



Smart Management for  
Small Water Systems

# Demystifying Electric Bills -- Common energy bill elements and making sense of rate structures

March 8, 2018

*[www.efcnetwork.org](http://www.efcnetwork.org)*



American Water Works  
Association

This program is made possible under a cooperative agreement with the U.S. EPA.



## **About the Environmental Finance Center Network (EFCN)**

The Environmental Finance Center Network (EFCN) is a university-based organization creating innovative solutions to the difficult how-to-pay issues of environmental protection and improvement. The EFCN works with the public and private sectors to promote sustainable environmental solutions while bolstering efforts to manage costs.

## **The Smart Management for Small Water Systems Program**

This program is offered free of charge to all who are interested. The Program Team will conduct activities in every state, territory, and the Navajo Nation. All small drinking water systems are eligible to receive free training and technical assistance.

## **What We Offer**

Individualized technical assistance, workshops, small group support, webinars, eLearning, online tools & resources, blogs

# The Small Systems Program Team

- Environmental Finance Center at The University of North Carolina at Chapel Hill
- Environmental Finance Center at Wichita State University
- EFC West
- New England Environmental Finance Center at the University of Southern Maine
- Southwest Environmental Finance Center at the University of New Mexico
- Syracuse University Environmental Finance Center
- Environmental Finance Center at the University of Maryland
- American Water Works Association (AWWA)



UNC  
ENVIRONMENTAL  
FINANCE CENTER



WICHITA STATE  
UNIVERSITY  
HUGO WALL SCHOOL  
OF PUBLIC AFFAIRS  
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SOUTHWEST  
ENVIRONMENTAL  
FINANCE CENTER



Environmental  
Finance  
Center  
*Syracuse University*



ENVIRONMENTAL  
FINANCE CENTER



American Water Works  
Association

# Areas of Expertise



Asset Management



Rate Setting and Fiscal Planning



Leadership Through Decision-making and Communication



Water Loss Reduction



Energy Management Planning



Accessing Infrastructure Financing Programs



Workforce Development



Water Conservation Finance and Management



Collaborating with Other Water Systems



Resiliency Planning



Managing Drought




# Small Systems Blog

Learn more about water finance and management through our Small Systems Blog! Blog posts feature lessons learned from our training and technical assistance, descriptions of available tools, and small systems “success stories.”

[efcnetwork.org/small\\_systems\\_blog/](http://efcnetwork.org/small_systems_blog/)

Sign Me Up


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Innovative Finance Solutions for Environmental Services

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> BLOG

Blog




**Magdalena, New Mexico: A Success Story from the Smart Management for Small Water Systems Project**

Written by: Allison Perch Allison Perch is a Program Coordinator with the Environmental Finance Center at the University of North Carolina. What can a small town do when the financial health of its water system is at risk? This is the question that Stephanie Finch, the town clerk and treasurer for the ...



**The Virtuous Cycle: Internal Energy Revolving Funds for Small Water Systems**

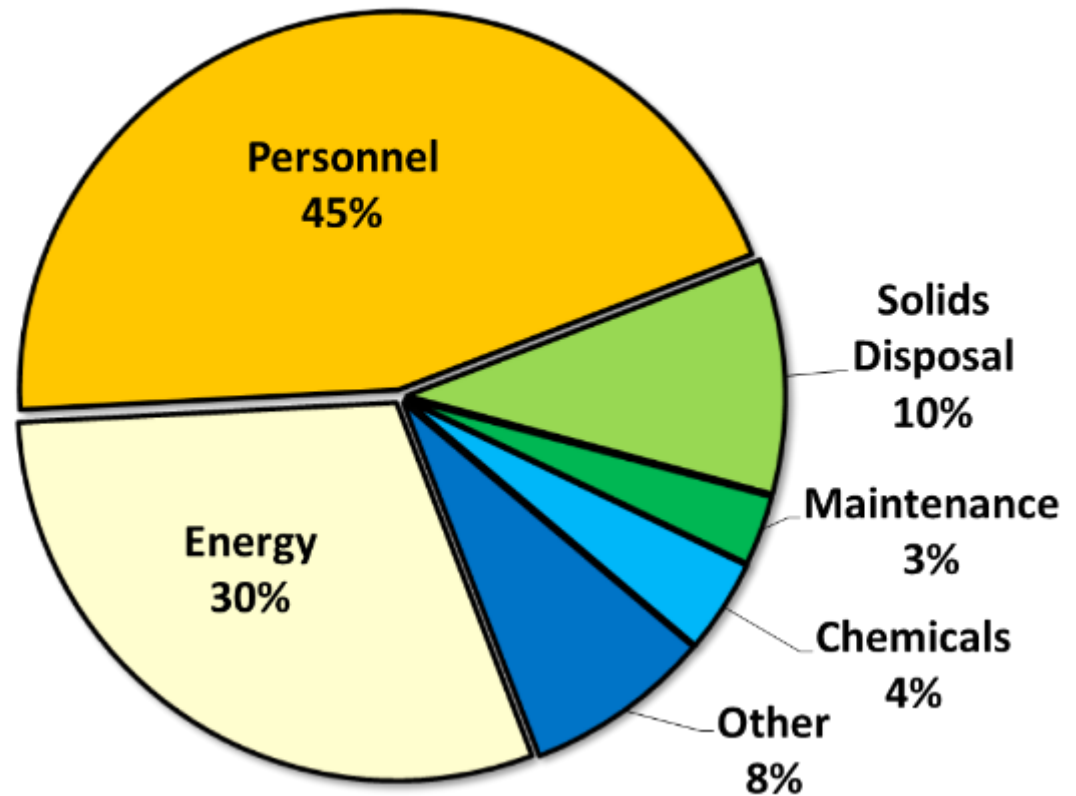
Written by: David Tucker David Tucker is a Project Director with the Environmental Finance Center at the University of North Carolina. How can small (and large) water systems pay for energy efficiency and renewable energy, helping cut utility costs? As energy is often the largest variable expense in a water system's operating ...



**Smart Management for Small Water Systems Program Newsletter | Fall 2015**

View Full Issue The Environmental Finance Center Network has published the third issue in a series of quarterly newsletters. The Fall 2015 Program Newsletter announces

# Why are we here today?



# Should a small water utility care about energy?



2 trillion  
gallons of H<sub>2</sub>O:  
estimated  
amount  
pumped each  
year by small  
systems.

\$1 billion:  
estimated  
electric power  
costs per year  
for these small  
systems.

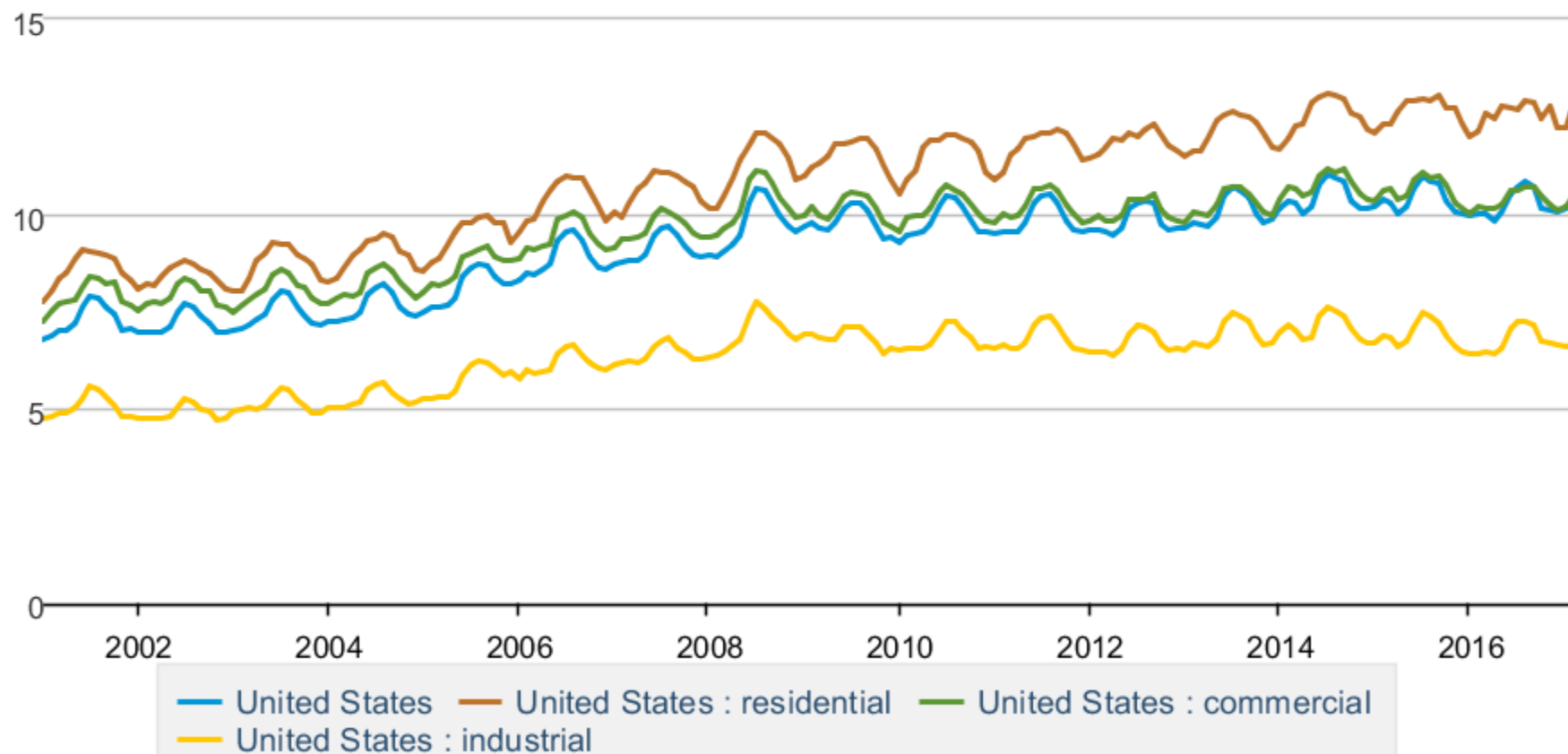
\$10 million:  
annual electric  
bill savings  
from a 1%  
reduction in  
electric costs.

\$100 million:  
annual electric  
bill savings  
from a 10%  
reduction in  
electric costs.

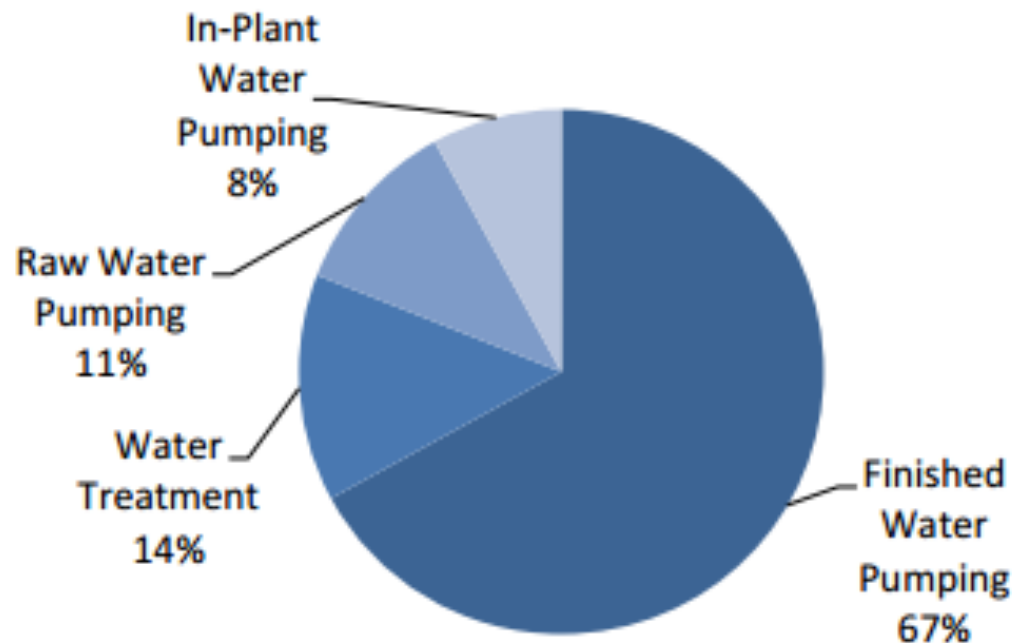
Source: Regnier and Winters, "Reducing electric power costs in small water systems,"  
Journal AWWA, April 2013, 67-72.

## Average retail price of electricity, monthly

cents per kilowatthour



# Typical Energy End-Uses in Public Surface Water Systems



Source: Keith Carns, EPRI Solutions, "Bringing Energy Efficiency to the Water & Wastewater Industry: How Do We Get There?," presented at *WEFTEC 2005*, Washington DC, November 2, 2005.



Letting a faucet run for  
**five minutes**  
uses as much energy as  
leaving a  
**60-watt light bulb**  
on for  
**22 HOURS**



[epa.gov/watersense](http://epa.gov/watersense)





# Polling Question

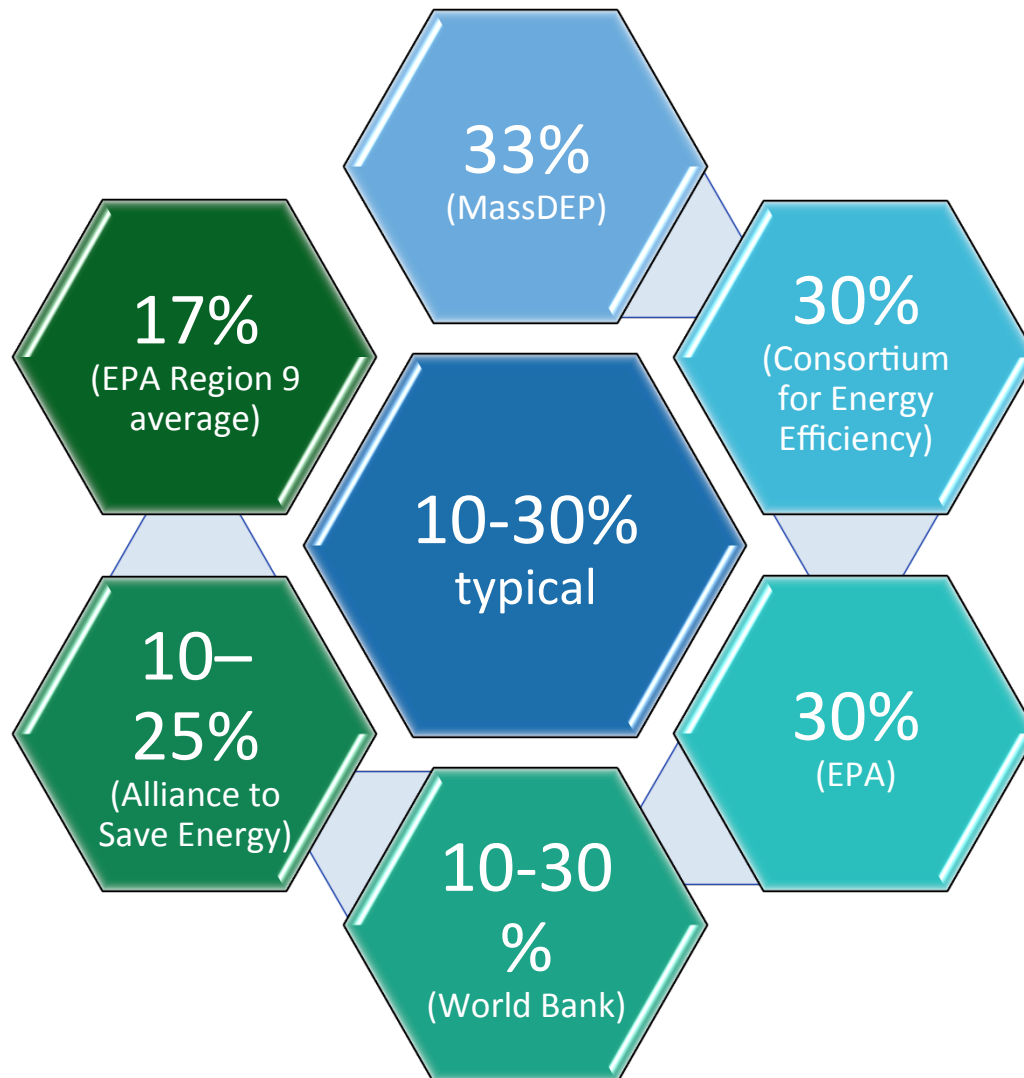
**Do you know how  
much you are  
paying for electricity  
at your system?**



Name	Average retail price (cents/kWh)	Name	Average retail price (cents/kWh)	Name	Average retail price (cents/kWh)	Name	Average retail price (cents/kWh)
Alabama	9.56	Iowa	8.55	New Jersey	13.38	Vermont	14.46
Alaska	17.93	Kansas	10.49	New Mexico	9.12	Virginia	9.09
Arizona	10.33	Kentucky	8.42	New York	14.47	Washington	7.68
Arkansas	8.13	Louisiana	7.46	North Carolina	9.2	West Virginia	8.98
California	15.23	Maine	12.8	North Dakota	8.94	Wisconsin	10.67
Colorado	9.83	Maryland	12.21	Ohio	9.84	Wyoming	8.19
Connecticut	17.24	Massachusetts	16.48	Oklahoma	7.83	<b>U.S. Total</b>	<b>10.27</b>
Delaware	11.09	Michigan	11.05	Oregon	8.83	Data from 2016, published January 2018	
District of Columbia	11.73	Minnesota	9.99	Pennsylvania	10.19		
Florida	9.91	Mississippi	8.67	Rhode Island	16.28		
Georgia	9.59	Missouri	9.74	South Carolina	9.79		
Hawaii	23.87	Montana	8.84	South Dakota	9.83		
Idaho	8.08	Nebraska	9.05	Tennessee	9.23		
Illinois	9.38	Nevada	8.39	Texas	8.43		
Indiana	9.22	New Hampshire	15.66	Utah	8.72		

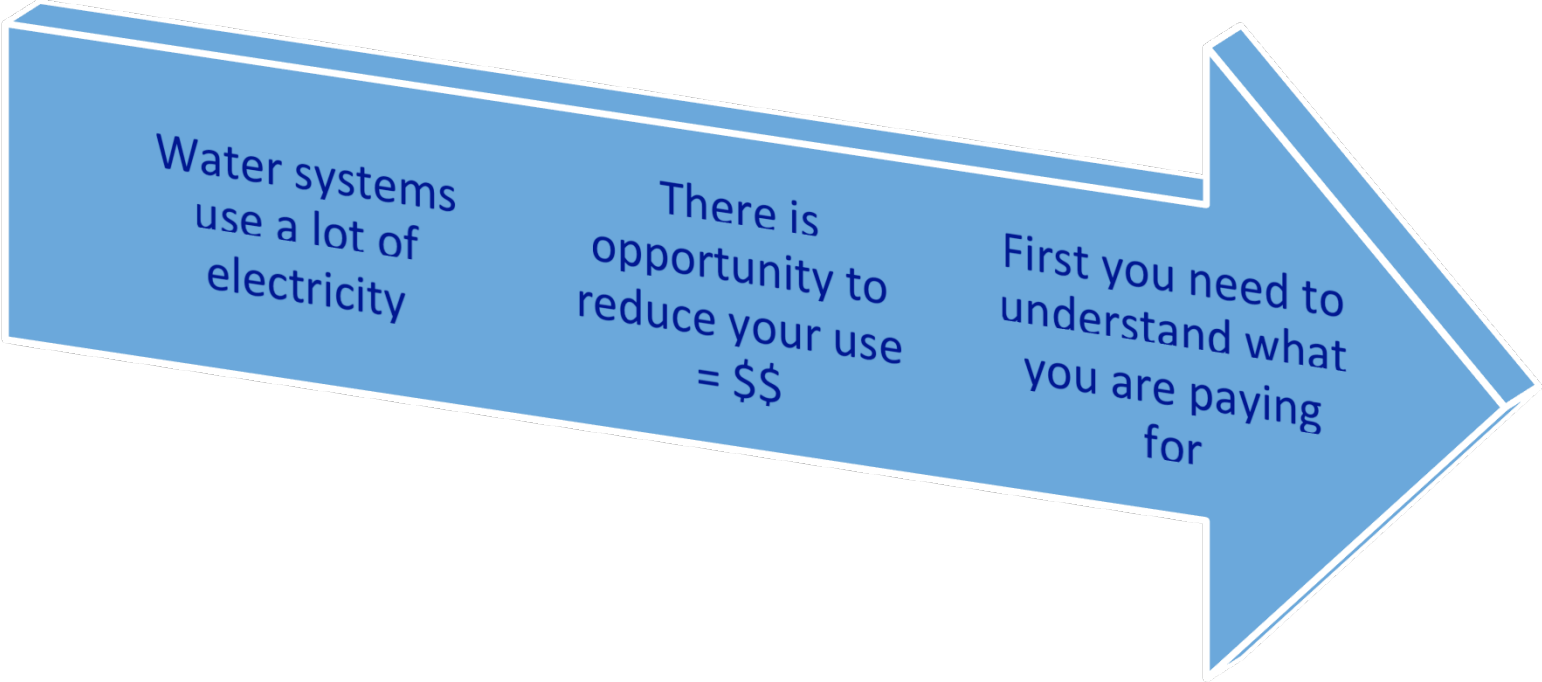
Source: <http://www.eia.gov/electricity/state/>

# What's the Opportunity?





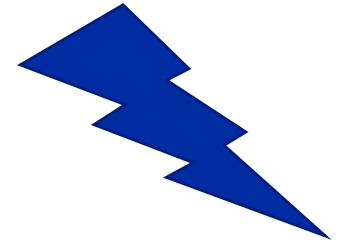
# So why are we here today?



Water systems  
use a lot of  
electricity

There is  
opportunity to  
reduce your use  
= \$\$

First you need to  
understand what  
you are paying  
for



# Understanding Energy Terminology

Watt did you say?





# Polling Question

**Do you get a copy of  
the energy bill?**



If so, do you  
understand what  
you are paying for?



# Energy Terminology

**Kilowatt-hours  
(kWh)**  
Electricity  
measurement  
1,000 watts  
used for 1  
hour

**Rate  
(\$/kWh) X  
use (kWh)=  
Consumption  
Charge (\$)**

**Demand (kW)  
x Rate (\$/kW)  
= Demand  
Charge (\$)**

**5 kW motor  
x 10 hours  
use = 50  
kWh**

**50 kW  
motor x 1  
hour use =  
50 kWh**

**300 kW x 8  
hours =  
2,400 kWh**

**100 kW x 24  
hours =  
2,400 kWh**



**kWh** — like **odometer** (a measure of total energy you use over a specific period of time, NOT at a given moment)

**kW** — like **speedometer** (a measure of energy use at a given moment, NOT over time)





# Typical Electric Bill Components

- Customer Charge / Base Charge / Delivery Charge / Distribution Charge / Service Availability Charge
- Consumption Charge / Supply Charge / Generation Charge
- Demand Charge (by kW or kVa)
  - May not apply in some rate structures, e.g. residential electric rate structures
- Other charges
- You may be able to switch rate structures



# Typical Electric Bill Components

- Other information – not charges
  - Start date
  - End date
  - Total number of days billed
  - Rate schedule / tariff
  - Account number
  - Meter number
- You may be able to switch rate structures



# **Base charges / Customer charges / Service availability charges**

- Typically charged on a per meter basis regardless of consumption
- Typically covers administrative costs of providing service to the customer / access to the grid
- May vary with single phase vs. three phase service



# Consumption Charges

- Amount of energy you used (kWh) multiplied by a rate, shown on your bill in cents per kWh
- Charged on monthly, per kWh basis
- Typically covers the cost of fuel
- Can vary based on season
- Can vary based on time of day

# Demand Charges

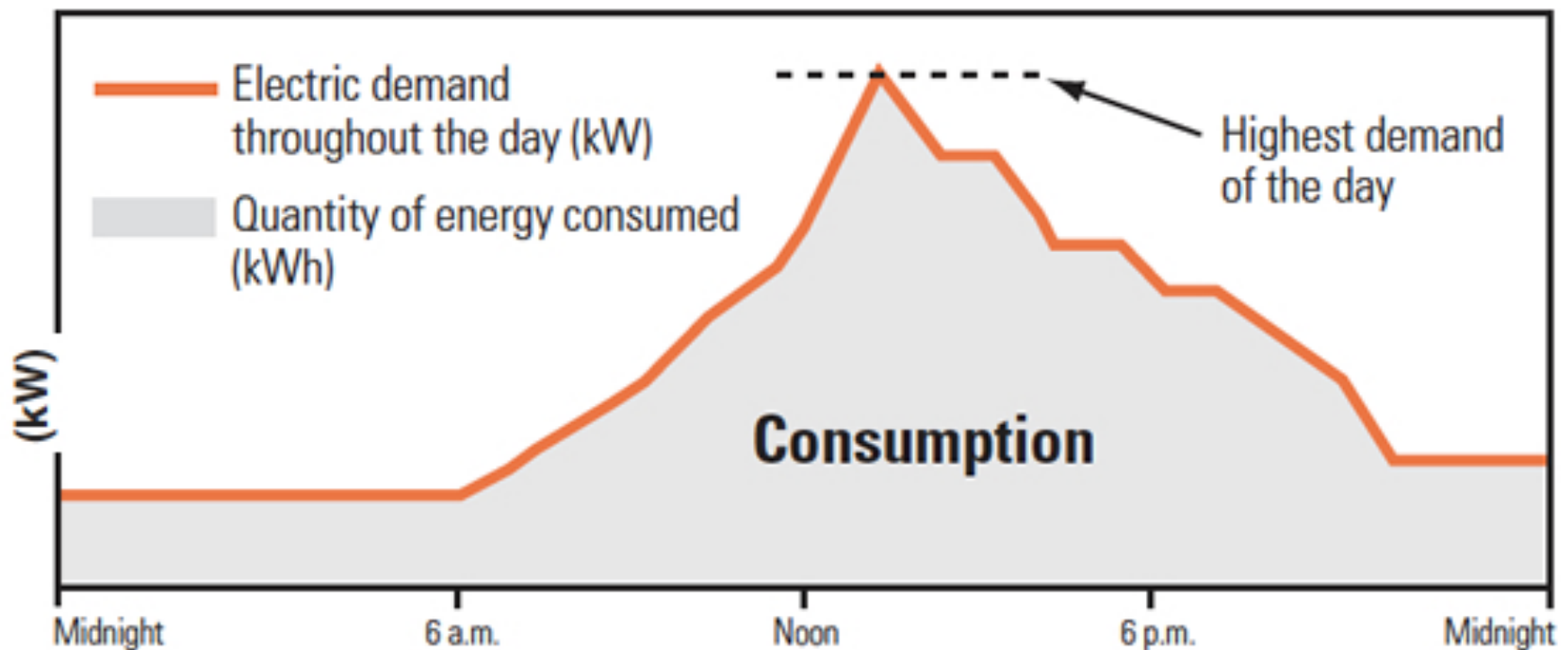


Image credit: We Energies

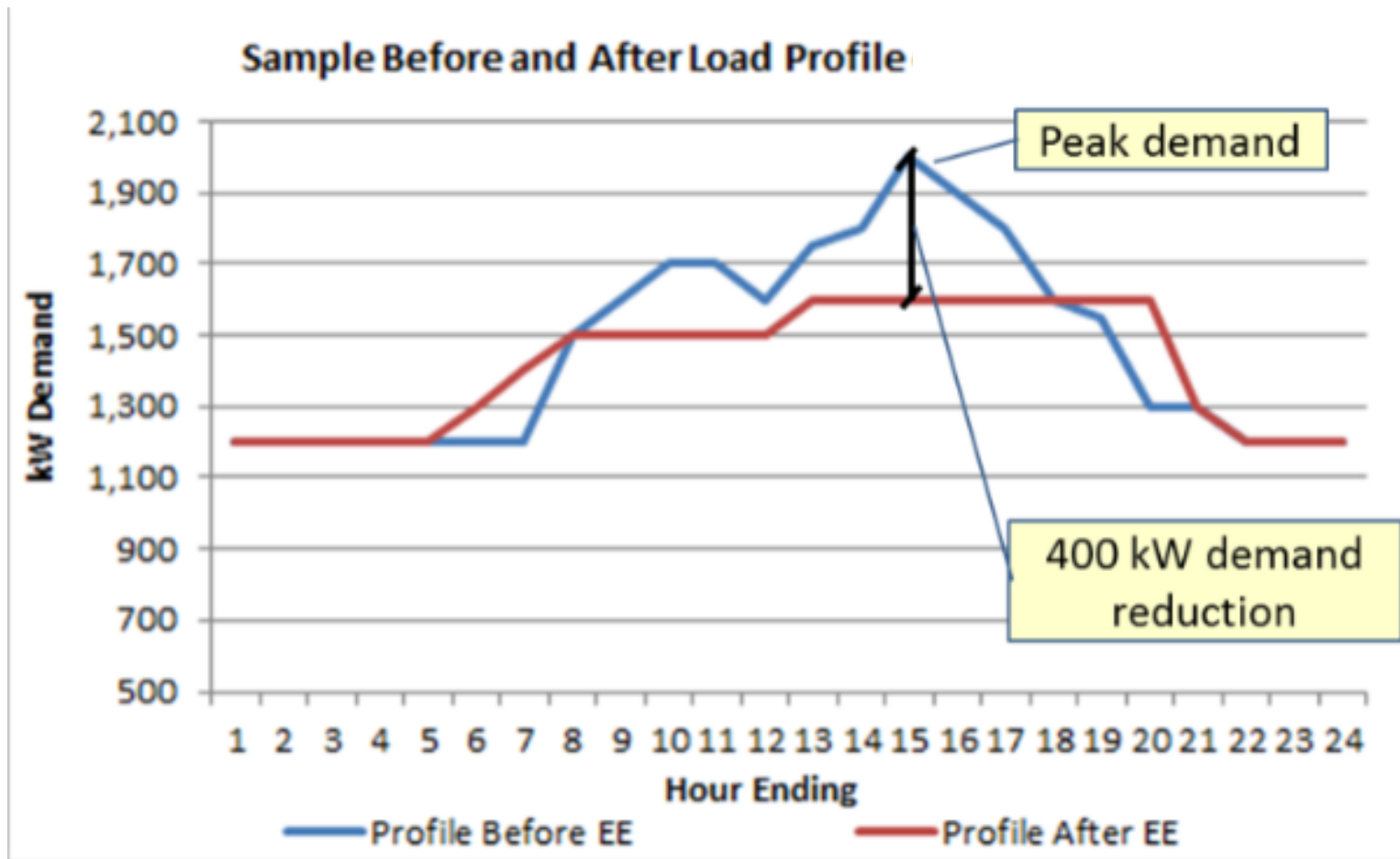


# Demand Charges

- Demand charges can be a VERY significant part of an electricity bill
- Demand can often be reduced through operational changes
- Understanding the window of time that the energy utility views for demand is important
- SCADA systems can be helpful when trying to reduce demand



# Control Peak Demand





# Other Charges

- Fuel surcharges
- Line loss charges
- Maintenance charges
- Service charges
- Charges for improving green energy efforts
- Taxes
- Others still



# Other Charges

- It is important to understand what the other charges are for
  - Do they apply to your utility?
  - Are they based on a fixed fee or on consumption?

# "Simple" Energy Bill



Granby Office Hours: 8:00 AM-5:00 PM Monday-Friday

**Mountain Parks Electric, Inc.**  
321 West Agate Avenue, PO Box 170  
Granby, CO 80446-0170  
**Phone: 970-887-3378**  
**TOLL FREE: 877-887-3378**  
600 3rd Street, Walden, CO 80480  
Phone: 970-723-4500  
Website: mpei.com

Statement Date: 01/10/2013  
Account#: 100264200  
Statement ID: 18885198  
Billing Cycle: Cycle 1  
Rate Description: 4-5  
Multiplier: 1

**Account For: Town**

**Account Number: 100264200**

**SERVICE ADDRESS: NO VALID SERVICE ADDRESS**

**WELLS 8 & 9**

Previous Balance 192.41

12/24/12 Payment -- Thank You -192.41

## Current Billing Detail

01/10/13 Energy Charge 73.85

01/10/13 Service Availability Charge 29.00

**Total Current Charge 102.85**



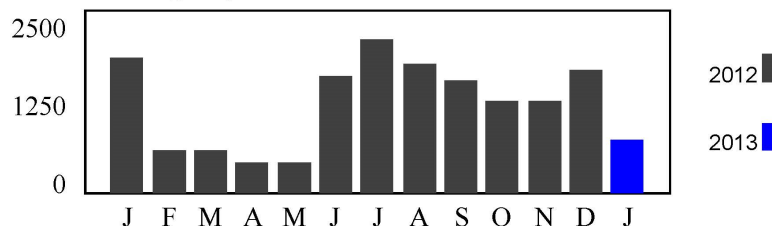
## SERVICE PERIOD

12/01/2012-12/30/2012

## Meter Reading Summary:

	Meter Number	Present Reading	Previous Reading	Multi	Usage	Days of Service
KWH Meter Reads	98911457	52970	52224	1	746	29

KWH Usage by Month



# “Complex” Energy Bill

OPT-V TOU Secondary Small Gen

Meter Number: 041069590

Contract Demand

Master: 550

Summer: 550

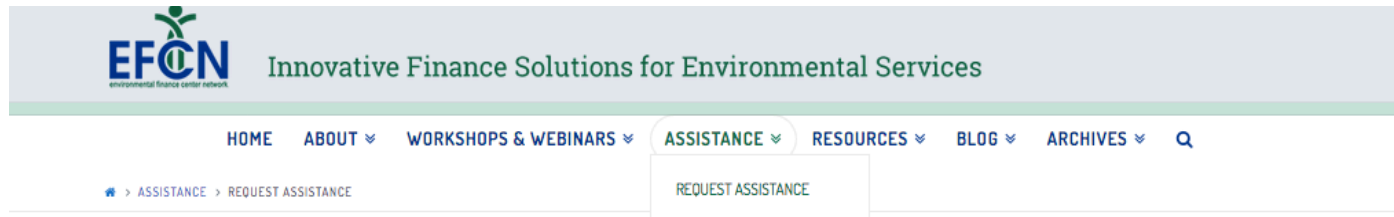
Winter: 550

Bill Month	Bill Year	Customer Charge	On-Peak Actual Demand(Winter)	On-Peak Billing Demand	On-Peak Billing Demand Amount	On-Peak Actual Demand(Summer)	On-Peak Billing Demand	On-Peak Billing Demand Amount	Off-Peak Actual Demand	On-Peak Energy(Winter)	On-Peak Energy(Winter) Amount
10	2016	\$32.17	369.6	370	\$2,084.47	356	356	\$2,244.14	388	20,960	\$1,309.77
9	2016	\$32.17				392	392	\$6,514.65	379.2		
8	2016	\$32.17				383.2	383	\$6,365.08	373.6		
7	2016	\$32.17				360.8	361	\$5,999.46	360.8		
6	2016	\$32.17	356.8	357	\$1,334.25	361.6	362	\$3,538.87	372.8	13,520	\$885.70
5	2016	\$32.17	358.4	358	\$3,249.39				368	26,560	\$1,739.95
4	2016	\$32.17	381.6	382	\$3,467.22				391.2	31,200	\$2,043.91
3	2016	\$32.17	411.2	411	\$3,730.44				399.2	42,000	\$2,751.42
2	2016	\$32.17	414.4	414	\$3,757.67				415.2	42,240	\$2,767.14
1	2016	\$32.17	416	416	\$3,775.82				434.4	39,680	\$2,582.13
12	2015	\$32.17	404.8	405	\$3,675.98				398.4	37,760	\$2,434.84
11	2015	\$32.17	375.2	375	\$3,403.69				393.6	40,240	\$2,594.76

Bill Month	On-Peak Energy(Summer)	On-Peak Energy(Summer) Amount	Off-Peak Energy	Off-Peak Energy Amount	Economy Demand	Economy Demand Amount	Renewable Energy Rider	Sales Tax	# of Days	Adj	Total Charges
10	19,760	\$1,234.78	113,200	\$3,776.92	18	\$22.55	\$4.19	\$749.63	29	N	\$11,458.62
9	50,400	\$3,216.86	131,120	\$4,550.21			\$3.92	\$1,002.25	33	N	\$15,320.06
8	47,600	\$3,124.56	111,680	\$4,078.33			\$3.55	\$952.26	29	N	\$14,555.95
7	46,400	\$3,043.68	108,160	\$3,944.86			\$3.55	\$911.66	29	N	\$13,935.38
6	29,440	\$1,928.61	135,040	\$4,913.57	11	\$13.78	\$3.55	\$885.54	34	N	\$13,536.04
5			118,000	\$4,293.55	10	\$12.53	\$3.55	\$653.18	29	N	\$9,984.32
4			128,640	\$4,680.70	9	\$11.27	\$3.55	\$716.72	32	N	\$10,955.54
3			119,120	\$4,334.30			\$3.55	\$759.63	30	N	\$11,611.51
2			127,680	\$4,645.76	1	\$1.25	\$3.55	\$784.53	28	N	\$11,992.07
1			153,280	\$5,510.40	18	\$22.55	\$3.55	\$834.86	33	N	\$12,761.48
12			119,120	\$4,211.84			\$3.55	\$725.09	30	N	\$11,083.47
11			108,000	\$3,818.66	19	\$23.80	\$3.55	\$691.36	29	N	\$10,567.99



# If you need help understanding your energy bill, please contact us



## REQUEST ASSISTANCE

A screenshot of the "Technical Assistance Request Form" page. The page has a header with a banner image showing hands writing on a document, a calculator, and a water drop logo. The main heading is "Technical Assistance Request Form". Below it, a paragraph states: "The EFCN offers free help on financial and managerial topics to systems serving 10,000 or fewer people. Examples of assistance we can provide include:". This is followed by a list of services: "Creating an Asset management plan", "Near-term financial planning and rate setting", "Analyzing your revenues and expenses", "Offering ideas on how to effectively budget", "Long-term capital planning", "Assessing options for lowering energy use and/or water loss", "Identifying sources of outside funding", "Collaborating with other water systems", and "Resiliency Planning". At the bottom, a paragraph says: "If you are interested in requesting assistance from our experts, please fill out the form below. You will be asked a few questions to help us understand your water system and what kind of assistance you need."

[efcnetwork.org](http://efcnetwork.org)

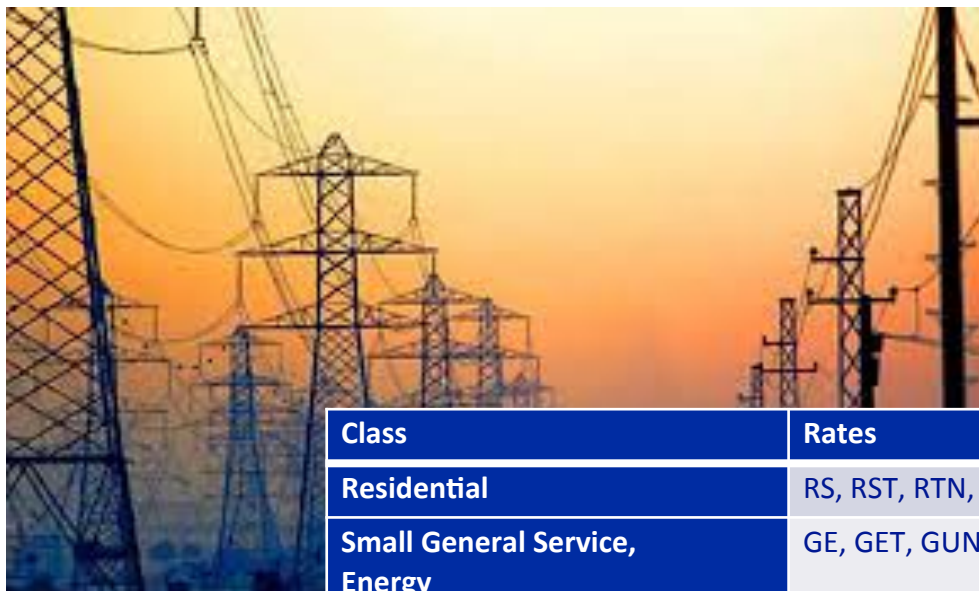


# Types of Rates

And what they mean to you



# Types of Electric Rate Structures



Class	Rates	\$/kWh	\$/kW
Residential	RS, RST, RTN, RTS	\$ 0.00120	n/a
Small General Service, Energy	GE, GET, GUN, GUS	\$ 0.00093	n/a
Small General Service, Demand	GD, GDT, GD3	n/a	\$ 0.38
Large General Service	DAP, LS, LST	n/a	\$ 0.33
Substation Service	SS, SST	n/a	\$ 0.33
Individual Contract Rates	ICR	n/a	\$ 0.31
Traffic Control Service	TC	\$ 0.00069	n/a
Water Pumping Service	MWP	\$ 0.00065	n/a
Lighting	SL, AL	\$ 0.00046	n/a

A blue-tinted photograph of industrial machinery, possibly a water treatment plant, featuring large pipes and mechanical components.

# Some common rate structures

- Simple (or Fixed) Rate
- Tiered (or Step) Rate
- Time of Use (TOU) or Time of Day (TOD)
- Seasonal (2 or 4 Seasons)
- Weekend / Holidays
- Combinations of the above

## Simple or Fixed Rates

The utility charges a rate that does not vary, \$0.XX cents per kilowatt-hour used.

There may still be sales tax or other charges added.



# Tiered (or Step) Rate

- Can be increasing or decreasing depending on energy utility's goals
- Increasing tiers – rates increase as use increases
- Decreasing tiers – rates decrease as use increases

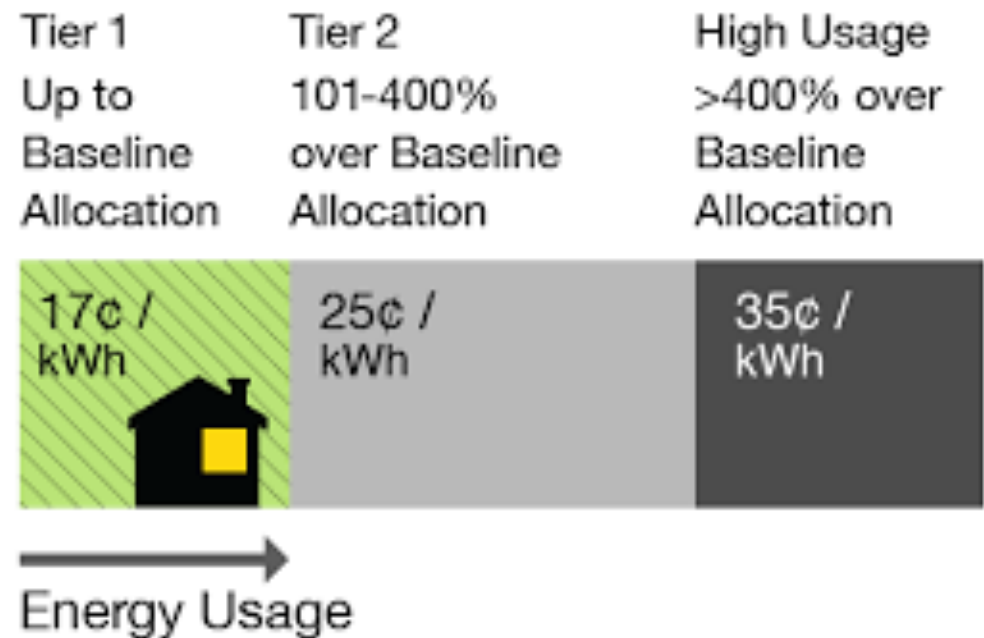


Image credit: Southern California Edison

# Time of Use Rates

- Charge highest rate during peak usage periods – encourages conservation
- Peak periods vary
  - Two peak periods per day
  - Multiple periods throughout the day
- Rate names may include:
  - Off-peak
  - Mid-peak
  - Peak
  - Critical Peak
- May require new meter

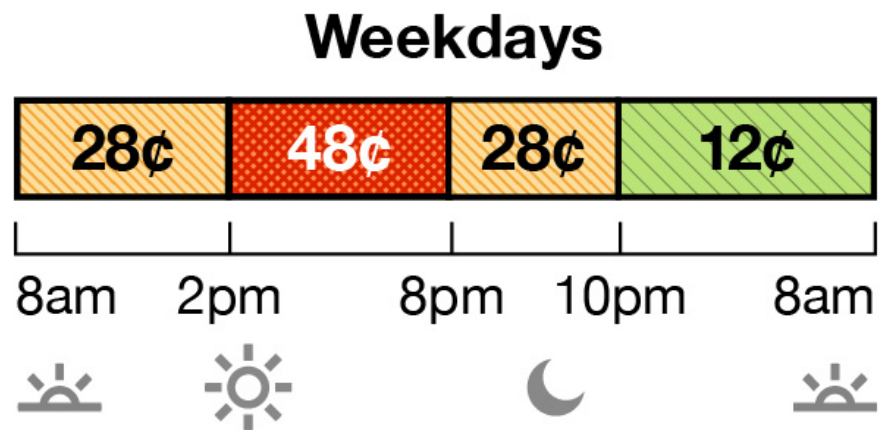


Image credit: Southern California Edison

# Seasonal Rates

- Rates are typically highest during the time(s) of the year when more electricity is being consumed
- Energy utilities typically have 2 or 4 seasonal rates
- May also be combined with a TOU Rate





# Weekend Rates

- Typically part of a Tiered or Time of Use Rate
- Rates on specific days of the week (typically weekends or holidays) are different than the rest of the week.

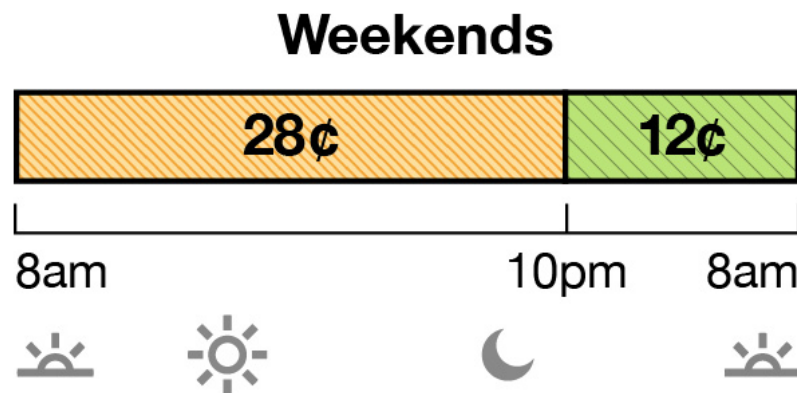


Image credit: Southern California Edison



# Which rate is best?

- The least expensive rate is best\*
  - If a Time of Use rate looks to be best
    - Make sure you can manage your operations to take advantage of the lower rates, if not you may end up paying more
- If you pay a Base Charge per meter and meters aren't too far apart, costs may be saved by eliminating a meter and connecting facilities\*
  - What are the savings? What are the costs to remove a meter and connect? What is the return on investment time?
  - Would it be harmful to any equipment to do this?
  - Does having multiple meters allow you to better control your use?



# Which rate is best?

- If possible, do a rate comparison
  - Possibly available on energy utility's website
  - Possibly available by request to your energy utility representative
- Look at what is covered in the rate
  - What is the kWh range
  - Who was the rate designed for? (Industry, churches, water utilities, large users, small users, etc., etc.)
  - Look at other rates charges per kWh – are they higher or lower than the rate you pay?



what  
does  
it all  
mean?



# Understand Your Energy Bill

Operations  
Budget

Rate Review

Energy  
Representative

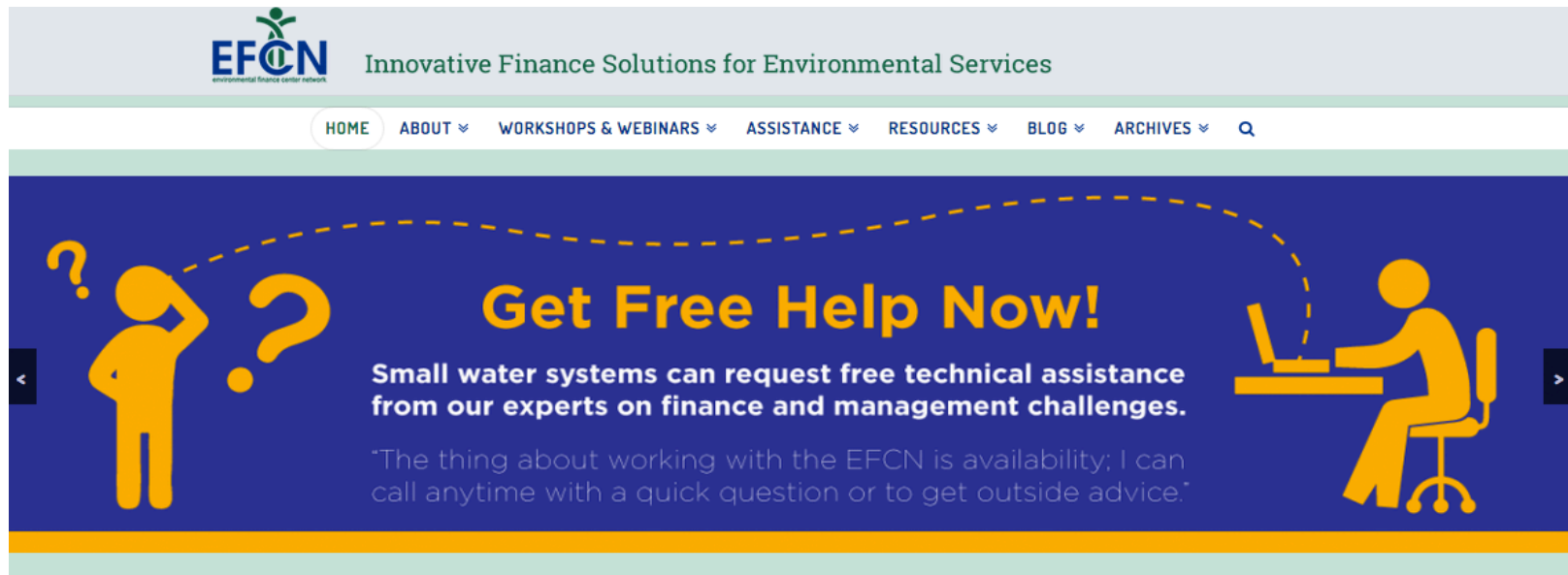
Understand  
the rates

Determine  
Demand

Request  
Assistance

# Visit the EFCN Website – *[www.efcnetwork.org](http://www.efcnetwork.org)*

for more information on upcoming events, funding, and resources.



The image shows the header and a large banner for the EFCN website. The header is light blue and contains the EFCN logo (a green stylized figure above the text 'EFCN' and 'environmental finance center network') and the tagline 'Innovative Finance Solutions for Environmental Services'. Below the header is a navigation bar with links: HOME, ABOUT, WORKSHOPS & WEBINARS, ASSISTANCE, RESOURCES, BLOG, ARCHIVES, and a search icon. The main banner has a dark blue background with yellow text and graphics. On the left, a yellow stick figure stands with a question mark above its head. On the right, a yellow stick figure sits at a desk with a laptop. A dashed yellow line connects the two figures. The text in the banner reads: 'Get Free Help Now!', 'Small water systems can request free technical assistance from our experts on finance and management challenges.', and a quote: 'The thing about working with the EFCN is availability; I can call anytime with a quick question or to get outside advice.'

**EFCN**  
environmental finance center network

Innovative Finance Solutions for Environmental Services

HOME ABOUT WORKSHOPS & WEBINARS ASSISTANCE RESOURCES BLOG ARCHIVES

## Get Free Help Now!

Small water systems can request free technical assistance from our experts on finance and management challenges.

"The thing about working with the EFCN is availability; I can call anytime with a quick question or to get outside advice."





Dawn Nall  
Program Manager  
Southwest EFC  
dnall@unm.edu



Smart Management for  
Small Water Systems



SOUTHWEST  
ENVIRONMENTAL  
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**Thank you for participating today, and we  
hope you attend a future webinar!**

*[www.efcnetwork.org](http://www.efcnetwork.org)*



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