

MEMO TO: PREPA IRP Team
FROM: Siemens IRP Team
DATE: August 21, 2018
SUBJECT: Energy Efficiency and Demand Response Projections for PREPA IRP

As inputs to PREPA's IRP, energy efficiency (EE) and demand response (DR) measures can serve as cost-effective and clean demand-side resources. To date, program offerings and participation in EE and DR programs has been limited in Puerto Rico and, as a result, demand side savings were also limited. Puerto Rico Regulation 9021, Regulation on Integrated Resource Plan for the Puerto Rico Electric Power Authority, specifically requires that the IRP considers demand side resources, including EE and DR, as a means to satisfy electric demand over the study period.

To reasonably project EE and DR for the IRP, first a list of potential measures was developed based on effective programs implemented in similar climates and island settings that would yield measurable savings. PREPA reviewed this list and filtered down the measures to a subset which were deemed most appropriate for PREPA. These measures were then evaluated and characterized using models which build estimates based on participation rates, energy savings, and program costs. This memorandum details the estimated availability of energy savings and associated costs from new demand side measures.

ENERGY EFFICIENCY

The initial list of potential energy efficiency measures included a variety of potential measures to consider including residential and commercial lighting, residential and commercial air conditioning, efficient refrigerator rebates, low income weatherization measures, residential ceiling insulation, residential solar water heaters, and advanced residential new construction building codes. This broad list was presented to PREPA and discussed further to consider the feasibility and potential magnitude of energy savings as it relates to the IRP. The Puerto Rico Energy Public Policy Office (EPPO) also reviewed the list and responded on the feasibility to refine the list. The refined list of energy efficiency projects determined to be the most realistically implemented and would result in the greatest volume of energy savings is presented in Exhibit 1. Detailed projections for these measures were then developed for inclusion in the IRP.

Exhibit 1: Summary Energy Efficiency Measures

EE Program	Program Description	Rationale	Key Assumptions	Approximate Cost Effectiveness Range (TRC)
Residential A/C	Incentivizes higher efficiency A/C units in existing homes. Eligible equipment types are central A/C systems and window units	Residential consumption represents ~ 35% of total energy consumption, and space cooling is a major component of this consumption. This measure provides rebates for the installation of higher efficiency A/C units: 16 SEER for central A/C and 12 EER for window A/C units. It is assumed that there is a large inventory of lower efficiency A/C systems installed and available for replacement.	Participation rates, energy savings, and program costs are based on comparable programs with adjustments made for Puerto Rico based available data. An 85%/15% breakdown is assumed for the use of window units to central A/C units.	3 - 4
Residential Lighting	Provides free LEDs to residential customers	This measure provides LED bulbs to residential customers with 5 per customer and 60W equivalent bulbs. This measure offers an option for the nearly 1/3 of customers who rent their residence. Similar lighting projects have also been used in Barbados and Jamaica (Pilot).	Participation rates are just 1% annually, and assume that there are still significant numbers of incandescent bulbs in use.	4 - 5
Commercial A/C	Incentivizes higher efficiency A/C systems in existing commercial buildings	This measure provides an incentive for the installation of more efficient (17 SEER) 5-ton A/C systems in commercial buildings. A prescriptive 5-ton unit size was used to model this measure to simplify the initial program design. Comparable programs are offered by mainland U.S. utilities in Florida and in many other states.	This program model had to assume typical commercial building A/C sizes in the absence of more granular data. Industry calculators were used to estimate the resulting savings from the higher efficiency A/C unit.	1 - 2
Commercial Lighting	Incentivizes installation of high efficiency lighting in commercial buildings	This measure provides commercial customers with an incentive for efficient lighting retrofits which is based on a \$ / kW reduction in lighting demand resulting from the retrofit. This measure is open to different lighting technologies which can provide improved performance. This flexibility should make the measure applicable to more commercial customers, and the lighting energy reductions should also reduce evening consumption and demand. Comparable programs are offered by mainland U.S. utilities in Florida and in many other states.	A significant assumption is the annual kWh savings per participant, which was based on a review of comparable lighting programs. This estimate could be better informed by more granular data on commercial building loads and the breakdown of end use loads in Puerto Rico should this data become available.	3 - 4
Public Street Lighting	Funded full conversion of public street lighting to LED lamps	Street lighting historically accounted for around 2 percent of PREPA's total load. New and more efficient technologies exist and are cost competitive. A full conversion of Puerto Rico's public street lighting, from conventional incandescent lamps to LED, phased in over 5 years.	A key assumption to this measure is that public funding for this project is available.	na

Source: Newport Partners, LLC, PREPA

The ranges for total resource costs (TRCs) are based on key assumed inputs for PREPA and a review of comparable programs in the U.S. including utilities in Florida, Hawaii, Massachusetts, and Illinois. Most existing programs are well established, have large numbers of participants, and are part of a larger portfolio of energy efficiency and demand response programs. In initial piloting of these measures, PREPA metrics may be more variable and actual TRC values may be lower relative to the estimated range.

Residential Air Conditioning

This program offers residential customers an incentive to install a higher efficiency air-conditioning equipment in their home, which will reduce cooling energy consumption. Both whole house air conditioning equipment and window/room units are assumed to be eligible.

Key assumptions underlying the projected costs and energy savings for residential air conditioning incentives as an energy efficiency measure include:

- Participation ranges from 1 to 4 percent of eligible residential customers in for the initial years of the program offering;
- The majority, 85 percent, of participants use window units and receive a \$50 incentive towards the purchase of more efficient units;
- The remaining 15 percent of participants use central air conditioning and receive a \$400 incentive towards a more efficient unit;
- Additional administrative costs are assumed to implement the program;
- Average annual energy savings are assumed to be 500 kWh for window units and 1,300 kWh for central systems;
- The window air conditioning unit program assumes a 10 year unit life and the program running from 2019 to 2023 and then sun setting through 2028 after which the program resumes as the original units reach their end of life; and
- The central air conditioning unit program assumes a 15 year unit life and the program running from 2019 to 2023 and then sun setting through 2033 after which the program resumes as the original units reach their end of life.

A summary of the residential air conditioning program energy savings and program costs is presented in Exhibit 2.

Exhibit 2: Residential Air Conditioning Projections

	Participant Costs (Central AC)	Participant Costs (Room/Window AC)	Utility Program Costs (nominal\$)	Utility Incentive Costs (nominal\$)	Total Costs (excluding incentives) (nominal\$)	Annual MWh Savings - Central AC	Annual MWh Savings - Window AC	Annual MWh Savings - TOTAL
2019	\$1,596,000	\$678,300	\$3,990,000	\$2,726,500	\$6,264,300	5,187	11,305	16,492
2020	\$2,458,973	\$1,045,064	\$6,147,433	\$4,118,378	\$9,651,470	13,022	28,381	41,403
2021	\$3,367,613	\$1,431,235	\$8,419,032	\$5,529,609	\$13,217,881	23,542	51,309	74,851
2022	\$864,752	\$367,520	\$2,161,881	\$1,392,079	\$3,394,154	26,190	57,081	83,271
2023	\$888,222	\$377,494	\$2,220,555	\$1,401,824	\$3,486,271	28,857	62,893	91,750
2024	\$0	\$0	\$0	\$0	\$0	28,857	62,893	91,750
2025	\$0	\$0	\$0	\$0	\$0	28,857	62,893	91,750
2026	\$0	\$0	\$0	\$0	\$0	28,857	62,893	91,750
2027	\$0	\$0	\$0	\$0	\$0	28,857	62,893	91,750
2028	\$0	\$0	\$0	\$0	\$0	28,857	62,893	91,750
2029	\$0	\$1,773,161	\$8,865,806	\$2,424,350	\$10,638,968	28,857	75,832	104,689
2030	\$0	\$1,821,285	\$9,106,424	\$2,441,320	\$10,927,709	28,857	83,169	112,026
2031	\$0	\$1,870,715	\$9,353,573	\$2,458,409	\$11,224,287	28,857	84,825	113,682
2032	\$0	\$1,921,486	\$9,607,429	\$2,475,618	\$11,528,914	28,857	103,809	132,666
2033	\$0	\$1,973,635	\$9,868,174	\$2,492,948	\$11,841,809	28,857	122,926	151,783
2034	\$4,769,881	\$0	\$1,788,705	\$3,544,092	\$6,558,586	35,188	122,926	158,115
2035	\$4,899,335	\$0	\$1,837,251	\$3,568,900	\$6,736,586	38,952	122,926	161,879
2036	\$5,032,303	\$0	\$1,887,114	\$3,593,883	\$6,919,417	40,113	122,926	163,039
2037	\$5,168,880	\$0	\$1,938,330	\$3,619,040	\$7,107,210	49,226	122,926	172,153
2038	\$5,309,163	\$0	\$1,990,936	\$3,644,373	\$7,300,100	58,403	122,926	181,330
Total	\$34,355,123	\$13,259,894	\$79,182,643	\$45,431,323	\$126,797,661	607,250	1,610,630	2,217,880

Source: Newport Partners, LLC

Residential Lighting

This program offers residential customers a voucher for five free LED bulbs (60 W equivalent). This is assumed to be a standalone program here, but could be combined with a home energy audit program which could qualify customers for other energy efficiency programs. This measure would also be applicable to the nearly one third of PREPA's residential customers who are renters. The measure also helps reduce evening peak loads.

Key assumptions underlying the projected costs and energy savings for residential lighting incentives as an energy efficiency measure include:

- Participation increases to 2.5percent of eligible customers participating in the program in the early years of the offering;
- There is no additional cost to participants;
- Additional administrative costs are assumed to implement the program; and
- Annual household energy savings assumed to be 172 kWh.

A summary of the residential lighting program energy savings and program costs is presented in Exhibit 3.

Exhibit 3: Residential Lighting Projections

	Participant Costs	Utility Program Costs (nominal\$)	Utility Incentive Costs (nominal\$)	Total Costs (excluding incentives) (nominal\$)	Annual MWh Savings - TOTAL
2019	\$0	\$864,500	\$0	\$864,500	2,282
2020	\$0	\$1,775,925	\$0	\$1,775,925	6,877
2021	\$0	\$2,280,155	\$0	\$2,280,155	12,661
2022	\$0	\$2,342,038	\$0	\$2,342,038	18,486
2023	\$0	\$2,405,601	\$0	\$2,405,601	24,351
2024	\$0	\$2,470,889	\$0	\$2,470,889	30,258
2025	\$0	\$2,537,949	\$0	\$2,537,949	36,205
2026	\$0	\$2,606,829	\$0	\$2,606,829	42,195
2027	\$0	\$2,677,578	\$0	\$2,677,578	48,226
2028	\$0	\$2,750,248	\$0	\$2,750,248	54,300
2029	\$0	\$2,824,889	\$0	\$2,824,889	60,416
2030	\$0	\$2,901,557	\$0	\$2,901,557	66,575
2031	\$0	\$2,980,305	\$0	\$2,980,305	72,777
2032	\$0	\$3,061,190	\$0	\$3,061,190	79,023
2033	\$0	\$3,144,271	\$0	\$3,144,271	85,312
2034	\$0	\$3,229,607	\$0	\$3,229,607	91,645
2035	\$0	\$3,317,258	\$0	\$3,317,258	98,022
2036	\$0	\$3,407,289	\$0	\$3,407,289	104,445
2037	\$0	\$3,499,762	\$0	\$3,499,762	110,912
2038	\$0	\$3,594,746	\$0	\$3,594,746	117,424
Total	\$0	\$54,672,585	\$0	\$54,672,585	1,162,390

Source: Newport Partners, LLC

Commercial Air Conditioning

This program offers commercial customers an incentive to install a more efficient air-conditioning system in their commercial buildings, which will reduce cooling energy consumption. A prescriptive 5-ton, 17 SEER unit size was used to model this measure to simplify the initial program design. Comparable programs are offered by mainland U.S. utilities in Florida and in many other states.

Key assumptions underlying the projected costs and energy savings for commercial air conditioning incentives as an energy efficiency measure include:

- On average between one half and one percent of eligible commercial customers participate;
- All participants use central air conditioning and receive a \$700 incentive towards a more efficient unit;
- Additional administrative costs are assumed to implement the program;
- Average annual energy savings are assumed to be 1,500 kWh for commercial systems; and
- The commercial air conditioning unit program assumes a 15 year unit life.
- The commercial air conditioning unit program assumes that program sunsets after 8 years due to maximized participation and optimized costs/savings. The program resumes in Year 16 to reflect 15-year unit life and need for replacement.

A summary of the commercial air conditioning program energy savings and program costs is presented in Exhibit 4.

Exhibit 4: Commercial Air Conditioning Projections

	Participant Costs	Utility Program Costs (nominal\$)	Utility Incentive Costs (nominal\$)	Total Costs (excluding incentives) (nominal\$)	Annual MWh Savings - TOTAL
2019	\$945,998	\$315,333	\$441,466	\$1,261,330	946
2020	\$964,917	\$321,639	\$441,466	\$1,286,557	1,892
2021	\$1,476,324	\$492,108	\$662,198	\$1,968,432	3,311
2022	\$1,505,850	\$501,950	\$662,198	\$2,007,800	4,730
2023	\$1,535,967	\$511,989	\$662,198	\$2,047,956	6,149
2024	\$1,566,687	\$522,229	\$662,198	\$2,088,915	7,568
2025	\$1,598,020	\$532,673	\$662,198	\$2,130,694	8,987
2026	\$1,629,981	\$543,327	\$662,198	\$2,173,308	10,406
2027	\$0	\$0	\$0	\$0	10,406
2028	\$0	\$0	\$0	\$0	10,406
2029	\$0	\$0	\$0	\$0	10,406
2030	\$0	\$0	\$0	\$0	10,406
2031	\$0	\$0	\$0	\$0	10,406
2032	\$0	\$0	\$0	\$0	10,406
2033	\$0	\$0	\$0	\$0	10,406
2034	\$1,909,782	\$636,594	\$662,198	\$2,546,376	11,825
2035	\$1,947,978	\$649,326	\$662,198	\$2,597,304	13,244
2036	\$1,986,937	\$662,312	\$662,198	\$2,649,250	14,663
2037	\$2,026,676	\$675,559	\$662,198	\$2,702,235	16,082
2038	\$2,067,210	\$689,070	\$662,198	\$2,756,279	17,501
Total	\$21,162,326	\$7,054,197	\$8,167,112	\$28,216,435	190,145

Source: Newport Partners, LLC

Commercial Lighting

This program offers commercial customers a rebate for replacing existing interior lighting fixtures or lamps with high efficiency lamps. The \$/kW incentive should make this type of program attractive to commercial customers since there is such variation in lighting types across commercial buildings. However, a significant assumption is the annual kWh savings per participant, which was based on a review of comparable lighting programs. This estimate could be better informed by more granular data on commercial building loads and the breakdown of end use loads for Puerto Rico should this data become available.

Key assumptions underlying the projected costs and energy savings for commercial lighting incentives as an energy efficiency measure include:

- On average two percent of eligible customers participate in the program;
- The program sunsets after ten years;
- There cost of retrofit is \$7,800, of which the utility offers a 50% rebate to customer;
- Additional administrative costs are assumed to implement the program; and

- Annual participant energy savings assumed to be 15,000 kWh.

A summary of the commercial lighting program energy savings and program costs is presented in Exhibit 5.

Exhibit 5: Commercial Lighting Projections

	Participant Costs	Utility Program Costs (nominal\$)	Utility Incentive Costs (nominal\$)	Total Costs (excluding incentives) (nominal\$)	Annual MWh Savings - TOTAL
2019	\$9,838,374	\$2,522,660	\$4,919,187	\$12,361,034	18,920
2020	\$20,070,283	\$5,146,226	\$9,838,374	\$25,216,509	56,760
2021	\$20,471,689	\$5,249,151	\$9,838,374	\$25,720,840	94,600
2022	\$20,881,122	\$5,354,134	\$9,838,374	\$26,235,256	132,440
2023	\$21,298,745	\$5,461,217	\$9,838,374	\$26,759,961	170,280
2024	\$21,724,720	\$5,570,441	\$9,838,374	\$27,295,161	208,119
2025	\$22,159,214	\$5,681,850	\$9,838,374	\$27,841,064	245,959
2026	\$22,602,398	\$5,795,487	\$9,838,374	\$28,397,885	283,799
2027	\$23,054,446	\$5,911,397	\$9,838,374	\$28,965,843	321,639
2028	\$23,515,535	\$6,029,624	\$9,838,374	\$29,545,160	359,479
2029	\$0	\$0	\$0	\$0	359,479
2030	\$0	\$0	\$0	\$0	359,479
2031	\$0	\$0	\$0	\$0	359,479
2032	\$0	\$0	\$0	\$0	359,479
2033	\$0	\$0	\$0	\$0	359,479
2034	\$0	\$0	\$0	\$0	359,479
2035	\$0	\$0	\$0	\$0	359,479
2036	\$0	\$0	\$0	\$0	359,479
2037	\$0	\$0	\$0	\$0	359,479
2038	\$0	\$0	\$0	\$0	359,479
Total	\$205,616,527	\$52,722,186	\$93,464,553	\$258,338,713	5,486,786

Source: Newport Partners, LLC

Street Lighting

Public street lighting accounts for approximately 2 percent of PREPA’s load historically. The existing lighting uses conventional incandescent lamps. Conversion to more efficient, LED technology would offer substantial savings estimated to range from 30 to 50 percent savings. The EE savings estimates are assumed to be 40 percent in these projections.

For this measure, a full conversion of the public street lighting to LED light bulbs is assumed to be phased in over five years. Public funding to support this measure is assumed as a key input. Energy savings from this measure are presented in Exhibit 6.

Exhibit 6: Public Street Lighting Projections

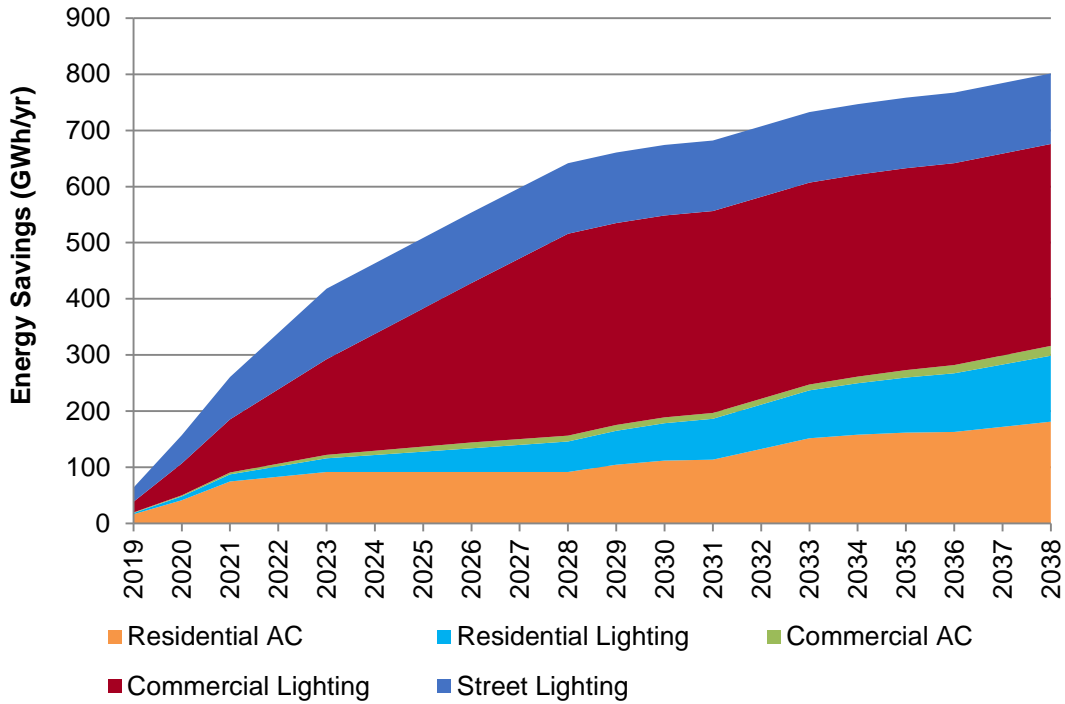
	Annual MWh Savings - TOTAL
2019	25,233
2020	50,240
2021	75,360
2022	100,480
2023	125,600
2024	125,600
2025	125,600
2026	125,600
2027	125,600
2028	125,600
2029	125,600
2030	125,600
2031	125,600
2032	125,600
2033	125,600
2034	125,600
2035	125,600
2036	125,600
2037	125,600
2038	125,600
Total	2,260,913

Source: Newport Partners, LLC

Total Savings – Energy Efficiency

Aggregate annual energy savings from energy efficiency measures is presented in Exhibit 7. These projections reflect participation rates on par with that of other successful programs implemented in other areas in the U.S. and island utility settings. Total savings projected from these measures are estimated to reach 800 GWh annually by the end of the study period.

Exhibit 7: Annual EE Savings by Measure



Source: Newport Partners, LLC

DEMAND RESPONSE

Demand response measures considered for the IRP included programmatic demand response for residential customers and for commercial customers. A summary of demand response programs is presented in Exhibit 8.

Exhibit 8: Summary of Demand Response Measures

DR Program	Program Description	Rationale	Key Assumptions	Approximate Cost Effectiveness Range (TRC)
Residential Demand Response	Load control of residential A/C systems	This measure provides for residential load management by enabling load control for residential central A/C systems of participating customers via an installed communicating thermostat. Comparable programs are offered by mainland U.S. utilities in Florida, Massachusetts, and in other states as well as in Hawaii.	It is assumed that roughly 1/3 of PREPA customers have central A/C and would form the base of potential participants.	4 - 5
Commercial Demand Response	Load control during anticipated peak conditions, minimum load to participate	This measure provides for commercial load management by enabling load control for commercial AC and lighting systems. Some programs have also included water heating. This measure can be implemented either automatically where the pre-designated loads are reduced under low-frequency conditions or manually by either utility or on-site operators when peak conditions are anticipated. Utility-controlled load curtailment is the most reliable implementation method. In all cases, the participant is notified in advance that loads will be shed. Most utility programs also require that participants identify a minimum of 50 kW for load curtailment. Usually, events are guaranteed to last no more than 1 hour.	While most commercial demand response programs include some very large commercial and industrial customers, for PREPA, it is assumed that participants would most likely be small and medium-sized commercial establishments – especially in initial program years. Pharmaceuticals are not assumed to participate due to the need for tightly controlled environments all hours of the day. Typical participants well-suited to such a program include hotels/motels, office buildings, non-food retail establishments, and educational facilities.	1 - 2

Source: Newport Partners, LLC

Residential Demand Response

This program sheds residential loads during peak demand periods by curtailing air conditioning operation. Comparable programs are offered by mainland U.S. utilities in Florida, Massachusetts, and in other states as well as in Hawaii.

Key assumptions underlying the projected costs and peak energy savings for residential demand response include:

- On average one percent of eligible customers participate in the program;
- There is no additional cost to participants to participate;
- Utility incurs a one-time cost of \$175 per customer to install wifi monitored thermostat and set up the customer account;
- Additional administrative costs are assumed to implement and manage the program on an ongoing basis;

- On average, customers receive \$100 per year in payments for peak demand reductions; and
- Net peak energy load reductions per participating customer assumed to be 1.4kW.

A summary of the residential demand response program peak load savings and costs is presented in Exhibit 9.

Exhibit 9: Residential Demand Response Projections

	Participant Costs	Non-Recurring Utility Cost	Recurring Utility Cost	Utility Incentive Costs	Total Costs (excluding incentives)	Annual kW Reduction:
2019	\$0	\$768,075	\$702,240	\$438,900	\$1,470,315	6,145
2020	\$0	\$788,921	\$1,294,327	\$793,092	\$2,083,247	11,103
2021	\$0	\$810,332	\$1,797,045	\$1,079,540	\$2,607,377	15,114
2022	\$0	\$832,324	\$2,227,371	\$1,311,1814	\$3,059,695	18,365
2023	\$0	\$854,914	\$2,599,170	\$1,500,770	\$3,454,084	21,011
2024	\$0	\$878,116	\$2,923,772	\$1,655,094	\$3,801,888	23,171
2025	\$0	\$901,948	\$3,210,436	\$1,781,734	\$4,112,384	24,944
2026	\$0	\$926,427	\$3,466,734	\$1,886,251	\$4,393,161	26,408
2027	\$0	\$951,570	\$3,698,862	\$1,973,090	\$4,650,432	27,623
2028	\$0	\$977,396	\$3,911,890	\$2,045,809	\$4,889,286	28,641
2029	\$0	\$1,003,922	\$4,109,974	\$2,107,257	\$5,113,897	29,502
2030	\$0	\$1,031,169	\$4,296,522	\$2,159,709	\$5,327,690	30,236
2031	\$0	\$1,059,155	\$4,474,332	\$2,204,987	\$5,533,486	30,870
2032	\$0	\$1,087,900	\$4,645,706	\$2,244,551	\$5,733,606	31,424
2033	\$0	\$1,117,426	\$4,812,542	\$2,279,566	\$5,929,968	31,914
2034	\$0	\$1,147,753	\$4,976,408	\$2,310,965	\$6,124,161	32,354
2035	\$0	\$1,178,903	\$5,138,603	\$2,339,496	\$6,317,506	32,753
2036	\$0	\$1,210,898	\$5,300,207	\$2,365,756	\$6,511,105	33,121
2037	\$0	\$1,243,762	\$5,462,122	\$2,390,223	\$6,705,884	33,463
2038	\$0	\$1,277,517	\$5,625,108	\$2,413,279	\$6,902,625	33,786
Total	\$0	\$20,048,425	\$74,673,373	\$37,281,882	\$94,721,797	521,946

Source: Newport Partners, LLC

Commercial Demand Response

This program sheds commercial loads during peak demand periods by curtailing air conditioning and lighting operation. While most commercial demand response programs include some very large commercial and industrial customers, for PREPA, it is assumed that participants would most likely be small and medium-sized commercial establishments, especially in initial program years.

Key assumptions underlying the projected costs and peak energy savings for commercial demand response include:

- On average annual participation growth of 0.4 percent of eligible customers participate in the early years of the program, slowing to 0.2 percent annual increase after the first five years of the program due to saturation of interest. (Annual participation growth rate in commercial DR programs is particularly dependent upon the types and sizes of commercial establishments in the service territory as well as upon the characteristics of generating capacity and distribution.)
- There is no additional cost to customers to participate;

- Utility incurs a one-time cost of \$400 per customer to install wifi monitored thermostats, lighting controls, communication software and set up customer account;
- Additional administrative costs are assumed to implement and manage the program on an ongoing basis;
- On average, customers receive \$3,000 per year in payments for peak demand reductions; and
- Net peak energy load reductions per participating customer are assumed to be 6 kW.

A summary of the commercial demand response program energy savings and costs is presented in Exhibit 10.

Exhibit 10: Commercial Demand Response Projections Revised

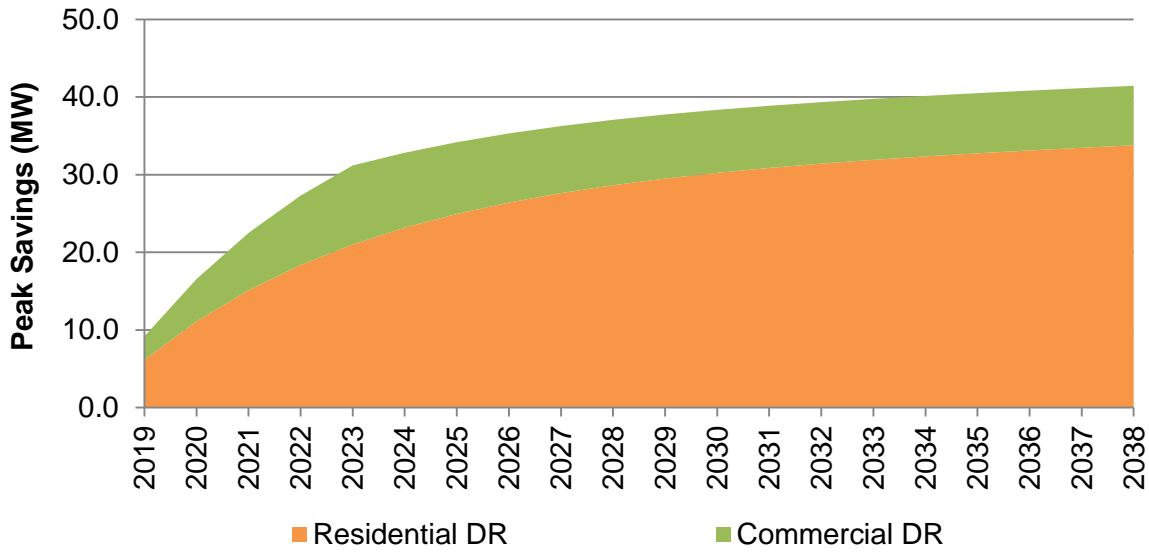
	Participant Costs	Non-Reoccurring Utility Cost	Reoccurring Utility Cost	Utility Incentive Costs	Total Costs (excluding incentives)	Annual kW Reduction:
2019	\$0	\$201,813	\$1,009,064	\$1,513,596	\$1,210,877	3,027
2020	\$0	\$205,849	\$1,852,642	\$2,724,473	\$2,058,473	5,449
2021	\$0	\$209,966	\$2,561,586	\$3,693,174	\$2,771,552	7,386
2022	\$0	\$214,165	\$3,161,081	\$4,468,135	\$3,375,246	8,936
2023	\$0	\$218,449	\$3,671,685	\$5,088,104	\$3,890,134	10,176
2024	\$0	\$111,409	\$3,553,139	\$4,827,281	\$3,664,548	9,655
2025	\$0	\$113,637	\$3,346,547	\$4,618,623	\$3,581,184	9,237
2026	\$0	\$115,910	\$3,409,067	\$4,451,697	\$3,524,976	8,903
2027	\$0	\$118,228	\$3,372,938	\$4,318,155	\$3,491,166	8,636
2028	\$0	\$120,592	\$3,355,280	\$4,211,322	\$3,475,872	8,423
2029	\$0	\$123,004	\$3,352,930	\$4,125,856	\$3,475,934	8,252
2030	\$0	\$125,464	\$3,363,313	\$4,057,483	\$3,488,778	8,115
2031	\$0	\$127,974	\$3,384,332	\$4,002,784	\$3,512,306	8,006
2032	\$0	\$130,533	\$3,414,281	\$3,959,025	\$3,544,814	7,918
2033	\$0	\$133,144	\$3,451,772	\$3,924,018	\$3,584,916	7,848
2034	\$0	\$135,807	\$3,495,680	\$3,896,013	\$3,631,487	7,792
2035	\$0	\$138,523	\$3,545,089	\$3,873,608	\$3,683,612	7,747
2036	\$0	\$141,293	\$3,599,259	\$3,855,684	\$3,740,553	7,711
2037	\$0	\$144,119	\$3,657,592	\$3,841,346	\$3,801,711	7,683
2038	\$0	\$147,002	\$3,719,603	\$3,829,874	\$3,866,604	7,660
Total	\$0	\$2,976,881	\$64,397,879	\$79,280,252	\$67,374,760	158,561

Source: Newport Partners, LLC

Total Savings – Demand Response

Aggregate peak energy savings from demand response measures is presented in Exhibit 11. These projections reflect participation rates on par with that of other successful programs implemented in other areas in the U.S. and island utility settings.

Exhibit 11: Annual Peak Energy Savings from DR Programs



Source: Newport Partners, LLC

Overall Energy Savings from Demand-Side Resources

Regulation 9021 defines a target for the IRP to achieve two percent incremental energy savings per year for at least ten years.¹ Energy savings from new energy efficiency measures developed are projected to range from between 0.3 percent and 0.7 percent incremental annual savings over the first ten years of the study period, from 2019 to 2028. Demand response programs contribute additional savings to peak demand, on average 0.15% of peak load over the same ten year period. Additional demand side savings from government end use and existing programs is expected to also contribute towards the prescribed two percent incremental energy savings goal.

¹ Regulation 9021, Section F 3 e