2025 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 9 Agenda

Tuesday, June 18, 2024
Virtual Meeting – 8:30 am to 10:00 am PTZ

Topic	**Staff**
Introductions	John Lyons
Loads & Resources Discussion	Lori Hermanson
IRP Generation Option Transmission Planning Studies	Dean Spratt
Distribution Planning and Microgrids	Damon Fisher

2025 IRP TAC 9 Introductions

John Lyons, Ph.D.
Technical Advisory Committee Meeting No. 9
June 18, 2024

Today's Agenda

Introductions, John Lyons

Loads & Resources Discussion, Lori Hermanson

IRP Generation Option Transmission Planning Studies, Dean Spratt

Distribution Planning and Microgrids, Damon Fisher

Remaining 2025 Electric IRP TAC Schedule

- **Technical Modeling Workshop: June 25, 2024: 9:00 am to 12:00pm (PTZ)**
  - PRiSM Model Tour
  - ARAM Model Tour
  - New Resource Cost Model

- **TAC 10: July 16, 2024: 8:30 to 10:00 (PTZ)**
  - Preferred Resource Strategy Results
  - Washington Customer Benefit Indicator Impacts
  - Resiliency Metrics

- **TAC 11: July 30, 2024: 8:30 to 10:00 (PTZ)**
  - Preferred Resource Strategy Results
  - Portfolio Scenario Analysis
  - LOLP Study Results

- **TAC 12: August 13, 2024: 8:30 to 10:00 (PTZ)**
  - Preferred Resource Strategy Results (continued)
  - Portfolio Scenario Analysis (continued)
  - LOLP Study Results (continued)
  - QF Avoided Cost

Remaining 2025 Electric IRP TAC Schedule

- **September 2, 2024- Draft IRP Released to TAC.**

- **Virtual Public Meeting- Natural Gas & Electric IRP (September 2024)**
  - Recorded presentation
  - Daytime comment and question session (12pm to 1pm- PST)
  - Evening comment and question session (6pm to 7pm- PST)

2025 IRP Loads & Resources Discussion

Lori Hermanson, Senior Power Supply Analyst
Technical Advisory Committee Meeting No. 9
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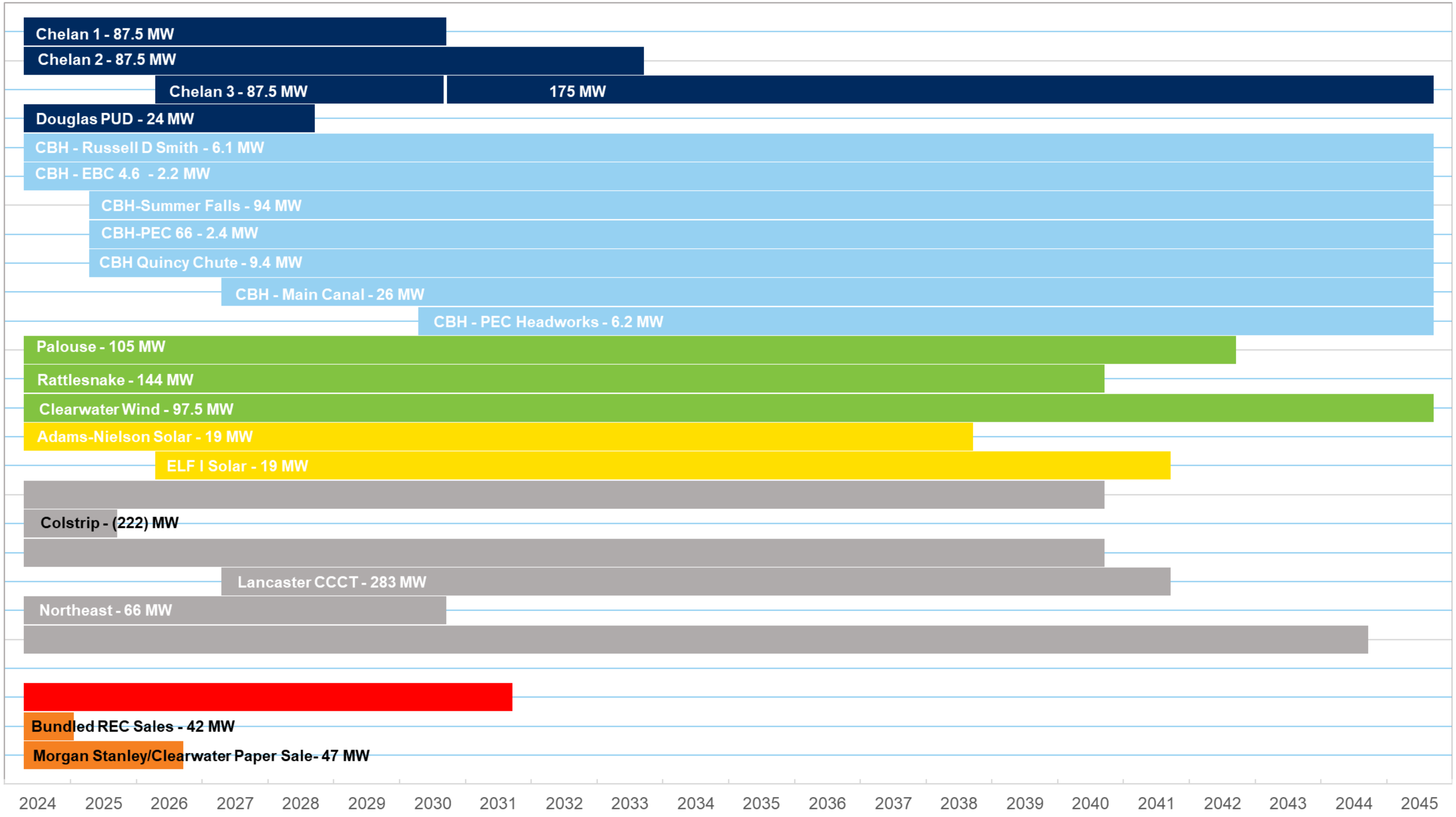
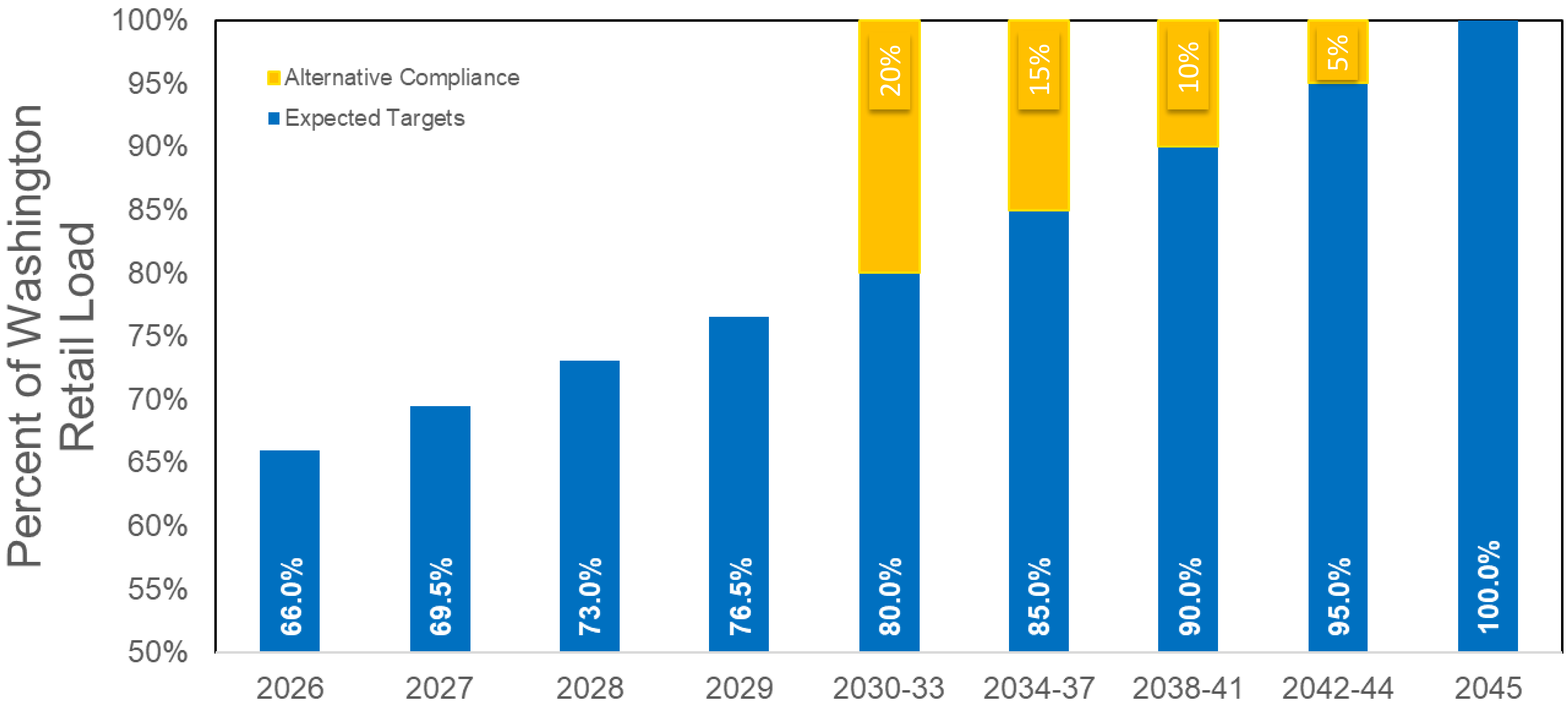
Portfolio Realignment



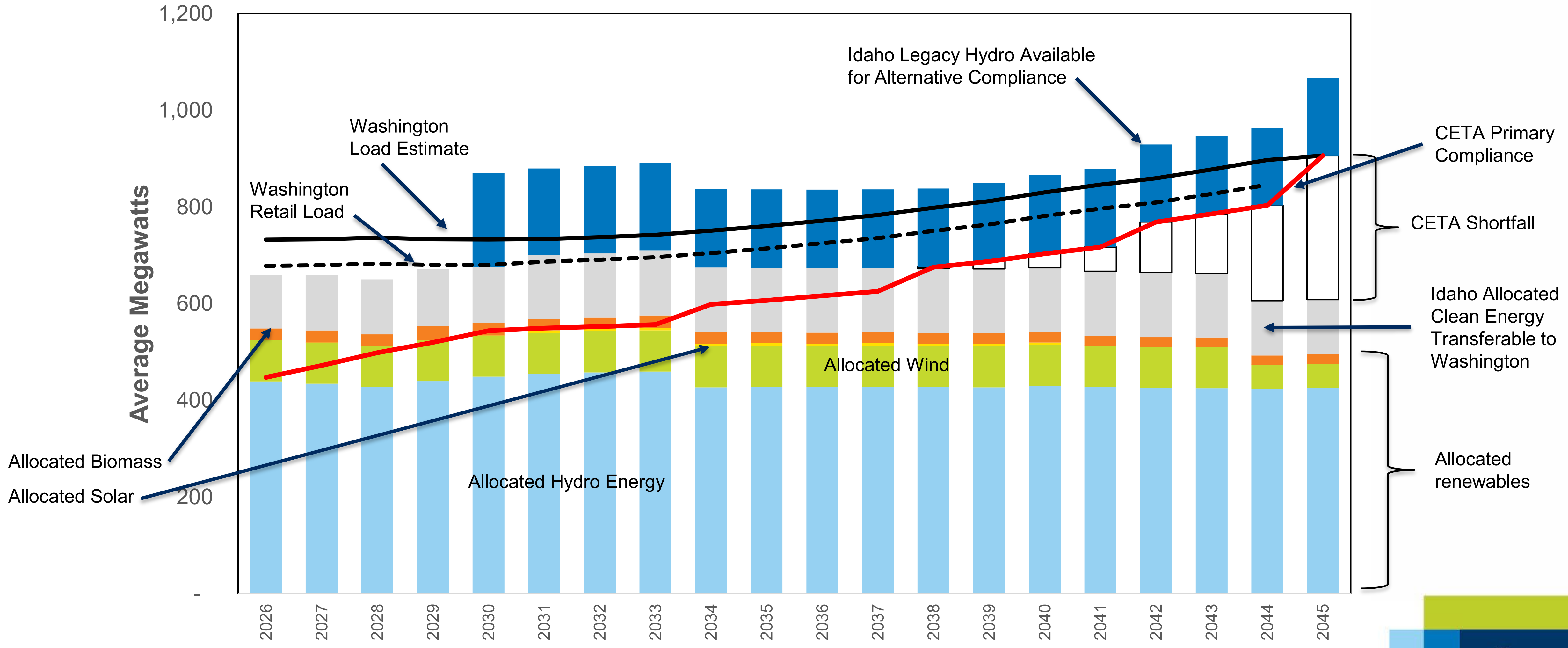
Monthly Net Energy Position

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2026	(25)	26	175	348	696	508	177	78	200	171	63	22	204
2027	(1)	54	209	381	750	553	226	133	254	215	94	57	244
2028	(7)	96	209	374	743	551	219	126	255	219	98	51	245
2029	9	87	234	401	760	563	221	122	258	227	106	67	255
2030	13	86	234	394	754	561	217	121	254	227	105	69	253
2031	16	97	245	398	768	579	231	125	264	229	108	72	261
2032	21	142	251	405	769	580	223	122	257	227	102	72	264
2033	14	103	252	399	765	571	214	112	253	226	105	71	258
2034	(44)	64	205	344	696	509	161	60	210	184	44	12	204
2035	(65)	54	195	337	690	500	148	45	195	167	32	5	192
2036	(76)	88	186	326	677	484	133	33	182	154	11	(17)	182
2037	(91)	37	170	307	665	473	119	16	170	146	(5)	(32)	165
2038	(110)	18	148	290	639	439	73	(16)	148	124	(23)	(57)	140
2039	(129)	6	138	272	622	419	52	(35)	138	110	(37)	(71)	124
2040	(131)	29	126	260	612	387	29	(57)	120	93	(46)	(105)	110
2041	(246)	(134)	20	148	510	272	(108)	(179)	9	(16)	(160)	(214)	(8)
2042	(525)	(402)	(244)	(34)	323	82	(372)	(433)	(248)	(271)	(415)	(489)	(252)
2043	(585)	(462)	(313)	(103)	272	29	(426)	(485)	(298)	(328)	(485)	(562)	(312)
2044	(617)	(445)	(339)	(132)	249	2	(464)	(516)	(321)	(347)	(510)	(594)	(336)
2045	(798)	(664)	(510)	(246)	151	(93)	(612)	(666)	(473)	(505)	(677)	(764)	(488)

Proposed CETA's Clean Energy Goals



Washington Clean Energy Position



Capacity L&R Discussion Issues

- **Avista is not settled on capacity planning assumptions**
- **LOLP studies indicate a need for increased planning margin or higher market reliance.**
  - Current market reliance limit is 330 MW in “constrained” hours
  - Avista’s main challenge is energy limited capacity resources
- **Other capacity planning issues under consideration**
  - Maintenance planning
    - Historically maintenance is not included in L&R planning due to uncertainty on timing and number of units out year to year
    - Should we plan for a minimum maintenance assumption?
  - 3rd Parties in our control area
    - Should we plan for 3rd party load and transmission schedules who under schedule during peak events?
  - Should we use an alternative capacity planning methodology
    - For example, low water, low VER, and high load event

Integrated Resource Plan (IRP) Transmission Planning Studies

Dean Spratt, Transmission Planning

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FERC Standards of Conduct

Summary of requirements

- Non-public transmission information can not be shared with Avista Merchant Function employees.
- There are Avista Merchant Function employees attending today.
- We will not be sharing any non-public transmission information. Avista’s OASIS is where this information is made public.

Agenda

- Introduction to Avista System Planning
  - Useful information about Transmission Planning
  - Overview of recent Avista projects
- Generation Interconnection Study Process
  - Integrated Resource Plan (IRP) Requests
  - Large Generation Interconnection Queue
  - Third year into the Cluster Study Process

Introduction to Avista System Planning

Avista's System Planning Group includes:

- Distribution Planning
- Transmission Planning
  - Focus on reliable electric service
    - Federal, regional, state, and local compliance
    - Regional system coordination
  - Provide transmission service and system analysis
    - Planning for load growth and a changing generation mix as well as dispatch
    - Interconnection of any type of generation or load
      - We are ambivalent about type (must perform though)

Information About Transmission Planning

- Our focus is the Bulk Electric System (BES)
  - Avista's 115 kV and 230 kV facilities (>100 kV)
- We identify issues where Avista's BES won't reliably deliver power to our customers
- Then we develop plans to fix it
  - "Corrective Action Plans"
  - Mandated and described in NERC TPL-001-4
- We live in the world of NERC Mandatory Standards
  - Energy Policy Act of 2005

NERC Standard TPL-001-5

- Describes outage conditions we must study
  - P0: everything online and available
  - P1: single facility outages, like a transformer
  - P2, P4, P5 & P7: multiple facility outages
  - P3 & P6: overlapping combination of two facilities

Table 1 – Steady State & Stability Performance Planning Events

Steady State & Stability:

a. The System shall remain stable. Cascading and uncontrolled islanding shall not occur.

b. Consequential Load Loss as well as generation loss is acceptable as a consequence of any event excluding P0.

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Steady State (

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Stability Only

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Category	Initial Condition	Event [1]	Fault Type [2]	BES Level [3]	Interruption of Firm Transmission Service Allowed [4]	Non-Consequential Load Loss Allowed
P0 No Contingency	Normal System	None	N/A	EHV, HV	No	No
P1 Single Contingency	Normal S					
P2 Single Contingency	Normal S					

Category	Initial Condition	Event [1]	Fault Type [2]	BES Level [3]	Inte...	
P3 Multiple Contingency	Loss of generator unit followed by System adjustments[9]	Loss of one of the following: 1. Generator 2. Transmission Circuit 3. Transformer[5] 4. Shunt Device[6]	3Ø	EHV, HV		
		5. Single pole of a DC line	SLG			
P4 Multiple Contingency *(Fault plus stuck breaker[10])*	Normal System	Loss of multiple elements caused by a stuck breaker[10](non-Bus-tie Breaker) attempting to clear a Fault on one of the following: 1. Generator 2. Transmission Circuit 3. Transformer[5] 4. Shunt Device[6] 5. Bus Section	SLG	EHV		
				HV	Yes	Yes
		6. Loss of multiple elements caused by a stuck breaker[10] (Bus-tie Breaker) attempting to clear a Fault on the associated bus	SLG	EHV, HV	Yes	Yes

Category	Initial Condition	Event [1]	Fault Type [2]	BES Level [3]	Interruption of Firm Transmission Service Allowed [4]	Non-Consequential Load Loss Allowed
P5 Multiple Contingency *(Fault plus non-redundant component of a Protection System failure to operate)*	Normal System	Delayed Fault Clearing due to the failure of a non-redundant component of a Protection System[13] protecting the Faulted element to operate as designed, for one of the following: 1. Generator 2. Transmission Circuit 3. Transformer[5] 4. Shunt Device[6] 5. Bus Section	SLG	EHV	No[9]	No
				HV	Yes	Yes
P6 Multiple Continge *(Two overlapp singles)*	Loss of one of the	Loss of one of the following:				

Category	Initial Condition	Event [1]	Fault Type [2]	BES Level [3]	Interruption of Firm Transmission Service Allowed [4]	Non-Consequential Load Loss Allowed
P7 Multiple Contingency *(Common Structure)*	Normal System	The loss of: 1. Any two adjacent (vertically or horizontally) circuits on common structure [11] 2. Loss of a bipolar DC line	SLG	EHV, HV	Yes	Yes

TPL-001-5, cont.

- A couple of NERC directives for the above faults
  - "The System shall remain stable"
    - Cascading and uncontrolled islanding shall not occur
  - "Applicable Facility Ratings shall not be exceeded"
    - Equipment ratings, voltage, fault duty, etc.
  - "An objective of the planning process is to minimize the likelihood and magnitude of Non-Consequential Load Loss following planning events"

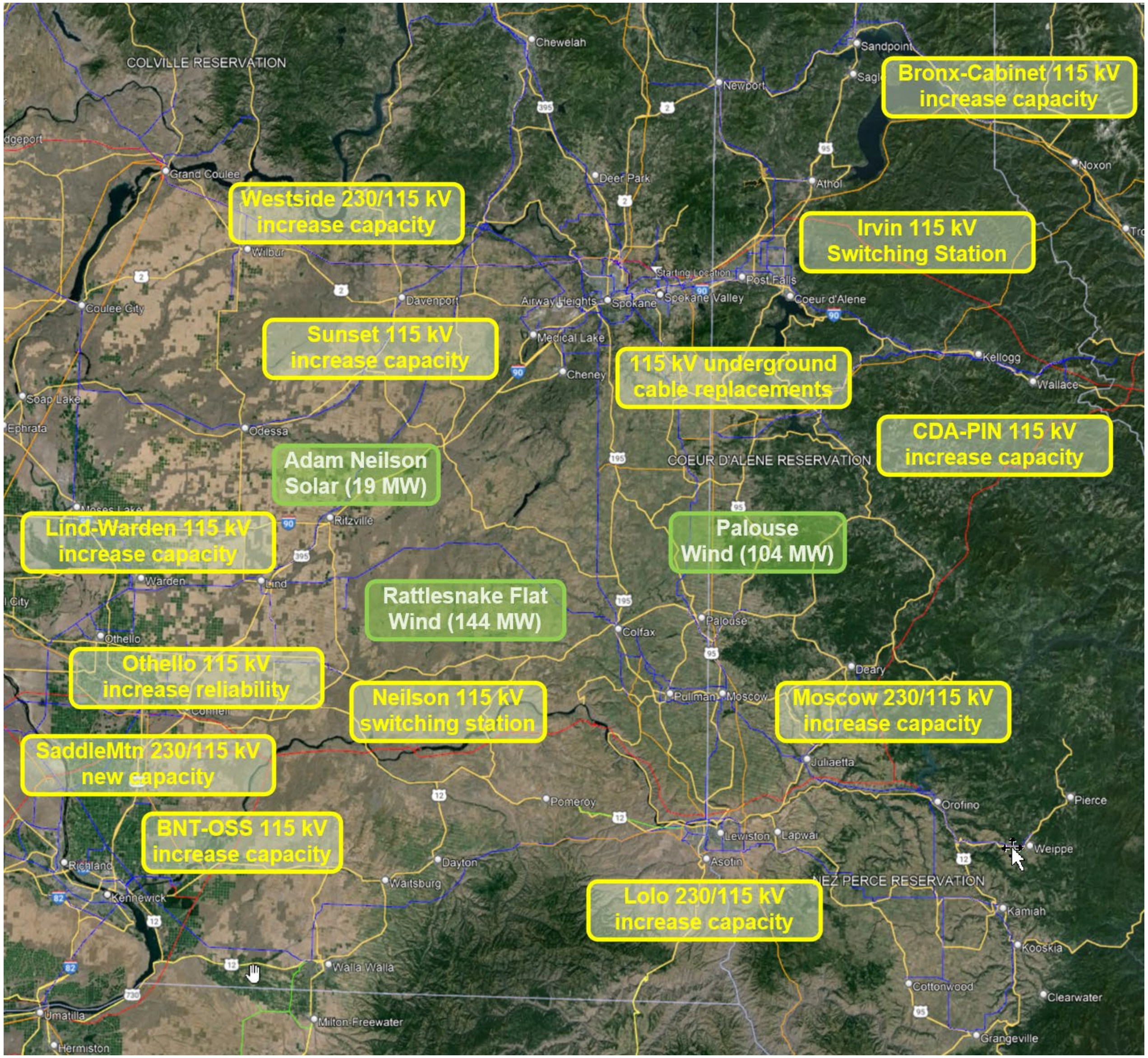
Two Approaches to Reliability Issues

- Transmission Operations (TO) are guided by *significantly* different standards than Transmission Planning (TP)
- TO standards provide *flexibility* that TP standards do not allow
  - Operators can push system limits to ***SAVE*** the interconnected system
    - Shed load, overload equipment, etc. – all short term
    - The planned system should give them the tools to do this
    - The standards continue to define this balance

Standards are a Roadmap

- Western Systems Coordinating Council (WSCC)
  - Ensure that disturbances in one system do not spread to other systems.
    - Operating agreement with 40 electric power systems established in 1967
- Western Electricity Coordinating Council (WECC)
  - Responsible for coordinating and promoting electric system reliability established in 2002
- North American Electric Reliability Council (NERC)
  - Ensure the reliability of the North American bulk power system reformed in 2006; Corporation in 2007
    - Established as a voluntary organization in 1968

Recent Transmission Projects



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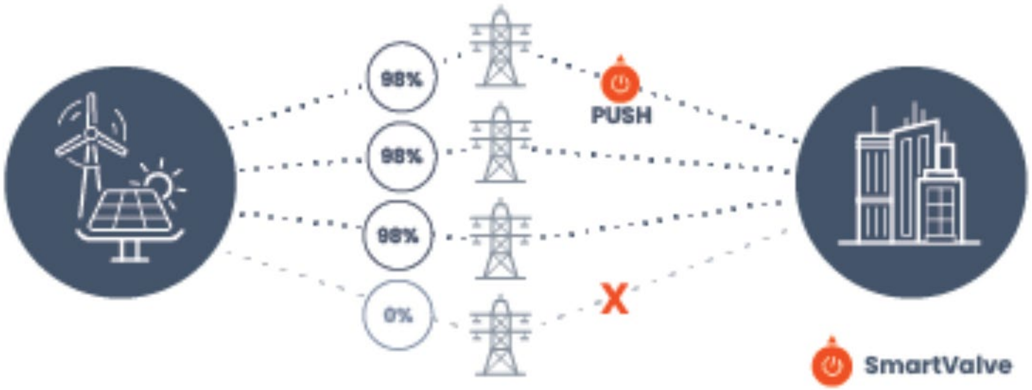
Non-Wire Alternatives are Considered

- We are documenting this with more clarity
- Non-wire options require robust wires to perform
  - Avista is working on the transmission fundamentals



Evaluated Batteries for T-1-1

- TPL-001-5 ~ T-1-1 for long lead equipment
  - Double transformer outages
    - Shawnee 230/115 kV outage followed by a concurrent outage of Moscow 230/115 kV transformer.
  - Could we mitigate performance issues with storage?
    - Yes…but… We would need a 125 MW battery
      - Typical charge is 8 hours, discharge for 12 to 16 hours
      - Transformer outage is weeks to months
    - A third transformer is a better solution
      - Robust performance and much less $$$$

Requisitions: Requisitions >

Requisition 162964

Description: **M08 - Westide 250/280MVA, 230-115-13.8kV, three phase auto transformer.**
Created By: **Wilson, Barnes Scott (Scott)**
Creation Date: **12/06/2017 12:49:35**
Deliver-To: **One Time Ship To**
Justification: **This is the second transformer associated with the Westside Substation rebuild.**

Status: Approved
Change History: **No**
Urgent Requisition: **No**
Attachment: View
Note to Buyer: **Quote attached. Bid evaluation sheet pre Shelly Campbell.**

Details

Line	Description	Need-By	Deliver-To	Unit	Quantity	Qty Delivered	Qty Cancelled	Open Quantity	Price	Amount (USD)
1	250/280MVA, 230-115-13.8kV, three phase auto transformer.	10/03/2018 12:51:34	One Time Ship To	Each	1	1	0	0	2397826 USD	2,397,826.00
2	SFRA Testing at factory and field	10/03/2018 12:51:34	One Time Ship To	Each	1	1	0	0	5400 USD	5,400.00
									Total	2,403,226.00

Generation Interconnection Study Process

Process for Generation Requests

- Two sources:
  - External developers
    - Enter via the OATT
  - Internal IRP requests
    - Feasibility Study…then OATT
      - AVA Merchant MUST follow the OATT just like external parties
- Typical process:
  - Hold a scoping meeting to discuss particulars
  - Outline a study plan
  - Augment WECC approved cases for our studies
  - Analyze the system against the standards
  - Publish findings and recommendations

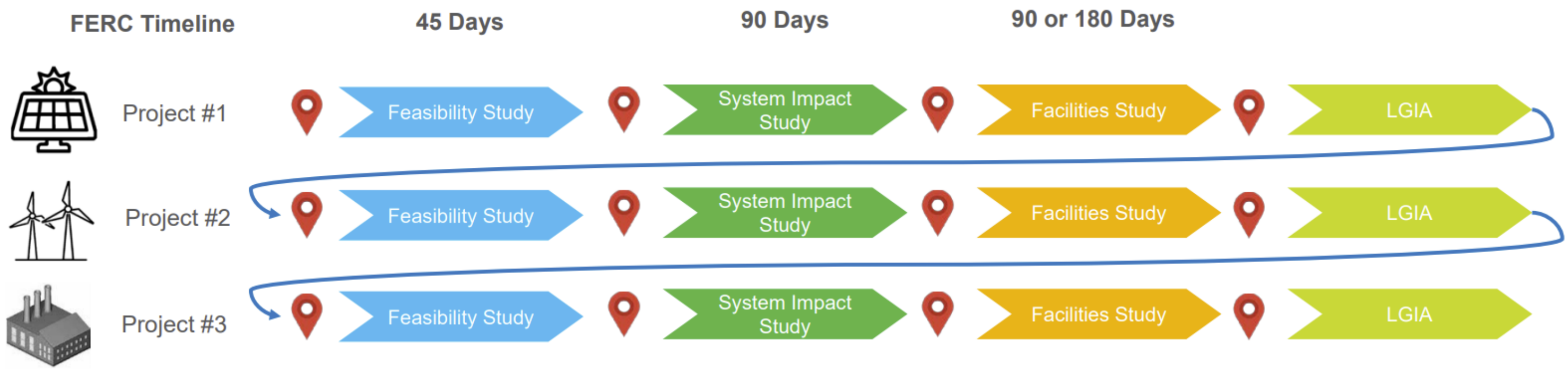
Transition to Cluster Study Process

Challenges with Serial Interconnections

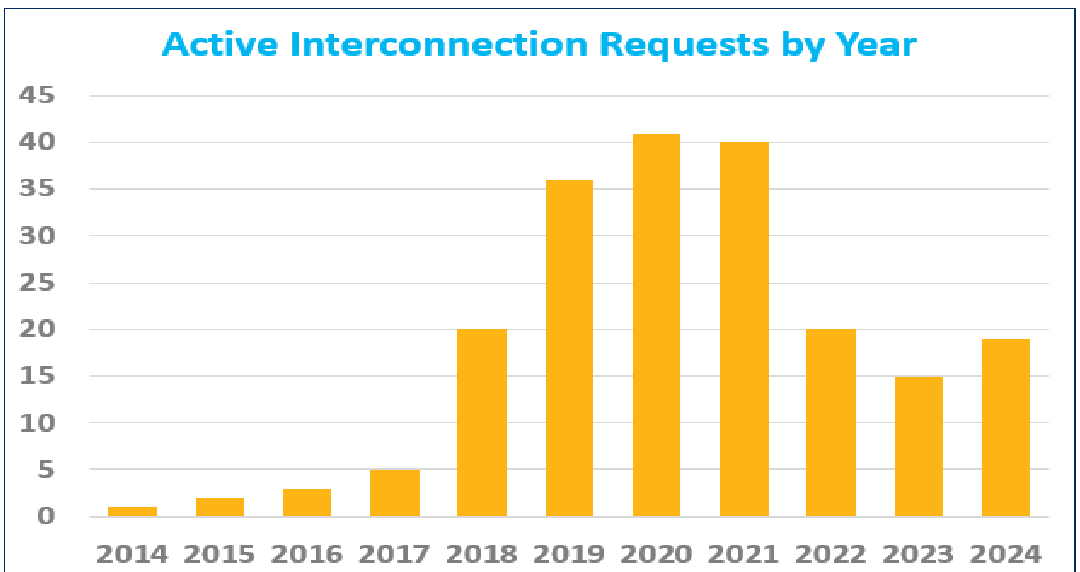
- Large serial queues become difficult to process efficiently
- Interdependency of projects becomes complicated
  - Studying single projects is inefficient compared to studying projects in a group
  - Projects that do not reach commercial operation may cause re-studies
  - System Upgrade allocation
- The serial process is difficult for the developers and the utility

Transition to Cluster Study process in 2022

Serial Process was Complex and Slow



Interconnection Requests necessitated a better Process



Two-Phase Cluster Study Process

Benefits and Objectives

- Create a more efficient process
- Design a process with definitive timelines that can be consistently met
- Allocate System Upgrades proportionally
- Ensure commercially viable projects have a clear path for development
- Alleviate the backlog in the queue

Current Interconnection Queue

Serial or Cluster Number	Point of Interconnection	Max MW Output	Type	County	State
Q59	Roxboro 115kV	60.0	Solar/Storage	Adams	WA
Q60	Dry Creek 230kV	150.0	Solar/Storage	Asotin	WA
Q63	Post Falls 115kV	26.0	Hydro	Kootenai	ID
Q66	Kettle Falls 115kV	71.0	Wood Waste	Stevens	WA
Q97	Lolo 230kV	100.0	Solar/Storage	Nez Perce	ID
TCS-03	Warden 115kV	80.0	Solar/Storage	Adams	WA
TCS-14	Dry Creek 230kV	375.0	Wind/Storage	Garfield	WA
CS23-06	Shawnee - Thornton 230kV	255.9	Wind	Whitman	WA
CS23-12	AVAHub-04 230kV	199.0	Storage	Franklin	WA
CS23-13	Davenport 115kV	40.0	Solar	Lincoln	WA
CS23-14	North Fairchild Tap 115kV	40.0	Solar	Spokane	WA
CS24-01	South Othello 13kV	1.1	Solar	Adams	WA
CS24-02	Third & Hatch 13kV	0.5	Storage	Spokane	WA
CS24-03	Saddle Mountain 115kV	150.0	Storage	Adams	WA
CS24-04	Benewah 230kV	100.0	Storage	Spokane	WA
CS24-05	Rathdrum 230/115kV	203.0	Natural Gas CT	Kootenai	ID
CS24-06	Bronx 115kV	120.0	Natural Gas CT	Bonner	ID
CS24-07	Othello 13kV	2.0	Solar	Adams	WA
CS24-08	AVAHub-04 230kV	199.0	Solar/Storage	Franklin	WA
CS24-09	Othello 13kV	9.5	Solar	Adams	WA
CS24-10	Spangle 115kV	80.0	Solar/Storage	Spokane	WA
CS24-11	Thornton 230kV	70.0	Solar	Whitman	WA
CS24-12	Shawnee - Sunset 115kV	40.0	Solar	Whitman	WA
CS24-13	Benewah - Thornton 230kV	95.0	Solar	Whitman	WA
CS24-14	South Fairchild Tap 115kV	40.0	Solar	Spokane	WA
CS24-15	Bluebird 230kV	300.0	Wind/Storage	Lincoln	WA

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Generation Integration Cost Estimates

Generation Integration at New sites

POI Station or Area	Requested (MW)	POI Voltage	Cost Estimate ($ million)
Big Bend area near Lind (Tokio)	100/200	230kV	127.8
Big Bend area near Odessa	100/200/300	230kV	170.5
Big Bend area near Othello	100/200	230kV	216.8
Big Bend area near Othello	300	230kV	258.7
Big Bend area near Reardan	50	115kV	9.7
Big Bend area near Reardan	100	115kV	12.8
Lewiston/Clarkston area	100/200/300	230kV	1.9
Lower Granite area	100/200/300	230kV	2.9
Palouse area, near Benewah (Tekoa)	100/200	230kV	2.4
Rathdrum Prairie, north Greensferry Rd	100	230kV	34.0
Rathdrum Prairie, north Greensferry Rd	200/300/400	230kV	51.9
Sandpoint Area	50/100/150	115kV	1.6
West Plains area north of Airway Heights	100/200/300	230kV	2.4

Preliminary estimates are given as -25% to +75%

Cost Estimates, continued

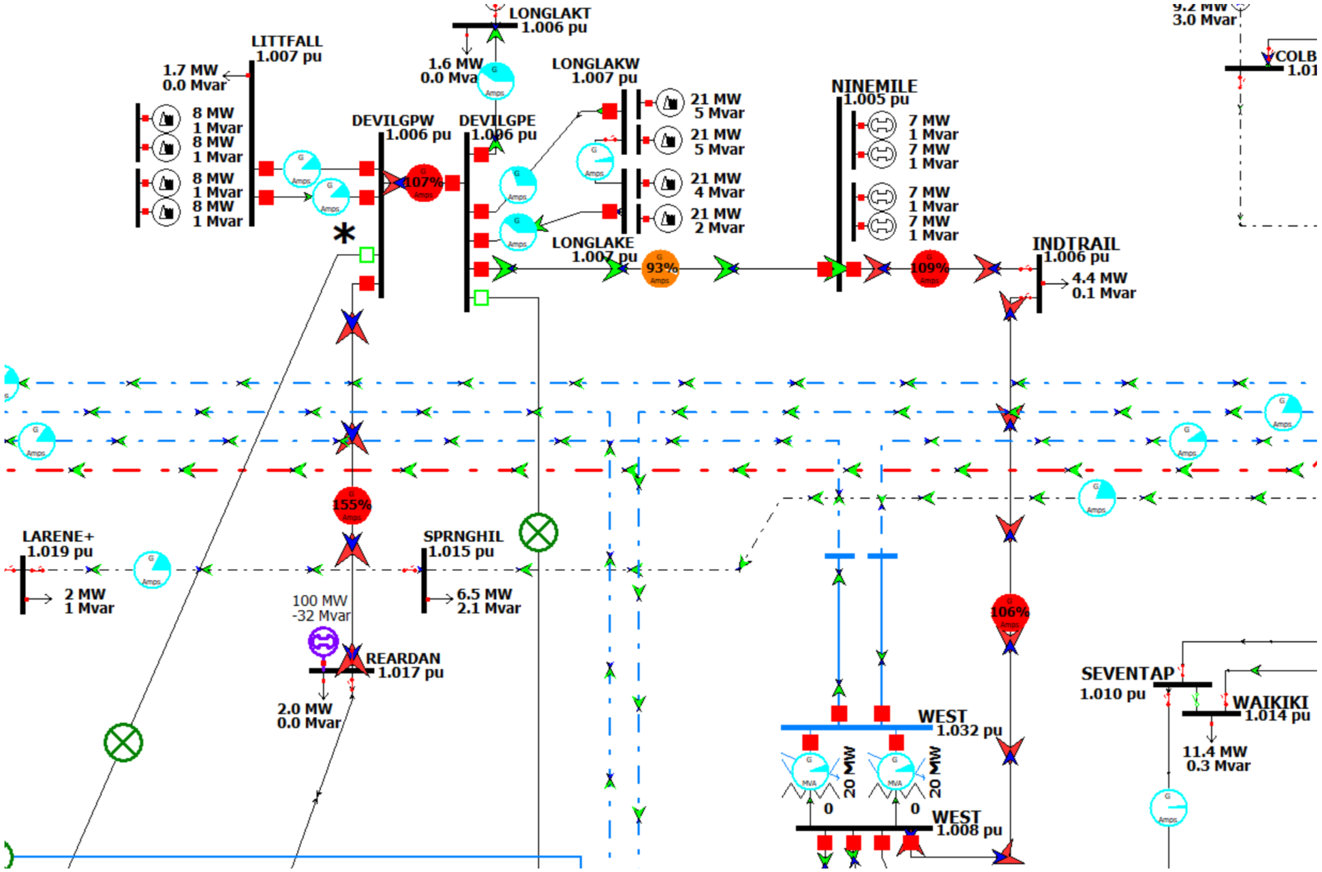
Increase in Capacity or Additional Generating Facilities at existing generation sites

POI Station or Area	Requested (MW)	POI Voltage	Cost Estimate ($ million)
Kettle Falls Station	50	115kV	1.6
Kettle Falls Station	100	115kV	19.0
Northeast Station	50	115kV	1.6
Northeast Station	100	115kV	7.7
Palouse Wind, at Thornton Station	100/200	230kV	1.4
Rathdrum Station	25/50	115kV	11.1
Rathdrum Station	100	230kV	15.9
Rathdrum Station	200	230kV	40.5

Preliminary estimates are given as -25% to +75%

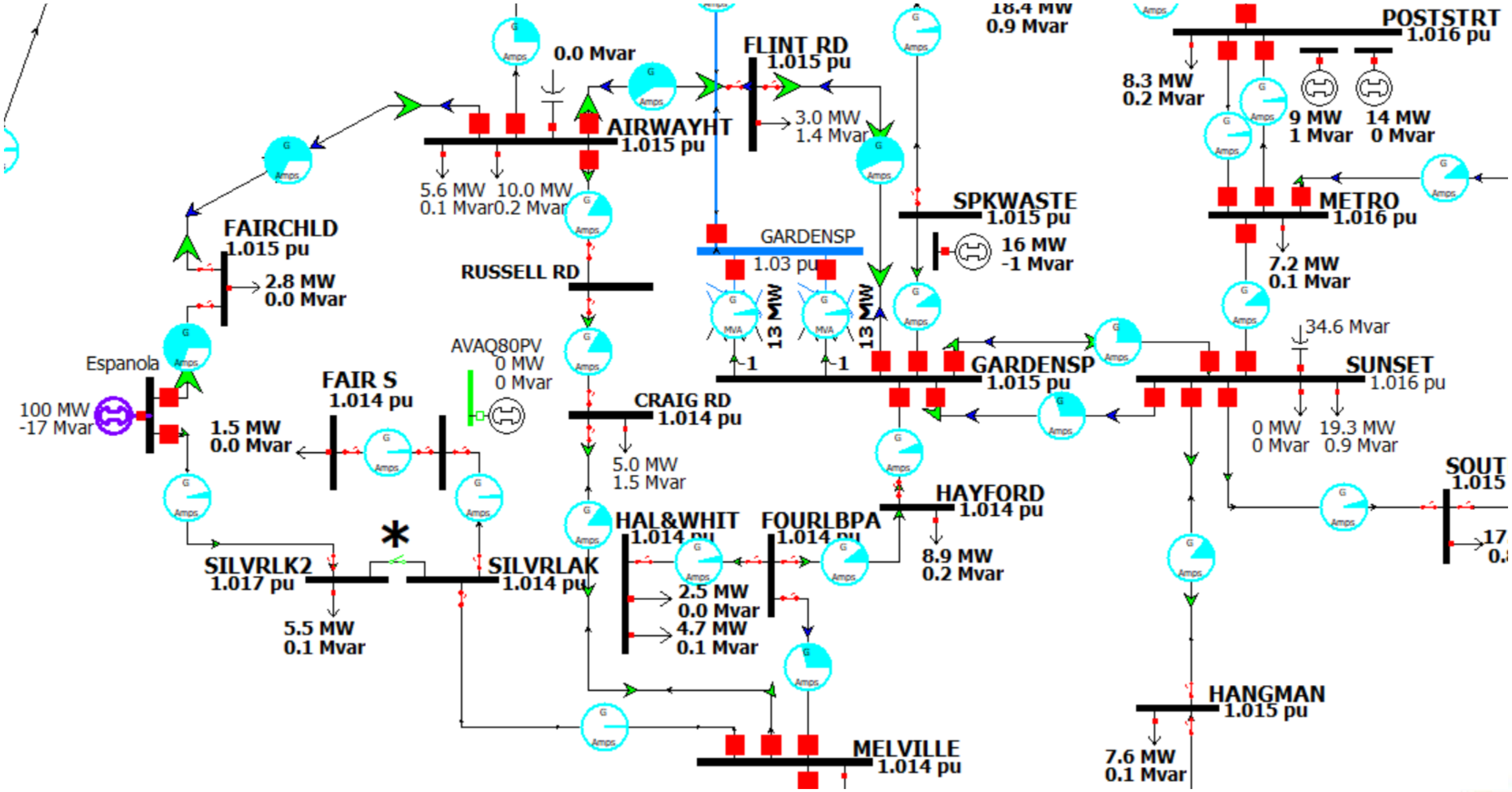
Reardan: 100 MW

Choice of interconnection point may result in extensive system reinforcements



Espanola: 100 MW

Optimizing the interconnection point is a key benefit of the Cluster Study process



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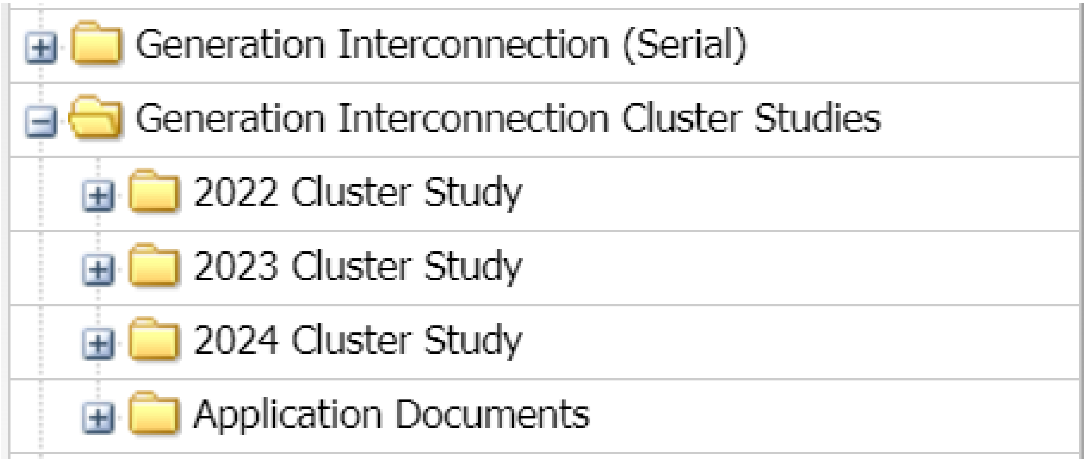
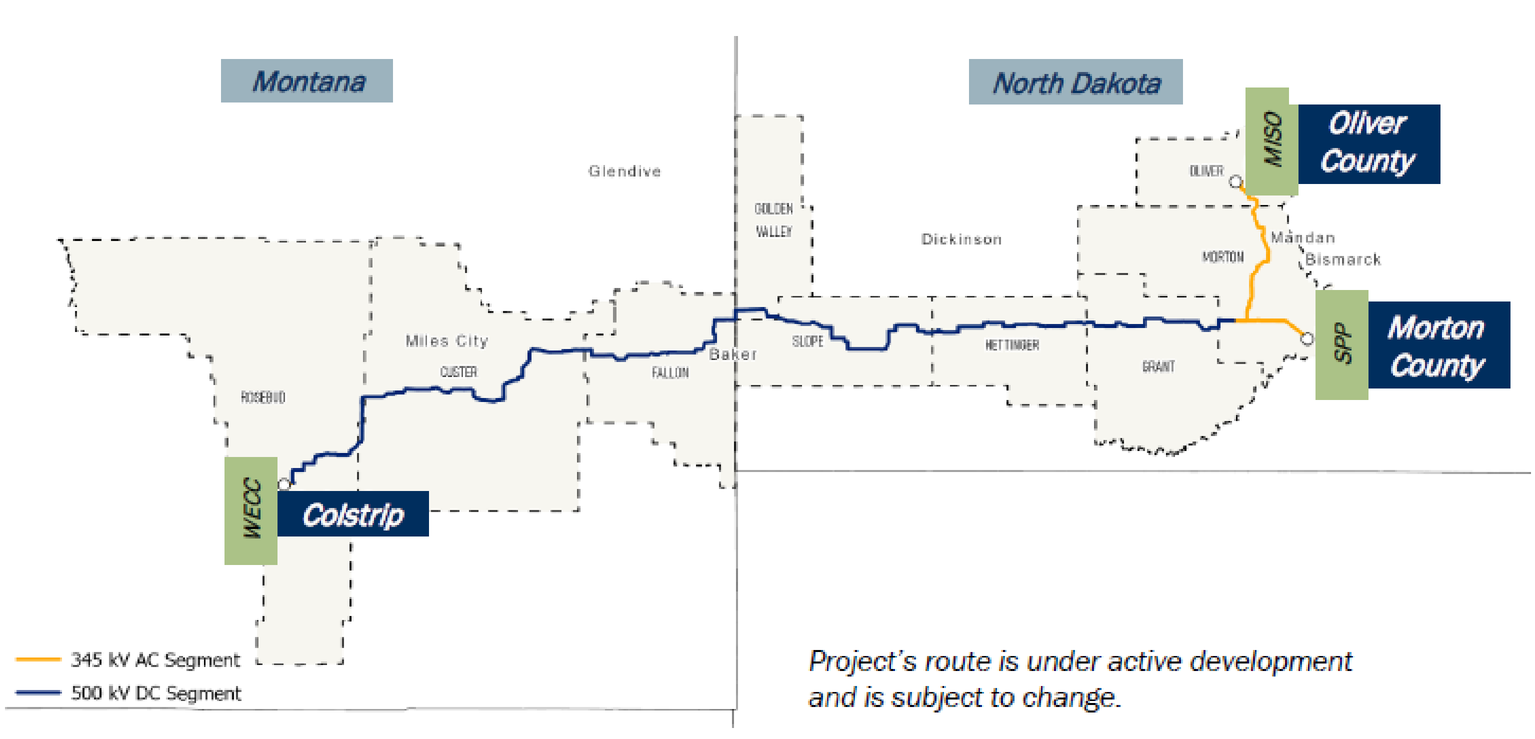
Questions?

Refer to Avista's Open Access Same-time Information System (OASIS) link for information regarding System Planning and the Interconnection Process at:

http://www.oasis.oati.com/avat/index.html



North Plains Connector



- 2025 IRP will model this transmission expansion as a capacity market resource up to 300 MW.
- QCC will be limited to the difference between line rating and Montana Wind QCC.
- Project can be selected beginning in 2033 or any year thereafter.

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Distribution Planning and Microgrids

Damon Fisher, System Planning

Technical Advisory Committee Meeting No. 9

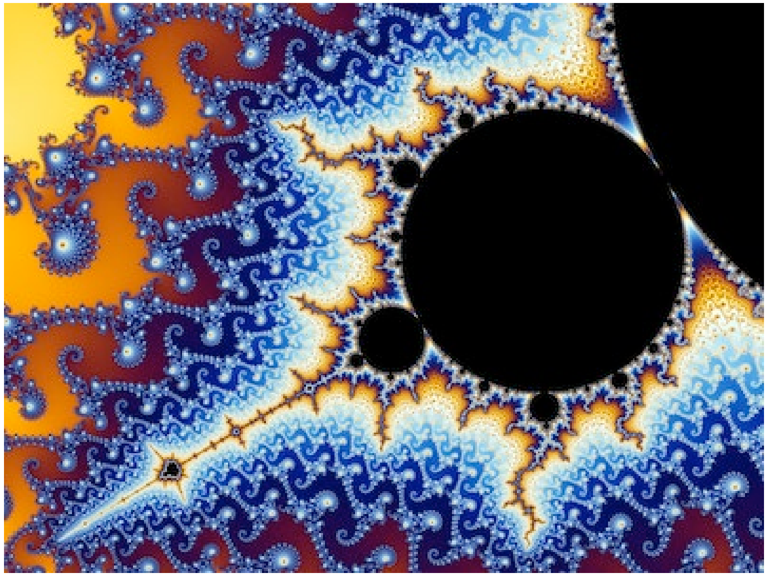
June 18, 2024

Goals of Electric Distribution Planning

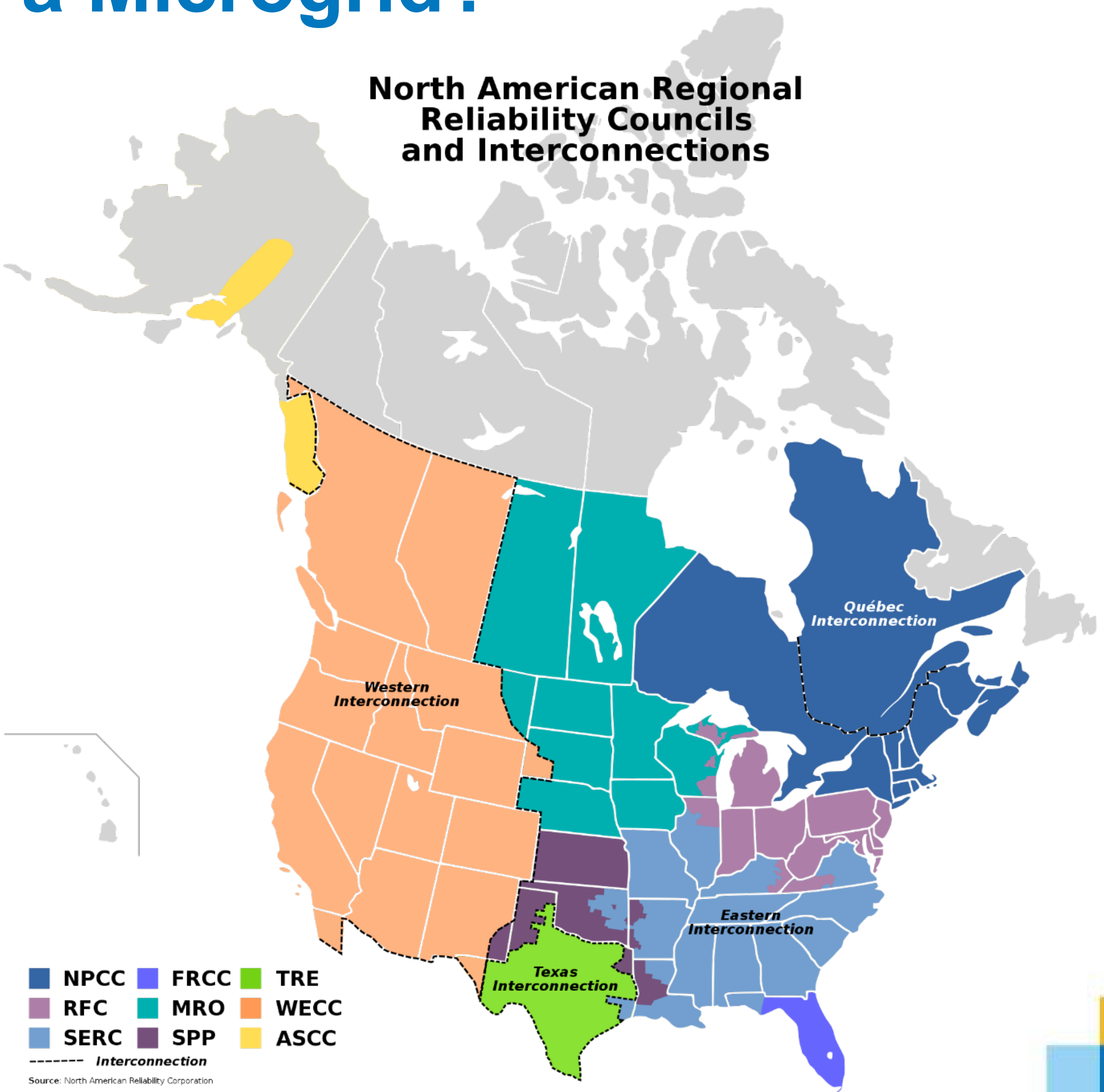
- Ensure electric distribution infrastructure to serve customers now and in the future with a focus on:
  - Safety
  - Reliability
  - Capacity
  - Efficiency
  - Level of service
  - Operational flexibility
  - Corporate/Regulatory goals
  - Affordability

What is a Microgrid?

- What is a microgrid?
  - Same as a “macro” grid but smaller (self similar)
  - Maintain Voltage and Frequency within limits
  - Respect Thermal Limits
  - Load = Generation
  - Protected equipment



What is a Microgrid?



What is a Microgrid?

- Major equipment-
  - Microgrid Controller and Communications
  - Generation (PV, Wind, Thermal, Fuel Cells… etc.)
  - Storage and/or dispatchable source
  - Grid disconnect switch
- Major functionality-
  - Black start capable
  - Island mode
  - Grid Synchronization
  - Managed Demand

Why a Microgrid?

Typically, one of four reasons or combination of them-

1. Resilience
   - Critical Load
   - Essential Service
2. Economic
   - Demand charges
   - Energy arbitrage
   - Other utility services
3. Climate goals
4. Difficulty serving load or getting service
   - Remote/isolated

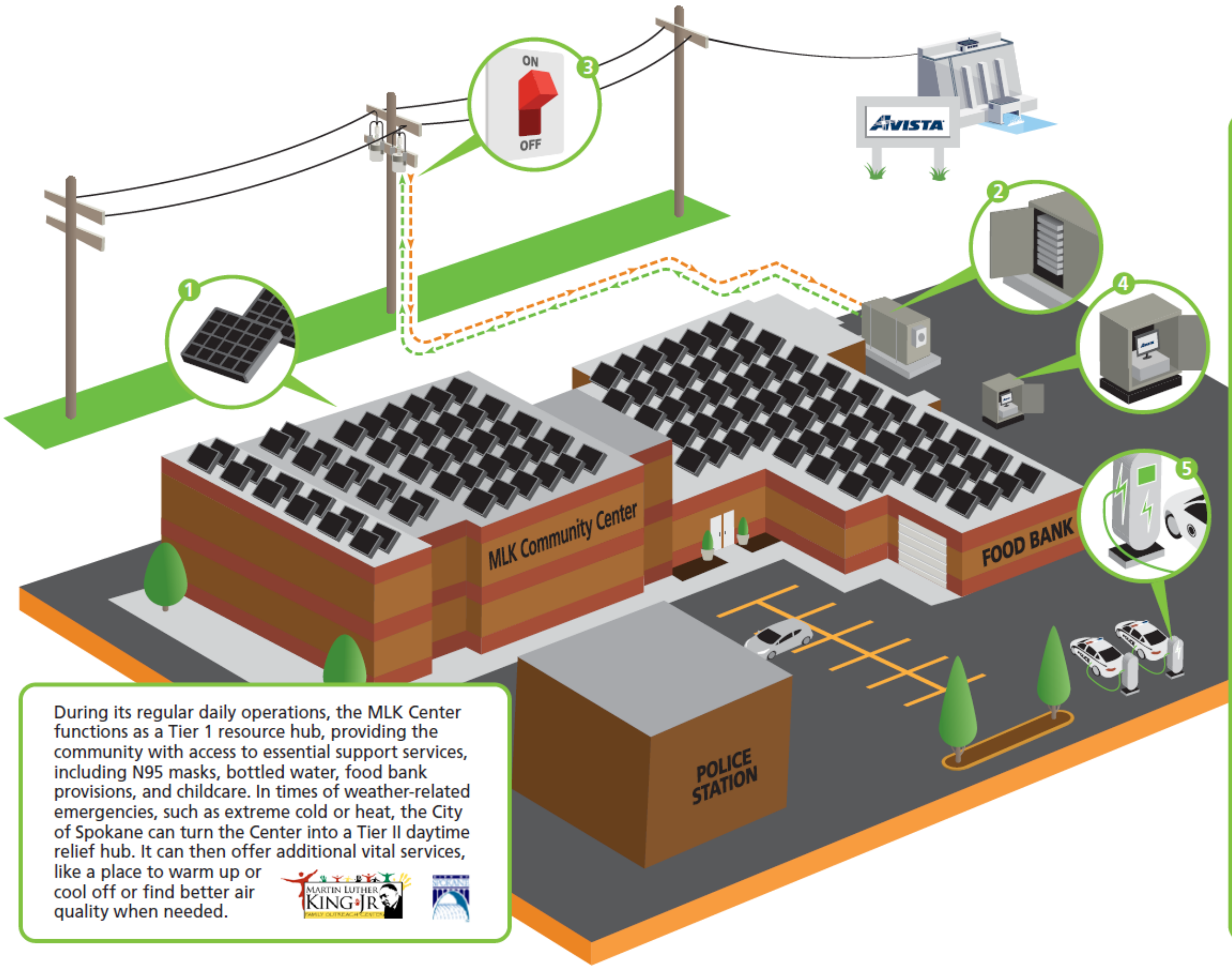
Microgrid as a resource

- A microgrid is a black box that the utility can ask for help. That help will usually be in the form of reduced demand or increased generation.
  - Depending on the goals of the microgrid and the current state of the system the microgrid controller may say-
    - I can't help
    - Sure, here you go
    - Sure, I am going into island mode
- The incentives/agreements between the microgrid owner and the utility will greatly influence the answer.

Avista and Microgrids

- Avista has a couple of microgrid projects.
  - WSU Spokane campus (demonstration/pilot)
    - Solar + Battery
  - MLK Center (Out for bid)
    - Solar (115-kW dc array) + Battery (500KW/1MWh) + Natural Gas Generator (150kW)
    - Approximate cost $2.5 million (grants and matching funds)

Avista and Microgrids



During its regular daily operations, the MLK Center functions as a Tier 1 resource hub, providing the community with access to essential support services, including N95 masks, bottled water, food bank provisions, and childcare. In times of weather-related emergencies, such as extreme cold or heat, the City of Spokane can turn the Center into a Tier II daytime relief hub. It can then offer additional vital services, like a place to warm up or cool off or find better air quality when needed.

MLK Resiliency Center

Operated by the MLK Community Center

1. **SOLAR PANELS:** Produce clean, renewable electricity to run the Center and charge the batteries when grid power is out.
2. **BATTERY STORAGE:** Powers essential operations during unexpected outages, enabling the Center to function as an emergency community hub. During a power or natural gas outage you can receive the following services and resources in your neighborhood:
   - Food bank refrigeration
   - Kitchen operations
   - Lighting
   - Showers
   - Heating & cooling
   - Outlets (for charging phones)

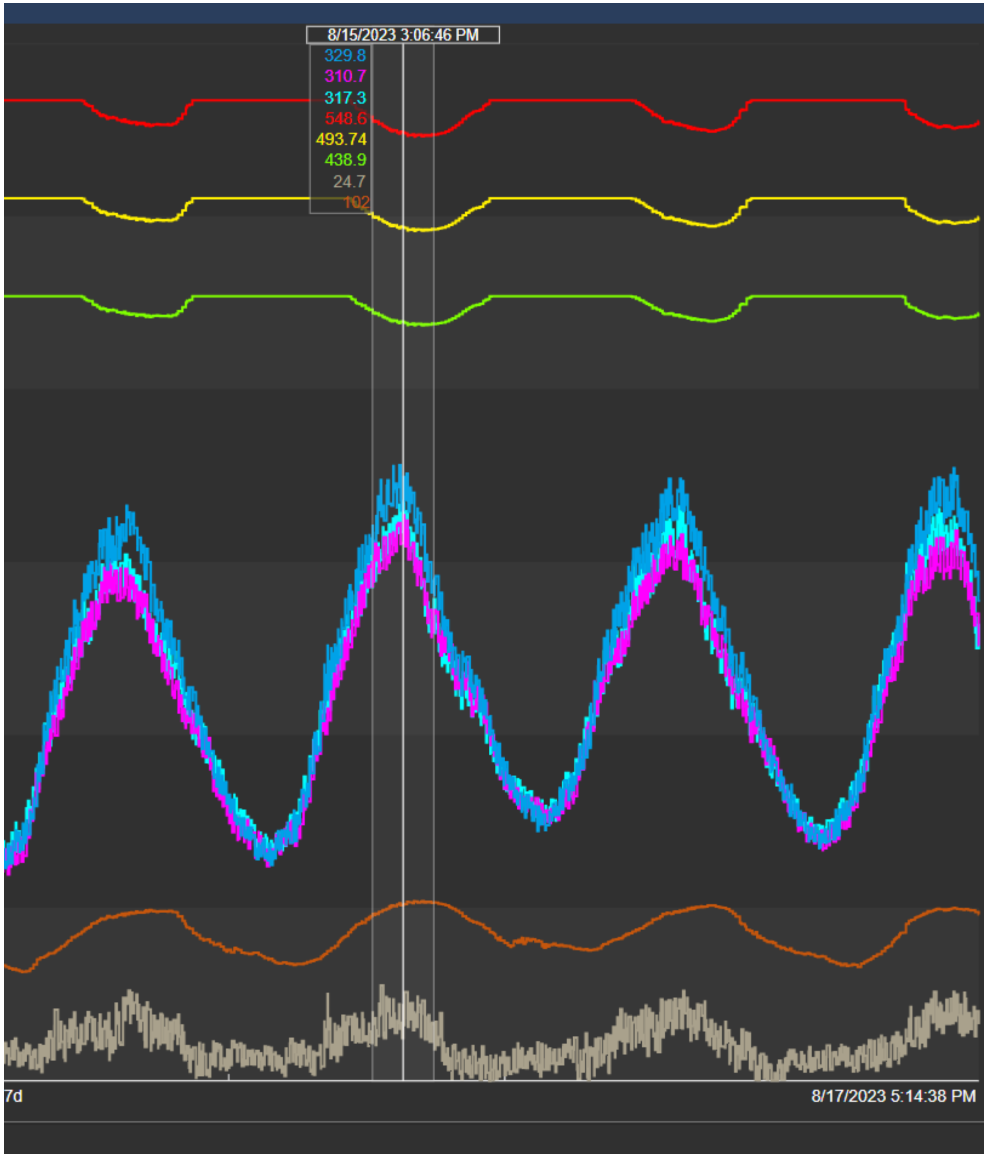
   Battery storage also lessens the strain on Avista's grid, boosting resilience.
3. **GRID INTERFACE SWITCH:** Disconnects the Center from Avista's grid when there is a power outage, allowing the microgrid batteries to sustain the center independently.
4. **MICROGRID CONTROLLER:** Manages the different modes and provides control/monitoring of the microgrid.
5. **EV CHARGERS:** Excess electricity can be utilized during an outage to power two electric police cars stationed at MLK.

Avista and Microgrids

How could it be a resource?

Feeder 3HT12F5

- Mitigate a grid constraint
    - Transformer
    - Feeder
- Mitigate a resource constraint



Advantages of Microgrids

1. Ride through grid outages for those served by the microgrid.
2. Control system optimizes resources on the microgrid for the desired goals.
3. Billing flexibility and autonomy.
4. Grid resource options.

Disadvantages of Microgrids

1. Initial costs can be high. Equipment is expensive and the systems are custom-made designs which are complex.
2. Extra costs for the ongoing maintenance and the local expertise to maintain it.
3. Regulatory, policy, and contractual complications.

Distribution Planning Advisory Group

- Avista's overarching Distribution Planning goals are:
  - Develop a transparent, robust, holistic planning process for electric system operations and investment
  - Create a long-term plan to ensure we are maximizing operational efficiency and customer value
- Distribution Planning Advisory Group (myavista.com)
- Next meeting Wednesday, July 24, 2024, 9:00 AM-10:50 AM

Questions?

AVISTA