ITEM # 4
DATE: 04-21-15

COUNCIL ACTION FORM

SUBJECT: TIME-OF-USE (TOU) INDUSTRIAL ELECTRIC RATE

BACKGROUND:

Electric Services is responsible for providing electricity to the majority of the City's residents and to parts of Iowa State University on a wholesale and retail level. As an electric utility, the Ames Municipal Electric System (AMES) strives to provide reliable and secure service to its customers at the best possible price.

AMES traditionally establishes ongoing operating plans using a "supply-side management" philosophy. Not only does the electric utility need to meet ever-changing energy needs on a minute by minute basis, but it is required by the Midcontinent Independent System Operator to meet the hourly maximum peak demand requirement plus a 7-10% margin of reserve.

As demand has continued to grow through the years, the City's energy and capacity needs were met through multi-year power-supply contracts and through construction of new generation. New generation is expensive to build and affects the rates paid by AMES customers. The City's last base generating unit was installed in 1982 and the last peaking generating unit in 2006. Based on projected load growth, the 2007 Capital Improvement Plan (CIP) included plans for additional peaking generation capacity to be installed in 2012.

In 2007 the City Council also embarked on a progressive approach to keep rates stable by delaying the need to expand generation capacity by initiating a demand-side-management (DSM) program. Through incentives and rebates, the AMES began to help customer accelerate the replacement of older, less efficient equipment, appliances, and lights with new ones that use less energy. As a result of these programs, it is estimated that the City's projected peak demand has been reduced by over 15,000 kilowatts, and 25,000,000 kilowatt hours of energy has been saved. More importantly, the success of the DSM program has eliminated the need for the next generating unit originally outlined in the 2007 CIP with its associated large capital expenditure.

While the City's DSM program remains effective in slowing electric demand growth, a new peak of 130.6 megawatts was set in July, 2012, and came close again in August 2013 with a peak load of 130.2 megawatts. The maximum demand in 2014 would again have been close to the 130 megawatt-or-greater level had it not been for a cool summer and process changes by the utility's largest customer. Because of this increasing peak load, the current CIP again includes a project to add additional generation capacity in the 2019/20 time frame to meet expected demand growth.

To develop the next phase of DSM, one must first look at the relationship between the City's cost of supply and the customer's usage. Ignoring the cost of the wires and poles to deliver the electricity, there are two things a utility must have – **energy** and **capacity**.

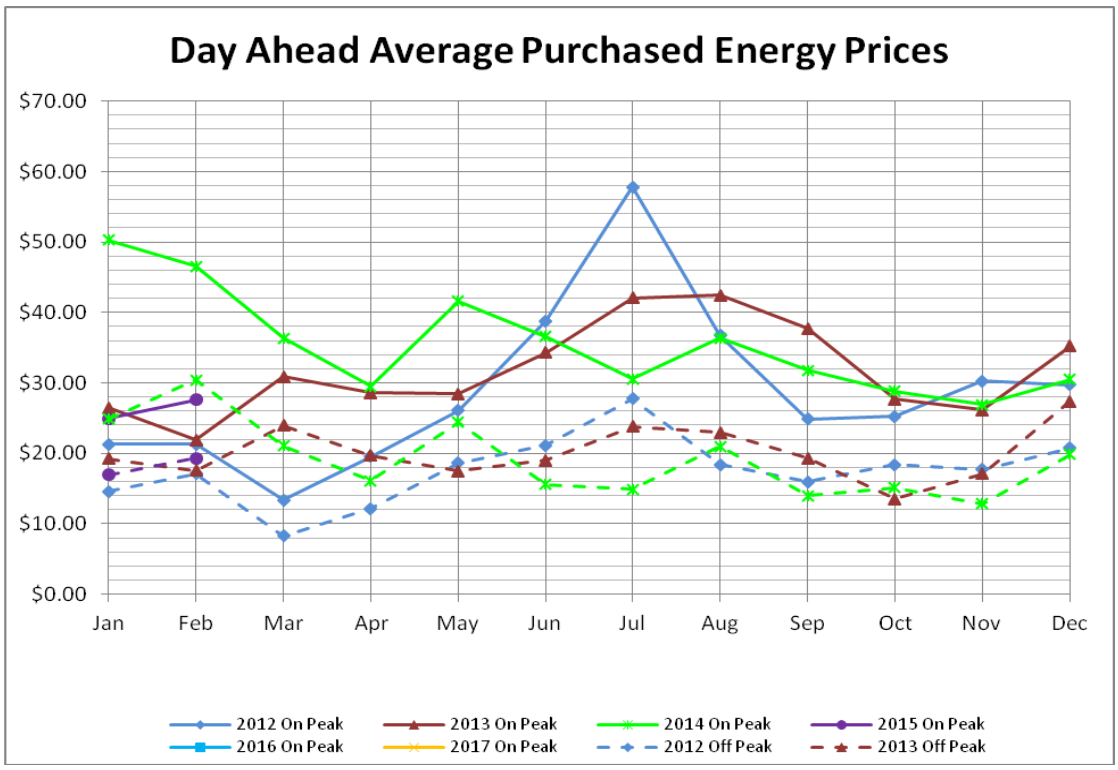
Energy

The AMES must have the exact amount of energy required by its customers every moment of every day. This is provided through AMES owned generation and through purchases from the electric “grid”. Energy from City-owned generation is produced at a reasonably stable and nearly fixed cost. However, the price of energy from the grid changes hourly in the “day ahead” market and every five minutes in the “real time” market. Much of the City’s energy is purchased from the market because the market is oftentimes cheaper. Ames customers are insulated from these wholesale price swings through the development of an “average” retail rate, a rate that does not differ with the time of the day.

Developing an average rate is a very good practice for the typical homeowner or business because it stabilizes their bills. However, for our largest customers that can vary their production schedules and adjust their energy consumption, having different rates throughout the day could reshape their production schedule. Lower cost energy could be used by the customer to reduce their cost of production if they are willing to move some production to late evenings and weekends.

There are predictable and measurable pricing patterns in the energy market. On average, energy prices are higher Monday through Friday between the hours of 8:00 am and 8:00 pm and are lower from 8:00 pm to 8:00 am, as well as all day on weekends and holidays. This makes intuitive sense since more energy in used during daylight hours on work days than at other hours. More energy required means more generators running, and typically this means higher costs.

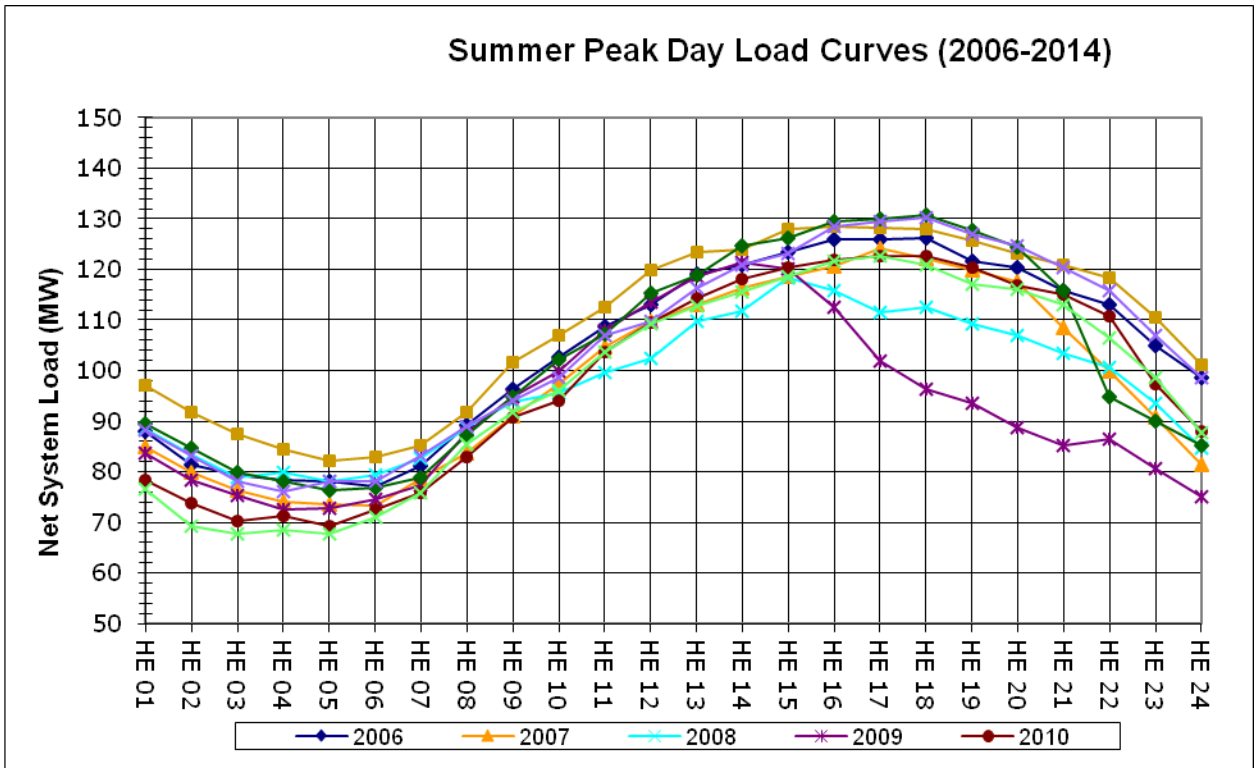
The chart below represents the average market cost, paid by the City for on-peak energy (Monday-Friday, 8:00 am to 8:00 pm) and off-peak energy (all other hours) on a month by month basis for the past several years. Moving usage to off-peak hours reduces the energy cost to the City. This would also benefit the customer if a rate was developed which passes on some or all of the savings.



Capacity

The AMES must have enough **capacity** to meet that one hour in any year when customer energy demand reaches its hourly maximum peak, plus a marginal amount above peak demand for system reliability. This is a requirement of all utilities, so that if any generating unit is down there surplus generation will exist to cover the requirements at any given moment. The AMES is at a point where growth in peak demand will soon required the acquisition of additional capacity. The old supply-side management style would to simply say build more capacity. However, if the City can work with its largest customers and encourage reduction in demand by lowering production while other AMES customers are peaking, a win-win scenario can be achieved.

When does the City peak? The graph below is the hour-by-hour demand of the City for each peak day from 2006 to 2014. The Y axis represents the electric demand of all customers supplied by the City measures in megawatt hours. The X axis lists the 24 hours in a day. Standard language in the utility industry is to talk in terms of “hour ending” or HE. Therefore, HE 11 represents the time from 10:00 am to 11:00 am. With the exception of 2008 and 2009, when storms interrupted the peak, the critical City Peak window has been from HE 16 (4 pm) to HE 19 (7 pm). Reducing demand during these hours would delay the need for the next generator and would save both the City and its customer’s money.



In order to reduce or control peaks and to delay the need for added capacity, many larger utilities across the country modify their electric rate designs. The City does this today on a very limited basis. AMES electric rates are different between the summer season and the rest of the year. This is done in part because Ames is a summer peaking utility and energy is more expensive when air conditioning is needed.

Through new rate design incentives, the AMES could encourage customers to reduce consumption during the peaking window of 4:00 pm to 7:00 pm. A major impact could be made immediately by using such a rate design to encourage large industrial users to shift production from on-peak to off-peak hours. The utility and the community would benefit when large electric users are encouraged to reduce their demand during peak hours of a day and peak days of a year.

A Time-of-Use (TOU) Rate is a pricing strategy whereby AMES would vary the price of electricity depending on the time-of-day it is delivered to the customer. Prices encourage the customer to use electricity during times of low demand and discourage use during the peak times of the day. Time-of-Use pricing could allow AMES to better control costs and mitigate any negative system impacts related to times of peak demand.

In its January 16, 2015 packets, the City Council received a letter from Amcor dated January 6, 2015 encouraging the development of a TOU rate. A copy of the letter is attached. Having done extensive exploration and analysis of potential TOU rates, staff is now recommending that a pilot program be implemented for the City's Industrial Rate customers using a TOU-based rate. The Industrial Rate customers include Amcor, 3M, Danfoss, and the College of Veterinary Medicine. Use of the TOU would not be mandated for any customer, but would be optional.

Electric Services staff has worked with Amcor, the City's largest Industrial Rate customer, to develop a TOU rate that Amcor is willing to be subject to through a pilot period. The basic components are shown in the following table:

Billing Component	Existing Industrial Rate	Proposed Industrial TOU Optional Rate
Customer Charge	$150/month	$250/month
Demand Charge	$10/kVA (summer months) or $7.50/kVA (winter months) times the highest 15 minute peak demand measured in the month.	$10/kVA (summer months) or $7.50/kVA (winter months) times the highest 15 peak demand measured in the month between the hours of 4:00 pm to 7:00 pm, Monday through Thursday.
Energy Charge	$0.0619/kilowatt-hour for all energy	$0.0619/kilowatt-hour for all energy measured Monday-Friday from 8:00 am to 8:00 pm, and energy consumed during all other hours up to the customer's peak demand. $0.04/kilowatt-hour for all energy consumed during off-peak hours in excess of the customer's peak demand.
Energy Cost Adjustment	Applies to all energy	Applies to all energy.
Interruption	N/A	Customer must curtail load for up to 4 hours with a 6 hour notice; up to 3 times per month

The following estimated revenue impacts would occur with implementation of this rate. Assuming there is a 5,000 kW peak reduction as a result of the rate, the utility's corresponding revenue would decrease by $500,000. This loss of revenue could be offset in a combination of two ways. First, as a form of demand side management, some or all of the lost revenue could be credited toward the existing DSM budget. The current Council approved DSM budget for FY 15/16 is $1,000,000. Second, the reduction of the City's peak would delay the need for new generation and a large capital expenditure. If the reduction delayed a $25,000,000 expenditure, that would equate to roughly a $390,000 annual avoided cost.

The proposed TOU rate would capture the necessary ideals outlined above in the following ways:

Basing customers demand charges on their contribution to the City's peak will encourage

load reduction during the critical 4:00 pm to 7:00 pm window.

Offering lower off-peak rates will encourage shifting energy consumption from on peak periods to late night, early morning and weekend periods.

Additional City-triggered interruption periods would give the City the flexibility to reduce peak outside of the typical high demand window.

The proposed rate addition would not alter existing Municipal Code Chapter 28, Section 28:107, Industrial Electric Rates and Charges, but would add an optional TOU rate to the Code. It is intended that this rate addition be optional and only be offered to Industrial Rate customers within Electric Services' service territory. Advanced metering and individual billing calculations are required, which currently limit the ability to cost effectively apply this to smaller customers at this time. The Optional Time-Of-Use Industrial Electric Rate would be offered for 15 months, so it can be evaluated for system and revenue impacts and for utility and customer efficacy. The rate would expire after the 2016 summer billing season. The pilot period would thus extend through two summer seasons. Should the Optional Time-Of-Use Industrial Electric Rate be deemed beneficial after that time, staff would approach Council seeking authority to make this a permanent part of the Municipal Code.

Attached is the draft ordinance section reflecting the Optional Time-Of-Use (TOU) Rate in red, together with the existing Industrial Rate, Section 28.107 in black.

ALTERNATIVES:

1. Approve the proposed changes to Municipal Code Chapter 28, adding Section 28:108, Optional Time-Of-Use (TOU) Industrial Electric Rate and Charges for a 15-month trial period.

2. Refer the electric utility rate ordinance back to staff with direction to develop an alternative rate structure. Depending on the complexity of the desired rate structure, this action would likely delay implementation of a Time-Of-Use (TOU) rate to 2016 and result in not having a rate induced method for assisting in the control of electric demand for this year's summer peak season.

3. Do not approve the addition of a TOU rate into the Municipal Code at this time.

MANAGER'S RECOMMENDED ACTION:

The City's electric utility does an excellent job in meeting the electric needs of its customersand tempering rate increases. Through demand side management programs, customers are encouraged to use less electricity by replacing older equipment with more energy efficient equipment.

The next step in energy conservation and peak usage control is specialized rates that more closely align wholesale costs and retail consumption. A pilot study using a combination of Time-of-Use rates together with a customer Interruption feature will allow staff to determine the benefits and costs for both the individual customer using the rate and for all electric customers served by the City.

Normally staff does not ask the City Council to vote on an ordinance change at the night of a workshop. However, swift action is needed in order for the ordinance to be in place and for industrial customers who choose the TOU rate option to make necessary advance arrangements prior to this summer's peaking season. Therefore, City Council is being asked to approve this ordinance on first reading on April 21st, and to approve the ordinance on second and third readings on April 28th.

Therefore, it is the recommendation of the City Manager that the City Council adopt Alternative No. 1 as stated above.

Sec. 28.107. INDUSTRIAL ELECTRIC RATES AND CHARGES.

(1) **Availability:** The Industrial Electric Rates and Charges shall be mandatory for any non-residential customer whose metered demand at any time exceeds 2,500 kVA. If at any time, a non-residential customer's metered demand exceeds 2,500 kVA, all consumption for the billing period in which that occurs, and for the next succeeding eleven billing periods, shall be charged at the Industrial Rates and Charges.

(Ord. No. 4130, 11-27-12)

(2) **Rate Per Billing Period:** For each monthly billing period, an Industrial customer shall be charged:

(a) the Service Charge of one hundred fifty dollars ($150.00);

(b) the Demand Charge and the Energy Charge for the energy consumption during the billing period as follows:

(i) for bills mailed on or between July 1 and October 31 (summer period):

1) the Demand Billing Rate of $10.00 per kVA, and

2) the Energy Billing Rate of $0.0619 per kWh,

(ii) for bills mailed on or between November 1 and June 30 (winter period):

1) the Demand Billing Rate of $7.50 per kVA, and

2) the Energy Billing Rate of $0.0619 per kWh;

(Ord. No. 3955, 05-27-08; Ord 3987, 05-12-09; Ord. No. 4130, 11-27-12)

(c) the applicable Energy Cost Adjustment (ECA) per Sec. 28.102.

(Ord. No. 4130, 11-27-12)

(3) **Billing Demand:** The Billing Demand shall be the greater of:

(a) The peak fifteen (15) minute demand measured during the current monthly billing period, or

(b) Seventy-five percent (75%) of the peak demand measured during the most recent four months of the summer period; or

(c) Sixty percent (60%) of the peak demand measured during the last eleven billing periods; or

(d) 2,500 kVA after discounts.

(Ord. No. 4130, 11-27-12)

(4) **Minimum Bill:** The minimum monthly bill shall be the Service Charge plus the current Demand Charge plus the Energy Charge for and the Energy Cost Adjustment for 600,000 kWh.

(5) **RESERVED**

(6) **Service Facilities:** The Ames Municipal Electric System shall furnish as a standard installation, facilities adequate to supply service at a single point of delivery to a normal load equal to the maximum 15-minute demand of the customer. Each standard installation shall include, where necessary, one standard transformer capable of supplying the demand and energy requirements of the service.

(7) **Excess Facility Charge:** In the event service facilities in addition to, or different from, a standard installation are requested by the customer, or are required to serve the customer's load, the Ames Municipal Electric System shall furnish, install, and maintain such facilities subject to the following considerations:

(a) The type, extent, and location of such service facilities shall be determined by agreement between the Ames Municipal Electric System and the customer.

(b) Such service facilities shall be the property of the Ames Municipal Electric System.

(c) The customer shall pay a monthly rental charge on those facilities in excess of the facilities included in a standard installation.

(d) If the optional or nonstandard facilities are used for other customers also, the rental payable by the customer shall be that portion of the total rental which is reasonably assignable to the customer.

(8) **Primary service:** Customers who take service at primary voltage shall be granted discounts to demand and energy as follows:

(a) 1-1/2% of the billing demand and measured energy where metering is on the high voltage side of utility-owned transformers.

(b) 5% of the billing demand and 1-1/2% of the measured energy where metering is on the high voltage side of customer-owned transformers.

(c) A minimum Billing Demand after discount shall be 2,500 kVA

(Ord. No. 4130, 11-27-12)

(d) Voltages below 8,000/13,800 Y nominal are considered secondary voltage.

(9) **Conditions:** The Industrial Rate shall be subject to the following specific conditions.

(a) the general condition in section 28.101 (1), (2) and (5) and

(b) the following specific conditions:

(i) The customer's total usage on a single premise shall determine whether the customer qualifies for service under this rate structure. In no event will the customer be billed on more than one rate. A premise is defined as the main building of a commercial or industrial establishment, and shall include the outlying or adjacent buildings used by the same provided the use of service in the outlying buildings is supplemental and similar to the service used in the main building.

(ii) Fluctuating loads. If use of energy is intermittent or subject to violent fluctuation, the Ames Municipal Electric System may add to the 15-minute measured demand an amount equal to 65% of the rated capacity in kVA of the apparatus which causes such fluctuations.

Sec. 28.108. OPTIONAL TIME-OF-USE (TOU) INDUSTRIAL ELECTRIC RATE AND CHARGES.

(1) **Availability:** The Industrial Time-of-Use (TOU) Electric Rate shall be voluntary for any non-residential customer whose metered demand at any time exceeds 2,500 kVA. Service under this rate schedule is billed on a Time-of-Use (TOU) basis as provided under these rules established by Electric Services. The Optional Time-of-Use Industrial Electric Rate is an alternative to, and at the customer's discretion replaces Section 28.107 (1) Availability. Customers opting for inclusion on the Optional Time-of-Use (TOU) Industrial Electric Rate are required to remain on the rate for a period no less than twelve consecutive calendar months.

(Ord. No. 4130, 11-27-12)

(2) **Intent:** Electric Services is a summer peaking electric utility, and as such, the cost to deliver electricity is generally most expensive and detrimental to generation and distribution systems during hours of greatest demand. The utility, and the community of Ames, benefit when large electric users are encouraged to reduce their demand during these times. A Time-of-Use (TOU) Rate is a pricing strategy whereby Electric Services may vary the price of electricity depending on the time-of-day it is delivered to the customer. Prices encourage the customer to use electricity during times of low demand and discourage use during the peak times of the day. Time-of-Use (TOU) pricing allows Electric Services to better control costs and mitigate any negative system impacts related to times of peak demand.

(3) **Definitions:**

(a) **Time-of-Use (TOU)**: A specifically identifiable period of time during a twenty-four hour day used for establishing a pricing strategy aimed at reducing the overall demand for electricity.

(b) **Peak**: The greatest fifteen (15) minute demand for electricity measured during the current billing period.

(c) **Billing Demand**: Highest metered kilovolt-amp (kVA) electric use, in a billing period measured between the hours of 3pm and 7 pm Monday through Thursday, over the billing period. If however, a higher kVA electric use is set during a required Interruption (see Section 28.108 (5)) this will result in a **Billing Demand** set outside of the Monday – Thursday window.

(d) **Holidays**: Federally observed Holidays.

(e) **On-Peak Energy**: Electricity, measured in kilowatt hours, used Monday through Friday between the hours of 8:00 am and 8:00 pm.

(f) **Off-Peak Base Energy**: Electricity, measured in kilowatt hours, used Monday through Friday between the hours of 8:00 pm and 8:00 am, and all day Saturday, Sunday and **Holidays**, up to the established monthly **Billing Demand**.

(g) **Off-Peak Time-of-Use Energy**: Electricity, measured in kilowatt hours, used Monday through Friday between the hours of 8:00 pm and 8:00 am, and all day Saturday, Sunday and **Holidays**, in excess of the established monthly **Billing Demand**

(h) **Summer period**: Bills mailed on or between July 1 and October 31.

(i) **Winter period**: Bills mailed on or between November 1 and June 30.

(j) **Energy Cost Adjustment (ECA)**: The Energy Cost Adjustment (ECA) is a billing component that allows the utility to reflect fluctuations in the cost of fuel for the power plant without frequently changing the standard energy charges. The ECA is simply the difference between actual fuel costs for the past twelve months and the base fuel cost added to every metered kilowatt-hour (kWh).

(4) **Rate Per Billing Period:** For each monthly billing period, an Industrial customer participating in the Optional Time-of-Use (TOU) Electric Rate shall be charged:

(a) the Service Charge of two hundred fifty dollars ($250.00);

(b) the Demand Charge and the Energy Charge for the energy consumption during the billing period as follows:

(i) for bills mailed on or between July 1 and October 31 (summer period):

1) the **Billing Demand** times the billing rate of $10.00 per kVA, and

2) the **On Peak, Energy** times the billing rate of $0.0619 per kWh,

3) the **Off Peak, Base Energy** times the billing rate of $0.0619 per kWh,
4) the **Off Peak, Time-of-Use Energy** times the billing rate of $0.04 per kWh,

(ii) for On-Peak bills mailed on or between November 1 and June 30 (winter period):
1) the **Billing Demand** times the billing rate of $7.50 per kVA, and
2) the **On Peak, Energy** times the billing rate of $0.0619 per kWh,
3) the **Off Peak, Base Energy** times the billing rate of $0.0619 per kWh,
4) the **Off Peak, Time-of-Use Energy** times the billing rate of $0.04 per kWh,

(Ord. No. 3955, 05-27-08; Ord 3987, 05-12-09; Ord. No. 4130, 11-27-12)

(c) the applicable Energy Cost Adjustment (ECA) per Sec. 28.102, and

(Ord. No. 4130, 11-27-12)

(d) any applicable bill impacts of Section 28.107 (3) Billing Demand, (4) Minimum Bill, (6) Service Facilities, (7) Excess Facilities, (8) Primary Service, and (9) Conditions.

(5) **Interruptible Option:** For each summer monthly billing period, an Industrial customer participating in the Optional Time-of-Use (TOU) Electric Rate may, at Electric Services' discretion,

(a) on at least a 6 hour notice, be required to reduce demand to that equal to, the previous **Billing Demand** two months prior at any time Monday at 8:00 am thorough Saturday before 8:00 pm,

(i) the actual demand during the interruption period will be used as the **Billing Demand** for the month if it is higher than the highest metered kilovolt-amp (kVA) electric use, in a billing month measured between the hours of 3pm and 7 pm Monday through Thursday, over the billing period.

(b) the duration of the interruption will be up to 4 hours in length

(c) maximum number of occurrances per month (3)

(6) **Noncompliance Penalty:** If at any time during participation in the Optional Time-of-Use (TOU) Electric Rate the customer's On-Peak demand exceeds One hundred thirty (130) percent of their ninety (90) day rolling average peak, the customer will be charged a penalty of $5 per kVA on the current billing period's billing demand.

(7) This ordinance shall remain in effect until September 1, 2016, on which date it is repealed in its entirety.

PKTS. 1-16-15

Michael Simpson, Senior Plants Manager
Amcor Rigid Plastics
520 Bell Avenue
Ames, IA 50010

January 6, 2015

Ann Campbell, Mayor
PO Box 811
515 Clark Avenue
Ames, IA 50010

Dear Ms. Campbell,

The purpose of this writing is to begin a discussion on an opportunity to benefit both Ames Electric Services industrial customers and the City of Ames Utility.

In general, the Ames Electric Service could control cost of supplementing power from the grid, as well protect from or delay a capital investment for capacity. This would be achieved by working with its largest industrial customers to control the timing of their Peak Demand relative to that of the residential community.

Background:

The utility which services 70% residential and 30% industrial customers, based on output, will have peaks in the summer months, generally during the warmest times of the day, identified as the window between 5pm and 8pm. This is most critical on weekdays Monday to Thursday.

The industrial demand is roughly 35MW. Amcor, as the utilities largest customer, represents roughly a third of this demand (9.5MW).

Amcor is operating in a commodity industry where operational costs are not only critical to competing with other companies but also for existing business within our own organization. Electricity which is one of our top cost drivers is evaluated and published monthly. It is recognized that Ames electrical cost is well above the median within our company which has 25 plants across the country.

Over the last year, Amcor Ames has gone to great efforts to "flatten" its electric load profile which as a result has reduced its peak, helping us and the utility control costs. This summer we were recognized by the city and joined the Mayor's "Green Team" as a result of these efforts. Amcor, and the City's remaining Industrial customers, can take further steps to reduce the City's peak by controlling the timing of our own usage relative to that of the residential community, but we need the City Council's help to accomplish this.

Opportunity:

Amcor and the other City Industrial customers can create a Win-Win situation. The Energy Rate, as it exists today, gives no deference to when we use energy. Also, the Demand Charge is applied to our usage equally without regard for when we set our peak. If we set our peak when the City typically peaks it has a direct impact on the City of Ames operational costs, likewise if our peak was not coincident with the city peak the impact would be positive to the utility's operational cost.

As a result, Amcor would ask the City Council to consider the development of a specialized 'off peak" rate for its industrial customers. Our suggestion would be that:

- The window of time in which our "Peak" could be recorded is reduced to the critical window when residential demand is high. In this scenario we would schedule our production around this window and control our usage during the timeframe.
- The electricity used when residential consumption is lowest, identified as Monday - Thursday from 7pm to 7am and on weekends, is reduced to a rate more in line with the market during those time frames.

By creating this on/off peak rate, Amcor Ames would have the incentive it needs to adjust production schedule to help its own bottom line and help the city at the same time. We would hope to utilize this further by attracting business and competing internally for additional business at our Amcor Ames plant.

As outlined in your Excellence through People program, the city desires to provide "exceptional service at the best price". I believe that designing a rate structure which encourages the industrial electric customer to make cost-saving choices in alignment with the city goal of Demand Reduction is consistent with your ideals.

Thank you for your consideration.

Best Regards,

Michael Simpson
Amcor Rigid Plastics, Ames
(515) 239-9601

cc. Gloria Betcher - Ward One, Tim Gartin – Ward Two, Peter Orazem – Ward Three, Chris Nelson – Ward Four, Amber Corrieri – At Large, Matthew Goodman – At Large, Lissandra Villa – Ex-Officio, Donald Kom – Director Electric Services, Steve Wilson – Coordinator Electric Services