# Residential Rate Design Strategy Study

## Kansas City Power & Light and
## KCP&L Greater Missouri Operations Company

**Residential Rate Design Strategy Study**
**Project No. 97119**

**Final Report**
**12/13/2017**

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**prepared for**

**Kansas City Power & Light and**
**KCP&L Greater Missouri Operations Company**
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**Kansas City, Missouri**

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**Final Report**
**12/13/2017**

**prepared by**

**Burns & McDonnell Engineering Company, Inc.**
**Kansas City, Missouri**

# TABLE OF CONTENTS

**Page No.**

**1.0 EXECUTIVE SUMMARY ... 1-1**
1.1 Introduction ... 1-1
1.2 Study Approach ... 1-1
1.3 KCP&L Rate Design Goals ... 1-1
1.4 KCP&L Stakeholder Input ... 1-2
1.5 Qualitative Evaluation of Rate Design Options ... 1-3
1.6 Conceptual Rate Designs and Rate Transition Plan ... 1-5
1.7 Rate Design Development ... 1-6

**2.0 RATE DESIGN GOALS ... 2-1**
2.1 Rate Design Goals ... 2-1
2.2 Provide Revenue Sufficiency and Stability ... 2-1
2.3 Utilize Cost of Service Based Rate Designs ... 2-2
2.3.1 Support Cost Effective Electric Space Heating and Other Non-Summer Use ... 2-2
2.3.2 Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use ... 2-3
2.3.3 Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions ... 2-3
2.4 Deploy Economically Efficient Rate Designs ... 2-4
2.4.1 Promote Peak Load Reduction and Shifting ... 2-4
2.4.2 Support Efficient Usage of Energy ... 2-5
2.5 Provide Rate and Bill Simplicity ... 2-6
2.5.1 Promote Gradualism ... 2-7

**3.0 RATE DESIGN INTERNAL STAKEHOLDER INPUT ... 3-1**
3.1 Regulatory Affairs – Missouri ... 3-1
3.2 Regulatory Affairs – Kansas ... 3-1
3.3 Energy Resource Management and Energy Solutions ... 3-2
3.3.1 Electric Space Heating ... 3-3
3.3.2 Electric Vehicles ... 3-4
3.3.3 Distributed Generation ... 3-5
3.4 Customer Service and Market Insights ... 3-6
3.5 Measurement Technology and Meter Data Management ... 3-6
3.6 Information Technology and Billing Capabilities ... 3-8
3.7 Input Regarding Rate Designs ... 3-8
3.7.1 Seasonal Rates ... 3-8
3.7.2 Declining Block Rates ... 3-9
3.7.3 Inclining Block Rates ... 3-9
3.7.4 Residential Rate Choices Options ... 3-10
3.7.5 Time of Use and Dynamic Rate Options ... 3-11

3.7.6 Demand Rates and Multi-Part Rates .................................................. 3-12
3.8 Internal Stakeholder Input Summary ................................................. 3-13

**4.0 QUALITATIVE EVALUATION OF RATE DESIGN OPTIONS .......................... 4-1**
4.1 Summary .................................................................................... 4-1
4.2 Flat Energy Rates ......................................................................... 4-2
4.3 Declining Block Energy Rates ........................................................ 4-4
4.4 Inclining Block Energy Rate ........................................................... 4-6
4.5 Demand Rates .............................................................................. 4-9
4.6 TOU Energy Rate ........................................................................ 4-12
4.7 TOU Energy and Demand Rate .................................................... 4-15
4.8 Dynamic Pricing .......................................................................... 4-17
4.9 Rate Design Qualitative Evaluation Summary ................................. 4-20

**5.0 RATE DESIGN DEVELOPMENT ......................................................... 5-1**
5.1 Conceptual Rate Designs and Rate Transition Plan ........................... 5-1
5.2 Residential Service Rate Designs and Planned Transitions ................. 5-2
5.2.1 General Use Rate ..................................................................... 5-2
5.2.2 Electric Space Heating Rate ....................................................... 5-3
5.2.3 Demand Rate ............................................................................ 5-3
5.2.4 TOU Energy Rate ..................................................................... 5-3
5.2.5 TOU Energy and Demand Rate ................................................... 5-4
5.3 Existing and Optional Rate Designs ................................................. 5-4
5.4 Bill Impacts and Self Selection Analysis .......................................... 5-6
5.5 Demand Reduction and Revenue Attrition Analysis ......................... 5-10
5.6 Peak Demand Reduction and Demand Cost Savings Analysis ............ 5-13
5.7 Customer Bill Analysis ................................................................ 5-14

## LIST OF TABLES

**Page No.**

Table 1-1: Qualitative Summary of Rate Design Options ........ 1-4
Table 1-2: KCP&L Residential Rate Transition Plan ........ 1-6
Table 1-3: KCP&L GMO - Optional Residential Rates ........ 1-7
Table 1-4: KCP&L Missouri - Optional Residential Rates ........ 1-7
Table 1-5: KCP&L Kansas - Optional Residential Rates ........ 1-8
Table 4-1: Rate Design Qualitative Summary ........ 4-21
Table 5-1: KCP&L Residential Rate Transition Plan ........ 5-2
Table 5-2: GMO - Optional Residential Rate Designs ........ 5-5
Table 5-3: KCP&L Missouri - Optional Residential Rate Designs ........ 5-5
Table 5-4: KCP&L Kansas - Optional Residential Rate Designs ........ 5-6
Table 5-5: GMO Monthly Bill Change from Potential Rate Switching ........ 5-9
Table 5-6: KCP&L-MO Monthly Bill Change from Potential Rate Switching ........ 5-9
Table 5-7: KCP&L-KS Monthly Bill Change from Potential Rate Switching ........ 5-10
Table 5-8: GMO Residential Self Selection and Demand Response Revenue Loss ........ 5-12
Table 5-9: KCP&L – MO Residential Self Selection and Demand Response Revenue Loss ........ 5-12
Table 5-10: KCP&L – KS Residential Self Selection and Demand Response Revenue Loss ........ 5-13
Table 5-11: GMO Typical Bill Analysis ........ 5-15
Table 5-12: KCP&L – MO Typical Bill Analysis ........ 5-16
Table 5-13: KCP&L – KS Typical Bill Analysis ........ 5-17

## LIST OF FIGURES

**Page No.**

Figure 5-1: GMO General Use Monthly Bill Change from Potential Rate Switching..........................5-7
Figure 5-2: GMO Electric Space Heating Monthly Bill Change from Potential Rate Switching..........................5-8

# LIST OF ABBREVIATIONS

| Abbreviation | Term/Phrase/Name |
|---|---|
| AMI | Advanced Metering Infrastructure |
| BMcD | Burns & McDonnell Engineering Company, Inc |
| CIS | Computer Information Systems |
| CPP | Critical Peak Pricing |
| DG | Distributed Generation |
| DR | Demand Response |
| DSM | Demand-Side Management |
| ECA | Energy Cost Adjustment |
| EV | Electric Vehicle |
| GMO | Greater Missouri Operations |
| GU | General Use |
| IT | Information Technology |
| KCC | Kansas Corporation Commission |
| KCP&L | Kansas City Power & Light |
| KEEIA | Kansas Energy Efficiency Investment Act |
| MDM | Meter Data Management |
| MEEIA | Missouri Energy Efficiency Investment Act |
| MPSC | Missouri Public Service Commission |
| OG&E | Oklahoma Gas & Electric |
| PTR | Peak Time Rebates |
| RTP | Real Time Pricing |
| SH | Space Heating |
| SPP | Southwest Power Pool |
| Study | Residential Rate Design Strategy Study |
| TOU | Time-of-Use |
| VPP | Variable Peak Pricing |

# 1.0 EXECUTIVE SUMMARY

## 1.1 Introduction

This report documents the findings and analyses of the Residential Rate Design Strategy Study (Study) prepared by Burns & McDonnell (BMcD) for Kansas City Power & Light and KCP&L Greater Missouri Operations (GMO). The purpose of the study is to prepare a general long term plan for implementing Residential rate designs that align with the utility's internal goals and objectives, reflect sound rate making principles, and align with future end use measures. The Study may serve as an input to future rate designs contemplated by Kansas City Power & Light (KCP&L-Kansas or KCP&L-Missouri) and GMO and will allow KCP&L (the collective companies of KCP&L and GMO) to comply with terms of settlements and orders from previous rates cases.

## 1.2 Study Approach

The Study consists of collecting information and conducting qualitative and quantitative analyses of KCP&L's existing and optional new rates to develop new optional Residential rate designs for each of KCP&L's jurisdictions. The contents of this report include the following.

- **Section 2.0 Rate Design Goals –** Provides a summary of input provided on each of KCP&L's short-term and long-term rate design goals collected during the research and internal stakeholder interview process.
- **Section 3.0 KCP&L Internal Stakeholder Input** – Provides a summary of other relevant regulatory requirements in Missouri and Kansas, KCP&L's business goals and objectives, and general internal stakeholder input on rate designs.
- **Section 4.0 Qualitative Evaluation of Rate Design Options** – Provides a qualitative analysis of various rate design options specific to KCP&L and rate recommendations for further investigation.
- **Section 5.0 Rate Design Development and Analysis** – Provides a long term Residential rate transition plan, optional rate designs for each jurisdiction, and estimated bill and revenue impacts from optional rates.

## 1.3 KCP&L Rate Design Goals

During the internal stakeholder interview process, BMcD solicited input on the key rate design principles listed below which align with utility industry best practices and Bonbright's Rate Design Principles[1]. Where appropriate, additional insight was collected on specific new industry issues such as electric space

[1] James C. Bonbright, Principles of Public Utility Rates (New York, Columbia University Press, 1951)

heating, electric vehicles (EV), distributed generation (DG), peak load reduction and shifting, and energy efficiency. KCP&L desires that any new rates align with the following rate design goals listed below.

- Provide Revenue Sufficiency and Stability
- Utilize Cost of Service Based Rate Designs
- Deploy Economically Efficient Rate Designs
- Promote Peak Load Reduction and Load Shifting
- Support Efficient Use of Energy
- Provide Customer Value and Satisfaction
- Promote Rate and Bill Simplicity

In addition, KCP&L provided BMcD with previously prepared documents[2] regarding its internal rate design positions and strategic goals on Residential rate designs in Kansas and Missouri.

## 1.4 KCP&L Stakeholder Input

BMcD met with internal KCP&L stakeholders that included individuals in Regulatory Affairs, Energy Resource Management, Energy Solutions, Customer Service, Market Insights, Information Technology (IT), Measurement Technologies and Revenue Management. There are several overarching themes that resulted from the internal stakeholder interviews that were generally consistent across all groups. These include:

- **Electric Space Heating** – KCP&L would like to work towards implementing a rate structure that recognizes the value of electric space heating load and other non-summer loads without having a specific end-use rate.
- **Electric Vehicles** – KCP&L would like to implement a rate that can be used by and marketed to EV owners to shift EV load off-peak in a cost-efficient manner.
- **Distributed Generation –** KCP&L would like to address the growth of DG and better mitigate existing cross subsidization and cost shifting through modifications to its existing rate design.
- **Customer Insights** – KCP&L customer surveys[3] indicate that customers desire rate options including Time of Use (TOU) rates, or other rates which customers can actively use to save or promote their energy choices.

[2] EPRI/KCP&L Project – Matching Service Plan Goals to KCP&L Strategic Goals 2013
[3] KCP&L Customer Advisory Panel Surveys, September 2015, May 2016, and October 2016

- **Metering & Billing** – KCP&L would like to utilize the additional functionality of its Advanced Metering Infrastructure (AMI), Meter Data Management (MDM), and billing systems currently being designed and implemented to develop new rates. These systems, expected to be predominantly implemented in 2018, will better enable deployment of demand rates and TOU rates for KCP&L/GMO residential customers.
- **Existing Rate Structure** – Several elements of the current rate design are working well today. Seasonal rates, declining block rates, and customer charge levels in their current form should continue until a new rate structure can be offered that aligns with the rate design goals outlined above. Existing Inclining Block Rates (IBR) in Missouri should be replaced with TOU rates or other more appropriate designs as soon as it is practical.
- **TOU and Dynamic Rates** – A simple TOU rate that can be used to promote efficient energy use, including EV adoption, is desired in the near term. Other dynamic rate options like real time pricing or critical peak pricing can be more complex to implement and market to customers and are not strongly supported within KCP&L at this time for those reasons.
- **Demand Rates and Multi-Part Rates** – The majority of internal stakeholders agree that the Residential classes should move to a rate structure that includes a demand charge and provides TOU optionality within the energy charge in the future.

## 1.5 Qualitative Evaluation of Rate Design Options

The following table summarizes the qualitative evaluation rankings of each of the rate options considered, the ratings, explored more fully in Section 4 of this Study, are based on sound rate design principles and KCP&L goals.

### Table 1-1: Qualitative Summary of Rate Design Options

| KCP&L Rate Design Goals | Flat Energy Rate | Declining Block Rate | Inclining Block Rate | Demand Rate | TOU - Energy Rates | TOU - Energy + Demand Rates | Dynamic Rates VPP / CPP / PTR | Real Time Pricing |
|---|---|---|---|---|---|---|---|---|
| Provide Revenue Stability and Sufficiency | NEUTRAL | POSITIVE | NEGATIVE | POSITIVE | NEUTRAL | POSITIVE | NEUTRAL | NEUTRAL |
| Promote Economic Efficiency in Rate Design | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE |
| Promote Peak Load Reduction and Load Shifting | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE |
| Support Efficient Use of Energy | NEUTRAL | NEGATIVE | NEUTRAL | POSITIVE | NEUTRAL | POSITIVE | NEUTRAL | NEUTRAL |
| Provide Customer Value & Satisfaction | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE |
| Provide Rate & Bill Simplicity | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | NEGATIVE | NEGATIVE |

| KCP&L Other Goals | Flat Energy Rate | Declining Block Rate | Inclining Block Rate | Demand Rate | TOU - Energy Rates | TOU - Energy + Demand Rates | Dynamic Rates VPP / CPP / PTR | Real Time Pricing |
|---|---|---|---|---|---|---|---|---|
| Support Cost Effective Electric Space Heating and Other Non-Summer Use | NEGATIVE | POSITIVE | NEUTRAL | POSITIVE | NEUTRAL | POSITIVE | NEUTRAL | NEUTRAL |
| Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | POSITIVE | POSITIVE | NEUTRAL | NEUTRAL |
| Support Equitable Cost Recovery From Distributed Generation and Other Low Use | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | NEGATIVE | POSITIVE | NEGATIVE | NEGATIVE |
| Metering and Billing Capablility | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | NEGATIVE | NEGATIVE |
| Recommended | Limited | Limited | No | Yes | Yes | Yes | No | No |

As depicted in Table 1-1, BMcD recommends that KCP&L should pursue the recommended rate design options and make changes to existing rates as described in the following.

- **Flat Energy Charges** – Work toward gradually limiting availability of the existing flat energy rate for Residential customers and move toward rates that reflect the utility's cost and provide an efficient rate design. Use of flat energy rate designs should be limited to low load Residential customers.
- **Declining Block Rates** – Work toward gradually limiting the availability of winter declining block rate (DBR) structures for existing and future Residential customers and move towards rates that reflect the utility's cost structure, which include both demand rates and TOU rates.
- **Inclining Block Rates** – Work toward transitioning the IBR structure that is in place for Residential customers to plans that better align with sound rate design principles. As with the flat and declining blocks, KCP&L should move toward rates that better reflect the utility's cost structure, which include both demand rates and TOU rates.
- **Demand and Energy Rates** – Implement an optional demand rate for Residential customers. Particularly for Kansas customers, where consistent with the Kansas Corporation Commission (KCC) order concerning DG rate design in Docket 16-GIME-403-GIV, under which the demand rate option is acknowledged as an acceptable default rate for future Kansas DG customers. To ensure more proper recovery of costs and improve the equity of rate designs, Residential customers in both Kansas and Missouri should be transitioned to a demand rate structure over time. Residential demand charges

could be designed to include various costs. For complete recovery of proper costs, demand charges should be set to recover both production and distribution fixed costs to the extent practical.

- **TOU Energy Rates** – Implement a TOU energy rate to provide time based pricing that would be priced to encourage off-peak use, a rate design that would support EV adoption and other beneficial forms of off-peak electric energy usage throughout the year, the season, and the day.
- **TOU Energy + Demand Rates** – Implement TOU energy plus demand rates to support beneficial off-peak and non-summer energy use including electric space heating and EV charging. A TOU energy plus demand rate option should be optional for future Kansas DG customers who desire TOU.
- **Dynamic Pricing Rates** – BMcD does not recommend that KCP&L implement other dynamic rates, such as variable peak pricing (VPP), critical peak pricing (CPP), and peak time rebates (PTR) at this time. Dynamic rates could be justified later when greater levels of peak demand avoidance are needed and billing systems are able to meter and bill these more complex rates.
- **Real-Time Pricing** – BMcD does not recommend that KCP&L implement real time pricing (RTP) for residential customers at this time. The realizable benefits that are achieved from a RTP rate are not significant for the Residential class or in Southwest Power Pool (SPP) at this time. However, this could change in the future.

## 1.6 Conceptual Rate Designs and Rate Transition Plan

KCP&L intends to offer rates that support its long-term rate design and business objectives. Future rates may reflect changes from existing rates, and where practical, should be offered as optional rates initially, while existing rates that are not consistent with the utility's long term rate design strategy should be phased out gradually. This makes way for new rates to be marketed and implemented for existing and future customers. This may include freezing and then eliminating rates and limiting rates availability. The timing of new rate implementations in each jurisdiction will vary based on KCP&L's meter deployment, regulatory filings, IT capabilities, and other external considerations such as statutory limitations around net metering in Missouri. These conceptual rate designs and transition plans represent recommendations from a point in time and utilizing a certain set of assumptions and may need to be adjusted based upon learnings from the initial pilots. Additionally, conditions and assumptions may change in the future and will serve as only <u>one input</u> into the many considerations that must be evaluated in the design of new rates for each of KCP&L's three utility jurisdictions. Within KCP&L-Kansas, KCP&L-Missouri, and GMO there are specific regulatory issues, customer characteristics, and rate design challenges that will need to be addressed before a final proposal may be offered as part of general rate proceeding.

The basic components of the long term KCP&L Residential rate transition plan derived from interviews of KCP&L internal stakeholders and working groups is provided in the following table.

**Table 1-2: KCP&L Residential Rate Transition Plan**

| Rate Option | Current | Step 1 | Step 2 *Pending Pilot Results* | Step 3 *Pending Pilot Results* | Notes |
|---|---|---|---|---|---|
| General Use Rate | Available | Available | Available and Cap | Available and Cap | Step 2 - Optional for all customers under a threshold.<br>Step 2 - Cap rate to users under a threshold (<30,000 kWh/year, 25 kW cap).*<br>Sept 3 - Reduce cap to smaller usage customers (<9,000 kWh/year, 7.5 kW cap). |
| Electric Space Heating Rate | Available | Available | Freeze | Unavailable | Step 2 - Freeze SH rate short term.<br>Step 2 - Give all customers option for Demand Rate.<br>Step 3 - Eliminate SH class long term. |
| Optional Demand Rate<br>(Optimal Rate for Space Heating) | Unavailable | Available (Pilot) | Available | Available | Step 1 - Optional for a limited number of customers.<br>Step 2 - Optional for all customers.<br>Step 2 - Demand Rate offered to new SH customers (revenue neutral).<br>Step 3 - Move all existing SH customers to this rate long term. |
| Optional TOU Energy Rate<br>(Optimal Rate for Electric Vehicle) | Unavailable | Available (Pilot) | Available | Available | Step 1 - Optional for a limited number of customers.<br>Step 2 - TOU Energy marketed to EV customers.<br>Step 2 - Cap rate to users under a threshold (<30,000 kWh/year, 25 kW cap).<br>Step 3 - Reduce cap to smaller usage customers (<9,000 kWh/year, 7.5 kW cap). |
| Optional TOU Energy and Demand Rate<br>(Optimal Rate for Space Heating and Electric | Unavailable | Available (Pilot) | Available | Available | Step 1 - Optional for a limited amount of customers.<br>Step 2 - Optional for all customers.<br>Step 2 - TOU Energy and Demand Rate marketed to EV + SH customers.<br>Step 3 - Offer as the default TOU rate for all new customers. |

[1] All existing and future rates will have seasonality.
[2] Steps 1, 2, and 3 will depend on regulatory support and technical capabilities in each jurisdiction.
[3] Step 1 (Pilot Study) results will validate and refine future steps in each utility jurisdiction.
[4] New demand + energy rate plan is revenue neutral to electric space heating customers and general use customers.
[5] These caps were selected as a reasonable initial design as they are similar to those used within the GMO SGS class to distinguish the transition between non-demand and demand rates. The 25kW limit also has relevance within the distribution network where the 25kW size is perceived to match the common size for distribution transformation for these customers. The additional terms (9,000 kWh and 7.5kW) were established to support further reduction of the limits and were derived from a review of load factors for Residential customers.

## 1.7 Rate Design Development

Optional Residential rates for each jurisdiction were designed based on the general principles documented in this report. Rates were designed and tested with calendar year 2015 load research data sets with the goal of generating revenue neutral rates for both General Use (GU) and Electric Space Heating (SH) customers. Not all the rates generate revenue neutral bills for each customer load profile and type. Modifications were made where appropriate to limit the potential increase or decrease to both the GU and SH customers. For consistency between rates, certain provisions such as consistent customer charges were applied across rate plans. All new optional rates were designed to maintain seasonality in the rate structure and remove declining block structures in the winter months. The optional rates would initially be offered to a limited number of customers through a pilot program, analysis would then be performed to determine program performance and possibly revise program and subsequent rate design offerings, before allowing all customers to participate. The existing and optional new rates for KCP&L GMO, KCP&L-Missouri, and KCP&L-Kansas are presented in the tables that follow.

## Table 1-3: KCP&L GMO - Optional Residential Rates

| Existing | | Existing | | New | | New | | New | |
|---|---|---|---|---|---|---|---|---|---|
| General use Rate | | Space Heating Rate | | Optional Demand Rate | | Optional TOU Energy Rate | | Optional TOU Energy + Demand Rate | |
| | Price | | Price | | Price | | Price | | Price |
| Customer Charge ($/mo) | $10.43 | Customer Charge ($/mo) | $10.43 | Customer Charge ($/mo) | $10.43 | Customer Charge ($/mo) | $10.43 | Customer Charge ($/mo) | $10.43 |
| | | | | | | | | | |
| Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | |
| Summer | $0.121 | Summer | $0.121 | Summer | $0.037 | Summer Peak | $0.302 | Summer Peak | $0.101 |
| | | | | | | Summer Off Peak | $0.107 | Summer Off Peak | $0.031 |
| | | | | | | Summer Super Off Peak | $0.046 | Summer Super Off Peak | $0.017 |
| Winter, up to 600 | $0.106 | Winter, up to 600 | $0.106 | Winter | $0.034 | Winter Peak | $0.211 | Winter Peak | $0.100 |
| Winter 601 - 1000 | $0.078 | Winter 601 - 1000 | $0.060 | | | Winter Off Peak | $0.090 | Winter Off Peak | $0.025 |
| Winter, 1001 + | $0.078 | Winter, 1001 + | $0.050 | | | Winter Super Off Peak | $0.033 | Winter Super Off Peak | $0.019 |
| Tier 1 Max kWh | 600 | Tier 1 Max kWh | 600 | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A |
| Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A |
| | | | | | | | | | |
| Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | $15.25 | Summer Demand | N/A | Summer Demand | $15.25 |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | $7.75 | Winter Demand | N/A | Winter Demand | $7.75 |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | On Peak | Summer Demand | N/A | Summer Demand | On Peak |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | On Peak | Winter Demand | N/A | Winter Demand | On Peak |
| Current Default General Use Rate<br>Small Use Customers | | Current Default Space Heat Rate<br>Frozen Space Heat Rate | | Optimal Space Heat Rate<br>Default for High Use Customers<br>Revenue neutral to GU and SH classes | | Optimal EV Rate<br>Available for all customers<br>Revenue neutral for GU class | | Optimal Space Heat + EV Rate<br>Default for High Use Customers<br>Revenue neutral for GU and SH classes | |

1. For this analysis, summer months are assumed from June 1 to September 30 for optional rates.
2. TOU Peak from 4 - 8 pm. Off Peak from 6 am to 4 pm and 8 pm to 12 am. Super Off Peak from 12 am to 6 am.
3. Max monthly on-peak demand is billed based on 15 min maximum measured demand from 4 - 8 pm.
4. Existing rates are based on Residential rates effective February 22, 2017.
5. New optional rates are set to recover the same revenues as the existing GU and SH rates.

## Table 1-4: KCP&L Missouri - Optional Residential Rates

| Existing | | Existing | | New | | New | | New | |
|---|---|---|---|---|---|---|---|---|---|
| General use Rate | | Space Heating Rate | | Optional Demand Rate | | Optional TOU Energy Rate | | Optional TOU Energy + Demand Rate | |
| | Price | | Price | | Price | | Price | | Price |
| Customer Charge ($/mo) | $12.62 | Customer Charge ($/mo) | $12.62 | Customer Charge ($/mo) | $12.62 | Customer Charge ($/mo) | $12.62 | Customer Charge ($/mo) | $12.62 |
| | | | | | | | | | |
| Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | |
| Summer, up to 600 | $0.129 | Summer, up to 600 | $0.138 | Summer | $0.031 | Summer Peak | $0.316 | Summer Peak | $0.062 |
| Summer, 601 - 1000 | $0.149 | Summer, 601 - 1000 | $0.138 | | | Summer Off Peak | $0.122 | Summer Off Peak | $0.028 |
| Summer, 1001 + | $0.149 | Summer, 1001 + | $0.138 | | | Summer Super Off Peak | $0.058 | Summer Super Off Peak | $0.016 |
| Winter, up to 600 | $0.122 | Winter, up to 600 | $0.097 | Winter | $0.026 | Winter Peak | $0.210 | Winter Peak | $0.041 |
| Winter 601 - 1000 | $0.074 | Winter, 601 - 1000 | $0.097 | | | Winter Off Peak | $0.109 | Winter Off Peak | $0.023 |
| Winter, 1001 + | $0.066 | Winter, 1001 + | $0.061 | | | Winter Super Off Peak | $0.044 | Winter Super Off Peak | $0.017 |
| Tier 1 Max kWh | 600 | Tier 1 Max kWh | 600 | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A |
| Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A |
| | | | | | | | | | |
| Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | $17.26 | Summer Demand | N/A | Summer Demand | $17.26 |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | $10.58 | Winter Demand | N/A | Winter Demand | $10.58 |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | On Peak | Summer Demand | N/A | Summer Demand | On Peak |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | On Peak | Winter Demand | N/A | Winter Demand | On Peak |
| Current Default General Use Rate<br>Small Use Customers | | Current Default Space Heat Rate<br>Frozen Space Heat Rate | | Optimal Space Heat Rate<br>Default for High Use Customers<br>Revenue neutral to GU and SH classe | | Optimal EV Rate<br>Available for all customers<br>Revenue neutral for GU class | | Optimal Space Heat + EV Rate<br>Default for High Use Customers<br>Revenue neutral for GU and SH classes | |

1. For this analysis, summer months are assumed to be from May 15 to September 15 for optional rates.
2. TOU Peak from 4 - 8 pm. Off Peak from 6 am to 4 pm and 8 pm to 12 am. Super Off Peak from 12 am to 6 am.
3. Max monthly on-peak demand is billed based on 15 min maximum measured demand from 4 - 8 pm.
4. Existing rates are based on Residential rates effective June 8, 2017.
5. New optional rates are set to recover the same revenues as the existing GU and SH rates.

## Table 1-5: KCP&L Kansas - Optional Residential Rates

| Existing<br>General use Rate | | Existing<br>Space Heating Rate | | New<br>Optional Demand Rate | | New<br>Optional TOU Energy Rate | | New<br>Optional TOU Energy + Demand Rate | |
|---|---|---|---|---|---|---|---|---|---|
| | Price | | Price | | Price | | Price | | Price |
| Customer Charge ($/mo) | $14.00 | Customer Charge ($/mo) | $14.00 | Customer Charge ($/mo) | $14.00 | Customer Charge ($/mo) | $14.00 | Customer Charge ($/mo) | $14.00 |
| | | | | | | | | | |
| Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | |
| Summer | $0.108 | Summer | $0.108 | Summer | $0.098 | Summer Peak | $0.220 | Summer Peak | $0.181 |
| | | | | | | Summer Off Peak | $0.082 | Summer Off Peak | $0.044 |
| | | | | | | Summer Super Off Peak | $0.055 | Summer Super Off Peak | $0.016 |
| Winter, up to 2000 | $0.084 | Winter, up to 600 | $0.075 | Winter | $0.030 | Winter Peak | $0.249 | Winter Peak | $0.222 |
| Winter 2001 - 2000 | $0.084 | Winter 601 - 1000 | $0.075 | | | Winter Off Peak | $0.072 | Winter Off Peak | $0.045 |
| Winter, 2001 + | $0.084 | Winter, 1001 + | $0.066 | | | Winter Super Off Peak | $0.044 | Winter Super Off Peak | $0.017 |
| Tier 1 Max kWh | N/A | Tier 1 Max kWh | 600 | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A |
| Tier 2 Max kWh | N/A | Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A |
| | | | | | | | | | |
| Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | |
| Summer Demand ($/kW) | N/A | Summer Demand ($/kW) | N/A | Summer Demand ($/kW) | $9.00 | Summer Demand ($/kW) | N/A | Summer Demand ($/kW) | $9.00 |
| Winter Demand ($/kW) | N/A | Winter Demand ($/kW) | N/A | Winter Demand ($/kW) | $2.00 | Winter Demand ($/kW) | N/A | Winter Demand ($/kW) | $2.00 |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | On Peak | Summer Demand | N/A | Summer Demand | On Peak |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | On Peak | Winter Demand | N/A | Winter Demand | On Peak |
| Current Default General Use Rate<br>Small Use Customers | | Current Default Space Heat Rate<br>Frozen Space Heat Rate | | Optimal Space Heat Rate<br>Default for High Use Customers<br>Revenue neutral to GU and SH classes | | Optimal EV Rate<br>Available for all customers<br>Revenue neutral for GU class | | Optimal Space Heat + EV Rate<br>Default for High Use Customers<br>Revenue neutral for GU and SH classes | |

1. For this analysis, summer months are assumed to be from June 1 to September 30 for optional rates.
2. TOU Peak from 4 - 8 pm. Off Peak from 6 am to 4 pm and 8 pm to 12 am. Super Off Peak from 12 am to 6 am.
3. Max monthly on-peak demand is billed based on 15 min maximum measured demand from 4 - 8 pm.
4. Existing rates are based on Residential rates prior to June 21, 2017 .
5. New optional demand rates are set to recover the same revenues as the existing GU and SH rates.

# 2.0 RATE DESIGN GOALS

## 2.1 Rate Design Goals

In the stakeholder interview process, BMcD solicited input on the key rate design goals listed below. Where appropriate, additional insight was collected on specific new industry issues such as electric space heating, EV, DG, peak load reduction or shifting, and energy efficiency. KCP&L's corporate rate design goals include the following:

- Provide Revenue Sufficiency and Stability
- Utilize Cost of Service Based Rate Designs
- Deploy Economically Efficient Rate Designs
- Promote Peak Load Reduction and Load Shifting
- Support Efficient Use of Energy
- Provide Customer Value and Satisfaction
- Provide Rate and Bill Simplicity

KCP&L provided BMcD with previously prepared documents[4] regarding its internal rate design positions and strategic goals on Residential rate design in Kansas and Missouri. For each of the corporate rate design goals, which align with utility industry best practices and Bonbright's Rate Design Principles[5], input was consolidated from the internal stakeholders in the sections below. Where internal stakeholder comments overlapped, the input is not duplicated. If internal stakeholders had differing opinions or positions, both are provided and noted as contradictions.

## 2.2 Provide Revenue Sufficiency and Stability

- The revenue impact of any new design needs to be considered.
- Changes to the rate design should be made gradually to minimize significant impacts to customers.
- New rates must recognize the effect of any rate switching that may occur in the revenue requirement.
- The performance of block rate designs should be monitored to avoid unintended or extreme impacts. The revenue provided from higher blocks is generally more subject to weather and conservation efforts. Block rates, specifically, inclining block rates, can provide indiscriminate efficiency signals to customers and can cause increasing instability of customer bills and utility revenues. Use of inclining block rates should be minimized and transitioned to more advanced, time-based rates.

[4] See footnote #2
[5] James C. Bonbright, Principles of Public Utility Rates (New York, Columbia University Press, 1951)

## 2.3 Utilize Cost of Service Based Rate Designs

- Rates should be cost based and offer an opportunity to recover the utility's cost to provide service.
- Utility rate design structures should, when technically and politically feasible, be designed in such a way to reflect the way that the utility incurs its cost by having both demand and energy charges.
- Rates need to reflect seasonal cost differences in the rate design which are based on cost of service.
- Recent increased penetrations of Residential customers with DG will require the utility to modify is rate design structure and uniquely consider the impact of these customers. The structures of the residential rates today do not provide proper cost recovery absent volumetric sales and will need to change in the future to avoid the shifting of costs to non-DG customers' loss of revenue from DG.
- The rate design should reflect distinguishing characteristics of various customer usage profiles in its current energy charge and customer charge form. KCP&L's Residential rates should distinguish between Residential GU class and Residential SH class until rates can be restructured into a single rate that properly reflects the seasonal cost of providing service.
- Rates should provide continuity across the range of customer classes (i.e. you should not have one rate for each customer nor should you have one rate only for all customers).
- KCP&L is open to having rate alternatives such as TOU rates and demand rates in both Missouri and Kansas, but the rates proposed should be based on the cost to serve. Alternative rate choices should be designed to be revenue neutral at the time they are proposed.
- KCP&L should introduce an optional rate that includes a demand charge and energy supply charge that vary by season based on cost and potentially by time of day.
- KCP&L ultimately may move to rates that charges all customers, a customer charge, facilities demand, generation demand, and seasonal TOU energy in some form. This was a uniform position of all internal stakeholders, however the structure varied.
- Any rate designs implemented will likely result in unforeseen rate switching and losses. The Company will need to monitor and track and seek ways to minimize the effects to the Commission approved revenue requirement and its ability to cover their fixed costs, and possibly, seek recovery for these losses to the extent possible.

### 2.3.1 Support Cost Effective Electric Space Heating and Other Non-Summer Use

- KCP&L wants to work toward making rates indifferent to the end-use as it is technically feasible with AMI metering and its Customer Information system (CIS). Residential rates, like commercial rates, should ultimately be independent of end-use type, but reflect the value of different customer end-uses. This position was uniform across all internal stakeholders.

- KCP&L would prefer to merge the Residential GU and Residential SH classes from an administrative standpoint. Administration of end-use rates is difficult to manage and requires additional effort diverting resources from other tasks.
- KCP&L wants to have a rate or optional rate that all Residential customers can use to cost effectively use electric space heating and other non-summer load, that is more reflective of the utility's costs. This could be a seasonal opt-in TOU rate or opt-in demand charge rate.
- Long term, KCP&L stakeholders prefer charging all Residential customers, including those with electric space heating and EVs, based on the same rate structure which employs both demand and TOU energy pricing components.
- KCP&L wants to support increased beneficial electrification in a cost-efficient manner and develop rates that support this goal.

### 2.3.2 Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use

- KCP&L does not want a specific EV rate for Residential customers since it would create a new end-use class. Residential rates (like commercial rates) should be designed to provide value through proper recognition of cost and indifferent to end-use type.
- Near term, KCP&L wants to have an optional rate that Residential customers can use to cost effectively charge EVs that is based on the utility's costs. This rate option could be an opt-in seasonal TOU rate or opt-in seasonal demand charge rate structure.
- KCP&L is interested in having rates that reflect cost and promote appropriate EV charging practices such as charging EVs during off-peak hours.
- Long term, KCP&L stakeholders prefer charging all customers, including customer who charge EVs, based on the same rate structure.
- KCP&L wants to increase beneficial electrification in a cost-efficient manner and implement rates that support this goal.
- These rate design goals are directed at customer level charging, not public charging services.

### 2.3.3 Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions

- KCP&L is in favor of having a rate, preferably a default rate, for future Residential DG customers that would include a form of demand charge structure to fairly recover the utility's capacity-related costs. While there is currently not a significant penetration of DG in the area, all stakeholders agreed that a rate change should be addressed in the near term before it becomes larger and more difficult to change. This may not be possible across all jurisdictions for regulatory reasons.

- DG rate policy will impact any proposed rate design in both Missouri and Kansas.
- In Missouri, DG customers receiving service under net metering must be provided the same rates as non-net metering customers currently.
- In Kansas, Residential DG rate designs are being reviewed as part of a generic investigation.[6] The KCC has already allowed utilities, such as Westar, to place DG customers into a separate rate class.
- Long term, KCP&L would prefer to charge all Residential customers, including Residential DG customers, based on the utility's actual cost structure which includes seasonal TOU energy charges based on KCP&L's cost, seasonal TOU generation demand charges, and maximum demand facilities charges.

## 2.4 Deploy Economically Efficient Rate Designs

- Rate structures, in general, should be designed to reflect the utility's cost and promote efficient use of the utility's resources and infrastructure to the greatest extent possible while minimizing customer dissatisfaction.
- Economically efficient rates should be designed in a manner that reflect the generation cost of serving peak loads, the transmission and distribution cost of serving non-coincident peak loads, the utility's seasonal cost of energy, and reflect differences in the time of day.

### 2.4.1 Promote Peak Load Reduction and Shifting

- KCP&L has a goal of having rates that consider the cost of serving peak and off-peak loads.
- Peak load reduction is a long-term goal supported by resource planning and DSM programs as opposed to an immediate need driven by resource constraints.
- However, planned generation retirements will realign loads and generation resource capacity which will further reinforce the need for DSM programs and rates that reduce peak load in a cost based manner.

[6] The general investigation, completed under Docket #16-GIME-403-GIV was completed and a Final Order issued on September 21, 2017. In the Order, the KCC accepted a Non-Unanimous Stipulation and Agreement to address the KCC goals for the investigation. The Non-Unanimous Stipulation and Agreement established that Utilities may create a separate class for DG customers, establishes that the existing two-part residential rate designs are problematic, identifies appropriate rate design options (demand rate, grid charge, expanded customer charge), acknowledges that customer education must accompany the new DG rate, establishes that DG rates are to be cost based and the value of solar approach should not be considered, states that the class cost of service study is sufficient to support a new DG rate, defines that cost analysis for the DG rate should be limited to quantifiable market-based costs, requires new DG rates to be proposed within a rate case, defines "grandfathering" for preexisting rates, and clarifies the order does not bind self-regulated cooperatives in the state. On October 5th, the Climate and Energy Project have petitioned the Commission for reconsideration.

- It would be preferred to reduce peak load by using a rate structure such as a TOU rate or a demand rate implemented as a DSM program through the Missouri Energy Efficiency Investment Act (MEEIA) or a similar investment recovery statutes.
- KCP&L-Missouri and GMO are currently planning to achieve their respective goals of peak load reduction through MEEIA DSM programs which invest in energy efficiency measures. KCP&L-Missouri and GMO completed their Cycle 1[7] portfolio in 2016 and has nearly completed 18 months of its 36-month Cycle 2[8] portfolio.
- KCP&L-Kansas withdrew its DSM portfolio that was filed under Kansas Energy Efficiency Investment Act (KEEIA) following the Commission's order decision to modify the proposed filing[9]. KCP&L-Kansas subsequently filed an application to extend its current programs for five-years; however, these programs are largely education or low income based.
- KCP&L would like to better utilize the existing generation, transmission, and distribution assets by flattening customer load profiles.
- KCP&L would like rate design structures to better recognize or consider the on-peak and off-peak cost of energy that it purchases from the SPP market as well as the on-peak and off-peak cost of its generation assets.

### 2.4.2 Support Efficient Usage of Energy

- Any pricing structures should consider energy efficiency and demand response (DR) programs and provide customers with an additional means for monitoring energy consumption.
- Conservation is defined as preserving scarce resources and is characterized by less comfort, inconvenience, less production and less economic growth. An example would be a punitive rate design that causes customers to shut-off their air conditioners and manage through the rising temperatures in their homes. KCP&L prefers to seek efficient energy use, where energy is used effectively and minimizes wasteful use, not penalize beneficial economic growth and cause customer inconvenience and disruption.
- KCP&L does not want to continue to promote the use of Residential rates that overly incentivize energy conservation by improperly charging customers. KCP&L would prefer to recover costs in a way that aligns with the goal of having an efficient and equitable rate design and reflects more closely the manner that utility's costs are incurred versus recovering its fixed system costs through an

[7] KCP&L MO Docket # EO-2014-0095 and GMO MO Docket # EO-2012-0009.
[8] KCP&L MO Docket # EO-2015-0240 and GMO MO Docket # EO-2015-0241.
[9] KS Docket No. 16-KCPE-446-TAR.

artificially higher variable energy charge and lower fixed charge. Provide Customer Value and Satisfaction

- Customers should be able to understand any new rates offered by the utility and understand the value proposition provided.
- Customers should be able to respond to any new rates and receive value without doing so at the expense of other customers.
- KCP&L wants to increase the number of available rate alternatives. Surveys support that customers believe having options will increase their satisfaction.
- KCP&L wants to offer rate alternatives that are beneficial for KCP&L and the customer and are part of a systematic plan, not alternatives that are deployed individually. The rate must be economical for both parties and be an efficient design.
- New rate options (i.e. TOU rates or demand rates) that meet multiple objectives are preferred, such as, reflecting the utility's actual cost structure, and reflecting the cost to serve residential electric space heating and EVs.
- KCP&L wants to have rate alternatives that it can use to promote efficient use of its resources. KCP&L wants Residential rate options that it can promote as the best rate for EV customers or electric space heating customers in the near term.

## 2.5 Provide Rate and Bill Simplicity

- KCP&L wants to standardize residential and non-residential rate structures as much as possible across jurisdictions. This includes having consistent blocks, including the number and size of each block as used under the current structure if possible.
- Rates should be designed to reflect the utility's cost.
- Customers should be able to understand the rate option.
- KCP&L understands that many rates being considered will require customers to learn new structures and terminologies, but will provide opportunities to achieve other rate design goals. Specifically, goals around cost-basis, revenue sufficiency, and efficiency. Education will be necessary to enable the transition.
- KCP&L has several frozen two-meter electric hot water and/or space heating rates. A plan to address these rates should be established. The plan should define a process to eliminate the rates and customers moved to either the GU or SH single-meter rates. This will allow these customers to see their whole-house usage as a single meter and be better able to participate in new optional demand and TOU rates.
- Customers must be able to respond to a rate and realize the value it provides.

- To ensure success of new rate designs, customer education on rates will be necessary.

### 2.5.1 Promote Gradualism

- Changes should be made in such a way as to control the impacts to customers. This may require a gradual or multi-phase application, if the impact on certain customers is considered too harsh for a single shift.
- Although the Commission has authority to determine the effective dates of rates, the Company should propose a transitional period if certain rates are no longer offered to new customers (i.e., frozen from new customer locations). This transitional period would allow some time period to elapse before eliminating the rate completely, providing customers time to remain on the rate and receive reasonable benefit from the rate, particularly rates that might be associated with investment in equipment.
- If a rate is to be discontinued to all customers, the rate impact of those customers should be considered and the evaluation of the alternative rates the customer could move to should be considered in the determination of the revenue requirement of the Company.
- If KCP&L is to freeze the Residential SH rate class or merge it into the existing Residential GU rate class, KCP&L should work to minimize the impact to those customers.

# 3.0 RATE DESIGN INTERNAL STAKEHOLDER INPUT

BMcD collected information on a variety of issues from multiple internal stakeholders. A summary of the key findings on each topic are provided in the sections below along with general trends in the electric utility industry.

## 3.1 Regulatory Affairs – Missouri

BMcD met with KCP&L regulatory management and staff to collect information and insight on key issues in Missouri that will impact rate design strategy in the future as well as collect insight for the TOU rate study being conducted for GMO. Many of the general corporate goals and positions apply to both states, however specific key issues in Missouri are summarized below.

- Missouri has structures to support energy efficiency as evident from the MEEIA programs currently in place.
- Through Integrated Resource Planning (IRP) regulations[10], the MPSC requires utilities to identify demand side resources (e.g. demand side program or rate) to reduce energy consumption or modify the timing of its use for purposes of developing alternative resource plans.
- In a recent rate case, the MPSC ordered IBR structures for the KCP&L-Missouri jurisdiction[11].
- The MPSC requires utilities to assess the technical potential, economic potential, maximum achievable potential, and realistic achievable potential of energy efficiency and DR measures. TOU rates and demand rates have been included in the DSM market potential study and were evaluated in the most recently filed KCP&L IRP in Missouri.[12]
- In Docket No. ER-2016-0156, the MPSC has recently approved a Stipulation & Agreement where GMO agreed to study and propose new rates that could encourage load shifting and efficiency.

## 3.2 Regulatory Affairs – Kansas

BMcD met with KCP&L regulatory management and staff to collect information and insight on key issues in Kansas that will impact rate design strategy in the future as well as collect insight for the Electric Space Heating Rate study being conducted for KCP&L-Kansas. Many of the general corporate goals and positions apply to both states, however specific issues in Kansas are summarized below.

[10] MO Chapter 22 Electric Utility Resource Planning rules or 4 CSR 240-22.050.
[11] MO rate case Docket No. ER-2016-0285.
[12] MO Docket No’s. EO-2017-0229 and EO-2017-0230.

- Residential electric space heating rates and more recently, residential rates for DG resources such as solar, are being reviewed as part of general investigations for the KCC[13,14].
- TOU rate design research has been done by the KCC in other studies[15]; however, there is no clear, KCC mandate to offer TOU rates today.
- Rates, programs, and other initiatives deployed by other Kansas utilities often shape the prevailing opinion with the KCC, limiting the potential response allowed by KCP&L.
- In Kansas, the lack of statutory or regulatory mandates has left existing rate structures relatively unchanged since 2010.
- As noted in the following section, KCP&L filed and subsequently withdrew a proposal to implement DSM programs in Kansas that would have been similar in nature to MEEIA.
- The Residential SH class rate change made in 2010 was made based on a cost of service study and significantly increased electric space heating winter energy rates. This has been subject to subsequent study efforts.
- Westar recently submitted a filing to the KCC to offer rate options as well as segregate DG customers into a separate class with the ultimate goal of charging them a mandatory demand charge. This issue has been taken up in a generic proceeding that should result in guidance from the KCC concerning an appropriate residential DG rate design.[16]

## 3.3 Energy Resource Management and Energy Solutions

BMcD met with Energy Resource Management and Energy Solutions stakeholders to solicit input on multiple issues germane to rate designs. Both Energy Resource Management and Energy Solutions identified programs that are considering the use of rates as a means for managing supply and demand.

- In both Kansas and Missouri, electric rates have not traditionally been the means by which utilities have helped achieve their generation resource planning requirements and DSM targets.
- Contingent on KCP&L's plan for implementing DSM and rates defined in the 2017 Integrated Resource Plan[17], the Company currently has no major generation builds planned in the 20-year planning horizon. Multiple plant retirements are planned over the next two years.

[13] KCC Docket No. 16-GIME-576-GIE ("16-576 Docket")
[14] KCC Docket No. 16-GIME-403-GIE ("16-403 Docket")
[15] Residential Rate Study for the KCC Final Report, Christensen Associates Energy Consulting, LLC, 2012. Available at: http://www.kcc.state.ks.us/electric/residential_rate_study_final_20120411.pdf
[16] See footnote #6.
[17] MPSC Docket No. EO-2017-0229

- In Missouri, currently Commission approved DSM programs under MEEIA, are being used to reduce peak demand which will not only meet future load growth, but continue to reduce system peak loads further.
- KCP&L-Missouri and GMO promote DSM through programs that have been approved by the MPSC utilizing the MEEIA legislation and rules.
- As discussed previously, KCP&L-Kansas has a limited number of DSM programs in Kansas and they are largely education and low income based.
- Absent DSM programs, KCP&L and GMO would likely install natural gas peaking plants to meet its resource planning needs.
- TOU or demand rates are not currently used within the traditional DSM construct in Kansas or Missouri. However, if they can be implemented appropriately, these rates are desired.
- ***Industry Trend*** – Utilities continue to adjust their generation, responding to the supply of generation available through the SPP and the high cost of environmental compliance. As coal fired generation is retired, new resources will include renewable resources, peaking generation, and DSM programs. Peak load management rates have been implemented as a means for achieving some peak load reduction and will be a part of utilities DSM solutions.
- ***Key Conclusion*** – KCP&L could potentially consider using new rate alternatives to achieve greater energy efficiency and peak demand savings.

### 3.3.1 Electric Space Heating

BMcD solicited input from internal stakeholders on the Residential SH class rates for the purposes of the general rate strategy development as well as the Electric Space Heating Rate Study that is being conducted for the generic investigation in the Kansas jurisdiction.

- KCP&L historically promoted its all-electric space heating rates to new building developments through its commercial partner program. This program ended in about 2010 following internal restructuring and the Company instead relied on more general promotional efforts. Coincidently, it was also in 2010 when the Residential SH class winter energy rate differential in Kansas was reduced.
- Most internal stakeholders prefer rates to be indifferent to the end-use or freeze end-use rates as technology and regulatory decision makers allow.
- Several internal stakeholders indicated that electric space heating rates are challenging from an administrative standpoint.
- Most believe that electric space heating rates are priced appropriately to reflect their cost of providing service and that the SH rate classes should remain in place unless there is a better alternative.

- Most internal stakeholders support having a rate that is marketable for electric space heating; however, most would accept a single cost based rate that could provide benefit for all non-summer usage, including electric space heating, that any customer can use.
- In the past, the MPSC has pursued a reduction of the electric space heating differentials within the commercial and industrial rate classes.
- KCC and other parties seem currently in favor of continuing or even restoring the electric space heating differentials for its constituents. This reflects a change in position from the KCC and other party positions offered in the 2010 Kansas rate case.
- Any rate design that considers elimination of the electric space heating rate will need to consider that small usage customer, such as apartment dwellers, may be impacted more significantly than larger usage customers, such as home owners. This is not desired.
- ***Industry Trend*** – Observations support that utilities are no longer relying on end-use rates. End-use rates have been removed by most utilities and replaced with a seasonal or time-based structures that recognize the seasonal price differentials as part of generally available rates.
- ***Key Conclusion*** – KCP&L would like to work towards implementing a cost based rate structure that provides a benefit to electric space heating customers, in one overall rate option.

### 3.3.2 Electric Vehicles

BMcD solicited input from internal stakeholders on EV for the purposes of the general rate strategy development. EV adoption is a relatively new market and is expected to be a significant growth opportunity for KCP&L over the next 5 to 10 years. This growth has been supported by KCP&L's installation of its Clean Charge Network (CCN).

- Nearly all internal stakeholders advocate for rate design options that support the adoption and efficient charging of EVs in both Missouri and Kansas. EV penetration is growing and is expected to increase in response to vehicle manufacturer incentives, development of EV models with greater range, and the availability of the CCN.
- KCP&L does not want a specific EV rate, but rather a cost-based rate that can provide value to Residential EV customers.
- Internal stakeholders are open to various opt-in rate structures that will benefit customers and the utility for shifting usage to off-peak time periods. This could be either a TOU rate or demand rate.
- Residential solar customers also tend to own EVs as well. TOU rate designs should be prepared for this trend.

- ***Industry Trend*** – Many utilities are beginning to offer an EV[18] TOU rate or a general TOU rate that can be used by Residential EV customers.
- ***Key Conclusion –*** KCP&L would like to implement a rate option in all jurisdictions that can be used by EV owners that recognizes the value of shifting EV load off-peak in a cost-efficient manner.

### 3.3.3 Distributed Generation

BMcD solicited input from internal stakeholders on DG, such as roof-top solar, for the purposes of the general rate strategy development. DG adoption in the Midwest has been relatively slow compared to other parts of the country, however, significant reductions in the costs and increases in electric rates have driven more growth across the country due to improved economics.

- There is no final long term direction from KCC or MPSC for DG rates beyond adhering to current state net metering regulations.
- In March 2017, KCC staff recommended a three-part Residential rate consisting of a demand charge, energy charge, and customer charge for DG customers to achieve a fair and reasonable, cost-based rate design for DG and non-DG customers. This was filed as part of Docket No. 16-GIME-403-GIE.[19,20]
- In April 2017, the MPSC opened a workshop case regarding Emerging Issues in Utility Regulation. This effort included consideration of DG issues and was filed under Case No. EW-2017-0245.
- Most internal stakeholders recommend all new DG customers be put on a demand rate.
- Internal stakeholders also recommended implementing a rate that compensates DG customers for their excess generation based on the utility's avoided cost of wholesale solar contracts.
- There is interest amongst some internal stakeholders to add a renewable rider.
- ***Industry Trend –*** There is no single industry trend across the United States with Residential DG. However, the growing industry trend is to implement rate structures that have a facilities charge or demand charge for DG and particularly solar customers[21]. Many variations exist including net billing, net metering, and value of solar rates. The allowable structure is typically set at the state legislative level with most states having net metering with a system cap[22].
- ***Key Conclusion*** – KCP&L would like to address DG and existing subsidization through modifications to its existing rate design.

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[18] http://www.fleetcarma.com/utility-time-of-use-plug-in-vehicles/
[19] See footnote #6.
[20] See footnote #6.
[21] EEI, Primer on Rate Design for Residential Distributed Generation, February 2016, page 25.
[22] http://www.dsireusa.org/

## 3.4 Customer Service and Market Insights

BMcD met with representatives from Customer Service and Market Insights to collect information on recent surveys that have been prepared by KCP&L. Additionally, BMcD met with customer account representatives to gain their insights on the history of rate promotion programs. A summary of the key findings is provided below.

- Pertaining to rate options, such as TOU rates, surveys[23] found that customers are very interested in TOU rates and expect to save money by switching to TOU rates.
- Customers have expressed interest in having the opportunity to directly receive renewable energy supply.
- The abovementioned surveys indicated that the majority of KCP&L's customers spend less than 8 minutes per year reviewing their utility bill and even less time attempting to understand the rates. [24]
- These same surveys also indicated that customers felt, when educated, that they were able to understand complex TOU rates and demand rate service plans, as well as the benefits they provide.
- Any new rate options offered will require significant marketing, education and implementation of other tools so that customers participate and understand the new offerings.
- ***Industry Trend -*** KCP&L has conducted many customer surveys, focus groups, and industry research on what customers want from rates, billing and options. Results indicate that customers want to have options and the availability of options increase customer satisfaction. However, it is uncertain the degree to which customers will utilize the options when offered. The results of these surveys are consistent with industry trends.
- ***Key Conclusion –*** KCP&L surveys and market studies indicate that customers desire rate options including TOU rates or other rates that they can actively participate to save energy and reduce their bill. Customers will require education concerning any new rates to understand how they may be applied to their benefit.

## 3.5 Measurement Technology and Meter Data Management

BMcD met with internal stakeholders of the Metering and Meter Data Management groups to understand KCP&L's current and future capabilities as well as the timelines for implementation of new metering and billing systems. A summary of the key findings is provided below.

[23] See footnote #3.
[24] www.greentechmedia.com/articles/read/customers-spend-8-minutes-a-year-interacting-online-with-their-utility#gs.cuE8t20

- KCP&L customer meters are currently read in multiple ways, including automated and manual elements. This is being replaced with a comprehensive AMI meter data collection network that will be used to collect meter data, including interval usage data suitable for use by advanced rate designs. The AMI conversion is in progress. AMI meter installations have been completed in the Kansas City metro area for all jurisdictions, with conversion of rural areas to be completed by the end of 2020. The rural areas are the last as communication networks must be extended and meters are more widely dispersed, increasing the installation time per meter.
- A new MDM system is already in place, but not fully interfaced with CIS until the implementation of the new CIS is complete.
- The new MDM is receiving data from AMI meters today, but due to legacy interface limitations, not all of the data can be readily accessed. When the new CIS is in place, it is expected that this data will be available to other systems. Data expected to be available includes 15-minute usage, demand, and daily register reads.
- The new CIS will obtain billing determinants from the MDM when it is expected to be operational in or about April 2018.
- The existing CIS can receive billing units for all existing tariffs from the new AMI meters.
- Metering management recommended that no new Residential rate tariffs or major modifications to existing tariffs be integrated into the existing MDM and metering systems until after the new CIS is operational in or about April 2018.
- ***Industry Trend*** – As utilities upgrade their metering and billing capabilities, they will begin to enhance their rate structures offerings. New metering capabilities across the country will increase the number of utilities that can offer unique rate options such as TOU rates and demand rates.[25]
- ***Key Conclusion*** – New metering and MDM systems will be able to provide billing determinants needed for Demand, TOU, and Demand TOU rates for all KCP&L and GMO customers by 2020. Implementation of dynamic rates such as RTP, CPP, VPP, and PTR will most likely require assistance from internal IT department resources and could require additional system upgrades and testing. Therefore, the implementation of dynamic rates should not be realistically considered for implementation until after 2020 or later.

[25] Lazar, J. and Gonzalez, W. (2015). Smart Rate Design for a Smart Future. Montpelier, VT: Regulatory Assistance Project. Available at: http://www.raponline.org/document/download/id/7680, page5.

## 3.6 Information Technology and Billing Capabilities

BMcD met with internal representatives from the Information Technology (IT) department to understand KCP&L's current and future billing system capabilities as well as the timelines for implementation of the new CIS. A summary of the key findings is provided below.

- The existing CIS can receive billing units for all existing tariffs from the new AMI meters.
- KCP&L is installing a new CIS Billing system. The project is referred to as the "One CIS" project. The new CIS is expected be operational in April 2018.
- IT project management and directors recommend that no new Residential rate structures or major modifications to existing structures be integrated into the existing CIS until after the new CIS is operational in April 2018. They recommend that implementation of any new rate structures wait until 2019, after the 6-month system stabilization and warranty period.
- Notwithstanding the above concerns, the new CIS should have the ability to bill all Residential customers on demand, energy, and TOU energy with proper programming changes. IT and Billing project management could not comment on other rate alternatives.
- ***Industry Trend*** – As utilities upgrade their metering and billing capabilities they will begin to enhance their rate structures offerings. New metering and billing capabilities across the industry will increase the number of utilities that are able to offer TOU rates and demand rates as options.[26]
- ***Key Conclusion*** – The new CIS and AMI meters will be able to bill new rate structures, such as TOU and demand rates. The CIS implementation team must configure and test new rate design options such as Demand, TOU Energy, and Demand-TOU Energy rates prior to making rates available.

## 3.7 Input Regarding Rate Designs

### 3.7.1 Seasonal Rates

KCP&L is currently in the process of conducting other internal studies ordered by the MPSC that are examining the seasonality of the Residential rate structure. BMcD solicited input from internal stakeholders on seasonal rates which is summarized below.

- Seasonal rates are important for winter electrification and aligns with class cost of service.
- A well-designed rate that keeps KCP&L indifferent to weather conditions is ideal.

[26] See footnote #21.

- No specific rate options were discussed, but the desire for a lower winter rate was uniform. This is based on the presumption that winter costs are lower than summer costs.
- Seasonally differentiated rates should be implemented for all structures.
- ***Industry Trend*** – Most utilities employ a summer / winter seasonality to their rate structures which is typically cost of service based. This should and will continue even with new rate structures.
- ***Key Conclusion*** – KCP&L should continue to employ seasonality in all its rate structure offerings in the future.

### 3.7.2 Declining Block Rates

KCP&L is currently in the process of conducting other internal studies ordered by the MPSC that are examining the blocking of the Residential energy charge. BMcD solicited input from internal stakeholders on DBR structures which is summarized below. Additional details are provided as an appendix.

- Most internal stakeholders agree that it has been appropriate to place fixed costs not included in the customer charge in the first blocks of the energy charge and reducing the block rate in the last block closer to the marginal cost of energy, resulting in a DBR. This is necessary to help ensure recovery of the fixed revenue requirement given the rate design and policy limitations.
- MPSC has ordered the Company to examine TOU rates, believing it may be a better option. Based on efforts thus far, KCP&L believes that a multi-part rate with a TOU energy charge may be best for cost recovery based on cost causation principles and beneficial electrification.
- ***Industry Trend*** – It has been observed that many utilities and regulatory commissions have eliminated DBRs for the standard Residential customer class on the argument of promoting conservation while some have left the DBR in the winter season only.
- ***Key Conclusion*** – KCP&L should continue to employ a DBR as needed until a better solution can be implemented from a metering, billing, and design standpoint.

### 3.7.3 Inclining Block Rates

BMcD solicited input from internal stakeholders on the use of IBR structures. The interviews occurred prior to the conclusion of KCP&L's 2016 Missouri Rate Case. In that case the MPSC ordered KCP&L to deploy an IBR for its Residential GU customers in the summer season. For this study, we will identify the positions offered by internal stakeholders, recognizing that the new rate structure is in place and any modification will need to be supported within a future general rate proceeding. A summary of the key findings is provided below.

- Internal stakeholders interviewed do not believe IBRs are an appropriate rate design. Respondents are concerned that the IBR design creates an arbitrary price signal directed at indiscriminate conservation and increases the volatility of the customer bill and in turn, utility revenue recovery.
- KCC and MPSC Staff do not appear to support an IBR, however Westar has an IBR in their top summer block of their Residential rate.
- There are groups within Missouri that are advocating for an IBR as a demand-side measure.
- An IBR does not support KCP&L's goal of a cost effective EV charging rate.
- ***Industry Trend*** –Some regulatory commissions, such as MPSC, have implemented IBRs for utilities with the goal of increasing energy conservation; however, some utilities, such as APS, have recently removed IBRs from their rate structures in favor of TOU rates and demand rates. California has also announced plans to move away from IBR designs and toward TOU rates.
- ***Key Conclusion*** – Given that the MPSC has ordered IBR in the KCP&L-Missouri jurisdiction, KCP&L should work to limit implementation in other jurisdictions and rather move toward recommending demand or TOU rate designs. If future IBR structures are mandated, the differential should be minimal to limit volatility and should be phased out once Residential demand rates and TOU rates are in place.

### 3.7.4 Residential Rate Choices Options

BMcD solicited input from internal stakeholders on offering electric rate choices for the purposes of the general rate strategy development. While for some utilities offering rate choices is currently limited due to advanced metering and billing technology constraints, many other utilities are enhancing service and customer satisfaction by offering multiple, alternative opt-in rate structures. A summary of the key findings is provided below.

- Rate choice is important for customer satisfaction and has been further confirmed through surveys.
- Amongst internal stakeholders, the number of rate choices that seem most appropriate to offer varies between two and five.
- The MPSC or KCC has not provided specific guidance on preferred rate choices.
- Too many options could be a detriment to the utility through revenue attrition and too few customers on a rate class. Overlap within options could create confusion and lead to unnecessary switching by customers.
- Having too few options causes the customer to feel constrained and unable to select a rate that suits their lifestyle and opinions concerning energy use.

- ***Industry Trend*** – Many utilities are beginning to offer multiple rate option offerings to Residential customers. These include fixed rates, TOU rates[27], demand rates[28], dynamic rates, and various renewable energy rates[29].
- ***Key Conclusion*** **–** Rate choices are preferred based on internal stakeholder; however, the complexity, number of choices, and the relationship of the rate options will need to be examined within KCP&L's capability to support those options. Any new rate implementation should be gradual and accompanied by an appropriate customer education component.

### 3.7.5 Time of Use and Dynamic Rate Options

BMcD solicited input from internal stakeholders on TOU and dynamic rates for the purposes of the general rate strategy development as well as the TOU rate study that is being conducted for GMO. Offering TOU rates to small users has been a significant trend in the utility industry due to advances in metering and billing systems. Parties within KCP&L are interested in their adoption due to a variety of issues. A summary of the key findings is provided below.

- TOU rates are widely considered as an optional rate class. The opinion on the pricing structure and benefits of a TOU rate vary among internal stakeholders.
- Some internal stakeholders view it as a means of providing DSM with price signals of using a three to six times differential between off-peak and on-peak. Other internal stakeholders recommend that it should be based on KCP&L's cost structure and designed to be more broadly beneficial.
- Customers expect to save if they are on a dynamic rate, but the actual use shifting observed is minimal and savings is not always realized based on the recent KCP&L Smart Grid pilot project[30].
- Most internal stakeholders support a TOU rate for promoting effective EV charging. This is a high priority from most in Energy Solutions and is generally supported by Power Supply and Regulatory.
- If TOU can be deployed as a DSM program, this would be ideal as it would provide better visibility to the benefit received through measurement and verification.
- If implemented, a thorough marketing campaign and implementation of customer tools are expected to be necessary for wide adoption.

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[27] http://www.fleetcarma.com/utility-time-of-use-plug-in-vehicles/
[28] www.brattle.com/system/publications/pdfs/000/005/171/original/The_Top_10_Questions_about_Demand_Charges.pdf
[29] http://instituteforenergyresearch.org/topics/policy/green-pricing-programs/
[30] KCP&L Green Impact Zone SmartGrid Demonstration Project Final Technical Report, version 2.0, dated May 22, 2015. Available at: https://www.smartgrid.gov/files/OE0000221_KCPL_FinalRep_2015_04.pdf

- In general, the majority of internal stakeholders see having a well-designed TOU rate as something that needs to be done relatively soon, but the approach and structure varies amongst internal stakeholders.
- There is not strong support for implementing a dynamic rate option such as a CPP, PTR, or VPP. The greatest impediment to these options are their complexity from a metering and billing standpoint.
- ***Industry Trend*** – Many utilities have implemented pilot studies in the past studying TOU prior to implementation and have had special TOU rates requiring AMI metering like KCP&L. Many utilities across the country are offering some form of TOU rate as an opt-in rate alternative as new metering technology is installed. Mandatory TOU is not common.
- ***Key Conclusion*** – A simple TOU rate that can be used to help promote efficient EV adoption is desired in the near term. TOU for DSM alone is not as strong of a business case today; however, other factors such as customer choice and regulatory mandates may warrant its implementation.

### 3.7.6 Demand Rates and Multi-Part Rates

BMcD solicited input from internal stakeholders on demand rates for the purposes of the rate strategy development as well as the TOU rate study that is being conducted for GMO. Offering demand rates to small users has been an increasing trend in the utility industry due to (1) advances in metering and billing systems and (2) a desire to reduce cost shifts caused by reduced consumption and two-part rate designs. At some utilities, demand rates are being implemented to address cost shifts created by DG. Many internal stakeholders are interested in the adoption of demand rates at other utilities due to a variety of issues. A summary of the key findings is provided below.

- KCP&L had Residential Demand rates in the past. The Residential Demand options were discontinued in 1996 and replaced with the current residential time of day (TOD) rate as part of a comprehensive rate design change.
- Residential Demand rates have been discussed with MPSC Staff, but no formal study has been performed or proposal offered.
- KCC and MPSC may consider demand rates for future rates as an opt-in rate, however, it is believed that neither KCC or MPSC is looking to set a demand component in the standard rate that is currently being offered.
- Although approaches could vary, a demand charge or charges that recovers both distribution and generation costs is desired long term and the charges developed in this study for GMO and KCP&L MO assume both are recovered in the demand charge. A demand charge that recovers fixed distribution costs or only a portion of the generation costs could also be considered as a first step

which may be easier to market to customers and more palatable than a large demand charge including both distribution and generation.

- Multi-part rates are good for cost recovery based on cost causation principles and the lower energy charge that results would be more representative of cost. Cost-based rates will likely help promote beneficial electrification for KCP&L.
- The number of rate parts is important to many. A demand rate option could include 3-5 parts.
- Nearly all internal stakeholders agree that long term, a Residential rate should include a customer charge, demand charge, and energy charge which vary on a seasonal basis and potentially TOU basis.
- ***Industry Trend*** – There is a growing trend in the industry to begin to recover distribution and generation costs through a Residential demand charge. Demand rates have been deployed by about 30 utilities, generally as opt-in rates, or as rates associated with DG.[31]
- ***Key Conclusion*** – Nearly all internal stakeholders agree that the Residential classifications should move to a rate structure that includes a demand charge and energy charge with some form of TOU. This transition would have to occur incrementally over time.

## 3.8 Internal Stakeholder Input Summary

There are several overarching themes that have resulted from the internal stakeholder input that are generally consistent across all groups. The general themes are listed below.

- Electric Space Heating – KCP&L would like to work towards implementing a cost-based rate structure that recognizes the value of electric space heating load and other non-summer loads while not having specific end-use requirements.
- Electric Vehicles – KCP&L would like to implement a rate in all jurisdictions that can be marketed to and used by EV owners to shift EV charging load off-peak in a cost-efficient manner.
- Distributed Generation – KCP&L needs to address the growth of DG and better mitigate existing cross subsidization and cost shifting through modifications to its existing rate design.
- Customer Insights – KCP&L surveys and market studies indicate that customers desire rate options including TOU rates, or other rates which they can actively use to save money or promote their energy choices.
- Metering & Billing – KCP&L would like to take advantage of new AMI, MDM, and billing systems currently being designed and implemented. These systems, once fully implemented and integrated,

[31] Affidavit of Ahmad Faruqui in Kansas Generic Docket on Distributed Generation Rate Design. Available at: www.eenews.net/assets/2017/03/24/document_ew_02.pdf

should be able to better enable deployment of demand rates and TOU rates for all KCP&L/GMO residential customers.

- Existing Rate Structure – Several elements of the current rate design are working well today. Seasonal rates, declining block rates, and cost based customer charge levels in their current form provide a time tested, basic rate design that should continue until a new rate structure can be offered that better aligns with the rate design principles and Company goals outlined above. IBRs in Missouri should be replaced with TOU rates or other more appropriate design as soon as practical.
- TOU and Dynamic Rates – A simple TOU rate that can be used to help promote efficient energy use, including EV adoption, is desired in the near term. Other dynamic rate options, which are viewed as increasingly complex by internal stakeholders, are not supported within KCP&L at this time. It is perceived that these dynamic rates will need to be deployed incrementally and only after TOU effectiveness can be evaluated.
- Demand Rates and Multi-Part Rates – Nearly all internal stakeholders agree that the Residential classes should move to a rate structure that includes a demand charge and provide for TOU optionality within the energy charge.

# 4.0 QUALITATIVE EVALUATION OF RATE DESIGN OPTIONS

## 4.1 Summary

Each rate option considered should be qualitatively evaluated prior to conducting rigorous in-depth modeling and analysis. Rate designs considered should reflect good rate making principles and consist of a range of potential options that exist today. Additionally, the rate evaluation should analyze if the rate structures align with future technologies being developed, are supportive of KCP&L's goals and objectives, and are consistent with regulatory trends geographically and nationally. The following is a description and qualitative analysis of the rate options considered with each section evaluating how each rate aligns with KCP&L's rate design goals and business objectives. These criteria are listed below.

- **Provide Revenue Sufficiency and Stability** – Rates provide an opportunity to produce revenues sufficient to cover KCP&L's annual revenue requirements. Rates provide predictable revenues through changes in system load conditions and weather.
- **Provide Cost of Service Based Rate Designs** – Rates are cost based. Revenue is collected by class, classification, and season based on amounts derived from the class cost of service for each of KCP&L's jurisdiction.
- **Promote Economic Efficiency in Rate Design** – Rates reflect time-varying wholesale energy prices, reflect the relevant risk to providers, and offer choices that reflect diverse consumer risk preferences. Rates can encourage the adoption of technologies that can provide services to the energy grid and customers.
- **Promote Peak Load Reduction and Load Shifting** – Rates promote peak load reduction and the shifting of load from peak periods (months and hours), reflecting the associated cost savings and other benefits.
- **Support Efficient Use of Energy** – Rate designs allow for savings from energy efficiency and demand reduction measures deployed by customers.
- **Provide Customer Value and Satisfaction** – Customers are provided adequate price signals to respond to the rates and have the opportunity to receive value, either real or perceived.
- **Provide Rate and Bill Simplicity** – Customers understand the rate options offered. This criterion is measured relative to the current two-part residential rate with a DBR energy charge.
- **Support Cost Effective Electric Space Heating and Other Non-Summer Use** – Rate designs reflect the cost to provide service by time and season for customers who tend to use more energy in the non-summer periods for uses such as electric space heating.

- **Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use** – Rate designs reflect the cost to provide service by time and season for customer who tend to use more energy in the off-peak periods for uses such as EV charging.
- **Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions** Rate designs allow for equitable recovery of costs from customers reflective of their use of the energy grid and not the energy they consume. Providing cost-based rates to customers with DG generation and protecting from cost-shifting to non-DG customers.
- **Metering and Billing Complexity** – Rates can be billed and metered within the new metering and billing systems.

Each criterion is ranked as Positive, Negative, or Neutral. This assessment reflects the alignment of that rate option to the criteria defined previously. "Positive" meaning the rate design option supports the criteria and "Negative" meaning the rate design option does not support the criteria. "Neutral" means the rate design option neither supports or does not support the criteria. The assessment is also relative, meaning this assessment section is to be considered in its entirety with the various rate design options being measured to each other option. The relative assessment will, in effect, provide a ranking of sorts for the various rate design options.

Additionally, these rate design options may be combined with other rate design elements to modify the application. For example, most can be applied through "seasons", where a different price is offered for different periods of the year. The rate options can also be combined with availability provisions to limit their use. For example, a rate may be limited to customers with a specific end-use, such as electric space heating or EV charging. Most of the criteria can be evaluated independent of these options while others cannot. Where applicable, these additional elements are noted.

## 4.2 Flat Energy Rates

- General Description

  Flat energy rates are constant rates that do not vary by time of day or level of consumption, though they are also volumetric, in that they are based on the volume of energy consumed. They are a simplistic pricing approach, designed to produce revenue for the utility to cover its fixed and variable costs of service and its allowed rate of return.

- Provide Revenue Stability and Sufficiency – Neutral

  Revenues change with usage levels, which are affected by weather and economic conditions. A flat rate will provide less stability than a DBR, but more stability than an IBR.

- Promote Economic Efficiency in Rate Design – Negative

  The price does not vary with expected or actual market conditions. The price tends to reflect average costs more than marginal costs which creates inefficient price signals to customers.

- Promote Peak Load Reduction and Load Shifting – Negative

  Flat energy rates do not promote reducing peak demands on the system or using energy at less expensive times of the day. Customers are not compensated or provided a benefit for reducing their demand during the system peak hours of the year.

- Support Efficient Use of Energy – Neutral

  The value or rate associated with reduced usage resulting from energy efficiency measures is the same for all usage. Some support is provided, but the flat energy rate is more supportive than a DBR but less than an IBR.

- Provide Customer Value and Satisfaction – Negative

  A flat energy rate provides little price signal to a customer. Usage in all time periods and all levels of consumption are at the same price.

- Provide Rate and Bill Simplicity – Positive

  On a flat rate, it is easy for a customer to determine the change in bill associated with a change in consumption as there is no additional consideration of energy blocking.

- Support Cost Effective Electric Space Heating and Other Non-Summer Use – Negative

  A low, flat winter rate alone does not support cost effective non-summer use such as electric space heating. A DBR or some other form of rate reflecting the lower marginal cost of additional generation helps to generate revenues consistent with the utility’s cost of service. A seasonal rate with a lower flat winter rate and demand rate, or consolidated Residential class may be alternatives.

- Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use – Negative

  A flat energy charge, with or without seasonality, does not support cost effective non-peak use such as EV charging. Having the same rate for all hours sends a signal to customers that use during on-peak is the same as off-peak. This could cause overloads on distribution equipment and increases in system peak demand.

- Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions – Negative

  A flat energy charge does not support equitable cost recovery under low consumption conditions such as customers with DG. Under a flat energy rate, there is no means to identify the customer's demand on the system. As nearly all costs are in the energy charge, a DG customer might avoid paying their fair share of the distribution system or generation costs, with those costs being shifted to other rate payers.

- Metering and Billing Complexity – Positive

  The metering and billing systems currently being developed and implemented will be able to meter and bill the current flat energy rates without any significant modifications.

- Overall Recommendation

  Flat energy rates are generally neutral, neither supporting or not supporting the KCP&L goals. Use of flat energy rate designs should be limited. KCP&L should maintain the existing summer flat energy rates as the default option but should gradually work towards limiting the availability of flat energy rates for Residential customers in both the summer and winter. All customers should be transitioned to more efficient rate designs such as demand rates and TOU rates over time.

## 4.3 Declining Block Energy Rates

- General Description

  Under DBRs, the per unit price of energy decrease with the greater level of energy consumption used throughout the month. Under two-part rate structures, they are designed to use the first blocks to produce the bulk of the revenue for the utility to recover its fixed and variable costs to provide service and its allowed rate of return with the last blocks moving closer to the average marginal energy costs. In the Midwest, where summer peaks are higher than winter peaks, DBR designs are typically limited to the winter season.

- Provide Revenue and Bill Stability – Positive

  Revenues and bills change with usage levels, which are affected by weather and economic conditions. Revenues generated from DBRs are less susceptible to changes in weather and provide greater revenue and bill stability during extreme weather conditions than flat rates or IBRs due to more costs being recovered in the initial blocks.

- Promote Economic Efficiency in Rate Design – Negative

  The price does not vary with expected or actual market conditions. The price tends to reflect average costs during the season rather than TOU costs which creates inefficient price signals from the utility to the customer. Additionally, DBRs send the price signal that using more energy at any time during the month is less expensive for the utility. However, the DBR is designed to first recover cost of service based on the average customer with incremental energy being charged closer to the marginal cost of energy.

- Promote Peak Load Reduction and Load Shifting – Negative

  DBRs do not promote efficient use of energy by reducing peak demands on the system or using energy at less expensive times of the day.

- Support Efficient Use of Energy – Negative

  The value or rate associated with reduced usage resulting from energy efficiency measures is lowest in the higher blocks, the blocks where the reduction is likely to manifest itself. Some support is provided, but the DBR is less supportive than a flat energy rate and less than an IBR. However, an IBR design will typically subsidize low usage customers at the expense of larger customers and provide less energy savings in the first block for a given energy efficiency investment. Additionally, DBR structures alone do not provide a demand cost reduction benefit to customers who deploy load reduction measures.

- Provide Customer Value & Satisfaction – Negative

  A DBR alone provides little value to a residential customer other than promoting the concept that using less at any time is better and this concept typically only benefits the larger users. The value of the reduction is not directly correlated to the utility's cost reduction and customers who change behaviors will only save the utility and themselves minimal money.

- Provide Rate & Bill Simplicity – Positive

  Since a DBR for energy pricing has been part of the Residential rate for years, customers using a DBR generally understand the structure and understand that using less will result in a cost savings. However, the expected level of savings is unknown depending on which block they may fall into during the month.

- Support Cost Effective Electric Space Heating and Other Non-Summer Use – Positive

When used in conjunction with seasonal pricing, a DBR can better support cost effective non-summer use, such as electric space heating, than a flat rate alone and is commonly used by utilities to recover revenues consistent with cost of service. A low flat winter rate and demand rate, or simply a rate class consolidation and readjustment of the structure may also be a good alternative as noted above.

- Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use – Negative

  A DBR, with or without seasonality, does not support cost effective non-peak use, such as EV charging. Additionally, having the same rates for all hours of the day sends the signal to customers that charging during on-peak is the same as off-peak, which isn't accurate. This could cause overloads on distribution equipment while potentially increasing the system peak demand.

- Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions – Negative

  A DBR alone does not support equitable cost recovery under low consumption, such as with DG. Under a DBR, there is no means to identify the customers demand on the system. As nearly all costs are in the energy charge, a DG customer might avoid paying their fair share of the distribution system or generation costs, with those costs being shifted to other rate payers.

- Metering and Billing Capability – Positive

  The metering and billing systems currently being developed and implemented will be able to meter and bill the current DBRs without any significant modifications.

- Overall Recommendation

  KCP&L should maintain the existing DBR, where applicable, as the default option over the short term but work towards limiting the availability of the existing winter DBR for Residential customers. This rate change will need to be implemented gradually over time and supplemented with alternative rates that customers can use for cost efficient winter electric energy use.

## 4.4 Inclining Block Energy Rate

- General Description

  Under IBRs the per unit price of energy increases with the greater level of energy consumption used throughout the month and are typically only implemented in the summer months. IBRs may be implemented with the goal of encouraging conservation or subsidizing low-usage customers.

However, the actual result is not generally realized by utilities and can result in increased usage by smaller customers.

- Provide Revenue Stability and Sufficiency – Negative

  Revenues and bills increase with greater levels of usage, which are affected by weather and economic conditions. The high tail-block price of an IBR, combined with variability in tail-block usage levels, can produce relatively high variability in utility revenues and customer bills as compared to flat energy rates and DBRs.

- Promote Economic Efficiency in Rate Design – Negative

  The price does not vary with expected or actual market conditions. The price offered tends to reflect average costs more than marginal costs which creates inefficient price signals from the utility to the customer. The last blocks of the rate normally exceed the utility's marginal costs in nearly all hours of the year.

- Promote Peak Load Reduction and Load Shifting – Negative

  IBRs do not promote efficient use of energy by reducing peak demands on the system or using energy at less expensive times of the day. Customers are not compensated or provided a benefit for reducing demand during the system peak hours of the year.

- Support Efficient Use of Energy – Neutral

  In the short-term and based on the definition utilized here, IBR provides positive support to efficient use as the value or rate associated with reduced usage resulting from energy efficiency measures is highest in the higher blocks, the blocks where the reduction is likely to manifest itself. This support is not cost based and as rates in IBR structures increase over time, reductions in use will increase the cost per kWh in all blocks. An IBR design will typically subsidize low usage customers at the expense of larger customers and provide less energy savings in the first block for a given energy efficiency investment.

- Provide Customer Value & Satisfaction – Negative

  An IBR provides little value to a customer other than promoting the concept that using less at any time during the summer, and possibly the winter, is better. Customers cannot change usage behaviors and save the utility and themselves money without reducing comfort.

- Provide Rate & Bill Simplicity – Positive

On an IBR, customers generally understand that using less will result in a cost savings, particularly for lower-use customers, however the expected level of savings is unknown depending on which block they fall into.

- Support Cost Effective Electric Space Heating and Other Non-Summer Use – Neutral

  Even when used with seasonal pricing, implementing an IBR will not support cost effective non-summer use, such as electric space heating or other forms of beneficial and cost-effective electrification.

- Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use – Negative

  An IBR does not support cost effective off-peak use, such as EV charging. Having the same set of rates for all hours sends the signal to customers that charging during the peak is the same as off-peak and could cause overloads on distribution equipment and increases in system peak demand. Additionally, if EV customers are on an IBR their EV usage will likely fall into the higher rate blocks which will cost them more and discourage efficient electrification.

- Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions – Negative

  An IBR does not support equitable cost recovery under low consumption, such as with DG. Under an IBR, there is no means to identify the customers demand on the system. As nearly all costs are in the energy charge, a DG customer might avoid paying their fair share of the distribution system or generation costs, with those costs being shifted to other rate payers. A mandatory IBR with net metering would only magnify the subsidization impacts of net metered DG.

- Metering and Billing Capability – Positive

  The metering and billing systems currently being developed and implemented will be able to meter and bill IBR without any significant modifications.

- Overall Recommendation

  An IBR is not an efficient rate design and it does not promote cost efficient forms of electrification such as EV, elimination of DG subsidization, load management, and preservation of revenue and bill stability. Efficient load growth and increased energy usage provides positive benefits to the utility and its customers, and should not necessarily be discouraged simply for the sake of using less electricity. If an IBR is made mandatory by either MPSC or KCC, then KCP&L should work towards limiting the magnitude of the inclining differential and work toward offering other rates that could replace the IBR and are consistent with the utility's rate design goals and business objectives.

## 4.5 Demand Rates

- General Description

Residential demand rates vary in structure, but generally include an energy charge and demand charge which can both differ by season. The demand charge seeks to identify and bill the maximum grid capacity demanded by the customer rather than through a volumetric consumption charge. As most of the energy grid is constructed to serve the capacity demanded from customers, proponents believe the demand rate design is better aligned with ratemaking principles.

- Provide Revenue Stability and Sufficiency – Positive

Revenues and bills increase with greater usage levels, which are affected by weather and economic conditions. Weather normalized demand and energy rate designs will benefit the customer and harm the utility in cooler years and provide an opposite effect in warmer years but much less so than a traditional flat energy rate or IBR. As long as opt-in demand rates are designed to be revenue neutral based on load research data, customers and the utility should see only a small change to revenue from customers who self-select the demand rate without a change in behavior. If customers shift loads, the utility will observe reduced revenues, but some portion of that might be offset by avoided future generation investment due to peak demand avoidance.

- Promote Economic Efficiency in Rate Design – Positive

According to recent class cost of service studies, approximately 80% of KCP&L's costs are fixed while 90% of the revenues are recovered by variable charges. Recovering a portion of the utilities cost through a monthly demand charge is far more efficient than a traditional flat energy rate alone with or without a block rate. By instituting a Residential demand charge of some level into the rate structure, the utility will begin to align is cost structure with its rate structure.

- Promote Peak Load Reduction and Load Shifting – Positive

Peak demand rates or load management rates have been shown to reduce customers' peak load during the on-peak periods. Many utilities across the United States have had peak demand rates and have seen demand reduction from those rates. Arizona Public Service (APS) has had demand rates for nearly 40 years and customers on the Demand-TOU rate reduce their peak demand between 11 to 21% when compared to an IBR customer[32]. Additionally, a demand rate could be coupled with a TOU energy rate, as opposed to flat energy rate. This will further help shift energy usage to off-peak time periods.

- Support Efficient Use of Energy – Positive

  Residential demand rates will incentivize the utility to promote energy efficiency. Utilities will be more inclined to support energy efficiency programs if revenues are not dependent on customer usage alone. By designing a rate that reflects the way the utility incurs its costs the customer will utilize the utility's resources in a more efficient manner by reducing energy usage during the peak and shifting usage to low cost off-peak periods, benefiting the customer and the utility.

- Provide Customer Value & Satisfaction – Positive

  A demand rate will better reflect the split between fixed and variable costs for the utility and ensure that customers' changes in consumption behavior will directly affect their bills. Residential customers will be able to choose the rate that best meets their energy needs.

- Provide Rate & Bill Simplicity – Positive

  A simple demand rate has been widely adopted by utilities and customers across the United States. KCP&L has conducted customer focus group research and found that customers, when briefly educated, can understand demand rates and their applications. APS has had on-peak demand rates for many years and has good success with customers adopting and using these rates to reduce demand. A demand rate was presented to KCP&L customer focus groups in the October 2016 Customer Advisory Panel survey and customers felt that they understood the educational videos and information.

- Support Cost Effective Electric Space Heating and Other Non-Summer Use – Positive

  When used with seasonal pricing, a demand rate can be designed to provide a cost-effective means for all customers to utilize non-summer use, including electric space heating. Some utilities, such as Midwest Energy in Kansas, have an optional demand rate with a summer peak demand and partial year-round ratchet. This rate, which has lower energy charges, provides an effective means for controlling peak demand while providing cost based electric space heating.

- Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use – Positive

[32] Leland Snook, *http://www.omlaw.com/uploads/docs/Fortnightly.pdf*, Public Utilities Fortnightly, November 2015

A rate comprised of an on-peak demand rate and possibly an off-peak partial ratchet can support cost based non-peak use, such as EV charging. By implementing an on-peak demand charge with a lower monthly energy charge, higher load factor customers will be benefited by charging during off-peak time periods as opposed to on-peak periods.

- Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions – Positive

  Demand rate designs, as the name states, include provisions to identify the customers demand on the system. Thus, the demand rate is well positioned to equitably assign the cost of the distribution system or generation costs, without those costs being shifted to other rate payers. In low consumption scenarios, such as customers with DG, it is important that all customers pay their fair share of the cost of being connected to the electric utility grid. All customers are relying on the utility’s generation, transmission, and distribution assets and the rate design should recognize this fact. A flat energy rate, IBR, DBR, or even TOU energy rate when used for a DG customer, particularly with net metering, will allow the DG customer to avoid some portion of the cost to serve and those costs will be shifted to others. It will be important for all future DG customers to be on some form of demand rate to pay for a portion of the fixed infrastructure required to serve DG customers.

- Metering and Billing Capability – Positive

  The metering and billing systems currently being developed and implemented should be able to meter and bill demand rates. However, as a demand rate is currently not used for the Residential class, a specific implementation project will be required to configure and test the rate within the billing system and ensure the related systems communicate properly.

- Overall Recommendation

  Demand rates have been available for KCP&L commercial customers for many years and can be based on the maximum on-peak demand, non-coincident peak (NCP) demand, or some form a demand ratchet. On-peak demand rates enable the utility to recover the cost of its distribution system or generation system based on capacity instead of energy and promote efficient use of the utility’s assets by providing lower cost service to high load factor customers. KCP&L has offered Residential demand rates in the past and other utilities in Kansas, such as Westar and Midwest Energy, currently offer optional Residential demand rates to their retail customers. Additionally, at the beginning of 2016 over 10 percent of APS's Residential customers have chosen to be on the optional Demand-TOU rate[33].

With the deployment of AMI meters to residential customers, it is now becoming more practical to offer up this option to a broader customer base. KCP&L should implement an optional demand rate, at a minimum, in each utility jurisdiction as soon as technically possible. An optional demand and energy rate will help support KCP&L's long term rate design goals regarding load management, efficient rate designs, and support cost based rates for future DG customers. A demand rate option should be mandatory for any future Residential customer installing a DG system in Kansas and potentially in Missouri if allowed under future statutes and regulations. The demand rate was identified in a recent potential study for KCP&L's integrated resource planning as a feasible demand-side rate option. As a demand-side option, KCP&L should explore implementing the demand rate as a program in its MEEIA program portfolio.

## 4.6 TOU Energy Rate

- General Description

TOU energy rates contain prices that vary across the hours of the day. These rates are fixed within a TOU period and do not respond to changing system conditions. The primary motivation for TOU rates is that electricity costs vary across the hours of the day in reasonably predictable ways. By establishing different rates for different periods of the day, it is possible for rates to be more reflective of average differences in the cost to serve. TOU rates provide customers with an incentive to reduce peak-period usage by shifting it to lower-cost hours. TOU rates are traditionally offered as an opt-in rate and are generally more successful when heavily marketed.

- Provide Revenue Stability and Sufficiency – Neutral

Revenues and bills increase with greater usage levels, which are affected by weather and economic conditions. TOU rates are designed to be revenue neutral based on typical load patterns. Customers and the utility should see only a small change to revenue from customers who select the TOU rate and don't alter their behavior versus a default flat rate. If customers shift usage to lower cost periods, the utility will lose revenues, but may also reduce its energy costs at specific times of the day to potentially avoid higher energy costs and possibly future generation investment due to peak demand avoidance.

- Promote Economic Efficiency in Rate Design – Positive

[33] Leland Snook, *http://www.omlaw.com/uploads/docs/Fortnightly.pdf*, Public Utilities Fortnightly, November 2015

TOU energy rates that are designed to recover the marginal cost of market energy, the fixed cost of generation, fixed cost of transmission, and fixed cost of distribution by time of day and season are far more efficient than a traditional blocked energy rate. By recovering the utility's costs over the hours in which costs are associated, the utility comes closer to providing a direct cost causality relationship to retail electricity customers.

- Promote Peak Load Reduction and Load Shifting – Positive

TOU energy rates have been shown to reduce peak load during the on-peak pricing periods and shift load to lower price periods. More recently, KCP&L's Smart Grid pilot project[34] demonstrated that customers who chose to participate in the TOU rate program responded by shifting their load to lower cost off-peak hours. The response is dependent upon the TOU energy price differential and duration of time period.

- Support Efficient Use of Energy – Neutral

Customers seeking savings from energy efficiency or demand reduction measures are provided an opportunity to recognize those savings during specific, high cost periods, maximizing the benefit for the customer, and if properly designed, the utility as well.

- Provide Customer Value & Satisfaction – Positive

A TOU rate can provide higher value and satisfaction to customers who elect to choose a TOU opt-in rate and shift their usage in-order to save money on their electric bill. Based on Customer Advisory Panel surveys conducted by KCP&L in May 2016, customers are interested in capturing the value of a TOU rate for various purposes such as off-peak EV charging and other activities that can be done during off-peak time periods which will save customers money.

- Provide Rate & Bill Simplicity – Neutral

Simple seasonal TOU rate consisting of two or three periods have been widely adopted by utilities and customers across the United States. The KCP&L Customer Advisory Panel customer focus group research completed in May 2016 found that customers, when educated, felt that they understood price levels of a TOU rate to change their behavior. Customers surveyed, felt that the three-period TOU rates presented were understandable, when supported with educational videos and information.

[34] KCP&L Green Impact Zone SmartGrid Demonstration Project Final Technical Report, version 2.0, dated May 22, 2015. Available at: https://www.smartgrid.gov/files/OE0000221_KCPL_FinalRep_2015_04.pdf

- Support Cost Effective Electric Space Heating and Other Non-Summer Use – Neutral

  An optional TOU energy rate should not have a significant impact on KCP&L providing cost effective energy for non-summer loads such as electric space heating. A TOU energy rate offered during the winter months would better reflect the marginal cost of energy and would provide customers with lower cost off-peak heating if customers chose to pre-heat homes during the off-peak hours with cheaper off-peak market energy. The incentive to control system peak demand today is not as critical during the winter months as it is in the summer months.

- Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use – Positive

  A TOU rate will be very important for supporting cost effective non-peak energy use, such as EV charging. As noted above, a TOU rate will help customers cost effectively charge during off-peak periods and reduce distribution system overloads and increased contributions to the system peak demand.

- Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions – Negative

  A TOU energy rate alone does not support equitable cost recovery under low consumption, such as with DG, however it can be part of the DG rate solution if designed well. If a TOU on-peak rate is set to recover the utility's peaking generation cost during the on-peak period of 4 pm and 8 pm only a portion of the solar energy generation will be available to offset the utility's peaking generation cost and the customer's more expensive on-peak usage. To be effective at minimizing other cost shifts, a DG customer on TOU would also need to have a demand charge to recover fixed system investments.

- Metering and Billing Capability – Positive

  The future metering and billing systems should be able to meter and bill TOU energy rates. A specific implementation project will be required to configure and test the TOU energy rate within the billing system and ensure the related systems communicate properly.

- Overall Recommendation

  KCP&L should implement an optional TOU energy rate in each utility jurisdiction as soon as technically possible. An optional TOU energy rate will help support KCP&L's long term rate design goals regarding load management, efficient rate designs and will promote efficient system adoption of EV charging. The TOU energy rate was identified in a recent potential study for KCP&L's integrated resource planning as a feasible demand-side rate option. As a demand-side option, KCP&L should explore implementing the TOU energy rate as a program in its MEEIA program portfolio.

## 4.7 TOU Energy and Demand Rate

- General Description

  Rates that include both a TOU energy and demand component contain prices that vary across the hours of the day and provide nearly all of the same benefits as a TOU rate or demand rate do on a standalone basis. These rates are fixed within a TOU period and do not respond to changing system conditions. The primary motivation for TOU energy and demand rates is that electricity costs vary across the hours of the day in reasonably predictable ways. By establishing different rates for different periods of the day, it is possible for rates to be more reflective of average differences in the cost to serve. TOU energy and demand rates provide customers with an incentive to reduce peak-period usage by shifting it to lower-cost hours. TOU rates are traditionally offered as an opt-in rate and are generally more successful when supported by educational efforts and general marketing promotion.

- Provide Revenue Stability and Sufficiency – Positive

  Revenues and bills increase with greater usage levels, which are affected by weather and economic conditions. So long as opt-in TOU energy and demand rates are designed to be revenue neutral based on typical load patterns, customers and the utility should see only a small change to revenue from customers who select the TOU, but do not change their behavior. If customers shift usage to lower cost periods, the utility will lose revenues, but may also reduce its energy costs at specific times of the day by avoiding higher energy costs and possibly future generation investment due to peak demand avoidance.

- Promote Economic Efficiency in Rate Design – Positive

  TOU energy and demand rates that are designed to recover the marginal cost of market energy, the fixed cost of generation, fixed cost of transmission, and fixed cost of distribution by time of day and season are far more efficient than a traditional blocked energy rate. By recovering the utility’s costs over the hours in which costs are associated, the utility is providing a direct cost causality relationship to retail electricity customers.

- Promote Peak Load Reduction and Load Shifting – Positive

TOU energy and demand rates have been shown to reduce peak load during the on-peak pricing periods and shift load to lower price periods. More recently, KCP&L's Smart Grid pilot project[35] demonstrated that customers who chose to participate in the TOU rate program responded by shifting their load to lower cost off-peak hours. The response is dependent upon the TOU energy price differential and duration of time period.

- Support Efficient Use of Energy – Positive

  Customers seeking savings from energy efficiency or demand reduction measures are provided an opportunity to recognize those savings during specific, high cost periods, maximizing the benefit for the customer, and if properly designed, the utility as well.

- Provide Customer Value & Satisfaction – Positive

  A TOU energy and demand rate can provide higher value and satisfaction to customers who elect to choose a TOU opt-in rate and shift their usage in-order to save money on their electric bill. Based on customer surveys conducted by KCP&L, customers are interested in capturing the value of a TOU rate for various purposes such as off-peak EV charging and other activities that can be done during off-peak time periods which will save customers money.

- Provide Rate & Bill Simplicity – Neutral

  Simple seasonal TOU rate structures consisting of energy and demand have been adopted by utilities and customers across the United States. KCP&L has conducted customer focus group research and found that customers, when educated, can easily understand price levels of a TOU rate to change their behavior. The three-part TOU energy and demand rates presented to customers in KCP&L focus groups were easily understood when supported with educational videos and information.

- Support Cost Effective Electric Space Heating and Other Non-Summer Use – Neutral

  An optional TOU energy and demand rate should not have a significant impact on providing cost effective energy to non-summer loads such as electric space heating. A TOU energy and demand rate offered during the winter months would better reflect the marginal cost of energy and would provide customers with lower cost off-peak heating if customers chose to pre-heat homes during the off-peak hours with cheaper off-peak market energy. The need to control system peak demand today is not as critical during the winter months as it is in the summer months.

[35] KCP&L Green Impact Zone SmartGrid Demonstration Project Final Technical Report, version 2.0, dated May 22, 2015. Available at: https://www.smartgrid.gov/files/OE0000221_KCPL_FinalRep_2015_04.pdf

- Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use – Positive

  A TOU rate, with or without demand, will be very important for supporting the adoption of cost effective non-peak use, such as EV charging. As noted above, a TOU rate will help to provide a cost based rate to customers who charge during off-peak periods and reduce distribution system overloads and increased contributions to the system peak demand. To protect against off-peak overloads, some form of off-peak partial demand charge may be beneficial.

- Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions – Positive

  A TOU energy and demand rate can support equitable cost recovery under low consumption, such as DG. If a TOU on-peak rate is set to recover the utility's peaking generation cost during the on-peak period of 4 pm and 8 pm, only a portion of the solar energy generation will be available to offset the utility's peaking generation cost and the customer's more expensive on-peak usage. Inclusion of the demand charge will ensure equitable recovery of fixed costs typically avoided by DG customers under the existing two-part rate design.

- Metering and Billing Capability – Positive

  The future metering and billing systems should be able to meter and bill TOU energy and demand rates. A specific implementation project will be required to configure and test the TOU energy and demand rate within the billing system and ensure the related systems communicate properly.

- Overall Recommendation

  KCP&L should implement an optional TOU energy and demand rate in each utility jurisdiction as soon as technically possible. An optional TOU energy and demand rate will help support KCP&L's long term rate design goals regarding load management, efficient rate designs, and will promote efficient system adoption of EV charging as well as support equitable distributed generation for those customers that elect to do both DG and EV. Both TOU energy rates and demand rates were identified in a recent potential study for KCP&L's integrated resource planning as feasible demand-side rate options. As a demand-side option, KCP&L should explore implementing the TOU energy and demand rate as a program in its MEEIA program portfolio.

## 4.8 Dynamic Pricing

- General Description

  Dynamic pricing rates are designed to reflect the actual cost of electricity during specific hours of the day and year and change customers' hourly load shapes with reductions in peak demand or shifts in peak usage to other hours of the day. These rates can include CPP, PTR, VPP, and RTP rates. For the purpose of this study, evaluation will be limited to these four rates.

CPP rates are designed to charge a significantly higher price during system peak hours which can be up to 10 times as high as the average $/kWh price. A PTR typically includes a large negative $/kWh during the peak time and provides a customer a credit on their bill for reducing usage over a baseline amount. A VPP rate changes with expected system conditions and may consist of three sets of summer TOU rates for cool days, medium days, and hot days. RTP rates can have a portion of the rate that is flat with a portion that varies directly based on the wholesale hourly.

- Several utilities in the Midwest, such as Oklahoma Gas & Electric (OG&E), have implemented CPP and VPP rates for Residential customers and have experienced penetration rates as high as 16 percent[36] by aggressively marketing the rates to their customers. Commonwealth Edison, located in Illinois, is the closest regional utility that has offered RTP to Residential customers and has approximately 10,700 of its 3.8 million customers participating which is less than 1 percent of all customers[37].
- Revenue Stability and Sufficiency – Neutral

  Revenues and bills increase with greater usage levels, which are affected by weather and economic conditions. So long as opt-in dynamic rates are designed to be revenue neutral based on typical load patterns, customers and the utility should see only a small change to revenue from customers who self-select the dynamic rate without a change in behavior. If customers shift usage to lower cost periods, the utility will reduce revenues, but may also reduce its energy costs at specific times of the day by avoiding higher energy costs and possibly future generation investment due to peak demand avoidance.
- Promote Economic Efficiency in Rate Design – Positive

  Dynamic rates that are designed to recover the marginal cost of market energy, the fixed cost of generation, fixed cost of transmission, and fixed cost of distribution by time of day and season are far more efficient than a traditional blocked energy rate. By recovering the utility's costs over the hours in which costs are associated, the utility is providing a direct cost causality relationship to retail electricity customers.

[36] OG&E FERC Form 1 2015
[37] Robert Walton, www.utilitydive.com/news/comed-real-time-pricing-delivers-15m-in-customer-savings, May 2016

- Promote Peak Load Reduction and Load Shifting – Positive

  Dynamic rates have been shown to reduce peak load during the on-peak pricing periods and shift load to lower price periods. Many studies have been completed that demonstrate that customers who participate in dynamic pricing programs will respond by shifting usage off on-peak time periods.

- Support Efficient Use of Energy – Neutral

  Customers seeking savings from EE or DR measures are provided an opportunity to recognize those savings during specific, high cost periods, maximizing the benefit for the customer, and if properly designed, the utility as well.

- Provide Customer Value & Satisfaction – Positive

  A dynamic rate can provide higher value and satisfaction to customers who elect to choose an opt-in rate and shift their usage to save money on their electric bill. Based on customer surveys conducted by KCP&L, customers are interested in capturing the value of a time base rate for various purposes that can save customers money.

- Provide Rate & Bill Simplicity – Negative

  Dynamic rates have been implemented by some utilities both as pilot programs and as a rate option. Dynamic rates are more complex in nature and are normally coupled with some type of enabling technology or notification system for customers to adequately respond to CPP, VPP, and PTR rates. While dynamic rates are more complex, this does not appear to deter customers from participating. OG&E rate has nearly 1 in 6 Residential customers participating on either a VPP or TOU with CPP rate[38].

- Support Cost Effective Electric Space Heating and Other Non-Summer Use – Neutral

  Dynamic pricing rates alone do not support cost based non-summer use, such as electric space heating, however, dynamic rates could be combined with the existing rates or some other form of seasonal demand rate to provide that support.

- Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use – Neutral

[38] OG&E FERC Form 1 2015

Dynamic pricing rates alone do not support cost based non-peak use, such as EV charging and other forms of beneficial electrification, however, dynamic rates could be combined with a TOU rate similar to OG&E's Residential TOU with CPP rate.

- Support Equitable Cost Recovery from Distributed Generation and Other Low Use Conditions – Negative

  A dynamic rate alone does not support equitable cost recovery under low consumption, such as with DG, however it can be part of the solution. If a dynamic rate such as a CPP is designed to recover the utility's peaking generation cost, only a portion of the solar energy generation will be available to offset the utility's peaking generation cost and the customer's more expensive CPP usage. To be effective at limiting cost shifts, a demand charge should be part of the customer rate.

- Metering and Billing Capability – Negative

  The future metering and billing systems may have the functionality to meter and bill RTP, CPP and VPP rates, however, substantial efforts would be required to implement and administer these dynamic pricing rates in the new CIS and MDM systems. Implementing a Residential dynamic rate that is available to all customers will potentially take longer and/or cost more than implementing other time variant rates.

- Overall Recommendation

  KCP&L should not consider implementing dynamic pricing rates such as RTP, CPP, VPP, or PTRs at this time. The CIS and MDM systems are not currently being developed to support dynamic rate structures and implementing and testing these types of rates will take more time than a traditional TOU rate or demand rate. The TOU rate or demand rate can be implemented more easily and provide similar peak demand reduction benefits to dynamic rates.

## 4.9 Rate Design Qualitative Evaluation Summary

Table 4-1 presents the qualitative evaluation rankings of each of the rate options considered within this section.

**Table 4-1: Rate Design Qualitative Summary**

| KCP&L Rate Design Goals | Flat Energy Rate | Declining Block Rate | Inclining Block Rate | Demand Rate | TOU - Energy Rates | TOU - Energy + Demand Rates | Dynamic Rates VPP / CPP / PTR | Real Time Pricing |
|---|---|---|---|---|---|---|---|---|
| Provide Revenue Stability and Sufficiency | NEUTRAL | POSITIVE | NEGATIVE | POSITIVE | NEUTRAL | POSITIVE | NEUTRAL | NEUTRAL |
| Promote Economic Efficiency in Rate Design | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE |
| Promote Peak Load Reduction and Load Shifting | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE |
| Support Efficient Use of Energy | NEUTRAL | NEGATIVE | NEUTRAL | POSITIVE | NEUTRAL | POSITIVE | NEUTRAL | NEUTRAL |
| Provide Customer Value & Satisfaction | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE |
| Provide Rate & Bill Simplicity | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | NEGATIVE | NEGATIVE |

| KCP&L Other Goals | Flat Energy Rate | Declining Block Rate | Inclining Block Rate | Demand Rate | TOU - Energy Rates | TOU - Energy + Demand Rates | Dynamic Rates VPP / CPP / PTR | Real Time Pricing |
|---|---|---|---|---|---|---|---|---|
| Support Cost Effective Electric Space Heating and Other Non-Summer Use | NEGATIVE | POSITIVE | NEUTRAL | POSITIVE | NEUTRAL | POSITIVE | NEUTRAL | NEUTRAL |
| Support Cost Effective Electric Vehicle Charging and Other Off-Peak Use | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | POSITIVE | POSITIVE | NEUTRAL | NEUTRAL |
| Support Equitable Cost Recovery From Distributed Generation and Other Low Use | NEGATIVE | NEGATIVE | NEGATIVE | POSITIVE | NEGATIVE | POSITIVE | NEGATIVE | NEGATIVE |
| Metering and Billing Capablility | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | POSITIVE | NEGATIVE | NEGATIVE |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Recommended | Limited | Limited | No | Yes | Yes | Yes | No | No |

As depicted in the table, KCP&L should work towards implementing several of the rate structures considered in the near term while other rate options should be limited in the future or not implemented at this time.

- Flat Energy Charges – Work towards gradually limiting availability of the existing flat energy rate for customers and move towards rates that reflect the utility's cost and provide an efficient rate design. Use of flat energy rate designs should be limited to low load customers.
- Declining Block Rates – Work towards gradually limiting the availability of winter DBR structures for existing and future customers and move towards rates that reflect the utility's cost structure which include both demand rates and TOU rates.
- Inclining Block Rates – Work toward eliminating IBR used for Residential customers. KCP&L should pursue rate designs that better align with a greater range of rate design principles. As with the flat and declining blocks, KCP&L should move towards rates that better reflect the utility's cost structure which include both demand rates and TOU rates.
- Demand and Energy Rates – Implement a new optional demand rate for Residential customers. If possible, the demand rate option should be mandatory for future DG customers in Kansas. Residential customers with higher peak demands in both Kansas and Missouri should be transitioned to the demand rate over time. Although approaches could vary, Residential demand charges should be set to recover both production and distribution fixed costs to the extent practical.

- TOU Energy Rates – Implement a TOU energy rate to support EV advancement and other beneficial forms of off-peak electric energy usage throughout the year.
- TOU Energy + Demand Rates – Implement TOU energy + demand rates to support all forms of beneficial off-peak and non-summer energy usage including electric space heating and EV charging. A TOU energy + demand rate option should be mandatory for future DG customers who choose TOU in Kansas. Although approaches could vary, Residential demand charges should be set to recover both production and distribution fixed costs to the extent practical.
- Dynamic Pricing Rates – Do not implement other dynamic rates, such as CPP, VPP, or PTR at this time. Dynamic rates could be justified at a later date when the value of peak demand avoidance is greater to the utility and when Company systems are able to meter and bill the rates.
- Real-Time Pricing – Do not implement RTP at this time. The realizable benefits that are achieved from a RTP rate are not believed to be significant for the Residential class, however, it could be in the future.

# 5.0 RATE DESIGN DEVELOPMENT

## 5.1 Conceptual Rate Designs and Rate Transition Plan

KCP&L intends to offer rates that support its long-term rate design and business objectives. These rates may reflect change from existing rates, and where practical, should be offered as optional rates initially, while existing rates that are not consistent with the utility's long-term rate design strategy should be phased out gradually. This makes way for new rates to be marketed and implemented, initially through a pilot program, for existing and future customers. This may include freezing and then eliminating rates or otherwise limiting rates availability. The timing of new rate implementations in each jurisdiction will vary based on KCP&L's meter deployment, regulatory filings, IT capabilities, and other external considerations such as statutory limitations around net metering in Missouri. The basic components of the recommended long term KCP&L Residential rate transition plan derived from interviews of KCP&L internal stakeholders and working groups is provided below. For this study, four incremental planning steps were established:

- Current – The existing rate design configuration and rate options available for each jurisdiction.
- Step One (1) – Represents the actions to consider for the next general rate case to establish a pilot study for each jurisdiction. The optional rates should be marketed to all Residential customers through a small rollout and initially made available to a limited number of GMO's Residential GU and SH customers balanced in proportionate to the number of GU and SH customers.
- Step Two (2) – Represents the actions to consider in a following general rate proceedings for each jurisdiction, taking into consideration results and analysis from the pilot study and verifying the appropriateness and feasibility of proceeding to Step 3.
- Step Three (3) - Represents the actions to consider in a subsequent general rate proceeding, after the successful deployment of the rates in Step 2, and after all internal system implementations are completed and stabilized.

The basic tenants of the long-term residential rate transition plan for each utility jurisdiction, as developed by the KCP&L internal stakeholders and working groups, is presented in the following table.

**Table 5-1: KCP&L Residential Rate Transition Plan**

| Rate Option | Current | Step 1 | Step 2<br>*Pending Pilot Results* | Step 3<br>*Pending Pilot Results* | Notes |
|---|---|---|---|---|---|
| General Use Rate | Available | Available | Available and Cap | Available and Cap | Step 2 - Optional for all customers under a threshold.<br>Step 2 - Cap rate to users under a threshold (<30,000 kWh/year, 25 kW cap).*<br>Sept 3 - Reduce cap to smaller usage customers (<9,000 kWh/year, 7.5 kW cap). |
| Electric Space Heating Rate | Available | Available | Freeze | Unavailable | Step 2 - Freeze SH rate short term.<br>Step 2 - Give all customers option for Demand Rate.<br>Step 3 - Eliminate SH class long term. |
| Optional Demand Rate<br>(Optimal Rate for Space Heating) | Unavailable | Available (Pilot) | Available | Available | Step 1 - Optional for a limited number of customers.<br>Step 2 - Optional for all customers.<br>Step 2 - Demand Rate offered to new SH customers (revenue neutral).<br>Step 3 - Move all existing SH customers to this rate long term. |
| Optional TOU Energy Rate<br>(Optimal Rate for Electric Vehicle) | Unavailable | Available (Pilot) | Available | Available | Step 1 - Optional for a limited number of customers.<br>Step 2 - TOU Energy marketed to EV customers.<br>Step 2 - Cap rate to users under a threshold (<30,000 kWh/year, 25 kW cap).<br>Step 3 - Reduce cap to smaller usage customers (<9,000 kWh/year, 7.5 kW cap). |
| Optional TOU Energy and Demand Rate<br>(Optimal Rate for Space Heating and Electric | Unavailable | Available (Pilot) | Available | Available | Step 1 - Optional for a limited amount of customers.<br>Step 2 - Optional for all customers.<br>Step 2 - TOU Energy and Demand Rate marketed to EV + SH customers.<br>Step 3 - Offer as the default TOU rate for all new customers. |

[1] All existing and future rates will have seasonality.
[2] Steps 1, 2, and 3 will depend on regulatory support and technical capabilities in each jurisdiction.
[3] Step 1 (Pilot Study) results will validate and refine future steps in each utility jurisdiction.
[4] New demand + energy rate plan is revenue neutral to electric space heating customers and general use customers.
[5] These caps were selected as a reasonable initial design as they are similar to those used within the GMO SGS class to distinguish the transition between non-demand and demand rates. The 25kW limit also has relevance within the distribution network where the 25kW size is perceived to match the common size for distribution transformation for these customers. The additional terms (9,000 kWh and 7.5kW) were established to support further reduction of the limits and were derived from a review of load factors for Residential customers.

The plan presented above is provided to outline the transition expected to implement the new rate designs and to provide support that the rate designs are achievable. These conceptual rate designs and transition plans will serve as only <u>one input</u> into the many considerations that must be evaluated in the design of new rates for each of KCP&L's three utility jurisdictions. Within KCP&L-Kansas, KCP&L-Missouri, and GMO there are specific regulatory issues, customer characteristics, and rate design challenges that will need to be addressed before a final proposal may be offered as part of general rate proceeding.

## 5.2 Residential Service Rate Designs and Planned Transitions

The following section details how the rate transition plan might be put into action, detailing the relationship between the rate design options and the expected utilization of each. As noted previously, these are conceptual plans and optional rate options. Actual implementation details will be defined at a future date as part of a future general rate proceeding.

### 5.2.1 General Use Rate

The existing GU rate is assumed to remain in place within each utility jurisdiction and will become the new standard rate offering. The GU Rate will remain available to all customers in Step 1, but will then transition from the Residential GU rate used for most customers, to a limited use rate, in Steps 2 and 3. It will initially be limited to customers with an average usage of less than 30,000 kWh per year or an annual peak of less than 25 kW with the threshold lowered over time[39]. In Step 2, the GU Rate will be the default plan for new Residential GU customers and will not be available to DG customers in Kansas. In Steps 2 and 3, Kansas DG customers will be placed on one of the new Demand Rate plans provided a specific DG rate can be approved for use.

### 5.2.2 Electric Space Heating Rate

In Step 1, the SH rate will remain available to all customers as it currently is today. In Step 2, the existing SH Rate class for each utility is assumed to be frozen for each utility jurisdiction and will only be available to existing SH customers. All existing two-meter water and space heating rates are assumed to be discontinued in Step 3 when an appropriate replacement rate design can be deployed. Customers would be placed on an appropriate single meter rate so that the entire usage at the premise can be service under the replacement rate. All new SH customers will be offered either the existing GU Rate, if they are under the applicable usage limits, or one of the three new rate plans. The Demand Rate will be promoted as the recommended rate for new SH customers and will result in a revenue that is neutral to the existing SH Rate.

### 5.2.3 Demand Rate

In Step 1, the Demand Rate would be available to a limited number of Residential customers in the pilot program, and is designed to be revenue neutral to both Residential GU and SH customers. Although customers could select other rates, the Demand Rate would provide SH customers a lower cost rate than the GU Rate. Steps 2 and 3 would provide the opportunity for any customer to select the Demand Rate. The Demand Rate consists of a seasonal flat energy charge and seasonal monthly on-peak demand charge. Although approaches could vary, the demand charges for GMO and KCP&L MO developed in this study are set to recover the company's cost of generation and distribution with the energy charges set to recover energy and transmission costs. KCP&L KS demand charge rates prepared early on in this study were conceptually designed to only recover system distribution costs as an interim step, however could be modified to recover fixed production costs like those proposed for KCP&L MO and GMO.

### 5.2.4 TOU Energy Rate

In Step 1, the TOU Energy Rate would be available to a limited number of Residential customers in the pilot program. It is designed to be revenue neutral to the existing Residential GU customers in each utility

[39] These limits were selected as a reasonable initial design as they are like those used within the GMO Small General Service class to distinguish the transition between non-demand and demand rates. The 25kW limit also has relevance within the distribution network where the 25kW size is perceived to match the common size for distribution transformation for these customers. The additional terms (9,000 kWh and 7.5kW) were established to support further reduction of the limits and were derived from a review of load factors for Residential customers.

jurisdiction and would be made available to all Residential customers in Steps 2 and 3 who are under the annual usage and peak demand thresholds. The TOU Energy Rate is designed to recover the utility's cost during the hours in which those costs are allocated. The various generation costs are allocated to super off-peak, off-peak, and peak energy by season. Transmission costs are allocated to off-peak and peak energy periods by season. The distribution costs are allocated to all energy by season. The weighted average energy costs by season and time period are used to build up the energy cost portion of the TOU energy rate. KCP&L Kansas is assumed to continue to recover its energy costs through the energy cost adjustment (ECA) rider, however, a TOU ECA could be considered in the future. For each jurisdiction, a three period TOU rate structure was assumed.

### 5.2.5 TOU Energy and Demand Rate

In Step 1, the TOU Energy and Demand Rate would be available to a limited number of Residential customers in the pilot program. It is designed to be revenue neutral to the existing Residential GU customer in each utility jurisdiction and would be made available to all Residential customers in Steps 2 and 3. The rate is designed to recover the utility's cost during the hours in which those costs are allocated. Transmission costs are allocated to on-peak energy periods by season. The weighted average energy costs by season and time period are used to build up the TOU energy portion of the rate. Although approaches could vary, the demand charges for GMO and KCPL MO developed in this study are set to recover the company's cost of generation and distribution with an adjustment to achieve revenue neutral bills for GU and SH customers. KCP&L KS demand charge rates prepared early on in this study were conceptually designed to only recover system distribution costs as an interim step, however could be modified to recover fixed production costs similar to those proposed for KCP&L MO and GMO.

## 5.3 Existing and Optional Rate Designs

The existing rates and optional rates developed for each jurisdiction are presented in the tables below. The optional rates for each jurisdiction were designed based on the general principles summarized above. Rates were designed and tested with calendar year 2015 load research data sets with the goal of generating revenue neutral rates for both Residential GU and SH customers. Not all of the optional rates achieved revenue neutral bills for each customer load profile and type. Modifications were made where appropriate to limit the potential increase or decrease to both the GU class and SH class customers. For consistency between rate options, certain provisions such as customer charges were held constant across rate options. All new optional rates were designed to maintain seasonality in the rate structure and remove DBR structures in the winter months.

## Table 5-2: GMO - Optional Residential Rate Designs

| Existing | | Existing | | New | | New | | New | |
|---|---|---|---|---|---|---|---|---|---|
| General use Rate | | Space Heating Rate | | Optional Demand Rate | | Optional TOU Energy Rate | | Optional TOU Energy + Demand Rate | |
| | Price | | Price | | Price | | Price | | Price |
| Customer Charge ($/mo) | $10.43 | Customer Charge ($/mo) | $10.43 | Customer Charge ($/mo) | $10.43 | Customer Charge ($/mo) | $10.43 | Customer Charge ($/mo) | $10.43 |
| | | | | | | | | | |
| Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | |
| Summer | $0.121 | Summer | $0.121 | Summer | $0.037 | Summer Peak | $0.302 | Summer Peak | $0.101 |
| | | | | | | Summer Off Peak | $0.107 | Summer Off Peak | $0.031 |
| | | | | | | Summer Super Off Peak | $0.046 | Summer Super Off Peak | $0.017 |
| Winter, up to 600 | $0.106 | Winter, up to 600 | $0.106 | Winter | $0.034 | Winter Peak | $0.211 | Winter Peak | $0.100 |
| Winter 601 - 1000 | $0.078 | Winter 601 - 1000 | $0.060 | | | Winter Off Peak | $0.090 | Winter Off Peak | $0.025 |
| Winter, 1001 + | $0.078 | Winter, 1001 + | $0.050 | | | Winter Super Off Peak | $0.033 | Winter Super Off Peak | $0.019 |
| Tier 1 Max kWh | 600 | Tier 1 Max kWh | 600 | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A |
| Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A |
| | | | | | | | | | |
| Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | $15.25 | Summer Demand | N/A | Summer Demand | $15.25 |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | $7.75 | Winter Demand | N/A | Winter Demand | $7.75 |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | On Peak | Summer Demand | N/A | Summer Demand | On Peak |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | On Peak | Winter Demand | N/A | Winter Demand | On Peak |
| Current Default General Use Rate<br>Small Use Customers | | Current Default Space Heat Rate<br>Frozen Space Heat Rate | | Optimal Space Heat Rate<br>Default for High Use Customers<br>Revenue neutral to GU and SH classes | | Optimal EV Rate<br>Available for all customers<br>Revenue neutral for GU class | | Optimal Space Heat + EV Rate<br>Default for High Use Customers<br>Revenue neutral for GU and SH classes | |

1. For this analysis, summer months are assumed from June 1 to September 30 for optional rates.
2. TOU Peak from 4 - 8 pm. Off Peak from 6 am to 4 pm and 8 pm to 12 am. Super Off Peak from 12 am to 6 am.
3. Max monthly on-peak demand is billed based on 15 min maximum measured demand from 4 - 8 pm.
4. Existing rates are based on Residential rates effective February 22, 2017.
5. New optional rates are set to recover the same revenues as the existing GU and SH rates.

## Table 5-3: KCP&L Missouri - Optional Residential Rate Designs

| Existing | | Existing | | New | | New | | New | |
|---|---|---|---|---|---|---|---|---|---|
| General use Rate | | Space Heating Rate | | Optional Demand Rate | | Optional TOU Energy Rate | | Optional TOU Energy + Demand Rate | |
| | Price | | Price | | Price | | Price | | Price |
| Customer Charge ($/mo) | $12.62 | Customer Charge ($/mo) | $12.62 | Customer Charge ($/mo) | $12.62 | Customer Charge ($/mo) | $12.62 | Customer Charge ($/mo) | $12.62 |
| | | | | | | | | | |
| Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | |
| Summer, up to 600 | $0.129 | Summer, up to 600 | $0.138 | Summer | $0.031 | Summer Peak | $0.316 | Summer Peak | $0.062 |
| Summer, 601 - 1000 | $0.149 | Summer, 601 - 1000 | $0.138 | | | Summer Off Peak | $0.122 | Summer Off Peak | $0.028 |
| Summer, 1001 + | $0.149 | Summer, 1001 + | $0.138 | | | Summer Super Off Peak | $0.058 | Summer Super Off Peak | $0.016 |
| Winter, up to 600 | $0.122 | Winter, up to 600 | $0.097 | Winter | $0.026 | Winter Peak | $0.210 | Winter Peak | $0.041 |
| Winter 601 - 1000 | $0.074 | Winter, 601 - 1000 | $0.097 | | | Winter Off Peak | $0.109 | Winter Off Peak | $0.023 |
| Winter, 1001 + | $0.066 | Winter, 1001 + | $0.061 | | | Winter Super Off Peak | $0.044 | Winter Super Off Peak | $0.017 |
| Tier 1 Max kWh | 600 | Tier 1 Max kWh | 600 | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A |
| Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A |
| | | | | | | | | | |
| Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | $17.26 | Summer Demand | N/A | Summer Demand | $17.26 |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | $10.58 | Winter Demand | N/A | Winter Demand | $10.58 |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | On Peak | Summer Demand | N/A | Summer Demand | On Peak |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | On Peak | Winter Demand | N/A | Winter Demand | On Peak |
| Current Default General Use Rate<br>Small Use Customers | | Current Default Space Heat Rate<br>Frozen Space Heat Rate | | Optimal Space Heat Rate<br>Default for High Use Customers<br>Revenue neutral to GU and SH classe | | Optimal EV Rate<br>Available for all customers<br>Revenue neutral for GU class | | Optimal Space Heat + EV Rate<br>Default for High Use Customers<br>Revenue neutral for GU and SH classes | |

1. For this analysis, summer months are assumed to be from May 15 to September 15 for optional rates.
2. TOU Peak from 4 - 8 pm. Off Peak from 6 am to 4 pm and 8 pm to 12 am. Super Off Peak from 12 am to 6 am.
3. Max monthly on-peak demand is billed based on 15 min maximum measured demand from 4 - 8 pm.
4. Existing rates are based on Residential rates effective June 8, 2017.
5. New optional rates are set to recover the same revenues as the existing GU and SH rates.

### Table 5-4: KCP&L Kansas - Optional Residential Rate Designs

| Existing | | Existing | | New | | New | | New | |
|---|---|---|---|---|---|---|---|---|---|
| General use Rate | | Space Heating Rate | | Optional Demand Rate | | Optional TOU Energy Rate | | Optional TOU Energy + Demand Rate | |
| | Price | | Price | | Price | | Price | | Price |
| Customer Charge ($/mo) | $14.00 | Customer Charge ($/mo) | $14.00 | Customer Charge ($/mo) | $14.00 | Customer Charge ($/mo) | $14.00 | Customer Charge ($/mo) | $14.00 |
| | | | | | | | | | |
| Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | | Energy Charges ($/kWh) | |
| Summer | $0.108 | Summer | $0.108 | Summer | $0.098 | Summer Peak | $0.220 | Summer Peak | $0.181 |
| | | | | | | Summer Off Peak | $0.082 | Summer Off Peak | $0.044 |
| | | | | | | Summer Super Off Peak | $0.055 | Summer Super Off Peak | $0.016 |
| Winter, up to 2000 | $0.084 | Winter, up to 600 | $0.075 | Winter | $0.030 | Winter Peak | $0.249 | Winter Peak | $0.222 |
| Winter 2001 - 2000 | $0.084 | Winter 601 - 1000 | $0.075 | | | Winter Off Peak | $0.072 | Winter Off Peak | $0.045 |
| Winter, 2001 + | $0.084 | Winter, 1001 + | $0.066 | | | Winter Super Off Peak | $0.044 | Winter Super Off Peak | $0.017 |
| Tier 1 Max kWh | N/A | Tier 1 Max kWh | 600 | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A | Tier 1 Max kWh | N/A |
| Tier 2 Max kWh | N/A | Tier 2 Max kWh | 1,000 | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A | Tier 2 Max kWh | N/A |
| | | | | | | | | | |
| Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | | Demand Charges ($/kW) | |
| Summer Demand ($/kW) | N/A | Summer Demand ($/kW) | N/A | Summer Demand ($/kW) | $9.00 | Summer Demand ($/kW) | N/A | Summer Demand ($/kW) | $9.00 |
| Winter Demand ($/kW) | N/A | Winter Demand ($/kW) | N/A | Winter Demand ($/kW) | $2.00 | Winter Demand ($/kW) | N/A | Winter Demand ($/kW) | $2.00 |
| Summer Demand | N/A | Summer Demand | N/A | Summer Demand | On Peak | Summer Demand | N/A | Summer Demand | On Peak |
| Winter Demand | N/A | Winter Demand | N/A | Winter Demand | On Peak | Winter Demand | N/A | Winter Demand | On Peak |
| Current Default General Use Rate<br>Small Use Customers | | Current Default Space Heat Rate<br>Frozen Space Heat Rate | | Optimal Space Heat Rate<br>Default for High Use Customers<br>Revenue neutral to GU and SH classes | | Optimal EV Rate<br>Available for all customers<br>Revenue neutral for GU class | | Optimal Space Heat + EV Rate<br>Default for High Use Customers<br>Revenue neutral for GU and SH classes | |

1. For this analysis, summer months are assumed to be from June 1 to September 30 for optional rates.
2. TOU Peak from 4 - 8 pm. Off Peak from 6 am to 4 pm and 8 pm to 12 am. Super Off Peak from 12 am to 6 am.
3. Max monthly on-peak demand is billed based on 15 min maximum measured demand from 4 - 8 pm.
4. Existing rates are based on Residential rates prior to June 21, 2017 .
5. New optional demand rates are set to recover the same revenues as the existing GU and SH rates.

## 5.4 Bill Impacts and Self Selection Analysis

For each of the rates, monthly bills were calculated for the load profiles in the load research group data set. When necessary, high usage customer load profiles, deemed to be outliers to the data set, were removed from the data sets to arrive at an adjusted load research data set that is representative of the class in total. Billing demand determinants were based on 15-minute interval data. The annual change in each customer's bill was calculated to determine how each customer would be impacted if they were to switch to the new optional rate design. The potential bill impact of each customer in the load research groups switching to each of the new rates for KCP&L GMO is provided in the figures on the following page. Similar bill impacts were also developed for KCP&L-Missouri and KCP&L Kansas utility jurisdictions. When customers are offered new choices between rates, their selection may be influenced by a variety of factors including their expected bill on each rate, their ability to respond to the price signal, their risk aversion to a new rate, and their time dedicated to analyzing their electric rates. Because the utility does not know which customers will select which rates and if customers will select the rate that provides the lowest bill, the level of revenue change is not known with certainty.

The analysis considers the scenario in which customers select the rate that provides them with the lowest annual bill based on perfect knowledge of their energy usage profile without any changes in behavior. From a revenue perspective, this "perfect choice" scenario is the worst-case scenario that could be experienced by the utility. Based on the rates developed, the maximum potential revenue loss from

Residential GU customer switching could range from a high of 8.8 percent in GMO to a low of 4.2 percent in KCP&L-Kansas.

In addition to the "perfect choice" scenario, several additional scenarios were also developed to test the range of potential outcomes. The "baseline" customer switching scenario assumes that approximately 28 percent of all customers would switch to the rate that provides them with the lowest bill as opposed to the "perfect choice" as shown on the following pages. The "baseline" scenario is represented as the expected average bill. Assuming 28 percent of all Residential GU customers switch to the lowest rate based on their usage profile (perfect choice), the potential revenue loss would range from a high of 2.5 percent in KCP&L-GMO to a low of 1.2 percent in KCP&L Kansas. It is also possible that customers could switch to a rate that inadvertently causes an increase to their monthly bills, however this was not assessed.

## Figure 5-1: GMO General Use Monthly Bill Change from Potential Rate Switching

**BILL COMPARISONS AND REVENUE ATTRITION ESTIMATES**

**Penetration**
**28%**

**GMO GU CUSTOMERS**

| | General Use | General Use | Demand | TOU | TOU + Demand | Perfect Choice | % Change | $/mon change | Perfect Choice | Expected Avg. Bill | $/mon change | $/yr change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SC0086 | $ 952.01 | $ 952.01 | $ 446.62 | $ 971.43 | $ 431.91 | $ 431.91 | -54.6% | $ (43.34) | TOU + Demand | $ 806.38 | $ (12.14) | $ (145.63) |
| SC0069 | $ 1,838.91 | $ 1,838.91 | $ 1,467.55 | $ 1,907.82 | $ 1,468.03 | $ 1,467.55 | -20.2% | $ (30.95) | Demand | $ 1,734.93 | $ (8.66) | $ (103.98) |
| SC0074 | $ 1,616.00 | $ 1,616.00 | $ 1,286.93 | $ 1,552.96 | $ 1,272.23 | $ 1,272.23 | -21.3% | $ (28.65) | TOU + Demand | $ 1,519.75 | $ (8.02) | $ (96.25) |
| SC0067 | $ 1,722.03 | $ 1,722.03 | $ 1,379.92 | $ 1,729.45 | $ 1,383.39 | $ 1,379.92 | -19.9% | $ (28.51) | Demand | $ 1,626.24 | $ (7.98) | $ (95.79) |
| SC0089 | $ 1,369.90 | $ 1,369.90 | $ 1,081.67 | $ 1,265.60 | $ 1,061.01 | $ 1,061.01 | -22.5% | $ (25.74) | TOU + Demand | $ 1,283.41 | $ (7.21) | $ (86.49) |
| SD0037 | $ 1,626.59 | $ 1,626.59 | $ 1,370.38 | $ 1,634.43 | $ 1,370.58 | $ 1,370.38 | -15.8% | $ (21.35) | Demand | $ 1,554.85 | $ (5.98) | $ (71.74) |
| SD0041 | $ 1,338.65 | $ 1,338.65 | $ 1,155.17 | $ 1,309.41 | $ 1,110.78 | $ 1,110.78 | -17.0% | $ (18.99) | TOU + Demand | $ 1,274.85 | $ (5.32) | $ (63.80) |
| SC0098 | $ 1,614.01 | $ 1,614.01 | $ 1,474.65 | $ 1,654.04 | $ 1,502.73 | $ 1,474.65 | -8.6% | $ (11.61) | Demand | $ 1,574.99 | $ (3.25) | $ (39.02) |
| SC0066 | $ 1,841.64 | $ 1,841.64 | $ 1,705.24 | $ 1,889.16 | $ 1,707.44 | $ 1,705.24 | -7.4% | $ (11.37) | Demand | $ 1,803.45 | $ (3.18) | $ (38.19) |
| SC0062 | $ 1,391.93 | $ 1,391.93 | $ 1,298.37 | $ 1,423.55 | $ 1,323.03 | $ 1,298.37 | -6.7% | $ (7.80) | Demand | $ 1,365.73 | $ (2.18) | $ (26.20) |
| SC0058 | $ 1,182.80 | $ 1,182.80 | $ 1,091.41 | $ 1,168.60 | $ 1,090.98 | $ 1,090.98 | -7.8% | $ (7.65) | TOU + Demand | $ 1,157.09 | $ (2.14) | $ (25.71) |
| SC0076 | $ 1,115.75 | $ 1,115.75 | $ 1,373.52 | $ 1,028.76 | $ 1,352.50 | $ 1,028.76 | -7.8% | $ (7.25) | TOU | $ 1,091.39 | $ (2.03) | $ (24.36) |
| SD0034 | $ 878.90 | $ 878.90 | $ 798.91 | $ 814.11 | $ 793.20 | $ 793.20 | -9.8% | $ (7.14) | TOU + Demand | $ 854.90 | $ (2.00) | $ (23.99) |
| SD0042 | $ 648.87 | $ 648.87 | $ 571.38 | $ 650.06 | $ 578.39 | $ 571.38 | -11.9% | $ (6.46) | Demand | $ 627.18 | $ (1.81) | $ (21.70) |
| SD0039 | $ 809.92 | $ 809.92 | $ 934.03 | $ 737.10 | $ 923.31 | $ 737.10 | -9.0% | $ (6.07) | TOU | $ 789.53 | $ (1.70) | $ (20.39) |
| SC0092 | $ 845.79 | $ 845.79 | $ 1,000.00 | $ 782.10 | $ 988.60 | $ 782.10 | -7.5% | $ (5.31) | TOU | $ 827.96 | $ (1.49) | $ (17.83) |
| SC0091 | $ 1,462.10 | $ 1,462.10 | $ 1,408.49 | $ 1,437.95 | $ 1,402.04 | $ 1,402.04 | -4.1% | $ (5.00) | TOU + Demand | $ 1,445.28 | $ (1.40) | $ (16.82) |
| SC0080 | $ 1,389.47 | $ 1,389.47 | $ 1,365.63 | $ 1,333.76 | $ 1,356.51 | $ 1,333.76 | -4.0% | $ (4.64) | TOU | $ 1,373.87 | $ (1.30) | $ (15.60) |
| SC0059 | $ 583.22 | $ 583.22 | $ 532.19 | $ 556.07 | $ 530.09 | $ 530.09 | -9.1% | $ (4.43) | TOU + Demand | $ 568.35 | $ (1.24) | $ (14.88) |
| SD0038 | $ 1,089.74 | $ 1,089.74 | $ 1,038.52 | $ 1,077.91 | $ 1,036.83 | $ 1,036.83 | -4.9% | $ (4.41) | TOU + Demand | $ 1,074.93 | $ (1.23) | $ (14.81) |
| SC0072 | $ 1,398.56 | $ 1,398.56 | $ 1,364.43 | $ 1,380.04 | $ 1,375.34 | $ 1,364.43 | -2.4% | $ (2.84) | Demand | $ 1,389.00 | $ (0.80) | $ (9.56) |
| SC0071 | $ 1,096.58 | $ 1,096.58 | $ 1,213.40 | $ 1,062.45 | $ 1,214.54 | $ 1,062.45 | -3.1% | $ (2.84) | TOU | $ 1,087.02 | $ (0.80) | $ (9.56) |
| SC0073 | $ 1,517.13 | $ 1,517.13 | $ 1,528.86 | $ 1,483.10 | $ 1,534.12 | $ 1,483.10 | -2.2% | $ (2.84) | TOU | $ 1,507.60 | $ (0.79) | $ (9.53) |
| SC0075 | $ 1,047.97 | $ 1,047.97 | $ 1,026.85 | $ 1,024.05 | $ 1,028.84 | $ 1,024.05 | -2.3% | $ (1.99) | TOU | $ 1,041.27 | $ (0.56) | $ (6.70) |
| SC0082 | $ 1,727.98 | $ 1,727.98 | $ 1,706.71 | $ 1,836.74 | $ 1,734.50 | $ 1,706.71 | -1.2% | $ (1.77) | Demand | $ 1,722.02 | $ (0.50) | $ (5.96) |
| SD0036 | $ 728.37 | $ 728.37 | $ 955.00 | $ 709.85 | $ 960.73 | $ 709.85 | -2.5% | $ (1.54) | TOU | $ 723.19 | $ (0.43) | $ (5.19) |
| SC0064 | $ 378.82 | $ 378.82 | $ 474.57 | $ 360.77 | $ 472.46 | $ 360.77 | -4.8% | $ (1.50) | TOU | $ 373.76 | $ (0.42) | $ (5.05) |
| SC0079 | $ 1,469.42 | $ 1,469.42 | $ 1,469.86 | $ 1,455.19 | $ 1,481.13 | $ 1,455.19 | -1.0% | $ (1.19) | TOU | $ 1,465.43 | $ (0.33) | $ (3.98) |
| SC0070 | $ 1,177.24 | $ 1,177.24 | $ 1,435.64 | $ 1,163.32 | $ 1,437.93 | $ 1,163.32 | -1.2% | $ (1.16) | TOU | $ 1,173.34 | $ (0.32) | $ (3.90) |
| SC0063 | $ 897.63 | $ 897.63 | $ 966.55 | $ 887.84 | $ 970.20 | $ 887.84 | -1.1% | $ (0.82) | TOU | $ 894.89 | $ (0.23) | $ (2.74) |
| SC0088 | $ 1,551.67 | $ 1,551.67 | $ 1,785.68 | $ 1,547.69 | $ 1,751.11 | $ 1,547.69 | -0.3% | $ (0.33) | TOU | $ 1,550.56 | $ (0.09) | $ (1.11) |
| SC0101 | $ 974.68 | $ 974.68 | $ 1,030.74 | $ 1,127.04 | $ 1,099.17 | $ 974.68 | 0.0% | $ - | General Use | $ 974.68 | $ - | $ - |
| SC0068 | $ 1,175.57 | $ 1,175.57 | $ 1,447.17 | $ 1,208.48 | $ 1,472.80 | $ 1,175.57 | 0.0% | $ - | General Use | $ 1,175.57 | $ - | $ - |
| SC0065 | $ 1,217.25 | $ 1,217.25 | $ 1,450.79 | $ 1,270.20 | $ 1,475.17 | $ 1,217.25 | 0.0% | $ - | General Use | $ 1,217.25 | $ - | $ - |
| GU Profiles | $ 41,677 | $ 41,677 | $ 40,637 | $ 41,441 | $ 40,692 | $ 38,011 | | | | $ 40,650.65 | $ (85.54) | $ (1,026.45) |
| % Change | | **0.0%** | **-2.5%** | **-0.6%** | **-2.4%** | **-8.8%** | | | | **-2.46%** | | |

## Figure 5-2: GMO Electric Space Heating Monthly Bill Change from Potential Rate Switching

**BILL COMPARISONS AND REVENUE ATTRITION ESTIMATES**

**GMO-SH CUSTOMERS**

Penetration: 28%

| | Space Heating | General Use | Demand | TOU | TOU+Demand | Perfect Choice | % Change | $/mon change | Perfect Choice | Expected Avg. Bill | $/mon change | $/yr change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SC0010 | $ 1,551.57 | $ 1,746.00 | $ 1,196.15 | $ 1,814.18 | $ 1,171.48 | $ 1,171.48 | -24.5% | $ (31.67) | TOU+Demand | $ 1,445.15 | $ (8.87) | $ (106.43) |
| SC0028 | $ 2,324.01 | $ 2,584.13 | $ 1,998.19 | $ 2,528.41 | $ 1,990.75 | $ 1,990.75 | -14.3% | $ (27.77) | TOU+Demand | $ 2,230.70 | $ (7.78) | $ (93.31) |
| SC0032 | $ 1,265.21 | $ 1,413.71 | $ 1,083.74 | $ 1,298.47 | $ 1,106.63 | $ 1,083.74 | -14.3% | $ (15.12) | Demand | $ 1,214.40 | $ (4.23) | $ (50.81) |
| SC0022 | $ 1,820.43 | $ 2,028.40 | $ 1,657.44 | $ 1,980.64 | $ 1,661.24 | $ 1,657.44 | -9.0% | $ (13.58) | Demand | $ 1,774.79 | $ (3.80) | $ (45.63) |
| SC0040 | $ 1,903.25 | $ 2,119.31 | $ 1,784.93 | $ 2,032.81 | $ 1,744.66 | $ 1,744.66 | -8.3% | $ (13.22) | TOU+Demand | $ 1,858.84 | $ (3.70) | $ (44.40) |
| SC0001 | $ 1,396.59 | $ 1,565.59 | $ 1,262.67 | $ 1,550.07 | $ 1,239.45 | $ 1,239.45 | -11.3% | $ (13.09) | TOU+Demand | $ 1,352.59 | $ (3.67) | $ (44.00) |
| SC0024 | $ 1,864.02 | $ 2,072.09 | $ 1,721.36 | $ 2,127.83 | $ 1,766.81 | $ 1,721.36 | -7.7% | $ (11.89) | Demand | $ 1,824.08 | $ (3.33) | $ (39.95) |
| SC0033 | $ 1,443.17 | $ 1,615.17 | $ 1,302.33 | $ 1,498.29 | $ 1,326.34 | $ 1,302.33 | -9.8% | $ (11.74) | Demand | $ 1,403.73 | $ (3.29) | $ (39.44) |
| SC0026 | $ 1,577.51 | $ 1,766.94 | $ 1,442.36 | $ 1,656.18 | $ 1,473.66 | $ 1,442.36 | -8.6% | $ (11.26) | Demand | $ 1,539.67 | $ (3.15) | $ (37.84) |
| SD0008 | $ 2,000.53 | $ 2,217.88 | $ 1,893.92 | $ 2,257.83 | $ 1,917.25 | $ 1,893.92 | -5.3% | $ (8.88) | Demand | $ 1,970.68 | $ (2.49) | $ (29.85) |
| SC0023 | $ 1,879.12 | $ 2,089.79 | $ 1,780.96 | $ 2,179.40 | $ 1,810.92 | $ 1,780.96 | -5.2% | $ (8.18) | Demand | $ 1,851.64 | $ (2.29) | $ (27.49) |
| SC0021 | $ 1,937.20 | $ 2,149.00 | $ 1,860.88 | $ 2,245.19 | $ 1,903.53 | $ 1,860.88 | -3.9% | $ (6.36) | Demand | $ 1,915.83 | $ (1.78) | $ (21.37) |
| SC0030 | $ 1,710.16 | $ 1,907.33 | $ 1,661.87 | $ 1,935.14 | $ 1,715.80 | $ 1,661.87 | -2.8% | $ (4.02) | Demand | $ 1,696.64 | $ (1.13) | $ (13.52) |
| SC0012 | $ 770.40 | $ 885.62 | $ 749.07 | $ 1,033.35 | $ 722.95 | $ 722.95 | -6.2% | $ (3.95) | TOU+Demand | $ 757.11 | $ (1.11) | $ (13.29) |
| SC0034 | $ 1,670.97 | $ 1,878.25 | $ 1,665.25 | $ 1,864.06 | $ 1,634.17 | $ 1,634.17 | -2.2% | $ (3.07) | TOU+Demand | $ 1,660.66 | $ (0.86) | $ (10.31) |
| SC0003 | $ 1,128.34 | $ 1,263.00 | $ 1,134.52 | $ 1,091.82 | $ 1,131.22 | $ 1,091.82 | -3.2% | $ (3.04) | TOU | $ 1,118.11 | $ (0.85) | $ (10.22) |
| SD0002 | $ 1,112.20 | $ 1,246.56 | $ 1,333.17 | $ 1,077.87 | $ 1,324.94 | $ 1,077.87 | -3.1% | $ (2.86) | TOU | $ 1,102.59 | $ (0.80) | $ (9.61) |
| SC0020 | $ 1,662.60 | $ 1,887.99 | $ 2,130.68 | $ 2,031.15 | $ 2,066.54 | $ 1,662.60 | 0.0% | $ - | Space Heating | $ 1,662.60 | $ - | $ - |
| SC0004 | $ 1,268.65 | $ 1,421.03 | $ 1,440.20 | $ 1,388.84 | $ 1,416.18 | $ 1,268.65 | 0.0% | $ - | Space Heating | $ 1,268.65 | $ - | $ - |
| SC0019 | $ 1,535.52 | $ 1,730.59 | $ 1,617.24 | $ 1,799.51 | $ 1,584.26 | $ 1,535.52 | 0.0% | $ - | Space Heating | $ 1,535.52 | $ (0.00) | $ (0.00) |
| SC0007 | $ 1,229.77 | $ 1,381.56 | $ 1,408.84 | $ 1,238.99 | $ 1,398.17 | $ 1,229.77 | 0.0% | $ - | Space Heating | $ 1,229.77 | $ - | $ - |
| SD0001 | $ 1,111.48 | $ 1,241.64 | $ 1,251.88 | $ 1,120.47 | $ 1,260.99 | $ 1,111.48 | 0.0% | $ - | Space Heating | $ 1,111.48 | $ - | $ - |
| SC0002 | $ 1,422.71 | $ 1,597.54 | $ 1,621.56 | $ 1,615.04 | $ 1,603.91 | $ 1,422.71 | 0.0% | $ - | Space Heating | $ 1,422.71 | $ - | $ - |
| SD0005 | $ 1,609.77 | $ 1,822.69 | $ 1,825.78 | $ 2,086.78 | $ 1,808.13 | $ 1,609.77 | 0.0% | $ - | Space Heating | $ 1,609.77 | $ - | $ - |
| SC0005 | $ 1,430.22 | $ 1,599.45 | $ 1,790.42 | $ 1,549.18 | $ 1,766.01 | $ 1,430.22 | 0.0% | $ - | Space Heating | $ 1,430.22 | $ - | $ - |
| SC0009 | $ 1,675.39 | $ 1,874.20 | $ 2,056.31 | $ 1,828.92 | $ 2,041.56 | $ 1,675.39 | 0.0% | $ - | Space Heating | $ 1,675.39 | $ - | $ - |
| SC0011 | $ 1,539.84 | $ 1,728.17 | $ 1,872.04 | $ 1,780.49 | $ 1,874.06 | $ 1,539.84 | 0.0% | $ - | Space Heating | $ 1,539.84 | $ - | $ - |
| SC0008 | $ 1,745.22 | $ 1,956.49 | $ 1,804.08 | $ 1,891.16 | $ 1,775.92 | $ 1,745.22 | 0.0% | $ - | Space Heating | $ 1,745.22 | $ - | $ - |
| SC0018 | $ 1,336.84 | $ 1,512.03 | $ 1,684.39 | $ 1,554.71 | $ 1,669.63 | $ 1,336.84 | 0.0% | $ - | Space Heating | $ 1,336.84 | $ - | $ - |
| SD0007 | $ 1,426.74 | $ 1,612.79 | $ 1,812.78 | $ 1,689.65 | $ 1,799.71 | $ 1,426.74 | 0.0% | $ - | Space Heating | $ 1,426.74 | $ - | $ - |
| SD0003 | $ 1,637.71 | $ 1,828.94 | $ 1,731.37 | $ 1,835.61 | $ 1,746.45 | $ 1,637.71 | 0.0% | $ - | Space Heating | $ 1,637.71 | $ (0.00) | $ (0.00) |
| SC0037 | $ 1,500.95 | $ 1,676.13 | $ 1,723.78 | $ 1,640.79 | $ 1,749.42 | $ 1,500.95 | 0.0% | $ - | Space Heating | $ 1,500.95 | $ - | $ - |
| SC0016 | $ 1,774.67 | $ 1,996.45 | $ 2,042.13 | $ 2,127.88 | $ 2,055.08 | $ 1,774.67 | 0.0% | $ - | Space Heating | $ 1,774.67 | $ - | $ - |
| SC0039 | $ 1,792.72 | $ 2,009.81 | $ 2,079.02 | $ 2,055.73 | $ 2,066.60 | $ 1,792.72 | 0.0% | $ - | Space Heating | $ 1,792.72 | $ - | $ - |
| SC0038 | $ 2,140.42 | $ 2,392.09 | $ 2,318.36 | $ 2,580.50 | $ 2,344.21 | $ 2,140.42 | 0.0% | $ - | Space Heating | $ 2,140.42 | $ - | $ - |
| SC0029 | $ 1,905.09 | $ 2,123.45 | $ 2,046.15 | $ 2,268.83 | $ 2,099.40 | $ 1,905.09 | 0.0% | $ - | Space Heating | $ 1,905.09 | $ - | $ - |
| SC0031 | $ 1,849.39 | $ 2,057.35 | $ 2,073.60 | $ 2,096.00 | $ 2,065.55 | $ 1,849.39 | 0.0% | $ - | Space Heating | $ 1,849.39 | $ - | $ - |
| SC0025 | $ 1,933.63 | $ 2,143.97 | $ 1,971.01 | $ 2,258.24 | $ 2,018.44 | $ 1,933.63 | 0.0% | $ - | Space Heating | $ 1,933.63 | $ - | $ - |
| SD0004 | $ 1,670.13 | $ 1,882.41 | $ 1,855.25 | $ 2,124.48 | $ 1,878.23 | $ 1,670.13 | 0.0% | $ - | Space Heating | $ 1,670.13 | $ - | $ - |
| SC0041 | $ 1,973.46 | $ 2,198.34 | $ 2,225.96 | $ 2,248.94 | $ 2,225.15 | $ 1,973.46 | 0.0% | $ - | Space Heating | $ 1,973.46 | $ - | $ - |
| SH Profiles | $ 64,527.6 | $ 72,223.9 | $ 67,911.6 | $ 72,983.4 | $ 67,955.4 | $ 62,250.9 | | | | $ 63,890.14 | $ (53.12) | $ (637.47) |
| % Change | | **11.9%** | **5.2%** | **13.1%** | **5.3%** | **-3.5%** | | | | **-1.0%** | | |

It is also possible that customers only switch to a new rate plan if it provides a minimum amount of monthly bill savings. For example, customers may not be willing to switch to a new rate unless it saves them $5 per month. Several scenarios are provided for each utility jurisdiction in the following tables along with the “perfect choice” scenario and 28 percent penetration scenario which are defined as follows.

1. ***Perfect choice scenario*** – This is the $0.00 savings threshold scenario. This assumes all customers that would save from an optional rate would switch to the optimal rate and the average bill reduction of all customers would be $8.99 per month and the total revenue loss would be 8.8 percent.
2. ***Saving thresholds scenarios*** – These scenarios determine the average bill reduction and total revenue loss assuming customers would switch to an optional rate for at least a specific threshold of savings. In the $2.50 threshold scenario, 67 percent of all GMO GU customers would switch to an optional rate and the average savings would be $8.68 per month with a total revenue loss of 8.5 percent.
3. ***28 percent penetration rate scenario -*** This scenario represents the estimated average bill reduction and percent revenue change assuming 28 percent of all customers switched to the optimal rate. In this scenario, the average bill reduction of all GMO GU customers would be $2.52 per month with a total revenue loss of 2.46 percent.

**Table 5-5: GMO Monthly Bill Change from Potential Rate Switching**

| General Use | [1] Perfect Choice | [2] Savings Threshold | [2] Savings Threshold | [2] Savings Threshold | [3] 28% Penetration |
|---|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $2.50 | $5.00 | $7.50 | N/A |
| Avg Bill Reduction $/month | ($8.99) | ($8.68) | ($1.27) | ($1.27) | ($2.52) |
| Revenue Change % | -8.80% | -8.50% | -1.25% | -1.25% | -2.46% |
| Customers Switched % | 91.2% | 67.6% | 2.9% | 2.9% | 28.0% |

| Electric Space Heating | [1] Perfect Choice | [2] Savings Threshold | [2] Savings Threshold | [2] Savings Threshold | [3] 28% Penetration |
|---|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $2.50 | $5.00 | $7.50 | N/A |
| Avg Bill Reduction $/month | ($1.36) | ($1.07) | ($0.43) | ($0.43) | ($1.33) |
| Revenue Change % | -1.01% | -0.80% | -0.32% | -0.32% | -0.99% |
| Customers Switched % | 59.4% | 28.1% | 6.3% | 6.3% | 28.0% |

**Table 5-6: KCP&L-MO Monthly Bill Change from Potential Rate Switching**

| General Use | [1] Perfect Choice | [2] Savings Threshold | [2] Savings Threshold | [2] Savings Threshold | [3] 28% Penetration |
|---|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $2.50 | $5.00 | $7.50 | N/A |
| Avg Bill Reduction $/month | ($8.69) | ($8.44) | ($8.04) | ($7.87) | ($2.43) |
| Revenue Change % | -7.95% | -7.71% | -7.35% | -7.20% | -2.23% |
| Customers Switched % | 77.4% | 58.1% | 48.4% | 45.2% | 28.0% |

| Electric Heating | [1] Perfect Choice | [2] Savings Threshold | [2] Savings Threshold | [2] Savings Threshold | [3] 28% Penetration |
|---|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $2.50 | $5.00 | $7.50 | N/A |
| Avg Bill Reduction $/month | ($1.87) | ($1.63) | ($1.41) | ($0.69) | ($1.87) |
| Revenue Change % | -1.52% | -1.33% | -1.15% | -0.56% | -1.52% |
| Customers Switched % | 41.2% | 23.5% | 17.6% | 5.9% | 28.0% |

**Table 5-7: KCP&L-KS Monthly Bill Change from Potential Rate Switching**

| General Use | [1] Perfect Choice | [2] Savings Threshold | [2] Savings Threshold | [2] Savings Threshold | [3] 28% Penetration |
|---|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $2.50 | $5.00 | $7.50 | N/A |
| Avg Bill Reduction $/month | ($4.61) | ($4.36) | ($0.58) | ($0.58) | ($1.29) |
| Revenue Change % | -4.2% | -3.9% | -0.5% | -0.5% | -1.2% |
| Customers Switched % | 76.9% | 57.7% | 3.8% | 3.8% | 28.0% |

| Electric Heating | [1] Perfect Choice | [2] Savings Threshold | [2] Savings Threshold | [2] Savings Threshold | [3] 28% Penetration |
|---|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $2.50 | $5.00 | $7.50 | N/A |
| Avg Bill Reduction $/month | ($2.62) | ($2.42) | ($2.06) | ($1.56) | ($0.87) |
| Revenue Change % | -2.2% | -2.0% | -1.7% | -1.3% | -0.7% |
| Customers Switched % | 40.0% | 28.0% | 20.0% | 12.0% | 28.0% |

## 5.5 Demand Reduction and Revenue Attrition Analysis

If the optional rates are offered, there is a risk of revenue attrition due to demand reduction and load shifting. Demand reduction will occur when customers change their usage behaviors in response to changes in the price of energy or demand throughout the day. The larger the energy or demand price differential between on and off-peak periods the higher the expected level of response from a rate.

For this analysis, it was assumed that rates developed would generate a peak load reduction of 10 percent in both the summer and winter months similar to the rate structure types included in the 2016 KCP&L DSM Potential Study. A 10 percent usage shift from on to off-peak periods is reasonable based elasticity of substitution factors achieved in the KCP&L Smart Grid TOU pricing pilot[40] and rate designs being considered. Customer load response estimates were prepared to validate estimates were within reason. However, actual response will almost certainly vary and will need to be tracked and analyzed once implemented to understand actual shift.

The estimated demand reduction resulting from the implementation of new optional rates along with the estimated loss is presented below for each utility. The scenarios assume that customers' demand response revenue reduction is incremental to self-selection and that only customers who switch to a time variant rate would respond. The revenue change and demand reduction for the "perfect choice" case and 28 percent penetration case are presented below with and without demand response. If customers both switch

[40] KCP&L Green Impact Zone SmartGrid Demonstration Project Final Technical Report, version 2.0, dated May 22, 2015. Available at: https://www.smartgrid.gov/files/OE0000221_KCPL_FinalRep_2015_04.pdf

and respond as predicted, the potential revenue loss would increase as presented. It is expected that penetration rates would vary as the rate designs vary from those used in Potential Study. The scenarios considered are defined below.

1. ***Perfect choice scenario*** – This is the $0.00 savings threshold scenario. This assumes all customers that would save from an optional rate would switch to the optimal rate. For the GMO GU customers, the average bill reduction of all customers would be $8.99 per month and the total revenue loss would be 8.8 percent.
2. ***Demand response and perfect choice scenario*** – This is the $0.00 savings threshold scenario coupled with expected demand response. This assumes all customers that would save from an optional rate would switch to the optimal rate and shift their load off the on-peak time periods resulting in additional revenue reduction and bill savings. For the GMO GU customers, the average bill reduction for all customers would be $13.16 per month and the total revenue loss would be 12.88 percent.
3. ***28 percent penetration rate scenario* -** This scenario represents the estimated average bill reduction and percent revenue change assuming 28 percent of all customers switched to the optimal rate. In this scenario, the average bill reduction of all GMO GU customers would be $2.52 per month with a total revenue loss of 2.46 percent.
4. ***Demand response and 28 percent penetration scenario* -** This scenario represents the estimated average bill reduction and percent revenue change assuming 28 percent of all customers switched to the optimal rate and shift their load off the on-peak time periods resulting in additional revenue reduction and bill savings. In this scenario, the average bill reduction of all GMO GU customers would be $3.68 per month with a total revenue loss of 3.61 percent.

**Table 5-8: GMO Residential Self Selection and Demand Response Revenue Loss**

| General Use | [1] Perfect Choice | [2] Demand Response Perfect Choice | [3] 28% Penetration | [4] Demand Response 28% Penetration |
|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $0.00 | N/A | N/A |
| Avg Bill Reduction $/month | ($8.99) | ($13.16) | ($2.52) | ($3.68) |
| Revenue Change % | -8.80% | -12.88% | -2.46% | -3.61% |
| Customers Switched % | 91.2% | 94.1% | 28.0% | 28.0% |
| Demand Response % | 0.0% | -9.2% | 0.0% | -2.6% |

| Electric Space Heating | [1] Perfect Choice | [2] Demand Response Perfect Choice | [3] 28% Penetration | [4] Demand Response 28% Penetration |
|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $0.00 | N/A | N/A |
| Avg Bill Reduction $/month | ($1.36) | ($2.36) | ($1.33) | ($2.30) |
| Revenue Change % | -1.01% | -1.76% | -0.99% | -1.71% |
| Customers Switched % | 59.4% | 71.9% | 28.0% | 28.0% |
| Demand Response % | 0.0% | -5.3% | 0.0% | -1.5% |

**Table 5-9: KCP&L – MO Residential Self Selection and Demand Response Revenue Loss**

| General Use | [1] Perfect Choice | [2] Demand Response Perfect Choice | [3] 28% Penetration | [4] Demand Response 28% Penetration |
|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $0.00 | N/A | N/A |
| Avg Bill Reduction $/month | ($8.69) | ($13.53) | ($2.43) | ($3.79) |
| Revenue Change % | -7.95% | -12.37% | -2.23% | -3.46% |
| Customers Switched % | 77.4% | 93.5% | 28.0% | 28.0% |
| Demand Reduction % | 0.0% | -9.5% | 0.0% | -2.7% |

| Electric Heating | [1] Perfect Choice | [2] Perfect Choice | [3] 28% Penetration | [4] 28% Penetration |
|---|---|---|---|---|
| Savings Threshold $/month | $0.00 | $0.00 | N/A | N/A |
| Avg Bill Reduction $/month | ($1.87) | ($3.06) | ($1.87) | ($3.06) |
| Revenue Change % | -1.52% | -2.49% | -1.52% | -2.49% |
| Customers Switched % | 41.2% | 70.6% | 28.0% | 28.0% |
| Demand Reduction % | 0.0% | -6.2% | 0.0% | -1.7% |

**Table 5-10: KCP&L – KS Residential Self Selection and Demand Response Revenue Loss**

| | [1] | [2] | [3] | [4] |
|---|---|---|---|---|
| General Use | Perfect Choice | Demand Response Perfect Choice | 28% Penetration | Demand Response 28% Penetration |
| Savings Threshold $/month | $0.00 | $0.00 | N/A | N/A |
| Avg Bill Reduction $/month | ($4.61) | ($8.48) | ($1.29) | ($2.38) |
| Revenue Change % | -4.2% | -7.7% | -1.2% | -2.1% |
| Customers Switched % | 76.9% | 100.0% | 28.0% | 28.0% |
| Peak Demand Reduction % | 0.0% | -10.0% | 0.0% | -2.8% |
| | [1] | [2] | [3] | [4] |
| Electric Heating | Perfect Choice | Demand Response Perfect Choice | 28% Penetration | Demand Response 28% Penetration |
| Savings Threshold $/month | $0.00 | $0.00 | N/A | N/A |
| Avg Bill Reduction $/month | ($2.62) | ($5.17) | ($0.87) | ($1.45) |
| Revenue Change % | -2.2% | -4.4% | -0.7% | -1.2% |
| Customers Switched % | 40.0% | 50.0% | 28.0% | 28.0% |
| Peak Demand Reduction % | 0.0% | -4.4% | 0.0% | -1.2% |

It should be noted that DR and resulting revenue attrition is extremely difficult to estimate. The revenue losses shown here have specific assumptions and include elasticities that were utilized in the 2016 DSM Market Potential Study. However, actual revenue losses may vary, going up or down. As such, for purposes of recovery, it will be critical that actual revenue losses be monitored and tracked and ideally, recovered as part of a MEEIA type program or like mechanism that recognizes the need for the Company to be kept whole when promoting energy efficiency, demand response rate programs, and demand side rates that impacts the company's revenue requirement and ability to recover fixed costs.

## 5.6 Peak Demand Reduction and Demand Cost Savings Analysis

Each utility may reduce its system peak demand due to customers responding to demand rates and TOU rates. The level of response realized by customers may result in peak demand costs being avoided or saved by KCP&L. The value of the peak demand savings to KCP&L-GMO, KCP&L-Missouri, and Kansas and how those savings can be realized will depend on how the regulatory Commissions in Kansas and Missouri establish the value for peak demand reduction achieved from demand side rates.

The potential annual peak demand cost savings resulting from customers shifting load may offset a portion of the estimated revenue losses resulting from customer switching and DR. However, as noted earlier, actual revenue losses will require monitoring and tracking to size, and any peak demand cost savings, likely to be more long term in realization, will require clarity on the value of peak demand savings, to determine true impact. As a demand-side option, KCP&L should explore implementing the optional rates as programs in its MEEIA program portfolio to recover the program costs and revenue losses.

## 5.7 Customer Bill Analysis

The implementation of the optional rates and response from the rates will depend on several factors as explained in previous sections. These will include KCP&L's promotional activities to encourage adoption of optional rates. Some future customers will automatically be placed on certain rates by default while others will be able to choose the rate that provides them with the most benefits.

For each utility, typical bills were prepared to demonstrate how customer bills would be impacted by choosing one of three optional rates over their existing residential rate without any DR. Typical bills for high, medium, and low usage and load factor users are provided in the tables below. Based on a review of the bills there are several points that should be made regarding the optional rates as it relates to the various types of customer types.

- General Use Customers – Low load factor customers will be inclined to select the existing rates while high load factor customers will be better off to choose one of the demand rates. In the short term, Missouri high use customers will elect to remain on the GU Rate due to the DBR.
- Electric Space Heating Customers – Most existing low load factor customers would likely choose to stay on the existing SH Rate until it is no longer available to them while high load factor customers would benefit from one of the demand rates. Future SH customers would be placed on the Demand Rate by default however some low load factor customers may benefit from the GU Rate. As shown in the following tables, many SH customers will benefit from selecting either the Demand Rate or TOU Energy and Demand Rate.
- EV Customers – Existing and future EV customers would be best served to switch to the TOU with Demand Rate or possibly TOU Energy Rate depending on their other usage. The TOU Energy Rate would also be much more favorable for EV customers than remaining on the existing rate.
- DG Customers – All future DG customers would be placed on either the Demand or TOU with Demand Rate subject to statutory limitations. Absent any changes in usage, their bills would increase over the existing rate reducing the current subsidy inherent in the existing GU Rate.

## Table 5-11: GMO Typical Bill Analysis

| Load profile | Average Load Factor | Energy | Existing Residential | Optional Demand | Optional TOU | Optional TOU + Demand | Minimum | Change from Existing | |
|---|---|---|---|---|---|---|---|---|---|
| | % | kWh | $ / Year | $ / Year | $ / Year | $ / Year | $ / Year | $ / Year | % |
| Res. General Use - GMO | 22.0% | 5,000 | $684 | $1,290 | $653 | $1,290 | $653 | ($31) | -5% |
| Res. General Use - GMO | 22.0% | 10,274 | $1,228 | $1,477 | $1,210 | $1,478 | $1,210 | ($18) | -1% |
| Res. General Use - GMO | 22.0% | 15,000 | $1,680 | $1,644 | $1,709 | $1,646 | $1,644 | ($35) | -2% |
| Res. General Use - GMO | 25.2% | 5,000 | $698 | $1,223 | $687 | $1,228 | $687 | ($11) | -2% |
| Res. General Use - GMO | 25.2% | 10,274 | $1,298 | $1,413 | $1,279 | $1,423 | $1,279 | ($20) | -2% |
| Res. General Use - GMO | 25.2% | 15,000 | $1,800 | $1,583 | $1,809 | $1,598 | $1,583 | ($217) | -12% |
| Res. General Use - GMO | 36.7% | 5,000 | $699 | $916 | $682 | $917 | $682 | ($17) | -2% |
| Res. General Use - GMO | 36.7% | 10,274 | $1,296 | $1,106 | $1,270 | $1,109 | $1,106 | ($189) | -15% |
| Res. General Use - GMO | 36.7% | 15,000 | $1,813 | $1,277 | $1,796 | $1,280 | $1,277 | ($536) | -30% |
| Res. Electric Heat - GMO | 29.9% | 7,500 | $919 | $1,455 | $889 | $1,443 | $889 | ($30) | -3% |
| Res. Electric Heat - GMO | 29.9% | 15,051 | $1,565 | $1,723 | $1,657 | $1,698 | $1,565 | $0 | 0% |
| Res. Electric Heat - GMO | 29.9% | 22,500 | $2,145 | $1,987 | $2,415 | $1,950 | $1,950 | ($195) | -9% |
| Res. Electric Heat - GMO | 48.8% | 7,500 | $974 | $1,084 | $939 | $1,081 | $939 | ($35) | -4% |
| Res. Electric Heat - GMO | 48.8% | 15,051 | $1,674 | $1,354 | $1,758 | $1,348 | $1,348 | ($326) | -19% |
| Res. Electric Heat - GMO | 48.8% | 22,500 | $2,290 | $1,620 | $2,566 | $1,612 | $1,612 | ($678) | -30% |
| Res. Electric Heat - GMO | 64.7% | 7,500 | $866 | $873 | $883 | $861 | $861 | ($5) | -1% |
| Res. Electric Heat - GMO | 64.7% | 15,051 | $1,864 | $2,004 | $1,949 | $1,801 | $1,801 | ($64) | -3% |
| Res. Electric Heat - GMO | 64.7% | 22,500 | $1,911 | $1,399 | $2,399 | $1,366 | $1,366 | ($545) | -29% |
| 110v EV Charger [1] | | - | $554 | $262 | $268 | $195 | $195 | ($358) | -65% |
| 220v EV Charger [1] | | - | $554 | $262 | $268 | $195 | $195 | ($358) | -65% |
| 5kW Solar [2] | | 12,000 | $631 | $920 | $664 | *$964* | $920 | $289 | 46% |

[1] EV charger only includes super off peak EV charging load of 3860 kWh per year.
[2] Solar profile is based on NREL profiles for Missouri.

*TOU is equivalent to the TOU Energy Rate
*TOU + Demand is equivalent to the TOU Energy and Demand Rate

## Table 5-12: KCP&L – MO Typical Bill Analysis

| Load profile | Average Load Factor | Energy | Existing Residential | Optional Demand | Optional TOU | Optional TOU + Demand | Minimum | Change from Existing | |
|---|---|---|---|---|---|---|---|---|---|
| | % | kWh | $ / Year | $ / Year | $ / Year | $ / Year | $ / Year | $ / Year | % |
| Res. General Use - MO | 32.8% | 5,000 | $790 | $1,162 | $842 | $1,167 | $790 | $0 | 0% |
| Res. General Use - MO | 32.8% | 9,358 | $1,374 | $1,289 | $1,444 | $1,297 | $1,289 | ($85) | -6% |
| Res. General Use - MO | 32.8% | 15,000 | $2,055 | $1,453 | $2,223 | $1,466 | $1,453 | ($602) | -29% |
| Res. General Use - MO | 33.0% | 5,000 | $790 | $1,146 | $802 | $1,142 | $790 | $0 | 0% |
| Res. General Use - MO | 33.0% | 9,358 | $1,379 | $1,273 | $1,369 | $1,267 | $1,267 | ($112) | -8% |
| Res. General Use - MO | 33.0% | 15,000 | $2,075 | $1,437 | $2,103 | $1,428 | $1,428 | ($647) | -31% |
| Res. General Use - MO | 38.9% | 5,000 | $776 | $985 | $759 | $978 | $759 | ($18) | -2% |
| Res. General Use - MO | 38.9% | 9,358 | $1,306 | $1,109 | $1,288 | $1,095 | $1,095 | ($210) | -16% |
| Res. General Use - MO | 38.9% | 15,000 | $1,884 | $1,269 | $1,973 | $1,247 | $1,247 | ($636) | -34% |
| Res. Electric Heat - MO | 20.0% | 7,500 | $908 | $1,001 | $1,080 | $995 | $908 | $0 | 0% |
| Res. Electric Heat - MO | 20.0% | 12,252 | $1,343 | $1,539 | $1,669 | $1,529 | $1,343 | $0 | 0% |
| Res. Electric Heat - MO | 20.0% | 17,500 | $1,810 | $2,134 | $2,319 | $2,120 | $1,810 | $0 | 0% |
| Res. Electric Heat - MO | 27.1% | 7,500 | $963 | $865 | $938 | $738 | $738 | ($225) | -23% |
| Res. Electric Heat - MO | 27.1% | 12,252 | $1,405 | $1,318 | $1,436 | $1,110 | $1,110 | ($295) | -21% |
| Res. Electric Heat - MO | 27.1% | 17,500 | $1,888 | $1,817 | $1,987 | $1,521 | $1,521 | ($367) | -19% |
| Res. Electric Heat - MO | 30.1% | 7,500 | $1,043 | $838 | $1,166 | $840 | $838 | ($205) | -20% |
| Res. Electric Heat - MO | 30.1% | 12,252 | $1,864 | $2,004 | $1,949 | $1,801 | $1,801 | ($64) | -3% |
| Res. Electric Heat - MO | 30.1% | 17,500 | $2,123 | $1,753 | $2,519 | $1,759 | $1,753 | ($370) | -17% |
| 110v EV Charger [1] | N/A | - | $632 | $260 | $338 | $215 | $215 | ($417) | -66% |
| 220v EV Charger [1] | N/A | - | $632 | $260 | $338 | $215 | $215 | ($417) | -66% |
| 5kW Solar [2] | | 12,000 | $699 | $1,132 | $766 | *$1,137* | $1,132 | $433 | 62% |

[1] EV charger only includes super off peak EV charging load of 3860 kWh per year.
[2] Solar profile is based on NREL profiles for Missouri. Solar will default to one of the Demand rates.

*TOU is equivalent to the TOU Energy Rate
*TOU + Demand is equivalent to the TOU Energy and Demand Rate

## Table 5-13: KCP&L – KS Typical Bill Analysis

| Load profile | Average Load Factor | Energy | Existing Residential | Optional Demand | Optional TOU | Optional TOU + Demand | Near Term Minimum | Near Term Change from Existing | |
|---|---|---|---|---|---|---|---|---|---|
| | % | kWh | $ / Year | $ / Year | $ / Year | $ / Year | $ / Year | $ / Year | % |
| Res. General Use - KS | 23.1% | 6,100 | $747 | $750 | $753 | $764 | $747 | $0 | 0% |
| Res. General Use - KS | 23.1% | 12,200 | $1,326 | $1,333 | $1,338 | $1,360 | $1,326 | $0 | 0% |
| Res. General Use - KS | 23.1% | 18,300 | $1,905 | $1,915 | $1,923 | $1,955 | $1,905 | $0 | 0% |
| Res. General Use - KS | 30.0% | 6,100 | $740 | $655 | $758 | $696 | $655 | ($84) | -11% |
| Res. General Use - KS | 30.0% | 12,200 | $1,312 | $1,143 | $1,347 | $1,224 | $1,143 | ($169) | -13% |
| Res. General Use - KS | 30.0% | 18,300 | $1,884 | $1,630 | $1,937 | $1,753 | $1,630 | ($253) | -13% |
| Res. General Use - KS | 42.6% | 6,100 | $717 | $555 | $714 | $625 | $555 | ($162) | -23% |
| Res. General Use - KS | 42.6% | 12,200 | $1,267 | $942 | $1,261 | $1,083 | $942 | ($325) | -26% |
| Res. General Use - KS | 42.6% | 18,300 | $1,816 | $1,329 | $1,807 | $1,540 | $1,329 | ($487) | -27% |
| Res. Electric Heat - KS | 19.0% | 7,500 | $803 | $768 | $795 | $789 | $768 | ($34) | -4% |
| Res. Electric Heat - KS | 19.0% | 15,000 | $1,395 | $1,369 | $1,423 | $1,409 | $1,369 | ($27) | -2% |
| Res. Electric Heat - KS | 19.0% | 22,500 | $1,979 | $1,969 | $2,050 | $2,030 | $1,969 | ($9) | 0% |
| Res. Electric Heat - KS | 29.7% | 7,500 | $843 | $796 | $894 | $826 | $796 | ($47) | -6% |
| Res. Electric Heat - KS | 29.7% | 15,000 | $1,493 | $1,425 | $1,619 | $1,484 | $1,425 | ($68) | -5% |
| Res. Electric Heat - KS | 29.7% | 22,500 | $2,121 | $2,053 | $2,345 | $2,142 | $2,053 | ($68) | -3% |
| Res. Electric Heat - KS | 41.1% | 7,500 | $858 | $783 | $886 | $769 | $769 | ($89) | -10% |
| Res. Electric Heat - KS | 41.1% | 15,000 | $1,864 | $2,004 | $1,949 | $1,801 | $1,801 | ($64) | -3% |
| Res. Electric Heat - KS | 41.1% | 22,500 | $2,181 | $2,012 | $2,322 | $1,971 | $1,971 | ($210) | -10% |
| 110v EV Charger [1] | N/A | - | $523 | $373 | $353 | $234 | $234 | ($289) | -55% |
| 220v EV Charger [1] | N/A | - | $523 | $373 | $353 | $234 | $234 | ($289) | -55% |
| 5kW Solar [2] | | 12,000 | $591 | **$669** | $676 | **$780** | $669 | $78 | 13% |

[1] EV charger only includes super off peak EV charging load of 3860 kWh per year.
[2] Solar profile is based on NREL profiles for Missouri. Solar will default to one of the Demand rates.

*TOU is equivalent to the TOU Energy Rate
*TOU + Demand is equivalent to the TOU Energy and Demand Rate

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