



**Portland General Electric Company**  
121 SW Salmon Street • Portland, Oregon 97204  
PortlandGeneral.com

February 8, 2019

Public Utility Commission of Oregon  
Attn: Filing Center  
201 High Street, S.E.  
P.O. Box 1088  
Salem, OR 97308-1088

**RE: Advice No. 19-03, Schedule 7 PGE's Flexible Residential Pricing Program**

Portland General Electric Company (PGE) submits this filing pursuant to Oregon Revised Statutes 757.205 and 757.210, and Oregon Administrative Rules (OARs) 860-022-0025 and 860-022-0030, for filing proposed tariff sheets associated with Tariff P.U.C. No. 18, with a requested effective date of **May 1, 2019**:

Fourteenth Revision of Sheet No. 7-1  
Ninth Revision of Sheet No. 7-2  
Ninth Revision of Sheet No. 7-3  
Fifth Revision of Sheet No. 7-4  
Fourth Revision of Sheet No. 7-5  
First Revision of Sheet No. 7-6  
Original Sheet No. 7-7  
Original Sheet No. 7-8

The purpose of this filing is to implement PGE's Flexible Residential Pricing Program (Flex 2.0), which was piloted as Flex 1.0 from 2015-2018 in Public Utility Commission of Oregon (OPUC or Commission) Docket No. UM 1708. In moving from pilot to program, PGE has revised its residential standard service option, Schedule 7, to include the following pricing options:

- Opt-in Peak Time Rebate (PTR) – Customers choose to participate in this option that provides a PTR as an incentive to customers who use less electricity during critical peak events. Participants will be notified prior to the event. After a PTR event, PGE will measure the customer's energy reduction based on the customer's energy use compared to the customer's baseline usage to determine the amount of hourly kilowatt reduction and the amount of the rebate.
- Time of Use (TOU) with PTR – A TOU rate with optional participation in PTR events. A TOU rate is a DR program that segments each billing month into smaller hourly windows each with a separate pricing level related to energy production costs. For PTR, participants are provided price signals to reduce load during higher cost hours.

Attachment A provides the plan for Flex 2.0 and includes program goals and design, marketing strategy, cost recovery, cost effectiveness, and program benefits. The total costs for the program are about \$6.9 million (over five years), and are described in Section 5.1 of Attachment A. These costs will be included in the reauthorization of the deferral application in UM 1708.

In addition to the updates described above, PGE is also making smaller changes that are also included in this filing, which include:

- Adding “Purpose” and “Definitions” sections;
- Changing references to customer price plans;
- Updating the TOU Transmission and Distribution rate structure by including an off-peak rate, which was recommended by Staff at a PGE workshop; and
- Updating the general name of PGE’s renewable portfolio options to “Green Future<sup>SM</sup>” to be consistent with how these options are being communicated to customers. This includes updating the Renewable Habitat Support Adder to “Habitat Support”. PGE plans to update the names of the other renewable portfolio options this spring.

#### Relationship of Flex 2.0 to PGE’s Smart Grid Testbed Pilot Program

Pursuant to Commission Order No. 17-386, PGE proposed a Testbed pilot program as a new smart grid effort to enable PGE to gain learnings that will aid the industry towards decarbonizing the grid.<sup>1</sup> Testbed is composed of three smart grids and approximately 22,000 PGE residential customers who may initially participate in PTR and DR programs that will be marketed to them. This will inform design of products or enhancements that could be introduced to other PGE customers. Participants will be enrolled in an opt-out PTR program, through PGE’s Schedule 13, and given the option to migrate to a TOU with PTR (i.e. Flex 2.0 through Schedule 7) or other Direct Load Control (DLC) programs (e.g. Schedule 5).

Through Customer participation in Testbed, PGE hopes to validate the following assumptions:

- It is feasible for customers to be enrolled in multiple DLC programs because PGE can discern which load control device was responsible to responding to an event dispatch.
- It is feasible for customers on TOU rates to be enrolled in one or more DLC program. This is because TOU rates are a daily occurrence and are generally persistent while DLC programs are temporal, event-driven, and discernable when analyzing customer metering data conjunction with device data reporting.

---

<sup>1</sup> See OPUC Docket ADV No. 859.

- It is feasible for customers to be enrolled in both PTR and TOU. Customers may be enrolled in PTR and TOU as the former is event-driven while the latter is a daily/persistent behavioral change. This dual enrollment in PTR and TOU follows the logic, practices, and findings of Flex 1.0 as well as Cadmus's evaluation findings of the pilot.
- It is not currently feasible for customers to be enrolled in both PTR and DLC programs because PGE cannot currently ensure that customers will not be paid twice for the same response or capacity. PGE will explore whether A) customers are able to differentiate, and B) whether the utility can verify that customers responding to a PTR program can additionally respond through a DLC program. Where customers on both programs can demonstrate additional load shifting from the DLC program, PGE will explore how to create an offering which could pay customers for verified additional load drop attributable to additional activity beyond the automated response through a DLC technology such as a smart thermostat or water heater.

Flex 2.0 and Testbed are interdependent. Commission approval of Flex 2.0 is critical to the success of the Testbed pilot and demand response in PGE's service territory. The Testbed will allow PGE to quickly learn about customer behaviors, attitudes, satisfaction measures, and nimbly iterate and refine program parameters or features to achieve high DR value and customer satisfaction ratings. Flex 2.0 will operationalize and pilot the PTR program. As stated earlier in this report, Flex 2.0 will provide an option for residential customers to opt-in to the PTR program while the Testbed pilot, if approved by the Commission, will take the opt-out approach to specific areas in PGE's service territory. The idea is for PGE to gain insights between the differences in opt-in and opt-out customer behaviors, reaction to different incentive offering (on-bill credit versus potential donation to charitable organization), receptivity to other DLC programs, and message testing. These parameters will help inform future design enhancements of the Flex 2.0 program. In addition, Flex 2.0 will allow PGE to identify other various customer value propositions for demand response thereby allowing us to better understand the technical and feasible potential of DR specific to PGE's service territory and strategy.

To satisfy the requirements of OARs 860-022-0025 and 860-022-0030, PGE provides the following response:

The proposed revisions to Schedule 7, Residential Standard Service, do not increase, decrease, otherwise change existing prices, or impact revenues.

Work papers supporting the revision to the TOU rate in Schedule 7 are confidential and being submitted under OAR 860-001-0070 under separate cover.

Should you have any questions or comments regarding this filing, please contact Kalia Savage at (503) 464-7432.

Please direct all formal correspondence and requests to the following email address [pge.opuc.filings@pqn.com](mailto:pge.opuc.filings@pqn.com)

Sincerely,

A handwritten signature in blue ink, appearing to read "Karla Wenzel". The signature is fluid and cursive, with the first name "Karla" being more prominent than the last name "Wenzel".

Karla Wenzel  
Manager, Pricing & Tariffs

Enclosures

**SCHEDULE 7  
RESIDENTIAL SERVICE**

**PURPOSE**

This schedule provides Default and Optional Service choices for Residential Customers. Optional Services include a time of use portfolio option, Peak Time Rebate, and Green Future<sup>SM</sup> renewable portfolio options.

(N)

(N)

**AVAILABLE**

In all territory served by the Company.

**APPLICABLE**

To Residential Customers.

**DEFINITIONS**

Peak Time Rebate (PTR) Program – Customers choosing the PTR program are eligible to receive a rebate for reducing Energy use during Company-called events, relative to each Customer's baseline Energy use, as determined by the Company. See details below.

(N)

**ENERGY PRICE PLANS (DEFAULT RESIDENTIAL SERVICE AND TIME OF USE)**

RESIDENTIAL SERVICE (DEFAULT) PRICE PLAN

This default service is provided to Residential Customers who do not choose the time of use Portfolio option price plan.

(N)

**Monthly Rate**

Residential Service is priced as the totals of the following charges per Service Point (SP)\*, \*\*: (C)

<u>Basic Charge</u>	\$11.00		(C)
<u>Transmission and Related Services Charge</u>	0.243	¢ per kWh	
<u>Distribution Charge</u>	4.662	¢ per kWh	
<u>Energy Charge**</u>			(C)
First 1,000 kWh	6.329	¢ per kWh	
Over 1,000 kWh	7.051	¢ per kWh	

\* See Schedule 100 for applicable adjustments.

\*\* As defined in Section Rule B of this tariff.

(N)

**SCHEDULE 7 (Continued)**

ENERGY PRICE PLANS: RESIDENTIAL SERVICE (Continued)

(C)

***Peak Time Rebate Event Participation***

(N)

Residential Customers on Residential Service can also enroll and participate in PTR events. This option is available for enrollment to the first 110,000 Residential Customers. Customer enrollment will be made available May 1, 2019 and will close once the program has 110,000 Residential Customers.

Monthly Rate

Customers on Residential Service plus PTR will pay the Residential Service monthly rate – which includes Basic Charge, transmission and related services, distribution, and charges – Energy Charges may also include the following PTR credit:

PTR Credit	100.00 ¢ per kWh
------------	------------------

To receive the PTR Credit, the Customer must reduce Energy use during a PTR Event. Such event will be a two- to five-consecutive-hour window between the hours of 3:00 PM to 8:00 PM. Events will not be called on holidays. Holidays are New Year’s Day on January 1; Memorial Day, the last Monday in May; Independence Day on July 4; Labor Day, the first Monday in September; Thanksgiving Day, the fourth Thursday in November; and Christmas Day on December 25. If a holiday falls on a Saturday, the preceding Friday will be designated the holiday. If a holiday falls on a Sunday, the following Monday will be designated the holiday.

(N)

OPTIONAL TIME OF USE PORTFOLIO OPTION

(C)(M)

This Portfolio option provides optional Time of Use (TOU) pricing for transmission and related services, distribution, and Energy charges. TOU service will become effective with the next regularly scheduled meter reading date. If a meter configuration change is required, then service will become effective following the initialization meter reading for the new meter configuration.

(C)(M)

***Monthly Rate***

(N)

<u>Basic Charge</u>	\$11.00	
<u>Transmission and Related Services Charge TOU Portfolio</u>		
On-Peak Period	0.305 ¢ per kWh	
Off-Peak Period	0.229 ¢ per kWh	
<u>Distribution Charge TOU Portfolio</u>		
On-Peak Period	5.864 ¢ per kWh	
Off-Peak Period	4.398 ¢ per kWh	
<u>Energy Charge TOU Portfolio</u>		
On-Peak Period	15.539 ¢ per kWh	
Off-Peak Period	5.180 ¢ per kWh	
First 1,000 kWh block adjustment	(0.722) ¢ per kWh	

(M)

(C)

(C)

(C)

(C)

(C)

(C)

(M)

**SCHEDULE 7 (Continued)**

ENERGY PRICE PLANS: OPTIONAL TIME OF USE (Continued)

(C)

**Peak Time Rebate Event Participation**

(N)

In addition to enrolling in the Optional TOU Portfolio option, Residential Customers have the option to opt-in and participate in PTR events.

Monthly Rate

The Optional TOU Portfolio option monthly rate, which includes basic charge, transmission and related services distribution, and Energy Charges, applies and may include the following PTR credit:

PTR Credit 100.00 ¢ per kWh

As with Residential Service with PTR participation, the enrolled Customer is eligible to receive a PTR after reducing Energy use during a called PTR event window of two to five consecutive hours, shown in the table below.

	AM												PM											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	
Standard Day Mon. - Fri.	Off Peak												On Peak			Off Peak								
Day with PTR (when called)	Off Peak												PTR Window 2-5 Hours					Off Peak						
Saturdays, Sundays, and Holidays	Off Peak																							

(N)

Note: The time periods, set forth above, will begin and end one hour later for the period between the second Sunday in March and the first Sunday in April, and for the period between the last Sunday in October and the first Sunday in November. Customers with Network Meters will observe the regular daylight-saving schedule.

(M)

Holidays are New Year's Day on January 1; Memorial Day, the last Monday in May; Independence Day on July 4; Labor Day, the first Monday in September; Thanksgiving Day, the fourth Thursday in November; and Christmas Day on December 25. If a holiday falls on Saturday, Friday is designated the TOU holiday. If a holiday falls on a Sunday, the following Monday will be designated a TOU holiday.

(C)

**Special Conditions Related to Optional Time of Use Portfolio Option**

(C)

1. Participation requires a one-year commitment by the Customer. Generally, if a Customer requests removal from the optional TOU Portfolio option, the Customer will be required to wait 12 months before re-enrolling. However, a Customer may request to reinstate service within 90 days of termination, in which case the Portfolio Enrollment Charge will be waived.
2. TOU service may be terminated at the next regularly scheduled meter reading provided the Company has received two weeks' notice prior to the meter read date. Absent the two-week notice, the termination will occur with the subsequent meter reading date.

(C)

(C)

(C)(M)

**SCHEDULE 7 (Continued)**

ENERGY PRICE PLANS: OPTIONAL TOU (Continued)

3. The Customer must provide the Company access to the meter monthly. (M)
4. A Customer's election to participate in this Portfolio option is based solely on the Customer's own analysis of the benefits of this schedule. The Company does not assure that participation in this option will result in reductions in the Customer's bill or that it will not increase costs to the Customer compared to other options. After a Customer's initial 12 months of service on the TOU option, the Company will calculate what the Customer would have paid under the Residential Service and compare billings. If the Customer's Energy Charge billings under the optional TOU Portfolio option exceeded the Energy Charge under Residential Service by more than 10%, the Company will issue the Customer a refund for the amount more than 10% either as a bill credit or refund check. No refund will be issued for Customers not meeting the 12-month requirement. (N)  
(N)  
(C)  
(C)
5. The Company may recover lost revenue related to the difference between the revenue generated from the TOU Portfolio option and the revenue that would have been generated if the TOU Customers were on Residential Service. In addition, the Company will recover the cost to reimburse Schedule 7 Customers who meet the 12-month requirement, described above in Special Condition No. 4, from Schedule 7 Customers. The recovery in this special condition is from Schedule 7 Customers. (M)  
(N)
6. The Company may recover the cost of the PTR incentives from all cost of service Customers. (M)

**PEAK TIME REBATE EVENTS**

The PTR program has two event seasons: summer (the successive calendar months of June through September) and winter (successive calendar months of November through February). The Company will call PTR events only in event seasons. Prior to each season, the Company will remind the enrolled Customers that they are on the program, that they may participate in PTR events, and ways to be successful.

The Company initiates PTR events with an event notification to participating Customers the day prior to the PTR event, as well as a notification the day of the event. Participating Customers must choose at least one method for receipt of notification: email, text, or another available option. The Company will not call PTR events for more than two consecutive days. Reasons for calling events may include but are not limited to: Energy load forecasted to be in the top 1% of annual load hours, forecasted temperature above 90 or below 32, expected high generation heat rates and market power prices, and/or forecasted low or transitioning wind generation.



**SCHEDULE 7 (Continued)**

PEAK TIME REBATE EVENTS (Continued)

(N)

SPECIAL CONDITIONS RELATED TO PEAK TIME REBATE OPTIONS

1. To be eligible for a PTR credit, the Customer must agree to receive PTR notifications.
2. The Customer may unsubscribe from the PTR event notification at any time. If the Customer unsubscribes, they will receive credit only for those events for which they are enrolled and receive notifications.
3. The PTR incentive may be provided in an on-bill credit on the Customer's next monthly billing statement or by check at the next billing statement after end of the event season ends.
4. Customers enrolled in Schedule 5 Direct Load Control are not eligible to participate in PTR on this schedule.
5. Customers with interconnected energy storage are only eligible for this schedule if the energy storage system is controlled by the Company and not the Customer.
6. The Company will defer and seek recovery of all PTR costs not otherwise included in rates.

(N)

**GREEN FUTURE<sup>SM</sup> RENEWABLE PORTFOLIO OPTIONS**

(C)(M)

Customers can add any of the following Green Future<sup>SM</sup> Renewable Portfolio options to any service described in this schedule: renewable fixed option, renewable usage option, renewable solar option, and renewable habitat option adder (Habitat Support).

(N)

(N)

The Customer will be charged for the Green Future<sup>SM</sup> Renewable Portfolio option in addition to all other charges under this schedule for the term of enrollment in the Green Future<sup>SM</sup> Renewable Portfolio option.

(C)

(C)

Energy or RECs supporting the Green Future<sup>SM</sup> will be acquired by the Company such that by March 31 of the succeeding year, the Company will have received sufficient RECs or renewable energy to meet the purchases by Customers. For the Renewable Fixed and Renewable Usage options, the Company is not required to own renewables or to acquire Energy from renewable resources simultaneously with Customer usage.

(C)

(T)

For purposes of these options, renewable resources include wind generation, solar, biomass, low impact hydro (as certified by the Low Impact Hydro Institute) and geothermal energy sources used to produce electric power. All RECs will be Green-e certified by the Western Renewable Energy Generation Information System (WREGIS) beginning January 1, 2009.

(M)

**SCHEDULE 7 (Continued)**

(T)

GREEN FUTURE<sup>SM</sup> RENEWABLE PORTFOLIO OPTIONS (Continued)

(C)(M)

RENEWABLE FIXED OPTION

The Company will purchase 200 kWh of Renewable Energy Certificates (RECs), as defined in Rule B of this tariff, and/or renewable energy per block enrolled in the Renewable Fixed option. All RECs purchased under this option will come from new renewable resources.

(C)  
(C)

The Company will also place \$1.50 of the amount received from Customers enrolled in the Renewable Fixed option in a new renewable resources development and demonstration fund (Renewable Development Fund or "RDF").

Amounts in the fund will be disbursed by the Company to public renewable resource demonstration projects or projects that commit to supply Energy according to a contractually established timetable. The Company will report to the Commission annually by March 15<sup>th</sup>, pursuant to Order No. 16-156, on collections and disbursements for the preceding calendar year. The annual report will include a list of projects that received or were allocated RDF funding.

Amounts placed in the fund prior to July 6, 2016 will accrue interest at the Commission-authorized cost of capital until disbursed. Amounts placed in the fund on and after July 6, 2016 will accrue interest at the Commission-authorized rate for deferred accounts in amortization until disbursed. Amounts within the fund will be disbursed on a first-in-first-out basis. Once funds have been committed to projects, following the required OPUC review, they will be deemed disbursed. Funds deemed disbursed and still held by the Company, will accrue interest at the Commission-authorized rate for deferred accounts in amortization.

(M)

**Monthly Rate**

(N)

Renewable Fixed Option	\$2.50	per month per block
------------------------	--------	---------------------

(M)

RENEWABLE USAGE OPTION

All amounts received from the Customer under the Renewable Usage option less administrative fees will be used to acquire RECs and/or renewable energy all of which will come from new renewable resources.

(M)

**Monthly Rate**

(N)

Renewable Usage Option	0.800	¢ per kWh in addition to Energy Charge
------------------------	-------	----------------------------------------

(M)

**SCHEDULE 7 (Continued)**

GREEN FUTURE<sup>SM</sup> RENEWABLE PORTFOLIO OPTIONS (Continued) (N)

RENEWABLE SOLAR OPTION (M)

The Renewable Solar option allows participating Customers, monthly, to support a PGE sponsored utility-scale solar power plant and its renewable attributes. The Company will purchase 1 kW of the output and RECs from new solar facilities connected to the Company's electric grid per unit enrolled in the Renewable Solar option. (T)

In exchange for the Customer's payment of \$5.00 per unit per month, the Customer receives the environmental attributes from a local utility-scale solar project and the utility-scale solar project produces 1 kW of Energy which flows into the grid. Typical purchases may range to the equivalent of a 1, 2, or 3 kW solar panel array. At the end of each year, the Company will provide individual results to the Customer, reporting how much the Customer's Energy usage was offset by solar power and the carbon footprint reduction benefit received. The RECs purchased by the Customer will be retired on behalf of the Customer. (T) (M)

**Monthly Rate** (N)

Renewable Solar Option	\$5.00	per unit in addition to Energy Charge	(M)
------------------------	--------	---------------------------------------	-----

RENEWABLE HABITAT OPTION ADDER (HABITAT SUPPORT) (C)

The Company will distribute \$2.50 per month as received from each Customer enrolled in Habitat Support to a nonprofit agency chosen by the Company who will use the funds for habitat restoration. (C) (M)

**Available** (N)

Only Customers who are enrolled in a Green Future<sup>SM</sup> Renewable Portfolio option, described in this schedule, may choose Habitat Support. (C)(M) (C)(M)

**Monthly Rate** (N)

Habitat Support	\$2.50	per month	(C)(M)
-----------------	--------	-----------	--------

**SCHEDULE 7 (Concluded)**

GREEN FUTURE<sup>SM</sup> RENEWABLE PORTFOLIO OPTIONS (Continued)

(N)

SPECIAL CONDITIONS RELATED TO GREEN FUTURE<sup>SM</sup> RENEWABLE PORTFOLIO OPTIONS

(C)(M)

1. Service will become effective with the next regularly scheduled meter reading date provided the Customer has selected the option at least five days prior to their next scheduled meter read date. Absent the five-day notice, the change will become effective on the subsequent meter read date. Service may be terminated at the next regularly scheduled meter reading provided the Company has received two weeks' notice prior to the meter read date. Absent the two-week notice, the termination will occur with the subsequent meter reading date.
2. The Company, in its discretion, may accept enrollments on accounts that have a time payment agreement in effect, or have received two or more final disconnect notices. However, the Company will not accept enrollments on accounts that have been involuntarily disconnected in the last 12 months.
3. The Company will use reasonable efforts to acquire renewable energy but does not guarantee the availability of renewable energy sources to serve Green Future<sup>SM</sup> Renewable Portfolio Options. The Company makes no representations as to the impact on the development of renewable resources or habitat restoration projects of Customer participation.
4. Enrollment into Renewable Solar option: Customer agrees to participate for no fewer than 12 months.

(C)

**ADJUSTMENTS**

Service under this schedule is subject to adjustments approved by the Commission. Adjustments include those summarized in Schedule 100.

(M)

PGE Advice No. 19-03  
Attachment A  
Flex 2.0 – Flexible Residential Pricing Program

# Flex 2.0 – PGE’s Flexible Residential Pricing Program

February 2019



[This page intentionally left blank]

## Table of Contents

Executive Summary .....	6
Section 1: History of PGE’s Flex 1.0 Pilot & Learnings.....	7
Section 2: Flex 2.0 Program Goals and Design .....	10
2.1: Program Implementation .....	11
2.2: Program Enrollment Goals .....	13
Section 3: Marketing Strategy .....	14
3.1: DR Awareness and Education.....	14
3.2: Flex 2.0 Program-Specific Marketing Strategy .....	16
Section 4: Cost Recovery .....	17
Section 5: Cost Effectiveness.....	18
5.1: Flex 2.0 Program Costs .....	18
Section 6: Program Benefits .....	20
6.1: Benefit-Cost Estimates .....	20
Section 7: Conclusion .....	21

### Tables, Figures, and Charts

Table 1 Cost Summary of Residential Pricing Program Costs (2018\$, \$M) .....	7
Table 2 Cost Effectiveness Summary: Residential Pricing Program (2018\$, \$M) .....	7
Table 3 Flex 2.0 TOU Rate Structure.....	11
Table 4 Flex 2.0 Enrollment Targets .....	13
Table 5 Flex 2.0 Budget .....	18
Figure 1 Flex 1.0 Pricing Scenarios .....	8
Figure 2 Flex 1.0 TOU Treatment Rates.....	9
Figure 3 Flex 1.0 Customer Satisfaction vs. CPP Pilot.....	10
Figure 4 Cost Effectiveness Test Details (all values 10-year NPV).....	21



## Acronyms

ADR ..... Automated Demand Response  
AMI ..... Advanced Metering Infrastructure  
BDR ..... Behavioral Demand Response  
CPP ..... Critical Peak Pricing  
DLC ..... Direct Load Control  
DLCT .... Direct Load Control Thermostat  
DR ..... Demand Response  
DRMS .. Demand Response Management System  
DSM .... Demand-Side Management  
FTE ..... Full-Time Equivalent  
IRP ..... Integrated Resource Plan  
IT ..... Information Technology  
kW ..... Kilowatt  
kWh .... Kilowatt Hour  
MW ..... Megawatt  
MWa ... Average Megawatt  
OPUC... Oregon Public Utility Commission  
PAC ..... Program Administration Cost Test  
PCT ..... Participant Cost Test  
PGE ..... Portland General Electric Company  
PTR ..... Peak Time Rebate  
RIM ..... Ratepayer Impact Measure Test  
SCE ..... Southern California Edison Company  
TOU ..... Time-of-Use  
TRC ..... Total Resource Cost Test

## Key Terms and Concepts

**Demand Response (DR)** – “Changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.”<sup>1</sup>

**Flexible Load** – a more dynamic type of DR identified as a necessary resource in a decarbonization study. It is a dynamic form of demand response capable of providing valuable grid balancing services that are necessary for integrating high levels of renewable or variable energy resources. To supply grid balancing services, these demand side resources must be available to grid operators throughout the day and capable of supplying several different types of energy products beyond peak load shifting.

---

<sup>1</sup> FERC. “National Assessment & Action Plan on Demand Response.” *Federal Energy Regulatory Commission*, FERC, 1 July 2016, [www.ferc.gov/industries/electric/indus-act/demand-response/dr-potential.asp](http://www.ferc.gov/industries/electric/indus-act/demand-response/dr-potential.asp).

## Executive Summary

Portland General Electric Company (PGE) is pleased to file this Plan to implement its Flexible Residential Pricing Program (Flex 2.0), which was piloted as Flex 1.0 from 2015-2018 in Oregon Public Utility Commission (OPUC or Commission) Docket No. UM 1708.

In 2016, PGE filed its Integrated Resource Plan (IRP) with the OPUC, outlining a five-year strategy that focuses on energy efficiency and customer-side DR while leaning on dispatchable generation and short-term contracts to replace coal. Included in the plan are more than 200 megawatts (MW) of DR and energy efficiency, part of PGE's path to reach 20% renewables by 2020, and then 50% by 2040. To enable that plan:

- PGE plans to increase production of electricity from variable renewable energy resources to comply with the requirements of Oregon Senate Bill 1547 (2016 Regular Legislative Session).
- PGE will introduce DR programs to help manage system peak loads and to assist with the integration of renewable energy resources.

At least 135 average megawatts (MWa) in energy efficiency will be added within the next four years. Notably, the 2016 IRP also includes up to 77 MW of DR resources of which residential pricing programs will play a significant role.

Section 1 of this Plan describes PGE's research into best-in-class residential DR programs (based on learnings from other utilities) as well as its own residential DR pilots (including Flex 1.0) that leveraged Advanced Metering Infrastructure (AMI), provided insights into PGE's specific residential customer usage patterns and rate preferences, and led to recommendations for the Flex 2.0 program. PGE piloted Flex 1.0 through PGE's Tariff Schedule 6 (Residential Pricing Pilot). Schedule 6 provided twelve pricing options to the pilot participants. For Flex 2.0, PGE will move forward with two of these piloted pricing options:

- Opt-in Peak Time Rebate (PTR) – Customers choose to participate in this option which provides a PTR incentive to customers who use less electricity during critical peak events. Advanced notice will be given to participants prior to an event. After a PTR event, PGE will measure the customer's demand reduction using the customer's usage baseline to determine the amount of hourly kilowatt reduction and the amount of the rebate.
- Time of use (TOU) with PTR – A TOU rate with optional participation in PTR events. A TOU rate is a DR program that segments each billing month into smaller hourly windows each with a separate pricing level related to energy production costs. Participants are provided price signals to reduce load during higher cost hours.

In moving from pilot to program, PGE has revised its residential standard service option (Schedule 7) to include these pricing options, noted in the tariff. Flex 2.0 and its program goals and design are described in more detail in Section 2. To ensure overall program success, in 2019 we will focus on PTR enrollment, specifically from April to June, prior to the summer season kickoff. We are aimed at sufficient enrollment during the first summer season to gauge overall DR value of these participants. PGE will undertake marketing efforts focused on TOU enrollments in the second half of 2019, followed by another burst of PTR marketing efforts in November for the winter season. For more on PGE's marketing strategy, see Section 3.

The incremental costs associated with this program are subject to a deferral filing for later recovery. PGE plans to use its Tariff Schedule 135 (Demand Response Cost Recovery Mechanism) for cost recovery, subject to the conditions set forth in Order No. 18-381.<sup>2</sup> Cost recovery is described in more detail in Section 4. A summary of estimated costs is included below and are described in more detail in Section 5:

**Table 1 Cost Summary of Residential Pricing Program Costs (2018\$, \$M)**

	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Budget	\$0.2	\$3.0	\$5.5	\$6.4	\$6.9	\$7.4
Average annual MW achieved	16.3	38.8	50.3	57.4	64.3	67.7

PGE has estimated cost effectiveness on a total resource cost (TRC), ratepayer impact measure (RIM), program administration cost (PAC), and participant cost (PCT) tests. The summary of the results is provided below and described in more detail in Section 5. The program benefits are described in Section 6.

**Table 2 Cost Effectiveness Summary: Residential Pricing Program (2018\$, \$M)**

	<b>TRC</b>	<b>RIM</b>	<b>PAC</b>	<b>Participant</b>
Benefits	35.1	34.1	34.1	36.2
Costs	27.5	55.3	45.4	8.3
Net Benefit	7.6	(21.3)	(11.3)	27.8
<b>Benefit/Cost Ratio</b>	<b>1.28</b>	<b>0.62</b>	<b>0.75</b>	<b>4.34</b>

PGE believes that the Flex 2.0 program design will achieve our enrollment targets, deliver our DR value, and cost effectively support PGE’s strategy to decarbonize the grid by meeting our IRP goals for this program.

## Section 1: History of PGE’s Flex 1.0 Pilot & Learnings

To support our residential DR goals, PGE identified and researched two residential pilots [Flex 1.0 and Direct Load Control (DLC) Thermostat] that would best inform development of future DR programs. The Flex 2.0 program leverages learnings from these efforts, specifically Flex 1.0, which was a pricing and behavioral demand response (BDR) pilot that tested the load impacts and customer acceptance of various residential rate options.

PGE conducted the Flex 1.0 pilot after Commission approval in OPUC Docket No. UM 1708. The pilot enrolled 14,000 customers and tested 12 pricing design options, described in Figure 1, all aimed at reducing residential peak demand during summer and winter months. The treatments featured three TOU rates, three PTR incentive levels, BDR options, four hybrid DR treatments (TOU pricing in combination with PTR or BDR) and opt-out (automatically enrolled) and opt-in (choose to enroll) design options. Treatments offered a range of on-peak/off-peak hours and rates as well as differing PTR incentive levels.

- TOU: Customers pay less for electricity during certain times of the day. This is a daily savings plan.
- PTR: Customers receive rebates or incentives for shifting energy use during special Event days.
- BDR: Same as PTR but customers don’t receive a financial incentive for their participation.
- Opt-In: Customers choose to participate in the program.

<sup>2</sup> Oregon Public Utility Commission. *Order No. 18-381*. OPUC Docket No. UM 1708, 11 Oct. 2018, <https://apps.puc.state.or.us/orders/2018ords/18-381.pdf>

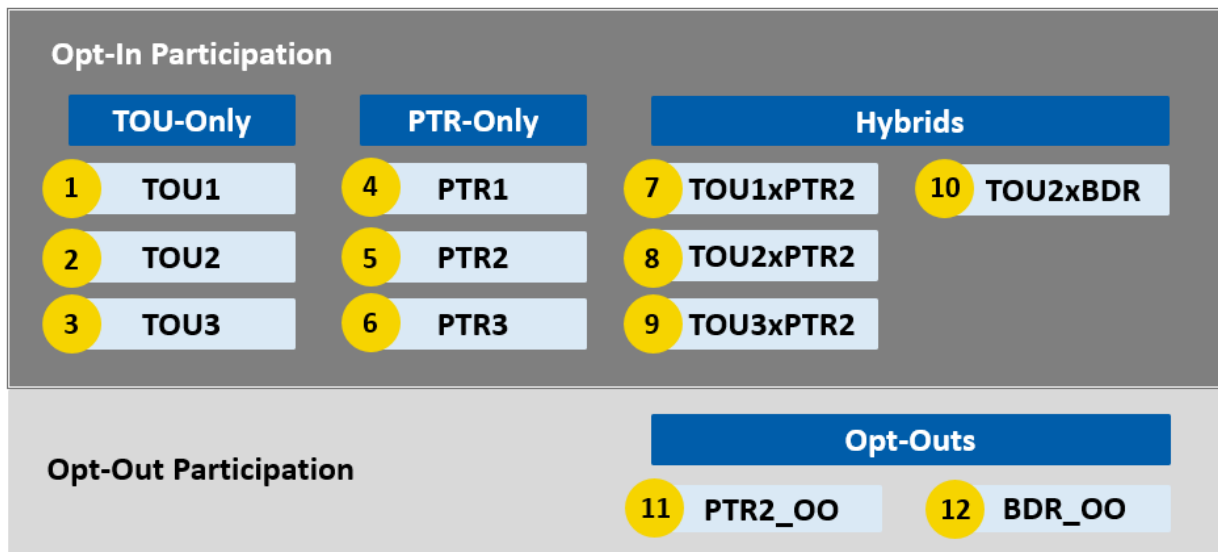
- Opt-Out: Customers are automatically enrolled in the program and must choose to opt-out if they don't want to participate.

Flex 1.0 investigated two types of DR dynamic pricing strategies: enrolling some customers in a TOU rate while others were enrolled in a PTR program. In addition, Flex 1.0 offered a series of pricing alternatives by having nine groups of participants:

- (1) A control group that has standard pricing and receives no additional information;
- (2) A group that has standard pricing and that receives information regarding peak events but no incentives;
- (3) A group on standard pricing and receives information regarding peak events and PTRs;
- (4) A group on Day and Night TOU rates;
- (5) A group on Day and Night TOU rates that receives PTRs;
- (6) A group on Peak-Only TOU;
- (7) A group on Peak-Only TOU that receives PTRs;
- (8) A group on standard TOU rates with on-peak hours constant across the seasons; and
- (9) A group like group 8 but with PTRs.

Participants who were not part of the control group were considered “treatment customers” and were enrolled in one of the twelve pricing scenarios below that included TOU, PTR, BDR, opt-in, and opt-out configurations.

Figure 1 Flex 1.0 Pricing Scenarios



TOU rate scenarios included seasonal changes across rates with varying degrees of complexity and price structures, provided in Figure 2.

Figure 2 Flex 1.0 TOU Treatment Rates

Summer				Winter			
	TOU1	TOU2	TOU3		TOU1	TOU2	TOU3
Off Peak	7.5¢/kWh	8.3¢/kWh	6.9¢/kWh	Off Peak	8.0¢/kWh	8.8¢/kWh	7.4¢/kWh
	10pm - 6am	8pm - 3pm	10pm - 11am		10pm - 6am	8pm - 7am 11am - 3pm	10pm - 7am
Mid Peak			11.9¢/kWh	Mid Peak			12.4¢/kWh
			11am - 3pm				11am - 3pm 8pm - 10pm
On Peak	13.6¢/kWh	17.6¢/kWh	18.0¢/kWh	On Peak	14.1¢/kWh	18.1¢/kWh	18.5¢/kWh
	6am - 10pm	3pm - 8pm	3pm - 8pm		6am - 10pm	7am - 11am 3pm - 8pm	7am - 11am 3pm - 8pm

PGE also tested three tiers of incentives for PTR customers:

- PTR1 \$0.80/kWh;
- PTR2 \$1.55/kWh; and
- PTR3 \$2.25/kWh.

These groups of customer participants helped PGE explore the following key questions based on the types of residential customer load shape profiles:

- What peak reduction can PTR programs deliver?
- How does peak reduction compare between PTR and Critical Peak Pricing (CPP)?
- What is the effect of education alone on behavior?
- Will optimized TOU rates change load shape?

PGE performed customer research and evaluated different TOU rate plans based on customer load profiles and cost of service. The pilot’s TOU rates had different on-, mid-, and off-peak periods, which varied by season. In addition, the TOU rates had PTR and non-PTR versions. PGE maintained control groups to provide comparable baseline data, both with and without additional customer education on DR and energy conservation.

PGE selected the participants in the Flex 1.0 pilot, and a third-party vendor administered the program. The individual rebates were measured as the difference in energy over the peak period and the customer's personalized baseline. This calculation involves complex statistical methods and is much more computationally intensive than simple X of Y methods used in its commercial and industrial programs.

PGE called at least six events per season, but no more than ten. The events lasted up to five hours but were more typically three. The vendor provided customers with energy information and tips on how they could save during peak times via several channels (e.g. email, text, and web).

PGE contracted with Cadmus to evaluate the load impacts and customer satisfaction associated with different pricing and behavioral DR program designs for Flex 1.0. Cadmus’ evaluation report was filed with the Commission in July 2018 and is provided as Appendix A. The Cadmus evaluation reviewed two winter seasons (2016/2017 and 2017/2018) and two summer seasons (2016 and 2017) and involved analysis of randomized control trials for twelve DR treatments including PTR, TOU pricing, BDR, and combinations of these treatments. Cadmus performed the research design, peak demand impact analysis, program staff interviews, and customer surveys.

In June 2018, Cadmus completed its evaluation of Flex 1.0 and confirmed that PGE can obtain customer demand savings through pricing and behavior-based DR programs to manage its system peak demand while delivering a positive customer experience.

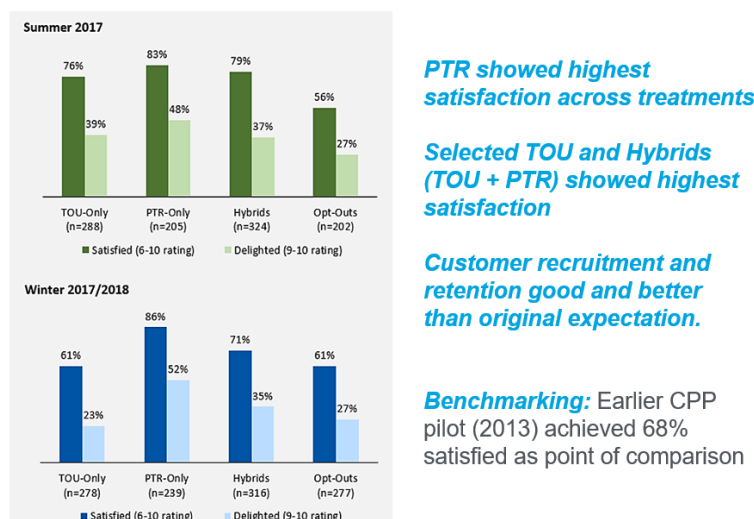
## Section 2: Flex 2.0 Program Goals and Design

The program goals for Flex 2.0 are as follows:

- Design and deploy a large-scale DR program that equitably and cost-effectively contributes a substantial DR amount to our IRP goals.
- Offer easy-to-engage-in DR offerings that serve as gateways for adoption of other DLC offerings such as Smart Thermostat.

The Cadmus evaluation revealed that hybrid treatments, which combined TOU pricing with PTR incentives, resulted in the highest demand savings of those scenarios tested in Flex 1.0. Satisfaction was also high for those customers who saved on the hybrid plan, as shown in Figure 3.

**Figure 3 Flex 1.0 Customer Satisfaction vs. CPP Pilot**



TOU and PTR hybrid customers had lower satisfaction in winter, as demand saving or shifting proved challenging for them in this season and they voiced concern about winter bill increases. PGE conducted a detailed analysis of the TOU structures to see where changes could potentially be made to mitigate issues in winter while maintaining resource value. The Flex 2.0 program design reflects winter TOU changes made because of that analysis.

Based on these learnings, the Flex 2.0 program will include a combination of TOU+PTR offerings that have been proven to achieve high load shift and customer satisfaction. The proposed Flex 2.0 program will include:

- **Opt-in TOU+PTR Hybrid** – Customers can save on their daily energy costs by shifting usage to off-peak times when rates are lower. They also receive notifications asking them to shift energy use during peak-time events (16-20 events per year). As a reward, they receive an on-bill credit based on actual versus expected usage if they had not shifted.
  - A mid-morning peak time during winter season has been eliminated to reduce customer concerns about bill increases and to mitigate un-enrollments during that time.
  - Customers who participated in TOU2+PTR programs demonstrate a larger percentage of savings during PTR events versus TOU alone.
  - The new TOU rate is designed to be revenue neutral – roughly half of PGE’s eligible residential customer base could save money on the plan without making any changes to their usage.

Table 3 Flex 2.0 TOU Rate Structure

Summer		Winter	
Flex 2.0 TOU		Flex 2.0 TOU	
Off Peak	8.4¢/kWh 8 p.m. - 3 p.m.	Off Peak	8.4¢/kWh 8 p.m. - 3 p.m.
Mid Peak		Mid Peak	
On Peak	19.1¢/kWh 3 p.m. - 8 p.m.	On Peak	19.1¢/kWh 3 p.m. - 8 p.m.

- **Opt-in PTR only** – Customers receive notifications asking them to shift energy use during peak-time events (16-20 events per year). As a reward, they receive an on-bill credit based on actual versus expected usage if they had not shifted.
  - This offering delivered the highest DR value, customer satisfaction, and retention scores in the Flex 1.0 pilot.
  - The primary reasons for PTR’s high customer satisfaction are customer perception of monetary benefit for their efforts and that occasional behavior changes on specific days present less of an obstacle to participation than day in, day out changes.

**2.1: Program Implementation**

To enable the Flex 2.0 program, PGE has engaged two of the industry’s leading DR Management System (DRMS) and data analytics vendors to support our efforts. By merging the strengths of specialized companies and



platforms, we have created a solution that maximizes PGE’s future flexibility while enhancing every element of a multi-year DR/DLC strategy.

### 2.1.1: TROVE Advanced Data Analytics

Accurate and timely delivery of PTR event measurements are critical to the success of a PTR program. PGE will leverage TROVE’s Data Synthesis Platform (via licensing) which will serve as the backbone of the PTR program, applying predictive data science analytics to measure and forecast individual customer behaviors and loads with precision and at scale.

Using AMI and billing data from PGE, TROVE will estimate customer-specific curtailment and the associated PTR incentives. Trove will calculate rebates by comparing the participating customer’s actual energy use during the PTR event compared to the customer’s baseline energy use, with the baseline calculated using a customer-specific regression analysis. TROVE will:

- *Create Customer-Specific regression models for each PTR customer.*
- *Apply the prevailing customer specific regression coefficients to the actual weather data for the PTR event.* This will serve as the preliminary customer-specific baseline.
- *Compute event-day hour adjustment ratios.*
- *Apply hourly adjustment ratios to the customer specific regression-based hourly kWh for the PTR event day.*
- *Apply a final additive adjustment.* To further align the baseline to the PTR customer’s event day load shape, TROVE will perform an additive adjustment aligning the baseline to the actual load according to the average kWh across the 3 hours prior to the start of the event.
- *Calculate kWh impact.* The delta between the adjusted baseline and actual hourly kWh for PTR event hours will be the event impact, and the settlement payment will be based off the applicable rebate for hour-specific event impacts.
- *PTR ex-ante calculations.* TROVE will provide an annualized software license for ex-post modeling and perform calculations at the customer and aggregate level to forecast impact and DR value of future PTR events.

PGE will continuously evaluate data insights to inform and optimize the Flex 2.0 program design and customer engagement strategy. Ultimately, customer segmentation will inform recruitment campaigns and enable targeted, personalized messaging in recruitment collateral. This is detailed in more detail in the marketing section that follows.

### 2.1.2: Oracle

Oracle Utilities has a proven track record of operating large-scale residential peak management programs (such as Baltimore Gas and Electric’s Energy Savings Day program with more than one million participants) and will provide the operational and communication support for PGE’s PTR program.

Customer engagement and customer satisfaction are at the core of Oracle Utilities’ approach to Peak Management. In post-season surveys, more than 85% of participants reported that they had a higher awareness of peak savings, and 75%-85% of customers indicated that they were highly satisfied with the program. In another key indicator of satisfaction, an average less than 1% of participants choose to opt-out of a typical Oracle peak management program.

Additionally, Oracle will provide personalized TOU rate comparison information for our residential customers (comparing what a customer uses on the Basic Rate plan to what a customer would pay on the new TOU rate) which will be used to help customers select the plan that is best for them. Again, this is discussed in more detail in the marketing section that follows.

## 2.2: Program Enrollment Goals

PGE has considered other utility programs as well as our own Flex 1.0 pilot in setting enrollment targets. Enrollment across treatments in the Flex 1.0 pilot ranged from 3% to 6% with restricted marketing efforts given the nature of the pilot. Other utilities, such as Sacramento Municipal Utility District achieved enrollment targets as high as 16% for its TOU program. In setting enrollment targets, PGE used a conservative adoption rate of 7% year 1 (2019), with 9% growth in year 2 (2020), 4% growth in year 3 (2021) and a more modest 3% growth year-over-year thereafter.

Enrollment goals are also designed to support our IRP goal of 38 MW of residential DR by end of year 2020 with more aggressive marketing occurring in the first two years of the program to support that DR goal. To ensure continued cost effectiveness, PGE will monitor enrollment for its PTR program and reassess incentive costs once 110,000 customers have enrolled in the PTR program.

**Table 4 Flex 2.0 Enrollment Targets**

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
TOU + PTR	19,000	43,000	57,000	66,000	75,000	80,000	84,000	88,000	93,000	97,000
PTR	36,000	87,000	111,000	125,000	139,000	146,000	152,000	159,000	166,000	172,000
Total	55,000	130,000	168,000	191,000	214,000	226,000	236,000	247,000	259,000	269,000
AAGR		136%	29%	14%	12%	6%	4%	5%	5%	4%
% of Res Accounts	7%	16%	20%	23%	26%	27%	28%	29%	30%	31%
MW Impact	16.3	38.8	50.3	57.4	64.3	67.7	71.0	74.3	77.6	80.9

After initial DR education and awareness, PGE will communicate information about TOU+PTR and encourage customers to stay on the incentive program or move to a DLC program, specifically the Smart Thermostat program. DLC programs capture larger DR loads and are automated, which presents fewer hurdles to event participation, a more streamlined customer experience, and have energy efficiency benefits. Therefore, transitioning customers to DLC will be key to prove the resource capability of DR. DR initiatives such as PTR, TOU and BDR - with relatively low barriers to entry for customers - can serve as a launching point for drawing residential customers into deeper DR engagement over time.

## Section 3: Marketing Strategy

Marketing provides important outreach and education for customers to learn about and participate in these DR options. In addition to using the Cadmus findings and recommendations to inform PGE’s target participants, PGE conducted further segmentation to profile the following customers: customers who could benefit most from the TOU rate plan, customers with a neutral impact, and customers who could be negatively impacted. As part of PGE’s proposal, PGE’s marketing efforts will target those customers who are most likely to benefit from the program.

The marketing strategy is to align customer value propositions with highly targeted residential segmentation to educate, engage and enroll customers in PGE’s PTR and TOU programs to be part of Oregon’s clean energy future. Based on a JD Power “Residential Customer Satisfaction Study”<sup>3</sup> below are nine key learnings on customer behavior that will influence PTR and TOU marketing strategy:

1. **The customer is going to measure PGE by others** – no industry is an island and expectations are the same whether customers are interacting with their banks, favorite retailer or utility.
2. **Every customer is mobile** – even the customer who doesn’t identify as mobile, is mobile.
3. **Customers today expect that PGE knows them** – this applies to every communication point of contact and transaction (i.e. knowing who they are and account history).
4. **If PGE makes a promise, keep it** – customers do not like problems but have less tolerance for broken promises on services or messaging.
5. **Work backwards from the customer** – listen to what they have to say and put it into practice.
6. **Customers love convenience** – you must be on all channels, not just the ones easiest for you.
7. **Consistent customer messaging** – customers want communication across channels to connect and expect consistency in messaging.
8. **An aware customer, is a happy customer** – if customers know your programs from the details down, consumer satisfaction increases.
9. **All customers respond to one phrase** – a satisfaction boost comes from the oldest adage, take the time to say, “thank you.”

### 3.1: DR Awareness and Education

PGE’s DR research findings have shown that at this time there is little awareness among its customers of the economic significance of when electricity is used or the meaning of DR; the “why” of DR and load control are not common concepts generally understood by customers. While many customers think they are already doing everything possible in terms of energy efficiency, our findings indicate there are customers looking for more choices regarding their energy use. Research specific to DR also demonstrates that messaging and how PGE educates customers about DR opportunities shapes their understanding of its value and thus their willingness to participate.

In its final pilot evaluation, filed in UM 1708, Cadmus recommended PGE offer more education to TOU participants on how to save energy and would like to better understand how PGE will improve its customer

---

<sup>3</sup> J.D. Power. *Electric Utility Residential Customer Satisfaction Study*. J.D. Power, 2018.

education. To address this, the first step in customer engagement must be around awareness and education of the following:

- **DR Concepts:** Educating customers about DR needs to be tactfully undertaken. Even the term “DR” is energy company-centric. The lexicon relied on by system operators needs to be redeveloped for communicating the value proposition to the customer. Additionally, most customers do not think much about or understand how energy is generated and transmitted and take electric service for granted. Our education and outreach efforts will focus on the concept of DR and how it fits within an energy ecosystem that includes other DSM options and how this new resource can help control costs and address climate change.
- **Effect Upon the Customer Bill:** Whether as a pricing mechanism or an incentive program DR participation can reduce customers’ overall energy costs. TOU pricing can also reduce a customer’s monthly bill but requires knowledge and consistent daily behavioral changes. Incentive programs for DLC, such as a smart thermostat offering or a smart water heater offering, can assist customers with their overall energy costs by providing an incentive for participation or the technology required for participation. Hybrid programs, such as PTR, familiarize the customer with the concept of beneficial behavioral change for a series of DR events. PTR programs operate by providing the customers an incentive for responding to DR events while holding those harmless who cannot, or choose not, to respond to an event.
- **Beneficial Effect on Future Customer Rates:** Part of the customer value proposition to be communicated is that DR is a customer-controlled resource that has the capability of offsetting larger, long-term investments in new fossil fuel generation. By offsetting these investments, the individual customers are helping to keep rates lower to meet a limited number of hours of high energy needs that would otherwise need to be met by investments in fast-ramping resources (traditionally single cycle gas plants with long investment terms).
- **Environmental Implications:** Using DR instead of fossil fuel-fired generation to address energy can help with capacity gaps. The customer and the community will also be presented with the environmental benefits of DR. Offsetting investments in fossil fuel presents its own implicit environmental value proposition. In addition to established efficiency and renewable options, enabled by advances in Information Technology (IT) and grid operations, the distribution system can now be leveraged as a resource to meet customers’ energy needs, grid service’s needs, and as part of a tool set to lower the carbon content of the electric system. Supported by PGE’s decarbonization study, PGE will need nearly 900 MW of customer sited resources. DR is the first of these resources.
- **Community Effort:** Enabling the customer and the energy company to use DR can be a community effort with broader and immediate implications. In related customer messaging, PGE will present a community benefit beyond assisting with customer bills and putting downward pressure on energy rates. Many customers consider community-level messaging and action a significant incentive. Messaging to these customers will promote the community value of DR to empower and enable the customer to control energy costs and address environmental considerations (also applicable to DERs). Investments by customers who can afford early adoption of technologies, such as roof-top solar, energy storage, or EVs, can be leveraged to assist the community. Residential customers’ investments in DER can help spur additional

renewables, help mitigate rate increases, and provide both locally-sourced energy services during normal grid operations and resiliency services during emergencies.

Customers will have several options for participating in DR programs and one of the results of our marketing strategy is to help guide them to their best option. When customers have choices for product or services that align with their core values and see a real benefit to them or to their community, engagement and satisfaction tend to follow. PGE wants its customers to clearly understand the value of being a part of DR and the contribution they will make.

### **3.2: Flex 2.0 Program-Specific Marketing Strategy**

The Flex 2.0 program will directly benefit from the education, engagement and enrollment marketing efforts of the DR campaign that will position PGE's strength as a trusted utility that introduces new products and services to provide a smarter, sustainable energy future.

Incorporating the learnings from PGE's Flex 1.0 pilot, we will target Flex 2.0 marketing to those customers who will directly benefit from PTR and TOU by providing smarter choices with the long-term goal of building a deeper relationship with all our customers.

TOU and PTR are two distinct DR programs with unique customer enrollment and load shift goals. Driving awareness, consideration and active enrollment in PTR and TOU programs will involve delivering on the value proposition of each program utilizing learnings and strategies around education, engagement, and enrollment.

#### **3.2.1: Awareness and Education**

- Educating and engaging PGE's Customer Service Call Center on PTR and TOU programs and how they can use personalization tools they will have at their fingertips, to recommend and enroll customers in smarter energy choices to further load control.
- A smarter self-service model will allow PGE customers to discover and understand the benefits of PTR and TOU participation without having to contact PGE's call center as our customer's demand convenience and easy access to personalized recommendations based on their energy use.
- Personalization to identify and educate customers on their energy usage and potential saving opportunities, which offers a targeted value proposition specific to consumer segments based on new analytic capabilities from Trove.
- Building a robust online web experience to educate customers on PTR and TOU programs and make it easy to understand and enroll in programs utilizing omni-channel messaging to keep customers engaged, offer personalized savings tips and aware of upcoming program events.
- Providing printed PTR and TOU marketing materials that will also be translated into Spanish and Russian to ensure we educate customers in the cases where English isn't their primary language.

#### **3.2.2: Engagement**

- Continue to refine customer value propositions and relevant recommendations for load control opportunities that we know that will benefit our customers (based on incentivized personalization) as a direct result of Trove analytics and insights.

- Driving PTR and TOU adoption through PGE’s portfolio channel of DLC programs and products designed to interact with smart technologies and reduce energy load during seasonal events, i.e., air conditioning cycling, heat pumps or thermostats.
- Promote rewards of participation in PTR and TOU in terms of community and economic incentives and the expected impact of shifting energy usage to further drive adoption and opt-in.
- Engaging with lower income audiences through outreach programs and partnering with community agencies to promote access to these new programs, specifically the benefits of the “win-only” PTR program through education and messaging specific to this customer.
- An omni-channel approach to engage customers along their PTR and TOU journey from awareness, interest and enrollment, knowing we want to empower our customers to feel ownership in their participation and share their testimonials/personal stories to highlight positive experiences regarding monthly bill savings and the overall impact to community.
- Public relations and advertising initiatives that engage with media (print, digital, social) partners, seek sponsorship opportunities and influencers to promote PTR and TOU education and enrollment with the additional benefit of DR that will drive awareness in PGE’s smarter energy use programs.

### 3.2.3: Targeted Messaging and Enrollment

- Extensive digital A/B testing and message refinement (i.e. Trove) will continually improve marketing omni-channel PTR and TOU strategy at key consumer touch points along the journey to achieve enrollment and load control metrics.
- Increase in-marketing efforts prior to key seasonal opportunities, for example understanding that summer based on learnings from other utilities, has the highest potential to impact load control for PTR and TOU.
- Building awareness and enrolling customers at planned PGE sponsored events throughout the season, these highly attended grass roots celebrations can vary from festivals to safety education but reflect PGE’s core values in serving its community and being a great neighbor.
- Personalization to enroll customers based on their energy usage and potential saving opportunities, which offers a targeted value proposition specific to consumer segments based on new analytic capabilities (i.e. Trove).
- Optimize online digital enrollment PTR and TOU process to simplify enrollment on PGE’s web site for desktop and mobile users as well as enhance customer account summary section to include personalization components that will allow cross-promotion of DLC programs and products.

It is our hope that the Flex 2.0 program can become a powerful foundation of a broad and robust DR portfolio that can drive system efficiency and optimization for PGE now and into the future

## Section 4: Cost Recovery

As stated in PGE’s 2019 Deferral Reauthorization Application and authorized in Commission Order No. 18-381, filed in OPUC Docket No. UM 1708, PGE plans to file for amortization of costs associated with Flex 2.0 using PGE Tariff Schedule 135 (Demand Response Cost Recovery Mechanism).

On February 23, 2011, PGE filed Advice No. 10-29 to establish Schedule 135,, a mechanism to recover Automated Demand Response (ADR) program costs to implement and operate, on a pilot basis.<sup>4</sup> Schedule 135 supports the peak capacity objectives described in Order No. 08-245 (Docket UE 189 AMI) and Section 4.2 of PGE’s Commission-acknowledged 2009 IRP. This Schedule has two components:

1. It includes rates based on the forecasted costs of DR programs over a 12-month period; and
2. It includes amortization of the deferred variance between forecasted costs and actual costs for the previous 12-month period.

Schedule 135 is updated annually when PGE adjusts the rates to update forecasted costs and amortize the deferred variance between forecasted and actual costs for the previous 12-month period.

## Section 5: Cost Effectiveness

Cost effectiveness considers both the costs and benefits associated with an investment.

### 5.1: Flex 2.0 Program Costs

The forecast of Flex 2.0 program annual costs through 2023 are outlined in Table 5, below.

Table 5 Flex 2.0 Budget

Budget Component	2018	2019	2020	2021	2022	2023
PTR Rebates	\$0	\$540,000	\$1,850,000	\$3,060,000	\$3,760,000	\$4,330,000
Marketing + communications	\$60,000	\$1,050,000	\$1,120,000	\$980,000	\$790,000	\$670,000
Program Operations						
Vendor implementors	\$0	\$770,000	\$890,000	\$850,000	\$920,000	\$920,000
Program management	\$120,000	\$117,000	\$106,000	\$108,000	\$110,000	\$112,000
Data analytics	\$0	\$158,000	\$158,000	\$162,000	\$165,000	\$168,000
Program evaluation	\$0	\$120,000	\$180,000	\$184,000	\$188,000	\$191,000
Check processing	\$0	\$169,000	\$0	\$0	\$0	\$0
Misc dispersed support	\$2,000	\$24,000	\$0	\$0	\$0	\$0
	\$122,000	\$1,358,000	\$1,334,000	\$1,304,000	\$1,383,000	\$1,391,000
IT capital investment	\$0	\$0	\$940,000	\$880,000	\$810,000	\$740,000
Total	\$182,000	\$2,948,000	\$5,244,000	\$6,224,000	\$6,743,000	\$7,131,000
Average annual MW achieved	16.3	38.8	50.3	57.4	64.3	67.7

#### 5.1.1: Rebates

Rebate costs grow with program subscribers. By 2021 rebates comprise half the program costs. The PTR rebate is modeled at \$1.00/kWh. Pilot results reported that PTR1 participants average annual rebate amount was \$16.09; this was increased by 25% to reflect the higher per kWh rebate within the proposed program structure (\$1.00/kWh proposed vs. \$0.80/kWh provided in PTR1 pilot). Rebates for TOU-PTR subscribers are modeled at a lower amount, per pilot results (\$16.58). This reflects the significant load decrease that TOU-PTR participants

<sup>4</sup> Schedule 135 was authorized in Order No. 11-182 regarding the deferral and recovery of costs related to PGE's ADR Pilot Programs.

evidenced during all peak hours; the additional reduction during PTR events was relatively lower than for subscribers enrolled in PTR only.

Note that the reduction in energy sales associated with TOU is not treated as a cost to the utility. This revenue reduction is assumed to be compensated in the short-term by PGE's decoupling mechanism, which adjusts rates to account for difference between forecasted and actual energy usage.

#### 5.1.2: Marketing

As noted above, PGE plans to aggressively promote both TOU+PTR and PTR-only enrollment in 2019 and 2020 to achieve the critical mass needed to support our IRP DR goals. Budgeting for Flex 2.0 in 2020 will increase 9% with a reduction in budget of 15% in 2021 and 24% in 2022 respectively. To support ongoing marketing, PGE has budgeted for 1.5 full-time equivalent (FTE) employees in the marketing line.

#### 5.1.3: Vendor

As discussed above, two vendors will implement the Flex 2.0 program. Oracle will manage PTR events communications and TOU customer engagement, and TROVE will provide predicate data analytics to identify target customers for Flex 2.0 programs and calculate individual customer baselines and rebates (PTR performance summaries). Vendor setup and launch services will be capitalized and are a component of the IT capital investment line item.

#### 5.1.4: Staffing

In addition to the 1.5 FTE in marketing and communications, the Flex 2.0 budget includes 1.0 full-time project manager, and 1.5 FTE on internal analytics to support vendor integrations and customer segmentation (used in marketing and communication efforts). The total incremental FTE addition is four.

#### 5.1.1: Data Analytics

The data analytics performed will assess meters prior to customer enrollment to determine the percent of interval data that is successfully transmitting, resolve exceptions that relate to billing to ensure billing accuracy, and validate meter readings to flag results that are not in line with trends.

#### 5.1.2: Program Evaluation

An external consultant will assess the program including load impact, customer satisfaction, and seasonal performance trends to inform PGE's management of its system peak demand. This evaluation will occur on an ongoing basis during each calendar year and will provide feedback at the end of each event season.

#### 5.1.3: Check Processing

This cost accounts for the potential delay in bill rebate functionality and represents the cost of issuing checks to participants for the program's first season of operations. Given the recent transition to a new Customer Care & Billing system, which will allow for on-bill crediting of PTR rebates, this cost is not expected, but is included as a conservative assumption.



#### 5.1.4: IT Capital Investment

This line item describes the annual income statement impact of a \$2.9 million capital investment to develop the integrations and framework required for PGE's DRMS as well as to augment PGE's existing data analytics platforms. This cost is not part of the deferral application<sup>5</sup> and will be covered through PGE's existing IT capital budget.

## Section 6: Program Benefits

DR programs are undertaken for the capacity they provide. As most programs shift rather than reduce energy consumption, energy savings are minimal. Because Oregon does not have a capacity market, PGE values capacity based upon the cost to build the least expensive capacity resource. PGE's 2016 IRP update established this as a simple cycle combustion turbine, with real levelized fixed costs of \$126.33 per kW-year in 2019. This cost/value is then discounted, or de-rated, to reflect the ways in which DR varies from a dispatchable thermal capacity resource. PTR is significantly de-rated (to 45% of the value of an SCCT) due to its limited availability and the notice that participants receive. TOU, in contrast, is always available; peak load reductions demonstrated by TOU participants receive full capacity value. The incremental load reduction that TOU participants provide during a PTR event is de-rated at the PTR value.

Capacity value reflects the de-rated value of the program (associated with the program's design), the load impact per participant, and the number of participants. The value of Flex 2.0 would increase with expanded availability, increased load impact per event, and more participants.

### 6.1: Benefit-Cost Estimates

PGE's DR cost effectiveness modeling includes four distinct tests and is based on PGE's 'A Proposed Cost-Effectiveness Approach for DR,' submitted to the OPUC in 2016 and based upon California protocols.<sup>6</sup>

As implementation and administration supports both programs, PTR and PTR/TOU hybrid are combined into a single benefit/cost ratio. All tests compare the net present value of costs and benefits over a 10-year horizon. A ratio greater than 1.0 indicates that the program's benefits exceed its costs.

---

<sup>5</sup> Oregon Public Utility Commission. *UM 1708 PGE's Reauthorization Application for Deferral of Expenses Associated with Two Residential Demand Response Pilots*. OPUC Docket No. UM 1708, 4 May 2018, <https://edocs.puc.state.or.us/efdocs/HAQ/um1708haq142741.pdf>

<sup>6</sup> Portland General Electric Company. "A Proposed Cost-Effectiveness Approach for DR." OPUC Docket No. UM 1708, 28 Apr. 2016, <https://edocs.puc.state.or.us/efdocs/HAD/um1708had113843.pdf>

Figure 4 Cost Effectiveness Test Details (all values 10-year NPV)

**Total Resource Cost Test**

Cost/Benefit Category	Costs	Benefit
Administrative costs	\$16,060,000	
Avoided costs of supplying electricity		\$34,050,000
Bill Reductions		
Capital costs to utility	\$3,120,000	
Environmental benefits		\$1,020,000
Incentives paid		
Revenue loss from reduced sales		
Transaction costs to participant	\$0	
Value of service lost	\$8,320,000	
	\$27,500,000	\$35,070,000

**Benefit Cost Ratio** 1.28

**Program Administrator Cost Test**

Cost/Benefit Category	Cost	Benefit
Administrative costs	\$16,060,000	
Avoided costs of supplying electricity		\$34,050,000
Bill Reductions		
Capital costs to utility	\$3,120,000	
Environmental benefits		
Incentives paid	\$26,180,000	
Revenue loss from reduced sales		
Transaction costs to participant		
Value of service lost		
	\$45,360,000	\$34,050,000

0.75

**Ratepayer Impact Measure Test**

Cost/Benefit Category	Cost	Benefit
Administrative costs	\$16,060,000	
Avoided costs of supplying electricity		\$34,050,000
Bill Reductions		
Capital costs to utility	\$3,120,000	
Environmental benefits		
Incentives paid	\$26,180,000	
Revenue loss from reduced sales	\$9,970,000	
Transaction costs to participant		
Value of service lost		
	\$55,330,000	\$34,050,000

0.62

**Participant Cost Test**

Cost/Benefit Category	Costs	Benefit
Administrative costs		
Avoided costs of supplying electricity		
Bill Reductions		\$9,970,000
Capital costs to utility		
Environmental benefits		
Incentives paid		\$26,180,000
Revenue loss from reduced sales		
Transaction costs to participant	\$0	
Value of service lost	\$8,320,000	
	\$8,320,000	\$36,150,000

4.34

The document PGE filed in 2016 proposed that the TRC Test serve as the primary measure of cost effectiveness. Flex 2.0 reports a 1.28 on this test, shown in Figure 4. The TRC is the ‘all parties’ perspective. It includes all program costs other than incentives (which are considered a transfer between the utility and the participant). Participant costs are included: transaction costs (purchases required; this does not apply to Flex 2.0) and value of service lost. Value of service lost approximates the nuisance factor the participant realizes and is calculated as a percentage of the incentive received. For Flex 2.0, the value of service lost was equated to the share of participants who reported a post-participation satisfaction rating of less than ‘satisfied.’ This was 18% for PTR and 28% for the hybrid program. When program assumptions are varied, test results vary.

## Section 7: Conclusion

An important source of future DR capacity for PGE will come from residential customers. These customers contribute to PGE’s system peak demand through weather-driven increases in demand for air conditioning in summer and demand for space heating in winter. By deploying DR programs such as Flex 2.0 to residential customers, PGE can manage its peak system loads and reduce its costs of electricity supply.



**Portland General Electric Company**

121 S.W. Salmon Street | Portland, Oregon 97204  
PortlandGeneral.com

