

FUEL & TECHNOLOGY OPTIONS FOR REDUCING MARINE VESSEL EMISSIONS in the GEORGIA BASIN

(DRAFT REPORT)

Genesis Engineering Inc.

in association with

Environment Canada



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What clean fuel and technology options can be used now or in the near future to reduce marine vessel emissions?

- Installed cost. Additional annual costs.
- Reduction in smog-forming emissions?
- Cost-effectiveness (\$/tonne reduction).



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Georgia Basin/Puget Sound



GB/PS STUDY AREA

- 7 million people
- Air-pollution health costs are significant.
- Marine vessels emit 33% of SO_x, 22% of NO_x and 7% of particulate matter (Lower Fraser Valley)

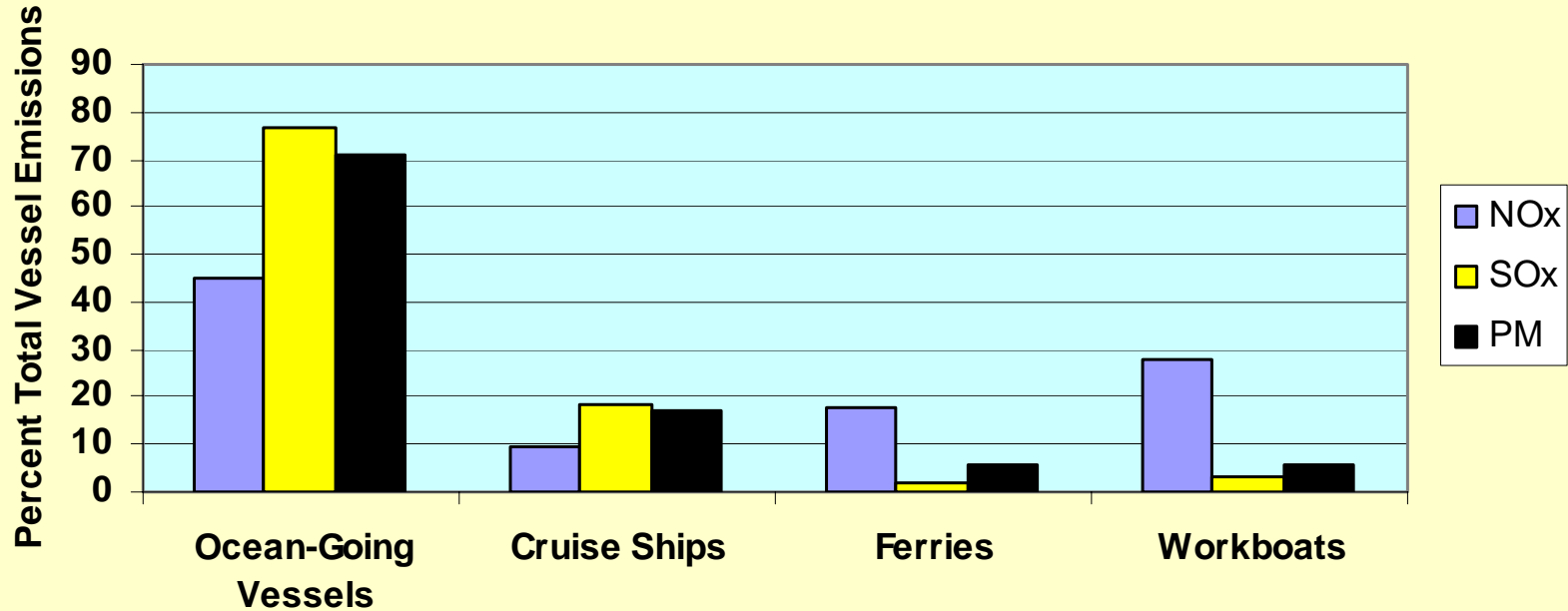


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CLASSES OF VESSELS STUDIED

Marine Vessel Emissions in the
Georgia Basin/Puget Sound Area

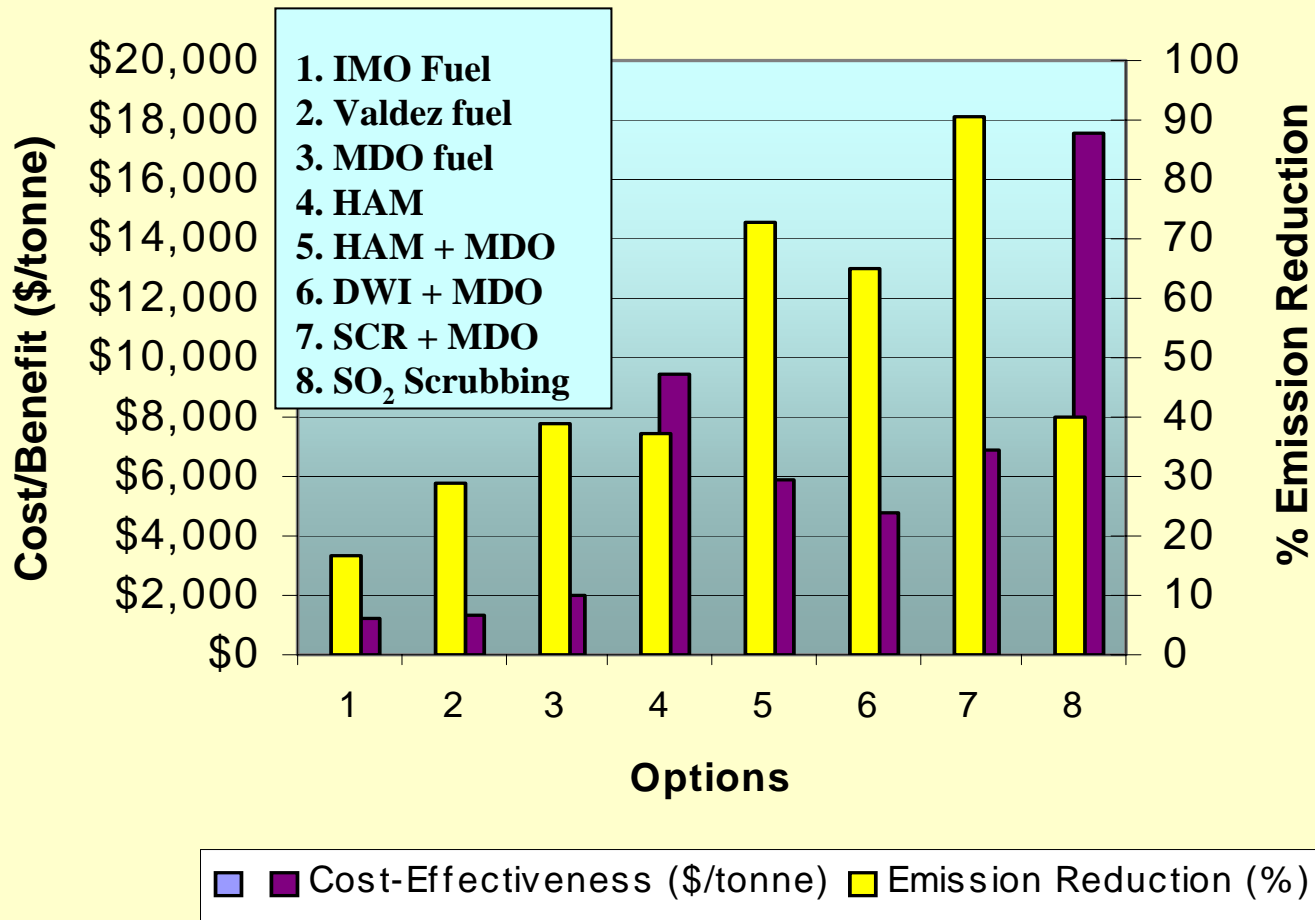


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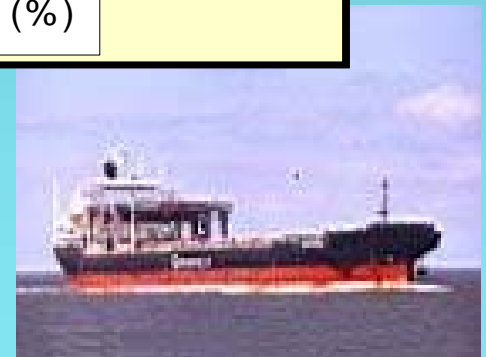


Large Vessel Options - Underway



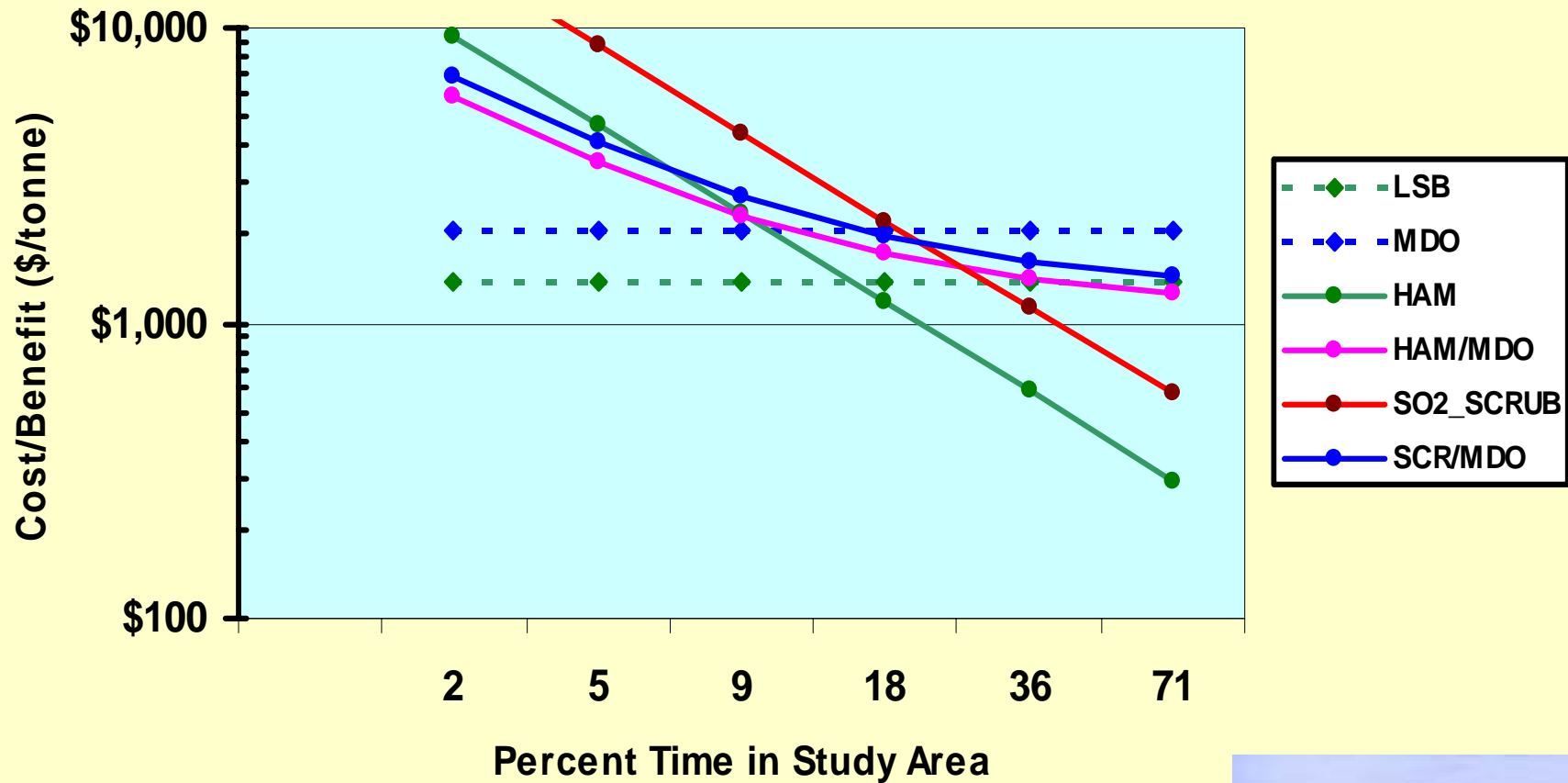
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Large Vessels Underway

Sensitivity of Cost-Effectiveness to Time Spent in Study Area

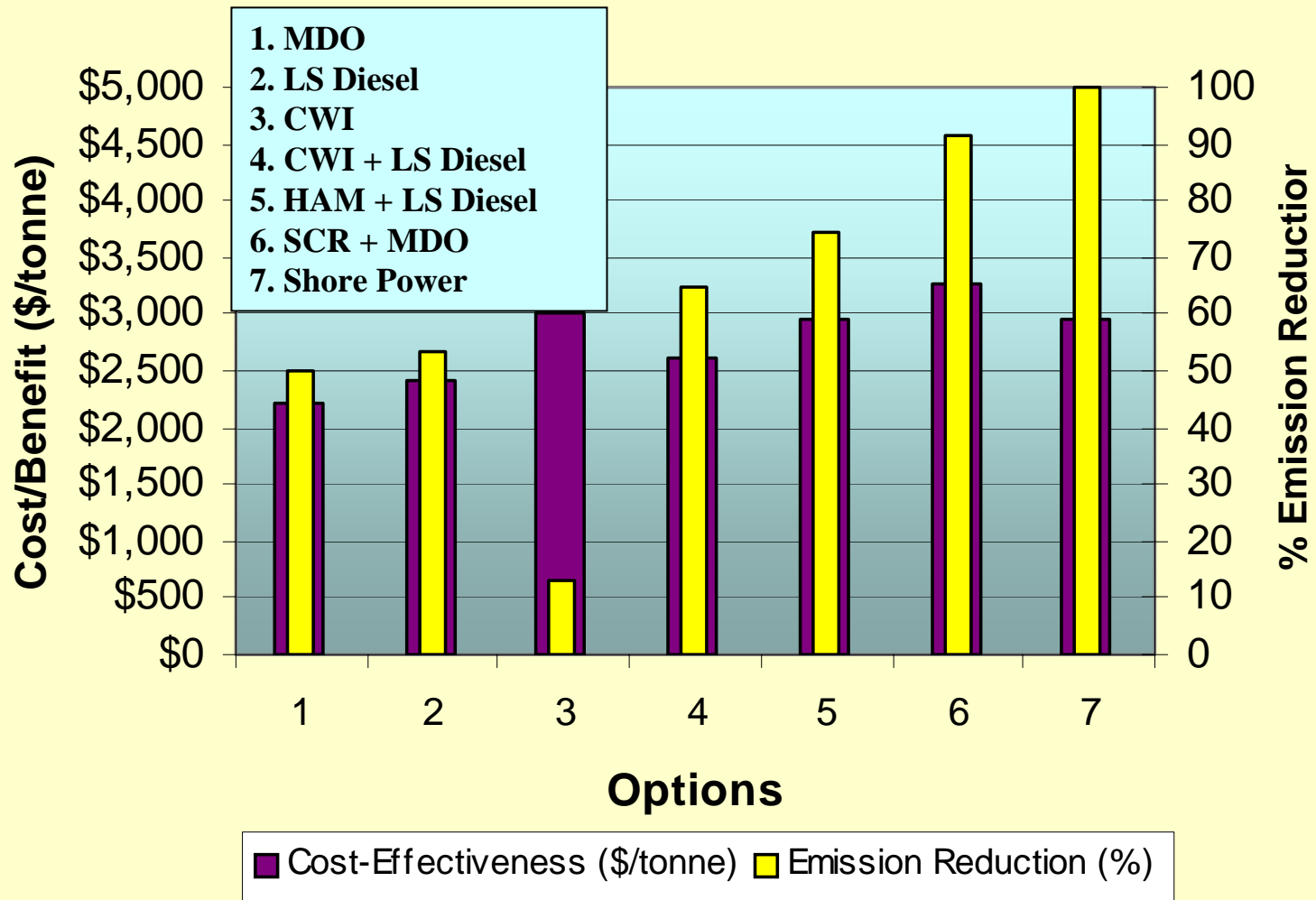


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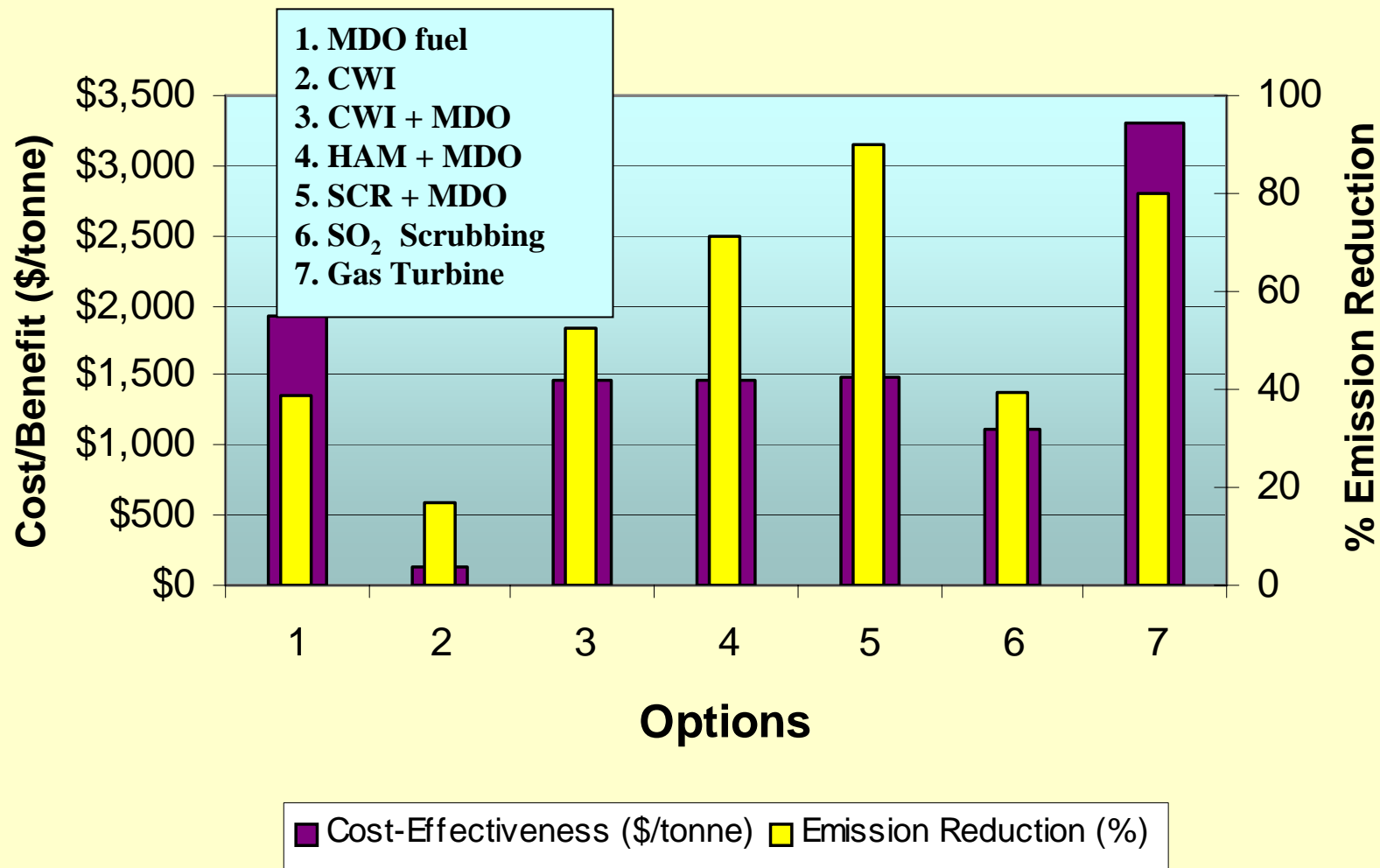
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Large Vessel Options - Hoteling



Cruise Ships - Total Activity

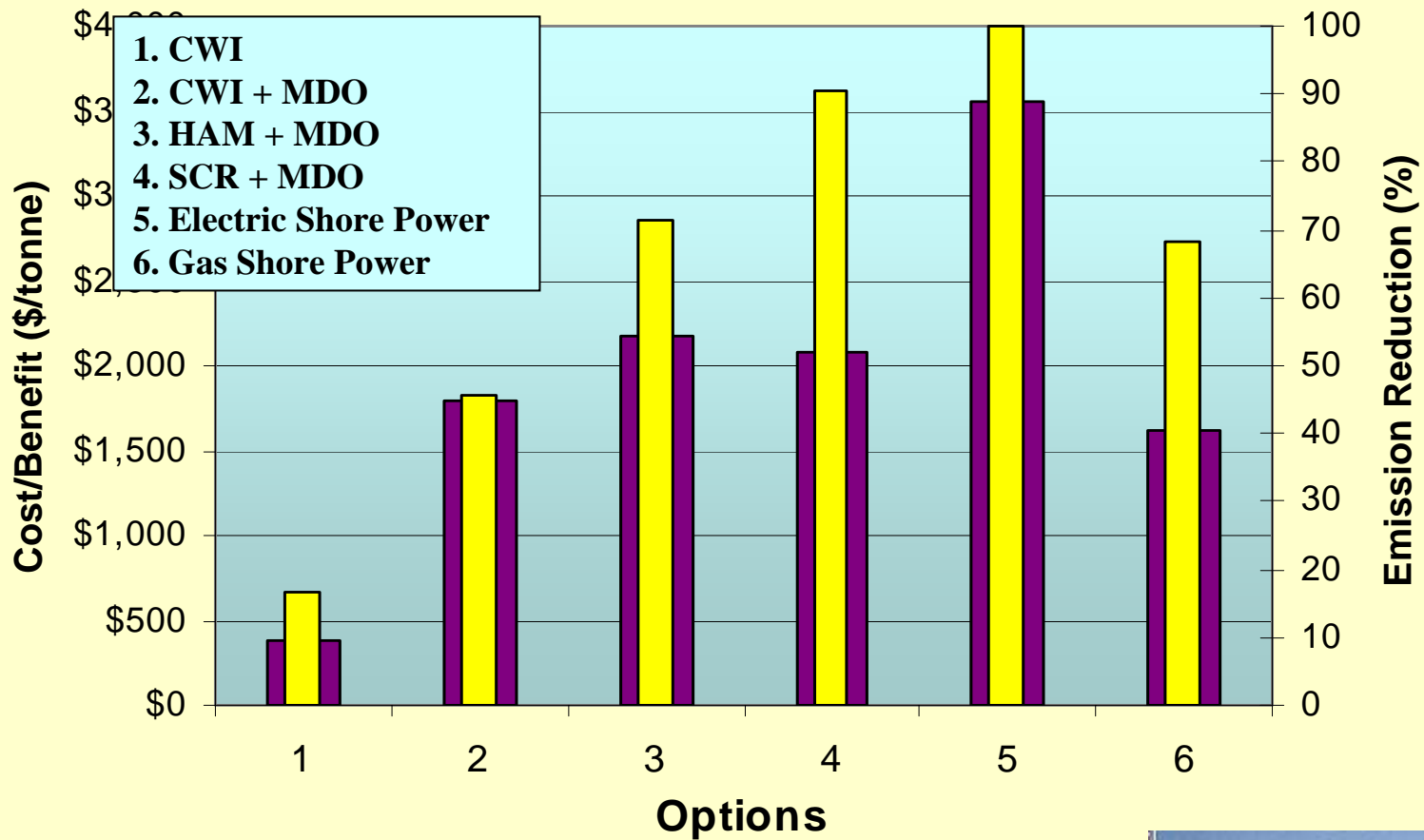


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Cruise Ships - Hoteling



■ Cost-Effectiveness (\$/tonne) ■ Emission Reduction (%)



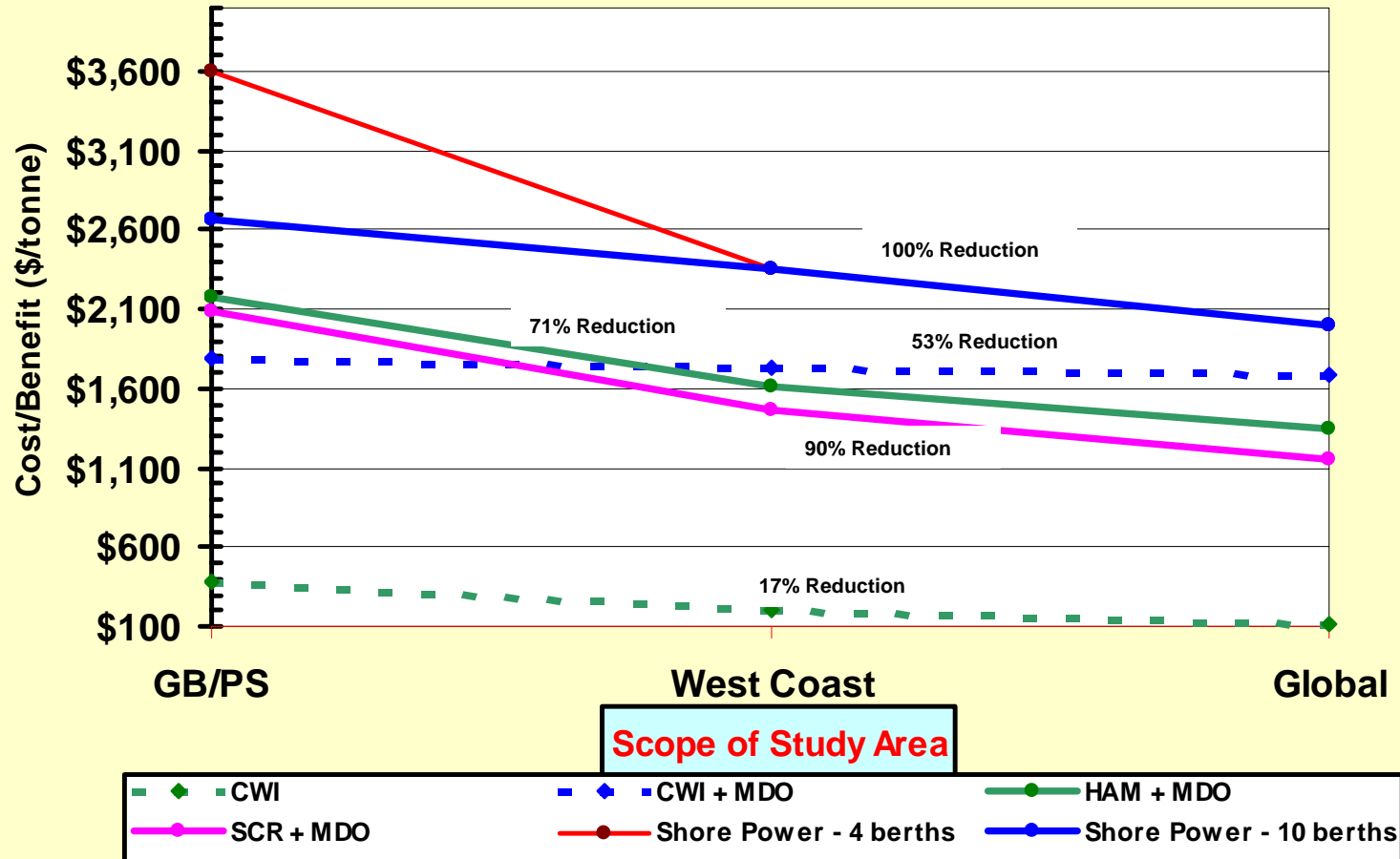
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Hoteling Cruise Ships

Sensitivity of Cost-Effectiveness to Scope of Study Area

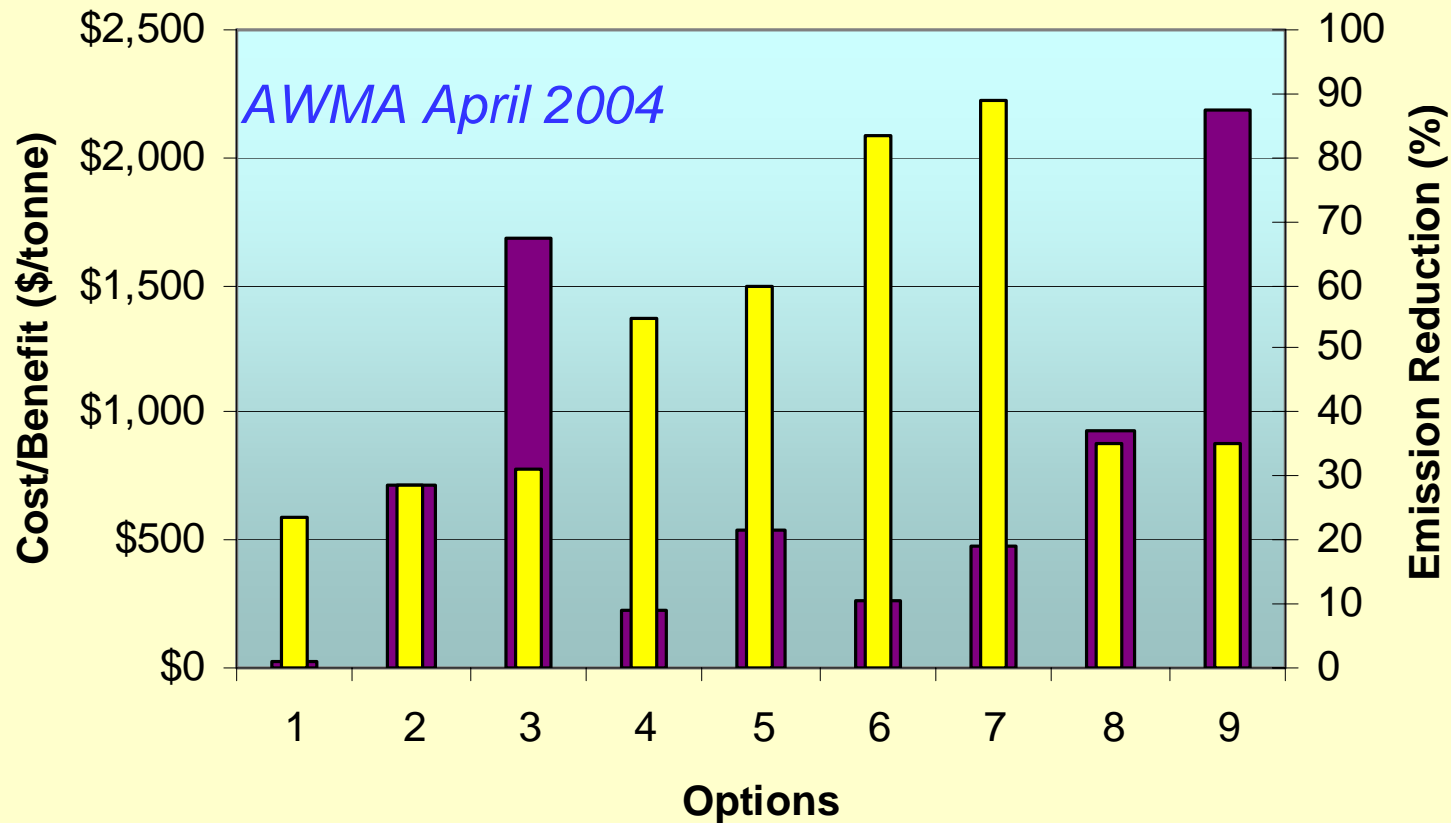


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Ferry Options



■ Cost-Effectiveness (\$/tonne) ■ Emission Reduction (%)

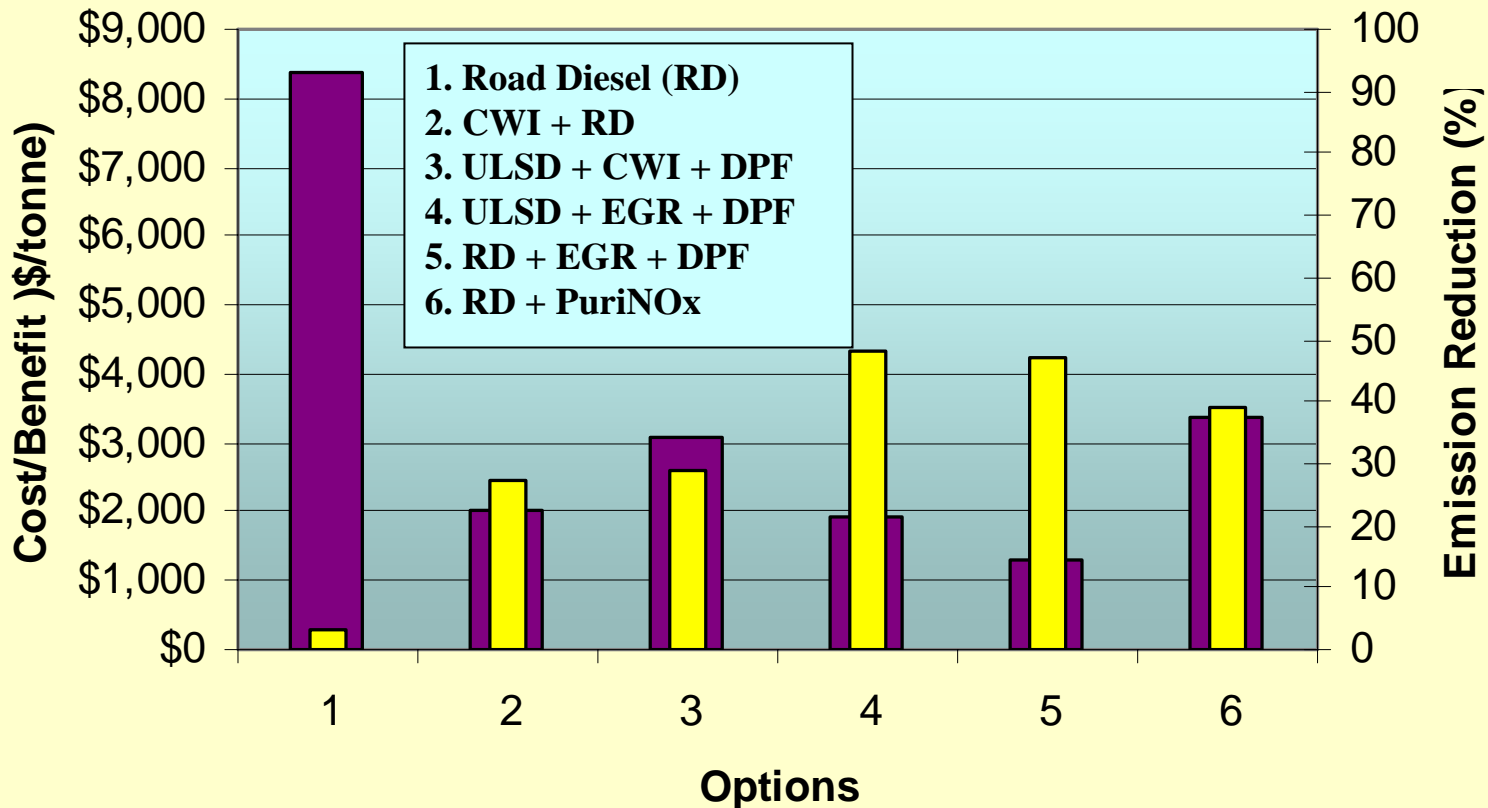
- | | |
|---------------------|------------------|
| 1. CWI | 2. CWI + LSD |
| 3. ULSD + CWI + DPF | |
| 4. HAM | 5. HAM + LSD |
| 6. SCR | 7. SCR + LSD |
| 8. LNG \$5/MMBtu | 9. LNG \$6/MMBtu |

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Work Boat Options



■ Cost-Effectiveness (\$/tonne) ■ Emission Reduction (%)



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CONCLUSIONS

- Merchant vessels (largest source) can reduce smog emissions 45% using MDO, at a cost of about \$2000/tonne.
- Cruise Ships can reduce emissions 90% using SCR and MDO, at a cost of around \$1500/tonne.
- Ferries can reduce emissions 90% using SCR, at a cost of around \$1500/tonne.
- Workboats can reduce emissions 50% using EGR, at a cost of around \$1200/tonne.



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More Info?

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