



SVCE CPAG Program Evaluation Worksheet Results - Positive Impacts Only

		Residential Storage - reduce duck curve impacts	Connected Home Devices - customer understanding and load management	Residential & MF EV Charging - encourage vehicle electrification	MF Residence Energy Efficiency - GHG and customer cost reduction	Safety Preparedness & Resilience with Micro Grids	Incentives or Rebates for Used Electric Cars and Smart Chargers	Electricity Bill Explorer	Residential Electricity Monitoring	Residential BE Ready Program, SF + MF Variants	Pilot "Mass Produced" Zero Emission Retrofit Approach	Electrification Process "Survivorship Curve" Analysis	BE Smart Residential Water and Space Heating Upgrade
Poster 1	Increase customer energy literacy	6	13	3	11	2	3	13	13	10	6	7	9
	Provide personalized customer engagement; promote active choices (e.g. upgrading to GreenPrime); increase SVCE awareness	7	11	4	7	2	9	13	12	7	7	6	9
	Engage customers in their energy use through comparisons with peers, benchmarks, their own trends (gamification)	7	13	4	7	1	3	8	12	4	4	4	4
	Improve transparency on decisions for customers	5	10	3	7	3	4	11	11	7	4	7	7
	Provide customers more choices and local control	11	8	8	9	10	10	10	9	13	8	7	8
Poster 2	Increase engagement and participation in energy programs for disadvantaged communities	3	2	5	10	4	10	7	4	6	12	6	9
Poster 3	Provide customer services or programs not offered by PG&E and leverage services and programs offered by PG&E	10	3	6	6	11	10	3	6	10	9	6	10
Poster 4	Reduce customer bills by reducing usage and shifting usage from peak price periods	13	10	5	10	2	5	8	12	4	6	2	6



SVCE CPAG Program Evaluation Worksheet Results - Positive Impacts Only

		Residential Storage - reduce duck curve impacts	Connected Home Devices - customer understanding and load management	Residential & MF EV Charging - encourage vehicle electrification	MF Residence Energy Efficiency - GHG and customer cost reduction	Safety Preparedness & Resilience with Micro Grids	Incentives or Rebates for Used Electric Cars and Smart Chargers	Electricity Bill Explorer	Residential Electricity Monitoring	Residential BE Ready Program, SF + MF Variants	Pilot "Mass Produced" Zero Emission Retrofit Approach	Electrification Process "Survivorship Curve" Analysis	BE Smart Residential Water and Space Heating Upgrade
	Reduce customer costs in purchasing and using energy-consuming devices	7	11	6	14	0	11	6	10	10	8	4	13
Poster 5	Reduce demand during peak hours and increase demand during peak PV production (duck curve)	14	13	5	6	5	5	8	10	6	8	2	5
	Reduce the need for/use of carbon-emitting peaker plants	13	12	6	9	6	4	7	6	6	9	2	5
	Reduce GHG emissions through reduced electricity use	5	12	7	10	2	4	8	9	6	10	5	7
Poster 6	Promote local jobs and economic development	10	3	10	10	7	4	0	2	10	11	4	11
Poster 7	Provide customer backup power	13	1	2	2	11	3	0	1	2	1	1	0
Poster 8	Transform markets (accelerate adoption of clean energy devices and practices)	7	5	7	12	4	9	6	6	13	10	11	10
Poster 9	Alleviate climate change impacts (GHG reduction)	12	11	14	13	6	13	9	9	12	13	6	13
	Increase readiness for expanded use of clean electricity	9	4	7	10	7	6	5	5	13	11	10	12
	Improve indoor/outdoor air quality	5	2	11	8	5	10	5	6	9	11	3	10



SVCE CPAG Program Evaluation Worksheet Results - Positive Impacts Only

		Residential Storage - reduce duck curve impacts	Connected Home Devices - customer understanding and load management	Residential & MF EV Charging - encourage vehicle electrification	MF Residence Energy Efficiency - GHG and customer cost reduction	Safety Preparedness & Resilience with Micro Grids	Incentives or Rebates for Used Electric Cars and Smart Chargers	Electricity Bill Explorer	Residential Electricity Monitoring	Residential BE Ready Program, SF + MF Variants	Pilot "Mass Produced" Zero Emission Retrofit Approach	Electrification Process "Survivorship Curve" Analysis	BE Smart Residential Water and Space Heating Upgrade
Poster 10	Increase SVCE sales of clean electricity	6	1	13	6	4	13	4	5	12	6	3	9
	Total Positive Impacts	163	145	126	167	92	136	131	148	160	154	96	157
*Please note numbers are approximate													



SVCE CPAG Program Evaluation Worksheet Results - Negative Impacts Only

		Residential Storage - reduce duck curve impacts	Connected Home Devices - customer understanding and load management	Residential & MF EV Charging - encourage vehicle electrification	MF Residence Energy Efficiency - GHG and customer cost reduction	Safety Preparedness & Resilience with Micro Grids	Incentives or Rebates for Used Electric Cars and Smart Chargers	Electricity Bill Explorer	Residential Electricity Monitoring	Residential BE Ready Program, SF + MF Variants	Pilot "Mass Produced" Zero Emission Retrofit Approach	Electrification Process "Survivorship Curve" Analysis	BE Smart Residential Water and Space Heating Upgrade
Poster 1	Increase customer energy literacy	0	0	0	0	1	0	0	0	0	0	1	0
	Provide personalized customer engagement; promote active choices (e.g. upgrading to GreenPrime); increase SVCE awareness	1	0	0	1	1	0	0	0	0	0	1	0
	Engage customers in their energy use through comparisons with peers, benchmarks, their own trends (gamification)	0	0	0	0	1	0	0	0	1	0	2	0
	Improve transparency on decisions for customers	1	0	1	1	1	0	0	0	1	0	1	0
	Provide customers more choices and local control	1	1	1	1	1	0	0	0	0	0	1	0
Poster 2	Increase engagement and participation in energy programs for disadvantaged communities	7	2	3	1	1	0	0	0	1	0	1	0
Poster 3	Provide customer services or programs not offered by PG&E and leverage services and programs offered by PG&E	0	2	1	1	0	0	1	0	1	0	1	0
Poster 4	Reduce customer bills by reducing usage and shifting usage from peak price periods	0	0	2	1	1	3	0	0	2	0	1	0



SVCE CPAG Program Evaluation Worksheet Results - Negative Impacts Only

		Residential Storage - reduce duck curve impacts	Connected Home Devices - customer understanding and load management	Residential & MF EV Charging - encourage vehicle electrification	MF Residence Energy Efficiency - GHG and customer cost reduction	Safety Preparedness & Resilience with Micro Grids	Incentives or Rebates for Used Electric Cars and Smart Chargers	Electricity Bill Explorer	Residential Electricity Monitoring	Residential BE Ready Program, SF + MF Variants	Pilot "Mass Produced" Zero Emission Retrofit Approach	Electrification Process "Survivorship Curve" Analysis	BE Smart Residential Water and Space Heating Upgrade
	Reduce customer costs in purchasing and using energy-consuming devices	1	0	1	0	1	0	1	0	1	1	1	0
Poster 5	Reduce demand during peak hours and increase demand during peak PV production (duck curve)	0	0	0	0	1	1	0	0	1	0	1	1
	Reduce the need for/use of carbon-emitting peaker plants	0	0	1	1	0	3	0	0	1	0	1	0
	Reduce GHG emissions through reduced electricity use	3	0	1	0	0	3	0	0	1	0	1	0
Poster 6	Promote local jobs and economic development	0	0	0	0	1	0	1	0	0	0	1	0
Poster 7	Provide customer backup power	0	1	2	1	0	0	1	1	1	0	2	1
Poster 8	Transform markets (accelerate adoption of clean energy devices and practices)	1	0	0	0	1	0	0	0	1	0	1	0
Poster 9	Alleviate climate change impacts (GHG reduction)	0	0	0	0	1	0	0	0	1	0	1	0
	Increase readiness for expanded use of clean electricity	0	0	0	0	2	0	0	0	0	0	1	0
	Improve indoor/outdoor air quality	0	0	0	0	1	0	0	0	1	0	1	0



SVCE CPAG Program Evaluation Worksheet Results - Negative Impacts Only

		Residential Storage - reduce duck curve impacts	Connected Home Devices - customer understanding and load management	Residential & MF EV Charging - encourage vehicle electrification	MF Residence Energy Efficiency - GHG and customer cost reduction	Safety Preparedness & Resilience with Micro Grids	Incentives or Rebates for Used Electric Cars and Smart Chargers	Electricity Bill Explorer	Residential Electricity Monitoring	Residential BE Ready Program, SF + MF Variants	Pilot "Mass Produced" Zero Emission Retrofit Approach	Electrification Process "Survivorship Curve" Analysis	BE Smart Residential Water and Space Heating Upgrade
Poster 10	Increase SVCE sales of clean electricity	3	5	0	4	1	0	2	2	1	3	2	1
	Total Negative Impacts	18	11	13	12	16	10	6	3	15	4	22	3
*Please note numbers are approximate													

CPAG
Program Costs, GHG Impact, Cost of Carbon
May 11, 2018

PRELIMINARY - for discussion only

	Residential Storage - reduce duck curve impacts	Connected Home Devices - customer understanding and load management	Residential & MF EV Charging - encourage vehicle electrification	MF Residence Energy Efficiency - GHG and customer cost reduction	Safety Preparedness & Resilience with Micro Grids	Incentives or Rebates for Used Electric Cars and Smart Chargers	Electricity Bill Explorer	Residential Electricity Monitoring	Residential BE Ready Program, SF + MF Variants	Pilot "Mass Produced" Zero Emission Retrofit Approach	Electrification Process "Survivorship Curve" Analysis	BE Smart Residential Water and Space Heating Upgrade
Scale	1,000 pilot then assess peak reduction benefit	2,500 pilot then assess peak reduction benefit	10k/5 yrs [1]	6k/5 yrs [2]	3 sites in 5 yrs [3]	350/yr used EV rebates, 750/yr smart chargers[4]	11k/yr [5]	11k/yr [5]	10s of thousands of participants	pilot site; but critical mass	one-time analysis/market assessment	4300/yr HPHWH, 2800/yr HPSC [6]
5yr or program cost	< \$500k [7]	< \$500k [8]	\$5m - \$10m [9]	\$10m-\$50m [10]	< \$500k [11]	\$5m - \$10m [12]	\$1m-\$5m [13]	\$1m-\$5m [13]	\$500k - \$1m [14]	\$1m-\$5m [14]	< \$500k [14]	\$50m-\$100m [15]
notes	1. 10% MF penetration in 5 yrs						9. \$500/unit direct financial support plus program costs					
	2. About 25% capture of 1/20 annual renovation rate						10. \$1500/unit direct financial support plus program costs					
	3. 13 member agencies and 30 year facility refit interval (2 in 5 years) plus one other site						11. No direct financial support					
	4. Scaled from SCP experience						12. \$2k used vehicle rebate, \$400 smart charger rebate plus program costs					
	5. 5% per yr uptake rate						13. \$35/yr per endpoint plus program costs					
	6. 25% capture of 1/13 WH and 1/20 SC annual replacement rates						14. Program costs only					
	7. Pilot only; No direct financial support						15. HPHWH installs only; incremental cost: \$1000 plus \$1,700 installation; direct support or financing					
	8. Pilot only, based on 2017 Nest 'Seasonal Savings' quote											
GHG												
program instances (5yrs)	1,000	2,500	10,000	6,000		1,750				10		21,500
GHG per instance (mTCO2/yr)	0.66	0.04	4.25	0.90		4.25				0.90		0.90
instance life (yrs)	10	10	5	10		5				10		10
Program A GHG (mTCO2)	6,554	910	212,500	54,162		37,188				90		194,081
program instances (5yrs)						3,750						
GHG per instance (mTCO2/yr)						0.29						
instance life (yrs)						5						
Program B GHG (mTCO2)						5,486						
Program GHG (mTCO2)	6,554	910	212,500	54,162		42,674	indirect	indirect	indirect	90	indirect	194,081
	[16,17]	[16,18]	[19]	[20]		[21,22]				[20,23]		[20]
Cost of Carbon \$/mTCO2 (at midpoint of cost range)	38	275	35	554		176				33,234		386
notes	16. 0.133 mTCO2/MWh benefit shifting from high GHG emission period (CAISO, NPT analysis)						22. half of 0.133 mTCO2/MWh shifting benefit per unit smart EVSE , 4.4 MWh/yr per unit					
	17. 13.5kWh/d load shift per unit (Powerwall rating)						23. Assumes 10 units converted in pilot					
	18. 2h shift of 1.5 kW load, or 3 kWh/d per unit, daily, 3mo/yr											
	19. Assumes every charger results in one EV, 4.25 mTCO2/yr per unit											
	20. HPHWH only; 170 T/yr avoided per unit (Carbon Free PA); 0.00531 mT/T nat gas emission factor (PG&E)											
	21. Gives full "additional" CO2 credit to used vehicles; 4.25 mTCO2/yr per unit, no "additional" CO2 credit to smart chargers											