

2013 Network Open Season Cluster Study

Cluster Study Results Customer Briefing

May 20, 2014



Topics for Discussion

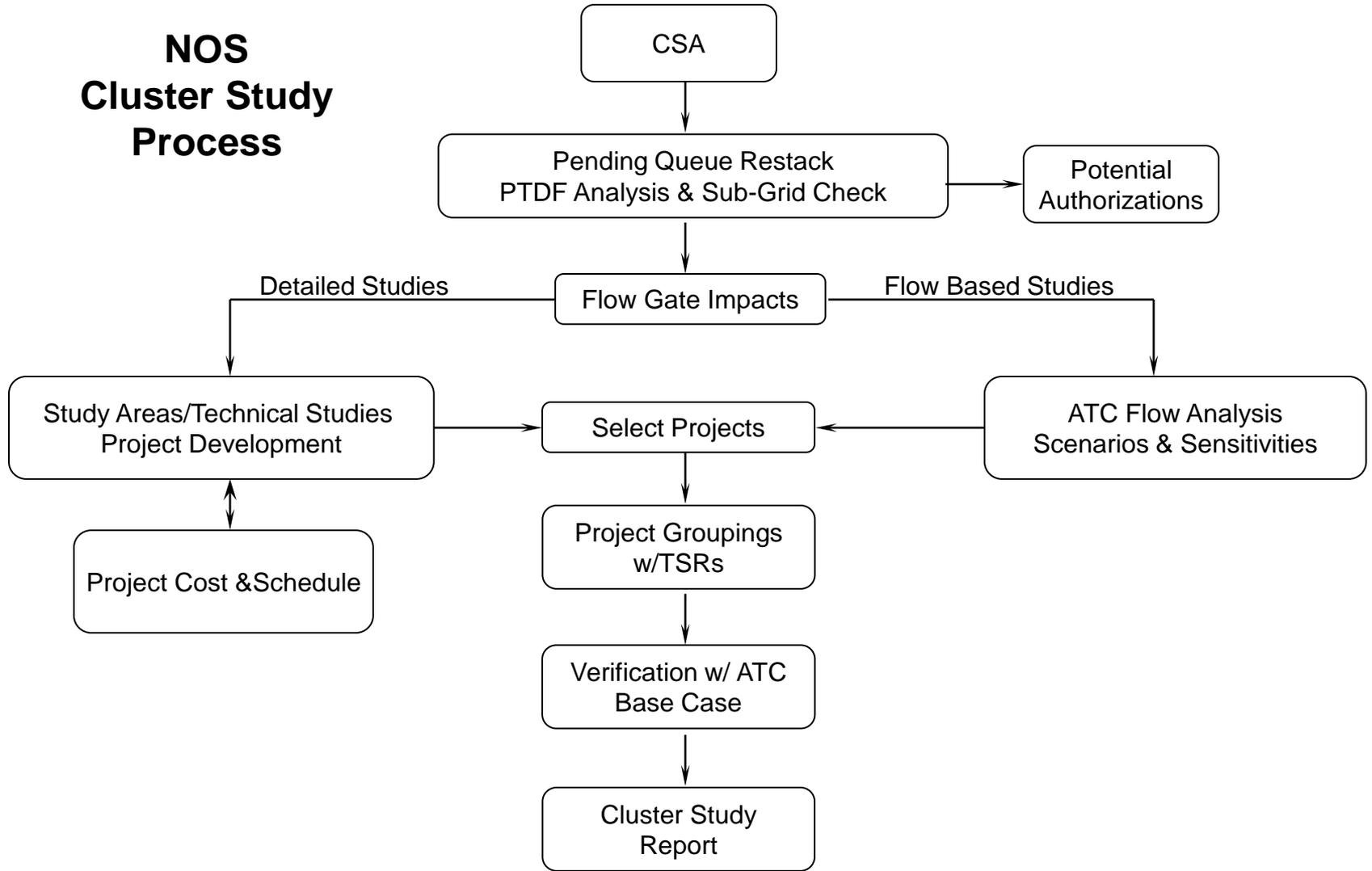
- Cluster Study TSR Overview
- Cluster Study Areas
- Assumptions and Methodology
- Discussion of Flow Based Results
- Cluster Study Areas – Final Plans of Service
- Cluster Study Extension – Issues Discussion and Resolution

TSR Overview

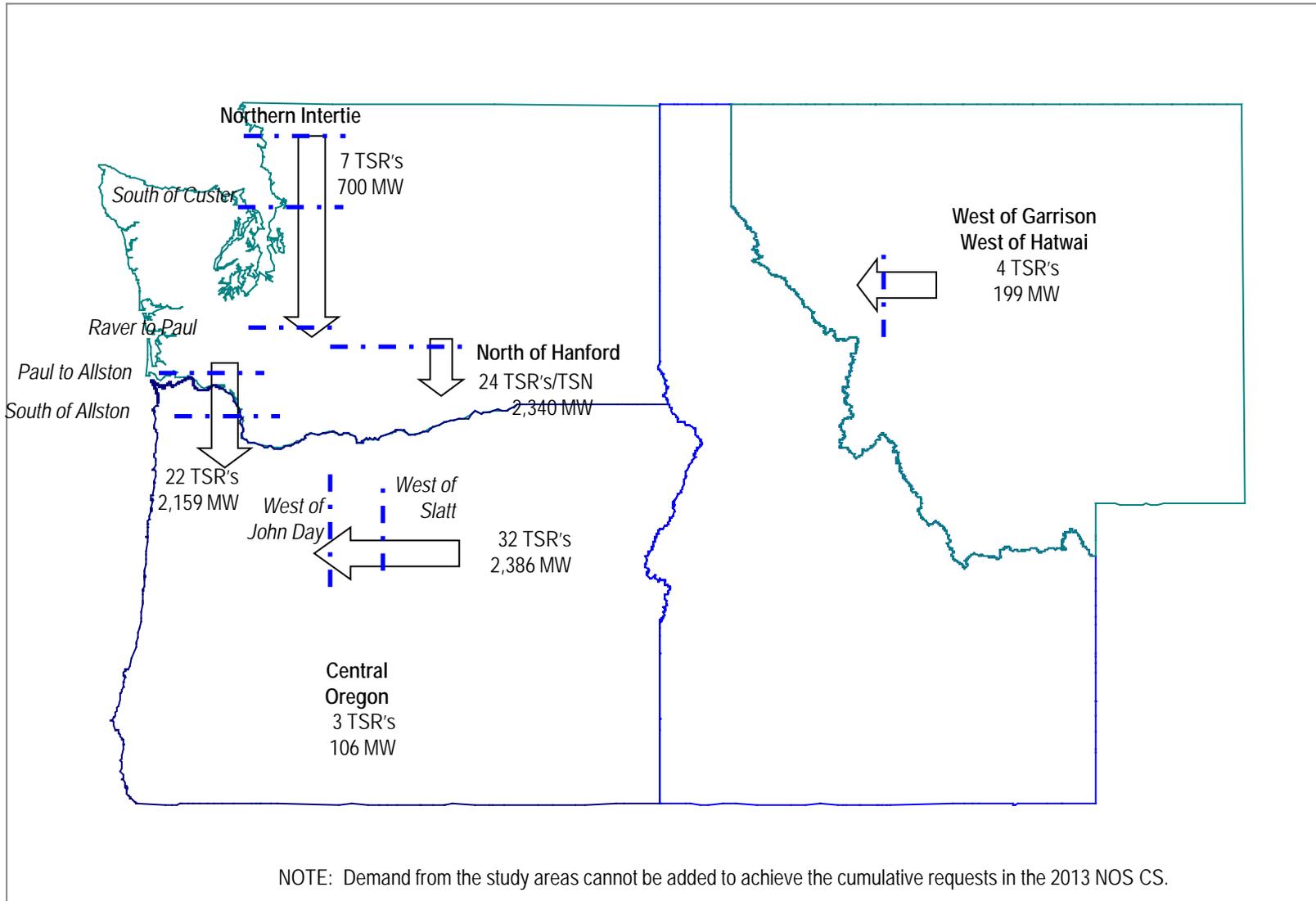
	MW Studied	# TSRs
Total	4,173	50
Point-to-Point Service	2,839	31
New Service	2,101	21
Redirected Existing Service	738	10
NT Service	834	19
SILS Asset Exchange	500	N/A

- 26 TSR's with an associated demand of 1,925 MW were not modeled in ATC powerflow basecases as generation was already on-line (NT, Mid-C, Redirect and Redundant TSRs).

NOS Cluster Study Process



Cluster Study Areas



Assumptions & Methodology

Item	2013 NOS
Basecase	Summer Case: WECC 18HS Winter Case: WECC 18HW
Load	Expected 1-in-2 peak
Hydro	-95th percentile dispatch -Mid-C remained at assumed contract level
Thermal	Based upon Thermal Merit Order Sequence -Thermal turned down to accommodate requests for service
Wind	Base scenario: All wind in Northwest set to 60% of contracted/requested demand Wind in Montana set to 100% of requested demand
COI/PDCI	4,800/3,220 Summer
Northern Intertie	Contracted demand in N>S direction for summer; Canadian Entitlement Return for Winter
Montana>NW; Idaho > NW	Set at agreed to levels from ATC Methodology

Assumptions & Methodology (cont'd)

Generation Scenarios

- **Base Scenario**
 - 95th Percentile FCRPS Hydro Gen., 60% Wind Generation in the NW, 100% of the Montana and Northern Intertie requests.
- **High Wind Scenario**
 - 95th Percentile FCRPS Hydro Gen., 100% Wind Generation in the NW.
- **No Wind Scenario**
 - FCRPS Hydro Gen. High Upper Columbia and Low Lower Columbia, No Wind Generation.

Additional Sensitivities

- **Sensitivity 1**
 - NW Load Growth.
- **Sensitivity 2**
 - Export from NW.
- **Sensitivity 3**
 - Reduced FCRPS.
- **Sensitivity 4a**
 - Boardman to Hemingway. Energize project
- **Sensitivity 4b**
 - Boardman to Hemingway. Energize project & increase schedules from Northwest to Idaho

Proposed Plan of Service

- Northern Intertie (Westside)/South of Custer
 - Upgrade Monroe-Novely 230kV to 80° C plus
 - Third party impact to Puget Sound Energy (PSE) transmission – Second Portal Way 230/115kV Transformer required plus additional fixes on PSE system. Final plan of service to be determined based upon discussion with PSE.
- North of Echo Lake
 - The 2013 NOS Cluster Study did not identify a need to reinforce the North of Echo Lake Flowgate beyond the capability provided under the PSAST reinforcements.
- Raver-Paul
 - PSE Woodland-Gravelly 115kV and reconfiguration at Gravelly Lake plus
 - Third Party impact requiring upgrade of PSE's Alderton-Fairchild 115kV to 70° C. Final plan of service to be determined based upon discussion with PSE.

Proposed Plan of Service (cont'd)

- Paul-Allston/South of Allston
 - I-5 Corridor Reinforcement Project found to be sufficient to meet the impacts from the 2013 NOS requests for service
- North of Hanford
 - The 2013 NOS CS demonstrated that the existing system performance of the North of Hanford Flowgate is sufficient to meet existing obligations and anticipated uses in the 2013 NOS.
- West of Slatt/West of John Day
 - Completion of Big Eddy-Knight found to be sufficient to meet the impacts from 2013 NOS requests for service
- Central Oregon
 - No additional transmission expansion required for 21 MW redirect request. PAC transmission capacity required to utilize/access
 - One redirect found to impact BPA's COI N>S capacity; resolution of other queued requests for Intertie capacity required before request could be accommodated

Proposed Plan of Service (cont'd)

- West of Garrison/West of Hatwai
 - Assume Montana to Northwest Project (M2W) in-service
 - Garrison to Ashe would be the next transmission expansion after M2W

Generation Scenarios – Flows on Network

Scenarios	Summer					Winter		
	TTC with 2010 NOS Projects	TTC with 2013 NOS Projects	BASE	High Wind	No Wind	Base	High Wind	No Wind
Flowgate	TTC	TTC	MW	MW	MW	MW	MW	MW
NW - B.C.	2400	2850	-2576	-2575	-2576	1678	1677	1627
South of Custer N->S		2200	2202	1952	2317	-1540	-1539	-1491
North of Echo Lake S->N		3500	-370	76	-572	2429	2413	2408
West of Cascades North E->W	10350	10350	4392	5185	3951	9442	9667	9187
West of Cascades South E->W	7700	7575	5444	5834	4589	6527	7029	5857
North of Hanford N->S	4400	4650	2626	2060	3500	-304	-227	-237
North of John Day N->S	8400	8400	6925	6473	7086	3707	4258	3030
Raver to Paul	1700	1760	1316	1213	1272	521	665	389
Paul to Allston	2990	3180	2157	2002	2163	700	878	533
South of Allston N->S	3890	4470	2855	2674	3362	1342	1376	1223
West of McNary E->W	4500	4500	3413	3204	2027	3674	4609	2330
West of Slatt E->W	7500†	4760	3920	4223	2474	3506	4557	1923
West of John Day E->W		4400	2967	3284	1547	3177	4016	1795
West of Lower Monumental		3650	2098	2301	1467	2364	2678	1773
West of Hatwai E->W	4800	4800	1167	920	1353	583	493	558
COI	4800	4800	4806	4808	2377	3016	4796	656
PDCI	3220	3220	3220	3220	1500	2000	3220	0

† The 2010 NOS CS listed TTC across West of Slatt based upon a different flowgate definition.

Plant	Gen MW					
FCRPS -- Big 10 Hydro	8345	8304	8484	13480	13447	14093
FCRPS -- Upper Columbia	5762	5721	7228	6903	6870	7516
FCRPS -- Lower Columbia	2079	2079	984	4795	4795	4795
FCRPS -- Lower Snake	504	504	272	1782	1782	1782
Mid-Columbia Gen	3882	3882	3882	4616	4616	4616
Northwest Wind	5688	9158	64	5738	9208	64
Northwest Thermal Total	12632	9332	13744	13805	13794	13693

Additional Sensitivities – Flows on Network

Sensitivities	Summer					Winter				
	S1- Load Growth	S2- Export	S3- FCRPS Reduction	S4- B2H	S4- B2H w/ Adjustment	S1- Load Growth	S2- Export	S3- FCRPS Reduction	S4- B2H	S4- B2H w/ Adjustment
Flowgate	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
NW - B.C.	-2584	-2439	-2586	-2575	-2574	1048	1236	1703	1678	1679
South of Custer N->S	2282	2176	2319	2201	2212	-947	-1111	-1565	-1541	-1541
North of Echo Lake S->N	-400	-473	-484	-370	-455	2228	2170	2477	2430	2432
West of Cascades North E->W	4396	4105	3808	4379	4182	9408	9146	9371	9436	9413
West of Cascades South E->W	5553	5246	5165	5371	5337	6881	6553	6503	6474	6429
North of Hanford N->S	2692	2996	2542	2649	2817	-321	22	-563	-279	-298
North of John Day N->S	7060	7314	6746	6995	7189	3815	4179	3368	3779	3702
Raver to Paul	1306	1291	1193	1307	1338	628	629	459	516	501
Paul to Allston	2112	2184	2059	2145	2228	743	836	620	694	675
South of Allston N->S	2472	2555	2456	2841	2940	1377	1448	1283	1336	1322
West of McNary E->W	3391	3460	3348	3501	3510	3612	3765	3573	3749	3731
West of Slatt E->W	3942	4065	3888	3443	3412	3469	3634	3405	3138	2999
West of John Day E->W	2917	2727	2858	2947	2875	3058	3108	3013	3158	3061
West of Lower Monumental	2205	2148	2131	2153	2150	2403	2398	2367	2414	2368
West of Hatwai E->W	1329	1259	1376	1219	1234	629	598	682	634	573
COI	4777	5369	4779	4742	4752	2810	3319	2812	2973	2614
PDCI	3100	3285	3206	3220	3220	1500	2091	1606	2000	1860

Plant	Gen MW									
FCRPS -- Big 10 Hydro	8434	8481	6865	8295	8348	13571	13660	12638	13460	13473
FCRPS -- Upper Columbia	5851	5866	4739	5712	5765	6994	7051	6360	6883	6896
FCRPS -- Lower Columbia	2079	2105	1715	2079	2079	4795	4821	4581	4795	4795
FCRPS -- Lower Snake	504	510	411	504	504	1782	1788	1697	1782	1782
Mid-Columbia Gen	3882	3882	3882	3882	3882	4616	4616	4616	4616	4616
Northwest Wind	5838	5838	5838	5688	5688	5838	5824	5838	5738	5738
Northwest Thermal Total	13923	13597	13921	12626	12434	13933	13214	13928	13803	12747

Estimated Costs and Projected Energization Date

Project Description	Estimated BPA Direct Cost (\$M)	Projected Energization Date*
Upgrade of Monroe – Novelty Hill 230 kV line	\$1.6	Oct. 2017
Garrison Ashe Project	\$943.5	Oct. 2024
PSE Portal Way Transformer †	Pending	Pending
PSE Alderton-Fairchild Upgrade 115 kV line Upgrade ‡	Pending	Pending

* Projected energization date based on construction feasibility

† The Portal Way Transformer plan of service also includes rebuilds of the Portal Way-Lynden 115 kV and Portal Way-Bellingham 115 kV transmission lines, both owned and operated by Puget Sound Energy.

‡ Assumes PSE proceeds with proposed Gravelly Lake project.

2013 NOS Cluster Study Results

Breakdown of Requirements	TSRs	MW
<u>TSRs that need no new infrastructure (existing system is sufficient to accommodate)</u> <ul style="list-style-type: none"> SILS TSN also falls into this category 	4 1	72 500
<u>TSRs that need only previous NOS or other existing projects:</u> <ul style="list-style-type: none"> Big Eddy-Knight, McNary transformer, I-5, M2W, Central Ferry-Lower Monumental, or Puget Sound Area Study Team Upgrades 	30	2,505
<u>TSRs that need new infrastructure identified in the 2013 Cluster Study</u> <ul style="list-style-type: none"> Puget Upgrades or Monroe-Novelty Hill Upgrade, in addition to category above Garrison-Ashe Project, in addition to category above 	14 13 1	992 957 35
<u>Special Considerations:</u> 1 TSR was found to have impacts on the AC Intertie	1	10
TOTAL MW STUDIED		4,079*

**One customer withdrew one 94-MW TSR during the study*

- We note that, included in the study from previous NOS Processes were 1,018 MW that were previously contained under PTSAs, but were later terminated
 - These TSRs continue to require similar upgrades as were originally identified in PTSAs

Third-Party System Impacts

- BPA's tariff allows for the coordination of upgrades on its system with upgrades necessary on a third-party transmission provider's system
 - 13 TSRs representing 957 MW in the 2013 NOS Cluster Study require mitigation of impacts on third-party transmission systems
 - 10 additional TSRs for 875 MW that were previously under PTSAs also require mitigation of third-party system impacts
- BPA will assist the requesting Customer(s) in coordinating with the impacted third-party transmission system

Cluster Study Extension

- BPA Transmission extended the 2013 Cluster Study by four months to address two substantive policy issues
 - Policy surrounding the ATC Methodology Margin (AMM) over the North of Hanford (NoH) Flowgate
 - Ran scenarios in the NOS base case on a variety of generation dispatch patterns for load.
 - Mid-C Area analysis
 - Analysis of substation characteristics from a flow and contractual perspective

FCRPS Dispatch Effects on North of Hanford (NoH) Flowgate

- In the NOS Cluster Study, BPA performed a series of power flow studies on this range of dispatch patterns to test the flexibility of the transmission system to accommodate multiple scenarios.
 - These studies demonstrated that the existing system provided for generation flexibility across the NoH flowgate while accommodating flows from new requests and the SILS TSN.

Next Steps

- BPA sees the need to relook at the AMM and other study assumptions.
 - Long-term capacity is not available on NoH in the summer months for post-cluster study requests, which will allow BPA time to explore this topic without additional impacts.
- Staff is recommending a BPA initiative that would review assumptions and methodologies for creating and managing transmission inventory.
 - BPA would conduct a customer engagement process to look at both federal and non-federal needs.
 - This process could also consider possible solutions other than builds such as Planning Redispatch.

Mid-C: Substation Capacity Limitations

- As part of the Cluster Study, BPA evaluated existing reservations at Mid-C area points to determine whether BPA has available capacity at these points
 - This evaluation showed that power flows do not present a reliability concern that requires transmission upgrades (actual flows do not approach facility limits)
 - BPA also found that it has the capacity at these points to accommodate the additional requests in the Study
 - This finding was specific to the Mid-C area points. Some of the requests may have impacts on other flowgates that require new infrastructure.
 - However, BPA found that at Rocky Reach and Valhalla, BPA currently lacks additional transmission capability to enable future long-term requests sourcing from associated points
- BPA posted a notice to its OASIS temporarily suspending the use of Rocky Reach and Valhalla as source points for long-term requests

Convergence of Contract Path Accounting and Sub-grid Flows

- From a contract accounting perspective, BPA appears not to have the ability to provide additional long-term service at these points
- However, power flows are well within substation capacity and rarely, if ever, approach contracted, long-term reserved demand
- Factors that are contributing to or complicating this analysis:
 - Customers own long-term transmission rights from specific points but not own equivalent amounts of the associated generation, and can use their transmission in flexible ways;
 - BPA's policies and practices allow for flexible short-term and scheduling use of the long-term reservations
 - ColumbiaMarket point
 - Short-term reservations and schedules require identification of Points of Receipt and Delivery, but not the source or sink that long-term reservations require
 - Redirects and resales in the short-term offer further flexibility

Mid-C Area Next Steps

- BPA is looking at potential solutions given the complex situation
 - Should BPA revise its long-term ATC methodology and process to more align with actual power flows in this area of the system?
 - Are transmission upgrades an appropriate solution to the growing contractual constraints in this area of the system?
- BPA will make these points available again when a long-term solution is adopted

Additional Subscribers to Legacy NOS Projects

Category	Project	Status	Financial Proposal	Contractual Proposal
A	Big Eddy – Knight or Central Ferry-Lower Monumental <i>(Under Construction)</i>	NEPA	Not Applicable	Not Applicable
		Build	No Additional Financial Requirement	Service Agreement that is contingent on the energization of the needed project
B	I-5 Corridor Reinforcement or Montana to Washington <i>(In NEPA)</i>	NEPA	No Additional Financial Requirement	No contract while the Project is undergoing NEPA review
		Build	To be determined as these projects near the decision to Construct	To be determined as these projects near the decision to Construct
C	2013 Project	NEPA	Advance funding for estimated share of NEPA/Preliminary Engineering Costs (non-PTSA provisions currently contained in BPA's OATT)*	Environmental Study and Preliminary Engineering Agreement (non-PTSA provisions currently contained in BPA's OATT)*
		Build	Financial Security equal to Customer's share of estimated construction costs (non-PTSA provisions currently contained in BPA's OATT)*	Construction Agreement (non-PTSA provisions currently contained in BPA's OATT)*
D	Any combination of A, B and/or C	NEPA	The relevant financial determination for each category of project needed	The relevant contractual determination for each category of project needed
		Build	The relevant financial determination for each category of project needed	The relevant contractual determination for each category of project needed

Additional Subscribers to Legacy NOS Projects

- At the February NOS Customer meeting, BPA presented on the prospective treatment of additional subscribers to Legacy NOS projects
 - New TSRs included in the 2013 NOS Cluster Study that need a project identified in the 2008-2010 NOS Processes
- BPA is seeking Customer comments and feedback on its additional subscriber proposal (previous slide)
 - Customer comments due Tuesday, June 3
 - Please submit comments to techforum@bpa.gov, with the subject heading of “NOS - Additional Subscriber Proposal”

SILS TSN

- Results of the study find that no additional facilities are required to support the proposed asset exchange
 - If this proposal moves forward, assets representing 500 MW of capacity over both the North of Hanford and North of John Day flowgates would be exchanged with Idaho Power
 - BPA would receive ownership in assets from Hemingway to southeast Idaho
 - The proposal is contingent on construction of Boardman to Hemingway

Cluster Study True Up

- Based on initial estimates, Cluster Study participants provided advance funding equal to \$105/MW for participating in the study
- The actual cost of the Cluster Study was \$104.88/MW, resulting in a slight credit owed to study participants
 - Customers should start to receive invoice notices this week, and refunds should follow in a few weeks

2013 NOS Preliminary Business Evaluation

- Next steps will be to complete preliminary evaluations for the present value and potential rate effects on:
 - Monroe-Novelty Hill Upgrade
 - With and without completion of prior NOS projects
 - Garrison-Ashe Project

2014 NOS Cluster Study

- When will BPA conduct the next NOS Cluster Study?
- The 2013 Cluster Study identified a number of issues that require additional time in order to implement solutions before starting another cluster study
 - Flowability issues related to long-term reservations (i.e., divergence between contracts and flows);
 - Ability to run adequate dispatch sensitivities to ensure flexibility in meeting load service and other system obligations;
 - Sustainable approach for addressing new long-term reservations in the Mid-C Area
- There are currently over 2000 MW of requests in the LTF pending queue submitted after the commencement of the 2013 NOS Cluster Study
- Based on 2013 Cluster Study observations, BPA is evaluating when would be best to conduct the next NOS Cluster Study