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Appendix 1
Cost Effectiveness

Guidehouse

Memorandum

To: Nicole Karpavich and Alesha Pino, PacifiCorp

From: David Basak, Guidehouse

Date: May 26, 2020

Re: Cost-Effectiveness for the Portfolio and Sector Level - Washington

Guidehouse estimated the cost-effectiveness for the overall energy efficiency portfolio and component sectors, based on 2019 costs and savings estimates provided by PacifiCorp. This memo provides the cost-effectiveness results for the overall energy efficiency portfolio and the two sector components.

The program passes the cost-effectiveness for the UCT and PCT tests. The memo consists of the following tables.

Table 1 – Utility Inputs
Table 2 – Portfolio Level Costs 2019
Table 3 – NEEA Inputs 2019
Table 4 – Benefit/Cost Ratios by Portfolio Type
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Table 1 – Utility Inputs

Parameter	Value
Discount Rate	6.57%
Residential Line Loss	9.67%
Commercial Line Loss	9.53%
Industrial Line Loss	8.16%
Irrigation Line Loss	9.67%
Residential Energy Rate ($/kWh)[1]	$0.0869
Commercial Energy Rate ($/kWh)[1]	$0.0794
Industrial Energy Rate ($/kWh)[1]	$0.0649
Irrigation Energy Rate ($/kWh)[1]	$0.0872
Inflation Rate	2.20%

[1] Future rates determined using a 2.20% annual escalator.

Table 2 – Portfolio Level Costs 2019

Expense	Cost
Portfolio DSM Central	$255,404
Outreach and Communication (includes Education)	$293,275
Portfolio Evaluation (Process and Impact)	$181,846
Portfolio Potential Study	$18,851
Portfolio System Support	$3,873
End Use Load Research	$34,382
Total Costs	**$787,631**

Table 3 – NEEA Inputs 2019

Sector	Savings at Meter (kWh)	NEEA Expenses ($)
Residential	2,155,902	$509,305
Industrial	1,514,487	$357,779
Commercial	48,287	$11,407
Total	**3,718,676**	**$878,492**

Table 4 – Benefit/Cost Ratios by Portfolio Type

Measure Group	PTRC	TRC	UCT	RIM	PCT
Total Portfolio	0.86	0.78	1.20	0.36	2.91
Total Portfolio (Including NEEA)	0.99	0.90	1.32	0.37	3.44
Total Portfolio (Including NEBs)	0.94	0.86	1.20	0.36	3.04
Total Portfolio (Including NEEA & NEBs)	1.06	0.97	1.32	0.37	3.56
C&I Programs	1.17	1.06	1.61	0.40	3.59
C&I Programs (Including NEEA)	1.19	1.09	1.61	0.39	3.88
C&I Programs (Including NEBs)	1.17	1.07	1.61	0.40	3.60
C&I Programs (Including NEEA & NEBs)	1.20	1.09	1.61	0.39	3.89
Residential Programs	0.57	0.51	0.86	0.30	2.01
Residential Programs (Including NEEA)	0.85	0.78	1.22	0.36	2.85
Residential Programs (Including NEBs)	0.76	0.71	0.86	0.30	2.29
Residential Programs (Including NEEA & NEBs)	1.03	0.96	1.22	0.36	3.13

*Portfolio and Residential results exclude the Low Income Program from the analysis.

Table 5 – Total Portfolio Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0561	$12,173,422	$10,504,782	-$1,668,640	0.86
Total Resource Cost Test (TRC) No Adder	$0.0561	$12,173,422	$9,549,802	-$2,623,621	0.78
Utility Cost Test (UCT)	$0.0368	$7,984,571	$9,549,802	$1,565,231	1.20
Rate Impact Test (RIM)		$26,751,880	$9,549,802	-$17,202,078	0.36
Participant Cost Test (PCT)		$7,617,253	$22,195,711	$14,578,458	2.91
Lifecycle Revenue Impacts ($/kWh)					$0.0000156979
Discounted Participant Payback (years)					1.53

Table 6 – Total Portfolio Cost-Effectiveness Results (Including NEEA)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0503	$13,051,914	$12,907,614	-$144,300	0.99
Total Resource Cost Test (TRC) No Adder	$0.0503	$13,051,914	$11,734,194	-$1,317,719	0.90
Utility Cost Test (UCT)	$0.0341	$8,863,062	$11,734,194	$2,871,132	1.32
Rate Impact Test (RIM)		$31,601,926	$11,734,194	-$19,867,731	0.37
Participant Cost Test (PCT)		$7,617,253	$26,167,265	$18,550,012	3.44
Lifecycle Revenue Impacts ($/kWh)					$0.0000157923
Discounted Participant Payback (years)					1.36

Table 7 – Total Portfolio Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0561	$12,173,422	$11,465,500	-$707,923	0.94
Total Resource Cost Test (TRC) No Adder	$0.0561	$12,173,422	$10,510,519	-$1,662,903	0.86
Utility Cost Test (UCT)	$0.0368	$7,984,571	$9,549,802	$1,565,231	1.20
Rate Impact Test (RIM)		$26,751,880	$9,549,802	-$17,202,078	0.36
Participant Cost Test (PCT)		$7,617,253	$23,156,429	$15,539,176	3.04
Lifecycle Revenue Impacts ($/kWh)					$0.0000156979
Discounted Participant Payback (years)					1.53

Table 8 – Total Portfolio Cost-Effectiveness Results (Including NEEA and NEBs)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0503	$13,051,914	$13,868,332	$816,418	1.06
Total Resource Cost Test (TRC) No Adder	$0.0503	$13,051,914	$12,694,912	-$357,002	0.97
Utility Cost Test (UCT)	$0.0341	$8,863,062	$11,734,194	$2,871,132	1.32
Rate Impact Test (RIM)		$31,601,926	$11,734,194	-$19,867,731	0.37
Participant Cost Test (PCT)		$7,617,253	$27,127,983	$19,510,730	3.56
Lifecycle Revenue Impacts ($/kWh)					$0.0000157923
Discounted Participant Payback (years)					1.36

Table 9 – C&I Energy Efficiency Portfolio Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0420	$6,779,391	$7,898,312	$1,118,921	1.17
Total Resource Cost Test (TRC) No Adder	$0.0420	$6,779,391	$7,180,284	$400,892	1.06
Utility Cost Test (UCT)	$0.0276	$4,453,677	$7,180,284	$2,726,607	1.61
Rate Impact Test (RIM)		$18,044,306	$7,180,284	-$10,864,022	0.40
Participant Cost Test (PCT)		$4,346,127	$15,611,041	$11,264,914	3.59
Lifecycle Revenue Impacts ($/kWh)					$0.0000202956
Discounted Participant Payback (years)					1.52

Table 10 – C&I Energy Efficiency Portfolio Cost-Effectiveness Results (Including NEEA)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0409	$7,148,577	$8,534,333	$1,385,755	1.19
Total Resource Cost Test (TRC) No Adder	$0.0409	$7,148,577	$7,758,484	$609,907	1.09
Utility Cost Test (UCT)	$0.0276	$4,822,863	$7,758,484	$2,935,621	1.61
Rate Impact Test (RIM)		$19,653,882	$7,758,484	-$11,895,398	0.39
Participant Cost Test (PCT)		$4,346,127	$16,851,431	$12,505,304	3.88
Lifecycle Revenue Impacts ($/kWh)					$0.0000194297
Discounted Participant Payback (years)					1.39

Table 11 – C&I Energy Efficiency Portfolio Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0420	$6,779,391	$7,946,891	$1,167,500	1.17
Total Resource Cost Test (TRC) No Adder	$0.0420	$6,779,391	$7,228,862	$449,471	1.07
Utility Cost Test (UCT)	$0.0276	$4,453,677	$7,180,284	$2,726,607	1.61
Rate Impact Test (RIM)		$18,044,306	$7,180,284	-$10,864,022	0.40
Participant Cost Test (PCT)		$4,346,127	$15,659,620	$11,313,493	3.60
Lifecycle Revenue Impacts ($/kWh)					$0.0000202956
Discounted Participant Payback (years)					1.52

Table 12 – C&I Energy Efficiency Portfolio Cost-Effectiveness Results (Including NEEA and NEBs)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0409	$7,148,577	$8,582,912	$1,434,334	1.20
Total Resource Cost Test (TRC) No Adder	$0.0409	$7,148,577	$7,807,063	$658,486	1.09
Utility Cost Test (UCT)	$0.0276	$4,822,863	$7,758,484	$2,935,621	1.61
Rate Impact Test (RIM)		$19,653,882	$7,758,484	-$11,895,398	0.39
Participant Cost Test (PCT)		$4,346,127	$16,900,010	$12,553,883	3.89
Lifecycle Revenue Impacts ($/kWh)					$0.0000194297
Discounted Participant Payback (years)					1.39

Table 13 – Residential Energy Efficiency Portfolio Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0828	$4,606,400	$2,606,470	-$1,999,930	0.57
Total Resource Cost Test (TRC) No Adder	$0.0828	$4,606,400	$2,369,518	-$2,236,882	0.51
Utility Cost Test (UCT)	$0.0493	$2,743,263	$2,369,518	-$373,745	0.86
Rate Impact Test (RIM)		$7,919,944	$2,369,518	-$5,550,426	0.30
Participant Cost Test (PCT)		$3,271,127	$6,584,670	$3,313,544	2.01
Lifecycle Revenue Impacts ($/kWh)					$0.0000099021
Discounted Participant Payback (years)					1.54

Table 14 – Residential Energy Efficiency Portfolio Cost-Effectiveness (Including NEEA)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0603	$5,115,705	$4,373,281	-$742,424	0.85
Total Resource Cost Test (TRC) No Adder	$0.0603	$5,115,705	$3,975,710	-$1,139,995	0.78
Utility Cost Test (UCT)	$0.0383	$3,252,569	$3,975,710	$723,141	1.22
Rate Impact Test (RIM)		$11,160,413	$3,975,710	-$7,184,703	0.36
Participant Cost Test (PCT)		$3,271,127	$9,315,834	$6,044,707	2.85
Lifecycle Revenue Impacts ($/kWh)					$0.0000111246
Discounted Participant Payback (years)					1.33

Table 15 – Residential Energy Efficiency Portfolio Cost-Effectiveness (Including NEBs)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0828	$4,606,400	$3,518,609	-$1,087,791	0.76
Total Resource Cost Test (TRC) No Adder	$0.0828	$4,606,400	$3,281,657	-$1,324,743	0.71
Utility Cost Test (UCT)	$0.0493	$2,743,263	$2,369,518	-$373,745	0.86
Rate Impact Test (RIM)		$7,919,944	$2,369,518	-$5,550,426	0.30
Participant Cost Test (PCT)		$3,271,127	$7,496,809	$4,225,682	2.29
Lifecycle Revenue Impacts ($/kWh)					$0.0000099021
Discounted Participant Payback (years)					1.54

Table 16 – Residential Energy Efficiency Portfolio Cost-Effectiveness (Including NEEA and NEBs)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0603	$5,115,705	$5,285,420	$169,714	1.03
Total Resource Cost Test (TRC) No Adder	$0.0603	$5,115,705	$4,887,849	-$227,857	0.96
Utility Cost Test (UCT)	$0.0383	$3,252,569	$3,975,710	$723,141	1.22
Rate Impact Test (RIM)		$11,160,413	$3,975,710	-$7,184,703	0.36
Participant Cost Test (PCT)		$3,271,127	$10,227,973	$6,956,846	3.13
Lifecycle Revenue Impacts ($/kWh)					$0.0000111246
Discounted Participant Payback (years)					1.33

The table below summarizes the non-energy benefits for the Home Energy Savings program and the Wattsmart Business program that were included in the results above.

Table 17 – Home Energy Savings Non-Energy Benefits (2019)

Non-Energy Benefits	Non-Energy Benefits Water ($/yr)	Non-Energy Benefits Other ($/yr)	Measure Life	Quantity	Total Present Value Benefits
Appliances	$2,479	$9	14	111	$23,798
Building Envelope	$0	$1,883	45	301,316	$28,801
Energy Kits - DHW	$57,355	$562	9	647	$409,595
Energy Kits - Lighting	$0	$152	5	183	$674
HVAC	$0	$15,031	15	1,107	$149,945
Lighting	$0	$80,654	4	207,227	$293,990
Water Heating	$0	$0	13	20	$0
Whole Home	$0	$382	31	79	$5,337
Total NEBs	**$59,834**	**$98,674**	**11**	**510,690**	**$912,139**

Table 18 – Wattsmart Business Program Non-Energy Benefits (2019)

Non-Energy Benefits	Non-Energy Benefits Water ($/yr)	Non-Energy Benefits Other ($/yr)	Measure Life	Quantity	Total Present Value Benefits
Irrigation	$0	$4,914	14	4,352	$47,004
Lighting	$0	$320	11	39,493	$2,612
Total NEBs	**$0**	**$5,234**	**14**	**43,845**	**$49,616**

Guidehouse

Memorandum

To: Nicole Karpavich and Alesha Pino, PacifiCorp

From: David Basak, Guidehouse

Date: May 26, 2020

Re: Cost-Effectiveness Results for the Wattsmart Business Program - Washington

Guidehouse estimated the cost-effectiveness results for the Washington Wattsmart Business Program, based on 2019 costs and savings estimates provided by PacifiCorp. This memo provides the cost-effectiveness results for the overall program and for the 10 measure categories.

Cost-effectiveness was tested using the 2017 IRP decrement for all measure categories. The program passes all cost-effectiveness tests except the RIM. The memo consists of the following tables.

Table 1 - Utility Inputs
Table 2 - Annual Wattsmart Business Program Costs by Measure Category
Table 3 - Annual Wattsmart Business Program Savings by Measure Category
Table 4 - Benefit/Cost Ratios by Measure Category
Table 5 - Wattsmart Business Program Level Cost-Effectiveness Results
Table 6 - Wattsmart Business Additional Measures Cost-Effectiveness Results
Table 7 - Wattsmart Business Building Shell Cost-Effectiveness Results
Table 8 - Wattsmart Business Compressed Air Cost-Effectiveness Results
Table 9 - Wattsmart Business Energy Management Cost-Effectiveness Results
Table 10 - Wattsmart Business Food Service Equipment Cost-Effectiveness Results
Table 11 - Wattsmart Business HVAC Cost-Effectiveness Results
Table 12 - Wattsmart Business Irrigation Cost-Effectiveness Results
Table 13 - Wattsmart Business Lighting Cost-Effectiveness Results
Table 14 - Wattsmart Business Motors Cost-Effectiveness Results
Table 15 - Wattsmart Business Refrigeration Cost-Effectiveness Results
Table 16 - Wattsmart Business Non-Energy Benefits by Measure
Table 17 - Wattsmart Business Program (with NEBs) Cost-Effectiveness Results
Table 18 - Wattsmart Business Irrigation (with NEBs) Cost-Effectiveness Results
Table 19 - Wattsmart Business Lighting (with NEBs) Cost-Effectiveness Results

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Table 1 - Utility Inputs

Parameter	Value
Discount Rate	6.57%
Commercial Line Loss	9.53%
Industrial Line Loss	8.16%
Irrigation Line Loss	9.67%
Commercial Energy Rate ($/kWh)[1]	$0.0794
Industrial Energy Rate ($/kWh)[1]	$0.0649
Irrigation Energy Rate ($/kWh)[1]	$0.0872
Inflation Rate	2.20%

[1] Future rates determined using a 2.20% annual escalator.

Table 2 - Annual Wattsmart Business Program Costs by Measure Category

Measure Category	Engineering Costs	Utility Admin	Program Delivery	Program Dev.	Incentives	Inspection Cost	Total Utility Costs	Gross Customer Costs
Additional Measures	$10,508	$599	$0	$466	$7,904	$0	$19,477	$13,836
Building Shell	$0	$592	$123	$460	$17,096	$0	$18,271	$56,029
Compressed Air	$31,044	$24,131	$175,180	$10,189	$124,266	$0	$364,810	$213,276
Energy Management	$116,479	$109,493	$57,819	$28,916	$65,402	$0	$378,108	$85,250
Food Service Equipment	$0	$251	$52	$195	$1,600	$0	$2,099	$3,060
HVAC	$11,010	$12,621	$130,829	$4,849	$106,188	$0	$265,498	$221,486
Irrigation	$87,649	$5,157	$92,125	$9,710	$153,950	$0	$348,590	$403,661
Lighting	$0	$131,285	$235,611	$96,553	$1,024,234	$16,586	$1,504,270	$2,203,807
Motors	$36,526	$10,435	$2,549	$3,982	$57,484	$0	$110,976	$144,297
Refrigeration	$192,138	$38,798	$719,863	$28,490	$462,288	$0	$1,441,577	$1,001,425
Total	**$485,356**	**$333,361**	**$1,414,152**	**$183,811**	**$2,020,412**	**$16,586**	**$4,453,677**	**$4,346,127**

Table 3 - Annual Wattsmart Business Program Savings by Measure Category

Measure Category	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings	Net to Gross Ratio	Net kWh Savings	Measure Life
Additional Measures	52,690	94%	49,529	100%	49,529	15
Building Shell	51,989	94%	48,870	100%	48,870	17
Compressed Air	1,152,222	96%	1,106,133	100%	1,106,133	15
Energy Management	3,270,087	100%	3,270,087	100%	3,270,087	3
Food Service Equipment	22,071	94%	20,747	100%	20,747	15
HVAC	548,423	100%	548,423	100%	548,423	12
Irrigation	1,098,082	100%	1,098,082	100%	1,098,082	14
Lighting	10,919,095	90%	9,827,185	100%	9,827,185	11
Motors	450,367	94%	423,345	100%	423,345	15
Refrigeration	3,221,924	100%	3,221,924	100%	3,221,924	15
Total	**20,786,950**	**94%**	**19,614,324**	**100%**	**19,614,324**	**11**

Table 4 - Benefit/Cost Ratios by Measure Category

Measure Category	PTRC	TRC	UCT	RIM	PCT
Additional Measures	1.14	1.04	1.36	0.41	3.88
Building Shell	0.59	0.54	1.69	0.46	1.18
Compressed Air	1.43	1.30	1.61	0.44	5.15
Energy Management	0.81	0.74	0.77	0.28	8.78
Food Service Equipment	3.42	3.11	5.28	0.52	6.78
HVAC	0.66	0.60	0.87	0.34	2.33
Irrigation	1.03	0.93	1.60	0.40	2.96
Irrigation with NEBs	1.10	1.01	1.60	0.40	3.08
Lighting	1.44	1.31	2.34	0.41	3.66
Lighting with NEBs	1.44	1.31	2.34	0.41	3.66
Motors	1.25	1.14	2.03	0.47	2.95
Refrigeration	0.95	0.86	1.18	0.39	3.42
Total	**1.17**	**1.06**	**1.61**	**0.40**	**3.59**
Total with NEBs	**1.17**	**1.07**	**1.61**	**0.40**	**3.60**

Table 5 - Wattsmart Business Program Level Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0420	$6,779,391	$7,898,312	$1,118,921	1.17
Total Resource Cost Test (TRC) No Adder	$0.0420	$6,779,391	$7,180,284	$400,892	1.06
Utility Cost Test (UCT)	$0.0276	$4,453,677	$7,180,284	$2,726,607	1.61
Rate Impact Test (RIM)		$18,044,306	$7,180,284	-$10,864,022	0.40
Participant Cost Test (PCT)		$4,346,127	$15,611,041	$11,264,914	3.59
Lifecycle Revenue Impacts ($/kWh)					$0.0000202956
Discounted Participant Payback (years)					1.52

Table 6 through Table 15 provide cost-effectiveness results for all 10 measures.

Table 6 - Wattsmart Business Additional Measures Cost-Effectiveness Results (Load Shape – WA_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0473	$25,409	$29,085	$3,675	1.14
Total Resource Cost Test (TRC) No Adder	$0.0473	$25,409	$26,441	$1,031	1.04
Utility Cost Test (UCT)	$0.0363	$19,477	$26,441	$6,963	1.36
Rate Impact Test (RIM)		$65,187	$26,441	-$38,747	0.41
Participant Cost Test (PCT)		$13,836	$53,614	$39,778	3.88
Lifecycle Revenue Impacts ($/kWh)					$0.0000006369
Discounted Participant Payback (years)					1.50

Table 7 - Wattsmart Business Building Shell Cost-Effectiveness Results (Load Shape – WA_School_Space_Cool)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0990	$57,204	$33,910	-$23,294	0.59
Total Resource Cost Test (TRC) No Adder	$0.0990	$57,204	$30,827	-$26,377	0.54
Utility Cost Test (UCT)	$0.0316	$18,271	$30,827	$12,556	1.69
Rate Impact Test (RIM)		$67,518	$30,827	-$36,691	0.46
Participant Cost Test (PCT)		$56,029	$66,343	$10,315	1.18
Lifecycle Revenue Impacts ($/kWh)					$0.0000005318
Discounted Participant Payback (years)					12.31

Table 8 - Wattsmart Business Compressed Air Cost-Effectiveness Results (Load Shape – WA_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0379	$453,820	$647,529	$193,709	1.43
Total Resource Cost Test (TRC) No Adder	$0.0379	$453,820	$588,663	$134,843	1.30
Utility Cost Test (UCT)	$0.0304	$364,810	$588,663	$223,853	1.61
Rate Impact Test (RIM)		$1,339,175	$588,663	-$750,513	0.44
Participant Cost Test (PCT)		$213,276	$1,098,631	$885,356	5.15
Lifecycle Revenue Impacts ($/kWh)					$0.0000123356
Discounted Participant Payback (years)					1.04

Table 9 - Wattsmart Business Energy Management Cost-Effectiveness Results (Load Shape – WA_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0442	$397,957	$322,077	-$75,879	0.81
Total Resource Cost Test (TRC) No Adder	$0.0442	$397,957	$292,797	-$105,159	0.74
Utility Cost Test (UCT)	$0.0420	$378,108	$292,797	-$85,311	0.77
Rate Impact Test (RIM)		$1,061,596	$292,797	-$768,798	0.28
Participant Cost Test (PCT)		$85,250	$748,889	$663,639	8.78
Lifecycle Revenue Impacts ($/kWh)					$0.0000632855
Discounted Participant Payback (years)					0.08

Table 10 - Wattsmart Business Food Service Equipment Cost-Effectiveness Results (Load Shape – WA_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0158	$3,559	$12,183	$8,624	3.42
Total Resource Cost Test (TRC) No Adder	$0.0158	$3,559	$11,076	$7,517	3.11
Utility Cost Test (UCT)	$0.0093	$2,099	$11,076	$8,977	5.28
Rate Impact Test (RIM)		$21,246	$11,076	-$10,170	0.52
Participant Cost Test (PCT)		$3,060	$20,747	$17,687	6.78
Lifecycle Revenue Impacts ($/kWh)					$0.0000001672
Discounted Participant Payback (years)					0.87

Table 11 - Wattsmart Business HVAC Cost-Effectiveness Results
(Load Shape – WA_School_HVAC_Aux)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0753	$380,796	$252,777	-$128,019	0.66
Total Resource Cost Test (TRC) No Adder	$0.0753	$380,796	$229,798	-$150,998	0.60
Utility Cost Test (UCT)	$0.0525	$265,498	$229,798	-$35,700	0.87
Rate Impact Test (RIM)		$674,923	$229,798	-$445,126	0.34
Participant Cost Test (PCT)		$221,486	$515,614	$294,127	2.33
Lifecycle Revenue Impacts ($/kWh)					$0.0000091553
Discounted Participant Payback (years)					2.85

Table 12 - Wattsmart Business Irrigation Cost-Effectiveness Results
(Load Shape – WA_Irrigation_General)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0532	$598,302	$614,852	$16,550	1.03
Total Resource Cost Test (TRC) No Adder	$0.0532	$598,302	$558,956	-$39,346	0.93
Utility Cost Test (UCT)	$0.0310	$348,590	$558,956	$210,366	1.60
Rate Impact Test (RIM)		$1,390,999	$558,956	-$832,043	0.40
Participant Cost Test (PCT)		$403,661	$1,196,358	$792,697	2.96
Lifecycle Revenue Impacts ($/kWh)					$0.0000146582
Discounted Participant Payback (years)					2.67

Table 13 - Wattsmart Business Lighting Cost-Effectiveness Results
(Load Shape – WA_Miscellaneous_Lighting)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0322	$2,683,843	$3,864,265	$1,180,422	1.44
Total Resource Cost Test (TRC) No Adder	$0.0322	$2,683,843	$3,512,968	$829,125	1.31
Utility Cost Test (UCT)	$0.0180	$1,504,270	$3,512,968	$2,008,698	2.34
Rate Impact Test (RIM)		$8,536,740	$3,512,968	-$5,023,772	0.41
Participant Cost Test (PCT)		$2,203,807	$8,056,705	$5,852,897	3.66
Lifecycle Revenue Impacts ($/kWh)					$0.0001127508
Discounted Participant Payback (years)					1.52

Table 14 - Wattsmart Business Motors Cost-Effectiveness Results (Load Shape – WA_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0431	$197,789	$247,645	$49,856	1.25
Total Resource Cost Test (TRC) No Adder	$0.0431	$197,789	$225,132	$27,343	1.14
Utility Cost Test (UCT)	$0.0242	$110,976	$225,132	$114,156	2.03
Rate Impact Test (RIM)		$479,749	$225,132	-$254,617	0.47
Participant Cost Test (PCT)		$144,297	$426,257	$281,960	2.95
Lifecycle Revenue Impacts ($/kWh)					$0.0000041850
Discounted Participant Payback (years)					2.78

Table 15 - Wattsmart Business Refrigeration Cost-Effectiveness Results (Load Shape – WA_Grocery_Refrigeration)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0567	$1,980,714	$1,873,989	-$106,724	0.95
Total Resource Cost Test (TRC) No Adder	$0.0567	$1,980,714	$1,703,627	-$277,087	0.86
Utility Cost Test (UCT)	$0.0413	$1,441,577	$1,703,627	$262,049	1.18
Rate Impact Test (RIM)		$4,407,171	$1,703,627	-$2,703,545	0.39
Participant Cost Test (PCT)		$1,001,425	$3,427,883	$2,426,458	3.42
Lifecycle Revenue Impacts ($/kWh)					$0.0000444362
Discounted Participant Payback (years)					2.12

In addition to the energy benefits reported above, irrigation and lighting measures in the Wattsmart Business program offer non-energy benefits (NEBs). Table 16 through Table 19 detail the non-energy benefits and cost-effectiveness results.

Table 16 - Wattsmart Business Non-Energy Benefits by Measure

Measure Category	Non-Energy Benefits Water ($/yr)	Non-Energy Benefits Other ($/yr)	Quantity	Measure Life	Total NEBs ($/yr)	Discount Rate	Total Net Present Value Benefits
Irrigation	$0	$4,914	4,352	14	$4,914	6.57%	$47,004
Lighting	$0	$320	39,493	11	$320	6.57%	$2,612

The following tables provide the cost-effectiveness results after adding in the non-energy benefits detailed above beginning with the overall program results.

Table 17 - Wattsmart Business Program (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0420	$6,779,391	$7,946,891	$1,167,500	1.17
Total Resource Cost Test (TRC) No Adder	$0.0420	$6,779,391	$7,228,862	$449,471	1.07
Utility Cost Test (UCT)	$0.0276	$4,453,677	$7,180,284	$2,726,607	1.61
Rate Impact Test (RIM)		$18,044,306	$7,180,284	-$10,864,022	0.40
Participant Cost Test (PCT)		$4,346,127	$15,659,620	$11,313,493	3.60
Lifecycle Revenue Impacts ($/kWh)					$0.0000202956
Discounted Participant Payback (years)					1.52

Table 18 - Wattsmart Business Irrigation (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0404	$598,302	$660,819	$62,517	1.10
Total Resource Cost Test (TRC) No Adder	$0.0404	$598,302	$604,923	$6,621	1.01
Utility Cost Test (UCT)	$0.0235	$348,590	$558,956	$210,366	1.60
Rate Impact Test (RIM)		$1,390,999	$558,956	-$832,043	0.40
Participant Cost Test (PCT)		$403,661	$1,242,325	$838,664	3.08
Lifecycle Revenue Impacts ($/kWh)					$0.0000146582
Discounted Participant Payback (years)					2.67

Table 19 - Wattsmart Business Lighting (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0336	$2,683,843	$3,866,877	$1,183,034	1.44
Total Resource Cost Test (TRC) No Adder	$0.0336	$2,683,843	$3,515,580	$831,737	1.31
Utility Cost Test (UCT)	$0.0189	$1,504,270	$3,512,968	$2,008,698	2.34
Rate Impact Test (RIM)		$8,536,740	$3,512,968	-$5,023,772	0.41
Participant Cost Test (PCT)		$2,203,807	$8,059,317	$5,855,509	3.66
Lifecycle Revenue Impacts ($/kWh)					$0.0001127508
Discounted Participant Payback (years)					1.52

Guidehouse

Memorandum

To: Nicole Karpavich and Alesha Pino, PacifiCorp

From: David Basak, Guidehouse

Date: April 15, 2020

Re: Cost-Effectiveness Results for the Home Energy Savings Program - Washington

Guidehouse estimated the cost-effectiveness results for the Washington Home Energy Savings Program, based on 2019 costs and savings estimates provided by PacifiCorp. This memo provides the cost-effectiveness results for the overall program and for the 8 measure categories.

Cost-effectiveness was tested using the 2017 IRP decrement for all measure categories. The program passes the cost-effectiveness for the PCT tests. The memo consists of the following tables.

Table 1 - Home Energy Savings Inputs
Table 2 - Home Energy Savings Annual Program Costs
Table 3 - Home Energy Savings – Savings by Measure Category
Table 4 - Benefit/Cost Ratios by Measure Category
Table 5 - Home Energy Savings Program Level (without NEBs) Cost-Effectiveness Results
Table 6 - Home Energy Savings Appliances Cost-Effectiveness Results
Table 7 - Home Energy Savings Building Shell Cost-Effectiveness Results
Table 8 - Home Energy Savings Energy Kits – DHW Cost-Effectiveness Results
Table 9 - Home Energy Savings Energy Kits – Lighting Cost-Effectiveness Results
Table 10 - Home Energy Savings HVAC Cost-Effectiveness Results
Table 11 - Home Energy Savings Lighting Cost-Effectiveness Results
Table 12 - Home Energy Savings Water Heating Cost-Effectiveness Results
Table 13 - Home Energy Savings Whole Home Cost-Effectiveness Results
Table 14 - Home Energy Savings Non-Energy Benefits by Measure
Table 15 - Home Energy Savings Program (with NEBs) Cost-Effectiveness Results
Table 16 - Home Energy Savings Appliances (with NEBs) Cost-Effectiveness Results
Table 17 - Home Energy Savings Building Shell (with NEBs) Cost-Effectiveness Results
Table 18 - Home Energy Savings Energy Kit – DHW (with NEBs) Cost-Effectiveness Results
Table 19 - Home Energy Savings Energy Kit – Lighting (with NEBs) Cost-Effectiveness Results
Table 20 - Home Energy Savings HVAC (with NEBs) Cost-Effectiveness Results
Table 21 - Home Energy Savings Lighting (with NEBs) Cost-Effectiveness Results
Table 22 - Home Energy Savings Whole Home (with NEBs) Cost-Effectiveness Results

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Table 1 - Home Energy Savings Inputs

Parameter	Value
Discount Rate	6.57%
Residential Line Loss	9.67%
Residential Energy Rate ($/kWh)[1]	$0.0869
Inflation Rate	2.20%

[1] Future rates determined using a 2.20% annual escalator.

Table 2 - Home Energy Savings Annual Program Costs

Measure Category	Engineering Costs	Utility Admin	Program Delivery	Program Dev.	Incentives	Total Utility Costs	Gross Customer Costs
Appliances	$0	$111	$4,202	$76	$8,300	$12,689	$49,504
Building Shell	$0	$1,147	$43,467	$790	$80,096	$125,501	$364,948
Energy Kits - DHW	$0	$2,210	$36,817	$1,522	$8,217	$48,766	$8,217
Energy Kits - Lighting	$0	$41	$675	$28	$1,061	$1,805	$1,061
HVAC	$0	$14,686	$556,574	$10,116	$848,775	$1,430,151	$2,221,439
Lighting	$0	$17,152	$330,950	$11,815	$305,540	$665,456	$310,663
Water Heating	$0	$179	$6,782	$123	$8,900	$15,984	$14,756
Whole Home	$0	$1,577	$59,757	$1,086	$147,100	$209,519	$300,537
Total	**$0**	**$37,101**	**$1,039,224**	**$25,556**	**$1,407,990**	**$2,509,871**	**$3,271,127**

Table 3 - Home Energy Savings – Savings by Measure Category

Measure Category	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings	Net to Gross Ratio	Net kWh Savings	Measure Life
Appliances	17,208	100%	17,208	100%	17,208	14
Building Shell	178,025	100%	178,025	100%	178,025	45
Energy Kits - DHW	343,014	100%	343,014	100%	343,014	9
Energy Kits - Lighting	6,290	100%	6,290	100%	6,290	5
HVAC	2,279,506	80%	1,823,605	100%	1,823,605	15
Lighting	2,662,335	100%	2,662,335	100%	2,662,335	4
Water Heating	27,775	100%	27,775	100%	27,775	13
Whole Home	244,739	100%	244,739	100%	244,739	31
Total	**5,758,893**	**92%**	**5,302,992**	**100%**	**5,302,992**	**11**

Table 4 - Benefit/Cost Ratios by Measure Category

Measure Group	PTRC	TRC	UCT	RIM	PCT
Appliances	0.17	0.15	0.66	0.29	0.50
Appliances with NEBs	0.61	0.60	0.66	0.29	0.98
Building Shell	0.57	0.52	1.69	0.47	1.12
Building Shell with NEBs	0.64	0.59	1.69	0.47	1.19
Energy Kits - DHW	2.15	1.95	1.95	0.34	29.39
Energy Kits - DHW with NEBs	10.55	10.35	1.95	0.34	79.23
Energy Kits - Lighting	0.57	0.52	0.52	0.21	3.42
Energy Kits - Lighting with NEBs	0.94	0.89	0.52	0.21	4.06
HVAC	0.39	0.35	0.69	0.30	1.21
HVAC with NEBs	0.44	0.41	0.69	0.30	1.28
Lighting	0.51	0.47	0.47	0.20	3.85
Lighting with NEBs	0.95	0.91	0.47	0.20	4.79
Water Heating	0.62	0.56	0.77	0.30	2.31
Whole Home	0.74	0.67	1.16	0.41	1.77
Whole Home with NEBs	0.75	0.68	1.16	0.41	1.79
Total	**0.47**	**0.43**	**0.75**	**0.30**	**1.57**
Total with NEBs	**0.68**	**0.64**	**0.75**	**0.30**	**1.85**

Table 5 - Home Energy Savings Program Level (without NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1095	$4,373,008	$2,061,670	-$2,311,338	0.47
Total Resource Cost Test (TRC) No Adder	$0.1095	$4,373,008	$1,874,245	-$2,498,763	0.43
Utility Cost Test (UCT)	$0.0629	$2,509,871	$1,874,245	-$635,626	0.75
Rate Impact Test (RIM)		$6,230,948	$1,874,245	-$4,356,703	0.30
Participant Cost Test (PCT)		$3,271,127	$5,129,067	$1,857,940	1.57
Lifecycle Revenue Impacts ($/kWh)					$0.0000078865
Discounted Participant Payback (years)					4.23

Table 6 through Table 13 provides cost-effectiveness results without NEBs for all 8 measures.

Table 6 - Home Energy Savings Appliances Cost-Effectiveness Results (Load Shape – Residential_ERWH_7P)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.3038	$53,893	$9,168	-$44,725	0.17
Total Resource Cost Test (TRC) No Adder	$0.3038	$53,893	$8,334	-$45,558	0.15
Utility Cost Test (UCT)	$0.0715	$12,689	$8,334	-$4,354	0.66
Rate Impact Test (RIM)		$29,220	$8,334	-$20,885	0.29
Participant Cost Test (PCT)		$49,504	$24,831	-$24,673	0.50
Lifecycle Revenue Impacts ($/kWh)					$0.0000003679
Discounted Participant Payback (years)					n/a

Table 7 - Home Energy Savings Building Shell Cost-Effectiveness Results (Load Shape – WA_Single_Family_Heat_pump)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1179	$410,353	$233,962	-$176,391	0.57
Total Resource Cost Test (TRC) No Adder	$0.1179	$410,353	$212,692	-$197,660	0.52
Utility Cost Test (UCT)	$0.0361	$125,501	$212,692	$87,192	1.69
Rate Impact Test (RIM)		$452,483	$212,692	-$239,791	0.47
Participant Cost Test (PCT)		$364,948	$407,078	$42,130	1.12
Lifecycle Revenue Impacts ($/kWh)					$0.0000013090
Discounted Participant Payback (years)					26.78

Table 8 - Home Energy Savings Energy Kits – DHW Cost-Effectiveness Results (Load Shape – Residential_ERWH_7P)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0194	$48,766	$104,763	$55,997	2.15
Total Resource Cost Test (TRC) No Adder	$0.0194	$48,766	$95,239	$46,473	1.95
Utility Cost Test (UCT)	$0.0194	$48,766	$95,239	$46,473	1.95
Rate Impact Test (RIM)		$282,017	$95,239	-$186,778	0.34
Participant Cost Test (PCT)		$8,217	$241,468	$233,251	29.39
Lifecycle Revenue Impacts ($/kWh)					$0.0000051268
Discounted Participant Payback (years)					n/a

Table 9 - Home Energy Savings Energy Kits – Lighting Cost-Effectiveness Results (Load Shape – Residential_Lighting_7P)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0651	$1,805	$1,024	-$781	0.57
Total Resource Cost Test (TRC) No Adder	$0.0651	$1,805	$931	-$874	0.52
Utility Cost Test (UCT)	$0.0651	$1,805	$931	-$874	0.52
Rate Impact Test (RIM)		$4,378	$931	-$3,448	0.21
Participant Cost Test (PCT)		$1,061	$3,635	$2,573	3.42
Lifecycle Revenue Impacts ($/kWh)					$0.0000001704
Discounted Participant Payback (years)					n/a

Table 10 - Home Energy Savings HVAC Cost-Effectiveness Results (Load Shape – WA_Single_Family_Heat_Pump)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1418	$2,802,814	$1,088,071	-$1,714,743	0.39
Total Resource Cost Test (TRC) No Adder	$0.1418	$2,802,814	$989,156	-$1,813,659	0.35
Utility Cost Test (UCT)	$0.0724	$1,430,151	$989,156	-$440,995	0.69
Rate Impact Test (RIM)		$3,272,140	$989,156	-$2,282,984	0.30
Participant Cost Test (PCT)		$2,221,439	$2,690,764	$469,325	1.21
Lifecycle Revenue Impacts ($/kWh)					$0.0000375237
Discounted Participant Payback (years)					10.20

Table 11 - Home Energy Savings Lighting Cost-Effectiveness Results (Load Shape – Residential_Lighting_7P)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0700	$670,580	$344,363	-$326,217	0.51
Total Resource Cost Test (TRC) No Adder	$0.0700	$670,580	$313,057	-$357,523	0.47
Utility Cost Test (UCT)	$0.0695	$665,456	$313,057	-$352,400	0.47
Rate Impact Test (RIM)		$1,554,643	$313,057	-$1,241,586	0.20
Participant Cost Test (PCT)		$310,663	$1,194,727	$884,063	3.85
Lifecycle Revenue Impacts ($/kWh)					$0.0000766868
Discounted Participant Payback (years)					0.02

Table 12 - Home Energy Savings Water Heating Cost-Effectiveness Results (Load Shape – Residential_HPWH_7P)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0806	$21,840	$13,499	-$8,342	0.62
Total Resource Cost Test (TRC) No Adder	$0.0806	$21,840	$12,271	-$9,569	0.56
Utility Cost Test (UCT)	$0.0590	$15,984	$12,271	-$3,712	0.77
Rate Impact Test (RIM)		$41,235	$12,271	-$28,964	0.30
Participant Cost Test (PCT)		$14,756	$34,151	$19,395	2.31
Lifecycle Revenue Impacts ($/kWh)					$0.0000005498
Discounted Participant Payback (years)					2.45

Table 13 - Home Energy Savings Whole Home Cost-Effectiveness Results (Load Shape – WA_Single_Family_Heat_pump)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0882	$362,957	$266,821	-$96,136	0.74
Total Resource Cost Test (TRC) No Adder	$0.0882	$362,957	$242,564	-$120,393	0.67
Utility Cost Test (UCT)	$0.0509	$209,519	$242,564	$33,045	1.16
Rate Impact Test (RIM)		$594,832	$242,564	-$352,268	0.41
Participant Cost Test (PCT)		$300,537	$532,412	$231,875	1.77
Lifecycle Revenue Impacts ($/kWh)					$0.0000027937
Discounted Participant Payback (years)					8.17

In addition to the energy benefits reported above, appliances, building envelope, energy savings kits, HVAC, lighting, and whole home in the Home Energy Savings program offer significant non-energy benefits (NEBs). Table 14 through Table 22 detail the non-energy benefits and cost-effectiveness results.

Table 14 - Home Energy Savings Non-Energy Benefits by Measure

Measure Category	Non-Energy Benefits Water ($/yr)	Non-Energy Benefits Other ($/yr)	Quantity	Measure Life	Total NEBs ($/yr)	Discount Rate	Total Net Present Value Benefits
Appliances	$2,479	$9	111	14	$2,488	6.57%	$23,798
Building Envelope	$0	$1,883	301,316	45	$1,883	6.57%	$28,801
Energy Kits - DHW	$57,355	$562	647	9	$57,917	6.57%	$409,595
Energy Kits - Lighting	$0	$152	183	5	$152	6.57%	$674
HVAC	$0	$15,031	1,107	15	$15,031	6.57%	$149,945
Lighting	$0	$80,654	207,227	4	$80,654	6.57%	$293,990
Water Heating	$0	$0	20	13	$0	6.57%	$0
Whole Home	$0	$382	79	31	$382	6.57%	$5,337
Total NEBs	**$59,834**	**$98,674**	**510,690**	**11**	**$158,508**	**6.57%**	**$912,139**

The following table provides the cost-effectiveness results after adding in the non-energy benefits detailed above beginning with the overall program results.

Table 15 - Home Energy Savings Program (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1095	$4,373,008	$2,973,808	-$1,399,200	0.68
Total Resource Cost Test (TRC) No Adder	$0.1095	$4,373,008	$2,786,384	-$1,586,624	0.64
Utility Cost Test (UCT)	$0.0629	$2,509,871	$1,874,245	-$635,626	0.75
Rate Impact Test (RIM)		$6,230,948	$1,874,245	-$4,356,703	0.30
Participant Cost Test (PCT)		$3,271,127	$6,041,206	$2,770,079	1.85
Lifecycle Revenue Impacts ($/kWh)					$0.0000078865
Discounted Participant Payback (years)					4.23

The following tables provide the cost-effectiveness results after adding in the non-energy benefits for the measure categories receiving NEBs.

Table 16 - Home Energy Savings Appliances (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.3038	$53,893	$32,966	-$20,927	0.61
Total Resource Cost Test (TRC) No Adder	$0.3038	$53,893	$32,132	-$21,761	0.60
Utility Cost Test (UCT)	$0.0715	$12,689	$8,334	-$4,354	0.66
Rate Impact Test (RIM)		$29,220	$8,334	-$20,885	0.29
Participant Cost Test (PCT)		$49,504	$48,629	-$875	0.98
Lifecycle Revenue Impacts ($/kWh)					$0.0000003679
Discounted Participant Payback (years)					n/a

Table 17 - Home Energy Savings Building Shell (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1179	$410,353	$262,763	-$147,590	0.64
Total Resource Cost Test (TRC) No Adder	$0.1179	$410,353	$241,494	-$168,859	0.59
Utility Cost Test (UCT)	$0.0361	$125,501	$212,692	$87,192	1.69
Rate Impact Test (RIM)		$452,483	$212,692	-$239,791	0.47
Participant Cost Test (PCT)		$364,948	$435,880	$70,932	1.19
Lifecycle Revenue Impacts ($/kWh)					$0.0000013090
Discounted Participant Payback (years)					26.78

Table 18 - Home Energy Savings Energy Kit – DHW (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0194	$48,766	$514,358	$465,592	10.55
Total Resource Cost Test (TRC) No Adder	$0.0194	$48,766	$504,834	$456,068	10.35
Utility Cost Test (UCT)	$0.0194	$48,766	$95,239	$46,473	1.95
Rate Impact Test (RIM)		$282,017	$95,239	-$186,778	0.34
Participant Cost Test (PCT)		$8,217	$651,063	$642,846	79.23
Lifecycle Revenue Impacts ($/kWh)					$0.0000051268
Discounted Participant Payback (years)					n/a

Table 19 - Home Energy Savings Energy Kit – Lighting (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0651	$1,805	$1,697	-$108	0.94
Total Resource Cost Test (TRC) No Adder	$0.0651	$1,805	$1,604	-$201	0.89
Utility Cost Test (UCT)	$0.0651	$1,805	$931	-$874	0.52
Rate Impact Test (RIM)		$4,378	$931	-$3,448	0.21
Participant Cost Test (PCT)		$1,061	$4,308	$3,247	4.06
Lifecycle Revenue Impacts ($/kWh)					$0.0000001704
Discounted Participant Payback (years)					n/a

Table 20 - Home Energy Savings HVAC (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1418	$2,802,814	$1,238,016	-$1,564,798	0.44
Total Resource Cost Test (TRC) No Adder	$0.1418	$2,802,814	$1,139,101	-$1,663,713	0.41
Utility Cost Test (UCT)	$0.0724	$1,430,151	$989,156	-$440,995	0.69
Rate Impact Test (RIM)		$3,272,140	$989,156	-$2,282,984	0.30
Participant Cost Test (PCT)		$2,221,439	$2,840,709	$619,270	1.28
Lifecycle Revenue Impacts ($/kWh)					$0.0000375237
Discounted Participant Payback (years)					10.20

Table 21 - Home Energy Savings Lighting (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0700	$670,580	$638,352	-$32,228	0.95
Total Resource Cost Test (TRC) No Adder	$0.0700	$670,580	$607,047	-$63,534	0.91
Utility Cost Test (UCT)	$0.0695	$665,456	$313,057	-$352,400	0.47
Rate Impact Test (RIM)		$1,554,643	$313,057	-$1,241,586	0.20
Participant Cost Test (PCT)		$310,663	$1,488,716	$1,178,053	4.79
Lifecycle Revenue Impacts ($/kWh)					$0.0000766868
Discounted Participant Payback (years)					0.02

Table 22 - Home Energy Savings Whole Home (with NEBs) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0882	$362,957	$272,157	-$90,800	0.75
Total Resource Cost Test (TRC) No Adder	$0.0882	$362,957	$247,901	-$115,056	0.68
Utility Cost Test (UCT)	$0.0509	$209,519	$242,564	$33,045	1.16
Rate Impact Test (RIM)		$594,832	$242,564	-$352,268	0.41
Participant Cost Test (PCT)		$300,537	$537,749	$237,212	1.79
Lifecycle Revenue Impacts ($/kWh)					$0.0000027937
Discounted Participant Payback (years)					8.17

Guidehouse

Memorandum

To: Nicole Karpavich and Alesha Pino, PacifiCorp

From: David Basak, Guidehouse

Date: April 15, 2020

Re: Cost-Effectiveness Results for the Home Energy Reporting Program - Washington

Guidehouse estimated the cost-effectiveness results for the Washington Home Energy Reporting Program, based on 2019 costs and savings estimates provided by PacifiCorp. This memo provides the cost-effectiveness results for the overall program.

Cost-effectiveness was tested using the 2017 IRP decrement. The program passes the cost-effectiveness for all the tests except the RIM and PCT tests.

Table 1 - Home Energy Reporting Inputs
Table 2 - Home Energy Reporting Annual Program Costs
Table 3 - Home Energy Reporting Savings
Table 4 - HER Program Level Cost-Effectiveness Results

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Table 1 - Home Energy Reporting Inputs

Parameter	Value
Discount Rate	6.57%
Residential Line Loss	9.67%
Residential Energy Rate ($/kWh)[1]	$0.0869
Inflation Rate	2.20%

[1] Future rates determined using a 2.20% annual escalator.

Table 2 - Home Energy Reporting Annual Program Costs

Measure Category	Engineering Costs	Utility Admin	Program Delivery	Program Dev.	Incentives	Total Utility Costs	Gross Customer Costs
HER Program	$0	$21,023	$211,393	$977	$0	$233,392	$0

Table 3 - Home Energy Reporting Savings

Measure Category	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings	Net to Gross Ratio	Net kWh Savings	Measure Life
HER Program	8,366,413	100%	8,366,413	100%	8,366,413	2

Table 4 - HER Program Level Cost-Effectiveness Results (Load Shape – WA_Single_Family_Heat_Pump)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0149	$233,392	$544,800	$311,408	2.33
Total Resource Cost Test (TRC) No Adder	$0.0149	$233,392	$495,273	$261,881	2.12
Utility Cost Test (UCT)	$0.0149	$233,392	$495,273	$261,881	2.12
Rate Impact Test (RIM)		$1,688,996	$495,273	-$1,193,723	0.29
Participant Cost Test (PCT)		$0	$1,455,604	$1,455,604	n/a
Lifecycle Revenue Impacts ($/kWh)					$0.0001472856
Discounted Participant Payback (years)					n/a

Guidehouse

Memorandum

To: Nicole Karpavich and Alesha Pino, PacifiCorp

From: David Basak, Guidehouse

Date: April 15, 2020

Re: Cost-Effectiveness Results for the Low Income Weatherization Program - Washington

Guidehouse estimated the cost-effectiveness results for the Washington Low Income Weatherization Program, based on 2019 costs and savings estimates provided by PacifiCorp. This memo provides the cost-effectiveness results for the overall program.

Cost-effectiveness was tested using the 2017 IRP decrement. The program does not pass any of the cost-effectiveness tests.

Table 1 - Low Income Weatherization Inputs
Table 2 - Low Income Weatherization Annual Program Costs
Table 3 - Low Income Weatherization Savings by Measure Category
Table 4 - Low Income Weatherization Program Level Cost-Effectiveness Results
Table 5 - Low Income Weatherization Non-Energy Benefits
Table 6 - Low Income Weatherization Program (with NEBs) Level Cost-Effectiveness Results

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Table 1 - Low Income Weatherization Inputs

Parameter	Value
Discount Rate	6.57%
Residential Line Loss	9.67%
Residential Energy Rate ($/kWh)[1]	$0.0869
Inflation Rate	2.20%

[1] Future rates determined using a 2.20% annual escalator.

Table 2 - Low Income Weatherization Annual Program Costs

Measure Category	Engineering Costs	Utility Admin	Program Delivery	Program Dev.	Inspection Costs	Incentives	Total Utility Costs	Gross Customer Costs
Low Income Weatherization	$0	$21,496	$61,620	$364	$5,260	$441,492	$530,233	$0
Total	**$0**	**$21,496**	**$61,620**	**$364**	**$5,260**	**$441,492**	**$530,233**	**$0**

Table 3 - Low Income Weatherization Savings by Measure Category

Measure Category	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings	Net to Gross Ratio	Net kWh Savings	Measure Life
Low Income Weatherization	166,912	100%	166,912	100%	166,912	24
Total	**166,912**	**100%**	**166,912**	**100%**	**166,912**	**24**

Table 4 - Low Income Weatherization Program Level Cost-Effectiveness Results (Load Shape – WA_Single_Family_Heat_Pump)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.2163	$530,233	$152,138	-$378,095	0.29
Total Resource Cost Test (TRC) No Adder	$0.2163	$530,233	$138,307	-$391,926	0.26
Utility Cost Test (UCT)	$0.2163	$530,233	$138,307	-$391,926	0.26
Rate Impact Test (RIM)		$759,395	$138,307	-$621,088	0.18
Participant Cost Test (PCT)		$0	$670,654	$670,654	n/a
Lifecycle Revenue Impacts ($/kWh)					$0.0000063672
Discounted Participant Payback (years)					n/a

In addition to the energy benefits reported above, the Low Income program offers significant non-energy benefits (NEBs). Table 5 details the non-energy benefits and Table 6 provides the cost-effectiveness results.

Table 5 - Low Income Weatherization Non-Energy Benefits

Non-Energy Benefit	Program Impact	Perspective Adjusted
Home Repair Costs	$30,624.61	PTRC, TRC
Economic Benefit	$402,976.97	PTRC, TRC
Arrearage	-$2,436.00	PTRC, TRC, UCT, RIM
Payment Assistance	$20,184.00	PTRC, TRC
Total	**$451,349.58**	-

Table 6 - Low Income Weatherization Program (with NEBs) Level Cost-Effectiveness Results (Load Shape – WA_Single_Family_Heat_Pump)

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.2163	$530,233	$603,487	$73,254	1.14
Total Resource Cost Test (TRC) No Adder	$0.2163	$530,233	$589,657	$59,424	1.11
Utility Cost Test (UCT)	$0.2163	$530,233	$135,871	-$394,362	0.26
Rate Impact Test (RIM)		$759,395	$135,871	-$623,524	0.18
Participant Cost Test (PCT)		$0	$670,654	$670,654	n/a
Lifecycle Revenue Impacts ($/kWh)					$0.0000066711
Discounted Participant Payback (years)					n/a

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Appendix 2
Washington Measure Installation Verifications

Washington Measure Installation Verifications

Home Energy Savings

Site inspections by Program Administrator staff for the following retrofit and/or new homes measures. Inspections are performed on >=5 percent of single family homes, >=5 percent of manufactured homes, 100 percent of multifamily projects, and 20 percent of new homes projects.

- Central air conditioning best practices installation and sizing
- Duct sealing
- Duct sealing and insulation
- Ductless heat pumps
- Heat pump conversion
- Heat pump upgrade
- Heat pump performance tested comfort systems, commissioning, controls, and sizing
- Heat pump water heaters
- Insulation (attic, floor, wall)
- Whole Homes Performance Path

No site inspections are conducted for the following measures. However, all post-purchase incented measures undergo a quality assurance review prior to the issuance of the customer/dealer incentive and recording of savings (e.g. proof of purchase receipt review) and eligible equipment review. Additionally, customer account and customer address are checked to ensure the Company does not double pay for the same measure or double count measure savings.

- Clothes washers
- Evaporative coolers
- Freezers
- Smart thermostats
- Windows

No site inspections are conducted for the following measures, which are delivered via an upstream, manufacturer buy-down model. Promotion agreement contracts are signed with manufacturers and retailers to set incentive levels, final product prices, and limits to the total number of units that can be purchased per customer. Program Administrator verifies measures for product eligibility and correct pricing. Pricing is also verified by Program Administrator field visits to retail locations.

- CFL bulbs
- LED bulbs
- Light fixtures (upstream)
- Room air conditioners

Customer eligibility for Wattsmart Starter Kits is verified using the customer's account number and last name and cross-verifying with the current PacifiCorp customer database to ensure the customer has not received a Kit within the last ten years.

Low Income Weatherization

All projects

- All measures are qualified through US Department of Energy approved audit tool or priority list.
- 100 percent inspection by agency inspector of all homes treated, reconciling work completed and quality (corrective action includes measure verification) prior to invoicing Company.
- State inspector follows with random inspections.

The Company hires independent inspector to inspect between 5-10 percent of homes treated (post treatment and payment).

Wattsmart Business

Lighting projects (typical upgrades, small business and midmarket/instant incentive offer)

- Retrofits - 100 percent pre- and post-installation site inspections of all projects with incentives over a specified dollar amount. Project cost documentation reviewed for all projects.
- New construction - 100 percent post-installation site inspections of all projects with incentives over a specified dollar amount.
- A percent of post-installation site inspections by program administrator of projects with incentives under a specified dollar amount. For the midmarket/instant incentive offer, these inspections are done by phone.

For typical upgrades, required inspections are performed by the program administrator[1]. For the small business and instant incentive offers, required inspections are performed by the program administrator.

Non-lighting projects (typical upgrades/listed measures where savings is deemed)

- 100 percent of applications with an incentive that exceeds a specified dollar amount will be inspected (via site inspection) (typically by program administrator).
- A minimum of a specified percent of remaining non-lighting applications will be inspected, either in person or via telephone interview, (typically by program administrator).

Non-lighting projects (typical upgrades/listed measures where savings is determined using a simplified analysis tool)

- 100 percent of applications with project savings that exceeds a specified threshold will be inspected (via site inspection) (typically by program administrator).
- A minimum of a specified percent of remaining non-lighting applications will be inspected, either in person or via telephone interview, (typically by program administrator).

Custom projects

- 100 percent pre/post-installation inspections, invoice reconciled to inspection results. On-site pre/post inspections are required for projects with savings over a specified threshold. For projects with savings below the threshold, inspection information may be collected by phone or email.
- No pre-inspection for new construction.
- Inspections are conducted by the managed account delivery provider (Cascade Energy)[2] for the in-house project manager/managed account delivery channel.

[1] In 2019, responsibility for these required inspections transitioned from a third party consultant to the program administrator.

[2] In 2019, responsibility for these inspections transitioned from energy engineering firms to the managed account delivery contract provider.

- Inspections are conducted by outsourced delivery team for projects delivered by third party outsourced program delivery teams.

All Programs

As part of the third-party program evaluations (two-year cycle) process, the Company has implemented semi-annual customer surveys to collect evaluation-relevant data more frequently to cure for memory loss and other detractors such as customers moving and data not be readily available at evaluation time). This will serve as a further check verifying customer participation and measures installed.

Additional record reviews and site inspections (including metering/data logging) is conducted as part of the process and impact evaluations, a final verification of measure installations.

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Appendix 3
Home Energy Savings Retailers

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Participating Upstream/Midstream Lighting Retailers and Redemptions

The Company worked with 45 lighting retailers in 2019 to promote efficient lighting. Table 1 lists the retailer and the type of redemption(s) provided.

Table 1[1]
Participating Upstream/Midstream Lighting Retailers and Redemptions

Retailer	City	State	LEDs	Fixtures
Ace Hardware - Stein's #7047	Yakima	WA	✓	✓
Ace Hardware #15365	Kennewick	WA	✓	
Ace Hardware #14426	Naches	WA	✓	
Ace Hardware Hometown #11909	Yakima	WA	✓	
Ace Hardware Roy's #10640	Yakima	WA	✓	
Batteries Plus #250	Kennewick	WA	✓	
Batteries Plus #654	Yakima	WA	✓	✓
Batteries Plus #967	Walla Walla	WA	✓	
Best Buy #831	Yakima	WA	✓	
Best Buy #590	Kennewick	WA	✓	
Bi-Mart #619	Walla Walla	WA	✓	✓
Bi-Mart #636	Sunnyside	WA	✓	
Costco #486	Kennewick	WA	✓	✓
Costco #1013	Union Gap	WA	✓	✓
Dollar Tree #2387	Yakima	WA	✓	
Dollar Tree #2691	Walla Walla	WA	✓	
Dollar Tree #2696	Kennewick	WA	✓	
Dollar Tree #5342	Yakima	WA	✓	
Dollar Tree #5863	Walla Walla	WA	✓	
Dollar Tree #3450	Kennewick	WA	✓	
Dollar Tree #4295	Yakima	WA	✓	
Fred Meyer #163	Kennewick	WA	✓	
Fred Meyer #486	Yakima	WA	✓	✓
Goodwill	Kennewick	WA	✓	✓
Goodwill	Selah	WA	✓	✓
Goodwill	Walla Walla	WA	✓	✓
Goodwill	Yakima	WA	✓	✓

[1] To be considered as a participating retailer for discounted lighting products, the retailer's sales coming from Pacific Power customers must be a significant majority of their total sales.

Retailer	City	State	LEDs	Fixtures
Grocery Outlet	Kennewick	WA	✓	
Habitat For Humanity (Yakima, 1st St)	Yakima	WA	✓	✓
Habitat For Humanity (Yakima, Mead Ave)	Yakima	WA	✓	✓
Home Depot #4727	Yakima	WA	✓	✓
Home Depot #4735	College Place	WA	✓	✓
Home Depot #4739	Kennewick	WA	✓	✓
Hometown Ace Hardware #11909	Yakima	WA	✓	✓
Lowe's #249	Kennewick	WA	✓	
Lowe's #3240	Yakima	WA	✓	✓
Target #760	Yakima	WA	✓	
Target #830	Kennewick	WA	✓	
True Value (Helms)	Selah	WA	✓	
True Value Hardware – Country Farm and Garden	Yakima	WA	✓	
True Value Hardware #5353	Selah	WA	✓	
Wal-Mart - Supercenter #2101	Kennewick	WA	✓	
Wal-Mart - Supercenter #5078	Yakima	WA	✓	✓
Wal-Mart #2269	Yakima	WA	✓	✓

Downstream Retailers

Eighteen **participating** retailers provided redemptions for downstream clothes washers, evaporative coolers, self-installed heat pump water heaters, attic insulation, floor insulation, wall insulation, smart thermostats, and windows.

Table 2
Downstream Retailers

Participating Retailer (Retailers who are not actively enrolled in the program)	City	State	Clothes Washer	Evaporative Cooler - Tier 2	Heat Pump Water Heater, Self-installed	Insulation-Attic	Insulation-Floor	Insulation- Wall	Smart Thermostat	Windows
Bemis Home Appliance & Tv Ctr	Yakima	WA	✓							
Best Buy #831	Yakima	WA	✓						✓	
Costco #1013	Union Gap	WA							✓	
Elgin's Appliance Center	Milton-Freewater	WA	✓							
Ferguson Enterprises	Walla Walla	WA	✓							
Ferguson Enterprises	Yakima	WA	✓							
Fred Meyer #486	Yakima	WA							✓	
Home Depot #4727	Yakima	WA	✓	✓	✓	✓	✓	✓	✓	
Home Depot #4735	College Place	WA	✓		✓	✓			✓	✓
Lowe's #3240	Yakima	WA	✓		✓	✓			✓	
Lowe's of Pasco	Pasco	WA	✓						✓	
Sears #2029	Union Gap	WA	✓							
Sears #6914	Walla Walla	WA	✓							
Target #760	Yakima	WA							✓	
Wal-Mart #2241	Sunnyside	WA							✓	
Wal-Mart #2269	Yakima	WA							✓	
Wal-Mart #5078	Yakima	WA							✓	

Ten **non-participating** retailers provided redemptions for downstream clothes washers, heat pump water heaters, and smart thermostats. Some retailers are located outside Pacific Power's service territory. However, the customer resides with the service territory.

Table 3
Non-Participating Retailers

Redemptions from Non-Participating Retailer's (Retailer may not be located in the service territory)	City	State	Clothes Washer	Heat Pump Water Heater, Self-installed	Smart Thermostat
Amazon.com	Seattle	WA			✓
Appliances Connection	Yakima	WA	✓		
BestBuy.com	N/A		✓		✓
Costco	Yakima	WA	✓		
Home Depot	Waitsburg	WA	✓		
Home Depot	Walla Walla	WA	✓		
Lowe's	Grandview	WA		✓	
Lowe's	Tieton	WA	✓		
Sears	College Place	WA	✓		
Sears	Zillah	WA	✓		

The Company worked with 30 HVAC trade allies. Some trade allies are located outside Pacific Power's service territory. However, the customer resides with the service territory.

Table 4
HVAC Trade Ally

Trade Ally (Trade ally may be located outside of the territory)	City	State	Central Air Conditioner Equipment	Duct Sealing	Duct Sealing and Duct Insulation	Electric System to Heat Pump Conversion	Heat Pump to Heat Pump Upgrade	Heat Pump - PTCS Commissioning, Controls, and	Heat Pump, Ductless
Absolute Comfort Technology, LLC	Yakima	WA	✓			✓	✓	✓	✓
Absolute Electrical Heating and Air		WA							✓
AccuTemp Heating and Air Conditioning	Yakima	WA				✓			
Ackerman Heating & Air		WA							✓
American Air Heating and Conditioning	Walla Walla	WA	✓			✓	✓		✓
Aztec Heating & Air		WA				✓			✓
Blaze to Blizzard Heating & Cooling	Walla Walla	WA				✓			
Brian Dow Heat & Air LLC		WA							✓
Campbell & Company	Pasco	WA	✓	✓		✓	✓		✓
Central Mechanical Services		WA					✓		
Chapman Heating & Air Conditioning Inc	Dayton	WA							✓
Chinook Heating & Air Inc	Kennewick	WA					✓		
CK Home Comfort Systems	Grandview	WA				✓			✓
College Place Heating & Air Conditioning	College Place	WA	✓			✓	✓	✓	✓
Comfort Pro's Heating & Air Conditioning	Yakima	WA					✓		✓
Dave's Heating and Cooling		WA				✓			
Dayco Inc	Kennewick	WA				✓	✓	✓	
Don Jordan Energy Systems		WA			✓				
Farwest Climate Control	Yakima	WA				✓	✓		✓
Four Seasons HVAC	Yakima	WA				✓			✓
Jacobs & Rhodes, Inc.	Kennewick	WA				✓			
Mill Creek Mechanical		WA					✓		
Miller & Team Heating & AC	Zillah	WA				✓			✓
Platte Heating & AC		WA					✓		
ThermAll Heating & Cooling Inc	Yakima	WA			✓	✓	✓	✓	✓
TNG Heating & Refrigeration	Zillah	WA							✓
Total Quality Air		WA				✓	✓		✓

Trade Ally (Trade ally may be located outside of the territory)	City	State	Central Air Conditioner Equipment	Duct Sealing	Duct Sealing and Duct Insulation	Electric System to Heat Pump Conversion	Heat Pump to Heat Pump Upgrade	Heat Pump - PTCS Commissioning, Controls, and	Heat Pump, Ductless
Total Comfort Solutions, LLC	Walla Walla	WA	✓			✓	✓		✓
Vance Heating and AC	Yakima	WA	✓			✓	✓		✓
Young's Heating & Cooling, LLC	Walla Walla	WA				✓			✓

Table 5
Manufactured Homes Trade Ally

Trade Ally Name (Trade ally may be located outside of the territory)	City	State	Manufactured Homes Duct Sealing	Energy Star/Eco-Rated Manufactured Homes
Caris-Sell Homes, Inc.		WA		✓
Columbia Homes	Union Gap	WA		✓
Gillespie Homes	Kennewick	WA		✓
Home Energy Experts	Clearfield	UT	✓	
Lakeshore Homes Sales LLC	Yakima	WA		✓
Sunrise Home Center, Inc.	Clarkston	WA		✓
Valley Quality Homes	Yakima	WA		✓

Plumbing Trade Ally

Table 6 lists 4 plumbing trade allies the Company worked with to promote efficient plumbing technologies.

Table 6
Plumbing Trade Ally

Trade Ally Name (Trade ally may be located outside of the territory)	City	State	Heat Pump Water Heaters
Campbell & Company	Pasco	WA	✓
Paul's Air F/X	Yakima	WA	✓
Rainwater		WA	✓
RossCo Plumbing	Yakima	WA	✓

Weatherization Trade Ally

Table 7 lists 6 weatherization trade allies the Company worked with.

Table 7
Weatherization Trade Ally

Trade Ally Name (Trade ally may be located outside of the territory)	City	State	Air Sealing	Insulation-Attic	Insulation-Floor	Insulation-Wall	Windows
Don Jordan Energy Systems	Yakima	WA		✓	✓		
Insul Homes	Yakima	WA		✓			
Intermountain West Insulation	Kennewick	WA		✓	✓	✓	
McKinney Glass Inc.	Yakima	WA					✓
RJ Weatherization & Insulation	Yakima	WA			✓		
Smith Insulation	Walla Walla	WA		✓	✓	✓	

Table 8
Applications by Customer City and Measure Category

Customer City	% of All Applications	% of Appliance Applications	% of HVAC Applications	% of Manufactured Homes Applications	% of Kits Applications
BUENA	0.13%	0.00%	0.00%	0.00%	0.36%
BURBANK	0.36%	0.00%	0.38%	0.18%	0.12%
COLLEGE PLACE	3.07%	4.90%	2.58%	0.73%	3.01%
COWICHE	0.27%	0.98%	0.10%	0.00%	0.48%
DAYTON	1.33%	1.96%	1.15%	0.00%	1.20%
DIXIE	0.09%	0.98%	0.10%	0.00%	0.00%
GRANDVIEW	2.84%	0.98%	1.72%	0.54%	4.46%
GRANGER	0.67%	0.98%	0.96%	0.00%	0.48%
HARRAH	0.09%	0.00%	0.00%	0.00%	0.24%
MABTON	0.18%	0.00%	0.10%	0.00%	0.24%
MOXEE	1.55%	0.98%	1.24%	0.91%	2.29%
NACHES	1.29%	1.96%	1.43%	0.36%	1.20%
OUTLOOK	0.40%	0.98%	0.48%	0.00%	0.24%
POMEROY	0.44%	0.98%	0.10%	0.18%	0.72%
PRESCOTT	0.22%	0.00%	0.19%	0.00%	0.12%
PROSSER	0.04%	0.00%	0.00%	0.00%	0.12%
SELAH	7.37%	6.86%	8.32%	6.72%	5.90%
SUNNYSIDE	2.62%	1.96%	1.24%	0.36%	4.82%
TIETON	0.93%	0.98%	0.57%	0.54%	1.45%
TOPPENISH	1.29%	0.98%	0.48%	0.018%	2.65%
TOUCHET	0.36%	0.98%	0.38%	0.36%	0.24%
UNION GAP	3.55%	0.98%	5.83%	9.44%	2.05%
WAITSBURG	1.02%	1.96%	0.96%	0.00%	0.60%
WALLA WALLA	17.55%	15.69%	13.38%	1.09%	17.71%
WALLULA	0.13%	0.00%	0.00%	0.00%	0.36%
WAPATO	0.98%	1.96%	0.57%	0.00%	1.45%
YAKIMA	49.40%	49.02%	56.21%	77.86%	44.94%
ZILLAH	1.82%	2.94%	1.53%	0.54%	2.53%

Appendix 4

*watt*smart Business Vendor Network

PACIFIC POWER

Website: https://www.pacificpower.net/savings-energy-choices.html

Search at Tue Mar 24 2020 3 : 51 : 56 PM

Search Criteria:

Sector:	Business
Specialties:	Appliances, Building envelope, Compressed air, Controls - HVAC, Controls - Lighting, Farm and dairy, Food service, HVAC - evaporative, HVAC - unitary, Irrigation, Lighting, Lighting instant incentives, Motors and VFDs, Office equipment, Other Specialty, Small business lighting
Company Name:	
Address, City or Zip Code:	
Radius:	0
Business Types:	""
Service Locations:	["a0R2E00000JR8hZUAT"]

Search Result: 43 record(s) found

The following is a list of contractors, distributors, manufacturers and other vendors participating in Pacific Power's Wattsmart® Vendor Network displayed in random order (unless sorted by the user) based on the search criteria selected. This listing is provided solely as a convenience to our customers. Pacific Power does not warrant or guarantee the work performed by these participating vendors. You are solely responsible for any contract with a participating vendor and the performance of any vendor you have chosen.

#	Name	Contact	Specialties
1	Young's Heating & Cooling LLC 878 Wallula Ave Walla Walla, WA 99362 https://youngsheating.com	Susan Fouste (509) 525-4328 mail@youngsheating.com	Controls - HVAC HVAC HVAC - evaporative HVAC - unitary Motors and VFDs
2	Stoneway Electric Supply 44 s Palouse St. Walla Walla, WA 99362 http://www.stoneway.com	Tom Vinti (509) 522-1550 tom.vinti@stoneway.com	Lighting instant incentives
3	Transformative Wave 1012 Central Ave S Kent, WA 98032 http://transformativewave.com/	Joe Schmutzler (253) 867-2333 joe.s@twavetech.com	Controls - HVAC HVAC - unitary Motors and VFDs
4	Online Store, LLC 1000 Westinghouse Drive STE 1 New Stanton, PA 15672 http://www.Lightup.com	Kerry H (724) 925-5645 keary.hoffman@onlinestores.com	Lighting Lighting instant incentives
5	North Coast Electric - Yakima 215 N 3rd Ave Building A Yakima, WA 98902 Yakima, WA 98902 http://www.northcoastelectric.com	Jay Claussner (630) 639-3084 jclaussn@nclec.com	Controls - Lighting Lighting Lighting instant incentives
6	Batteries Plus Bulbs -	Kristie Midili	Lighting

#	Name	Contact	Specialties
	Kennewick 321 N Columbia Center Blvd. Kennewick, WA 99336 https://www.batteriesplus.com/	(509) 783-3400 mgr250@batteriesplus.net	Lighting instant incentives
7	Smith Insulation 49 Wallula Ave Walla Walla, WA 99362	Jim McEwen (509) 529-7506 sii2ttk@gmail.com	Building envelope HVAC Insulation Manufactured Homes Multifamily New Construction Weatherization
8	Stusser Yakima 116 N. 2nd Ave. Yakima, WA 98902 https://www.www.com	Steve DiBenedetto (509) 453-0378 steved@stusseryakima.com	Lighting Lighting instant incentives Motors and VFDs
9	BidEnergy Inc. 1628 JFK Blvd, Ste 2100 Philadelphia, PA 19103 http://bidenergy.com	Timothy Mayo (215) 732-4480 tim.mayo@bidenergy.com	Appliances Building envelope Controls - Lighting Food service HVAC - evaporative HVAC - unitary Lighting Motors and VFDs Office equipment
10	ENERGY MANAGEMENT COLLABORATIVE 2890 Vicksburg Lane N PLYMOUTH, MN 55447 http://www.emcllc.com	NICK OLSEN (952) 542-7967 nolsen@emcllc.com	Controls - Lighting Lighting

#	Name	Contact	Specialties
11	Core Northwest LLC 1413 River Road Yakima, WA 98902 http://www.corenorthwest.com	Rod Cassel (509) 248-2673 rod@corenorthwest.com	Controls - Lighting Irrigation Lighting Motors and VFDs
12	Stoneway Electric Supply - Yakima 23 N. 3rd Ave Yakima, WA 98902 http://www.stoneway.com/	Tyler Hicks (509) 469-6154 tyler.hicks@stoneway.com	Controls - Lighting Lighting Lighting instant incentives Motors and VFDs
13	Bulbs 243 Stafford St Worcester, MA 1603 https://www.bulbs.com/contactus.aspx	Bulbs Bulbs customerservice@bulbs.com	Lighting Lighting instant incentives
14	Platt Electric Supply - Yakima 16 S. 1st Avenue Yakima, WA 98902 http://www.platt.com	Jeremy Sandino (509) 452-6444 jlsandino@platt.com	Controls - HVAC Controls - Lighting Lighting Lighting Lighting instant incentives Motors and VFDs Multifamily New Construction Other Specialty
15	Lumenal Lighting LLC 21706 66th Ave W Mountlake Terrace, WA 98043 https://www.Lumenal.com	Don Nielsen service@lumenal.com	Controls - Lighting Lighting

#	Name	Contact	Specialties
16	TJ's Refrigeration, Heating & Air 329 S 6th St Sunnyside, WA 98944 http://tjsrefrigerationheatingandair.com	Joe Tovar (509) 839-8840 tjsref@hotmail.com	Appliances Building envelope Controls - Lighting Food service HVAC HVAC - evaporative HVAC - unitary Lighting Motors and VFDs
17	North Coast Electric - Pasco 1928 W. A St Pasco, WA 99301 http://www.NorthCoastElectric.com	Zack Boucher (206) 442-9846 zboucher@ncelec.com	Building envelope Controls - Lighting Lighting Lighting instant incentives Motors and VFDs Other Specialty
18	KIE Supply 113 E Columbia Dr Kennewick, WA 99336 https://www.kiesupply.com	Leigh Kluthe (509) 582-5156 leigh@kiesupply.com	Controls - Lighting Lighting
19	Knobel's 801 Tennant ln Yakima, WA 98901	Steve Soderstrom (509) 452-9157 knobelselectric@msn.com	Lighting Motors and VFDs Small business lighting
20	CED - Yakima 131 S 1st Ave YAKIMA, WA 98903	Dan Derosier (509) 248-0872 dan@cedyakima.com	Lighting Lighting instant incentives
21	Columbia Electric Supply 3211 Allen Rd Sunnyside, WA 98944 http://www.ces-sunnysi	Tye Kaple (509) 837-6033 tkaple@ces-sunnyside.com	Controls - Lighting Lighting Motors and VFDs

#	Name	Contact	Specialties
	de.com		
22	Walla Walla Electric 1225 W. Poplar Walla Walla, WA 99362 http://www.wwelectric.com	Spike Teal (509) 525-8672 spike@wwelectric.com	Controls - Lighting Lighting Lighting Motors and VFDs Multifamily New Construction Small business lighting
23	Conserve Energy 1045 Andover Park East #200 Tukwila, WA 98188 http://www.ezmetro.com	Mark Hansen (206) 409-4869 mark.hansen@ezmetro.com	Controls - HVAC Controls - Lighting Lighting Motors and VFDs Small business lighting
24	Platt Electric - Walla Walla 415 west main Walla Walla, WA 99362 https://www.platt.com	Robert Kinion (509) 522-0611 robert.kinion@platt.com	Lighting Lighting instant incentives
25	Batteries Plus Bulbs - Yakima 1731 South 1st Street Yakima, WA 98901 https://www.batteriesplus.com	Jessie Hottell (509) 571-1322 mgr654@batteiresplus.net	Lighting Lighting instant incentives
26	American Wholesale Lighting 1725 Rutan Dr Livermore, CA 94551 http://www.awlighting.com	Rianto Lie (510) 252-1088 rlie@awlighting.com	Lighting

#	Name	Contact	Specialties
27	Mint LED 1045 Andover Park East Seattle, WA 98188 http://www.mintled.com	Justin Canter (509) 954-7498 justin@mintled.com	Controls - HVAC Controls - Lighting HVAC - evaporative HVAC - unitary Lighting Motors and VFDs
28	Stoneway 630 Railroad St. Richland, WA 99352 http://www.stoneway.com	Tom Vinti (509) 943-4664 tom.vinti@stoneway.com	Lighting instant incentives
29	ShineRetrofits 1550 Larimer St Denver, CO 80202 https://www.shineretrofits.com/	Shine Retrofits (877) 643-4534 sales@shineretrofits.com	Lighting Lighting instant incentives
30	Forever Green Indoors 1314 S Grand Blvd, Ste 2, #127 Spokane, WA 99202 http://www.forevergreenindoors.com	Kathleen Sullivan (800) 630-7345 ksullivan@forevergreenindoors.com	Lighting
31	Lake Shore Electric, Inc. 9702 Tieton Drive Yakima, WA 98908 http://www.lakeshoreelectric.com	Bill Ross (509) 965-4281 billjr@lakeshoreelectric.com	Lighting Motors and VFDs
32	Batteries Plus Bulbs -	Michelle Russell	Lighting

#	Name	Contact	Specialties
	Walla Walla 632 S 9th Ave Walla Walla, WA 99362 https://www.batteriesplus.com/	(509) 924-6645 mrussell@batteriesplus.net	Lighting instant incentives
33	Leidos Engineering, LLC. 301 Plainfield Rd. Suite 310 Syracuse, NY 13212 https://energy.leidos.com/	Christopher Piechuta (855) 926-7543 amplify@leidos.com	Appliances Compressed air Controls - Lighting Food service HVAC - evaporative HVAC - unitary Lighting Motors and VFDs Office equipment Other Specialty
34	eledlights 7835 Wilkerson Court San Diego, CA 92111 https://www.eledlights.com/	Landon Landon (215) 607-6830 lights@eledlights.com	Lighting Lighting instant incentives
35	LED SUPPLY CO 12340 W Cedar Dr Lakewood, CO 80228 https://www.ledsupplyco.com/	Ian Skolnick orders@ledsupplyco.com	Lighting
36	Total Digital Systems 13433 NE 20th St STE O Bellevue, WA 98005 http://www.totaldigitalsystems.com	Ken Kang (425) 533-0112 kyungk@totaldigitalsystems.com	Lighting

#	Name	Contact	Specialties
37	ecomodus, LLC 5110 Tieton Drive Yakima, WA 98908	Dan Richards (509) 307-4363 ecomodus@msn.com	Lighting
38	CED - Richland 1920 Fowler St Richland, WA 99352	Dan Derosio (509) 737-8282 dan@cedyakima.com	Lighting instant incentives
39	All-Phase Electric, Inc. 2500 S 12th Ave Union Gap, WA 98903 http://allphaseelectric.org	Andrew Lea (509) 454-5093 andrew@allphaseelectric.org	Lighting Motors and VFDs
40	MH Electric Inc. P.O. Box 11224 Yakima, WA 98909	Walt Wenda (509) 452-6039 ww@mhelectricinc.com	Controls - Lighting Farm and dairy HVAC Lighting Lighting Motors and VFDs Small business lighting
41	McKinney Glass Inc. 2220 Goodman Road. Union Gap, WA 98903 http://mckinneyglass.com	Mike McKinney (509) 248-2770 mgmckinney@yvn.com	Building envelope Weatherization
42	Platt Electric - Grandview 100 Stover Loop Rd. Grandview, WA 98930 https://www.platt.com/	Rolando Solis (509) 882-1616 rolly.solis@platt.com	Lighting Lighting instant incentives
43	Columbia Electric	Daron Waldon	Lighting

#	Name	Contact	Specialties
	Supply - Walla Walla 932 N 13TH AVE Walla Walla, WA 99362 http://www.ced-columbia.com/	(509) 522-1419 dwalden@ces-ww.com	Motors and VFDs

PACIFIC POWER
A DIVISION OF PACIFICORP

Appendix 5
Communications

Energy Efficiency Communications 2019

Creative *(click on the hyperlinks below to see the creative)*

TV

- Washington winter 68-degree :30 – English
- Washington winter 68-degree :15 – English
- Washington winter 68-degree :30 – Spanish
- Washington winter 68-degree :15 – Spanish
- Washington summer 78-degree :30 – English
- Washington summer 78-degree :30 – Spanish
- Washington efficiency for business customers" Baker"
- Washington hidden savings for business customers "Vet"
- Washington efficiency "Apple King"
- Washington efficiency "Canoe Ridge Vineyard"
- Washington efficiency "Wray's Marketfresh"
- Washington efficiency "Yakima Bindery"

Radio

- Washington Better :60 – English
- Washington Better :60 – Spanish
- Incentives for Lighting and lighting controls for businesses
- Washington efficiency "Apple King"
- Washington efficiency "Canoe Ridge Vineyard"
- Washington efficiency "Wray's Marketfresh"
- Washington efficiency "Yakima Bindery"

Print

- Yakima spring – "Good"
- Walla Walla spring – "Good"
- Yakima summer 78-degrees – "Better"
- Walla Walla summer– "Helps"
- Walla Walla summer 78-degrees – "Better"
- Yakima winter – "Good"
- Walla Walla winter – "Good"
- Spanish spring "Bueno"
- Spanish winter "Bueno"
- Spanish summer "Bueno"
- Spanish summer "Mejor"
- Summer cooling 78-degrees thermostat
- Irrigation – color
- Ad to thank business customers and vendors for being Wattsmart last year

- LED Lighting and Controls for business b/w
- Washington efficiency “Canoe Ridge Vineyard”
- Washington efficiency “Apple King”

Digital Ads

- Winter Being Wattsmart is “good”
- Winter Being Wattsmart “helps”
- Winter Being Wattsmart is “better”
- Being Wattsmart is “good”
- Being Wattsmart “helps”
- Being Wattsmart is “better”
- Yakima Bindery
- Wray’s Marketfresh
- Canoe Ridge Vineyard
- Apple King
- Energy efficiency is GOOD for your bottom line and Washington - business
- Your business has the power to save - baker

Social

- Winter Wattsmart tips 68 degrees Facebook ads – English
- Winter Wattsmart tips 68 degrees Facebook ads – Spanish
- Cooling – ceiling fan
- Cooling – thermostat
- Yakima Bindery
- Wray’s Marketfresh
- Canoe Ridge Vineyard
- Apple King

Press releases:

- Henningsen Cold Storage named Pacific Power wattsmart(R) 2019 Business partner of the year
- Quick tips to beat the heat

Newsletters:

- January Connect newsletter
- April Connect newsletter
- July Connect newsletter
- October Connect newsletter

Onserts:

- Wattsmart Starter Kit onsert

Direct mail:

- Mailing to irrigation customers encouraging application for incentives:
  - Letter – February
  - Application – February
  - LESA flyer – February
  - Letter – October
  - Application – October
  - Pivot Flyer – October
- Manufactured homes duct sealing letter
- Yakima Energy Fair mailing flyer
- Washington direct business mailing

Emails:

- Wattsmart Starter Kit email
- Thank you for being Wattsmart last year - January

Collateral:

- Wattsmart Business – light midstream brochure
- Wattsmart Business – Small Business flyer

2019

NEF

BE *WATT*SMART, BEGIN AT HOME

WASHINGTON

Program Report

Prepared for:

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Prepared by:

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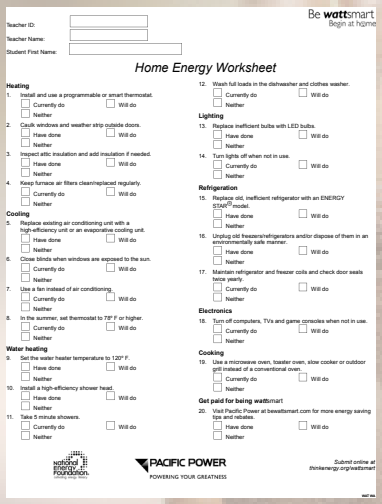
February 28, 2020

Savings



Be wattsmart
Begin at home

Teacher ID:
Teacher Name:
Student First Name:

Home Energy Worksheet

Heating

1. Install and use a programmable or smart thermostat.
   ☐ Currently do ☐ Will do ☐ Neither
2. Caulk windows and weather strip outside doors.
   ☐ Have done ☐ Will do ☐ Neither
3. Inspect attic insulation and add insulation if needed.
   ☐ Have done ☐ Will do ☐ Neither
4. Keep furnace air filters clean/replaced regularly.
   ☐ Currently do ☐ Will do ☐ Neither

Cooling

5. Replace existing air conditioning unit with a high-efficiency unit or an evaporative cooling unit.
   ☐ Have done ☐ Will do ☐ Neither
6. Close blinds when windows are exposed to the sun.
   ☐ Currently do ☐ Will do ☐ Neither
7. Use a fan instead of air conditioning.
   ☐ Currently do ☐ Will do ☐ Neither
8. In the summer, set thermostat to 78° F or higher.
   ☐ Currently do ☐ Will do ☐ Neither

Water heating

9. Set the water heater temperature to 120° F.
   ☐ Have done ☐ Will do ☐ Neither
10. Install a high-efficiency shower head.
    ☐ Have done ☐ Will do ☐ Neither
11. Take 5 minute showers.
    ☐ Currently do ☐ Will do ☐ Neither
12. Wash full loads in the dishwasher and clothes washer.
    ☐ Currently do ☐ Will do ☐ Neither

Lighting

13. Replace inefficient bulbs with LED bulbs.
    ☐ Have done ☐ Will do ☐ Neither
14. Turn lights off when not in use.
    ☐ Currently do ☐ Will do ☐ Neither

Refrigeration

15. Replace old, inefficient refrigerator with an ENERGY STAR® model.
    ☐ Have done ☐ Will do ☐ Neither
16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.
    ☐ Have done ☐ Will do ☐ Neither
17. Maintain refrigerator and freezer coils and check door seals twice yearly.
    ☐ Currently do ☐ Will do ☐ Neither

Electronics

18. Turn off computers, TVs and game consoles when not in use.
    ☐ Currently do ☐ Will do ☐ Neither

Cooking

19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.
    ☐ Currently do ☐ Will do ☐ Neither

Get paid for being wattsmart

20. Visit Pacific Power at bewattsmart.com for more energy saving tips and rebates.
    ☐ Have done ☐ Will do ☐ Neither

national energy foundation

PACIFIC POWER
POWERING YOUR GREATNESS

Submit online at thinkenergy.org/wattsmart

Home Energy Worksheets

– Returned: 1,908 –

– 53% –

Teacher Packets

– Returned: 95 –

– 66% –

Participants

Students
– 3,567 –

Teachers
– 145 –

Schools
– 47 –

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Program Overview

Program Description

Be *watt*smart, Begin at home, an energy efficiency education program, is a collaborative partnership between Pacific Power and the National Energy Foundation (NEF). This unique and interactive program teaches the importance of energy and natural resources and their impact on the environment. The objective is to expand and promote energy awareness through a school-based education program which encourages Washington students and teachers to change behaviors which will impact the energy consumption in their homes and community. Teachers are also provided teaching materials to support further classroom instruction on this valuable message.

Program Administration

Be *watt*smart, Begin at home is administered by NEF, a non-profit organization (established in 1976) dedicated to increasing energy literacy through the development, distribution and implementation of educational programs and materials. These resources relate primarily to energy, natural resources, energy efficiency and energy safety. Concepts are taught through science, math, art, technology and writing. Our mission remains constant, to cultivate and promote an energy literate society. NEF is pleased to report on activities of the Be *watt*smart, Begin at home energy efficiency education program conducted during the 2019 - 2020 school year.

Anne Lowe, Vice President – Operations, oversees program organization. Gary Swan, Vice President – Development, oversees contract accounting. Patti Clark, Program Director, is responsible for overseeing and implementing the scope of work and Megan Hirschi is responsible for scheduling the presentations. A team of trained and seasoned presenters brought the interactive, hands-on program to Washington schools from September 1 through November 1, 2019.

Building Collaborations

The Washington State Office of Education's Core Curriculum for fourth grade correlates well to the content of Be *watt*smart, Begin at home. Teachers appreciated the collaborative efforts to align program components to their learning standards. Curriculum correlations were provided to teacher participants in the *Teacher Guide* delivered to each teacher prior to the presentation date.

Yakima and Walla Walla Districts were contacted to clarify policy that mini-grant checks must be made payable to the school and not to individual teachers. Although teachers would prefer the grant money be made payable directly to them, it was determined that Washington State requires all incoming dollars to be deposited through the schools. In an effort to help teachers, mini-grant checks were mailed directly to the lead teacher followed by an email to the qualified teacher.

Program Implementation

During the month of May 2019 an invitation to register for the fall 2019 program was sent via email to all teachers that had participated in the 2018 program. In August and September, the program coordinator made phone calls to all unregistered schools. Teacher questions were addressed and highlights of the program content with an emphasis on how the program aligns with Washington content standards were reviewed.

Program Registration

Registration for the program was online at *bewattsmart.com/begin*. Registered schools were checked against the qualified schools list before email and phone communications were made with teachers to determine optimum presentation dates and student numbers.

After registration was qualified, a series of email communications with teachers, was sent automatically by the program registration website. The website calculated *Home Energy Worksheet* returns as well as earned gift card

levels and communicated this information to the participating teachers. Later communications were customized through programming to be sent only to teachers needing a reminder to return their program documents.

Be *watt*smart, Begin at home Presentation

Be *watt*smart, Begin at home presentations were given starting on September 1 and ending on November 1, 2019. The presentation featured a custom Keynote slideshow that brought energy concepts to the forefront of Washington education. The presentation focused on important concepts, such as natural resources, electrical generation, the energy mix used by Pacific Power to generate electricity and tips for energy efficiency in the home.

The presentation provided interactive activities that involved and engaged the audience. Students participated in making a human electrical circuit, during which they learned key core curriculum concepts such as insulators and conductors of electricity and electrical generation. Student volunteers used props to demonstrate the process of electrical generation for their classmates. All students reviewed material learned with an "Energy Lingo" review activity at designated points throughout the presentation. To help students remember energy efficiency tips, participants viewed "Caitlynn Power" energy efficiency video vignettes produced by PacifiCorp. The videos are always well received by both teachers and students. At the end of each short video, students learned a rhyme about Caitlyn's wise energy choices to help them remember the efficiency concept.

The last portion of the presentation communicated the importance of the program take-home pieces. These documents enabled households to participate in energy education along with students.

Program Materials

A *Parent Letter* was provided in both English and Spanish to explain the importance of Be *watt*smart, Begin at home. In addition, students took home a *Student Guide* and *Home Energy Worksheet* to share with their families. Students who returned their worksheet received an LED nightlight featuring the Pacific Power logo as a reward.

Educators were also given helpful energy educational materials. Each teacher participant was provided a custom *Be watt*smart, Begin at home folder. The folder contained a custom *Teacher Guide* with additional information and activities to supplement and continue energy education in the classroom. Also, in the folder were two NEF instructional posters, *Energy Efficiency* and *Bright Ways to Save*.

A program *Implementation Steps Flier* assisted teachers in carrying out the program. It also gave simple steps for successfully returning *Home Energy Worksheets* and the sponsor *Thanks a "Watt" Card* in the postage paid envelope provided in the *Teacher Materials Folder*. A *Rewarding Results* Flier gave information concerning the gift card teacher participants would receive for returning their student surveys. Educators received a $50 mini-grant for an 80% return, or a $25 mini-grant for a 50 – 79% return by the December 1, 2019 deadline.

Program Accomplishments – Fall 2019

- 47 Be *watt*smart, Begin at home presentations
- 3,567 students and families reached
- 145 Washington teachers reached
- 53% student *Home Energy Worksheet* surveys return
- $50 gift cards delivered to 74 Washington teachers
- $25 gift cards delivered to 17 Washington teachers

Program Improvements - Fall 2019

- Updated all program materials
- Added a *Parent Letter* in Spanish
- New video vignettes entitled "Caitlin Power" produced by sponsor for presentation
- Added online *Home Energy Worksheet* option to program
- Created a program website for teachers and students *thinkenergy.org/wattsmart/*
- Uploaded "Caitlin Power" videos to website for teachers to access and use in the classroom
- Sent notification of mini-grants to each qualifying teacher
- Mailed mini-grant checks directly to lead teacher (checks were made payable to the qualified school as required by the State of Washington)

Program Attachments – Fall 2019

- Fall 2019 Participating Schools
- Program Promotions
- Program Documents
    - Keynote Presentation
    - Teacher *Implementation Steps Flier*
    - *Rewarding Results Flier*
    - *Student Guide*
    - *Teacher Guide*
    - Lingo Card
    - *Parent Letter*
- *Teacher Evaluation* Compilation
- *Home Energy Worksheet*
- *Home Energy Worksheet* Summary – Pacific Power
- Wise Energy Behaviors in Pacific Power Washington Homes
- Sampling of *Thanks a "Watt" Cards*

Attachments

Fall 2019 Participating Schools

Participating Schools	Address	City	State	Zip
Adams Elementary - Wapato	1309 S. Camas Avenue	Wapato	WA	98951
Adams Elementary - Yakima	713 S. 8th St.	Yakima	WA	98901
Ahtanum Valley Elementary	3006 S Wiley Rd	Yakima	WA	98903
Apple Valley Elementary	9206 Zier Road	Yakima	WA	98908
Arthur H. Smith Elementary	205 Fir Street	Grandview	WA	98930
Artz-Fox Elementary	805 Washington	Mabton	WA	98935
Barge-Lincoln Elementary	219 E. I Street	Yakima	WA	98901
Blue Ridge Elementary	1150 W. Chestnut	Walla Walla	WA	99362
Chief Kamiakin Elementary	1700 E. Lincoln Ave	Sunnyside	WA	98944
Christ the Teacher Catholic School	5508 W. Chestnut Ave	Yakima	WA	98908
Cottonwood Elementary	1041 S 96th Ave	Yakima	WA	98908
Davis Elementary	31 SE Ash St	College Place	WA	99324
Dayton Elementary	302 E Park Street	Dayton	WA	99328
Discovery Lab School	2810 Castlevale	Yakima	WA	98902
Dixie Elementary School	10520 US-12	Dixie	WA	99329
East Valley Elementary	1951 Beaudry Rd.	Yakima	WA	98901
Edison Elementary School	1315 E. Alder	Walla Walla	WA	99362
Garfield Elementary - Toppenish	505 Madison Ave	Toppenish	WA	98948
Garfield Elementary - Yakima	612 N. 6th Ave	Yakima	WA	98902
Gilbert Elementary	4400 Douglas Drive	Yakima	WA	98908
Green Park Elementary	1105 E Isaacs Street	Walla Walla	WA	99362
Harriet Thompson Elementary	1105 2nd Street	Grandview	WA	98930
Hoover Elementary	400 west Viola Avenue	Yakima	WA	98902
Lincoln Elementary	309 North Alder	Toppenish	WA	98948
Martin Luther King Elementary	2000 S 18th Street	Yakima	WA	98903
McClure Elementary - Grandview	811 W 2nd	Grandview	WA	98930
McClure Elementary - Yakima	1222 S 22nd Ave	Yakima	WA	98902
McKinley Elementary	621 S. 13th Ave	Yakima	WA	98902
Montessori School of Yakima	511 N 44th Avenue	Yakima	WA	98908
Naches Valley Elementary	151 Bonlow Drive	Naches	WA	98937
Nob Hill Elementary	801 South 34th Avenue	Yakima	WA	98902
Outlook Elementary	3800 Van Belle Rd	Outlook	WA	98938
Prospect Point Elementary	55 Reser Road	Walla Walla	WA	99362
Ridgeview Elementary	609 West Washington Ave	Yakima	WA	98903
Riverside Christian School	721 Keys Road	Yakima	WA	98901
Robertson Elementary	2807 West Lincoln	Yakima	WA	98902
Roosevelt Elementary - Yakima	120 N. 16th Avenue	Yakima	WA	98902
Roosevelt Elementary School - Granger	405 Bailey Ave	Granger	WA	98932
Satus Elementary	910 S. Camas Ave	Wapato	WA	98951
Sharpstein Elementary	410 S. Howard St.	Walla Walla	WA	99362
St Joseph-Marquette School	202 N 4th St	Yakima	WA	98901
Terrace Heights Elementary	101 N. 41st Street	Yakima	WA	98901
Union Gap School	3201 4th St	Union Gap	WA	98903
Valley View Elementary	515 Zillah Ave	Toppenish	WA	98948
Waitsburg Elementary	184 Academy Street	Waitsburg	WA	99361
Whitney Elementary	4411 W. Nob Hill Blvd.	Yakima	WA	98908
Wide Hollow Elementary	1000 S. 72nd Ave	Yakima	WA	98908
Zillah Intermediate	303 2nd Ave.	Zillah	WA	98953

Waitlisted Schools	Address	City	State	Zip
Green Park Elementary	1105 E Isaacs Street	Walla Walla	WA	99362

Program Promotions

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We invite you to reserve your school's participation in the Be **watt**smart, Begin at home program for fall 2019. Click on "Yes, register me" below and you will be linked directly to the registration site. After you have registered, a coordinator will reach out to you with additional information.

"Yes, register me"

Questions or concerns?
Contact Megan Hirschi

megan@nefl.org | 1-800-616-8326 ext. 132

Offer available for teachers within the Pacific Power service area in Washington. Teachers must submit 80 percent or more of *Home Energy Worksheets* to earn the $50 mini-grant.

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View this email in your browser

You have the *power* to be **watt**smart

Enroll your fourth-grade science students in our free, engaging energy education program.

Be *watt*smart, Begin at home

National Energy Foundation

PACIFIC POWER
POWERING YOUR GREATNESS

Be **watt**smart Begin at home

reinforces electricity learning standards in an engaging and interactive assembly. Participating teachers receive free energy education posters, activities and student materials as well as the chance to receive a mini-grant of up to $50, depending on participation.

Presentations begin in October 2019. Reserve your classroom's spot today at **bewattsmart.com/begin**.

National Energy Foundation

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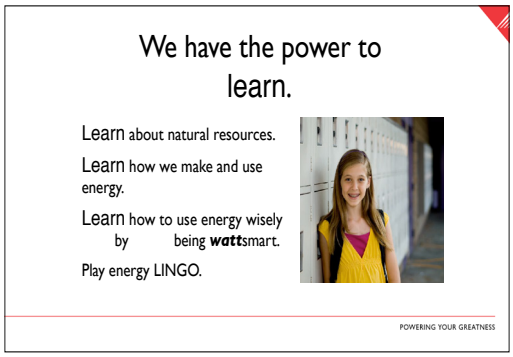
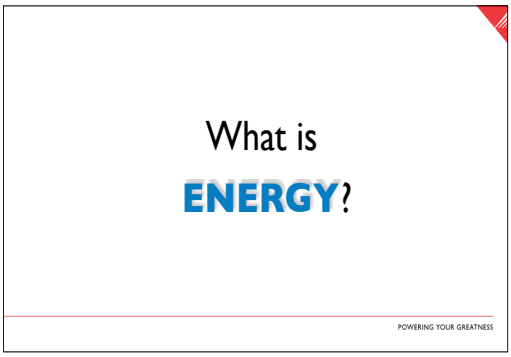
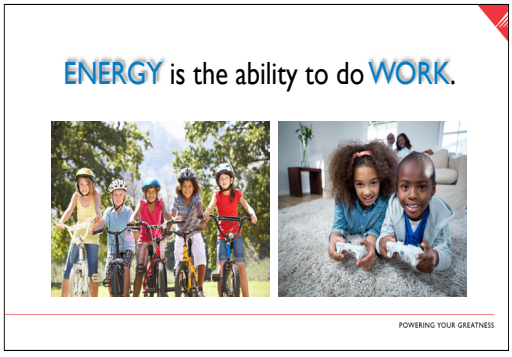
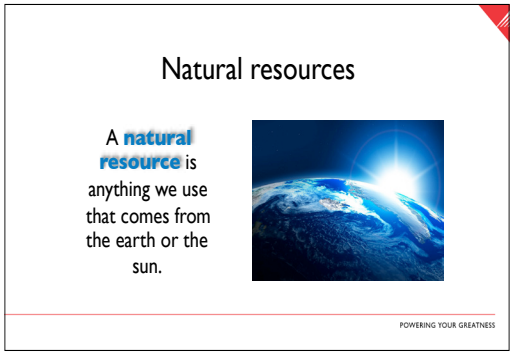
Program Documents

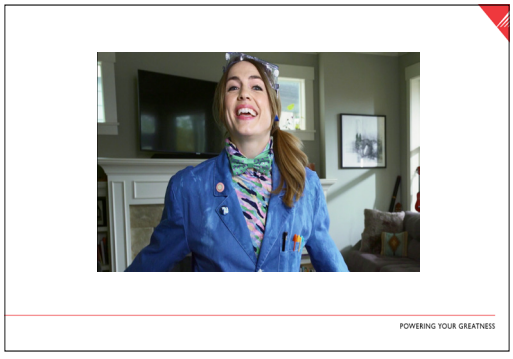
Keynote Presentation











energy

There are many ____.

natural gas

The blue flame of n_____ g_____ is a nonrenewable resource.

natural resource

Anything we use that comes from the earth or the sun is a n_____ r_____.

Electricity

- The electricity we use is not a natural resource.
- It is made from natural resources.

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Pacific Power

Electric generation by energy source

Coal 56%

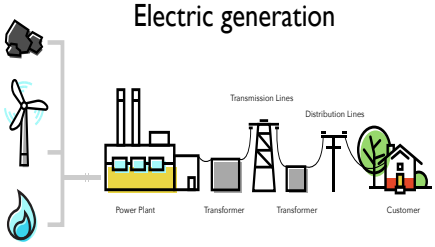
Renewables 19%

Natural gas 15%

Other sources 10%

POWERING YOUR GREATNESS

Electric generation



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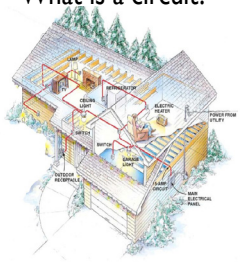
What is a circuit?



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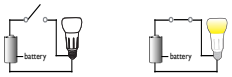
Let's make a circuit.

What things do we need to make an electrical circuit?

- An **energy source**, such as a battery.
- A **conductor** to carry electrical energy, such as wire.
- A **load** to use the energy, such as a light bulb.



Open circuit:
No electricity can flow

Closed circuit:
Electricity can flow

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Energy efficiency

- Using less energy to accomplish the same amount of work.

Technology + Behaviors
to reduce energy use

POWERING YOUR GREATNESS

It's time to play Lingo!

Energy efficiency

E_____
e_____ is
to do the same amount
of work.

Renewable

R_____
naturally replaced.

Nonrenewable

N_____
or not at all.

Oil

rce used to produce
O__

Caitlynn Power

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Caitlynn Power

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Home efficiencies

What can you do to be ***watt***smart?

- Decide what you want before opening the refrigerator.
- Use a fan instead of turning up the air conditioner

Remind your parents to:

- Install a smart or programmable thermostat.
- Change furnace filters.
- Insulate your home and seal air leaks.

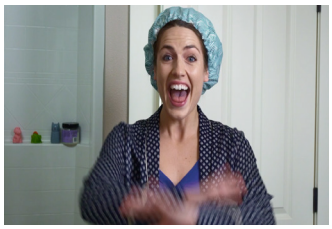
POWERING YOUR GREATNESS

Water efficiencies

What can you do to be ***watt***smart?

- Take shorter showers.
- Turn off the **water** when brushing teeth.
- Set your water heater to 120°F.
- Install an energy-efficient shower head.
- Make sure your dishwasher has a **full load** before you push the start button.

POWERING YOUR GREATNESS



Caitlynn Power

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What else can you do to be ***watt***smart?

POWERING YOUR GREATNESS

POWERING YOUR GREATNESS

It's time to play Lingo!

LED

A bulb that can last 25 [illegible] longer than an incandescent. L _ _

Phantom Load

Electricity consumed by an electronic device [illegible] in standby mode. P_ _ _ _ _ _ L _ _ _

full load

Make sure you have a [illegible] before starting your dishwasher.

water

Turn off the w_ _ _ _ when [illegible] your teeth.

What have we done today?

- Learned why energy is important.
- **Discussed** energy and where it comes from.

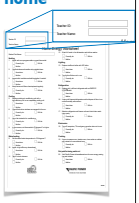
POWERING YOUR GREATNESS

Engage in energy efficiency

Review your **Be *watt*smart, Begin at home** booklet with your parent(s).

Complete the *Home Energy Worksheet*.

Sign the *Thanks A "Watt" Card*.



POWERING YOUR GREATNESS

YOU *have the power to be* ***watt***smart!

Visit **thinkenergy.org/wattsmart** for further information about the program.

POWERING YOUR GREATNESS

Implementation Steps

1 Verify you have received:

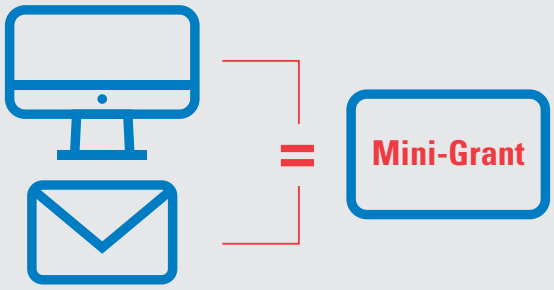
- *Teacher Materials Folder*
- Your **Be *watt*smart, Begin at home** *Teacher Guide*
- *Home Energy Worksheets* for you and your students
- **Be *watt*smart, Begin at home** student booklets
- Set of *Parent Letters*
- *Watt*smart nightlights (student incentive for completing the *Home Energy Worksheet*)

2 After the presentation, distribute to each student a:

- **Be *watt*smart, Begin at home** student booklet
- *Home Energy Worksheet*
- *Parent Letter*

3 Final steps:

- Reward students with a wattsmart nightlight when they complete their worksheet on paper or online at **thinkenerg.org/wattsmart**.
- Have each student sign the *Thank You Card* to Rocky Mountain Power.
- *Home Energy Worksheets* submitted online can be verified through the teacher portal (nef1.org/programs/teacher-lookup) with your Teacher ID.
- Mail completed paper *Home Energy Worksheets* and the *Thank You Card* in the self-addressed postage-paid envelope (found in your materials folder) by November 29, 2019.



National Energy Foundation
cultivating energy literacy

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WA


Attention Teachers
Return your student *Home Energy Worksheets* and receive a **$25 – $50** mini-grant for classroom use, depending upon participation. Students may submit worksheets online or return the completed survey to you. See the *Implementation Steps* flier for additional *Home Energy Worksheet* online information.
80% or greater return of registered students' *Home Energy Worksheets* = $50
50 – 79% return of registered students' *Home Energy Worksheets* = $25
Postmark due date:
November 29, 2019
Offer open only to teachers participating in Be *watt*smart, Begin at home. Certain restrictions may apply. Good while grant funding is in place. *Home Energy Worksheets* must be completed for eligibility. For more information, contact Megan Hirschi at megan@nef1.org.
NEF
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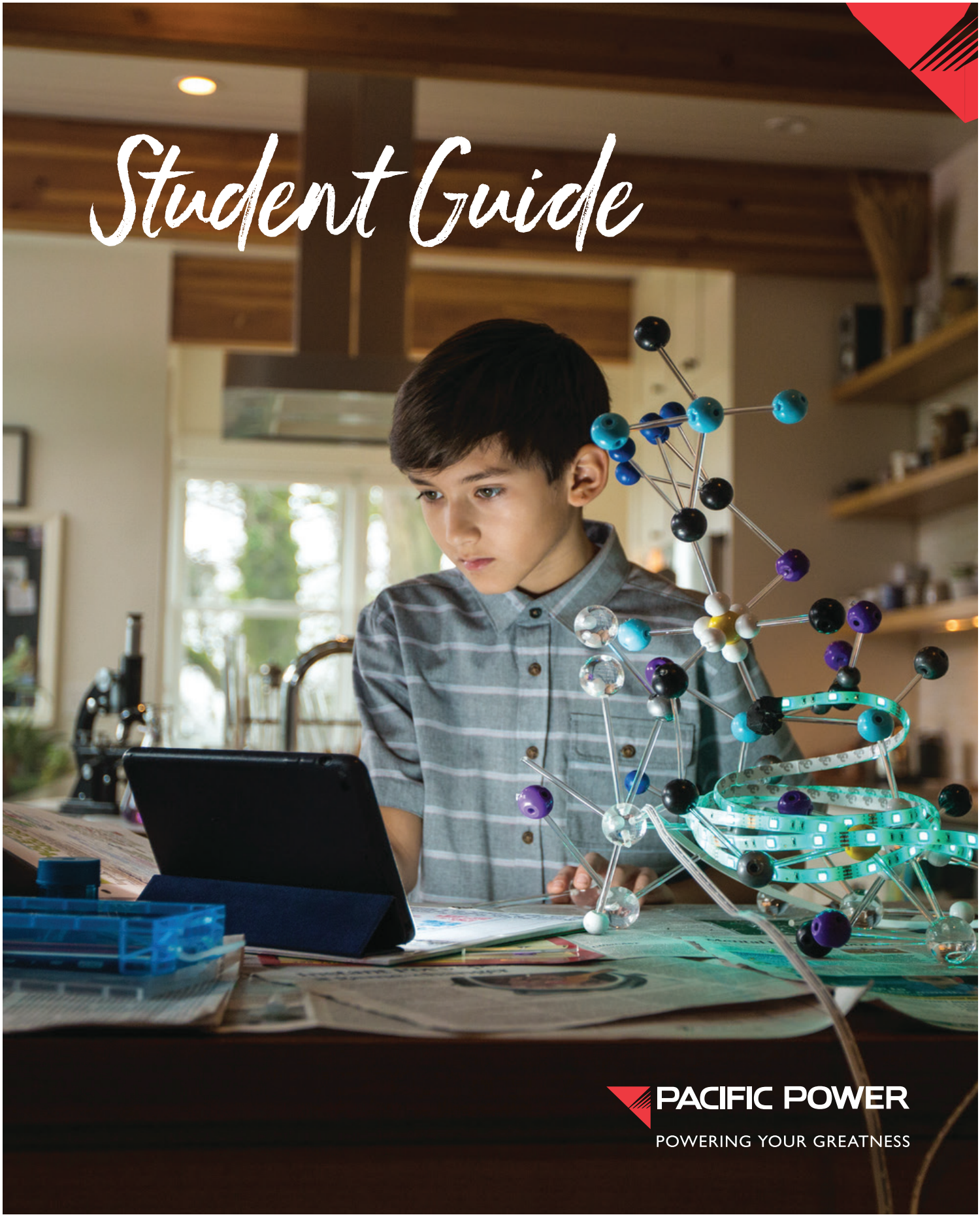


Dear Parents,

The **Be *watt*smart, Begin at home** program assists teachers and students to learn about energy, discuss important energy topics and engage in energy efficiency actions now. Your child has participated in a presentation addressing natural resources, energy basics and energy efficiency. Your participation in this program will help you be wattsmart, enhance energy efficiency in your home and help save money on your utility bills. Here are three simple ways that you can help:

- Review this **Be *watt*smart, Begin at home** booklet with your child.
- Assist your child with completing the activities on Page 7.
- Have your child complete the ***Home Energy Worksheet*** online or return it to your child's teacher.

Thank you for being *watt*smart and for your participation!

What's inside?

This booklet is divided into three sections that will give you the power to:

1. Learn about sources of energy, how they get to your home and why they are important in your life.
2. Discuss wattsmart energy efficiency tips that will help you use energy wisely and save money.
3. Engage in energy efficiency by determining how energy can be saved in your home through a simple audit activity and the *Home Energy Worksheet*.

About Pacific Power

Pacific Power is committed to the delivery of reliable electric service that's safe, low-cost and increasingly from clean, renewable resources. Serving more than 700,000 customers in Washington, Oregon and California, the company is one of the lowest cost energy producers in the nation. Pacific Power is moving toward a sustainable energy future that includes increased use of solar, wind and other renewable resources; and provides customers with more choices to meet their energy needs.

About the National Energy Foundation

The National Energy Foundation (NEF) is a 501 (c)(3) nonprofit organization, founded in 1976. It is dedicated to increasing energy literacy through the development, distribution and implementation of educational programs and materials. These resources relate primarily to energy, natural resources, energy efficiency, energy safety and the environment. Concepts are taught through science, math, art, technology and writing. NEF recognizes the importance of educating individuals about energy so they can make informed decisions about energy issues and use.

I have the *power* to be ***watt***smart.

- Being wattsmart is all about taking steps to save energy – which in turn can help you save money.
- You have the power to become more energy efficient. Pacific Power can help with wattsmart programs and incentives for homes and businesses. Saving energy also saves money and is good for the environment.

I have the power to *learn.*

The importance of energy:

Energy is the ability to do work or produce change. Virtually everything we do or use at work and home uses energy.

- Heating and cooling systems
- Computers
- Electronic equipment such as gaming and entertainment systems and TVs
- Charging electronic tablets, music players and cell phones
- Appliances
- Lights
- Food storage and preparation
- Security systems

Where does energy come from?

Our energy comes from natural resources. There are two general categories of natural resources – nonrenewable and renewable. A nonrenewable resource is not capable of being renewed, replaced or takes a very long time to replace. A renewable resource is capable of being renewed or replaced.

Primary natural resources are used to convert energy into electricity. They can be either nonrenewable or renewable.

Nonrenewable examples are:

Coal is the most abundant nonrenewable energy source in the world. There is an estimated 129 year supply remaining.

Oil can be both refined and unrefined. Refined oil is transformed into petroleum products and unrefined oil remains as crude oil.

Natural Gas is usually captured alongside oil deposits and is a major source for electrical generation.

Uranium is the fuel most widely used by nuclear plants. Nuclear energy is the energy inside the nucleus (core) of the atom of uranium.

Renewable examples are:

Solar is energy from the sun.

Wind is energy from the wind captured by a group of wind turbines (generators).

Geothermal is energy derived from the heat of the earth.

Hydropower is energy from water that generates electricity.

Secondary energy resources are created by using nonrenewable and renewable resources of energy.

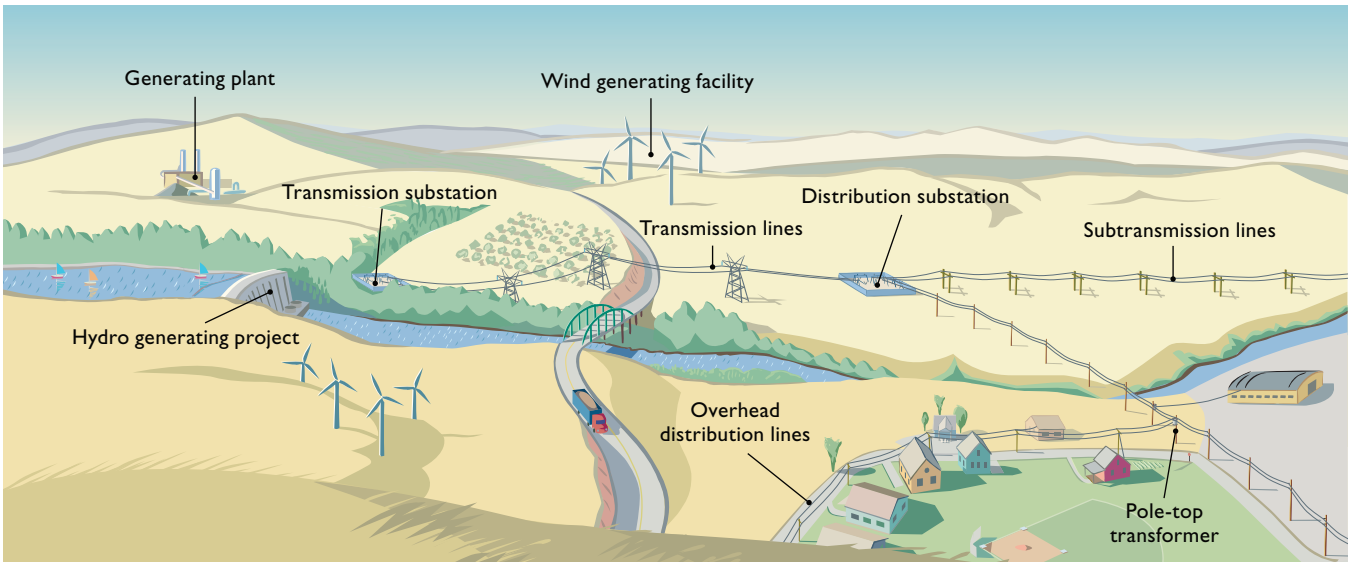
Electricity is the most abundant secondary energy resource used. It is the flow of electrical power or charge. It occurs in nature as lightning and static electricity. A generator uses energy resources to create mechanical energy that is then converted into electrical energy.

Energy efficiency

Energy efficiency is using less energy to accomplish the same amount of work – we call it being wattsmart. There are many technologies we can use today that decrease the amount of energy needed to do work. Good examples are ENERGY STAR® products and LED lighting.

You can save even more money if you start thinking about using energy wisely. Try turning off the lights when you leave the room, take shorter showers or turn off your electronics when you are not using them.

Using electricity



For more than 100 years, electricity has made our homes more comfortable and industries more productive. Today electricity is powering a world of electronics.

How is electricity generated? It begins with a fuel that heats water and turns it to steam. The steam drives the turbine that turns the generator motor to produce electricity.

How is electricity transmitted? Once the electricity is produced, the current flows from the generator to the power plant transformer where the voltage is increased to boost the flow of the electric current through the transmission lines. The transmission lines transport the electricity to Pacific Power's substations where the voltage is decreased. Power lines then carry the electricity from the substations to be used in our homes and businesses.

ELECTRICAL GENERATION

Energy Source	Pacific Power (2018 Basic Fuel Mix)*	United States (U.S. EPA, data)
Natural Gas	15.44%	35.1%
Coal	56.39%	27.4%
Nuclear	0.00%	19.3%
Petroleum	0.00%	.6%
Other/misc.	9.75%	.5%
Renewables (total)	18.42%	17.1%
Hydropower	5.15%	7%
Wind	8.80%	6.6%
Biomass	0.34%	1.5%
Solar	3.79%	1.6%
Geothermal	0.34%	0.4%

**This information is based on Federal Energy Regulatory Commission Form 1 data. The Pacific Power "basic fuel mix" is based on energy production and not resource capability, capacity or delivered energy. All or some of the renewable energy attributes associated with wind, solar, biomass, geothermal and qualifying hydro facilities in Pacific Power's basic fuel mix may be: (a) used in future years to comply with renewable portfolio standards or other regulatory requirements, (b) sold to third parties in the form of renewable energy credits and/or other environmental commodities or (c) excluded from energy purchased. Pacific Power's basic fuel mix includes owned resources and purchases from third parties.*

4

I have the power to *discuss* energy use to help save money.

Saving energy happens in two ways. First, you can use less energy through wise behaviors that conserve energy. Second, you can install energy-efficient products, appliances and devices that use less energy to accomplish the same task. Let's talk about the following areas of your home that have the largest potential to save energy.

Home heating and cooling

- Install a programmable thermostat or smart thermostat. Set your thermostat to 78°F or higher in the summer and 68°F or lower in the winter.
- Make sure your house is properly insulated. If you have less than 6 inches of insulation in your attic, you would benefit from adding more.
- You can save 10% or more on your energy bill by reducing the air leaks in your home with caulking and weather stripping.

- To help your furnace run more efficiently and cost-effectively, keep your air filters clean.
- For windows with direct sunlight, close your blinds in the summer to keep the heat out. Open them on winter days to let the warmth in.
- Small room fans are an energy-efficient alternative to air conditioning.
- For information about energy-saving programs and cash incentives, visit wattsmart.com.

Water and water heating

- Check your faucets for leaks that can cost you hundreds of dollars each year.
- Install a water-efficient shower head and save as much as $145 a year.
- Set the water heater at 120°F.
- Install faucet aerators to decrease water use.

Lighting

- Let the sun shine in. Use daylight and turn off lights.

- Replace your incandescent bulbs with LEDs (light-emitting diodes) and save $5 to $8 per year per bulb. These bulbs use up to 80% less energy than incandescent bulbs and last much longer.
- Use lighting controls such as motion detectors and timers.
- Turn off lights when you leave the room.
- Always use the lowest wattage bulb that still gives you the light you need.
- Keep your light bulbs clean. It increases the amount of light from the bulb and reduces the need to turn on more lights.

Electronics

- Turn off your computer and game consoles when not in use.
- Home electronics are made to turn on and off many times. Always turn them off to save energy.
- Electronics with the ENERGY STAR® label use as much as 60% less energy while providing the same performance.
- Beware of phantom loads which continue to draw electricity when they are plugged in but not in use. Examples are telephone chargers, electronic games and television sets.
- Use advanced power strips for household electronics. One button will turn off multiple appliances, which conserves electricity.

Refrigerators and freezers

- When looking to replace your old refrigerator, do so with an ENERGY STAR® model, which requires approximately 40% less energy than conventional models and provides energy savings without sacrificing the features you want.
- Clean door gaskets with warm water or a detergent that leaves no residue.

Dishwashers

- Only run dishwashers when full and use the "air dry" or "no heat dry" settings.
- ENERGY STAR® dishwashers use at least 41% less energy than the federal minimum standard for energy consumption.

Laundry

- Buy a moisture sensitive dryer that automatically shuts off when clothes are dry.
- Use a drying rack whenever possible.

Cooking

- Use a microwave oven, toaster oven or slow cooker instead of a conventional oven.
- Use the right-sized pan for the stove top element.
- Cover pans with lids to keep heat from escaping.

Reduce

- Use less.
- Purchase products with little packaging.

Reuse

- Use something again.
- Reuse a box or a grocery bag.

Recycle

- Make something into another new item.
- Participate in the recycling programs in your community.

I have the power to *engage* in energy efficiency.

Parents, be *watt*smart and watch the energy savings add up.

An individual with a combined electric and heating fuel bill of $2,500 per year could save 20% or $42/month by using these and other energy efficiency tips. That is like getting a pay raise without having to work harder or longer.

The cost of lighting your home

Take a walk around your home with your family to learn about your lighting.

1. Count the types of bulbs in each room and record in Table 1; then total each column.
2. Transfer the total for each type of lighting into Column A on Table 2.

TABLE 1

Location	Incandescent	CFL	LED
Bedroom 1			
Bedroom 2			
Kitchen			
Dining room			
Living room			
Hallway			
Laundry room			
Family room			
Front porch			
Other			
TOTAL			

3. In Table 2, multiply the numbers in Column A by the given amounts in Column B. Place the answers in Column C.
4. Add the numbers in Column C to get the total approximate cost of electricity for lighting your home.
5. Discover how much money you will save if all the bulbs in your home were CFLs or LEDs. Add the numbers in Column A to get the total number of bulbs in your home. Transfer the total to both rows in Table 3, Column E as indicated by the arrows.
6. Multiply the total number of CFLs by the annual cost of electricity for one CFL provided in Column F and put your answer in Column G.
7. In the last row of Table 3, multiply the total number of LEDs in Column E by the annual cost of electricity for one LED bulb provided in Column F and put your answer in Column G.

   How do the amounts in Column G compare with your current total cost for lighting in Column C above?

TABLE 2

	A	B	C
	Number of bulbs from Table 1	Annual cost of electricity for one bulb	Annual cost of electricity for lighting
Incandescent		× $5.16	
CFL		× $1.08	
LED		× $0.60	
TOTAL			

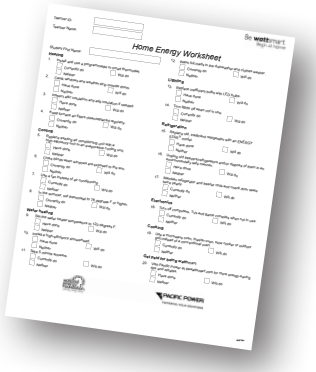
TABLE 3

	E	F	G
All CFLs		× $1.08	Annual cost of electricity with only CFLs
All LEDs		× $0.60	Annual cost of electricity with only LEDs

Cost figures are for an individual bulb (60 Watt incandescent), the lumens equivalent CFL (13 Watts) and LED (7.5 Watts) each used for 2 hours each day for 30 days. EEI Typical Bills and Rates Report, Winter 2019 (12 months ending 2018).

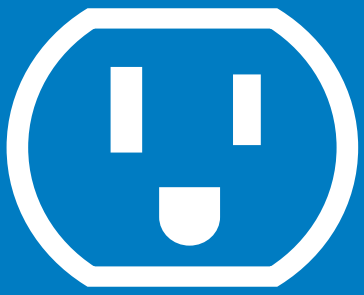
I have the *power* to be **watt**smart.

Together with your parent(s), complete the separate *Home Energy Worksheet*. Return the completed *Home Energy Worksheet* to your teacher or submit it online at thinkenergy.org/wattsmart to receive your wattsmart nightlight. You may find you are already practicing ways to be energy efficient but there is always room to do more.



Challenge yourself and your family to commit to practice energy efficiency by making wise energy choices and being wattsmart. You will not only help extend the life of our natural resources, but save money, too!

For other energy saving ideas and incentives, visit wattsmart.com. Congratulations to you and your family for making a difference.

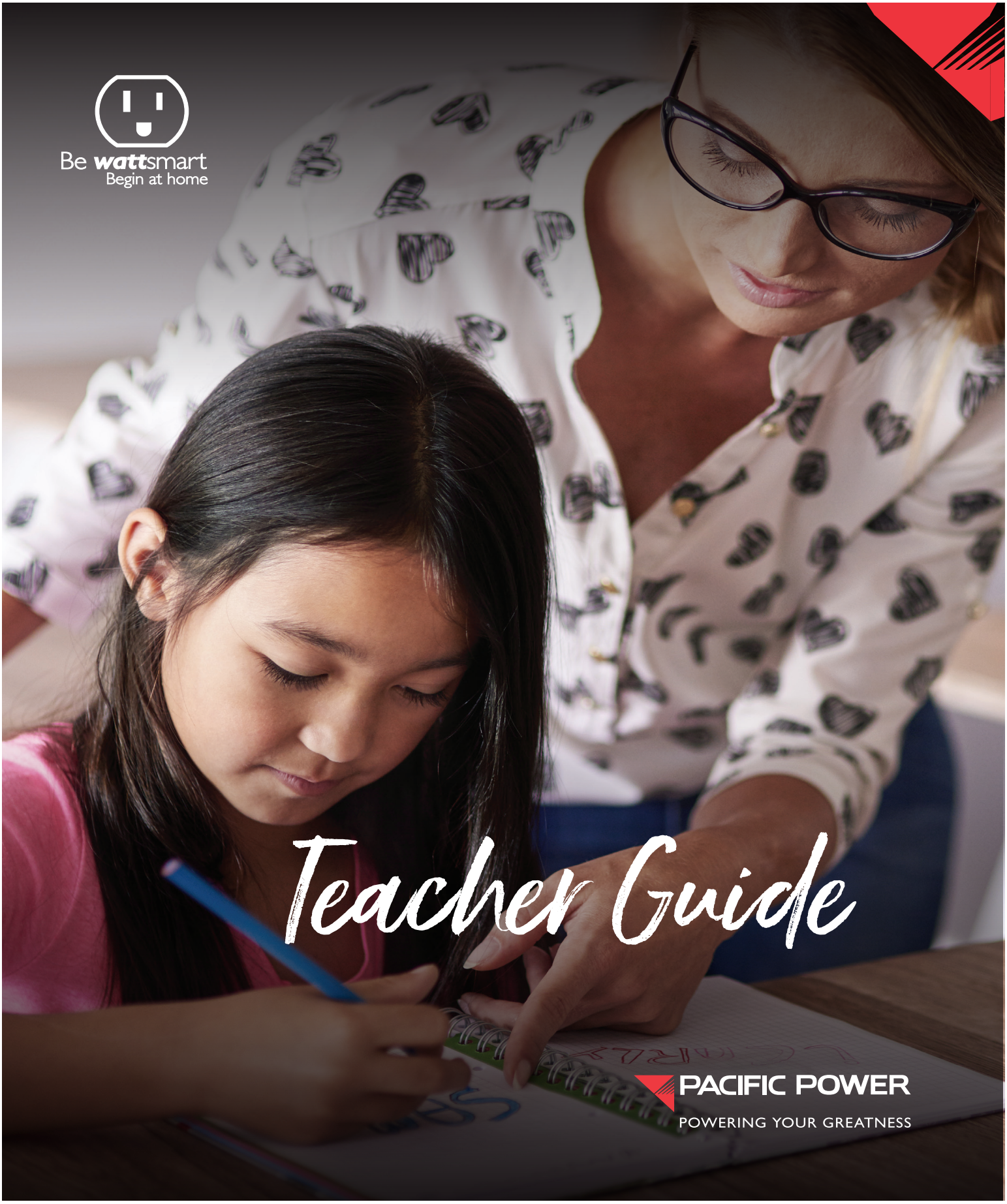


Be *watt*smart
Begin at home

National Energy Foundation
cultivating energy literacy

*watt*smart.com

PACIFIC POWER
POWERING YOUR GREATNESS



Welcome to Be ***watts***mart, Begin at home

This program teaches the importance of energy and assists students and their families in saving energy in their homes. For teachers, Be ***watts***mart, Begin at home reinforces important electrical concepts from your curriculum.

This *Teacher Guide* was designed to supplement program instruction. A variety of tools have been provided to allow you to format Be ***watts***mart, Begin at home to meet your instructional needs. These tools include:

- General guidelines and activity suggestions
- Classroom activities to further the impact of lessons
- Additional fun and interesting activities for students
- Activities containing STEM-correlated curriculum for your classroom

About Pacific Power

Pacific Power is committed to the delivery of reliable electric service that's safe, low-cost and increasingly from clean, renewable resources. Serving more than 700,000 customers in Washington, Oregon and California, the company is one of the lowest cost energy producers in the nation.

About the National Energy Foundation

The National Energy Foundation (NEF) is a unique 501(c)(3) nonprofit educational organization dedicated to the development, dissemination and implementation of supplementary educational materials and programs. These resources for education relate primarily to energy, water, natural resources, science, math, technology, conservation, energy efficiency and the environment. NEF recognizes the importance and contribution of natural resources to our economy, to our national security, the environment and our quality of life.

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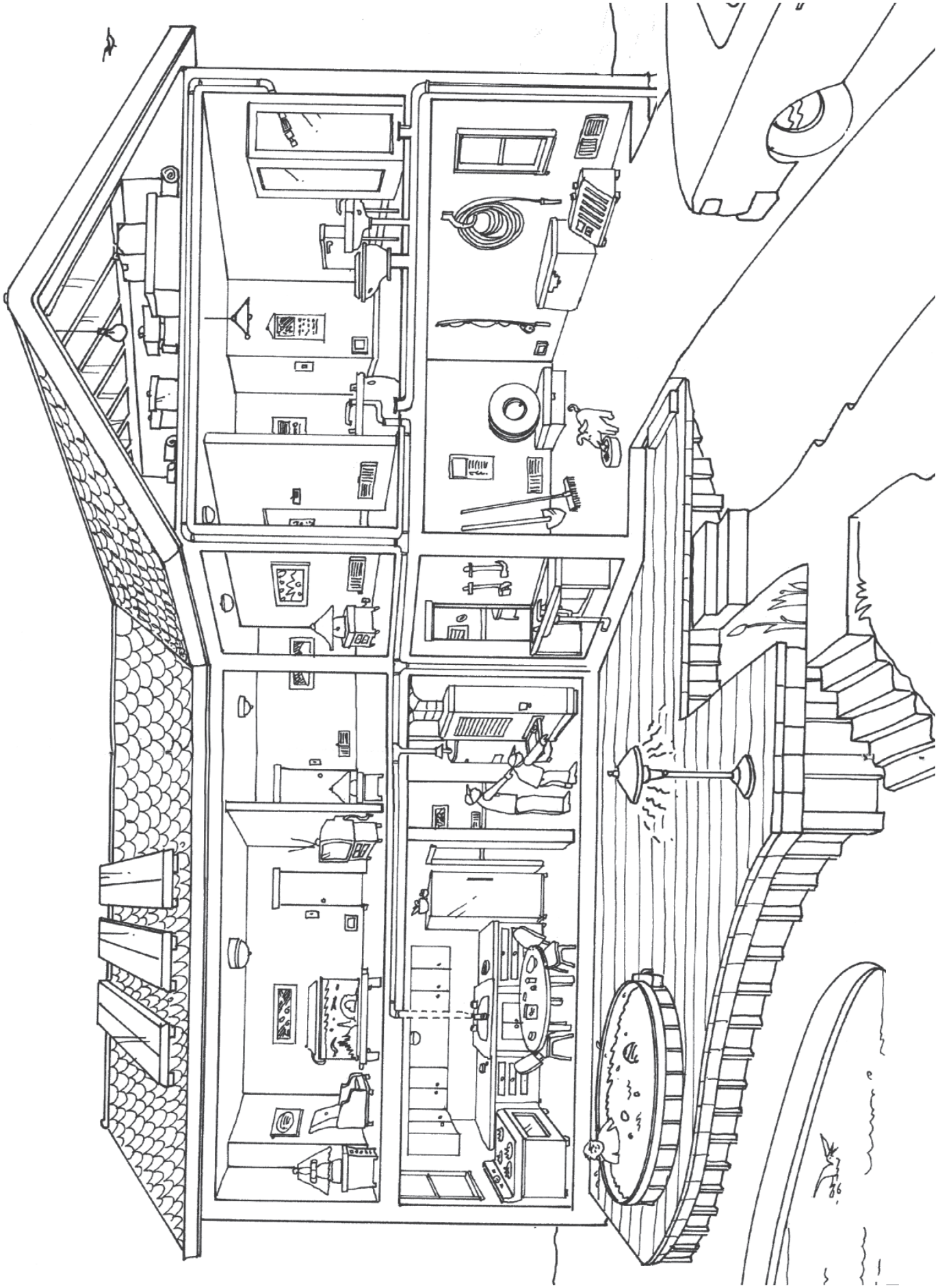

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STEM Connections

Activity	Science				Technology				Engineering					Math			
	Science as Inquiry	Energy Sources, Forms and Transformations	Science and Technology	Personal and Social Perspectives	Productivity Tools	Communication Tools	Research Tools	Problem-solving and Decision-making Tools	Historical Perspective	Design and Modeling	Invention and Innovation	Test Design and Troubleshooting	Use and Maintain	Numbers and Operations	Measurement	Data Analysis and Probability	Connection to the Real World
Pass the Sack		•		•													
The Search for Energy	•	•	•	•										•		•	•
A Bright Idea!	•	•	•	•	•	•	•	•	•	•	•	•	•				
The Art of Circuits	•	•	•					•		•	•	•					•
Shine a Light on History		•	•	•		•	•	•	•		•						
Layered Lunch	•		•							•							
How Do You Rate?	•	•		•		•	•					•	•		•		•
Energy in Math														•	•	•	•
Be wattsmart, Begin at home Poster		•		•			•	•									•

Activity: Pass the Sack

Objective
Students will demonstrate the difference between renewable and nonrenewable resources and the need for conservation of resources.

Curriculum Focus
Science
Social Studies

Materials
- Two different kinds of candy or other objects students find desirable
- Sack to hold candy, such as a gallon size plastic bag

Key Vocabulary
Nonrenewable resource
Renewable resource

Next Generation Science Correlations
4-ETS1 – 2
4-ESS3 – 1-2
4-ESS3.A
5-ETS1 – 2
5-ETS1 – 1
5-ESS3 – 1
MS-ESS3 – 4
MS-ESS3.A

Introduction

Statistical research confirms world consumption of natural resources is increasing every year. Continued population growth ensures that demand for renewable and nonrenewable energy resources necessary to maintain our way of life will continue to increase. This creates problems for future availability of nonrenewable resources. Nonrenewable resources are just that, resources that cannot be renewed. For example, a resource used at our present rate might last about 100 years. Factor in population growth and increasing reliance on technology, and that resource may last only 79 years.

In this activity, two different types of candy (or other objects students would like) will represent resources. One type of candy will represent renewable resources and the other will represent nonrenewable resources.

Procedure

1. Before class, count out enough candy so there is one piece per student (some of each type of candy – less of one so it will run out faster). Put it in the sack or bag. Save the remaining candy. If you have a very polite class, count enough candy for half of the class. **You want the contents to run out before everyone gets candy!**
2. Tell students you will be demonstrating how resources get used over time by playing "Pass the Sack." Show students the sack and explain that when they get the sack, they should take some energy and pass the sack to the person next to them.
3. Before passing the sack to the first student, review renewable and nonrenewable resources. Have students give examples of each as you hand the sack to a student.
4. While this discussion is taking place, allow students to pass around the bag of candy without any rules about how many pieces students may take. Occasionally, add four or five pieces of **one** type of candy you are using, this will be your renewable resource. The sack will be empty before it reaches all the students.
5. Ask students who did not get any candy how they might obtain energy from other students. What if each student represented a country? How do countries obtain resources, trade, barter (trade for goods), buy (trade for currency), invade and take or go to war? What effect did the availability of candy have on relationships between students? What effect might the availability of natural resources have on the relationship among nations, provinces, states, people, standards of living and quality of life?

6. Explain how our resources are like the candy. Which type was the nonrenewable? How could you tell? (No more was added to the bag once it was being passed around.) Which type was renewable? How could you tell? (It was added periodically to renew it.)
7. Point out that resources have limits just like the candy. Emphasize that many resources, such as fossil fuels, are nonrenewable and are being consumed faster than they are being replaced by nature. Discuss the fact that it would be more difficult for students to eat the candy if they had to search the room to find it instead of just taking it from the sack. Energy companies must seek resource deposits and obtain rights to drill or mine for them; they do not just magically appear.
8. Point out that renewable resources can also have limitations. They may not generate electricity as reliably as nonrenewable sources and the amount of energy produced may vary with weather and location.
9. Plan how to pass out the remaining candy.

Discussion

- Should rules be established to determine how the candy is distributed?
- Do oil, coal and natural gas companies have rules/regulations that must be followed to find resources?
- Should there be rules and regulations on how much oil, coal and natural gas people use?
- How do the class' social decisions influence the availability of candy?

To Know and Do More

Go to *eia.gov/kids* to access games, tips and facts for kids to learn about renewable energy and energy efficiency.

Discuss whether or not it is possible to run out of a renewable resource. Wood and fresh water are examples of renewable resources that can be used faster than nature can replace them.

Activity: The Search for Energy

Objective

Students will learn the difference between renewable and nonrenewable resources.

Curriculum Focus

Math
Science
Social Studies

Materials

- 1/2 bag popcorn or other small item to represent solar energy
- Small pieces of ripped paper to represent approximate U.S. nonrenewable energy reserves
  - 164 black - coal
  - 22 red - uranium
  - 8 green - natural gas
  - 2 blue - oil
- Large sheet or tarp to place paper and popcorn on for easy clean up (optional)
- Copies of "Data Table and Graph"

Key Vocabulary

Nonrenewable resources
Renewable resources

Next Generation Science Correlations

4-ESS3-1
4-ESS3.A
5-ESS3 - 1
MS-PS1 - 2
MS-LS2 - 1
MS-ESS3.A

Introduction

Fossil fuels are extremely useful energy sources. Our society has adopted them because they can be readily available and economical. In the early part of the 20th century, a fledgling solar industry took root but was ultimately displaced by less expensive energy sources such as fossil fuels. Today some fossil fuels are harder to find and increasingly more costly. The sun, on the other hand, is just as plentiful as it was 100 years ago. It is a renewable resource that could become our most widely used source of energy.

The following activity is a simulation game in which students learn the difference between renewable and nonrenewable resources. The game reflects society's use and exhaustion of nonrenewable fuels and the eventual transition to renewable technologies.

Procedure

1. Divide the class into five equal groups. Each group will be a company going after a particular resource (coal, uranium, natural gas, oil or the sun). The paper and popcorn represent reserves of the various energy resources. Pass out copies of the student sheet "Data Table and Graph" to each group or have students create their own data tables on paper.
2. Have students gather in a large circle. Scatter the papers plus a handful of "solar" popcorn so they are well spread out in the center of the circle. You can do this on a sheet for easier clean up. Explain that this exercise demonstrates how the availability of resources changes over time. You may want to designate certain places as protected areas, where the resources are off limits to protect the environment.

3. Tell students you will do several trials and look to see how the types of resources that are available change after each trial. Tell each group that they will have 30 seconds to pick up as many papers or popcorn as they can of their assigned type. Start timing.

   After 30 seconds have the groups stop and count the items they have gathered. Have each group announce their results to the class and record every count in their data table. If some groups have collected all of their available resource, point out that the resource is now depleted and they are unemployed.

4. Scatter another handful of "solar energy," helping students realize that since the sun is a renewable resource, there is the same amount of it each time you look, whereas the nonrenewable fuels are being depleted. Repeat the search period so students can get more papers or popcorn.

5. Stop after 30 seconds and have the group count and record the papers and popcorn collected again. Note that there are fewer nonrenewable fuels found in the second round. Students have to look harder to find what is left. The solar count is slowly catching up with the nonrenewable fuels. Repeat with additional trials as needed.

6. Have groups create a bar chart or, for more advanced students, a multiline graph of the number of papers and popcorn collected each trial.

Discussion

- Why does the solar line differ from the others? Why does it go up rather than down?
- How do improvements in technology affect the extraction of resources from the earth?
- How do improvements in technology affect our usage of renewable resources?
- In the real world, can we extract ALL of a resource? Why do some deposits go unused?

To Know and Do More

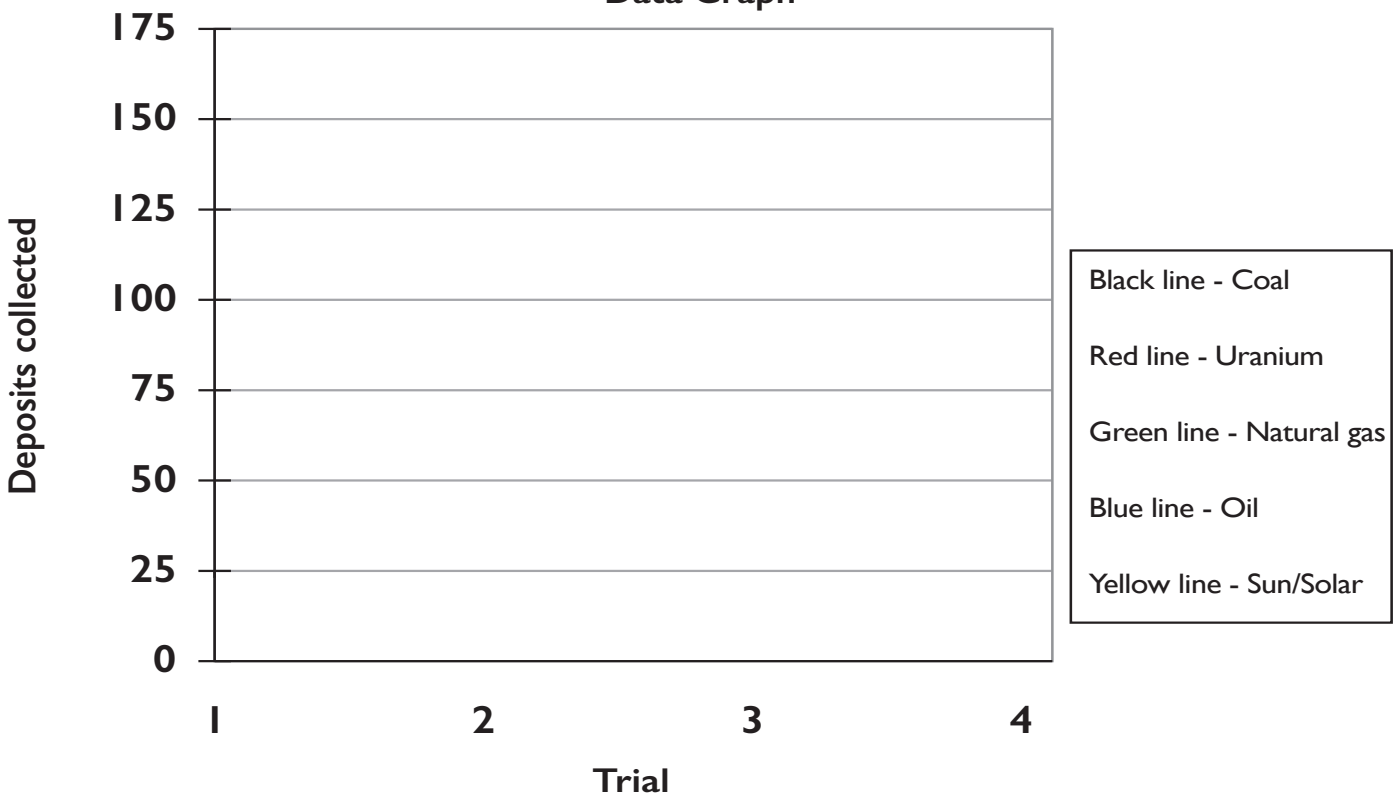
Add wind and water to the activity. Lead a discussion to be sure the students understand why you continued adding more sun, wind and/or water after each trial, but did not add more of the other papers. As a class, come up with a general outline of how to more effectively manage the resources that are available to us.

Student Sheet: Data Table and Graph

Data Table

Search Period	Coal (Black)	Uranium (Red)	Natural Gas (Green)	Oil (Blue)	Sun/Solar (Popcorn)
1					
2					
3					
4					
Totals					

Data Graph



Be wattsmart Begin at home

Activity: A Bright Idea!

Objective
Students will study an example of potential energy converted to energy in the forms of heat and light.

Curriculum Focus
Science

Materials
- Several general purpose C dry cell batteries
- A string of holiday lights, cut apart and stripped at the ends or small bulbs and sockets with wires
- Battery operated toy and batteries
- Small flashlight bulbs and sockets
- Copies of "A Bright Idea!"

Key Vocabulary
chemical energy, circuit, closed circuit, current, electrode, electrolyte, kinetic energy, open circuit, parallel circuit, potential energy, radiant energy, series circuit, thermal energy, transformation, voltage

Next Generation Science Correlations
4-ETS1 – 1-2
4-PS3 – 2-4
4-ESS3 – 1
5-PS1.B
5-ESS3 – 1
5-ESS3.C
MS-PS3 – 3
MS-PS3.B
MS-LS2 – 1
MS-ESS3.A

Introduction

Alessandro Volta, an Italian physicist, made the first battery in 1799. Volta placed two different metal electrodes in an electrolyte solution (a chemical mixture which will conduct an electrical current). The chemical reaction caused an electromotive force. A common misconception is that batteries store electrical energy. This is not really true; batteries convert chemical energy to electrical energy. They store chemical energy that can be released during a chemical reaction. By using metals or carbons that have different chemical properties and an acid or base that will allow the movement of electrical charges, an electric current can be produced.

Procedure

1. Demonstrate a battery operated toy with and without the battery. Explain that energy is the ability to do work or cause change, such as moving the toy or powering a light bulb.
2. Discuss:
   - How do we know the energy from the battery is working?
   - What kind of energy is the toy giving off? (possible answers include kinetic energy, mechanical, light, sound and heat)
   - The battery converts chemicals (chemical energy) to electricity (electrical energy) and the toy converts electricity to many possible forms of energy, including mechanical energy, heat (thermal energy), light and sound.
3. Have students use the materials provided to experiment with simple circuits by following the guided inquiry activity on the student sheet. As the students do the activity, have them note the light and heat energy given off.
4. Give students examples of types of potential and kinetic energy.

   Kinetic energy – a person riding a bike, a fire in a woodburning stove, a person running

   Potential energy – a lump of coal, a sandwich, a rock at the top of a hill

Discussion

Write the word choices on the board. Read the statements to the students and have them fill in the blanks using the words.

1. A battery converts chemical energy into _____ energy.
2. Electricity is a form of _____ energy.
3. The light bulb converts electrical energy into _____ and _____ energy.
4. A battery contains _____ energy.

Word choices:

potential electrical heat kinetic light

Answers:

1. electrical 2. kinetic 3. light, heat 4. potential

To Know and Do More

Ask students if they believe batteries are important to our way of life today. Have students make a list of all the items they used yesterday that contained a battery. Their list might include:

Wristwatch	Tablet
Automobile	Video game controller
Cell phone	TV remote control

To continue this, have students add to the list all of the items they can think of that use batteries. Are your students surprised at how many items today depend on batteries to operate and how many battery operated items they depend on daily?

Career Awareness Activity

Search the internet for a company that produces batteries. Discover the various job opportunities and careers within that company. Your list might include: scientists, chemists, research analysts, accountants, purchasing agents and administrative assistants.

Student Sheet: A Bright Idea!

Alessandro Volta, an Italian physicist, made the first battery in 1799. Volta put sheets of two different types of metal in a jar of water with a chemical that could carry electricity (an electrolyte). The chemical reaction between the electrolyte and the metal plates caused electrons to move when the plates were connected with a wire. The flow of electrons moving in a wire is called an electric current, or electricity.

Using one battery and one light, make the bulb light up. Congratulations, you have made an electrical circuit!

1. What did you have to do to get the light to come on and complete the circuit? How was it touching the battery?

2. What do you have to do to make the light bulb turn off and then back on?

3. What do you think the electrical terms "open circuit" and "closed circuit" mean?

4. How do you think a light switch works?

5. What type and form of energy is in the battery?

6. The battery's energy was transformed into what other forms of energy?

Using one battery, try to light up two lights.

1. Sketch how the wires are connected to the battery when you light two lights.

2. Are the lights the same brightness as when you lit only one or are they dimmer?

3. A series circuit has only one path that electrons can follow as they are pushed from one side of the battery to the other. A parallel circuit has more than one path and the electrons can go more than one way to get from one end of the battery to the other. Which type of circuit did you make and draw?

4. Experiment with multiple batteries connected together, placing the positive end of one battery touching the negative end of another battery. What effect does the number of batteries have on the brightness of the bulbs?

5. If you leave the battery connected to a bulb long enough, you will feel the wire and the ends of the battery getting warm. What do you think is causing this?

6. Can that heat be useful? Can it be dangerous? Give an example to prove your point.

7. Wash your hands when you are finished.

Be wattsmart
Begin at home

Activity: The Art of Circuits

Objective

Students will learn about conservation of energy and energy transfer by experimenting with electrical circuits.

Curriculum Focus

Science
Social Studies
Language Arts
Art

Materials

- Playdough® or homemade salt dough
- 9V batteries
- 9V battery clips with red and black cables
- 2V LED miniature light bulbs
- Insulating material - cardboard, packaging plastic or dough made from sugar, not salt (optional)

Key Vocabulary

Energy transfer
Electric current
LED (light-emitting diode)
Electric circuit
Insulator
Conductor

Next Generation Science Correlations

4-PS3 - 2
4-PS3 - 4
4-PS3.A-B, D
4-ETS1 - 1
4-ETS1.A
5-ETS1 - 1
5-ETS1.A
MS-PS3 - 3
MS-PS3.A-B
MS-ETS1 - 1
MS-ETS1.A

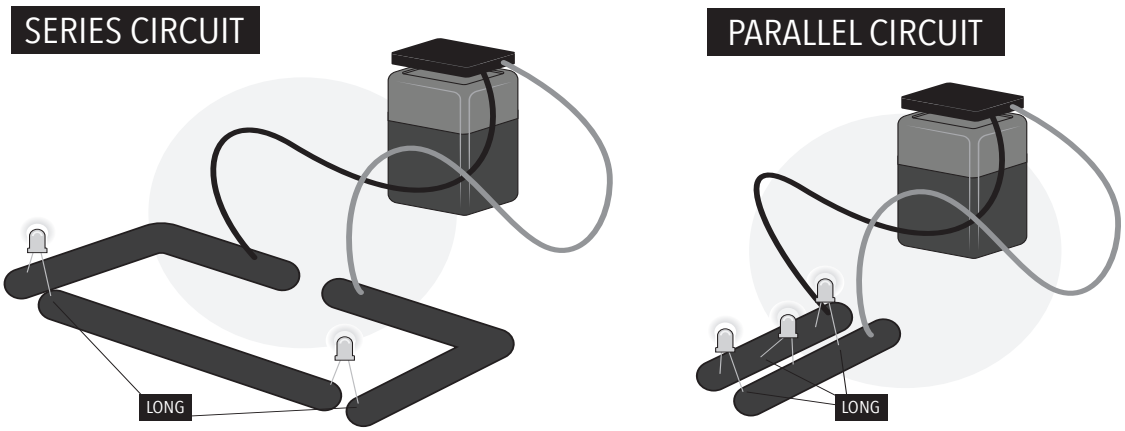
Introduction

Materials that allow a flow of electric current to pass through them more easily are called conductors. Aluminum, silver and copper are examples. Insulators block the flow of electricity. Nonmetallic materials, such as rubber, plastic, water, wood, cloth and dry air are insulators. An electrical circuit is a path of conductors through which electric current flows. Energy can be transferred from place to place by electric current.

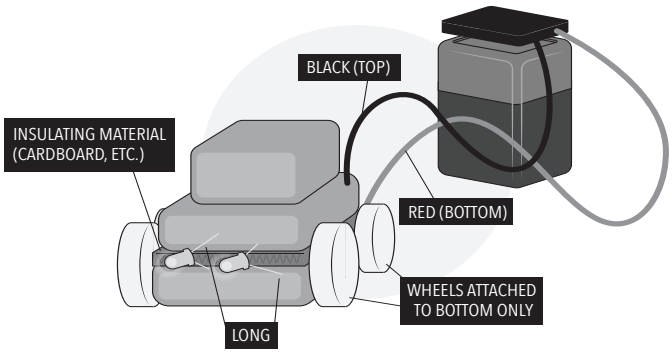
In this activity, students will use salt dough, which is a conductor, to design circuits which will transfer electrical energy. If they are successful, the electricity will be transformed to light and heat energy in a miniature LED bulb.

Procedure

1. Introduce students to their materials:
   a. Attach the battery to a battery clip with red and black cables. The red lead is the positive terminal and the black lead is the negative terminal.
   b. Examine the LED bulb. Two wires (or legs) extend from the bulb. The longer wire is the positive side of the LED and the short wire is the negative side. The LED should only be connected to dough, never directly to the battery terminals, which will cause the bulb to burn out.
2. Tell students that electricity can only go through the circuits they will create in one way. The positive terminal of the battery (red lead on battery clip) must be nearest a positive (long) leg of the LED. A battery pushes electricity around the circuit through the positive leg and out the negative (short) leg, then repeating through the next positive leg (if there is more than one LED in the circuit).
3. Explain that electricity will take the path of least resistance. It is easier for electricity to travel through the dough than through the LED, so if two pieces of dough are touching, the LED will not light.
4. Challenge students to design a simple circuit like the ones on the next page.



If time allows, have students create a circuit work of art like the one below. Since the conductive dough cannot touch, use insulating material between layers.

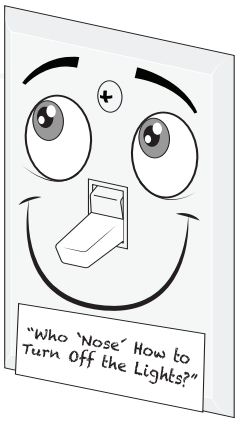


Discussion

- How does your dough circuit light the LED compared to the circuits at your home?
- In a series circuit with multiple LEDs, what happens to the brightness of the LEDs that are further from the battery? Why?

To Know and Do More

When a light switch is off, the electrical pathway to a bulb is not complete and electricity cannot flow to light that bulb. When you flip the switch on, you close the circuit and the light turns on. If light is not needed, it is important not to waste the natural resources used to generate the electrical power that is being transformed to light. Have students create characters without noses to put over light switches at school or home. The art should help remind them to turn lights off!



Activity: Shine a Light on History

Objective

Students will gather details and make inferences from text to explain historical events related to electricity. They will use their knowledge to write information text to support an opinion.

Curriculum Focus

Language Arts
Social Studies
Science

Materials per student group

- Copies of "Edison v. Holonyak"

Key Vocabulary

LED (light-emitting diode)
Incandescent bulb
Filament
Electric meter
Inference
Persuasive
Lumen
Watt

Next Generation Science Correlations

4-PS3 - 2
4-PS3.A-B
MS-PS3 - 3

Introduction

Thomas Edison and Nick Holonyak are two famous lighting inventors. They both made major contributions that changed the way people lived. Thomas Edison patented the incandescent bulb in the late 1870s. Since that time, people have enjoyed the convenience of using electricity for light. Nick Holonyak created the first practical, visible spectrum LED which revamped lighting as we know it.

In this activity, students will study the contributions of these two inventors. They will gather details to form an opinion about which man was more influential in history.

Procedure

1. Pass out copies of "Edison v. Holonyak" and have students read about each. If time allows, they can use the internet, or other sources, to find additional information.
2. Have students fill out the research cards for each inventor. Using that information, they should decide which inventor was more influential in history and write a persuasive paragraph, with details from their research to support their opinion.
3. Challenge students to practice reciting their paragraph and then present it to another student(s) in an attempt to change a differing opinion.

Discussion

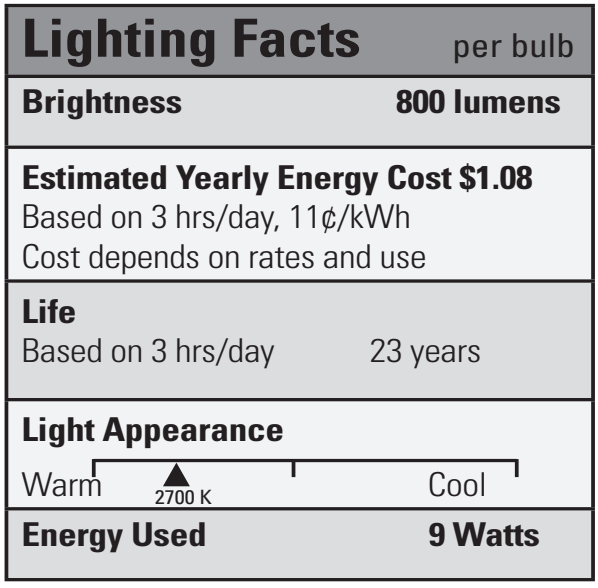
- What kinds of light bulbs are used in your home? How do they affect the way you live and work?
- What do you think the next great electrical invention will be?
- Thomas Edison said, "Genius is one percent inspiration and ninety-nine percent perspiration." What did he mean? How does his quote apply to you?

To Know and Do More

A light bulb package has a lighting facts label that contains different numbers.

- The light output in lumens.
- The power used by the bulbs, measured in Watts. The higher the wattage, the more energy the bulb uses.
- A measure of how warm or cool the light from that bulbs looks, measured in Kelvin (K). Low numbers are warmer light hues (orange or yellow). High numbers are cooler hues (blue or green).

When buying new bulbs, we should shop by lumens, not wattage. We save energy by finding bulbs with the lumens we need, then choosing the lowest wattage possible for that number of lumens.



Activity: Layered Lunch

Objective

Students will understand that natural gas deposits are trapped and held by certain types of geologic formations.

Curriculum Focus

Science
Art

Materials

- Slices of bread
- Almond butter or other thick spread (e.g. cream cheese)
- Honey
- Plastic wrap or wax paper
- Plastic knife

Key Vocabulary

Permeable
Impermeable
Source rock

Next Generation Science Correlations

4-ETS1 - 1
4-ETS1.A
5-ETS1 - 1
5-ETS1.A
MS-LS4 - 1
MS-LS4.A
MS-ESS1 - 4
MS-ESS1.C
MS-ETS1 - 4
MS-ETS1.B

Introduction

How do we find natural gas? Try this activity to get an idea of the type of rock formations and characteristics geologists look for when locating natural gas deposits.

As natural gas molecules form, they migrate from shale "source rock" into more porous areas such as sandstone. Porous or permeable layers are much like a sponge with little pockets throughout the rock. The natural gas continues to move to either the earth's surface (where it escapes into the atmosphere) or it is trapped when nonporous or impermeable rock layers block its path.

Procedure

Using bread, almond butter and honey, create some edible models of rock layers.

1. Spread thick layers of almond butter then honey on a slice of bread. Top it with another slice of bread.
2. Make a second sandwich just like the first, or gently cut the sandwich in half.
3. Now put one sandwich (or one half) with the almond butter layer above the honey and the other sandwich (or other half) with the honey on top of the almond butter.
4. Next spread a thick layer of only honey on a slice of bread, adding another slice on top.
5. Cover your sandwiches with wax paper or plastic wrap and gently press down on them for about three seconds, representing millions of years of pressure.
6. Cut the sandwiches in half and observe what has happened.

Discussion

1. What do you think the honey represents?

2. Which layer do you think represents porous rock?

3. Which layer is the nonporous rock?

4. Did the honey seep into both slices of bread? Why or why not?

5. What do you predict would happen with a sandwich made with only almond butter?

6. How might the ingredients you used affect your results?

7. Draw the layers of your sandwich and use colored pencils or crayons to distinguish the different layers and write labels for each layer that includes: impermeable, permeable, natural gas, nonporous rock and porous rock.

Answers

The honey represented natural gas or a fossil fuel. The bread was the porous rock where the honey or natural gas gets into the little pockets or air spaces. Almond butter acted like a nonporous rock layer blocking the honey from seeping into the slice of bread above the almond butter. The results may be different depending on your ingredients: denser bread – less seepage, creamier almond butter may be less impermeable or thicker honey may not fill the little pockets as easily.

To Know and Do More

Assign students to further investigate how natural gas is trapped in rock formations. Have them draw pictures of a formation and the trapping of oil and natural gas in the earth.

Visit a natural history museum and look for prehistoric life forms and rock formations.

Activity: How Do You Rate?

Objective
Students will conduct a home survey to determine how they can use energy more efficiently by changing their habits and improving conditions and thereby improve the environment in which they live.

Curriculum Focus
Language Arts
Science
Social Studies

Materials
- Copies of "How Do You Rate?"

Key Vocabulary
Conservation
Efficiency
Environment
Natural resources
Quality of life

Next Generation Science Correlations
4-ESS3 – 1
5-ESS3 – 1
5-ESS3.C
MS-LS2 – 1
MS-ESS3 – 3
MS-ESS3.A

Introduction

We use natural resources every day. Sometimes we use them just as they come from earth or the atmosphere. At other times we alter their makeup to fit our needs. For instance, we use the sun just as it is to dry clothes, but we use photovoltaic cells to capture the sun's energy and convert it to electricity, a secondary energy source. We use coal just as it comes to us from the earth to make electricity, or we use coal to provide coke for steel manufacturing. Many natural resources we use every day are nonrenewable, once we use them they are gone; others are renewable, they can be replaced through natural and/or human processes.

It is responsible to use all resources efficiently and wisely. When we do, we reduce energy use, save money and preserve the environment. Making wise decisions today will have a positive impact on our future.

Imagine the difference we could make if we all used energy more efficiently. We would conserve natural resources for the future and enjoy better air quality and a better life. Each one of us can truly make a difference. All it takes is knowledge and action.

Procedure

Using energy efficiently and conserving our natural resources are responsible and easy actions that students can take today to show they respect the environment and have a desire to protect and preserve it.

1. Pass out "How Do You Rate?" Discuss the actions that may apply to the school (e.g., windows and doors have weather stripping; drapes or blinds are open on cold, sunny days and closed on hot days; thermostats are adjusted at night; lawns are only watered early or late in the day). As you discuss each action, write a T for true or F for false on the board to see how the school rates. What can the students do to improve energy use at school?
2. Decide on several actions the students can take at school to help save energy and protect the environment. One action might be to use both sides of their paper and then recycle. If a room is empty during lunch or at other times, they can be sure lights are turned off and computers are on sleep mode.
3. Have the students take the survey home and complete it with their parent's or guardian's help. Explain to students that it is important to record their true energy use and not mark what they think they should be doing.
4. How did the students' homes rate? Discuss the results of the home survey. Help students to become enthusiastic about conserving natural resources and using energy more efficiently.

5. Prepare a graph to show the results of the energy efficiency survey. Which efficiency tips are already practiced by most students? Which were least used? Graph the number of students marking "yes" for each item.
6. Find the mean, median, mode and range of the data on the home survey.

Discussion

Discuss the benefits of energy conservation. How will our energy use impact our future? Compare the benefits and possible inconveniences and their correlation to our quality of life.

To Know and Do More

Why do you think people do not practice all of the energy efficiency tips on the survey? Are there false assumptions that affect people's behavior? (Believing that turning things on and off uses more energy than leaving them on, for example.)

Discuss how people in other geographic areas and cultures would rate. Does everyone have a car, dishwasher or an air conditioner?

Career Awareness Activity

Have the students think of some careers that could have a big impact on your community's energy usage. Some areas to consider: teachers — impact energy usage through education and by example; utility workers — through education and incentives; government regulators — through restrictions and rewards, such as financial benefits or tax breaks.

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Begin at home

Student Sheet: How Do You Rate?

How energy efficient is the building you live in? Together with your parents or guardians, answer the following questions to rate your home or apartment.

Circle T if the statement is true, F if the statement is false or NA if the statement does not apply to your living situation.

Heating and Cooling

Windows and doors have good weather stripping.	T	F	NA
Window coverings are open on cold, sunny days and closed on hot days.	T	F	NA
Window coverings are closed at night when heat is on.	T	F	NA
Thermostat is set at 68° F (20° C) or lower in winter.	T	F	NA
Air conditioning is set at 78° F (26° C) or higher in summer.	T	F	NA
Ducts are insulated in unheated/uncooled areas.	T	F	NA
Garage is insulated.	T	F	NA
Air filters on furnace and air conditioner are cleaned and changed regularly.	T	F	NA
An energy audit has been conducted from your local utility in the last 3 years.	T	F	NA
Thermostat is adjusted at night.	T	F	NA
Fireplace damper is closed when fireplace is not in use.	T	F	NA

Water

A pitcher of water is kept in the refrigerator for drinking.	T	F	NA
Faucets and toilets do not leak.	T	F	NA
Showers and faucets are fitted with energy-efficient shower heads and aerators.	T	F	NA
Showers last no longer than 5 minutes.	T	F	NA
Toilets are low flow, or tanks use water displacement devices.	T	F	NA
Hot water heater is set at 120° F (49° C). • If someone in your household has a compromised immune system, consult your physician.	T	F	NA
Hot water pipes from water heater are insulated.	T	F	NA
If located in an unheated area, hot water heater is wrapped in an insulation blanket.	T	F	NA
Broom, not hose, is used to clean driveways and sidewalks.	T	F	NA
Faucet is shut off while brushing teeth and shaving.	T	F	NA

Appliances

Dishwasher is usually run with a full load.	T	F	NA
Automatic air-dry is used with the dishwasher.	T	F	NA
Washing machine is usually run with a full load.	T	F	NA
Cold water is used in washing machine most of the time and is always used for rinses.	T	F	NA
Clothes dryer is usually run with a full load.	T	F	NA
Clothes are often hung up to dry.	T	F	NA
Refrigerator is set no lower than 37° F (3° C).	T	F	NA
Lids are usually put on pots when boiling water.	T	F	NA
Oven is preheated for only 10 minutes (if at all).	T	F	NA

Lighting

Lights are turned off when not in use.	T	F	NA
LED bulbs are used in at least one room.	T	F	NA
Security and decorative lighting is powered by solar energy.	T	F	NA
Light bulbs are kept dusted and clean.	T	F	NA
Sunlight is used whenever possible.	T	F	NA

Trash

Glass, cans and newspapers are recycled.	T F NA	Overpackaged products are usually avoided.	T F NA
Plastic is separated and recycled.	T F NA	Reusable bags are used for groceries, or bags are recycled.	T F NA
Old clothes are often given to charities, secondhand clothing stores, etc.	T F NA	Rechargeable batteries are used when possible.	T F NA
Food scraps and organic waste are composted.	T F NA	Food is often bought in bulk.	T F NA
		Products made of recycled materials are favored.	T F NA

Transportation

Car is properly tuned and tires properly inflated.	T F NA	Public transportation is used when possible.	T F NA
Family drivers obey speed limit on the highway.	T F NA	Family members often walk or ride a bike for short trips.	T F NA
Family drives an electric vehicle	T F NA	Kids and parents carpool when possible.	T F NA

Environment

Trees and bushes are maintained for wildlife shelter and food.	T F NA	Bird feeders or bird houses are maintained.	T F NA
		Native plants are used to decrease water use.	T F NA

Yard and Workshop

Lawns are watered early or late in the day.	T F NA	Cutting edges on tools are kept sharp.	T F NA
Grass is mowed to a height of 2 to 3 inches (5 to 8 cm).	T F NA	Electrical tools are maintained and gas equipment is kept tuned and serviced.	T F NA
Hand tools, like pruners and clippers (rather than power tools) are used whenever possible.	T F NA		

Score 1 point for True, 0 points for False and 0 points for Not Applicable (NA).

Total Points: _____

Discuss the results of this survey with your family.
What can you and your family do to raise your score?

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Begin at home

Activity: Energy in Math

Objective
Students will interpret and evaluate numerical expressions as they solve word problems.

Materials
- Student Worksheet
- Individual White Boards (optional)

Key Vocabulary
Watt

Common Core Correlations
Numbers and Operations

Data Analysis and Probability

Connection to the Real World

Measurement

Introduction:

In this activity, students will complete the problem set found on the bottom of Page 22 within an allotted time (10 minutes). Students will solve the mathematical problems making connections to real world situations.

Procedure:

1. Instruct students on the importance of learning to solve real world problems using their math skills. You may want to review some steps to solving word problems before beginning the first problem. The following questions might be useful to review:
   - Can you draw something to help you?
   - What can you draw?
   - What conclusions can you make from your drawing?
2. Pass out the worksheet.
3. Model the problem.

   Have a pair of students work at the board while the others work independently or in pairs at their seats.

   As students work, circulate. Reiterate the questions above. After several minutes, have the demonstrating students receive and respond to feedback and questions from their peers if necessary.
4. Calculate to solve and write a statement.

   Give everyone two minutes to finish work on that question, sharing their work and thinking with a peer. All should write their equations and statements of the answer.
5. Assess the solution for reasonableness.

   Give students one to two minutes to assess and explain the reasonableness of their solution.

Discussion/Debrief

The student debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the problem set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed. Then guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- What did you notice about this word problem?
- What is different in the problem?
- What are we trying to find out?
- How can we represent this part of the story? (draw, write a number, use manipulatives)
- What would help us organize our thinking and our work? (answers may vary: draw it out, act it out, write an equation, etc.)
- What strategies can we use to solve this problem?

To Know and Do More

Have your students turn in their worksheet showing their work to solve each problem. This will help you to assess your students' understanding of the math concepts presented in the lesson.

1. Jessie saved more energy than Michael. Michael saved more energy than Maggie. Maggie saved less energy than Jessie. Karen saved more energy than Jessie. List the kids' names in order of how much energy they saved, least to most:
   - Jessie, Karen, Maggie, Michael
   - Maggie, Michael, Jessie, Karen
   - Michael, Jessie, Maggie, Karen
   - Maggie, Karen, Michael, Jessie

2. The Maher family used 57,000 gallons of water a year, costing them $525 to heat it. Estimate how much money they would save in a year if they cut their hot water use by 30,820 gallons.
   - $100
   - $240
   - $284
   - $525

3. If each person in a house uses a 60 Watt bulb in their own bedroom 4 hours a day, and there are three people living there, how many Watts will be used a day to light the bedrooms?
   - 20 Watts
   - 240 Watts
   - 650 Watts
   - 720 Watts

4. For every 10 degrees the water heater setting is turned down, you can save 6% of the energy used. If Charles turns his water heater down by 15 degrees, about what percent savings in energy will he save?
   - 6%
   - 9%
   - 12%
   - 15%

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Activity: Be *watt*smart, Begin at home Poster

Objective
Students will make their own energy-efficient choices that can be practiced at home to help future societies.

The students will also learn how they can be part of the solution to save energy and natural resources.

Materials
- House poster found on the following page
- Colored markers or pens

Key Vocabulary
Carbon footprint
Recycle
Energy efficient

Common Core Correlations
Energy Sources, Forms and Transformation

Personal and Social Perspectives

Research Tools

Problem-solving and Decision-making Tools

Connection to the Real World

Introduction:

This is a fun project for students to create after they have studied energy, energy efficiency and renewable and nonrenewable resources. Using the poster given, students will add or color the items listed below to create a house that is eco-friendly and energy efficient. You can help your students answer questions about what types of energy they can use and how it will work in the house to create efficiency and save energy.

Procedure:

1. Add or color the items listed below. You may want to do different items each day as you cover different topics: electricity, natural gas, water, etc.
    - Add a bicycle.
    - Add recycling bins in the garage.
    - Add trees to shade the house.
    - Add a ceiling or floor fan to the home for cooling.
    - Put a blue star (for ENERGY STAR® products) on the refrigerator, television and furnace.
    - Color the energy-efficient shower head, red.
    - Color all items that use electricity, yellow.
    - Color the thermostat, brown.
    - Color the furnace filter that is being changed, orange.
    - Draw a purple water drop next to all items in the house that use water.

To Know and Do More

- Have your students write a brief description of the things their family has done to improve energy efficiency at home. Have your students add any items that will encourage their families to be energy efficient in the future.
- Choose a natural resource used for energy and create a Venn diagram comparing the positive and negative effects of the use of this resource on the physical environment.


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Lingo Card

L	I	N	G	O
Water Heater	Natural Gas	Natural Resource	Incandescent	Reduce
Reuse	Phantom Load	Oil	Coal	ENERGY STAR®
Renewable	Energy	Be ***watt***smart Begin at home	Turn It Off!	Uranium
Energy Efficiency	LED	Recycle	68 Degrees	Embodied Energy
Cooking	78 Degrees	Solar	Programmable or Smart Thermostat	Electricity

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L	I	N	G	O
Reuse	Natural Gas	Phantom Load	LED	78 Degrees
Cooking	Electricity	Renewable	Recycle	68 Degrees
Natural Resource	Water Heater	Be ***watt***smart Begin at home	ENERGY STAR®	Nonrenewable
Embodied Energy	Coal	Energy Efficiency	Heating	Incandescent
Programmable or Smart Thermostat	Reduce	Oil	Solar	Uranium

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L	I	N	G	O
Coal	Natural Gas	Solar	Turn It Off!	Renewable
Water Heater	Nonrenewable	Phantom Load	Electricity	Reuse
Energy	Oil	Be ***watt***smart Begin at home	68 Degrees	Cooking
Programmable or Smart Thermostat	Incandescent	Recycle	Uranium	Natural Resource
Reduce	78 Degrees	Embodied Energy	LED	Energy Efficiency

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L	I	N	G	O
Natural Resource	Water Heater	Natural Gas	Programmable or Smart Thermostat	78 Degrees
Turn It Off!	Reduce	Oil	Embodied Energy	Cooking
Phantom Load	ENERGY STAR®	Be ***watt***smart Begin at home	Uranium	Recycle
Energy	LED	68 Degrees	Energy Efficiency	Heating
Electricity	Renewable	Incandescent	Reuse	Solar

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Dear Parents,

Today your child participated in the **Be *watt*smart, Begin at home** program sponsored by Pacific Power. In this engaging presentation, your child learned key science curriculum concepts as well as important ways to be more efficient with energy use at home.

As part of the **Be *watt*smart, Begin at home** program, your child received a:

- **Be *watt*smart, Begin at home** booklet
- *Home Energy Worksheet*

Please take a moment to read through this informative booklet with your child. Then, fill out the *Home Energy Worksheet* in one of two ways:

- Visit thinkenergy.org/wattsmart and fill out an online worksheet. You will need to enter the teacher ID found on the paper worksheet.

  or

- Fill out the paper worksheet and return it to your child's teacher. To thank you, Pacific Power will provide your child with a wattsmart nightlight.

We appreciate your efforts to reinforce important **Be *watt*smart, Begin at home** energy knowledge and efficiency actions in your home!

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Estimados padres,

Su hijo ha participado en el programa **Ser *watt*smart, Empieza en casa**, patrocinado por Pacific Power. En esta presentación atractiva, su hijo aprendió conceptos claves de su plan de estudios de ciencias, así como formas importantes para ser más eficiente con el uso de energía en el hogar.

Como parte del programa de **Ser *watt*smart, Empieza en casa**, su hijo recibirá:

- El folleto de **Ser *watt*smart, Empieza en casa**
- *Verificación de Energía Doméstica*

Tome un momento para leer el folleto informativo con su hijo. Luego, complete la *Verificación de Energía Doméstica* de una de estas maneras:

- Visite thinkenergy.org/wattsmart para rellenar el formulario en línea. Necesitará entrar el número de identificación de su profesor que se encuentra en el formulario de papel.

  o

- Rellenar el formulario y devolverlo al profesor de su hijo. Para agradecerle, Pacific Power le proporcionará a su hijo una luz de noche.

Apreciamos sus esfuerzos para reforzar la importancia del **Ser *watt*smart, Empieza en casa** de la energía y los acciónes eficientes en el hogar.

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*Watt*smart **Pacific Power program**

Program Evaluation Summary

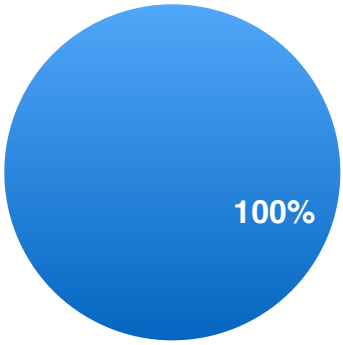
Educators' impressions of the program from 16 educators.

	Strongly Agree	Agree	Disagree	Strongly Disagree	
Materials were attractive and easy to use.	14	2	0	0	88% 13%
Materials and activities were well received by students.	14	2	0	0	88% 13%
Materials were clearly written and well organized.	14	2	0	0	88% 13%
Presenters were able to keep students engaged and attentive.	15	1	0	0	94% 6%
Overall program	15	1	0	0	94% 6%

If you had the opportunity, would you conduct this program again?

Yes	No
16	0

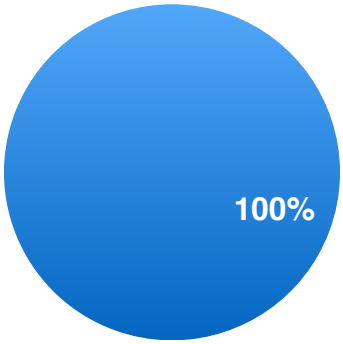
Yes No



Would you recommend this program to other colleagues?

Yes	No
16	0

Yes No



In my opinion, the thing the students liked best about the materials/program was:

Fun way to learn and reinforce the information they already know about energy.
I believe the students liked the interactive parts of the program and materials the best.
LINGO
LINGO, the videos with the lady and her cow:)
The energy stick.
The hands on activity
the light
The presentation
The presentation was very interactive and liked the way the video/powerpoint were used.
The program kept their interest and the videos were crazy but they love crazy.
The videos as well as the interactive portions of the presentation.
They love the whole pressentation. They especially like the part when they show humans are conductors of electricity.
They loved the experience with the conductor being their bodies.
They really enjoyed the interactive activities.

In the future, one thing I would change would be:

I liked Tex Wattsmart myself! But it is ALL GOOD!
I would add more interactive materials and parts to the program.
I wouldn't change a thing.
Maybe some follow up videos and handouts to continue teaching through out the year.
More student participation
Not having it at the end of the day, mid day is so much better.
Nothing. Love the updated videos!

Be *watt*smart
Begin at home

Teacher ID:

Teacher Name:

Student First Name:

Home Energy Worksheet

Heating

1. Install and use a programmable or smart thermostat.
   ☐ Currently do ☐ Will do ☐ Neither
2. Caulk windows and weather strip outside doors.
   ☐ Have done ☐ Will do ☐ Neither
3. Inspect attic insulation and add insulation if needed.
   ☐ Have done ☐ Will do ☐ Neither
4. Keep furnace air filters clean/replaced regularly.
   ☐ Currently do ☐ Will do ☐ Neither

Cooling

5. Replace existing air conditioning unit with a high-efficiency unit or an evaporative cooling unit.
   ☐ Have done ☐ Will do ☐ Neither
6. Close blinds when windows are exposed to the sun.
   ☐ Currently do ☐ Will do ☐ Neither
7. Use a fan instead of air conditioning.
   ☐ Currently do ☐ Will do ☐ Neither
8. In the summer, set thermostat to 78º F or higher.
   ☐ Currently do ☐ Will do ☐ Neither

Water heating

9. Set the water heater temperature to 120º F.
   ☐ Have done ☐ Will do ☐ Neither
10. Install a high-efficiency shower head.
    ☐ Have done ☐ Will do ☐ Neither
11. Take 5 minute showers.
    ☐ Currently do ☐ Will do ☐ Neither
12. Wash full loads in the dishwasher and clothes washer.
    ☐ Currently do ☐ Will do ☐ Neither

Lighting

13. Replace inefficient bulbs with LED bulbs.
    ☐ Have done ☐ Will do ☐ Neither
14. Turn lights off when not in use.
    ☐ Currently do ☐ Will do ☐ Neither

Refrigeration

15. Replace old, inefficient refrigerator with an ENERGY STAR® model.
    ☐ Have done ☐ Will do ☐ Neither
16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.
    ☐ Have done ☐ Will do ☐ Neither
17. Maintain refrigerator and freezer coils and check door seals twice yearly.
    ☐ Currently do ☐ Will do ☐ Neither

Electronics

18. Turn off computers, TVs and game consoles when not in use.
    ☐ Currently do ☐ Will do ☐ Neither

Cooking

19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.
    ☐ Currently do ☐ Will do ☐ Neither

Get paid for being *watt*smart

20. Visit Pacific Power at bewattsmart.com for more energy saving tips and rebates.
    ☐ Have done ☐ Will do ☐ Neither

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Submit online at thinkenergy.org/wattsmart

WAT WA

Home Energy Worksheet (Spanish)

Ser **watt**smart
Empieza en casa

Identificación del profesor(a): _____

Nombre del profesor(a): _____

Primer nombre del estudiante: _____

Verificación de Energía Doméstica

Calefacción

1. Instalar y usar un termostato programable o termostato inteligente.
   ☐ Lo hago ☐ Lo haré ☐ Ninguno
2. Calafatear ventanas e instalar burletes en el exterior de las puertas.
   ☐ Lo he hecho ☐ Lo haré ☐ Ninguno
3. Inspeccionar el aislamiento del ático y agregar aislamiento si es necesario.
   ☐ Lo he hecho ☐ Lo haré ☐ Ninguno
4. Mantener los filtros de aire de la calefacción limpios/reemplezarlos regularmente.
   ☐ Lo hago ☐ Lo haré ☐ Ninguno

Enfriamiento

5. Reemplazar la unidad de aire acondicionado existente por una unidad de alta eficiencia o un enfriador evaporativo.
   ☐ Lo he hecho ☐ Lo haré ☐ Ninguno
6. Cerrar las persianas cuando las ventanas están expuestas al sol.
   ☐ Lo hago ☐ Lo haré ☐ Ninguno
7. Usar un ventilador en lugar del aire acondicionado.
   ☐ Lo hago ☐ Lo haré ☐ Ninguno
8. En el verano, ajustar el termostato a 78º F o más.
   ☐ Lo hago ☐ Lo haré ☐ Ninguno

Calentadores de agua

9. Programar el calentador de agua a 120º F.
   ☐ Lo he hecho ☐ Lo haré ☐ Ninguno
10. Instalar un cabezal de ducha de alta eficiencia.
    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno
11. Tomar duchas de 5 minutos.
    ☐ Lo hago ☐ Lo haré ☐ Ninguno
12. Lavar cargas llenas en los lavaplatos y las lavadoras de ropa.
    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Iluminación

13. Reemplazar los focos ineficientes con focos LED.
    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno
14. Apagar las luces cuando no estén en uso.
    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Refrigerador

15. Reemplazar el refrigerador viejo e ineficiente con un modelo de ENERGY STAR®.
    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno
16. Desenchufar refrigeradores/congeladores viejos y/o desecharlos de una manera ambientalmente segura.
    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno
17. Mantener las bobinas del refrigerador y del congelador e inspeccionar el sello de las puertas dos veces al año.
    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Electrónicos

18. Apagar computadoras, televisores y consolas de juegos cuando no estén en uso.
    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Cocinar

19. Usar un horno microonda, un horno eléctrico, un olla de cocimiento lento o un parrilla de aire libre en lugar del horno convencional.
    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Reciba paga siendo *watt*smart

20. Visite Pacific Power en bewattsmart.com para obtener más consejos y rebajas de ahorro de energía.
    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

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Enviar en línea a thinkenergy.org/wattsmart

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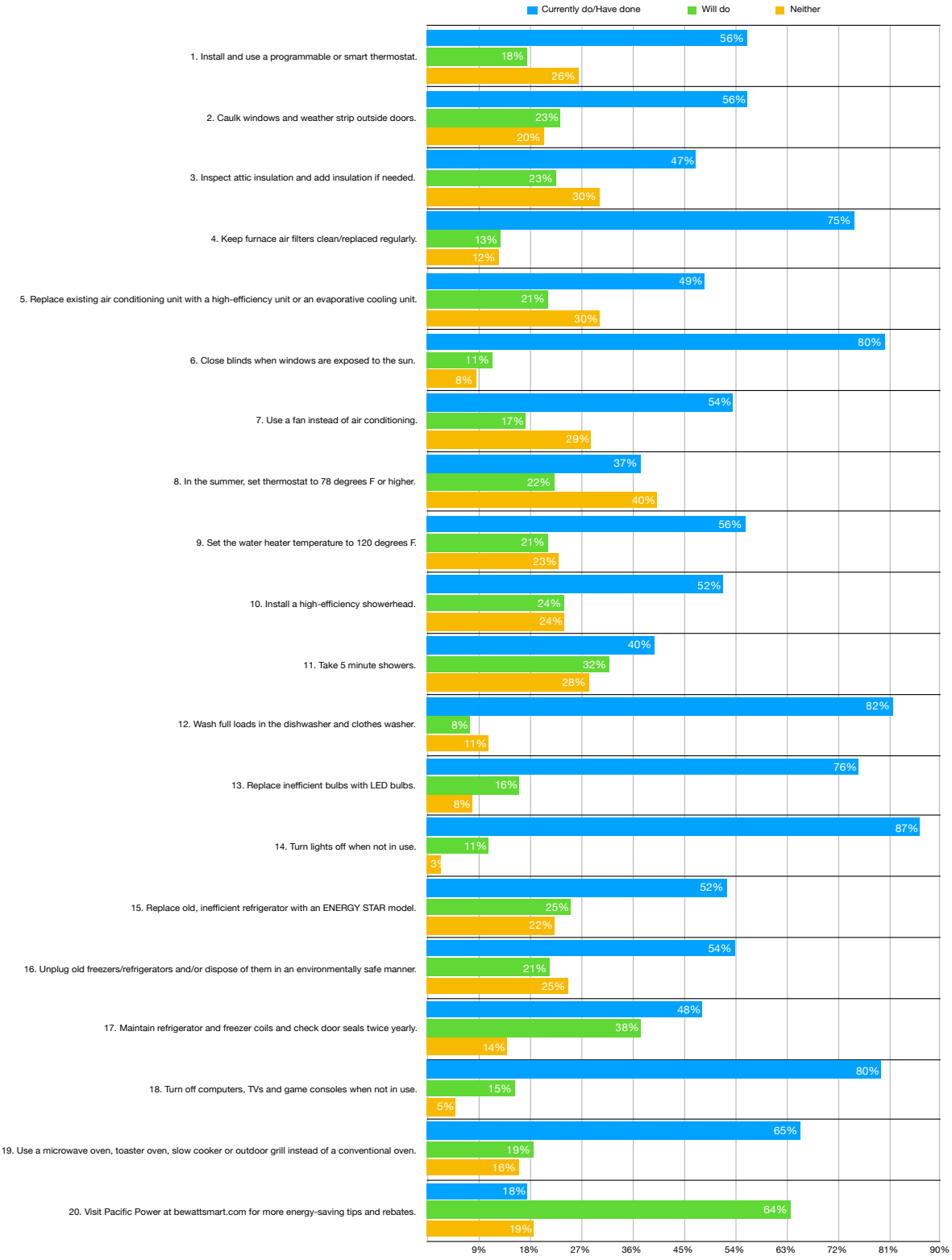
Home Energy Worksheet Summary – Pacific Power

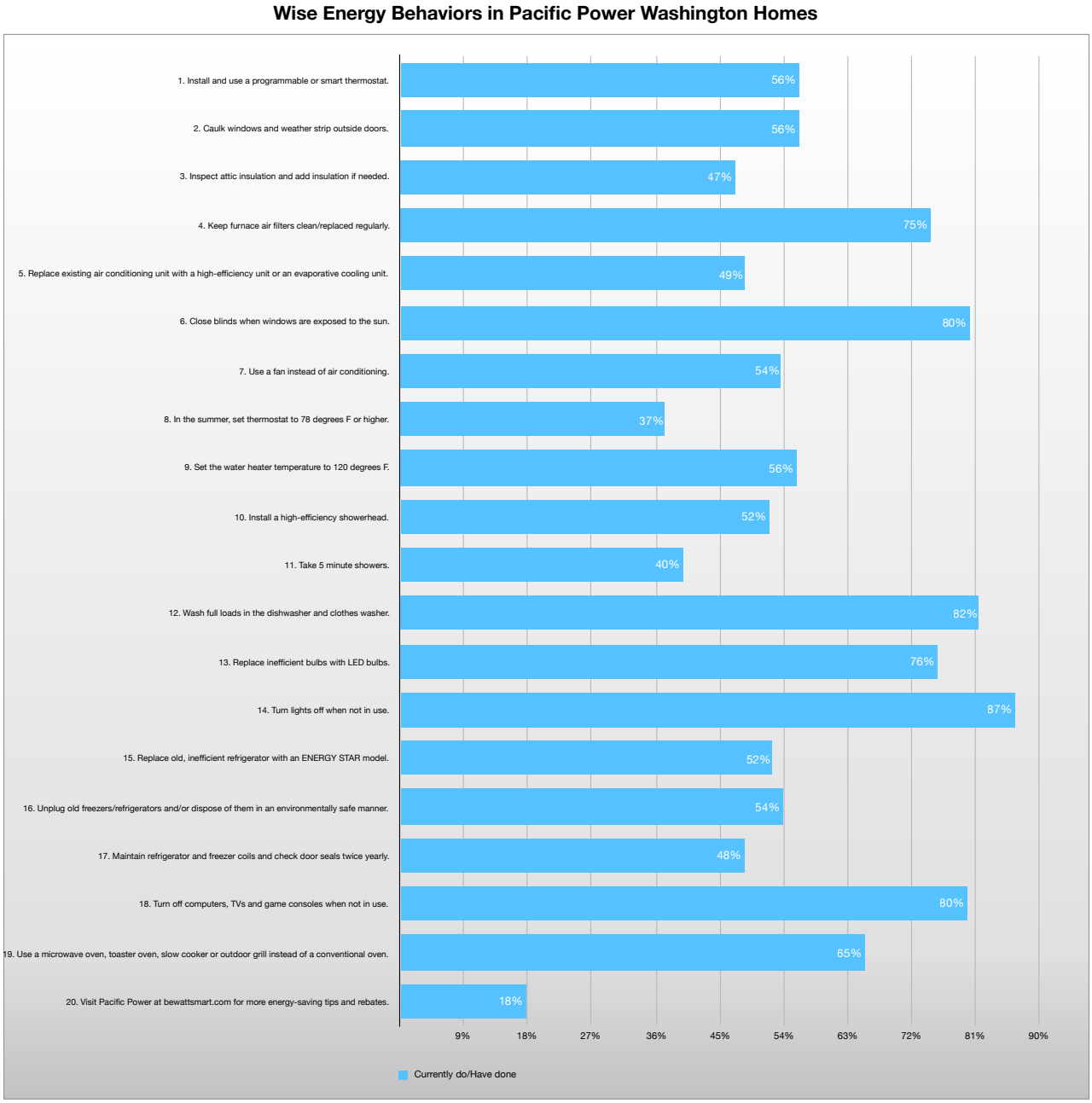
Energy Efficient Activity	Currently do/Have done	Will do	Neither
1. Install and use a programmable or smart thermostat.	56%	18%	26%
2. Caulk windows and weather strip outside doors.	56%	23%	20%
3. Inspect attic insulation and add insulation if needed.	47%	23%	30%
4. Keep furnace air filters clean/replaced regularly.	75%	13%	12%
5. Replace existing air conditioning unit with a high-efficiency unit or an evaporative cooling unit.	49%	21%	30%
6. Close blinds when windows are exposed to the sun.	80%	11%	8%
7. Use a fan instead of air conditioning.	54%	17%	29%
8. In the summer, set thermostat to 78 degrees F or higher.	37%	22%	40%
9. Set the water heater temperature to 120 degrees F.	56%	21%	23%
10. Install a high-efficiency showerhead.	52%	24%	24%
11. Take 5 minute showers.	40%	32%	28%
12. Wash full loads in the dishwasher and clothes washer.	82%	8%	11%
13. Replace inefficient bulbs with LED bulbs.	76%	16%	8%
14. Turn lights off when not in use.	87%	11%	3%
15. Replace old, inefficient refrigerator with an ENERGY STAR model.	52%	25%	22%
16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.	54%	21%	25%
17. Maintain refrigerator and freezer coils and check door seals twice yearly.	48%	38%	14%
18. Turn off computers, TVs and game consoles when not in use.	80%	15%	5%
19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.	65%	19%	16%
20. Visit Pacific Power at bewattsmart.com for more energy-saving tips and rebates.	18%	64%	19%


Currently do/Have done
Will do
Neither
1. Install and use a programmable or smart thermostat.
56%
18%
26%
2. Caulk windows and weather strip outside doors.
56%
23%
20%
3. Inspect attic insulation and add insulation if needed.
47%
23%
30%
4. Keep furnace air filters clean/replaced regularly.
75%
13%
12%
5. Replace existing air conditioning unit with a high-efficiency unit or an evaporative cooling unit.
49%
21%
30%
6. Close blinds when windows are exposed to the sun.
80%
11%
8%
7. Use a fan instead of air conditioning.
54%
17%
29%
8. In the summer, set thermostat to 78 degrees F or higher.
37%
22%
40%
9. Set the water heater temperature to 120 degrees F.
56%
21%
23%
10. Install a high-efficiency showerhead.
52%
24%
24%
11. Take 5 minute showers.
40%
32%
28%
12. Wash full loads in the dishwasher and clothes washer.
82%
8%
11%
13. Replace inefficient bulbs with LED bulbs.
76%
16%
8%
14. Turn lights off when not in use.
87%
11%
3%
15. Replace old, inefficient refrigerator with an ENERGY STAR model.
52%
25%
22%
16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.
54%
21%
25%
17. Maintain refrigerator and freezer coils and check door seals twice yearly.
48%
38%
14%
18. Turn off computers, TVs and game consoles when not in use.
80%
15%
5%
19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.
65%
19%
16%
20. Visit Pacific Power at bewattsmart.com for more energy-saving tips and rebates.
18%
64%
19%
9%
18%
27%
36%
45%
54%
63%
72%
81%
90%

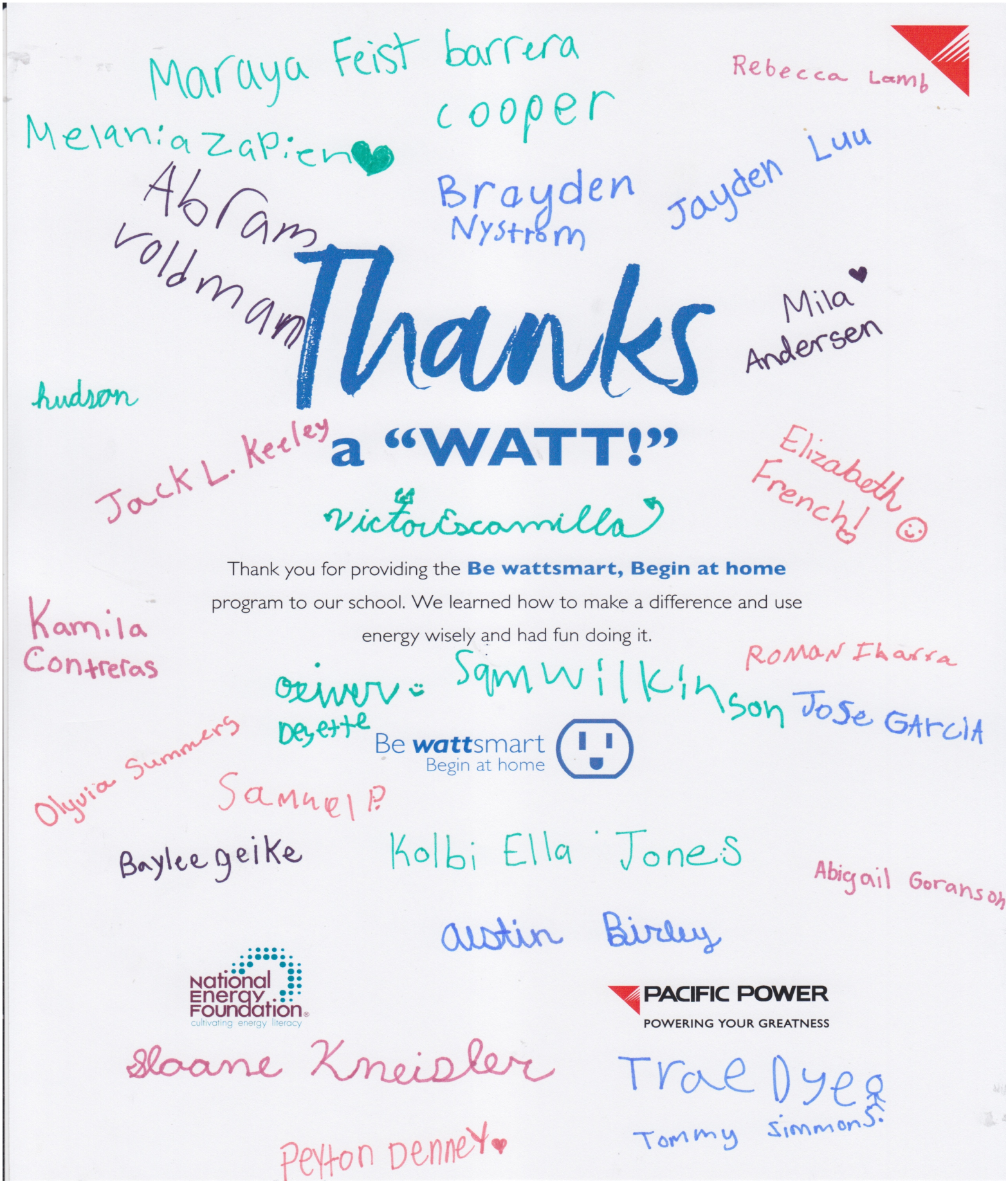
Data Numbers

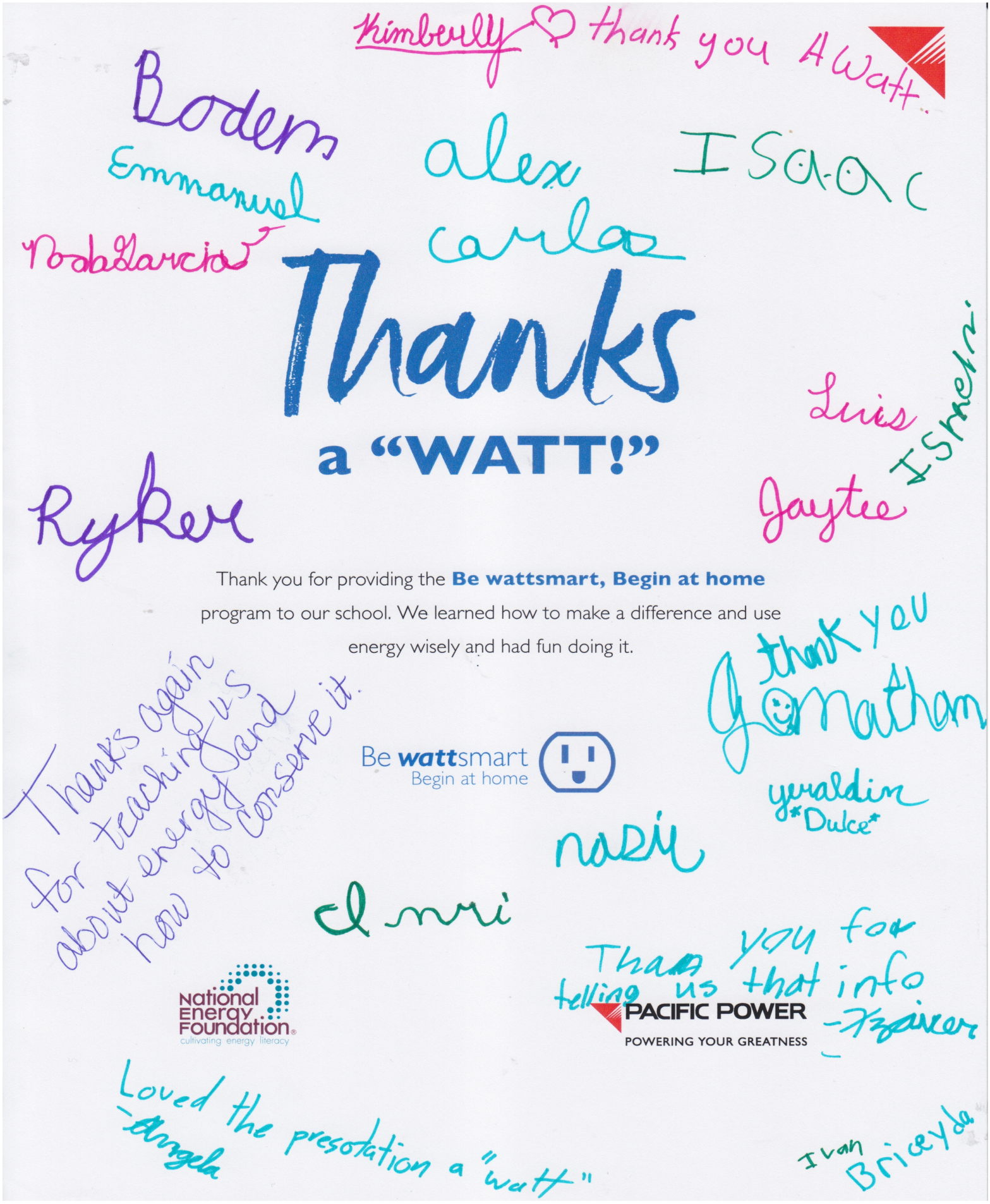
Energy Efficient Activity	Currently do/Have done	Will do	Neither	Total Responses
1. Install and use a programmable or smart thermostat.	1059	331	500	1890
2. Caulk windows and weather strip outside doors.	1054	440	381	1875
3. Inspect attic insulation and add insulation if needed.	878	419	561	1858
4. Keep furnace air filters clean/replaced regularly.	1397	240	232	1869
5. Replace existing air conditioning unit with a high-efficiency unit or an evaporative cooling unit.	909	395	567	1871
6. Close blinds when windows are exposed to the sun.	1521	214	160	1895
7. Use a fan instead of air conditioning.	1013	327	544	1884
8. In the summer, set thermostat to 78 degrees F or higher.	701	417	758	1876
9. Set the water heater temperature to 120 degrees F.	1050	398	435	1883
10. Install a high-efficiency showerhead.	980	451	455	1886
11. Take 5 minute showers.	753	604	537	1894
12. Wash full loads in the dishwasher and clothes washer.	1543	143	206	1892
13. Replace inefficient bulbs with LED bulbs.	1434	308	152	1894
14. Turn lights off when not in use.	1626	204	48	1878
15. Replace old, inefficient refrigerator with an ENERGY STAR model.	990	477	421	1888
16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.	1014	403	465	1882
17. Maintain refrigerator and freezer coils and check door seals twice yearly.	917	712	267	1896
18. Turn off computers, TVs and game consoles when not in use.	1514	290	95	1899
19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.	1236	351	303	1890
20. Visit Pacific Power at bewattsmart.com for more energy-saving tips and rebates.	333	1201	353	1887

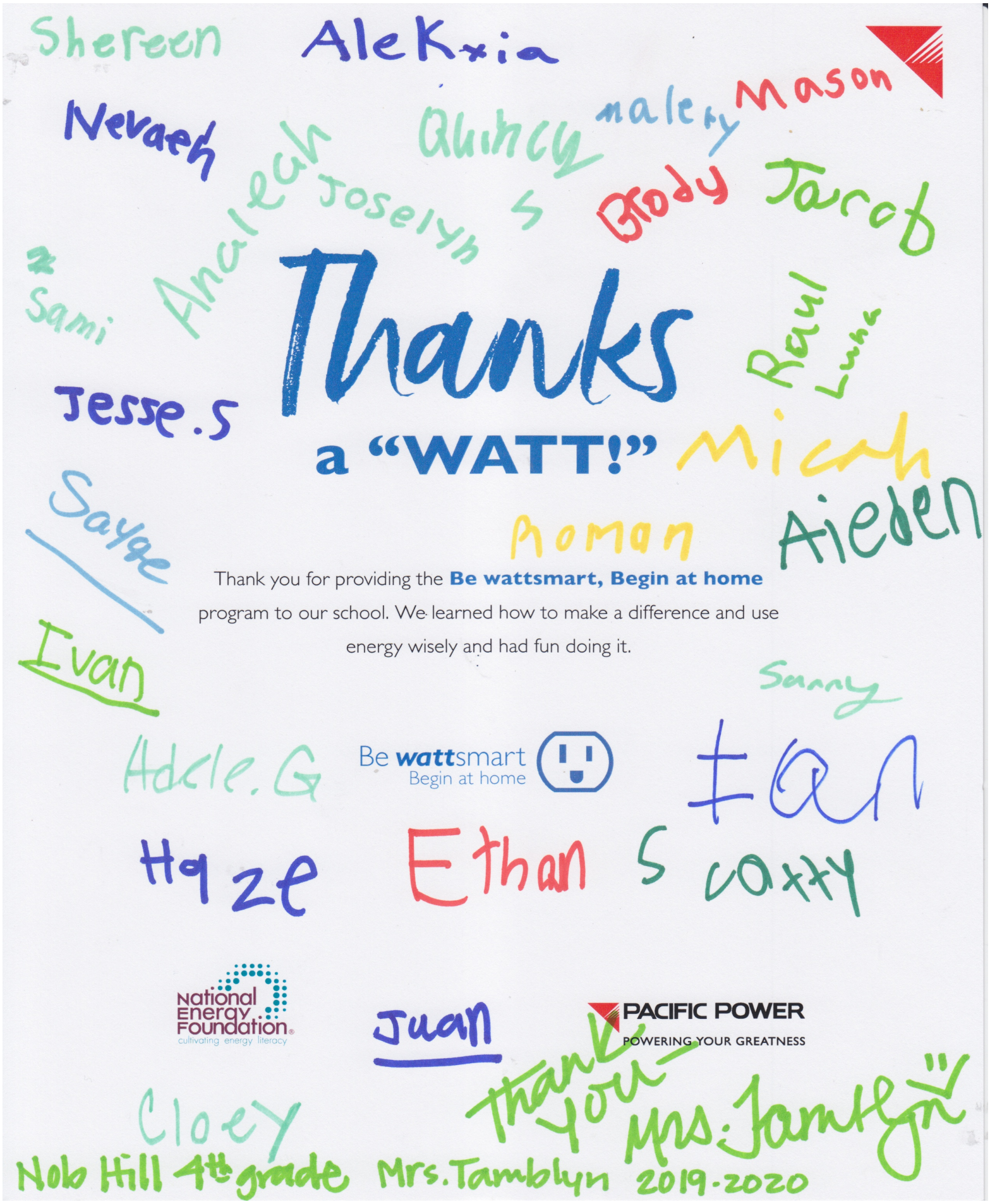
Wise Energy Behaviors in Pacific Power Washington Homes



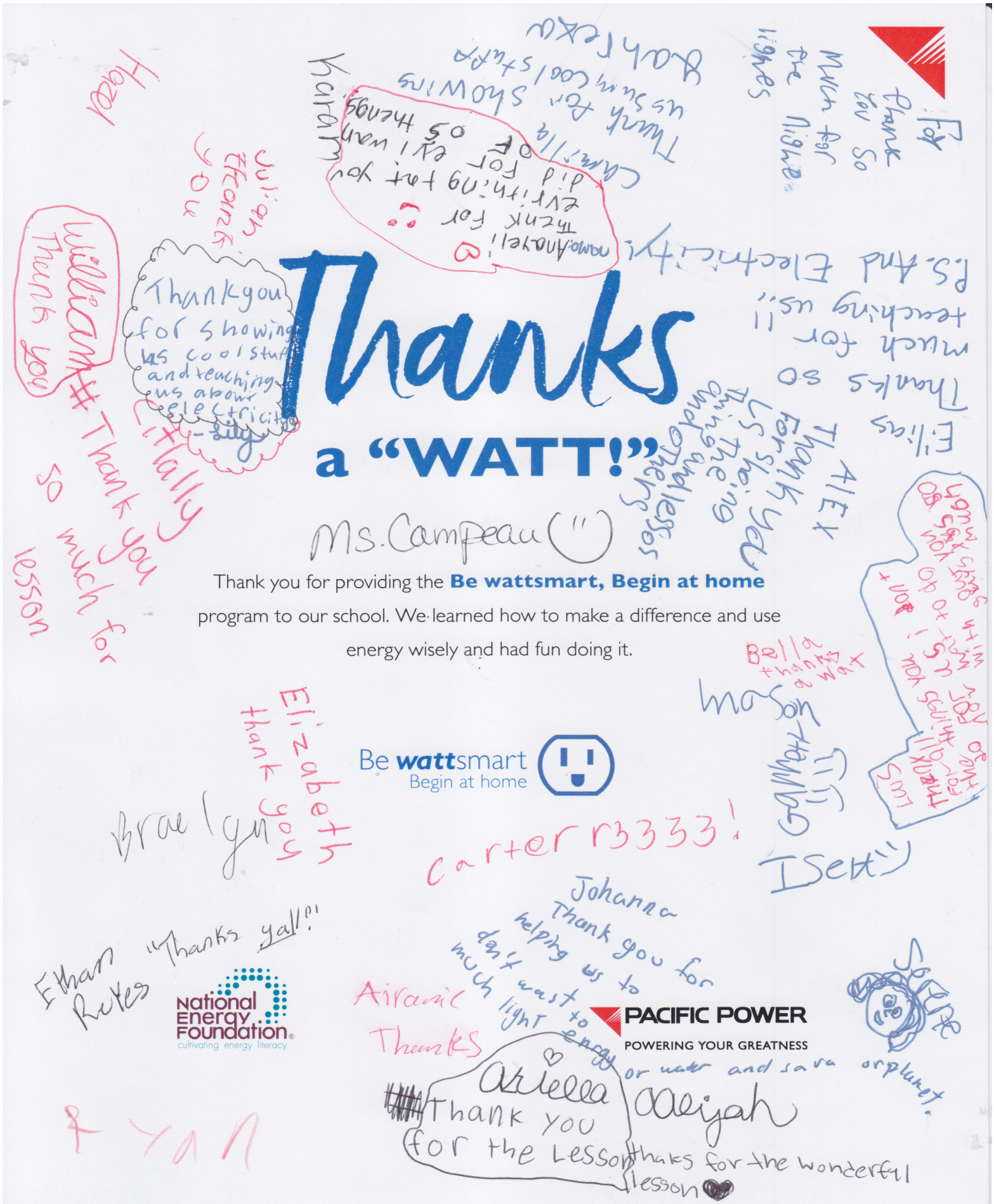
Sampling of *Thanks a "WATT" Cards*

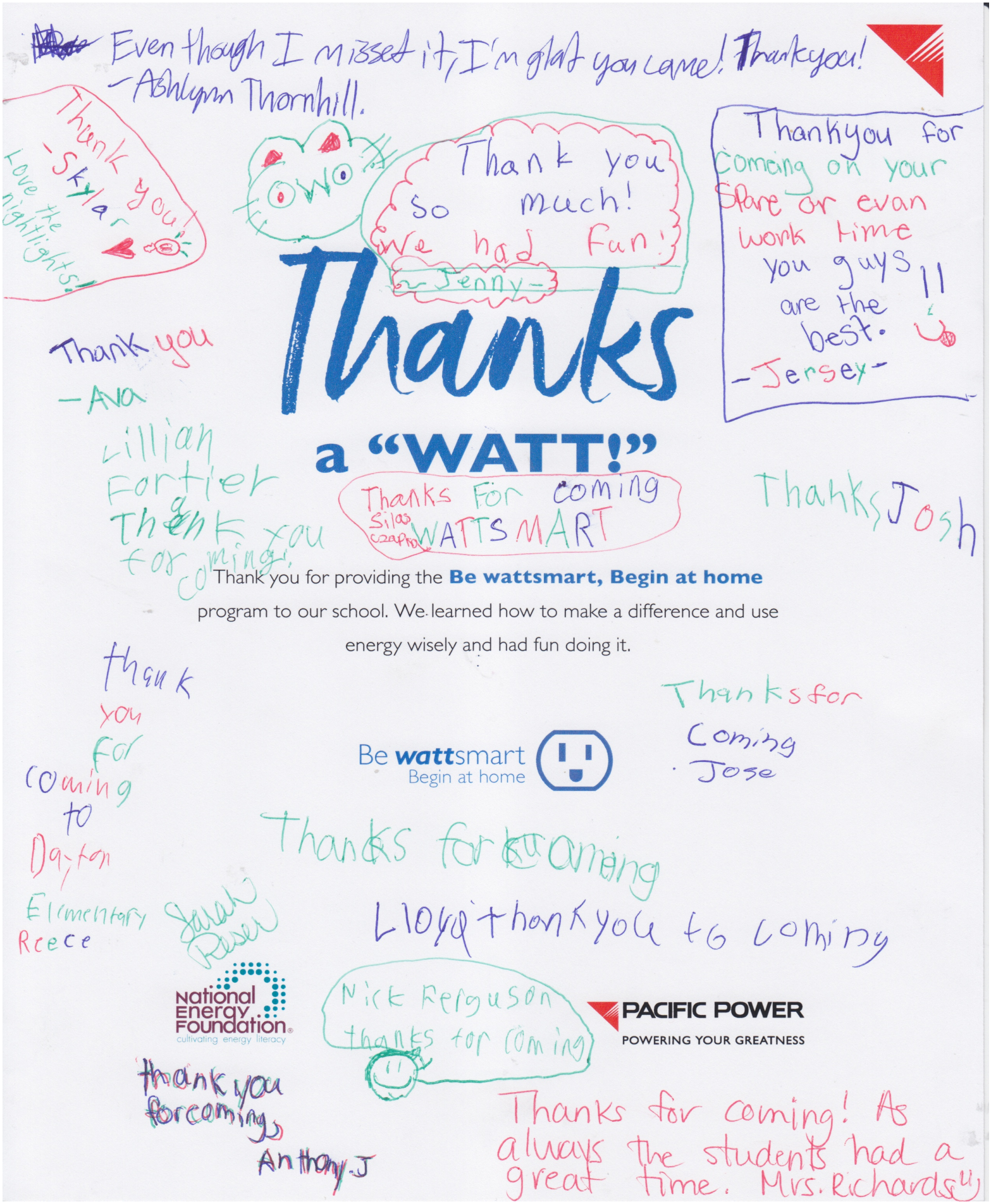






Thank you for providing the **Be wattsmart, Begin at home** program to our school. We learned how to make a difference and use energy wisely and had fun doing it.


Thanks
a "WATT!"
Ms. Campeau
Thank you for providing the Be wattsmart, Begin at home program to our school. We learned how to make a difference and use energy wisely and had fun doing it.
Be wattsmart
Begin at home
National Energy Foundation
cultivating energy literacy
PACIFIC POWER
POWERING YOUR GREATNESS



Appendix 6
Washington Program Evaluations

Washington 2019 Evaluations

Program Evaluation Recommendations and Company Responses

Evaluation reports provide detailed information on the process and impact evaluations performed on each program, summarizing the methodology used to calculate the evaluated savings as well as providing recommendations for the Company to consider for improving the process or impact of the program, as well as customer satisfaction.

Outlined below is a list of the programs, the years that were evaluated during 2019 and the third party evaluator who completed the evaluation. Program evaluations are available for review at https://www.pacificorp.com/environment/demand-side-management.html

Program	Years Evaluated	Evaluator
Home Energy Savings Evaluation	2017-2018	ADM

Company responses to the program recommendations contained in the evaluations are provided below.

Table 1
Home Energy Savings Evaluation Recommendations

Evaluation Recommendations	Pacific Power Response
To understand further how the RSAT tool accounts for leakage and how the store allocations relate to the Program Tracking Data, ADM recommends that the next evaluation of subsequent program years includes a full life-cycle review of the lighting contracts, including the participation agreements with the implementation contractor and a sample of all associated invoices. This would allow the evaluation to follow the life-cycle of the bulbs from the original agreement to final installation.	Additional information on the RSAT tool (used throughout the region) and the underlying methodology can be made available during the next evaluation cycle. This information would be provided by the third party responsible for the RSAT tool. If necessary, the participation agreements and a sample invoices can also be provided to help the next evaluator develop a more refined estimate of where the bulbs are likely to be installed.
The TRL files should specify the inputs to the lighting savings engineering calculation. This would increase the efficiency of the impact evaluation process and would be consistent with other PacifiCorp states' TRL files.	Engineering calculations used to support the lighting savings estimates are found in the RTF workbooks referenced in the TRL in the source document data fields. Since the workbooks were publicly accessible on the RTF web site (including archived versions), the decision to not replicate calculations publicly accessible was made to minimize the chance of errors and to manage administrative costs of program delivery. In response to this recommendation and to help minimize program evaluation costs during the evaluation cycle, more support will be provided to the selected evaluation firm to help them locate and understand the publicly accessible calculations should it be necessary. Washington's EIA requirement to utilize RTF savings estimates aren't necessarily conducive to aligning TRL files across other PacifiCorp states when other states may be using other data sources and calculation to estimate lighting savings.
ADM recommends that Pacific Power consider including only one showerhead in the Best Kit – 2 Bathroom Energy Kits, which could increase the overall ISR for showerheads.	This recommendation has been reviewed and included in the design of the upcoming energy saver kit campaigns. Additional screening questions will be added to the on-line order process to help insure the second showerhead is needed and installed.
In the next evaluation cycle, primary data should be collected regarding the use of wood as a supplemental heating source.	Pacific Power has been collecting information on the presence of wood heat in homes (via the heat pump application) since the beginning of 2018. This information is not currently included in the DSMC tracking system, so the evaluator was not aware of it. Wood heat and the impact savings are known to the RTF and accounted for during the savings estimation process. Application information on wood heat in homes is available and utilized during the program design and planning process and used to assess which RTF values (including ones that tie measure eligibility to the presence or absence of supplemental heat) are utilized for savings reporting. It may be possible to add data fields in DSMC to capture this data prior to

Evaluation Recommendations	Pacific Power Response
	the next evaluation cycle. At a minimum, communication early in the evaluation cycle about the availability of this data will be provided to the next evaluator.
If the whole homes measure category is expected to grow in subsequent program years, ADM will request the REM/Rate™ modeling files to further verify savings.	Pacific Power utilizes the regional BetterBuiltNW framework for their new homes offer in Washington. Information on each home (including REM/Rate modeling files) is uploaded to the AXIS data base. For the next evaluation cycle, early project communication will be provided to the evaluator about where this information is stored.