

PSE IRP Consultation Update

Webinar 4: Demand-side resources

July 14, 2020

8/04/2020

The following consultation update is the result of stakeholder suggestions gathered through an online Feedback Form, collected between July 7 and July 21, 2020 and summarized in the July 28 Feedback Report. The report themes have been summarized and along with a response to the suggestions that have been implemented. If a suggestion was not implemented, the reason is provided.

PSE also thanks Joni Bosh, Fred Huette and Amy Wheelless of Northwest Energy Coalition (NVEC) for meeting with PSE staff on July 29 to help further clarify their questions and suggestions.

Electric Vehicles – Demand Response Program

PSE received feedback from Brian Grunkemeyer and Rob Briggs (Vashon Climate Action Group) concerning the high levelized cost assumption of the DR program for electric vehicles and requested Cadmus to provide more details on their estimate.

Cadmus' EV estimate of \$300 from the Regional Technical Forum (RTF) study is reasonably close to the cost data that Brian provided on July 31, 2020 of \$250 per participant. The other costs that are included in the \$362 levelized cost are detailed in the table below:

Parameters	Units	Values	Notes
Setup Cost	\$	DLC: \$150,000	Assuming 1 FTE to set up the program.
O&M Cost	\$ per year	DLC: \$150,000	Assuming 1 FTE.
Equipment Cost	\$ per new participant	\$300	The Regional Technical Forum's researched incremental equipment cost of networked 240V level 2 charger compared to non-networked level 2 charger is \$287 (Shum 2019).
Marketing Cost	\$ per new participant	DLC: \$30	Assuming this product requires higher marketing cost than the BPA assumption (Cadmus 2018a) for DLC products: \$25 per new participant.
Incentives (Annual)	\$ per new participant	DLC: \$25	In line with incentives for residential DLC space heat products.
Attrition	% of existing participants per year	5%	In line with BPA assumption (Cadmus 2018a) for DLC products.
Eligibility	% of segment/	36%	The number of EV owners is aligned with the study's assumptions for energy efficiency. The proportion of EV owners that already have a residential 240V AC level 2 charger (64%) is based on research by the Regional Technical Forum (Shum 2019).
Peak Load Impact	kW per participant (at meter)	0.34	Based on 2021 Plan Workbook "Inputs_Product_ResEVSEDLWinter" peak load impact assumption. Available at: https://nwcouncil.app.box.com/s/osjwinvjomgo7vd4uc75y16z3x9b32i/file/655868985770
Program Participation	% of eligible segment/end-use load	DLC: 25%	In line with assumptions for DLC products.
Event Participation	%	0.95	Based on 2021 Plan Workbook "Inputs_Product_ResEVSEDLWinter" event participation assumption. Available at: https://nwcouncil.app.box.com/s/osjwinvjomgo7vd4uc75y16z3x9b32i/file/655868985770

Transmission & Distribution Deferral Cost Update

PSE received feedback from Kyle Frankiewich (WUTC) and Fred Heutte (NVEC) requesting more details behind the numbers on slide 13: "Updates in 2021 CPA: T&D deferral benefit." The costs that the Power Council is using in their 2021 Plan is significantly lower than the ones used in the 7th Plan¹. The Council updated its assumptions for the 2021 Plan: no new T&D development projects were included in the update, and for T&D upgrade projects, only capacity related costs were included. In past IRPs, PSE has used the Council's T&D deferral numbers. Since the costs came down substantially in the Council's 2021 plan, PSE decided to update their own system related costs. The PSE system estimates came close to the updated Power Council estimates, these were presented on slide 13 of the July 14 Webinar.

PSE reviewed projects going back to 2010 and included projects or portions of the projects that were related to the capacity upgrades on the T&D systems. The costs for reliability projects and routine O&M were excluded as conservation will not impact these costs.

Details of the projects used to estimate the new T&D deferral costs are in Appendix A.

Fuel Conversion from Gas to Electric

PSE received feedback from Kyle Frankiewich, Willard Westre, Rob Briggs and Court Olson concerning inclusion of measures or sensitivities to test the impact of converting some end uses from gas to electricity use. PSE has added fuel conversion as a sensitivity for further discussion with stakeholders at the August 11 webinar.

Distributed Solar pV

PSE received feedback from Fred Heutte (NVEC) and Kyle Frankiewich (WUTC) that the cost curve was not up to date, and that a sensitivity should be considered with a lower cost curve. Fred referenced to the recently released (July 2020) 2020 ATB data from NREL.

¹ https://www.nwcouncil.org/sites/default/files/2019_0312_p3.pdf

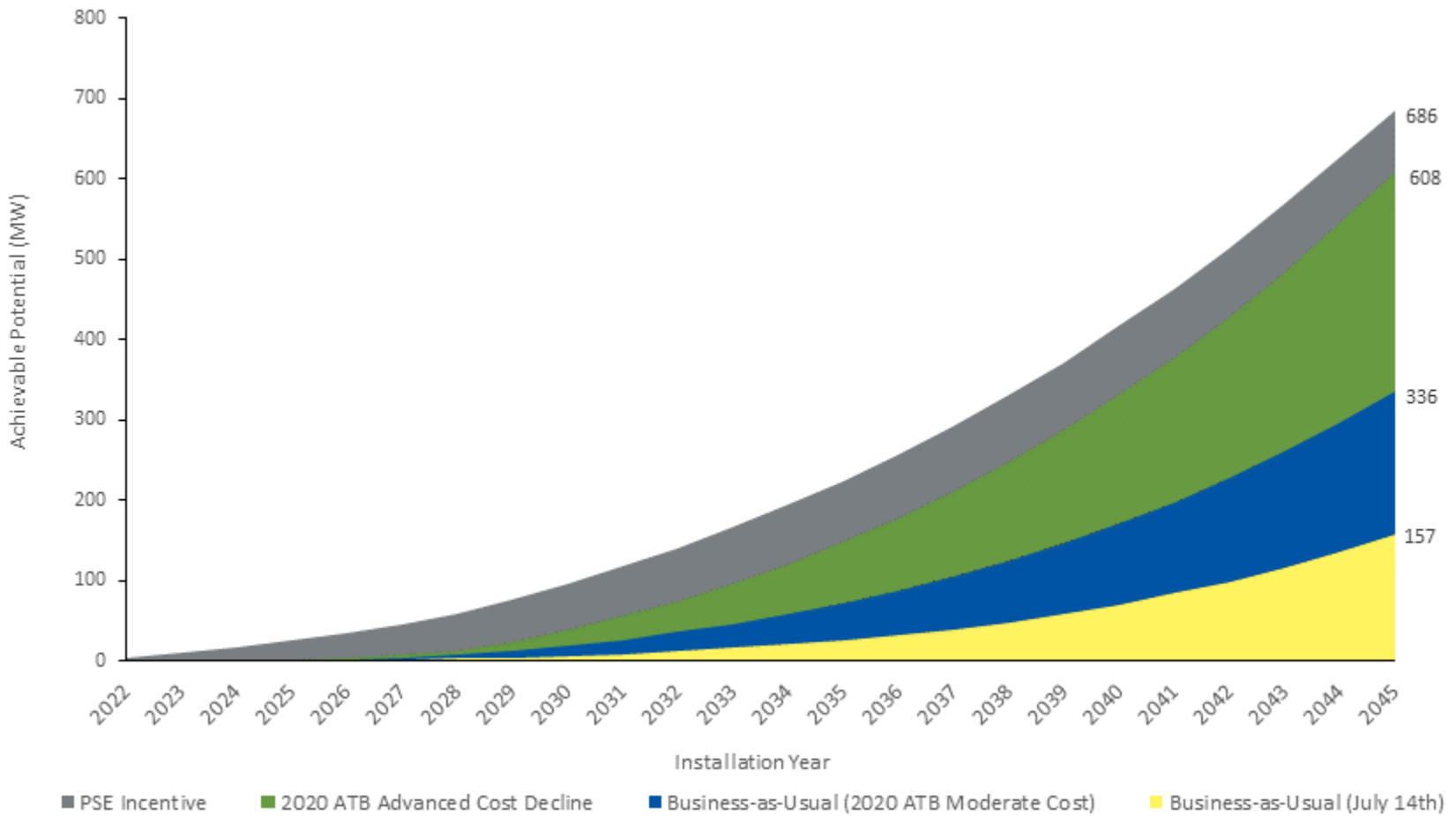
Cadmus had used the 2019 ATB data in their webinar slide, and has since updated the distributed solar pv market potential using the 2020 ATB data. As NVEC had suggested the costs are lower.

The figure below shows the results. The business as usual (BAU) case, which represents the current net metering program, updated with the 2020 MTB *Moderate* Cost forecast, now shows 24-year cumulative potential of 336 MW, which is about 10% higher than the program’s straight line projection of 300 MW, which was shown in the August 14 webinar.

Furthermore, the 2020 ATB *Advanced* Cost Decline forecast shows 24-year cumulative potential of 608 MW.

Based on these results and feedback from the stakeholders, PSE will:

1. Update the business as usual (BAU) case to the 2020 ATB *Moderate* Cost forecast, and
2. Replace the PSE incentive sensitivity with the 2020 ATB *Advanced* Cost decline as the sensitivity



There was also a request for historical achievements to date with respect to PSE’s distributed solar pv program. The following is the historical data for all customer classes, including a breakdown by sector:

Total historical installations:

Year installed	Number of Systems	kW AC	kW DC
2000	1	4	1
2001	3	7	4
2002	7	15	12
2004	12	42	34
2005	8	34	30
2006	39	238	236
2007	85	438	409
2008	84	405	399
2009	157	818	814
2010	199	1,148	1,169
2011	227	1,447	1,532
2012	405	2,429	2,627
2013	572	3,913	4,123
2014	691	4,731	5,176
2015	1363	9,907	10,619
2016	1245	10,497	11,659
2017	1009	8,072	9,200
2018	1590	13,688	15,695
2019	1535	14,301	16,215
2020	605	6,189	6,859
Grand Total	9837	78,322	86,813

Installations by customer class:

Sector	Percent Share	
	Systems	kW AC
Commercial	5%	14%
Industrial	0.03%	0.17%
Residential	95%	85%

Equity in the IRP

PSE has scheduled a discussion with WUTC staff regarding an equity assessment in the IRP. Further details will be available by the end of September.

Load Forecast in the CPA

PSE received feedback from several stakeholders expressing concerns that the load forecast used to develop the CPA was a draft and what might happen if the final load forecast is considerably different. There was also a general perception that the changes in load forecast have a major impact on the conservation savings.

Changes in load forecast have a relatively minor impact on the total achievable potential. The CPA will be updated with the final load forecast.

Demand Side Resource Sensitivities

PSE received feedback from several stakeholders to consider several sensitivities – see section below on “Summary of all updates” for details. All stakeholder suggested sensitivities have been added to the August 11 webinar for further discussion.

Summary of all updates

PSE appreciates the feedback provided by stakeholders. In summary, the following changes will be implemented:

- Workbooks requested by NWECC – PSE is working with Cadmus to provide a measure details workbook for their review. This will be provided towards the end of August.
- T&D deferral cost update details – details of the updated T&D numbers are presented in Appendix A below.
- PSE will include a discussion and provide historical data on achievements to date for PSE’s net metered distributed solar pV program in the demand side resources report.
- Electric Vehicle levelized cost for the DR program is summarized on page 1 of this report.
- Several sensitivities listed below were suggested by stakeholders. PSE will review the list of proposed portfolio sensitivities with stakeholders at the August 11, 2020 webinar and will seek feedback around the details of these sensitivities and additional sensitivities:
 - PSE will remove the PSE incentive and PSE ownership sensitivities and instead consider the one proposed by the stakeholders: sensitivity with a lower cost curve using the 2020 ATB *Advanced* scenario.
 - Accelerated DSR 6 year ramp for discretionary measures
 - Accelerated DSR 8 year ramp for discretionary measures
 - Non Energy impacts using EPA estimates
 - Social discount rate of 2.5% consistent with the social cost of carbon from the technical support document
 - Fuel conversion gas to electric
- PSE will update the CPA with the final load forecast and a discussion of the changes will be provided in the demand side report.

Appendix A: T&D Cost update details

PSE T&D Deferral Cost Summary:

PSE deferral costs	\$/kW-yr	\$/kW-yr 2020\$
Transmission	\$ 5.22	\$ 5.22
Distribution	\$ 7.40	\$ 7.40
T&D Deferral Costs	\$ 12.61	\$ 12.61
Power Council deferral costs 2021 Plan	\$/kW-yr 2016\$	\$/kW-yr 2020\$
Transmission	\$ 3.08	\$ 3.35
Distribution	\$ 6.85	\$ 7.45
T&D Deferral Costs	\$ 9.93	\$ 10.79
Power Council deferral costs 7th Plan	\$/kW-yr 2012\$	\$/kW-yr 2020\$
Transmission	\$ 26.00	\$ 29.55
Distribution	\$ 31.00	\$ 35.23
T&D Deferral Costs	\$ 57.00	\$ 64.77

PSE TRANSMISSION SYSTEM PROJECTS DATA:

Project	Capital Investment 2020\$	Capacity Gained (MW)	Power Factor	Discount rate	Asset lifetime	Result \$/kW-yr
Alderton Substation Project Totals	\$ 28,277,441	1021	0.98	6.97%	35	2.18
Sedro - Horseranch Project Totals	\$ 43,651,437	1203	0.98	6.97%	35	2.85
Juanita Substation Upgrade Project Total	\$ 6,969,792	25	0.98	6.97%	35	21.90
Greenwater Upgrade Project Total	\$ 7,638,716	15	0.98	6.97%	35	40.00
Cumberland Substation Rebuild Project Total	\$ 7,900,038	0	0.98	6.97%	35	0.00
Thorp Substation Rebuild Project Total	\$ 3,545,756	0	0.98	6.97%	35	0.00
Sedro - Baker #2 Reconductor Project Total	\$ 27,628,881	330	0.98	6.97%	35	6.58
Spurgeon Substation Project Total	\$ 1,895,271	339	0.98	6.97%	35	0.44
Maxwelton Substation Project Total	\$ 7,869,250	1046	0.98	6.97%	35	0.59
Sedro - Fredonia T-Line Uprate	\$ 6,929,378	94	0.98	6.97%	35	5.79
Mt. Si Substation Project Total	\$ 16,012,300	25	0.98	6.97%	35	50.31
Port Madison Substation Project Total	\$ 18,206,586	252	0.98	6.97%	35	5.68
Sterling Substation Project Total	\$ 30,909,684	45	0.98	6.97%	35	53.96
Spurgeon Substation Project Total	\$ 32,515,004	45	0.98	6.97%	35	56.76
Blackburn Substation Project Total	\$ 43,823,648	45	0.98	6.97%	35	76.50
Ardmore Substation Project Total	\$ 24,951,787	261	0.98	6.97%	35	7.51
Semiahmoo Substation Project Total	\$ 6,599,786	0	0.98	6.97%	35	0.00
Total/Average	\$ 315,324,755	4746	0.98	6.97%	35	5.22

PSE DISTRIBUTION SYSTEM PROJECTS DATA:

Project	Capital Investment 2020\$	Capacity Gained (MW)	Power Factor	Discount rate	Asset lifetime	Result \$/kW-yr
New OH FDR addition	\$ 1,451,190	13.96	0.98	6.97%	35	\$ 8.16
New UG FDR addition	\$ 938,758	9.05	0.98	6.97%	35	\$ 8.15
New OH FDR addition	\$ 327,970	13.96	0.98	6.97%	35	\$ 1.84
New FDR WCA	\$ 2,420,732	13.96	0.98	6.97%	35	\$ 13.62
New UG FDR addition	\$ 2,153,063	9.05	0.98	6.97%	35	\$ 18.69
New UG FDR addition	\$ 1,081,724	9.05	0.98	6.97%	35	\$ 9.39
New UG FDR addition	\$ 379,362	9.05	0.98	6.97%	35	\$ 3.29
New UG FDR addition	\$ 209,939	9.05	0.98	6.97%	35	\$ 1.82
Repl 1-ph lateral w/OH FDR	\$ 1,470,663	13.96	0.98	6.97%	35	\$ 8.27
Extend UG FDR	\$ 238,033	9.05	0.98	6.97%	35	\$ 2.07
UG FDR tie	\$ 275,575	9.05	0.98	6.97%	35	\$ 2.39
UG FDR extension	\$ 1,351,231	9.05	0.98	6.97%	35	\$ 11.73
UG FDR extension	\$ 2,185,186	9.05	0.98	6.97%	35	\$ 18.97
Extend UG FDR in existing conduit	\$ 282,905	9.05	0.98	6.97%	35	\$ 2.46
Upgrade 3-167 auto to 7.5 MVA	\$ 2,642,984	7.00	0.98	6.97%	35	\$ 29.66
Extend UG FDR	\$ 449,758	9.05	0.98	6.97%	35	\$ 3.90
UG FDR extension	\$ 760,693	9.05	0.98	6.97%	35	\$ 6.60
Reconductor from #6CU to OH FDR 397.5	\$ 162,528	10.57	0.98	6.97%	35	\$ 1.21
New OH FDR TW Extention	\$ 602,496	13.96	0.98	6.97%	35	\$ 3.39
OH FDR 397.5	\$ 294,938	15.20	0.98	6.97%	35	\$ 1.52
OH FDR 397.5	\$ 1,403,819	10.65	0.98	6.97%	35	\$ 10.35
new FDR breaker &UG FDR	\$ 937,867	9.05	0.98	6.97%	35	\$ 8.14
Repl 3.75 MVA trf with 20 MVA	\$ 70,953	16.25	0.98	6.97%	35	\$ 0.34
Add two additional #2 ACSR conductors	\$ 1,374,218	3.23	0.98	6.97%	35	\$ 33.46
Recond 2/0 to 397.5, 5.91, added capacity	\$ 1,542,684	7.92	0.98	6.97%	35	\$ 15.29
Recond 2/0 to 397.5, 5.91, added capacity	\$ 472,612	7.92	0.98	6.97%	35	\$ 4.69
Recond 1-ph #6 CU to 336.4 TW FDR	\$ 725,016	12.83	0.98	6.97%	35	\$ 4.44
OH FDR 397.5	\$ 1,908,196	11.24	0.98	6.97%	35	\$ 13.34
Add I -ph #2 ACSR	\$ 55,644	1.61	0.98	6.97%	35	\$ 2.71
Recond 4/0 ACSR to 397.5 FDR	\$ 736,591	5.59	0.98	6.97%	35	\$ 10.36
Recond 2/0 CU to 397.5 FDR	\$ 223,865	5.72	0.98	6.97%	35	\$ 3.08
Recond 2/0 CU to 397.5 FDR	\$ 253,699	5.72	0.98	6.97%	35	\$ 3.49
OH FDR 397.5	\$ 445,011	15.20	0.98	6.97%	35	\$ 2.30
Recond #2 ACSR to 397.5 FDR	\$ 330,543	10.44	0.98	6.97%	35	\$ 2.49
Recond #4 CU to 397.5 FDR	\$ 585,694	10.65	0.98	6.97%	35	\$ 4.32
Recond #4 CU to 336.4 TW FDR	\$ 1,282,001	9.42	0.98	6.97%	35	\$ 10.69
Recond #6 CU to 397.5 FDR	\$ 632,575	11.80	0.98	6.97%	35	\$ 4.21
Recond #6 CU to 397.5 FDR	\$ 737,312	11.80	0.98	6.97%	35	\$ 4.91
Recond #2/0 CU to 397.5 FDR	\$ 168,986	5.72	0.98	6.97%	35	\$ 2.32
New UG FDR Extension	\$ 1,190,576	9.05	0.98	6.97%	35	\$ 10.33
New UG FDR Extension	\$ 1,496,886	9.05	0.98	6.97%	35	\$ 12.99
Recond #4 ACSR to FDR TW	\$ 228,706	10.33	0.98	6.97%	35	\$ 1.74
UG FDR 750	\$ 4,020,530	9.05	0.98	6.97%	35	\$ 34.90
UG FdDR	\$ 178,224	9.05	0.98	6.97%	35	\$ 1.55
UG FDR Extension	\$ 384,637	9.05	0.98	6.97%	35	\$ 3.34
UG FDR Extension	\$ 391,211	9.05	0.98	6.97%	35	\$ 3.40
New 750 UG Fdr, 1/0 UG, FDR TW	\$ 3,007,573	9.05	0.98	6.97%	35	\$ 26.11
Extend new 750 UG Fdr, new 1/0 UG section	\$ 132,136	9.05	0.98	6.97%	35	\$ 1.15
New 750 UG Fdr; new OH FDR TW	\$ 442,187	9.05	0.98	6.97%	35	\$ 3.84
New 750 UG Fdr	\$ 2,107,015	9.05	0.98	6.97%	35	\$ 18.29
new 750 UG Fdr, new 1/0 3-ph	\$ 265,951	9.05	0.98	6.97%	35	\$ 2.31
Recond 2/0 with 336.4 ACSR TW and 397.5 FDR	\$ 290,545	7.92	0.98	6.97%	35	\$ 2.88
Recond 1- ph #6 CU with 336.4 TW FDR	\$ 366,913	12.83	0.98	6.97%	35	\$ 2.25
Add new FDR 336.4 TW	\$ 1,509,437	13.96	0.98	6.97%	35	\$ 8.49
Recond 1-ph #6 CU with 397.5 FDR	\$ 383,763	14.07	0.98	6.97%	35	\$ 2.14
Recond 2-ph #4 ACSR with 336.4 FDR	\$ 1,588,710	11.39	0.98	6.97%	35	\$ 10.95
Recond 3-ph #2 ACSR to 397.5 FDR	\$ 2,346,705	7.92	0.98	6.97%	35	\$ 23.26
Recond 2-ph #2 ACSR to 336.4 FDR TW	\$ 888,821	10.59	0.98	6.97%	35	\$ 6.59
Recond 1-ph #6 CU with 336.4 TW	\$ 628,079	12.83	0.98	6.97%	35	\$ 3.84
Repla 2/0 CU with 397.5 FDR	\$ 131,277	5.72	0.98	6.97%	35	\$ 1.80
Repl 1-ph #2 ACSR with 3-ph #2 ACSR TW	\$ 738,696	2.76	0.98	6.97%	35	\$ 21.02
Repl 2-ph #2 ACSR with 3-ph #2ACSR TW	\$ 777,704	1.15	0.98	6.97%	35	\$ 53.21
New 336.4 FDR TW	\$ 393,919	13.96	0.98	6.97%	35	\$ 2.22
New UG 1/0	\$ 355,356	3.64	0.98	6.97%	35	\$ 7.68
New FDR DUV-16	\$ 1,091,254	9.05	0.98	6.97%	35	\$ 9.47
New UG FDR	\$ 2,355,496	9.05	0.98	6.97%	35	\$ 20.45
New 750 UG Fdr	\$ 124,622	9.05	0.98	6.97%	35	\$ 1.08
Reconductor #2 ACSR to 397.5 FDR	\$ 98,862	10.35	0.98	6.97%	35	\$ 0.75
new UG FDR	\$ 2,068,257	9.05	0.98	6.97%	35	\$ 17.95
10 new UG FDRs	\$ 7,025,651	90.50	0.98	6.97%	35	\$ 6.10
Totals/Average	\$ 70,576,718	749.61	0.98	6.97%	35	\$ 7.40