BEFORE THE STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS

In the Matter of the Complaint of Kansas Gas Service, a Division of ONE Gas, Inc., Against Westar Energy, Inc., Regarding Westar's Practice of Offering Payments to Developers in Exchange for the Developers Designing All Electric Subdivisions.	**)))))))**	**Docket No. 19-KGSG-061-COM**

DIRECT TESTIMONY

PREPARED BY

JUSTIN PRENTISS

UTILITIES DIVISION

KANSAS CORPORATION COMMISSION

7/22/2019

I. STATEMENT OF QUALIFICATIONS

Q. What is your name?

A. My name is Justin Prentiss.

Q. By whom and in what capacity are you employed?

A. I am employed by the Kansas Corporation Commission ("KCC" or "Commission") as a Senior Research Economist in the Economics and Rates Section within the Utilities Division.

Q. What is your business address?

A. 1500 S.W. Arrowhead Road, Topeka, Kansas, 66604-4027.

Q. What is your educational background and professional experience?

A. I hold a Master's Degree in Applied Economics from the University of Wisconsin-Whitewater and a Bachelor's Degree in Applied Mathematics from the University of Rochester. I have been a Senior Research Economist with the KCC since February 2018.

Q. Have you previously submitted testimony before this Commission?

A. Yes. I filed testimony in 18-WSEE-328-RTS Docket sponsoring Commission Staff's (Staff) position on Customer Annualization and Rate Annualization, in the 18-KCPE-480-RTS Docket sponsoring Staff's Class Cost of Service (CCOS), in 18-KGSG-560-RTS Docket sponsoring Staff's Rate Annualization and position on Kansas Gas Service's (KGS) Test Year Revenue Adjustment, and in the 19-EPDE-223-RTS Docket sponsoring Staff's CCOS. I have also participated, as a member of Commission Staff, in a number of other dockets.

II. INTRODUCTION

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to sponsor Staff's analysis of the Total Electric Subdivision Heat Pump Program (Program) from the perspective of the individual end-use customer.

Q. How is your testimony organized?

A. I will discuss Staff's analysis from the perspective of the individual end-user. Then, I will summarize the implications from the analysis and recommend the Commission consider these implication, in determining whether the Rebate Program is in the public interest.

III. ANALYSIS

Q. What are the key components in the Program?

A. The essence of the Program is the subdivisions must first be built total electric with a Total Electric heat pump heating system as the primary heating source, then Westar provides a rebate to the developer when the heat pump system and the residential meter are installed.

Q. How are the individual end-users affected by the program?

A. Staff's analysis shows the individual end user will currently pay more for electric heat than they otherwise would for gas heat. Gas heating is currently cheaper and the cost continues its trend downward, as opposed to electric heating, which is currently higher and has been increasing over time. If this were to change and gas heating becomes more expensive, gas customers have the option to switch their gas appliances to electrical appliances. But, the Total Electric customers do not have

the same opportunity to switch their electric appliances to gas appliances. They are potentially locked into the higher electric heating costs, even while gas heating continues to be a cheaper option, due to the lack of gas facilities on their premise or installed in their subdivision.

Q. How did you evaluate the individual end-user's choice between electric heating and gas heating for home space heating?

A. I evaluated the individual end-user's choice between electric heating or gas heating for home space heating by discussing two factors that help shape the choice: first, bill estimates for the individual end-user over the most recent year (given each home space heating type); and second, the heating costs the individual end-user would be subject to over time.

Heating Costs

Space Heating Market

Q. What are the dominant space heating options in the Kansas home space heating market?

A. The options for space heating fuel sources in the Kansas home space heating market include electricity, natural gas, wood, propane, solar powered, etc. The two most used space heating fuel options in Kansas are electricity at 38.1% (electric furnace or heat pump) and natural gas at 48.2%.[1] Through my analysis, I evaluated the individual end-user's choice between the heat pump electric space heating option and the natural gas space heating option.

[1] *PHYSICAL HOUSING CHARACTERISTICS FOR OCCUPIED HOUSING UNITS 2013-2017 American Community Survey 5-Year Estimates*, Census.gov American FactFinder, https://factfinder.census.gov/bkmk/table/1.0/en/ACS/17_5YR/S2504/1600000US5370000 (last visited Jul. 22, 2019).

Methodology

Q. How did you estimate the monthly cost of heating a home with gas versus electricity?

A. To estimate the monthly cost of heating a home with gas versus the cost of heating a home with electricity, I used KGS's Home Energy Calculator, along with Westar's and KGS' current tariffed charges, assuming the same house size, insulation value, and location for each of these two scenarios.[2]

Q. Why did you use KGS's Home Energy Calculator?

A. I used KGS's Home Energy Calculator because both KGS and Westar used it in their responses to discovery requests, which indicates they agree it produces accurate results.[3]

Q. Please explain how you used the Home Energy Calculator.

A. I began by assuming a somewhat insulated medium sized house located in Manhattan, KS, with four occupants, a mix of lights, typical appliances, and the temperature set at 70 degrees year round.[4] I then took this basic house configuration and ran two customer profiles (an electric heat customer and a gas heat customer) through the calculator, which produced the monthly energy usage estimates for each type of customer.[5]

[2] This tool can be found at https://www.kansasgasservice.com/energy-calculators/calculators.
[3] Westar used it in response to DR 16 and KGS used in response to DR 19.
[4] I assumed the house had some insulation and the temperature settings for both heating and cooling were 70ºF with a non-programmable thermostat. In addition, the house had one refrigerator, an Energy Star – top load washer, and an Energy Star dishwasher. The residents had one laptop computer, one liquid crystal display light emitting diode television in the size range of 40"-49", and one Cable Box/digital video recorder. The house had a mixture of compact fluorescent lights/light emitting diodes and conventional lights. Finally, the house had neither a pool nor a hot tub.
[5] KGS's Home Energy Calculator estimates usage (kWh and Mcf) for the established home configuration through the most recent thirteen months.

Q. How did you use the estimated usage results from the Home Energy Calculator?

A. I took the resulting monthly usage estimates (kWhs and MCFs) and combined them with the customer charge, applicable base rates, and riders to calculate monthly bills for each customer type (electric heat and gas heat). I then created an average bill for each season (Summer, Winter, and Shoulder) by first summing the estimated bills for the summer months, the winter months, and the shoulder months, then dividing by the number of months in each time period.[6]

Q. Why did you group the bills into winter, summer, and shoulder seasons?

A. I grouped the bills into winter, summer, and shoulder seasons to isolate the bill impact of space heating, which is the subject of the Complaint.

Total Electric Customer

Q. What appliances and heating and cooling equipment did you assume for the Total Electric customer?

A. I assumed the typical Total Electric heat customer has a Total Electric heat pump,[7] an electric water heater, [8] an electric clothes dryer, and an electric range.

Q. What is the calculated electric bill for a Total Electric customer?

A. The electric bill for a Total Electric customer is presented in Table 1. The table shows relatively higher bills in the summer and winter months compared to the shoulder months, which would be expected given that electricity is doing the job of

[6] For the purposes of this analysis, summer was defined as June through August, winter was defined as December through February, and the shoulder months were defined as all remaining months.
[7] Specifically, a highly efficient heat pump was selected.
[8] Specifically, a heat pump type electric water heater was selected.

both heating in the winter and cooling in the summer, and the need for heating and cooling diminishes during the shoulder months.

Table 1: Total Electric Utility Bill

	Summer	Winter	Shoulder
Monthly Average Usage (kWh)	2,934	2,839	1,741
Monthly Average Bill	$ 381.30	$ 316.92	$ 208.26

Electric Customer with Gas Heat, Water, Dryer, and Range (Gas Customer)

Q. What appliances did you assume for the gas customer?

A. I assumed the gas customer has a gas furnace with an electric air conditioner,[9] a natural gas water heater, a natural gas clothes dryer, and a natural gas range.

Q. Why did you choose these appliances?

A. For the purpose of this evaluation, I assumed gas customers would choose to maximize their use of gas appliances.

Q. What are the calculated utility bill costs to a gas customer?

A. The electric bill for a gas customer is presented in Table 2.

Table 2: Electric Utility Bill

	Summer	Winter	Shoulder
Monthly Average Usage (kWh)	2,643	319	580
Monthly Average Bill	$ 344.23	$ 51.53	$ 83.06

Electric bills are highest in the summer because of air conditioning. The gas bill for a gas customer is presented in Table 3.

[9] Specifically, a high efficiency gas furnace was selected.

Table 3: Gas Utility Bill

	Summer	Winter	Shoulder
Monthly Average Usage (Mcf)	3	22	11
Monthly Average Bill	$ 37.90	$ 177.06	$ 89.67

Gas bills are highest in winter because of heating.

Comparison

Q. How did the utility bills compare between a Total Electric customer and a gas customer?

A. Combined, the total utility bill in the summer for a gas customer is $382.13, $228.59 for the winter, and $172.73 in the shoulder season. For comparison, the total utility costs for the two different customer groups are presented in Table 4.

Table 4: Utility Bill Comparison

Monthy Average Bill	Summer	Winter	Shoulder
Total Electric Customer	$ 381.30	$ 316.92	$ 208.26
Gas Customer	$ 382.13	$ 228.59	$ 172.73
Difference	-$0.83	$88.34	$35.54

When compared to a gas customer, the Total Electric customer will, on average, pay $0.83 (or 0.22%) less in the summer, $88.34 (or 38.64%) more in the winter, and $35.54 (or 20.57%) more in the shoulder months. This compares to the Total Electric customer paying $123.04 (or 15.71%) more than the gas customer over the course of the entire year.

Q. How accurate are these cost estimates?

A. I believe these estimates are accurate since they are based on volumes derived from KGS's model and current tariffed prices. However, some variation from these values can happen over time. I will discuss these variations in the next section.

Exposure to Price Changes over Time

Explanation of Model

Q. Why did you build a model?

A. I wanted to analyze the variations in customer heating costs from using electric heat versus using gas heat over time. Because one kWh will not produce the same amount of heat as a single MMBtu, I built a model to find the number of kWhs that will produce the same amount of heat as 1 MMBtu given the differences in equipment efficiencies. After finding the equivalent fuel inputs, I multiplied these quantities with their corresponding rates to calculate the end-user's costs of using each fuel source.

Model Assumptions

Conversion Factor

Q. What conversion factor did you use to convert kWh to MMBtus?

A. I used the Standard conversion 1 kWh = 1/293 MMBtus.

Heating Efficiency Ratings

Q. Are there any differences in the heating systems' components and efficiencies?

A. Gas heating systems and electric heating systems operate at different efficiencies. The gas heating system only has one component (a furnace), but the Total Electric heat pump heating system has two components (the heat pump itself and backup resistance heating), which each have different efficiency ratings as well. The model contains both gas and Total Electric heating systems.

Q. What are the components of a Total Electric heat pump heating system?

A. The two components of the Total Electric heat pump heating system are the heat pump itself and backup resistance heating. While a heat pump operates very efficiently, one cannot use a heat pump alone when a certain temperature threshold (around 27 degrees) is reached. A Total Electric heat pump will operate standing alone, switch to using both the heat pump and resistance heating in tandem, and then switch entirely to the backup resistance heating as the outdoor temperature falls.

Q. What are the efficiencies that were inputs into the model?

A. The model evaluates the cost of each of the two components of the Total Electric heat pump heating system (the heat pump itself and the backup resistance heating) separately due to their difference in efficiency ratings. The efficiency of each component (an efficiency rating of 250% for the heat pump itself and an efficiency rating of 100% for the resistance back up heating) are inputs into the model. The gas furnace efficiency (96%) is also an input into the model.

Prices

Q. What prices did you use in the model?

A. I used KGS Tariffs and Westar North Tariffs in the model.

Model Calculations

Q. How does the model calculate the end-user's costs over time?

A. The model uses the efficiencies of each different heating option to find the amount of electricity needed to produce the same amount of heat that 1 MMBtu[10] of gas produces in a furnace. These quantities are then multiplied by their corresponding tariff rates to calculate the end-user's costs over time.

Q. What quantity of kWhs produces the same amount of heat as 1 MMBtu produces in a gas furnace?

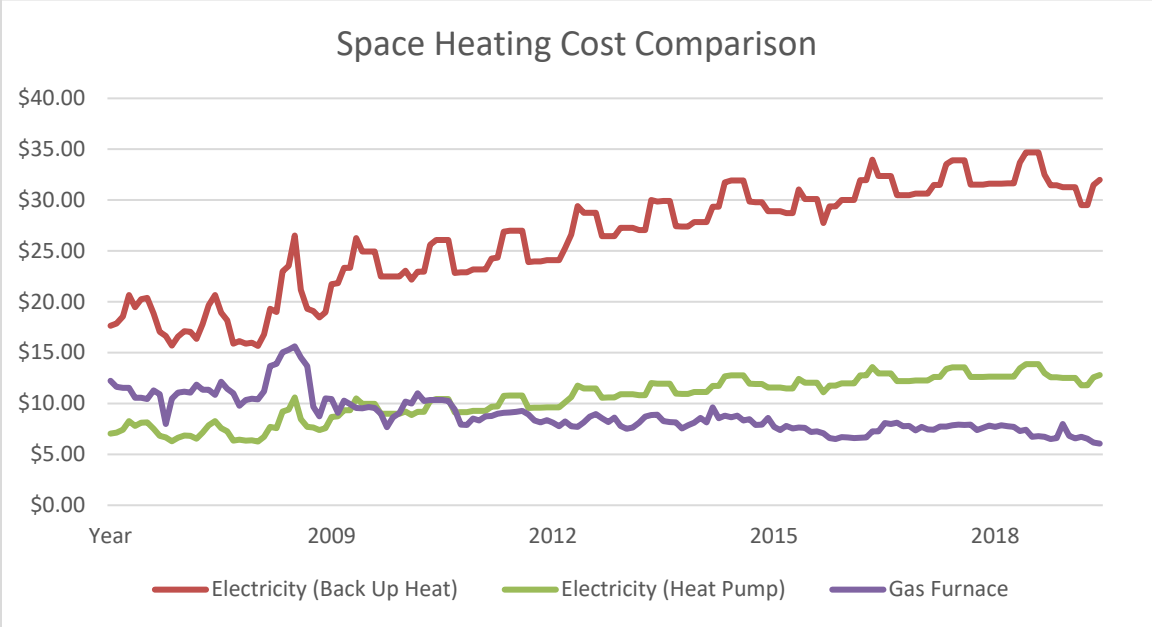
A. The equivalent number of kWh's that will produce the same amount of heat as 1 MMBtu produces in a gas furnace is 281.28 kWh for the backup resistance heater and 112.50 kWh for the stand-alone heat pump unit.

Q. How are End-User Costs calculated in the model?

A. The equivalent fuel quantities are multiplied by their corresponding rates from February 2006 through the present time to derive the end user's costs over time for the Total Electric and Gas customers. These results are presented graphically in Figure 1 below.

[10] 1 Mcf of natural gas contains about 1 MMBtu of energy per KGS's quality standards (Schedule GTC9 9.03.01 (7).

Figure 1: Space Heating Cost Comparison



Comparison

Q. Has the standalone heat pump heating option ever been cheaper than a gas furnace?

A. Yes. The Standalone Heat Pump has been a cheaper option at times. The higher efficiency of the heat pump unit without the backup resistance heating made electric heating a cheaper option than gas heating at times. However, the heat pump unit alone is not a viable option in the Midwest and must be used with backup resistance heating equipment, which is less efficient than the stand alone heat pump. This causes electric heating to always cost more than gas heating.

Q. How do these costs vary over time?

A. The gas heating cost varies more often than electric heating costs, but ever since the cost of gas heating spiked in 2008, it has generally been trending downwards, especially when compared to the cost of electric heating.

Future Options

Q. Can gas customers respond to price changes?

A. Though the current trends indicate electric heating will remain more costly than gas heating, there is a chance the trends will change and costs will again flip. If such a change were to occur, the gas customer would have the option of switching to electric heating without incurring additional expenses beyond the heating unit itself. However, the opposite is not true.

Q. Can electric customers respond to price changes?

A. Electric heating customers may want to switch to gas heating as currently gas heating is cheaper than electric heating. But to switch to gas heating, electric heating customers may face substantial costs. In areas where no natural gas facilities have been run to the house, customers would have to pay for the installation costs of distribution pipes, service lines, and internal piping themselves.

Summary

Q. Please summarize your conclusions

A. As discussed above, Staff's analysis shows the individual end user will currently pay more for electric heat than they otherwise would for gas heat. Gas heating is currently cheaper and the cost continues its trend downward, as opposed to electric heating, which is currently higher and has been increasing over time. If this were to change and gas heating becomes more expensive, gas customers have the option to switch their gas appliances to electrical appliances. But, the Total Electric customers do not have the same opportunity to switch their electric appliances to gas appliances. They are potentially locked into the higher electric heating costs,

even while gas heating continues to be a cheaper option, due to the lack of gas facilities on their premises or installed in their subdivision.

IV. CONCLUSION

Recommendation

Q. What are your recommendations?

A. I recommend, for the purposes of this docket, the Commission accept the assumptions and results of my model for comparing electric and natural gas heating costs for residential customers; find that Total Electric customers would likely pay more for heating their homes; and find that Total Electric customers are locked into those higher heating costs unless they can sell their homes and move to another location.

Q. Does this conclude your testimony?

A. Yes. Thank you.

STATE OF KANSAS)
) ss.
COUNTY OF SHAWNEE)

VERIFICATION

Justin W. Prentiss, being duly sworn upon his oath deposes and states that he is a Senior Research Economist for the Utilities Division of the Kansas Corporation Commission of the State of Kansas, that he has read and is familiar with the foregoing *Direct Testimony*, and attests that the statements contained therein are true and correct to the best of his knowledge, information and belief.

Justin W. Prentiss
Senior Research Economist
State Corporation Commission of the
State of Kansas

Subscribed and sworn to before me this 22nd day of July, 2019.

VICKI D. JACOBSEN
Notary Public - State of Kansas
My Appt. Expires 6-30-22

Vicki D. Jacobsen
Notary Public

My Appointment Expires: 6-30-22

CERTIFICATE OF SERVICE

19-WSEE-061-COM

I, the undersigned, certify that a true and correct copy of the above and foregoing Staff Direct Testimony was served via electronic service this 22nd day of July, 2019, to the following:

JAMES G. FLAHERTY, ATTORNEY
ANDERSON & BYRD, L.L.P.
216 S HICKORY
PO BOX 17
OTTAWA, KS 66067
Fax: 785-242-1279
jflaherty@andersonbyrd.com

ROBERT J. AMDOR, MANAGER, REGULATORY SERVICES
BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
D/B/A BLACK HILLS ENERGY
1102 E FIRST ST
PAPILLION, NE 68046
Fax: 402-829-2227
robert.amdor@blackhillscorp.com

DARI R. DORNAN, ASSOCIATE GENERAL COUNSEL
BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
D/B/A BLACK HILLS ENERGY
1102 East 1st Street
Papillion, NE 68046
dari.dornan@blackhillscorp.com

TERRI PEMBERTON, ATTORNEY
CAFER PEMBERTON LLC
3321 SW 6TH ST
TOPEKA, KS 66606
Fax: 785-233-3040
terri@caferlaw.com

GLENDA CAFER
IDEATEK TELCOM, LLC
CAFER PEMBERTON LLC
3321 SW 6TH AVE
TOPEKA, KS 66606
Fax: 785-233-3040
glenda@caferlaw.com

PHOENIX ANSHUTZ, LITIGATION COUNSEL
KANSAS CORPORATION COMMISSION
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3354
p.anshutz@kcc.ks.gov

COLE BAILEY, LITIGATION COUNSEL
KANSAS CORPORATION COMMISSION
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3354
c.bailey@kcc.ks.gov

MICHAEL DUENES, ASSISTANT GENERAL COUNSEL
KANSAS CORPORATION COMMISSION
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3354
m.duenes@kcc.ks.gov

ROBERT VINCENT, LITIGATION COUNSEL
KANSAS CORPORATION COMMISSION
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3354
r.vincent@kcc.ks.gov

JUDY JENKINS HITCHYE, MANAGING ATTORNEY
KANSAS GAS SERVICE, A DIVISION OF ONE GAS, INC.
7421 W 129TH ST
OVERLAND PARK, KS 66213-2713
Fax: 913-319-8622
judy.jenkins@onegas.com

CERTIFICATE OF SERVICE

19-WSEE-061-COM

CATHRYN J. DINGES, CORPORATE COUNSEL
WESTAR ENERGY, INC.
818 S KANSAS AVE
PO BOX 889
TOPEKA, KS 66601-0889
Fax: 785-575-8136
cathy.dinges@westarenergy.com

/s/ Vicki Jacobsen
Vicki Jacobsen