

Canada New England Cruise Symposium



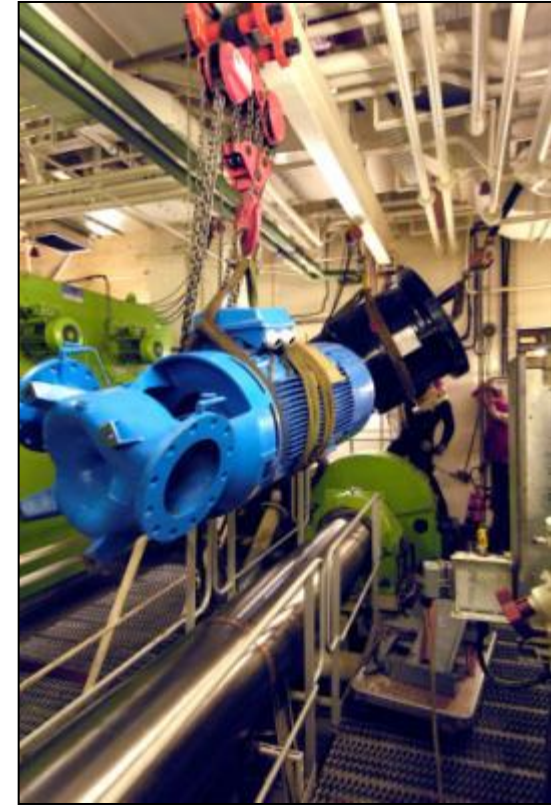
CARNIVAL
CORPORATION & PLC

Tom Dow
Vice President - Public Affairs

Technology for Cleaner Air

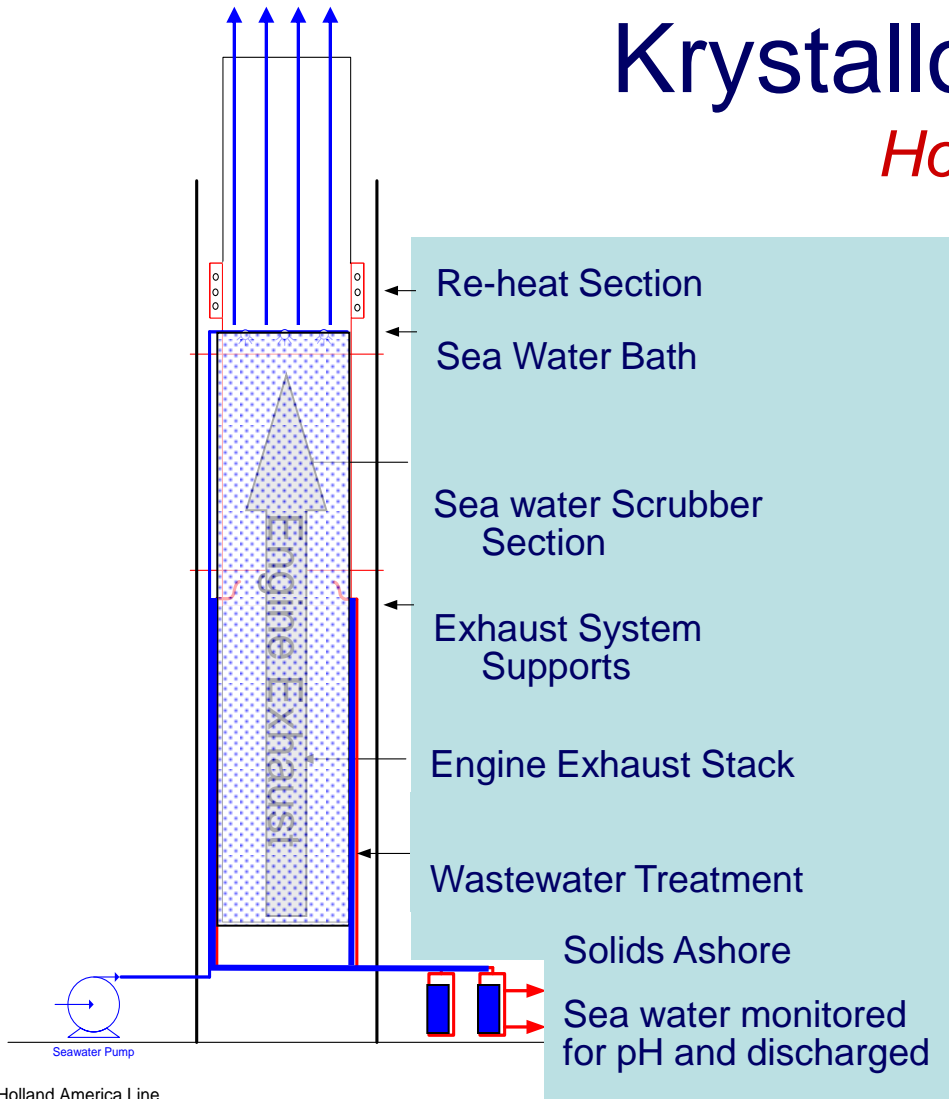
Why Sea Water Scrubbing?

- Simple chemistry
- Proven application for land-based facilities and as inert gas systems on petroleum & chemical tankers
- Substantially minimizes harmful emissions from diesel engines (SO_x and particulate matter)
- Can be used in port or at sea



Krystallon Seawater Scrubber

How it Works - in Concept



- Exhaust passes through a multi-sectioned scrubber. Scrubber is designed to promote thorough mixing of gaseous engine emissions and seawater (wash water)
- Wash water is treated to raise pH and separate solids from liquids prior to overboard discharge
- Solids are collected as a sludge and are properly discharged ashore

Shore Power Projects

EXISTING

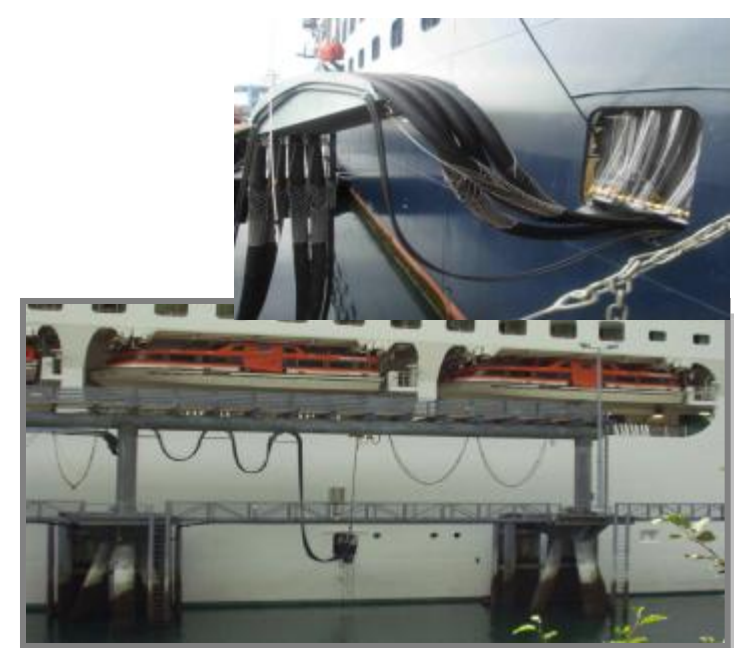
Juneau Alaska, Seattle & Vancouver

PLANNED

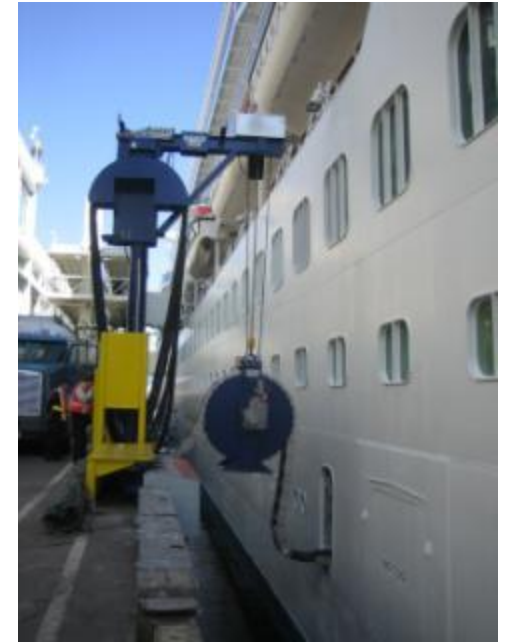
**San Francisco, Los Angeles, San Diego,
Long Beach**

Criteria for a Successful Project

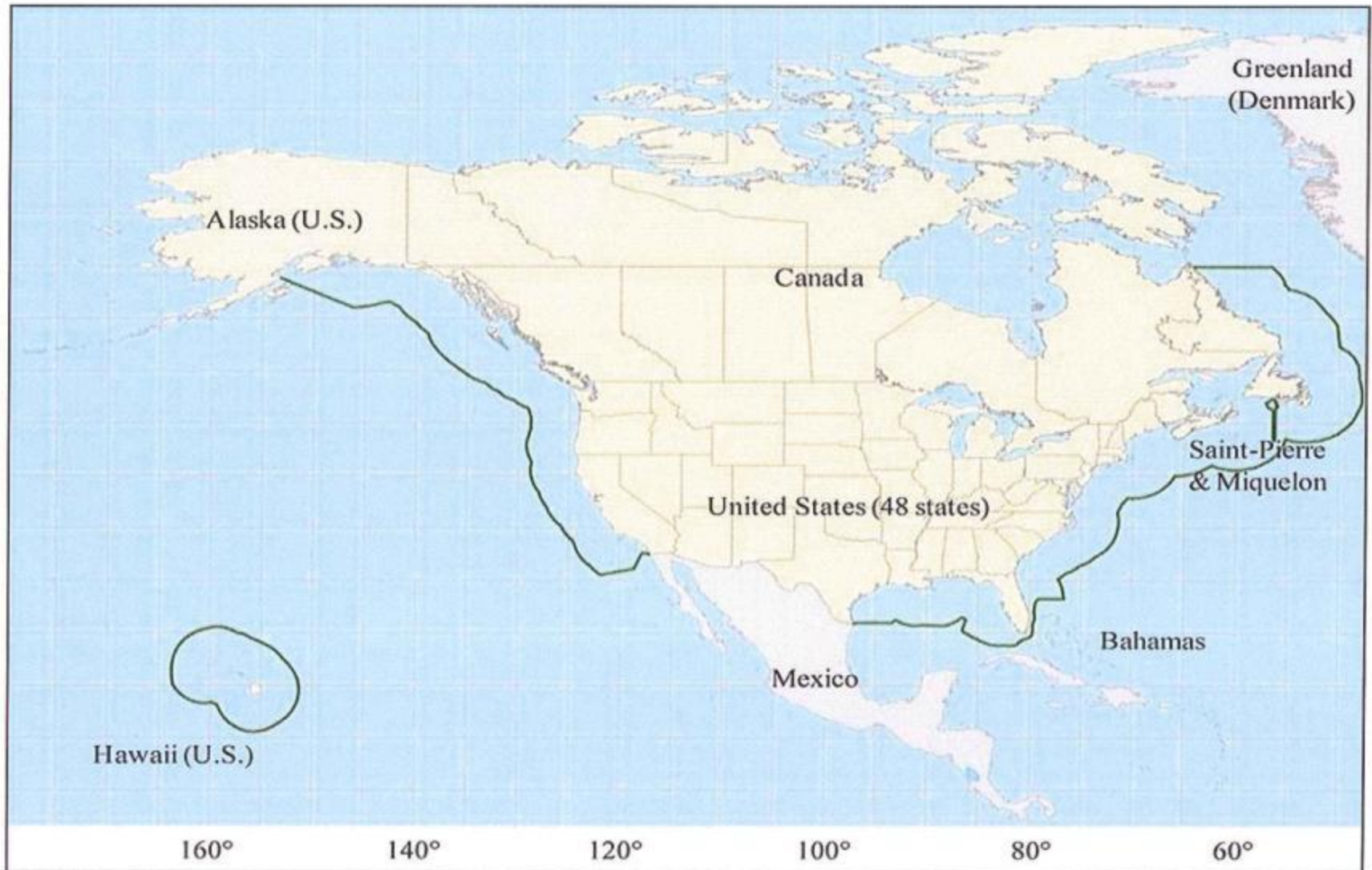
- Environmentally responsible source.
- Availability of an adequate supply of electricity at a reasonable cost.
- Frequency of calls by cruise vessels equipped to connect to Shore Power.
- Availability of the same dock and pier facility for these vessels for every call.
- Adequate dock and uplands space for equipment.
- Willing partners including – utility, port and government agencies.



“Plugging In”



Emission Control Area (ECA)



Source: Environment Canada