



# *Final Deliverable:* E2C Expert Match Tama County, IA

## **Microlearning modules on residential energy efficiency- Module 1**

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U.S. DEPARTMENT  
of **ENERGY**

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# E2C: Technical Assistance Opportunities

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## EXPERT MATCH

E2C's Expert Match program connects energy experts with local governments, electric utilities, and community-based organizations to provide technical assistance to inform near-term energy decisions.

Expert Match offers:

- Access to experts from the U.S. Department of Energy's national lab system.
- 40–60 hours of support over 3 months from the first kickoff call.
- Focus on community-driven challenges or goals.

For more information, visit:  
[www.nrel.gov/e2c/expertmatch](http://www.nrel.gov/e2c/expertmatch)

# Scope

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ORNL will develop a set of short microlearning modules to help Montour (Tama County) homeowners better understand and manage household energy use. The work focuses on creating clear, practical, and accessible content that guides residents toward cost-effective improvements and available incentives. Activities in this work may include:

- **Content Development:**  
ORNL will prepare seven (agreed upon) modules using plain language, relatable examples, and simple step-by-step guidance covering topics on home energy efficiency improvements.
- **Learning Management System on Website:**  
ORNL will use a simple WordPress website of learning management system (LMS) to support hosting the above modules. After creating such web-based LMS, ORNL will handover the website management to the community POC with instructions for future updates.

#### Points of Contact

##### **Community POC**

Kent Scheid, CEDI-Tama County

##### **Subject Matter Expert**

Archana Ghodeswar, ORNL

##### **E2C Team**

Darylann Aragon – NREL

Drazenka Svedruzic – NREL

# Microlearning modules on residential energy efficiency

## Module 1. Energy Billing

Welcome to Energy Basics. We will explore the fundamental concepts of energy consumption to help understand your energy bills and make informed decisions about energy usage.

\*All the pictures in this presentation slides are generated through various AI tools and are added here for illustrative purpose. The pictures do not represent technical accuracy.



# 1.1 Understanding Your Energy Bill

Your energy bill contains various terms and metrics that might seem confusing at first glance. Understanding these elements is important for managing your energy consumption effectively.



› Date Billed: 11/28/23  
 › Account Number: 47070-50000

**Total Amount Due by 12/20/23**

A late payment charge of \$1.46 will be assessed if payment is received after

**Service For:**  
 AMANDA J DELUCCI  
 000 0 BLAINE CT  
 LENOX 00-07000

▶ <b>Current Charges Summary</b>	▶ Last Bill	▶ Payments and Credits	▶ New Charges
	\$195.41	\$195.41	\$97.00

**Payments and Credits Applied to Your Account**

11/16/23	Web Payment	\$195.41
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**New Charges This Month**

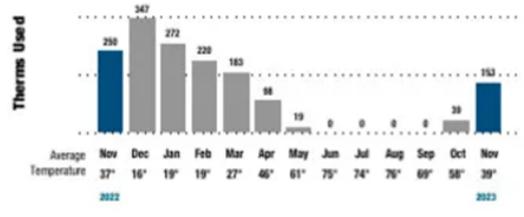
Budget Bill Difference	-\$14.83
Gas Charges	\$111.83

See details about this bill on Page 3

▶ **You Used**

**Gas Usage**

	<b>Last Year</b>	<b>Current</b>
Monthly Therm Usage	250	153
Number of Days	33	33
Average Temperature	37°	39°
Average Cost per Day	\$6.95	\$3.38
Average Usage per Day	8	5



▶ [Keep]  
 ▶ [Send]

› Account Number: 47070-50000  
**Total Amount Due by 12/20/23** \$97.00

For online bill payment log in to My Account at MidAmericanEnergy.com



**i care**

Monthly  One Time

My Contribution \$

I want to contribute to the I CARE program

MidAmerican Energy  
 PO Box 8020  
 Davenport IA 52001

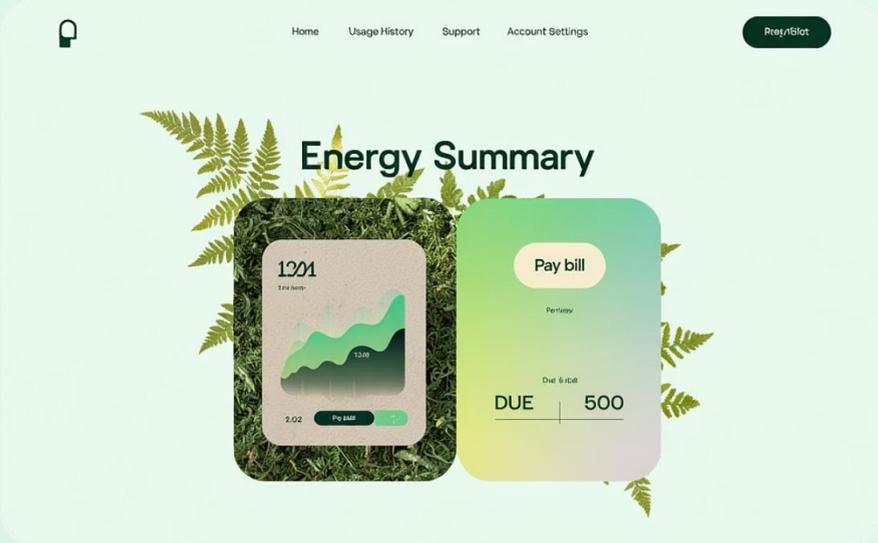
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# Understanding Electricity & Natural Gas Bills

Confused by the charges on your natural gas or electricity bill? The following guidance breaks down every detail, helping you take control of energy costs and spot saving opportunities.

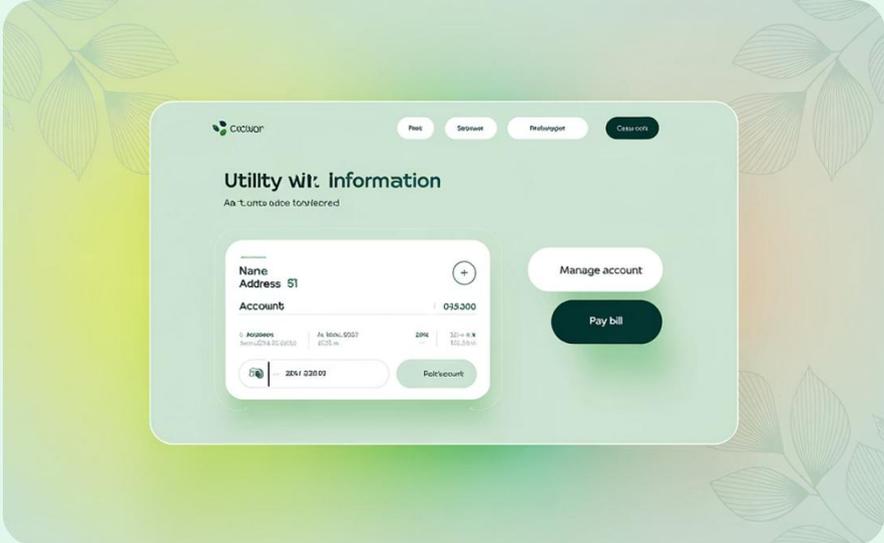


# Key Components of Your Energy Bill



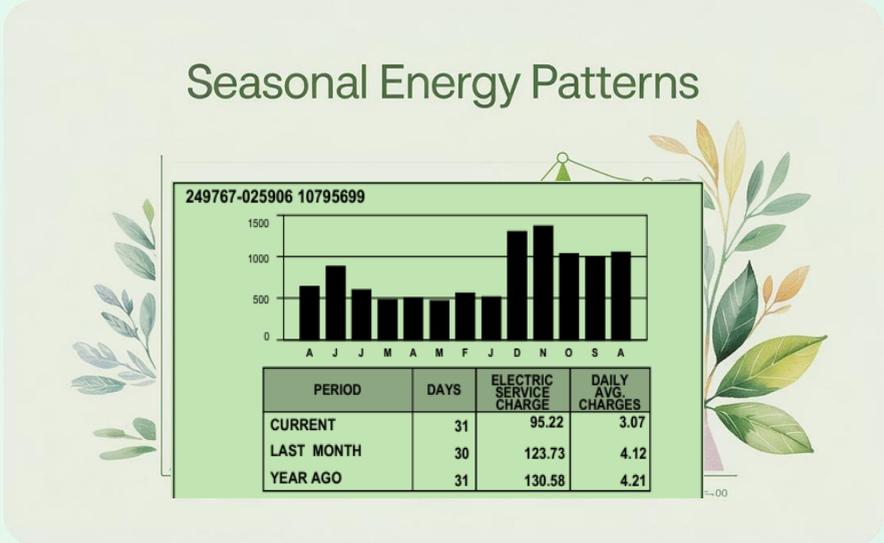
## Billing Summary

Provides a basic overview of your utility account, including your most recent payment activity, current balance due, and payment due date.



## Account Information

Details the account holder's name, bill date, service address, and utility account number.



## Usage Snapshot Graph

Charts your energy consumption over time, helping identify seasonal usage patterns and manage expensive seasonal energy costs.

# Understanding Your Bill Charges



## Delivery Charges

Determined by your local utility company to cover the cost of safely delivering energy to your home. Includes maintenance of infrastructure like power lines, gas pipelines, meters, and transformers.



## Supply/Usage Charges

Based on the amount of energy your household consumes. Electricity is measured in kilowatt-hours while natural gas is measured by volume. These rates can be compared across suppliers in deregulated markets.



## Taxes & Regulatory Fees

Determined by various government levels to fund energy-related programs. Varies by location.

SERVICE	DAYS BILLED	PRESENT READING	PREVIOUS READING	AMOUNT USED	AMOUNT
Electric (Kilowatt Hours)	31	55675	55031	644	95.22

**Service Type:** Gas - Residential  
**Billing Period:** 07/22/2025 - 08/19/2025  
**Read Date:** 08/19/2025  
**Total Gas Usage:** 9 Ccf = 9.54 Therms

Meter Number	Current Reading	Prior Reading
0095148	2,101 Ccf	2,092 Ccf

Basic Service: \$10.90  
Natural Gas Usage: \$9.43  
**Total Gas Charges: \$20.33**

**Gas Usage History (Therms)**

Year	Last month	Current month
Prior Year	15	13
Current Year	14	10

# Electricity Measurement Terms

## Kilowatt-hour (kWh)

A unit that calculates electricity consumption over time - one kilowatt of power (1000 watts) used for one hour.

Energy consumption examples:

- 100-watt lightbulb: 10 hours to consume 1kWh
- 2000-watt appliance: only 30 minutes to consume 1kWh

## Demand Charges

Fees based on the highest amount of electricity used during specific peak periods, typically applied during high regional energy use times like hot summer afternoons.

# Electricity Usage Comparison



Refrigerator

Washing Machine

Television

Toaster

# Natural Gas Measurement Terms

## British Thermal Units (Btu)

The amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. Used to determine natural gas value and efficiency.

## Therms

Equivalent to 100,000 Btus. Commonly used on natural gas bills to calculate energy usage. One therm equals about 96.7 cubic feet of natural gas, depending on gas composition.

## Ccf/Mcf

Ccf (hundred cubic feet) and Mcf (thousand cubic feet) measure natural gas volume. One Ccf equals 100 cubic feet, one Mcf equals 1,000 cubic feet. These are the most common billing units.

Dollars per Ccf

$$\div 1.037 =$$

Dollars per therm

Dollars per therm

$$\times 1.037 =$$

Dollars per Ccf

Dollars per Mcf

$$\div 1.037 =$$

Dollars per MMBtu

# Key Terms on Your Energy Bill



## kWh (Kilowatt-hour)

The standard unit of electricity consumption. One kWh represents the amount of energy used by a 1,000-watt appliance running for one hour.

For example, a 100-watt light bulb running for 10 hours would consume 1 kWh of electricity.



## Therms

The unit used to measure natural gas consumption. One therm equals 100,000 BTUs (British Thermal Units) of heat energy.

This measurement helps quantify how much natural gas you're using for heating, cooking, or other purposes.

Understanding these units helps you track your energy usage and compare consumption across different billing periods.

# Time-of-Use Pricing

## How It Works

Time-of-Use (TOU) pricing divides your day into different rate periods. You pay different rates for electricity depending on when you use it, with higher costs during peak demand.

## Rate Structures

Most TOU plans include 2-3 pricing tiers: peak (highest cost), off-peak (lowest cost), and sometimes mid-peak or shoulder periods with intermediate rates.

## Smart Meters

These advanced meters track exactly when electricity is used, enabling precise billing that reflects your consumption patterns during different rate periods.

TOU pricing is increasingly common among energy suppliers as part of the nationwide smart meter rollout, helping to balance electricity demand across the grid while giving consumers more control over their bills.

# Time-of-Use Pricing

On-Peak

Highest rates

Mid-Peak

Moderate rates

Off-Peak

Lowest rates

# Peak Rates

Peak rates refer to higher electricity prices charged during times of day when energy demand is at its highest.



## Weekday Mornings

Higher rates typically apply during morning hours when people are getting ready for work and using multiple appliances simultaneously.



## Weekday Evenings

Peak rates often occur in the evenings when people return home and use multiple appliances for cooking, entertainment, and household tasks.



## Hot Summer Afternoons

During summer months, afternoon hours see peak rates due to high air conditioning usage across homes and businesses.

Energy providers implement peak rates to manage grid demand and encourage consumers to shift their energy usage to off-peak hours when possible.

# Understanding Peak vs Off-Peak Rates



## Peak Hours

During peak hours, electricity costs more because demand is high. These hours typically fall between 4 PM and 9 PM on weekdays when most households are active.



## Off-Peak Hours

Off-peak hours usually include late nights, early mornings, weekends, and holidays when overall energy demand is lower, resulting in cheaper rates.

By shifting energy-intensive activities to off-peak hours, you can significantly reduce your energy costs.

# Benefits of Time-of-Use Pricing

## Cost Savings

By shifting energy-intensive activities to off-peak hours, consumers can significantly reduce their electricity bills without necessarily reducing their total energy consumption.

## Energy Efficiency

TOU pricing encourages more efficient use of energy resources by incentivising consumption during periods when renewable energy is more abundant.

## Power Infrastructure Impact

Lower peak demand helps prevent overuse of high-cost, peak-only generation resources and reduces stress on the power system.

# Taking Control of Your Energy Usage

## Monitor Your Usage

Track your energy consumption patterns using your utility's online tools or smart home devices to identify when you're using the most energy.

## Shift Usage Times

Run major appliances like dishwashers, washing machines, and dryers during off-peak hours to take advantage of lower rates.

## Invest in Smart Technology

Consider programmable thermostats and smart appliances that can automatically operate during off-peak hours.

By understanding the key terms on your energy bill—kWh, therms, peak rates, and time-of-use pricing — you can make more informed decisions about your energy consumption and potentially reduce your utility costs.

# Energy Saving Tips for Lower Monthly Bills

Heating, cooling, and water heating make up about 43% of household energy consumption, making them key areas to target. Practicing energy conservation and completing efficiency upgrades can help save between 5% and 30% in energy costs every year.



## Smart Thermostat

Install a smart thermostat to optimize your heating and cooling costs throughout the day.



## LED Lighting

Upgrade to LED lighting which is up to 90% more efficient than incandescent bulbs.



## Seal Air Leaks

Seal gaps, cracks, and air leaks around windows and doors to reduce temperature loss and energy waste.

# More Ways to Save on Energy Costs



## Improve Insulation

Improve insulation in high-impact areas, like attics and exterior walls



## Use Off-Peak Hours

Prioritize off-peak hours to run energy-intensive appliances



## Smart Power Management

Invest in smart power strips and plugs to reduce standby energy waste



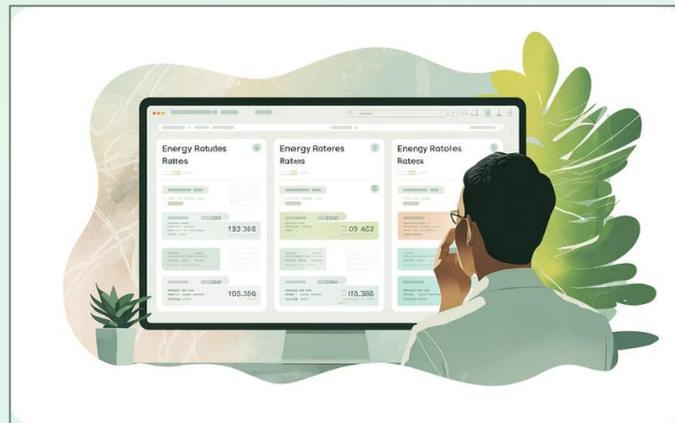
## Lower Water Heater Temperature

Reduce your water heater to 120°F to reduce standby heat losses



## Insulate Water Heater

Insulate your water heater tank to save 7-16% in energy costs/year



## Compare Energy Suppliers

Lock in a low, fixed energy rate by comparing suppliers