Welcome!
Transmission Corridors Work Group
Meeting #2
October 20, 2021

Observers: Please join the meeting via Livestream: www.rossstrategic.com/livestream
Public Participation

- Public observers, if you are in the Zoom meeting right now, please log off and listen/watch the meeting via livestream: [www.rossstrategic.com/livestream](http://www.rossstrategic.com/livestream)
- If you wish to provide public comment, please join the Zoom meeting at 3:50p.
- We will share Zoom info at that time (available through livestream)
Welcome and agenda review
Susan Hayman, TCWG co-facilitator, Ross Strategic
Kathleen Drew and Joe Wood, EFSEC
A few quick reminders....

Please keep yourself muted while others are speaking.

Raise your virtual hand to contribute to the conversation.
- Alt+Y to raise and lower your hand

Allow everyone the chance to speak, and listen actively to understand others’ views.

If you need technical assistance, please send a Zoom chat to Lauren Dennis.
Agenda Review
## Today's agenda – Morning

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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<tbody>
<tr>
<td>9:00 AM</td>
<td>Opening (agenda review, remarks, etc)</td>
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<tr>
<td>9:15 AM</td>
<td>TCWG member round robin</td>
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<tr>
<td>9:45 AM</td>
<td>Energy &amp; Transmission “Needs and Opportunities” Presentation:</td>
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<tr>
<td></td>
<td>• Rob Lothrop, Columbia River Intertribal Fish Commission</td>
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<tr>
<td>10:30 AM</td>
<td>Break (15 mins)</td>
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<tr>
<td>10:45 AM</td>
<td>Panel 1—Energy &amp; Transmission Needs and Opportunities:</td>
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<tr>
<td></td>
<td>• Investor-Owned Utilities and Public Utility Districts</td>
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<td></td>
<td>• Tom Flynn, Puget Sound Energy</td>
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<td></td>
<td>• Nicolas Garcia, Washington Public Utility Districts Association;</td>
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<tr>
<td></td>
<td>• Ian Hunter, Snohomish County Public Utility District</td>
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<tr>
<td>12:00 PM</td>
<td>Extended Lunch Break (90 mins)</td>
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# Today's agenda - Afternoon

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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| 1:30 PM  | Panel 2—Energy & Transmission Needs and Opportunities: Renewables Northwest, Avangrid, and Climate Solutions  
• Katie Ware, Renewable Northwest  
• Anders Bisgard, Avangrid  
• Vlad Gutman-Britten, Climate Solutions |
| 2:45 AM  | **Break (15 mins)**                                                                        |
| 3:00 AM  | Group discussion: Impressions and Reflections  
• High-level key takeaways & observations from the presentations |
| 4:00 PM  | Public Comment Opportunity                                                                 |
| 4:15 PM  | Looking Forward and Wrap Up                                                                 |
| 4:30 PM  | **Adjourn**                                                                                |
Opening Remarks
Kathleen Drew and Joe Wood, EFSEC
Agenda informed by Meeting #1 Mural feedback
New Work Group Member Introductions
(<2 mins each)

- Name
- What is your organization/agency’s interest in transmission siting? (If two members present, only necessary to answer once.)
- Why is the work of the TCWG important to you?
TCWG member round robin

Observations? Outstanding questions on charter, process, outcomes, other?
Presentations on Energy & Transmission “Needs and Opportunities”
Perspectives shared today

- Columbia River Intertribal Fish Commission
  - Rob Lothrop

- Panel 1 - Investor-Owned Utilities and Public Utility Districts
  - Tom Flynn, Puget Sound Energy
  - Nicolas Garcia, Washington Public Utility Districts Association
  - Ian Hunter, Snohomish County PUD

- Panel 2 - Renewables Northwest, Avangrid, and Climate Solutions
  - Katie Ware, Renewable Northwest
  - Anders Bisgard, Avangrid
  - Vlad Gutman-Britten, Climate Solutions
Following each presentation or panel:

- Brief Q&A
- Mural exercise (10 mins)
  - What are your key findings or takeaways from these presentations/perspectives?
  - What gaps in 1) energy sources or 2) transmission infrastructure do you see emerging based on the needs and opportunities identified during the presentation?
  - What are the implications for state and local governments? Labor and industry? Cultural and natural resources?
CRITFC Energy Vision for the Columbia Basin: Selected Issues

- Protecting Treaty Resources from Energy Development
- Siting Renewable Resources
  - Solar, Wind and Transmission
- Role of the Columbia River Power System and its Snake Dams
- Climate Change
- Energy Conservation as a Priority Resource
- Future of the Columbia River Treaty
Four Tribes’ Ceded Lands Combined

- 66,591 square miles
- More than 25% of the entire Columbia Basin
- 55% of the rivers and streams that are still accessible to salmon
- Includes almost all of the salmon habitat above Bonneville Dam
“...the right of taking fish at all usual and accustomed places, in common with the citizens of the Territory, and of erecting temporary buildings for curing them: together with the privilege of hunting, gathering roots and berries....”

—1855 Treaty with the Yakima
CRITFC Energy Vision for the Columbia Basin

- Reduce the stress of existing and changing energy demands on the Columbia Basin’s natural and cultural resources
- Lessen the demand for fossil-fuel generation that contributes to climate change
- Provide increased protection for ratepayers and fish and wildlife against unanticipated events, such as those the region faced in 2001
Wild Chinook Salmon Smolt-to-Adult Returns in the Columbia River Basin

What is a Smolt-to-Adult Return?
SAR is the percentage of ocean-bound juvenile salmon that return as adults to spawn in freshwater. SARs must be at least 2% for salmon persistence. 4% SAR is the goal for healthy & harvestable populations.

SAR data source:
Fish Passage Center
2020 Comparative Survival Study

- Yakima River - 4 dams
  2.4% Returns to Bonneville Dam = Growth = Sustainable

- John Day River - 3 dams
  3.5% Returns to Bonneville Dam = Growth = Sustainable

- Snake River - 8 dams
  0.9% Returns to Bonneville Dam
  0.8% Returns to Lower Granite Dam = Declining = Extinction

- Dams (with dam count between Pacific and Snake Basin)
- Current salmon/steelhead distribution

0 50 100 200 Miles
Western Energy Coordinating Council (WECC)
Projected Flows at The Dalles Dam in July 2031
Comments

- CRITFC member tribes
- Bonneville Power Administration
- Northwest Power and Conservation Council
- Former BPA Administrators
- Northwest Energy Coalition
- Natural Resources Defense Council
- Oregon Dept. of Energy
- U.S. Fish and Wildlife Service
- U.S. EPA
Timeline
Tentative Schedule Depending on Scope and Future Input

DRAFT ENERGY VISION
BY LATE SPRING

60 DAYS FOR
COMMENTS ON THE
DRAFT

FINAL ENERGY VISION
BY LATE FALL
Tribal elders taught us that if we take care of the salmon, the salmon will take care of us.
Break
Please return at 11:00 AM
Mural exercise
10 mins
Mural Reminder

- Copy-paste link from Zoom chat box into an internet browser
- Keep Zoom and Mural open simultaneously
- Add your name & click “Enter as a visitor”
The page outline can help you jump to where you need to go.

Zoom in/out by using:
1. Your mouse scroll-wheel
2. This pane
To add thoughts in a sticky note, **click once** and begin typing.

**Click outside** of the sticky when you’re done typing. You can then move it, resize it, go back to edit it, or delete it.

To add a new sticky note, **double click** in the area.
Presentation reflections

Work currently occurring in the Mural....
Panel 1—Energy & Transmission Needs and Opportunities: Investor-Owned Utilities and Public Utility Districts
Tom Flynn, Puget Sound Energy
Nicolas Garcia, Washington Public Utility Districts Association & Ian Hunter, Snohomish County PUD
CETA Transmission Needs
Transmission Corridors Work Group

Tom Flynn, Manager Energy Delivery
Matching renewable generation with transmission capacity will be a challenge for PSE

- PSE has a relatively small service territory, localized in NW Washington

- Renewable resources are scattered across the regional footprint and are often located distant from load centers

- PSE must work with surrounding transmission providers (especially BPA) to secure transmission across the region
The region’s generic renewable resources are geographically diverse

- W Washington Solar
- E Washington Solar
- Offshore Wind
- Washington Wind
- Montana Wind
- Idaho Wind
- E Wyoming Wind
- W Wyoming Wind
PSE works mainly with BPA to secure transmission to bring new resources to PSE territory
PSE identified 7 Resource Group regions in the 2021 IRP that align with existing transmission resources
Each Resource Group region contains a distinct mix of generic resources

<table>
<thead>
<tr>
<th>Resource Group Region</th>
<th>WA Wind</th>
<th>MT Wind</th>
<th>Offshore Wind</th>
<th>ID Wind</th>
<th>East WY Wind</th>
<th>West WY Wind</th>
<th>CCCT</th>
<th>Frame</th>
<th>Recip</th>
<th>Biomass</th>
<th>Solar Residential</th>
<th>Solar Utility</th>
<th>Pumped Storage</th>
<th>Battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSE territory*</td>
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<td>Eastern Washington</td>
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<tr>
<td>Central Washington</td>
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<tr>
<td>Western Washington</td>
<td>x</td>
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<td>x</td>
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<tr>
<td>Southern Washington/Gorge</td>
<td>x</td>
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<tr>
<td>Montana</td>
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<tr>
<td>Idaho / Wyoming</td>
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</table>
## Figure 1-4: Electric Preferred Portfolio, Incremental Nameplate Capacity of Resource Additions

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Incremental Resource Additions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2022-2025</td>
<td>2026-2031</td>
</tr>
<tr>
<td>Distributed Energy Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand-side Resources¹</td>
<td>256 MW</td>
<td>440 MW</td>
</tr>
<tr>
<td>Battery Energy Storage</td>
<td>25 MW</td>
<td>175 MW</td>
</tr>
<tr>
<td>Solar</td>
<td>80 MW</td>
<td>180 MW</td>
</tr>
<tr>
<td>Demand Response</td>
<td>29 MW</td>
<td>167 MW</td>
</tr>
<tr>
<td>DSP Non-wire Alternatives²</td>
<td>22 MW</td>
<td>28 MW</td>
</tr>
<tr>
<td><strong>Total Distributed Energy Resources</strong></td>
<td>412 MW</td>
<td>990 MW</td>
</tr>
<tr>
<td>Renewable Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind</td>
<td>400 MW</td>
<td>1,100 MW</td>
</tr>
<tr>
<td>Solar</td>
<td>-</td>
<td>398 MW</td>
</tr>
<tr>
<td>Biomass</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Renewable + Storage Hybrid</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total Renewable Resources</strong></td>
<td>400 MW</td>
<td>1,498 MW</td>
</tr>
<tr>
<td>Peaking Capacity with Biodiesel</td>
<td>-</td>
<td>255 MW</td>
</tr>
<tr>
<td>Firm Resource Adequacy Qualifying</td>
<td>574 MW</td>
<td>405 MW</td>
</tr>
<tr>
<td>Capacity Contracts</td>
<td></td>
<td></td>
</tr>
</tbody>
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NOTES
1. Demand-side resources include energy efficiency, codes and standards, distribution efficiency and customer solar PV.
2. DSP Non-wire Alternatives are resources such as energy storage systems and solar generation that provide specific benefit on the transmission and distribution systems and simultaneously support resource needs.
**PSE CETA TRANSMISSION NEED**

**IRP RESOURCE NEED (RENEWABLES & CAPACITY):**

- **2030:** 2,150 MW
  - 2,150 MW need could be met with:
    - Repurposed transmission including retirements
    - Additional BPA transmission
    - Co-Locate Projects (wind/solar/storage)
    - B2H/Gateway to WY/ID

- **2045:** +3,250 MW
  - 3,250 MW of NEW Transmission needed
    - Greenfield Transmission (3 new transmission lines @1,000 MW ea)
      - 10-20 yr site/permit/build
      - $4B-$6B
    - Uprate Existing Lines
      - 115 kV to 230 kV
PacifiCorp has transmission projects planned across 10 states

- PacifiCorp has over 16,900 miles of high-voltage transmission spanning 10 states

- PacifiCorp’s 2021 IRP preferred portfolio includes a Yakima local area reinforcement upgrade in 2030 enabling 180 MW of interconnection

- Transmission upgrades and resources are subject to change and reassessment in subsequent IRP cycles
Hurdles for New Transmission under CETA

• Costs and Capital Financing
  • Multi-billion dollar projects
  • Need multiple partners and “anchor” tenants
  • Business models

• Prudency and Rate Recovery

• FERC Regulatory processes
  • Order 1000 Regional Planning

• 10-20 year timelines
  • Need to initiate projects in 2020s for 2030-2045 commercial operation date
Costs for new transmission are a significant hurdle*

- 500 kV transmission
  - Cost per mile - $3.6 million
  - Substation - $26 million
- 345 kV transmission
  - Cost per mile - $2.5 million
  - Substation - $20 million
- 230 kV transmission
  - Cost per mile - $1.6 million
  - Substation - $14 million

*The above costs are based on a simple cost calculator available to WECC members and reflect basic information; actual costs will vary.
Greenfield Project Example

Boardman to Hemingway (B2H) Project

- 290 mile 500 kV transmission line
- Eastern Oregon to southwestern Idaho
- Project start date: 2006
- Project estimated in-service: 2026
- Capacity: 1,000 MW each direction
- Project Partners: Idaho Power, PacifiCorp, BPA
- $1.2 billion
NW Electrical System: Grid Reliability

Nicolas Garcia, WPUDA Policy Director
Ian Hunter, Snohomish County PUD

October 20, 2021
How PUDs view Grid Reliability

• Review what is required to be “reliable”

• Outline challenges, both present and future

• Brainstorm potential solutions as utilities consider CETA compliance
What is required to be reliable? - Grid Physics 101:

Generation **MUST EXACTLY BALANCE** Consumption

Electricity is the only commodity that is consumed immediately upon production; this creates challenges that are unique to its creation and distribution.

If *generation* is unable to match load (such as during high use events like Cold Snaps/Heat Domes); or ... or if available *transmission* capability is inadequate to deliver that generation; ... then grid operations, and electric service in general, can become **unreliable**.
What is required to be reliable? – Why is matching generation to load difficult?

Electricity use varies year-to-year, month-to-month, even hour-to-hour; changing needs require utilities to be ready to respond to all eventualities.
PNW Beginning to see Challenges

• Changing dispatch patterns (hydrology/thermal resources) and growing load needs are pushing established transmission corridors to their limits during certain periods
  • While the June/July heat dome event punctuated this point, utilities have been seeing increasing curtailment events during summer and winter peaks, where transmission paths are at or above rated limits

• Changing generation patterns may exacerbate congestion or create new congestion zones
Example of a Potential future Challenge

Path 4 – the Major Transmission line(s) across the Cascades to western Washington (known as “Cross-Cascades North”)

The wintertime transfer capability of Path 4 is up to 10,250 MWs.

Cross-Cascades North is emblematic of a transmission path historically considered to be free-flowing which is now seeing increasing congestion
Example of a Potential future Challenge

Path 4 is now, at times, congested in the Winter:

- 52 MWs on 3/7/19, 8:00 am
- 530 MWs on 2/24/20, 8:00 am

[Source: Northwest Power and Conservation Council: Transmission | Northwest Power and Conservation Council (nwcouncil.org)]

https://transmission.bpa.gov/Business/Operations/Paths
What could exacerbate these challenges?

- Looking at CCN as our test-case, what could impact conditions on that line?
  - Decrease in West-side generation
  - Increase in West-side demand
Decreasing West-side Generation: 17 Major Thermal Generating Plants (~5000MW)

As CETA/CCA transitions Washington away from emitting resources, “West of Cascades” generation will no longer supply West-side loads thereby increasing utility transmission needs.
Increasing West-side Demand: Washington’s Electrification Strategy

State Energy Strategy

**Transportation (45% of 2018 emissions):** Electrify passenger, truck and freight vehicles; immediate infrastructure investment; and incentives and land use plans to reduce travel and increase transit, cycling and walking.

**Buildings (23%):** A 10-year transition to electrify heating, cooling and cooking, combined with deep levels of efficiency for new and existing buildings.

**Electricity, (16%):** 100% clean by 2030 and double in output by 2050. Expand transmission and renewable generation; develop smart, distributed resources and grids; and strengthen market mechanisms to ensure reliability.
How can Washington utilities meet their upcoming needs reliably?

- If increasing west-side demand and decreasing generation exacerbates transmission congestion, then we can begin to ameliorate this congestion through:
  - Reducing West-side Demand
    - Demand response programs
    - Cost-effective energy efficiency
  - Increasing West-side generation / capacity
    - Energy storage as a grid tool and capacity resource
    - Distributed renewable energy (timing?)
    - Utilize any available flexible and fast-ramping resources

- Examine new resource siting patterns and begin long-term transmission analysis
- Reinforce existing transmission corridors and infrastructure where cost-effective
- Consider new transmission only where none-of-the-above is effective
Thank You – Questions?
Brief Q&A
Mural exercise
10 mins
Extended lunch break

Please return at 1:30 PM
Panel 2—Energy & Transmission Needs and Opportunities: Renewables Northwest, Avangrid, and Climate Solutions

Katie Ware, Renewable Northwest
Anders Bisgard, Avangrid
Vlad Gutman-Britten, Climate Solutions
Brief Q&A
Mural exercise

10 mins
Break
Please return at 3:08 PM

For those wishing to provide public comment at 4:00 PM:

• Log into the Zoom meeting at 3:50 PM by typing this address into your browser: https://www.zoomgov.com/j/1611646683
• You can also join by phone:
  Phone number: (669) 254-5252
  Meeting ID/Passcode: 161-164-6683
Group discussion: Impressions and Reflections
Group Reflection: Framing questions

- High-level observations and takeaways from across today’s presentations?
- Cross-cutting concepts or themes?
- Range of energy needs and opportunities?
- Any surprises?
Frame is bigger than just WA. Solving WA problems means reaching beyond borders

Solutions are multi-faceted. Distributed plus other items.
- What are the different ways/options to solve the problem of linking load/generation.

Most of the resource is on the E side and load is on the W side

Conservation/efficiency needs to be part of the solution set. But not the only part of the solution.

Surprise: Perspective that generation needs to be ‘close’ to load.

Better use of existing facilities and focus on existing facilities to upgrade.
Variables are about more than generation resources. Demand response, Env impacts, equity, and other pieces need to be a part of the puzzle. Higher level perspective on where resources/opps exist. Lead to more holistic recommendations.

Transmission planning/reliability planning should account for load extremes (peaks).

Peak load ‘design’ can lead to potentially inefficient/expensive solutions. However; an inability to handle peak demand can have significant and adverse outcomes. Significant consequences of getting the planning right.

Can we think about alternative ways/technologies to meet peak that is different than how we have historically planned? (link to first bullet). Gets power to the highest need (e.g., medical/vulnerable).
We want to look for least cost/most effective solutions. Accommodating peak has significant equity considerations. The options have to be ‘truly available’.

Barriers to transmission as a focus – can’t sidestep this. Charge from the legislature!

Surprise: Lack of focus on distributed generation. Overlooking moving energy closer to load needs to be a part of the discussion.

Where does the data about vulnerable live (data and mechanism to know this)? Have to know this to tie solutions to real impacts. What is the definition of vulnerable (beyond just no power for instance location of facility is another)? Can we identify a FW for types of vulnerabilities and intersect with types of actions/protections.
Early and often consultation on tribal nations needs to be more proactive/explicit during our deliberations (early 106 process). Understand what the implications are for energy projects going forward. Focus on improving existing transmission before new lines to mitigate the impacts to tribal cultural resources.

Other ways to engage tribal interests beyond formal mechanisms – staff level engagement regarding project important before it becomes G2G consultation.

Standardization of transmission lines/voltages is important/key consideration. Standard and/or convert. This is important because the higher the voltage the higher the transmission. (See the chat from Anders)
Shared learning opportunity – what is the current baseline (use + capacity) for next meeting (201 level presentation not graduate level)? Many of the ‘lower hanging fruit’ efforts would be useful to know within the context of current baseline. Enables a ‘bang for buck’ analysis and then allows a deeper dive in the next level of projects. (+1 on need to know the baseline)

Cost considerations – workforce – what are the implications on transmission on workforce? What is the vision/approach on the workforce to build out the grid of the future? Tied to equity conversations.
For those wishing to provide public comment

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- You can also join by phone:
  Phone number: (669) 254-5252
  Meeting ID/Passcode: 161-164-6683

Public Comment Opportunity will start at 4:00 PM
Public Comment Opportunity
Public Comment Opportunity

- Each commentor has up to 2 minutes to provide comment.
- Please raise your virtual hand to indicate you would like to comment. (Alt-Y)
- The facilitation team will call on commenters when it is their turn to speak. You will be muted until your turn.
- Commenters may also email comments to transmissioncorridors@rossstrategic.com by Nov 3
Looking Forward and Wrap Up
Looking Forward and Wrap Up

- Action items/next steps
- Meeting #3 is December 8, 2021
Closing remarks
Thank you!

Please direct group member questions and public comments to:

transmissioncorridors@rossstrategic.com