



A CMS Energy Company

February 1, 2017

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Re: Case No. U-18013 - In the matter, on the Commission's own motion, for Consumers Energy Company to file a report Describing Strategies for Education, Outreach, Marketing, and Customer Support of Time of Use Rates and Other Pricing Options

Dear Ms. Kale:

Attached please find the Company's "2016 Annual Report of Demand Response Programs & 2017-2021 Forecasts" as required by the Commission's November 7, 2016 Order in this docket. This is a paperless filing and is therefore being filed only in a PDF format.

Sincerely,

Digitally signed by
Robert W. Beach
Date: 2017.02.01
16:25:48 -05'00'

Robert W. Beach

cc: David Isackson, Esq.

**MPSC Case No. U-18013**

**Consumers Energy Company**

**2016 Annual Report of Demand Response Programs  
&  
2017-2021 Forecasts**

**February 1, 2017**



## Table of Contents

<b>EXECUTIVE SUMMARY</b> .....	<b>3</b>
<b>INTRODUCTION</b> .....	<b>4</b>
<b>OVERVIEW OF DEMAND RESPONSE PROGRAMS</b> .....	<b>4</b>
<b>LEGACY PROGRAMS AND PILOTS</b> .....	<b>5</b>
Residential.....	5
Commercial and Industrial .....	6
<b>EXISTING PILOTS</b> .....	<b>7</b>
Air Conditioning Peak Cycling.....	7
Critical Peak TOU.....	8
Peak Rewards TOU.....	8
Peak Power Savers ® Portfolio .....	8
<b>DISPATCH CRITERIA FOR DEMAND RESOURCES DURING 2016 PILOTS</b> .....	<b>9</b>
<b>EXISTING PROGRAMS</b> .....	<b>9</b>
Commercial and Industrial Programs .....	9
<b>MARKET PURCHASES 2016</b> .....	<b>10</b>
<b>FUTURE PROGRAM CHANGES</b> .....	<b>10</b>
<b>NEW PROGRAMS</b> .....	<b>11</b>
Commercial & Industrial.....	11
<b>REGISTRATION WITH MISO</b> .....	<b>11</b>
<b>FORECASTS</b> .....	<b>13</b>
Customer Enrollments .....	13
Financial Forecast.....	14
<b>OVERVIEW OF GDS DEMAND RESPONSE POTENTIAL STUDY</b> .....	<b>15</b>
Study Objectives.....	15
Study Approach .....	15
Summary of Results.....	16

## **EXECUTIVE SUMMARY**

Consumers Energy Company (“Consumers Energy” or the “Company”) strives to deliver energy at low costs while also ensuring reliability to its customers. Demand Response (“DR”) programs are a resource the utility can use to save our customers money by optimizing investments in electric generation and distribution systems to meet reserve margin requirements and limit the potential for purchasing high-priced energy during periods of peak demand.

As concerns about resource adequacy have risen in recent years, Consumers Energy has worked to increase and grow its DR programs. The Company will continue to take advantage of valuable economic demand response programs to balance its short term deployment and scalability with long-term supply resource planning and reliability - all to the benefit of customers (see Capacity Self-Assessment filing in Case No. U-17792 and Time of Use (“TOU”) Report in Case No. U-18013).

Consumers Energy is committed to continuously improving existing programs and developing new programs as additional learnings are realized through the implementation process. This is evidenced by changes planned for our residential demand response programs and the initiation of our commercial and industrial programs. Consumers Energy embraces demand response programs and the diversity they bring to the generation portfolio; protecting customers from price volatility and reliability issues that can arise when suppliers rely predominantly on one generating source.

## **INTRODUCTION**

The Michigan Public Service Commission (“MPSC” or the “Commission”); in its Nov. 7, 2016 order in Case No. U-18013, directed Consumers Energy to file an annual report on the demand response programs: (1) describing in detail legacy, pilot, and new DR programs by customer class, including an explanation of any program changes resulting from lessons learned in the previous year; (2) in the event that energy was purchased in the market, a description of the Company’s method for determining whether to purchase energy rather than relying on DR; and (3) a description of any other programs the Company is considering that might have potential for expanding DR resources. Additionally, forecasts for 2017-2021 enrollment, megawatts (“MW”), and financial investments for these programs are to be included.

The year 2016 was a year of program development for Consumers Energy. Over the next five years, we will continue to evaluate DR programs offered to customers and use the learnings from past and existing pilots to expand and improve both residential and commercial and industrial cost-effective DR programs.

## **OVERVIEW OF DEMAND RESPONSE PROGRAMS**

Consumers Energy offers many programs for customers to help reduce peak demand. Demand response programs benefit customers and the Company by managing loads and stresses on the electrical system when needed most and channeling wholesale generation dollars back to Michigan customers and businesses. However, these programs do more than help solve capacity needs. They also:

- Provide rewards to customers who use energy more efficiently.
- Boost Michigan’s economy.
- Help manage costs for all customers through lower power supply cost.
- Make use of otherwise idle, customer-owned backup generators.

Peak demand reduction is reached with programs targeting residential, and commercial and industrial customer classes. Demand response programs are subdivided into direct control and behavioral programs. Details specific to each of these types of programs are in the Company’s Capacity Self-Assessment report filed April 21, 2016, Case No. U-17992.

Demand response resources, which are registered with the Midcontinent Independent System Operator, Inc (“MISO”), qualify as load modifying resources (“LMRs”) if they can reduce demand with no more than 12 hours advance notice and sustain reduction for a minimum of four consecutive hours. The resources must be capable of being interrupted at least the first five times during the summer season when directed by MISO to do so for emergency purposes. The capability to reduce demand to a targeted reduction level and measurement and verification (M&V) protocol must be documented and approved by MISO. Demand response (DR) programs focus on curtailing on-peak loads or shifting use from peak periods to off-peak periods, either by controlling the load directly, such as with air conditioning (“AC”) cycling, or by motivating and incentivizing customers to take action. DR programs usually are offered for economic reasons, allowing the utility to avoid

high-priced energy during periods of peak demand and to pass these savings on to customers. Direct control programs may also be bid into MISO as a capacity resource. For the purposes of this report and exhibit, MW values associated with demand response reductions are reported at the customer level, except for the values counted by MISO for capacity planning purposes (in units of zonal resource credits, or ZRCs), which are provided in the “Demand Response Forecast” table in the forecast section of this report and in the “Total Resource Capacity Adjusted by MISO” column of Exhibit A.

Consumers Energy will continue to offer economic demand response programs to its customers. These offerings have increased since the last capacity self-assessment filing, and will continue with the deployment of advanced meter technology throughout the state. Consumers Energy will continue to capitalize on this economic and valuable resource to balance short-term deployment and scalability with long-term supply resource planning and reliability, all to the benefit of customers.

## **LEGACY PROGRAMS AND PILOTS**

### **Residential**

The Company conducted two residential pilot programs in 2010: Peak Power Savers and Personal Power Plan. During the pilots, we evaluated the potential customer response and load reduction for each treatment. Peak Power Savers was a direct control demand response AC cycling pilot including installation of a one-way switch on customers’ air conditioning units. Customers were recruited using direct mail marketing, and offered a \$25 incentive and 8.43 percent rate reduction on energy charges over 600 kilowatts per hour (“kWh”) per summer month. Approximately 2,200 residential customers in the Grand Rapids area participated in the pilot. Key learnings included:

- Achieved economically and statistically average load reductions.
- Average hourly load reductions increased with temperature and the hour of an event.
- If the Company markets the program to customers with average hourly AC loads of 1 kilowatt (“kW”) or more during hours when events might be called, the expected average load reduction would increase.

We incorporated these learnings into the program design and marketing strategy, informing the Company’s strategy for timing events to align the peak demand reductions of the event with peak system demand and targeting marketing efforts at high AC users to maximize the benefit achieved for each program enrollment.

Personal Power Plan was a behavioral demand response pilot to evaluate participants’ response to technology, new types of information and dynamic pricing structures. The pilot was conducted with more than 600 residential customers in the greater Jackson area and included providing customers with pricing information via web portal access and email notifications, technology in the form of an intelligent, communicating thermostat and dynamic pricing based on critical peak pricing information. Key learnings included:

- The most cost-effective program design was using pricing incentives for demand reduction but without an enabling technology, such as a thermostat.
- Both critical peak pricing and peak time reward approaches performed equally in peak load reduction.

We incorporated these learnings into the program design, which offers both a critical peak pricing and peak time reward option with no supporting technology.

### **Commercial and Industrial**

In 2015, the Company reinstated the Peak Load Management (“PLM”) program in a limited pilot program fashion, conducting two small pilot programs: one for small and medium commercial customers, and one for large Commercial & Industrial customers. We conducted the pilots to validate cost assumptions, technology, processes and customer receptiveness and are using the data to refine the programs prior to broader rollout. Consumers Energy has proposed expansion of the DR program in its currently pending electric rate case.

Additionally, we can encourage load-shifting behavior by virtue of rate design. For the commercial and industrial markets, we developed the Energy Intensive Primary (“EIP”) rate and received approval for its use on Dec. 2, 2015. The EIP encourages off-peak power consumption by charging a high on-peak rate for consumption from 3-5 p.m. during the summer and 5-7 p.m. the remainder of the year when market prices exceed 150 percent of the high peak energy charge for customer voltage level 1. EIP rate customers can avoid those charges by shifting load to an off-peak time.

In 2015, the Company also conducted a Commercial and Industrial Demand Response Pilot involving customers of various sizes, across multiple segments. Based on the results of this pilot, the Company will offer a response program in 2017. This demand response program provides an additional energy resource to use as a Load Modifying Resource to MISO for grid emergencies and during times of peak electricity demand to reduce supply costs that directly impact all of our customers via the Power Supply Cost Recovery (“PSCR”) factor. Each business customer is contracted for a specified (kW) load reduction with individualized demand reduction plans at their facility that will be implemented when a demand response event is called, (i.e., a time when electricity demand and cost are highest). We notify customers in advance when an event is scheduled, informing them of when they need to shed load. During the event, customers implement their established demand reduction plan. This engagement with Michigan businesses will deliver electric demand reductions that are scalable, environmentally friendly and flexible, producing a Michigan-first energy resource from businesses to help meet capacity needs.

Because business customers’ requirements vary, management and coordination will be more individualized than residential programs. Customer assigned account managers and the third-party demand response service provider will market this program using direct contacts and existing relationships. We will conduct additional marketing through various channels to priority customers who benefit from and provide an economic and predictable demand response resource. In addition to receiving a credit based on their demand and energy reduction, participating customers have real-time access to detailed electric usage information. Customers participating in the pilot found

this immediate feedback most valuable to understand operational impacts on their energy use, both during and outside scheduled demand response events.

## **EXISTING PILOTS**

### **Residential**

Building on the legacy of the residential pilots from 2010, Consumers Energy launched the AC Cycling pilot to 1,754 customers, resulting in 1.9645 MWs enrolled in 2016. The Company used a planning value of 1.12 kW per participant in the program for 2016. The 1.12 kW was established during the Smart Energy business case by using an average of the 2010 pilot savings of 1.01 kW per participant and a Stone & Webster engineering analysis of 1.25 kW per participant.

The Company also launched two TOU pilots to a small group of 37 employees, resulting in 0.0233 MWs enrolled in 2016. The Company used a planning value of 0.63 kW per participant in the program for 2016. The 0.63 kW was established during the Smart Energy business case by using a combination of the results from the 2010 pilot savings of 15% or 0.33 kW per participant and other Brattle Group evaluations of similar programs nationally that demonstrated impacts in the range of 10% - 50% per participant. The Company chose a middle ground and used results from a ComEd pilot as the source for the 23.5% or 0.63 kW per participant. The TOU pilots will begin open enrollment in 2017, providing customers with two additional pricing options that combine daily TOU rate structures with extra price incentive for customers to reduce consumption during summer hours of peak system demand.

With the addition of these options, the Company will transition its marketing approach for residential demand response from marketing individual programs to a portfolio approach, offering a portfolio of options for customers. We will call the portfolio Peak Power Savers® and offer customers the following direct control and behavioral demand response pilots detailed below:

- AC Peak Cycling (Tariff DLM; Sheet No. D-11.00-11.10)
- Critical Peak Time of Use (Tariff RDP; Sheet No. D11.10-11.20)
- Peak Rewards Time of Use (Tariff RDPR; Sheet No. D11.20-11.30)

### **Air Conditioning Peak Cycling**

Our residential direct load management (“DLM”) AC program is used to reduce load on peak demand days, decreasing the need for purchase or construction of peak generation capacity. We give participating customers bill credits from June through September. The credits are applied directly to their energy bill. The load control peak demand reduction is achieved using the Automated Metering Infrastructure (“AMI”) and ZigBee two-way communication technology. A signal from the Company’s Demand Response Management System (“DRMS”) activates and manages the timing of central air conditioning equipment cycling during a peak demand period. Load management may occur any day of the week between 7 a.m. and 8 p.m. for no more than an eight-hour period in any one day. Load management may be implemented for, but not limited to, maintaining system integrity, making an emergency purchase, economic reasons, or when there is insufficient system generation available to



meet anticipated system load. Load management may only occur outside of the hours of 7 a.m. and 8 p.m. during a declared emergency event as directed by MISO.

### **Critical Peak TOU**

With Critical Peak TOU, customers receive discounted summer prices in exchange for higher prices during the hours of critical peak events, referred to as “Energy Savings Days.” The Company may call up to eight Energy Savings Day events from June through September, excluding weekends and holidays, for the on-peak hours of 2-6 p.m. During an Energy Savings Day event, customers will be charged the critical peak price in place of the on-peak power supply charge. We will notify customers the day before an Energy Savings Day event is expected to occur. This option offers the highest potential savings for customers who reduce their on-peak and critical peak use.

### **Peak Rewards TOU**

Peak Rewards TOU allows customers to earn cash in the form of bill credits when they reduce their use during the Energy Savings Day events. The Company may call up to eight Energy Savings Day events from June through September, excluding weekends and holidays, for the on-peak hours of 2-6 p.m. During an Energy Savings Day event, we will credit customers with the critical peak rebate for incremental energy reductions. The customer’s incremental energy reduction is the difference between baseline hourly consumption and recorded hourly consumption during an Energy Savings Day event. The customer’s baseline consumption is the hourly average consumption from the prior five non-event business days. We will notify customers the day before an Energy Savings Day event is expected to occur. This offers customers a convenient way to participate in demand response with no commitment or risk because there is no penalty or higher pricing if the customer does not participate or reduce usage during the event.

### **Peak Power Savers ® Portfolio**

As a portfolio, these three residential options offer choices to help customers reduce their summer bills in a way that fits their lifestyle, the amount of savings they want to achieve, and the effort they are willing to put into achieving those savings.

This portfolio approach follows the recommendation of a strategic marketing consultant with nationwide experience in demand response as the best way to communicate the variety of options to customers clearly and effectively. This strategy offers many advantages including:

- Increasing marketing efficiency by reducing market noise and confusion.
- Ensuring customers are aware of all available options.
- Increasing conversion by enhancing cross-sell of all available options.
- Positioning for long-term success as the portfolio of offerings expands and adapts.

The portfolio will be marketed with an integrated, multi-channel approach leveraging all tactics at the Company’s disposal, including but not limited to:

- Direct mail
- Email

- Digital
- Mass-media
- Social media
- Bill inserts
- Cross-selling from energy efficiency programs and other company offerings

Messaging will focus on creating awareness of the available options to help customers lower their summer bills by using every day, simple language and educating customers to make the most of these options. Following standard Company procedure, we will regularly test the messaging with customer surveys as well as in-market testing to identify the clearest and most effective approaches. We will focus resources on the most cost-effective tactics.

To further inform marketing efforts, the Company continues to engage a variety of marketing and implementation vendor-partners in order to leverage their national experience in communicating, marketing and delivery of residential demand response programs. Additional information regarding the Company's marketing efforts is contained in the TOU Report in Case No. U-18013, the Capacity Self-Assessment filing in Case No. U-17792, and the current electric general rate case, Case No. U-17990.

## **DISPATCH CRITERIA FOR DEMAND RESOURCES DURING 2016 PILOTS**

Prior to summer 2016, the Company developed operational criteria to use in judging when to call a demand response (DR) event. Demand response resources most often are used to shift loads from periods of high prices and/or high system demand, or a combination of high prices and high loads. We determined when our 8-hour load forecast was greater than 43,000–47,000 MWh, depending on month, and LMPs were greater than or equal to \$45/MWh, we would call a DR event. The AC Peak Cycling program allows 10 events during the summer, with another five events held in case of MISO emergency. Once the 10 events occurred, no further events were called.

## **EXISTING PROGRAMS**

### **Commercial and Industrial Programs**

Consumers Energy has an active legacy interruptible rate that has 62.24 MW of load under contract (rate GPD, GI provision). This is available to any full service customer billed under the company's General Service Primary Demand Rate GPD (Sheet No. D-31 through D-36) and who is willing to contract for at least 500 kW of on-peak billing demand as interruptible capacity. The Company reserves the right to limit the amount of load contracted as interruptible, but in no case shall it exceed 50 MW. The aggregate amount of monthly on-peak billing demand that can be subscribed under this provision is limited to 250MW. The customers on this rate are obligated to reduce load by the amount specified in their contract when directed.

For billing purposes, the contracted GI capacity becomes the minimum monthly on-peak billing demand. The actual on-peak billing demand for the interruptible load supplied is credited by the amount specified under the Power Supply Charges – Interruptible Credit, which is currently \$7/kW

during the billing months of June to September and \$4/kW during the billing months of October to May. Subsequently, all firm service used during the billing period in excess of the contracted interruptible amount is billed at the appropriate firm rate. When and if MISO declares a system emergency, we would immediately notify this group of customers of their obligations under the tariff and their contract. MISO's Max Gen Event – Step 2 is when the Company issues an “enactment” message to all GI customers notifying them to interrupt their site load by their contractual interruptible amount, (See appendix for MISO Event Procedure). GI customers are given 30 minutes to 12 hours’ notice to reduce their facility load by their contracted kW amount, depending on MISO’s scheduling instructions.

## **MARKET PURCHASES 2016**

In 2016, the Company purchased 25,651,588 MWhs of on-peak energy at an average price of \$33.65/MWh. Each day, the Company bids all of its generating units into the market and purchases all of its demand from the market. During the Summer of 2016, we established load and price triggers to guide our dispatch of demand resources. The triggers were established after analyzing the prior 12 months’ loads and prices, and were set as follows: whenever during the summer season our day-ahead 8-hour load forecast exceeded 43,000-47,000 MWh (depending on month) and our day-ahead LMP forecast was at \$45/MWh or higher, an event was called. Because our Demand Response resources allow for only a limited number of events per season (10 for A/C cycling and 8 for TOU pricing), there are many days that we could have called DR events but were limited by the number of events that could be called.

## **FUTURE PROGRAM CHANGES**

### **Residential**

As part of electric rate case U-17990, the Company proposed the residential demand response rates be adjusted from “pilot” to “program” rates, consistent with broader implementation. Additionally, several changes are also proposed to each program, as detailed below. An order in this electric rate case is expected later this year.

The Company proposed to adjust the incentive structure of the AC Peak Cycling program. Currently, customers receive a \$.040147 per kWh credit on all use over 600 kWh. The proposed new incentive will adjust to a flat credit of \$7.84 per month from June through September. This change simplifies the value of the incentive to the customer, ensuring they know exactly what benefit they’ll receive and removing barriers to enrollment. It also better aligns the customer’s incentive with the value of participation to the Company which is tied to the capacity available on peak days, when it is likely that even those customers who don’t use more than 600kwh a month have their AC running.

Both TOU pricing options also have a proposed change in their rate structures, where the TOU rate structure would be extended to apply all year. Currently, TOU rates are only applied during the customer’s summer bills. The proposed change would apply a two-tier TOU rate with off-peak prices from 11 p.m. to 7 a.m. and mid-peak prices from 7 a.m.-11 p.m. during the winter bill months. This provides residential customers with year-round TOU pricing options similar to those offered to primary customers, with pricing and time periods which reflect market prices. This provides

customers with a more accurate reflection of pricing signals in the energy market and additional opportunity to save year-round by shifting electric use. Additionally, the maximum number of demand response events per year would be increased in the programs consistent with the company's methodology for determining events outlined above. Increasing the number of events will ensure customers receive the maximum benefit from the capacity reduction of these programs.

### **Legacy Interruptible Rate**

MISO's customer response requirement is 30 minutes to 12 hours advanced notice for load modifying resources. Therefore, the Company will make this change from 10 minutes to 30 minutes for the amount of time a customer would have to reduce load in our current electric rate case (U-17990). This change is needed to be consistent with MISO rules.

## **NEW PROGRAMS**

### **Commercial & Industrial**

In 2017, the Company is adding to the existing demand response portfolio by launching a program specific to Commercial & Industrial customers. As volunteer program participants, customers will sign a contract with the Company to reduce electric use to a predetermined amount when called upon. Each business customer that signs up for the program is contracted for a specific kW load reduction. Customers determine what capacity they are able to curtail when called upon and the Company works with the customers to create a demand reduction plan that can be implemented when demand response events are called. The demand response program applies only to the summer months, June through September. Participants are asked to curtail energy use no more than 10 times per season and receive compensation for the capacity they nominate as well as the reduction in energy use. Customers who participate are not financially penalized for non-compliance with a request to curtail energy use. The Company has currently signed up 38 MW of curtailable load with another 13 MW anticipated for the 2017 season. The Company is forecasting to have enrolled 150 MW by the 2019 program year.

## **REGISTRATION WITH MISO**

MISO's resource adequacy construct requires an annual registration of energy efficiency resources ("EE"), demand response resources ("DRRs"), and LMRs prior to the annual planning resource auction (PRA). Existing LMRs and EE resources are due annually on February 1, and new LMRs and EE resources for a fixed resource adequacy plan ("FRAP") are due on February 15. A second opportunity to register new LMRs occurs on March 1. Final FRAP data is due on March 9, and MISO completes final FRAP review by March 15.

For MISO Planning Year 2017-18, the Company will renew by February 1 its existing Rate GI load and its residential DLM program. Documentation required by MISO includes a copy of the approved rate sheet, a copy of any contract it may have with customers of a certain rate class (specifically Rate GI), load data to substantiate the load reduction being registered, and the measurement and verification (M&V) protocols to be used to measure performance.

The Company will register three new LMRs by February 15. First, the Company will register 50 MW from our new commercial and industrial demand response program accompanied by a copy of the customer contract describing the Company's right to order a demand reduction, and load data for each customer as a composite load shape at the time of MISO's 2016 annual peak. We expect this registration to be approved.

On February 15, the Company will also register its residential Peak Time of Use programs, Critical Peak TOU and Peak Rewards TOU with MISO, submitting the approved rate sheet, expected load reduction per customer, and number of customers. The Company can estimate how much load will drop when we enact an event with this population, but MISO generally requires DR assets to be dispatchable and/or controllable and therefore may deny this registration.

Finally, the Company will register its Energy Intensive Primary (Rate EIP) load by February 15. Rate EIP contains a high peak energy charge clause that charges 150 percent of the peak energy charge any time real-time prices exceed a calculated "economic trigger price" during two late afternoon hours, year-round. The rate sheet and contract also give the Company the right to require interruption any time MISO declares a shortage of electrical capacity, just as Rate GI does. We believe MISO will grant LMR status on the basis of the "right to interrupt for emergencies" clause, but there is some uncertainty due to the two-hour high peak energy charge clause. We expect to register 48.3 MW of Rate EIP load, the expected load at the time of MISO's annual peak. Due to the uncertainty of this resource, no expected load reductions from this resource have been included in the forecasted DR section of this report.

## FORECASTS

### Customer Enrollments

The following table shows the forecasted cumulative enrollment at year end from 2017-2021 for our residential and commercial and industrial demand response programs. The numbers for MW enrolled represent delivery at the customer level. The last section of the table provides ZRCs expected to be awarded by MISO for the planning year specified. A new GI contract was added in 2017 increasing the forecasted customer-level MWs at year end from around 62MWs to 112MWs. The forecasted plan maximizes the available demand response based on the potential studies for our Residential and Commercial and Industrial programs.

### 2017-2021 DEMAND RESPONSE ENROLLMENT FORECAST

Cumulative Enrollment at Year End (Customers)					
<b>Residential</b>					
Tariff & Sheet No.	2017	2018	2019	2020	2021
DLM; Sheet No. D - 11.00 - 11.10	26,700	61,700	96,700	131,700	178,500
RDP & RDPR; Sheet No. D - 11.10 - 11.30	28,560	87,703	145,251	201,610	228,569
<b>Commercial &amp; Industrial</b>					
Rate GDP, GI Provision	18	18	18	18	18
C&I Demand Response Program	110	225	350	350	350
Cumulative Enrollment at Year End (Customer-Level MW)					
<b>Residential</b>					
Tariff & Sheet No.	2017	2018	2019	2020	2021
DLM; Sheet No. D - 11.00 - 11.10	30	69	108	148	200
RDP & RDPR; Sheet No. D - 11.10 - 11.30	18	55	92	127	144
<b>Commercial &amp; Industrial</b>					
Rate GDP, GI Provision	112	112	112	112	112
C&I Demand Response Program	50	100	150	150	150
MISO Zonal Resource Credits (ZRCs) for Planning Year					
<b>Residential</b>					
Tariff & Sheet No.	2017	2018	2019	2020	2021
DLM; Sheet No. D - 11.00 - 11.10	12	47	89	131	177
RDP & RDPR; Sheet No. D - 11.10 - 11.30	7	32	70	107	137
<b>Commercial &amp; Industrial</b>					
Rate GDP, GI Provision	127	126	126	126	126
C&I Demand Response Program	56	113	169	169	169

## Financial Forecast

The following table shows the forecasted financial investments at year end from 2017-2021 for our residential and commercial and industrial demand response programs.

### 2017-2021 DEMAND RESPONSE FINANCIAL FORECAST

Annual O&M Budget Forecast					
Residential					
Tariff & Sheet No.	2017	2018	2019	2020	2021
DLM; Sheet No. D - 11.00 - 11.10	\$2,444,609	\$3,129,807	\$3,136,191	\$3,140,575	\$3,218,885
RDP & RDPR; Sheet No. D - 11.10 - 11.30	\$2,360,609	\$3,191,807	\$3,137,191	\$2,911,575	\$2,170,846
Commercial & Industrial					
GI Rate	\$13,819	\$13,819	\$13,819	\$13,819	\$13,819
C&I DR Program	\$2,395,000	\$3,656,000	\$3,132,000	\$3,185,000	\$3,239,000
Incentive Payments (PSCR) *	\$1,450,000	\$3,100,000	\$4,950,000	\$5,100,000	\$5,100,000
Total	\$8,664,037	\$9,991,433	\$9,355,619	\$9,250,969	\$8,642,550
Annual Capital Budget Forecast					
Residential					
Tariff & Sheet No.	2017	2018	2019	2020	2021
DLM; Sheet No. D - 11.00 - 11.10	\$5,997,173	\$8,304,570	\$8,444,444	\$8,579,760	\$11,653,200
RDP & RDPR; Sheet No. D - 11.10 - 11.30	\$ -	\$ -	\$ -	\$ -	\$ -
Commercial & Industrial					
GI Rate	\$ -	\$ -	\$ -	\$ -	\$ -
C&I DR Program	\$626,000	\$626,000	\$626,000	\$ -	\$ -
Total	\$6,623,173	\$8,930,570	\$9,070,444	\$8,579,760	\$11,653,200

\*This row assumes PSCR incentive payments will be recovered in Power Supply Costs Recovery (PSCR). The incentive payments assume \$25/MWh for a 50MW program and \$30/MWh for a 100 or 150MW program.



## **OVERVIEW OF GDS DEMAND RESPONSE POTENTIAL STUDY**

Consumers Energy commissioned GDS Associates, Inc. (“GDS”), a national consulting firm, to conduct a DR potential study for our service territory. GDS was selected because of their deep expertise with potential studies across the U.S. and their experience conducting a Statewide Energy Optimization Potential Study for the MPSC in 2013. The following is a brief summary of the study’s objectives, methodology and key findings.

### **Study Objectives**

The major objectives of the study were to forecast the amount of peak summer electric demand reduction achievable in our service area over the next 20 years as well as the estimated cost of achieving those reductions using Demand Response approaches.

Consumers Energy also asked GDS to calculate these results for two different scenarios in order to estimate the potential and comparative cost effectiveness of two different approaches for air conditioning control, one using load switches and the second using controllable smart thermostats.

GDS termed the first scenario the “Base Case Scenario” in which all cost-effective DR programs are implemented and load switches are used to control central air conditioning. The second scenario is referred to as the “Smart Thermostat Scenario” which assumed that all cost-effective DR programs will be implemented and controllable smart thermostats are used instead.

### **Study Approach**

GDS used a systematic, bottom-up approach for developing estimates of DR for both the residential and non-residential (commercial and industrial) sectors. The study provides annual estimates of DR potential and associated benefits and costs for the period 2017-2036

The DR potential results were developed using customized versions of the GDS DR potential model (GDS DR Model) and Consumers Energy cost-effectiveness criteria including the most recent avoided electric avoided cost projections. Key model inputs such as per participant demand savings, demand response program participation rates and program delivery costs were obtained from various sources including:

- 1) Information provided by Consumers Energy
- 2) Baseline studies conducted by Consumers Energy
- 3) The 2011 Michigan Commercial Baseline Study
- 4) U.S. Department of Energy, Energy Information Administration (“EIA”)
- 5) Federal Energy Regulatory Commission (“FERC”) – National DR Model, DR Survey Data and Annual DR Reports
- 6) California Public Utilities Commission filings
- 7) Other recent DR potential studies



The GDS DR model is a spreadsheet tool that allows the user to determine the achievable potential for a demand response program based on the following basic equation:

$$\begin{array}{cccccc}
 \text{Achievable} & & \text{Per} & & \text{Eligible} & & \text{Percent CP} \\
 \text{DR} & = & \text{Customer} & \times & \text{Customer} & \times & \text{Load} \\
 \text{Potential} & & \text{CP Load for} & & \text{Participation} & & \text{Reduction} \\
 & & \text{Eligible} & & \text{Rate} & & \text{Per} \\
 & & \text{Customer} & & & & \text{Participant} \\
 & & \text{Segment or} & & & & \\
 & & \text{End Use} & & & & 
 \end{array}$$

The DR model also allows the user the option of inputting an expected peak kW reduction value per participant instead of a percent savings factor.

### Summary of Results

GDS Associates produced three estimates of DR potential which are defined below. The third of these, Achievable Potential, is the closest of the three to what is realistically “achievable” and is the potential estimate provided in this result summary. Unless otherwise noted, all MW reductions shown in this report are at the customer meter.

**Technical Potential:** All technically feasible demand reductions are incorporated to provide a measure of the theoretical maximum DR potential. This assumes 100% of eligible customers will participate in all programs regardless of the cost-effectiveness.

**Economic Potential:** All DR programs included in technical potential are screened for cost-effectiveness by Comparing the programs anticipated benefits and costs, specifically by using the current Michigan benefit/cost test (the “Utility Cost Test” test). Only cost-effective DR programs are included in the economic potential. In accordance with guidance provided by Consumers, all DR program capital costs, such as the cost of load control switches, are amortized over the assumed useful life of the equipment.

**Achievable Potential:** Achievable potential is the cost-effective DR potential that can practically be attained in a real-world program delivery scenario, assuming that a certain level of market penetration can be attained. Achievable potential takes into account barriers to convincing customers to participate in cost effective DR programs. Achievable savings potential savings is a subset of economic potential.

Table 1 and Table 2 show the estimates of achievable DR potential for each cost effective DR program, Consumers Energy’s projected system peak excluding new EE and DR impacts, and the percentage of system peak load that the achievable potential represents. Table 1 shows the Demand Potential forecast under the Base Case Scenario which utilizes load switches to control air conditioning. Table 2 shows Achievable Potential forecast under the Smart Thermostat Scenario. The Base Case Scenario is forecast to provide significantly higher demand reduction.

**Table 1: Achievable Potential for Base Case Scenario**

Sector	DR Program	2021 Potential (MW)	2026 Potential (MW)	2031 Potential (MW)	2036 Potential (MW)
Residential	DLC Central AC - Switch	87	178	270	363
	DLC Pool Pumps	15	30	45	60
	Dynamic Peak Pricing	36	69	97	121
	Electric Vehicle Charging Stations Off Peak	6	9	15	22
	<b>Residential Total</b>	<b>144</b>	<b>286</b>	<b>427</b>	<b>566</b>
Non-Residential	Behavioral Program	22	36	50	65
	Interruptible Rate	274	474	480	483
	DLC Central AC - Switch	29	59	90	122
	DLC Electric Water Heaters	3	7	11	14
	Dynamic Peak Pricing	33	64	95	125
	Electric Vehicle Charging Stations Off Peak	1	1	2	2
	Irrigation - Agriculture	7	15	22	30
	<b>Non-Residential Total</b>	<b>369</b>	<b>655</b>	<b>750</b>	<b>841</b>
<b>Total All Sectors</b>		<b>513</b>	<b>941</b>	<b>1,176</b>	<b>1,407</b>
<b>System Summer Peak (MW)</b>		<b>8,396</b>	<b>8,676</b>	<b>8,907</b>	<b>9,123</b>
<b>Percent of System Peak</b>		<b>6.1%</b>	<b>10.8%</b>	<b>13.2%</b>	<b>15.4%</b>

Table 2: Achievable Potential for Smart Thermostat Scenario

Sector	DR Program	2021 Potential (MW)	2026 Potential (MW)	2031 Potential (MW)	2036 Potential (MW)
Residential	DLC Central AC - Smart Thermostats	47	116	176	237
	DLC Pool Pumps	15	30	45	60
	Dynamic Peak Pricing	36	69	97	121
	Electric Vehicle Charging Stations Off Peak	6	9	15	22
	<b>Residential Total</b>	<b>104</b>	<b>224</b>	<b>333</b>	<b>440</b>
Non-Residential	Behavioral Program	22	36	50	65
	Interruptible Rate	274	474	480	483
	DLC Electric Water Heaters	3	7	11	14
	Dynamic Peak Pricing	33	66	99	133
	Electric Vehicle Charging Stations Off Peak	1	1	2	2
	Irrigation - Agriculture	7	15	22	30
	<b>Non-Residential Total</b>	<b>340</b>	<b>598</b>	<b>664</b>	<b>727</b>
<b>Total All Sectors</b>		<b>444</b>	<b>822</b>	<b>997</b>	<b>1,167</b>
<b>System Summer Peak (MW)</b>		<b>8,396</b>	<b>8,676</b>	<b>8,907</b>	<b>9,123</b>
<b>Percent of System Peak</b>		<b>5.3%</b>	<b>9.5%</b>	<b>11.2%</b>	<b>12.8%</b>

Figure 3 illustrates the differences in peak demand reduction achieved by the two different scenarios. The Base Case Scenario using load switches is forecast to provide greater demand savings over the course of the next 20 years and that advantage increases over time.

**Figure 3: Comparison of Achievable Potential for the Two Scenarios**

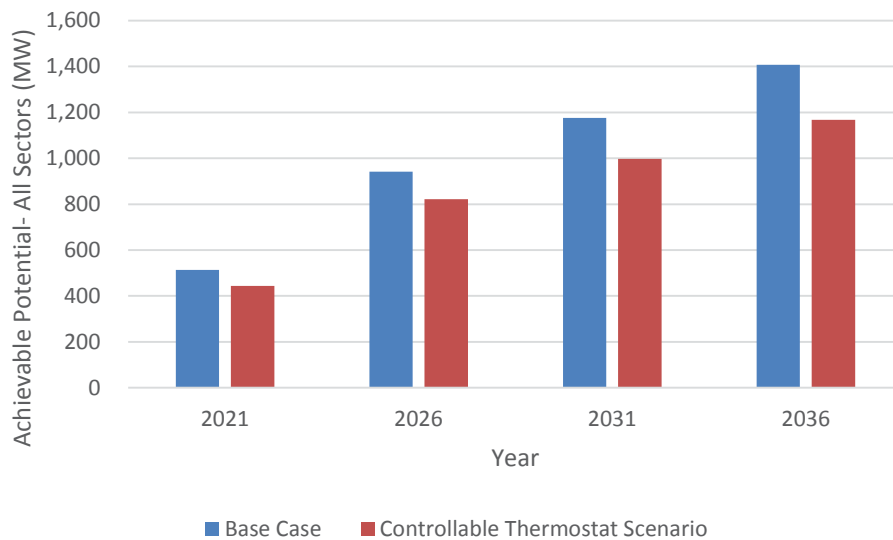


Table 4 shows the forecast of utility budgets that will be required to acquire the potential peak load reductions for each of the achievable potential scenarios. While the absolute cost of the Base Case Scenario is slightly higher, the efficiency of that investment is significantly greater as the amount of demand reduction achieved per dollar is forecast to be significantly less in the Base Case Scenario.

**Table 4: Forecast of Average Annual Program Budgets for the Achievable Potential Scenarios (in millions)**

Years	Base Case Scenario			Smart Thermostat Scenario		
	Residential	Non-Residential	Total	Residential	Non-Residential	Total
2017-2021	\$8.16	\$20.11	\$28.27	\$8.11	\$18.49	\$26.59
2022-2026	\$14.06	\$38.91	\$52.98	\$16.06	\$35.95	\$52.01
2027-2031	\$20.87	\$56.24	\$77.10	\$24.69	\$51.58	\$76.27
2032-2036	\$28.23	\$69.94	\$98.16	\$32.55	\$63.52	\$96.08

The improved efficiency of the Base Case is further illustrated in its stronger Utility Cost Test (“UCT”) ratio of 1.83 shown in Table 5 below.

**Table 5: Net Present Value (NPV) of Benefits, Utility Costs, Savings and UCT Ratio of the Two Scenarios**

Scenario	NPV Benefits	NPV Utility Costs	NPV Savings (Benefits - Costs)	UCT Ratio
Base Case	\$1,089,393,637.34	\$596,401,400.04	\$492,992,237.30	1.83
Smart Thermostat	\$933,065,932.54	\$585,101,151.97	\$347,964,780.57	1.59

## **CONCLUSION**

The Company is committed to delivering customer value while meeting or exceeding regulatory expectations and providing results to shareholders. DR programs are an opportunity for customers to save costs on energy by replacing utility-owned generation resources which affects utility revenue resources. The DR programs are a cost-effective and reliable resource that will continue to grow as part of the continuous improvement process that drives toward optimized results. We are committed to investing in DR programs when they are more cost-effective than investing in new resources. The 2016 energy law gives the MPSC new tools that allow it to find win-win incentives for utility investors and customers to create a level playing field for investors between supply side and demand side investments.

## APPENDIX A-1: MISO Emergency Operating Procedures

### Conditions of Interruption

Under the GI Provision, the customer can be interrupted at any time, on-peak or off-peak, the Company deems it necessary to maintain system integrity. The Company follows the "General Guide to MISO's Emergency Operations Messaging" (see table below) in providing its GI customers notifications on "alerts" and "enactments." While there are multiple steps in the MISO Emergency Operations process, Consumers Energy provides its GI customers with the following three levels of notification based upon the corresponding MISO Emergency Operations step:

- 1) **MISO Max Gen Alert** – the Company issues an "alert" message (phone and text) to all GI customers for awareness only; no action is necessary on the customer's part at this time.
- 2) **MISO Max Gen Event – Step 2** – the Company issues an "enactment" message (phone and text) to all GI customers notifying them to interrupt their site load by their contractual interruptible amount.
- 3) **MISO High Load Period Has Ended** – the Company issues an "all clear" message (phone and text) to all GI customers to notify them they can resume normal production and/or building load levels.

### General Guide to MISO's Emergency Operations Messaging

MISO's Emergency Operations messages define the area(s) involved, duration, and projections of system conditions. The table below is a summary, and does not replace or redefine MISO's Emergency Operations messages.

Message	Communication Intent	Potential Member/MISO Actions
<b>Conservative Operations Declaration</b>	<b>Alert for Situational Awareness:</b> Reliability issue possible for defined area.	<ul style="list-style-type: none"> <li>• Potentially suspend transmission maintenance</li> <li>• Review outage plans for deferral, cancellation</li> </ul>
<b>Hot Weather, Cold Weather or Severe Weather Alert</b>	<b>Alert for Situational Awareness:</b> MISO could be approaching tight supply conditions.	<ul style="list-style-type: none"> <li>• Review outage plans for deferral, cancellation</li> </ul>
<b>Min Gen Alert</b>	<b>Alert for Situational Awareness:</b> MISO is forecasting a potential supply surplus.	<ul style="list-style-type: none"> <li>• Prepare for de-commitment (taking generation off line), reduction in purchases or other actions</li> </ul>
<b>Max Gen Alert</b>	<b>Alert for Situational Awareness:</b> MISO is forecasting a potential capacity shortage.	<ul style="list-style-type: none"> <li>• Declare Conservative System Operations</li> <li>• Prepare for possible Max Gen Event</li> </ul>
<b>Max Gen Warning</b>	<b>Warning to Prepare for Possible Event</b>	<ul style="list-style-type: none"> <li>• Curtail non-firm exports</li> <li>• Schedule all available external resources into the MISO Market</li> </ul>
<b>Max Gen Event (Step 1)</b>	<b>Actions Taken to Preserve Operating Reserves:</b> NERC Emergency Alert 1	<ul style="list-style-type: none"> <li>• All available resources in use</li> <li>• Generators instructed to start off-line resources.</li> <li>• Use of reserves not yet implemented.</li> </ul>
<b>Max Gen Event (Steps 2, 3, 4)</b>	<b>Actions Taken to Preserve Firm Load:</b> NERC Emergency Alert 2 (Step 3 declaration)	<ul style="list-style-type: none"> <li>• Implement demand management programs</li> <li>• Utilize Contingency Reserves</li> <li>• Purchase Emergency Energy</li> <li>• Issue Public Appeals</li> <li>• Prepare for possible firm load shed</li> </ul>
<b>Max Gen Event (Step 5)</b>	<b>Event Occurring:</b> NERC Energy Emergency Alert 3	<ul style="list-style-type: none"> <li>• Shed firm load</li> <li>• Rolling brownouts or blackouts for defined area</li> </ul>

# Exhibit A



EXHIBIT A

2016 ANNUAL DEMAND RESPONSE REPORT

Tariff & Sheet No.	Total Demand Reduction Available (MW) <sup>1</sup>	Maximum Demand Reduction Achieved (kW) <sup>2</sup>	Total Resource Capacity Reported to MISO <sup>3</sup> (MW)	Total Resource Capacity Adjusted by MISO (ZRC) <sup>7</sup>	Total Energy Reduction Achieved (MWh) <sup>4</sup>	Total Spending on Marketing & Administration (\$)	Total Capital Expense (\$) (excluding AMI)	Average Customer Response (%) <sup>5</sup>	Notes
<b>RESIDENTIAL INTERRUPTIBLE AND PRICE RESPONSE</b>									
DLM; Sheet No. D - 11.00 - 11.10	1.16	1.89 kW - (39%)	0	0		\$ 624,208	\$ 1,200,429		(2) 7/26/16 event - 1 customer
RDP & RDPR; Sheet No. D - 11.10 - 11.30	0.02	0.70 kW per customer (57% reduction)	0	0		\$ 353,130	\$ -		(2) 7/26/16 event
<b>COMMERCIAL AND INDUSTRIAL INTERRUPTIBLE AND PRICE RESPONSE</b>									
Rate GDP, GI Provision; Sheet No. D-34.10 - 35.00	62.24MW <sup>6</sup>	0	61.5 MW	68.4	0	\$13,819.41	0	N/A	LMR - MISO Emergencies Only There were (2) GI Alerts issued and (0) GI Enactments issued during 2016.

	On-Peak Energy Purchased (MWh)	Average On-Peak Energy Purchase Price (\$/MWh)
Annual Total	25,651,588	\$33.65

<sup>1</sup> Report total demand response (i.e., potential demand reduction), in MW, available at the end of the year for each tariff. Calculated with a 1.12 conversion factor.

<sup>2</sup> Report the maximum amount of demand reduction achieved during a single event in the reported year. If this is an estimate, indicate how the estimate was calculated.

<sup>3</sup> Report the capacity amount associated with the DR program that was reported to MISO as a capacity resource (if it was reported as a resource). Also indicate the MISO category (LMR, DRR, other (specify))

<sup>4</sup> Report the total energy reduction achieved, on a cumulative basis, for each DR program during the reported year.

<sup>5</sup> Report the annual customer responsiveness (i.e., number of customers who responded) as a percentage of customers called for each program for the reporting year. If this is an estimate, indicate how the estimate was calculated.

<sup>6</sup> The total demand reduction available includes a contract added in 2016 but was not available by the required deadline to report to MISO as a capacity resource. The additional contract is to be reported for the year 2017.

<sup>7</sup> Total resource capacity adjusted by MISO. Calculated for the Rate GDP, GI provision as 61.5\*(1+3.3%)\*(1+7.6%). MISO factors used are 3.3% for transmission loss adjustment and 7.6% for the UCAP planning reserve margin.