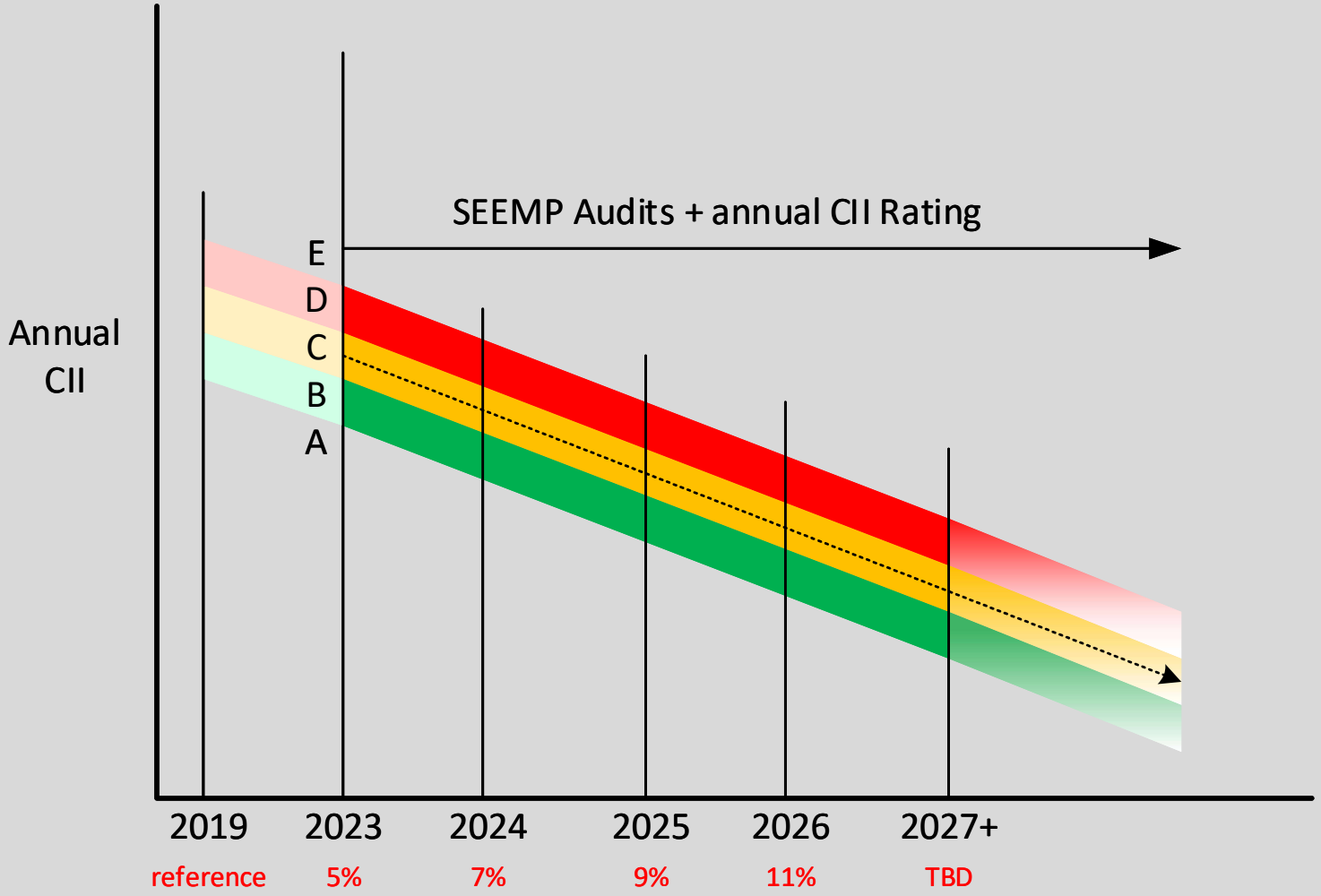
Carbon Intensity Indicator



Source: DNV

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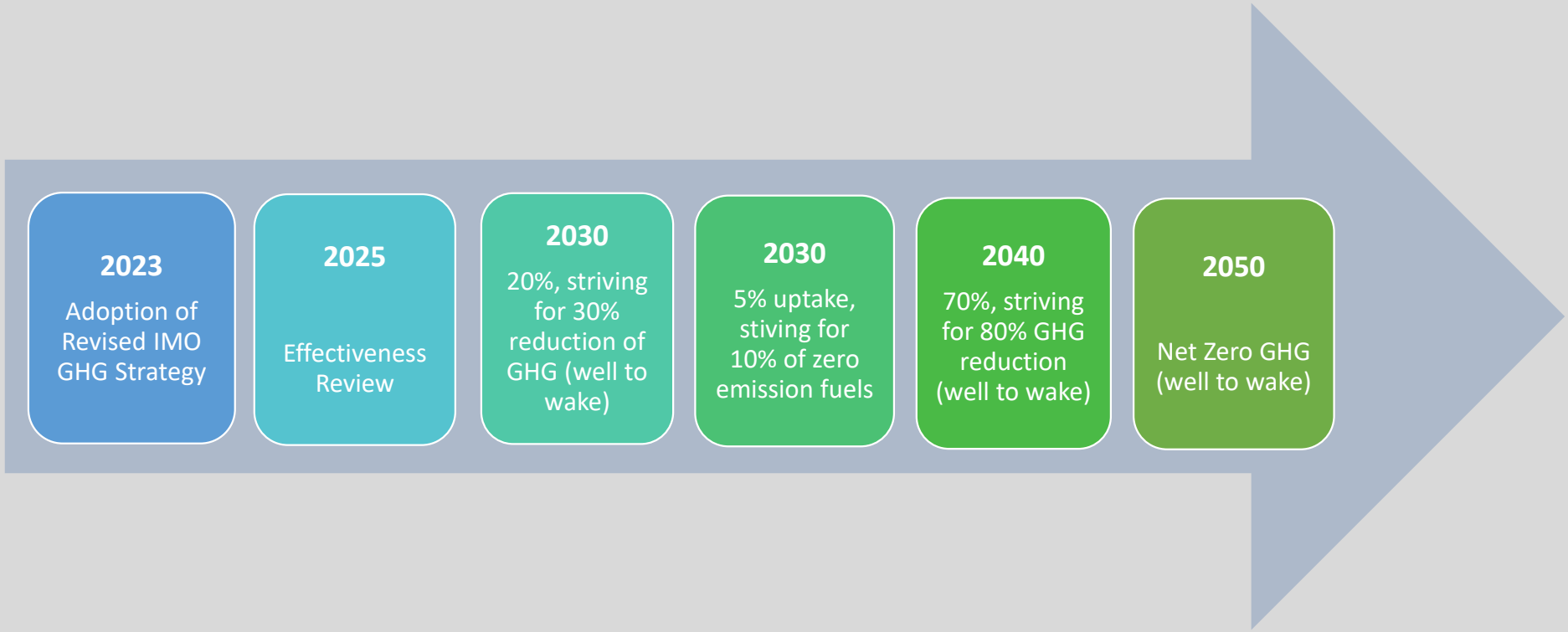
CII Noncompliance

Vessel Type	% Noncompliance	Vessels Surveyed
Bulk Carriers	59%	3347
Containerships	76%	1804
Tankers	53%	1526
Gas Carriers	56%	328
LNG Carriers	43%	343
Passenger Cruise	61%	179
RORO Vessels	56%	964

Source: ABS

IMO Emissions Targets



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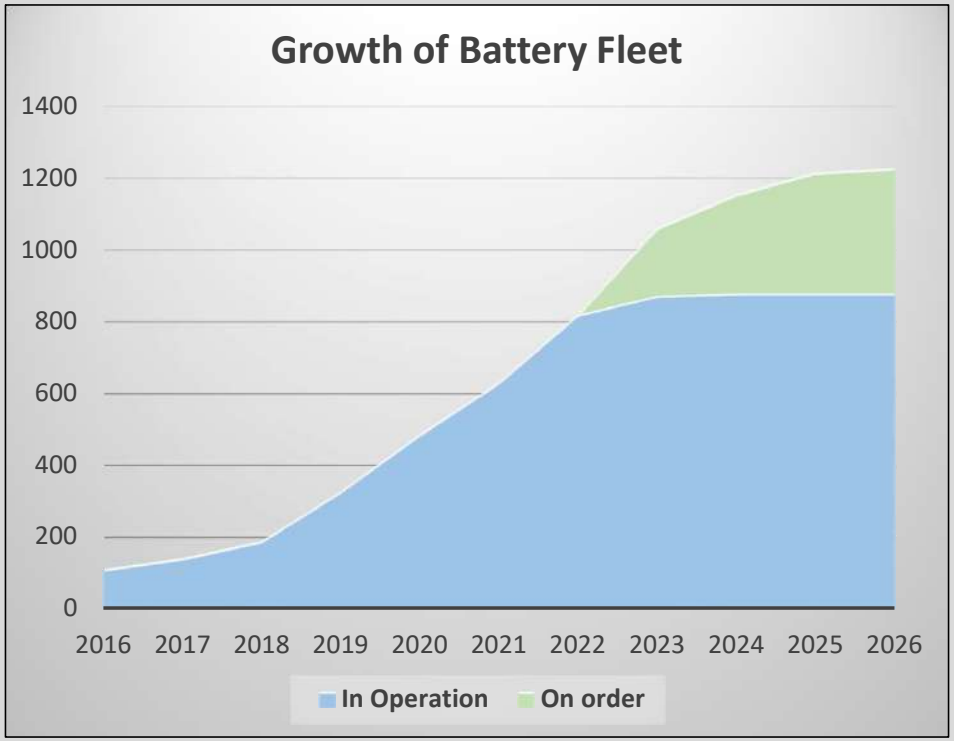
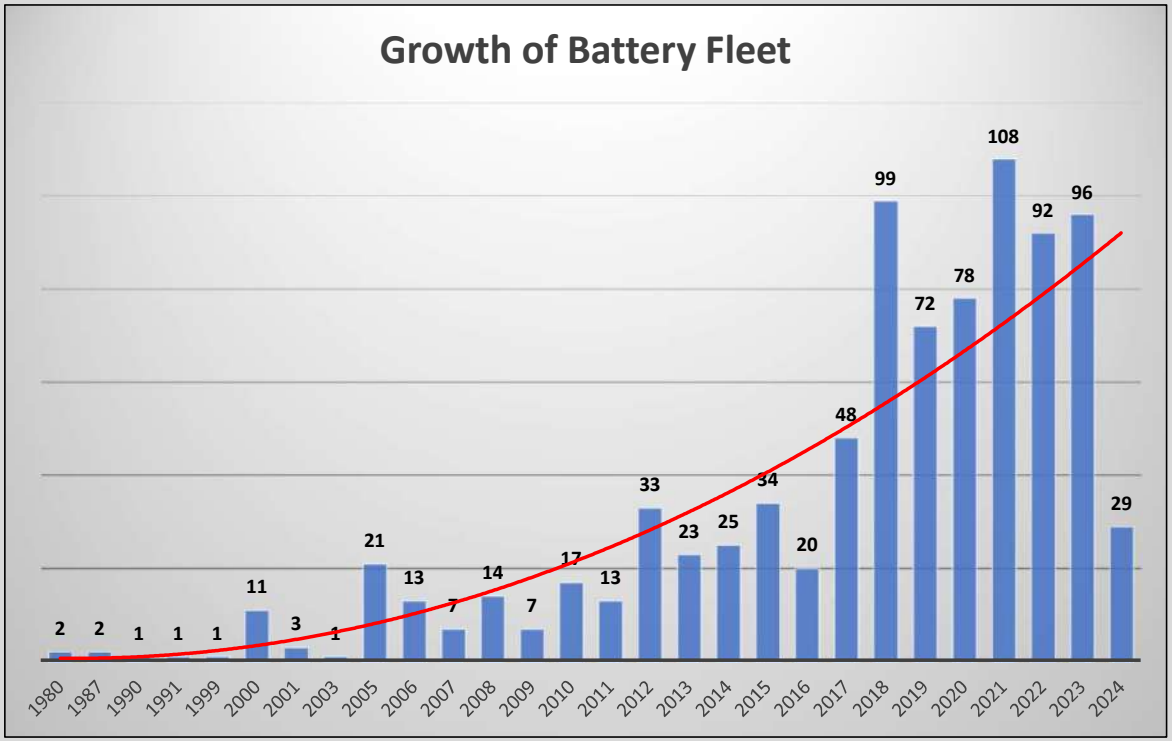
Vessel Electrification



Source: DNV AFI



Source: S&P Global

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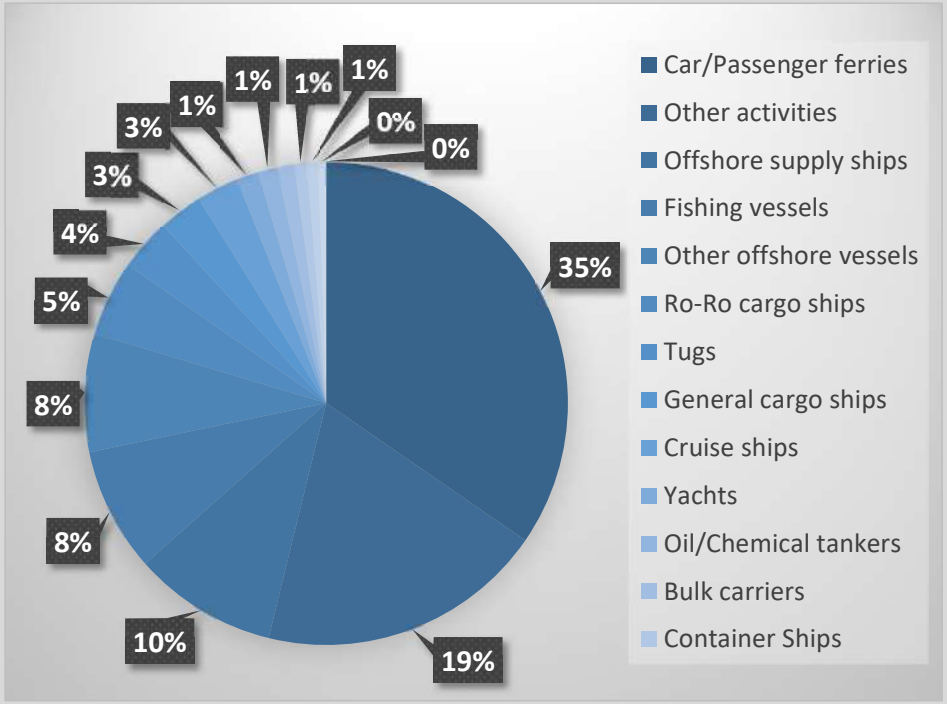
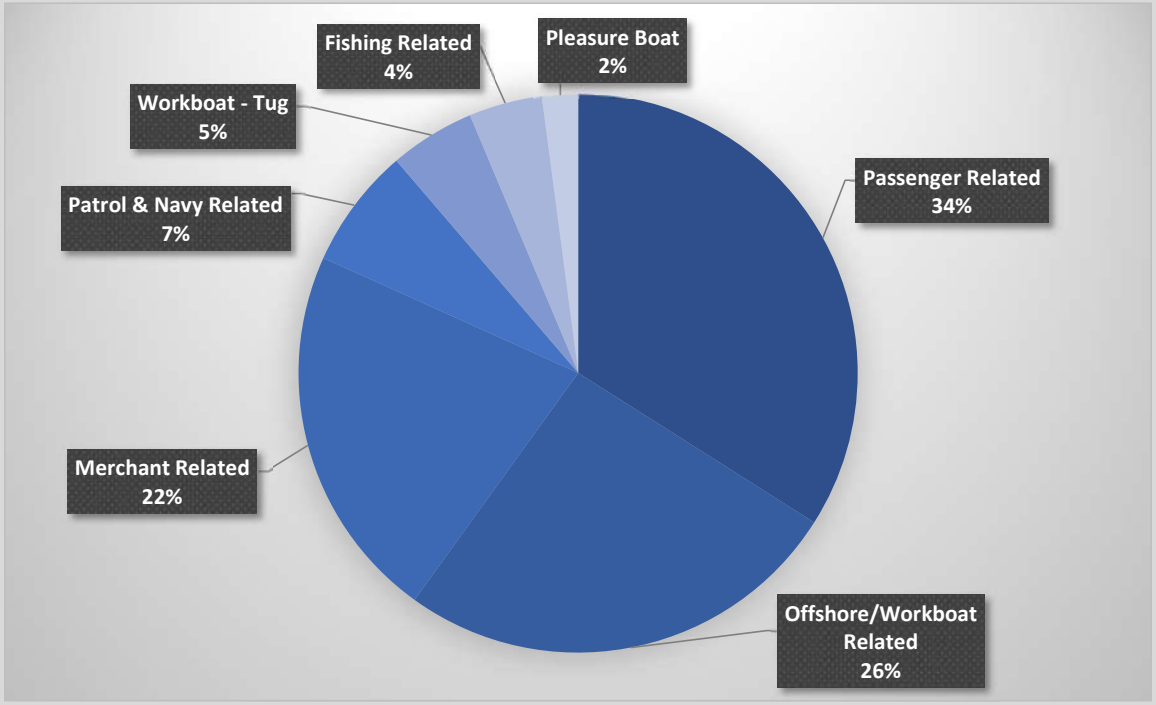
Vessel Electrification



Source: DNV AFI



Source: S&P Global

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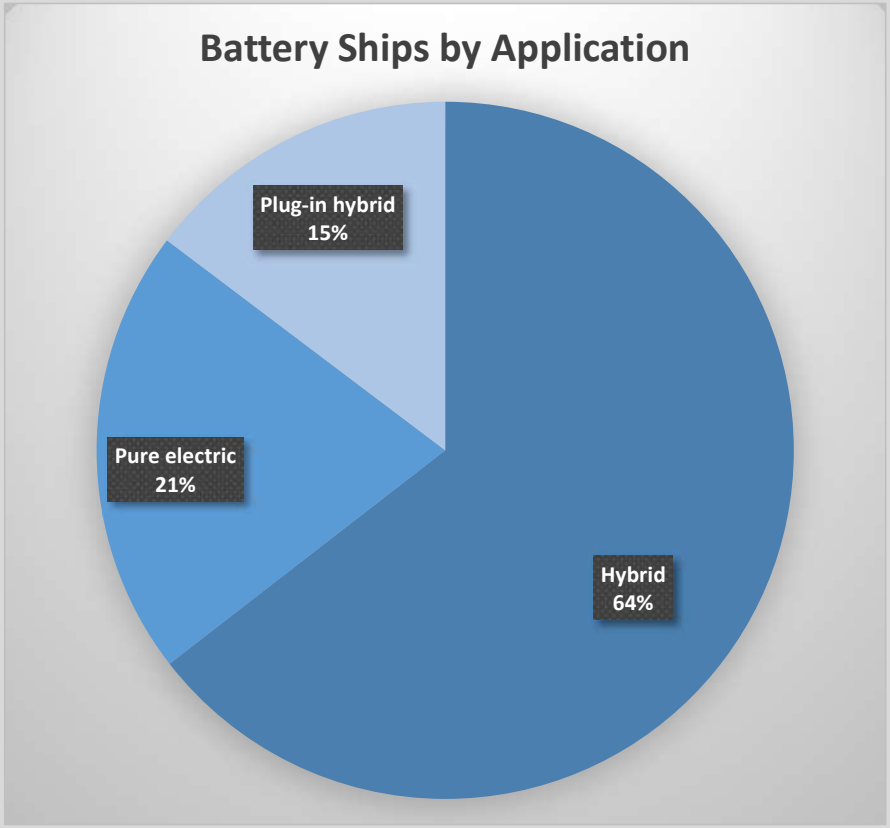
Vessel Electrification



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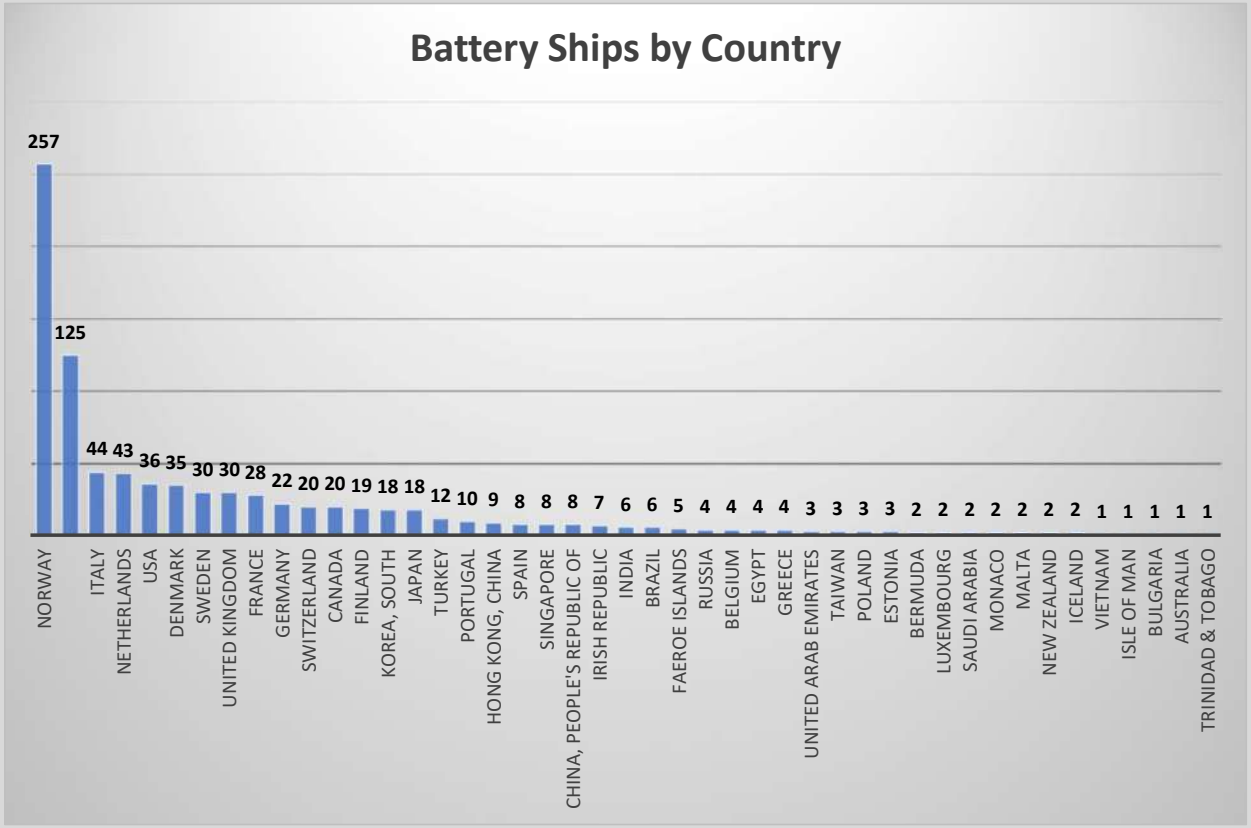

Source: S&P Global

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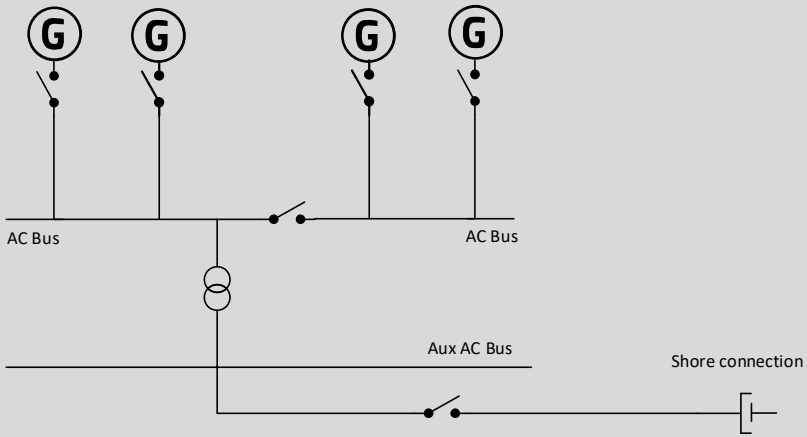
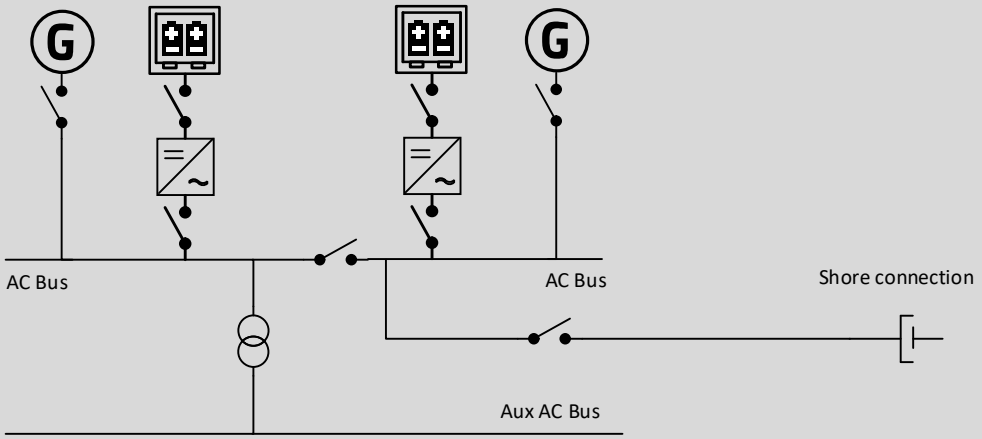
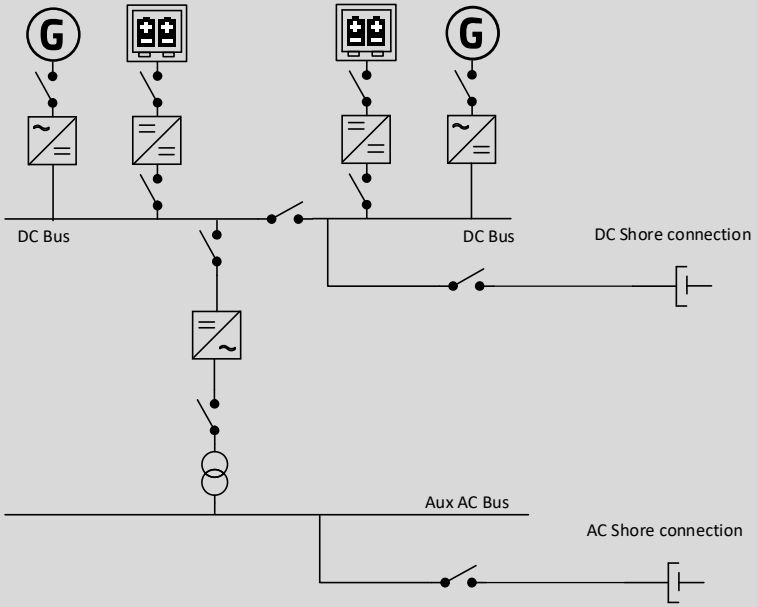
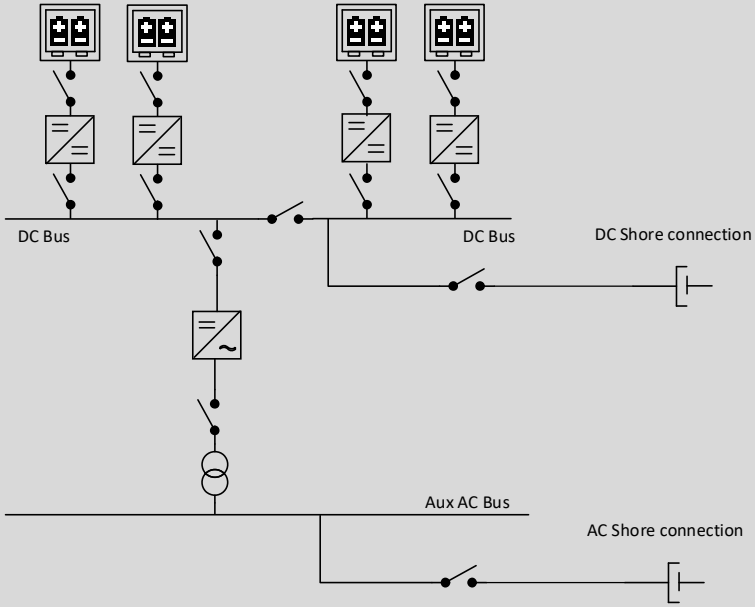
Hybrid, Electric vs. Bus Connection









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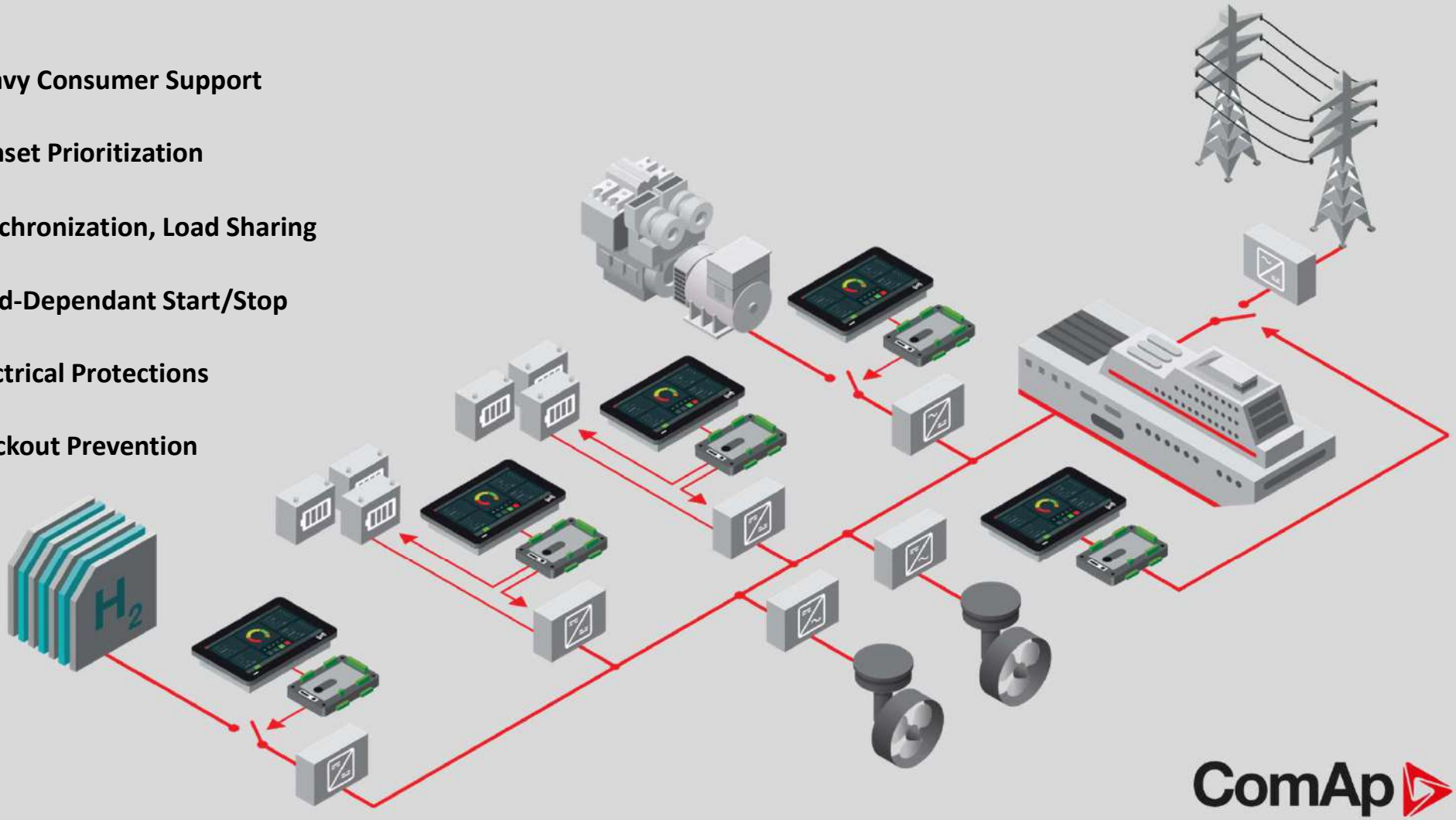
DC Power Management

- **Heavy Consumer Support**
- **Genset Prioritization**
- **Synchronization, Load Sharing**
- **Load-Dependant Start/Stop**
- **Electrical Protections**
- **Blackout Prevention**



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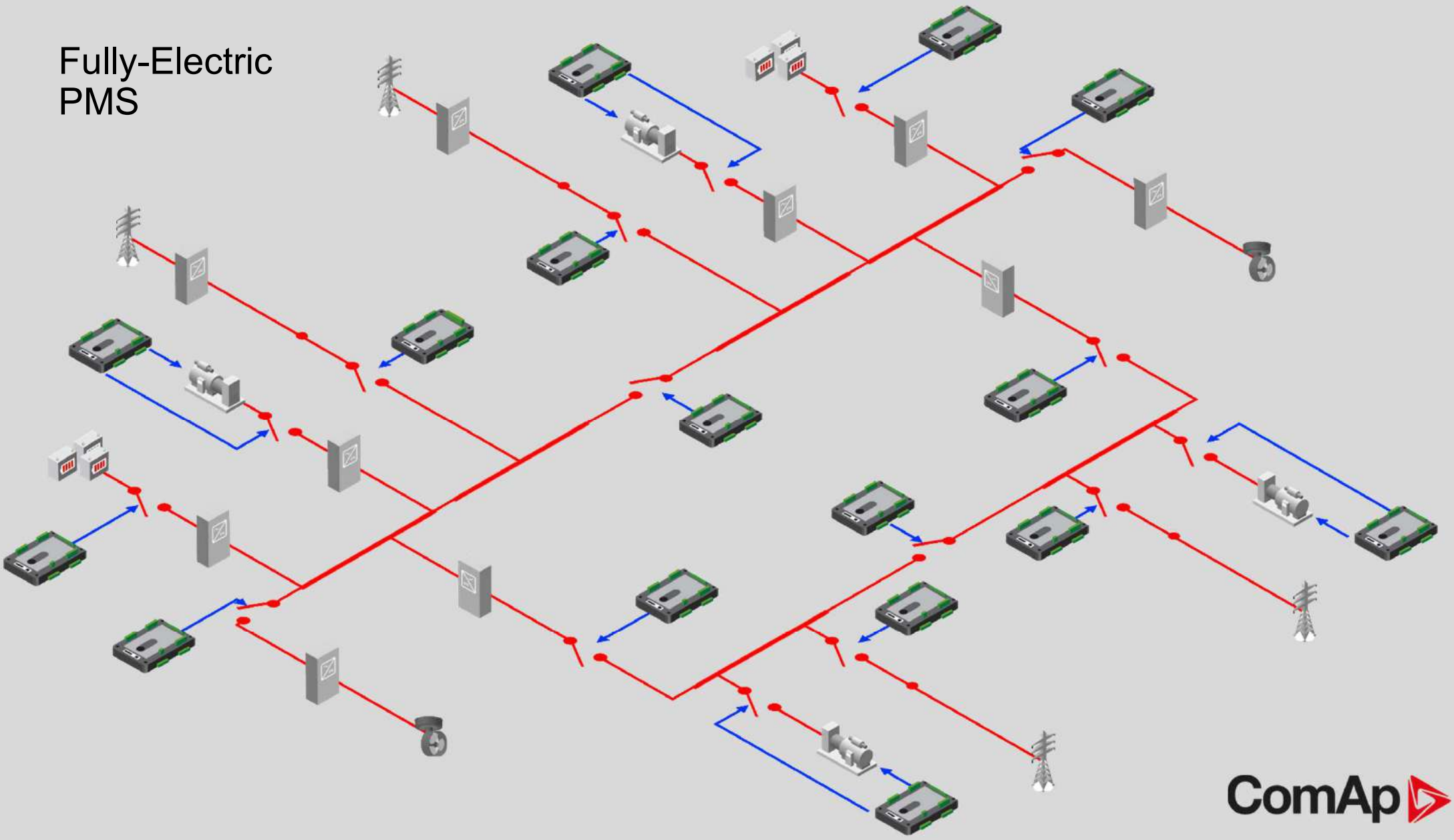
Fully-Electric PMS



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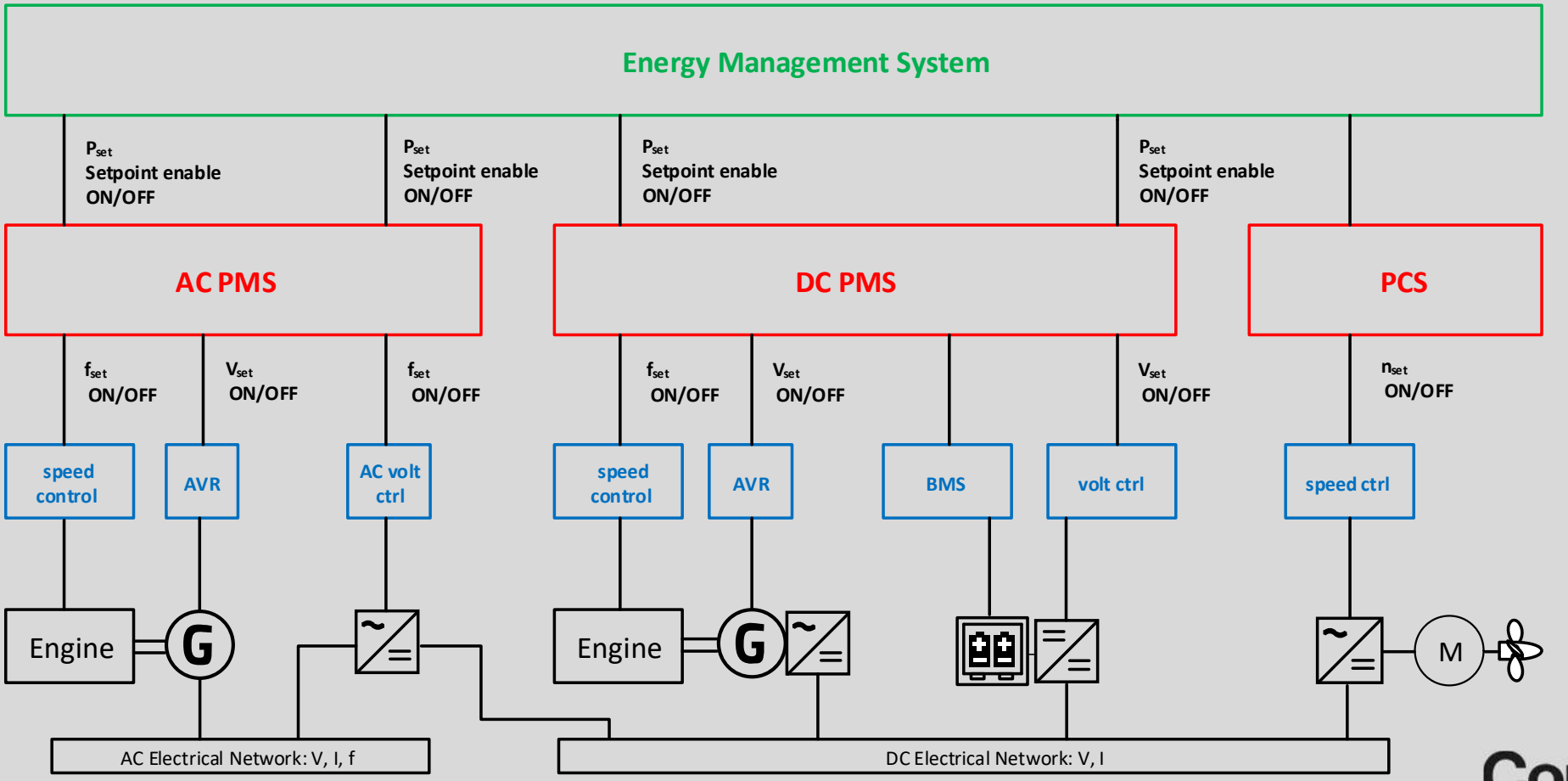
Layers of Control



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Suitable for Any Configuration

› Traditional AC	Generators in MINT to AC Bus
› Hybrid AC	Battery packs + Genset integration to AC Bus
› Hybrid DC	Generators + Batteries to DC Bus
› Fully Electric DC	Batteries / FC as the only sources

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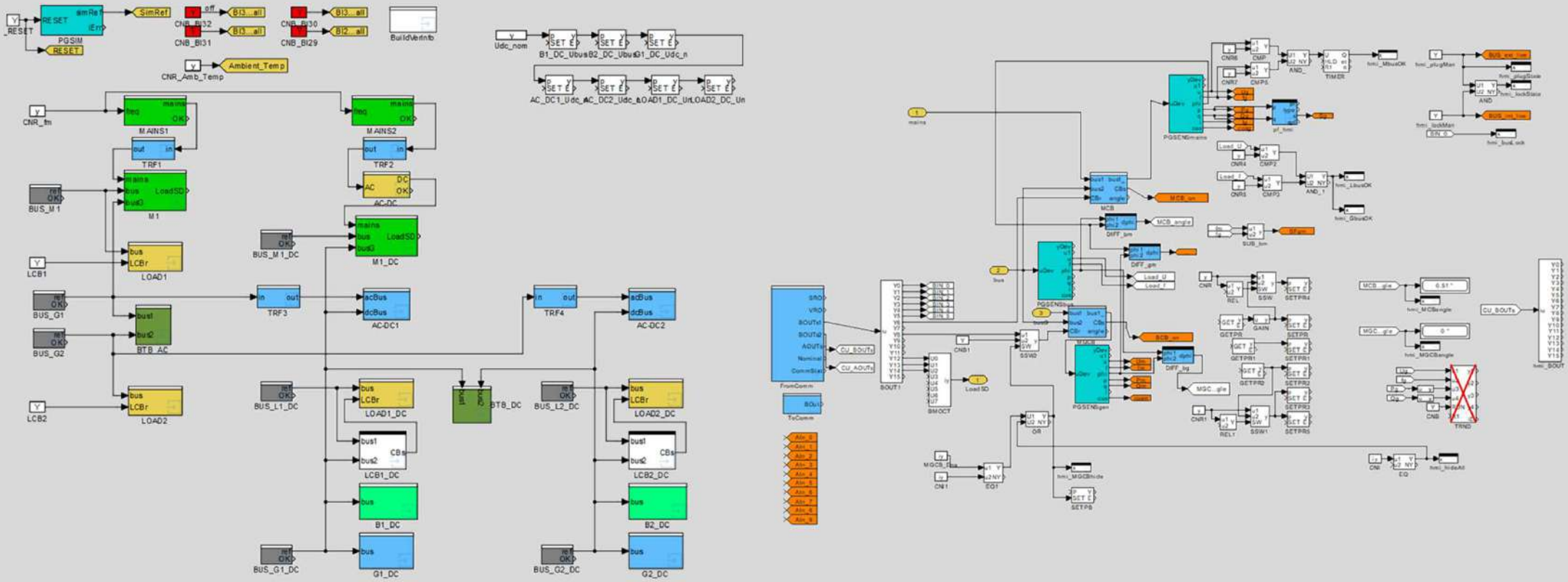
Simulation via REXYGEN



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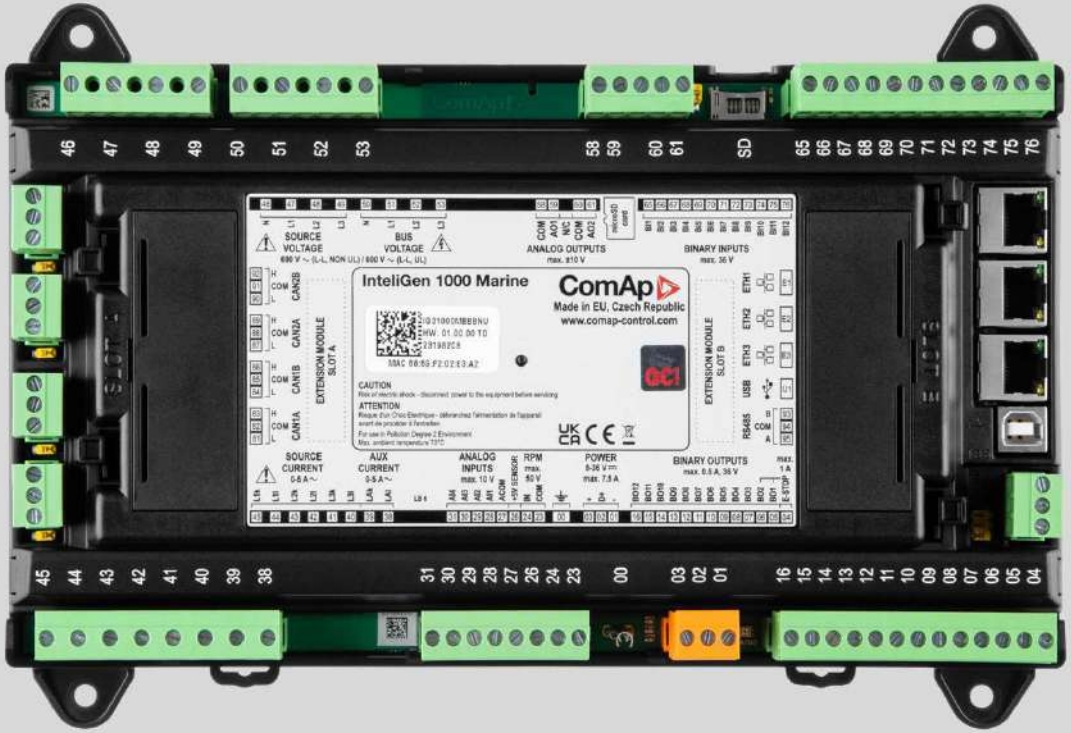
Various Vessel Types using ComAp's DC PMS



InteliGen 1000 Marine

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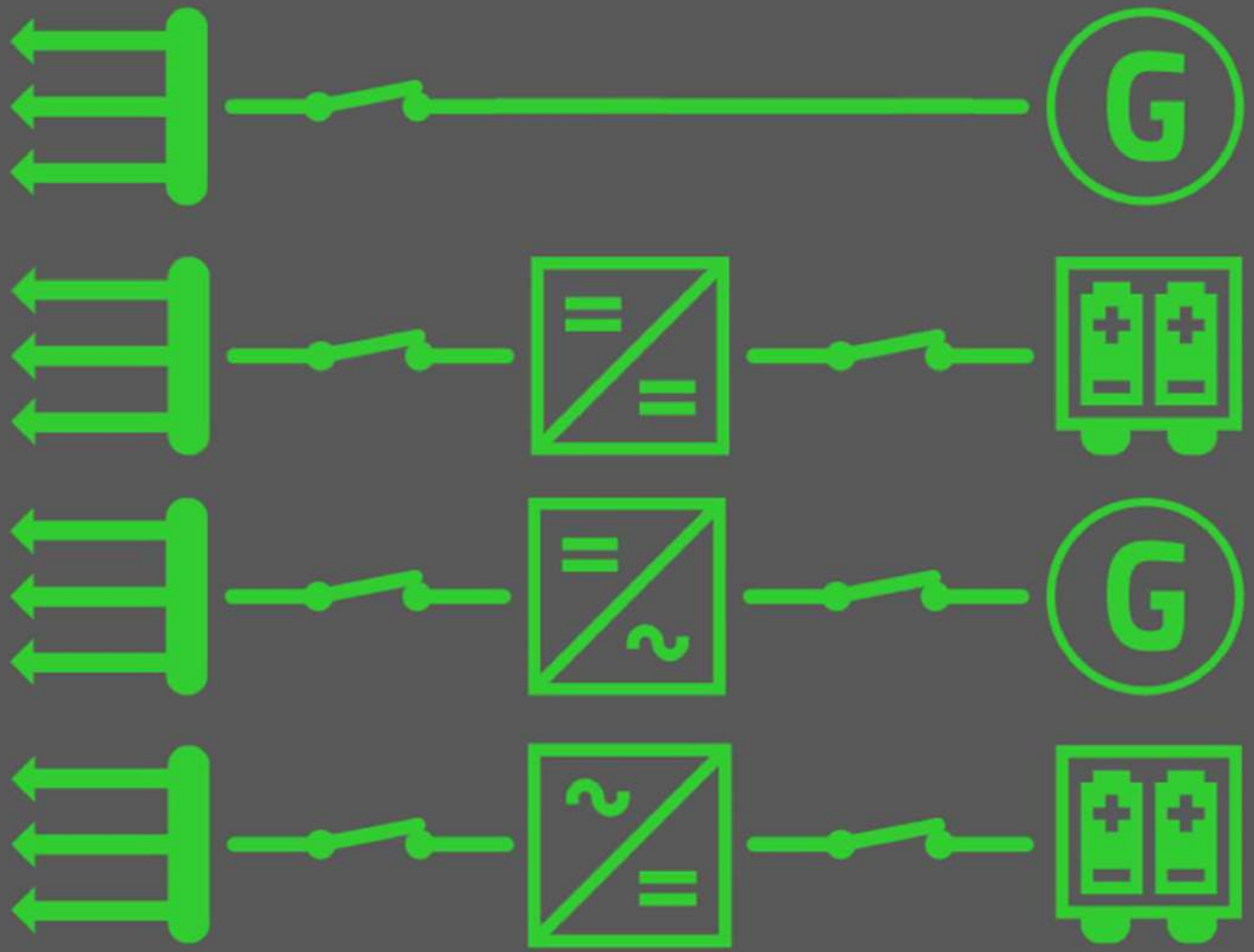
AC Applications

- AC Battery
- Genset
- Emer Gen
- AC BTB
- AC Shore
- AC shaft gen



DC Applications

- DC Battery
- DC Genset
- DC BTB
- DC Shore
- Microgrid

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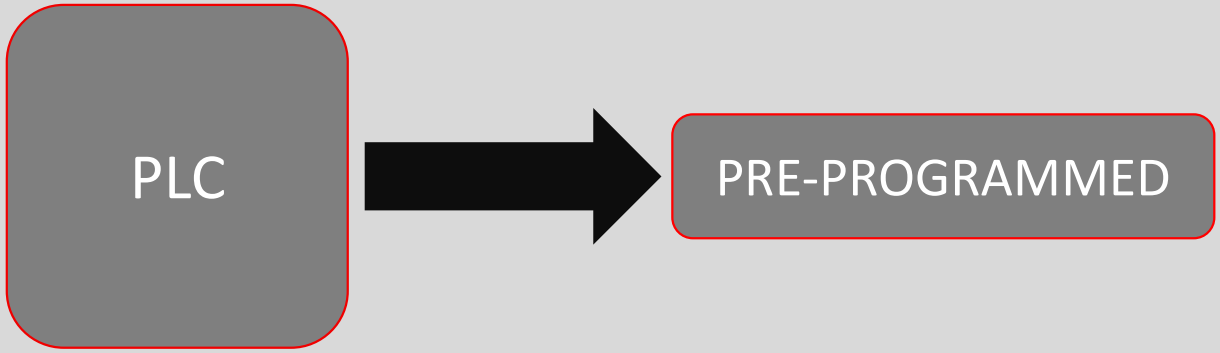
What is the Benefit?



- To minimize programming time
- Easy settings, monitoring, and commissioning
- Unified control logic across applications
- Complex vessel power management

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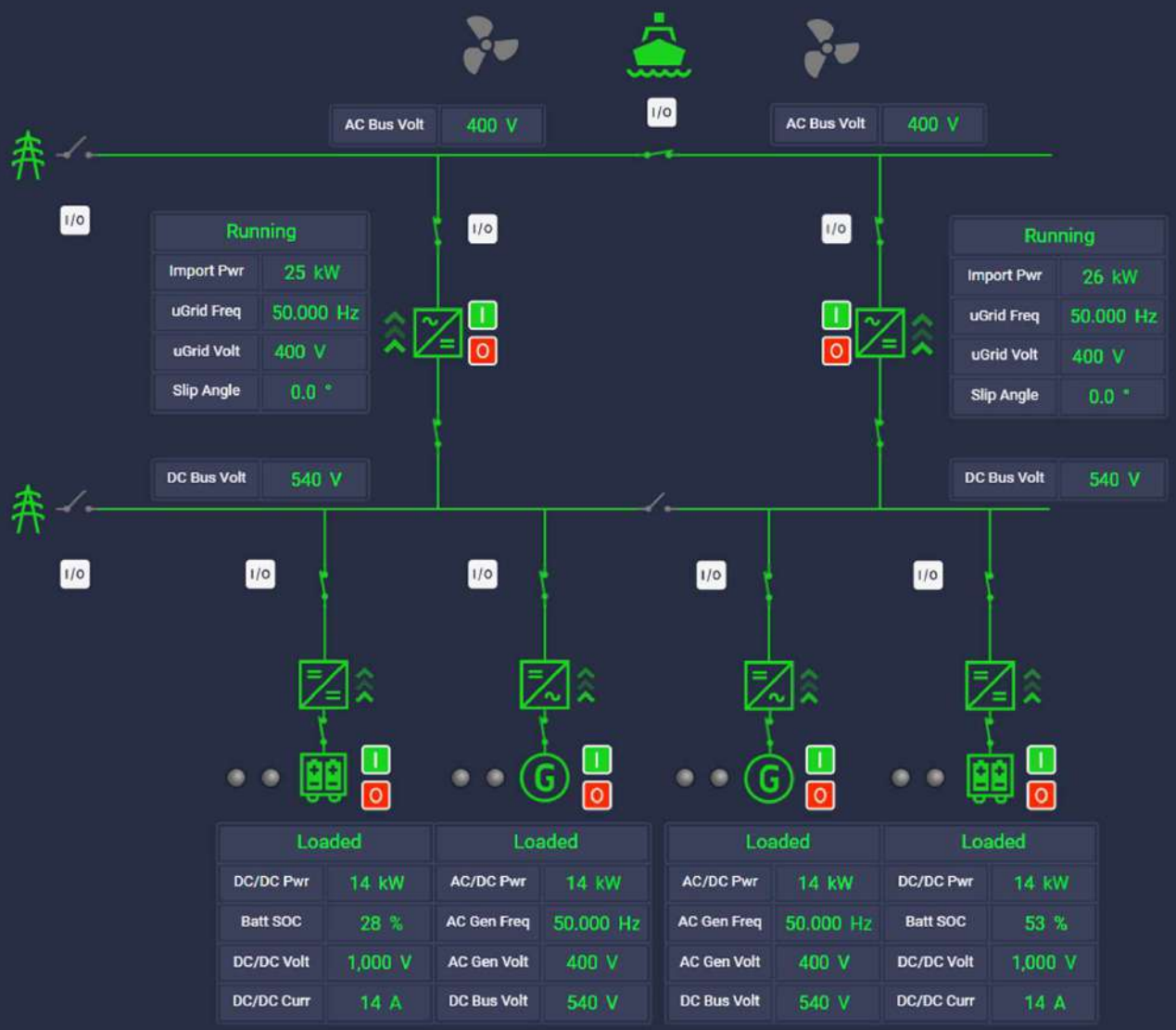
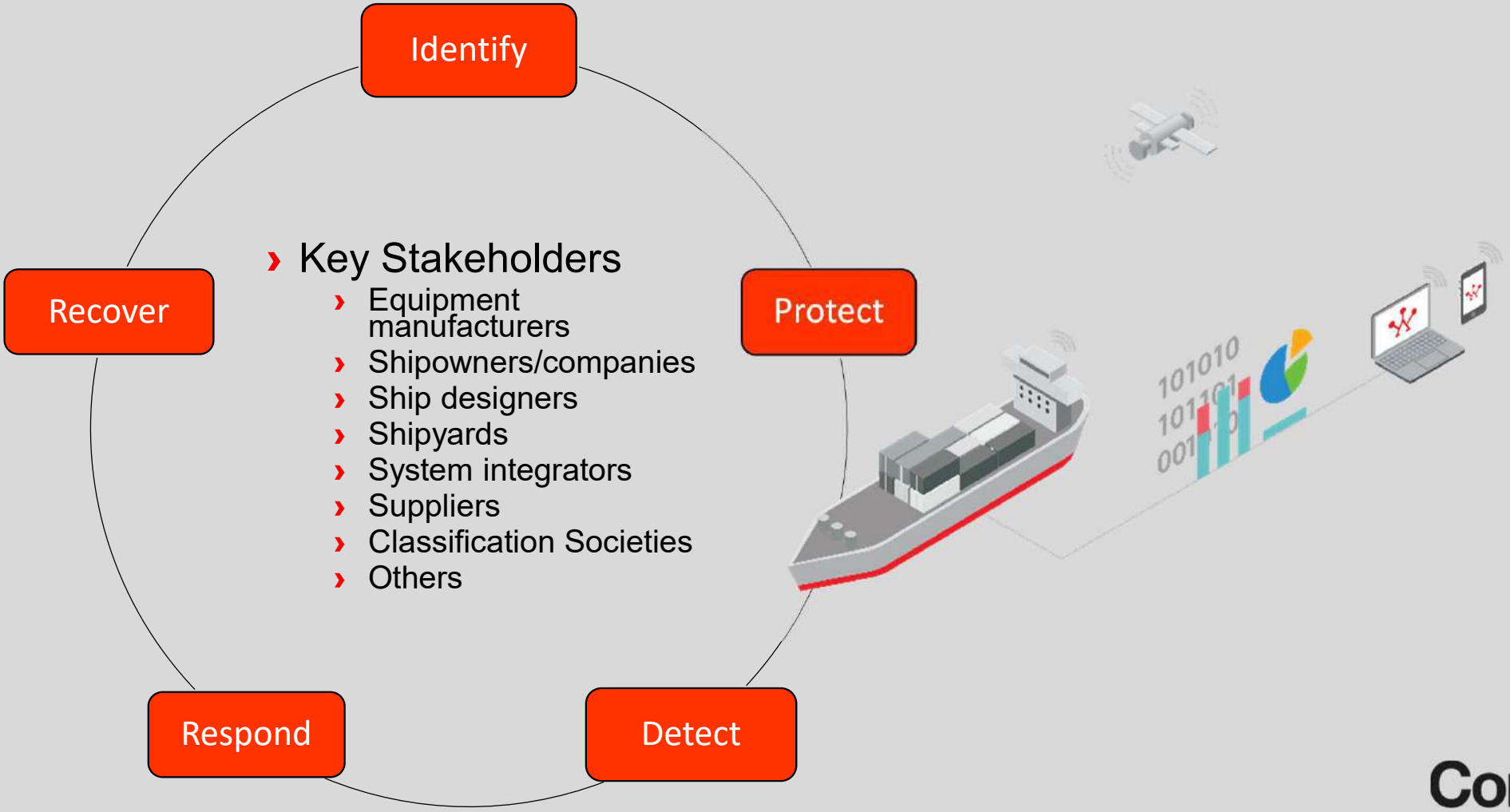
DC PMS Example



Cybersecurity



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Thank You!

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