CHP
Combined Heat & Power
in Kentucky

Understanding Electric Rates

Cheryl Eakle

Sustainability Engineer

KPPC

Kentucky Electric Utilities

PSC Regulated Rural Electric Utilities

- Big Sandy RECC
- Blue Grass Energy Cooperative
- Clark Energy Cooperative
- Cumberland Valley Electric
- Farmers RECC
- Fleming-Mason Energy Cooperative
- Grayson RECC
- Inter-County Energy Cooperative
- Jackson Energy Cooperative
- Jackson Purchase Energy Corporation
- Kenergy Corporation
- Licking Valley RECC
- Meade County RECC
- Nolin RECC
- Owen Electric Cooperative
- Salt River Electric Cooperative
- Shelby Energy Cooperative
- South Kentucky RECC
- Taylor County RECC

PSC Regulated Investor Owned Utilities

- American Electric Power (AEP)
- Duke Energy Kentucky, Inc.
- Kentucky Utilities Company (KU)
- Louisville Gas and Electric Company (LG&E)

TVA Regulated Utilities

- Hickman-Fulton Counties RECC
- Pennyrile RECC
- Tri-County REMC
- Warren RECC
- TVA West Kentucky RECC

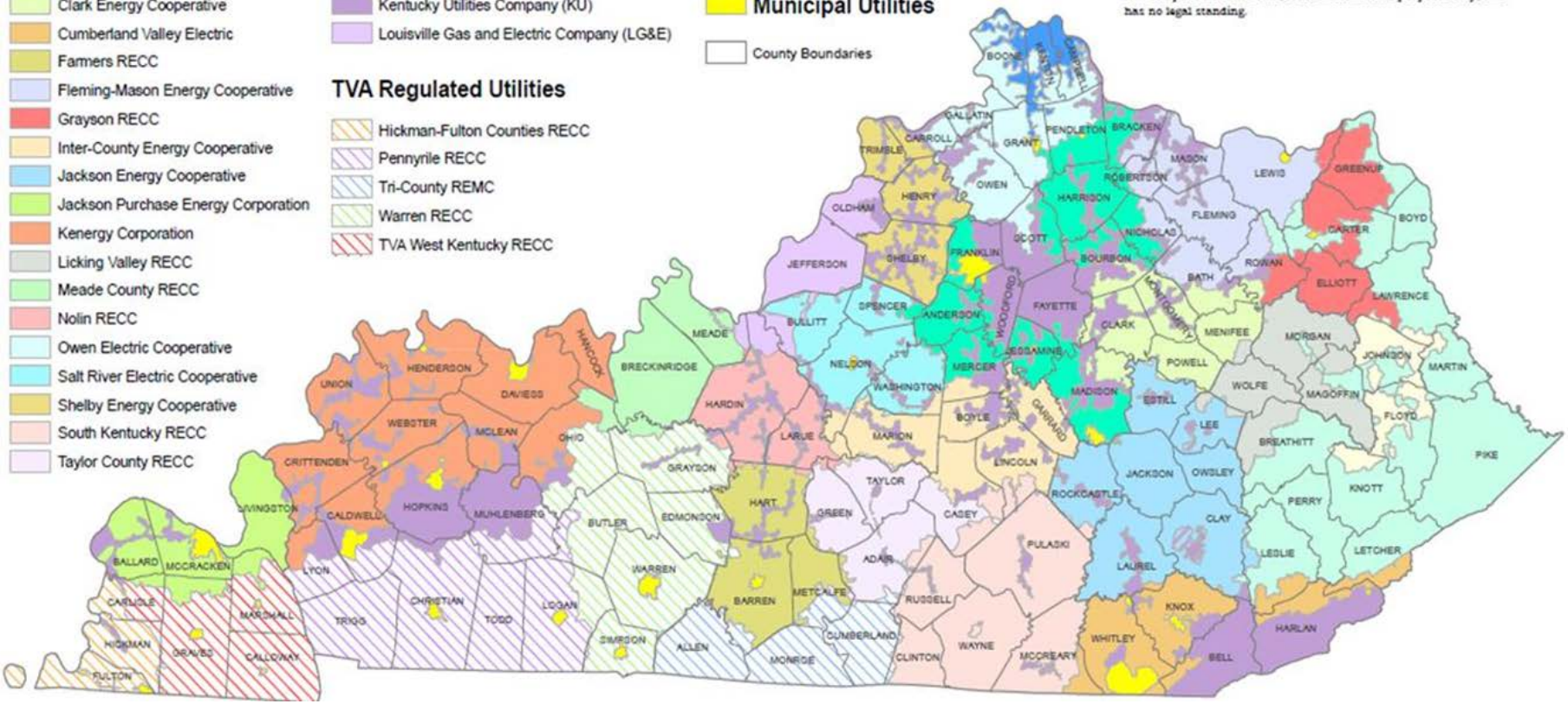
Multi-Service Areas

- Jackson Energy Cooperative & KU
- Meade County RECC & LG&E

Municipal Utilities

- County Boundaries

The electric service areas are compiled from certified territory maps on file with the Public Service Commission. These are legal documents which define the retail service area of electric suppliers regulated by the Commission (Kentucky Statute 278.017). The legal certified territory boundaries are drafted on 1:24,000 USGS topographic maps, and can be assumed to have an accuracy of 100 feet. This map, which was compiled from the data, is for informational purposes only, and has no legal standing.

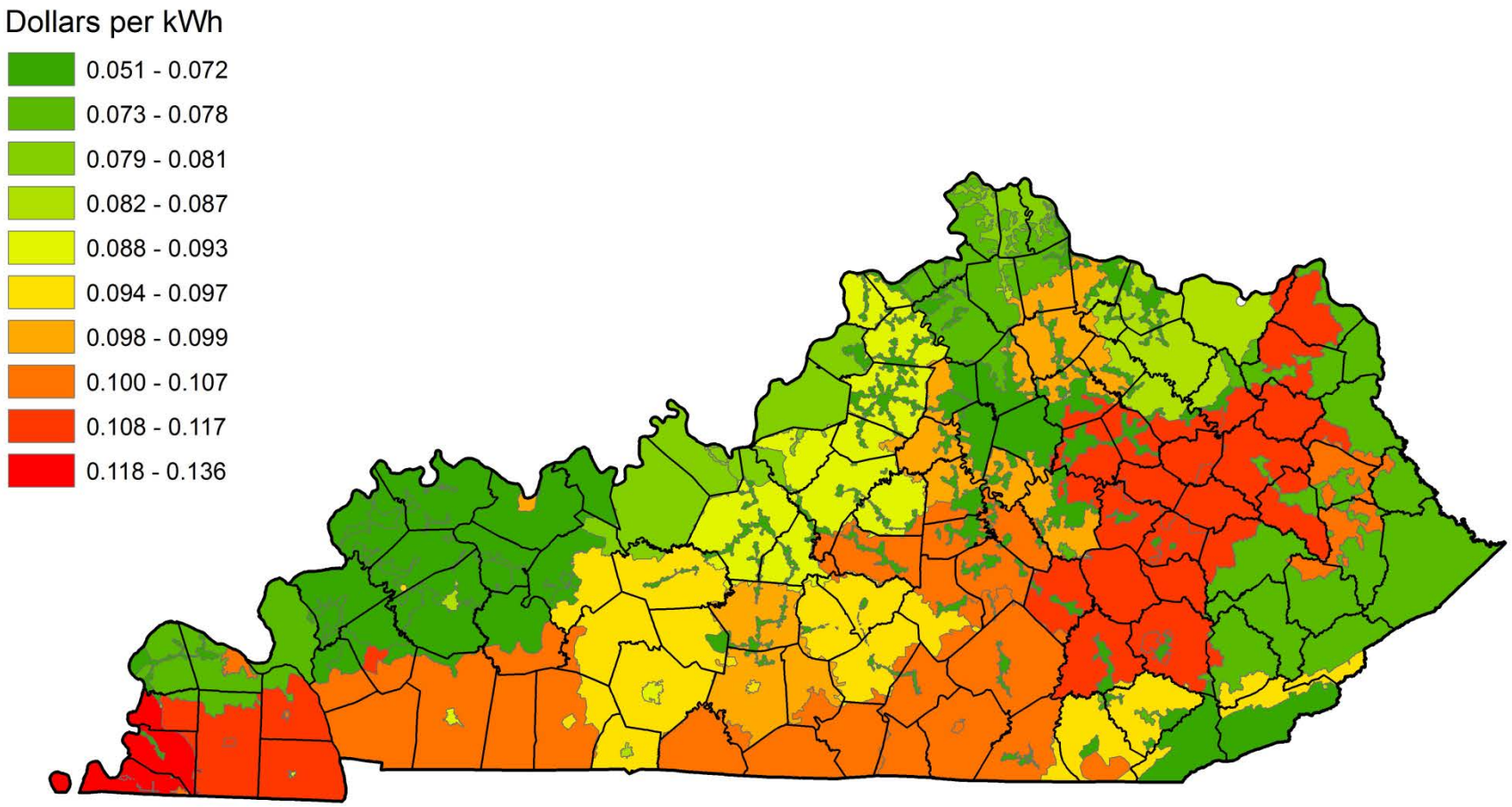


CHP

Kentucky PSC

Kentucky Electric Prices

Kentucky Total Electricity Prices, 2012



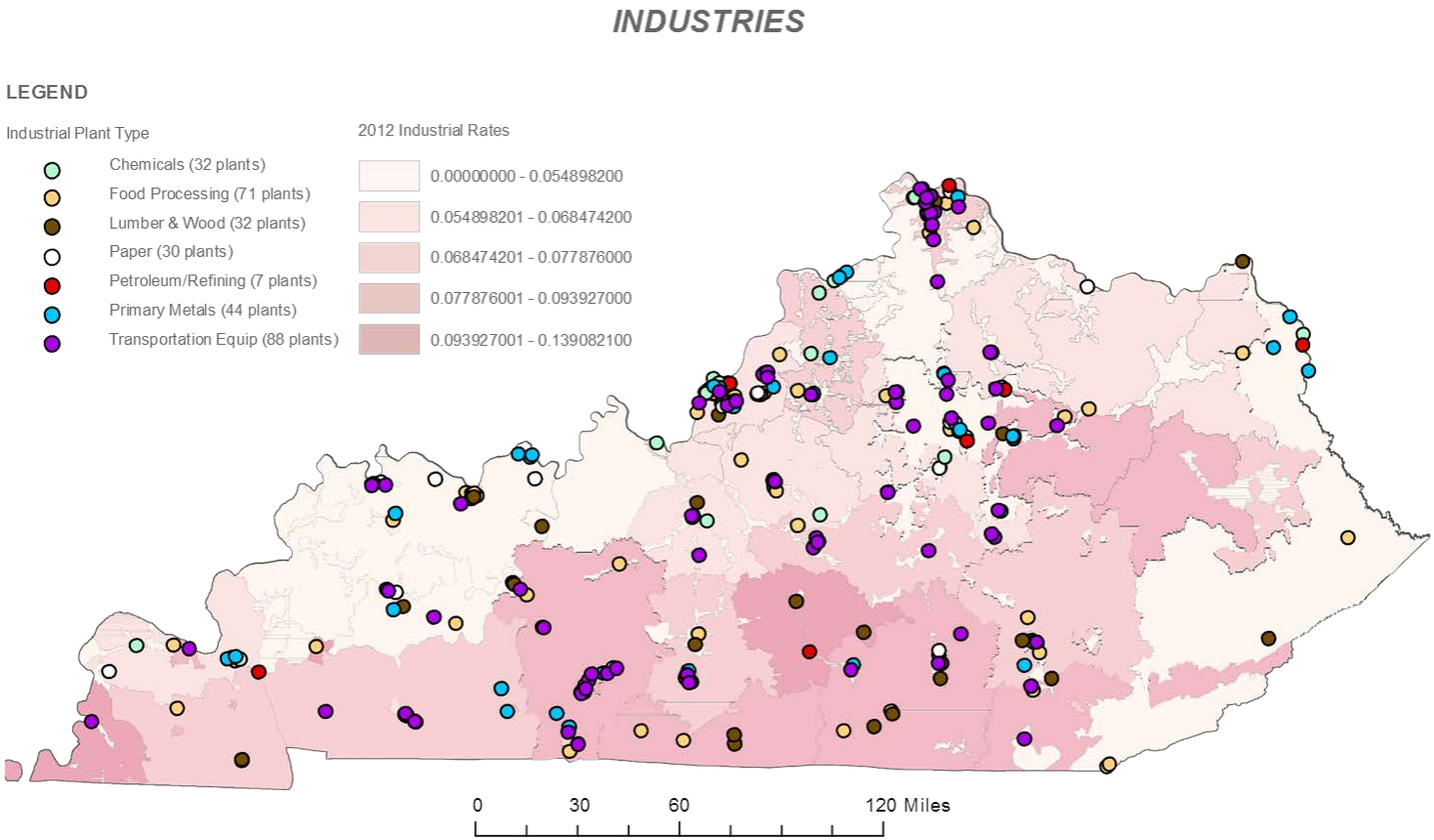
Kentucky Energy Database, EEC-DEDI, 2014

CHP Potential in Kentucky

SIC	Application	50-500 kW (MW)	0.5-1 MW (MW)	1-5 MW (MW)	5-20 MW (MW)	> 20 MW (MW)	Total MW
20	Food	11	16	44	17	0	88
22	Textiles	1	4	6	14	0	25
24	Lumber and Wood	27	19	25	0	0	71
25	Furniture	1	0	0	0	0	1
26	Paper	11	10	33	70	31	155
27	Printing	1	1	0	0	0	2
28	Chemicals	13	15	87	243	190	548
29	Petroleum Refining	0	4	11	0	118	133
30	Rubber/Misc Plastics	21	8	14	0	0	43
32	Stone/Clay/Glass	0	0	0	7	0	7
33	Primary Metals	9	7	20	33	0	69
34	Fabricated Metals	3	0	0	0	0	3
35	Machinery/Computer Equip	0	0	1	0	0	1
37	Transportation Equip	14	18	45	13	0	90
38	Instruments	0	1	0	0	0	1
39	Misc Manufacturing	1	0	0	0	0	1
49	Gas Processing	0	0	8	0	0	8
	Total	**113**	**103**	**294**	**397**	**2,184**	**3,223**

Source: ICF International-via SE CHP TAP September 2013

Kentucky Industrial CHP Potential



CHP Combined Heat & Power in Kentucky

THE UNIVERSITY OF LOUISVILLE UofL CGIS CENTER FOR GEOGRAPHIC INFORMATION SCIENCES

CHP

Typical Non-Residential Rates

- General Service (demand <50 kW)
- Commercial
- Power Service (50kW < demand)
- Industrial Time-of-Day
- Transmission Service

Consumption vs Demand

Electrical Charges typically have two metered components:

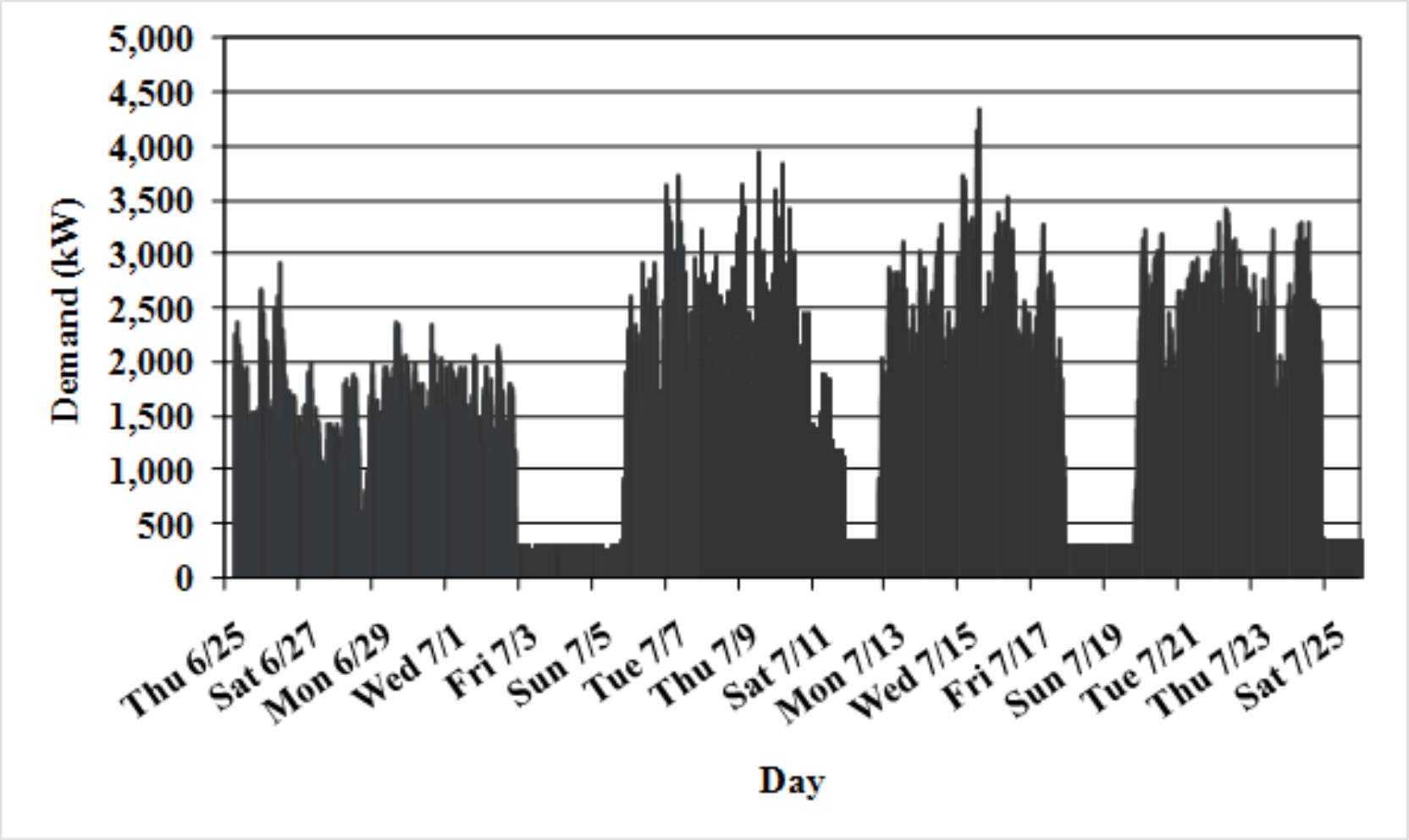
1. **Demand (Power)**
2. **Consumption (Energy)**

Electricity Units

- **kWh = unit used to measure electric consumption (1 kW used for 1 hour)**

- **kW = unit used to measure electric demand**
  - Usually calculated in 15 or 30 minute intervals
  - Peak Demand = greatest value over the interval

Demand Interval



Effective Cost or "All-In Cost"

$$\frac{\text{Total Electric Bill (\$)}}{\text{Total Electric Use (kWh)}}$$

Typical Industrial Electric Bill

ACCOUNT INFORMATION	
Account Number:	
Account Name:	
Service Address:	
Next Read Will Occur:	08/05/14 - 08/07/14
Date Bill Mailed:	07/10/14 (Meter Read Portion 04)

BILLING SUMMARY		
Previous Balance	$	10,738.10
Payment(s) Received 6/7 - 7/10	$	(10,738.10)
Balance as of 7/10	$	0.00
Current Charges:		
Contract	$	11,748.77
Total Amount Due	$	**11,748.77**

Late Payment Fees will be applied to current charges if the current amount due is not received in full by the payment due date on this bill even if payment arrangements have been made.
Please have your account number available when calling to discuss your account.

ELECTRIC CHARGES

Contract

Rate Type: Time-of-Day Secondary Service

$	200.00	Basic Service Charge
$	5,457.26	Energy Charge ($0.03773 x 144,640 kWh)
$	1,401.40	Peak Demand Charge ($4.55 x 308.0 kW)
$	136.04	82.04% Peak PF Adjusted to 90.00% ($4.55 x 29.9 kW)
$	971.44	Intermediate Demand Charge ($2.95 x 329.3 kW)
$	107.09	81.07% Intermed PF Adjusted to 90.00% ($2.95 x 36.3 kW)
$	1,257.59	Base Demand Charge ($3.62 x 347.4 kW)
$	128.15	81.68% Base PF Adjusted to 90.00% ($3.62 x 35.4 kW)
$	198.16	Electric DSM ($0.00137 x 144,640 kWh)
$	328.53	Environmental Surcharge (5.79% x ($9,857.13 - $4,182.99))
$	370.28	Fuel Adjustment ($0.00256 x 144,640 kWh)
$	316.68	Rate Increase For School Tax (3.00% x $10,555.94)
$	211.12	Franchise Fee- . (2.00% x $10,555.94)
$	665.03	Sales Tax (6.00% x $11,083.74)
$	**11,748.77**	**Total Charges Contract**

Please see reverse side for additional charges.

CHP

Typical Industrial Electric Bill

ACCOUNT INFORMATION
Account Number:

BILLING SUMMARY		
Previous Balance	$	10,738.10

ELECTRIC CHARGES

Contract

Rate Type: Time-of-Day Secondary Service

$	200.00	Basic Service Charge
$	5,457.26	Energy Charge ($0.03773 x 144,640 kWh)
$	1,401.40	Peak Demand Charge ($4.55 x 308.0 kW)
$	136.04	82.04% Peak PF Adjusted to 90.00% ($4.55 x 29.9 kW)
$	971.44	Intermediate Demand Charge ($2.95 x 329.3 kW)
$	107.09	81.07% Intermed PF Adjusted to 90.00% ($2.95 x 36.3 kW)
$	1,257.59	Base Demand Charge ($3.62 x 347.4 kW)
$	128.15	81.68% Base PF Adjusted to 90.00% ($3.62 x 35.4 kW)

Please see reverse side for additional charges.

Typical Industrial Electric Bill

ACCOUNT INFORMATION	
Account Number:	
Account Name:	
Service Address:	
Next Read Will Occur:	08/05/14 - 08/07/14

BILLING SUMMARY		
Previous Balance	$	10,738.10
Payment(s) Received 6/7 - 7/10	$	(10,738.10)
Balance as of 7/10	$	0.00
Current Charges:		
Contract	$	11,748.77

$	198.16	Electric DSM ($0.00137 x 144,640 kWh)
$	328.53	Environmental Surcharge (5.79% x ($9,857.13 - $4,182.99))
$	370.28	Fuel Adjustment ($0.00256 x 144,640 kWh)
$	316.68	Rate Increase For School Tax (3.00% x $10,555.94)
$	211.12	Franchise Fee- . (2.00% x $10,555.94)
$	665.03	Sales Tax (6.00% x $11,083.74)
$	11,748.77	**Total Charges Contract**

$	328.53	Environmental Surcharge (5.79% x ($9,857.13 - $4,182.99))
$	370.28	Fuel Adjustment ($0.00256 x 144,640 kWh)
$	316.68	Rate Increase For School Tax (3.00% x $10,555.94)
$	211.12	Franchise Fee- . (2.00% x $10,555.94)
$	665.03	Sales Tax (6.00% x $11,083.74)
$	11,748.77	**Total Charges Contract**

Please see reverse side for additional charges.

CHP

Effective Electric Cost

Time-of Day Energy Charge	**$0.037/kWh**
Total Electric Charges	**$11,748.77**
Total Energy Used	**144,640 kWh**
All-in Cost	**$0.081/kWh**

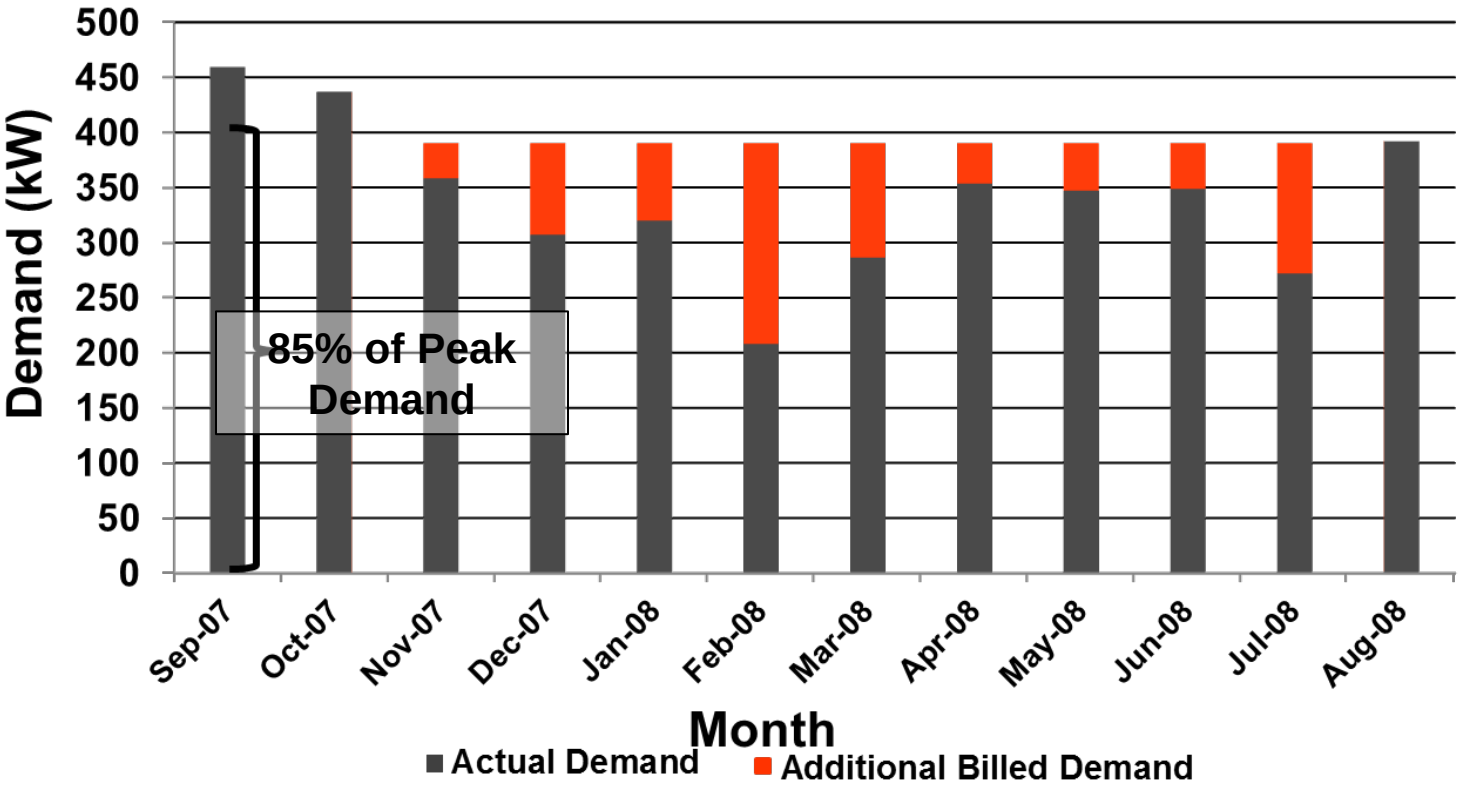
CHP

More on Demand

Demand Ratchet – billing mechanism selects highest demand from the current or previous months

Example – 85% of the highest demand recorded in previous 11 months

Ratchet Clause Example

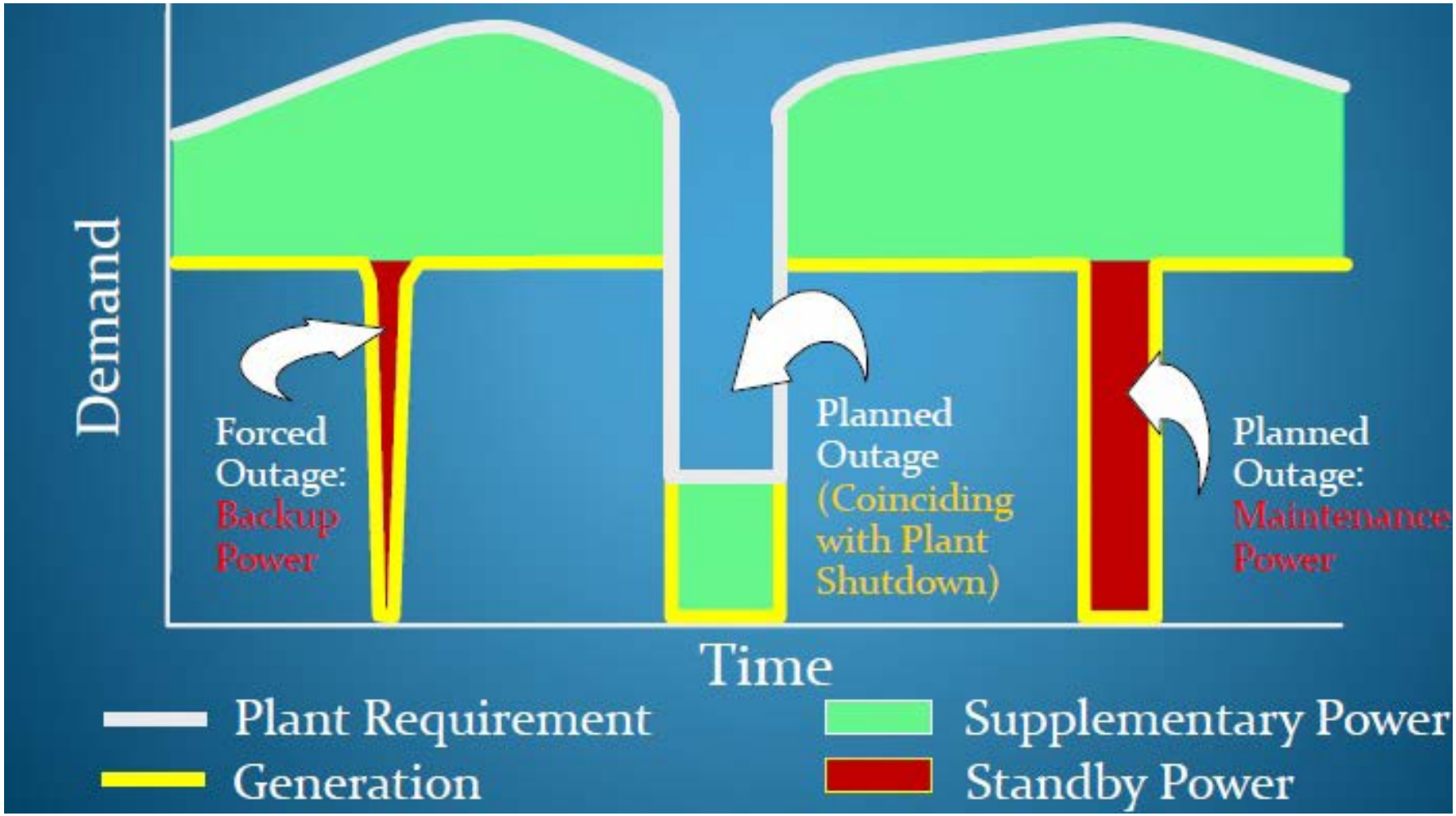


CHP

CHP
Combined Heat & Power
in Kentucky

Stand-By Rates

Demand, CHP and Stand-by



Source: Regulatory Assistance Project

Stand-by Rates

- **Vary from utility to utility**
  - Insurance against CHP failure
  - $4.30/kW to $12.86/kW
  - May or may not affect ratchet
- **TVA**
  - $3.56/kW to $3.87/kW
  - Administration Fee $750/month
  - Charge per use
    - $1.39/kW per week if planned
    - $2.78/kW per week if unplanned

Demand Profile Prior to CHP

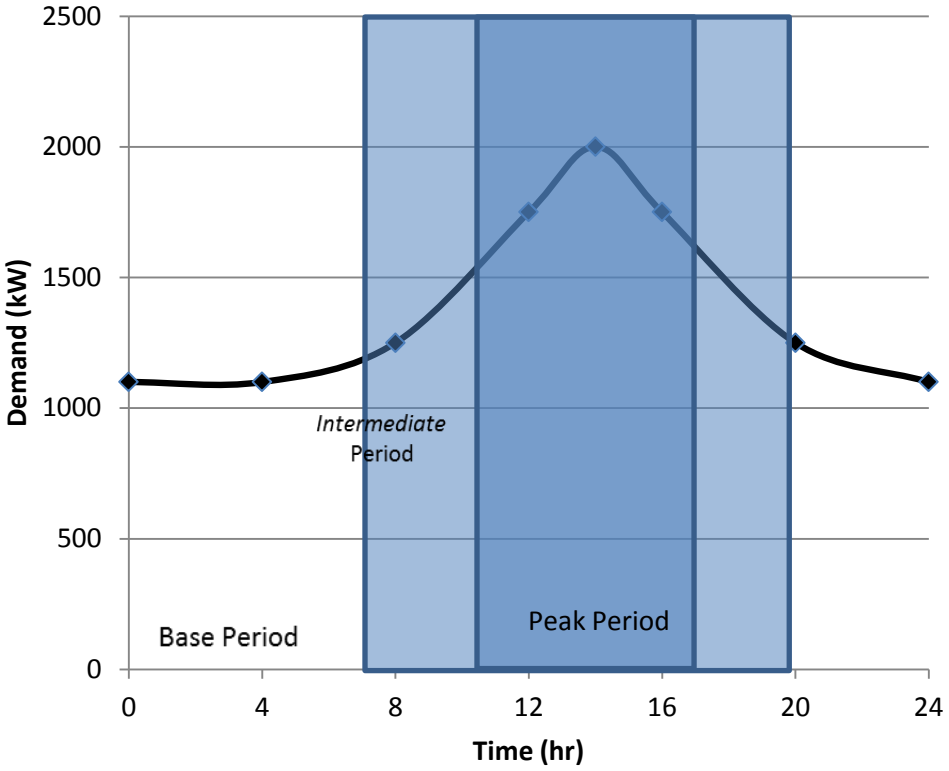
- 2 MW Max Load occurs during peak period
- ~1 MW Base Load
- 33,300 kWh daily
- 365 day operation

T.O.D. Energy Rates

Peak Demand - $6.11/kW
Intermediate Demand - $4.51/kW
Base Demand - $4.00/kW
Energy Charge - $0.0399/kWh

Annual Energy Costs

$350,880 – Demand Cost
$484,965 – Energy Cost
$835,845 – Total Cost



Demand Profile After CHP

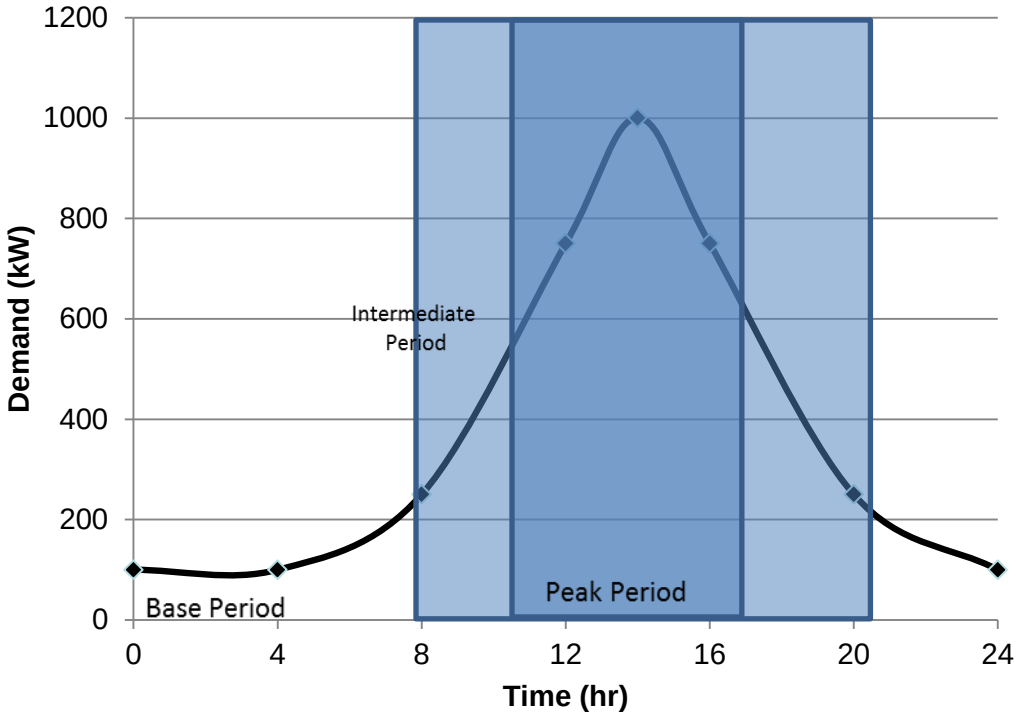
- 1 MW Base Load Generator used for CHP
- 24,000 kWh produced by CHP generator
- Generator fuel and maintenance cost - 0.043/kWh

Annual Energy Costs

$175,440– Utility Demand Cost
$135,441– Utility Energy Cost
$375,448– Generator Fuel and Operation Costs
$686,328– Total Cost
$149,516– Total Energy Savings

Annual Stand-by Costs

$3.56/kW – Stand-by Rate
$51,720 – Stand-by Costs for 1 MW
$97,796– Savings after standby charges



Unplanned CHP Outage

CHP Generator trips at 9 AM. It is not restored for 24 hours

Annual Energy Costs

$178,220 – Utility Demand Cost*

$136,399 – Utility Energy Cost**

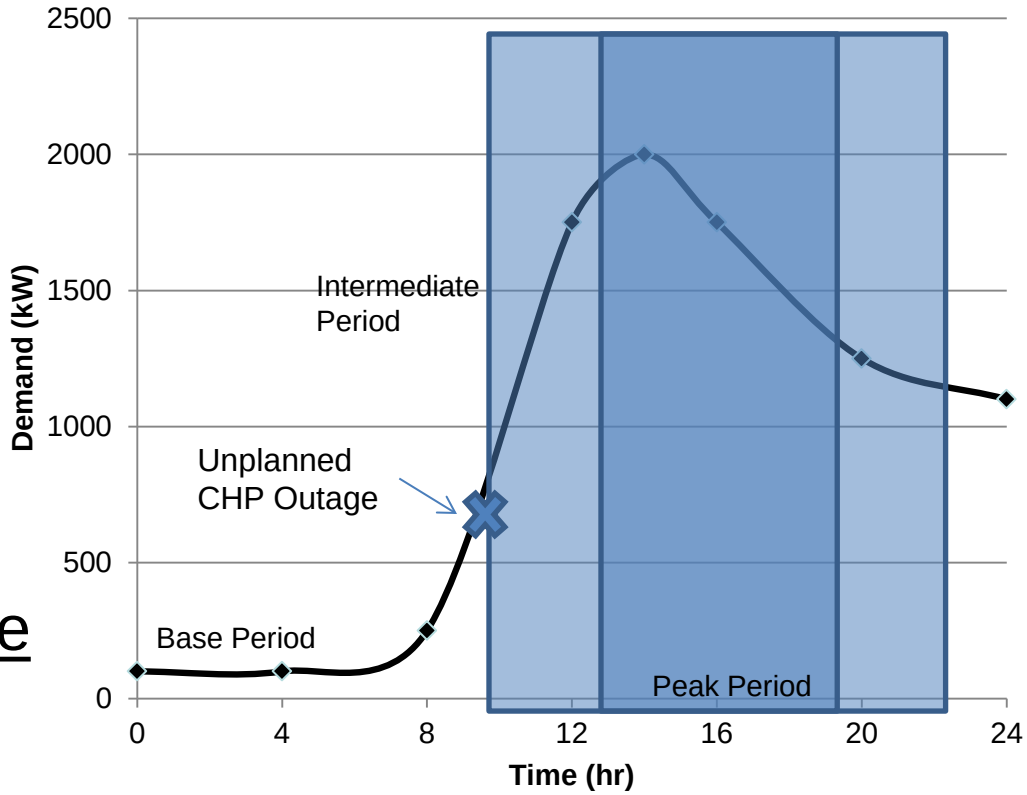
$374,419 – Generator Fuel and Operation Costs

$ 51,720 – Standby Costs

$741,787 – Total Cost

Annual Savings after Outage

$94,058



*includes extra 1,000 kW @ $2.78/kW for one day

**includes extra24,000 kWh@$0.0399/kWh

CHP
Combined Heat & Power
in Kentucky

Understanding Electric Rates

Cheryl Eakle

Sustainability Engineer

KPPC

502.852.3485

cheryl.eakle@louisville.edu

CHP Combined Heat & Power in Kentucky

Kentucky CHP Program Workshop –November, 2014

DEDI KENTUCKY DEPARTMENT for ENERGY DEVELOPMENT & INDEPENDENCE

KENTUCKY ASSOCIATION OF MANUFACTURERS

U.S. DEPARTMENT OF ENERGY
CHP Technical Assistance Partnerships
SOUTHEAST

KPPC
Kentucky's Resource Center for Environmental Sustainability