

Maritime Advisory Committee Meeting

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CRUISE SHIP SHORE POWER PROJECTS

**Tom Dow
Vice President, Public Affairs
Carnival Corporation & plc**

Criteria for a Successful Shore Power Project

- 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.

Existing Shore Power projects are:

- Juneau Alaska, one installation completed 2001
- Seattle. Two installations (each dual voltage) \$4 million. Electricity cost \$0.056 per kwh completed 2005 and 2006
- Vancouver, BC, two installations (each dual voltage) \$5 million. Electricity cost \$0.073 per kwh (Canadian = \$0.069 at current exchange rate). Estimated completion 2009
- San Francisco, one installation (dual voltage) \$2 million. Electricity cost not final, estimate \$0.09 - \$0.11per kwh. Estimated 2009
- Los Angeles, two installations, estimate electricity cost \$0.09 - \$0.11 per kwh. Estimated completion 2009.
- San Diego, one installation (dual voltage) \$2.5 million. (This is preliminary estimate from Cochran Electric. Rate for electricity not yet final. Estimated 2010
- Long Beach, one installation (dual voltage), very preliminary estimate, \$2.5 million.
- Brooklyn Red Hook, preliminary. One dual voltage. Estimate \$2.5 - \$3.0 million.

All-in the cost should be \$2.5-\$3.5 million per system.

Cruise Ship Shore Power Project Shoreside Installation

Shore Power Description

Power is transmitted from an onshore substation equipped with a dual voltage transformer that will supply power to 11kV or 6.6kV class ships.

Internal shore side monitoring and protection is achieved with protection relays to insure safety and protection of both ship and shore electrical systems.

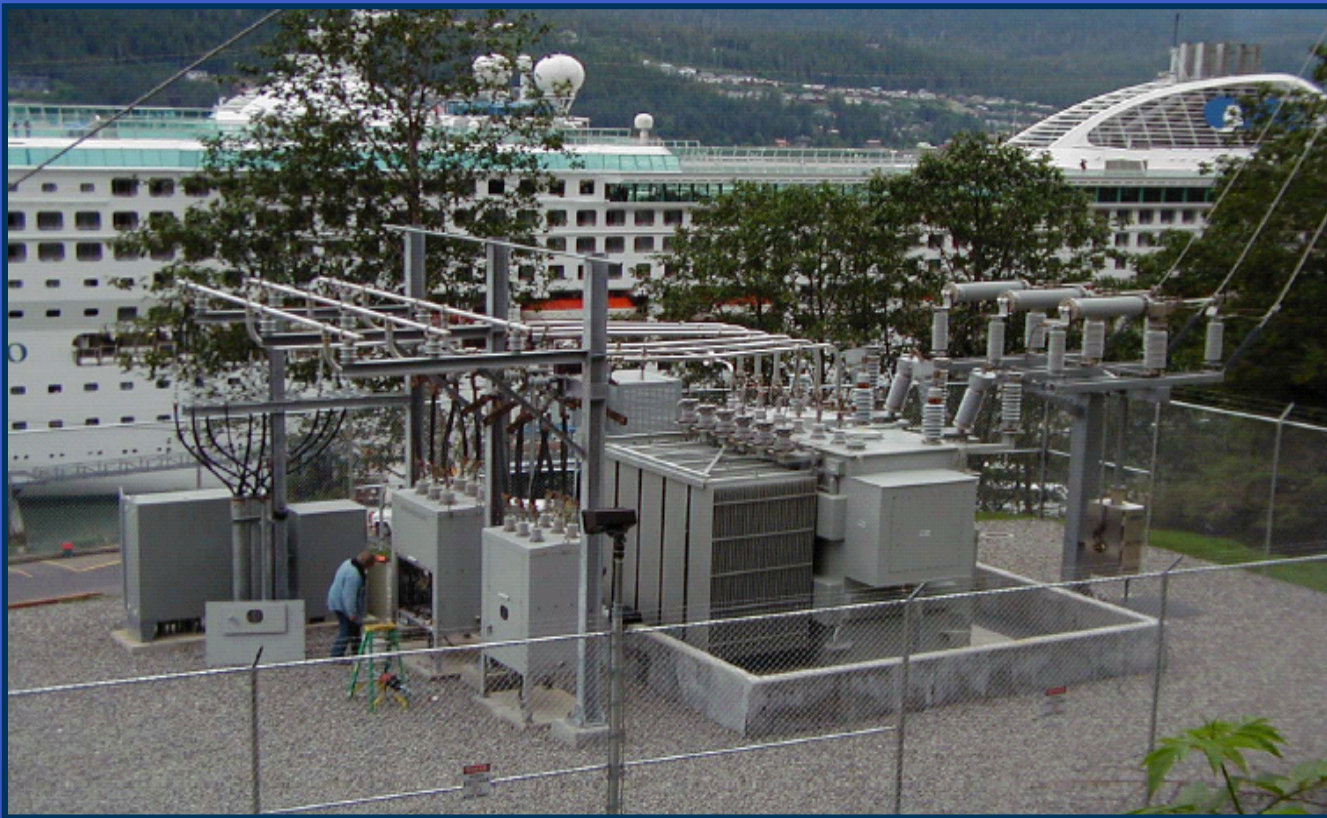
Flexibility to connect either 11kV or 6.6kV ships is achieved by two independent secondary breakers with Kirk-Key interlocks.

Power is carried to the ship through five flexible "Ship Cables" routed through a grounding switch.

This grounding switch works in conjunction with the ships automation system to ensure safety and reliability during the cable handling from shore to ship.

Cruise Ship Shore Power Project Juneau, Alaska 2001

First High Voltage Shore Power Connection
for Cruise Ships



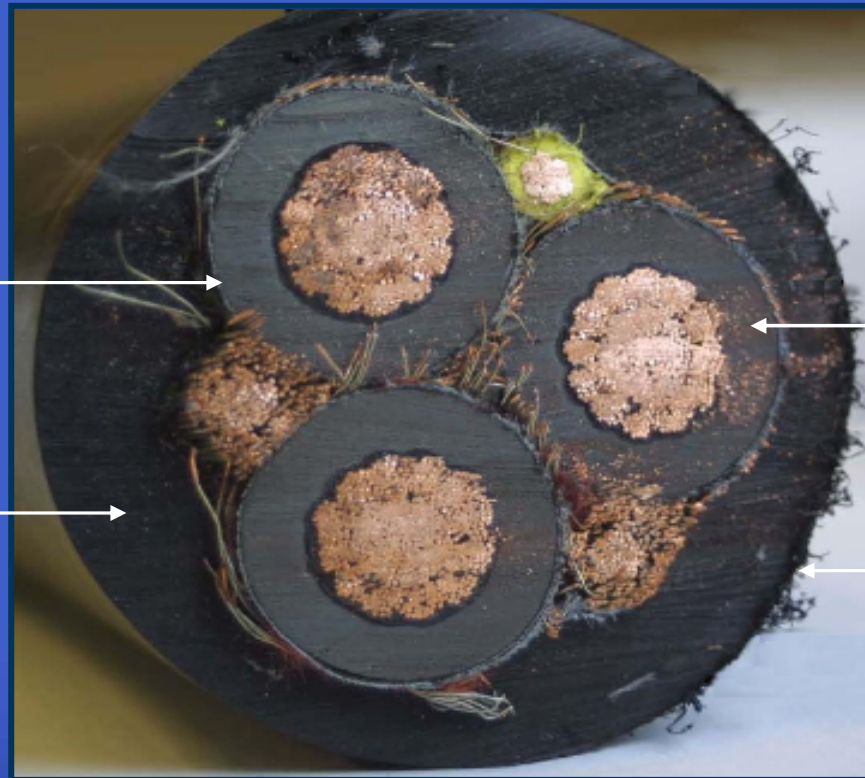
Cruise Ship Shore Power Project

Power Cables

AmeriCable 350 KCMIL 15kV SHD-GC CPE

15kV 350
MCM Cu
Conductor

Grounding
Conductor

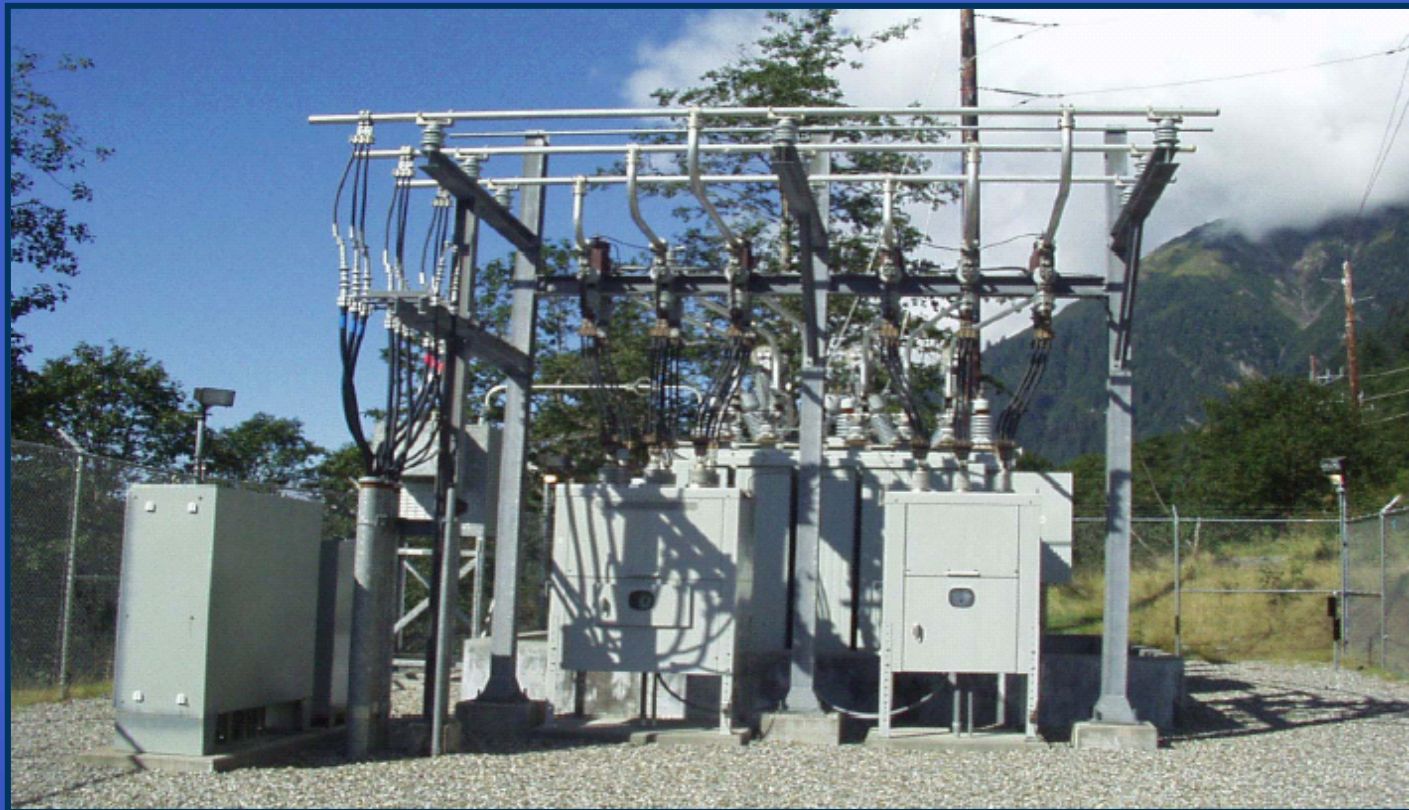


EPR
Insulation

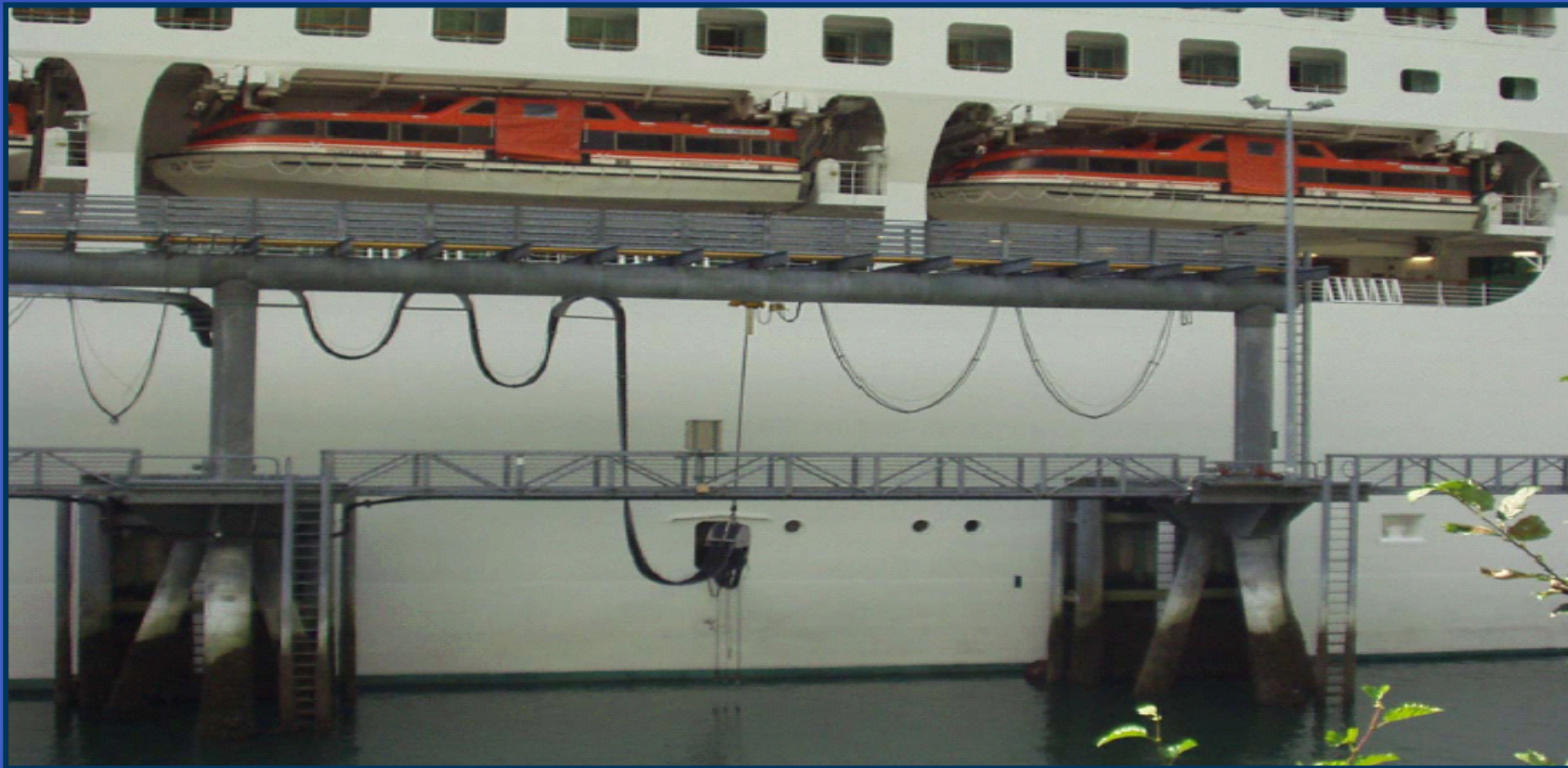
CPE
Jacket

Cruise Ship Shore Power Project Juneau, Alaska

Substation 6.6 & 11 KV Breakers



Cruise Ship Shore Power Project Juneau, Alaska



Cruise Ship Shore Power Project Juneau, Alaska



*Festooning
System
Allows for
Cable
Adjustment
for Tidal
Fluctuations*

Cruise Ship Shore Power Project Juneau, Alaska

Electrical Energy Sales In Juneau, Alaska

- Ship Hotel Electrical Loads 7 to 11 MW @ 6.6 KV or 11 KV and .83 to .86 PF
- Total Annual Shore Power Consumption is 11 - 12 GWH Annually

Cruise Ship Shore Power Project Seattle, Washington 2005-2006



Cruise Ship Shore Power Project Seattle, Washington

Electrical Energy Sales In Seattle, Washington

Transformer Capacity:

- 32.50 Megawatts.
- Total annual consumption 7.0 – 8 GWH.

Dual Service Delivery (Secondary) Voltage:

- 6.6kv and 11kv depending on class of ship.
- Both voltages are not used at the same time.

In Seattle the Primary Voltage is 27kv.

Cruise Ship Shore Power Project Shoreside Installation

System Components

- Transformer
- Main Metering Equipment
- Secondary Metering Equipment
- Grounding Switch
- Shore Power Cable Winch
- Power Cables

Cruise Ship Shore Power Project Seattle, Washington

T-30

Transformer, Main & Secondary Metering Equipment



Cruise Ship Shore Power Project Shoreside Installation

Power Cable Winch



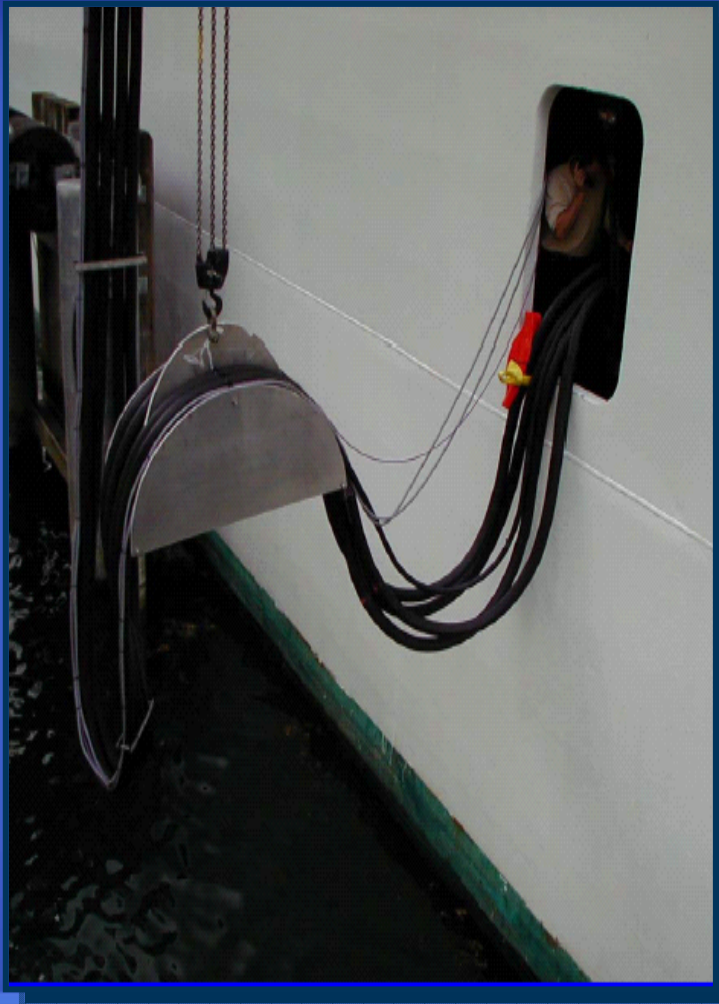
Cruise Ship Shore Power Project Shipboard Installation



Shipboard Cables Connections

- 4 Power Connectors
(Callenberg)
- 1 Neutral Connection
(Callenberg)
- 2 Control
(Cannon Plug)
- 1 SCADA
(Cannon Plug)
- Standardization of Cable
Connections

Cruise Ship Shore Power Project Shipboard Installation



CABLES FROM
SHORE SIDE

Cruise Ship Shore Power Project Seattle, Washington

Festooning System

