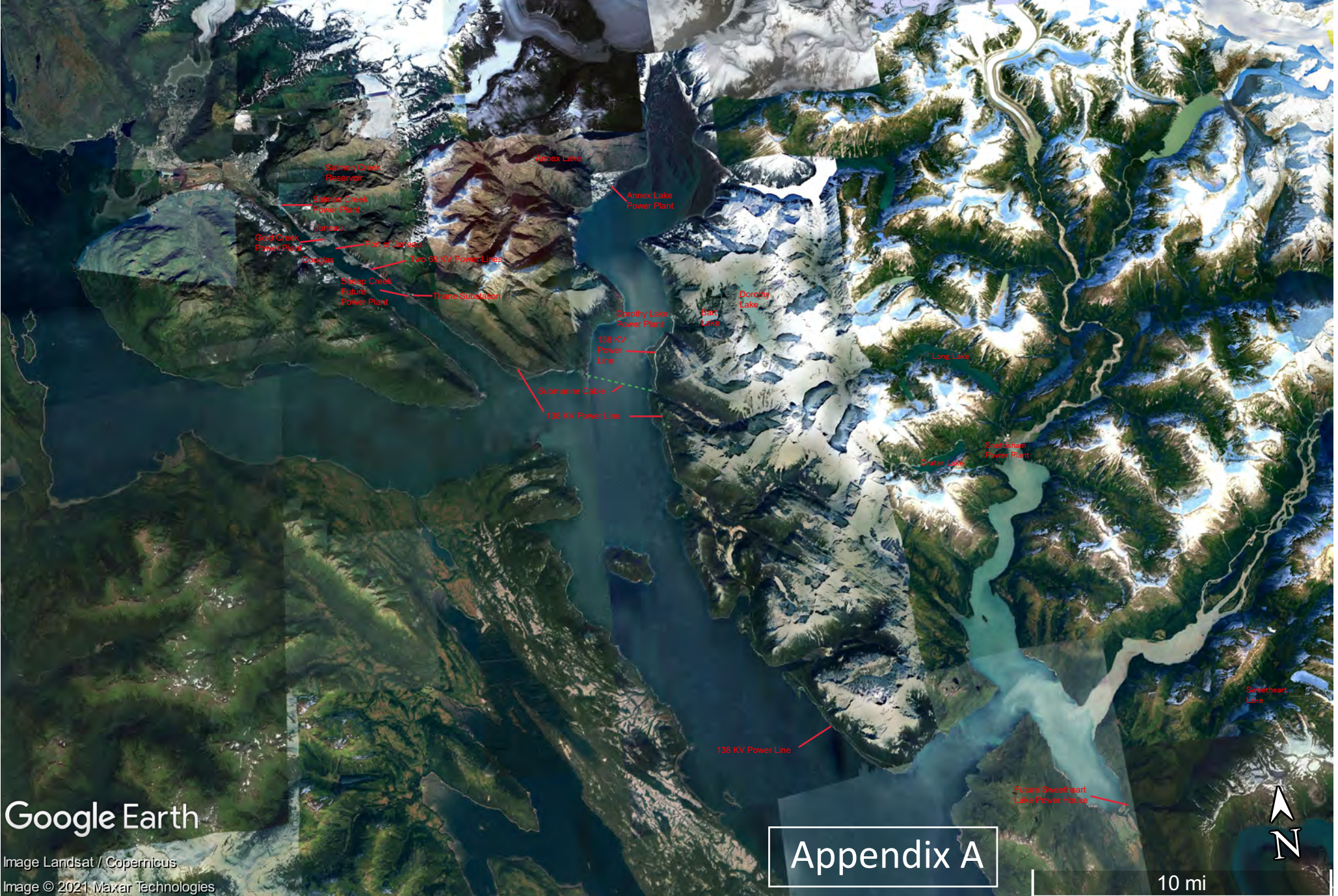
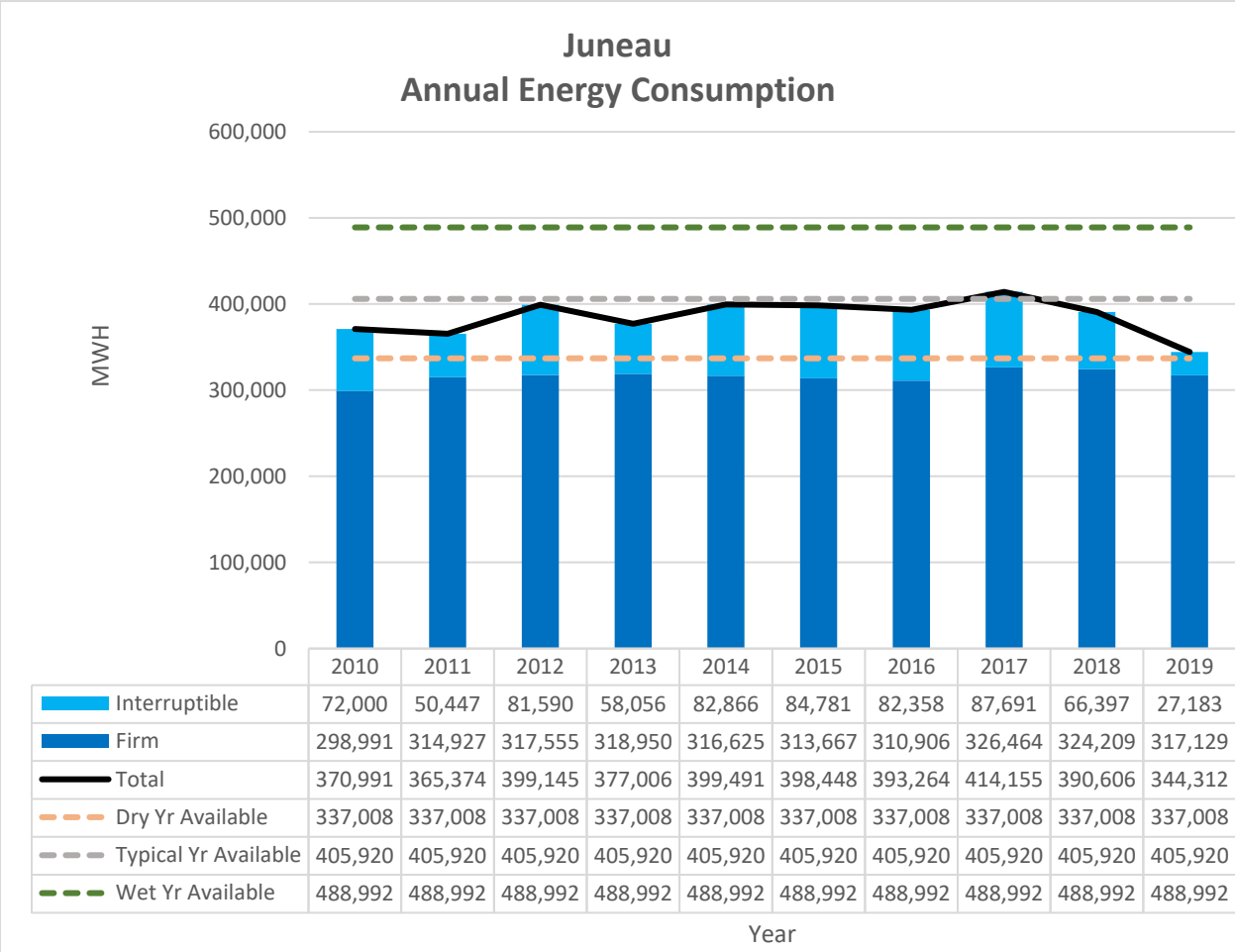

Salmon Creek Reservoir
Salmon Creek Power Plant
Juneau
Gold Creek Power Plant
Port of Juneau
Douglas
Two 69 KV Power Lines
Sheep Creek Future Power Plant
Thane Substation
Annex Lake
Annex Lake Power Plant
Dorothy Lake
Dorothy Lake Power Plant
Bay Lake
138 KV Power Line
Long Lake
Submarine Cable
138 KV Power Line
Snettisham Power Plant
Crater Lake
Sweetheart Lake
138 KV Power Line
Future Sweetheart Lake Power House
Google Earth
Image Landsat / Copernicus
Image © 2021 Maxar Technologies
Appendix A
N
10 mi

CRUISE SHIP PROFILES

August 2021

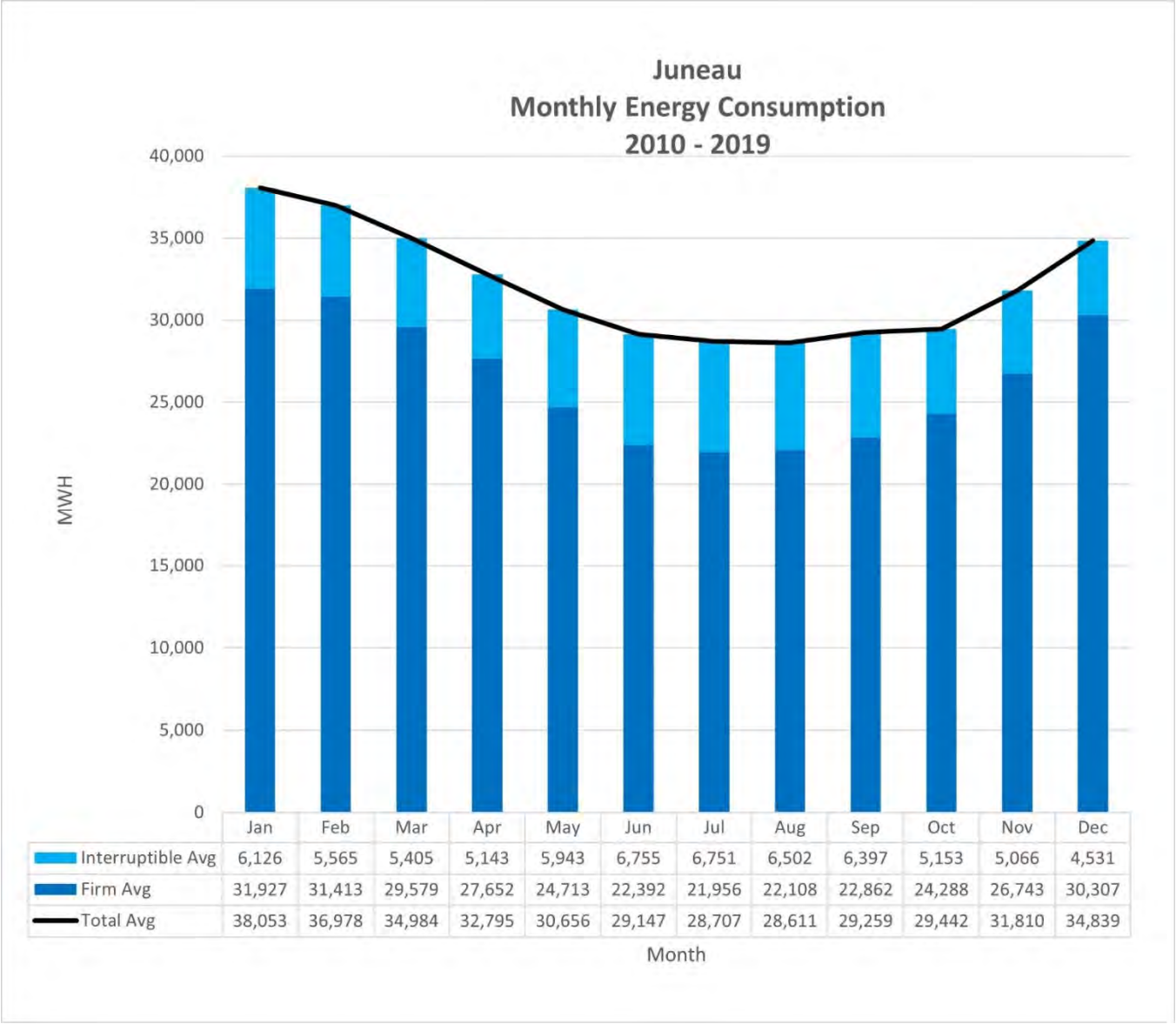
Cruise Line	Ship	Ship Length		Electrical Port Location		Distance from Stern		Peak Load	Voltage
		Meters	Feet	Port Side	Starboard Side	Meters	Feet	MW	Kilovolts
Princess Cruises									
	Sun Princess		857	X		66.0	216.5	8	6.6
	Sea Princess		762	X		66.0	216.5	8	6.6
	Grand Princess		823	X		57.0	187.0	10	6.6
	Golden Princess		823	X		57.0	187.0	10	6.6
	Star Princess		950	X		57.0	187.0	10	6.6
	Caribbean Princess		951	X		57.0	187.0	11	6.6
	Crown Princess		805	X		56.0	183.7	11	11.2
	Emerald Princess		951	X		56.0	183.7	11	11.2
	Ruby Princess		945	X		56.0	183.7	10	11.2
	Royal Princess		1082	X		102.0	334.6	10	11.2
	Regal Princess		1082	X		102.0	334.6	10	11.2
	Majestic Princess			X		102.0	334.6	10	11.2
	Sky Princess		1082	X		102.0	334.6	10	11.2
	Coral Princess		964	X		63.0	206.6	9	11.2
	Island Princess		964	X		63.0	206.6	9	11.2
	Diamond Princess		946	X		52.0	170.6	10	11.2
	Sapphire Princess		946	X		52.0	170.6	10	11.2
	Discovery Princess			Unk	Unk	Unk			
Holland America Line									
	Zuiderdam		936	X		59.0	193.5	7	11.2
	Oosterdam		934		X	52.5	172.2	7	11.2
	Westerdam		935		X	52.5	172.2	7	11.2
	Noordam		951		X	52.5	172.2	7	11.2
	Eurodam		937		X	51.8	169.9	7	11.2
	Nieuw Amsterdam		936		X	51.8	169.9	7	11.2
	Koningsdam		983	X	X	56.7	186.0	6	11.2
	Nieuw Statendam		983	X	X	56.7	186.0	6	11.2
	Volendam		679			62.0	203.4	6	6.6
	Zaandam		780			62.0	203.4	6	6.6
Norwegian Cruise Line Holdings									
	Norwegian Joy		1094		X	59.0	193.5	9	11.2
	Norwegian Bliss		994		X	59.0	193.5	9	11.2
	Norwegian Encore		1094		X	59.0	193.5	9	11.2
	Norwegian Jewel		965		X	64.0	209.9	6	11.2
	OCI Regatta		592	X		21.0	68.9	5	6.6
	RSSC Mariner		702		X	55.0	180.4	5	6.6
	RSSC Splendor		732		X	82.0	269.0	4	6.6
	OCI Insignia		592	X		21.0	68.9	5	6.6
	Norwegian Spirit		880	Unk	Unk	Unk			
	Norwegian Sun		848	Unk	Unk	Unk			
Royal Caribbean International									
	Voyager Class (Adventure, Explorer, Mariner, Navigator of the Seas)	311.1	1020.5		X	59.0	193.6		
	Radiance Class (Brilliance, Jewel, Serenade)	293.5	962.7	X	X	43.1	141.4		
	Grandeur Class (Enchantment of the Seas)	279.6	917.1	X	X	59.1	193.8		
	Quantum Class (Quantum of the Seas, Ovation of the Seas)		1142	Unk	Unk	Unk			
Carnival Cruise Line									
	Vista Class (Vista, Horizon)	323.7	1061.7		X	126.6	415.2		
	Dream Class (Dream, Magic, Breeze)	305.6	1002.4		X	107.3	351.8		
	Excel Class (Mardi Gras)	344.0	1128.3		X	53.3	174.7		
	Conquest Class (Carnival Freedom)		952	Unk	Unk	Unk			
	Spirit Class (Miracle, Spirit, Legend)		959	Unk	Unk	Unk			
Disney Cruise Line									
	Dream	352.1	1154.9		X	80.2	263.1		
	Magic	294.2	965.0	X		93.0	305.0		
	Wonder	294.2	965.0	X		93.0	305.0		
Celebrity Cruises									
	Solstice Class	317.3	1040.7	None	None				
	Millennium		964	Unk	Unk	Unk			
	Eclipse		1040.9	Unk	Unk	Unk			
Crystal Cruises				None	None				
	Crystal Serenity		820.2						
Seabourn				None	None				
	Seabourn Odyssey		581.9						
	Seabourn Sojourn		650.6						
	Seabourn Venture II								
SilverSeas Cruises				None	None				
	Silver Muse		698.2						
	Silver Shadow		610.2						
	Silver Explorer		354.3						
	Silver Wind								
Cunard									
	Queen Elizabeth		964						
Oceania Cruises									
	Regatta								

Appendix B



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Interruptible	72,000	50,447	81,590	58,056	82,866	84,781	82,358	87,691	66,397	27,183
Firm	298,991	314,927	317,555	318,950	316,625	313,667	310,906	326,464	324,209	317,129
Total	370,991	365,374	399,145	377,006	399,491	398,448	393,264	414,155	390,606	344,312
Dry Yr Available	337,008	337,008	337,008	337,008	337,008	337,008	337,008	337,008	337,008	337,008
Typical Yr Available	405,920	405,920	405,920	405,920	405,920	405,920	405,920	405,920	405,920	405,920
Wet Yr Available	488,992	488,992	488,992	488,992	488,992	488,992	488,992	488,992	488,992	488,992

Appendix C1



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Interruptible Avg	6,126	5,565	5,405	5,143	5,943	6,755	6,751	6,502	6,397	5,153	5,066	4,531
Firm Avg	31,927	31,413	29,579	27,652	24,713	22,392	21,956	22,108	22,862	24,288	26,743	30,307
Total Avg	38,053	36,978	34,984	32,795	30,656	29,147	28,707	28,611	29,259	29,442	31,810	34,839

Appendix C2


US Coast Guard
CBJ North Berth
CBJ South Berth
Franklin Dock
AJ Dock
Proposed CBJ Dock Substation
Two 69 KV Power Lines
Franklin Dock Shore Power Deployment Equipment
Franklin Dock Shore Power Substation
Google Earth
Image © 2021 Maxar Technologies
2000 ft
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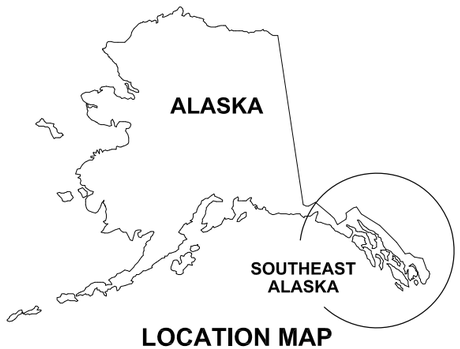
Appendix D1

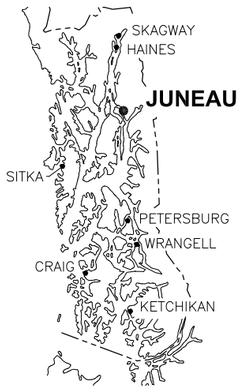
CITY & BOROUGH OF JUNEAU, ALASKA

PORT OF JUNEAU
CRUISE SHIP ELECTRIFICATION STUDY

PRELIMINARY DESIGN SUBMITTAL



LOCATION MAP

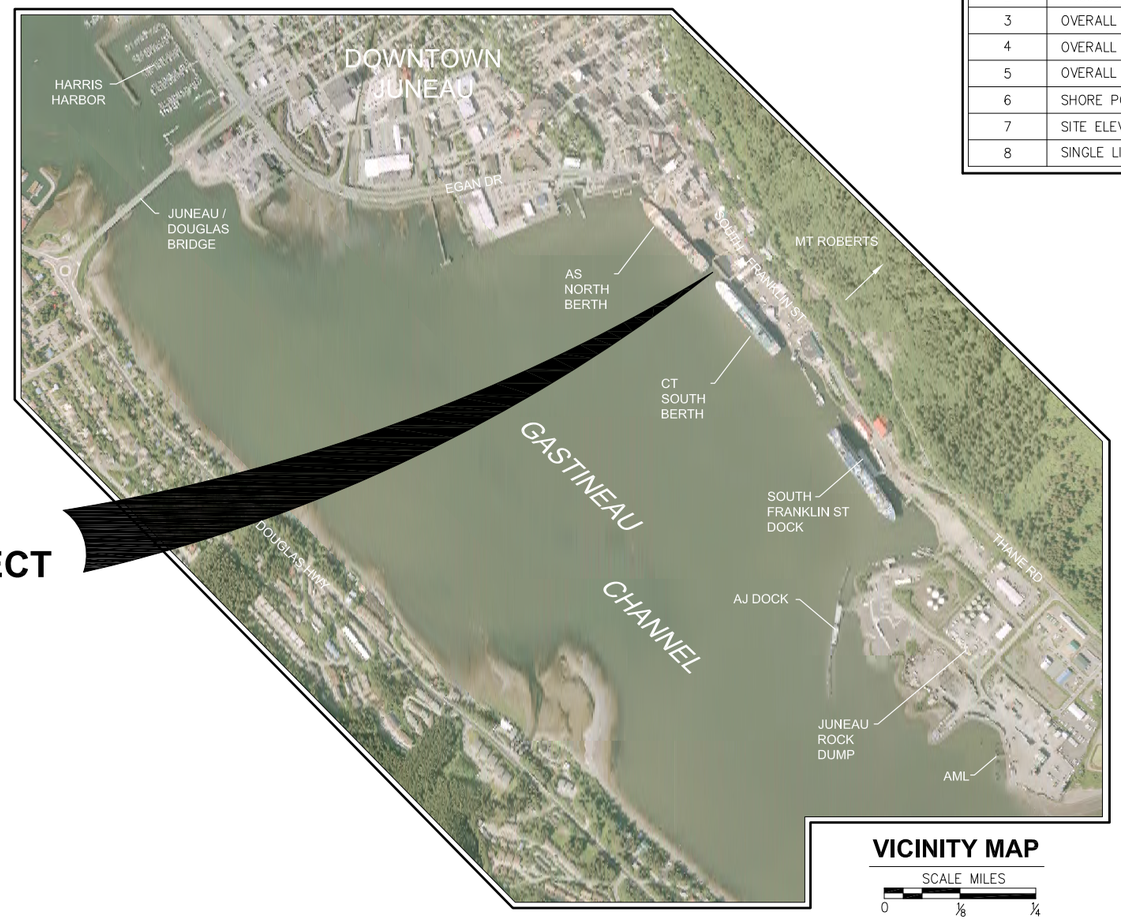


SOUTHEAST ALASKA

TIDAL DATA	ELEV. (FT)
HIGHEST OBSERVED WATER LEVEL	+24.58
MEAN HIGHER HIGH WATER (MHHW)	+16.30
MEAN HIGH WATER (MHW)	+15.34
MEAN SEA LEVEL (MSL)	+8.56
MEAN TIDE LEVEL (MTL)	+8.47
MEAN LOWER WATER (MLW)	+1.60
MEAN LOWER LOW WATER (MLLW)	0.0
LOWEST OBSERVED WATER LEVEL	−6.12

FROM:
NOAA NOS/CO-OPS STATION ID: 9452210 JUNEAU, ALASKA

THIS PROJECT



VICINITY MAP

SCALE MILES
0 ⅛ ¼

AERIAL PHOTO
FROM AEROMAP

DRAWING INDEX	
DWG. NO.	TITLE
1	COVER SHEET, VICINITY MAP & DRAWING INDEX
2	PROJECT DESCRIPTION AND SUMMARY OF WORK
3	OVERALL SITE PLAN
4	OVERALL SITE PLAN – CT SOUTH BERTH
5	OVERALL SITE PLAN – AS NORTH BERTH
6	SHORE POWER SUPPORT FLOAT PLAN AND ELEVATION
7	SITE ELEVATION – CT SOUTH BERTH
8	SINGLE LINE DIAGRAM, SUBSTATION LAYOUT

PRELIMINARY DESIGN SUBMITTAL

No.	Date	Item
REVISIONS		

CONSULTANT :
PND ENGINEERS, INC.
Juneau, AK
526 Main St.
Juneau, AK 99801
Phone: 907.586.3788
Fax: 907.586.5774
AECC163270

PROJECT :
JUNEAU CRUISE SHIP ELECTRIFICATION STUDY
JUNEAU, ALASKA

SHEET TITLE :
COVER SHEET, VICINITY MAP & DRAWING INDEX

DESIGN	BI
DRAWN	PND
CHECKED	PND
DATE	JULY 2022
PROJECT No.	H118-169
SHEET NUMBER	1

IF THIS BAR DOES NOT MEASURE EXACTLY ONE INCH, THE SCALE OF THIS DRAWING HAS BEEN ALTERED DURING IT'S PRODUCTION. AFFECTING ALL LABELED SCALES

N:\200XX\202060 Cruise Ship Berth Electrification\G. Drawings\Concept\080122\Cover and Vin Map- B1.01 Aug 01, 2022 3:59 PM

Project Description

Implement a shore power system to provide electrical energy to the cruise ships moored to the City & Borough of Juneau North and South Berths while they are in port. This system will provide energy generated from renewable, hydroelectric power plants to offset the use of fuel fired generators onboard the cruise ships.

Summary of Work

The installation involves the construction of five basic parts:

- **Substation: A substation with capacity to power two cruise ships will be located on the mountainside adjacent to the existing 69KV transmission lines routed from the Thane Substation into Juneau. A connection to the 69KV will provide power to the substation, initially feeding two load tap changing transformers. The transformers will reduce the voltage to 11.2KV or 6.6KV as required by the cruise ships. The power will be delivered to the distribution system via a set of voltage selection switches. Power factor correction capacitors will be located in the substation where they will be controlled to yield a favorable power factor for the utility system, minimizing the realized current to the transmission lines.**

- **Upland 15KV Feeders: Two feeders with multiple sets of conductors will be routed from the substation down the mountain to South Franklin Street and finally to an underground manhole near the water's edge. The installation involves conduits mounted on stands above grade to the street where they enter existing underground conduits installed with a previous project specifically for these feeders. The underground conduits extend beneath South Franklin Street to a vault in the Juneau Tram's parking lot, and then onto a manhole adjacent to the tram facility.**

- **Submarine 15KV Feeders: Multiple cables will be installed in an existing set of conduits from the shoreside manhole to below the low-low water level. From where they exit the conduits, they will lie on the ocean floor and extend to the deployment floating docks designated for each berth. At the deployment float, the cables will be laid in a circular fashion to absorb their movement caused by the tidal changes.**

- **Deployment Floats: A floating dock will be located and moored to pilings at the end of each floating berth dock. They will be positioned strategically to be aligned with the connection portals on the cruise ships. The submarine cables will be structurally supported with a large bracket on the deployment floats. From the support bracket, they will extend to grounding switches and then to the deployment equipment. The deployment equipment will be composed of a boom crane supporting the ends of the cables and their plug assemblies. The boom crane will be mobile allowing it to adjust its position along the face of the deployment float to reach the cruise ship portals more easily.**

- **Controls: Control panels will be located on the deployment floats with cables connecting them to the substation communications network. The cables will be routed with the power cables.**

PRELIMINARY DESIGN SUBMITTAL

CONSULTANT :
PND ENGINEERS, INC.
Juneau, AK
526 Main St.
Juneau, AK 99801
Phone: 907.586.3788
Fax: 907.586.5774
AECC163270
RESPEC

PROJECT :
JUNEAU CRUISE SHIP
ELECTRIFICATION STUDY
JUNEAU, ALASKA

SHEET TITLE :
PROJECT DESCRIPTION AND
SUMMARY OF WORK

DESIGN	BCH
DRAWN	PEL
CHECKED	BCH
DATE	JULY 2022
PROJECT No.	H118-169
SHEET NUMBER	2

No.	Date	Item
REVISIONS		

IF THIS BAR DOES NOT MEASURE EXACTLY ONE INCH, THE SCALE OF THIS DRAWING HAS BEEN ALTERED DURING IT'S PRODUCTION, AFFECTING ALL LABELED SCALES

1"

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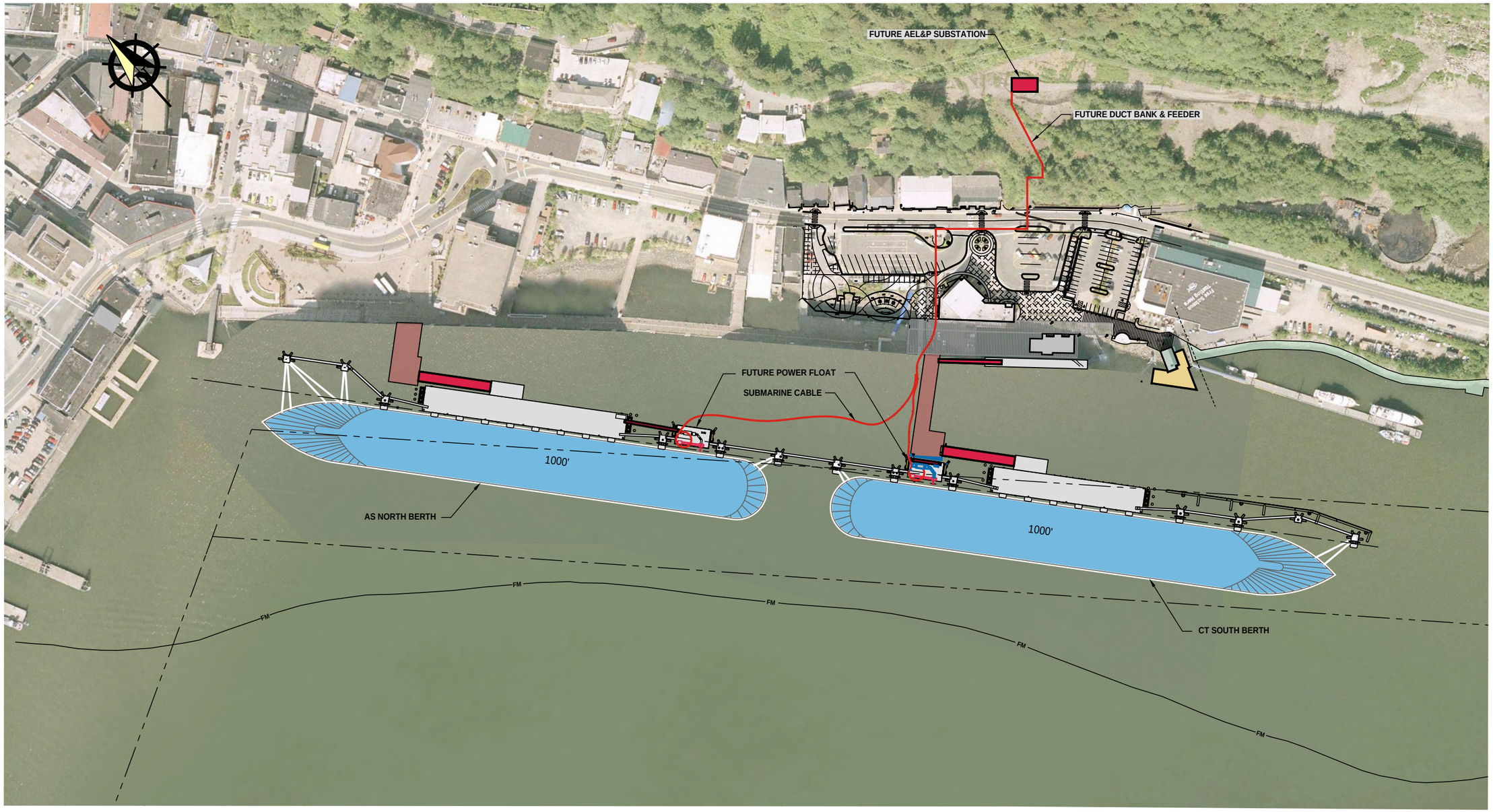


OVERALL SITE PLAN

PRELIMINARY DESIGN SUBMITTAL

No.	Date	Item

REVISIONS

CONSULTANT :

PND ENGINEERS, INC.

Juneau, AK
526 Main St.
Juneau, AK 99801
Phone: 907.586.9788
Fax: 907.586.5774
AECC163270

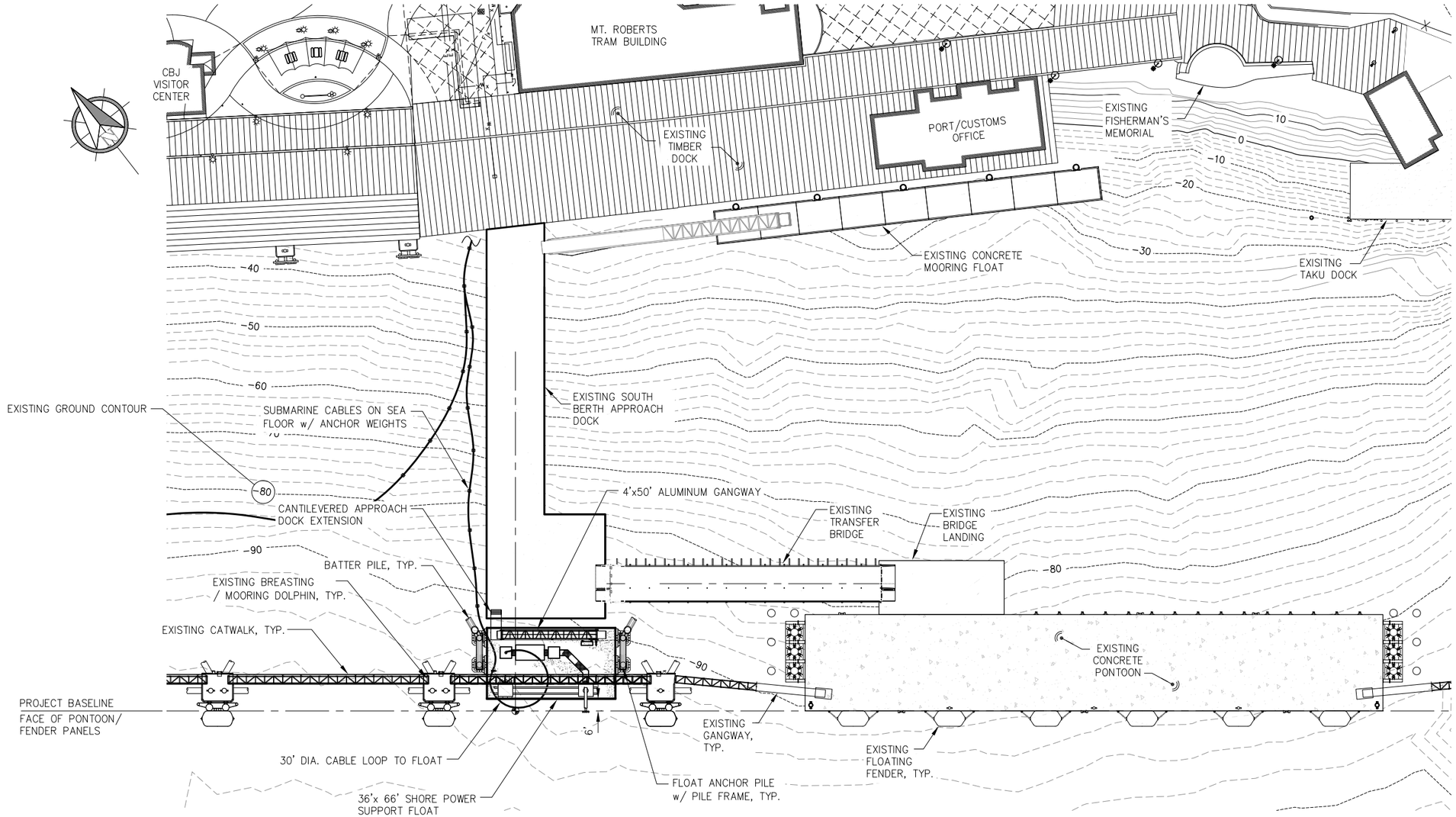
PROJECT :
JUNEAU CRUISE SHIP ELECTRIFICATION STUDY
JUNEAU, ALASKA

SHEET TITLE :
OVERALL SITE PLAN

DESIGN	BI
DRAWN	PND
CHECKED	PND
DATE	JULY 2022

PROJECT No.
H118-169

SHEET NUMBER
3



OVERALL SITE PLAN - CT SOUTH BERTH

PRELIMINARY DESIGN SUBMITTAL

No.	Date	Item
REVISIONS		

IF THIS BAR DOES NOT MEASURE EXACTLY ONE INCH, THE SCALE OF THIS DRAWING HAS BEEN ALTERED DURING IT'S PRODUCTION, AFFECTING ALL LABELED SCALES

1"

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CONSULTANT :

PND ENGINEERS, INC.

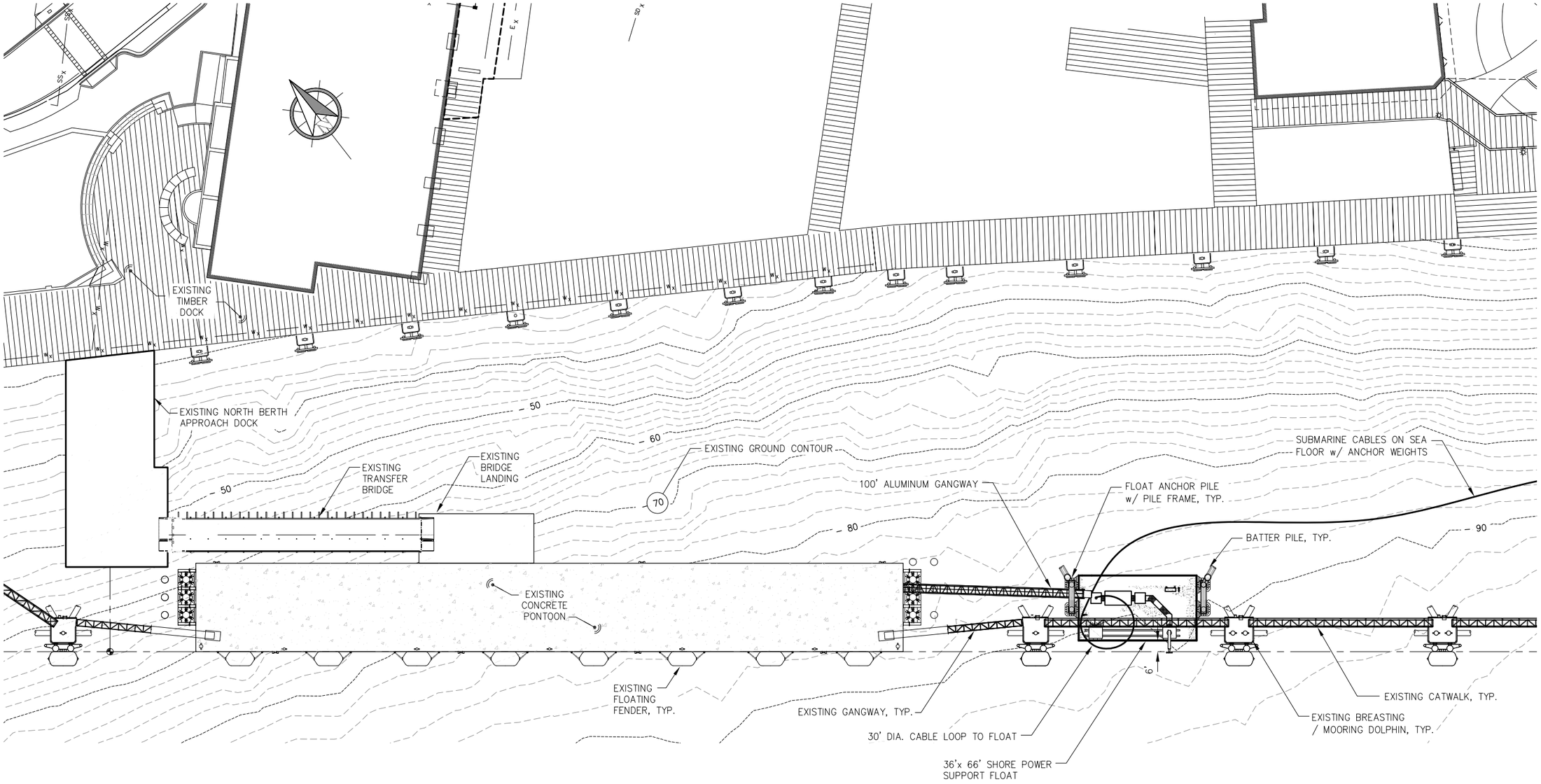
Juneau, AK
526 Main St.
Juneau, AK 99801
Phone: 907.586.3788
Fax: 907.586.5774
AECC163270

RESPEC

PROJECT :
JUNEAU CRUISE SHIP
ELECTRIFICATION STUDY
JUNEAU, ALASKA

SHEET TITLE :
OVERALL SITE PLAN -
CT SOUTH BERTH

DESIGN	BI
DRAWN	PND
CHECKED	PND
DATE	JULY 2022
PROJECT No.	H118-169
SHEET NUMBER	4



OVERALL SITE PLAN - AS NORTH BERTH

PRELIMINARY DESIGN SUBMITTAL

IF THIS BAR DOES NOT MEASURE EXACTLY ONE INCH, THE SCALE OF THIS DRAWING HAS BEEN ALTERED DURING IT'S PRODUCTION. AFFECTING ALL LABELED SCALES

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CONSULTANT :

PND ENGINEERS, INC.
Juneau, AK
526 Main St.
Juneau, AK 99801
Phone: 907.586.3788
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AECC163270

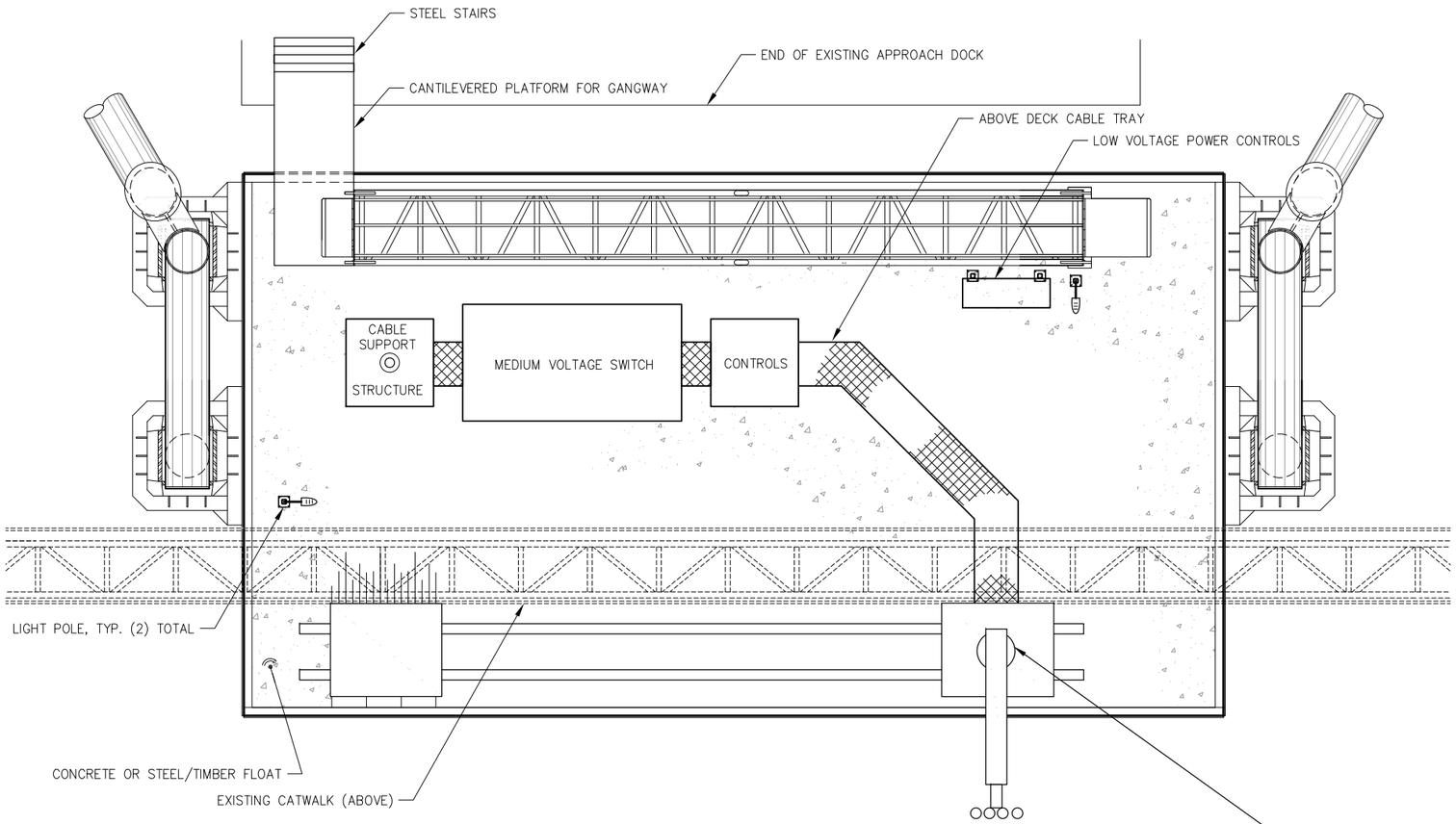
RESPEC

PROJECT : JUNEAU CRUISE SHIP ELECTRIFICATION STUDY
JUNEAU, ALASKA

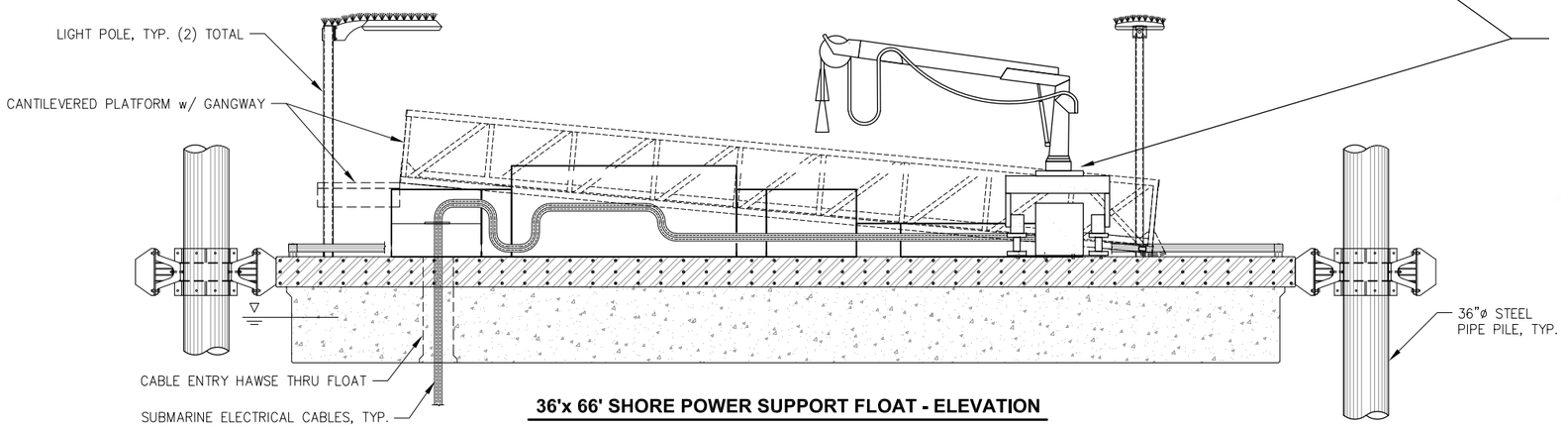
SHEET TITLE : OVERALL SITE PLAN - AS NORTH BERTH

DESIGN	BI
DRAWN	PND
CHECKED	PND
DATE	JULY 2022
PROJECT No.	H118-169
SHEET NUMBER	5

No.	Date	Item
REVISIONS		



36'x 66' SHORE POWER SUPPORT FLOAT - PLAN



36'x 66' SHORE POWER SUPPORT FLOAT - ELEVATION

(*)Hydraulic telescopic crane design

CABLE DEPLOYMENT DEVICE

(PHOTO USED WITH PERMISSION FROM STEMMAN-TECHNIK)

PRELIMINARY DESIGN SUBMITTAL

No.	Date	Item

REVISIONS

CONSULTANT :
PND ENGINEERS, INC.
Juneau, AK
526 Main St.
Juneau, AK 99801
Phone: 907.586.3788
Fax: 907.586.5774
AECC163270
RESPEC

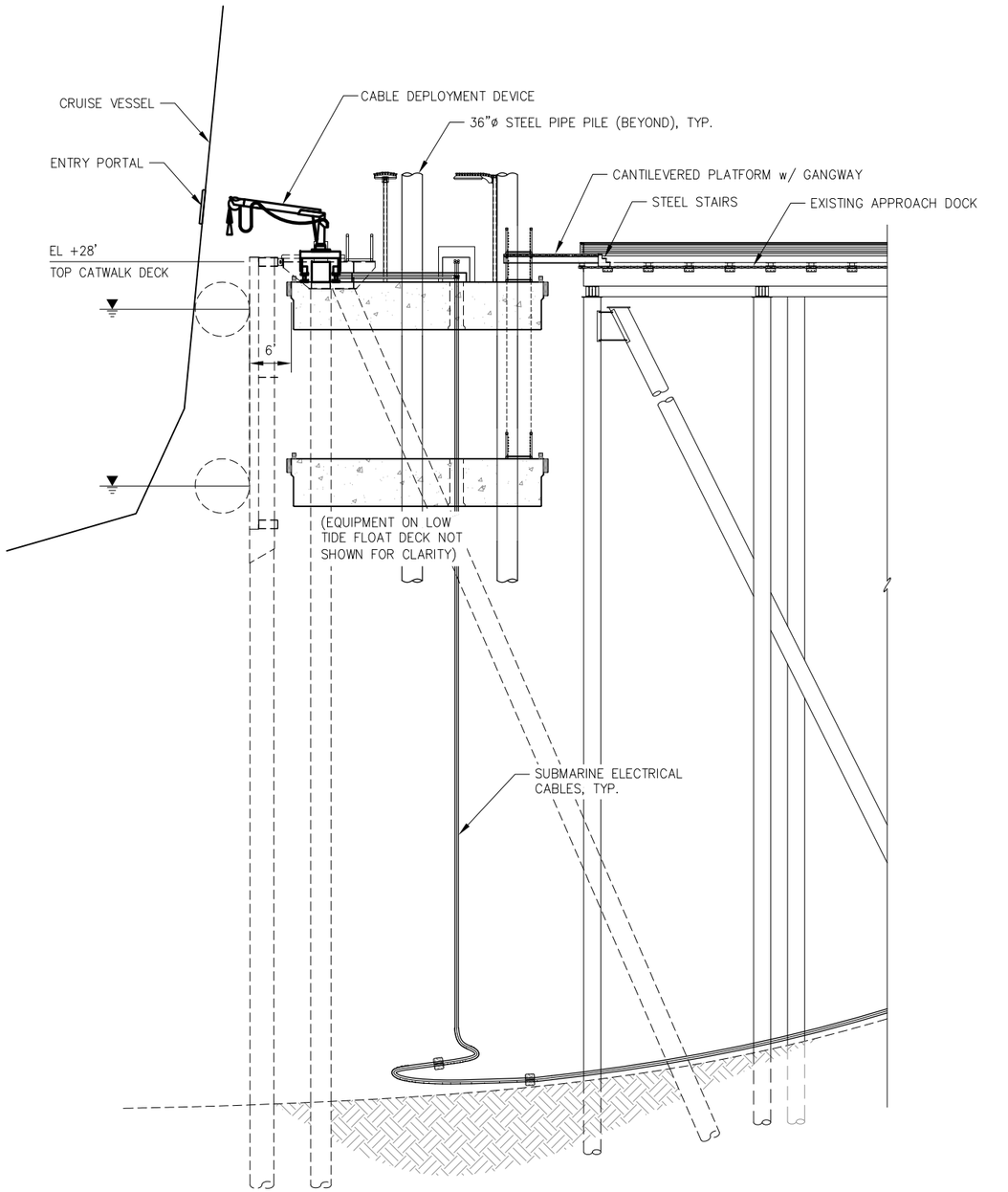
PROJECT :
JUNEAU CRUISE SHIP
ELECTRIFICATION STUDY
JUNEAU, ALASKA

SHEET TITLE :
SHORE POWER SUPPORT FLOAT
PLAN AND ELEVATION

DESIGN	BI
DRAWN	PND
CHECKED	PND
DATE	JULY 2022

PROJECT No.
H118-169

SHEET NUMBER
6



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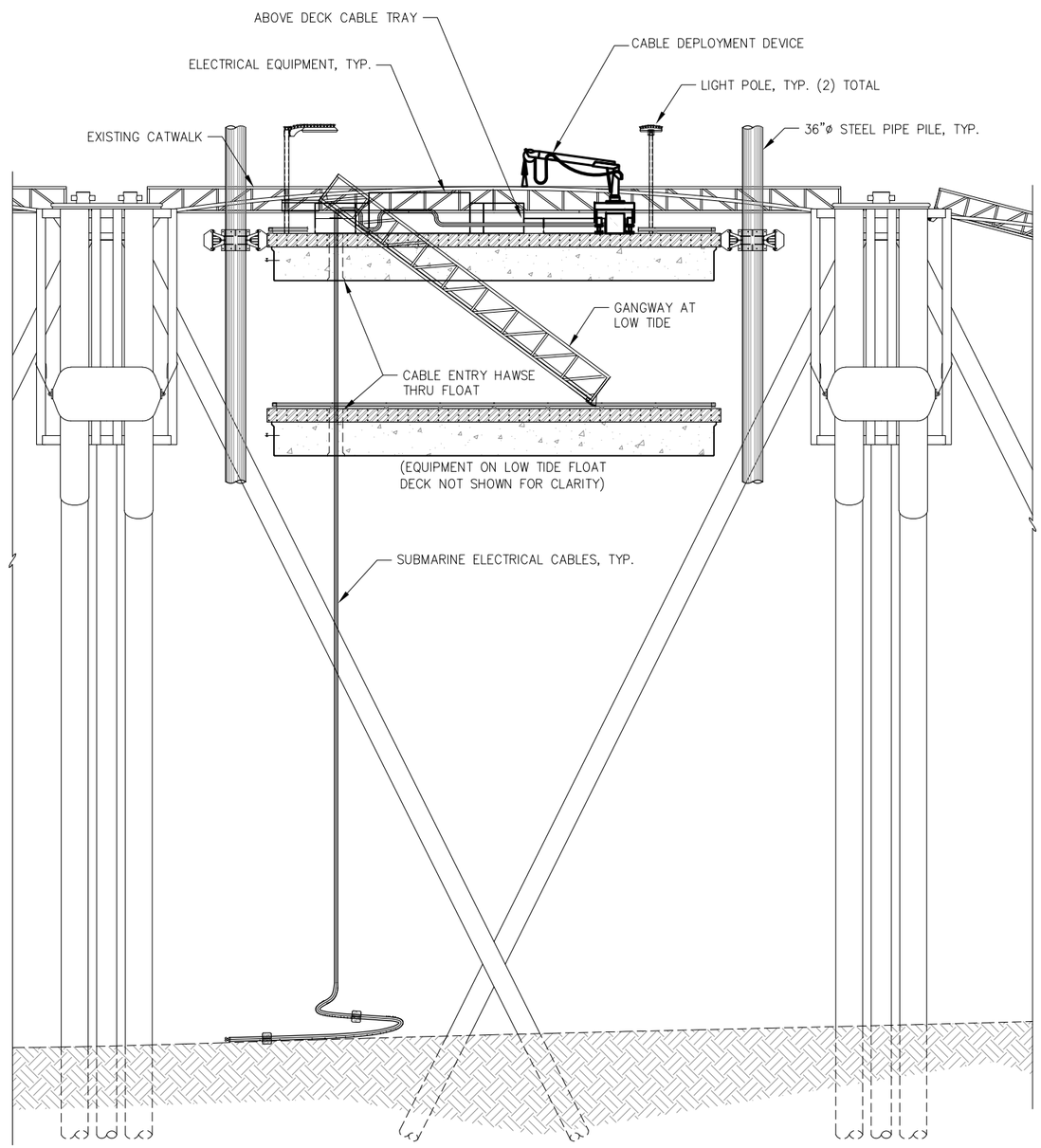

ELEVATION

PRELIMINARY DESIGN SUBMITTAL

IF THIS BAR DOES NOT MEASURE EXACTLY ONE INCH, THE SCALE OF THIS DRAWING HAS BEEN ALTERED DURING IT'S PRODUCTION, AFFECTING ALL LABELED SCALES

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CONSULTANT :

PND ENGINEERS, INC.

Juneau, AK
526 Main St.
Juneau, AK 99801
Phone: 907.586.3788
Fax: 907.586.5774
AECC163270

RESPEC

PROJECT :
JUNEAU CRUISE SHIP ELECTRIFICATION STUDY
JUNEAU, ALASKA

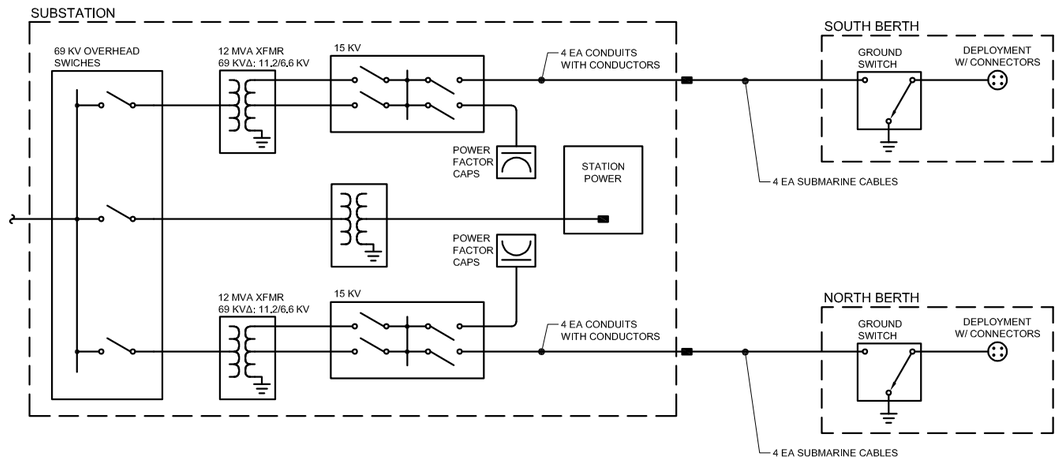
SHEET TITLE :
SITE ELEVATIONS - CT SOUTH BERTH

DESIGN	BI
DRAWN	PND
CHECKED	PND
DATE	JULY 2022

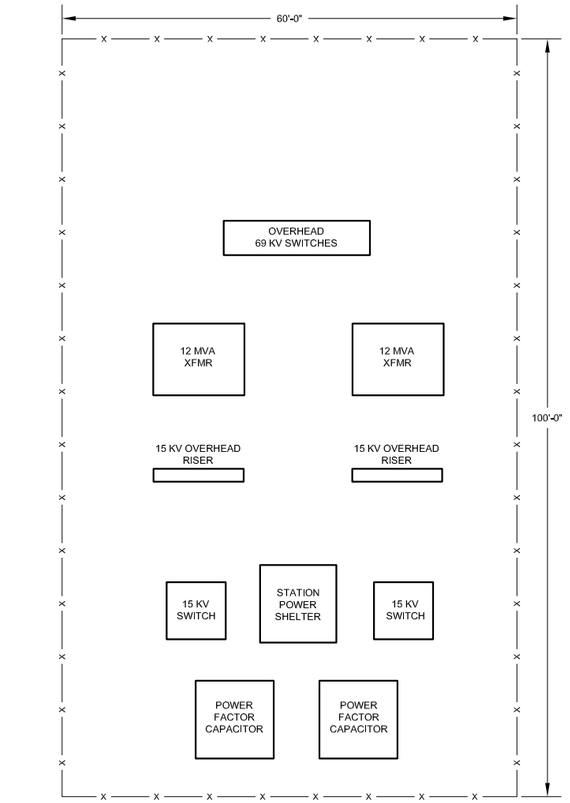
PROJECT No.
H118-169

SHEET NUMBER
7

No.	Date	Item
REVISIONS		



1 SINGLE LINE DIAGRAM – CRUISE SHIP SHORE POWER



2 SUBSTATION LAYOUT

SCALE: 0' 5' 10' 20'

CONSULTANT :

B.C. HAIGHT
EE 4800
July 25, 2022

Juneau, AK
526 Main St.
Juneau, AK 99801
Phone: 907.586.3788
Fax: 907.586.5774
AECC163270

PROJECT :
JUNEAU CRUISE SHIP ELECTRIFICATION STUDY
JUNEAU, ALASKA

SHEET TITLE :
SINGLE LINE DIAGRAM, SUBSTATION LAYOUT

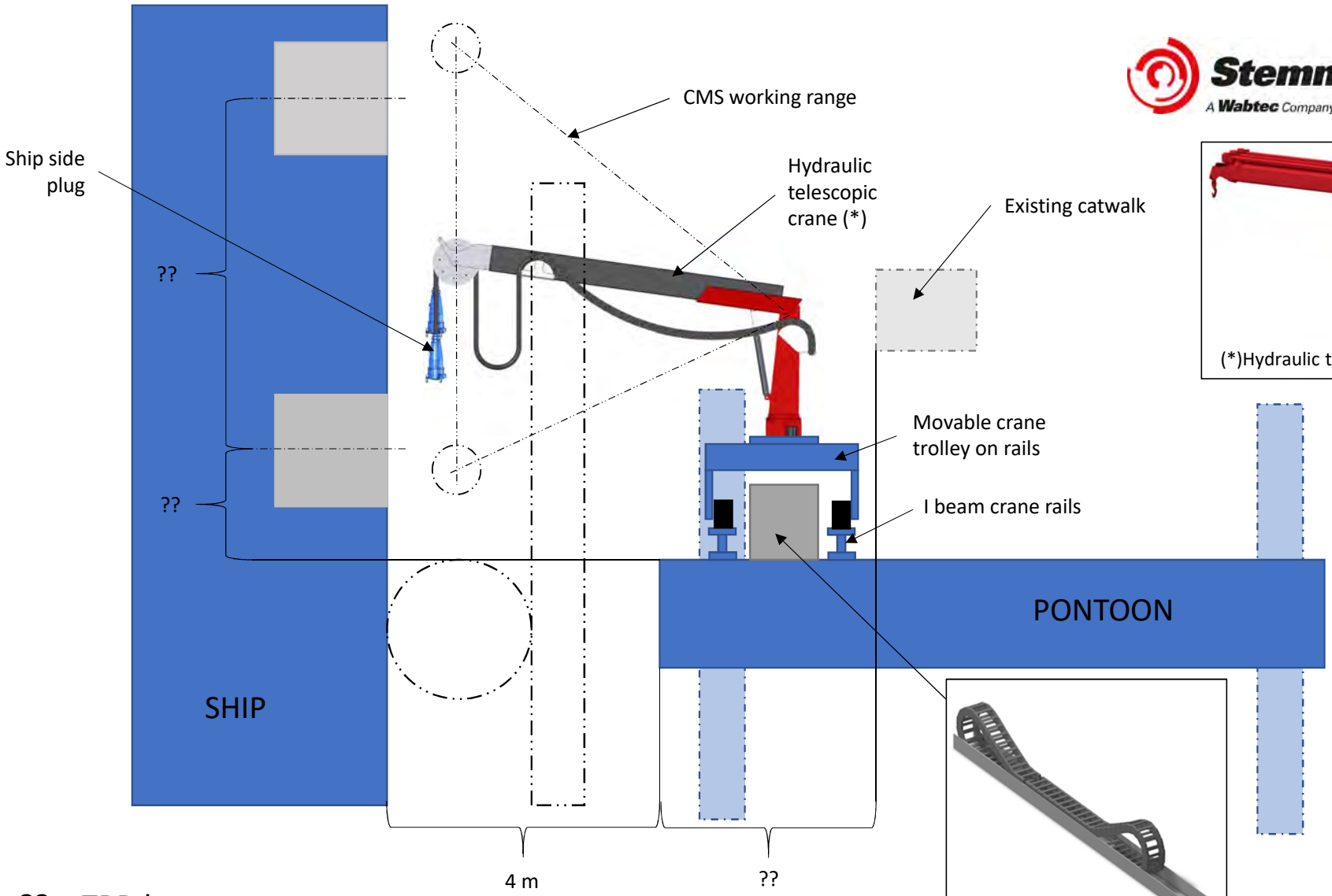
DESIGN	BCH
DRAWN	PEL
CHECKED	BCH
DATE	July 2022

PROJECT No.
H118-169

SHEET NUMBER
8

No.	Date	Item

REVISIONS

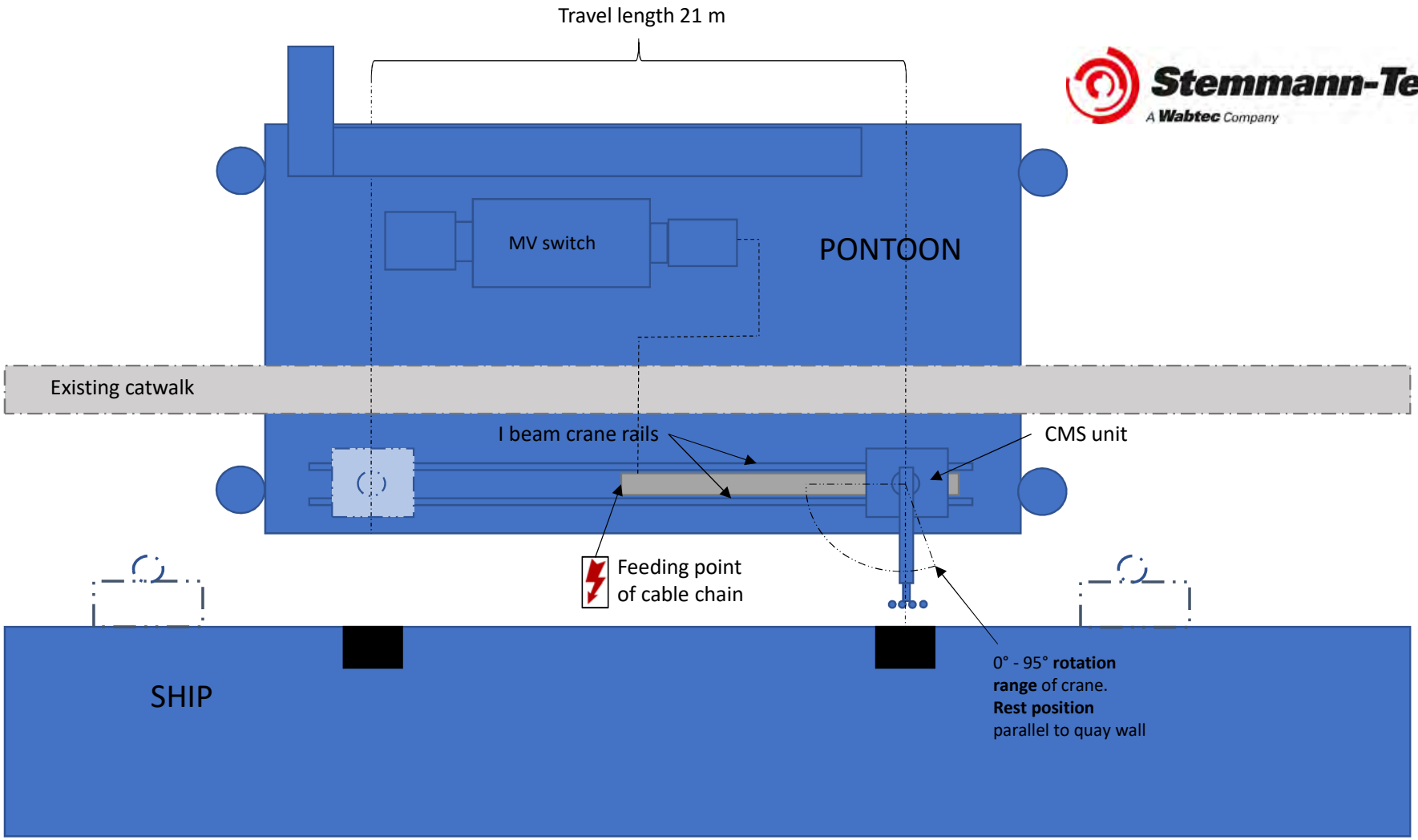


Stemmann-Technik
A Wabtec Company

(*)Hydraulic telescopic crane design

?? = TBD by customer

Appendix D3 - 1



Appendix D3 - 2

PORT OF JUNEAU
CRUISE SHIP ELECTRIFICATION
SHORE POWER CONNECTION STUDY
BUDGET LEVEL ESTIMATE - NORTH BERTH
Prepared by: PND ENGINEERS, INC.
July 2, 2021

Item	Item Description	Units	Quantity	Unit Cost	Amount
1505.1	Mobilization	LS	All Req'd	20%	$1,646,200
2702.1	Construction Surveying	LS	All Req'd	$75,000	$75,000
2894.1	100-ft Aluminum Gangway with Pontoon Mounting Assemblies	LS	All Req'd	$400,000	$400,000
2895.1	Floating Dock, 36' x 66'	SF	2,376	$500	$1,188,000
2896.1	Furnish 36-Inch dia. Steel Pipe Pile	LF	1,200	$350	$420,000
2896.2	Install 36 -Inch dia. Steel Pipe Vertical Pile	EA	4	$30,000	$120,000
2896.3	Install 36 -Inch dia. Steel Pipe Batter Pile	EA	2	$40,000	$80,000
2896.4	Furnish and Install Pile Frames	LS	All Req'd	$250,000	$250,000
2897.1	Transition Plates	LS	All Req'd	$75,000	$75,000
2899.1	Supply and Install Pile Anodes	LS	All Req'd	$75,000	$75,000
5120.1	Electrical Support Assemblies	LS	All Req'd	$50,000	$50,000
11000.1	Cable Positioning Device	LS	All Req'd	$1,000,000	$1,000,000
16000.1	Electrical Substation	LS	All Req'd	$3,193,000	$3,193,000
16000.2	Feeder to Shore	LS	All Req'd	$500,000	$500,000
16000.3	Submarine Cable & Support Structure	LS	All Req'd	$660,000	$660,000
16000.4	Power on Float	LS	All Req'd	$145,000	$145,000
	ESTIMATED CONSTRUCTION COST				**$9,877,200**
	CONTINGENCY (15%)				**$1,481,580**
	ENVIRONMENTAL PERMITTING & IHA				**$200,000**
	FINAL DESIGN & CONTRACT DOCUMENTS (10%)				**$1,135,878**
	CONTRACT ADMINISTRATION & CONSTRUCTION INSPECTION (10%)				**$1,135,878**
	TOTAL RECOMMENDED PROJECT BUDGET				**$13,830,536**

Note: This estimate assumes the North Berth Shore Power System is constructed prior to the South Berth Shore Power System.

Appendix D4 -1

PORT OF JUNEAU
CRUISE SHIP ELECTRIFICATION
SHORE POWER CONNECTION STUDY
BUDGET LEVEL ESTIMATE - SOUTH BERTH
Prepared by: PND ENGINEERS, INC.
July 2, 2021

Item	Item Description	Units	Quantity	Unit Cost	Amount
1505.1	Mobilization	LS	All Req'd	20%	$1,319,000
2702.1	Construction Surveying	LS	All Req'd	$75,000	$75,000
2894.1	50-ft Aluminum Gangway	LS	All Req'd	$100,000	$100,000
2895.1	Floating Dock, 36'x66'	SF	2,376	$500	$1,188,000
2896.1	Furnish 36-Inch dia. Steel Pipe Pile	LF	1,200	$350	$420,000
2896.2	Install 36 -Inch dia. Steel Pipe Vertical Pile	EA	4	$30,000	$120,000
2896.3	Install 36 -Inch dia. Steel Pipe Batter Pile	EA	2	$40,000	$80,000
2896.4	Furnish and Install Pile Frames	LS	All Req'd	$250,000	$250,000
2897.1	Transition Plates	LS	All Req'd	$75,000	$75,000
2898.1	Approach Dock Addition with Gangway Mounting Assemblies	LS	All Req'd	$350,000	$350,000
2899.1	Supply and Install Pile Anodes	LS	All Req'd	$75,000	$75,000
5120.1	Electrical Support Assemblies	LS	All Req'd	$50,000	$50,000
11000.1	Cable Positioning Device	LS	All Req'd	$1,000,000	$1,000,000
16000.1	Electrical Substation	LS	All Req'd	$1,855,000	$1,855,000
16000.2	Feeder to Shore	LS	All Req'd	$482,000	$482,000
16000.3	Submarine Cable & Support Structure	LS	All Req'd	$310,000	$310,000
16000.4	Power on Float	LS	All Req'd	$165,000	$165,000
	ESTIMATED CONSTRUCTION COST				**$7,914,000**
	CONTINGENCY (15%)				**$1,187,100**
	ENVIRONMENTAL PERMITTING & IHA				**$200,000**
	FINAL DESIGN & CONTRACT DOCUMENTS (10%)				**$910,110**
	CONTRACT ADMINISTRATION & CONSTRUCTION INSPECTION (10%)				**$910,110**
	TOTAL RECOMMENDED PROJECT BUDGET				**$11,121,320**

Note: This estimate assumes the North Berth Shore Power System is constructed prior to South Berth Shore Power System.

Appendix D4 -2

PORT OF JUNEAU
CRUISE SHIP ELECTRIFICATION
SHORE POWER CONNECTION STUDY
BUDGET LEVEL ESTIMATE - SOUTH BERTH
Prepared by: PND ENGINEERS, INC.
July 2, 2021

Item	Item Description	Units	Quantity	Unit Cost	Amount
1505.1	Mobilization	LS	All Req'd	20%	$1,590,200
2702.1	Construction Surveying	LS	All Req'd	$75,000	$75,000
2894.1	50-ft Aluminum Gangway	LS	All Req'd	$100,000	$100,000
2895.1	Floating Dock, 36'x66'	SF	2,376	$500	$1,188,000
2896.1	Furnish 36-Inch dia. Steel Pipe Pile	LF	1,200	$350	$420,000
2896.2	Install 36 -Inch dia. Steel Pipe Vertical Pile	EA	4	$30,000	$120,000
2896.3	Install 36 -Inch dia. Steel Pipe Batter Pile	EA	2	$40,000	$80,000
2896.4	Furnish and Install Pile Frames	LS	All Req'd	$250,000	$250,000
2897.1	Transition Plates	LS	All Req'd	$75,000	$75,000
2898.1	Approach Dock Addition with Gangway Mounting Assemblies	LS	All Req'd	$350,000	$350,000
2899.1	Supply and Install Pile Anodes	LS	All Req'd	$75,000	$75,000
5120.1	Electrical Support Assemblies	LS	All Req'd	$50,000	$50,000
11000.1	Cable Positioning Device	LS	All Req'd	$1,000,000	$1,000,000
16000.1	Electrical Substation	LS	All Req'd	$3,193,000	$3,193,000
16000.2	Feeder to Shore	LS	All Req'd	$500,000	$500,000
16000.3	Submarine Cable & Support Structure	LS	All Req'd	$310,000	$310,000
16000.4	Power on Float	LS	All Req'd	$165,000	$165,000
	ESTIMATED CONSTRUCTION COST				**$9,541,200**
	CONTINGENCY (15%)				**$1,431,180**
	ENVIRONMENTAL PERMITTING & IHA				**$200,000**
	FINAL DESIGN & CONTRACT DOCUMENTS (10%)				**$1,097,238**
	CONTRACT ADMINISTRATION & CONSTRUCTION INSPECTION (10%)				**$1,097,238**
	TOTAL RECOMMENDED PROJECT BUDGET				**$13,366,856**

Note: This estimate assumes the South Berth Shore Power System is constructed prior to North Berth Shore Power System.

Appendix D4 -3

PORT OF JUNEAU
CRUISE SHIP ELECTRIFICATION
SHORE POWER CONNECTION STUDY
BUDGET LEVEL ESTIMATE - NORTH BERTH
Prepared by: PND ENGINEERS, INC.
July 2, 2021

Item	Item Description	Units	Quantity	Unit Cost	Amount
1505.1	Mobilization	LS	All Req'd	20%	$1,375,000
2702.1	Construction Surveying	LS	All Req'd	$75,000	$75,000
2894.1	100-ft Aluminum Gangway with Pontoon Mounting Assemblies	LS	All Req'd	$400,000	$400,000
2895.1	Floating Dock, 36' x 66'	SF	2,376	$500	$1,188,000
2896.1	Furnish 36-Inch dia. Steel Pipe Pile	LF	1,200	$350	$420,000
2896.2	Install 36 -Inch dia. Steel Pipe Vertical Pile	EA	4	$30,000	$120,000
2896.3	Install 36 -Inch dia. Steel Pipe Batter Pile	EA	2	$40,000	$80,000
2896.4	Furnish and Install Pile Frames	LS	All Req'd	$250,000	$250,000
2897.1	Transition Plates	LS	All Req'd	$75,000	$75,000
2899.1	Supply and Install Pile Anodes	LS	All Req'd	$75,000	$75,000
5120.1	Electrical Support Assemblies	LS	All Req'd	$50,000	$50,000
11000.1	Cable Positioning Device	LS	All Req'd	$1,000,000	$1,000,000
16000.1	Electrical Substation	LS	All Req'd	$1,855,000	$1,855,000
16000.2	Feeder to Shore	LS	All Req'd	$500,000	$482,000
16000.3	Submarine Cable & Support Structure	LS	All Req'd	$660,000	$660,000
16000.4	Power on Float	LS	All Req'd	$145,000	$145,000
	ESTIMATED CONSTRUCTION COST				**$8,250,000**
	CONTINGENCY (15%)				**$1,237,500**
	ENVIRONMENTAL PERMITTING & IHA				**$200,000**
	FINAL DESIGN & CONTRACT DOCUMENTS (10%)				**$948,750**
	CONTRACT ADMINISTRATION & CONSTRUCTION INSPECTION (10%)				**$948,750**
	TOTAL RECOMMENDED PROJECT BUDGET				**$11,585,000**

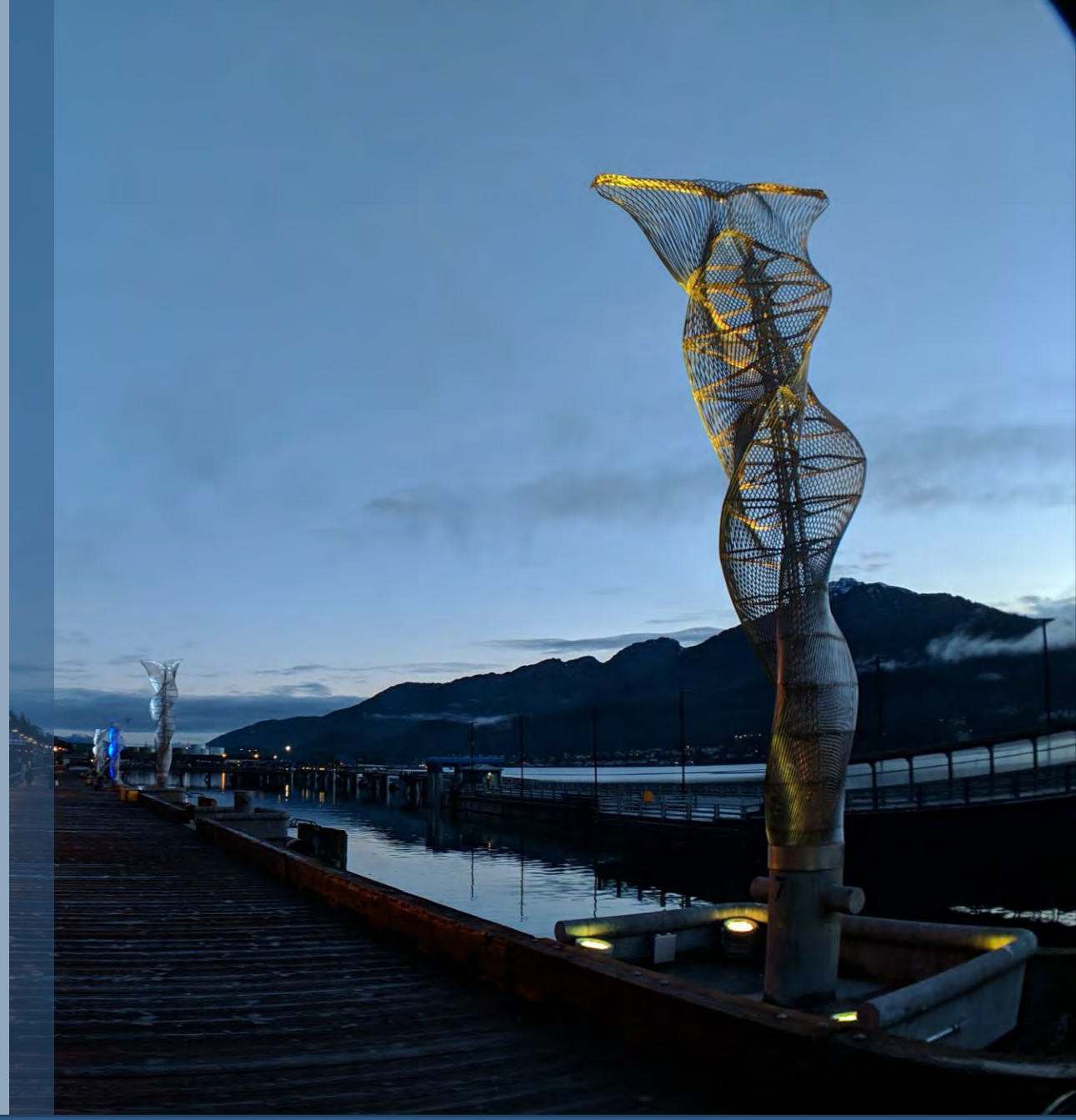
Note: This estimate assumes the South Berth Shore Power System is constructed prior to the North Berth Shore Power System.

Appendix D4 -4

October 2021

Cruise Ship Dock Electrification Study

Appendix D5: Background Supply and Demand Analysis



McKINLEY RESEARCH GROUP, LLC

Formerly McDowell Group

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AEL&P Sales Analysis

Firm Customer Overview

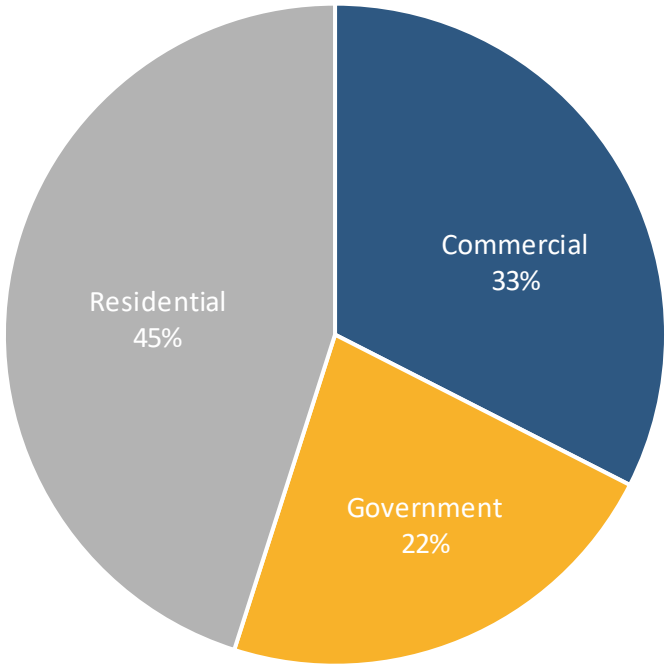
AEL&P Firm Customers and Electric Consumption (2019)

	Customer Count	Electric Consumption (MWhs)	Consumption per Cust (MWhs)
Commercial			
Small Commercial	1,632	39,690	24
Large Commercial	135	61,376	453
Snettisham Hatchery	1	1,899	1,899
Other	72	114	2
Total	1,840	103,079	56
Government			
Small Commercial	395	8,651	22
Large Commercial	89	61,544	695
Other	22	912	42
Total	506	71,107	141
Residential			
Non-Electric Hot Water/Heat*	6,686	48,590	7
Electric Hot Water*	3,626	38,548	11
Electric Heat*	4,337	54,711	13
Other	265	1,093	4
Total	14,914	142,943	10

*Residential Hot Water and Heat is self-reported

Source: AEL&P

AEL&P Firm Customer Electric Consumption by Customer Type (2019)



- Residential sales account for 45% of sales to firm customers
- Residential customers self-report whether they have electric hot water or heat, with those reporting purchasing significantly more electricity on average
- "Other" includes streetlights, EV charging, and residential heat pumps

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Firm Customer Sales

Firm Customer Sales ('000 MWhs)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
Commercial	106	107	109	110	111	110	113	112	103	109
Government	69	69	69	66	63	62	63	63	71	66
Residential	139	142	141	141	139	139	151	149	143	143
Total Firm	**314**	**318**	**319**	**317**	**314**	**311**	**326**	**324**	**317**	**318**

Firm Customers

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
Commercial	1,658	1,668	1,700	1,751	1,791	1,805	1,839	1,869	1,840	1,769
Government	466	463	459	456	446	441	441	440	506	458
Residential	13,919	13,989	14,058	14,207	14,382	14,559	14,674	14,811	14,914	14,390
Total Firm	**16,043**	**16,120**	**16,217**	**16,414**	**16,620**	**16,805**	**16,953**	**17,120**	**17,259**	**16,617**

MWhs/Customer

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
Commercial	64.0	64.0	64.0	62.7	62.1	60.9	61.5	60.1	56.0	61.7
Government	147.1	149.2	150.6	144.7	141.7	140.2	142.4	143.9	140.6	144.5
Residential	10.0	10.1	10.0	9.9	9.7	9.6	10.3	10.0	9.6	9.9
Average Firm	**19.6**	**19.7**	**19.7**	**19.3**	**18.9**	**18.5**	**19.3**	**18.9**	**18.4**	**19.1**

Source: AEL&P

- Electric sales to firm customers have averaged 318,000 MWhs per year over the last nine years
- The number of customers has increased each year, with an average annual growth rate of 0.9%
- MWHs per customer have generally decreased each year
  - Exception is 2017, which was a cold year
  - Sales per customer may be a function of both energy efficiency and generally warmer weather in later years
  - Relationship between HDDs and demand discussed in detail later
- Base demand for firm customers ranged between 317k-334k MWhs per year

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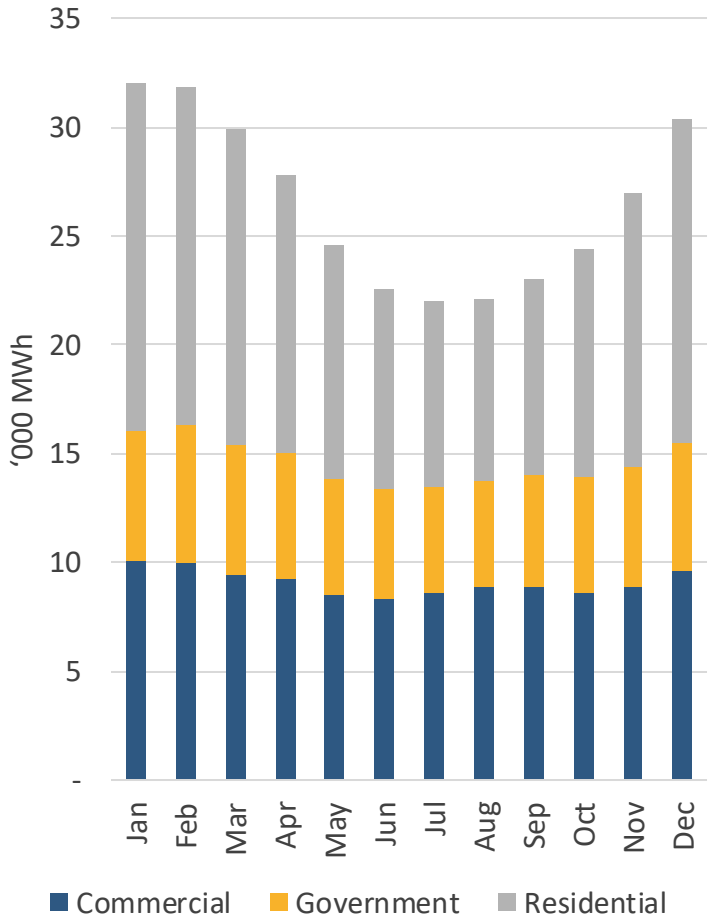
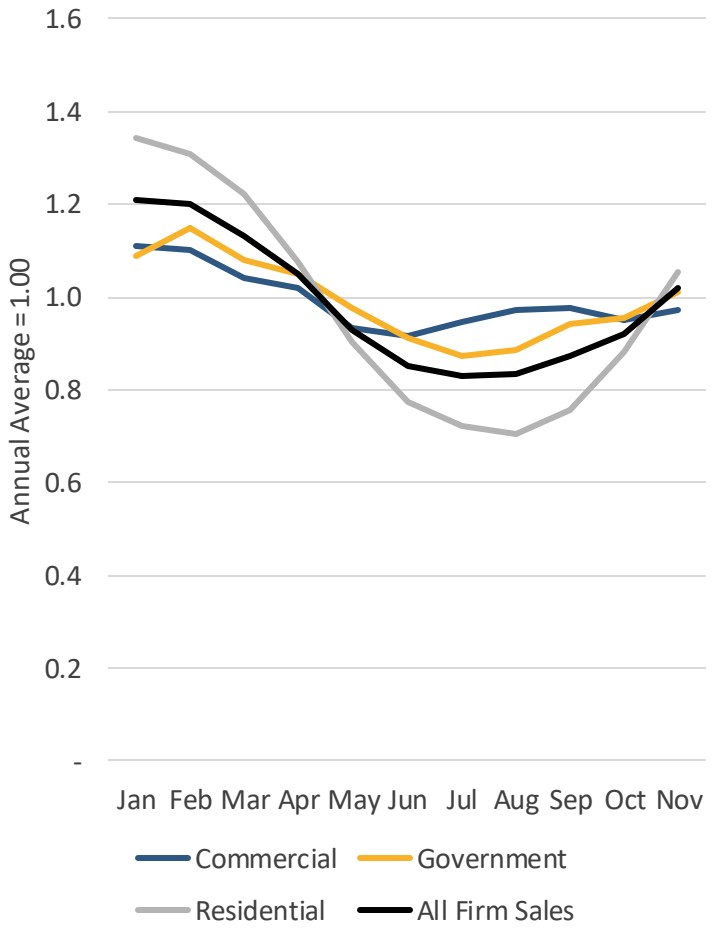
Firm Customer Seasonal Swing

Average Monthly Sales to Firm Customers by Type (2011-2019)





- Sales to firm customers are highly seasonal, with 46% higher sales in January than July.
- Each customer type has different seasonality:
  - Commercial: January is 17% higher than July
  - Government: 25%
  - Residential: 86%
- Residential sales account for 74% of the seasonal swing in sales to firm customers

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Source: AEL&P

Firm Customer Base Year Calculation

HDD vs Average Customer Sales (MWh/Customer)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
HDD	8,884	9,063	8,250	7,980	7,488	7,387	8,610	8,061	7,595	8,054
ComGov	82	82	82	80	78	76	77	76	74	79
Residential	10	10	10	10	10	10	10	10	10	10

High Demand (Cold Year)

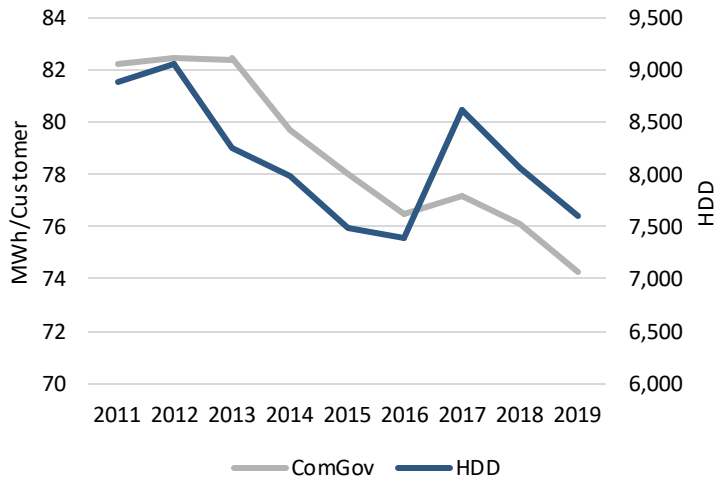
	Count	MWh/ Cust	Sales ('000 MWhs)
ComGov	2,345	74.3	174
Residential	14,914	10.3	153
Total	**17,259**	**19.0**	**327**

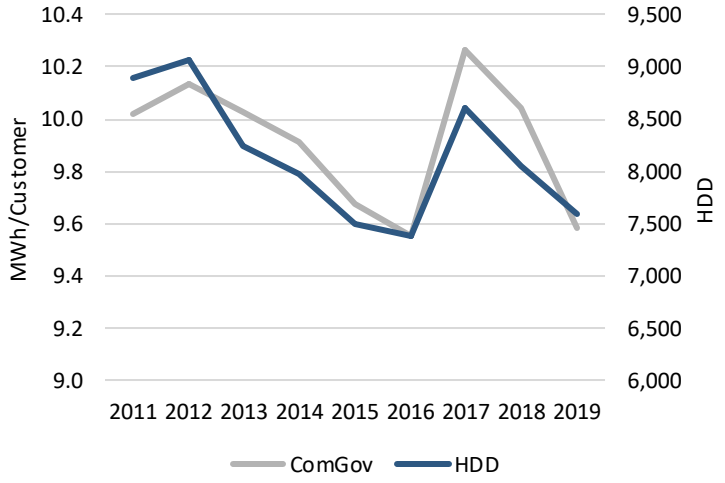
Low Demand (Warm Year)

	Count	MWh/ Cust	Sales ('000 MWhs)
ComGov	2,345	74.3	174
Residential	14,914	9.6	143
Total	**17,259**	**18.4**	**317**

Base Demand (Average Year)

	Count	MWh/ Cust	Sales ('000 MWhs)
ComGov	2,345	74.3	174
Residential	14,914	9.9	148
Total	**17,259**	**18.7**	**322**





- Commercial and Government customers are combined as:
  - They have similar sales patterns
  - About 40 customers switched from comm to gov in 2019
- ComGov sales per customer seem somewhat related to temperature (HDD) but shows persistent downward trend
- Residential sales per customer appear much more related to HDDs
- Base Year sales per customer:
  - ComGov: 2019 (74.3 MWh)
  - Residential
    - High: 2017 (10.3 MWh)
    - Low: 2019 (9.6 MWh)
    - Base: 2018 (10.0 MWh)
- 2019 customer counts are used
  - Expect steady growth in customers

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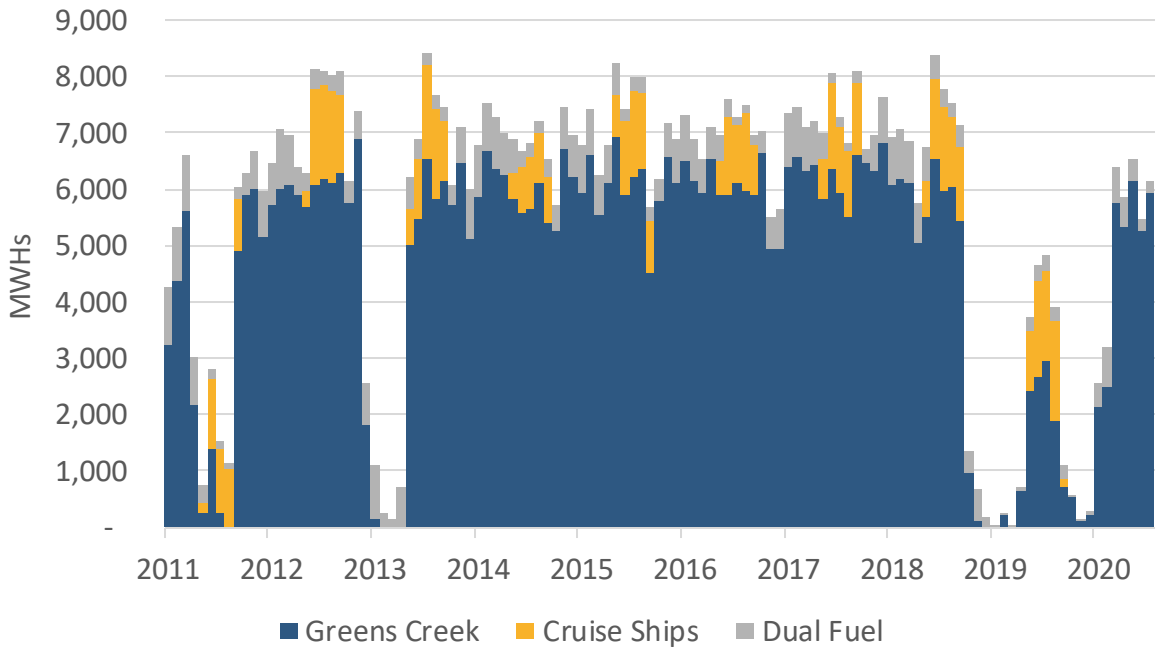
Source: AEL&P, NOAA, MRG Calcs

Interruptible Customer Overview

Interruptible Customer Sales ('000 MWhs)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2011-2019 Ave.	2014-2017 Ave.	Peak
Greens Creek	39	69	46	72	73	71	76	54	12	57	73	76
Princess Cruises	4	7	6	4	6	5	6	6	6	6	5	7
Dual Fuel	7	6	6	7	6	6	6	6	1	6	6	7
Total Non-Firm	**50**	**82**	**58**	**83**	**85**	**82**	**88**	**66**	**20**	**68**	**84**	**89**



- AEL&P has two large interruptible customers and a few dozen interruptible dual fuel customers
  - Greens Creek Mine is the largest with a max annual demand of 76k MWhs
  - Princess Cruises purchases available power in the summer with a max annual demand of 7k MWhs
  - Dual fuel costumers with total max annual sales of 7k MWhs
- The amount of interruptible sales is dependent on the available hydropower
  - Interruptible sales were curtailed in 2011, 2013 and the fall of 2018 through the beginning of 2020.
  - The available hydropower is a function of seasonal rain and snow and the reservoir water levels
- In a typical year with no curtailments AEL&P sells about 84k MWh of power to interruptible customers

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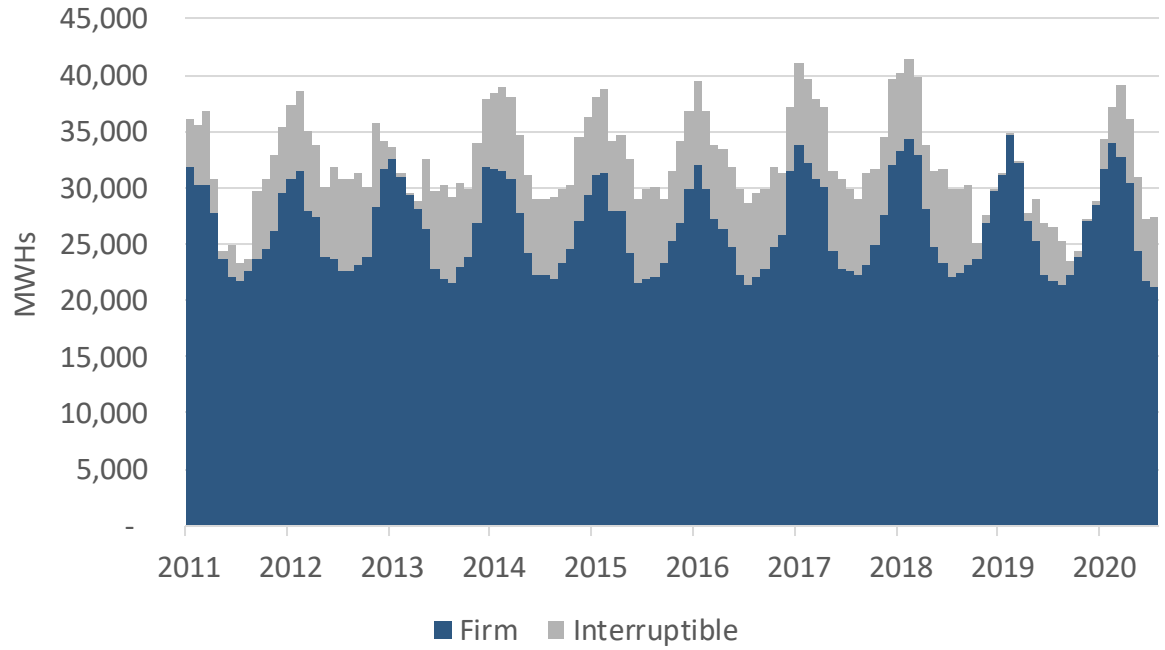
Source: AEL&P

Total Sales

Total Sales ('000 MWhs)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2011-2019 Ave.	2014-2017 Ave.	Peak
Firm	314	318	319	317	314	311	326	324	317	318	317	326
Non-Firm	50	82	58	83	85	82	88	66	20	68	84	88
Total	**364**	**399**	**377**	**399**	**398**	**393**	**414**	**391**	**337**	**386**	**401**	**414**



- Total sales averaged 386k MWhs from 2011-2019
  - Peak of 414k MWh in 2017
  - Low of 337k MWh in 2019

Source: AEL&P

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Cost Analysis

AEL&P Costs

Rate Base

	$thousands	notes
Plant in Place	$225,959	Does not include Snettisham
Accum Depreciation	-93,428	
Other	7,500	
Deferred Taxes	-17,003	
Rate Base	**$123,029**	

Income Requirement

	$thousands	notes
Rate Base	$123,029	
Return on Equity	7%	58.18% equity at 11.95% ROE
Cost of Debt	2%	41.82% debt at 4.67% cost of debt
Equity Allowance	8,554	
Debt Allowance	2,403	
Income Requirement	**$10,956**	

Income Taxes

	$thousands	notes
State Rate	9%	Adjusted for income under $200k
Federal Rate	21%	
Pre-Tax Income	$11,951	
Post-Tax Income	8,563	
State Tax	1,114	
Federal Tax	2,274	
Total Income Tax	**$3,387**	

Operation and Maintenance

	$thousands	notes
Electric Power Purchase	$10,367	Snettisham
Hydraulic	1,930	
Internal Combustion	607	
Transmission	473	
Distribution	2,778	
Customer	1,132	
A&G	4,480	
Total	**$21,768**	

Revenue Requirement

	$thousands	notes
Snettisham Power Purchase	$10,367	
Other O&M	11,401	
Depreciation	5,478	plant in place is 41 times larger
Other Taxes	1,061	mostly property taxes
Income Tax	3,387	
Income Requirment	10,956	
Revenue Requirment	**$42,651**	

$42.65 million Revenue Requirement is the amount the RCA allows AEL&P to earn each year on its firm and interruptible sales.

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Source: AEL&P Rate Cases

AEL&P Cost of Power – No Interruptible Sales

Revenue Requirement

	$thousands
Snettisham Power Purchase	10,367
Other O&M	11,401
Depreciation	5,478
Other Taxes	1,061
Income Tax	3,387
Income Requirement	10,956
Revenue Requirement	**42,651**

Base Demand (Average Year)

	Count	MWh/ Cust	Sales ('000 MWhs)
ComGov	2,345	74.3	174
Residential	14,914	9.9	148
Total	**17,259**	**18.7**	**322**

Firm Rates - No Interruptible Sales

Revenue Requirement	42,651	$thousands
Firm Sales	322	'000 MWh
Average Rate	**0.132**	**$/kWh**

Source: AEL&P, AEL&P Rate Cases, McKinley Research Group Calculations

- The average AEL&P cost of power with no interruptible sales is about $0.13 per kWh
  - Calculated by dividing the total annual revenue requirement by the firm power sold in an average year
- The average cost of power is not a "rate"
  - It does not consider:
    - Different rate classes
    - Customer or demand charges
    - Peak vs. non-peak sales
    - Any diesel generation needed
- AEL&P has a complex rate structure tailored for different customers and seasons
- AEL&P also credits interruptible sales in its base rates to firm customers
- The average cost is an effective metric for comparing different scenarios while avoiding the complexities of rates and how much different customers would pay

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AEL&P Cost of Power – With Interruptible Sales

Interruptible Sales

	Sales ('000 MWh)	Rate ($/kWh)	Revenue ($thousands)
Greens Creek	73	0.118	8,628
Princess Cruises	5	0.118	621
Dual Fuel	6	0.055	349
Total/Weighted Average	**84**	**0.114**	**9,598**

Firm Rates - Full Interruptible Sales

		notes
Revenue Requirement	42,651	$thousands
Firm Sales	322	000 MWh
Interruptible Rate	0.114	weighted average interruptible rate
Interruptible Sales	84	000 MWh, assumes no curtailments
Interruptible Revenue	9,598	$thousands
New Revenue Requirement	33,053	Revenue Requirement minus Interruptible Revenue
Average Rate	**0.103**	**$/kWh**

- AEL&P credits all revenue from interruptible sales back to firm customers
  - A portion of the Greens Creek revenue are accounted for in the base rates
  - Any additional interruptible revenue is accounted for in the Cost of Power Adjustment (COPA)
  - If Greens Creek revenue is lower than expected, the COPA is increased to adjust
- In a typical year with no curtailments, AEL&P can sell 84k MWh of interruptible power
- Rates are set by RCA approved contracts
  - Both Greens Creek and Princess Cruises pay $0.118 per kWh
  - Dual Fuel customers pay $0.055 per kWh
- AEL&P can generate almost $10 million per year from interruptible sales
- This can reduce the average power cost to firm customers by almost $0.03 per kWh, a 23% reduction

Source: AEL&P, AEL&P Rate Cases, McKinley Research Group Calculations

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AEL&P Generation Analysis

Generation Capacity

AEL&P Hydro Capacity by Total Capacity and Production Capacity

	Capacity (MW)	Production Capacity ('000 MWhs)		
		Firm	Average	Wet
Snettisham	78.2	245	295	355
Lake Dorothy	14.3	63	75	90
Annex Creek	3.6	22	24	28
Salmon Creek	5.0	23	31	38
Gold Creek Hydro	1.6	4	5	7
Total	**102.7**	**357.0**	**430.0**	**518.0**

- AEL&P has sufficient hydro capacity to serve its full firm customer load with no need to run diesels
  - Firm production is 357k MWhs
  - Peak firm sales were 326k MWhs in 2017
- The more it rains and snows in the area, the more water is in AEL&P reservoirs and it can produce more electricity
- On average or wet years, AEL&P has excess production capacity to serve interruptible customers

AEL&P Diesel Capacity

	Capacity (MW)
Gold Creek Diesel	7.0
Lemon Creek	51.8
Auke Bay	25.2
Industrial	23.5
Total	**107.5**

- AEL&P has enough diesel generation capacity to power all firm customer demand
- Diesel generation is very expensive and is only used when insufficient hydro is available
- AEL&P manages its sales to interruptible customers to reserve sufficient water inventory to meet firm demand.

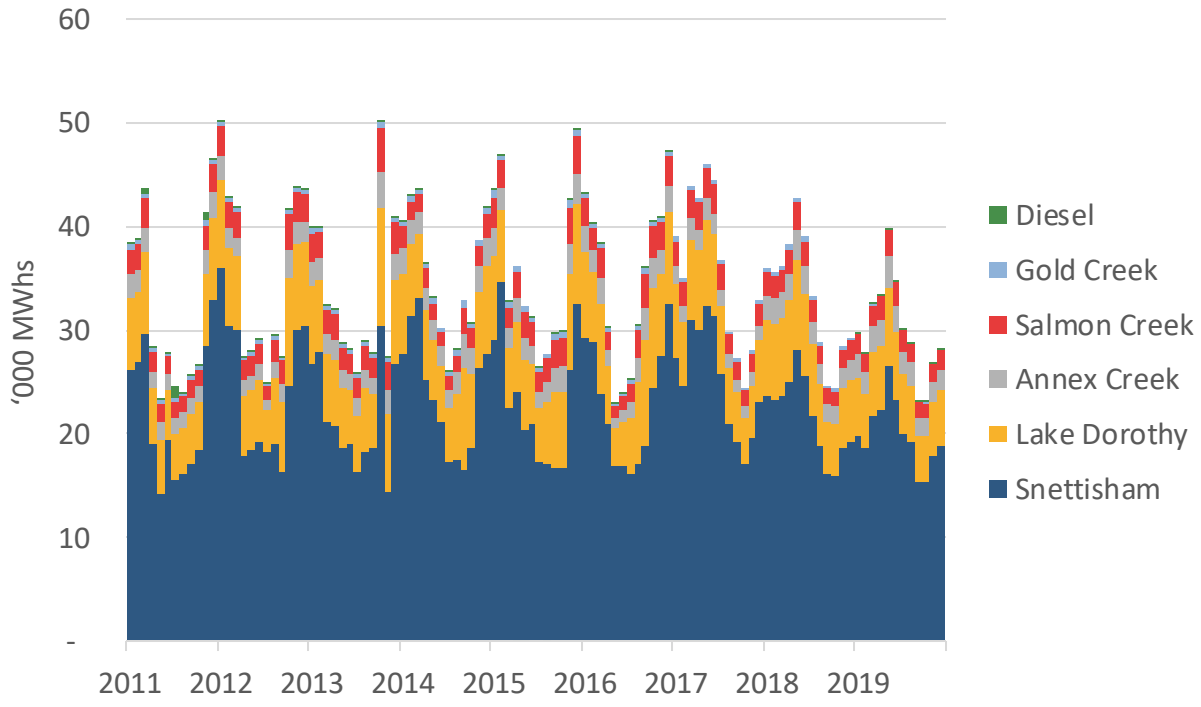
DRAFT

Source: AEL&P

AEL&P Generation

AEL&P Generation ('000 MWh)

	2011	2012	2013	2014	2015	2016	2017	2018	Average
Snettisham	264	290	259	286	278	273	302	260	276
Lake Dorothy	71	84	83	84	85	87	77	82	82
Annex Creek	22	22	25	27	27	26	19	27	24
Salmon Creek	24	28	30	22	31	28	27	24	27
Gold Creek	5	4	5	6	6	5	5	4	5
Total	**386**	**429**	**401**	**424**	**428**	**419**	**431**	**397**	**414**

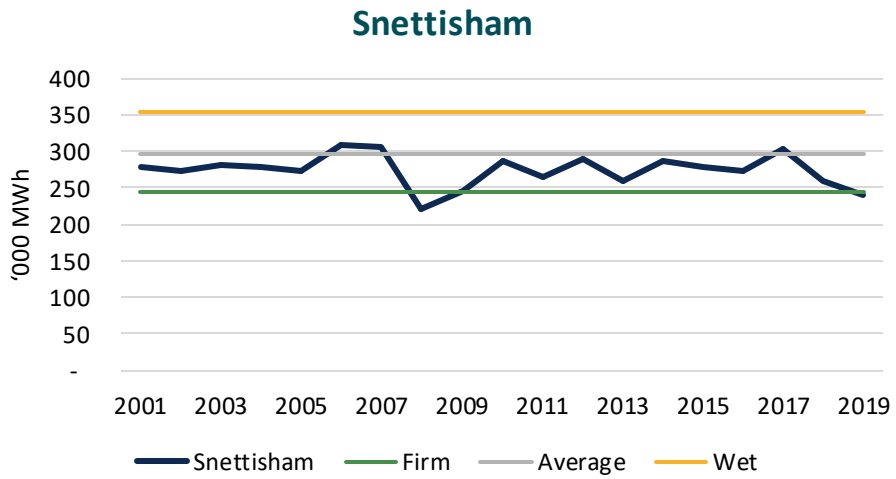


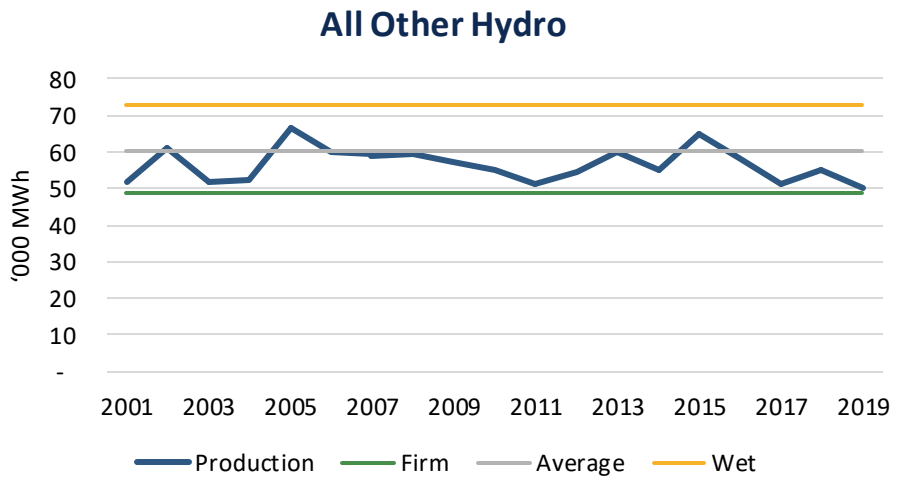
- From 2011 to 2019, AEL&P generated an average of 408k MWhs
- 99.8% came from hydro
  - Snettisham produces about 72% of AEL&P's power
  - Lake Dorothy came online in 2009 and produces about 21%

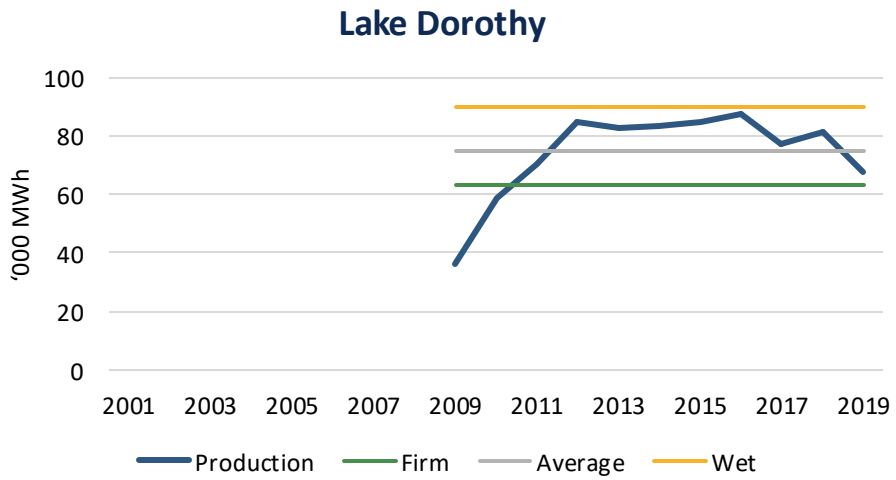
DRAFT

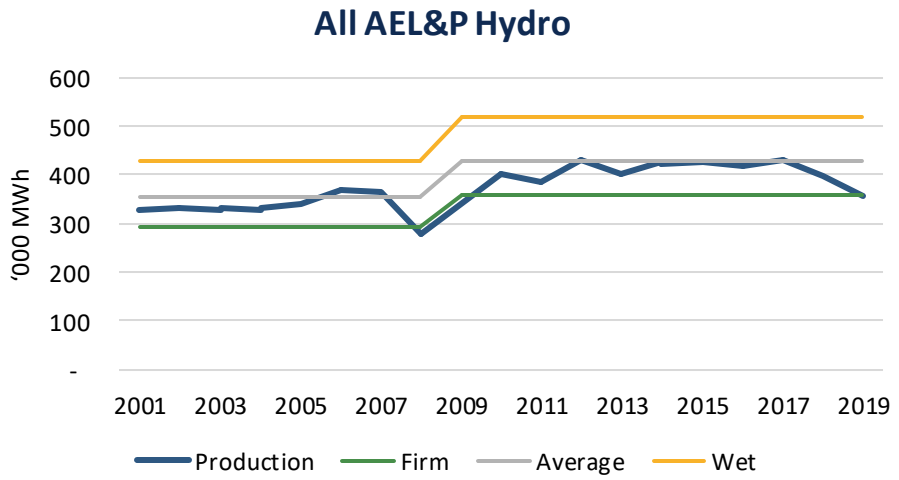
Source: AEL&P, EIA

Generation vs Capacity



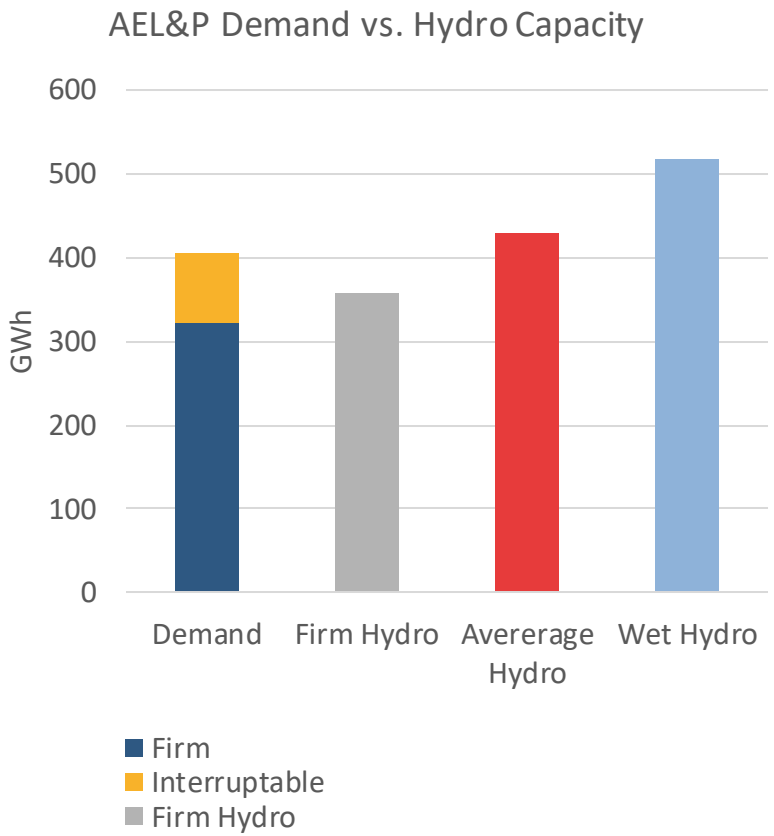






DRAFT *Source: AEL&P, EIA*

Generation Capacity and Demand



- AEL&P's firm hydro capacity exceeds its firm customer demand
  - Firm hydro capacity is 357 GWh/yr
  - Base firm demand is 322 GWh with a cold year peak of 326 GWh
  - Ensures that AEL&P will not need to run diesels to meet firm demand in dry years
- AEL&P's average hydro exceeds its firm and interruptible demand
  - Average hydro capacity is 430 GWh/yr
  - Base firm and interruptible demand is 406 GWh/yr
  - Peak firm and interruptible demand is 414 GWh/yr
- In 2019, AEL&P reported about 20 GWh of power consumed by itself without charge and energy losses
  - When netted out of hydro capacity:
    - Firm hydro capacity is about equal to peak firm demand
    - Average hydro capacity is about equal to peak firm and interruptible demand

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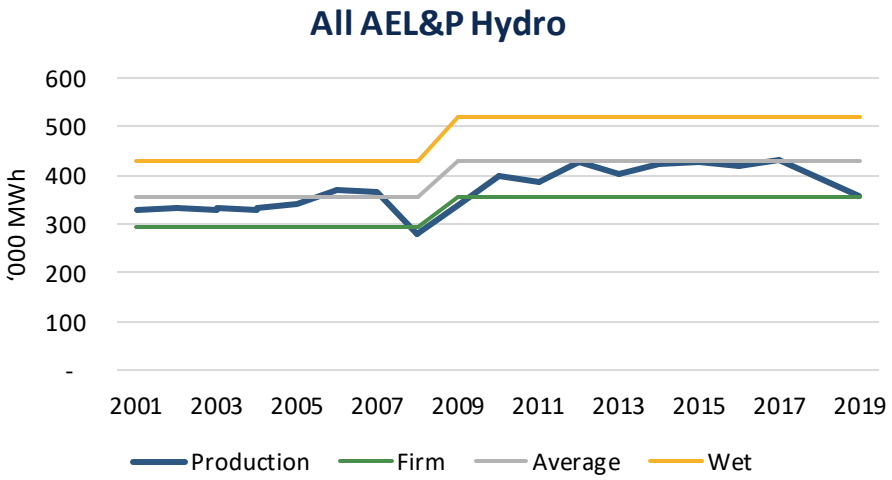
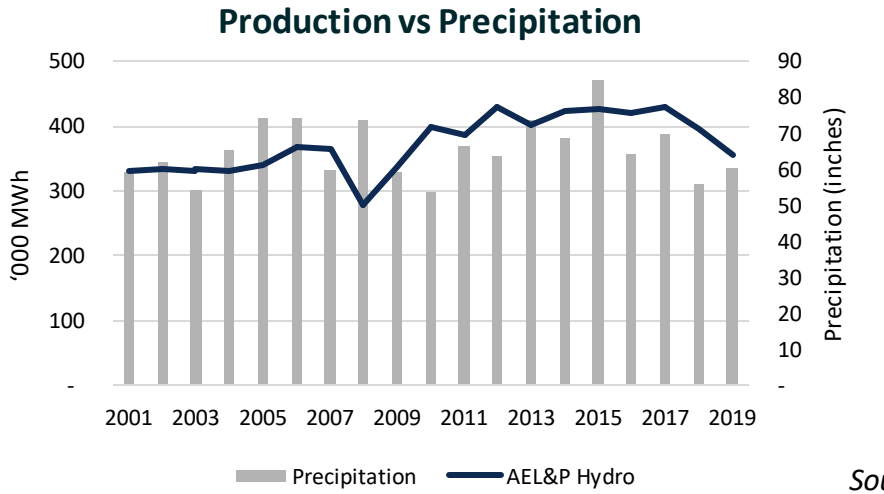
Generation and Precipitation





- AEL&P hydro generation has generally been between the Firm and Average production capacities reported by AEL&P
  - In 2008 the transmission line to Snettisham was taken out by an avalanche for six weeks
  - Lake Dorothy did not produce at full capacity until 2011 after coming into operation in 2009
- No years have significantly exceeded the average production
  - Most years were serving the full interruptible load
  - Uncertain if AEL&P had the production capacity (water) to serve additional load if it was there
- If AEL&P had additional water in excess of what was needed to supply its full firm and interruptible customers then the water would be "spilled"
  - This water could be used to provide power to additional interruptible customers
  - The "Wet" production capacity indicates that water is often spilled
  - No public data exists on the amount of water spilled

Source: AEL&P, EIA, NOAA

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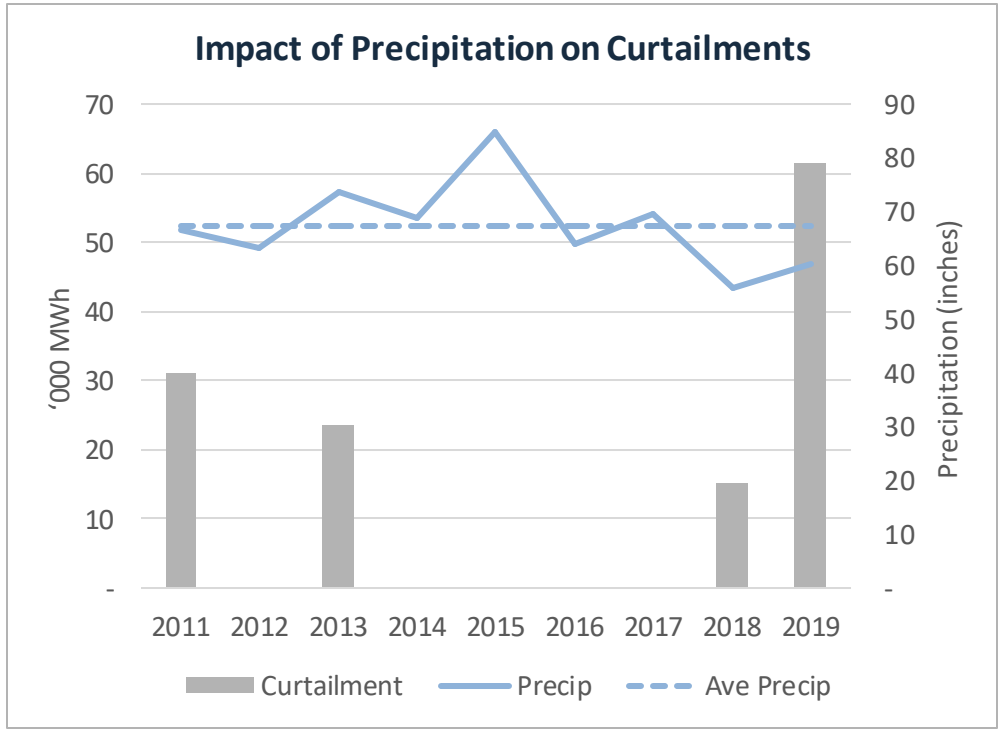
CURTAILMENTS

Total Sales, Curtailments, and Estimated Spills (GWhs)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
Total Hydro Generation	386	429	401	424	428	419	431	397	357	408
Firm	314	318	319	317	314	311	326	324	317	318
Interruptible	50	82	58	83	85	82	88	66	20	68
Curtailment	31	-	23	-	-	-	-	15	61	15



- In the last nine years:
  - Full capacity 5 years
  - Curtailment 4 years
  - Implies that there was four years of excess power and one “average year”

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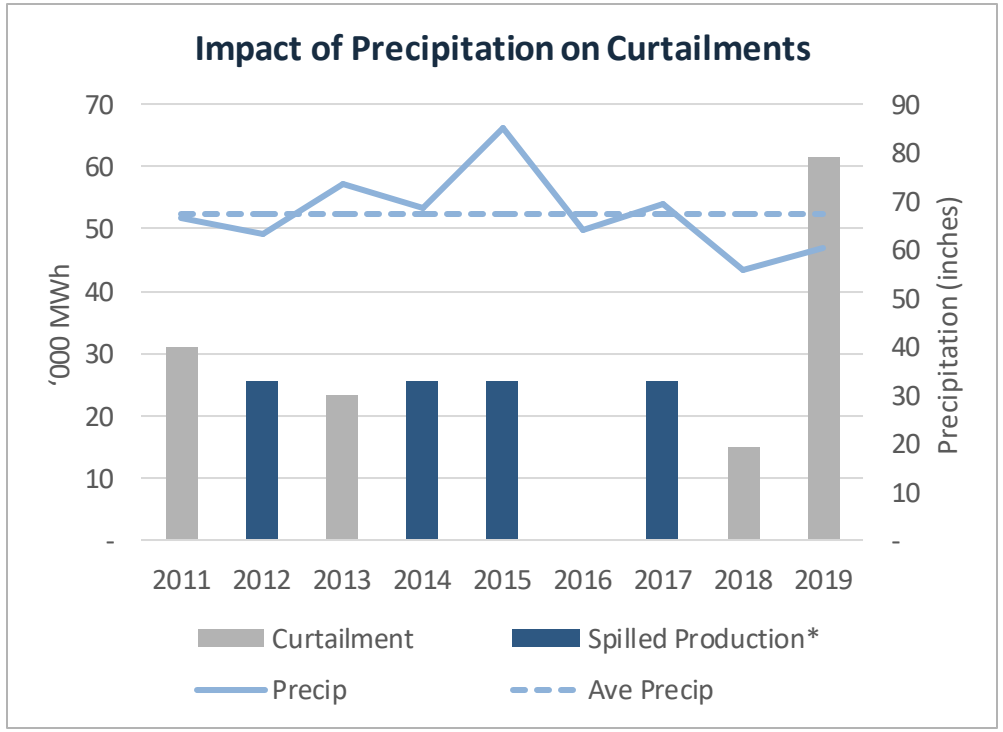
Source: AEL&P, EIA, NOAA, McKinley Research Group Estimates

Curtailments and Estimated Spilled Water Estimate

Total Sales, Curtailments, and Estimated Spills (GWhs)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
Total Hydro Generation	386	429	401	424	428	419	431	397	357	408
Firm	314	318	319	317	314	311	326	324	317	318
Interruptable	50	82	58	83	85	82	88	66	20	68
Curtailment	31	-	23	-	-	-	-	15	61	15
Spilled Production*	-	33	-	33	33	-	33	-	-	15

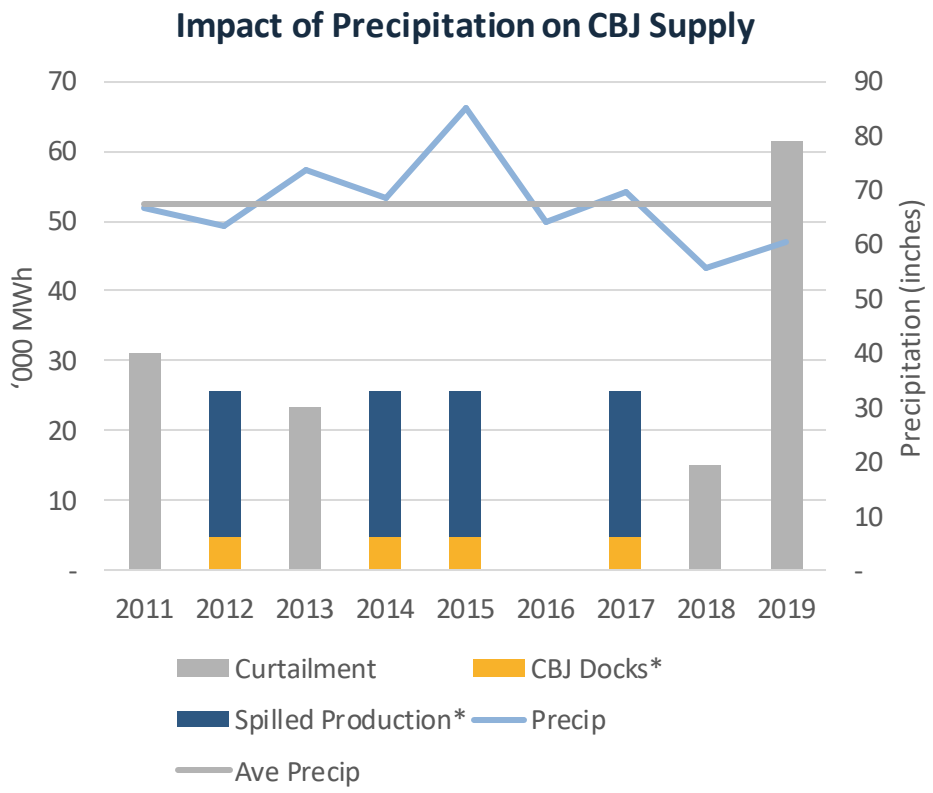


- **Spilled Production is estimated: No data is available to support. Estimate is based on precipitation, curtailments, and AEL&P Hydro Capacity**
- The average seems to equal the peak load for firm and interruptible customers
  - **Assumption**: there are an equal number of years with high precipitation and water spilling as there are years with low precipitation and curtailments
- Spilled water estimate:
  - Four years of spill (equal to years of curtailment)
  - Average spill volume equals average curtailment volume
- With AEL&P's current hydro capacity, this analysis indicates that there would have been sufficient power to provide CBJ at least 6 GWh in four of the last nine years

DRAFT

Source: AEL&P, EIA, NOAA, McKinley Research Group Estimates

CBJ Power Supply



Sales: CBJ Docks Electrified (GWh)

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Ave
AEL&P Firm	314	318	319	317	314	311	326	324	317	318
Greens Creek	39	69	46	72	73	71	76	54	12	57
Princess	4	7	6	4	6	5	6	6	6	6
Dual Fuel	7	6	6	7	6	6	6	6	1	6
CBJ Docks	-	6	-	6	6	-	6	-	-	3
Total	**364**	**405**	**377**	**405**	**404**	**393**	**420**	**391**	**337**	**389**

- AEL&P is assumed to be spilling water on the years when there is enough precipitation to exceed the "average hydro" capacity
  - Based on earlier analysis, it is assumed that this occurred in 4 or the last 9 years
  - Also assumed that enough energy is spilled to power CBJ docs full 6 GWh demand on those years
- Analysis assumes that if CBJ docks is electrified with no new hydro, it could sell dock power four out of every nine years

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Appendix E

AlaskaEnergy ENGINEERING LLC
25200 Amalga Harbor Juneau, Alaska 99801 Phone: 907-789-1226 jim@alaskaenergy.us

CBJ Dock Electrification

Princess Dock Interruptible and Firm Cost Comparison

Preliminary

PRINCESS DOCK ENERGY DATA - 2018															
Number of Dockings	May			June			July			August			September		
	MWh	Peak MW	Hours	MWh	Peak MW	Hours	MWh	Peak MW	Hours	MWh	Peak MW	Hours	MWh	Peak MW	Hours
1	67	7.7	8.4	70	6.7	10.9	62	8.5	7.6	83	7.6	11.5	87	7.7	11.7
2	79	9.4	9.8	49	6.6	8.0	53	8.4	6.7	52	7.3	7.4	50	7.2	7.3
3	62	9.0	7.1	84	9.5	9.2	56	8.5	6.9	51	9.9	5.4	85	9.4	10:24
4	62	7.8	8.2	90	8.6	11.0	81	7.7	11.6	58	8.1	7.4	85	8.7	10:00
5	70	6.7	10.8	9	8.0	1.7	49	7.3	6.3	80	7.4	11.3	54	8.4	16:24
6	44	9.1	5.1	72	6.7	11.8	86	9.4	10.8	59	7.5	8.1	75	7.2	2:24
7	90	8.8	10.7	47	6.5	7.6	39	9.1	5.5	86	9.6	9.4	60	7.4	11:36
8	50	7.9	6.7	87	9.8	9.5	56	8.2	6.8	54	8.7	6.7	85	9.2	15:36
9	83	7.5	11.4	53	8.5	6.8	74	7.2	11.0	87	7.8	11.7	86	8.6	14:48
10	48	6.7	7.5	64	8.5	7.8	57	7.2	8.3	50	7.3	7.2	54	8.4	18:00
11				57	8.8	8.3	84	9.4	9.4	76	9.4	8.3	46	8.6	12:24
12				69	6.6	11.1	93	8.7	11.3	84	8.8	10.2	86	7.7	16:24
13				57	7.4	8.3	58	8.6	7.2	58	8.8	7.3	116	9.4	18:24
14				87	9.3	9.6	84	7.5	11.8	43	8.4	5.4	54	9.3	17:12
15				86	8.6	10.7	51	7.2	7.4	78	7.2	11.1	61	7.6	7:12
16				48	8.3	6.2	83	9.3	9.4	81	2.7	9.2	82	9.3	6:48
17				72	6.6	11.9	55	8.4	6.6	85	8.8	10.3	62	8.6	12:24
18				45	7.1	7.2	83	8.6	10.2	56	8.3	7.0	93	8.7	2:24
19				41	8.8	4.8	75	7.3	10.9						
20				58	8.3	7.1	60	7.5	8.3						
21				69	6.5	11.0	88	9.4	9.8						
22				56	7.3	8.7	87	8.9	10.6						
23				59	9.3	6.8									
Minimum	44	6.7	5.1	9	6.5	1.7	39	7.2	5.5	43	2.7	5.4	46	7.2	5.5
Average	65	8.0	8.6	62	7.9	8.5	69	8.3	8.8	68	8.0	8.6	73	8.4	9.2
Peak	90	9.4	11.4	90	9.8	11.9	93	9.4	11.8	87	9.9	11.7	116	9.4	12.8
Total	655	-	86	1,429	-	196	1,512	-	194	1,221	-	155	1,318	-	166

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CBJ Dock Electrification

Princess Dock Interruptible and Firm Cost Comparison

Preliminary

PRINCESS DOCK ENERGY DATA - 2019															
Number of Dockings	May			June			July			August			September		
	MWh	Peak MW	Hours	MWh	Peak MW	Hours	MWh	Peak MW	Hours	MWh	Peak MW	Hours	MWh	Peak MW	Hours
1	96	8.9	11.2	49	8.7	6.8	60	8.8	7.0	81	7.6	11.1	67	8.3	8.3
2	82	8.3	10.4	66	8.2	8.4	79	7.2	11.6	59	7.4	8.3	87	7.6	12.0
3	57	7.0	8.5	89	9.8	11.2	55	7.4	7.8	84	8.9	9.9			
4	69	8.7	8.4	76	7.2	11.0	84	9.0	9.7	98	8.7	12.3			
5	20	6.5	3.0	57	7.6	8.0	94	8.5	11.6	77	8.5	9.4			
6	74	6.8	11.6	83	8.9	9.7	76	8.8	9.0	66	7.3	9.4			
7	81	8.9	9.5	90	8.3	11.5	85	8.8	12.0	50	7.1	7.2			
8	68	8.2	8.7	69	8.5	8.6	53	7.1	7.7	73	8.9	8.6			
9	67	6.5	10.7	86	7.7	11.9	84	8.8	10.9	97	8.5	12.1			
10	57	7.3	8.2	51	7.1	7.4	101	9.1	11.6	79	9.0	9.0			
11	81	9.1	9.3	85	9.0	9.9	70	8.2	9.0	91	8.8	10.9			
12	96	8.6	11.8	98	8.8	11.6	80	7.7	11.0	79	7.4	11.2			
13	74	6.7	12.0	66	8.2	8.5	58	7.5	8.1	61	7.6	8.4			
14	52	7.1	7.6	78	7.2	11.3	82	8.9	9.5	85	8.9	10.0			
15	85	9.2	9.7	59	7.5	8.1	96	8.4	12.0	98	8.8	11.8			
16				85	8.8	10.0	72	8.4	9.2	73	8.4	9.4			
17				97	8.5	11.9	84	7.6	11.6	50	7.1	7.3			
18				74	8.8	8.9	50	7.2	7.2	80	8.9	9.4			
19				85	7.7	11.2	84	9.3	9.4	68	8.2	8.7			
20				51	6.9	8.3	96	8.5	11.9	75	7.1	11.2			
21				52	9.0	5.8	72	8.2	9.1	56	7.5	7.7			
22				95	8.7	11.2				83	8.9	9.8			
23				74	8.9	9.3				97	8.6	12.1			
Minimum	20	6.5	3.0	49	6.9	5.8	50	7.1	7.0	50	7.1	7.2	67	7.6	8.3
Average	71	7.9	9.4	75	8.3	9.6	77	8.2	9.9	77	8.2	9.8	77	8.0	10.2
Peak	96	9.2	12.0	98	9.8	11.9	101	9.3	12.0	98	9.0	12.3	87	8.3	12.0
Total	1,060	-	141	1,715	-	220	1,615	-	207	1,761	-	225	154	-	20

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CBJ Dock Electrification

Princess Dock Interruptible and Firm Cost Comparison

Preliminary

PRINCESS DOCK ENERGY USE SUMMARY									
Basis	2018			2019			Averages		
	MWh	Peak MW	Hours	MWh	Peak MW	Hours	MWh	Peak MW	Hours
Minimums	9	2.7	1.7	20	6.5	3.0	15	4.6	2.3
Averages	67	8.1	8.7	75	8.1	9.8	71	8.1	9.2
Maximums	116	9.9	12.8	101	9.8	12.3	108	9.9	12.5
Totals	6,135	-	796	6,304	-	813	6,219	-	805

PRINCESS DOCK ENERGY COST COMPARISON between INTERRUPTIBLE AND FIRM ENERGY - 2018												
Month	Energy	Peak	Ave	Docked	Hours per	Interruptible Rate		Firm Rate			Difference	
	MWh	MW	MW	Hours	Docking	$ / kWh	Cost [2]	$ / kWh [1]	$ / kW	Cost [2]	Cost	Percent
May '18	655	9.4	7.6	86	8.6	$0.118	$81,000	$0.050	$13.85	$172,000	$91,000	112%
Jun '18	1,429	9.8	7.3	196	8.5	$0.118	$177,000	$0.046	$8.82	$161,000	($16,000)	-9%
Jul 18'	1,512	9.4	7.8	194	8.8	$0.118	$187,000	$0.053	$8.82	$173,000	($14,000)	-7%
Aug 18'	1,221	9.9	7.9	155	8.6	$0.118	$151,000	$0.053	$8.82	$161,000	$10,000	7%
Sep '18	1,318	9.4	7.9	166	9.2	$0.118	$163,000	$0.053	$8.82	$162,000	($1,000)	-1%
Total	6,135	9.6	7.7	796	8.7		$759,000			$829,000	$70,000	9%

PRINCESS DOCK ENERGY COST COMPARISON between INTERRUPTIBLE AND FIRM ENERGY - 2019												
Month	Energy	Peak	Ave	Docked	Hours per	Interruptible Rate Cost		Firm Rate Cost			Difference	
	MWh	MW	MW	Hours	Docking	$ / kWh	Cost [2]	$ / kWh [1]	$ / kW	Cost [2]	Cost	Percent
May - 2019	1,060	9.2	7.5	141	9.4	$0.117	$130,000	$0.084	$13.85	$227,000	$97,000	75%
Jun - 2019	1,715	9.8	7.8	220	9.6	$0.117	$210,000	$0.080	$8.82	$236,000	$26,000	12%
Jul - 2019	1,615	9.3	7.8	207	9.9	$0.117	$198,000	$0.079	$8.82	$221,000	$23,000	12%
Aug - 2019	1,761	9.0	7.8	225	9.8	$0.117	$216,000	$0.079	$8.82	$230,000	$14,000	6%
Sep - 2019	154	8.3	7.6	20	10.2	$0.117	$19,000	$0.079	$8.82	$90,000	$71,000	374%
Total	6,304	9.1	7.8	813	9.8		$773,000			$1,004,000	$231,000	30%

PRINCESS DOCK ENERGY COST COMPARISON between INTERRUPTIBLE AND FIRM ENERGY - AVERAGE 2018 and 2019												
Month	Energy	Peak	Ave	Docked	Hours per	Interruptible Rate Cost		Firm Rate Cost			Difference	
	MWh	MW	MW	Hours	Docking	$ / kWh	Cost [2]	$ / kWh [1]	$ / kW	Cost [2]	Cost	Percent
May	857	9.3	7.6	113	9.0	$0.117	$105,000	$0.067	$13.85	$195,000	$90,000	86%
June	1,572	9.8	7.5	208	9.0	$0.117	$193,000	$0.063	$8.82	$195,000	$2,000	1%
July	1,564	9.4	7.8	200	9.3	$0.117	$192,000	$0.066	$8.82	$195,000	$3,000	2%
August	1,491	9.5	7.9	190	9.2	$0.117	$183,000	$0.066	$8.82	$191,000	$8,000	4%
September	736	8.9	7.7	93	9.7	$0.117	$90,000	$0.066	$8.82	$133,000	$43,000	48%
Total	6,219	9.4	7.7	805	9.2		$763,000			$909,000	$146,000	19%

1. Includes energy, cost of power adjustment and regulatory cost charge. $0.124 $0.148
2. Includes monthly customer charge and sales tax

Appendix F - Cruise Ship Dock Electrification Study
Public Comments Matrix
Full Public Comment Doc Link: https://bit.ly/3zPNtHG

Commenter	Comment #	Packet Page #	Date Received	Substantive Comments	Study Team Responses	Study Reference
Kirby Day	1	1	11/2/2021	Princess Cruises is the interruptible power user at the Franklin dock, not the dock itself	Comment clarified in the study.	Pages 9,21,22,23,44
Kirby Day	2	2	11/2/2021	Explanation of when Princess Cruises was actually curtailed due to water constraints, vs other curtailments such as Greens Creek	Comment clarified in the study.	Page 21
Lisa EaganLagerquist	3	3	11/19/2021	Likes shore power, doesn't want Sweetheart Creek impacted, suggests Travel Juneau market the CBJ as being a green destination.	So noted	
Christine Woll	4	4	12/1/2021	The study regularly used the terms/ concepts “air quality” and “carbon footprint reduction” interchangeably, even though they really are two separate things. I believe the Juneau public is interested in two potential benefits of dock electrification: helping clean the air we breath in Juneau (improving local air quality) AND reducing our carbon footprint (addressing global climate change). You could easily group these two concepts under a header such as “Environmental benefits” but I think using the term “air quality” to get at these concepts more broadly sort of misses these important distinctions.	Comment clarified in the study.	Page 4
George Partlow & Linda McCargar	5	5	1/11/2022	We heard with great interest the announcement via KINY that Holland American line plans to buy electrical power for some of their vessels during the coming tourist season, and that the RCAA has approved the agreement. Anything that cleans up the downtown air and reduces greenhouse gas emissions is good news. However, we are concerned that the plan is for interruptible power. If CBJ is serious about meeting environmental goals, shoreside power for the tour ships should be a priority, rather than a “secondary” issue. Our understanding is that if power were available to ALL the cruise lines, 100% of the time instead of the projected 25%, Federal grants would be available to offset the cost of the necessary new infrastructure. This is an opportunity that should not be missed.	So noted	
Kathrin McCarthy	6	6	1/12/2022	Has experienced direct impacts from cruise ship emissions blowing directly into home's open windows. "Thus, the reason for my email is the importance of electrification of our docks. I am a proponent and wholeheartedly in favor of the electrification for many health reasons, mainly to improve our air quality in downtown. Diesel exhaust from cruise ships is carcinogenic and CBJ is responsible for preventing the continuation of air quality deterioration from cruise ship emissions. " Supports docks being firm power	So noted	
Wayne Coogan	7	7	1/14/2022	The Juneau Borough economy has undergone dramatic changes in the last four decades. During that time tour ship visitations have grown to become a crucial element of our economy. The draft study is necessarily voluminous due to the many relevant factors and considerations.... including variable capacities, infrastructure limitations, planned expansions, existing customer needs, etc, etc. However, the study seems ambivalent as to an affirmative solution to proceeding with development. I must stress, this project is a critical economic initiative. As such, as a community, we must embrace an over-arching agenda of doing whatever it takes to overcome limitations and make it become reality. Otherwise, I believe the future of our community will be jeopardized. This is not a luxury or optional item but rather a critical need. We cannot afford to think small on this one.	So noted	

Commenter	Comment #	Packet Page #	Date Received	Substantive Comments	Study Team Responses	Study Reference
Ed King	8	8	1/15/2022	1. Scope of work comments	1. The introductory components of the study were necessary to set a background to define the energy computations and system description. The power purchase and costs were only studied as information gained from AEL&P. With respect to the economic analysis, cost recovery is an important aspect of understanding potential impacts on ratepayers and the need for capital funding from sources other than rate payers. The study illustrates that capital cost recovery from rate payers is not a realistic expectation under any reasonable rate structure. As a first step in considering how the community might pay for dock electrification infrastructure, the cost recovery analysis is essential. Thanks to this analysis, we now know that due to high construction costs, funding mechanism other than (or in addition to) charges to cruise lines will be required.	
				2. Firm vs. Interruptible Contract Assumption	2. The economic analysis considers three electric power sales (to cruise ships) cases ranging from a conservative low case with year 1 sales of 4.6 GWH to a high case of 9.0 GWH (the JCOS estimate). Year 5 sales range to 4.6 GWH to 15.6 GWH. The analysis is not confined by assumptions about power availability but rather by the capability of ships to utilize shore power.	
				3. Supply Constraint Issue	3. An analysis of the economics associated with a firm rate structure is beyond the scope of this study. The process to identify a true firm power rate requires submitting a complete “Application of Service” to AEL&P. This application initiates a complex and time consuming "cost of service" rate study that at this point is premature.	
				4. Utilization	4. The electrical systems differ at other ports that are supported by a large grid. At these ports, the ships are moored for longer periods of time to disembark and board passengers, restock supplies, refuel, etc. As a result, their connect/disconnect time compared to the time of connection is much better. Their connect/disconnect times still rely on mooring time, time to deploy the connection equipment, coordinate connection with the utility operators, and again in reverse when departing.	
				5. Emissions Shifting	5. Point taken.	
				6. Funding	6. With respect to economic analysis, the scope of work required the contractor to "Coordinate with the electric utility to evaluate/estimate impacts on Juneau ratepayers, under various scenarios, of electrification to one or more cruise ship docks." The study team considered the rate implications of two broad scenarios, private ownership and public ownership. The scope of work did not include an analysis of financing options. The CBJ Assembly directed the City Manager to identify options for financing dock electrification. Additional analysis of cost impacts on the community and/or cruise lines can be conducted once those options have been identified. The study does not provide any capital funding recommendations other than to note that "Dock electrification could be funded by a mix for federal grant funds and local public debt financing." The study will be revised to change "...federal grant funding will be required" to "funding from sources other that ratepayers will be required."	Page 44
				7. Economic Benefits	7. The scope of the economic analysis was limited to the impact on ratepayers. It did not include an analysis of benefits and costs associated with electrifying CBJ cruise ship docks. A benefit cost analysis was conducted by Rainforest Data for purposes of federal BUILD grant application	
Martha Hopson	9	13	1/15/2022	Supports electrification but has questions about CBJ obligating power to cruise ships and what impacts would there be to residents.	Much of the premise of the study is to provide energy to the ships on an interruptible basis. This uses only the excess energy that is available yet retaining full support for the firm customers including residential and commercial sales.	

Commenter	Comment #	Packet Page #	Date Received	Substantive Comments	Study Team Responses	Study Reference
Jim Rehfeldt	10	14	1/16/2022	Comments about "General, Electrical Demand, Electrical Energy"	The references to the Juneau District Heating system will be clarified. Point taken regarding the impact of JDH and NCL loads to the system. The analysis of the loads and energy consumption for the Juneau Heating District and Norwegian Cruise Lines that should be coordinated by such customers with AEL&P. It all involves the timing of their implementation.	Page 18
Juneau Commission on Sustainability email	11	16	1/16/2022	2 pages of comments	1. JCOS participated in the debriefing on Feb 1st See comments addressed in Port Engineer Memo	
Juneau Commission on Sustainability memo - 6 pages	12	18	1/16/2022	I. Introduction	See comments addressed in Port Engineer Memo	
				IIA. Inadequate data and overly restrictive assumptions about electricity supplies.	This study intentionally analyzed the data for the presently available energy. This identifies the additional energy requirements such that policy and discussion can continue toward building new sources. The development of these sources involves AEL&P and the independent power producers. The study does identify the possible optimal energy sales considering the full time availability of such - this is illustrated with Graph No. 7.	
				IIB. Omission of CBJ energy policy and goals.	The study identifies the amount of energy estimated to be available from the present hydroelectric sources for cruise ship electrification and it projects future needs. To gain the additional energy required to meet future needs will require the community's discussion and direction.	
				IIC. Incomplete consideration of overall goals	The primary objective of using renewable energy is to improve air quality, reduce GHG. The improvement was so stated in the section regarding air quality. The scope of the study did not include analysis of tourism impacts, job creation, and downtown planning.	
				IID. Analysis reliant on legacy shore power system	AEL&P states that connection and disconnection time is approximately 3 hours total for each ship. This study used 2 hours total for each connection and disconnection, a reduction of one hour. As stated, the required time involves much more that just the apparatus to make the connection.	
				IIE. Incomplete economic analysis	The firm and interruptible rate differences are summarized in the study. The referenced analysis by Alaska Energy Engineering will be added to the Appendices. Supplementation to the Docks and Harbor fees for energy was not identified.	AEE Study added to the Appendix.
				III. JCOS Recommendation:	Analysis of options to supplement AEL&P's energy capacity must be completed by AEL&P and include coordination with the community.	
				Phase 1.	The study will be reviewed and strengthened as much as possible.	
				Phase 2.	A statement can be made regarding the predictability of electrical costs versus variable fuel costs, however, the emphasis is on reducing GHG. The impact of a firm rate structure involves additional energy sources, both fuel powered as well as renewable; and it involves necessary upgrades to the transmission system. These must be addressed by AEL&P and possibly independent consultants. The benefits of improved air quality are identified with Juneau's Climate Action Plan.	

Commenter	Comment #	Packet Page #	Date Received	Substantive Comments	Study Team Responses	Study Reference
David Burlingame memo - 7 pages	13	24	1/17/2022	Results if GHG reduction is a governmental requirement.	Comment addressed in the Electrical engineer's memo included in the Appendix	
				Identify requirements to provide full GHG reduction.	Comment addressed in the Electrical engineer's memo included in the Appendix	
				Connect/disconnect time	Comment addressed in the Electrical engineer's memo included in the Appendix	
				BESS technology	Comment addressed in the Electrical engineer's memo included in the Appendix	
				Firm vs. Interruptible.	Comment addressed in the Electrical engineer's memo included in the Appendix	
				Project Funding	Comment addressed in the Electrical engineer's memo included in the Appendix	
				"Near-firm" rates	Comment addressed in the Electrical engineer's memo included in the Appendix	
				Costs to meet the cruise ship energy requirements	Comment addressed in the Electrical engineer's memo included in the Appendix	
James Kee 6 pages	14	31	1/17/2022	CBJ request AEL&P develop proposed rates for "traditional firm" and "conditional firm" energy.	See comments addressed in Port Engineer Memo	
Bill Leighty	15	37	1/17/2022	Comments about Juneau energy usage and the hydrogen economy, has attachments. Also broader discussion about the size of Juneau's cruise industry	So noted	
AEL&P - 3 pages	16	118	1/17/2022	Connect/Disconnect time	So noted	
				Shore Power Design - Transformers	So noted	
				Connecting New Loads to the Electric System	So noted	
				Firm versus Interruptible Rates	So noted	
Renewable Juneau 19 pages	17	121	1/17/2022	Wonders why the plan doesn't add more generation capacity. Asks about adding Sweetheart Creek power and doesn't want to negatively effect Green's Creek Mine. Also wants to support Kensington Mine's power needs.	See comments addressed in Port Engineer Memo	
Scott Spickler	18	139	1/17/2022	Why does the study indicate only 25% power capacity until 2038? Why not bring more generation online?	See comments addressed in Port Engineer Memo	
				Expressed concern that Greens Creek could be forced to use diesel power.	So noted	
Duff Mitchell	19	121	1/17/2022	4 pages of comments	Comments are clarified in the study	Pages 18,19
Mary Alice McKeen	20	144	1/17/2022	4 Pages of comments	So noted	
John Gerrish	21	149	1/17/2022	4 Pages of comments (same letter as Mary Alice McKeen)	So noted	
Devon Kibby	22	154	1/17/2022	3 pages of comments	So noted	
John Gerrish	23	157	1/17/2022	Review comments on Renewable Juneau's comments and asks the Assembly to take them to heart	So noted	

Appendix G

Port of Juneau

City & Borough of Juneau • Docks & Harbors
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(907) 586-0292 Phone • (907) 586-0295 Fax

MEMORANDUM

DATE: **July 15, 2022**

TO: **Assembly et All**

FROM: **Erich Schaal, P.E. Port Engineer**

SUBJECT: **Juneau Cruise Ship Electrification Study – Public Comments**

The intent of this memorandum is to summarize and expand on our responses to the important public comments received concerning the Juneau Cruise Ship Electrification Study.

The Assembly has directed the study authors to include a record of all comments received, as well as responses addressed in study updates. Following this memo is a technical memo from Mr. Ben Haight with RESPEC, the lead author, and the comment matrix as requested.

22 separate comments were received for the draft study. They can generally be divided into four subcategories;

1. Comments voicing support or opposition to the project
2. Comments about the economic analytics portion of the study
3. Comments about the technical or environment portion of the study
4. Comments about the broader community impacts of the project and grant opportunities

Comments addressing support or opposition are noted in the comment appendix, but do not warrant edits to the study. Comments about the economic analytics were reviewed by Mr. Jim Calvin and some warranted edits in the study and those are noted in the comment matrix. Comments about the technical or environment portion of the study were reviewed by Mr. Ben Haight and those warranting response were included in edits to the study or included in his attached technical memo. Comments about the broader community impacts of the project and grant opportunities will be responded to by myself in this memo and in edits to the study.

In general, most comments were in support of the project. Many advocated for immediate implementation to see the benefits as soon as possible. Many comments felt the study was too conservative and didn't adequately expound the benefits. Our response to such criticism is that large public works projects such as this require sober, critical review, especially when there are several outcomes that could potentially increase Juneau's electrical rates and burden the most vulnerable segment of Juneau's residents. The study

identifies that the project would be successful with the current state and outlines future enhancements to the project that would increase its value to the community and reduce negative impacts.

Several comments use the term "conditional firm power". This is a hybrid between firm and interruptible service where CBJ, in this example, has more control over when it can demand power verses interruptible but doesn't force the AEL&P to operate its diesel generators to supplement hydro power generation. This new term is also used to circumvent the current interruptible customer order, thus effecting several large commercial entities in Juneau. At the writing of this memo, the RCA does not acknowledge "conditional firm power" as a valid type of utility agreement. This hybrid agreement may be formalized in the future, if the RCA process allows for it, but it cannot be a recommended part of this study due to its novelty at this time.

The Juneau Commission on Sustainability (JCOS) submitted comments about the use of firm verses interruptible power and the lack of forecasting new hydroelectric generation in the future. The study team has had extensive discussions and technical meetings with AEL&P and Juneau Hydropower about power agreement structures and current and future power generation projects. This study has provided the ground work to show that there is enough power to provide shore power to a significant number of vessels with the current generation capacity, as well as identify several new generation options and shares a path forward using an interruptible power agreement.

The Assembly has continually repeated that shore power is a top priority and provided $4.9M in match funding, in anticipation of several federal grants. This study will be used to develop an application for service with AEL&P which starts the official process to select the right power service type. There are additional studies AEL&P will conduct during this process of their service capabilities and infrastructure that will be used in the final calculus. The proposals identified in this study are the precursor to that work.

The Juneau Commission on Sustainability also submitted comments pertaining to several federal grants. Since the review of the draft, several rounds of grants have taken place and CBJ has partnered with JCOS in the writing and review of all of them. They've aided greatly in improving these grant submissions and we appreciate their assistance. The specific comments included in this packet have been thoroughly addressed and we're hopeful our latest grant submissions will be selected and funding provided.

Renewable Juneau provided comments under four main points;

1. More than GHG Emissions – Additional benefits not ideally expounded on
2. Making Connections – Observed connection times are too slow
3. Power Availability Concerns – Firm over interruptible power
4. The Economic Section is Misdirected and Incomplete – Too conservative in ship use and available power

These comments have been shared by other commenters as well and the study has been edited where necessary, but generally our responses are as follows.

1. GHG emissions are important but not the only benefit. They are however among the more quantifiable benefits where impacts can be measured in tons, dollars and other units. Other community benefits have a place in this study.
2. Connection times have been closely identified and validated, as recently as July 5th, 2022 with an onsite tour attended by CBJ assembly members, JCOS members, and industry experts as a ship was

connected to the Franklin Dock. These times are based on safe working procedures and are not subject to change. Notably, the ship staff have a vested interest due to fuel prices and California CARB regulations to optimize the process to connect as soon as possible and stay connected as long as possible before departure. The tour was enlightening and reinforces the professionalism of the ship and shore side technicians who connect and disconnect ships daily.

3. The future power agreement will be formalized in a public and transparent process that will follow RCA regulations and be led by highly qualified subject matter experts.
4. As stated above, large public works projects such as this require sober, critical review, especially when there are several outcomes that could potentially increase Juneau's electrical rates and burden the most vulnerable segment of Juneau's residents. The study identifies that the project would be successful with the current state and outlines future enhancements to the project that would increase its value to the community and reduce negative impacts.

In closing, the CBJ Assembly and Docks & Harbors remain firmly committed to providing shore power infrastructure to improve the health of our community, reduce emissions, and support the expansion of renewable energy use in Juneau.

#

Appendix H

TECHNICAL MEMORANDUM

To: Carl Uchytil, PE
Cc: Erich Schaal, PE

From: Ben Haight, PE

Date: August 2, 2022

Subject: Juneau Cruise Ship Electrification Study – Public Comments

The intent of this memorandum is to summarize and expand on our responses to the prominent public comments to our Juneau Cruise Ship Electrification Report.

TRADITIONAL FIRM, INTERRUPTIBLE, & CONDITIONAL FIRM RATES

A constraint of our study is to carefully control costs to the utility such that there is little or no effect to the rate payers. We analyzed interruptible and firm power rates, but not a conditional rate.

Interruptible Rate: As noted in our study, with use of an interruptible rate, energy is used only when it is available as excess energy from the hydroelectric plants. We estimated that with the ship mooring schedules as published for 2022, the utility can meet 25 percent of the cruise ship needs. This amount of energy is based on precipitation, the type of precipitation, and the time of year that it is available to the hydroelectric plants. The amount of precipitation and its availability for generation by the hydroelectric plants was estimated based on historic records. An interruptible rate does not require standby generation by AEL&P. Interruptible sales are for excess energy as noted above; the proceeds from these sales help offset costs to the rate payers, keeping them where they are today. The additional sales could possibly reduce the rates slightly.

Traditional Firm Rate: A traditional firm rate is provided for most of the community loads all the time. It is provided regardless of the hydroelectric plants' capacities. AEL&P has standby fuel fired generators in their system to ensure that electricity is available most if not all the time. To connect the cruise ships to AEL&P in a traditional firm rate fashion at this time will require additional support from AEL&P's standby fuel fired generators. AEL&P uses a strategy of supplementing their generation requirements with diesel fired plants when the system loads exceed their hydroelectric capacity. They continue this strategy in a stairstep manner until they determine an economical return of investment for construction of additional hydroelectric plants (Lake Dorothy Project presentation to the National Hydropower Association, March 2010, https://www.hydro.org/wp-content/uploads/2017/08/AK-Electric-Light-and-Power-Lake-Dorthy-Project.pdf). Considering that the cruise ship loads occur during the summer when the system loads are reduced, it appears that this can be provided with the existing generators and transmission lines. Due to the cost to supplement AEL&P's generation system, regardless of whether from

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their sources, or a third-party source, the additional costs are likely to be passed onto the rate payers, and there will be a lost benefit of savings for energy typically sold as an interruptible source.

Conditional Firm Rate: This is a nonexistent rate with little definition. It is possible that such a rate can be developed specifically for the cruise ships. I anticipate that with this rate, AEL&P will have to always provide energy to the ships, but during outages, the ships will have to use their on-board generators. For this case, it can be assumed that the transmission lines will be upgraded or augmented to have full capacity even when specific lines are shut down for maintenance during the summer. This type of rate will require additional generation with either the construction of more hydroelectric plants and/or the operation of fuel-fired generation. Based on past studies by AEL&P, their strategy is to allow the system load growth to exceed, or nearly exceed their hydroelectric plant capacity before bringing a new hydroelectric plant online. This requires their use of fuel-fired generation to supplement their needs. This type of rate will require AEL&P to supplement their generation system with costs likely to be like those for traditional firm power. The impact will also be similar for the rate payers.

COST OF FULL DOCK UTILIZATION

To provide firm energy, traditional or conditional, will require construction of additional hydroelectric plant(s), and perhaps part time use of fuel-fired generation as previously stated. The costs are not fully borne out in our study but will certainly include the construction of new hydroelectric plants and upgrading or supplementing the transmission lines from the Thane Substation into town.

We did analyze and mention that the cost for firm energy while assuming no costs for supplemental construction. We are including an analysis performed by AEE in the appendices addressing the cost of firm energy without the supplement cost of system upgrades or the losses of savings gained from interruptible energy sales.

Typically, the cost for new construction will be borne by all the rate payers, an increase in all the rates. If it is considered that the cruise ships might bear the cost of this construction, it is probably more feasible for them to generate their own electricity economically. Note that this condition requires full payment of the costs using five- or six-month seasons. It seems obvious that the rate payers will see an increase.

AEL&P has options for additional hydroelectric plant construction as noted in our study. One is to construct the next phase of Lake Dorothy and the second is to construct a run-of-the-river plant at Sheep Creek. They can also purchase energy from Juneau Hydro when it becomes connected to their system. AEL&P did not provide costs of construction and they have not completed a rate study based on connection of a new hydroelectric plant. Determination of costs and performing a rate study are within AEL&P's purview. CBJ can and should work with AEL&P to define options and costs to the rate payers.

SHIP CONNECT/DISCONNECT TIME

The amount of time to connect and disconnect a ship has typically been 3 hours according to AEL&P. They remain convinced it will be such even with a new and updated deployment system. While the actual deployment equipment connection and disconnection time is 15 to 20 minutes, there are numerous other conditions that weigh into the required time to completely transfer the load between the ship and AEL&P. These are enumerated in the report. In our analysis, we did reduce the time to two hours based on new technology and with the addition of LTC transformers it is possible that the time can be reduced further, but we must remain conservative in our analysis.

BATTERY ENERGY STORAGE SYSTEM (BESS) TECHNOLOGY

BESS are now developed for use in utility systems. Typically, they are coupled with renewable energy plants like solar and wind to offset the cyclical nature of these systems. Kodiak Electric Association installed one to stabilize the energy inserted from their wind farm into their grid. BESS have also been used to stabilize grid voltages when large plants rapidly cycle their loads on the system. A BESS was installed in Metlakatla many years ago to stabilize their grid voltage when their lumber mill log chipper operated causing rapid and excessive load changes. These units operate or operated year around.

A BESS was suggested in the comments for application at the cruise ship docks. For the CBJ docks, this would probably require a unit for each dock with capacities of 10 to 12 MW and be within the substation dedicated to the docks. This will require additional space at the substation.

The purpose for cruise ships is different from the applications in Kodiak and Metlakatla. The purpose and effect would be to reduce the time required to synchronize and transfer the load to and from the ship. I concur with the statement by one of the commenters that the AEL&P system is a "soft" system as compared to the systems commonly called "hard" systems supporting the ports in the lower states. The effect is that the time required to synchronize and ramp the loads from the ship to the utility and back is longer for a "soft" system versus a "hard" system. However, the time difference is in the realm of a minute to less than a few minutes. It is anticipated that the application of LTC transformers will reduce the time slightly. I remain convinced that the total connection/disconnection time will remain between 1.5 and 2 hours total per ship visit.

I anticipate that a configuration at the substation will be a direct feed from one of the 69 KV lines into each of the BESS units. The BESS units will subsequently feed the corresponding LTC based transformers (the need for the LTC function still needs to be investigated for this scheme). It appears necessary to have the transformers on the load side of the configuration as they also switch between 6.6 KV and 11.1 KV in accordance with the ship's requirements.

An additional question to investigate is the ownership and responsibility for the BESS and subsequently the LTC transformer. Considering that the purpose of these units is specifically for the ships, do the become CBJ's responsibility for ownership, operation, and maintenance?

The cost to operate and maintain a BESS would surely be incorporated into the rate borne by the ships. Notably these costs occur over a 12-month period while the ships will utilize it only 5 to 6 months of the year.

It was also noted by the commenter that a BESS could be provided for the entire AEL&P grid. Such a unit would be quite large and expensive. And it would not directly address the requirements to synchronize and transfer the loads to and from the ships. I do not recommend this direction.

MANDATED SHORE POWER CONNECTIONS

Mandated cruise ship connection to shore power is not considered with this study. This can and should be addressed by CBJ. Such a direction will impact energy costs borne by the cruise ships and the rate payers. These costs should be determined with collaboration between CBJ and AEL&P.

The Risk: As part of these considerations, I'm sure that CBJ will want to understand the impact of mandating shore power connections to tourism in Juneau.

- Higher costs to the ships could reduce the number of port visits, thus reducing income to the community.
- There is no guarantee that ships will visit Juneau in the future. We have already experienced such with the Covid pandemic the past two seasons.

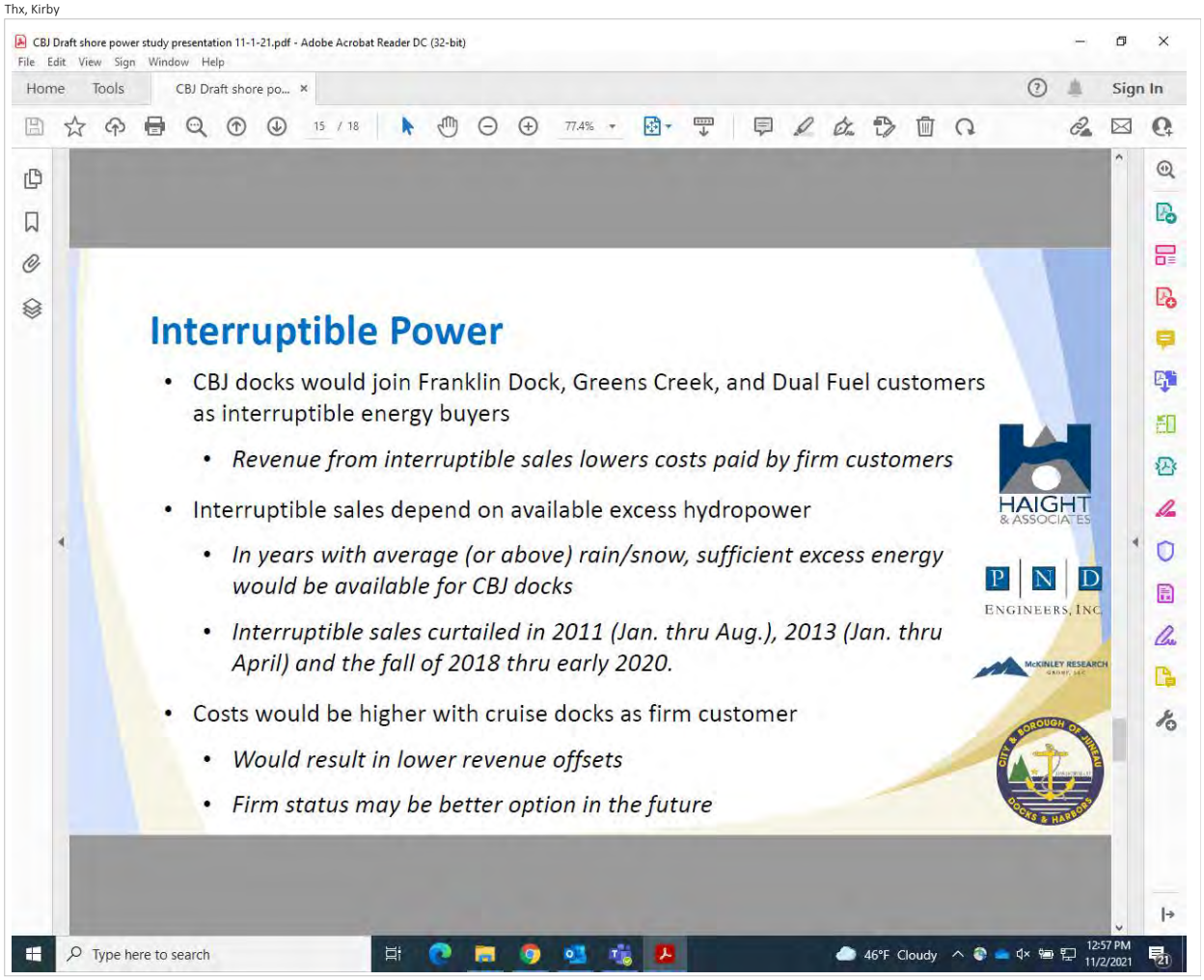
- Who pays the cost of additional hydroelectric plants if no ships or fewer ships visit Juneau? Will it go to the rate payers or will CBJ pick up the tab, which will probably affect the community with higher taxes?

Appendix I
Public Comments

From: Day, Kirby (HAP)
To: Erich Schaal
Subject: shore power note
Date: Tuesday, November 2, 2021 1:00:51 PM
Attachments: image001.png

EXTERNAL E-MAIL: BE CAUTIOUS WHEN OPENING FILES OR FOLLOWING LINKS

Hi – just thought I would share with you – not really necessary to change your study doc or notes, but realize that the interruptible power buyer/customer is Princess Cruises and not the Franklin Dock. Princess has the agreement with AELP and the RCA. Minor point but just in case it confuses someone.
Not one else can hook up or buy power at Franklin Dock at this point except Princess since the agreement is with the cruise line specific.
Thx, Kirby



S. Kirby Day, III PFSO Franklin Dock, Juneau Alaska
Community and Government Relations – Alaska
Holland America Group - Princess Cruises, Holland America Line & Seabourn
704 South Franklin Street | Juneau, AK 99801
+1-907-364-7250 office | +1-907-723-2491 mobile
kday@HAgroup.com

From: Day, Kirby (HAP) <kday@hagroup.com>
Sent: Tuesday, November 2, 2021 1:08 PM
To: Erich Schaal <Erich.Schaal@juneau.org>
Subject: FW: shore power note

Also this statement makes it sound like shore power was not available in 2019. That is not correct. What this says is that interruptible sales were curtailed – that could have been to Greens Creek and not to the ships – both in 2018 and 2019. 2020 there was no one to buy shore power -- no ships. Also, 2013 Jan-April was Greens Creek – again, no ships. Same for 2011 – most of that I believe was Greens Creek.

We were only shut off in September of 2019 for any significant period of time.

You might want to clarify this as it could paint an incorrect picture to some.

Interruptible sales curtailed in 2011 (Jan. thru Aug.), 2013 (Jan. thru April) and the fall of 2018 thru early 2020.

S. Kirby Day, III PFSO Franklin Dock, Juneau Alaska
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kday@HAgroup.com

From: Lisa EaganLagerquist
To: Erich Schaal
Subject: Comments on Juneau Cruise Ship Dock electrification
Date: Friday, November 19, 2021 3:24:26 PM

I like the idea of the Shore Tie Power, but as the report says without grants it doesn't seem economically feasible. If we do goto Shore Tie Power, please do not do anything that would impact the salmon fishing at Sweetheart Creek. Also, if we become a port with Shore Tie Power, Travel Juneau should really market it along with the other green activities that are occurring in Juneau.

(Sorry I didn't have time to read the whole report, but I did skim it. It was very informative.

Thanks.

Lisa EaganLagerquist
LCeagan@hotmail.com

From: Christine Woll
To: Erich Schaal
Subject: Comment on dock electrification study
Date: Wednesday, December 1, 2021 8:02:13 AM

Hi Erich -

I hope you are well. I'll save any more high-level comments on the study for when the report comes back to the Assembly, but I had one comment I thought I would make in case it is helpful:

The report regularly used the terms/ concepts "air quality" and "carbon footprint reduction" interchangeably, even though they really are two separate things. I believe the Juneau public is interested in two potential benefits of dock electrification: helping clean the air we breath in Juneau (improving local air quality) AND reducing our carbon footprint (addressing global climate change). You could easily group these two concepts under a header such as "Environmental benefits" but I think using the term "air quality" to get at these concepts more broadly sort of misses these important distinctions.

Christine

From: George Partlow
To: Erich Schaal
Subject: A comment on the draft Cruise Ship Dock Electrification Study
Date: Tuesday, January 11, 2022 12:38:41 PM

EXTERNAL E-MAIL: BE CAUTIOUS WHEN OPENING FILES OR FOLLOWING LINKS

Port Engineer Erich Schaal

Dear Mr. Schall,
We heard with great interest the announcement via KINY that Holland American line plans to buy electrical power for some of their vessels during the coming tourist season, and that the RCAA has approved the agreement. Anything that cleans up the downtown air and reduces greenhouse gas emissions is good news. However, we are concerned that the plan is for interruptible power. If CBJ is serious about meeting environmental goals, shoreside power for the tour ships should be a priority, rather than a "secondary" issue. Our understanding is that if power were available to ALL the cruise lines, 100% of the time instead of the projected 25%, Federal grants would be available to offset the cost of the necessary new infrastructure. This is an opportunity that should not be missed.
George Partlow
Linda McCargar
600 St Ann's Avenue Unit 3
Douglas AK 99824
cell phone 928-581-8146

From: Kathrin McCarthy
To: Erich Schaal
Subject: Dock electrification
Date: Wednesday, January 12, 2022 2:13:36 PM

EXTERNAL E-MAIL: BE CAUTIOUS WHEN OPENING FILES OR FOLLOWING LINKS

Dear Mr. Schaal,
I am a long time resident of Juneau. My address is 414 3rd St. Juneau, 99801. I am submitting these comments directly to you. They are my response to the CBJ request for responses to the electrification of our Juneau docks.

I have experienced the cruise ship industry in Juneau from its inception with one ship to the present situation, up to 5-6 mega-ships every three or four days in our small community The area of downtown where my husband and I live is known as the uptown residential area. It is heavily impacted by cruise ships in a number of ways. Poor Air quality is a major impact from cruise ships. When ships are tied up at the docks south of our home we have cruise ship exhaust blowing directly into any open window or door in our house. Since the winds prevail mainly for the southeast and southwest diesel exhaust is prevalent. This is true for our home and our neighbors in this area of downtown.

Thus, the reason for my email is the importance of electrification of our docks. I am a proponent and wholeheartedly in favor of the electfriciation for many health reasons, mainly to improve our air quality in downtown. Diesel exhaust from cruise ships is carcinogenic and CBJ is responsible for preventing the continuation of air quality deterioration from cruise ship emissions.

From the CBJ report on dock electrification, a main point is that electrification for docks where cruise ships will tie up will be on an interruptible basis rather than an uninterruptible basis . The electrification of our docks must be on a continuing, available, firm basis as any other essential service is in our community. Our water, garbage services are not on an interruptible basis. I cannot understand the reason for partial service or the 25% availability for electrification at the docks, which does not sound like a wise business decision and certainly one that could make the CBJ and others eligible for Federal grants and other monies that may be had to support our city's lowering of our carbon footprint.
Thank you for considering my email. Sincerely yours,
Kathrin McCarthy, 414 3rd St. Juneau, 99801, 907-635-0051

Comment Sheet

Juneau Cruise Ship Dock Electrification Study

This study revalidates the efforts of the 2016 Shore Tie Power Feasibility Study. Develops conceptual plans, options and cost estimates to add electrical service to the two CBJ owned dock facilities. Consults with the local electrical utility company to evaluate and estimate power availability and what impact additional cruise ship berth electrical connections would have to the Juneau rate payers. Evaluates opportunities to reduce the greenhouse gas emissions of cruise ships moored in Juneau Harbor. Utilizing existing mooring configurations, consults with the cruise ship industry to determine shore-side standardization connections to provide the industry with the most versatile electrical connection. **We encourage you contact us today.**

The draft study can be found here: https://tinyurl.com/27mc8dtk

Please provide your comments on this sheet or send a separate letter or email to the addresses below.

We are requesting your comments by January 17th, 2022. Thank you!

Comments:

The Juneau Borough economy has undergone dramatic changes in the last four decades. During that time tour ship visitations have grown to become a crucial element of our economy. The draft report is necessarily voluminous due to the many relevant factors and considerations.... including variable capacities, infrastructure limitations, planned expansions, existing customer needs, etc, etc. However, the report seems ambivalent as to an affirmative solution to proceeding with development. I must stress, this project is a critical economic initiative. As such, as a community, we must embrace an over-arching agenda of doing whatever it takes to overcome limitations and make it become reality. Otherwise, I believe the future of our community will be jeopardized. This is not a luxury or optional item but rather a critical need. We cannot afford to think small on this one.

Name: Wayne Coogan

Address: 3000 Fritz Cove

Phone: 907-723-7634

Email: wdc@cooganalaska.com

Visit the CBJ Docks & Harbors study website for more information and updates:
https://juneau.org/harbors/project-archive/entry/69827

Email comments to: Erich.schaal@juneau.org
Mail comments to: CBJ Docks & Harbors
155 S. Seward St.
Juneau, AK 99801

www.kingeconomicsgroup.com • Phone: (907) 699-6788 • ed.king@kingecon.com

January 15, 2022

Juneau Docks and Harbors
76 Egan Drive
Juneau, AK 99801

RE: Cruise Ship Dock Electrification Study

Docks and Harbors Members:

In response to a request for public comments to the Draft Cruise Ship Dock Electrification Study dated November 2021, I offer the following remarks for your consideration:

1. Scope of Work

The objective statement of the draft report (page 6) is consistent with the request for proposal in that the study is meant to determine the feasibility of providing electrical connections for cruise ships while at the port. The effort is a continuation of previous efforts to reduce carbon emissions in downtown Juneau and expand the community's sustainability efforts in general. Unfortunately, there appears to be some scope creep within the draft document that should be removed. Including these portions of the report unfairly hinders the project's viability and undermines efforts to secure funding from outside sources. Specifically, much of the description of the current electrical system (pages 11 – 19) is out of place in this report. While it is essential to understand the system's limitations, this report should not focus on the business efforts of AEL&P to meet consumer needs. Close coordination with a company that controls the market is cause for concern. Instead, this report should focus on its scope —To determine the feasibility of electrifying the docks. Power purchase and sales negotiations between the city and the utility are outside the scope of this report, as are system management decisions by the utility provider. Additionally, much of the economic analysis (pages 31 – 39) examines the cost recovery feasibility of the project. As a public works project to reduce emissions, cost recovery is not an applicable goal within the scope of this report and should be removed.

2. Firm vs. Interruptible Contract Assumption

Much of the draft report is written assuming that the docks would be interruptible customers. The authors calculated utilization and economic considerations under this assumption, putting the docks last in line for access to surplus power. These outputs are then used to assert that the benefits provided by the project are much smaller than expected. Servicing the publicly owned facilities on interruptible power could result in the public facilities receiving an inferior level of service compared to commercial and residential customers.

Given that the Juneau public and the Regulatory Commission of Alaska were told that Lake Dorothy was built for the people, it stands to reason that a project demanded by the people should have a higher call

on the infrastructure. Considering that Hecla Greens Creek purchases over 65,000 Megawatts a year under an interruptible contract, there is plenty of capacity in the system to provide power for dock electrification through curtailment to Hecla when required.

Regardless, the power purchase agreement between the docks and the utility has not yet been negotiated. Therefore, relying on the assumption that such an agreement would yield an interruptible contract may generate false conclusions. For example, the analysis regarding system constraints is only an issue of concern to the utility provider (as the customer is assured access to power needs). In the context of feasibility under a firm contract, pages 11-19 of the draft study become moot.

Further, the comparative power cost analysis found in the economic analysis section of the draft study concludes that shore power under a firm contract may not be cheaper for cruise lines than burning diesel fuel at port. The last few years have been dry, resulting in significant COPA surcharges. That is not always the case. As such, it may be worth running the numbers again under a high water assumption and diesel costs more in line with current prices to see if the conclusion holds.

Regardless, the finding is immaterial. The city has the lawmaking authority to prohibit running diesel engines in port once an alternative is available. Pursuing that route is a socio-political decision, not an economic market one. Beyond such a directive approach, cruise ship operators may be willing to pay a premium for the shore power as part of their sustainability goals, branding efforts, and visitor industry good faith relations with the Juneau public and downtown neighborhood associations. Whether the cruise ships would use the shore power is best raised with the cruise ship industry directly to their corporate officials rather than through this report.

In any case, the draft report should not make the strong assumption that interruptible service is the foregone conclusion and sole solution. It should be revised to fully understand the feasibility and limitations of options before policymakers begin discussions with other parties.

3. Supply Constraint Issue

The draft report discusses the limitations of the current supply system. It then analyzes the addition of new demand while holding the supply static. Consequently, the draft report seems to conclude that adding demand may be detrimental as there may be inadequate supply.

This is an overarching concerning issue within the draft study. It seems to suggest that Juneau is out of power. Communicating such an idea is detrimental to economic growth as anyone considering an investment in our community may be left with the feeling that there are energy supply constraints that would hinder their operation. Unfortunately, a suggestion that we are out of power sends a harmful message to potential investors, developers, financiers, federal, state, or tribal entities interested in expanding operations in Juneau. An alternative takeaway from the draft analysis may be that additional supply is necessary to meet the community's growing power needs. As an aside, it is now public knowledge that AEL&P and Holland America have signed an agreement for power sales at the new private dock. This market action contradicts the draft report's conclusions and may suggest the findings should be revisited.

A general issue with the draft is the strong assertion that ratepayers may not experience rate increases is improper for the authors to make. If ratepayers are willing to pay additional costs or assume the risks, the utility provider must manage the system to meet the demand as their regulatory obligation. The

report highlights some potential cost increases and associated risks for the public to consider. It should stop short of injecting the authors' opinions on how the public should proceed. The city and the utility must work out the details.

The docks are a public asset that serves a public purpose paid for by public funds. Providing reliable power to a public asset is no different from supplying reliable firm power to our community's water treatment plant, water pumping station, library, or city offices. The report fails to consider the public benefits (health, safety, GHG reduction, Juneau visitor marketing, Juneau Renewable Energy Strategy) of this project that align with other public facilities.

In summary, the authors should edit the draft report to include new power supply to meet the increased demand rather than assuming that the energy supply picture is static. Consequently, the discussion of system constraints should either provide an unbiased comparison of alternative scenarios, or that section of the report should be removed.

4. Utilization

Setting aside the previous points, the draft report raises an important issue regarding the utilization of shoreside power. Namely, the report highlights that logistical problems will take time to smooth out. More importantly, the report identifies a challenge at the Cruise Terminal (CT) berth — The connection port for most ships would be on the wrong side of the boat. Consequently, utilization at the CT berth is expected to be much lower than the Alaska Steamship (AS) berth for several years.

Because the construction cost is relatively similar between the two docks, the public benefits per dollar of cost are much lower at CT than AS. Given this finding, decision-makers need to understand the marginal cost-benefit of each dock separately. Despite the economies of scale from concurrent construction, the actual net value of the project to the public may be higher with a consecutive build schedule that ultimately offers higher utilization rates. The report should investigate this alternative. In fact, it may be possible that a cost-benefit analysis of electrifying the CT berth yields a negative value on its own. That is something the policymakers should know, and the report should address. In any case, the lower value generated by the CT dock is blending down the total project benefits reported in the draft and very likely impaired the RAISE grant application. The study should be revised to rectify this issue.

On a related note, the draft study lacks a detailed discussion of how other ports implement port connection and disconnection times for their ports compared to the assumed one-hour connect and disconnect times estimated for Juneau. A slower connect/disconnect time reduces the time on power and lowers the total displaced fuel calculations. Although Juneau is a stranded grid system, integrating computerized grid controls and Battery Energy Storage Systems may help optimize dock electrification investment and utilization. The study should revisit what it would take to have Juneau meet and or exceed connection and disconnections on a world-class standard, increasing utilization rates and the likelihood of receiving federal funds.

5. Emissions Shifting

On page 4 of the report, under the "Air Quality" heading, the draft asserts a basic premise that shifting emissions to another region in Juneau is not a net benefit. This premise appears to exist as an undertone in other sections of the report as well. From a social impact perspective, this assertion is fundamentally

flawed. Reducing emissions at the cruise ship terminal generates positive social impacts and public health benefits regardless of any offsetting emission increases out of town. While such benefits wash out from an environmental sustainability perspective, the report should recognize the direct benefits on the community (cleaner air downtown, decreased health issues, impacts on downtown businesses, workers and visitors) that shifting emissions would produce. The study should strip the negative language associated with shifting emissions out of town and capture the positive consequences.

6. Funding

A portion of the "economic analysis" section considers debt financing to fund the project. It concludes that the project requires federal grant funding to be feasible. The presentation to the Assembly went so far as to recommend against issuing any debt for the project. This conclusion is faulty, and the recommendation is improper.

As a public works project, it is unlikely that the city would attempt to issue revenue bonds for this project. The project's objective is to reduce emissions and create public benefit in the downtown area. This infrastructure project would provide public benefits rather than revenues — Like roads, bridges, and schools. As such, cost recovery is a false premise. If the population supports the project and is willing to pay the associated costs, it is perfectly proper to authorize such capital spending at the discretion of elected officials and the public at large.

Further, the city has a direct funding source to support the project without burdening taxpayers. That source is the fee-sharing payments provided by the State under AS 43.52.230, which states that "A city or borough that receives a payment under this subsection shall use the funds for port facilities, harbor infrastructure, and other services provide to the commercial passenger vessels and the passengers on board those vessels." The most recent revenue-sharing report from the Department of Revenue shows that Juneau receives $4 - $6 million per year under this revenue-sharing program. It may be possible to dedicate some, or all, of that revenue to repay bonds issued to facilitate the project. Again, at the discretion of elected officials and the public.

The city should discuss the structure, term, and type of financing options available with a qualified municipal advisor. The report should not provide such advice, as it may violate federal regulations imposed under the Dodd-Frank Act and implemented by the Municipal Securities Rulemaking Board.

7. Economic Benefits

The project's objective is clearly to garner the environmental, social, and health benefits as a public good. Unfortunately, those metrics are missing from the report. Additionally, the job creation and economic activity that would be generated are missing altogether. The study should help policymakers fully understand the project's direct, indirect, and induced economic impacts.

The report should generally be stripped of the cost recovery analysis as it is inapplicable for a public works project being built presumably for the public interests. In its place, the study should calculate and communicate the missing community value metrics as previously identified.

Concluding remarks

Overall, the draft report does an adequate job of demonstrating the feasibility of the dock electrification project. The engineering and design details are beyond my expertise and are not impugned by these comments. However, portions of the draft study detrimentally go beyond the scope of the document.

The Assembly should note that potential investors and grant reviewers will access a published feasibility study such as the draft under review. The negative conclusions in the draft study that stem from superfluous and tangential points will hinder the project from advancing and will almost certainly impede or preempt grant funding opportunities. Additionally, the authors seem to make strong assumptions that likely drive faulty findings. The report should provide unbiased, independent information about the feasibility of the project and all available options rather than making any assertions based on the opinions of the authors or other interested parties. As is, the study will materially and negatively impact Juneau's future dock electrification efforts that the public clearly supports.

Finally, the project's omitted benefits result in a much weaker conclusion than may genuinely exist. The tone of the conclusions appears to provide reasons not to progress, rather than the means and avenues to resolve the identified issues. It is unlikely that such an outcome was the intent of commissioning this study. Therefore, I believe this report requires significant reworking before being accepted by the Assembly and published.

Respectfully,

Ed King

Ed King, Principal Economist
King Economics Group

Ed King is a Juneau-based economist with an advanced degree in applied resource economics, professional strategic decision and risk management training, and is a registered municipal advisor with the SEC and MSRB, holding series 50 and 54 credentials. His experience in public finance includes serving as the State of Alaska's Chief Economist, Economic Advisor to the Governor, Economic Advisor to the Legislature, and a Special Advisor to the Commissioner of Natural Resources. He has also taught dozens of university courses in economics and was a subject matter expert in economics for McGraw-Hill Publishing and Robinhood Investments.

Disclosure: While the opinions expressed in this document reflect the author's professional opinion, he was compensated by Juneau Hydropower for his time to research this issue and draft these comments.

From: martha hopson
To: Erich Schaal
Subject: Juneau Cruise Ship Dock Electrification Study
Date: Saturday, January 15, 2022 7:31:34 PM

EXTERNAL E-MAIL: BE CAUTIOUS WHEN OPENING FILES OR FOLLOWING LINKS

_____

Hello,

The electrification of the docks seems reasonable but how much electricity are we obligating ourselves to provide the cruise ships?

At what rate will the cruise ships be charged for the electricity compared to:
-residential including sales tax per kWh
-commercial business including sales tax per kWh?

Will the city be able to walk back the amount of electricity we provide based on any increase the local residents might need?

Will this increase how much we pay for electricity?

Thank you,
Martha Hopson

Sent from my iPad

AlaskaEnergy ENGINEERING LLC
25200 Amalga Harbor Phone: 907-789-1226
Juneau, Alaska 99801 jim@alaskaenergy.us

Public Comment
January 15, 2022

To: **Juneau Docks and Harbors**

Subject: **Public Comments**

Project: **Cruise Ship Dock Electrification Study**

Introduction

Alaska Energy Engineering (AEE) is the principal engineer for the development of the Juneau District Heating (JDH) system that proposes to develop in phases a district heating system serving over 80 buildings covering an area from downtown to Juneau Douglas High School. The system will generate hydronic heating water with a seawater heat pump and distribute the heat in insulated pipelines. The JDH system will significantly reduce Juneau's carbon-footprint by removing fuel oil from downtown Juneau's heating systems and assisting the community in creating a healthier and more sustainable downtown with zero emission heating. AEE has provided technical consulting and engineering services since the initial stages including heating load and energy analysis and conceptual design. The status of the Juneau District Heating system has advanced past the feasibility stage and a decision has made to develop the project in coordination with other infrastructure developments in the surrounding properties.

This memo provides comments on the Dock Electrification Study that are relevant to the JDH project.

Comments

General

Pages 2 and 17 of the report mentions the "Willoughby Heating District". I believe this is an inaccurate reference to the proposed Juneau District Heating system. JDH has never used this title, and supports and uses the term Aak'w Village District to describe the area where its property is located.

The JDH system will cover a much larger area of downtown Juneau than just the Aak'w Village District. Further, unlike the description portrayed in the draft report, the JDH service area will extend to the entire downtown of Juneau in strategic phases and will provide significant environmental and health benefits with sustainable heating that is supported by both the Juneau Climate Action and Implementation Plan and the Juneau Renewable Energy Strategy.

JDH has made significant investments in its Aak'w Village District subport property, property improvements to bring the required electrical service to the property as well as significant investments for the community in engineering and planning to develop the district heating system. The study must recognize JDH as a future heat and hot water utility that will be connected to the AEL&P system. JDH has provided AEL&P a service request for firm power and has provided load characteristics as required for its service request. AEL&P has a regulatory obligation to serve JDH which is not fully described in the report.

Electrical Demand

The JDH facilities will be located along the waterfront between the CBJ docks and the Norwegian Cruise Lines dock. The district heating plant will be supplied power from the existing electrical distribution infrastructure as agreed to by AEL&P. The study does not evaluate this proposed multi-megawatt load, its significant firm load impact on the electrical distribution system and how its load profile will integrate with the Norwegian Cruise Lines load or the future CBJ Docks load. Additionally, the significant and materially impactful addition of firm loads from JDH and or Norwegian Cruise Line facilities would further lessen any available interruptible power that is available for CBJ dock electrification and for existing interruptible power customers. The reports shortcoming in fully analyzing JDH and potentially Norwegian firm power loads materially impacts the assumptions and findings of the report as incomplete and inconclusive.

Electrical Energy

The main loads of the JDH system are the seawater heat pump, backup heating equipment, and pumps. As a utility, JDH will have an obligation to serve its customers which will require energy from Juneau's electrical system. The study should evaluate the JDH energy requirements.

Disclosure

Alaska Energy Engineering was a member of the CBJ Docks Electrification Study team. Our involvement was limited to an early study that was included in the report on Page 39. We were not offered a larger role and had no further involvement in the study or drafting the report. AEE requested to not be included as a member of the study team since much of the work occurred without our involvement. The study team did not honor this request.

As is often the case with Juneau consultants, AEE serves the interests of multiple local clients. These comments are provided in the interest of JDH (who paid us to review the study and provide comments), are not derived from knowledge obtained while working with the study team and are not in conflict with the minor role AEE was afforded on the study team.

by: 

Jim Rehfeldt, P.E.

From:	Gretchen Keiser
To:	Erich Schaal
Cc:	Carl Uchytil; Don Etheridge; Rorie Watt; Beth Weldon; Maria Gladziszewski; Wade Bryson; Michelle Hale; Carole Triem; Christine Woll; Gregory Smith; Alicia Hughes-Skandijs; Waahlaal Giidaak; Beth McKibben; Beth McEwen
Subject:	JCOS Comments on Dock Electrification Study and RAISE Grant
Date:	Sunday, January 16, 2022 10:16:43 AM
Attachments:	01142022 dock electrification study comments Final.pdf

Hi - This email and the attached document constitute Juneau Commission on Sustainability (JCOS) comments on the *Juneau Dock Electrification Study* draft report. JCOS also provides recommendations for a future RAISE grant application process that the Commission believes will optimize Juneau's competitiveness for federal funding for dock electrification.

As JCOS was about to submit its comments on the draft dock electrification study (attached), the Commission learned that the 2022 RAISE Grant Notice of Funding Opportunity (NOFO) is expected to come out this week or next. The application period will probably be moved up, with a possible deadline in mid-April, instead of mid-July as occurred last year. Due to the 2021 Infrastructure Investment & Jobs Act's increase in program funds, there will be substantially more funding available, and predictably more competition for the grants. Projects with the most preparation are likely to score the highest (personal communication,1/14/2022, Howard Hill, Transportation Policy Analyst, US DOT RAISE Grant Point of Contact).

As JCOS notes in its comments, the sections of the draft report that deal with the benefits of dock electrification, power availability and economics are seriously flawed. The draft also fails to offer alternative solutions to some of the problems it identifies. These flaws must be corrected or the assumptions and conclusions of the draft study will seriously–even fatally–undermine the CBJ's competitiveness in ever obtaining RAISE grant funding for dock electrification.

JCOS strongly recommends that the Juneau Commission on Sustainability be given a leading role in developing the 2022 RAISE grant application. One of the Commission's charges from the Assembly is to apply for grants. JCOS's work and recommendations were ignored or given short shrift during development of the unsuccessful 2021 application. Based on the unsatisfactory experience with the 2021 RAISE grant application process, JCOS believes this change is crucial to the success of future grant applications.

In light of the extremely short turnaround time for the next RAISE grant application, JCOS recommends that:

1.

The CBJ immediately seek feedback from DOT on its 2021 RAISE grant application, and that JCOS participate in the debriefing.

2. The dock electrification study report be streamlined to focus on cost estimates and the technical and engineering components needed as a basis for the next RAISE grant application. The draft's limiting assumptions and conclusions about power availability should be replaced with the straightforward assumption that the utility will provide the necessary power on a firm or near-firm basis.

3. D&H/Engineering initiate work on dock electrification on any environmental permitting required for the project, before the 2022 RAISE grant application date.

4. The Assembly Public Works & Facilities Committee (PWFC) oversee dock electrification development as a community goal, effort, and priority.

5. The PWFC oversee the 2022 RAISE grant application, with assistance from JCOS and support from D&H, CBJ Engineering & Public Works Department, and the CBJ Tourism Manager under the premise that the CBJ docks will be optimally utilized and that power will be available for any vessel docking at the 16 B docks.

6. CBJ commit a minimum 20% match, with consideration to go higher to optimize CBJ's application against anticipated increased competitiveness in the next round of RAISE grants.

7. CBJ submit only one RAISE grant application in the 2022 grant cycle to make it clear that dock electrification is the community's priority for using RAISE grant funding.

Through focused, collaborative work in the near future, Juneau can submit a strong RAISE grant application in 2022. The Juneau Commission on Sustainability members are available to assist in this effort.

Thank you,
Gretchen Keiser, Chair
Juneau Commission on Sustainability

Juneau Commission
on Sustainability

(907) 586-0715
JCOS@juneau.org
www.juneau.org/sustainability
155 S. Seward Street • Juneau, AK 99801

January 14, 2022

Date: January 14, 2022

From: Juneau Commission on Sustainability (JCOS)

To: Erich Schaal, Port Engineer

Re: Draft Dock Electrification Study

Recommendations for Strengthening the Juneau Cruise Ship Dock Electrification Study

I. Introduction

The draft dock electrification study establishes a technical base and preliminary design for providing shore power for cruise ships at the CBJ docks. Together with strong public and cruise line support, the study provides a foundation for completing design and identifying funding for the project.

However, the draft study applies assumptions about power supply and ship connection times that are not supported by quantified data and that significantly reduce the projected benefits of dock electrification. The draft study also fails to offer alternative solutions to some of the problems that it identifies.

The Assembly's primary intent in funding this study was to develop preliminary design and cost estimates for shore power. They also wanted to be advised of the policy implications and potential effects of alternative approaches on three areas - dock scheduling, power supply, and utility rates.

In May 2019 the Assembly Finance Committee amended the proposed 2020 CIP for dock electrification planning. They changed the project title from "Large Berth Shore Power Feasibility/System Impact Analysis" to "Large Berth Shore Power Preliminary Design & Cost Estimate" and increased the funding amount from $250,000 to $300,000. They also changed the project description to read:

> *These funds would be used to prepare a preliminary design and cost estimate for adding shore power to additional docks. The Assembly would be additionally advised of the implications of the policy choice of requesting firm or interruptible power for new shore power, the potential implications for changes to ship docking and the potential effect on supply of power to other interruptible customers and on utility rates. Currently, the Franklin Dock is the only cruise ship dock that is equipped for shore power. These funds would accomplish the Assembly goal of figuring out the necessary steps to connect more ships to shore power.* *https://packet.cbjak.org/CoverSheet.aspx?ItemID=6629&MeetingID=960*

Before the study was completed, in spring 2021, the CBJ learned that AkDOT&PF's RAISE grant program included new federal program priorities and grant criteria favoring projects that include climate change mitigation and air quality improvement measures, thereby improving the opportunity to obtain federal

funding for dock electrification. The Juneau Commission on Sustainability (JCOS) assisted with the grant application, as part of its duty to advise and make recommendations to the CBJ and to apply for grants[1]. While the CBJ was unsuccessful in its first RAISE grant application, it has an upcoming opportunity in the next round of grants in spring 2022. The Port Director is also working to identify and develop other potential sources of federal funding.

The dock electrification study will provide essential information needed to successfully compete for these grants, including the Benefit-Cost Analysis that is a key element of federal grant applications. However, the draft's flawed assumptions and conclusions about availability of electricity and connection times significantly reduce Juneau's competitiveness, as does the lack of the documentation called for in grant guidelines. The following comments address these issues and offer recommendations to strengthen the draft study.

II. Key Issues

A. Inadequate data and overly restrictive assumptions about electricity supplies.

The draft study concludes (page 44) that the CBJ docks will have hydroelectricity available only 25% of the time it is requested with existing hydroelectric supplies, and that new hydroelectric supplies are not expected for an undetermined period of time. These conclusions, based on restrictive and poorly documented assumptions, significantly limit the benefits of the project and reduce the chances of obtaining federal funding.

Despite the Assembly's direction to advise it of "the implications of the policy choice of requesting firm or interruptible power for new shore power" the draft assumes that the CBJ docks would be a last-in-line interruptible customer for electricity, and fails to fully evaluate other options. Given the use of faulty assumptions, the conclusion that dock electrification is a poor financial investment is not surprising. The study demonstrates that cruise ships would use less than 10% of the electricity being supplied to Hecla Greens Creek mine, but assumes that Greens Creek would continue to have priority access to power.

The study's assertion that assessing "firm" power was too complicated is not surprising. The draft is unclear and speculative about how firm ratepayers would be affected by changes in interruptible and firm rates and sales (page 45 and elsewhere). JCOS recommends that a rate analysis should be done by an independent regulatory specialist who could then advise the CBJ more fully on the best way to structure arrangements for buying power to optimize dock electrification utilization with local and federal grant investments in electrifying the docks.

[1] CBJ Resolution 2755 (5/2/2016) the duties of the Juneau Commission on Sustainability are:

- To coordinate, propose, and promote sustainability initiatives among residents, businesses, government, and non-governmental agencies and educational organizations through education and outreach programs.
- To make recommendations to the Juneau Assembly and CBJ Boards and Commissions on policies and programs that promote sustainability.
- To research and apply for grants or other funds or gifts from public or private agencies for the purpose of carrying out any of the provisions or purposes of this resolution.
- To serve as an advisory group to the CBJ in reducing greenhouse gas emissions to target levels as adopted by the CBJ Assembly.
- To act as liaison between the public and the CBJ Assembly on sustainability related issues.

The second major limiting assumption is that no new hydroelectric supplies will be available in the foreseeable future. AEL&P did, in fact, report in their March 31, 2020 filing with the Regulatory Commission of Alaska that the company has no plans to add capacity at least through 2029. On the other hand, it is unclear whether AEL&P considered additional needs for dock electrification in this report. The draft study identifies three potential new sources of hydroelectricity--one of which is licensed and permitted. However, the report provides no meaningful information on timeframes or the conditions under which any of them would or would not be developed. As discussed below, the draft provides little information about trends, projects or plans that would affect future electricity demand in the community that would require new electricity supplies, which limits the Assembly's ability to adequately assess the implications of providing shore power.

The draft only tells part of the story of future power demand and supply; it ignores community goals and trends in electrification of heating loads and transportation. The study should document the power demand for fully-optimized dock electrification. That information will guide future actions that strengthen/expand/improve the community's reliance on renewable hydropower. Rather than presuming that the community will have insufficient power to achieve Juneau Renewable Energy Strategy {JRES} goals, the study should assume that the electric utility will treat the CBJ docks like any other customer and provide the power needed in a timely fashion, as required by state statutes. The study failed to address regulatory obligations. For example, under AS 42.05.291(a), AELP is required to furnish and maintain adequate, efficient, and safe service and facilities. This service shall be reasonably continuous and without unreasonable interruption or delay.

B. Omission of CBJ energy policy and goals.

The draft omits mention of CBJ energy policies and interests, including the JRES, which outlines CBJ policies and goals for renewable energy use. The report fails to consider how dock electrification fits into these broader community goals and policies. In the JRES (Resolution 2808), the CBJ Assembly adopted a goal of shifting energy use in the community away from fossil fuels so that by 2045 Juneau would get 80% of its total energy from renewable sources. If the study addresses the details of power supplies for dock electrification it should include the context of future demands and supplies to meet these climate and energy goals. Failure to do so undermines the purpose of the study.

C. Incomplete consideration of overall project goals.

The draft fails to fully address the purposes of dock electrification. Its purpose section focuses entirely on one aspect of sustainability: reducing GHG emissions. The report demonstrates that providing shore power to the CBJ docks so that cruise ships can shut off their generators while in port will make a significant contribution to the CBJ's climate goals.

However, in addition to addressing reductions in GHG emissions, the draft should fully describe the benefits of dock electrification and how it would contribute to multiple CBJ goals and policies regarding tourism impacts, air quality, job creation, downtown planning, and the community's primary reliance on renewable energy. JCOS provided much of this language to Docks & Harbors staff last June during preparation of the 2021 RAISE grant application, and it should have been incorporated in the draft study.

The study's confusion between GHG emissions and local air pollutants is particularly concerning. It focuses only on impacts on climate, while completely ignoring the project's significant benefits in improving local air quality by reducing SOx, NOx, and PM2.5 emissions, which rates highly in the RAISE grant.

D. Analysis reliant on legacy shore power system.

The draft study bases nearly all of its analysis on data and assumptions derived from the oldest shore-to-ship power connection system in the world, the Franklin Street Dock. It does not describe or explore what modern dock electrification systems look like beyond referencing that any new infrastructure would need to be built in accordance with the "international standard, IEC/ISO IEEE 80005-1." Use of outdated system information significantly reduces the potential value and benefits of dock electrification, which carries over into the economic analysis. For example, one well-known difference between legacy and modern dock electrification systems is the connection time, which is reportedly about half the time assumed in the study.

The report should describe and analyze state-of-the-art shore power systems, along with grid optimization and system upgrades required to connect and simultaneously supply power to multiple cruise ships.

E. Incomplete economic analysis

The economic assessment in the study is based on such flawed assumptions about power availability, connection times, and the purposes and benefits of dock electrification as discussed above, that it is essentially worthless. It also fails to provide any significant assistance to the CBJ in identifying options for financing.

Most of the economic analysis section should be eliminated. The following specific items are needed to address the direction from both the Assembly and the contract with the consultant:

1. Compare firm, near firm (conditional) and interruptible electricity rates and terms for the cruise ship load.

2. Provide analysis of revenues from firm and interruptible power options for cruise ship loads and their anticipated contribution to the rate base (i.e., additional revenue to the relevant firm rate directly or the anticipated contribution back to firm ratepayers through the COPA - Cost of Power Adjustment).

3. Evaluate and recommend a fee structure that Docks & Harbors could charge a cruise ship utilizing a shore connection while in port if Docks & Harbors is the electric customer. This item was identified in the consultant contract, but does not seem to be completed yet.

III. JCOS Recommendation: A phased approach that would:

- First, strengthen the report; and

- Subsequently, undertake additional work in order to more fully analyze the options for making power available for Juneau's docks.

The CBJ needs stronger supporting documentation to submit a competitive RAISE grant application for dock electrification in spring 2022. It also needs more complete information and analysis to guide future CBJ policy choices. JCOS recommends revising the draft report as Phase 1 during the next few months, and then completing Phase 2 of the project later.

Phase 1: Revise the draft with a focus on supporting and developing a strong 2022 RAISE grant:

1. Retain the portions of the study that address technical feasibility and design. Adjust cost estimates as necessary.

2. Strengthen the section dealing with the purposes and benefits of dock electrification ,-- including the local air quality benefits that score so highly in the RAISE grants - , as well as the contribution of the project to the JRES.

3. Add a more complete analysis of connection options, dock management, shore power hookup requirements under local government authority, and scheduling arrangements to maximize cruise ship utilization of shore power at the CBJ docks and thereby maximizing progress toward JRES goals.

4. Eliminate the presumption that other uses will have a priority and that the CBJ must restrict its demand for power. Assume, for purposes of the grant request, that the CBJ will be treated like any other customer, and that the utility will provide it with needed electricity.

Phase 2: Undertake additional independent studies to inform CBJ decision makers about key issues that are incompletely or inadequately addressed in the study:

1. Fully evaluate and advise the CBJ about the range of options for obtaining shore power, in addition to last-in-line interruptible power, including:

   a) Firm power. The draft superficially discusses some aspects of firm power but provides little relevant data and claims that analysis of this option is beyond the study scope (page 38) even though such analysis was specified in the Assembly's project direction.

   b) Interruptible power, but with a higher priority than some existing interruptible uses. Again, the current draft mentions this option and suggests some implications, but does not analyze or flesh out the pros and cons.

2. Analyze alternative cost structures for shore power connection. The analysis should not only compare costs for cruise ships to self-generate to the costs of shore power alternatives, but also consider:

   a) The value of the predictability of electricity costs versus variable fuel costs;

   b) The impact of various rate structures on Juneau's residents who are firm ratepayers:

c) The benefits to the community and the cruise lines of contributing to higher air quality and reduced noise while at dock; and

d) The detrimental impact of failing to connect to shore power and whether ships should be charged for that impact.

All Phase 2 analysis should be provided by independent professionals with experience in utility regulatory law and accounting. The analysis should focus on CBJ as the client and provide direction on the best options for the CBJ and Juneau ratepayers.

IV. Summary

There is work to be done to revise the draft study so it is useful background information for another RAISE grant application for dock electrification. JCOS is ready, willing, and able to work on completing this near-term effort. The more detailed analysis identified above in Phase 2 requires more time and professional utility regulatory expertise in order for the Assembly to obtain the information for future decision making. JCOS can assist with that effort as well.

January 15, 2022

Mayor Beth Weldon
Juneau Assembly Members
CBJ Docks & Harbors,
155 S. Seward Street,
Juneau, AK 99801

RE: EPS' CBJ Draft Dock Electrification Study Comments and Suggestions for Future Revisions

Dear Mayor, Assembly, and Docks & Harbors Board,

Electric Power Systems, Inc. (EPS) is an Alaska-based multidisciplinary consulting engineering firm that offers complete solutions to industrial and government clients of all sizes across the state and around the globe. Our team of professional engineers have registrations within our state and others in the following disciplines: Electrical- Mechanical- Civil- Structural. EPS helps clients with all facets relating to electric power systems. Our unmatched experience and all-inclusive approach assist the major utilities in Alaska and greatly assists utilities and other businesses throughout Alaska, Hawaii, the Pacific Northwest, and the South Pacific.

We have maintained an engineering office in Juneau since 1998 and provide services throughout Southeast, Alaska. We have maintained our office in Juneau to service the needs of Southeast Alaska, including prior projects with the City of Juneau, the Alaska Marine Highway, Greens Creek and Kensington mines and the State of Alaska.

EPS has provided services to both Alaska Electric Light & Power and Juneau Hydro. Through our experience with both companies as well as projects completed for the State of Alaska, we are very familiar with the electrical system of the Juneau area. We specialize in islanded electrical systems and are very familiar with the challenges and constraints of operating an islanded system, including a hydro-based electrical system.

I have experience as both a consulting engineer specializing in islanded power system design, operations, and studies as well as a utility engineer and manager for an operating utility in both Alaska and the Lower 48. I have reviewed the draft Juneau Dock Electrification Report and offer the following comments.

Summary Comments

The stated objective of the study is to reduce greenhouse gasses in Juneau (opening paragraph for the report). A goal to reduce greenhouse gasses is a goal to achieve the greatest value to the community of Juneau as opposed to a desire to develop the least cost solution for electrical service required to achieve that goal.

However, the first three pages following the Executive Summary outline the difficulties of providing shore power from the existing hydro-based system and the success AEL&P has accomplished utilizing its available hydro resources with prudent hydropower modeling to achieve the least cost service to its ratepayers. This is an admirable goal for the electric utility, but it is not the stated goal of the study or CBJ. The resulting conclusion of the study is that the AELP system has little to no hydropower resources to reliably meet future demand, including the supply of power to electrify Juneau's docks or presumably any other loads that may arise in the future. The report concludes that any other viable resources, especially additional hydro resources are many years away, although the report does not offer any detailed analysis of resources, including proposed AELP resources to meet the shortfall. The report focusses solely on the ability to provide energy at the lowest possible costs as opposed to the stated objective of the report, which is to reduce greenhouse gas emissions, a goal which cannot be achieved at the lowest possible cost of electrical service. The report does not address the actions required, and possible outcomes if for instance a GHG reduction becomes a mandate by either the State or Local government, either or both of which are very real possibilities in the future.

There is no action plan or identification of actions or utility improvements required to accomplish the goal of dock electrification or a discussion of possibilities to facilitate the objective of the report. The conclusion of the study's executive summary is to simply build the dock and hope for a solution in the future, without providing recommendations, clear pathways and solutions, analysis, or cost estimates of providing the required electrical energy to achieve the goal of reducing GHG emissions. Nor does it appear to include the impact to the existing hydro availability should GHG emissions become a mandated requirement.

The central theme of the Executive Summary appears to be identifying the difficulties in providing shore power as opposed to providing alternatives and solutions to overcome any obstacles for its success. For instance, there are no scenarios evaluated in the report where the cost of reducing GHG emissions is achieved, or various costs for different levels of reductions to allow for an assessment of the solution with the greatest value. The report is problem-driven and constrained by least-cost service rather than evaluating solutions with the greatest value to the community.

AELP was at the forefront of supplying shore power to the cruise industry. It has done well in operating and providing this need in the Juneau area with utility innovation. However, while the Juneau dock electrification was once the technical leader of the world in this area, the technology used in the future should not rely on 20-year-old solutions. The dock electrification should utilize new technology to improve service to Juneau area customers and optimize the future and existing docking process.

Since AELP electrified the first cruise ship dock, other ports, particularly on the west coast and northern European ports, have developed new technology and methods to improve docking methods and consequently increase in-port electrification benefits and energy sales. A survey of 10 ports indicated typical shoreside connection times are under 15 minutes. The Juneau system may not be able to perform the docking in this time period, but it could perform it substantially faster than evaluated in the report for both the new and existing docking methods. For Juneau's port electrification to be successful and responsive to the industry and meet Juneau's community goals, new technology capable of stabilizing the grid and providing more reliable service to all Juneau customers and the cruise industry should be used as part of the evaluation.

AELP does not have the luxury of a stiff grid to allow large loads to quickly ramp up and take full power or ramp down from a large load to no load, like the docking and undocking of a large cruise ship. When the first cruise ship facility was built in Juneau, AELP compensated for not having a stiff grid by placing restrictions on how fast a ship can connect or disconnect from its system. This report assumes that the same technology and system constraints available 20 years ago will be used 20 years into the future. Consequently, the future cruise ships will have similar results or possibly slower processes if multiple ships attempt loading concurrently than the time required for the past 20 years. However, today's technology provides options that were impossible 20 years ago to improve the ability to electrically load/unload vessels while simultaneously improving reliability to AELP's firm customers. Technology deployment using a Battery Energy Storage (BESS) is ideal for providing the ramping capability to control both voltage and power ramps during transitions of shipboard power. BESS technology is currently used in several Alaskan communities (Kodiak, Kotzebue, Cordova, and Metlakatla to name a few) to dampen the impact of wind power ramps and loads such as canneries and processors that are much more volatile than the loading/unloading of cruise ships. Both Cordova and Kodiak are also hydro-based systems with a slow frequency response of their baseload generation but are coupled with much faster system load/variable generation changes than those on the AELP system. The BESS is a proven technology that could easily reduce transition time to less than 50% of that used in the report. In addition to reducing greenhouse gas emissions, a properly designed BESS could significantly improve the reliability of the Juneau area power system and significantly reduce power outages due to the interruption of power following the loss of a transmission line from Snettisham or Lake Dorothy. Another consideration in a best value evaluation as opposed to a least cost evaluation.

The total estimated energy for future cruise ships is 7,133 MWh. The report claims this to be an extremely optimistic scenario based on the inability to reconfigure existing ships. In researching the cruise line sites, it appears all cruise lines have aggressive programs to maximize their potential use of shore power, and virtually all new ship builds as well as most existing ships will be upgraded to include the ability to use shore power, many are being configured to allow power from either side of the ship. In addition, several ports have configured their mooring systems to accommodate ship

connections on either side of the vessel. This 7,133 MWh also assumes that the same loading constraints developed 20 years ago in the AELP system will be controlling the loading/unloading time for the next 20 years. This assumption uses legacy data that requires updating for a modern Juneau dock electrification. Consider that increasing the in-port time by one hour per visit will positively impact the project economics, decrease particulates and emissions, and require more energy for the cruise ships. The report also does not discuss the trend that most port facilities are requiring port-based electrification as a condition of docking. While cost is a consideration in these ports, the reduction of GHG is the driving factor, not costs.

The report's discussion of firm vs. interruptible rates is informative but is insufficient and falls short in fully exploring solutions. Again, the primary deficiency of the report is that it strives for a least-cost solution to provide for electric service as opposed to a greatest value solution. Greenhouse Gas or Renewable Energy solutions are rarely the least cost solutions, but the greatest value for the public at the lowest reasonable cost. The supposition that interruptible rates require the same rate methodology as the existing tariff for the Franklin Dock or Greens Creek need not be the case. Interruptible rates can include allocation of costs required by the utility to provide an expected level of service, allocation of construction costs or any other costs agreeable to the parties taking service. The decision to take electrical shore service is not a least-cost decision for the cruise ship industry, it is a best value decision.

Whether the Princess contract rates now or in the past included any "Aid to Construction" by Princess lines for the Franklin Dock is not described in the report. The report does not describe whether AELP funded the project, the CBJ funded the project, the customer funded the project, or a combination of funding was used, and if the construction costs were recovered through a facility charge or not. The report should provide the scenarios that are possible under various aid-to-construction scenarios for the dock improvements and discuss their relationship to the previous dock electrification.

There are several different categories of firm service within Alaskan utilities, which is also true within the AELP system. Greens Creek, for instance, has a different class of "interruptible" service that allows for an interruption for certain problems or shortages within the AELP system but does not allow for an interruption for other problems in the system. Customers served by radial transmission lines in the AELP system have a different level of firm service than areas with multiple points or looped service.

The CBJ and the customer should decide whether any future dock service is based on a conditional firm service or interruptible service based on what is best for the CBJ, the public dock owner, and the cruise ship industry. However, this is not simply an economic decision. The State of Alaska and City Borough of Juneau's goals are to reduce the emissions within State and City jurisdiction and waters. CBJ, as a customer, has a right to service and to evaluate which type of service best fits its needs;

AELP is required to serve a requested load and must provide an analysis on what it would cost to serve the customer. In feasibility studies such as this, cost estimates are not as detailed or as accurate as they would be if an actual service request was made, but none-the-less, the utility should provide a listing of all improvements required to provide the service under the different scenarios, their respective costs, the possible rate structures, and the instances where service would or could be curtailed for the CBJ to evaluate. The report does not include any analysis of what facilities, their respective costs and corresponding rates would be required to meet the goals of the CBJ. The lack of an alternative analysis between a near-firm service and interruptible service and the analysis of additional energy resources is a shortcoming of the report and negatively impacts the credibility of the report. The current draft report on interruptible service vs. firm service is unclear, confusing, and provides no details on deficiencies or costs of any alternatives or an adequate description on why the projects are required and what alternatives were considered and when curtailments would be required.

Other service reliability options may be available besides a new transmission line from Lemon Creek to the substation to offer dock service at less than a firm service. Like many Alaskan utilities, AELP appears to strive for firm service, i.e., service to customers that cannot be interrupted with a single contingency event (a utility term meaning the failure of a single component of their system) but makes exceptions and deviates from the single contingency event standard in serving areas of its own system. The report's focus is on the classical definition of firm service and not one that is practiced throughout Alaska. The report did not consider a near firm or a conditional firm service that would be an appropriate and perhaps optimal service for dock utilization. A conditional firm service may not require additional capital expenditures to build an additional transmission line between Lemon and Salmon Creek and may provide reliable and cost-effective service to the CBJ and cruise line industry. However, if a capital improvement project is required, it is likely the project would contribute to the reliability of the AELP system as a whole and not solely the cruise ship docks.

The report should more clearly identify all the requirements and components for service as opposed to simply stating a new transmission line is required without providing the public with an understanding of why the line is required for the dock but not any other load-serving requirements. The report indicates the Lemon Creek line would only be required to service the cruise ships from a fossil fuel plant in the event of a scheduled or unscheduled outage of one of the 69 kV lines from Thane. This additional infrastructure requirement was not the objective in the study's scope and would appear to be counter to the goals stated in the report. This appears to be adding confusion to the issue whereas a simpler solution would have been to just not provide the cruise ships during this contingency.

There are other possibilities to "firm up" an interruptible customer at the dock, which are not mentioned in the report. There is also no reason why an interruptible customer does not contribute

to any facility improvements required to service the loads. How were the facilities at the existing electrified dock funded should be addressed in the report and if different than the limited options presented in the report, the report should be modified to include similar funding.

Finally, the report estimates that energy will be available to serve the future cruise ship electrical loads 25% of the time until 2038. This conclusion is difficult if not impossible to replicate with the available information provided in the report. However, assuming the statement is correct, another way to bring this forward is to state that 75% of the new loads of the cruise ship or presumably any other new CBJ loads such as electric vehicle loads, heating loads etc. required for mandated GHG reductions will require further development of resources prior to 2038 for dock electrification or other positive economic growth. Or put another way, the report should simply state, there is no way to reduce the GHG emissions in the CBJ, because that is the effective outcome of the energy constrained, least-cost service analysis.

The goal of the report was to reduce GHG emissions, to effectively state the CBJ cannot meet its goal is incorrect and a failure of the report's methods and approach. The report should instead be solution-oriented to meet the goals of the report and refrain from conclusive determinations that are based on narrow assumptions and precludes the judgement of CBJ as to what is the best value for its residents. It should present the solutions to the energy shortfall, if there are any, the system deficiencies, if there are any that cannot be addressed by different service conditions, and allow the CBJ to evaluate the lowest reasonable cost that meets their goals as opposed to simply concluding there is not available energy, service is too difficult, and the goals can't be met. Due to the lack of this data, verification of the conclusions and statements in the report cannot be confirmed or evaluated by other parties.

The report does not address the possibility of the resource deficiency being resolved by any new renewable resources, including those resources listed as future AELP or Juneau Hydro Projects in the report. The draft report leaves the assumption of AELP developing its internal resources ten (10) years out, but the construction and possibility of bringing any resources on-line was not addressed. There was no analysis of the cost impacts of bringing the proposed AELP projects forward or utilizing energy from the Sweetheart Lake project mentioned in the report to close this energy shortfall. It would appear the scope of the report was supposed to specifically require the analysis of utilizing future resources to meet the CBJ objective. Absent this analysis, the only conclusion is that the cost of AELP bringing a project forward or evaluating the Sweetheart Lake project is so horrendously expensive to the point that it would prevent the CBJ from meeting its goals. However, without knowing the costs of either of these options, how was that determined? If the projects referenced in the report cannot be used to meet the shortfall, or will not be evaluated as possible solutions, simply state that assumption in the beginning, that this report will not evaluate anything other than existing resources to accomplish the goal.

Summary

The draft report provides some helpful information, but its focus is on providing the least cost electrical service for the dock electrification. The measures required to either meet or evaluate the ability of the CBJ to obtain its goals of reducing greenhouse gas emissions are missing from the report and were not included in the study. The study concludes the new dock electrification could only be served 25% of the time which effectively precludes any GHG reductions to be realized by the CBJ. The basis of the 25% conclusion does not appear to be documented within the report. Given the conclusion effectively precludes dock electrification, it is a severe deficiency in the report not to clearly and succinctly describe in detail how the conclusion was derived and include all supporting data and why identified future projects were not considered.

However, assuming the 25% may be correct, the lack of information or effort to provide costs information on alternatives to fill the shortfall is the largest deficiency of the report. The focus of the report being to provide the least cost service and ignoring the intended goals of the study. The study provided no information by which the CBJ could evaluate the cost of meeting its goals, which were not driven by the providing the least cost service but driven by goal of reducing GHG.

If you have any questions or comments, please feel free to contact me at your convenience.

Thank you,

David Burlingame, P.E.

President,

January 17, 2022

Mayor Beth Weldon
Juneau Assembly Members
CBJ Docks & Harbors,
155 S. Seward Street,
Juneau, AK 99801

Mayor, Assembly, Docks & Harbors Board, and Juneau Commission on Sustainability,

By way of introduction, my name is James Keen and I am the Director of Utility Consulting for Aldrich CPAs + Advisors LLP. Aldrich is a nationally recognized CPA and advisory firm, serving many utilities in Alaska and throughout the West Coast. The Aldrich team has experience in the utility regulatory arena in Alaska and interacts with the Regulatory Commission of Alaska (RCA) routinely.[1] I personally have over twenty years' experience in Alaska utility regulation, working as an advisor to RCA Commissioners for almost 16 years and as a utility consultant for the past six years. I have worked with Juneau Hydropower, Inc. (JHI) since 2016 providing analysis of various regulatory matters, including dock electrification, and assisting with the negotiation of a draft transmission services agreement between JHI and Alaska Electric Light & Power (AELP).[2]

At the request of JHI, I have reviewed the Draft Cruise Ship Dock Electrification Study (Draft Study) prepared by Haight & Associates, dated November 2021, for the City and Borough of Juneau (CBJ). I also reviewed the AELP Tariff and current federal laws regarding the sale of power from a renewable independent power producer to a utility. While the Draft Study provides a great deal of useful information, there are some outstanding questions the CBJ should consider resolving to understand the true cost of providing reliable power to the cruise ship docks utilizing the potential electrification infrastructure. I am pleased to provide a brief analysis and recommendation for the Board's consideration regarding the Draft Study.

[1] Aldrich's experience includes preparing and defending numerous rate cases on behalf of multiple utility clients, submitting expert testimony and successfully appearing before the RCA to vigorously defend our client's positions. In addition, members of our team have worked both for the RCA and for Alaska utilities, providing Aldrich with unique insights and perspectives on the complex world of Alaskan regulation.

[2] The dock electrification analysis compared the cost of interruptible power and the firm power rates in AELP's tariff for Princess Cruise Lines.

Recommendation

It is recommended that the CBJ request AELP develop proposed rates with cost support for providing both "traditional firm" and "conditional firm" power to the CBJ Alaska Steamship and Cruise Ship Terminal Docks (Docks). This information is not part of the current Draft Study analysis, yet is essential to clearly and objectively understand and define the costs associated with the CBJ's options for dock electrification.

Background

The estimated $24.9M for construction of the infrastructure necessary to electrify the Docks would potentially be funded by $4.9M from the CBJ and the remaining $20M from a grant. Based on the Draft Report analysis, energy is projected to be available for cruise ship use at least 25% of the time.[3] This is the result of cruise ships being classified as AELP interruptible customers rather than a firm customer. As an interruptible customer, power is provided when available at the discretion of the utility with availability determined both by the demand of other firm and higher-priority interruptible customers and water levels at the AELP hydroelectric facilities. With so many options at play, interruptible service provides the least amount of energy security for the purchaser. Further, a relatively low utilization rate of dock electrification may create a challenge for obtaining private financing or the requisite grant funding needed for economical construction. It is therefore important for the CBJ to understand the costs involved with improving dock electrification utilization, which requires AELP to have more power available either from internal sources or purchased sources from a Qualifying Facility,[4] such as Sweetheart Lake Hydroelectric Facility, to reliably deliver required power to the CBJ-owned Docks.

System Constraints

The Draft Report identifies two constraints to improving utilization while avoiding the creation or shifting of additional greenhouse gases: (1) the need for additional hydroelectric generation; and (2) system improvements to reduce power delivery limitations.

In regard to additional hydro generation, three projects are identified, two of which would presumably be developed by AELP and one by JHI.[5] The two AELP projects may provide ample capacity for dock electrification, but additional load may be needed for the power to be provided economically and not create a burden to Juneau ratepayers. The non-utility privately financed and supplied power from JHI would not create a capital cost burden on Juneau ratepayers.

[3] Draft Report, page 3.

[4] Qualifying Facility means qualifying cogeneration facilities or renewable power production facilities from which an electric utility (i.e. AELP) has an obligation to purchase energy and capacity at or below its avoided cost, in accordance with federal regulations (18 CFR § 292.303) and State of Alaska regulations (3 AAC 50.770).

[5] Draft Report, page 19. Sweetheart Lake (JHI), Lake Dorothy Phase 2 (AELP) and Sheep Creek (AELP) were identified.

The Draft Report stated that in order to provide firm power, there is a need for an additional 69 kV line from the Lemon Creek powerplant to the Salmon Creek Substation.[6] Additionally, AELP has planned maintenance at times during the summer that requires the interruption of service to its interruptible customers (e.g. cruise ships). Resolving these constraints would require additional infrastructure investment beyond the $24.9M cited in the report.

Providing "traditional firm" power requires the utility to provide service instantaneously on-demand to the customer. While occasional outages and planned maintenance may limit provision of service at times, all power needs are otherwise reliably met by the utility. Traditional firm power requires both committed generation capacity and a committed power distribution pathway.

AELP also provides "interruptible" service to certain customers willing for power to be curtailed when excess hydroelectric energy is not available or other constraints prohibit delivery at the sole discretion of the utility. By seeking the traditional interruptible service, CBJ would be relegating a municipally-owned operation to an inferior position of curtailment hierarchy behind Princess Cruise Lines, Hecla Greens Creek Mine and now Holland America.[7] The Holland America contract was executed after the release of the draft study and further reduces the availability of interruptible power for the CBJ.

Options for Increasing Dock Electrification Utilization

CBJ should further explore two options for improving the reliability of power available to the Docks. The first is understanding the full price of receiving firm power to the Docks. This would require the construction of both additional energy generation capacity (e.g. more hydro) and presumably galvanizing the distribution system.

Additionally, the CBJ should explore requesting "conditional firm" power from AELP. For the purpose of this letter, "conditional firm" power would involve the construction of additional generation capacity, or require prioritization of power sales to the CBJ docks over existing interruptible customers. This accomodiation would recognize and accommodate the existing distribution constraints that exist. In other words, no additional 69kV line from Lemon Creek to the Salmon Creek substation would be required. This includes an understanding that diesel back-up would likely be unavailable in the event that hydroelectric power cannot be delivered to the Juneau publicly owned docks and that there would be certain planned maintenance windows when power delivery isn't possible. However, additional capacity under both of these options should significantly increase utilization above the 25% cited in the Draft Report and subsequently increase favor with federal grant authorities and facilitate CBJ dock electrification efforts.

At this time, the costs involved with adding new generation and upgrading the AELP distribution system are unidentified and have not been subject to careful review. AELP is required to forecast the cost of planned capacity construction every two years in a filing to the RCA.[8] AELP's most recent filing

[6] Draft Report, page 15.

[7] A new interruptible sales contract filed with the RCA in TA502-1 on November 18, 2021.

[8] See Alaska Administrative Code 3 AAC 50.790(e)

in March 2020 did not identify the addition of any capacity through 2029, indicating that AELP has no reported intention of adding capacity or generation for the Juneau energy market.[9]

As a prospective customer of AELP, the CBJ can apply for service in accordance with AELP's RCA-approved tariff.[10] This initiates the process for AELP to define the rates and terms under which it would provide service to CBJ. It is recommended that CBJ service be requested under the traditional firm and conditional firm conditions described above.[11]

With the identification of the costs of providing both firm and conditional firm power, AELP should identify the projected availability of power to the Docks if additional hydroelectric facilities were constructed. The projected availability would assist in successful grant writing and enable the RCA and the public to properly review the associated costs and scenarios at the appropriate time.

The benefit to adopting a firm or conditional firm model is minimizing or eliminating concerns about dock electrification utilization. Under firm or conditional firm, the utilization of the proposed project is significantly increased over current estimates. This can only serve to strengthen the CBJ grant application or pursuit of financing for public dock electrification.

Potential of Purchasing Power

As stated in the draft report, JHI is preparing to construct a fully licensed and permitted hydroelectric facility at Sweetheart Lake that could have capacity available to sell to AELP for provision of power to the Docks and to supplement power provided to other currently interruptible customers to reduce the use of diesel generation in and around Juneau, consistent with the Juneau Climate Action and Implementation Plan (JCAIP) and the Juneau Renewable Energy Strategy (JRES). JHI is a Federal Energy Regulatory Commission (FERC) self-certified Qualifying Facility (QF). This federal QF certification provides both rights and opportunity for JHI to interconnect with the AELP system and sell power to

[9] See AELP March 31, 2020 filing at the RCA pursuant to regulation 3 AAC 50.790(e).

[10] See AELP Tariff, Section 6.1. Each applicant for electric service is required to complete and sign the Company's form of application for electric service or a special contract. Applicants are also required to produce proof of identity. As an alternative to providing social security numbers on the application form, such proof can be provided by one type of photo-bearing identification (e.g. a passport or current driver's license) or two other types of identification (e.g. birth certificate, certified school records, etc.). In special cases for large industrial or commercial customers, a special contract may be written and shall contain such provisions and stipulations as may be necessary or desirable to protect the interest of both the Company and the customer. All fees shall be assessed at the time of the service application or prior to construction. Acceptance of service, with or without a signed application or contract, shall be subject to compliance with the terms of the applicable rate schedule or schedules and the customer service policies contained herein in this tariff…

Additionally, AELP's Tariff addresses Harbors (Section 7.10), Service Requiring a Special Contract (Section 7.14), and System Improvements (7.16). These sections may also have relevance to the request for AELP to develop a rate for traditional firm and conditional firm power. AELP's tariff can be found online at: https://www.aelp.com/Customer-Service/Tariff

[11] The application can be found online at: https://www.aelp.com/Customer-Service/Other-Forms

AELP as needed at an "avoided cost."[12] Avoided cost is defined as the cost at which AELP could self-provide the same power that could be provided by JHI to meet system needs. Essentially, power purchased from a QF such as JHI must be cost-neutral to the ratepayers of AELP in comparison to the cost of AELP supplying the power. There is also the potential for a defined quantity of power to be purchased that is right sized to AELP customer needs rather than constructing a project that would not be fully utilized in the near future.

Requesting AELP to provide the cost of infrastructure improvements necessary to improve the utilization of dock electrification is a reasonable request and allowed under AELP's tariff. It will also allow additional alternatives to be further developed, such as the opportunity to purchase discrete and defined quantities of power from other sources, such as JHI.

Even if AELP were to purchase power from an independent power producer to deliver to the Docks, AELP would likely be entitled to a distribution and customer fee in the charge which would provide a net economic benefit to its customers and possibly its shareholders. AELP customers benefit from better utilization of existing facilities because the fixed costs are spread across a larger customer base. These economic benefits also exist for any power that JHI transmits through the AELP system to customers outside of AELP's service area. JHI would be paying and substantially contributing revenues to offset transmission costs by helping Alaska Industrial Development and Export Authority (AIDEA) and AELP more fully utilize AIDEA and AELP transmission assets. Better utilization of Juneau's transmission and distribution assets benefits all ratepayers by spreading the cost over a larger customer base. In 2020, Aldrich analysis concluded that it was likely that JHI would be paying AELP in excess of $1 million annually in transmission fees, which would help reduce ratepayer costs.

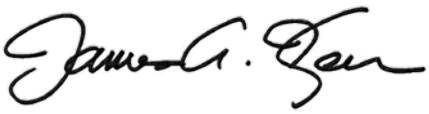
In summary, the CBJ should request additional information and gather essential data that will allow a more robust strategy to be developed. Presently, the dock electrification study only analyzes one approach and the approach chosen does not adequately utilize costly infrastructure assets and therefore may not be the appropriate approach to maximize the utilization of public facilities nor optimize the economic and grant benefits. However, more fully defining the cost of achieving higher utilization of the Docks and considering more cost-efficient strategies is essential to meeting CBJ's community values expressed in the JCAIP and JRES.

The significant amount of community engagement in addition to support for dock electrification from tribal entities, Native corporations, the cruise industry, chambers and business groups is a strong rationale for making sure the analysis of dock electrification fully considers all alternatives. I believe supplementing the analysis in the report with the cost of firm or conditional firm power could allow the CBJ to chart a reasonable and appropriate path to Juneau dock electrification. If you have any

[12] "Avoided cost" is the incremental costs to an electric utility of electric energy or capacity or both which, but for the purchase from the QF, such utility would generate itself or purchase from another source (18 C.F.R. §292.101(b)(6))

questions, please do not hesitate to contact me. I can be available to present to the Assembly of Juneau if my expertise would be beneficial to assisting the CBJ in its dock electrification efforts.

Sincerely,



James Keen, CDP
Aldrich CPAs and Advisors LLP
3801 Centerpoint Drive, Suite 303
Anchorage, AK 99503
Tel: 907 522-2129

From:	Bill Leighty
To:	Erich Schaal
Cc:	Steve Behnke; Margo Waring; Nancy Waterman; Zachary Brown; benjamin johnson; Dan Cannon; eschroederjnu@gmail.com; "Bob Schroeder"; Borough Assembly; Managers Office; lynncanalconservation@gmail.com; jessica@lynncanalconservation.org; stacie@lynncanalconservation; Beth McKibben; hotline@traveljuneau; Alexandra Pierce; info@haight-assoc.com
Subject:	Comments on Juneau's draft Cruise Ship Dock Electrification Study
Date:	Monday, January 17, 2022 12:56:23 PM
Attachments:	image.png ThwaitesGlacier-17Jan22.pdf 21-350Juneau-24Aug-H2-Juneau.pdf JuneauTotalEnergy-27Feb07-REV15Feb19 (version 6).xlsb

Port Engineer Erich Schaal at Erich.Schaal@juneau.org, 907-586-0397

REFERENCE:

- Juneau's draft Cruise Ship Dock Electrification Study
- 2021 RAISE Transportation Discretionary Grant | Port of Juneau Dock Electrification Grant

Juneau Colleagues,

The subject Study is well done. I agree with its assumptions and recommendations, except that:

1. Does it adequately deal with the ambitions of Juneau Hydro to supply hydroelectric energy to some markets segments of the Juneau Community, downtown and elsewhere ?

2. Neither reference report addresses the urgent questions before the CBJ and people of Juneau:

a. Shall we continue to welcome the cruise ship industry to enjoy the port and shoreside resources and activities -- generally, "shore excursions" -- of Juneau while both are operated almost exclusively on liquid fossil fuels ? Shall we rather close the Port of Juneau to large cruise ships, or to all cruise ships, until their "under way" propulsion and hotel loads energy is supplied entirely, or to a great extent, by renewables-source, CO2-emission-free energy, with the option to buy hydroelectric energy from Juneau source(s) while at dock in Juneau and perhaps in other SE AK ports-of-call ?
b. Shall we encourage the cruise ship industry to accelerate the conversion of its ships and shorex assets, via nascent technology, via whatever incentives and authorities are available to us ?
    i. See: "Could Hydrogen help us operate Juneau entirely on CO2-emission-free energy ? How ?", attached.
    ii. See: "Pacific Northwest Renewable Hydrogen Action Plan" : https://fcbf876f-0fb5-422a-8c51-9fbfc77ad93e.filesusr.com/ugd/0cf654_9225a6fa0eb84dc3950de07bbad56704.pdf
    iii. Consider several keynote speaker proposals, in recent years, in JEDC's annual "Innovation Summit", by which we might so encourage this industry.
    iv. Consider my "innovation shorts" presentations at several JEDC Innovation Summits:
        1. 2019: https://vimeo.com/318869809 Should Juneau Accommodate 1.5 million Cruise Ship Visitors per Year ?
        2. 2020: https://vimeo.com/373679728 Cruise Ships and Climate Change: Juneau's Bargain for New Hydroelectricity-powered Shoreside Infrastructure to Benefit Everyone
        3. 2018: https://vimeo.com/287808196 Elevator Juneau: Escaping Sea Level Rise

c. What is our collective and individual responsibility, our Kuleana, for preventing the dangers -- predicted by many experts, as in the attached Thwaites Glacier analysis from late 2021 -- of Global Climate Change (GCC) caused by burning fossil fuels of all kinds ? How may we examine and assess, and understand and agree about that responsibility ?
d. By what authorities may we apply and implement this responsibiity ?
e. Shall we have this conversation before we proceed to advance the draft Cruise Ship Dock Electrification Study, or to attempt to find funding by which to accomplish it ?

See my "Juneau Total Energy Analysis" of many years ago, showing the estimated magnitude of cruise ship industry energy consumption. This needs to be updated. Perhaps we have the data on individual cruise ship fuel consumption by which to update the study, per the published 2022 Juneau port call schedule. Should we ask CBJ staff to do that ?

The attached "Could Hydrogen help us operate Juneau entirely on CO2-emission-free energy ? How ?" presentation may result in opportunities to profitably harvest SE AK stranded indigenous renewable energy resources -- principally hydro, tidal, and wave -- to supply liquid hydrogen (LH2) fuel for bunkering cruise ships as they transit SE AK. LH2 may also be a fuel, or at least an energy carrier and storage medium, for fueling aircraft and marine vessels, large and small, at JNU or elsewhere.

I suggest that CBJ not proceed to finalize the excellent draft Cruise Ship Dock Electrification Study until we have had the community conversation, above.

Juneau's prosperous future may be rather as a refuge community than as a cruise ship industry hub.

Thank you for your consideration.

Bill Leighty

Director, The Leighty Foundation (TLF)

www.leightyfoundation.org/earth.php

Principal, Alaska Applied Sciences, Inc. (AASI)

www.AlaskaAppliedSciences.com

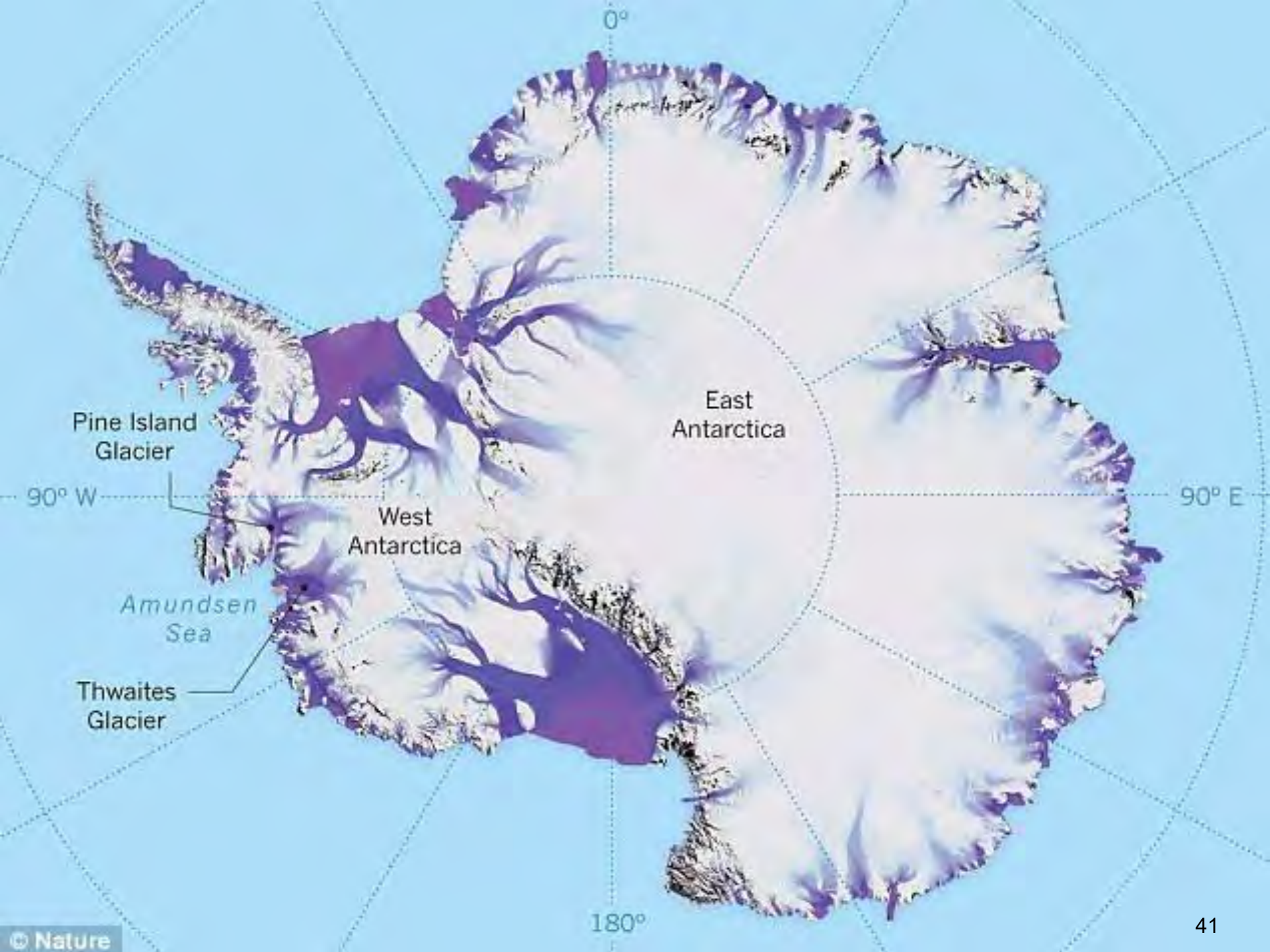
907-586-1426 (w) 206-719-5554 (cell)

Thwaites Glacier, West Antarctica: outlined in black

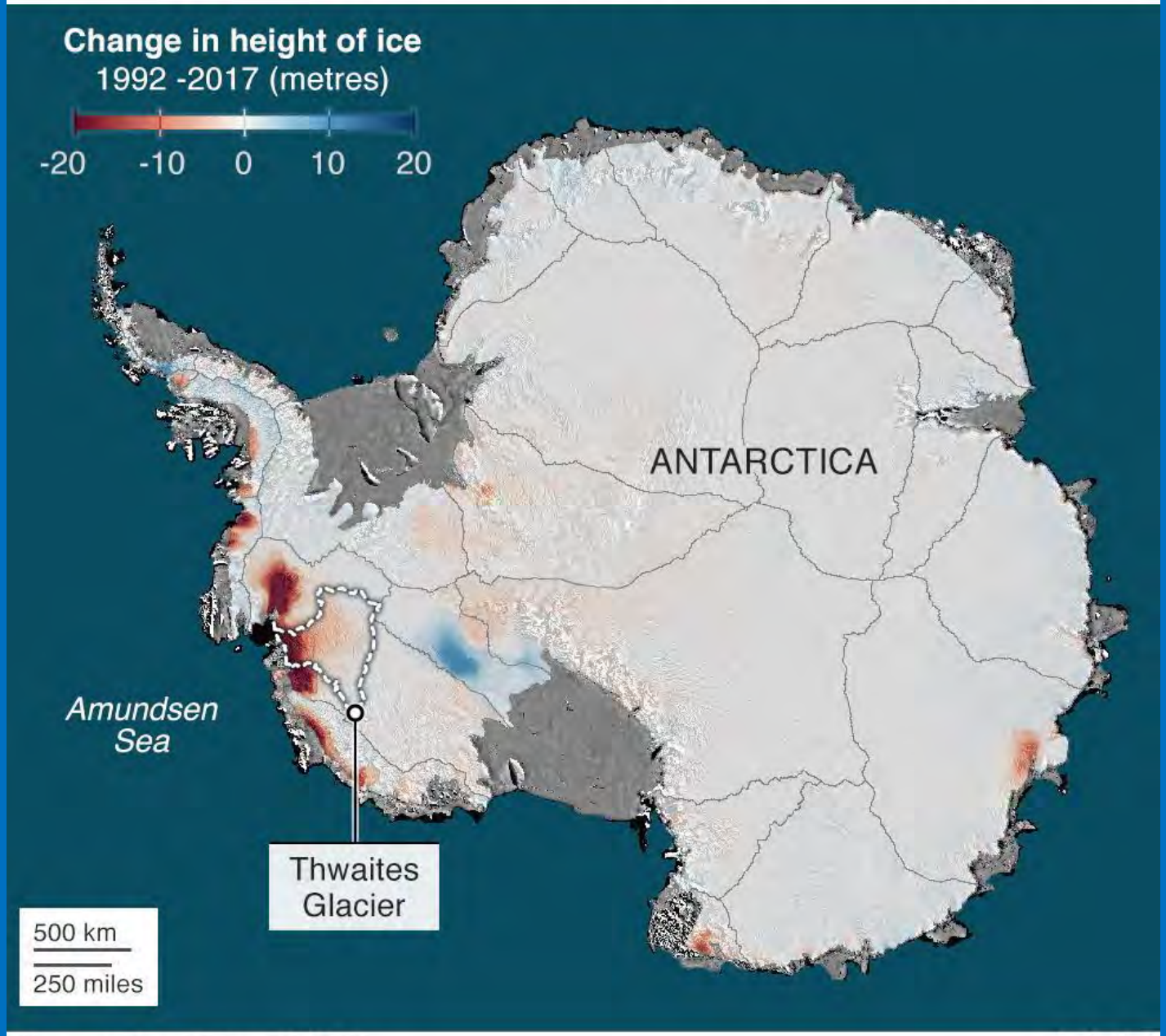
These graphics are from diverse copyrighted sources; circulate but do not publish.

Buttressed by the floating West Antarctic Ice Sheet, so that it remains above today's sea level, although it is not totally supported on land.

Thwaites contains a volume of water, if it were to melt into or slide into the ocean, would raise global sea level by about 60 cm, about two feet.


0°
Pine Island Glacier
90° W
East Antarctica
West Antarctica
90° E
Amundsen Sea
Thwaites Glacier
180°

Ice sheets in West Antarctica have thinned the most



Source: Tom Slater, CPOM

BBC

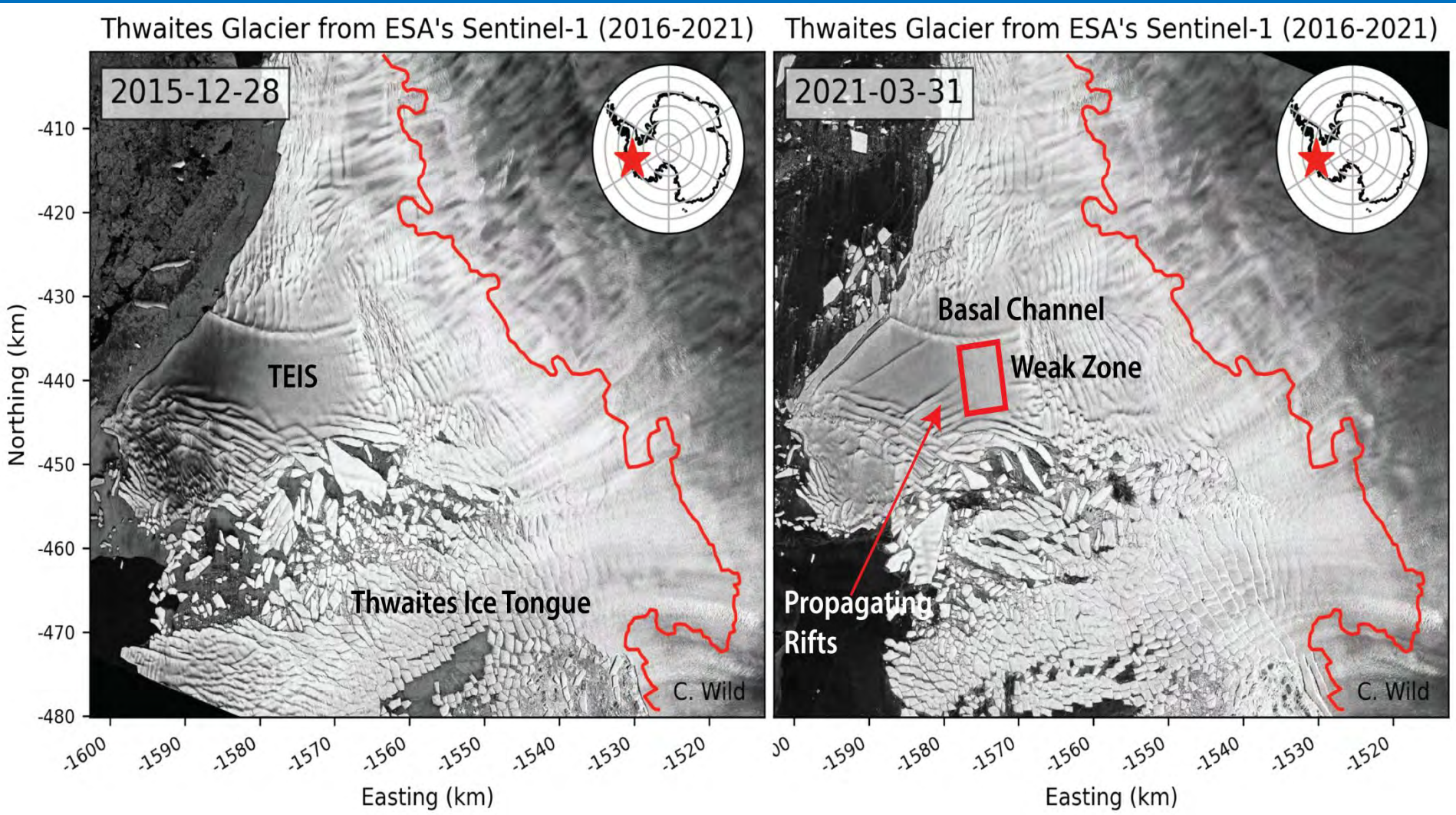
Thwaites Glacier is supported on the Antarctic continental shelf, below sea level. As sea level rises, Thwaites – and other coastal glaciers – are less supported, and will slide downhill and melt faster than now.

Thwaites Glacier, West Antarctica

Pine Island Glacier is above it, in this graphic.

Both are buttressed by the floating West Antarctic Ice Shelf, and Ice Sheet (WAIS) which is melting from below.

Thwaites Glacier is supported on the Antarctic continental shelf, below sea level. As sea level rises, Thwaites – and other coastal glaciers – are less supported, and will slide downhill and melt faster than now.



TEIS: Thwaites Eastern Ice Shelf

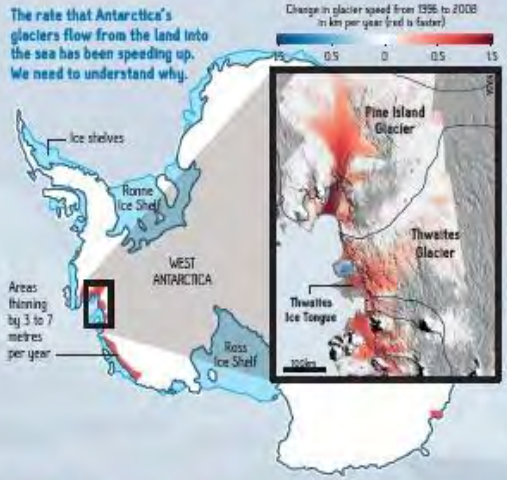
From: AGU, 2021 annual meeting, 13-17 Dec, Pettit, et al, C34A-07


2019-02-13
Thwaites
E-shelf
Glacier
Tongue
Thwaites
20 km
Contains modified
MODIS data provided by NASA
processed by @stefhermitte, TUDelft

INVESTIGATING THWAITES GLACIER

NERC SCIENCE OF THE ENVIRONMENT

The rate that Antarctica's glaciers flow from the land into the sea has been speeding up. We need to understand why.



Thwaites Glacier and Pine Island Glacier are two of the biggest and fastest-retreating in Antarctica. If both collapsed, global sea levels could rise by over a metre. Without them, the entire West Antarctic Ice Sheet could be more likely to collapse, leading global sea levels to rise by over three metres.

A five-year collaboration is investigating what's causing ice loss at Thwaites Glacier and how it will impact global sea levels. This is a joint venture between the U.S. National Science Foundation and the UK's Natural Environment Research Council. The eight projects use a suite of technologies.

RADAR

NERC's Twin Otter aircraft will take radar measurements to look deep below the surface of the ice and build a clear picture of how different layers of ice and the bedrock interact. This is crucial in understanding how climate change will affect large ice sheets.

HOT WATER DRILLS

These sample the seabed beneath floating ice shelves and sediments beneath grounded ice. They also take ice cores from the ice shelf, which will show us what the climate was like in the past.

REMOTE STATIONS

Multi-sensor remote autonomous stations will measure weather, ice conditions, ocean currents and temperature from on top of the ice shelf or on sea ice.

SEISMOMETERS

An array of seismometers will measure conditions under the ice and detect changes in movement, in the same way we monitor earthquakes.

SHIPS

Ships will use sonar to map the seafloor. They will also measure the water's temperature, pressure, density and salinity (saltiness) which tells us about ocean currents.

FROM STABLE GLACIER...

1 A stable glacier is in rough equilibrium. Annually, the snow falling on the glacier replaces the ice flowing into the ocean.

2 The floating part of a glacier, the ice shelf, acts like a cork or dam, holding back the ice upstream.

3 Sediments and water beneath the ice affect its speed – as does how much of the glacier is in contact with the land at the 'grounding line'.

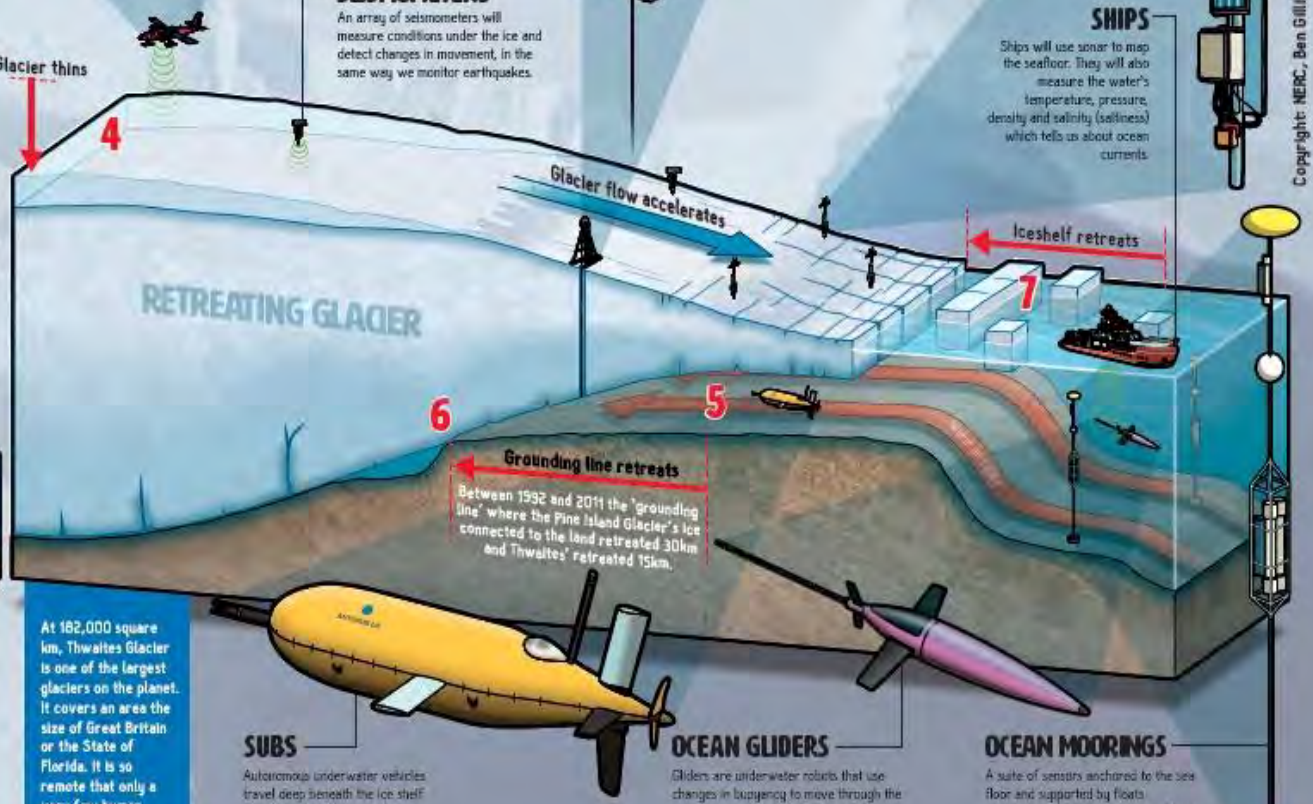
...TO RETREATING GLACIER

4 The equilibrium of the stable glacier is lost. There is no longer enough snowfall to replace the increasing ice flow into the ocean. All the lost ice ends up in the ocean, raising global sea level.

5 Warm currents under the ice increase, melting the floating ice shelf and causing more icebergs.

6 The thinning reduces its effectiveness in damming ice flow.

7 As more of the glacier begins to float the glacier flows faster.



At 182,000 square km, Thwaites Glacier is one of the largest glaciers on the planet. It covers an area the size of Great Britain or the State of Florida. It is so remote that only a very few human beings have ever set foot on it.

SUBS

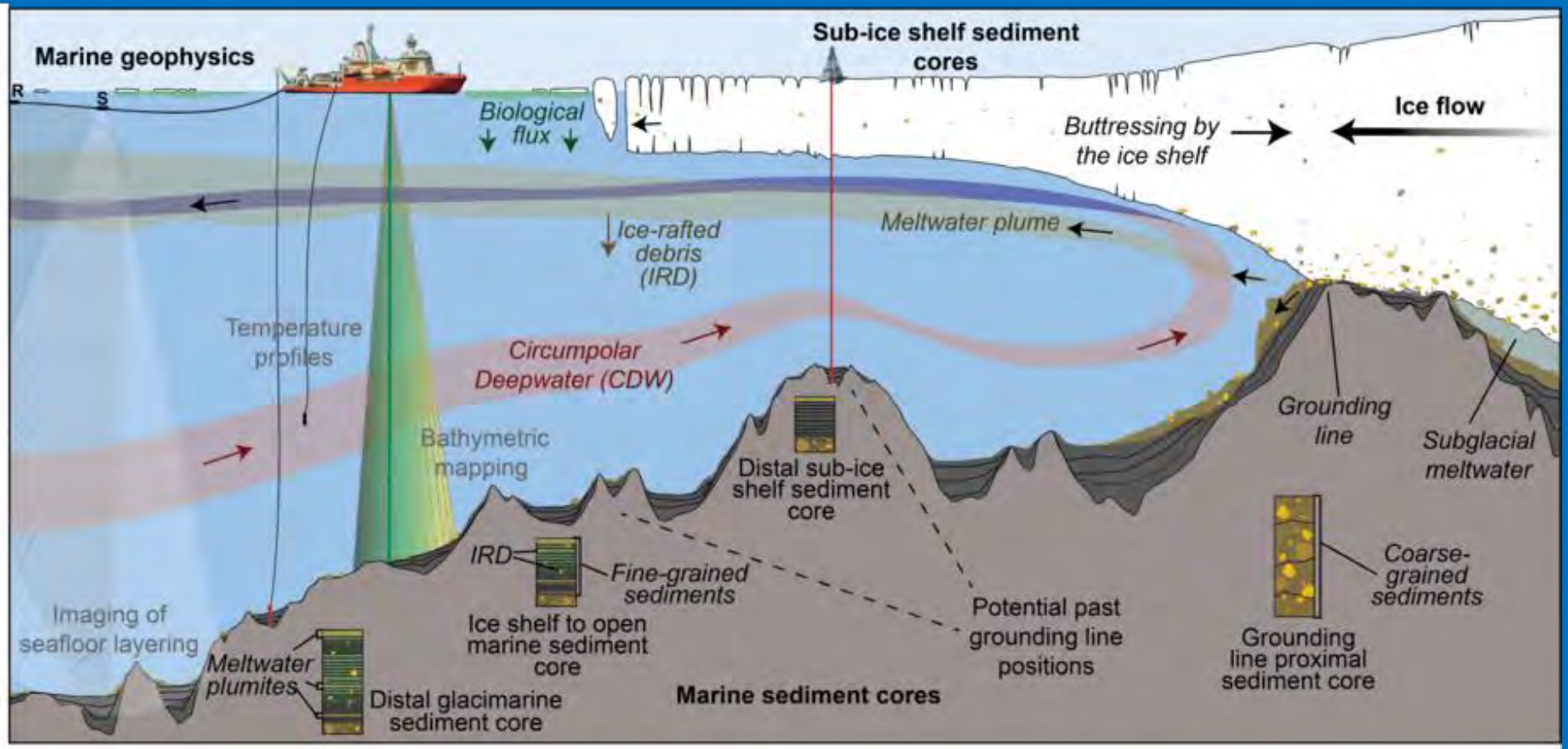
Autonomous underwater vehicles travel deep beneath the ice shelf to investigate cavities under the ice shelf and how a warmer ocean affects them.

OCEAN GLIDERS

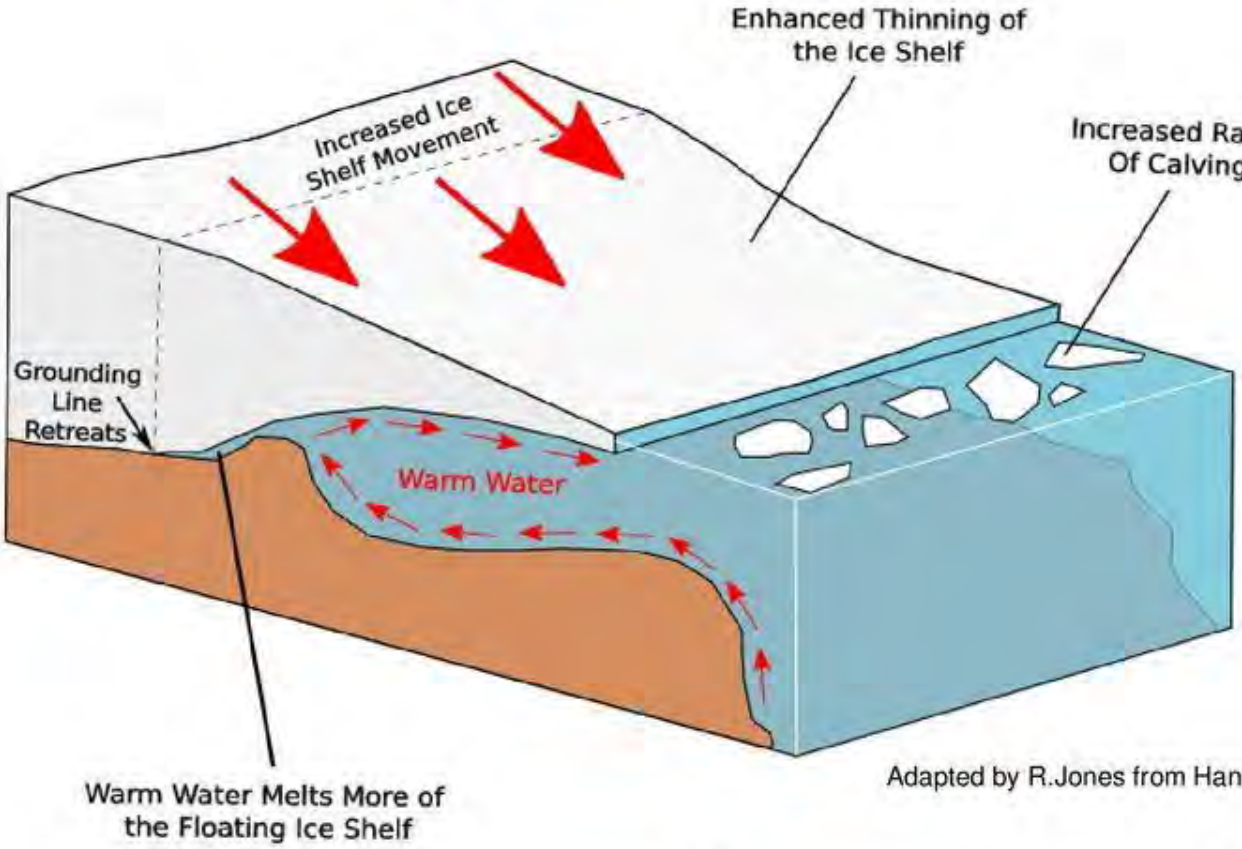
Gliders are underwater robots that use changes in buoyancy to move through the water instead of motors. These will investigate ocean currents by measuring temperature, pressure, density and salinity.

OCEAN MOORINGS

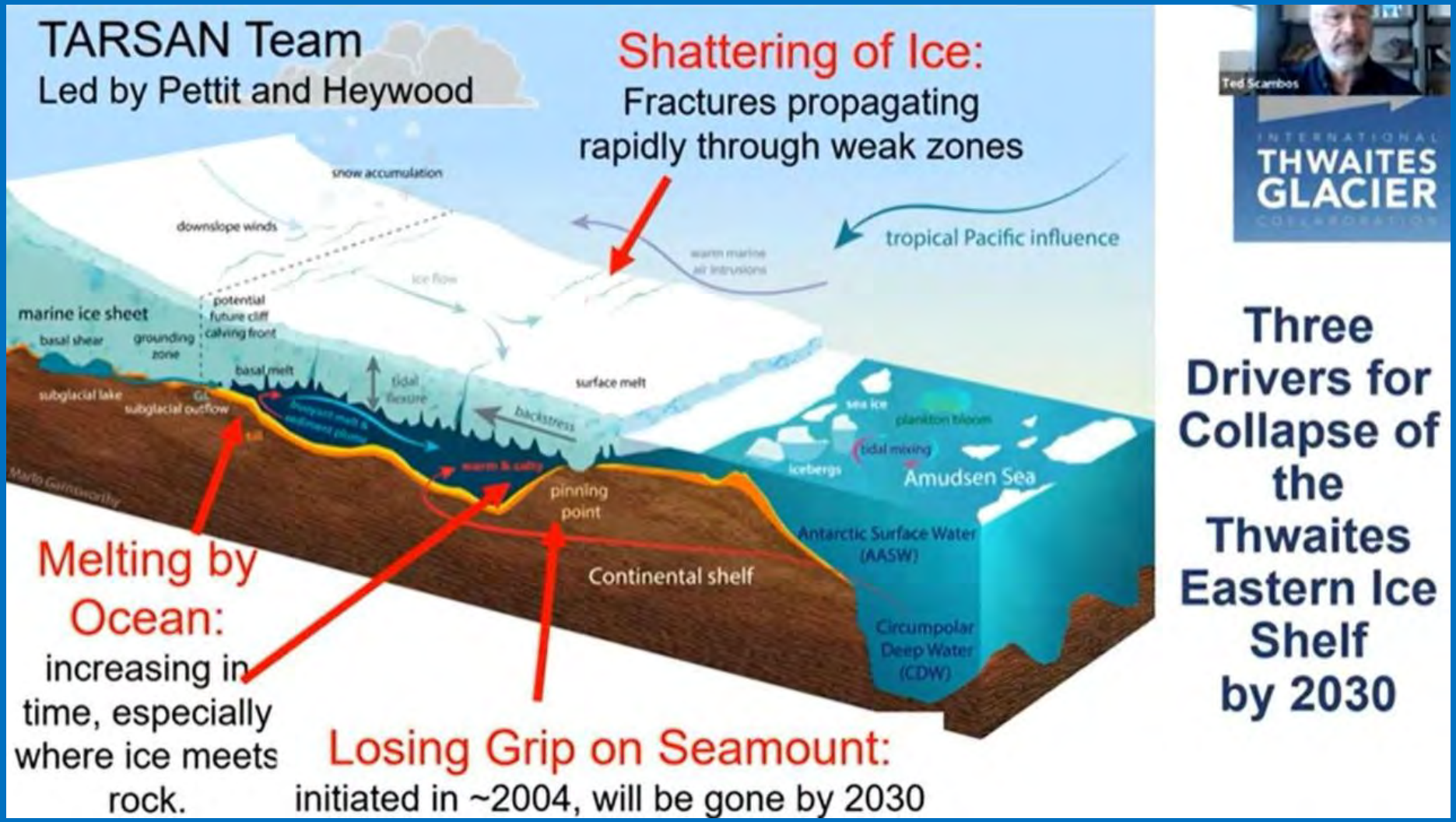
A suite of sensors anchored to the sea floor and supported by floats monitoring water temperature, salinity and density – as well as changes in conditions beneath the glacier.


Marine geophysics
R
S
Sub-ice shelf sediment cores
Biological flux
Buttressing by the ice shelf
Ice flow
Ice-rafted debris (IRD)
Meltwater plume
Temperature profiles
Circumpolar Deepwater (CDW)
Bathymetric mapping
Distal sub-ice shelf sediment core
Grounding line
Subglacial meltwater
IRD
Fine-grained sediments
Coarse-grained sediments
Imaging of seafloor layering
Ice shelf to open marine sediment core
Potential past grounding line positions
Meltwater plumites
Distal glacimarine sediment core
Marine sediment cores
Grounding line proximal sediment core

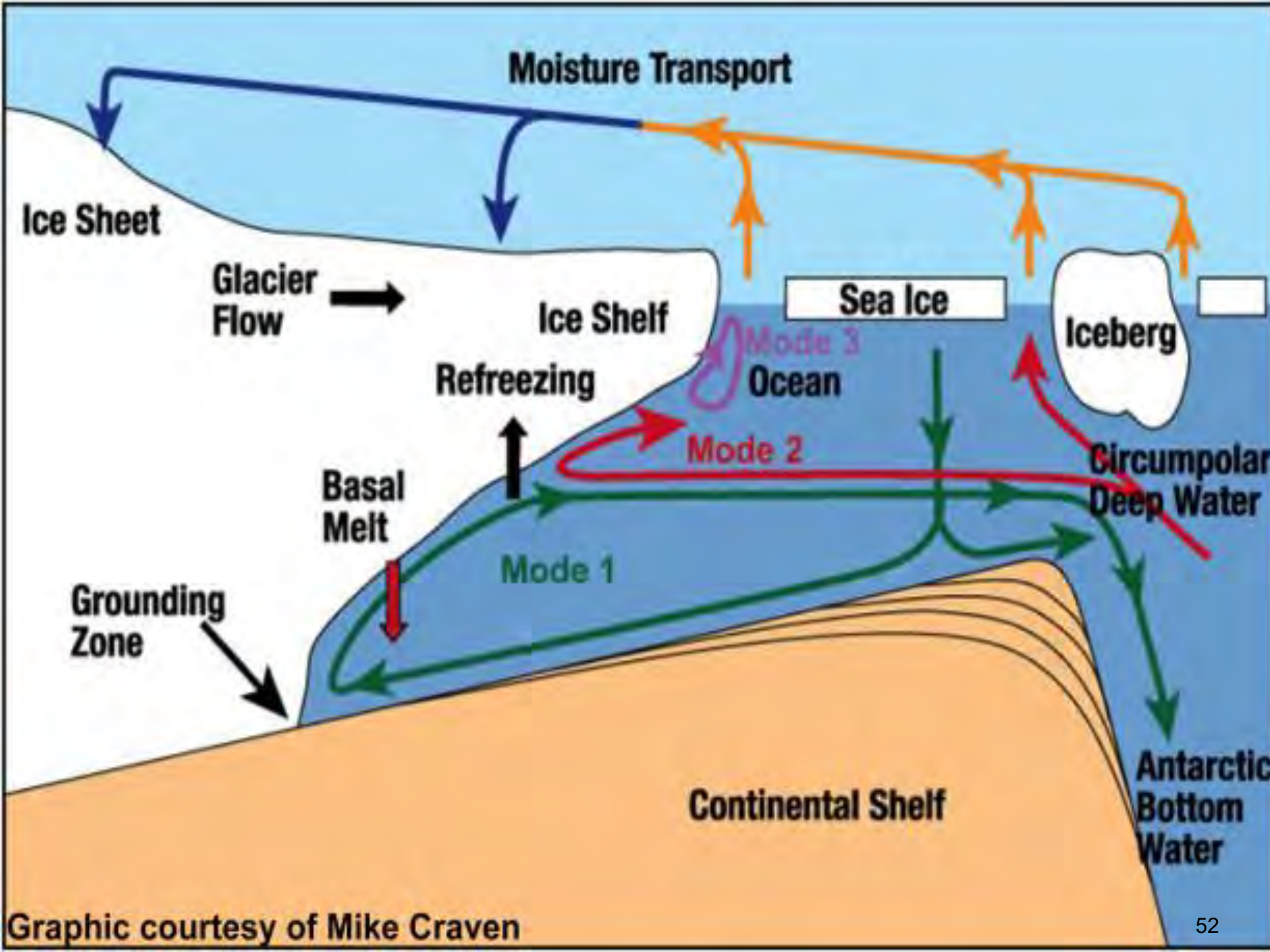
What is MISI?

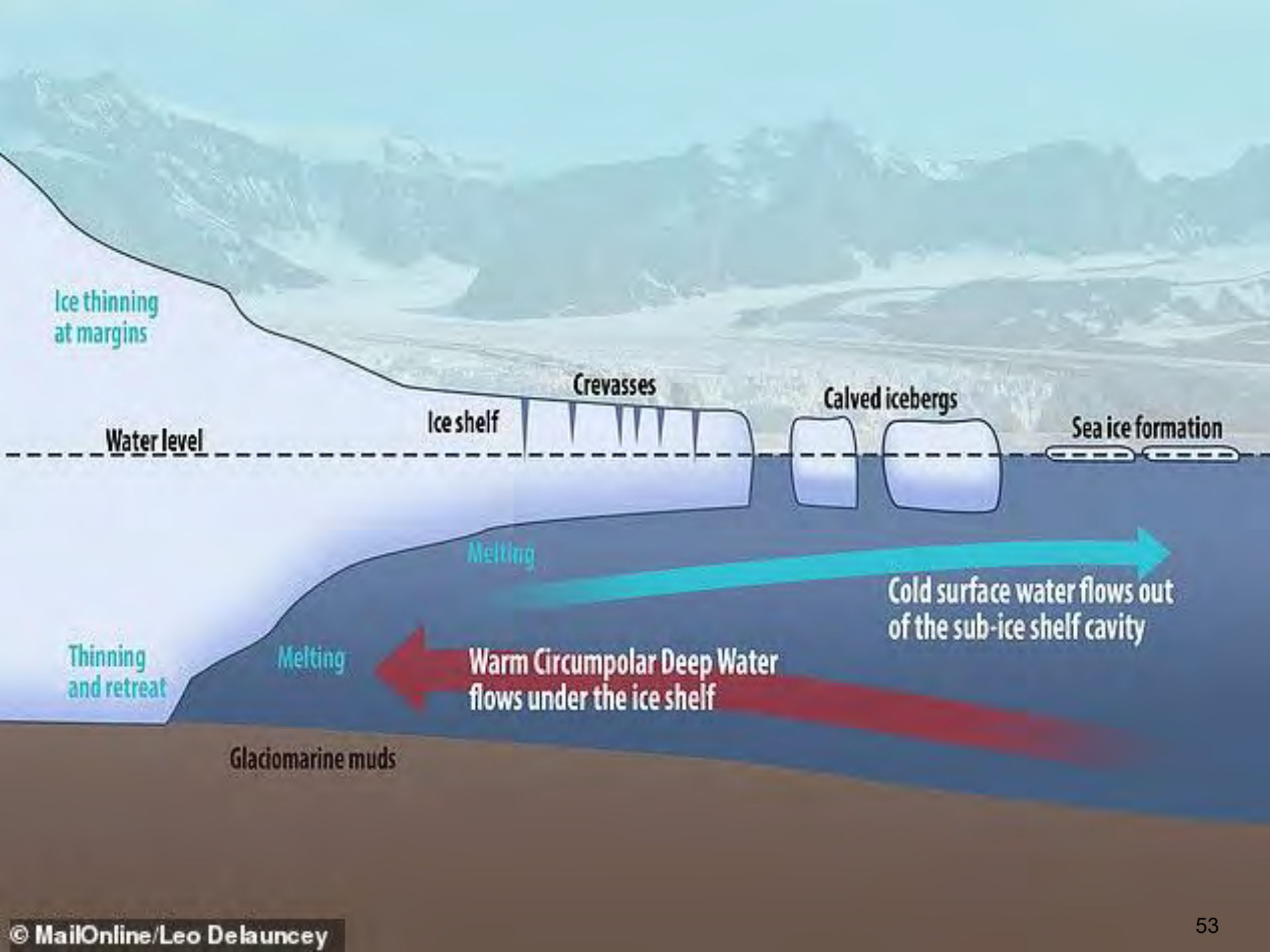


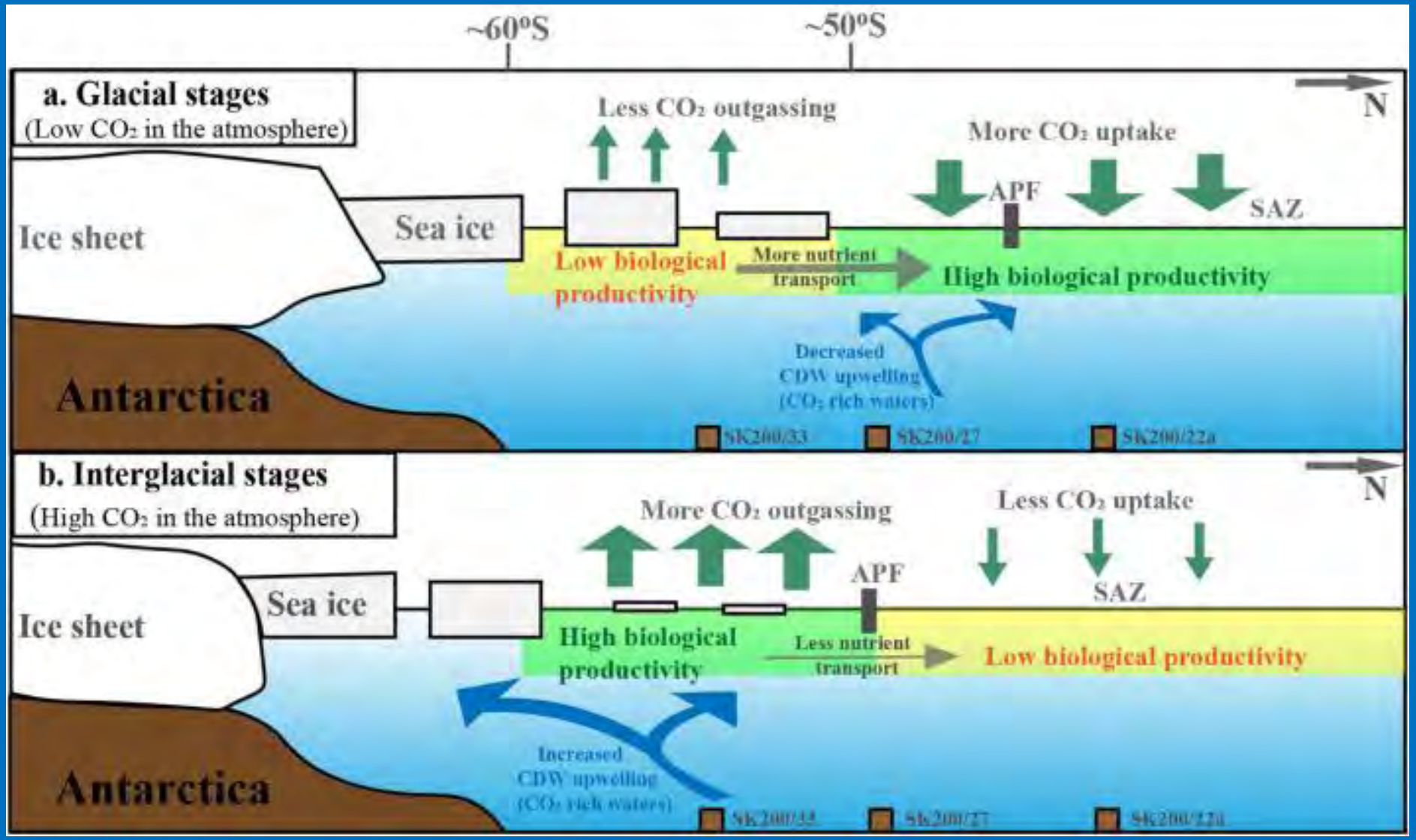
b. Warm water causes a retreat of the grounding line. As the grounding line retreats inland down the slope, an unstable position is reached and the glacier undergoes increased thinning and calving.



Three Drivers for Collapse of the Thwaites Eastern Ice Shelf by 2030


Moisture Transport
Ice Sheet
Glacier Flow
Ice Shelf
Sea Ice
Iceberg
Mode 3
Ocean
Refreezing
Mode 2
Circumpolar Deep Water
Basal Melt
Mode 1
Grounding Zone
Continental Shelf
Antarctic Bottom Water
Graphic courtesy of Mike Craven


Ice thinning at margins
Crevasses
Calved icebergs
Ice shelf
Water level
Sea ice formation
Melting
Cold surface water flows out of the sub-ice shelf cavity
Thinning and retreat
Melting
Warm Circumpolar Deep Water flows under the ice shelf
Glaciomarine muds
© MailOnline/Leo Delauncey


~60°S
~50°S
a. Glacial stages
(Low CO_2 in the atmosphere)
N
Less CO_2 outgassing
More CO_2 uptake
APF
SAZ
Ice sheet
Sea ice
Low biological productivity
More nutrient transport
High biological productivity
Decreased CDW upwelling (CO_2 rich waters)
Antarctica
SK200/33
SK200/27
SK200/22a
b. Interglacial stages
(High CO_2 in the atmosphere)
N
More CO_2 outgassing
Less CO_2 uptake
APF
SAZ
Ice sheet
Sea ice
High biological productivity
Less nutrient transport
Low biological productivity
Increased CDW upwelling (CO_2 rich waters)
Antarctica
SK200/33
SK200/27
SK200/22a

References

Ice shelf: https://en.wikipedia.org/wiki/Ice_shelf Large floating mass of ice

MICI: Marine Ice Cliff Instability

1. https://phys.org/news/2021-12-antarctica-doomsday-glacier-collapse-trigger.html
2. PBS News Hour, 23 Dec 2021 https://www.youtube.com/watch?v=aogMKvzN2x4
3. PBS News Hour, 19 Feb 2020 https://www.youtube.com/watch?v=UQ782Nz2VHs
4. British Antarctic Survey, 13 Dec 2021 https://www.youtube.com/watch?v=KcxpyfVWYFE
5. https://thwaitesglacier.org/
6. https://naturedocumentaries.org/19738/scientists-worried-antarctic-thwaites-glacier-vox/
7. Collapse of Thwaites Eastern Ice Shelf by intersecting fractures. Annual meeting, 13-17 Dec 2021, American Geophysical Union (AGU) https://agu.confex.com/agu/fm21/meetingapp.cgi/Paper/978762

Juneau Total Energy

Bill Leighty, The Leighty Foundation 27-Feb-07

Million gallons (or equivalent) per year

File: JuneauTotalEnergy-27Feb07-REV12Jun08.xls

REV 24-Apr-07

Estimated annual million gallons REV 15-Feb-19

INTERNAL: Purchased and Consumed Within Juneau, 2007

	Estimate million gal	Estimate other units	Estimate million gal
Highway gasoline	9		9
Highway diesel	1		1
Other diesel	1		1
Capital Transit diesel	0.5		0.5
Heating oil	10		10
AvGas	1		1
AvTurbine: Alaska Airlines	2		2
AvTurbine: other	2		2
Marine (AMHS)	3		3
Marine (other)	1		1
Other	1		1
Propane	1		1
TOTAL LIQUID FUELS	32.5		32.5
Electricity (MWh) (see NOTE below)		350,000	9
Pellets and wood (dry tons)		1,000	0.15
TOTAL ENERGY WITHIN (As gallons diesel equivalent)			41.5
(As MWh)			1,642,595

EXTERNAL: Purchased and consumed outside Juneau Economy, 2007

	Annual Million gal	15-Feb-19 2019 Est
Alaska Airlines	5	8
Less Juneau purchases, above	2	2
NET Alaska Airlines	3	6
Barge: Alaska Marine Line + Northland (Samson)	5.2	6
Barge: other	0	0
TOTAL BARGE	5.2	6
Subtotal		12
AMHS	3	3
Cruise Ships	95	**125**
TOTAL OUTSIDE ENERGY	106	140
(As gallons diesel equivalent)	106	
(As MWh)		
TOTAL JUNEAU ENERGY (As gallons diesel equivalent)	147.4	**181.5**
(As MWh)		

Juneau HYDRO	(GWH)	Million gal oil equivalent	2019 Estim
AELP 2007	350	8.8	8.8
AELP 2015	600	15.2	15.2
Internal total		41.5	41.5
External total		106	140.0
TOTAL total		147.39	181.5

NOTE: Electric energy converted to "millions of gallons oil equivalent" at 3,410 btu / kWh and 135,000 btu / gallon

INTERNAL Juneau Internal Energy	
Hiway Gasoline	9
Hiway Diesel	1
Other Diesel	1
CapTransit Diesel	0.5
Heating Oil	10
Av Gas	1
Av Turb AS	2
Av Turb Other	2
AMHS	3
Marine Other	1
Other	1
Propane	1
Electricity	9
Wood	0.15
TOTAL	41.5

EXTERNAL Juneau external energy	
AS (external)	3
Barge	5.2
AMHS	3
Cruise Ships	95
TOTAL	106.2

TOTAL Juneau total energy	
Cruise Ships	95.0
Heat Oil	10.0
Hiway Gas	9.0
Electric	9.0
Barge	5.2
AMHS	3.0
AS (external)	3.0
AMHS	3.0
Av Turb AS	2.0
Av Turb Other	2.0
Hiway Diesel	1.0
Other Diesel	1.0
CapTrans Diesel	0.5
Av Gas	1.0
Marine Other	1.0
Other	1.0
Propane	1.0
Wood	0.2
TOTAL	147.9

@100% conversion efficiency:

1 gal fuel oil = 135000 btu

1 kWh = 3410 btu

Assume 150 gal heat oil equiv per ton

Assume 8 flights / day @ 12,000 lbs fuel each one-way @ 7.5 lbs / gal

BARGE: AML estimate: 40,000 gal tug fuel per round trip;
2 trips/wk AML + 1 trip/wk Northland; share in winter;
estimated 2.5 sailings per week, year-round average;
serve HNS, SGY, YAK

AMHS Total system FY02 (Paul Johnson, AMHS ops) 8.7 million gal total
3 million gals Juneau share

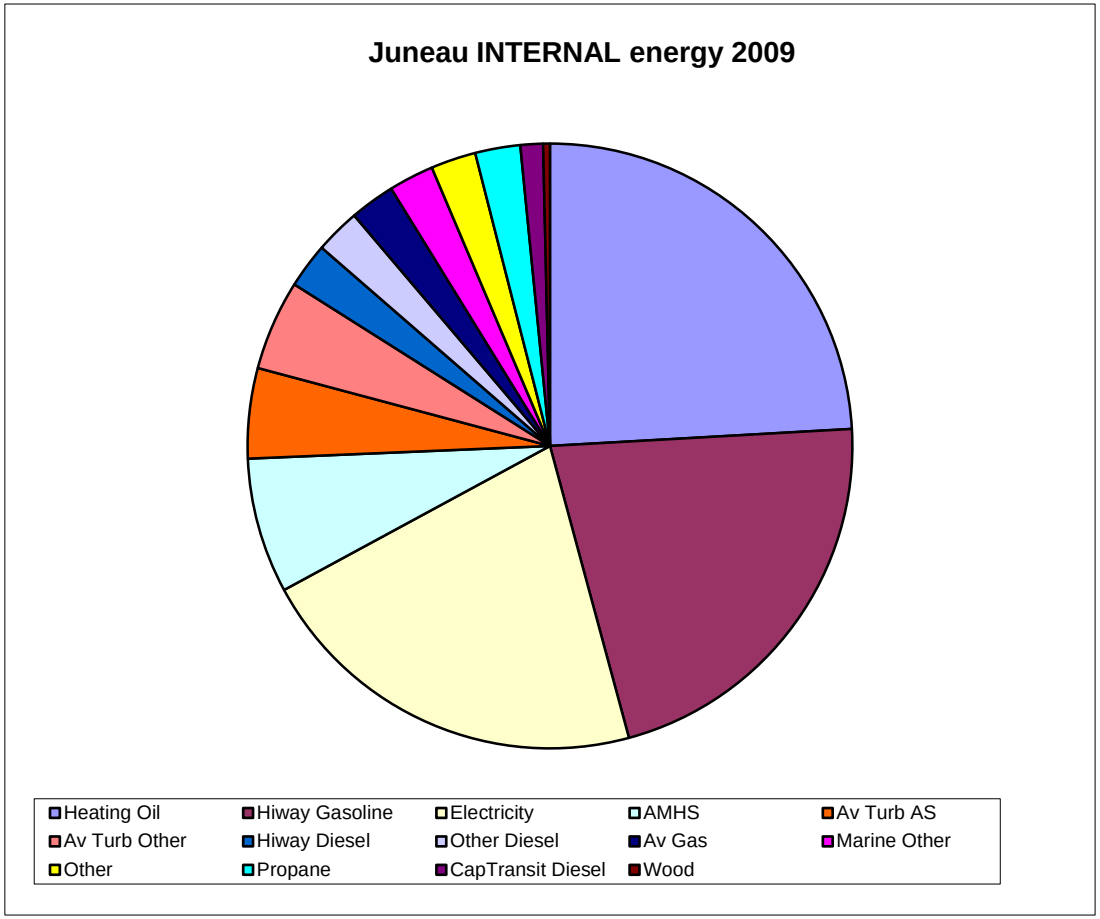
CRUISE SHIPS

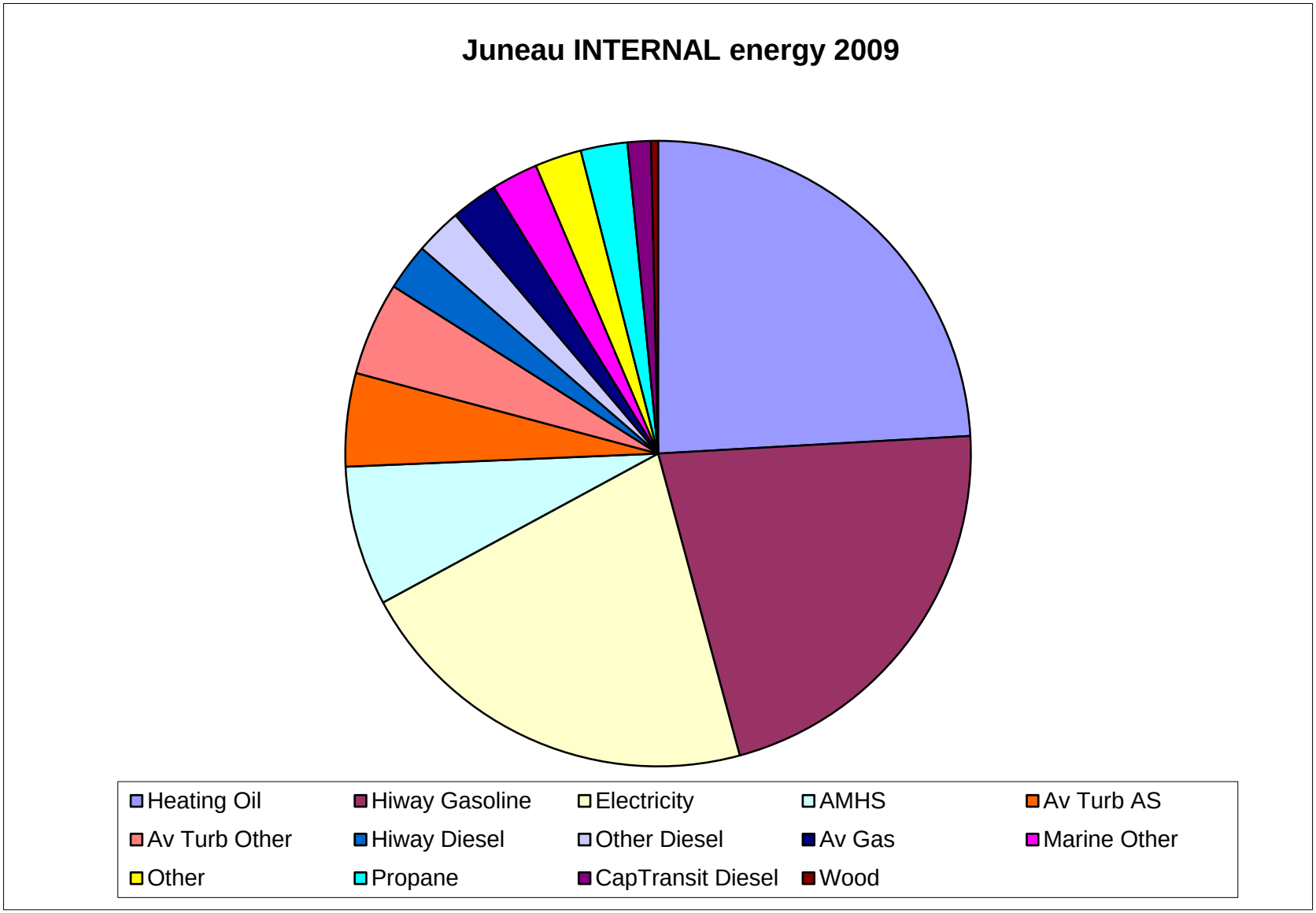
555	total arrivals in Juneau		
########	less small ship arrivals (<140 pax)	5	M gal total annual (guess) total small ships
422	large ship arrivals @ 800 Tons / week =	90	M gal / year
	337,600 Tons = 90 M gal @ 7.5 lbs/gal		
	small ship total (guess) = 5 million gallons		
	Total cruise ships = 90 + 5 = 95	95	M gal / yr

Juneau INTERNAL energy economy

million gallons of oil or oil-equivalent @ 130,000 btu / gal

Heating Oil	0	10.00
Hiway Gasoline	0	9.00
Electricity	0	8.84
AMHS	0	3.00
Av Turb AS	0	2.00
Av Turb Other	0	2.00
Hiway Diesel	0	1.00
Other Diesel	0	1.00
Av Gas	0	1.00
Marine Other	0	1.00
Other	0	1.00
Propane	0	1.00
CapTransit Diesel	0	0.50
Wood	0	0.15
TOTAL	0	41.49
(million gallons oil or equivalent)		



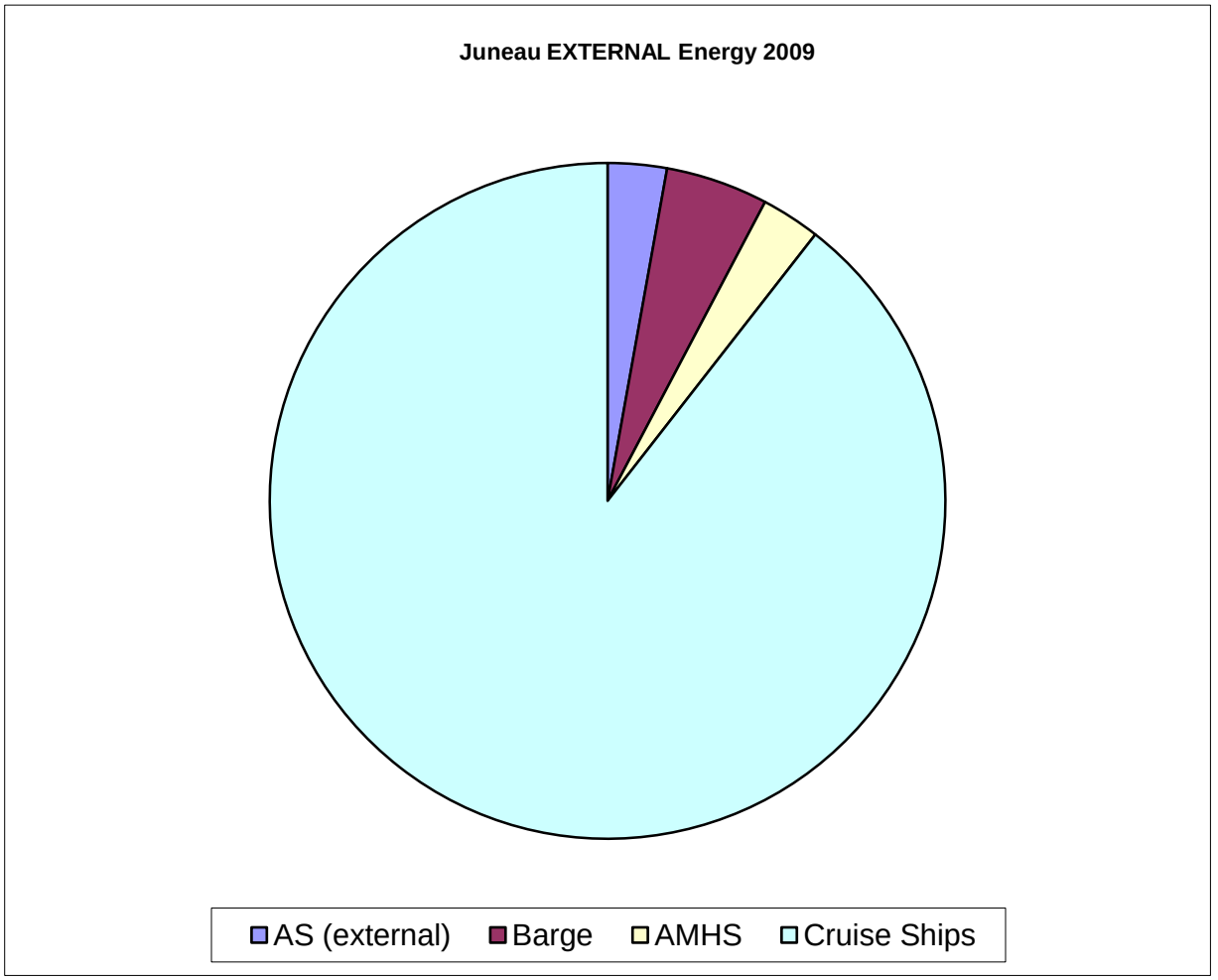

Juneau INTERNAL energy 2009
Heating Oil
Hiway Gasoline
Electricity
AMHS
Av Turb AS
Av Turb Other
Hiway Diesel
Other Diesel
Av Gas
Marine Other
Other
Propane
CapTransit Diesel
Wood

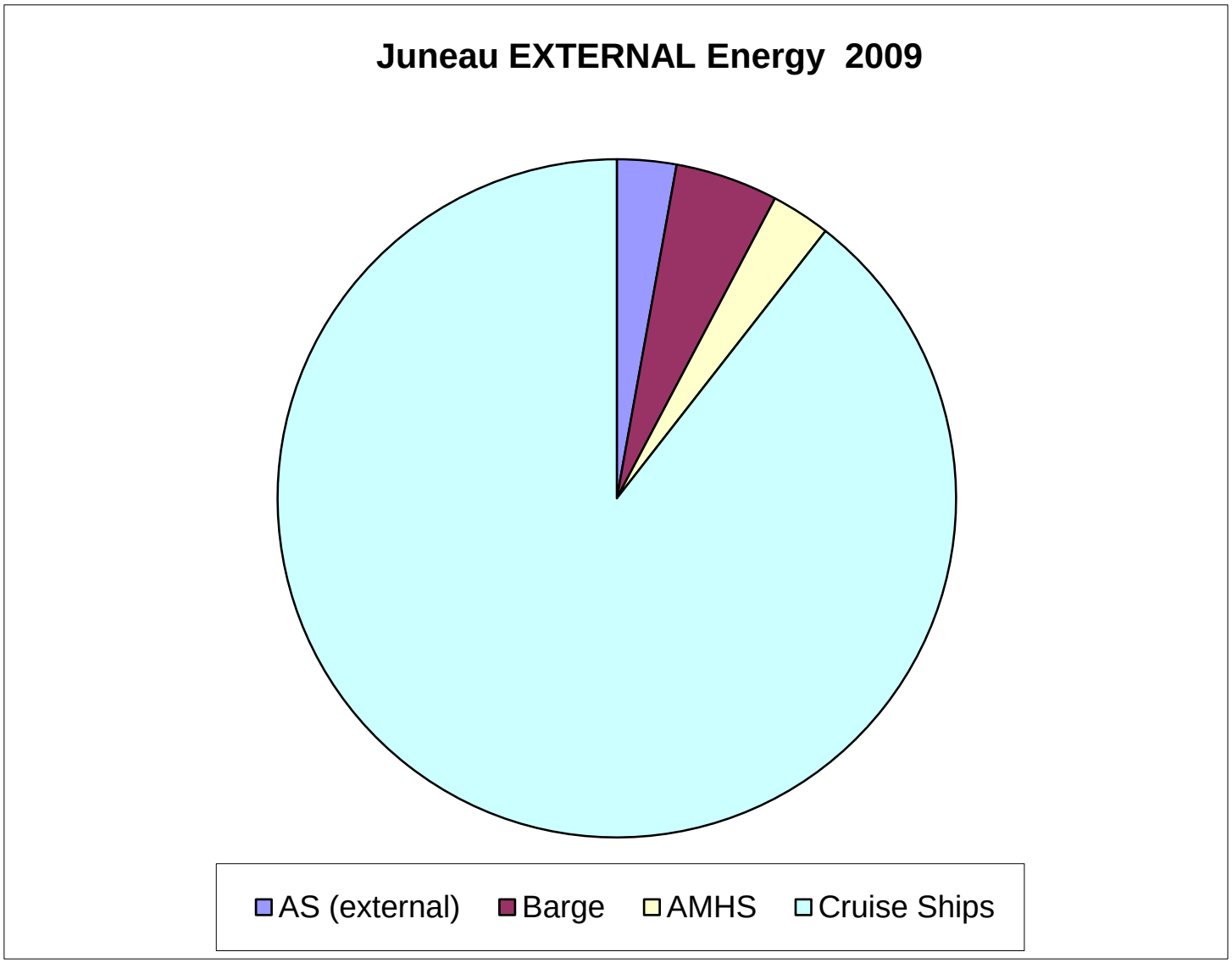
Juneau EXTERNAL energy economy

million gallons of oil or oil-equivalent @ 130,000 btu / gal

EXTERNAL
Juneau external energy

AS (Alaska Airlines)	3
Barge (AML, Northland)	5.2
AMHS (ferry)	3
Cruise Ships	95
TOTAL (million gallons oil or equivalent)	106.2

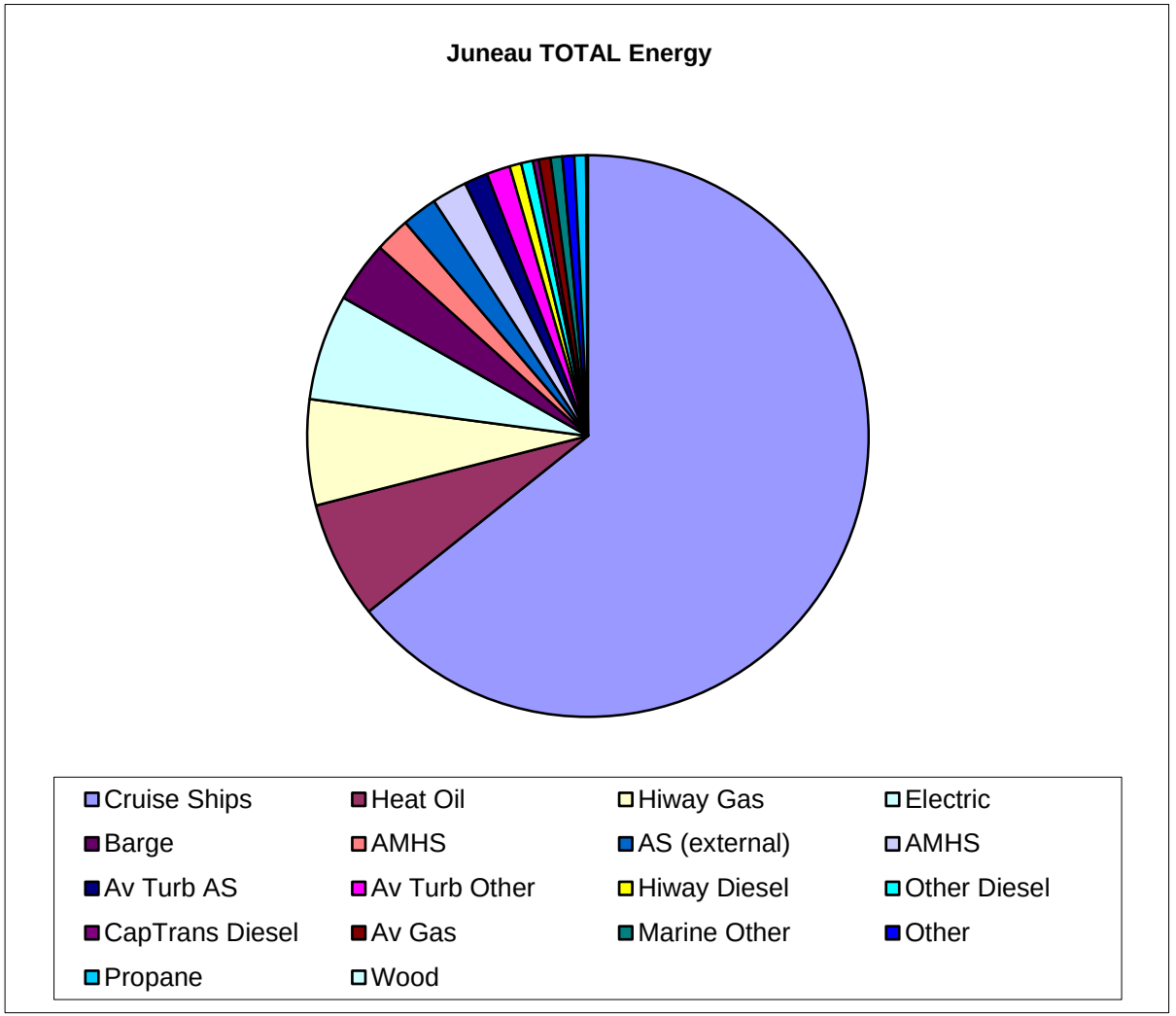



Juneau EXTERNAL Energy 2009
AS (external)
Barge
AMHS
Cruise Ships

Juneau TOTAL energy economy

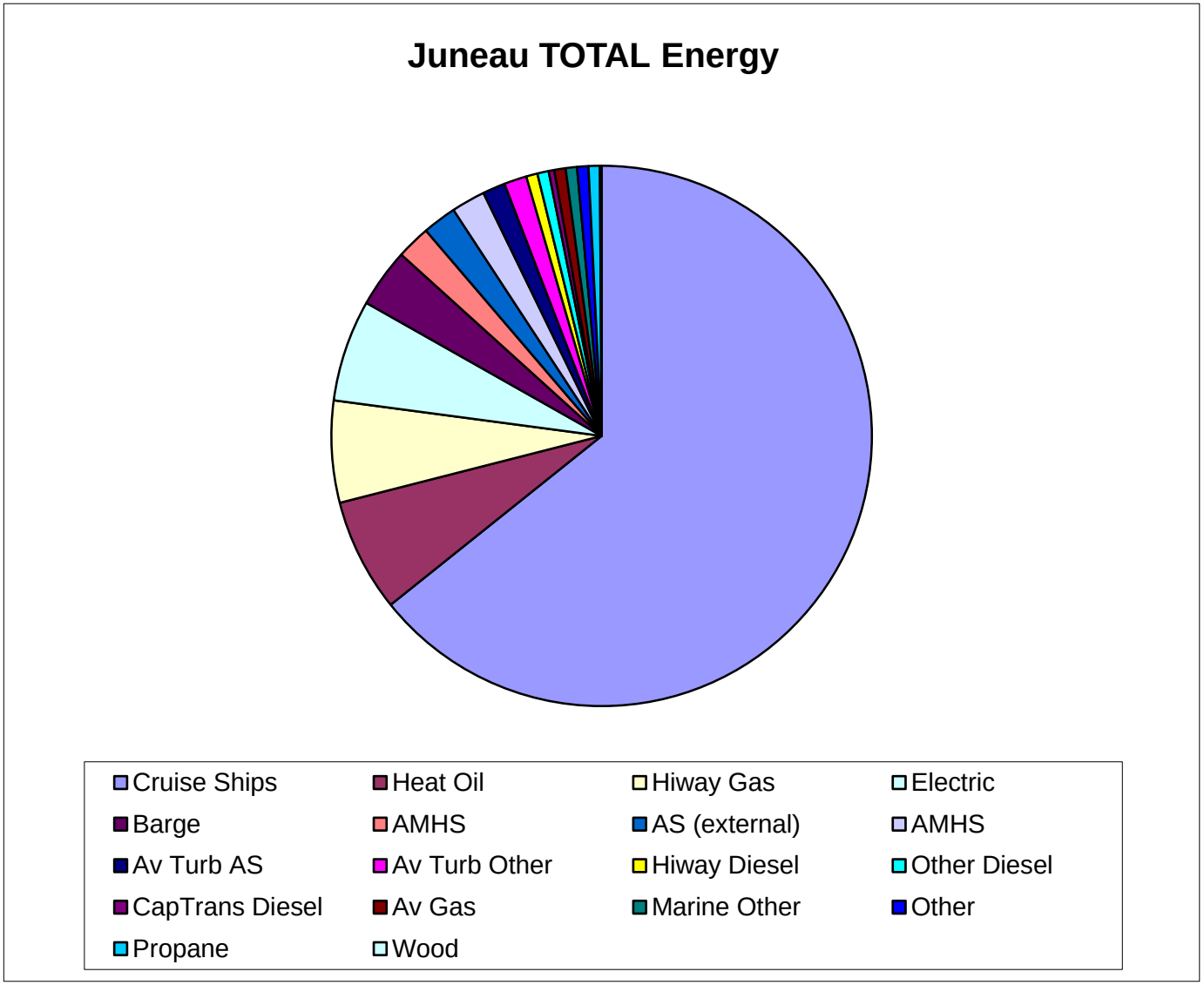
Million gallons (or equivalent) per year

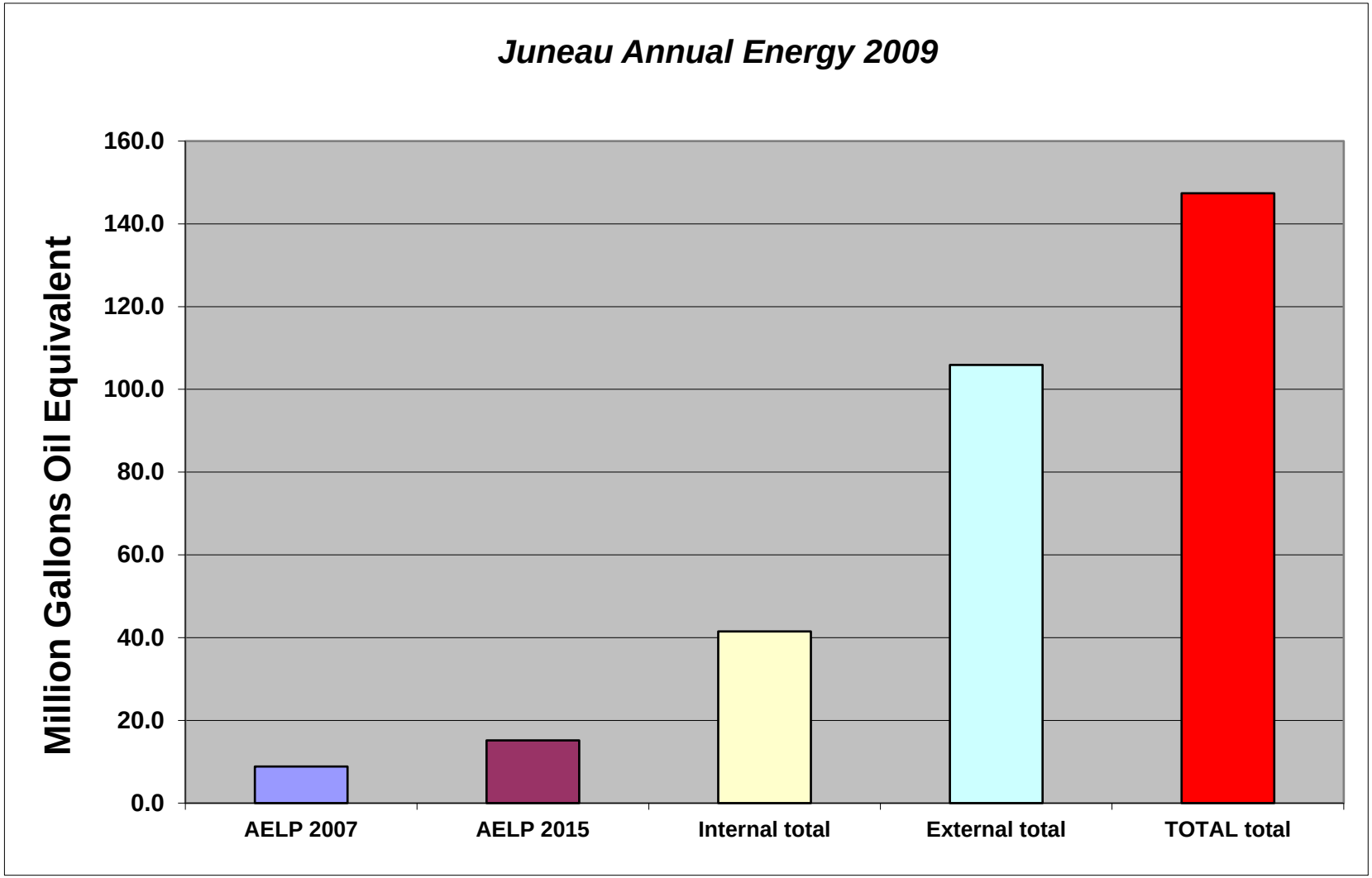
TOTAL Juneau total energy	
Cruise Ships	95.00
Heat Oil	10.00
Hiway Gas	9.00
Electric	9.00
Barge	5.20
AMHS	3.00
AS (external)	3.00
AMHS	3.00
Av Turb AS	2.00
Av Turb Other	2.00
Hiway Diesel	1.00
Other Diesel	1.00
CapTrans Diesel	0.50
Av Gas	1.00
Marine Other	1.00
Other	1.00
Propane	1.00
Wood	0.15
TOTAL	147.85

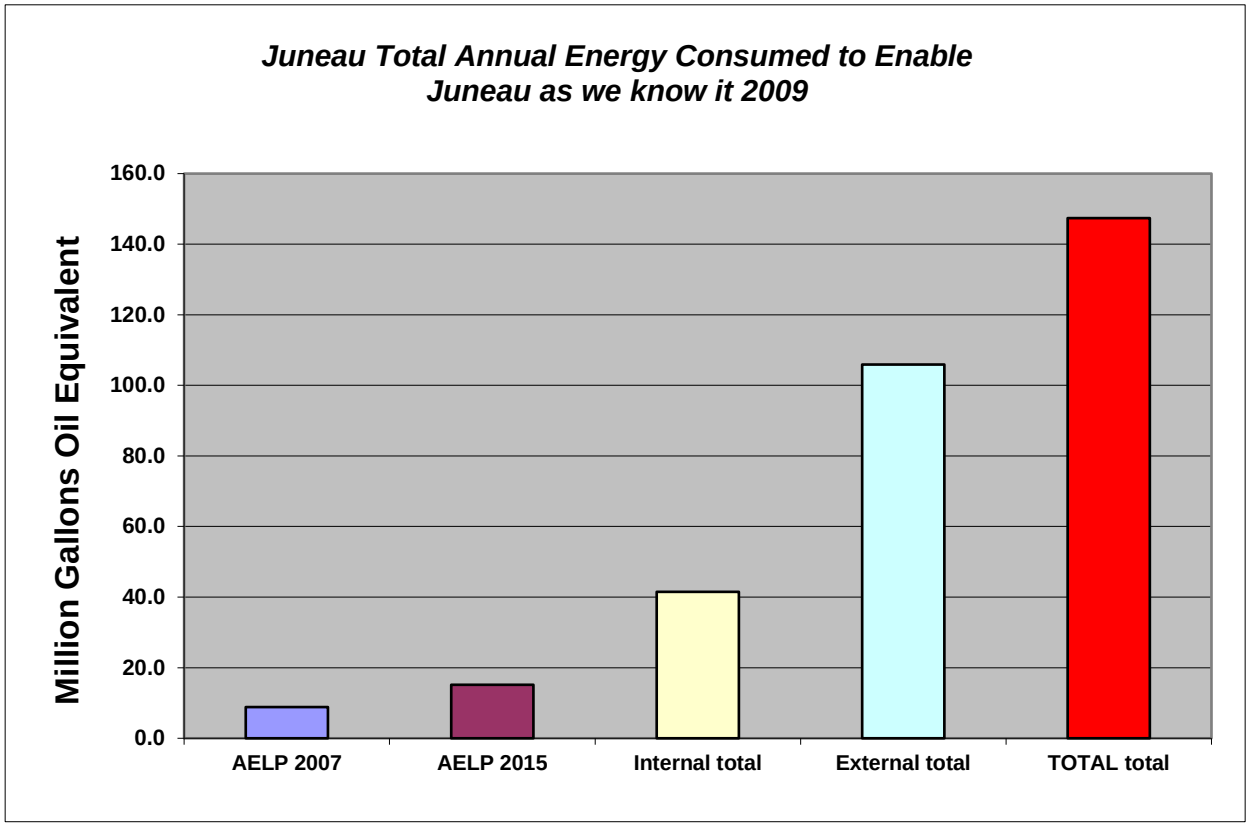


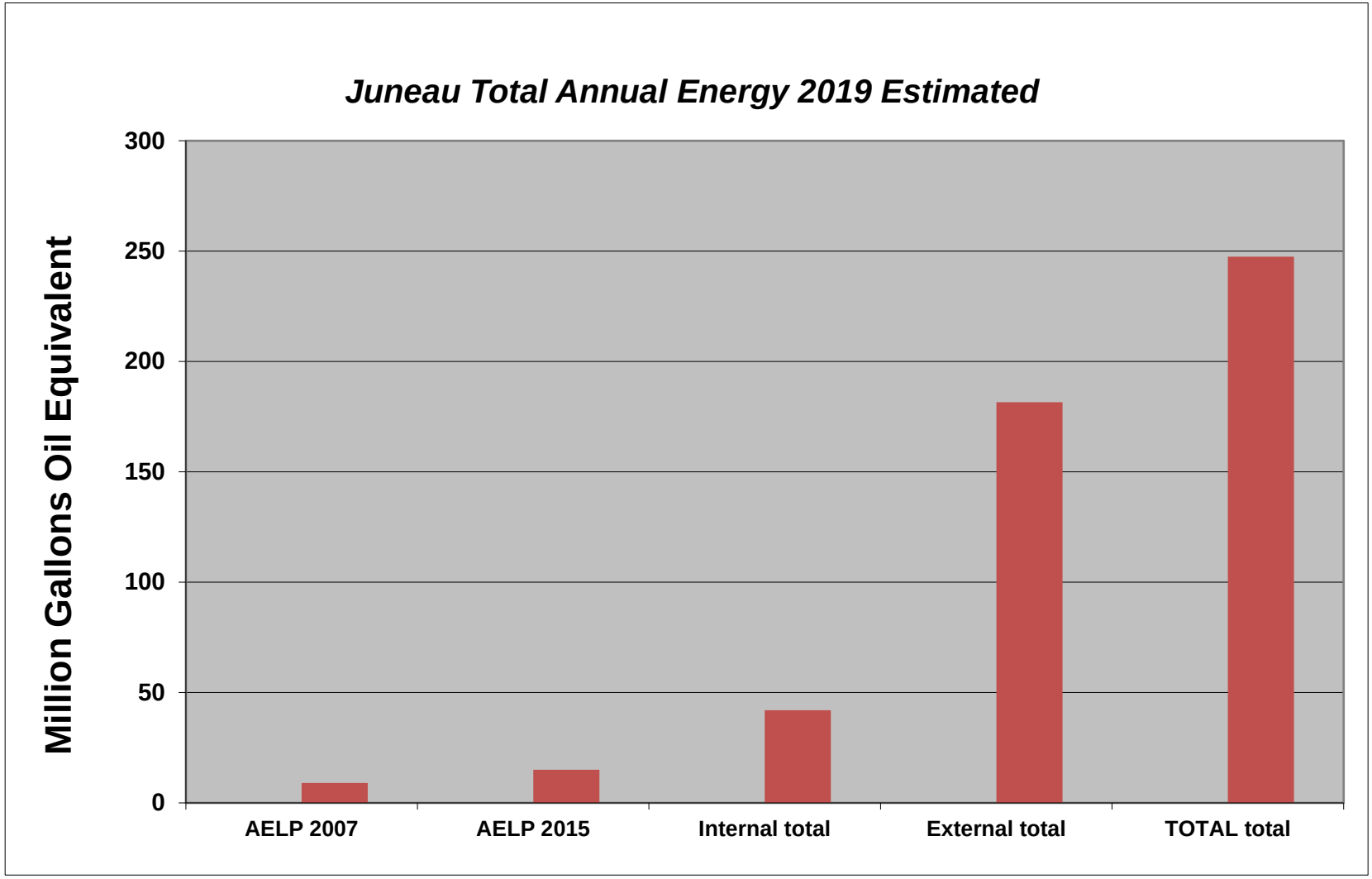
TOTAL ANNUAL		Million gal oil		2019 Est
Juneau HYDRO	(GWH)	equivalent		
AELP 2007	350	8.84		9
AELP 2015	600	15.16		15
Internal total		41.49		42
External total		105.90		181.4907
TOTAL total		147.39		247.4907

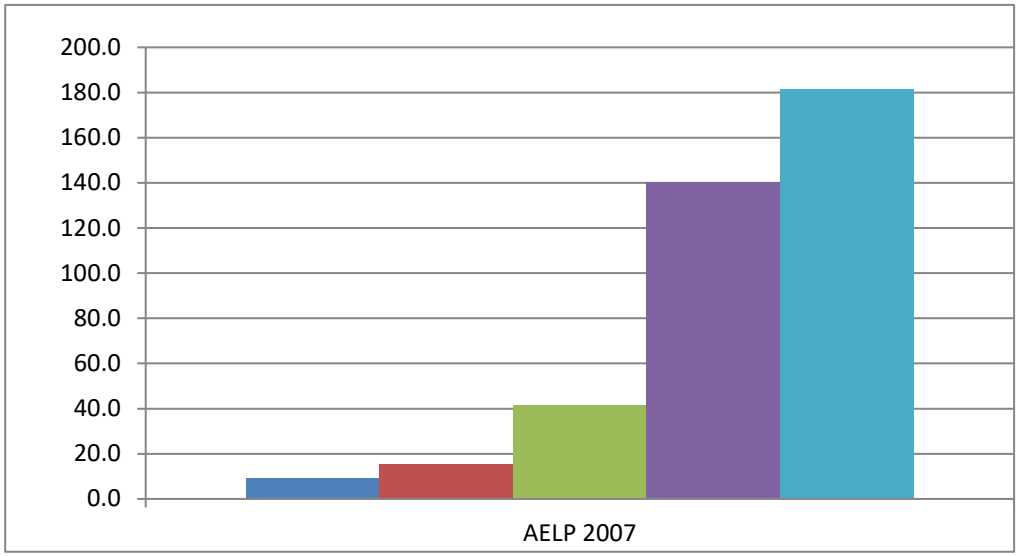
AELP 2007	9
AELP 2015	15
Internal total	42
External total	181.4907
TOTAL total	247.4907

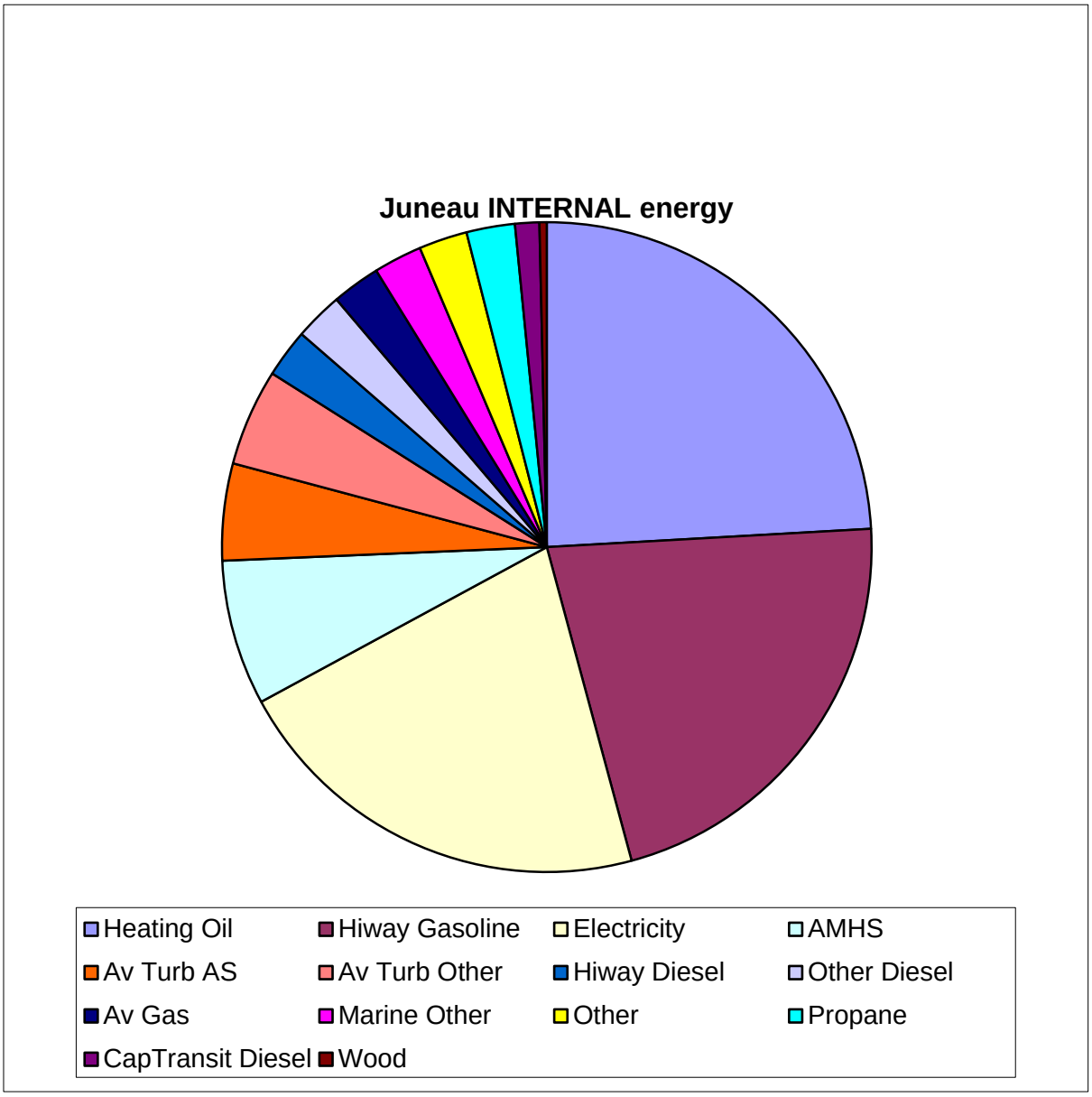

Juneau TOTAL Energy
Cruise Ships
Heat Oil
Hiway Gas
Electric
Barge
AMHS
AS (external)
AMHS
Av Turb AS
Av Turb Other
Hiway Diesel
Other Diesel
CapTrans Diesel
Av Gas
Marine Other
Other
Propane
Wood

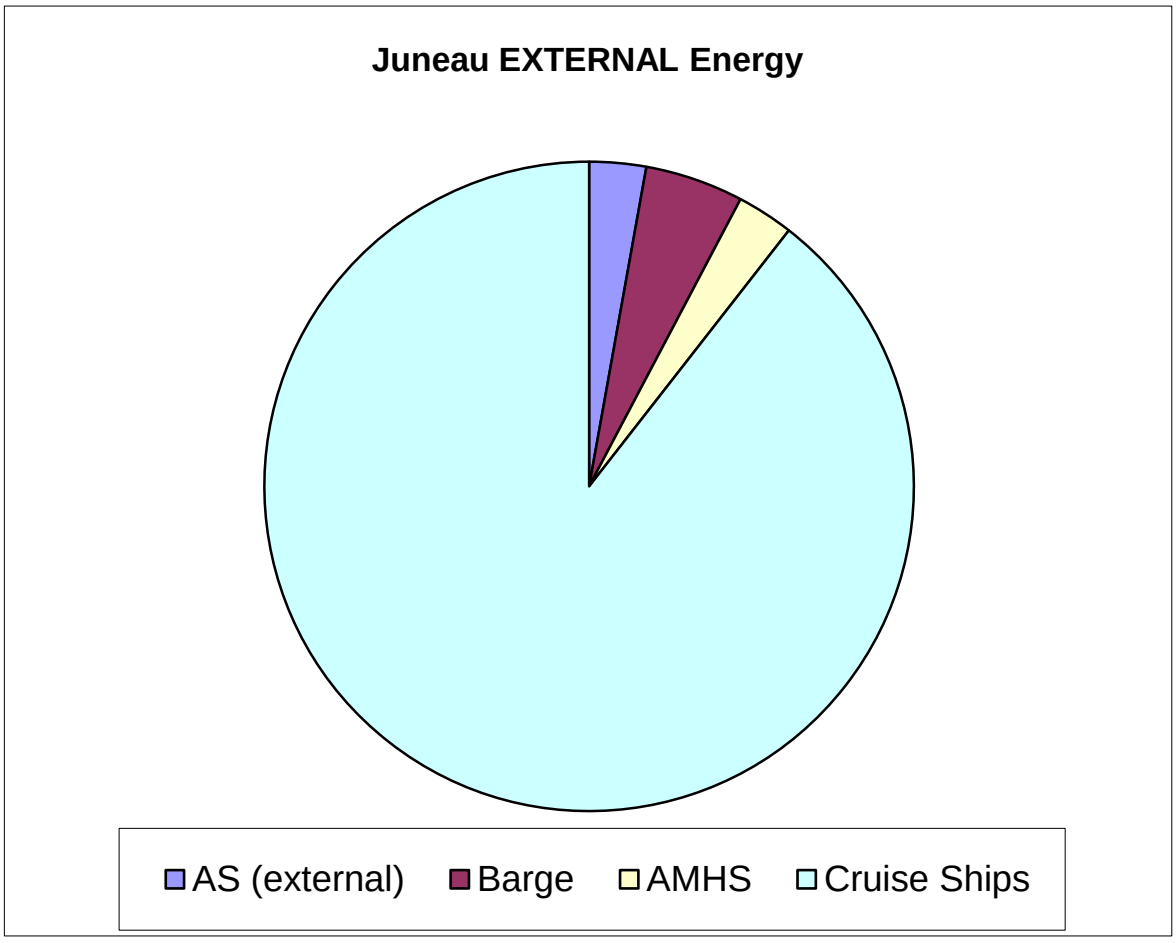

Juneau Annual Energy 2009
Million Gallons Oil Equivalent
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
AELP 2007
AELP 2015
Internal total
External total
TOTAL total


Juneau Total Annual Energy Consumed to Enable
Juneau as we know it 2009
Million Gallons Oil Equivalent
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
AELP 2007
AELP 2015
Internal total
External total
TOTAL total


Juneau Total Annual Energy 2019 Estimated
Million Gallons Oil Equivalent
300
250
200
150
100
50
0
AELP 2007
AELP 2015
Internal total
External total
TOTAL total


200.0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
AELP 2007


Juneau INTERNAL energy
Heating Oil
Hiway Gasoline
Electricity
AMHS
Av Turb AS
Av Turb Other
Hiway Diesel
Other Diesel
Av Gas
Marine Other
Other
Propane
CapTransit Diesel
Wood


Juneau EXTERNAL Energy
AS (external)
Barge
AMHS
Cruise Ships

AMHS 2007 total gallons purchased FY 2007

Source: Cathy Belfry Date: 13-Nov-07

Program Budget Analyst III
Alaska Marine Highway System
907-228-7266
catherine.belfry@alaska.gov

FYE

Vessel	Gallons Purchased
Aurora	787,636
Chenega	833,925
Columbia	2,191,440
Fairweather	1,338,450
Kennicott	2,174,007
LeConte	618,758
Lituya	107,979
Malaspina	959,460
Matanuska	1,631,961
Taku	1,004,071
Tustumena	882,007
TOTAL	12,529,694

Vessel	Annual Gallons
Aurora	787,636
Chenega	833,925
Columbia	2,191,440
Fairweather	1,338,450
Kennicott	2,174,007
LeConte	618,758
Lituya	107,979
Malaspina	959,460
Matanuska	1,631,961
Taku	1,004,071
Tustumena	882,007
TOTAL	12,529,694

Alaska Airlines (AS) 2007

From published flight schedules obtained from JNU station by W. Leighty, with thanks to JNU staff

REV	1-Nov-07
Jet-A lbs / gallon =	6.84
Per cent total fuel bou	20 (guess)

SEASON		FLIGHT	FROM	STOPS BEFORE JUNEAU	STOPS AFTER JUNEAU	TO	DAYS PER WEEK	DAYS PER SEASON	# FLIGHT SEGMENTS	AVG PER SEGMENT FUEL USE LBS	AVG PER SEGMENT FUEL USE GALS	AVG PER DAY FUEL USE LBS	AVG PER DAY FUEL USE GALS	AVG PER SEASON FUEL USE LBS	AVG PER SEASON FUEL USE GALS	NOTES
SPRING 07		7084	ANC			JNU	1		1	9,000	1,316	9,000	1,316	45,000	6,579	WED only
(28 Apr - 2 Jun)		7083	JNU			ANC	1		1	9,000	1,316	9,000	1,316	45,000	6,579	WED only
# days =	35	7082	ANC			ANC	7		2	9,000	1,316	18,000	2,632	630,000	92,105	XMO orig WED, FRI
		60	RON		KTN	SEA	7		2	6,000	877	12,000	1,754	420,000	61,404	
		73	SIT			ANC	7		2	5,000	731	10,000	1,462	350,000	51,170	
		72	RON			SEA	7		1	11,000	1,608	11,000	1,608	385,000	56,287	
		68	SEA		SIT	SEA	7		3	7,000	1,023	21,000	3,070	735,000	107,456	
		62	FAI	ANC	SIT, KTN	SEA	7		5	3,000	439	15,000	2,193	525,000	76,754	
		61	SEA		YAK, CDV	ANC	7		4	5,000	731	20,000	2,924	700,000	102,339	
		65	SEA	KTN, WRG, PSG		ANC	7		5	4,000	585	20,000	2,924	700,000	102,339	
		75	SEA			JNU	7		1	11,000	1,608	11,000	1,608	385,000	56,287	
		76	JNU			SEA	7		1	11,000	1,608	11,000	1,608	385,000	56,287	
		64	ANC		PSG, WR(	SEA	7		5	4,000	585	20,000	2,924	700,000	102,339	
		7062	SEA	KTN		JNU	1		2	6,000	877	12,000	1,754	60,000	8,772	SUN only
		7062	JNU		SIT	SEA	1		2	6,000	877	12,000	1,754	60,000	8,772	SUN only
		7067	SEA	KTN, SIT		JNU	7		3	4,000	585	12,000	1,754	420,000	61,404	XSU RON TUES, THURS
		7067	JNU			SEA	7		1	11,000	1,608	11,000	1,608	385,000	56,287	
		67	SEA	KTN, SIT		ANC	7		4	5,000	731	20,000	2,924	700,000	102,339	
		66	ANC	CDV, YAK		SEA	7		4	5,000	731	20,000	2,924	700,000	102,339	
		79	SEA			SIT	7		2	6,000	877	12,000	1,754	420,000	61,404	
		69	SEA	KTN		RON	7		2	6,000	877	12,000	1,754	420,000	61,404	
		70	ANC			RON	7		1	9,000	1,316	9,000	1,316	315,000	46,053	
					SEASON TOTALS							307,000	44,883	9,485,000	1,386,696	
					# Flights (arr + dep) pe		21									
SUMMER																
(3 Jun - 8 Sep)		7082	ANC			ANC	7		2	9,000	1,316	18,000	2,632	1,800,000	263,158	Cargo XMO ??
# days =	100	196	ORIG			SEA	7		1	11,000	1,608	11,000	1,608	1,100,000	160,819	
		60	ORIG		KTN	SEA	7		2	6,000	877	12,000	1,754	1,200,000	175,439	
		72	SIT			SEA	7		1	11,000	1,608	11,000	1,608	1,100,000	160,819	
		73	ORIG			ANC	7		2	5,000	731	10,000	1,462	1,000,000	146,199	
		68	SEA		SIT	SEA	7		3	7,000	1,023	21,000	3,070	2,100,000	307,018	XSA ??
		61	SEA		YAK, CDV	ANC	7		4	5,000	731	20,000	2,924	2,000,000	292,398	
		78	SEA	SIT		SEA	1		3	7,500	1,096	22,500	3,289	321,429	46,992	SAT only
		62	ANC		SIT, KTN	SEA	7		5	3,000	439	15,000	2,193	1,500,000	219,298	
		165	SEA			JNU	1		1	11,000	1,608	11,000	1,608	157,143	22,974	SAT only
		166	JNU			SEA	1		1	11,000	1,608	11,000	1,608	157,143	22,974	SAT only
		65	SEA	KTN, WRG, PSG		ANC	7		5	4,000	585	20,000	2,924	2,000,000	292,398	
		75	SEA			JNU	7		1	11,000	1,608	11,000	1,608	1,100,000	160,819	
		76	JNU			SEA	7		1	11,000	1,608	11,000	1,608	1,100,000	160,819	
		59	SEA			JNU	7		1	11,000	1,608	11,000	1,608	1,100,000	160,819	
		56	JNU			SEA	7		1	11,000	1,608	11,000	1,608	1,100,000	160,819	
		64	ANC		PSG, WR(	SEA	7		5	4,000	585	20,000	2,924	2,000,000	292,398	
		71	SEA		(JNU)	GST	7		2	12,000	1,754	24,000	3,509	2,400,000	350,877	Last day 31 Aug
		77	GST		(JNU)	ANC	7		2	10,000	1,462	20,000	2,924	2,000,000	292,398	
		67	SEA	KTN, SIT		ANC	7		4	5,000	731	20,000	2,924	2,000,000	292,398	
		66	ANC	CDV, YAK		SEA	7		4	5,000	731	20,000	2,924	2,000,000	292,398	
		74	ANC			RON	1		1	9,000	1,316	9,000	1,316	128,571	18,797	SAT only
		70	ANC			RON	7		1	9,000	1,316	9,000	1,316	900,000	131,579	XSA ??
		79	SEA			SIT	7		2	6,000	877	12,000	1,754	1,200,000	175,439	
		69	SEA	KTN		RON	7		2	6,000	877	12,000	1,754	1,200,000	175,439	
		171	SEA			JNU	7		1	11,000	1,608	11,000	1,608	1,100,000	160,819	
		172	JNU			SEA	7		1	11,000	1,608	11,000	1,608	1,100,000	160,819	
		7062	SEA	KTN	(JNU, SIT)	SEA	1		5	5,000	731	25,000	3,655	357,143	52,214	SUN only
		7067	SEA	KTN, SIT	(JNU)	ANC	7		4	5,500	804	22,000	3,216	2,200,000	321,637	XSU ??
					SEASON TOTALS							441,500	64,547	37,421,429	5,470,969	
					# Flights (arr + dep) pe		29									

RON
XMO
XSA
XSU

WINTER

(9 Sep - 27 Apr)		60	ORIG		KTN	SEA	7	2	6,000	877	12,000	1,754	2,760,000	403,509
# days =	230	73	SIT			ANC	7	2	5,000	731	10,000	1,462	2,300,000	336,257
		61	SEA		YAK, CDV	ANC	7	4	5,000	731	20,000	2,924	4,600,000	672,515
		62	FAI	ANC	SIT, KTN	SEA	7	5	3,000	439	15,000	2,193	3,450,000	504,386
		65	SEA	KTN, WRG, PSG		ANC	7	5	4,000	585	20,000	2,924	4,600,000	672,515
		75	SEA			JNU	7	1	11,000	1,608	11,000	1,608	2,530,000	369,883
		76	JNU			SEA	7	1	11,000	1,608	11,000	1,608	2,530,000	369,883
		64	ANC		PSG, WR(	SEA	7	5	4,000	585	20,000	2,924	4,600,000	672,515
		66	ANC	CDV, YAK		SEA	7	4	5,000	731	20,000	2,924	4,600,000	672,515
		67	SEA	KTN, SIT		ANC	7	4	5,000	731	20,000	2,924	4,600,000	672,515
		70	ANC			SIT	7	1	9,000	1,316	9,000	1,316	2,070,000	302,632
		69	SEA	KTN		RON	7	2	6,000	877	12,000	1,754	2,760,000	403,509
					SEASON TOTALS						180,000	26,316	41,400,000	6,052,632
					# Flights (arr + dep) p		12							

TOTALS	**365**	ANNUAL TOTAL GALLONS	**12,910,297**	
		Annual total gallons from Juneau "Internal" economy @ 20% of total (estimated by W. Leighty)	**2,582,059**	20 per cent of total
		Annual total gallons from Juneau "External" economy @ 80% of total (estimated by W. Leighty)	**10,328,237**	80 per cent of total

Juneau Cruise Ships '07 Rev: 29 Oct 07 Rev: 12-Jun-08

Source: http://www.traveljuneau.com/downloads/2007CruiseSchedule.pdf Viewed 29 Oct 07

Schedule from JCVB website **Leighty estimates, from Dawn Princess data point, with calculated results**

Missing data: cruise length, days

SHIP	COMPANY	PAX CAPACITY	CREW CAPACITY	JUNEAU ARRIVALS	SEASON TOTAL PAX	SEASON TOTAL CREW	SEASON TOTAL PEOPLE	CRUISE, LENGTH DAYS	POWER R=RECIP T=TURB	CRUISE, LENGTH DAYS	ESTIMATED FUEL CONSUMED PER CRUISE Mt	Barrels	US Gallons	ESTIMATED FUEL CONSUMED PER SEASON Mt	Barrels	US Gallons	FUEL CONSUMED PER DAY TONS (Mt)	FUEL CONSUMED PER PERSON PER DAY TONS (Mt)	FUEL TYPE
Sapphire Princess	Princess Cruises	2,600	1,240	17	44,200	21,080	65,280	7			4,500	189,000		76,500	3,213,000				
Golden Princess	Princess Cruises	2,600	1,100	20	52,000	22,000	74,000	**7**			**4,500**	189,000		**90,000**	**3,780,000**				
Diamond Princess	Princess Cruises	2,600	1,240	18	46,800	22,320	69,120	7			4,500	189,000		81,000	3,402,000				
Serenade of the Seas	Royal Caribbean International	2,501	859	20	50,020	17,180	67,200					0		0	0				
Radiance of the Seas	Royal Caribbean International	2,501	859	17	42,517	14,603	57,120	14			9,000	378,000		153,000	6,426,000				
Vision of the Seas	Royal Caribbean International	2,435	778	21	51,135	16,338	67,473	14			9,000	378,000		189,000	7,938,000				
Norwegian Star	Norwegian Cruise Line	2,240	1,100	20	44,800	22,000	66,800	21			**12,000**	504,000		**240,000**	**10,080,000**				
Norwegian Pearl	Norwegian Cruise Line	2,240	1,100	19	42,560	20,900	63,460	14			9,000	378,000		171,000	7,182,000				
Carnival Spirit	Carnival Cruise Line	2,124	900	19	40,356	17,100	57,456	7			4,500	189,000		85,500	3,591,000				
Summit	Celebrity Cruises	2,032	997	18	36,576	17,946	54,522	7			4,500	189,000		81,000	3,402,000				
Infinity	Celebrity Cruises	2,032	997	19	38,608	18,943	57,551	7			4,500	189,000		85,500	3,591,000				
Norwegian Sun	Norwegian Cruise Line	2,002	968	19	38,038	18,392	56,430	14			9,000	378,000		171,000	7,182,000				
Sun Princess	Princess Cruises	1,950	858	20	39,000	17,160	56,160	7			4,500	189,000		90,000	3,780,000				
Island Princess	Princess Cruises	1,950	930	18	35,100	16,740	51,840	7			4,500	189,000		81,000	3,402,000				
Dawn Princess	Princess Cruises	1,950	858	14	27,300	12,012	39,312	7			4,500	189,000		63,000	2,646,000				IFO-380
Coral Princess	Princess Cruises	1,950	930	18	35,100	16,740	51,840	7			4,500	189,000		81,000	3,402,000				
Mercury	Celebrity Cruises	1,882	909	20	37,640	18,180	55,820	7			4,500	189,000		90,000	3,780,000				
Zuiderdam	Holland America Line	1,848	800	20	36,960	16,000	52,960	7			4,500	189,000		90,000	3,780,000				
Oosterdam	Holland America Line	1,848	800	20	36,960	16,000	52,960	14			9,000	378,000		180,000	7,560,000				
Noordam	Holland America Line	1,848	800	20	36,960	16,000	52,960	**7**			**4,500**	189,000		**90,000**	**3,780,000**				
Zaandam	Holland America Line	1,440	647	20	28,800	12,940	41,740	14			9,000	378,000		180,000	7,560,000				
Volendam	Holland America Line	1,440	647	20	28,800	12,940	41,740	14			9,000	378,000		180,000	7,560,000				
Amsterdam	Holland America Line	1,380	647	18	25,020	11,646	36,666	14			9,000	378,000		162,000	6,804,000				
Statendam	Holland America Line	1,258	557	18	22,644	10,026	32,670	14			9,000	378,000		162,000	6,804,000				
Ryndam	Holland America Line	1,258	602	20	25,160	12,040	37,200	14			9,000	378,000		180,000	7,560,000				
Asuka II	NYK Line	940	545	1	940	545	1,485	7			1,000	42,000		1,000	42,000				
Seven Seas Mariner	Radisson Seven Seas	700	445	17	11,900	7565	19,465	14			2,000	84,000		34,000	1,428,000				
Pacific Princess	Princess Cruises	685	300	14	9,590	4,200	13,790	14			2,000	84,000		28,000	1,176,000				
Pacific Venus	Japan Cruise Line	290	195	1	290	195	485	7			1,000	42,000		1,000	42,000				
Empress of the North	Majestic America Line	235	84	19	4465	1,596	6,061	**7**			**1,000**	42,000		**19,000**	**798,000**				
Spirit of Yorktown	Cruise West	138	42	8	1,104	336	1,440	7			1,000	42,000		8,000	336,000				
Clipper Odyssey	Clipper Cruise Line	120	72	2	240	144	384	7			1,000	42,000		2,000	84,000				
Spirit of Endeavour	Cruise West	102	28	18	1,836	504	2,340	14			2,000	84,000		36,000	1,512,000				
Spirit of '98	Cruise West	96	26	9	864	234	1,098	14			2,000	84,000		18,000	756,000				
Spirit of Discovery	Cruise West	84	21	17	1,428	357	1,785	14			2,000	84,000		34,000	1,428,000				
Spirit of Columbia	Cruise West	78	21	2	156	42	198	7			1,000	42,000		2,000	84,000				
Spirit of Alaska	Cruise West	78	21	27	2,106	567	2,673	7			1,000	42,000		27,000	1,134,000				
Sea Lion	Lindblad Expeditions	70	22	8	560	176	736	7			1,000	42,000		8,000	336,000				
Sea Bird	Lindblad Expeditions	70	22	10	700	220	920	7			1,000	42,000		10,000	420,000				
Contessa	Majestic America Line	49	18	20	980	360	1,340	7			1,000	42,000		20,000	840,000				
TOTALS		53,644	23,985	646	980,033	434,267	1,414,300							**3,300,500**	**138,621,000**				
				473															
	Averages	1,341	600																

Number of ships: 40

Number of large ships: 25

2006 data:	Dawn Princess	Princess Cruises	1,950	858				7	4,916	206,472
	Assume:	Average "large" ship 7 day cruise consumed total barrels:				4,500				
		Average "large" ship 14 day cruise consumed total barrels				9,000				
		Average "small" ship 7 day cruise consumed total barrels:				1,000				
		Average "small" ship 14 day cruise consumed total barrels				2,000				
	PRINCESS									
	Coral Princess	Princess Cruises	1,950	930	18	35,100	16,740	51,840		
	Dawn Princess	Princess Cruises	1,950	858	14	27,300	12,012	39,312		
	Diamond Princess	Princess Cruises	2,600	1,240	18	46,800	22,320	69,120		
	Golden Princess	Princess Cruises	2,600	1,100	20	52,000	22,000	74,000		
	Island Princess	Princess Cruises	1,950	930	18	35,100	16,740	51,840		
	Pacific Princess	Princess Cruises	685	300	14	9,590	4,200	13,790		
	Sapphire Princess	Princess Cruises	2,600	1,240	17	44,200	21,080	65,280		
	Sun Princess	Princess Cruises	1,950	858	20	39,000	17,160	56,160		
	HOLLAND AMERICA									
	Amsterdam	Holland America Line	1,380	647	18	25,020	11,646	36,666		
	Noordam	Holland America Line	1,848	800	20	36,960	16,000	52,960		
	Oosterdam	Holland America Line	1,848	800	20	36,960	16,000	52,960		
	Statendam	Holland America Line	1,258	557	18	22,644	10,026	32,670		
	Volendam	Holland America Line	1,440	647	20	28,800	12,940	41,740		
	Zaandam	Holland America Line	1,440	647	20	28,800	12,940	41,740		
	Zuiderdam	Holland America Line	1,848	800	20	36,960	16,000	52,960		
	NORWEGIAN									
	Norwegian Pearl	Norwegian Cruise Line	2,240	1,100	19	42,560	20,900	63,460		
	Norwegian Star	Norwegian Cruise Line	2,240	1,100	20	44,800	22,000	66,800		
	Norwegian Sun	Norwegian Cruise Line	2,002	968	19	38,038	18,392	56,430		

NOTES: US Gallons per US oil barrel = 42

Cruise Ships Estimated Total Annual Fossil Fuel Consumption - SE AK Summer REV 14-Aug-21

Assumptions:

	Low	High	
Fuel per day at 100% capacity factor (CF): 24 hrs at typical cruise speed	150	250	Mt (metric tons) per day
Total # of large ships (> 2,000 pax)			
Total # of medium ships (400 - 2,000 pax)			
Total # of small ships (< 400 pax)			
Season = 120 days			
Avg ships cruise length = 7 days			
Avg ships / day = 3.5			
Avg ships pax size = 2,000			
Avg ships fuel consumption / day @ 100% CF = SF:	80	Mt / day	
Avg ships CF = 60%			
Avg ships fuel consumption / day @ 60% CF	48		

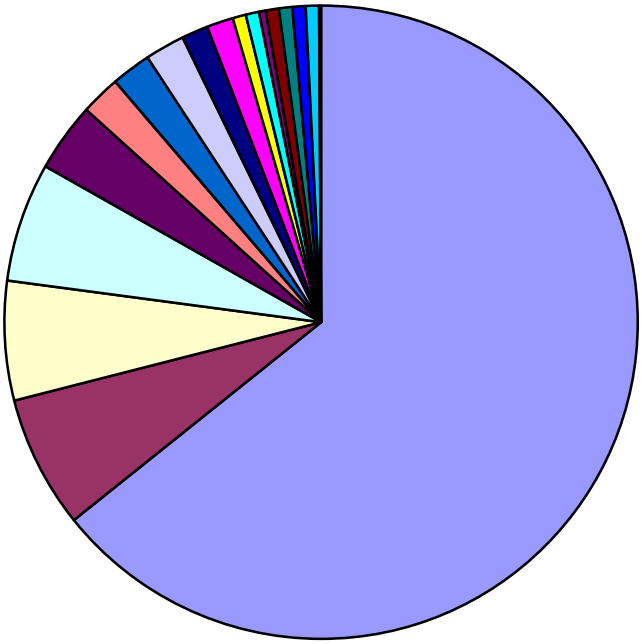
Rough estimate: average total ships per day in Juneau	3.5		
Avg ships fuel consumption / day @ 60% CF	48		
Days per season	120		
Total ship fuel consumption per season	20,160	Mt (metric tons)	

NOTE: Capacity Factor (CF) = Service Factor (SF) = % of time operating at full rated typical cruise power

Source: https://www.cruise1st.co.uk/blog/cruise-tips/cruise-facts/how-much-fuel-do-cruise-ships-use/
https://www.theguardian.com/environment/2016/may/21/the-worlds-largest-cruise-ship-and-its-supersized-pollution-problem

				Pax	Tons Displace	Length
Norwegian Spirit	1,100 gal / hr	26400 gal / day	84 Mt / day			
Freedom Of The Seas	2,800 gal / hr	67200 gal / day	214 Mt / day			
P&O Brittania	3,000			4,300	144,000	
Harmony Of The Seas	1,377			6,780		

Juneau TOTAL Energy



Cruise Ships	Heat Oil	Hiway Gas	Electric
Barge	AMHS	AS (external)	AMHS
Av Turb AS	Av Turb Other	Hiway Diesel	Other Diesel
CapTrans Diesel	Av Gas	Marine Other	Other
Propane	Wood		

Innovation !

Look, Ma, no stacks !

Hydrogen-fueled cruise ships,

running on renewable energy, zero emissions ?

Could Hydrogen help us operate Juneau entirely on CO_2-emission-free energy ? How ?

Bill Leighty, The Leighty Foundation www.leightyfoundation.org/earth.php wleighty@earthlink.net

World's first liquid hydrogen fuel cell cruise ship planned for Norway's fjords

Retrofitted by 2023. Combines a 3.2MW hydrogen fuel cell with battery storage.

Hydrogen-fueled,
Fuel cell electric drive
Now, or soon

6 Ballard Fuel Cell-Powered
Vessel Projects Underway Today

MAERSK promises CO2-emission-free fleet by 2050

- **Hydrogen-fueled**
- **Ammonia-fueled (NH_3)**

Yanmar / Toyota hydrogen fuel cell boat

250 kW electric drive train: Whalewatch size

Universal Hydrogen concept

Gaseous Hydrogen (GH2)
Fuel modules rapidly exchanged

Fuel cell electric motor propeller-driven passenger aircraft of ~ 20 – 40 pax

Scale-up ?

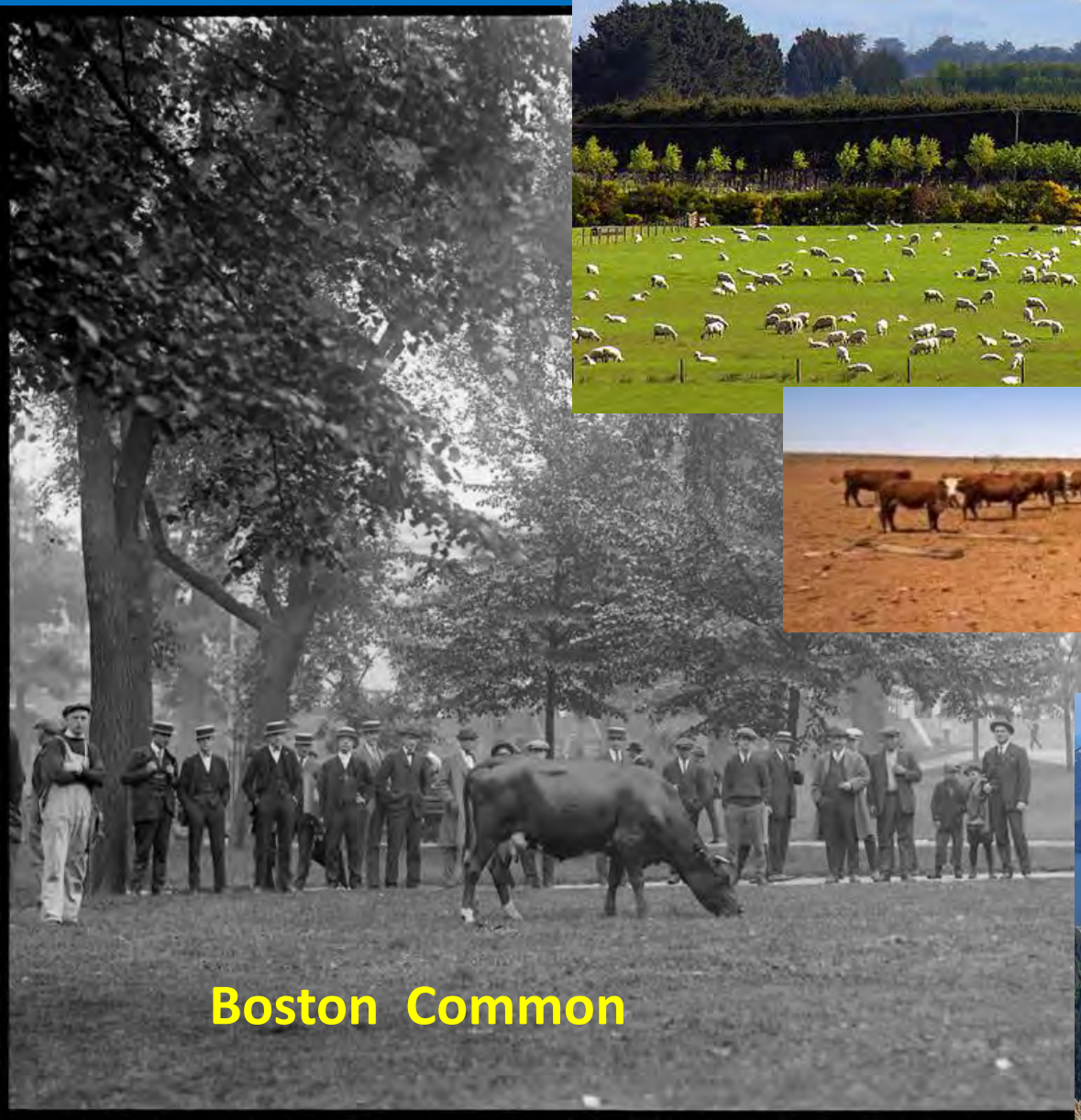
Paul Crutzen
1933 – 2021

Nobel Prize,
Chemistry
"Ozone Hole"

Holocene → **Anthropocene**

Innovation failure

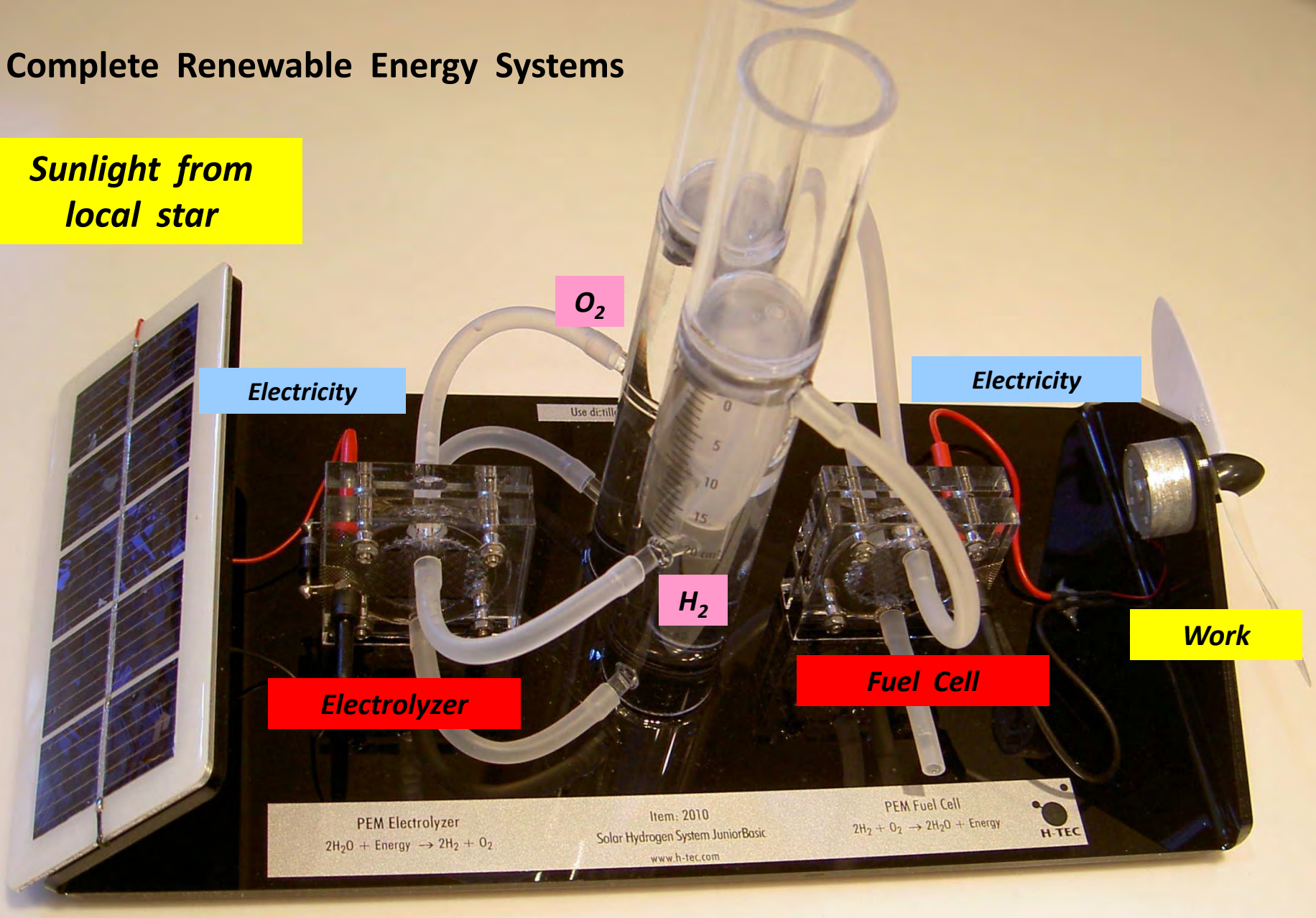
Tragedy of the Commons: Unpriced, free, abused



Tragedy of the Commons

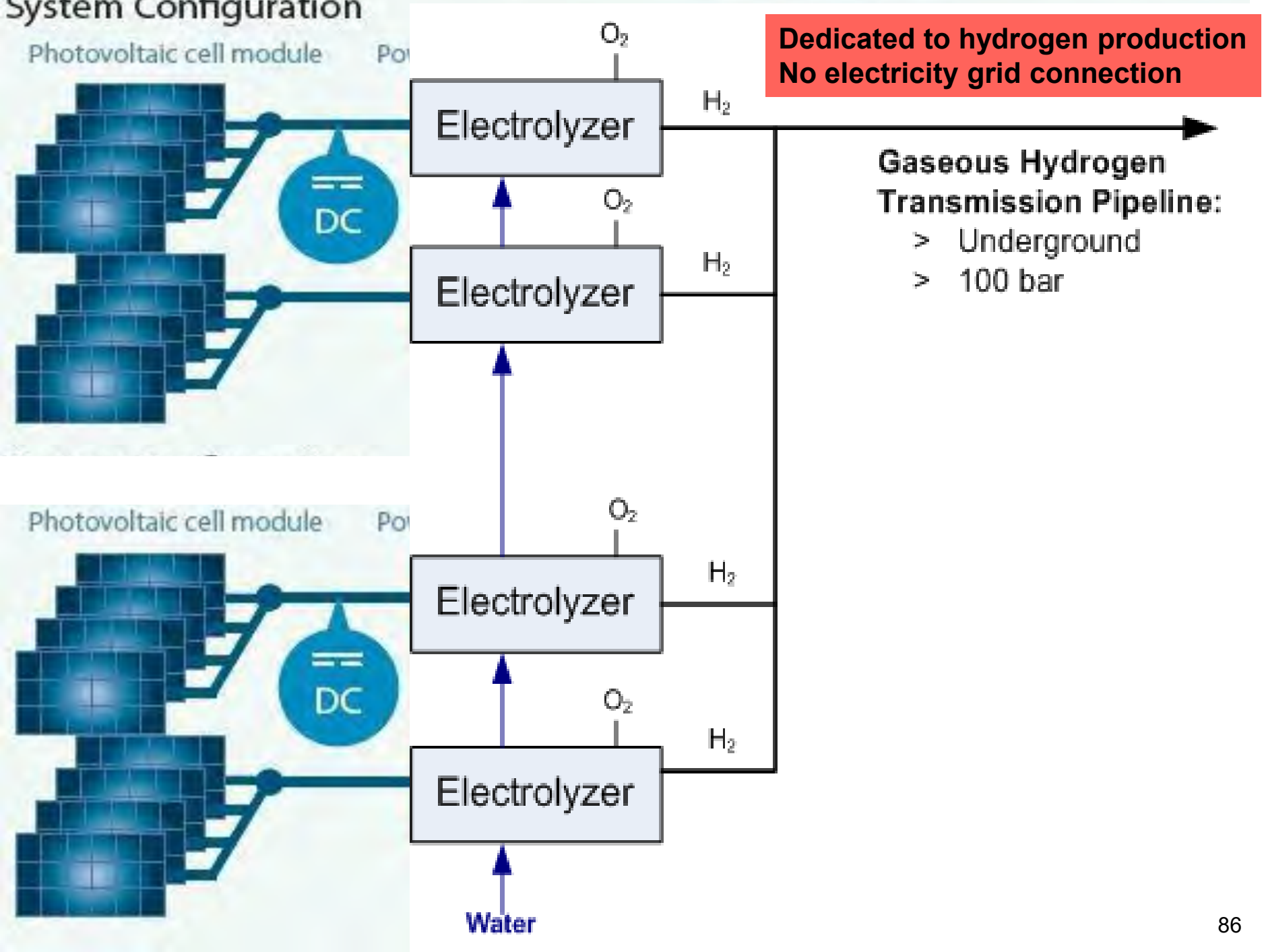
- COVID-19 a rehearsal for GCC
- Transform world's largest industry
- Total de-carbonization, de-GHG-emission, by 2050
- Entire human enterprise
- CO2-emission-free energy
- Complicated: watch your language !

Complete Renewable Energy Systems



Solar Hydrogen Energy System

System Configuration

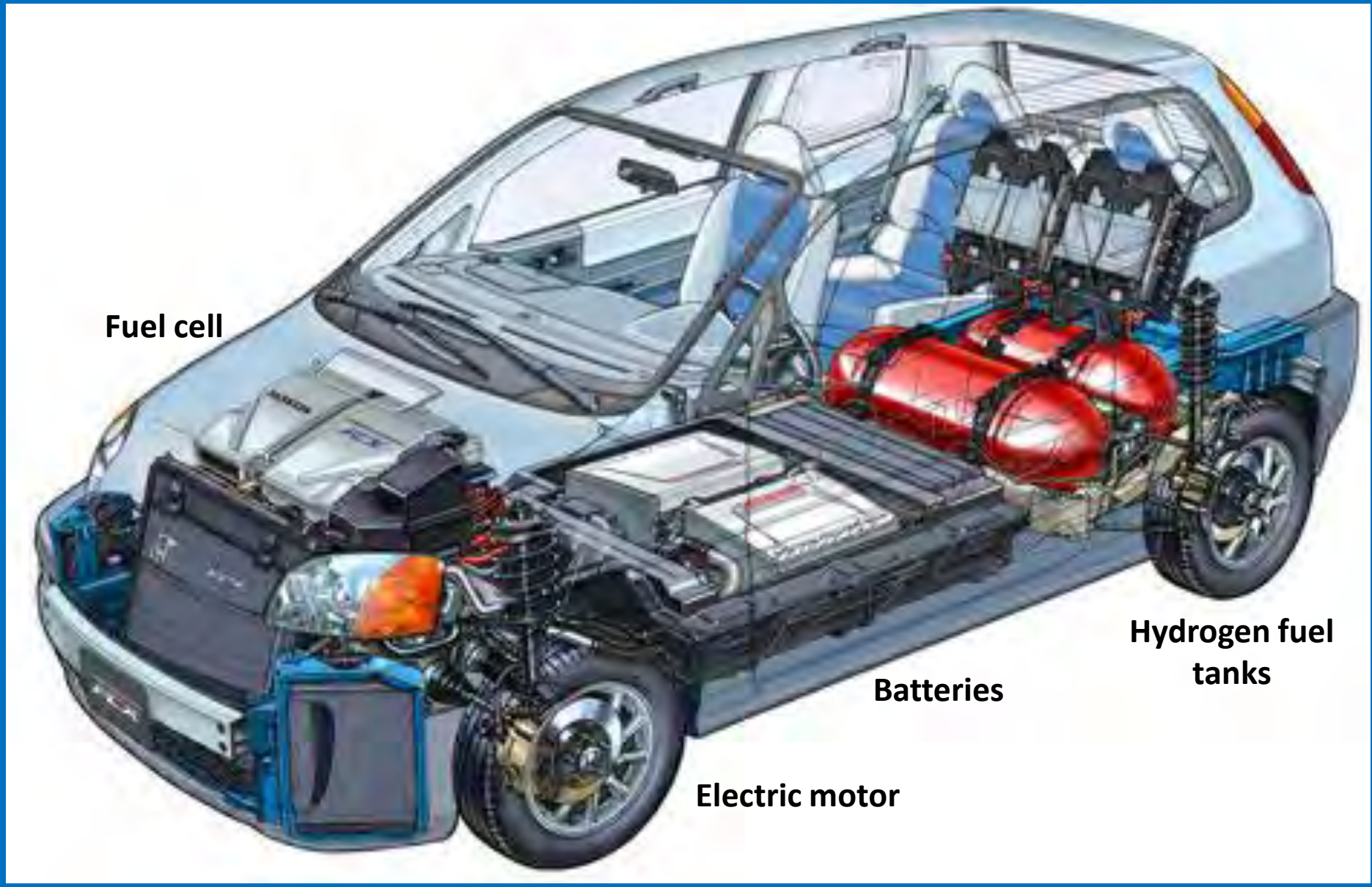


Dedicated to hydrogen production
No electricity grid connection

Gaseous Hydrogen Transmission Pipeline:

- > Underground
- > 100 bar

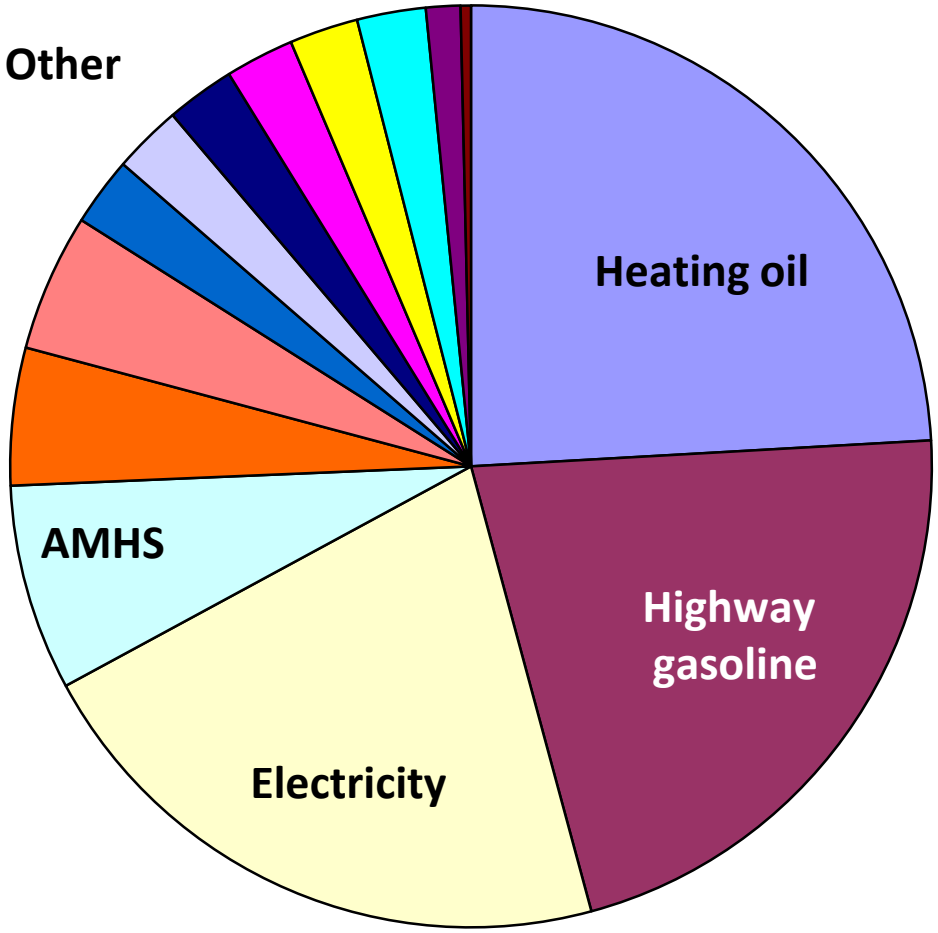

Snettisham Hydro:
Store spilled water as Hydrogen or Ammonia



Inside a Fuel Cell Car – or bus, train, truck

Juneau INTERNAL energy 2009

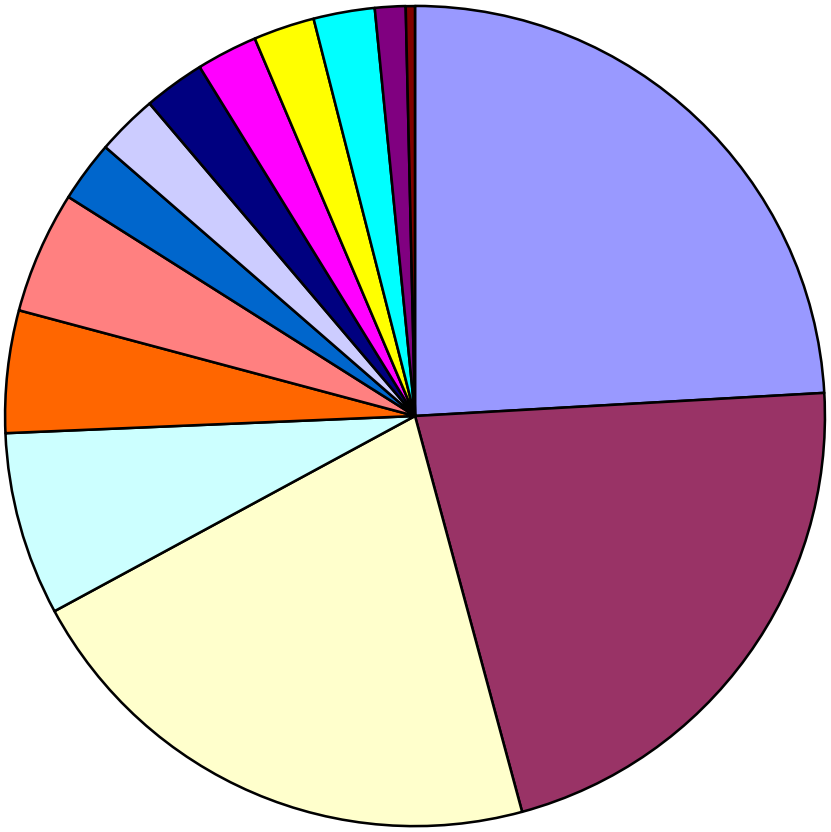
~ 30 million gallons liquid fossil fuels / year imported



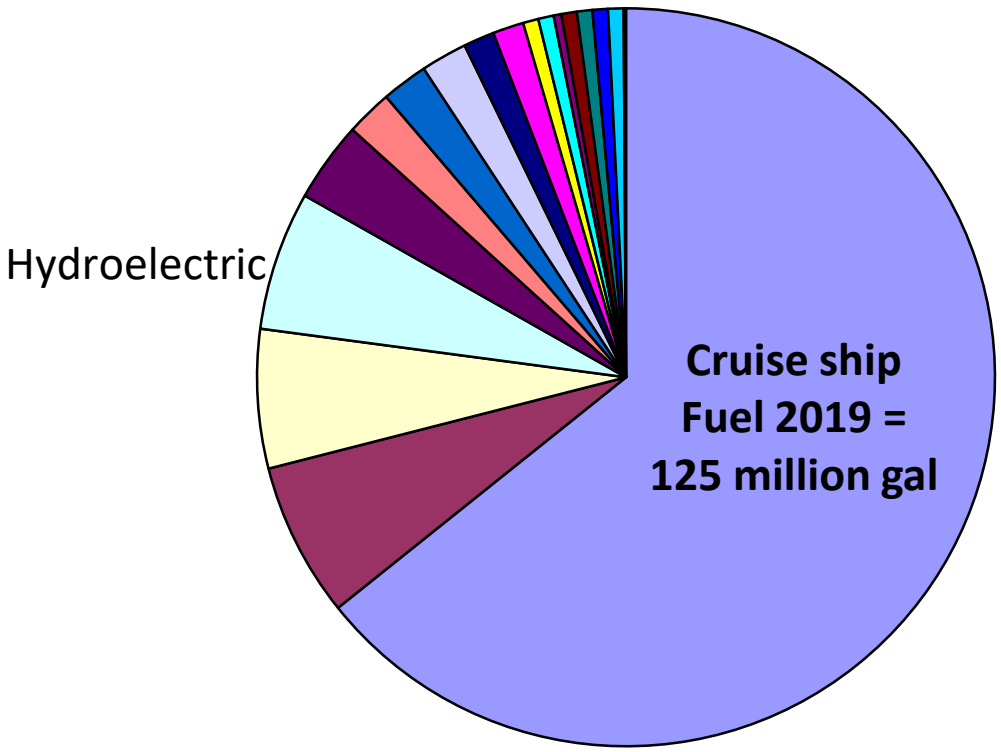
Heating Oil	Hiway Gasoline	Electricity	AMHS	Av Turb AS
Av Turb Other	Hiway Diesel	Other Diesel	Av Gas	Marine Other
Other	Propane	CapTransit Diesel	Wood	

Juneau INTERNAL energy 2019, Estimated
[assumed same as 2009, but tourism up]

~ 30 million gallons liquid fossil fuels / year imported



Juneau TOTAL Energy 2009
[assume 2019 tourism up]



Cruise Ships	Heat Oil	Hiway Gas	Electric	Barge
AMHS	AS (external)	AMHS	Av Turb AS	Av Turb Other
Hiway Diesel	Other Diesel	CapTrans Diesel	Av Gas	Marine Other
Other	Propane	Wood		

Juneau's first battery-electric (BEV) bus. About $ 800,000

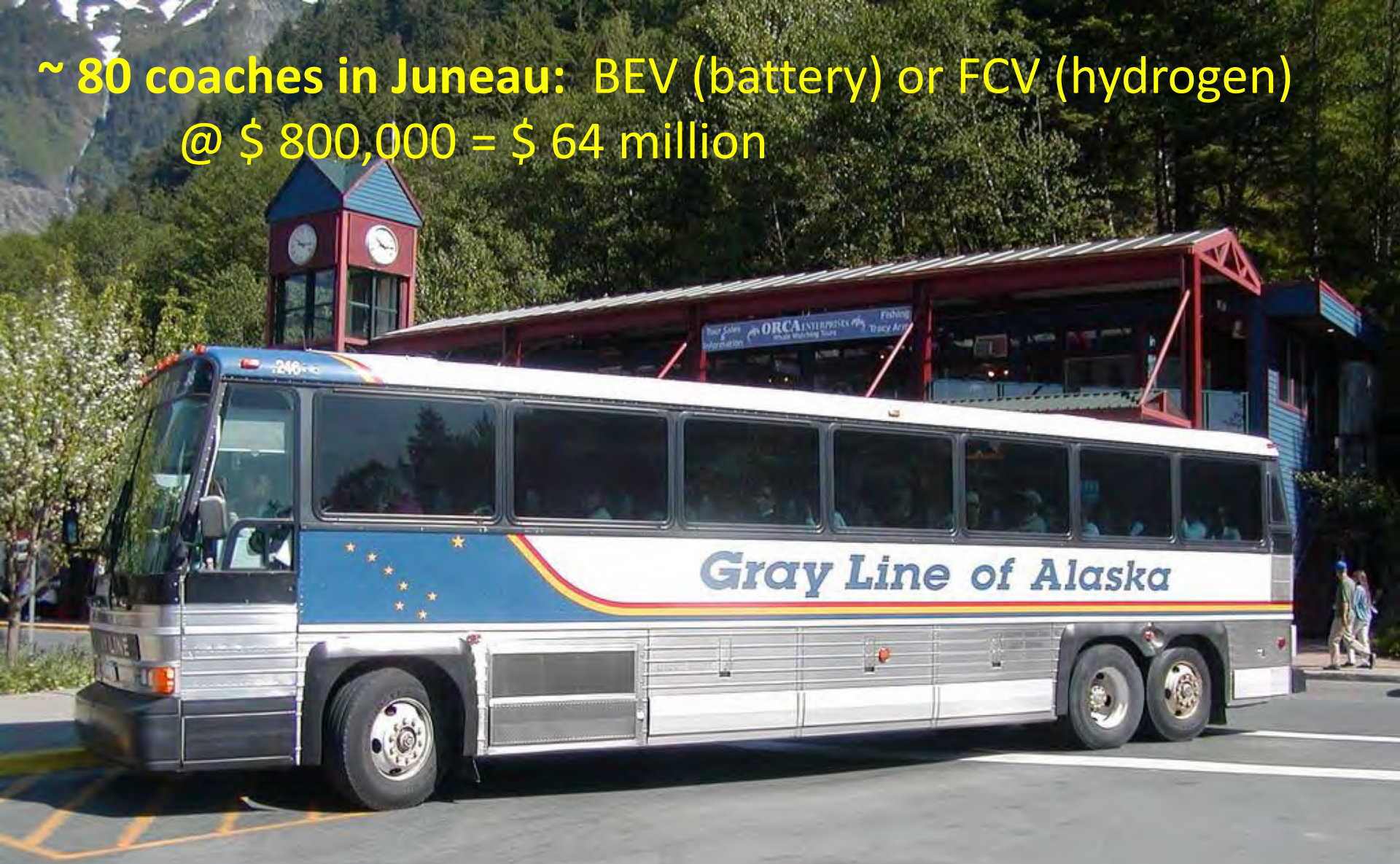
Juneau's first battery-electric (BEV) bus. About $ 800,000

Innovation: Another ~ 80 for summer visitors; coach seating

$ 64 million total CAPEX

Innovation, financing: public-private, crowdsourcing, local co-op

Hydrogen Fuel Cell Bus



~ 80 coaches in Juneau: BEV (battery) or FCV (hydrogen)
@ $ 800,000 = $ 64 million

"Solo buses": MCI "Coach" ~ 50 seats + baggage under high floor
Need the baggage level ? Are low-floor coaches OK ?

Cycle Alaska fleet of eight vans

Juneau

Battery Electric Vehicles (BEV's) and
Hydrogen-fueled Fuel Cell Vehicles (FCV's)
This size van will probably be available In USA within 3 years.
BEV fleets will charge overnight: 8 vans @ 7 kW = 56 kW
FCV's will fuel in 5 minutes from public hydrogen station.
Energy for either is from hydroelectricity.

Two CBJ-owned Cruise Ship Docks: April 2021

Annual CBJ debt service for both ~ $ 2 million total

Fixed Guideway System (FGS)

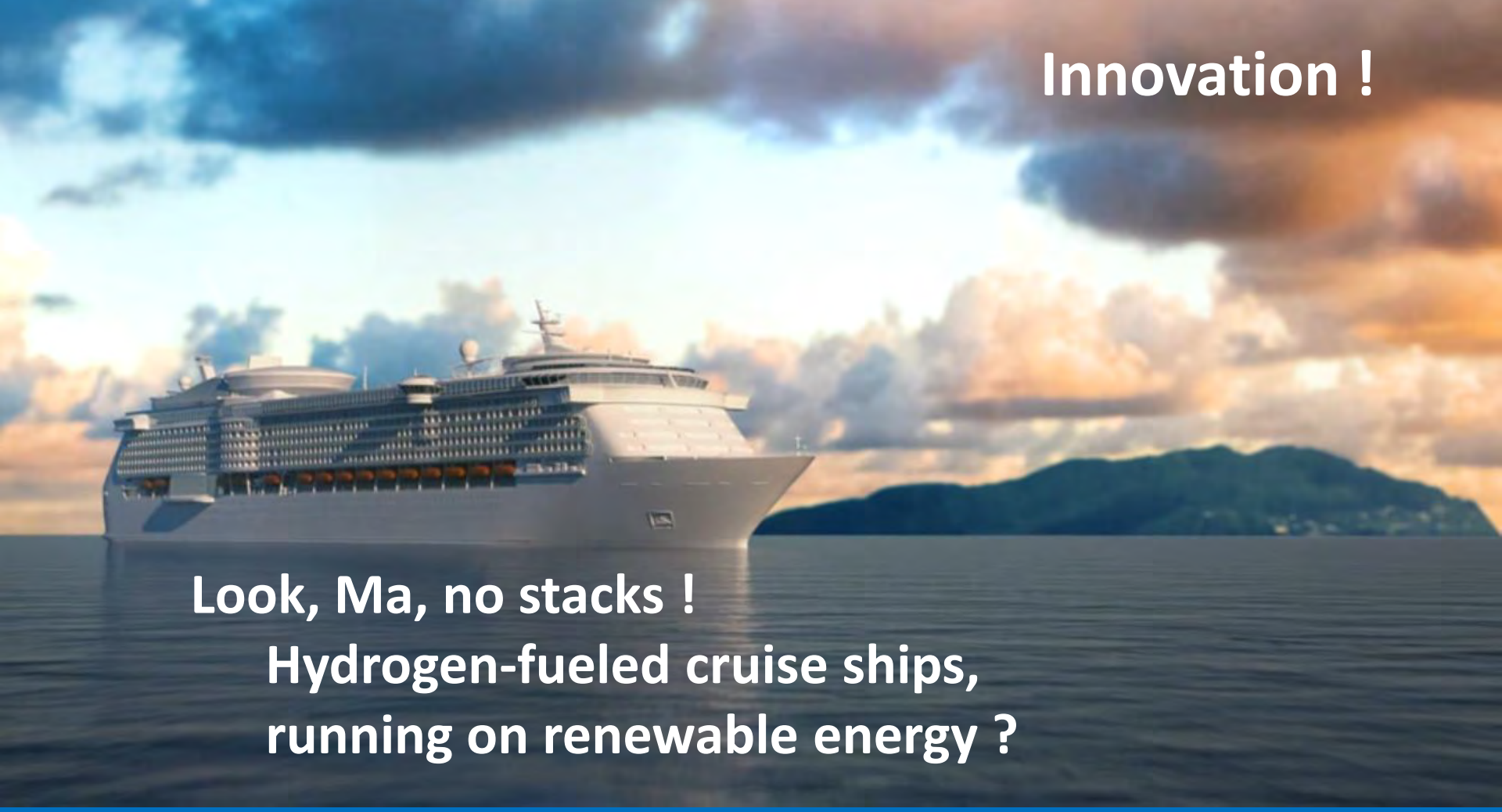
- Light Rail Transit (LRT)
- Streetcar
- Hybrid: LRT – Streetcar
- Bus Rapid Transit (BRT)

INNOVATION

Alstom Hydrogen-fueled, Fuel Cell Train

- No overhead wires
- 200 mile range
- 20 minute fueling
- Hydroelectric-source Hydrogen fuel: Zero Emission Vehicle (ZEV)

Light Rail Transit (LRT)
Fixed Guideway System (FGS)



Innovation !

Look, Ma, no stacks !
Hydrogen-fueled cruise ships,
running on renewable energy ?

Concept: Liquid Hydrogen (LH2) fueled, Fuel Cell electric drive
Zero emissions:

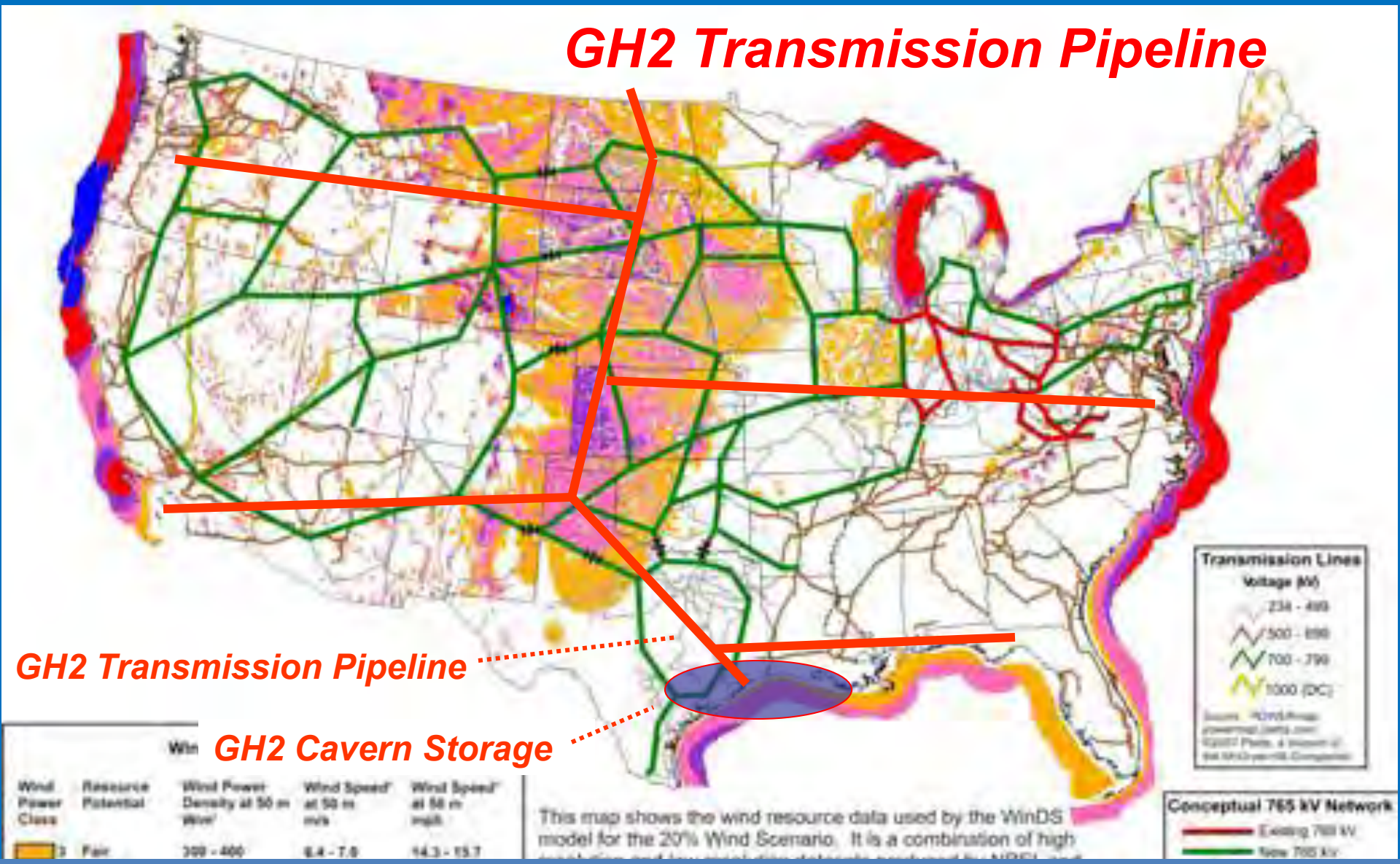
- **No "stacks"**
- **Must use LH2 fuel from "green" CO2-emission-free energy sources**
- **Bunker fueling in SE Alaska and BC, Canada, and Seattle ?**

Concept:
Hydrogen-fueled, Fuel cell electric drive cruise ship

Hydrogen fueled, Fuel cell electric drive container ship

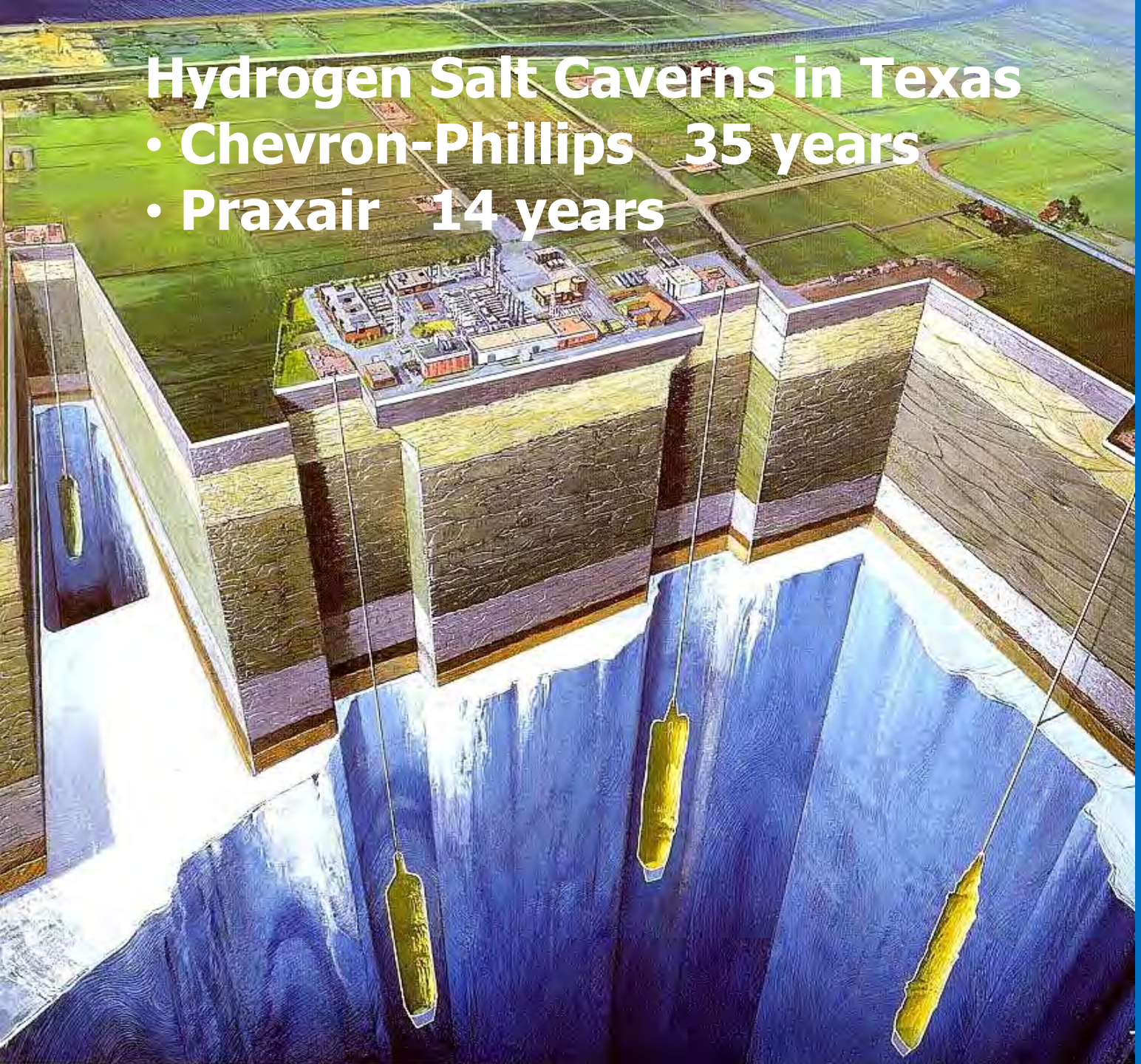
December 2019
World's first liquefied hydrogen (LH2) carrier: Kawasaki, in Japan

- " Suiso Frontier "
- HySTRA demonstration project
- 9,000 km from SE Australia to Kobe, Japan



Wind Potential ~ 10,000 GW

12 Great Plains states



Hydrogen Salt Caverns in Texas

- Chevron-Phillips 35 years
- Praxair 14 years

Domal Salt Storage Caverns

Each:

~ 90 GWh

CAPEX:

$ 15 million

$ 0.20 / kWh

Global total 2017 = 103 GWh / year (Bloomberg)
Global total 2021 = 278 GWh / year

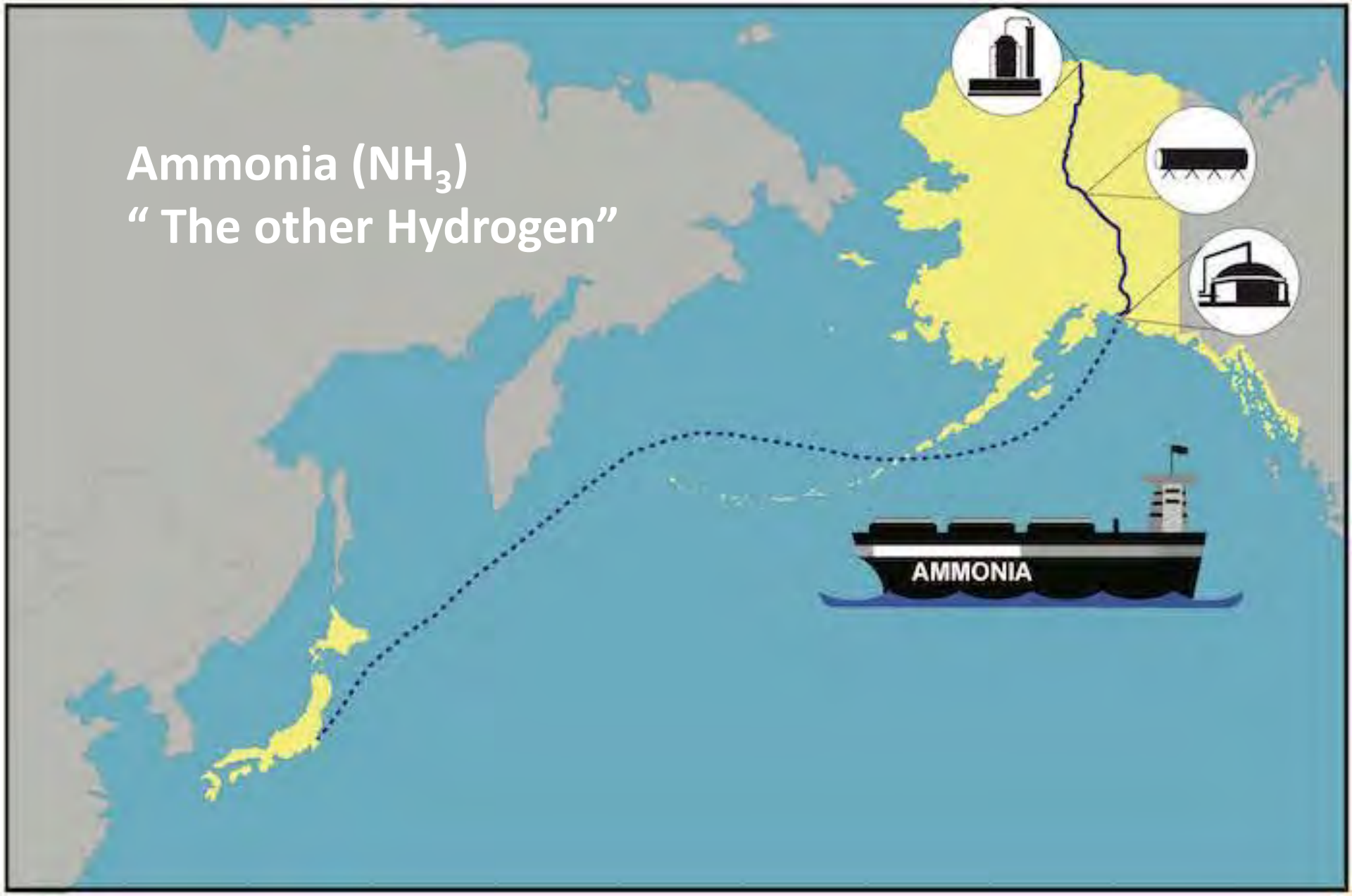
- **Hydrogen: 1 salt cavern @ $ 15-20 million = 90 GWh**
- **Ammonia: 1 liquid tank @ $ 15-20 million = 200 GWh**

“Atmospheric” Liquid Ammonia Storage Tank (Corn Belt)

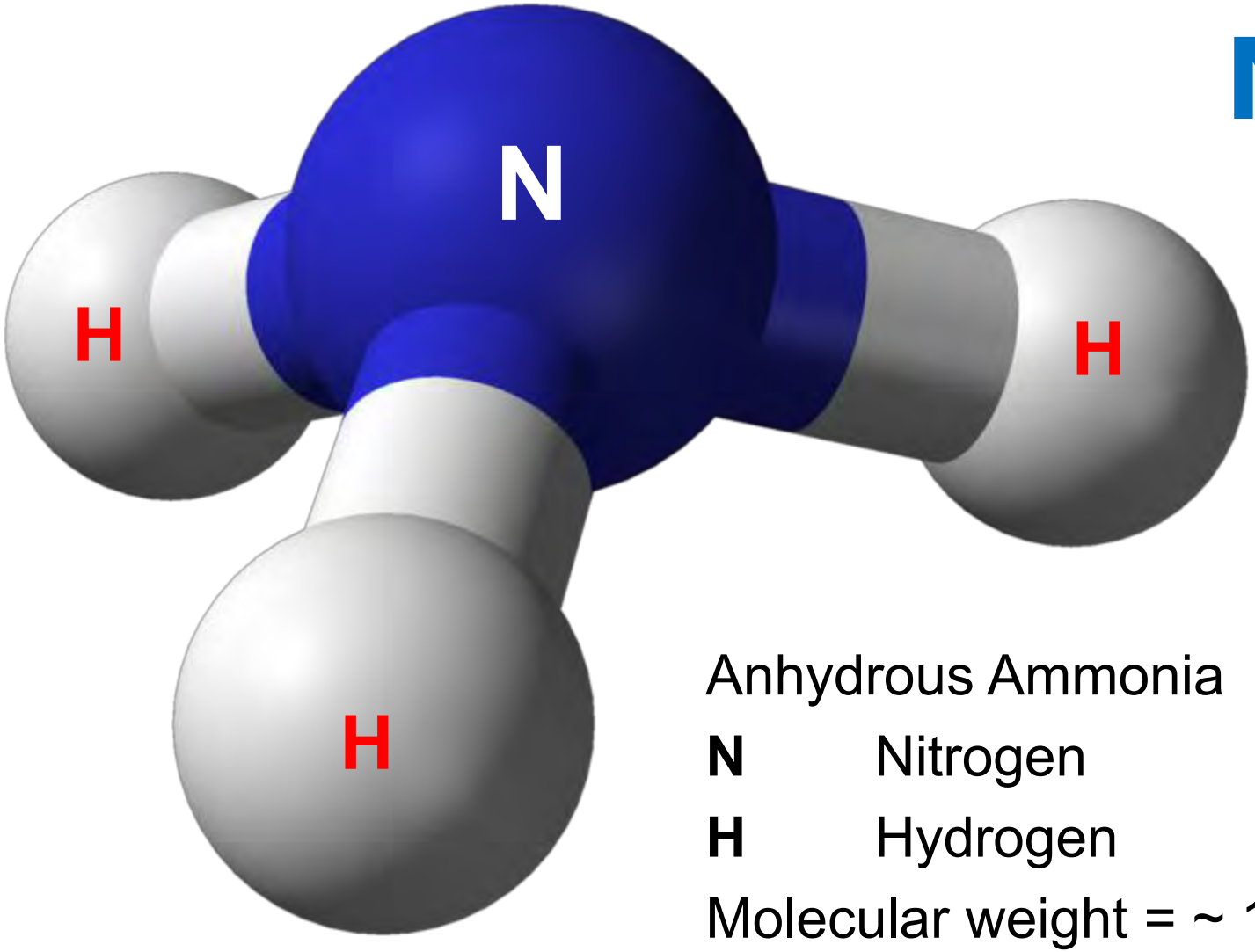
-33 C 1 Atm

Each: 30,000 Tons, 190 GWh $ 15 M turnkey

$ 80 / MWh = $ 0.08 / kWh capital cost



ANS gas-to-NH_3 to Japan, world markets



NH_3

Anhydrous Ammonia **NH_3**

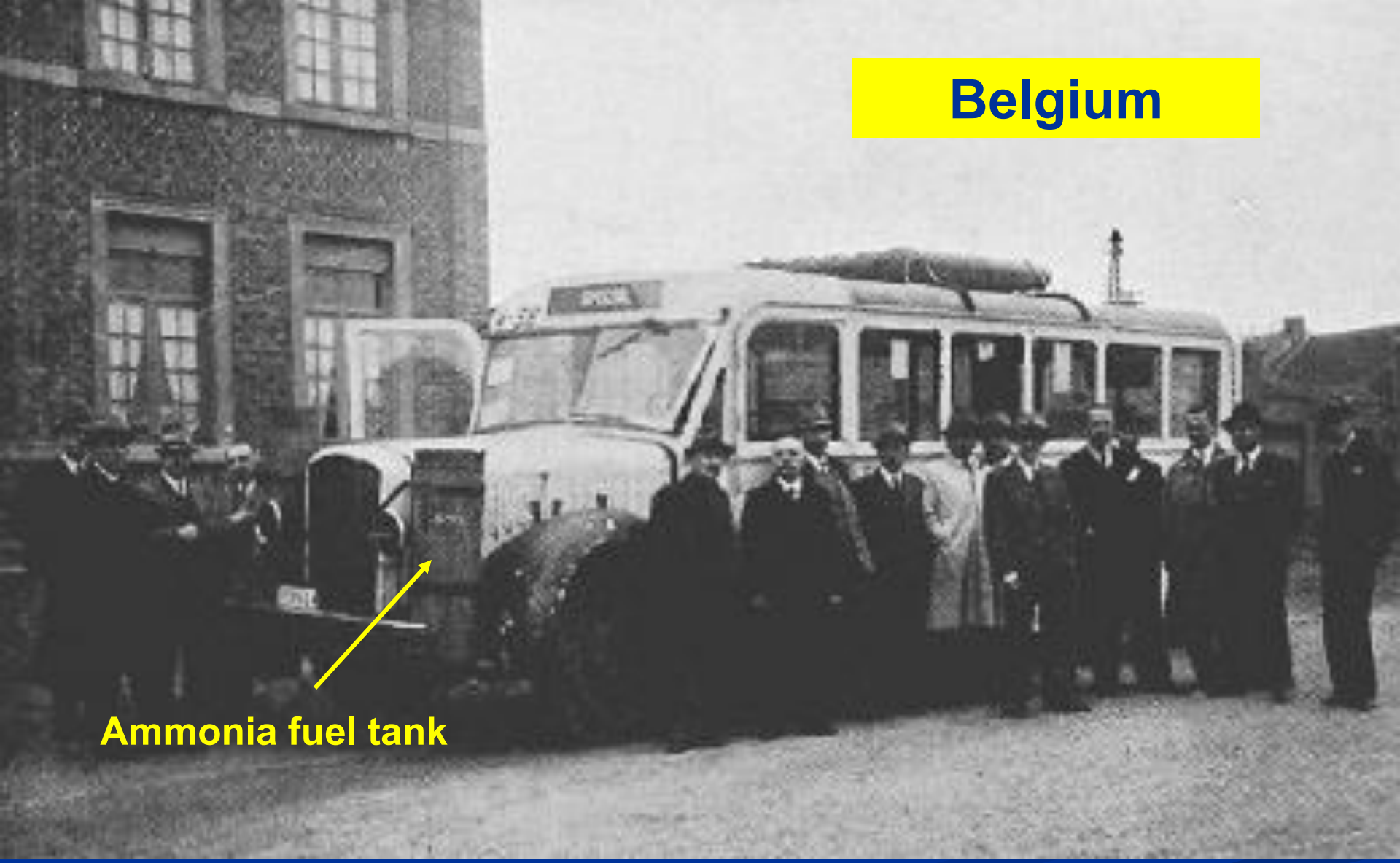
N Nitrogen

H Hydrogen

Molecular weight = ~ 17

18% **H** by weight: “other hydrogen”

$NH_3 + O_2 = N_2 + H_2O$



Ammonia Fueled Bus: Thousands of Problem-free Miles

1943

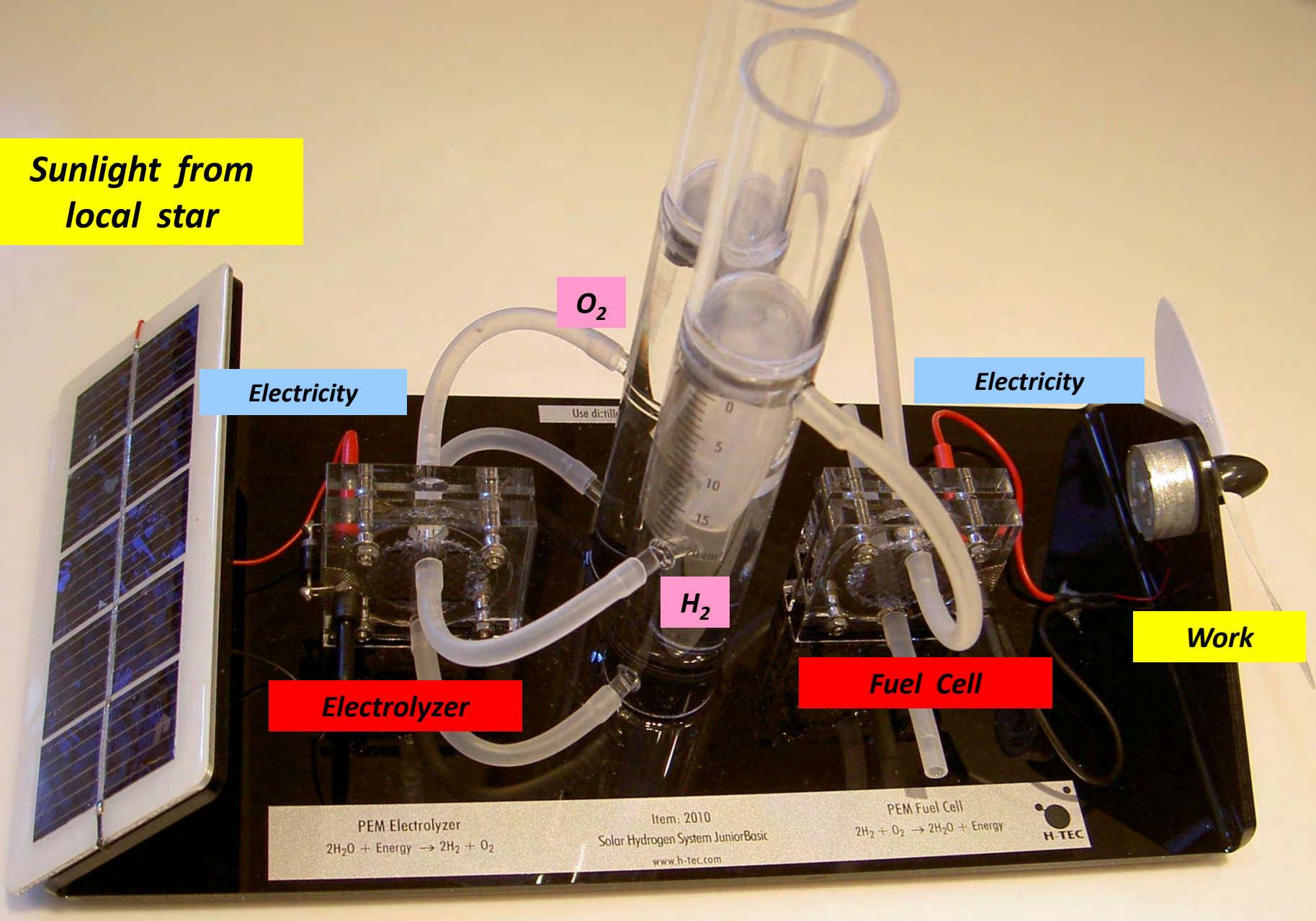
X-15 rocket plane: NH3 + LOX fuel

Mach 6.7 on 3 Oct 67

199 missions

1959 - 68

CF Industries' industrial complex in Donaldsonville, Louisiana. CF is adding a green ammonia plant.



Solar Hydrogen Energy System

Earth Day April 22

Denis Hayes, CEO
Bullitt Foundation, Seattle

- **Founder, organizer, Earth Day 1970**
- **Engineering professor, Stanford**
- **Director: SERI → NREL**
- **CEO, Bullitt Foundation, Seattle**
- **Inspiration: Bullitt Center, Seattle**

Innovation !

Look, Ma, no stacks !

Hydrogen-fueled cruise ships,

running on renewable energy, zero emissions ?

Could Hydrogen help us operate Juneau entirely on CO_2-emission-free energy ? How ?

Bill Leighty, The Leighty Foundation www.leightyfoundation.org/earth.php wleighty@earthlink.net

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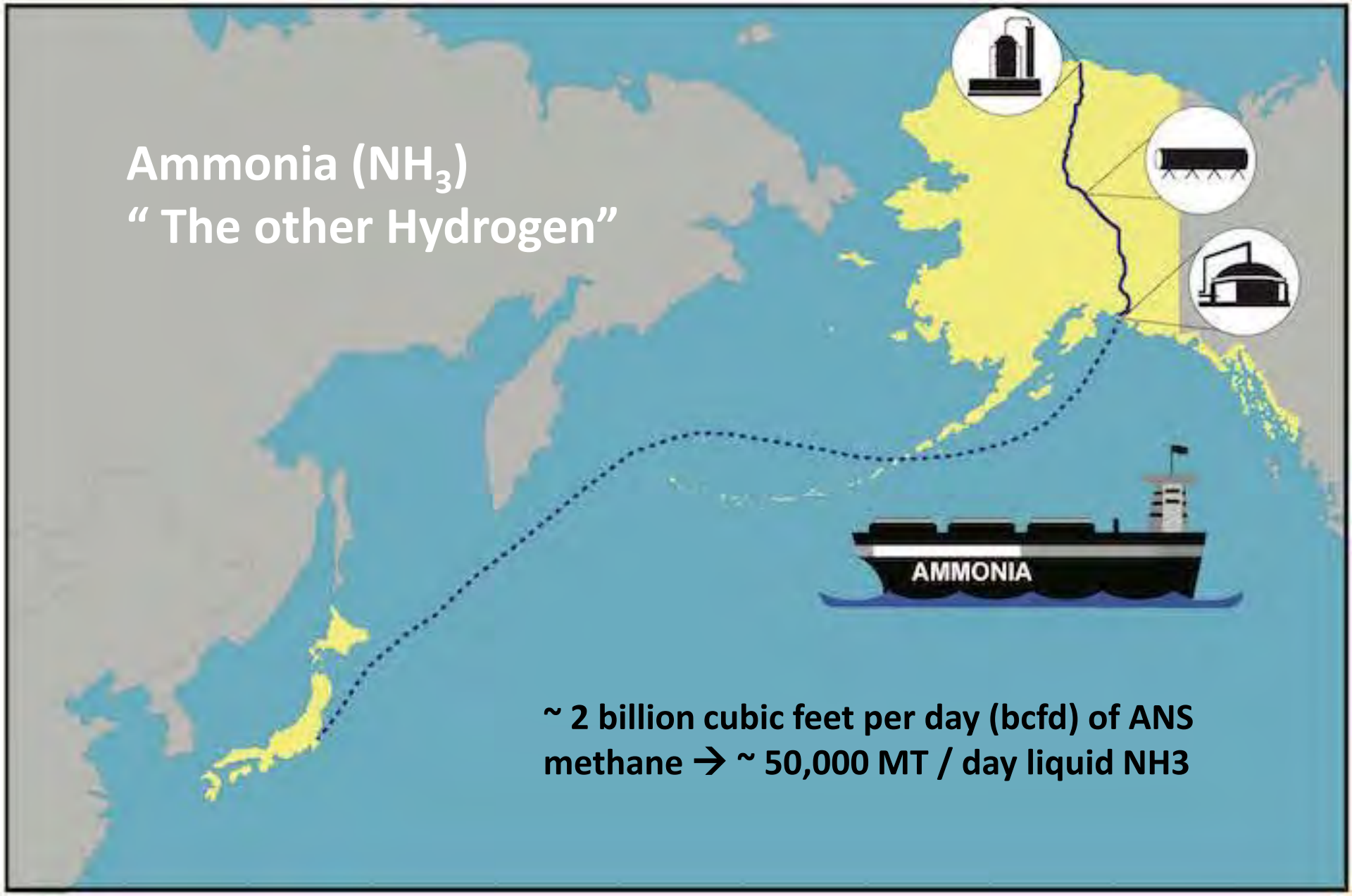


Alaska North Slope (ANS) gas-to-"blue" NH_3 to world markets

p: 907.780.2222 • f: 907.780.3571 • 5601 Tonsgard Ct. • Juneau, AK 99801

January 17, 2022

City and Borough of Juneau
Erich Schaal, Port Engineer
155 South Seward Street
Juneau, AK 99801

Mr. Schaal,

Thank you for the opportunity to comment on the draft Cruise Ship Dock Electrification Study. The following comments are on behalf of Alaska Electric Light and Power Company (AELP).

Connect / Disconnect Time

The estimate of anticipated energy consumption by ships docked at the CBJ Alaska Steamship (AS) and Cruise Terminal (CT) berths is in part based upon the time frame of an hour for connecting and an hour for disconnecting each ship. We have heard discussion of whether this estimate of an hour for connect and disconnect is accurate. AELP and Princess Cruise lines were the first in the world to develop the system where large cruise ships could completely rely on shore power while docked, and therefore AELP has a twenty-one-year period of experience with ship connects/disconnects. We fully understand the process and how long it takes. The shore side and shipboard procedures incorporate standard safety protocols and reflect the physical steps which must be taken each time. Below is a detailed description, which explains why the process takes at least an hour.

Safety procedures require that the ship be completely tied up to the dock before the shore power cables can be handled. After docking is completed, doors must be opened and gangways installed to allow personnel from the ship to access the dock. The ship's electrical officer then applies locks on the disconnect and ground switches, located on the dock, which ensure that the cables are de-energized and grounded as they are handled. After the safety lockout is complete, the cables (4 power cables plus neutral and 3 control cables) are lowered to the ship, where ship personnel manually manipulate them into the receptacles on the shore connection switchboard. The shore power rooms are approximately 8 feet by 10 feet, with three to four crewmen working in that space. Each power cable on board weighs approximately 130 pounds (38lbs for the connector and 9.36lbs per foot of cable), so lifting them into place and fitting them into each receptacle is challenging and takes time. The plug covers must be removed, and the plugs inspected to make sure they are dry. After the cables are maneuvered into the receptacles, each one is secured by 4 retaining bolts which are manually tightened with hand tools. Once the cables are secure, the ship's electrical officer removes the locks on the shore side equipment and then proceeds back to the ship to continue the switching steps required on board. These include opening the ground switch for the shore connection switchboard and then racking in the synchronizing breaker(s). The ground switch and breaker(s) are used to provide a lockout between the shipboard generation and the shore connection switchboard while personnel are securing the cables. After the switching is complete on board, then the transfer process with AELP is started and generally takes between 10-15 minutes.

Most of the connect/disconnect time is spent on the lockout processes followed both on the shore and on the ship, and the physical connection of the cables. The lockout steps are essential to ensure personnel safety while handling the cables and those steps cannot be skipped or substantially shortened. The lockout steps followed in Juneau are the same as the steps followed for connection and disconnection in other ports.

Shore Power Design - Transformers

The study notes that electrification of the CBJ docks will require a new electrical substation and transformers; the study also notes that the existing transformer at the Franklin Dock substation will need to be replaced with a more advanced transformer which will allow all three docks to be served simultaneously. The comments below will explain in more detail the importance of the capabilities of the transformers.

AELP recently requested $1.64 million in Marine Passenger Fees (MPF) to replace the existing electrical transformer at the Franklin Dock (FD) Substation. Not only is the replacement of the existing transformer required to be able to serve more than one cruise ship at a time, but it will also improve the operation of the AELP electrical system in the period prior to additional dock electrification.

The existing FD substation transformer does not have the capability to actively adjust the voltage when energized. This means that to adjust the voltage on the secondary (ship) side of the transformer, the voltage must be adjusted on the primary (utility) side, which can only be accomplished by adjusting the entire AELP system voltage. As the ships have grown, so have their power needs, and with the increased electrical load it has become increasingly difficult to connect Princess ships under certain AELP system conditions, even with only one electrified dock. When the system load is low, such as on an early summer morning, there may not be enough flexibility in the system to allow the system voltage to be lowered enough to meet the voltage level required by the ship. The connection must be delayed until later in the day when the system loading is sufficient to allow adequate adjustment of the system voltage. During that time, the ship must continue to use its fuel-fired generators, increasing GHG emissions while in port.

A transformer with an integral Load Tap Changer (LTC) would allow for voltage adjustment at the transformer itself, leaving the remainder of the system in a typically steady state. This will significantly improve the flexibility of the FD substation to meet the voltage levels required by the cruise ships and ultimately allow cruise ships which are currently connecting to be on shore power for a longer period of time by avoiding the connection delays related to system voltage control issues.

The lack of an LTC on the transformer at the FD substation will make it impossible or nearly impossible to successfully provide shore power at additional docks in Juneau. Once one ship is connected to the system, the system voltage is restricted by the connected ship's voltage requirements and cannot be sufficiently lowered to connect a second ship. Although it is not explicitly stated in the CBJ Study, the transformers to be installed in the new substation proposed to supply power to the AS and CT berths will also require LTCs. Because Juneau's electric grid will not be able to connect more than one cruise ship at a time until the voltage can be specifically adjusted at the point of delivery to each ship, independent of the overall system voltage, LTCs are necessary for each transformer installed to serve a cruise ship. The use of LTCs is now part of the standard design implemented in other ports.

The lead time between ordering and receiving the transformer is currently estimated at two to three years (and could possibly be longer once federal infrastructure spending begins). This is important to note when considering the timing of electrification of additional docks (CBJ-owned or otherwise).

Connecting New Loads to the Electric System

The study includes a comparison of the costs for electrification under a scenario where AELP would bear the costs of the electrification of the CBJ docks, vs. the CBJ funding the costs.

AELP's tariff requires that new loads pay the cost to connect to the existing electric system. That requirement ensures that customers with higher connection costs are not subsidized by other customers.

Princess Cruise Lines funded the installation of the shore power facilities in 2001 when the Franklin Dock was electrified (and subsequently received reimbursement for a portion of the costs through marine passenger fees).

If the CBJ moves ahead with electrifying their docks, the electrification costs should be borne by the CBJ because the most efficient configuration will be for the CBJ to be the interruptible customer at the AS and CT berths.

Firm versus Interruptible Rates

The study notes that cruise ships have never been firm electric service customers. In addition to the reasons cited in the study for serving the ships as interruptible customers, it is important to note that AELP must at times be able to interrupt service to the cruise ships in order to perform maintenance on the transmission lines. The Juneau electrical system is a long, radial system and the local climate and daylight require that maintenance be completed during the same season that the ships are visiting Juneau. If the maintenance is not completed, system reliability will deteriorate at the expense of all customers.

For instance, hydropower cannot be provided to the ships when the 138kV line is out of service. Thus, if the ships were firm customers, AELP would be forced to run diesel-fired generation during maintenance on the 138kV line – the effect of which simply displaces emissions from the downtown area to Lemon Creek or the valley. AELP's diesel generation is intended for standby use and in most cases it is less efficient than shipboard generation, which is intended for continuous use. It makes far more sense for the cruise ships to provide their own power in such circumstances than for AELP to utilize less efficient diesel generation to serve them.

There are also other circumstances under which we could not provide service to the ships unless additional electrical infrastructure is added to our system, which would increase the rates of all customers. It is much more efficient and effective to serve the ships as interruptible loads.

Sincerely,

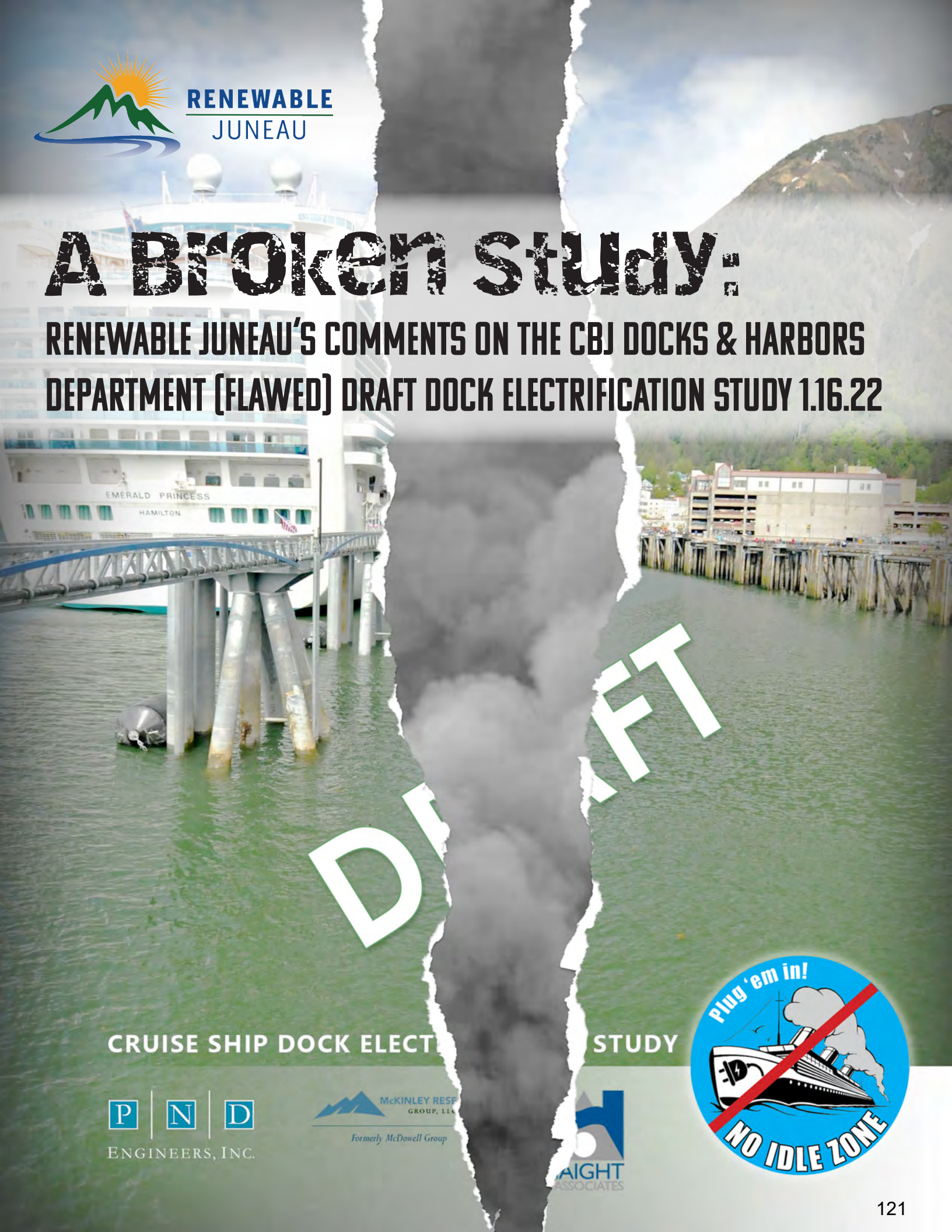
Constance Hulbert

Constance Hulbert
President and General Manager

RENEWABLE JUNEAU

A Broken Study:

RENEWABLE JUNEAU'S COMMENTS ON THE CBJ DOCKS & HARBORS DEPARTMENT (FLAWED) DRAFT DOCK ELECTRIFICATION STUDY 1.16.22



PND ENGINEERS, INC.

McKINLEY RESEARCH GROUP, LLC
Formerly McDowell Group

Introduction and Overview

Renewable Juneau (www.renewablejuneau.org) is an Alaska non-profit organization with a mission to help Juneau move toward its sustainability goals, with a focus on use of renewable energy. We offer the following specific comments and recommendations with the expectation that improving the study will improve the community's chances of successfully securing funding and providing dock electrification for the CBJ's cruise ship docks.

Providing cruise ships with access to shore power is crucial to meeting the sustainability goals adopted by the CBJ assembly. Using clean power generated at hydroelectric dams to replace power generated by burning petroleum onboard ships:

- improves air quality and public health
- creates jobs,
- reduces greenhouse gas (GHG) emissions,
- helps keep Juneau's visitor industry competitive
- mitigates negative aspects of tourism growth, and
- supports renewable energy development.

In response to broad public support for dock electrification the CBJ Assembly in 2019 funded a study to "...accomplish the Assembly goal of figuring out the necessary steps to connect more ships to shore power" by preparing "... a preliminary design and cost estimate for adding shore power…" and to advise them on the "...implications of the policy choice of requesting firm or interruptible power for new shore power, the potential implications for changes to ship docking and the potential effect on supply of power to other interruptible customers and on utility rates." (minutes, Assembly Finance, 5/8/2019).

However, the study got off to a biased and incomplete beginning, due to changes Docks and Harbors made to the Request for Proposals (RFP), changes that subverted the Assembly's intentions and direction by converting the study from an independent analysis to one that was based on a collaboration with AEL&P (see Appendix for details).

The Assembly clearly intended the study should deliver unbiased options for the CBJ to use in getting the project underway by designing and obtaining funding for cruise ship shore power. As discussed below (Section 3b & Appendix), Docks and Harbors (D&H) invited and allowed AEL&P to dictate the scope and details of the RFP for the study. We objected from the beginning that the D&H approach would waste CBJ money and result in a flawed product (see Section 3a).

When D&H re-crafted the RFP study design at AEL&P's request, they effectively sabotaged CBJ's effort to receive full and complete analysis of options to achieve CBJ goals, and to successfully compete for RAISE grant funding.

The result is a draft study with significant flaws in four areas. These flaws must be addressed and corrected before the draft can be accepted as final:

1. The draft defines the reasons for CBJ dock electrification too narrowly – project support is about much more than GHG emission reduction.

2. The study doesn't adequately address the key issue of how to efficiently connect and disconnect cruise ships.
3. The entire consideration of power availability is misleading and biased.
4. The economic analysis is misdirected, incomplete and biased.

Each of these deficiencies is discussed in these comments, followed by a set of recommendations for correcting these problems in the draft report.

1. It's more than GHG emissions. The draft takes too narrow a view of the reasons for CBJ dock electrification.

The draft focuses on an important, but overly narrow, project purpose. The only objective it identifies is to reduce greenhouse gas (GHG) emissions, citing the 2010 Juneau Climate Action and Implementation Plan (JCAIP – misspelled "CCAIP" on p. 6 and elsewhere). While this is important, it ignores the other significant community values and benefits that have been identified as reasons for dock electrification, including improved air quality; reduced noise pollution; health benefits to downtown residents, workers and visitors; managing the impacts of tourism growth; supporting a transition to renewable energy; helping the cruise industry address its carbon footprint; and enhancing Juneau's role in the regional and world-wide tourism industry and its competitive position as a cruise destination.

These other values and benefits are documented in numerous studies and planning efforts, such as the Visitor Industry Task Force and Blueprint Downtown. They are evidenced by strong Assembly support and by cruise line support, action and plans, including Holland America's recent contract with AEL&P to use shore power at the Franklin St. dock, and Norwegian Cruise Line's promises to incorporate electrification into its proposed dock project. None of these benefits are identified in the draft.

We are particularly concerned that, despite the study's emphasis on energy supplies, the draft completely ignores CBJ energy policies. The study fails to even mention the main policy document guiding the use and development of energy in the community, the Juneau Renewable Energy Strategy (JRES), adopted by the Assembly in 2018. Dock electrification is noted in the JRES, and provides one of the pathways toward the JRES goals. However, there is no discussion in the draft of the role that dock electrification plays in meeting this community value. This omission particularly weakens the section on power availability as discussed in item 3 below. While the report includes a short description of possible future projects that would require electricity (p.18), there is no discussion about their relationships to broader community energy goals or how dock electrification can help accelerate or achieve these goals.

The study also omits any consideration of the increasing significance of dock electrification to the world-wide cruise industry and the Southeast Alaska (SE) region. It is common knowledge–as reported in industry publications–that environmental and cost considerations are increasingly driving world-wide and regional trends toward dock electrification. However, the report is silent on these important trends. For example, there is no mention of the fact that the community of Skagway is working on plans for dock electrification. As more Southeast Alaska and West Coast ports develop shore power, the practice becomes more valuable to cruise lines, to climate mitigation,

and to cementing Alaska's–and particularly Juneau's–position as sustainable and environmentally responsible, and, therefore, as more competitive and desirable destinations.

The study's overly narrow view of its guiding objectives bleeds over into confusion and conflation of local air quality issues with climate impacts (pp.6, 40). JCOS identified this conflation as a significant weakness in the 2021 RAISE grant application, but Docks & Harbors dismissed this suggested improvement.

2. Making connections. The draft fails to adequately analyze shore power connection issues or to offer alternative solutions.

The study presumes that it takes one hour, or more, to connect and another hour to disconnect cruise ships. World-wide shore power connection times are significantly lower. The report fails to provide the data needed to understand these differences, or to offer concrete solutions.

Minimizing operation of ship generators in port depends on maximizing the time that ships are connected to shore power. The number of hours that ships plug in to shore power affects air quality, GHG emissions, and economics. AEL&P is reportedly concerned about the burden on the utility to connect and disconnect each ship, and about impacts to system stability under its existing contract with Princess. But the study fails to provide adequate information or offer alternative solutions.

The study used the existing Franklin Dock system as a model because data was easily available, but the Franklin Dock is the oldest and most outdated system in the world for dock electrification. Dock electrification technology and management experience have seen several generations of improvement in the last 20 years. The draft fails to examine the limitations of AEL&P's connection procedures and systems that burden the utility during ship connection, or how these would be magnified if multiple ships connect. The study describes some of the factors affecting this problem, including the location and configuration of different ships' shore charging ports. But this section of the study lacks adequate information or any proactive discussion about how AEL&P could provide faster and more consistent connect or disconnect times through operational or policy changes, state-of-the-art connection technology to ramp up and ramp down faster, or any other approaches that would meet international standards.

The study also restricts the boundaries of the connection issues too narrowly. There is little or no discussion of the potential need to update the Franklin St. dock's connection systems, and how this might interact with electrification of the CBJ's docks. Similarly, there is little or no mention of possible electrification of the private AJ dock or the proposed Norwegian dock. All or each of these possibilities could either exacerbate the types of problems identified in the study, or contribute to solutions by spreading the costs of the needed infrastructure over more parties, however, the draft fails to consider them. Further, no consideration is given to how investments in more automated and advanced grid control systems could help alleviate current power outages, surges that damage household appliances and electronics, and other grid stabilization problems that directly impact Juneau ratepayers. Again, this is a failure to consider how dock electrification relates to the CBJ's broader sustainability and renewable energy goals.

The draft mentions, but doesn't analyze, the ways that management of berthing schedules could help increase the number of ships and length of time that they could be connected. This scheduling could have spin-off benefits for the community, reducing the amount of air emissions involved with ship's maneuvering while arriving and departing, for example, or increasing the length of time that passengers can shop at downtown stores or take advantage of local tours. Given evolving industry standards, it seems reasonable to expect that within a few years' time, only ships using shore power will berth at the city docks– maximizing use and cost-recovery for the shore power infrastructure. These options are not adequately considered in the economic analysis.

The D&H study's use of assumptions that result in projected low utilization at the Cruise Terminal dock reduces the project's values. A final version should re-examine more specifically whether these values should be increased. A final version should also consider a scenario in which only the Alaska Steamship dock is electrified.

The RFP for dock electrification called for a 35% design for the project. The problems identified above and the failure to offer solutions that could speed up connections raise a question of whether this standard has been met.

3. The draft's consideration of power availability is inadequate and misleading.

The story of how much electricity Juneau will have available to do the work the community wants to do is complicated. But the D&H study uses biased assumptions, draws a simple, misleading conclusion, doesn't consider alternative approaches, and doesn't identify possible solutions to the problems it identifies.

The study reports that "based on availability of 4 of 9 years and a cruise season that extends 5 of 12 months of the year, the conclusion is energy will be available for the cruise ships approximately 25 percent of the time from the present hydroelectric power plants" (p.26). While it is not clear how this was calculated, the assumption is apparently based on a rough estimate and judgment call by AEL&P (pp. 37, 44), combined with the study's assumption that CBJ's docks should not only be "interruptible" customers, but that they should be last in line among other interruptible customers.

Under RCA regulations, "firm" users, those that AEL&P is legally obligated to provide electricity for, have the first claim on available power, while "interruptible" customers, those who have signed up for special deals with AEL&P, get electricity only when there is enough hydroelectricity available. These "interruptible" customers typically get a break on rates, in return for agreeing to shift over to other sources of power when AEL&P decides it needs to conserve hydro resources due to projected shortfalls in available water supply. "Interruptible" customers include Princess Cruise Lines, the Greens Creek Mine and now the Holland America Line. The federal building and some Juneau schools are also interruptible customers for heating. Each of these interruptible customers has varying degrees of priority, depending on the specifics of their contracts with AEL&P. The draft's conclusions are based on the assumption that all interruptible customers would have priority over the CBJ's docks. The study fails to inform the Assembly and the public that the CBJ has the regulatory right to require firm power, fails to provide information about firm power costs and fails to provide a comparative analysis

of interruptible vs. firm power and how each approach could lead to maximizing CBJ and federal grant investments.

3(a) Future availability of sufficient power.

This component of the study was misdirected. How utilities meet customers' needs is an issue for regulated utilities and the RCA, since regulated utilities are required to meet customers' power demands. The study was supposed to focus on dock electrification. Renewable Juneau was concerned from the beginning that including the issue of power availability in the scope of work would detract from the project's goal of figuring out how to electrify the city docks and, instead, become a series of inadequately studied or supported claims.

As we recommended in our Feb. 24, 2020 e-mail to the CBJ:

> "Docks and Harbors will soon be releasing an RFP for studies related to dock electrification that appears to be significantly flawed, and seems likely to result in wasting city money. One major problem is that it proposes to determine the cost and impacts of dock electrification to AEL&P and ratepayers. This is a task that is AEL&P's responsibility, not CBJ's. The CBJ should determine how much electricity will be needed under different scenarios of dock electrification, but as a regulated utility it is AEL&P's job to determine how to meet those demands. They should do any analysis needed to get the public input that an Integrated Resource Plan requires and that the Regulatory Commission of Alaska (RCA) requires for tariff changes. It is outside the expertise of Docks and Harbors to oversee such a study."

The CBJ never responded to, or addressed, our concerns. Renewable Juneau believes that this dismissal wasted CBJ public funds and created a misleading conclusion that makes it appear that there is no reasonably adequate supply of power to electrify Juneau's public and other private docks.

We believe that CBJ should act as any other utility customer, not as a market maker or as an energy market coordinator. The CBJ needs to identify how it would build the project, and how much electricity the project needs. Identifying where the electricity will come from is the utility's legal responsibility, as is calculating the costs of adding service (3 AAC 52.455). Among other problems with the CBJ doing the utility's work is the fact that much of the critical data is unavailable to any party other than the privately owned utility. The draft shows the weaknesses of this "customer-do-it-yourself" approach. Key information is missing, while other information is fragmented and undocumented, including information about AEL&P's future plans to appropriately and properly serve 16B, Norwegian or AJ dock electrification consistent with the CBJ's energy goals identified in the JCAIP and JRES.

3(b) The study should have included consideration of "firm" power.

As noted in the Introduction, the Assembly directed that the study should include examination of options for firm and interruptible power. The RFP for the study originally included consideration of firm power but this topic was dropped at the request of AEL&P, resulting in a biased, incomplete analysis that was inconsistent with Assembly direction (see Appendix). Apparently, the Juneau Commission on Sustainability was not consulted about these changes in the RFP, which is surprising

considering JCOS's role in supporting funding for the project and their charge to represent the public interest and advise the CBJ on sustainability issues. RJ's takeaway is that the D&H and CBJ paid more attention to a private business than it did to an advisory body appointed by the Assembly, and that in doing so it ignored specific direction from the Assembly.

Many of the supply availability and utilization issues raised in the study would not exist if CBJ's docks had parity with, or a priority over, interruptible users. The study should explore a firm or near firm power agreement scenario for comparison to the study's assumed "last-in-line" interruptible agreement for the CBJ.

If the CBJ inadvisably takes on the responsibility and cost of identifying the future of Juneau's power availability, it should do it completely. The first step would be to consider what it would mean to request firm power for dock electrification. This approach would have been consistent with the CBJ viewing itself, at least as an initial matter, as a customer for electricity. The study fails to provide basic information about the option of requesting firm power, the regulatory requirements for AEL&P, or to lay out pros and cons. The study omits the fact that AEL&P, as a regulated monopoly, must deliver firm and reliable power when requested by a customer. The draft states that this is a complicated issue, then unaccountably proceeds to ignore the option altogether. The study can't have it both ways – to claim to address power availability, but look at only the smallest, easiest, and least useful part of the issue.

The CBJ and the community should understand the option of firm power and its pros and cons. This would provide the basis for understanding the relative advantages to the CBJ, to the utility, and to various classes of customers. For example, the study notes (p.15) that if it is necessary to support the cruise ships with power from the diesel plants to meet firm power requirements, an additional 69 KV line will have to be constructed from the Lemon Creek power plant to the Salmon Creek Substation. However, there is no data supporting this statement and there are no cost estimates associated with this option. Again, there is no discussion about how this might fit with other future infrastructure needs, such as the proposed Aaw'k Village District Heating System.

Analyzing how to optimize dock electrification and summer loads requires more detailed information regarding the timing and amount of spilled water at our existing dams and at any future supply additions.

3(c) Options for "interruptible" supply are inadequately and incompletely considered.

The study failed to consider or fully analyze alternatives to last-in-line interruptible power. A range of possibilities exist for interruptible arrangements that could provide hydroelectricity for cruise ships most of the time. But without a full and comparative analysis, no one can determine the relative effects and benefits of firm and various interruptible arrangements. The interruptible rate established for Princess provides a starting point for analysis. Currently, the Hecla Greens Creek power sales agreement and interruptible power priority limits power for CBJ publicly owned docks, but this could be changed in a number of ways. The study should address the CBJ's options for seeking changes in priorities for power.

Starting in 2010 Juneau customers saw an unprecedented 22% increase in rates to pay off construction of Lake Dorothy. Hecla appears to have been the main direct beneficiary of this change in rates. Greens Creek got a series of beneficial deals – an upfront reimbursement of connection costs, including a submarine transmission line, a period of free power, and locking in a $.10/kwh rate that was below the cost of service for the first 7 years of the power sales agreement. The combination of cost overruns for the Lake Dorothy project and the Hecla agreements, resulted in costs of power that were substantially more than $.10/kwh, which appears to be why firm customers saw the 22% increase. The record of RCA approval of this increase is complicated, but the Dept. of Law reportedly argued at the time that AEL&P should get only a 6% increase, rather than 22% approved by the RCA.

AEL&P asserts that all Juneau customers benefit from a Cost of Power Adjustment (COPA) to rates resulting from sales of interruptible power to Greens Creek. The study does not show that since the most recent AEL&P rate increase in 2018 Juneau firm customers have paid over $9 million dollars in COPA surcharges. In order to thoroughly address power availability under the assumption of an interruptible power agreement, the study should address this history of the relative benefits of interruptible electricity rates to Green Creek and to Juneau's firm ratepayers, including a detailed analysis of how COPA surcharges result in rate volatility that has recently cost Juneau ratepayers millions of dollars in their firm rate fees.

3(d) The rest of the story – when will there be enough hydroelectricity to meet Juneau's future needs?

> "Based upon historical precipitation, existing hydroelectric generating capacity, and electrical demand, AEL&P projects they will be capable of offering electrical energy to the CBJ cruise ship docks only 25% of the time it is requested. It is expected this will improve over time as the firm load increases, requiring the construction of additional hydroelectric power plants. Such construction will likely facilitate additional capacity for interruptible loads." (p.44).

The draft study focuses only on the short-term. Since the CBJ and its contractors chose to study and address power availability (the inadvisability of which we discussed previously) the draft should include scenarios of new supply meeting new demand rather than assuming static supply–and unmet demand for power. The rest of the story, and the far more important policy issue the report should have addressed, is buried in the quote above, and in the conclusion at the end of the report:

> AEL&P's forecast with one percent growth graphically indicates that without the addition of consumption by the CBJ docks, the community's (including the Greens Creek interruptible load) energy consumption will exceed the identified average year capacity by 2023 or 2024. (p. 43).

While AEL&P has not experienced 1% load growth in recent years, local and national trends toward the "electrification of everything" make it likely that this will soon change. Rates of uptake of EV's over the next decade are predicted to rapidly increase and Juneau is experiencing rapid growth in heating systems that rely on electricity, including both electric boilers and heat pumps. Additional future energy consumers identified in the draft would add significantly to electricity demand (p. 18).

Significant expansion of hydroelectric supplies will be needed to accomplish the goals of the Juneau Renewable Strategy in shifting from the present 20-25% reliance on renewable energy to powering the community with 80% renewable energy sources by 2045.

Despite this potential shortfall, AEL&P has indicated to the Regulatory Commission of Alaska that it has no plans to increase supplies over the next 10 years (p.38, but the associated footnote #2 is missing from the draft).

This is a chicken and egg problem. CBJ needs to know that power will be available before committing to dock electrification, but AEL&P has no incentive to arrange for new hydroelectric supplies until they have customers to buy the electricity. This is a common problem with new and shifting power demands.

Given the study's stated purpose of identifying the availability of power, the draft report should have examined how dock electrification, in combination with Juneau's energy trends and plans can contribute to solving this longer-term problem of inadequate hydroelectric supplies and transmission systems.

Recent statements by AEL&P support the view that an examination of longer-term solutions is needed:

> We would need to see sustained load growth from firm (non-interruptible) customers or certainty of revenues from large interruptible customers before building additional generation capacity …, (AEL&P spokesman Alec Mesdag – https://www.juneauempire.com/news/grant-process-leaves-city-high-and-dry-but-electrification-plans-still-on-deck/).

As noted above, the study fails to address this larger picture, ignoring Juneau's renewable energy goals as expressed in the JRES, and the longer-term trends and community plans that will require substantially more power in coming decades as the community migrates from using imported fossil fuels for industrial, heating and transportation purposes to using locally produced renewable energy sources.

The study lacks real data or serious analysis of possible new renewable energy supplies. It mentions three potential sources of new supplies, offering little information about them, and appears to include inaccuracies. For example, the draft study presents incomplete and incorrect information about the Sweetheart Lake project's capacity and permitting status. It also fails to describe the relative timeframes or pros and cons of the various options to provide reliable power for dock electrification, or how these relate to electrification trends or community energy goals as expressed in the Comprehensive Plan or the Juneau Renewable energy Strategy.

In conclusion, the study should either do a full job of addressing future electricity demand and supply, or it should assume that the local utility will meet demonstrated demands. A regulated utility, such as AEL&P, is responsible for meeting the electricity needs of its customers. AEL&P has been aware of CBJ's intentions to provide shore power for cruise ships for a number of years, yet has told the Regulatory Commission of Alaska that it needs no new supplies in the next 10 years.

4. The economics section is misdirected and incomplete.

The study draft's failures to adequately address ship connections and power availability, described above, result in a flawed economic assessment. The study draft says that the economics of the project are poor because too few ships will be hooked up for long enough to make full use of shore power infrastructure, and because hydroelectricity may not be available in some years. But these conclusions are based on unrealistically narrow and limiting assumptions based on the history of the 20 year old Franklin Dock, with its outdated technology and absence of active management of the docks for the benefit of the community.

The study fails to address the full relative costs/benefits of shore power. A comparison of the cost of utility power and self-generated power should include all relevant costs: energy, operating and maintenance costs, capital costs and profits. Ratepayers pay all those costs, plus distribution, for our utility's power. The cruise ships pay all those costs to self-generate.

The draft fails to provide even basic data about fuel costs for cruise lines and how they affect the relative value of self-generation and shore power. In terms of pricing assumptions the most relevant is Marine Gas Oil (MGO) which is currently $784 per metric ton in Los Angeles. Generally, the vessels will bunker in Seattle/Vancouver and likely pay a small premium to LA/Long Beach (see World Bunker Prices). However, in recent years many ships have used a cleaner fuel mix to reduce visible air emissions as they near Juneau so their fuel costs while in port are higher than in open seas. This information should be available from the cruise lines but was missing from the study.

The study draft provides little or no analysis of the economic significance of dock electrification to the cruise lines or their future interests, or their marketing for Alaska and specifically, Juneau. The draft points out that dock electrification would result in avoidance of substantial quantities of fuel being burned and associated air pollutants and GHG emissions. Depending on connection times and management, dock electrification at two CBJ docks would result in the avoidance of burning between 358,000 gallons and 557,000 gallons per year.

The study draft fails to discuss industry trends in use of shore power in the west coast market or worldwide, or of the role that dock electrification will play as the cruise industry addresses air quality and carbon reduction in the future. It is clear that cruise lines are turning away from stack scrubbers as a solution to air quality problems and toward shore power. What will carbon reduction be worth to cruise lines in coming years? What will costs for self-generation look like under rising fuel costs, or if fuel taxes or a carbon tax are imposed? What are the costs if the CBJ does not electrify its docks? Would this create a competitive disadvantage for Juneau in coming decades? Would cruise lines prefer stops at electrified ports and avoid those that do not have shore power?

The report's assumption that emissions at Greens Creek are equivalent to emissions downtown is suspect. Shifting emissions out of downtown can have health benefits even if the community's net carbon emissions are unchanged. Federal grants place a high value on reductions in local air pollutants. The study does not examine or compare the relative levels of emissions between Greens Creek self-generation, cruise ship self-generation, and diesel generation by AEL&P.

Finally, the economic analysis makes a faulty and biased assumption that the project should pay for

itself. It concludes "that neither private or local public investment pass benefit/cost testing under any reasonable sales or fuel price assumptions" (p.35). But since it provides no analysis of the costs of firm versus interruptible power, this is clearly a subjective, unsupported assertion.
More fundamentally, this cost recovery analysis is inapplicable to dock electrification, like most public infrastructure that has public benefits.

The study's tone is superficially positive on dock electrification but this economics section focuses on reasons why dock electrification will not work rather than seeking known and constructive alternatives that will make dock electrification work for Juneau. The report assumes the CBJ is the provider of electricity to docks but fails to discuss how the CBJ would "sell" power to cruise ships given the provision in AEL&P's tariff that prohibits reselling of power. The report fails to examine the special status and adequacy of the Marine Passenger Fees, which are intended to cover the extra costs to communities of accommodating cruise ships and which seem perfectly suited to contributing to the costs of dock electrification. At the public presentation of the draft at the Nov. 1, 2021 Committee of the Whole, the Assembly recognized this gap and directed the city manager to identify additional options for financing the project. The CBJ should consult with a qualified municipal advisor to assist in this task.

Recommendations

- **Expand the discussion of benefits beyond just Greenhouse Gas (GHG) emission to include the full range of direct and secondary benefits resulting from dock electrification.** The study should address the full range of direct and secondary benefits (including clean air, health, jobs, competitiveness, meeting community energy goals, etc.) resulting from dock electrification, not just GHG emission reduction.

- **Update and expand the analysis of optimal ways to electrify docks and connect cruise ships to provide options/solutions.** The study needs more information about, and a focus on determining, the optimal way to electrify the docks and connect cruise ships. Such an optimization should include a comprehensive analysis of existing problems and consideration of state of the art grid control systems and ship connections, as well as potential solutions such as battery storage integration. It should include benefits and cost estimates, address AEL&P's concerns about electrical system stability, and offer options for mitigating those concerns to increase Juneau's grid resiliency.

- **Ask AEL&P to identify options for providing adequate power for dock electrification and to meet the Juneau Renewable Energy Strategy (JRES) goals.** The study draft should assume that AEL&P will address the question of power availability, and the CBJ should ask them to identify their plans for providing the power the community needs for dock electrification and meeting the goals of the Juneau Renewable Energy Strategy. Like a new tenant of the Walmart building, or a new fish processing business, the CBJ can request firm power as a customer and let AEL&P provide an engineering detail and cost of accomplishing the customer request.

- **Request expert, independent assistance to conduct an analysis that compares options and rate structures for firm/interruptible power for dock electrification.** If the study addresses power availability, it needs to correct two major omissions.

    1. First, rather than addressing the future of power availability in the abstract, it should start by exploring a firm or near firm power agreement scenario for comparison to a CBJ last-in-line interruptible agreement. The CBJ should request assistance from the RCA, or experienced utility advisors, and contract with appropriate independent experts to conduct an analysis that compares options and rate structures for firm and interruptible power for dock electrification. Referencing 3 AAC48.390-3AAC52.500, it appears that as a firm customer the docks could be served without impacting the rates of Juneau's firm ratepayers, that is, the costs of providing service would be borne by the cruise lines themselves.

    2. Second, the study needs to look at power availability for dock electrification in the context of full community needs and plans for electrification, including advancing the goals of the Juneau Renewable Energy Strategy.

- **Use the expertise of the Juneau Commission on Sustainability (JCOS) prior to finalizing and approving the study report.** The report is incomplete and inadequate. It is not a finished product and the CBJ should not accept it until the flaws and weaknesses identified here are corrected. Given the significance of this project to community sustainability goals and the

failure of the study draft to address them adequately, the Assembly should direct the Juneau Commission on Sustainability to advise the CBJ in finalizing the report.

- **Identify and discuss options for working with the cruise industry on their use and financing of dock electrification.** The study should include more information on cruise industry trends and the specific interests of the cruise lines in dock electrification, and should identify options for working more closely with them to develop a mutually beneficial path toward financing dock electrification.

- **Consult with an independent and qualified municipal advisor about financing options.**

- **Work with an experienced dock electrification contractor to outline efficient and effective connect/disconnect times of ships to shore power.** The next steps in design should be conducted by a contractor with specific experience in dock electrification, grid optimization and advanced controls, and other options for shortening connect and disconnect times.

Summary

The dock electrification study was funded by the CBJ Assembly in 2019 to begin design and construction of dock electrification infrastructure. The Assembly intended the study to deliver objective information and options. Docks and Harbors allowed AEL&P to dictate the scope and details of the RFP for the study. When D&H re-crafted the RFP study design, they effectively sabotaged CBJ's effort to receive full and complete analysis of options to achieve CBJ goals and to compete effectively for federal funding. The study needs major revisions, with strong direction from the CBJ Assembly.

For more information, contact Renewable Juneau, renewablejuneau@gmail.com

Appendix: How a flawed RFP for the dock electrification study resulted in a biased and inadequate study.

In trying to understand why the study included such limiting and misleading assumptions about power availability, and failed to evaluate the option of firm power, as directed by the Assembly, Renewable Juneau requested that the CBJ provide related public records (Renewable Juneau Public Records request to the CBJ, August 28, 2021).

While we still have not received all of the records we requested, the documents we received reveal a series of email and document exchanges between Port Director Carl Uchytil and AEL&P President and CEO Connie Hulbert that resulted in substantial changes to the intent and details of the Dock Electrification Study RFP (see email and document timeline, and AEL&P suggested edits, below).

At AEL&P's request, Docks and Harbors dropped the firm power analysis and a comprehensive analysis of options from other power supply sources originally called for in the study scope. They also changed the focus of the study from its original (and Assembly directed) intent to move toward design and construction to one of "consideration", while at the same time shifting it from an independent review to one of consultation with AEL&P.

AEL&P's edits were completely adopted by the CBJ in the final RFP. We understand that there was no other review by interested and involved parties, such as the Juneau Commission on Sustainability. As noted above, we received no response to our concerns about the RFP expressed to the Port Director in our Feb. 24, 2019 e-mail. We fail to understand why a private company, with strong economic interest in the project, was given the chance to comment and significantly influence the RFP, while our comments, coming from a non-profit public interest group, were ignored, and the Juneau Commission on Sustainability, as an Assembly-appointed public body, with specific duties to advise the CBJ, was not consulted.

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Email and document timeline:

10:35 AM February 20, 2020.
Port Director Carl Uchytil sent AEL&P President Connie Hulbert email containing draft RFP.

5:16 PM on February 25, 2020.
Ms. Hulbert sent Mr. Uchytil a return email with AEL&P suggested edits in file: RFP Electrification_20FEB20 2-25-2020

5:24 PM February 25, 2020.
Mr. Uchytil responded to Ms. Hulbert with a confirmation email accepting AEL&P modifications of the CBJ Dock Electrification Study RFP.

RFP signed and approved by CBH Port Director on Feb. 27, 2020 and issued on Feb.28, 2020 verbatim of AEL&P modifications

-----Original Message-----
From: Carl Uchytil <Carl.Uchytil@juneau.org>
Sent: Thursday, February 20, 2020 10:35 AM
To: Connie Hulbert <Connie.Hulbert@aelp.com>
Cc: Alec Mesdag <Alec.Mesdag@aelp.com>
Subject: ** EXTERNAL ** Dock Electrification Study - RFP

Connie -

Attached is the RFP, I intend to post in the coming days. As you know, the RFP is used to select the consultant to answer the question outlined in the Scope of Services (1.4). Once selected, there will be a similar detailed contract with the successful proposers for the work.

Sincerely,

Carl

Carl J. Uchytil, P.E.
Port Director
City & Borough of Juneau
(907)586-0294
http://www.juneau.org/harbors

From: Connie Hulbert <Connie.Hulbert@aelp.com>
Sent: Tuesday, February 25, 2020 5:16 PM
To: Carl Uchytil <Carl.Uchytil@juneau.org>
Cc: Alec Mesdag <Alec.Mesdag@aelp.com>
Subject: RE: ** EXTERNAL ** Dock Electrification Study - RFP
EXTERNAL EMAIL: BE CAUTIOUS WHEN OPENING FILES OR FOLLOWING LINKS

Hi Carl,

Suggested edits incorporated in the attached version.

Connie

From: Carl Uchytil
Sent: Tuesday, February 25, 2020 5:24 PM
To: 'Connie.Hulbert@aelp.com'
Cc: Erich Schaal; Alec Mesdag <Alec.Mesdag@aelp.com> (Alec.Mesdag@aelp.com)
Subject: FW: ** EXTERNAL ** Dock Electrification Study - RFP
Attachments: RFP Electrification_20FEB20 2-25-2020.docx

Connie –

I'll have Erich double check but your changes look fine to me. Thanks for taking the time to engage.

Kind regards,

Carl

Carl J. Uchytil, P.E.
Port Director
City & Borough of Juneau
(907)586-0294
www.juneau.org/harbors

The following underlined excerpts and strike-throughs are the changes requested by AEL&P on 2.25.20, to the original draft RFP that Docks and Harbors shared with them on 2.20.20. Our numbered comments point out some of the implications of these changes for the intent and conduct of the study.

1.4 SCOPE OF SERVICES

The Consultant shall provide professional services to study, evaluate and design facilities for consideration by Docks & Harbors. D&H may, at its own discretion, extend the master planning effort to include additional design level efforts, permitting, cost estimating, construction documents, as well as scheduling and construction phasing recommendations.

It is anticipated that D&H will negotiate fees with the selected consultant to develop elements to assist D&H in the following:

- Confirmation of electrical plans established in the 2016 *Shore Tie Power Feasibility Study Report* and review of as-builts drawings of New Cruise Ship Berth Project.
- Detailed engineering analysis of cruise ship vessels, regularly calling on Juneau, to determine the most versatile shore-side power connections to meet the suite of vessel options.
- Cost estimates for construction ~~and delivery~~ of electrical infrastructure necessary to deliver power to the Alaska Steamship and/or Cruise Ship Terminal Docks.
- Consultation with the design team of the Sub-Port Lot development to ascertain impacts of respective electrification projects ~~being constructed~~under consideration.

1. Changed wording from the proactive, forward moving term "being constructed" to "under consideration" (implying that docks are merely being considered for electrification).

- Development of conceptual drawings, up to 35% Design efforts, ~~to install electrical~~of electrical infrastructure necessary to deliver power to Alaska Steamship and/or Cruise Ship Terminal Docks.

2. Changed from active direction "to install" to the weaker, more passive "necessary to deliver."

- Coordinate with the electric utility to ~~E~~evaluate~~ion~~/estimate~~ion to~~ impacts on Juneau ratepayers, under various scenarios, ~~-~~of electrification~~s~~ to one or more cruise ship docks ~~to Juneau rate payers under a condition in which a dock is an interruptible customer and under a condition in which a dock is a firm customer~~.

3. Replaced the independent analysis standard for the CBJ to "evaluate/estimate" with "Coordinate with the utility…", making this a joint AEL&P and CBJ evaluation.

4. Eliminated a firm power analysis. Originally: "under a condition of which a dock is an interruptible customer and under a condition of which a dock is a firm customer" (emphasis added). * Accepting this AEL&P modification narrowed CBJ's information and options, despite the Assembly specifically directing that this option be considered.**

- ~~Evaluation of future power through the existing electrical utility or other new power provider(s) to increase energy availability to the Port of Juneau.~~

5. Removed the original language calling for a full, neutral analysis of future power supplies: "Evaluation of future power through the existing utility or either new power provider(s) to increase energy availability to the Port of Juneau."

- Coordinate with the electric utility to ~~E~~evaluati~~one~~ and recommend~~ation of~~ a rate structure which D&H can impose on cruise ship~~s connecting to shore power~~ using publicly provided infrastructure~~, consistent with RCA guidance~~ if D&H is the electric customer.

6. Replaced an independent analysis that would be consistent with Regulatory Commission of Alaska (RCA) guidance with a coordinated D&H-AEL&P analysis, again making the CBJ a partner with AEL&P instead of providing neutral information for public review and Assembly policy development. Replaced "Evaluate and recommend…a rate structure" (independent) with "Coordinate with the electric utility to recommend a rate structure…".

- Evaluate or approximate the cost ~~savings~~ impact to cruise lines ~~for~~ when using shore side provided electrification over self-generated power while moored in Juneau.

7. Removed the expectation of "savings" , replacing it with the more negative implication of "impact".

Copy of the Scope of Services excerpt with AEL&P requested modifications supplied to Mr. Uchytil on February 25, 2020. These were accepted verbatim and became the RFP Scope of Services language for the dock electrification study.

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- ~~Evaluation of future power through the existing electrical utility or other new power provider(s) to increase energy availability to the Port of Juneau.~~
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rate structure which D&H can impose on cruise ships connecting to shore power using publicly provided infrastructure~~, consistent with RCA guidance~~ if D&H is the electric customer.

- Evaluate or approximate the cost ~~savings~~ impact to cruise lines ~~for~~ when using shore side provided electrification over self-generated power while moored in Juneau.
- Evaluate or approximate air quality improvement anticipated in the Juneau downtown vicinity, if Alaska Steamship or Cruise Ship Terminal Docks were provided with shore power opportunities.

The scope of services is anticipated will include but not limited to the following milestones/deliverables:

- Meeting with Docks & Harbors Staff
- Meeting with cruise ship operators, coordinated by D&H Staff
- Meeting with local electric utility, coordinated by D&H Staff
- Meeting with Sub-Port Lot design & planning team, coordinated by D&H Staff
- Meetings with up to three potential ~~electrical providers, including micro-grid electrical providers~~independent power producers, coordinated by D&H Staff
- Presentation to Docks & Harbors Board
- Presentation to CBJ Assembly

The product of the Consultant's work will be phased and managed as specific milestones/deliverables are achieved. Future design elements, bidding assistance, construction administration, and inspection services may be amended to the contract if desired by the Port Director as result of final deliverables.

From: Scott Spickler
To: Erich Schaal
Subject: Dock Electrification Study
Date: Monday, January 17, 2022 4:17:55 PM

EXTERNAL E-MAIL: BE CAUTIOUS WHEN OPENING FILES OR FOLLOWING LINKS

Hi,

I have read the study and although its not a topic I am real familiar with, I am wondering why its stated that we only have 25% capacity until 2038? What about getting Sweetheart lake power connected to be able to provide the hydro power capacity we anticipate needing in the near future?

Wouldn't it make sense to accelerate that resource to supplement our power supply?

I am also very concerned that Greens Creek could be forced to rely on diesel power more frequently as they have been excellent employers and tax payers for Juneau for decades…we should do our best as a community to support them and the Kensington for their power needs, as well as future mining operations in Juneau.

Thank you,
Scott Spickler
10754 Horizon Dr.
Juneau,AK. 99801
907-789-3780

Sent from my iPad

January 17, 2022

Erich Schaal, Docks and Harbors, Port Engineer
Mayor Weldon and CBJ Assembly Members
155 S. Seward Street
Juneau, AK 99801

RE: Juneau Hydropower Draft Dock Electrification Study Comments

Dear Mr. Schaal,

For background, I have been a personal advocate for dock electrification before our 16B docks were built. I have in my possession a piece of CBJ promotion literature assuring the Juneau public that the 16B docks would have dock electrification. I share this as a historical note.

Juneau Hydropower Inc. (JHI) would like to provide constructive comments to optimize and value add to the CBJ investment in Docks and Harbors inadequate Draft Dock Electrification Study Report (Draft Report). The study, unfortunately, makes assertions that are diminutive and do not fully portray the strength or the ready-to-construct nature of the Sweetheart Lake Hydroelectric Project's nor does the draft report highlight or address its beneficial impact on dock electrification for the CBJ. The draft report also neglects to recognize and appreciate that the Sweetheart Lake Hydroelectric Project has the near-term future energy and capacity that transcends beyond dock electrification. The Sweetheart Lake Hydroelectric Project provides energy to energize the publicly owned facilities and the planned Norwegian Cruise Line Holdings new dock and could also energize the AJ Dock in the future for full Juneau port electrification.

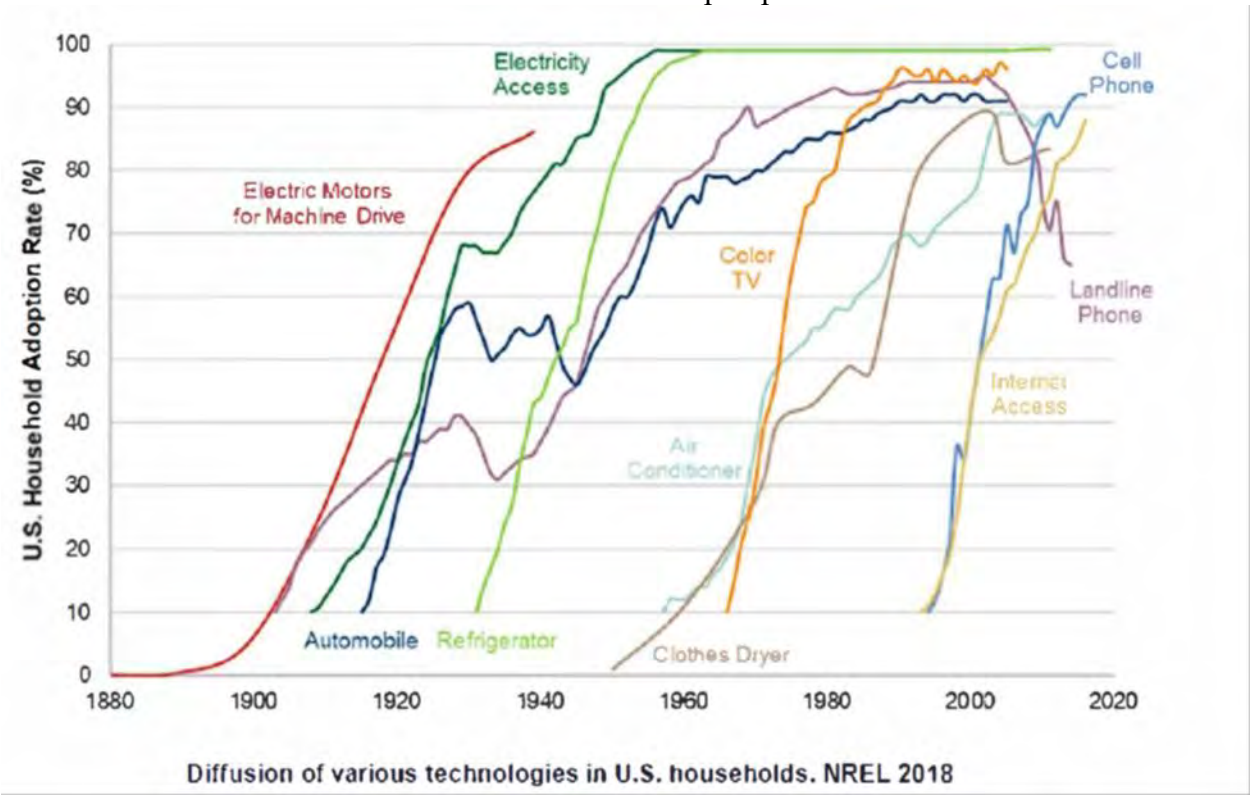
In addition to assisting in the full energizing of Juneau's port the Sweetheart Lake has the capacity and energy to assist Juneau and AELP meet Juneau's growing energy demand created from Juneau's ongoing transformation to beneficial electrification[1]. This beneficial electrification includes: electric vehicles; residential and business air source heat pumps; district energy; and providing power to AELP to supply interruptible customers when AELP cannot supply power and curtails these customers to operate on diesel generation with an increase in attendant emissions and Green House Gasses (GHG).

Beneficial electrification is a rapidly growing phenomenon in Juneau and America[2] to transform traditional diesel and fossil fuel uses into renewable energy use at a lower cost. Juneau is experiencing a migration to electric transportation that could accelerate as automakers produce SUV and Pickup truck EV's and phase-out of producing of internal combustion engines. Additional transportation migration has begun with electric buses, and heavy equipment, heavy trucks, and even locomotives and marine

[1] **Beneficial electrification** (or strategic electrification) is a term for replacing direct fossil fuel use (e.g., propane, heating oil, gasoline) with electricity in a way that reduces overall emissions and energy costs. Environmental and Energy Study Institute. https://www.eesi.org/electrification/be

[2] Beneficial Electrification: A Growth Opportunity. The Regulatory Assistance Project. https://www.raponline.org/blog/beneficial-electrification-a-growth-opportunity/

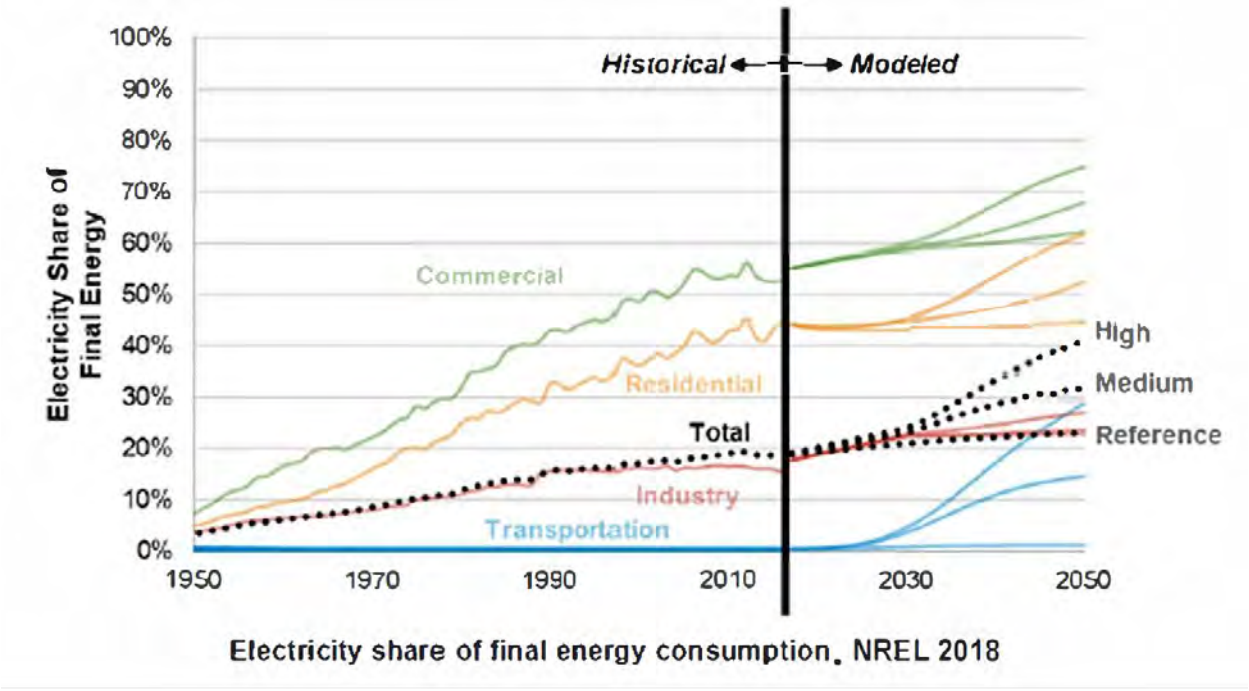
transportation to electric. Juneau has already demonstrated and is recognized as a leader in electric transportation transformation. Juneau is also is exceptionally well-positioned for beneficial electrification in displacing diesel heating and hot water with 300% more efficient and less costly air source heat pumps and district energy for downtown Juneau. These transformations are already in play and will deteriorate the availability of interruptible power as interruptible power customers are curtailed, and their power shifted to firm power customers for transportation and heating requirements. Adoption of technologies that use electricity creates technological and energy use shifts, as demonstrated in S-curves of adoption[3]. And while this sounds technical, it really means that once a technology has proved itself, everyone wants to use the technology. The same holds true for the recent past shift to everyone owning a cell phone, the current shift in the market to electric vehicles and heat pumps.



Diffusion of various technologies in U.S. households. NREL 2018

The draft report, portrays a past or historical analysis of demand, which, while useful, is not as relevant to what Juneau's future energy security or demand is. The draft report identified potential future uses of power and yet did not quantify or provide a relationship of how those other potentially large electric load demands impact dock electrification decisions making. Therefore, the draft report is insufficient to provide a well-balanced and future-oriented approach to how Juneau's dock electrification demand fits in with other growing demands to provide the complete picture to the public and decision makers. This "future factor" for electrical demand resulting from beneficial electrification is well known and well documented, yet not incorporated in the report. For example, federal research sources supplied to the report authors predict widespread end-use electric technology adoption would result in substantial shifts in fuel, electricity, and total energy consumption. This objective information was either discounted or ignored.

[3] *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States*. 2018. National Renewable Energy Laboratory. NREL/TP-6A20-71500 https://www.osti.gov/biblio/1459351-electrification-futures-study-scenarios-electric-technology-adoption-power-consumption-united-states



Electricity share of final energy consumption, NREL 2018

The draft report identified some potential areas of Juneau demand growth and correctly identified Kensington. The report did not identify the "firming" of the Greens Creek mine which would eliminate all of their emissions or mention other industrial or business uses such as fish processing expansion, reuse of the old Walmart facility or other growth. Any demand for power furnished by diesel generation is an unmet demand for locally produced hydropower. The identified growth areas in the report were not quantified to independently analyze their impact in conjunction and yet are quantifiable and would be expected for a report of this financial cost magnitude. For example, what is the power demand and energy required to electrify all of CBJ's Capital Transit Fleet fully? What is the power demand and energy required should CBJ fully electrify all of its vehicle fleet? What is the comparison of the demand and energy required of the Fred Meyer operation or Alaska Glacier Seafoods or Taku Fisheries in comparison to what a new store and operator would require firm power at the Walmart facility? Are these individual power requirements less or more than one dock electrification?. The report provides no energy context for comparison. Without the identification and comparison, the Juneau public and elected decision-makers are at a loss to understand and objectively consider the ramifications that firm dock electrification could actually hasten and support additional hydropower development to meet a more prosperous and more economically vibrant Juneau future.

As Juneau Hydropower has publicly stated, it is ready and able to assist AELP with providing Sweetheart Lake Power to meet all energy needs as a wholesale provider. The draft report fails to properly describe the Sweetheart Lake Hydroelectric Project as a FERC self-certified, Qualifying Facility which means that JHI can legally sell its power to AELP at its avoided cost or a contracted rate. Such a sale does not require AELP or the ratepayers to invest in hydropower thus saving the ratepayer the capital cost for any future hydropower that it is currently paying for on Lake Dorothy through COPA mechanisms. Additionally, under the draft but agreed Transmission Services Agreement between AELP and JHI, JHI will pay fees to AELP to transmit power to customers outside of AELP's service territory. These additional revenues could initially exceed $1million annually, providing AELP the ability to further reduce firm power rates. This

means that AELP makes money off the Sweetheart Lake Project and these funds could further reduce Juneau's firm rates. The draft report did not but should have included this analysis.

The report erroneously states that Sweetheart Lake obtained its FERC permit in 2016 when in fact, this is a FERC license. A FERC permit was granted in 2009, which initiates a complex and detailed regulatory process that culminates with a completed Environmental Impact Statement and FERC license issued in 2016. A FERC permit is the beginning of the process, whereas a license is the completion of the process. As a result of not fully and appropriately identifying the legal, regulatory and development status on the three projects identified, the draft report attempts to paint these projects as equal. It is unclear why the analysis did not appropriately and responsibly objectively differentiate for the public and elected leaders with this relevant information. The FERC permitting and licensing record for all three projects is publicly available on the FERC elibrary website.[4] The authors could have independently analyzed and determined what projects have a permit, a US Forest Service Special Use Permit, a US Army Corp 404 Wetlands permit, an Environmental Impact Statement, etc. All of which the Sweetheart Lake Hydroelectric Project has and more.

The draft report only casually mentions the Juneau District Heating but does not correctly address the area it is located in as the Aak'w Village District nor address the capacity and firm energy required that AELP is required to provide to the system. It should be noted that authors and AELP have been involved with the energy requirement applications and laying conduit to the Egan Drive Juneau District Heating property.

JHI was provided a draft RFP for the Juneau Dock Electrification Study on February 20, 2020. The subsequent RFP changes appear to have contributed to misplaced conclusions.

The draft report is expensive, confusing, problematic, and counterproductive to Juneau's economy by inferring that Juneau lacks power for dock electrification and, therefore, other economic development. The good news is that the study provides no solutions to Juneau's energy requirements or provides a clear path forward, but a key pathway exists. Juneau Hydropower is here to support the community in developing dock electrification and all other beneficial electric endeavors that our community is working on. The report did not appropriately and fully integrate the Sweetheart Lake Hydroelectric Project into the study analysis and how this project moves our community forward. We would appreciate reconsideration. If appropriately analyzed, JHI and the public should be confident that the final report will have reasonable and positive dock electrification conclusions.

Kind regards,

Duff Mitchell
Managing Director
Juneau Hydropower, Inc. duff.mitchell@juneauhydro.com

[4] Federal Energy Regulatory Commission E-library public portal https://ferc.gov/ferc-online/elibrary

From:	Mary Alice McKeen
To:	Erich Schaal; Borough Assembly
Cc:	Stuart Cohen; John and Debra Gerrish; Linda McCargar; George Partlow; Kathrin McCarthy; Angie Mendbayar; Bob Woolf; Caroline Malseed
Subject:	Comments on Draft Study on Electrification of Docks in Juneau
Date:	Monday, January 17, 2022 7:20:17 PM

EXTERNAL E-MAIL: BE CAUTIOUS WHEN OPENING FILES OR FOLLOWING LINKS

Dear Mr. Schaal,

Please accept these comments from Alaska Interfaith Power and Light on the Draft Study on Electrification of the Docks in Juneau.

Regards,

Mary Alice McKeen
Alaska Interfaith Power and Light

Comments by Alaska Interfaith Power and Light o...

--
Mary Alice McKeen
212 West 9th Street,
Juneau, Alaska 99801
907-957-6170 (cell)
907-586-5745 (fax)

January 17, 2022

Mr. Erich Schaal, Port Engineer
Mayor Beth Weldon
Members of CBJ Assembly
erich.schaal@juneau.org
boroughassembly@juneau.org

Re: Comments on Draft Juneau Cruise Ship Dock Electrification Study Submitted by Alaska Interfaith Power and Light

Dear Mr. Schall, Mayor Weldon and Members of the Assembly,

Alaska Interfaith Power and Light is a group of Alaska citizens who are members of faith communities and who are committed to supporting a strong, effective, and just response to climate change by private citizens, industry and government. To that end, we submit these comments on the draft Juneau Cruise Ship Dock Electrification Study.

Dock electrification is not merely an engineering issue, nor solely an economic issue. We must also address emissions reduction, climate change, and the opportunity to significantly decrease known health hazards for Juneau citizens. We are focusing most attention within these submitted comments on the direct health issues faced by individuals who breathe the air in the vicinity of the docks.

This issue needs to be resolved as it is dividing our community. Our elected Assembly must make a bold and conscientious decision, recognizing that it controls Juneau's future and that it should seek and optimize federal, state and other funding to optimize dock electrification in Juneau for all of its unarguable benefits. Firm power equals optimal dock electrification utilization. Optimal dock electrification utilization equals a higher probability of receiving federal funds to assist Juneau in its dock electrification efforts. Optimal dock electrification utilization increases environmental justice to downtown residents and workers, and provides a lowering of health risks associated with diesel particulates and emissions in an urban environment.

The exhaust emissions of the cruise ships create medical and health problems that directly impact all of those that live, work, and visit downtown. Below are two scientific references. Interestingly the report failed to address or correlate the health impacts of its decision to suggest that the docks could only use power 25% of the time. Not only would such a decision negate the economic justification for dock electrification and preclude federal or state participation in funding underutilized assets, but it does not address the underlying community needs to remove the impactful health hazard to Downtown Juneau elderly, children, and especially those who are immune- compromised.

Diesel exhaust from cruise ships is a carcinogen. Period. The CBJ has a responsibility to remove it. The CBJ also recognizes that many jobs and sales tax revenue are derived from the cruise ship industry and therefore it would be wise to ameliorate the friction of impacts caused by cruise ships. Eliminating diesel exhaust and thereby eliminating the carcinogens and the direct health impacts on downtown residents, workers and visitors should be a top priority for our CBJ elected leadership and staff.

The fact is that diesel dock emissions can cause cancer. Placing two cruise ship vessels located at the 16B docks is the equivalent of placing two industrial factories in the heart of downtown. Electrifying the docks and placing them on firm power so that the investment, and any federal and state funding, to assist the CBJ in fully utilizing the dock electrification assets is rational, wise, and highly recommended.

Conversely, the CBJ would not operate its sewer and wastewater operations on interruptible power and then suggest to the community that it would allow untreated and raw sewage to be pumped into the Mendenhall River and Gastineau Channel 75% of the time. So why would the CBJ suggest to its citizens that we should continue to pollute and impact the health of Juneau by placing the 16B publicly owned docks on interruptible power?

> The International Agency for Research on Cancer reclassified diesel exhaust from Group 2A (probably carcinogenic to humans) to Group 1 (carcinogenic to humans) in 2012. Since then, reevaluation and reanalysis of 2 major studies (Diesel Exhaust in Miners Study and Trucking Industry Particle Study) that were
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> influential to the International Agency for Research on Cancer evaluation have replicated the original findings and demonstrated the suitability of these epidemiologic data for the quantitative risk assessment needed to set safe exposure limits in occupational and outdoor ambient environments. The challenge now is to protect the workers and general populations in urban areas from the carcinogenicity of diesel exhaust.
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> Published by Oxford University Press on behalf of the Johns Hopkins Bloomberg School of Public Health 2018
>
> https://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC5982841&blobtype=pdf

The draft dock study erroneously assumes that removing emissions or trading emissions from the Greens Creek Mine to electrify vessels has no effect on reducing CBJ GHG emissions. However, this oversimplified correlation conveniently avoids the fact that the diesel exhaust health impact is eliminated in downtown and Aa'kw Village District of Juneau. This also was a shortcoming not properly or reasonably addressed in CBJ's RAISE grant application that CBJ, by not electrifying the docks, is placing environmental and health harm disproportionately on residents in an urban setting rather than a rural, less impactful setting. The US DOT called out in the

RAISE Grant application to address environmental justice and even defined an overburdened community that was not addressed by the CBJ. Overburdened Community: Minority, low-income, tribal, or indigenous populations or geographic locations in the United States that potentially experience disproportionate environmental harms and risks. We request that CBJ read the Goldbelt Corporation letter of dock electrification support that sums up the matter.

> "First and foremost, dock electrification provides environmental benefits and sustained reduction of smog, particulates, and harmful emissions that diesel exhaust can cause on our shareholders and workers employed in the Juneau tourism industry. Our Goldbelt Tram is yards from the public cruise ship terminals slated for electrification. Dock electrification eliminates all cruise ship smoke and emissions, thereby significantly improving the visitor experience on our Goldbelt Tram and providing a healthier work environment for our shareholders and employees."

Firm power for the CBJ docks should take precedent over any interruptible mining loads. In fact, AELP has an obligation to serve all customers equally and fairly in its service territory or it would give cause for a complaint with the Regulatory Commission of Alaska. The CBJ simply makes a customer service request to AELP. AELP then must then provide service within the requirements of their RCA-approved Tariff. This analysis of who, what, where and how appropriately takes the burden off the CBJ and places this on the utility, AEL&P.

The historical public relations record of AEL&P in their 2009 press releases states that Lake Dorothy was being built for Juneau. It is now time to convert interruptible Lake Dorothy power into firm power for dock electrification. Using this draft study report as a tool to hold off economic development, prosperity, and a cleaner downtown and Aak'w Village District that would emanate from 16B dock electrification should be corrected. The community supports dock electrification, and it appears that the scope of this study was designed to achieve preconceived outcomes to use interruptible power sources which would ensure that the dock electrification is not fully utilized and therefore not economic and also not attractive for federal grant funding. A firm power course of action with 100% utilization was in the original RFP but was, for reasons unknown, eliminated. In doing so, the report significantly alters and removes a positive conclusion.

The comparison in the draft study to the power situations in other communities such as Blue Lake in Sitka is not helpful. Unlike Juneau, the City of Sitka owns its own utility and made a conscientious community decision to add onto Blue Lake to provide sustainable power for its fish processing industry. The industry was threatening to move more processing and freezing jobs and activity to Seattle if Sitka did not fix its power supply problem.

In summary, dock electrification is not merely an engineering issue, nor solely an economic issue. We must also address emissions reduction, climate change, and the opportunity to significantly decrease known health hazards for Juneau citizens. Optimal dock electrification utilization is an issue of environmental justice for downtown residents and workers and provides a lowering of health risks associated with diesel particulates and emissions in an urban environment. Optimal dock electrification utilization also establishes a higher probability of receiving federal funds to assist Juneau in its dock electrification efforts.

Thank you for considering these comments.

Regards,

Alaska Interfaith Power and Light
725 5th Street
Juneau, Alaska 99801
ottokeen@gmail.com

Members of Steering Committee of Alaska Interfaith Power and Light: Stuart Cohen, Johnnie Gerrish, Linda McCargar, Kathrin McCarthy, Uyanga (Angie) Mendbayar, George Partlow, Bob Woolf

From:	John or Debra Gerrish
To:	Erich Schaal; Borough Assembly
Subject:	Comments on Draft Study on Electrification of Docks in Juneau
Date:	Monday, January 17, 2022 10:00:20 PM
Attachments:	Comments by Alaska Interfaith Power and Light on Draft Dock Electrification Study .pdf ATT00001.txt

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Dear Mr. Schaal,

Please accept these comments from Alaska Interfaith Power and Light on the Draft Study on Electrification of the Docks in Juneau.

Regards,

John M Gerrish
Alaska Interfaith Power and Light

9202 Emily Way
Juneau AK 99801
907-321-4458 (cell)
jdgerrish@alaska.net

January 17, 2022

Mr. Erich Schaal, Port Engineer
Mayor Beth Weldon
Members of CBJ Assembly
erich.schaal@juneau.org
boroughassembly@juneau.org

Re: Comments on Draft Juneau Cruise Ship Dock Electrification Study Submitted by Alaska Interfaith Power and Light

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The fact is that diesel dock emissions can cause cancer. Placing two cruise ship vessels located at the 16B docks is the equivalent of placing two industrial factories in the heart of downtown. Electrifying the docks and placing them on firm power so that the investment, and any federal and state funding, to assist the CBJ in fully utilizing the dock electrification assets is rational, wise, and highly recommended.

Conversely, the CBJ would not operate its sewer and wastewater operations on interruptible power and then suggest to the community that it would allow untreated and raw sewage to be pumped into the Mendenhall River and Gastineau Channel 75% of the time. So why would the CBJ suggest to its citizens that we should continue to pollute and impact the health of Juneau by placing the 16B publicly owned docks on interruptible power?

> The International Agency for Research on Cancer reclassified diesel exhaust from Group 2A (probably carcinogenic to humans) to Group 1 (carcinogenic to humans) in 2012. Since then, reevaluation and reanalysis of 2 major studies (Diesel Exhaust in Miners Study and Trucking Industry Particle Study) that were
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> https://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC5982841&blobtype=pdf

The draft dock study erroneously assumes that removing emissions or trading emissions from the Greens Creek Mine to electrify vessels has no effect on reducing CBJ GHG emissions. However, this oversimplified correlation conveniently avoids the fact that the diesel exhaust health impact is eliminated in downtown and Aa'kw Village District of Juneau. This also was a shortcoming not properly or reasonably addressed in CBJ's RAISE grant application that CBJ, by not electrifying the docks, is placing environmental and health harm disproportionately on residents in an urban setting rather than a rural, less impactful setting. The US DOT called out in the

RAISE Grant application to address environmental justice and even defined an overburdened community that was not addressed by the CBJ. Overburdened Community: Minority, low-income, tribal, or indigenous populations or geographic locations in the United States that potentially experience disproportionate environmental harms and risks. We request that CBJ read the Goldbelt Corporation letter of dock electrification support that sums up the matter.

> "First and foremost, dock electrification provides environmental benefits and sustained reduction of smog, particulates, and harmful emissions that diesel exhaust can cause on our shareholders and workers employed in the Juneau tourism industry. Our Goldbelt Tram is yards from the public cruise ship terminals slated for electrification. Dock electrification eliminates all cruise ship smoke and emissions, thereby significantly improving the visitor experience on our Goldbelt Tram and providing a healthier work environment for our shareholders and employees."

Firm power for the CBJ docks should take precedent over any interruptible mining loads. In fact, AELP has an obligation to serve all customers equally and fairly in its service territory or it would give cause for a complaint with the Regulatory Commission of Alaska. The CBJ simply makes a customer service request to AELP. AELP then must then provide service within the requirements of their RCA-approved Tariff. This analysis of who, what, where and how appropriately takes the burden off the CBJ and places this on the utility, AEL&P.

The historical public relations record of AEL&P in their 2009 press releases states that Lake Dorothy was being built for Juneau. It is now time to convert interruptible Lake Dorothy power into firm power for dock electrification. Using this draft study report as a tool to hold off economic development, prosperity, and a cleaner downtown and Aak'w Village District that would emanate from 16B dock electrification should be corrected. The community supports dock electrification, and it appears that the scope of this study was designed to achieve preconceived outcomes to use interruptible power sources which would ensure that the dock electrification is not fully utilized and therefore not economic and also not attractive for federal grant funding. A firm power course of action with 100% utilization was in the original RFP but was, for reasons unknown, eliminated. In doing so, the report significantly alters and removes a positive conclusion.

The comparison in the draft study to the power situations in other communities such as Blue Lake in Sitka is not helpful. Unlike Juneau, the City of Sitka owns its own utility and made a conscientious community decision to add onto Blue Lake to provide sustainable power for its fish processing industry. The industry was threatening to move more processing and freezing jobs and activity to Seattle if Sitka did not fix its power supply problem.

In summary, dock electrification is not merely an engineering issue, nor solely an economic issue. We must also address emissions reduction, climate change, and the opportunity to significantly decrease known health hazards for Juneau citizens. Optimal dock electrification utilization is an issue of environmental justice for downtown residents and workers and provides a lowering of health risks associated with diesel particulates and emissions in an urban environment. Optimal dock electrification utilization also establishes a higher probability of receiving federal funds to assist Juneau in its dock electrification efforts.

Thank you for considering these comments.

Regards,

Alaska Interfaith Power and Light
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Members of Steering Committee of Alaska Interfaith Power and Light: Stuart Cohen, Johnnie Gerrish, Linda McCargar, Kathrin McCarthy, Uyanga (Angie) Mendbayar, George Partlow, Bob Woolf

Comments on "2021 - Juneau Cruise Ship Dock Electrification Study" draft (CBJ Contract # DH20-037):

Having lived in Juneau for a while I've noticed there are some issues we as a community like to rotate through. They're discussed or studied until enough impasses are found or created such that there are no more friendships to ruin, so boredom sets in and we accept maintaining the status quo and move on. Some issues are more philosophical—or rather entirely opinion based—like fireworks and 4-wheelers—but for some reason we as a community also seem to accept substituting opinion when all we really wanted was for someone to present some well-reasoned quantitative position or observation for the elected-body of the community to make a yes or no decision upon, and then move on (or not).

The issue with the draft dock electrification study presented here by Haight and Associates, McKinley Research, and PND Engineers is that even if we— as a community— again shelve this project, when we inevitably pick it up again the project and impacts contemplated are narrowly considered and presented without a greater context that we have no easy way to reassess this project without doing the entire study over again.

Now I admittedly began writing these comments with my pedantic engineering brain and after about 11 pages where my curiosity got the better of me I think that responding directly will cause one to experience Brandolini's Law. After the holiday break and recognizing that, while interesting and informative, there really is no productive outcome to this tact via public comment or in general at this stage of the study.

I have a few fleeting trivia items to leave at the end, but I would ask all those involved to consider a more global thought. From a strictly financial accounting perspective, cruise ship dock electrification is tough—diesel or bunker fuel is relatively cheap and burning a tiny amount more is by extension inexpensive and in practice simple and easy. No party here is making a business decision on the basis of cost efficiency (i.e. saving money). The point here is for CBJ to investigate how it can seek better financial efficiency (i.e. increased revenue for both itself and other local institutions) by justifying better economic efficiency (i.e. increased societal benefits at large) to a grant-making institution (e.g. the Federal government).

What I think the takeaway should be is docked hotel loads are a rounding error to the cruise ship energy budget. The project to electrify the docks is a chance for Juneau to mitigate emissions and receive financial consideration for such mitigations from a third party in a lump sum payment. Most importantly the project can also convert that consideration to a contribution in aid of construction in the short-term and, while a relatively smaller sum, future revenue to support Juneau's electric grid and rapidly stagnating hydropower resources.

Less philosophical thoughts:

In the recent work for the RAISE grant completed last year, the consultant proposed a benefit-cost ratio of 3 for the cruise ship electrification project as currently presented in the study—even after accounting for very restrictive assumptions that resulted in an aggressive 75% ratio reduction, i.e. as I understand it the benefit-cost ratio without these assumptions would be around 12. I can't highlight this enough—supposedly the view under the current Federal guidance is that for $1 invested in the project, society will receive $12! So post grant application the study now says the project requires another 69 kV transmission line that would likely be prudent in the future where its cost would otherwise be borne solely by Juneau ratepayers? And—for the sake of argument—the line is super expensive and doubles the total cruise ship dock electrification project cost? By the study's logic, the transmission line addition—while costly— provides technical justification to not apply the 75% reduction thus even considering the increased cost still doubles the benefit-cost ratio from 3 to 6!

There has been a lot of focus put on the cruise ship dock electrification as it pertains to the ratepayer. This is even reflected in industry comments recorded in the minutes of CBJ meetings—that they are pro electrification as long as it doesn't affect the ratepayer. It seems the looming fear is the idea that increased demand for electricity will result in the requirement to burn diesel during drought or build new underutilized hydropower facilities that will be more expensive than current facilities, thus raising the overall average cost of electricity. (Kind of like how it is easy to find a hotel room with two beds for four people, but if suddenly you have five guests the only option is the penthouse suite and the per person cost is higher.) To avoid utilizing more expensive electricity sources, the study considers if the docks could use firm power and displace interruptible customers to serve firm customers, but concludes ratepayers would suffer because interruptible sales are paid directly back to firm customers. (Kind of like making your kid sleep in the car in the hotel parking lot because you know your Uncle will at least contribute his pro rata share to the hotel room.)

Regardless of whether or not the situation as described actually has those stated outcomes, the issue prohibiting better public understanding here is that no numbers or amounts are presented in the study. Page 37 states that an "important aspect of the interruptible power program is that revenues from interruptible sales are used to discount firm rates," but no quantitative analysis is presented. The net COPA from the sale of interruptible power should be fairly straight forward and I believe it is as follows. Let's assume sales are per Table 4 using the "optimized" case of 7,100 MWh. The current interruptible rate is $0.117901/kWh so the net contribution back to firm ratepayers would be $839,097.10 per year. Total firm sales are on the average 318,000 MWh per year, so the net attributable $/kWh for the year would be $0.00263867/kWh. The kWh per customer for the Rate 10 general residential customer according to the 2020 FERC 1 report is 10,562 kWh/year at $0.1255/kWh. So not intending to be exact, only relative, the docks would amount to $27.87 to offset the average $1,325.53 per year that we all pay at home. In terms of the monthly billing cycle we are all used to—that's $110 per month versus $108 per month. (To continue the hotel example, your Uncle maybe wasn't contributing all that much directly to you after all.)

This highlights what a relatively small load the cruise ship docks really are— 7,100 MWh for the "optimized" docks versus 318,000 MWh for current firm loads versus ~70,000 MWh (when available) for Greens Creek. The gains for our town are really not fighting over whether or not to collect a couple dollars off our monthly electric bill, but the gains are 1) to understand the means by which we can add to our firm load in the future and 2) to receive funds that are willing to consider and pay for mitigations that are difficult-to-touch from a financial accounting perspective.

Secondly, I wonder about the cruise ship industry's price sensitivity to the cost of electricity at the dock. Pages 21 through 25 presents the methodology for calculating the cruise ship hotel loads, i.e. the non-propulsive loads, while the ship is docked. The entire section is about cruise ships, but no context is given to how these hotel loads fit into the bigger energy budget of a cruise ship. Context here is important because the entire economic analysis presented later attempts to illustrate how futile the cruise ship dock electrification project is by comparing avoided fuel costs to hydroelectric rates.

I believe docked hotel loads are a rounding error to the cruise ship energy budget-- here is why—going online and picking a random cruise— say a 7 Night Multi Glacier Experience onboard the Royal Caribbean Serenade of the Seas departing Vancouver May 29, 2022 and arriving back in Vancouver on June 5, 2022. The Serenade of the Seas is powered by two GE LM2500+ aeroderivative gas turbines. Wikipedia indicates these 40,500 shp (30,200 kW) turbines have a fuel consumption of 0.354 lb/shp-hr (215 g/kW-hr). So doing some napkin math and assuming the ship runs both turbines at about 85% when steaming along that's ~12,000 lbs or 6 tons of fuel per turbine per hour. Running both turbines is on the order of 12 tons of fuel per hour. Looking at the 7 night schedule for my cruise there are 5 segments of "at sea" totaling 131 hours. So the whole trip is looking around 1,600 tons of fuel. With energetic liquid running on the order of $700/ton this one 7-day cruise is a $1.12 million fuel bill.

When the ship docks in Juneau for its 8 hours and consumes 5 MWh/hour it will use 40 MWh or 40,000 kWh. The current interruptible rate is $0.117901/kWh for cruise ships. Therefore if plugged in the Serenade of the Seas electric bill would come to $4,716 for that 8 hour visit. If the Serenade of the Seas was chugging along at 20 mph in 8 hours it would burn 96 tons of fuel at a cost on the order of $70,000. For every hour that ship and its passengers stay entertained at a dock in Juneau instead of feeling the wind in their hair there is an avoided roughly $8,000 of fuel. Therefore, assuming my napkin math above is even remotely in the ball park, the cost of electricity is clearly an entirely academic topic.

January 17, 2022
Devon Kibby
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dkibby@gmail.com

From: John or Debra Gerrish
To: Erich Schaal; Borough Assembly
Subject: Dock Electrification study comment
Date: Monday, January 17, 2022 10:28:35 PM

EXTERNAL E-MAIL: BE CAUTIOUS WHEN OPENING FILES OR FOLLOWING LINKS

Mr. Schall, Mayor Weldon and Members of the Assembly,

I have had opportunity to review Renewable Juneau's critical comments about CBJ's Docks and Harbors contracted study of Dock Electrification and I find the level of influence which AEL&P exerted on the Request for Proposal alarming. Docks and Harbors' willingness to accept the utility company's policy preferences over impartial language without review by any other CBJ agency, particularly Juneau Commission on Sustainability is shoddy at best, collusive at worst.

Please carefully review Renewable Juneau's comment on "A Broken Study", take them to heart and insist on a comprehensive analysis of full time electrification of the docks to remove the health risks of diesel generation from all ships docked on the Juneau waterfront.

https://renewablejuneau.org/2022/01/18/a-flawed-study

Thank you,
John M Gerrish

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