

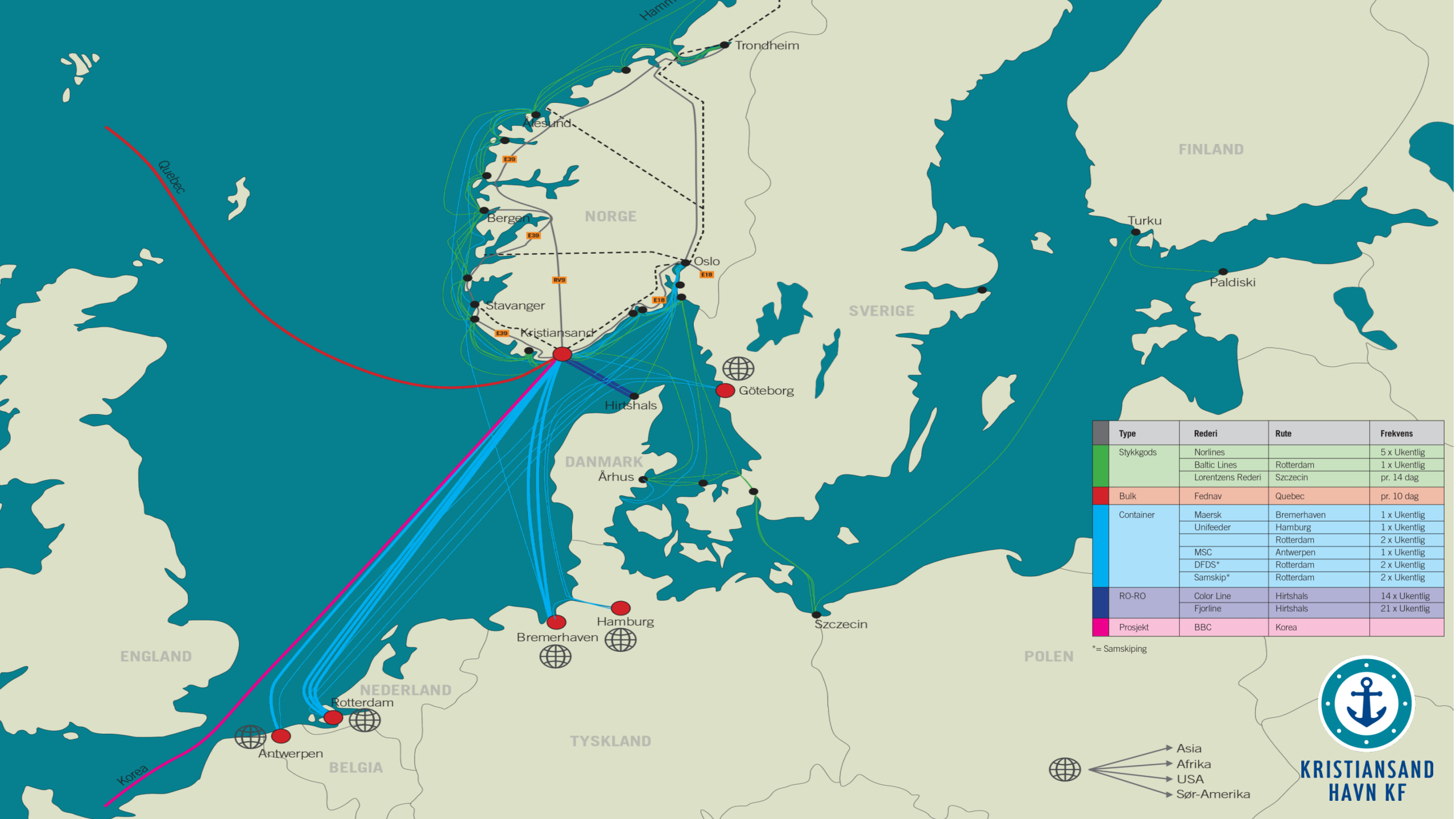


KRISTIANSAND
HAVN KF

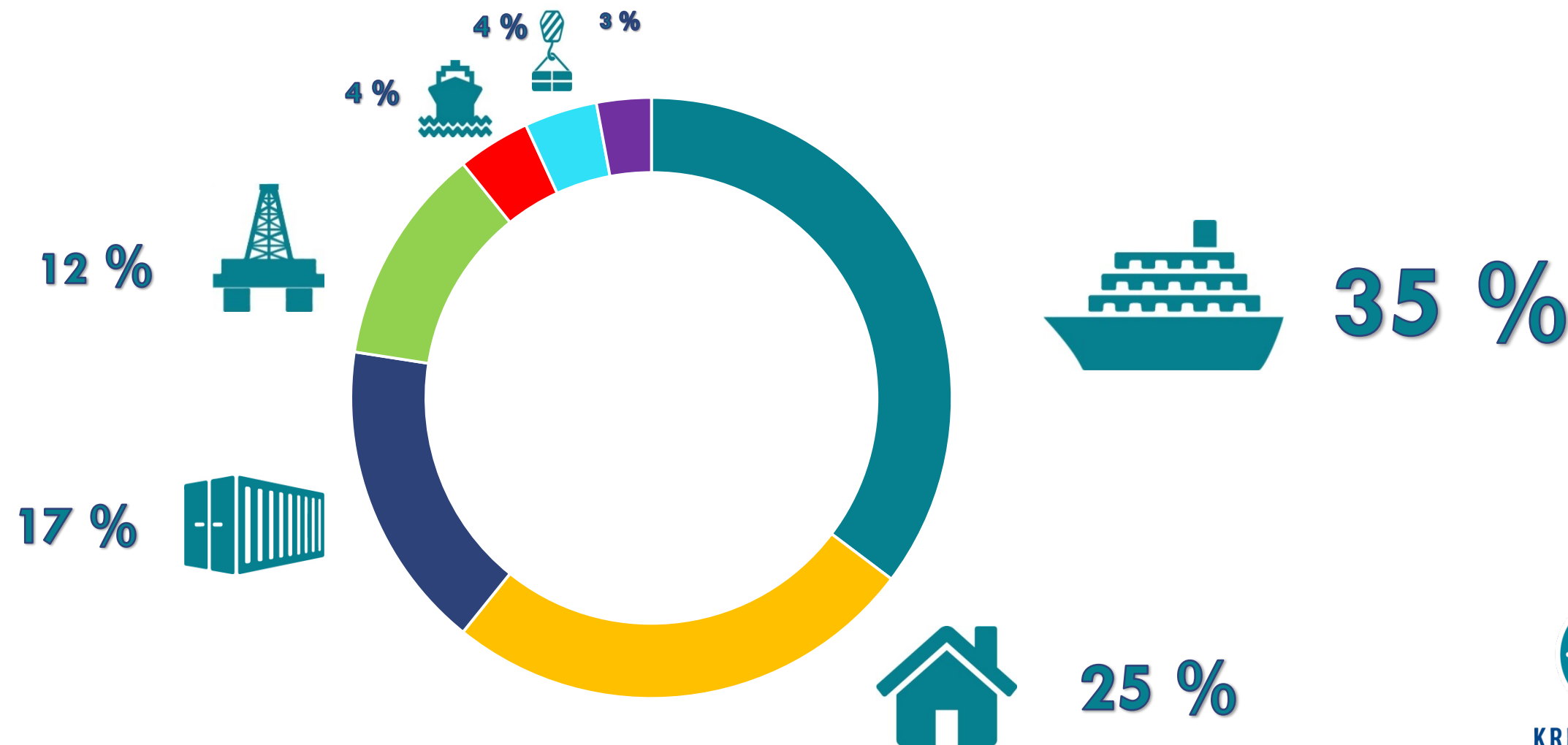


Port of Kristiansand

Shore Power



Strategy Areas



Shore Power Superspeed 1

Opened 2014



KRISTIANSAND
HAVN KF

Shore Power - Superspeed

2,8 mill kWh annually

- ▣ Reduction of Co2-emission: 2300 tons
- ▣ Reduction of NoX-emission: 34 tons
- ▣ Reduction of SoX-emissions: 1-2 tonn



KRISTIANSAND
HAVN KF

Shore Power Superspeed



Supplier: ABB Marine

High Voltage: 11 kV og 50 Hz – 100 percent automatic connection.

Delivers: 2,5 MVA



KRISTIANSAND
HAVN KF

Anbudskonkurranse Landstrøm Kongsgård



Tilbudsfrist: 22.05.2015 kl. 13.00

Kristiansand, 06.05.2015

06.05.2015 14:20:00



KRISTIANSD
HAVN KF

Shore Power, Low Voltage

- First mobile facility delivered september 2015
- 1200 kVA, 50/60Hz, 400/440/480/690V
- Processkontroll Elektriska AB won the tender



KRISTIANSAND
HAVN KF

Shore Power, Low Voltage

Rented facility for offshore-segment

- 1000 kVA
- Transformer 50 Hz and 60 Hz,
- User request for 480V, 60Hz
- Bought the transformer 400V/690V, 700kVA



KRISTIANSAND
HAVN KF

Shore Power, Low Voltage

ENOVA 2016, co financed

- PowerCon Hadsund, Denmark – Won the tender
- Opened november **2016**
- 1 400 kVA, 50/60Hz, can freely choose 400 – 690V
- 1 400 kVA for one ship or up to 700 kVA on two ships



KRISTIANSAND
HAVN KF

Shore Power, Low Voltage

2016 2,0 mill kWh + 2,8 mill kWh ColorLine = 4,8 mill kWh

2017 2,8 mill kWh + 2,8 mill kWh ColorLine = 5,6 mill kWh

2018 3,7 mill kWh + 2,8 mill kWh ColorLine = 6,5 mill kWh



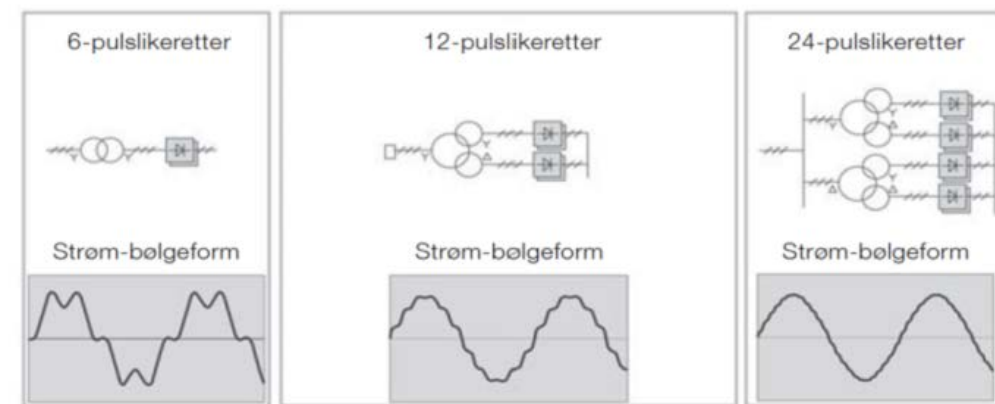
KRISTIANSAND
HAVN KF

Shore Power, Low Voltage

- ❑ Overharmonisk støy fra landstrøms anlegg.
- ❑ Aktiv front håndterer problemet, inntas i anbudsgrunnlaget,
- ❑ Betydelig tilførselskapasitet redusere problemet
- ❑ Be nettselskapet spesifisere

Utfordring for nettet - kraftelektronikk og svakt nett

- ▶ Kraftelektronikk utfordrer spenningskvalitet – overharmonisk støy
- ▶ Svakere nett større utfordringer med støy
- ▶ Nabobedriften får ikke produsert
- ▶ Elbil får ikke lade
- ▶ Induksjonskomfyrene slutter å virke
- ▶ Nettselskapet overvåker – kunden (støykilden) har som regel utbedringsansvar
- ▶ Hvem har ansvaret når nettselskapet gir tillatelse til en tilknytning uten å stille krav eller tar hensyn til dette under prosjekteringen?



Mest fremtredende frekvenser

September 10th 2018.



Total investment: 4 millioner Euro

Co financed over EU Horizon 2020

Port of Kristiansand, PowerCon, Agder Energi



KRISTIANSA
HAVN KF

Facility arrives Kristiansand



Shore Power Cruise



KRISTIANSAND
HAVN KF

Shore Power - Cruise

Europe`s largest shore power facility, 16MVA

- 11kV or 6,6kV high voltage effect - 60Hz
- International standard IEC 80005 -1,2, 3
- Facility integrated in 8, 20 fots containers – Mobile
- Build and planed for connection of containerships in the future



Shore Power- High Voltage

Authorities' approval to own and operate a high-voltage shore power plant

Konsesjonssøknad	
<i>Anleggskonsesjon for landstrømanlegg</i>	
	Oppdragets tittel: Anleggskonsesjon for å eie og drive høyspentanlegg for forsyning av skip med strøm fra Agder Energi sitt nett.
Prosjektleder: Arnstein Nygård	Forfatter: Arnstein Nygård – 913 80 271
Utførende instans: Rejlers Consulting AS	
Oppdragsgivere: Kristiansand Havn KF	Førord /sammendrag: I et samarbeid med EU har Kristiansand Havn fått mulighet til etablere et landstrømanlegg som tilfredsstiller IEC 80005-1 for strømforsyning av skip. Anlegget blir det første av sitt slag i Norge. Etter den internasjonale normen skal skipene ta imot høyspent forsyning fra land. Kristiansand Havn søker derfor om anleggskonsesjon som gir dem rett til å eie og drive anlegget.
Oppdragsgivers referanse: Trond Sikveland	
	Fire emneord:
Antall sider: 8	Dato: 2. mai 2018



Anleggskonsesjon

Meddelt:

Kristiansand Havn KF

Organisasjonsnummer: 963 897 642

Dato: 16.08.2018

Varighet: 01.08.2048

Ref.: 201834497-11

Kommune: Kristiansand

Fylke: Vest-Agder



Shore Power- High Voltage

- Connection agreement with local grid company
- Communication routines with local grid company
- Agreement Electrical operating manager, high voltage
- Agreement professional high voltage personell,

High voltage shore power requires extensive safety procedures!



KRISTIANSAND
HAVN KF

Shore Power - Cruise

SHORE POWER CONNECTION AGREEMENT

(with the ship)

This Shore Power Commissioning and Connection Agreement ("Agreement") has been entered into on 15.05. 2019 by and between:

The Port Authority of Kristiansand (the "Port")
and

Xxxxxx-Cruises, owners, agent- or representative of owner(the "Owners"),
(collectively the "Parties")

This Agreement has been entered into in connection with the connection and utilization of the shore power electricity facility (the "Facility") owned by the Port, concerning the following vessels:

- Ms Shore Power.



KRISTIANSAND
HAVN KF

Shore Power

Contact with the ship

- Technical information
- Contact info/persons
- Chief Electrical Officer

Lagmannsholmen Cruise Quay

High Voltage Shore Connection - HVSC

The HVSC facility is based on IEC 80005-1 standard.

Please fill out the required information below:

- The vessel voltage level:.....V
- Frequency :.....Hz
- Power requirement :.....kVA
- Number of connection points on the vessel:.....pcs
- Name of supplier, connectors / plugs:.....

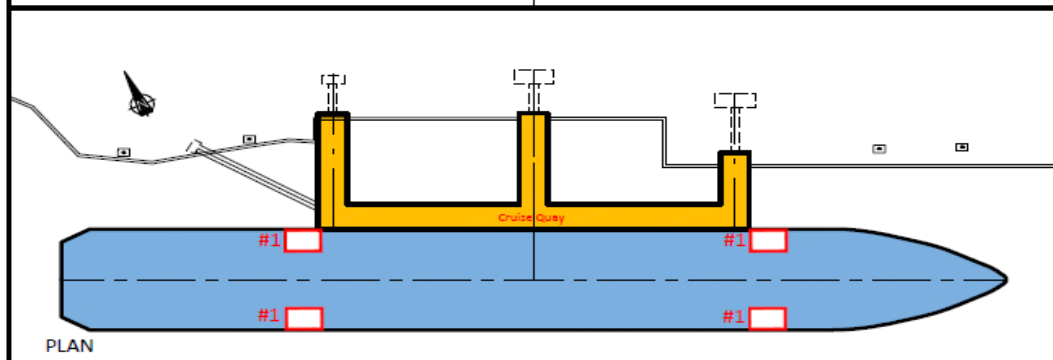
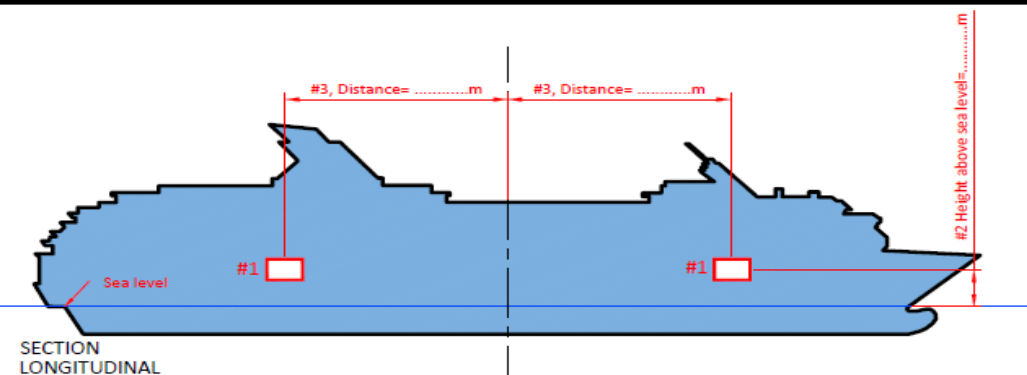
Contact information of the vessel technical manager:

- Name:.....
- E-mail:.....
- Phone:.....
- Date: Signature:

#1- Mark on Plan and Section sketch below, the position of the HVSC hatches on the vessel.

#2- Note on Section sketch below, the altitude above sea level of vessels HVSC hatches.

#3- Note on Section sketch below, the distance to the HVSC hatches on the vessel, measured from amidships.



KRISTIANSAND
HAVN KF

Shore Power Cruise

Kristiansand – Pier 10 7 + 2 FWD & AFT - PSTQ

L.O.B. 118° / 298°

- Length from midships going aft to the Shore Connection SD4.18 is 61.5m.
- Length from midships to SD 4.02 for the forward Gangway is 57.5m.
- Length between SD 4.02 and 4.18 is 119.2m.

The Berth is 146m long and 2.5m above Low water.

Our doors are 2.8m above Summer Draft so we can expect 30cm clearance.

Distance between the required doors fits within the berth length with 26.8m spare, 13.4m either end. If we berth in a similar position to our last call, the forward gangway will be towards the SE corner of the berth and this will allow more space for SD 4.18 Shore Connection door.

Pier 10:

Length Overall: 146m

Depth: 10.4m

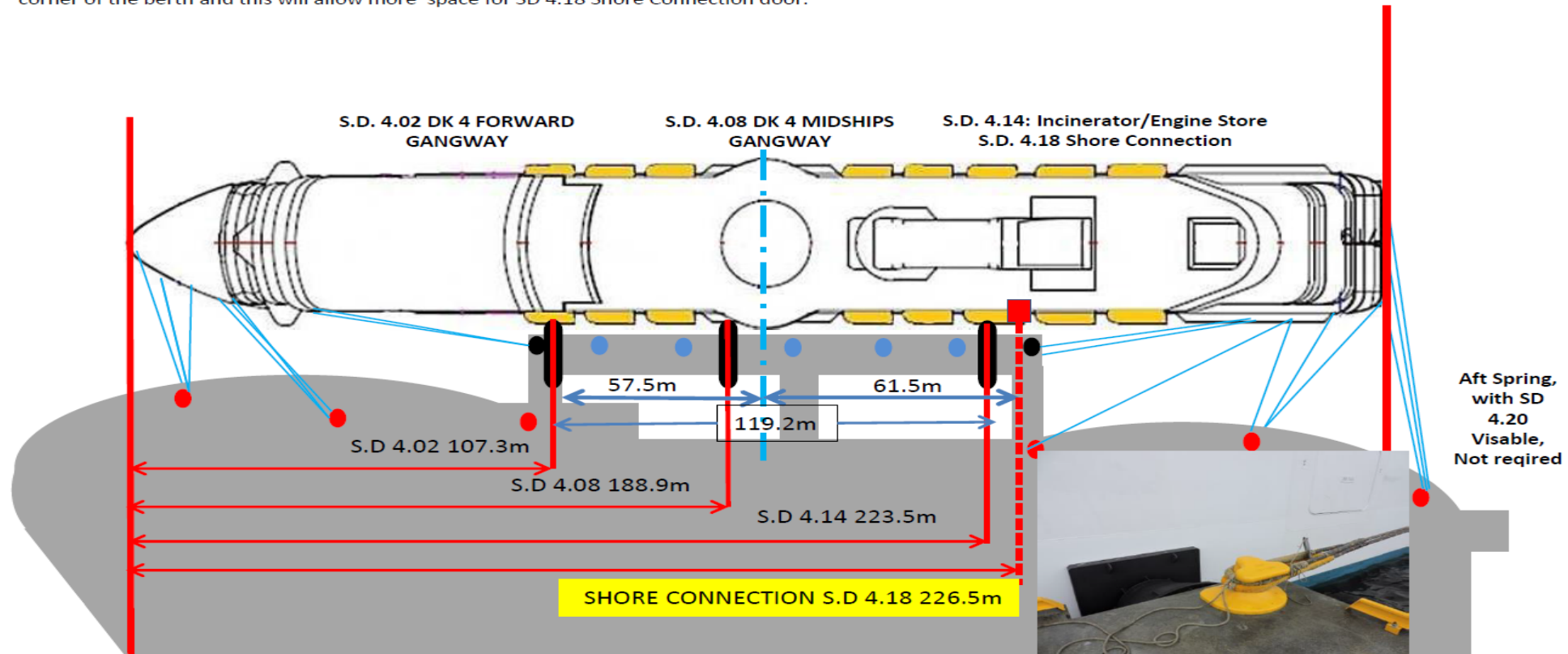
Height of Dock Above Chart Datum: 2.50m

Distance Between Blue Bollards: 15m

Bollard Capacity:

250 t / 100 t / 150 t

Fendering: Rubber Tyres



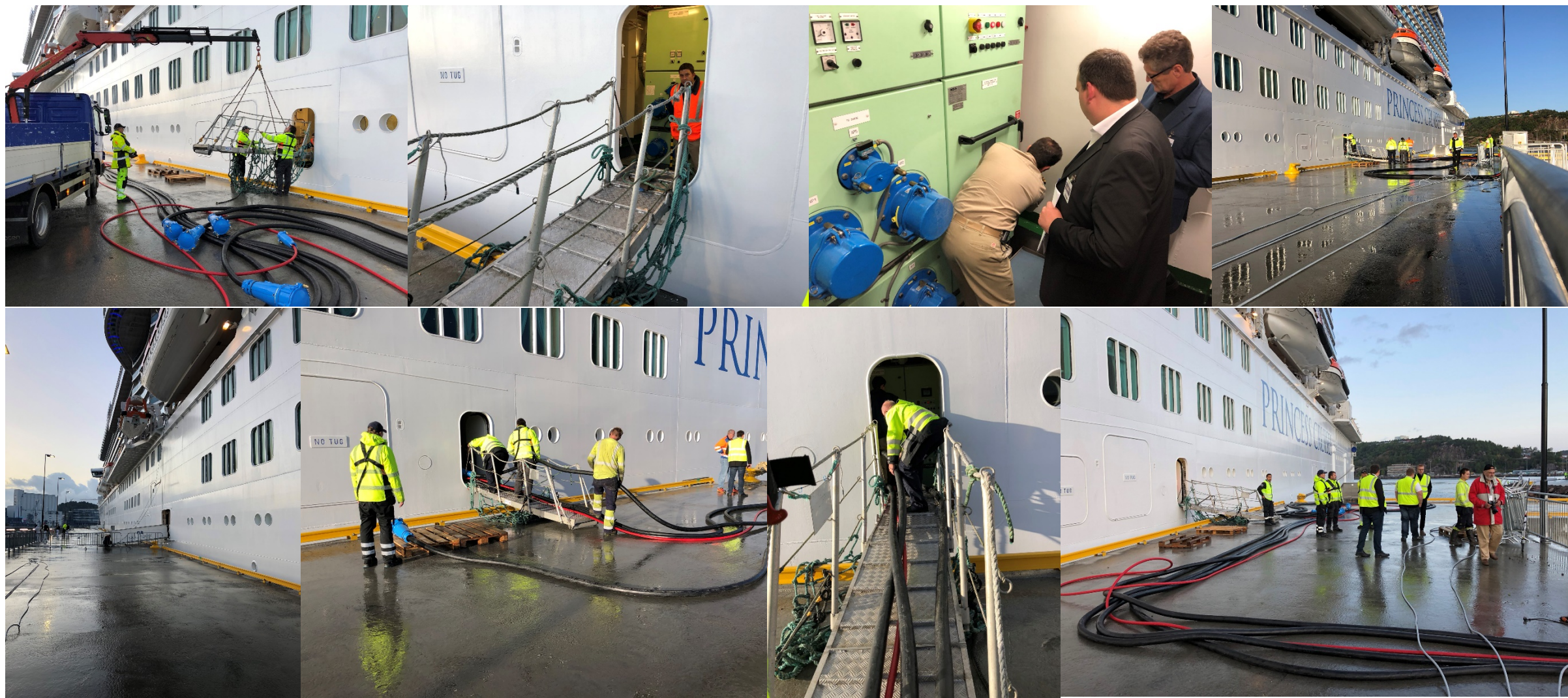
KRISTIANSAND
HAVN KF

Shore Power Cruise

Calls	Ship name	Shorepower	Based on	Voltage	Frequency	Effect	Connection	Connection	Distance from	Distance door	Distance door	Distance from
		possible to	IEC 80005-1	11kV/6,6kV	50Hz/60Hz	needed	portside	starboard	midship to	from bow to	from stern to	waterline up to
		connect		kV	Hz	kVA			HVSC-hatch	HVSC-hatch	HVSC-hatch	HVSC-hatch
5	Nieuw Statendam	Yes	Yes	11	60	6-8	Yes	Yes				
3	Rotterdam	Yes	Yes	6,6	60	5-7		Yes	56,9m	175,9m	62,1m	3m
1	Regal Princess	Yes	Yes	11	60	8,5 -13	Yes	No	61,5	226,5	103,5	2,9 m



Shore Power Cruise



Shore Power Cruise



An aerial photograph of an industrial site. In the center, a large dark-colored warehouse has its roof covered with a grid of solar panels. To the left, a red and white ship is docked at a pier, with a helipad visible on its deck. In the background, there is a large, open-pit mine or quarry with steep, rocky walls. Various industrial structures, including cranes and conveyor belts, are scattered throughout the site. The sky is overcast with grey clouds.

Solar Cells opened October 2017

360 Solar Panels

95 kWp

576 m²

Annual production: 85-90 000 kWh

www.portofkristiansand.no



Port of Kristiansand



@portkristiansand

Thanks you for your attention.

Trond Sikveland, Port of Kristiansand