Berth 121 Cold Ironing Project

A BP and Port of Long Beach Joint Project

The Berth 121 Project Summary

- A pilot project
  - Joint BP and Port of Long Beach
  - First of-a-kind
- Goals
  - Tests feasibility on oil tankers
  - Define opportunities and challenges

What We Have Learned So Far

- Cold ironing is not a universal solution
  - Regulations should not dictate which technology is used to achieve emission reductions
- Cost and complexity of cold ironing is easily under-estimated
  - Voluntary participation less likely without incentives such as emission reduction credits

Why This Pilot Project Makes Sense

- Vessel Design – Electric Motor driven crude pumps
- Berth infrastructure - $2m pre-invested in electrical infrastructure
- Vessel visit frequency – Tankers built to transport crude from Alaska to California
- Port of Long Beach support for the project
- Pollutant emission reductions (NOx, SOx, PM, CO, ROG)
- Greenhouse Gas emission reductions (CO2)

Emission Savings Vary by Vessel

- During discharge cargo operations:
  - Steam ships and Motor ships derive ~5% of their energy from electricity
  - Diesel electric vessels derive ~95% of their energy from electricity
- 1998 – Nov 2004, Berth 121 had 1143 ship calls; less than 10 of these have been from diesel electric vessels
  - At that time, 3 of these ship calls were the Alaskan Frontier

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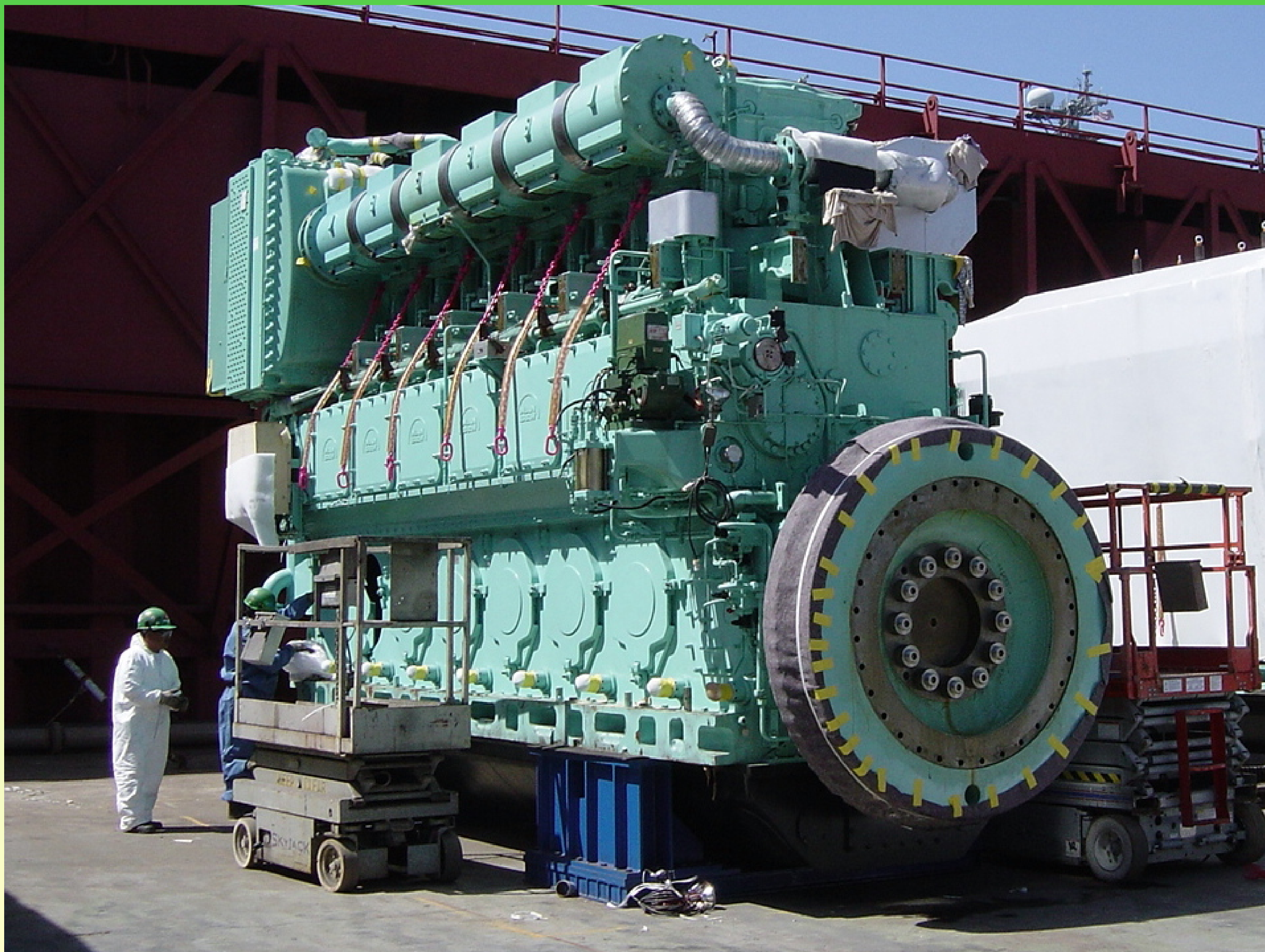
Vessel Generators MAN B&W 6L48/60 – 6.3MW



Project Considerations : Shore-side

- Port area power availability
- Facility electrical (berth power distribution infrastructure)
- Voltage requirements (6.6 kV) / transformers
- Dock structural issues (cable management system platform to withstand impact by ship)
- Operating costs – electrical costs, maint. costs, power outages, added personnel
- Construction window – dock downtime

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Project Considerations : Ship-side

- Electric-driven pumping system
- Bumpless power transfer (safety)
- Vessel length (placement of CMS platform)
- Voltage requirements (6.6 kV) / transformers
- Space for placement of power receptacles
- Port vs starboard connections, crane placement, cable guides
- Vessel demurrage costs

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Project Considerations Summary

- Not applicable to steam ships or ships with steam driven pumps in most cases
- Cold-ironing is more expensive than other emission reduction strategies, making voluntary participation less likely without incentives such as emission reduction credits
- Safety issues should be fully vetted with Port Authorities early in the process
- Existing port and berth infrastructure play a key role in determining feasibility
- Electrical power transmission and distribution systems to ports are a pivotal project consideration

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Summary

- The Berth 121 pilot project provides a unique opportunity because:
  - Infrastructure in place for Shoreside Booster Pumps
  - Diesel electric vessel design
  - Vessel visit frequency for ANS fleet
  - Shared capital expense with POLB
- Cold ironing is clearly not a universal solution
- Regulations should not dictate which technology is used to achieve emission reductions
- Cold ironing is a more expensive option making voluntary participation less likely – use of emission reduction credits could help offset this expense and provide short-term incentives

Any Questions?

Expected Emission Savings

Scenario	Estimated Emission Reductions (tons/year) Incremental to base case, Net of land-based power plant					
		NOx	CO	PM	ROG	SOx
BASE CASE: No changes No SSP's ; 0.8% S fuel oil		0	0	0	0	0
COLD IRONING – Alaskan Class Vessels (short tons/ship call) No SSP's		1.8	0.09	0.07	0.3	0.5
Annual Emission Reductions for Alaska Class Vessels – **Tons** (Assume 12 Calls/Yr.)		22.1	1.1	0.8	3.4	6.3
Annual Emission Reduction for Ecstasy Cruise Ship (Environ LB Port Study - 2004)		69.3	2.9	6.34	0.8	51.9

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