BOARD OF DIRECTORS
REGULAR MEETING
Thursday, December 19, 2019 8:30 a.m.
OPALCO Friday Harbor Office

TRAVEL

Via Island Air
378-2376

To:

Leave	LZ	7:45 am	Arrive	FH	8:00 am

Return:

Leave	FH	2:15 pm	Arrive	LZ	2:30 pm

Via Ferry:

To:

Leave	Lopez Shaw Orcas	6:55 am 7:15 am 7:35 am	Arrive	FH	8:15 am

Return:

Leave	FH	2:20 pm	Arrive	Orcas Shaw Lopez	3:10 pm 3:25 pm 3:45 pm

Sequence of Events

- OPALCO Board meeting

Orcas Power & Light Cooperative
Board of Directors
Regular Board Meeting
OPALCO Friday Harbor Office
December 19, 2019 8:30 A.M.*

**Time is approximate; meetings are scheduled around the ferry schedule; if all Board members are present, the meeting may begin earlier or later than advertised.*

WELCOME GUESTS/MEMBERS

Member attending the board meeting acknowledge that they may be recorded, and the recording posted to OPALCO's website.

- Member Comment Period
    - *Members are expected to conduct themselves with civility and decorum, consistent with Member Service Policy 17. If you would like answers to specific questions, please fill out Q&A card for post-meeting follow-up.*

ACTION ITEMS

- Consent Agenda
- OPALCO 2020 Tariffs (2nd Reading)
- Electric School Bus Charging Stations

DISCUSSION ITEMS

- 2019 Youth Rally Attendee Presentation
- The Challenges between Dam Removal and Reliable, Sustainable and Cost Effective Power (Open Discussion Noon - 1:45 PM)
    - OPALCO's Position on Dams and Ocean Health

REPORTS

- General Manager
- Rock Island Snapshot

APPENDICES

- Resolution 2-2019
- Quick Facts: Ocean Health
- Quick Facts: Orca Whales
- Letter from Orcas Women's Coalition

EXECUTIVE SESSION

Legal, Personnel, and Competitive

ADJOURNMENT

MEMORANDUM

December 13, 2019

TO: Board of Directors

FROM: Foster Hildreth

RE: Consent Agenda

All matters listed with the Consent Agenda are considered routine and will be enacted by one motion of the Board with no separate discussion. If separate discussion is desired, that item may be removed from the Consent Agenda and placed as an Action Item by request of a Board member. The minutes will reflect the approved consent agenda.

The Consent Agenda includes:

- **Minutes** of the previous meeting – attached.
- **Approval of New Members** – attached {as required by Bylaws Article I Section 2 (d)}

NEW MEMBERS – November 2019

District 1 (San Juan, Pearl, Henry, Brown, Spieden)

1. Avery, Jeffrey
2. Brink, Michelle L
3. Danhier, Mariah & Clark, Nick
4. Dove, Shelly
5. Elder, Jaclyn
6. Francis, Orlando
7. Franck, John
8. GCR 434 LLC
9. Gosselin, Ashley
10. Kessler-Jeffrey, Nathan
11. Kiehnle, Sarah
12. McCague, Scott & Ann
13. Moore, Brooke & Lois
14. Murphy, Tiffany & Kidwell, Michael
15. Nardi, Stephen
16. Neff, James
17. Nielsen, Jupiter
18. Noreau, Alex L
19. Oaks Harr, Allison
20. Sandwith, Jessica
21. Underhill LLC
22. Waddingham, Marie & William

District 2 (Orcas, Armitage, Blakely, Obstruction, Big Double, Little Double, Fawn)

23. Billings, David
24. Bonner, James & Wagner, Flavia
25. Cowen, Bruce F & Linda
26. Frost, Jason
27. Ghosh, Indranil & Culligan, Ann E
28. Goranson, Lori
29. Harvey, Robert T
30. Hayek, Samantha & Rogers, Alex
31. Island Tax Service Inc
32. Martin, Leah & Prakash, Vikramaditya
33. Meskew, Natasha
34. Moilino, Claudia
35. Olsheim, Glen & Elizabeth
36. Osland, Asbjorn & Joyce
37. Victory Hill LLC
38. Vierthaler, Nic & Heather

District 3 (Lopez, Center, Decatur, Center, Charles)

39. Chastain, Eric & Camilla L
40. Cook, Patrick & Gretchen
41. Courtion, Colette
42. Ehman, David & Harlan, Sara E
43. MacDonald, Jeffery W
44. Rust, Martha & David
45. Willemsen, Yahanni & Coenraad

District 4 (Shaw, Crane, Canoe, Bell)
None

- **Capital Credit** payments to estates of deceased members and/or organizations no longer in business as shown below:

December

Customer #	Amount
29610	$ 2,495.98
62893	2,244.52
69345	1,074.64
82462	364.58
Total	**$ 6,179.72**

- **RUS 219s** *Inventory of Work Orders* of projects completed from the Construction Work Plan totaling $556,219.98. These forms are submitted to RUS for approval of loan funds.
    - Inventory 201910 - $540,619.79 for projects associated with replacement of underground lines.
    - Inventory AS1910 - $15,600.19 for projects associated with system improvements.

Staff requests a motion to approve the Consent Agenda.

Orcas Power & Light Cooperative
Minutes of the Board of Directors Meeting
Thursday, November 21, 2019

President Vince Dauciunas called the meeting to order at 8:30 a.m. at the Orcas Island Fire Hall. Board members present were Rick Christmas, Brian Silverstein, Jeff Struthers, Mark Madsen, Peter Garlock and Jerry Whitfield. Staff present were General Manager Foster Hildreth; Manager of Engineering and Operations Russell Guerry; Manager of Finance and Member Services Nancy Loomis, Head Accountant Travis Neal, Public Relations Administrator Suzanne Olson and Executive Assistant Kelly Koral (serving as recording secretary). Consultant Jay Kimball, Legal Counsel Joel Paisner and member Cindy Wolf were also in attendance.

CONSENT AGENDA

- **Motion** was made and seconded to approve the Consent Agenda, including October 17, 2019 minutes, new members as listed with the Board materials and capital credit payments totaling $7,137.88. Motion carried by voice vote.

2020 BOARD MEETING DATES

The 2020 suggested meeting dates were discussed. It was agreed that the March Rock Island quarterly update and the monthly OPALCO Board meeting would be held on the same day, March 19, 2020.

- **Motion** was made to approve the meeting dates as amended. Motion carried by voice vote.

January 23 ..... Lopez (fourth Thursday)
February 20 ..... Friday Harbor
March 19 ..... Eastsound (Rock Island Quarterly)
March 19 ..... Eastsound
April 18 ..... ANNUAL MEETING
April 23 ..... Lopez (fourth Thursday Officer Elections)
May 14 ..... Friday Harbor (Rock Island Quarterly)
May 15 ..... Friday Harbor
June 18 ..... Lopez
July ..... NO MEETING
August 12 ..... Eastsound (Rock Island Quarterly)
August 13 ..... Eastsound
September 17..... Lopez
October 15 ..... Friday Harbor
November 18 ..... Eastsound (Rock Island Quarterly)
November 19 ..... Eastsound
December 17..... Lopez

ELECTION AND GOVERANCE (EGC)

Second read of the amended Bylaws, Policies 1, 7 and 23 was held. Two items discussed and agreed upon were the number of members required to sign a peitition for Board candidacy will remain at 20 (Bylaws Section 3) and no current or past employee or their family member will be eligible to become or remain a director (Bylaws Section 2 and Policy 23).

- **Motion** was made and seconded to approve the Bylaw and Policy changes as amended. Motion carried by voice vote.

Counsel noted that the Board is delegating the election process to management and the qualifications vetting process to legal counsel.

BYLAW UPDATE RELATED TO CAPITAL CREDITS

A discrepancy in the language contained in Article VIII versus Member Service Policy 11 was addressed regarding capital credit allocation basis.

- **Motion** was made and seconded to approve the amended language. Motion carried by voice vote.

CAPITAL CREDITS – UNCOLLECTIBLE ACCOUNTS

Staff requested that ~$4,624 in capital credits be applied to their corresponding uncollectible account balances. Discussion ensued.

- **Motion** was made to approve the application of ~$4,624 in capital credits to reduce the corresponding uncollectible account balances. Motion carried by voice vote.

CAPITAL CREDIT GENERAL RETIREMENT

Staff requested Board approval to fund the general retirement of capital credits for the remainder of 1994 and 1995 of ~$1.3M, with the amount of projected checks being ~$1,010,000. Discussion ensued.

- **Motion** was made and seconded to approve. Motion carried by voice vote.

Break at 10:15. Return at 10:30

Q3 FINANCIAL REPORT

Board reviewed and discussed the Q3 2019 financial report, which indicated that the year-to-date results were within budget expectations.

2020 BUDGET

Staff presented the 2020 budget with a projection for 2021 thru 2024. The 2020 budget was described as positioning OPALCO in direct alignment with the Board approved strategic documents: strategic directives, Integrated Resource Plan (IRP), Long Range Plan (LRP) and Construction Work Plan (CWP). Discussion ensued on the various components of debt, equity, Times Interest Earning Ratio (TIER), Heating Degree Days (HDD), labor, capital projects, grid control progress, community solar, energy storage system, capital credits and support for low income households. The proposed 3.0% rate increase (4% operating revenue increase) was further discussed and included an analysis of the financial impact to the average and low income members. The rate increase was held to 3% (despite forecasting at 6% for 2020) in order to give members a break as we communicate the goals of the IRP and anticipate the costs to build a sustainable, renewable energy future. Rates are expected to increase as forecasted in the 2020 buidget in order to increase equity to achieve the goals set forth by the board.

- **Motion** was made and seconded to approve the 2020 Budget. Motion carried by voice vote.

TARIFFS: FIRST READ

With Staff's recommendation for the Board's approval of the 3% rate increase, all affected tariffs were updated to reflect the increase, noting that the 2020 rate structure will not change from the current structure. The Board discussed the tariffs and were assured that the Energy Conservation Charge (ECC) tariff for the purpose of administering the Energy Assistance Program (EAP) would also increase to pass along a corresponding increased EAP bill credit. For calendar year 2021, the Board requested that staff review the current rate structure for a possible solar inequity and verify whether there was a potential residential and commercial rate imbalance, as was discussed during the 2018 cost of service study. No board action related to the 2020 tariff approval was required at the November meeting. The 2020 rate affected tariffs will be reviewed again during the second read at the December board meeting.

Break 12:15 – 12:40

OPALCO OPEN HOUSE RECAP

The November 20th OPALCO open house attended by the Board and membership was discussed, with ideas to increase future member attendance to be developed by Staff.

REPORTS

General Manager

The Board reviewed and discussed the GM report. It was noted that a portion of the funds currently in the Orcas Island Community Foundation (OICF) were to be transferred to support the OPALCO PAL program as part of their donation designation.

Executive Session 1:40. Return 1:50

ADJOURNMENT

Meeting adjourned at 2:00 p.m.

_____ _____

Vince Dauciunas, President Brian Silverstein, Secretary-Treasurer

11/22/2019 11:58:48 am

RUS Form 219 Inventory Of Work Orders

Period: OCT 2019 System Designation: WA O9

Inventory: 201910

Loan		Work Order			Gross Funds Required		Deductions			
							Salvage Relating To			
Project	Year	Construction (1)	Retirement (2)	Bdgt (3)	Cost Of Construction: New Constr Or Replacements (4)	Cost Of Removal: New Constr Or Replacements (5)	New Construction Or Replacements (6)	Retirements Without Replacements (7)	Contrib In Aid Of Constr and Previous Advances (8)	Loan Funds Subject To Advance By RUS (9)
608	2018	1111	1111	1	70,817.00	0.00	0.00	0.00 AFUDC: 4,047.05	5,429.86	61,340.09
					70,817.00	0.00	0.00	0.00	5,429.86	61,340.09
608 - 21	2018	3153	3153	1	111,004.94	1,616.69	0.00	0.00 AFUDC: 1,606.00	0.00	111,015.63
					111,004.94	1,616.69	0.00	0.00	0.00	111,015.63
608 - 54	2018	2959		1	80,983.43	0.00	0.00	0.00 AFUDC: 1,467.97	0.00	79,515.46
					80,983.43	0.00	0.00	0.00	0.00	79,515.46
706 - 3	2018	1583		1	298,061.30	0.00	0.00	0.00 AFUDC: 9,312.69	0.00	288,748.61
					298,061.30	0.00	0.00	0.00	0.00	288,748.61
903	2018	2468		2	162,792.31	0.00	0.00	0.00 AFUDC: 7,512.63	0.00	155,279.68
					162,792.31	0.00	0.00	0.00	0.00	155,279.68
Grand Totals:					$ 723,658.98	$ 1,616.69	$ 0.00	$ 0.00	$ 5,429.86	$ 695,899.47

11/22/2019 11:58:48 am

RUS Form 219 Inventory Of Work Orders

Period: OCT 2019 System Designation: WA O9

Inventory: AS1910

Loan		Work Order			Gross Funds Required		Deductions			
					Cost Of Construction: New Constr Or Replacements	Cost Of Removal: New Constr Or Replacements	Salvage Relating To New Construction Or Replacements	Salvage Relating To Retirements Without Replacements	Contrib In Aid Of Constr and Previous Advances	Loan Funds Subject To Advance By RUS
Project	Year	Construction (1)	Retirement (2)	Bdgt (3)	(4)	(5)	(6)	(7)	(8)	(9)
1600	2018	3151	3151	1	11,093.46	613.14	169.88	0.00 AFUDC: 239.25	0.00	11,297.47
1600	2018	3225		1	4,312.99	0.00	0.00	0.00 AFUDC: 10.27	0.00	4,302.72
					15,406.45	613.14	169.88	0.00	0.00	15,600.19
Grand Totals:					$ 15,406.45	$ 613.14	$ 169.88	$ 0.00	$ 0.00	$ 15,600.19

Minor Construction Work Orders

Work Order: 3151 - RETIRE OVERHEAD SECONDARY, INSTALL NEW UNDERGROUND

Work Order: 3225 - GET IN OPEN TRENCH WITH CLINK AND RIC TO COMPLETE LOOP ON HARBORVIEW LN

11/22/2019 11:58:48 am

RUS Form 219 Inventory Of Work Orders

Period: OCT 2019 System Designation: WA O9

Inventory : 201910

Budget Loan	Project	Amount
1	608	61,340.09
1	608 - 21	111,015.63
1	608 - 54	79,515.46
1	706 - 3	288,748.61
2	903	155,279.68
	Total:	695,899.47

BORROWER CERTIFICATION

WE CERTIFY THAT THE COSTS OF CONSTRUCTION SHOWN ARE THE ACTUAL COSTS AND ARE REFLECTED IN THE GENERAL ACCOUNTING RECORDS. WE FURTHER CERTIFY THAT FUNDS REPRESENTED BY ADVANCES REQUESTED HAVE BEEN EXPENDED IN ACCORDANCE WITH THE PURPOSES ON THE LOAN, THE PROVISIONS OF THE LOAN CONTRACT AND MORTGAGE, RUS BULLETINS, AND THE CODE OF FEDERAL REGULATIONS RELATIVE TO THE ADVANCE OF FUNDS FOR WORK ORDER PURPOSES. WE CERTIFY THAT NO FUNDS ARE BEING REQUESTED FOR REIMBURSEMENT OF CONSTRUCTION WORK IN A CBRA AREA.

SIGNATURE (MANAGER) DATE

SIGNATURE (BOARD APPROVAL) DATE

ENGINEERING CERTIFICATION

I HEREBY CERTIFY THAT SUFFICIENT INSPECTION HAS BEEN MADE OF THE CONSTRUCTION REPORTED BY THIS INVENTORY TO GIVE ME REASONABLE ASSURANCE THAT THE CONSTRUCTION COMPLIES WITH APPLICABLE SPECIFICATIONS AND STANDARDS AND MEETS APPROPRIATE CODE REQUIREMENTS AS TO STRENGTH AND SAFETY. THIS CERTIFICATION IS IN ACCORDANCE WITH ACCEPTABLE ENGINEERING PRACTICE.

INSPECTION PERFORMED BY FIRM

LICENSE NUMBER DATE SIGNATURE OF LICENSED ENGINEER

11/22/2019 11:58:48 am

RUS Form 219 Inventory Of Work Orders

Period: OCT 2019 System Designation: WA O9

Inventory : AS1910

Budget Loan	Project	Amount
1	1600	15,600.19
	Total:	15,600.19

ENVIRONMENTAL CERTIFICATION

1 ☐ WE CERTIFY THAT CONSTRUCTION REPORTED ON THE LISTED WORK ORDERS (EXCEPT CERTIFICATION "2" BELOW), IS A CATEGORICAL EXCLUSION OF A TYPE DESCRIBED IN 7 CFR 1970 WHICH NORMALLY DOES NOT REQUIRE PREPARATION OF A BORROWER'S ENVIRONMENTAL REPORT.

2 ☐ WE CERTIFY THAT CONSTRUCTION REPORTED ON WORK ORDERS_____ , IS A CATEGORICAL EXCLUSION OF A TYPE THAT NORMALLY REQUIRES A BORROWER'S ENVIRONMENTAL REPORT WHICH IS ATTACHED.

SIGNATURE (MANAGER) DATE

BORROWER CERTIFICATION

WE CERTIFY THAT THE COSTS OF CONSTRUCTION SHOWN ARE THE ACTUAL COSTS AND ARE REFLECTED IN THE GENERAL ACCOUNTING RECORDS. WE FURTHER CERTIFY THAT FUNDS REPRESENTED BY ADVANCES REQUESTED HAVE BEEN EXPENDED IN ACCORDANCE WITH THE PURPOSES ON THE LOAN, THE PROVISIONS OF THE LOAN CONTRACT AND MORTGAGE, RUS BULLETINS, AND THE CODE OF FEDERAL REGULATIONS RELATIVE TO THE ADVANCE OF FUNDS FOR WORK ORDER PURPOSES. WE CERTIFY THAT NO FUNDS ARE BEING REQUESTED FOR REIMBURSEMENT OF CONSTRUCTION WORK IN A CBRA AREA.

SIGNATURE (MANAGER) DATE

SIGNATURE (BOARD APPROVAL) DATE

ENGINEERING CERTIFICATION

I HEREBY CERTIFY THAT SUFFICIENT INSPECTION HAS BEEN MADE OF THE CONSTRUCTION REPORTED BY THIS INVENTORY TO GIVE ME REASONABLE ASSURANCE THAT THE CONSTRUCTION COMPLIES WITH APPLICABLE SPECIFICATIONS AND STANDARDS AND MEETS APPROPRIATE CODE REQUIREMENTS AS TO STRENGTH AND SAFETY. THIS CERTIFICATION IS IN ACCORDANCE WITH ACCEPTABLE ENGINEERING PRACTICE.

INSPECTION PERFORMED BY FIRM

LICENSE NUMBER DATE SIGNATURE OF LICENSED ENGINEER

MEMORANDUM

December 13, 2019

TO: Board of Directors

FROM: Foster Hildreth

RE: Tariff Revisions (Second Read)

Based on the Board approval of the 2020 budget during the November Board meeting, the tariffs have been edited to include the recommended revenue increases to meet the revenue requirements. This is the second read, and if approved after the second read, staff will implement the tariffs in the January 2020 billing period.

- R-20 Residential
- TOU-20 Time-of-Use Residential
- SCS-20 Small Commercial
- LCS-20 Large Commercial
- P-20 Pump
- EAP-20 Energy Assistance Program
- POL-20 Private Outdoor Lighting
- LR-20 Line Retention

Staff recommends a Board motion for the approval the 2020 tariff revisions as presented.

ORCAS POWER AND LIGHT COOPERATIVE
TARIFF R – 20
RESIDENTIAL SERVICE

TWENTY-FIRST REVISION – REPLACING TWENTIETH REVISION

AVAILABILITY

Available to all small farm and home members, subject to the General Provisions hereunder.

TYPE OF SERVICE

Single-phase, 60 cycles, at available secondary voltage, equipment subject to automatic load management controls.

APPLICATION

Service for home and farm uses, such as cooking, lighting, heating, private docks not used for commercial purposes, etc. Primary residential end-use shall be served under this tariff.

SERVICE ACCESS CHARGE $48.41

ENERGY ASSISTANCE CHARGE $0.00076 per kWh

ENERGY CHARGE

	Summer		Winter	
Block 1	≤ 2,000 kWh	$0.1089 per kWh	≤4,000 kWh	$0.1089 per kWh
Block 2	2,001 - 3,000 kWh	$0.1234 per kWh	4,001 - 5,000 kWh	$0.1234 per kWh
Block 3	> 3,000 kWh	$0.1464 per kWh	>5,000 kWh	$0.1464 per kWh

DEMAND CHARGE $0.00

MINIMUM MONTHLY CHARGE

The minimum monthly charge, under the above rate, shall be $48.41 per billing period or prorated if service is provided for less than a full billing period.

POWER COST ADJUSTMENT

A surcharge or credit may be applied to each billing for service under this tariff to reflect increases or decreases in the cost of power subject to Member Services Policy 29 – *Rate Design*.

GENERAL PROVISIONS

1. Member agrees to allow the cooperative, at its discretion, to install automatic load management controls.

2. The rated capacity of any motor served under this tariff shall be as follows:

    - Motors up to 2 HP can operate at 115 volts.
    - Motors larger than 2 HP shall operate at 230 volts and are subject to requirements in Member Service Policy 3 *Technical Provisions*.

3. No single resistive loads (examples: ovens, heaters, kilns) over 15 kW shall come on-line simultaneously.
4. Non-resistive loads such as arc welders, fluorescent or mercury lamps, and induction heating furnaces are causes of harmonic distortion and may require corrective measures.
5. See Member Service Policy 3 *Technical Provisions* for additional requirements.
6. Primary end-use for residential purposes shall be served under this tariff.
7. Summer Block is defined as May billing period through September billing period; Winter Block is defined as October billing period through April billing period.

ORCAS POWER AND LIGHT COOPERATIVE
TARIFF TOU – 20
RESIDENTIAL TIME OF USE RATE

TWENTY-SECOND REVISION – REPLACING TWENTY-FIRST REVISION

AVAILABILITY

Available to all small farm and home members otherwise served under the standard residential rate, and subject to the General Provisions hereunder.

TYPE OF SERVICE

Single-phase, 60 cycles, at available secondary voltage. Equipment subject to automatic load management controls.

APPLICATION

Service for small farms, homes, pools, greenhouses and other non-essential loads. Limited to single phase loads.

SERVICE ACCESS CHARGE: $58.20

ENERGY ASSISTANCE PROGRAM $0.00076 per kWh

ENERGY CHARGE:

Period	Time	
1	6:00 am – Noon	$0.1805 per kWh
2	Noon – 6:00 pm	$0.1116 per kWh
3	6:00 pm – 8:00 pm	$0.1805 per kWh
4	8:00 pm – 6:00 am	$0.0490 per kWh

DEMAND CHARGE: $0.00

MINIMUM MONTHLY CHARGE

The minimum monthly charge, under the above rate, shall be $58.20 per month or prorated if service is provided for less than a full billing period.

POWER COST ADJUSTMENT

A surcharge or credit may be applied to each billing for service under this tariff to reflect increases or decreases in the wholesale cost of power subject to Member Services Policy 29 – *Rate Design*.

GENERAL PROVISIONS

1. Member agrees to allow the cooperative, at its discretion, to install automatic load management controls.

2. The rated capacity of any motor served under this tariff shall be as follows:
    i. Motors up to 2 HP can operate at 115 volts.
    ii. Motors larger than 2 HP shall operate at 230 volts and are subject to requirements in Member Service Policy 3-Technical Provisions.
3. No single resistive loads (examples: ovens, heaters, kilns) over 15 kW shall come on-line simultaneously.
4. Non-resistive loads such as arc welders, fluorescent or mercury lamps, and induction heating furnaces are causes of harmonic distortion and may require corrective measures.
5. Loads served under this tariff shall not be capable of being switched to another meter served under a different tariff.
6. Member agrees to be billed on this rate for a minimum of 12 billing periods.
7. See Member Services Policy 3 *Technical Provisions* for additional requirements.

_____ Effective Date: January 2020 Billing Period
Foster Hildreth, General Manager

ORCAS POWER AND LIGHT COOPERATIVE
TARIFF SCS – 20
SMALL COMMERCIAL SERVICE

TWENTY-FIRST REVISION – REPLACING TWENTIETH REVISION

AVAILABILITY

Available to all non-residential members using less than 20 kW in all of the preceding twelve (12) months, subject to the General Provisions hereunder.

TYPE OF SERVICE

Single-phase or three-phase, 60 cycles, at available secondary voltage, equipment subject to automatic load management controls.

APPLICATION

General Service for heating, lighting, etc., for non-residential primary end-use.

SERVICE ACCESS CHARGE $67.57

ENERGY ASSISTANCE PROGRAM $0.00076 per kWh

ENERGY CHARGE Block 1 ≤5,000 kWh $0.1107 per kWh
Block 2 >5,000 kWh $0.1235 per kWh

DEMAND CHARGE $6.41 per billing period (flat rate)

MINIMUM MONTHLY CHARGE

The minimum monthly charge, under the above rate, shall be $67.57 per billing period or prorated if service is provided for less than a full billing period.

DETERMINATION OF BILLING DEMAND

The billing demand shall be the maximum kilowatt (kW) demand established by the member for any period of fifteen (15) consecutive minutes during the period for which the bill is rendered as indicated or recorded by a demand meter.

POWER COST ADJUSTMENT

A surcharge or credit may be applied to each billing for service under this tariff to reflect increases or decreases in the cost of power, subject to Member Services Policy 29 – *Rate Design*.

GENERAL PROVISIONS

1. Member agrees to allow the cooperative, at its discretion, to install automatic load management controls.
2. Primary end-use for commercial purposes shall be served by this tariff.

3. The rated capacity of any motor served under this tariff shall be as follows:

   - Motors up to 2 HP can operate at 115 volts.
   - Motors larger than 2 HP (single phase) are subject to requirements in Member Service Policy 3-Technical Provisions.

4. No single resistive 3-phase loads (examples: ovens, heaters, kilns) of over 45kW shall come on-line simultaneously.

5. Non-resistive loads such as arc welders, fluorescent or mercury lamps, and induction heating furnaces are causes of harmonic distortion and may require corrective measures.

6. See Member Service Policy 3-Technical Provisions for additional requirements.

ORCAS POWER AND LIGHT COOPERATIVE
TARIFF LCS – 20
LARGE COMMERCIAL SERVICE

TWENTY-THIRD REVISION – REPLACING TWENTY-SECOND REVISION

AVAILABILITY

Available to all non-residential members using more than 20 kW in any one or more of the preceding twelve (12) months, subject to the General Provisions hereunder.

TYPE OF SERVICE

Single-phase or three-phase, 60 cycles, at available secondary voltage, equipment subject to automatic load management controls.

APPLICATION

General Service for heating, lighting, etc., for non-residential primary end-use.

SERVICE ACCESS CHARGE $67.57

ENERGY ASSISTANCE PROGRAM $0.00076 per kWh

ENERGY CHARGE Block 1 (≤5,000 kWh) $0.0975 per kWh
Block 2 (>5,000 – 150,000 kWh) $0.1081 per kWh
Block 3 (>150,000 kWh) $0.1441 per kWh

DEMAND CHARGE Block 1 (≤300 kW) $3.94 per kW
Block 2 (>300 kW) $5.92 per kW

MINIMUM MONTHLY CHARGE

The minimum monthly charge, under the above rate, shall be $67.57 per month or prorated if service is provided for less than a full month.

DETERMINATION OF BILLING DEMAND

The billing demand shall be the maximum kilowatt (kW) demand established by the member for any period of fifteen (15) consecutive minutes during the period for which the bill is rendered as indicated or recorded by a demand meter.

POWER COST ADJUSTMENT

A surcharge or credit may be applied to each billing for service under this tariff to reflect increases or decreases in the cost of power, subject to Member Services Policy 29 – *Rate Design*.

GENERAL PROVISIONS

1. Member agrees to allow the cooperative, at its discretion, to install automatic load management controls.
2. Primary end-use for commercial purposes shall be served by this tariff.

3. The rated capacity of any motor served under this tariff shall be as follows:
    - Motors up to 2 HP can operate at 115 volts.
    - Motors larger than 2 HP (single phase) are subject to requirements in Member Service Policy 3 *Technical Provisions*.
4. No single resistive 3-phase loads (examples: ovens, heaters, kilns) of over 45kW shall come on-line simultaneously.
5. Non-resistive loads such as arc welders, fluorescent or mercury lamps, and induction heating furnaces are causes of harmonic distortion and may require corrective measures.
6. See Member Service Policy 3-*Technical Provisions* for additional requirements.

_____ Effective Date January 2020 Billing Period
Foster Hildreth, General Manager

ORCAS POWER AND LIGHT COOPERATIVE
TARIFF P – 20
PUMP SERVICE

TWENTY-THIRD REVISION – REPLACING TWENTY-SECOND REVISION

AVAILABILITY
Available to all members, subject to the General Provisions hereunder.

TYPE OF SERVICE
Single-phase, 60 cycles, at available secondary voltage, equipment subject to automatic load management controls.

APPLICATION
Service for exclusively pumping water for domestic use and/or irrigation.

SERVICE ACCESS CHARGE $43.49

ENERGY ASSISTANCE PROGRAM $0.00076 per kWh

ENERGY CHARGE	Block 1 0-370 kWh	$0.1157 per kWh
	Block 2 371-5,000 kWh	$0.0927 per kWh
	Block 3 Over 5,000 kWh	$0.1126 per kWh
DEMAND CHARGE	First 20 kW (flat rate) $1.21	
	Over 20 kW $3.99 per kW	

MINIMUM MONTHLY CHARGE
The minimum monthly charge, under the above rate, shall be $43.49 per billing period or prorated if service is provided for less than a full billing period.

POWER COST ADJUSTMENT
A surcharge or credit may be applied to each billing for service under this tariff to reflect increases or decreases in the cost of power, subject to Member Services Policy 29 – *Rate Design*.

GENERAL PROVISIONS
1. All pumps served under this tariff shall be metered separately.
2. The rated capacity of any motor served under this tariff shall be as follows:
   - Motors up to 2 HP can operate at 115 volts.
   - Motors larger than 2 HP shall operate at 230 volts and are subject to requirements in Member Service Policy 3-Technical Provisions.
3. See Member Service Policy 3-Technical Provisions for additional requirements.

_____ Effective Date: January 2020 Billing Period
Foster Hildreth, General Manager

ORCAS POWER AND LIGHT COOPERATIVE

TARIFF EAP – 20

ENERGY ASSIST PROGRAM

THIRD REVISION – REPLACING SECOND VERSION

AVAILABILITY

Available to low-income members, subject to the General Provisions hereunder, served under the current Tariff R *Residential Service*, and the provisions therein.

TYPE OF SERVICE

Electric service under the current Tariff R *Residential Service.*

APPLICATION

Residential homes with year-round low-income occupants being served by a standard residential service.

ENERGY ASSISTANCE CHARGE $0.00076 per kWh

ENERGY ASSIST CREDIT

Household Size	Monthly Credit
1	($31.41)
2	($37.41)
3	($43.41)
4	($49.41)
5	($55.41)
6+	($61.41)

MINIMUM MONTHLY CREDIT

The minimum monthly credit, under the above rate, shall be ($31.41). No refunds, or bills under $0.00, will be issued based on participation in the Energy Assist Program.

SUBJECT TO AVAILABLE FUNDING

The Energy Assist Credit is pending available funding through the Energy Assist Charge in each related tariff, and other funding sources as approved by the Board of Directors.

GENERAL PROVISIONS

1. Active eligible members must complete and sign an Energy Assist Application, and provide documentation that the low-income household member has been qualified for, and has recently received, benefits under another endorsed low-income program.
2. Reapplication will be required annually.

ORCAS POWER AND LIGHT COOPERATIVE
TARIFF POL – 20
PRIVATE OUTDOOR LIGHTING

TWENTY-SECOND REVISION – REPLACING TWENTY-FIRST REVISION

AVAILABILITY
New service under this tariff is not available after March 1, 1998. Those members receiving service under this tariff prior to March 1, 1998 may continue to do so.

TYPE OF SERVICE
OPALCO will own, maintain and operate suitable fixtures on brackets, with refractors and controls, and supply energy for sodium vapor lamps at locations agreed upon with the member, the service distance not to exceed 150 feet/2 wire, or 300 feet/3 wire.

APPLICATION
Non-metered or metered street, yard or security lighting service.

BILLING CHARGE *$2.79 per month

FIXTURE CHARGE $12.61 per month

ENERGY CHARGE **100 Watts $4.78 per month
200 Watts $9.71 per month

***Applies only when not included on a bill for other energy usage.
****Applies only when energy is not metered.

POWER COST ADJUSTMENT
A surcharge or credit may be applied to each billing for service under this tariff to reflect increases or decreases in the wholesale cost of power, subject to Member Services Policy 29 – *Rate Design*.

GENERAL PROVISIONS
1. All lamp replacements and other maintenance will be provided by OPALCO, except that lamps and fixtures broken by vandalism will be charged to the member.
2. The member shall notify OPALCO if a lamp does not operate. OPALCO agrees to repair lamps as soon as possible, but, in any event, within five (5) working days.
3. A timing device and/or photo electric cell may be installed by OPALCO in order to limit the time interval that the lamp is turned on each night.
4. During the periods of energy shortage, lamps may be disconnected by request of either the cooperative or member, with no charge to member. The member will not be charged for the period the light has been disconnected.

ORCAS POWER AND LIGHT COOPERATIVE

TARIFF LR – 20

LINE RETENTION

TWENTIETH REVISION – REPLACING NINETEENTH REVISION

AVAILABILITY

Available for individual residential, marina, and general service accounts where the primary and transformer only serve one member and the removal of the equipment will not affect the service to other members, and/or no service has been taken for a period of twelve (12) months.

TYPE OF SERVICE

Single-phase, 7200 GrdY primary or 120/240 secondary voltage.

APPLICATION

Payment of the line retention rate will ensure that the facilities remain in place for future use.

SERVICE ACCESS CHARGE $25.52

ENERGY CHARGE

No energy may be used under this rate.

MINIMUM MONTHLY CHARGE

The monthly charge, under the above rate, shall be $25.52 per billing period or prorated if service is provided for less than a full billing period.

GENERAL PROVISIONS FOR MEMBERS ON LINE RETENTION

1. The above rate is not available where energy is being used or where a meter is installed.

2. OPALCO normally retires and/or removes facilities that have not been used for twelve (12) months. Payment of the line retention rate will ensure that the facilities remain in place for future use. If OPALCO removes any equipment and the member wants it reinstalled, the member shall be required to apply for a new service or line extension in accordance with the current member service policy.

3. Members who have discontinued service for a period of twelve (12) months or have made a formal request for service and have not connected to the system after a period of twelve (12) months are subject to the line retention rate, provided that OPALCO has determined that the facilities are causing ongoing expenses, such as line losses or line maintenance to the system.

MEMORANDUM

December 13, 2019

TO: Board of Directors

FROM: Foster Hildreth

RE: Electric School Bus Charging Stations

Staff has received two requests from members on Lopez and Orcas to support grant funding (Department of Ecology) requests for electric school buses in their districts. As reviewed during the 2020 budget process, OPALCO strives to expand the vehicle electrification within the county via the inclusion of twelve level 2 charging stations in this budget. While these EV school bus requests are outside of the Board approved budget, we believe these initiatives further OPALCO's vision of saving member's money via fuel switching, reduce carbon emissions and provide additional energy sales. Transportation is the largest contributor of carbon emission in the county.

Schools are at the heart of our community, OPALCO sees the value in supporting pilot projects like these for future generations. After review of the requirements, staff has identified the following areas that OPALCO may be able to assist with these EV school bus projects:

- The capital cost for interconnection of the charging infrastructure is estimated at $20k per installation, totaling $40k. This includes all primary electrical facilities, communications, the interconnection transformer, and interconnection metering. These costs are normally funded by the member via Contribution in Aid of Construction (CIAC); staff proposes the use of Restricted Funds for these projects.

- Available incentives to support the charging (behind the meter) infrastructure would be rebate funding for the meter-base, vehicle chargers and balance of plant. Staff proposes this rebate be calculated as follows in order to share the benefits between OPALCO members and the recipient(s):

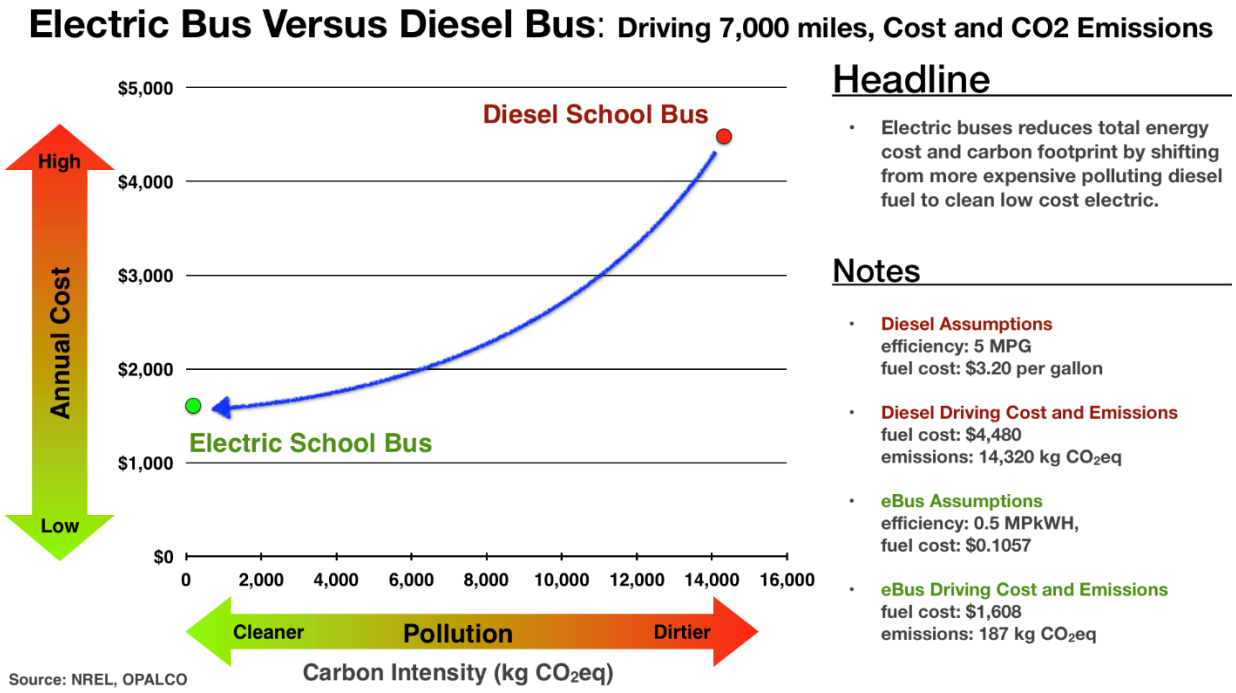
  equivalent of the retail rate minus the wholesale rate multiplied by the estimated energy consumed in half of the useful life of the equipment.

  We anticipate an increase in energy sales by 15,200 kWh annually per bus. Each electric bus will offset $4,480 in diesel fuel and reduce output by 14,000 kg CO_2eq annually. As a comparison, the electricity cost is $1,600 and outputs 187 kg CO_2eq annually. These figures are based off of Lopez School District bus mileage and 2019 fuel costs.

- Use of the RESP on-bill financing mechanism for the remainder of the costs of the charging (behind the meter) infrastructure not covered by the rebates.

With board approval of this approach, staff will work with all the school districts as they migrate to vehicle electrification. Note, the grant submittals and associated costs are preliminary, and staff will work with the school districts to ensure success of the project. Staff is also hoping to integrate these charging stations as one component of future demand response and outage mitigation.

Staff recommends a motion for assisting school bus electrification in the county as outlined above.



MEMORANDUM

December 13, 2019

TO: Board of Directors

FROM: Foster Hildreth

RE: The Challenges between Dam Removal and Reliable, Sustainable and Cost-Effective Power

This is a very emotionally charged issue for all of us. There is no one action that will solve the interconnected problems of climate change, a new era of carbon legislation with resulting resource inadequacies, and the protection of our sensitive environment. We care deeply about our islands, our membership, the salmon and whales – our way of life.

Cost is at stake, but more than that, we are concerned about reliability of power. That is our core mission. For the safety and economic sustainability of life in the islands, we must take prudent action to make sure we can continue to provide power to our communities. Until we are confident that there are adequate alternate resources for reliable clean energy in the region – including the realities of coal plants shutting down by 2025 and the mandate for all utilities to be carbon-free by 2040 (which requires firming sources of power when the wind doesn't blow and sun doesn't shine). OPALCO cannot support the loss of any part of our hydro system until clean firm energy alternatives become viable.

What are our clean energy alternatives for firm power?

As a result of the November open house and listening to our membership, it is clear that OPALCO needs to clarify its rationale for passing Resolution 2-2019. Our mission is to provide our membership with safe, reliable, sustainable and cost-effective essential utility services. In furtherance of this mission, our carbon-free hydro resource is critical for providing the membership with clean, reliable energy. The region is facing a resource inadequacy issue with our current energy assets. Without the full capacity of the federal hydro system, these issues are compounded, and further carbon-based resources may be required to fulfill the regional loads.

At the December Board meeting, staff is preparing to address the following:

- Member concerns about meeting the energy needs of our membership
- Member concerns with our position on the Federal Hydro System (Resolution 2-2019)
- Open discussion from 12-1:45pm at the meeting surrounding these issues
- Building common ground for actions we can all agree on

OPALCO firmly supports the orca whales and values our carbon-free hydro system. We currently have greater than 95% carbon-free resources and are transitioning to ~50% of our load to be generated locally (carbon-free) by 2040. Regional resource inadequacy is becoming a reality and if not addressed will result in rolling brownouts. Currently there are no viable carbon-free solutions (to provide firming for renewables). To meet future emergency demands, carbon-based resources may have to be introduced. We are dedicated to our efforts to transitioning our resource mix toward carbon-free renewable assets while relying on the most environmentally friendly resources available today.

The solution to the marine wildlife crisis lies in addressing the interwoven complexities of climate change, ocean warming and acidification, noise pollution, marine life over-harvesting and pollution. As a co-op located in the heart of the Salish Sea, we take this personally. Our best hope is to unify and take these critical actions together as a community:

- advocate for our clean resources
- electrify heating and transportation (Switch It Up!)
- institute energy efficiency and conservation measures
- advocate for electric ferries (contact your legislators)
- reduce marine vessel noise pollution
- eliminate pollution and contaminant runoff like PCBs
- halt the over-fishing of salmon until salmon runs recover
- solicit actionable ideas for our community and OPALCO to implement

The documents attached demonstrate the research and sources of information that the Board has relied on in their decision making, our efforts to educate the membership on these complex issues and correspondence from the membership.

- Resolution 2-2019
- Quick Fact: Ocean Health
- Quick Fact: Hydro Power and Whales
- OPALCO's Position on Dams and Ocean Health
- Letter from Orcas Women's Coalition

There will be an open discussion period with the Board and members at 12 pm.

OPALCO's Position on Dams and Ocean Health

December 13, 2019

OPALCO supports whales and values our hydro system.

- There is no one action that solve this complex problem.
- We must address the full web of interconnected issues including climate change, noise pollution, ocean acidification, harvest and pollution.
- Without 100% confidence in power resource adequacy for our islands and the region, OPALCO believes it is dangerous to eliminate carbon-free resources, such as hydro.
- OPALCO is committed to long-range energy solutions that will benefit our environment and keep costs affordable. We have set a goal of increasing our renewable generation to meet up to 50% of our power demand by 2040.

What OPALCO encourages everyone to do NOW:

- Advocate for our clean resources (the dams)
- Utilize non-fossil fuel heating and transportation (Switch It Up!)
- Institute energy efficiency and conservation measures (home energy audit)
- Advocate for electric ferries (contact your legislators)
- Reduce marine vessel noise pollution
- Eliminate pollution and contaminant runoff like PCBs
- Halt the over-fishing of salmon until salmon runs recover
- Solicit actionable ideas for our community and OPALCO to implement

The following document outlines the research and sources of information OPALCO is drawing upon for making decisions about ocean health and the hydro system. This study was the basis for the Board's resolution on the Lower Snake River Dams in September 2019.

A wealth of information is included. For a brief read, check out our Quick Facts: https://www.opalco.com/newsroom/quick-facts/

Introduction

OPALCO Board and staff continually work to understand the facts, nuances, and potential side-effects of important issues that relate to our mission of providing safe, reliable, sustainable and cost-effective essential utility services with a commitment to the use of renewable resources and carbon reduction.

With regard to the important interdependent issues of salmon, whales, climate change, ocean health, and dams, the board and staff endeavor to track the dynamic wealth of sometimes conflicting information that guides us as we contemplate long-range planning, policy and actions.

Some are calling for the breaching of the Lower Snake River Dams, but we believe that is the most expensive and radical action with too many risks and unintended consequences.

The material below provides a substantive overview of information that pertains to these topics, with sources and references that can help deepen insight, and give co-op members a feel for the wealth of information that informs our thinking. We welcome your comments and perspective.

"Unfortunately, there is no one, easy solution to saving Washington's resident killer whales. What was historically a healthy population of around 200 animals has now dwindled to 73 orcas. The environmental conditions that threaten their survival took generations to create and will take a grand, coordinated effort to reverse. Each piece of this puzzle is complicated and delicate. Three key problems impact the health of orcas: lack of food, toxics in the water and noise disturbance from boats and other vessels."

Gov. Inslee Southern Resident Orca Task Force

Salmon, Whales, Climate Change, Ocean Health, and Dams

Highlights

- **Salmon crisis is much bigger than the lower Snake River**. Scientists have described “an almost synchronous decline” in worldwide salmon survival due to climate crisis and its deteriorating effect on oceans. We are seeing the truth of this statement along the entire Western United States, including pristine rivers in Alaska.

- **Hydroelectric dams critical to our clean energy future**. To fight the climate crisis, our region needs “all hands on deck” when it comes to low carbon energy, including the LSRD. They are also critical in their ability to help us safely add intermittent renewables like wind and solar power to the grid.

- **CETA makes hydroelectric dams essential**. With the passage of the Clean Energy Transformation Act (CETA), we will need all of our clean energy resources to avoid regional blackouts. Between 2020-2030, the Northwest Power & Conservation Council is forecasting that thousands of megawatts of coal generation will be retired. The lower Snake River dams will be critical to helping avoid regular regional blackouts.

- **Planning for the future**. OPALCO has a strategic plan that reduces our reliance on energy from the mainland.

- **Dated Data**. Reports that imply that the lower Snake River dams are no longer necessary are based on dated, pre-CETA information and errant assumptions about our ability to control demand growth.

Topic Index

Note: While our expertise is in energy, we have for years shaped our energy policy and actions to help reduce climate change impact. To that end, we lead with how we think about climate change, which informs our daily strategic thinking and planning. Climate change is the existential crisis of our times, and co-op energy actions must be part of the solution, rather than part of the problem.

Our Precious Environment - Common Ground

When it comes to salmon and whales, there is much we agree on. We love them, we want to support them and ensure their sustained good health.

We also generally agree that climate impact is collapsing our ecosystems, warming our oceans and rivers, and acidifying the oceans too.

NOAA reports anthropogenic climate change poses a direct threat to existing global biodiversity. In fact, climate-related population extinctions have already occurred in 47% of 976 plant and animal species surveyed in a recent review of the literature. Moreover, local extinction percentages are higher in freshwater (74%) than in terrestrial (46%) or marine habitats (51%). Such impacts are expected to increase in the future, and managers are actively seeking information regarding the species or populations most vulnerable to climate change.

These enormous changes are impacting salmon abundance and river return rates, regardless of if there are dams on those rivers. The Fraser River, an important source for local salmon, is but one example, with salmon return rates that are a fraction of normal. This is true from Alaska down to California, and true throughout the world, as warming oceans are forcing species to move to cooler waters (lobster, prawns, salmon, etc.). To learn more, see the ***Climate Impact on Salmon*** section below.

Beyond this common ground of understanding, there are areas of disagreement. None is more controversial than the breaching of the Lower Snake River Dams (LSRD). As with most everything in life, the LSRD are not all good or bad. The rest of this paper explores LSRD pros and cons, climate impact on salmon, how the LSRD help fight climate change and accelerate the decommissioning of coal burning power plants, and how OPALCO is reducing our dependence on mainland power, regardless of source.

Sources and Further Research

https://www.governor.wa.gov/issues/issues/energy-environment/southern-resident-orca-recovery/task-force

https://www.governor.wa.gov/sites/default/files/OrcaTaskForce_FinalReportandRecommendations_11.07.19.pdf

Climate Impact on Salmon and Ocean Health

To understand how the LSRD help salmon, and whales, we need to look at how climate impact is hurting salmon.

Our oceans absorb nearly one-third of climate-changing carbon dioxide emissions.

Climate change and associated marine ecosystem collapse is at the heart of a long list of salmon and whale killing sources. From Washington Gov. Inslee's *Southern Resident Orca Task Force*, the list includes: over-fishing, marine vessel noise pollution, toxic chemical pollution from agricultural runoff and other human activities, declining salmon return rates, etc.

In addition to feeding us, the oceans have benevolently slowed the pace of climate impact on humans and all life on land. Recent estimates suggest that if the heat absorbed by the oceans since 1955 had gone into the lower levels of the atmosphere instead, land temperatures would be warmer by 65 degrees Fahrenheit. The oceans have literally "taken the heat" for us land dwellers, but at great cost to ocean health and the marine ecosystem.

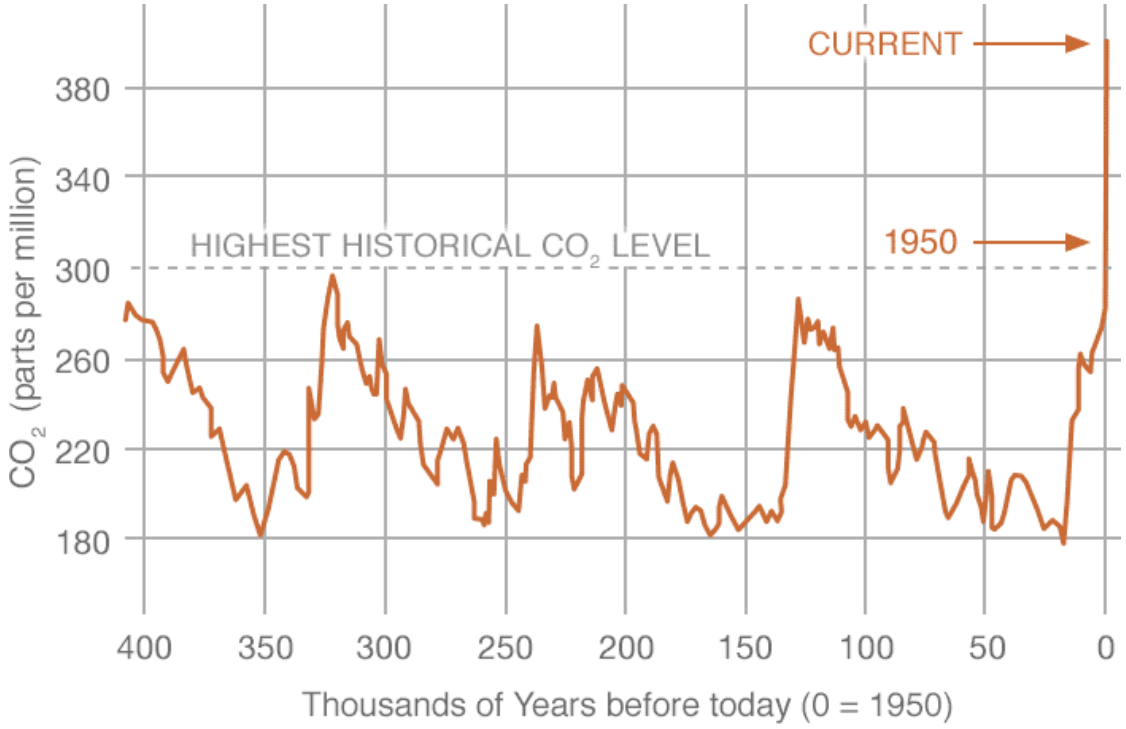
For decades, researchers have underscored how ocean dwelling phytoplankton form the basis of the marine food chain and provide half the Earth's oxygen supply (trees, shrubs, and grasses provide the other half, while absorbing CO2). As oceans warm, they produce (and hold) less oxygen. Deoxygenation is just one of the ways the world's oceans are dying. As they absorb carbon dioxide, oceans become more acidic, in some places dissolving the shells of aquatic life like clams, mussels, crabs, and shrimp.

Phytoplankton thrive in cooler waters. As the oceans warm, researchers predict that phytoplankton will migrate toward cooler waters, lessening the food source for fish and other marine life in our waters. Phytoplankton are at the bottom of the food chain. Where they go, the food chain will likely follow.

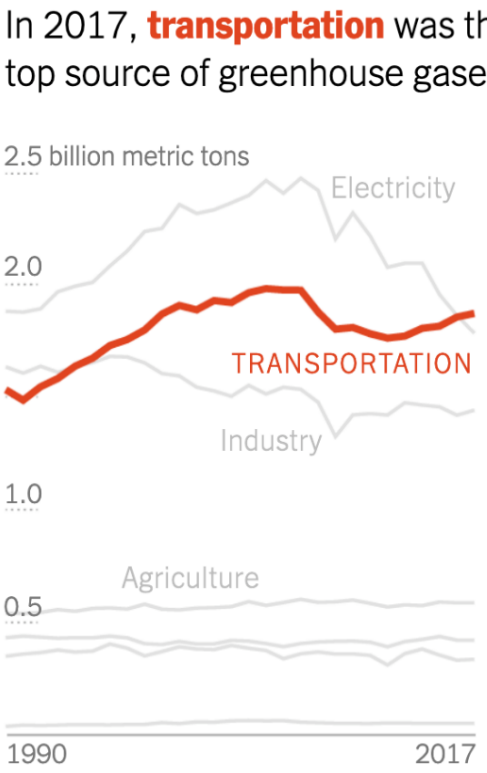
This has the potential to affect marine fisheries and all the species that depend on them, including salmon and whales.

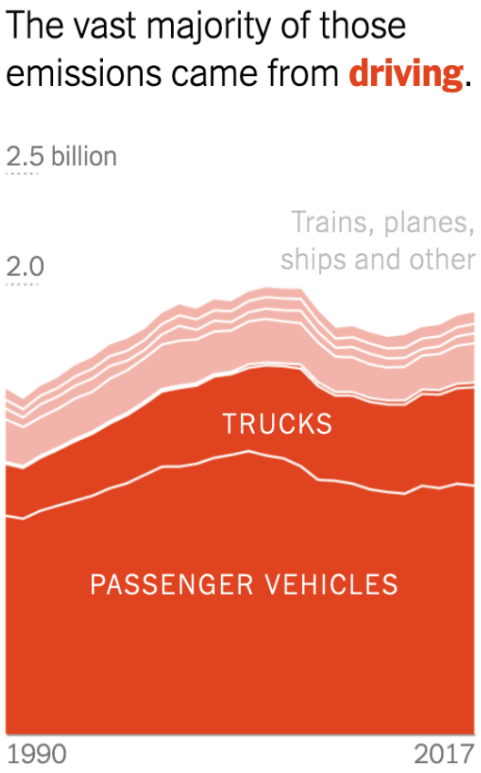
According to a NASA study, diatoms, the largest type of phytoplankton algae, have declined more than 1 percent per year from 1998 to 2012 globally, with significant losses occurring in the North Pacific. This reduction in Phytoplankton not only degrades ocean health, it may reduce the amount of carbon dioxide drawn out of the atmosphere and transferred to the deep ocean for long-term storage, accelerating climate impact on land ecosystems.

One of the keys to restoring ocean health is to reduce CO_2 greenhouse gas emissions (GHGs). CO_2 emissions have been growing and accelerating since the early days of the industrial revolution (see chart below).



As the charts below show, the largest source of GHGs is fossil-fueled transportation. Note that electricity used to be the largest source, driven by coal fired power plants. But in recent years, coal has rapidly fallen from favor as utilities around the world shift to lower carbon emitting sources, including hydro, solar, wind power and natural gas (natural gas is a fossil fuel, and while less dirty than coal is still 100 times dirtier than hydro).

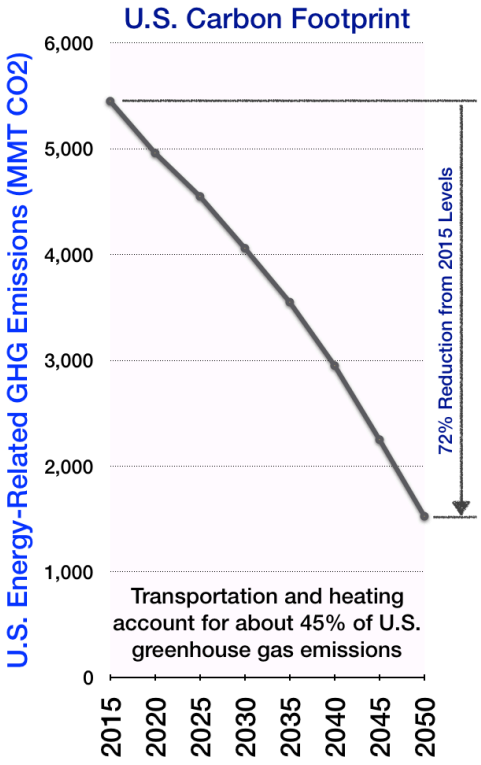




In the Pacific Northwest, with super clean hydro power (10 times cleaner than solar and 3 times cleaner than wind power), we have a major opportunity to reduce our regional GHG emissions, as we shift to electric transportation.

The chart at right shows that the electrification of transportation (and fossil-fuels heating) can reduce GHG emissions by 72% by 2050.

The electrification of transportation is a game changer. This explains why so many countries are committing to incentivizing the transition. In fact, to date, nine countries and a dozen cities or states have announced bans on fossil-fuels vehicles, including Copenhagen, Paris, Madrid, Athens and Mexico City, Norway, France, United Kingdom, Germany, Scotland, Netherlands, India, and Ireland. China is rapidly transitioning their mass transit to electric buses. Seattle has a fleet of electric buses. The U.S. has been slow to catch on, with only 300 electric buses delivered last year compared to China's 78,000. China accounts for more than 40% of the electric cars sold in the world and more than double the number sold in the U.S.



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https://www.ipcc.ch/srocc/

The Frontlines of Climate Action

This electrification of transportation and heating will power an enormous shift from fossil fuels to electricity over the coming decade and beyond. There's good news and challenges as this transition unfolds. On the positive side, it costs much less to drive and heat with electricity, saving co-op members potentially thousands of dollars per year. And it will reduce climate impacting GHG emissions. But while we are reducing fossil fuel consumption, electric consumption will rise by 75% by 2050. This will help keep electric rates lower than normal but will require near-term investments in electric infrastructure (solar, wind, tidal, storage) to replace fossil fueled power infrastructure (coal, oil, gasoline).

In other words, electric load will increase significantly in the coming decades as we transition away from fossil fuels.

Clean Energy Transformation Act (CETA)

While load is increasing, capacity has been decreasing with the decommissioning of coal power plants. In 2019 that decline in capacity accelerated. Washington State passed historic legislation, Senate Bill 5116 (SB5116), Washington Clean Energy Transformation Act (CETA). This bill puts into motion a complex set of interdependent actions intended to speed a transition to clean energy but offers no plan or funding to get there.

CETA commits the state to a path for no coal generation by end of 2025 and 100% clean energy by 2045. This is a bold move, recognizing the need to reduce carbon emissions as fast as possible. But equally important is what Washington replaces that coal energy with. **Washington recognizes hydropower as a critical source of generation in order to meet this goal**. CETA would not have been possible without the hydro system.

Similarly, the state of Oregon and many cities and electric utilities in the Northwest are all working towards carbon-free energy goals. To meet these goals, hydropower – with its energy storage firming capabilities and carbon-free attributes – will be especially important as it helps the region add even more renewable power to its resource mix. It is the go-to firm, clean, affordable energy resource. As western states decommission coal generation, the economics of supply and demand will put upward pressure on demand for hydro.

Coal generates about 13.4% of the energy currently used in Washington state. All of the renewable energy in Washington, built over the last two decades adds up to less than 3%. We should expect that developing clean energy resources to replace that coal will take time and money. And if those resources are intermittent (solar and wind), they will require hydro and storage to firm them, to maintain reliability and quality of electric service.

The task ahead is enormous, and there is no plan or funding to replace that coal energy with clean energy. For that reason, the NW Power and Conservation Council recently wrote:

> *"The loss-of-load probability increases from 6 percent in 2021 to 7 percent in 2022, and to 8 percent in 2024. The analysis shows that the region will need about 800 megawatts of new capacity to maintain adequacy through 2024. If some of the coal-fired generators at the Jim Bridger plant in Wyoming and the two other generators at the Centralia plant retire by 2024, as currently planned, the probability would increase to about 30 percent, a situation similar to what happened in the 1990s that led to the West Coast energy crisis, when the problem was not retiring existing plants but just not building enough new ones."*

By loss of load, they mean an inability to meet demand on occasions when load exceeds generation resources. As load approaches the maximum supply, prices will increase sharply to curtail use. But if demand continues to rise, exceeding supply, outages can result.

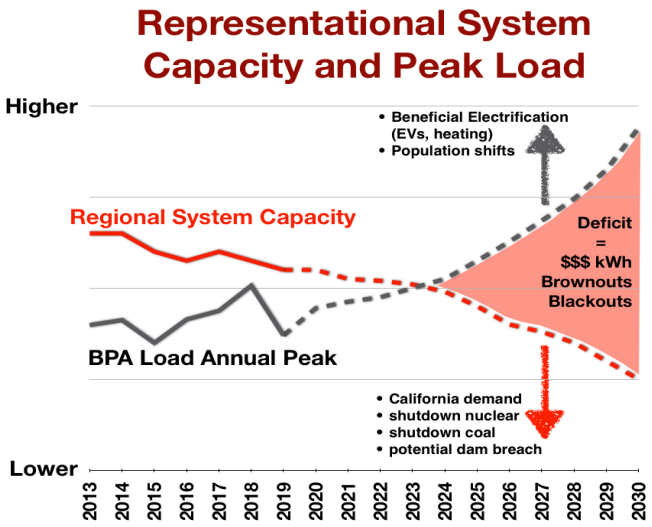
Sources and Further Research

https://www.natlawreview.com/article/washington-clean-energy-transformation-act-establishes-aggressive-mandates-grid

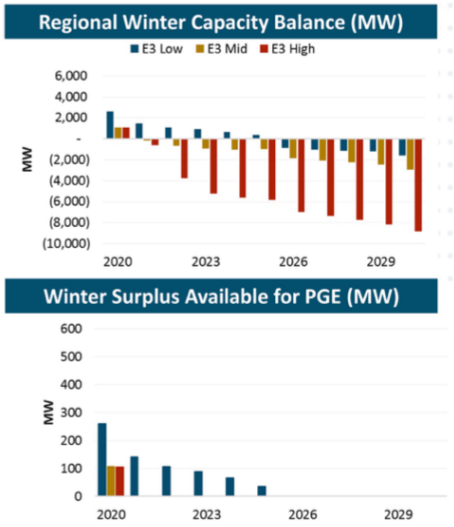
Balancing Electric Capacity to Meet Load

In the Northwest, electric load is "winter peaking" as homes and businesses heat with electricity. Utilities size their grid to meet peak demand, which often occurs during winter cold snaps. Therefore, we always want to ensure that capacity exceeds demand. If we don't, we get into rolling blackouts and major regional power outages. Outages have an economic cost of millions of dollars per minute in the region. Not to mention increased health and safety risks.

With the advent of CETA and other things that reduce regional capacity (California's thirst for hydro to firm their increasing solar and wind portfolio), regional capacity is in decline (see chart at right). Meanwhile, load is increasing and is project to go exponential in the coming decade as beneficial electrification of transportation accelerates.



+ **Except for the Low need scenario, the region is capacity short in the winter starting in 2021**
  - No market surplus available for PGE if region is net short
+ **For the Low need scenario, surplus capacity is available through 2025**



The chart at left provides an analysis of the net capacity of the Northwest region, in winter. This analysis was developed by E3 consulting for PGE, before CETA was enacted. Even without CETA mandated coal plant decommissioning, E3 is forecasting capacity shortfall as soon as 2021.

The problem is two-fold: The mainland is reducing capacity, and there is no plan or funding to replace that capacity. The table below summarizes the actions that are underway that will impact regional power capacity, and the impact/reaction that reduction will have. Reduced mainland capacity will necessitate development of local energy resources to mitigate mainland challenges.

Action	Results
• **Increased hunger for climate friendly hydro, especially in California** • **CETA** • **Decommissioning coal/nuke plants** • **Potential dam removal**	• **Reducing Capacity** • **Demand Charge increases** • **Energy cost increases** • **Brownouts** • **Rolling Blackouts**

This trend doesn't end well. While calls for immediately breaching the LRSD satisfy some, it exacerbates the energy capacity problem and climate change, which impacts the entire marine ecosystem, while removing very clean energy, to be replaced by what, and when? Solar and wind are dirtier than hydro, expensive, and require firming, from either hydro, the lowest cost firming, or battery storage (more expensive).

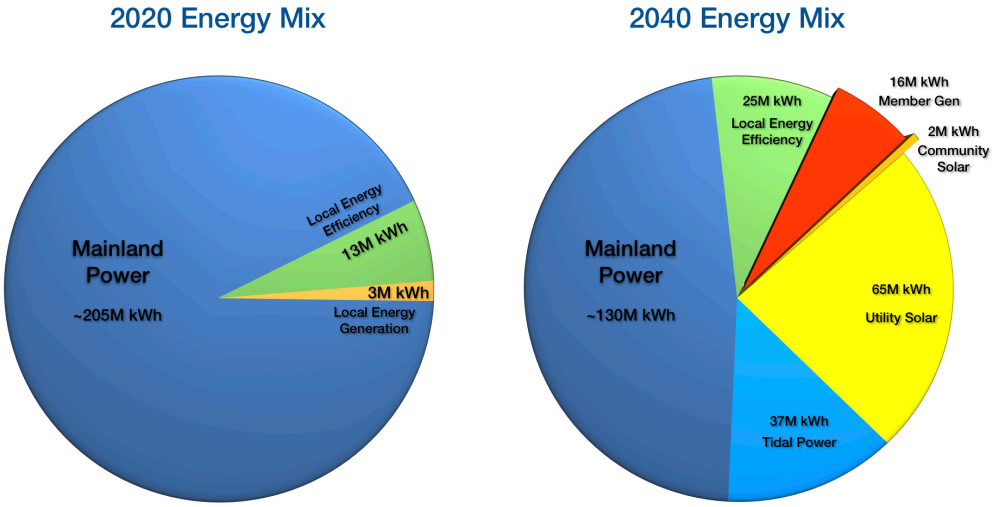
Sources and Further Research

https://www.nwpp.org/private-media/documents/2019.09.30_E3_NWPP_RA_ExecSum.pdf

https://www.ethree.com/wp-content/uploads/2019/03/E3_Resource_Adequacy_in_the_Pacific-Northwest_March_2019.pdf

Becoming Less Dependent on the Mainland for Energy

Regardless of how the mainland capacity issues develop, OPALCO is committed to increasing local energy resilience, and reducing our dependence on the mainland for energy. The chart below shows our current energy resource mix, and what we anticipate it will look like in 20 years. It is worth noting that if the mainland took similar steps as OPALCO, there would be no need for the energy supplied by the LSRD. OPALCO is doing more than its share to develop a more sustainable local energy resource mix.



Sources and Further Research

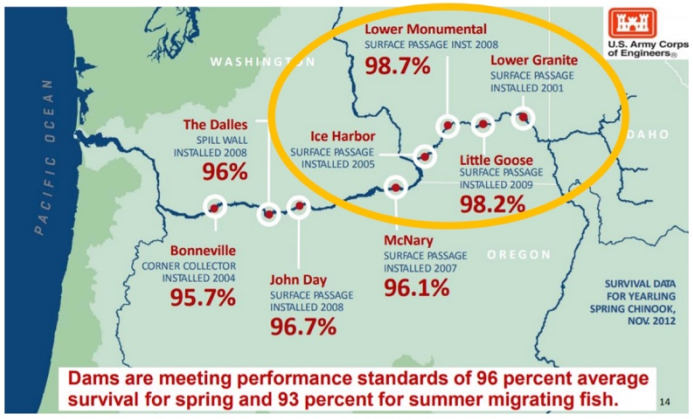
https://www.opalco.com/wp-content/uploads/2019/09/OPALCO-2020-2040-IRP.pdf

LSRD Pros and Cons

Are the LSRD helping or hurting? The answer is BOTH. Most people know that dams are designed to facilitate the passage of salmon, but in many cases, they don't do it is well as free-run rivers. Surprisingly, in some cases they do as well as free-run. The research on this is unsettled and evolving rapidly.

Salmon Survival Is Strong Through the Lower Snake River Dams

Since 2001, $2 billion has been invested in upgrading fish passage technologies at dams on the lower Columbia and lower Snake river systems. As a result, the salmon and steelhead that pass these dams have similar survival rates as fish in rivers without dams. Spring juvenile salmon survival is 96% and summer migrating fish survival is 93%, according to the U.S. Army Corps of Engineers (chart at right).



A recent NOAA scientific study shows that juvenile salmon that use these upgraded systems have the same adult return rate as juvenile salmon that are spilled over dams, once their size is accounted for.

LSRD Are Essential Part of Fighting Climate Change

When it comes to helping fight salmon killing climate change, the LSRD are an essential part of the fight to reduce carbon emissions. The hydro power that dams generate is very clean. About 10 times cleaner than solar and 3 times cleaner than wind power, and up to 400 times cleaner than oil, coal and natural gas.

Before we breach a dam, we want to make sure we have a very clean reliable affordable alternative, to keep the lights on and avoid polluting the atmosphere with fossil-fueled power.

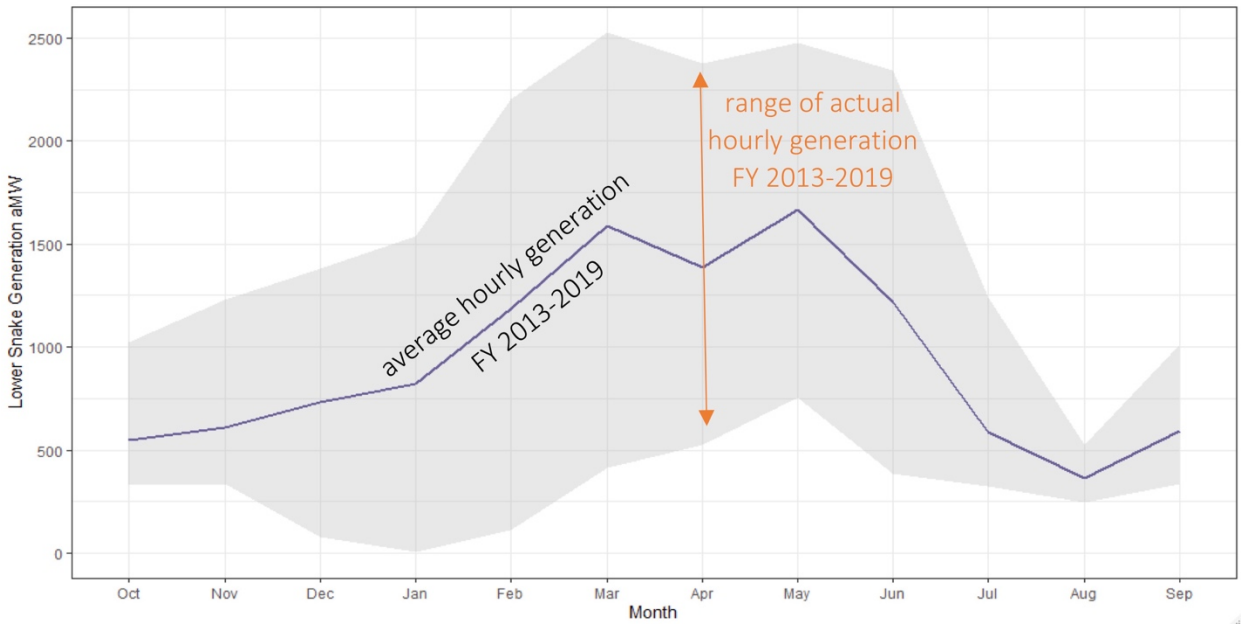
LSRD are a Major Source of Power in Winter

Lower Snake River Dams provide flexibility and peaking capability, especially during winter cold snaps. The sustained peaking capability of the four projects is 2,650 MW, 10 hours per day for five consecutive days. Sustained peaking capability is important during multi-day cold snaps, like the ones we had in February and March of 2019.

On March 4, 2019, after a multi-day cold snap, power supply was tight in the Pacific NW and wholesale market prices reached the WECC price cap of $1,000 per MWh. This signaled that all resources with sufficient fuel should generate and the PNW should import as much power as possible from neighboring regions. Between midnight and 8 am on March 4th, demand increased by 4,000 MWs (that's 4x the City of Seattle!) and the LSRD met 27% of that increased demand.

LSRD Provide Flexible Support for Solar and Wind Power

The LSRD also provide flexibility to maintain transmission system reliability and to integrate renewables like solar and wind. The chart below shows the actual flexibility in generation of the Lower Snake River dams from FY 2013-2019. Average generation is shown as the solid line, and the range of generation is shown in the gray shaded area. When more or less generation is needed, the LSRD can increase or decrease to keep the system in balance.



Beyond the generation of clean reliable affordable power, dams help with flood control, irrigation and much more.

Sources and Further Research

https://www.fisheries.noaa.gov/feature-story/fish-size-affects-snake-river-salmon-returns-more-route-through-dams

https://www.bpa.gov/Finance/FinancialPublicProcesses/IPR/2018IPR/IPR%202018%20EFW%20Workshop.pdf

https://www.pnas.org/content/110/17/6618

https://www.pnas.org/content/110/37/E3465

https://www.pnas.org/content/110/17/6883

https://www.nwcouncil.org/reports/columbia-river-history/fishpassage

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2573937/ Survival of Migrating Salmon Smolts in Large Rivers with and Without Dams

http://www.snakeriverdams.com/wp-content/uploads/2015/01/FS-Methane.pdf

Are the LSRD Needed?

Yes. One of the most flawed arguments for breaching the LSRD says "*we don't need the power they generate*." It's just the opposite. As discussed above, given capacity trends and CETA, we need the power now more than ever.

Most advocates for breaching the LSRD cite two deeply flawed studies: 1) ECONorthwest (*Lower Snake River Dams Economic Tradeoffs of Removal*); and 2. Energy Strategies (*LSRD Replacement Study*). Those studies are based on 2016 data from NWPCC's *7th Power Plan* which is no longer valid. In addition, the two studies:

- Incorrectly portray the PNW grid system as adequate, now and into the future
- Overstate the ease with which hydro can be replaced by wind and solar.
- Overestimate the amount of conservation and demand response which will realistically occur
- Don't take into account the enormous impact the new Washington Clean Energy Transformation Act (CETA) will have on regional power capacity reduction over the next decade
- Underestimate the resource adequacy problem, exacerbated by CETA, which now commands industry wide attention

In the Energy Strategies *LSRD Replacement Study*, published just last year, the authors admit:

> "*The study does not provide any specific recommendations about the exact nature of any potential replacement portfolio, nor does it support or recommend dam removal or claim to have considered the necessary benefits and costs that would weigh on such a decision.*"

We agree.

For a detailed sequence of the above reports' development, see the ***LSRD Breach Report Timeline*** section just below.

The average energy output of a generator is helpful when making comparisons. The four lower Snake River dams produce 1,004 average megawatts (aMW) each year. For comparison, the Boardman coal plant in Oregon provides 489 aMW. As an additional point of comparison, three recently removed dams in Washington that blocked fish passage — Condit, Elwha and Glines Canyon — generated a combined 31 aMW - just 3% of the LSRD.

But looking at just the average output misses the most important operational reality of running a reliable grid. It's important to look at winter peak demand rather than averages. It's like trying to fly through the mountains at average altitude. Sooner or later, you are going to hit a peak.

In the event of an extended cold snap or another power plant shutting down unexpectedly, the lower Snake dams can produce in excess of 2,650 MW of energy over a sustained period of 10 hours per day for five consecutive days. This represents over 10 percent of the total capacity of the Federal Columbia River Power System (FCRPS).

And finally, coal plant retirements are more rapid than any of the LSRD breach reports assumed, removing an estimated 8 GW by 2026. And replacing that capacity with solar and wind, based on averages, not on peaks, and without adequate firming to balance the intermittent output of wind and solar lacks credible engineering of the required replacement solution.

One of the above LSRD breach reports (Energy Strategies) has been reworked. It had underestimated the 8 GW of capacity that is being removed due to coal plant decommissioning. The new report still underestimates capacity. See analysis below. While CETA has set the region scrambling to understand the new capacity roadmap, by 2030, estimates suggest there will be a 16 GW deficit (before CETA). CETA won't allow that to be met with GHG emitting natural gas peaking plants. And the economics won't support it.

New Energy Strategies Report

The new report, Energy Strategies *Western Flexibility Assessment,* was just issued in December 2019. It is an honest and thorough attempt to suggest a path forward, given almost all new available information. It provides thoughtful questions that Gov't and Industry will need to answer. Ensuring adequate regional capacity will cost a lot of money!

This study acknowledges the Northwest's capacity deficit. Exec Summary excerpt below:

> *Resource adequacy is an important component of flexibility analysis. A system that is deficient in capacity will have exaggerated flexibility needs – the two are intertwined. The portfolios considered in this study were constructed to achieve regional adequacy targets, and in the case of the Northwest region, additional detailed analysis was performed to ensure the selected portfolio contained sufficient capacity. That modeling indicates that the Northwest region has a near-term capacity challenge, but that the deficit is one that can be addressed with existing technologies and resource options. The nature of the capacity challenge in the Northwest varies widely depending on assumptions regarding load forecasts and assumed resource build-outs. Analysis indicates that the capacity deficit varies between 1,100 MW by 2030 to more than 4,000 MW no later than the mid-2020s (or sooner, as no earlier years were studied), depending on load and resource-build assumptions. Results also indicate that gas, Montana wind, long-duration pumped storage, and increased access to Southwest market purchases, are all viable capacity solutions for the Northwest.*

This is a clear acknowledgement from Energy Strategies that its NWEC report is dated. The new report lacks any mention of CETA and the 14% of regional power from coal plants that are targeted for removal from the WA energy mix.

With CETA, fossil fuel solutions such as "gas" (natural gas-powered generation plants) are likely off the table since CETA is designed to remove fossil fueled power from the regional resource portfolio.

Notes on our first read:

- Demand response and Oregon/Washington wind had very low capacity values in the study. (Page 20). Therefore, Montana (uncorrelated) wind resources must grow.

- Hydro output does not materially change by 2035. (Page 62)

- The original LSRD report assumed winter demand response 519 to1035 MW, the new report is 180 MW. Summer was 485 to 971 MW, and is now 630 MW. Neither report include 7th Power Plan Mid-Term Assessment, which raises concern over achieving the goals, which makes both reports more rosy than may be real.

In summary, the LSRD report vastly overstated the amount of Demand Response available, uses more optimistic Conservation values, and states that removing the dams and substituting other resources results in improved adequacy compared to today. Whereas the Western Region report basically says adequacy is now, and will be, a problem unless a lot of stuff is funded, built, and coordinated in a timely fashion.

It paints a picture of 24 hour blackouts. It assumes NO hydro goes away, but actually increases slightly with addition of new pumped storage. It never suggests the LSRD can be removed. It does a good job of incorporating effects of RPS legislation, but we remain cautious in their belief that as much new Gas plants will be built vs what they project. And they WILL have to get built. And, they suggest new transmission lines will probably be necessary.

This casts doubt on the LSRD report of "easy and cheap removal with little or no consequences".

E3 Report

From E3's March 2019 (pre-CETA) report, *Resource Adequacy in the Pacific Northwest*, it would be extremely costly and impractical to replace all carbon-emitting firm generation capacity with solar, wind, and storage, due to the very large quantities of these resources that would be required;

- Firm capacity is needed to meet the new paradigm of reliability planning under deep decarbonization, in which the electricity system must be designed to withstand prolonged periods of low renewable production once storage has depleted; renewable overbuild is the most economical solution to completely replace carbon-emitting resources but requires a 2x buildout that results in curtailment of almost half of all wind and solar production.

- The Northwest is expected to need new capacity in the near term in order to maintain an acceptable level of Resource Adequacy after planned coal retirements.

- Current planning practices risk underinvestment in the new capacity needed to ensure Resource Adequacy at acceptable levels

- Reliance on market purchases or front-office transactions (FOTs) reduces the cost of meeting Resource Adequacy needs on a regional basis by taking advantage of load and resource diversity among utilities in the region

- Capacity resources are not firm without a firm fuel supply; investment in fuel delivery infrastructure may be required to ensure Resource Adequacy even under a deep decarbonization trajectory

Sources and Further Research

https://www.nwpp.org/private-media/documents/2019.09.30_E3_NWPP_RA_ExecSum.pdf

https://www.ethree.com/wp-content/uploads/2019/03/E3_Resource_Adequacy_in_the_Pacific-Northwest_March_2019.pdf

https://westernenergyboard.org/2019/12/western-flexibility-assessment/

LSRD Breach Report Timeline

As mentioned above, there are two deeply flawed studies: 1) ECONorthwest (*Lower Snake River Dams Economic Tradeoffs of Removal*); and 2. Energy Strategies (*LSRD Replacement Study*). Those studies are based on 2016 data from NWPCC's *7th Power Plan* which is no longer valid. The timeline below lays out the timeline and interdependence the reports have on old data.

A) The Energy Strategies Mar 2018 "*LSRD Replacement Study*", uses the February 2016 NWPCC "*7th Power Plan*" as the primary source for its analysis.

> "*The NWPCC's 7th Power Plan provided the foundation for building the Reference Case. The 7th Plan also established many of the parameters for incremental resources used to create the replacement portfolios." (Page 37)*

In doing so, Energy Strategies adopted the projected future estimates from the 7th Power Plan for 1) Energy Efficiency and Conservation, 2) Demand Response, and 3) Anticipated New Generating Resources.

B) The EcoNorthwest "*Lower Snake River Dams Economic Tradeoffs of Removal*" report from July 2019 references the Energy Strategies Mar 2018 "*LSRD Replacement Study*", and the NWPCC Feb 2016 "*7th Power Plan*".

> *"If there was not alignment between core assumptions, the study defaulted to assumptions from the Seventh Northwest Conservation and Electric Power Plan ("7th Power Plan"), which was developed by the NWPCC and is the most complete and accurate forecast for generation, load, and energy conservation in the region."*

C) Both the Energy Strategies and the EcoNorthwest reports base their modeling and analysis on the data from the *7th Power Plan*.

D) However, in Feb 2019, in NWPCC's "*7th Power Plan Midterm Assessment*", NWPCC **called into question and revised its estimates of all three important forecasts for conservation, demand response, and new generating sources**.

> **SEVENTH POWER PLAN MIDTERM ASSESSMENT**
>
> **NWPCC Feb 2019**
>
> *"In 2016 and 2017, the region achieved 408 aMW of energy efficiency. This surpasses the first two-year milestone of 370 aMW.*
>
> *While the region is currently on track, **more work is needed to meet the six-year goal of 1400 aMW**. Achieving the Seventh Plan goals for energy efficiency is going to rely on a mix of program savings, contributions from NEEA savings, and other savings through improvements in codes and standards or other market advancements. Based on initial reports, projected program budgets and savings for the next two years are expected to stay relatively flat, with a **projected savings of 365 aMW in 2018 and 2019**.*
>
> *Program savings have been shown to be closely tied to program budgets, meaning that if program budgets continue to remain flat, or decline, program savings are likely to do the same. Based on these projections, and assuming similar programmatic accomplishments in 2020 and 2021, the **region will likely need more than 250 aMW of energy efficiency to come from NEEA efforts and other market change**.*
>
> *NEEA projects 60 aMW of savings in 2018 and 2019. Assuming similar NEEA savings in the final two-year period, this would require around 150 aMW to come from other sources of market change. Based on the residential markets studied to date, the region has not seen any positive market change not already captured by utility programs and NEEA. While these savings may, indeed, develop, it is an area of uncertainty."*

> *"**As is, it is not likely the region will achieve the 600 MW of incremental demand response recommended in the Seventh Plan**. The Council will continue to engage in IRP advisory committees and, through the Demand Response Advisory Committee, explore the ways to expand the regional DR infrastructure."*

E) NW Energy Coalition made it a point to comment on this:

> **NW Energy Coalition**
>
> *https://nwenergy.org/featured/no-time-to-retreat-on-energy-efficiency-part-1/*
>
> *"This week, the Northwest Power and Conservation Council staff updated Council members on regional energy efficiency savings and savings projections relative to the goals contained in the 7th Power Plan. The good news is that the region beat the 2-year milestone in the plan.*
>
> ***The bad news is that the region is on a path that will fall well short of its 6-year targets**. Part of the shortfall is due to the Bonneville Power Administration (BPA). The agency is projected to fall behind its targets and still proposes to cut energy efficiency funding by 10% in 2020 and 2021."*

F) In Jun 2018, NWPCC issued the "*PNW Adequacy Assessment for 2023*". This was followed by Mar 2019, Energy & Environmental Economics Inc "*Resource Adequacy in the Pacific Northwest*", and then Oct 2019 the Northwest Power Pool "*Resource Adequacy Symposium*", Portland, OR.

All three of these reports and proceedings have **raised serious concerns of the adequacy of the Pacific Northwest power supply from 2021 onward**! In summary these documents paint a picture of higher than expected load growth, less than expected commitment to new generating sources, and uncertainty about achieving the expected levels of efficiency, conservation, and demand response reflected in the 7th Power Plan. In addition, the effects of WA State CETA legislation further complicate matters, And, Coal Plant retirements are occurring faster than the 7th Power Plan forecast.

G) Special attention needs to be paid to Mar 2019, Energy & Environmental Economics Inc "*Resource Adequacy in the Pacific Northwest*" report. This report characterizes intermittent Wind and Solar resources not just with Capacity Factor, but with ELCC (Effective Load Carrying Capacity) which is a way to compare Wind and Solar with "perfectly dispatchable" sources, which are ones that can generate during any of the 8,760 hours per year. Wind and Solar must be significantly overbuilt to increase ELCC. The Energy Strategies Mar 2018 "*LSRD Replacement Study*" does not consider this in its analysis.

Who is citing the flawed LSDR Reports advocating for dam removal?

Here is a sample (not exhaustive) of websites advocating dam removal, which base their description of the value of the dams to the PNW on the above mentioned "pro-removal;" reports: (Note: many of these sites do not appear to have the expertise to evaluate the content of the pro-removal reports.)

Examples of websites advocating for LSRD Removal:

https://www.wildsalmon.org/facts-and-information/myths-and-facts-about-lower-snake-river-dam-removal.html

https://www.sierraclub.org/washington/best-chance-save-wild-salmon-columbia-basin-remove-four-dams-lower-snake-river

https://nativefishsociety.org/action-alerts/remove-the-lower-snake-river-dams-now

https://earthjustice.org/news/press/2019/new-analysis-builds-economic-case-for-removing-snake-river-dams

https://econw.com/projects-collection/2019/7/29/lower-snake-river-dams-economic-tradeoffs-of-removal

http://www.orcanetwork.org/Main/

https://nwenergy.org/featured/a-simple-choice-to-save-salmon-and-orcas/

https://www.orcaconservancy.org/our-blog/

https://us.whales.org/whales-dolphins/how-we-help/southern-resident-orcas/

https://www.wildsalmon.org/projects/protecting-orca/protecting-orca-by-restoring-salmon.html

It Will Take Years to Breach the LSRD

There are a large number of special interest groups on both sides of the LSRD breach issue. Multiple studies are being done to identify the numerous pros and cons of breaching – economic, environmental, unintended consequences, etc. It will take years for this to move through the courts. Local environmental groups have provided numerous things we can all do help now, while the studies and court cases unfold.

There are a number of things we can all do to help. Breaching dams is one of the most expensive radical actions, with many risks and unintended consequences. What can we do right now to save the whales?

- Stop buying salmon, and put a moratorium on commercial salmon fishing
- Reduce noise pollution. Noise pollution comes from large ferries and commercial vessels and can be mitigated with slower speeds and replacement of aging ferries with the new quiet electric ferries that are now being built by WA Department of Transportation. 67% of WA DOT fleet GHG emissions come from diesel ferries. Contact OPALCO on what you can do to advocate with WA representatives.
- Remove contaminants like PCBs. In combination, reductions in noise and contaminant pollution are estimated to stop the Orca decline and increase local orca population annual growth rate to about 2%.

LSRD Environmental Impact Studies

The draft NEPA study is scheduled to be publicly available in February 2020 and a final Environmental Impact Statement (EIS) completed in June 2020. Washington state is not a co-lead of this process. The NEPA study and EIS are very detailed and comprehensive, and dwarf anything contemplated by the WA Orcas Task Force. OPALCO recommends we let the NEPA process complete and use follow-on studies to fill in any gaps in the NEPA study, as needed.

Background

In March 2017, the United States District Court for the District of Oregon directed the federal agencies to undertake a comprehensive review of hydro operations under the National Environmental Policy Act (NEPA) and urged the federal agencies to include analysis of the removal, bypass or breaching one or more of the four Lower Snake River dams. Additionally, Washington State is funding a study on the associated economic and social impacts of the potential breaching or removal of the four Lower Snake River dams which duplicates the same effort that is several years underway by the federal agencies in the Columbia River Systems Operations Environmental Impact Statement, making the study an unnecessary and wasteful use of taxpayers' money.

OPALCO supports the whales and our federal hydro system. We oppose the removal of the dams because we don't believe it will solve the problem for our fish and the food chain and may worsen the situation. We believe the NEPA study will provide the science necessary to understand the full web of interdependent issues at play, including water temperatures, ocean acidification, pollution and climate change. We believe we can build a successful future for our fish and wildlife, clean air and water, while keeping our power carbon free with the Federal Columbia River Power System (FCRPS).

GENERAL MANAGER'S REPORT
December 2019

DASHBOARDS

Please review the dashboards at https://www.opalco.com/dashboards. Note that all the dashboards are within board approved strategic parameters.

Finance
Budget Variance
Cash
Power Cost
TIER/Margin
Debt/Equity
Capital
WIP
Expense
Capital Projects

Member Services
Disconnects
ECA
PAL
Energy Assist
Community Solar
Service Additions
Member Generation

Outage
Historical SAIDI - Graph
Historical SAIDI - Figures
Outage Stats – Monthly
Outage Stats – Rolling 12 Mth
SAIDI by Category
Outage Summary
Outage Summary - Monthly

ENGINEERING, OPERATIONS, AND INFORMATION TECHNOLOGIES

WIP

As of December 13, 2019, there are 328 work orders open totaling $4.90M. Operations has completed construction on 92 work orders, totaling $1.35M.

Safety

John Spain, Safety Coordinator of Columbia REA, conducted accident investigation training. The total hours worked without a loss time accident: 203,898 hours.

Right-of-way

Below is a before and after of the Blakely right-of-way trimming.

Grid Modernization Projects

- **Decatur Battery Energy Storage System (ESS) – WA DOC CEF2 Grid Modernization (~$1M Grant)** – Staff will submit the ESS design and system impact study to WA DOC by the first of the year. Pre-construction walkthrough has been completed with an expected construction start and factory acceptance testing in January. The engineering group, HDR, who is working with OPALCO on the Decatur battery project, made a video for their audiences about the project. Staff worked with their crew to film on Orcas this fall. The following video will be posted for public viewing in January: https://hdr.wistia.com/medias/4pv51xha65. They are also submitting this project for award consideration in their industry.
- **Lopez Microgrid – WA DOC CEF3 Grid Modernization (Grant $ Amount TBD)** – WA DOC has awarded the grant funds and staff anticipates completing the contract with WA DOC by end of Q4.

FINANCE

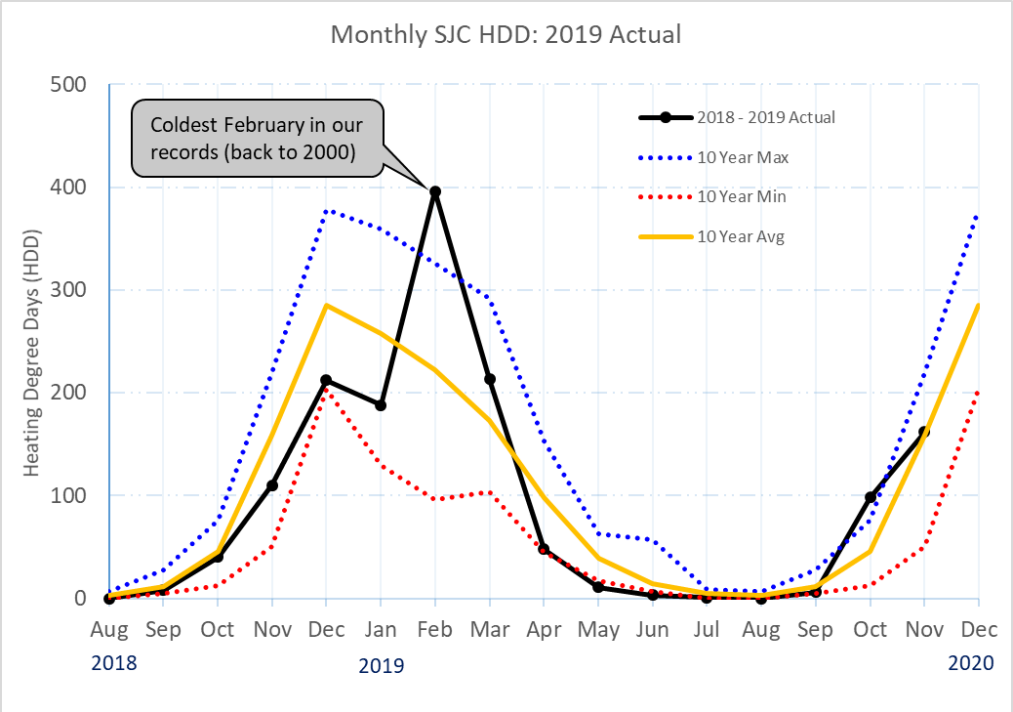
2019 Budget Tracking

Energy (kWh) purchases, sales were slightly higher than budgeted through November 2019. Note, the remaining accounts in the November income statement are in process of being closed out and reconciled and as such are not reported below.

Income Statement Summary (in thousands)	November 2019 YTD		
	Budget	Actual	Variance
Gross Revenue	$ 27,414	$ 28,433	$ 1,019
ECA Surcharge / (Credit)	-	(33)	(33)
Revenue	27,414	28,400	986
Expenses			
Cost of Power	8,470	8,393	(77)
HDD	793	1,125	332
kWh Purchases	186,430	197,416	10,986
kWh Sales	174,312	182,891	8,579

Heating Degree Days (HDD)

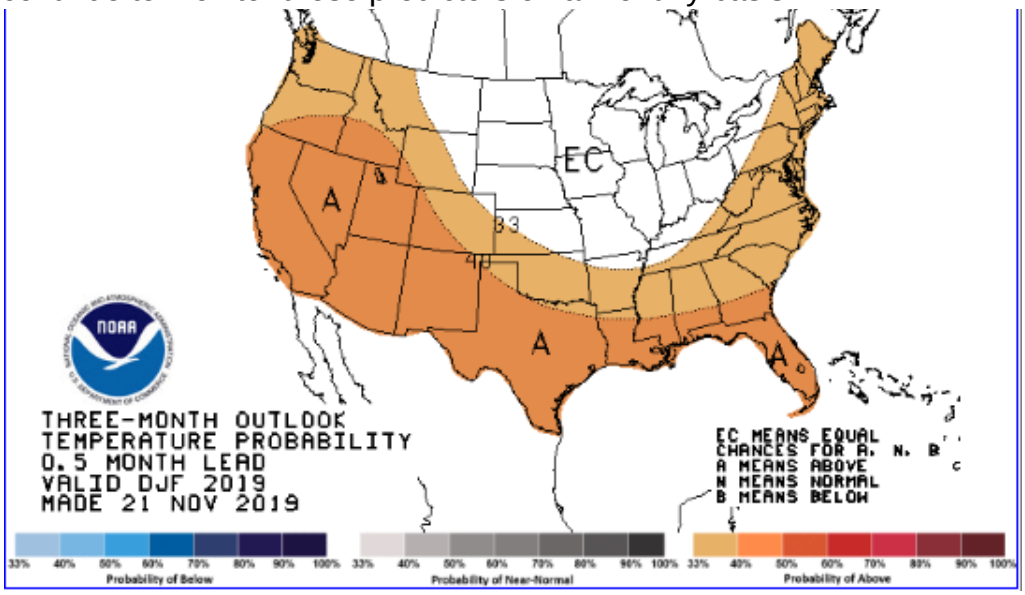
This winter HDD trended towards a neutral weather cycle (in between El Nino and La Niña), driven by prevailing winds. February surprised us with extreme cold as the wind and weather shifted, coming from the northeast. April through September returned to a warmer El Niño pattern, then October surprised us with the highest HDD for an October this century and November settled around the 10-year average.



*10-year max, min, avg is 2009-2018

Weather Forecast

The current NOAA '3-month outlook temperature probability' for Dec-Jan-Feb 2019-20 continues to show a 33-40% probability of 'above normal' temperatures in our region for the upcoming winter. We continue to monitor these predictors on a monthly basis.



Source: NOAA National Weather Service

Monthly ECA
The calculated amount for the November ECA was a bill surcharge of $.003826 per kWh which collected $72,127 in November, or $3.83 per 1,000 kWh. The YTD ECA through the November billing period is a credit to members (and reduction to operating revenue) of $32,984, or $0.0002 for a member using 1000 kWh/month. The December billing period ECA will be a bill credit of ($.013645) per kWh.

Capital Credit General Retirement
Based upon Board approval during the November board meeting, the capital credit General Retirement process was run which retired $1.3M of capital credits representing the remainder of 1994 and ~56% of 1995. The checks will be dated and distributed on December 20th and amounted to 5,334 checks totaling ~$971k.

MEMBER SERVICES

Assistance Programs
During November 2019, 338 members received $~11.6k from the Energy Assist program, compared to 308 members receiving $~9.1k in November 2018. There were 50 members awarded $8,125 in assistance through the PAL program by the local Family and Community Resource Centers. In November 2018 the volunteer PAL Council awarded $5,850 to 41 members.

Switch it Up!
There are now 110 projects in various stages of participation for a total of ~$975k in play. 67 projects are complete and billing.

Energy Savings
In November 2019 there were 21 rebates paid to members totaling ~$19.4k. Staff is continuing to accept and waitlist applications for beneficial electrification incentives (fuel-switching).

Staff has been working with the Washington State University Energy Program (WSU) to calculate incentives for the Renewable Energy System Incentive Program (RESIP). WSU gave the final approval for payments at the beginning of December for payments totaling $224,765.54, with an additional $43,520 paid out to participants in the Decatur Community Solar project. Also note that this includes an additional $4,352 paid directly to the Energy Assist program, and ~$110 donated to project PAL.

Community Solar
During the November 2019 billing cycle the Decatur Community Solar array produced 22,400 kWh, and 3 kWh per solar unit was credited to member participants. A total of ~$2k was distributed to 276 accounts, including an additional ~$208 for the PAL and Energy Assist programs.
(https://energysavings.opalco.com/energy-savings/renewable-generation/community-solar/decatur-community-solar-project/)

COMMUNICATIONS

Co-op Open House

Board and staff hosted a co-op open house event on Orcas on November 20th. The event was minimally attended with most people interested in EVs, Efficiency and the Dams. Foster Hildreth gave a brief overview of the 2020 budget and answered member questions, along with board members. The full board was in attendance.

Resolution on Snake River Dams

Public comment continues on the resolution the Board passed in support of the whales and the Federal Hydro System. Staff have been working with members of the Orcas Women's Coalition Environmental Action Team to provide background information and understand their concerns. A meeting was held on December 10th. As a result of member requests from San Juan Island, time will be allotted after the December Board meeting from noon to 1:45 PM at the Friday Harbor office for members to continue this discussion.

Quick Facts

Staff are updating and expanding our online library of Quick Facts for easy reference access by board, staff and members. Check out the growing list of topics: https://www.opalco.com/newsroom/quick-facts/ and let us know if there are other topics that would be helpful to add. Please note, with this expansion, Quick Facts now have their own page under "News + Events" in the top menu.

Orcas Village Tree Lighting

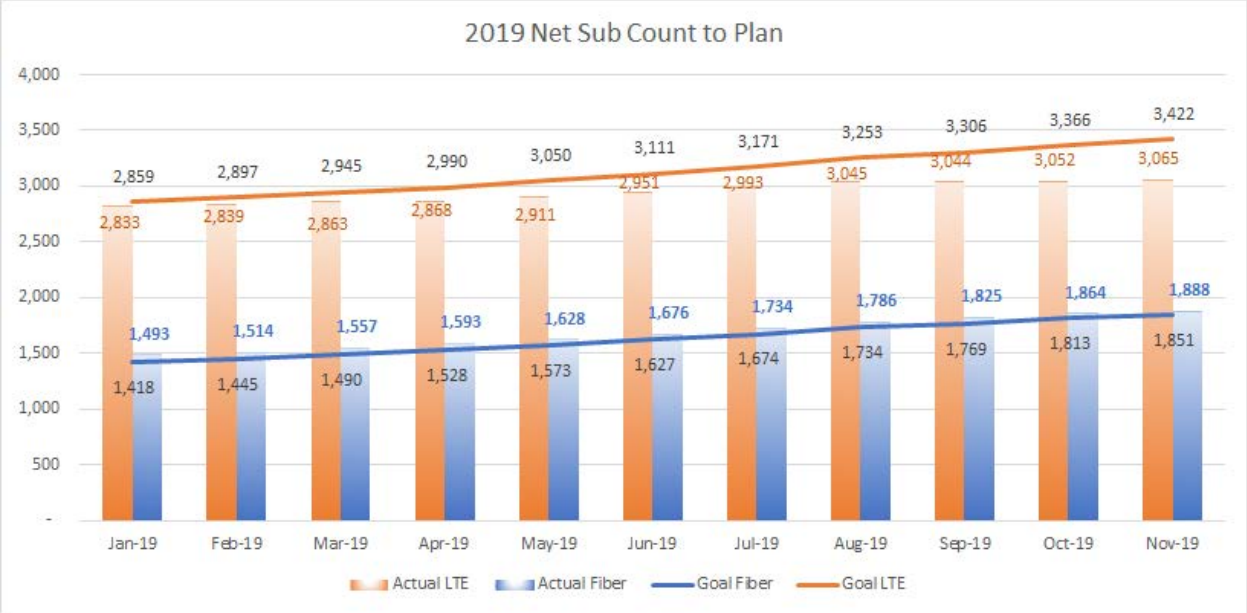
The Orcas crew hung lights on the village green for the community tree lighting ceremony. This is a long-standing tradition much appreciated by the Chamber of Commerce and the people of Orcas.

Eastsound Bathroom/ADA Remodel

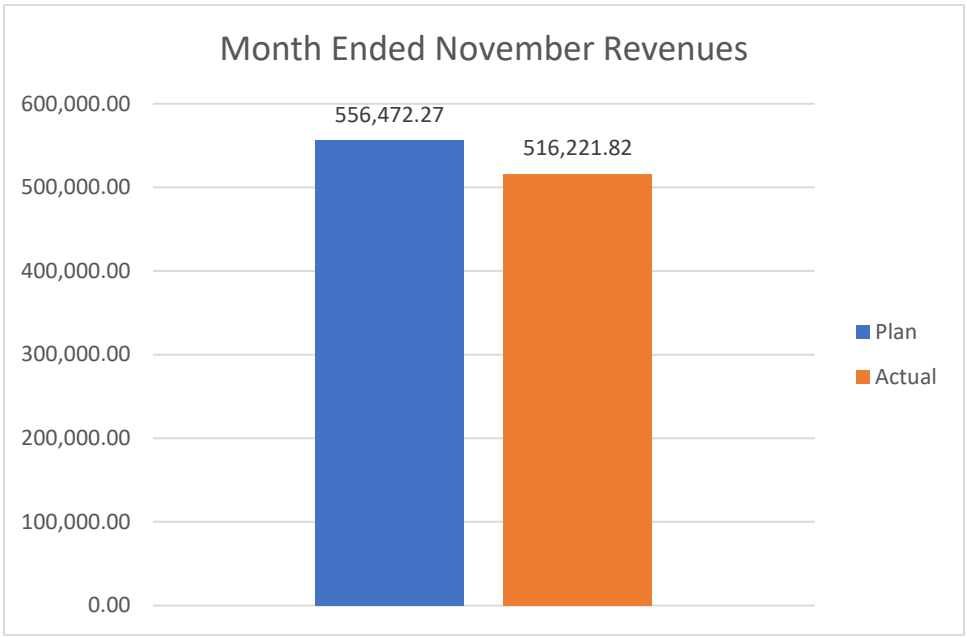
The remodel is on schedule with sheetrock starting on December 16th.

Snapshot December 2019

Net Subscribers as of November 30, 2019



Gross Revenues November 30, 2019



❖ Remaining revenues are still being closed for November Business.

APPENDIX

- Resolution 2-2019
- Quick Facts: Ocean Health
- Quick Facts: Orca Whales
- OPALCO'S Position on Dams and Ocean Health
- Letter from Orcas Women's Coalition

Resolution 2-2019

MEMORANDUM

September 13, 2019

To: Board of Directors

From: Foster Hildreth, General Manager

Re: Resolution re: Support of the Federal Columbia River Power System and the Four Lower Snake River Dams

WRECA is requesting their members adopt a resolution in support of continued operation of the four Lower Snake River dams and opposing removal or breach and the spending of taxpayer funds on duplicative and unnecessary studies. Other cooperatives have done so including Parkland and Benton REA.

The attached is a resolution that gives us a voice in the issue. The language of our resolution is slightly different than that of WRECA and other cooperatives due to our location in the heart of the Salish Sea and the interdependence of the issues at stake with our daily lives. We cannot tolerate any further decline of our sensitive marine environs or risk the survival of any part of the complex food chain that supports our orca whales.

OPALCO supports the whales and our federal hydro system. We oppose the removal of the dams because we don't believe it will solve the problem for our fish and the food chain and may worsen the situation. We believe the National Environmental Policy Act (NEPA) study (already funded and underway) will provide the science necessary to understand the full web of interdependent issues at play, including water temperatures, ocean acidification, pollution and climate change. We believe we can build a successful future for our fish and wildlife, clean air and water, while keeping our power carbon free with the Federal Columbia River Power System (FCRPS).

Staff requests the Board approve and adopt the attached resolution in support of the continued operation of the Lower Snake River dams.

ORCAS POWER & LIGHT COOPERATIVE
A Touchstone Energy Co-op

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BOARD OF DIRECTORS
RESOLUTION 2-2019
SUPPORTINGTHE FEDERAL COLUMBIA RIVER POWER SYSTEM, RECOGNIZING ITS ROLE IN ENVIRONMENTAL STEWARDSHIP, AND OPPOSING REMOVAL OF THE LOWER SNAKE RIVER DAMS

Orcas Power & Light Cooperative (OPALCO) is a member owned electric cooperative providing electric services in San Juan County, Washington, and is a full requirement utility, with all of the electricity it delivers to its members (other than a small amount of local distributed power) coming from the Bonneville Power Administration (BPA) and is generated by the Federal Columbia River Power System (FCRPS).

The FCRPS is in large part responsible for the clean air, water and lands enjoyed by millions in the Pacific Northwest. The dams on the Columbia and Snake Rivers provide navigable waters, irrigation, flood control, recreation and the FCRPS provides a reliable source of clean energy for millions of residents of Washington State and the Pacific Northwest.

Hydropower produces no emissions, making the Pacific Northwest's carbon footprint from energy production nearly half that of the other parts of the country and because hydropower output can be quickly increased or reduced, it is an excellent back-up for intermittent wind or solar generation.

Industries and businesses, representing hundreds of thousands of jobs, rely on low-cost hydropower to stay in business and prosper and high technology firms have located facilities in the Pacific Northwest because of the availability of reliable, carbon free hydropower, creating jobs and boosting local economies.

The clean and renewable energy generated by the FCRPS has made Washington State a national and world leader in responsible environmental stewardship and implementation of the FCRPS BiOp has successfully improved overall fish runs by 97 percent, proving that dams and fish can coexist. Consequently, there are more total fish in the Columbia River than at any time since the first lower mainstream dam was built at Bonneville in 1938.

To facilitate this remarkable achievement, BPA has spent nearly $17 billion on infrastructure and fish mitigation projects since 1978 representing from one-quarter to one-third of the BPA's total costs. Because of these efforts, for the foreseeable future, salmon and steelhead mitigation in the Northwest will continue to be one of the largest wildlife recovery efforts in history.

The four Lower Snake River dams enable irrigation for over seven million acres of farmland producing $8 billion annually in agricultural income, barging of approximately nine million tons of cargo valued at over $3 billion annually, and annually produce 1,000 aMW of emissions-free power, enough to serve nearly half a million Northwest businesses, industries and households. BPA has identified the four Lower Snake River Dams as critical components of the FCRPS mission of supporting peak power generation and removing over 2,000 megawatts of firm winter capacity generated by the four Lower Snake River Dams would add to a forecasted Northwest shortfall in energy capacity.

Despite the significant value the dams provide, and the success of the current FCRPS BiOp, there continues to be movement to have the four Lower Snake River dams removed. In March 2017, the United States District Court for the District of Oregon directed the federal agencies to undertake a

comprehensive review of hydro operations under the National Environmental Policy Act (NEPA) and urged the federal agencies to include analysis of the removal, bypass or breaching one or more of the four Lower Snake River dams. Additionally, Washington State is funding a study on the associated economic and social impacts of the potential breaching or removal of the four Lower Snake River dams which duplicates the same effort that is several years underway by the federal agencies in the Columbia River Systems Operations Environmental Impact Statement, making the study an unnecessary and wasteful use of taxpayers' money.

There is inaccurate information about the four Lower Snake River dams being spread in an effort to undermine the value of the FCRPS and create public support for the removal or breaching of the four Lower Snake River dams with no regards to science-based facts. However, the FCRPS and the four Lower Snake River dams have been, are and will continue to be a critical component of life in the Pacific Northwest.

OPALCO supports the whales and our federal hydro system. We oppose the removal of the dams because we don't believe it will solve the problem for our fish and the food chain and may worsen the situation. We believe the NEPA study will provide the science necessary to understand the full web of interdependent issues at play, including water temperatures, ocean acidification, pollution and climate change. We believe we can build a successful future for our fish and wildlife, clean air and water, while keeping our power carbon free with the FCRPS.

NOW, THEREFORE, the Board of Directors of Orcas Power & Light Cooperative resolves to support the continued operation of the FCRPS including the four Lower Snake River dams for the many benefits they provide including emissions-free, renewable, reliable, low-cost energy; and

Further resolve to oppose spending taxpayer money on a duplicative and unnecessary study of such removal or breaching; and

Further resolve to support effective actions to restore salmon runs as determined from existing and future BiOps; and

Further resolve to support effective actions to save the resident orcas in the Salish Sea.

CERTIFICATION OF SECRETARY

I, Brian Silverstein, Secretary of Orcas Power and Light Cooperative, do hereby certify that the above is a true and correct excerpt from the minutes of the meeting of the Board of Trustees of the Orcas Power and Light Cooperative, held on the 19th day of September 2019 at which meeting a quorum was present.

Brian Silverstein, Secretary

Quick Facts: Ocean Health

Quick Facts

Ocean Health

OPALCO is committed to reducing carbon emissions for the health of the Salish Sea.

• Climate change is making our oceans warmer, more acidic and less productive.

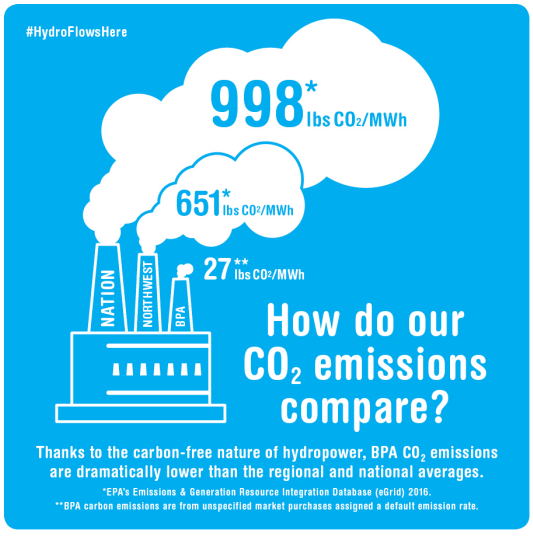
• Ocean acidification happens when our oceans absorb carbon dioxide. It threatens marine ecosystems world wide including our Salish Sea.

• The decrease in the ocean pH makes it harder for calcifying animals like the Dungeness crab to build and maintain shells and for fish like salmon to detect predators.

• Our oceans absorb nearly one-third of carbon dioxide emissions. The ocean has 30% more acidity than before the Industrial Revolution due to burning of fossil fuels (such as coal, gas, and oil) and deforestation.

• Warming waters are affecting marine wildlife worldwide. New reports come out daily about ocean acidification and declining or migrating fish and shellfish populations - salmon, lobsters, prawns, scallops, etc.

• Global warming threatens salmon in a variety of ways including young salmon that die when water warms above a certain threshold and warmer water streams that increase outbreaks of fish disease.



• OPALCO gets its power from PNGC/BPA, which is primarily generated through hydropower. "Hydro" is fueled by rainfall and snowpack, a clean and renewable resource with very low carbon emissions. Hydro is by far the best, cleanest source of baseload power for our ocean health. It's 10 times cleaner than solar, 200 times cleaner than fossil fuels like oil and coal.

• Browse OPALCO's library of quick facts to go deeper on this topic. Find more information on renewable energy, whales, electric ferries and more.

Sources and further research:

https://www.noaa.gov/education/resource-collections/ocean-coasts-education-resources/ocean-acidification

https://www.opb.org/news/article/study-northwest-salmon-ocean-acidification-disrupt-odor-predator/

www.bpa.gov

https://www.climate.gov/news-features/understanding-climate/climate-change-ocean-heat-content

Quick Facts: Orca Whales

Quick Facts

Orca Whales

OPALCO supports whales and values our hydro system.

• There are few topics that feel as important as the health and recovery of Southern Resident Orca Whales and salmon. There is no one action that will solve this complex problem. We need to address a web of interconnected issues including noise pollution, ocean acidification, over-harvesting of fish, water temperature change and toxic chemical pollution.

• We are witnessing the collapse of our ecosystem due to climate impact. Rivers that have no dams (Frasier, for example) are seeing significant falloff in salmon populations. Species are migrating northward to cooler waters on the Atlantic and Pacific coasts.

• BPA customers (OPALCO members) fund the largest fish and wildlife mitigation program in the nation to help preserve our region's culture and environmentally conscious way of life.

• There are a number of things we can all do to help. Some are calling for the breaching of the lower Snake River Dams but we believe that is the most expensive and radical action with too many risks and unintended consequences.

• We believe that it is dangerous to eliminate carbon-free resources. Clean hydro power is critical solution to reducing carbon emissions. With new carbon fees coming in through Washington's Clean Energy and Transportation Act, the demand and competition for our clean hydro resources will increase and the cost of replacing lost generation will be expensive - in dollars, and especially in carbon (which pollutes our air and water and then impacts marine species).

• Hydro is critical to firm up intermittent renewable resources like wind and solar. BPA uses the lower Snake River dams to help balance over half of the region's 9,000 MW of wind generation.

• OPALCO is positioned to offer long range energy solutions that will benefit our natural environment and keep costs affordable. Over the next 20 years, we want to increase our local generation of power from renewable sources by 50%. Read about the Co-op's vision for the future of our power:

https://www.opalco.com/wp-content/uploads/2019/11/OPALCO-2020-2040-IRP-R16.pdf

NOAA Report on Southern Resident Killer Whales:
https://nwriverpartners.org/wp-content/uploads/2015/07/Orcas-Recovery-Fact-Sheet-NOAA-2016.pdf
Seadoc Society on 7 things to benefit the whales:
https://www.opalco.com/wp-content/uploads/2019/10/Seadoc-Benefit-Whales.pdf

Letter from Orcas Women's Coalition

Orcas Women's Coalition

Submitted via email to OPALCO board on November 20, 2019

The Environmental Action Team of the Orcas Women's Coalition wants to register our strongest objection to the OPALCO board's decision to adopt a resolution on September 19 that opposes the best chance our Southern Resident killer whales have to avoid extinction - the removal of the Lower Snake River Dams.

We're disappointed that the OPALCO board would take such an absolutist position on these Lower Snake River dams that provide such a small amount of power and cost taxpayers money in the form of subsidies for barge traffic, when there's evidence that continuing to maintain the dams may be contributing to BPA's financial issues and rising rates.

From the board meeting minutes, it appears that the general manager of a pro-energy lobbying organization (WREC) requested the OPALCO board's support of a resolution "in support of the Federal Columbia River Power System and the four Lower Snake River dams." According to the minutes, "discussion was held" and a resolution (slightly modified from the lobbyist's suggested language) was brought to a vote at the next Board meeting and approved unanimously. Along with opposing removal of Lower Snake dams, the resolution opposes further study of hydropower's effect on salmon survival as recommended by Governor Inslee's Southern Resident Orca Task Force report.

We strongly believe this vote was done without meaningful outreach to the OPALCO membership and its unanimous adoption of the resolution does not accurately reflect the opinions of many OPALCO member-owners.

In fact, part of the board's resolution supported the federal National Environmental Policy Act (NEPA) review as the 'be-all end-all' of dam study yet this NEPA review is directly contradicted by a recent (10/22/2019) letter signed by 55 fisheries and natural resource scientists who state in their key findings:

> *"The Federal Columbia River Power System (FCRPS) reservoirs on the lower Snake River increasingly warm the river above critical levels from July to mid-September, significantly reducing salmon reproduction and survival. This problem was first recognized in the 1990s, and still remains largely unmitigated today. All available information to date about the court-ordered National Environmental Policy Act (NEPA) review now being conducted indicates that federal agencies will propose no plan to adequately address this critical issue.*
>
> *Restoring the lower Snake River by removing its four federal dams will significantly reduce mainstem water temperatures on a long-term basis, and is likely the only action that can do so, substantially lowering the risk of extinction for salmon and steelhead here."*

It's an established fact that the Southern Resident killer whales (SRKW) depend on salmon from the Columbia-Snake River system. Consensus among scientists who study the SRKW is that breaching the four dams on the Lower Snake is the most effective action we could take to recover both the endangered salmon and the SRKW. As member-owners of the power cooperative that operates in the Southern Resident killer whales' critical Salish Sea habitat, we find it paradoxical that our board could put out a statement saying "OPALCO supports the whales and our federal hydro system" while clearly announcing – by way of this resolution - that they don't support thorough scientific research on the issue, although they preemptively support the position of keeping the dams before even the latest NEPA report is published.

We would like the board to explain their actions, the evidence they used to study the issue, and reasoning why they chose not to bring the deliberations on such a vital issue to the community of owners for input and education instead of effectively putting our names on a lobbyist-authored resolution.

We would further like to know what the process is for appealing and perhaps revoking this resolution, which certainly does not unanimously represent the position of the membership.

Respectfully submitted,

Orcas Women's Coalition
Environmental Action Team (EAT)

Enclosure: October 22, 2019 letter from 55 fisheries and natural resource scientists to policymakers

October 22, 2019

TO: Northwest Policymakers – Governors and Members of Congress
FR: David Cannamela, on behalf of 55 fisheries and natural resource scientists
RE: Science-based solutions are needed to address increasingly lethal water temperatures in the lower Snake River

Dear Northwest Policymaker,

INTRODUCTION:
In recent decades, adult salmon and steelhead migrating upriver to spawning grounds in the Columbia Basin have suffered decreased survival. This is in part due to dangerously warm water in the mainstem Snake and Columbia Rivers, caused by hydro-electric development that created slackwater reservoirs and a changing climate. Excessively high water temperatures, above 20°C/68°F, are now normal for extended periods in July, August, and September.

The four lower Snake River reservoirs have a significant impact on these in-river temperatures. Based on modeling, EPA states that an un-impounded river could, on average, be 3.5°C/6.3°F cooler in late summer and early fall when measured at the site-potential for John Day Dam. EPA modeling also shows that, when considered collectively, the four lower Snake Dams can affect temperatures up to a potential maximum of 6.8°C/12.2°F (EPA, 2003). This water temperature issue remains unmitigated and will worsen as the climate continues to warm. With limited resources in the existing hydrosystem to cool the river, the restoration of the lower Snake River by breaching its four dams is the only action available that can substantially cool mainstem water temperatures on a long-term basis.

KEY FINDINGS:
The Federal Columbia River Power System (FCRPS) reservoirs on the lower Snake River increasingly warm the river above critical levels from July to mid-September, significantly reducing salmon reproduction and survival. This problem was first recognized in the 1990s, and still remains largely unmitigated today. All available information to date about the court-ordered National Environmental Policy Act (NEPA) review now being conducted indicates that federal agencies will propose no plan to adequately address this critical issue.

Cold-water resources to protect migrating salmonids in the existing hydrosystem are extremely limited; there are no additional resources available that can significantly cool the river. Restoring the lower Snake River by removing its four federal dams will significantly reduce mainstem water temperatures on a long-term basis, and is likely the only action that can do so, substantially lowering the risk of extinction for salmon and steelhead here.

DETAIL:
Late summer and early fall water temperatures in the mainstem lower Snake and lower Columbia Rivers have risen to critical levels in recent years, due in large part to the presence of Federal Columbia River Power System (FCRPS) dams and

reservoirs. Reservoir heating is exacerbated today by a warming climate. Historically, construction of FCRPS dams and reservoirs increased slackwater surface area and decreased water velocity compared to a free-flowing river; increased slackwater surface area now serves as a collector of solar energy, and the slow-moving water allows more time for heat to accumulate, compared to free-flowing conditions (Yearsley et al. 2001, EPA 2003, FPC 2015).

The U.S. Environmental Protection Agency (EPA) has modeled impacts of the presence of dams and reservoirs on water temperature to develop a Total Maximum Daily Load (TMDL) for temperature in the Columbia and Snake Rivers. Based on this modeling, EPA stated that an un-impounded river could, on average, be 3.5°C/6.3°F cooler in late summer and early fall when measured at the site-potential for John Day Dam. EPA modeling also showed that, when considered collectively, the four lower Snake Dams could affect temperatures up to a potential maximum of 6.8°C/12.2°F (EPA, 2003). The impact of additional heating in lower Snake River reservoirs is clear, and it can drive water temperatures above 68°F for extended periods in late summer and early fall – dangerous for salmon and steelhead.

In summer 2015, 96% of endangered adult Snake River sockeye salmon died during their upriver migration through the lower Columbia and Snake Rivers, due to the combined effects of very hot air and water temperatures, low flows, and the presence of mainstem dams and their associated reservoirs (FPC 2015). The extreme conditions faced by migrating adult salmon in 2015 will become more frequent as the climate continues to warm.

Although the poor success of the adult migration documented in 2015 for Snake River sockeye is an extreme example, reduced migration success due to high water temperatures has been observed for sockeye in other years, and for other Snake River salmon species generally (Crozier et al. 2014, McCann et al. 2018). These studies indicate that all Snake River salmon species (sockeye, spring/summer Chinook, fall Chinook and steelhead) experience reduced survival at elevated water temperatures above 18°C (64°F), which is, notably, 2°C cooler than the established water quality standard of 20°C (68°F). The proportion of adults of each species or run-type that experience temperatures in excess of 18°C depends on the timing of their upriver migration; steelhead, fall Chinook and sockeye have a greater exposure to high temperatures than adult spring/summer Chinook (McCann et al. 2018), because they migrate later in the summer, when temperatures are hottest. In addition, adults that were transported (barged) as juveniles exhibit impaired homing ability, which results in slower migration speed, lower upstream survival, and higher stray rates.

Temperature tolerance or intolerance in salmon and steelhead (and fish generally) has been well documented in the scientific literature, and local adaptation can play a role in thermal limits for different populations of the same species. Effects of high temperature on adult salmon migration include direct mortality, migration delay, and may also include depletion of energy reserves through delay and increased respiration, reduced gamete viability, and increased rates of disease (e.g.,

McCullough et al. 2001). It is well established that water at higher temperature carries less dissolved oxygen, while cooler water carries more and benefits all salmon species.

In the Snake/Columbia mainstem, impounded by FCRPS dams, fish ladders often expose adult salmon to elevated temperatures due to the warm surface water used to provide ladder flows (Keefer and Caudill 2015). High water temperatures can result in fish repeatedly entering and exiting these ladders, reducing survival rates. Ladders that have a high temperature gradient from warm surface waters in the forebay to cooler tailwaters can also delay migration of adult salmon through the ladders, reducing survival. The migration delays typically result in delayed migration to spawning grounds, increased total thermal exposure, and decreased migration success (Caudill et al. 2013, Keefer and Caudill 2015).

Elevated water temperature in the Columbia and Snake Rivers is a long-recognized problem that to date remains largely unmitigated (NMFS 1995; EPA 2001, FPC 2015). The inability to meet a temperature water quality standard of 20°C (68°F) in summer and the issue of elevated fish ladder temperatures are long-standing problems, both recognized in the 1995 FCRPS Biological Opinion (NMFS 1995). In general, the temperature exceedance problem has been more severe in the Snake River than in the Columbia River (FPC 2015). In 2015, temperatures exceeded the 20°C standard for 35% to 46% of the April-August passage season at all FCRPS projects except Lower Granite Dam (LGR; FPC 2015).

Current FCRPS strategies to cool overheated mainstem water in the Snake River rely primarily on the release of cold water from Dworshak Reservoir (on the North Fork Clearwater River) to help cool a portion of the lower Snake River from July into September, to protect migrating juvenile and adult salmonids. Dworshak's cold water releases have generally kept temperatures from exceeding the 20°C standard to Lower Granite Dam's tailwater, but the 20°C standard is routinely exceeded downstream (http://www.fpc.org). Cold water volumes from Dworshak are limited and must be used judiciously during the July-September period. Efforts to cool the adult fish ladders with auxiliary pumps at Lower Granite and Little Goose Dams have shown some potential to reduce migration delay at those dams (FPC 2015), but do not mitigate the larger problem of warm summer water temperatures in the entire lower Snake River and in the lower Columbia.

Climate change is exacerbating existing elevated temperature problems, and the severe problems faced in 2015 will increase in frequency. Snake River sockeye have been identified as extremely vulnerable to climate change due in part to their long migration through exceptionally warm reaches of the Snake River (Crozier et al. 2019). Data from recent years confirm that current strategies to cool the mainstem are insufficient, and the alternatives currently under evaluation by the Federal Action Agencies in the NEPA review process appear to inadequately address this problem. (http://crso.info).

Schultz and Johnson (2017) used the EPA temperature model (RBM-10) to simulate water temperatures in the lower Snake River throughout the summer of 2015,

assuming that its four dams and reservoirs in eastern Washington did not exist; the simulations also assumed that cold water releases as in 2015 from Dworshak would continue. Their simulations indicated that a free-flowing lower Snake River would have remained cool enough for salmon to migrate successfully in 2015 (i.e., met the 20°C standard, except for brief periods after which temperatures quickly returned to a safe level), despite that summer's record-breaking air/water temperatures and low flows. For comparison, most parts of the impounded lower Snake River during July and August of 2015 were dangerously warm, becoming lethal for salmon and steelhead. Although not evaluated specifically, the modeled temperatures at Ice Harbor Dam suggest that the cooling effect of dam removal (with cold water releases from Dworshak) would have extended downstream at least to the confluence of the lower Snake and Columbia rivers. Shultz and Johnson (2017) concluded that "a free-flowing Lower Snake River could remain viable salmon habitat—at least from a water temperature perspective—despite some degree of climate change."

In the current NEPA review process, in which FCRPS alternatives are being studied by federal Action Agencies to restore ESA-listed salmon populations, strategies to reduce overall mainstem water temperatures do not appear to be sufficiently addressed. This serious flaw, if uncorrected, will mean that hot mainstem water will remain unmitigated and salmon and steelhead losses will continue and worsen over time, especially for Snake River stocks.

The option of breaching lower Snake River dams, combined with existing or modified cold water releases, has enormous potential to alleviate the very serious problem of elevated summer temperatures in the lower Snake River, and increase the survival rate from out-migrating smolts to returning adults (smolt-to-adult return; SAR) for all salmon species (Marmorek et al. 1998, Peters and Marmorek 2001, McCann et al. 2017). It would also significantly increase available spawning and rearing habitat for imperiled Snake River Fall Chinook.

No other action or actions can significantly lower summer water temperatures in the lower Snake River on a long-term basis, while also providing additional cooling in the lower Columbia.

If you have questions about this letter or would like additional information, please contact:

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- Howard Schaller, howie.a.schaller@gmail.com, 503-560-6189
- Rick Williams, troutdna@gmail.com, 208-861-1325
- David Cannamela, dacannamela@gmail.com, 208-890-1319

Sincerely,

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