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Topics

- Policy and Perspective
- How It Works
- Price, Privacy and Health
- Customer Choice
- Web Portal
- Demand Response

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Policy and Perspective: Supporting Community Goals

Reducing Local Greenhouse Gas Emissions

- Fort Collins is a national leader in reducing local greenhouse (GHG) emissions.
- City Council policies support GHG reduction goals.
  - 2008 Climate Action Plan
  - 2009 Energy Policy
- Policy helps advance economic and environmental sustainability.

Council Goals

2008 Climate Action Plan

- By 2020, 20% GHG reduction below 2005 levels, 80% by 2050
- Advanced Metering first proposed in Climate Action Plan

Council Goals

Energy Policy

- 1.5% energy savings
- reduce system peak by 5% by 2015, 10% by 2020
- provide highly reliable electric service
- develop renewable resources to meet the Colorado Renewable Energy Standard

Council Goals

Energy Policy

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- develop renewable resources to meet the Colorado Renewable Energy Standard

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Highly Reliable Service

12 month period ending June 2012:

Electric system was available to customers an average of 99.9962 % of the time

Goal: 99.9886 %

Customers experienced an average service interruption of 40 minutes

Goal: 60 minutes

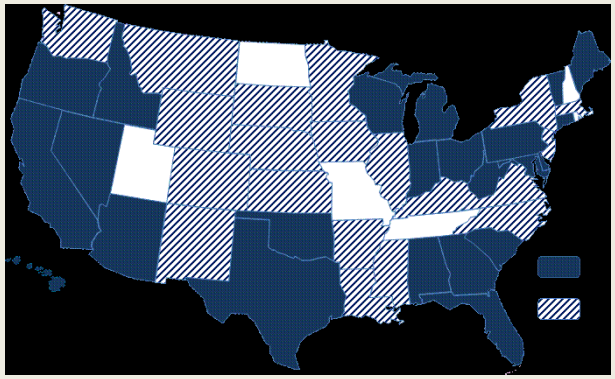
Customers experienced an average system outage frequency of 0.50

Goal: 1.0

National Perspective

Advanced meter programs in the U.S.

- 65 million advanced meters will be deployed by 2020 (50% of U.S. households)*
  - Solid = >50% of customers
  - Shaded = <50% of customers



* Source: Edison Foundation Institute for Electric Efficiency *edisonfoundation.net/iee/issuebriefs/SmartMeter_ Rollouts_0910.pdf*

Regional AMI Projects

Poudre Valley REA – Fort Collins/Loveland - 2009
36,000 Landis & Gyr automated meters

Fort Collins Loveland Water District/
South Fort Collins Sanitation District - 2010
Sensus & FlexNet14,000 automated meters

Cheyenne Light, Fuel & Power - 2010
38,000 Elster meters

Black Hills Energy – Pueblo - 2008
56,500 Elster meters
750,000 utility customers in Colorado, Iowa, Kansas, Montana, South Dakota, Wyoming

Xcel Energy – 2008
50,000 meters

City of Fountain - 2011
Cooper meters

Colorado Springs - 2009
530,000 Landis & Gyr meters

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Investing in the Future

AMI communication system

- **lays the foundation for future technologies and programs**
- **provides efficiencies today**

Other Cities' Projects

City	AMI/AMR	Mobile Workforce	Demand Response	Traffic Control	Public Internet	Public Safety
Baton Rouge, LA						✓
Burbank, CA	✓	✓	✓			
Corpus Christi, TX	✓	✓				✓
Glendale, CA	✓	✓				
Laguna Beach, CA					✓	✓
Lompoc, CA	✓				✓	✓
Mountain View, CA	✓				✓	
Oklahoma City, OK		✓		✓		✓
Phoenix, AZ				✓		
Ponca City, OK		✓			✓	
Redwood City, CA				✓		
Rock Hill, SC	✓				✓	✓
Tuscon, AZ				✓		✓
Vancouver, BC				✓		

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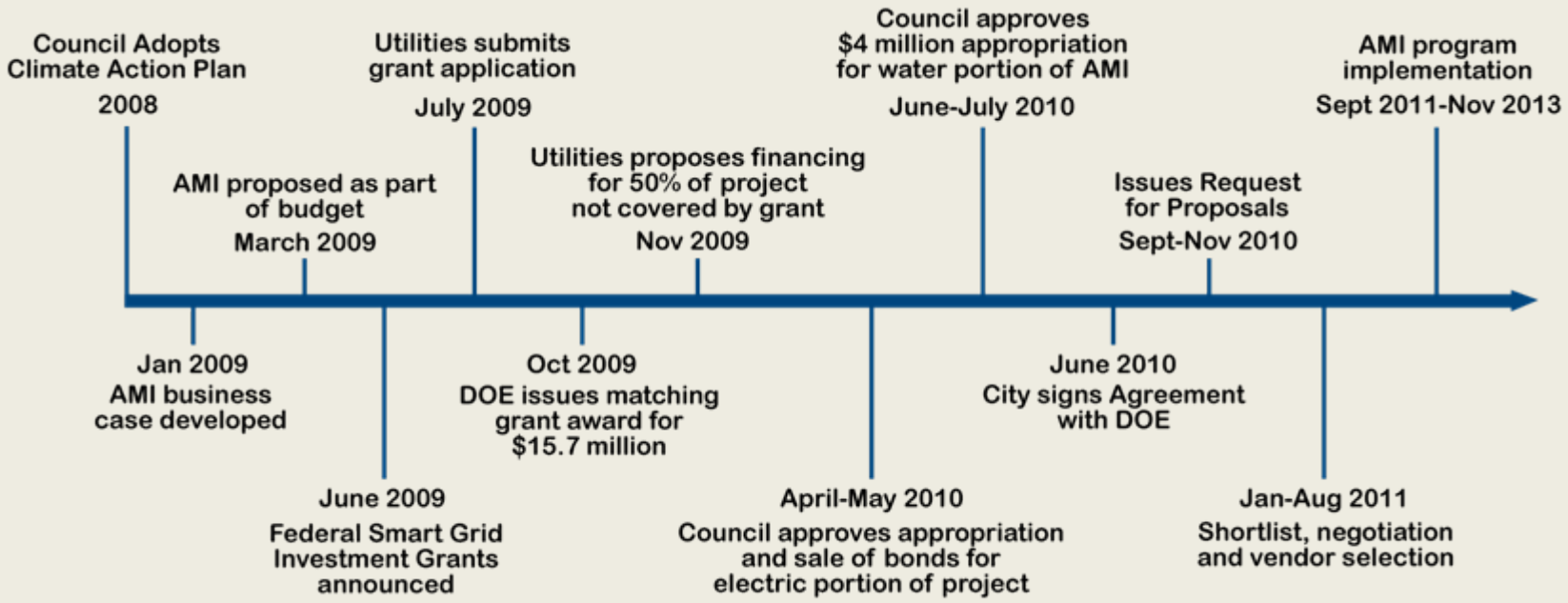
Advanced Meter Fort Collins' Timeline



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How It Works: Investment to Maximizes Benefits of Emerging Technologies.

New Electronic Electric and Water Meters

- replace mechanical meters
- enable two-way digital communication between the meter and the utility
- give customers data to better understand and manage utility use and costs
- allow Utilities to provide better service to the community

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- $36M total cost, $16M from Department of Energy grant
- 11-year payback from operational savings (e.g., meter reading)
- most meters installed from mid-2012 through mid-2013

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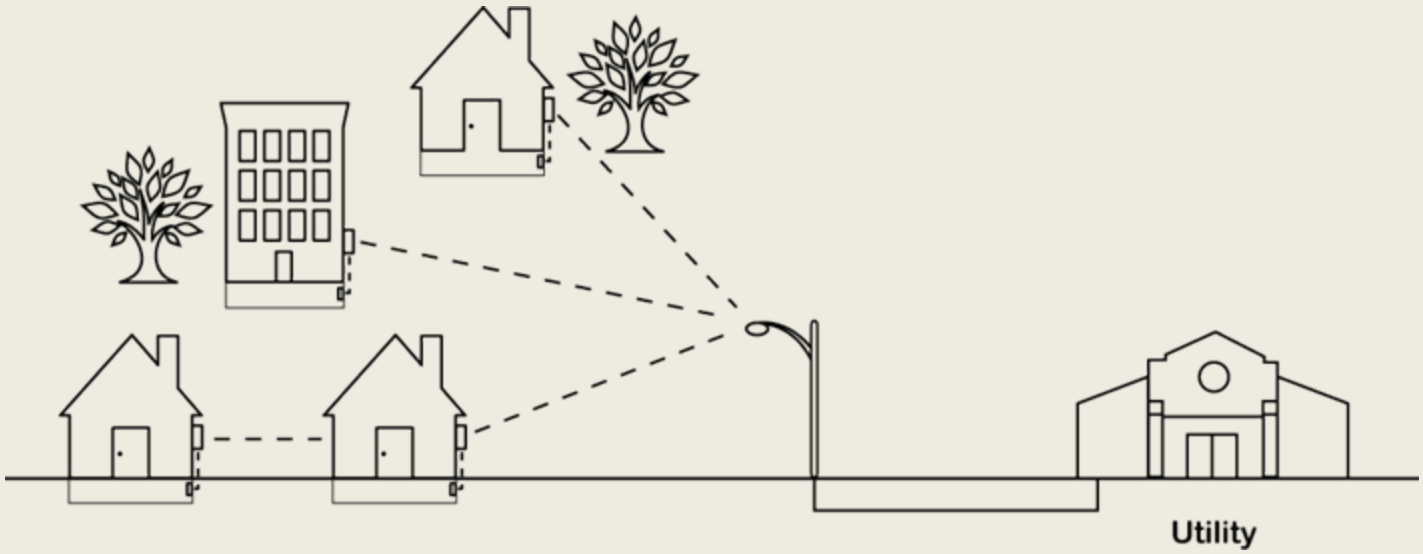
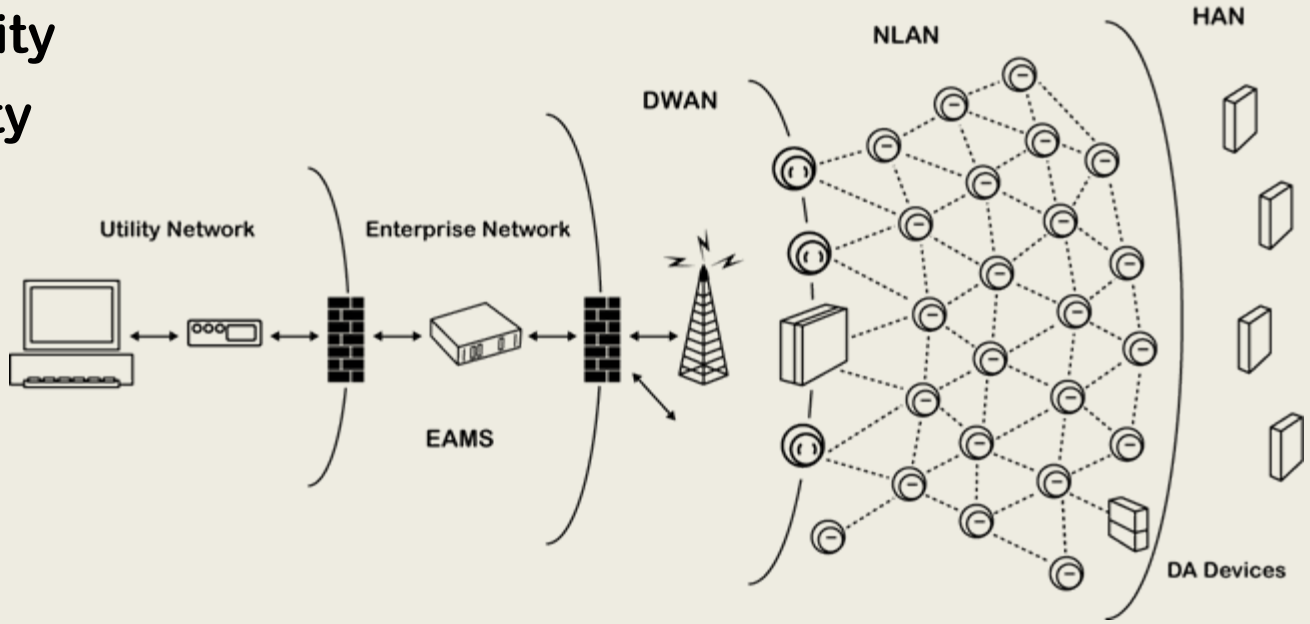
Utilities for the 21st Century.

Communication Network



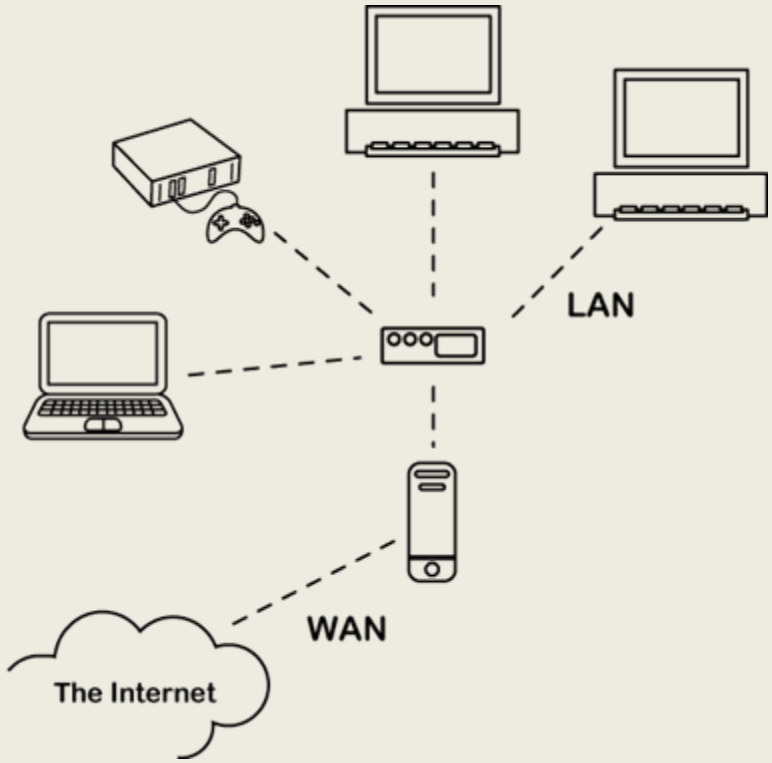
End-to-End Network

- A field proven, end-to-end network
- Authentication
- Confidentiality
- Data integrity
- Reliability
- Security

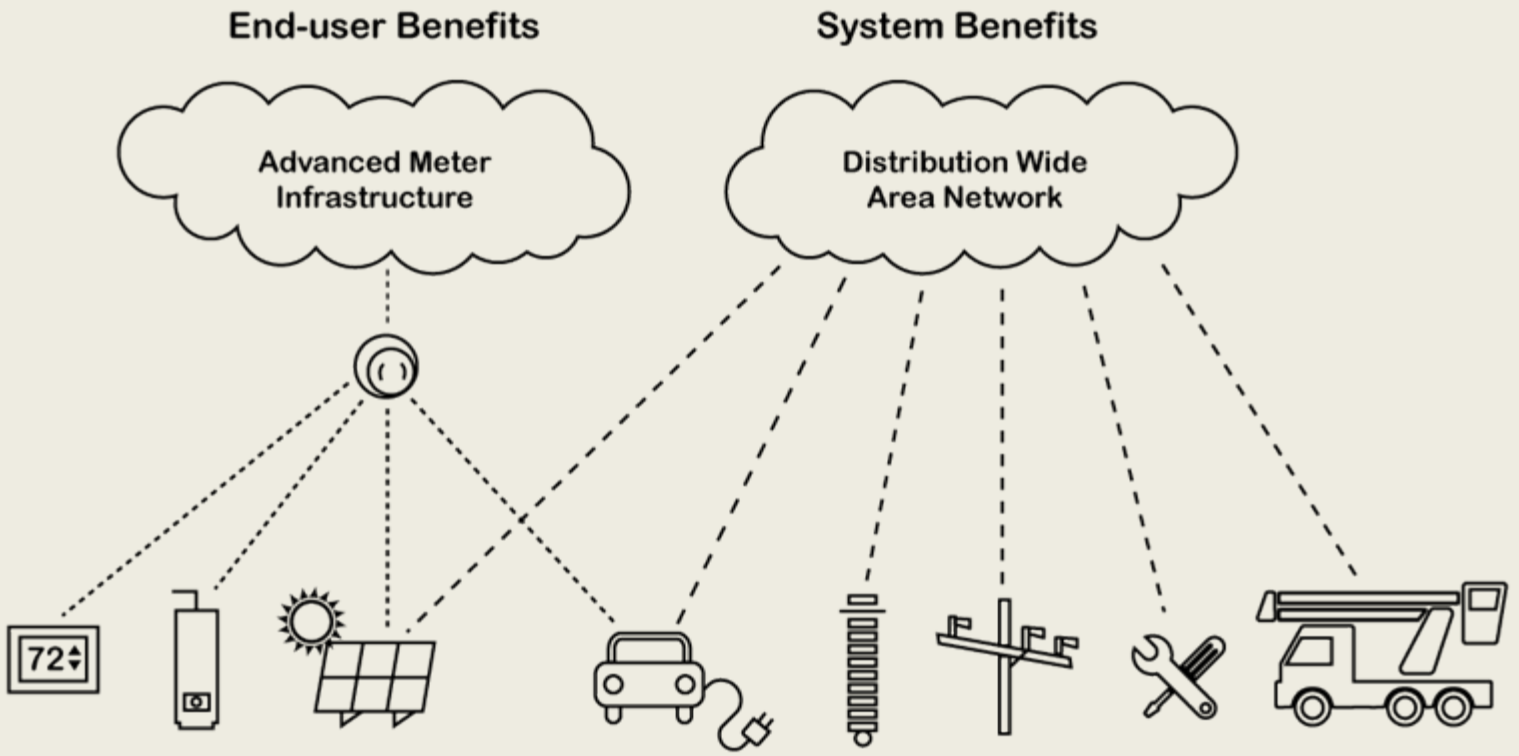


Typical Home Wireless Network

- Functions like home wireless computer network.
- Wireless devices make up home Local Area Network.
- The LAN connects to the rest of the world through a Wide Area Network (WAN).



Benefits of Selected Network



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Questions:

- Price
- Privacy
- Health

Price/Cost

- Utilities prepared a positive business case using nationally recognized analysis methods.
  - reviewed/validated
- Claims of inaccuracy have proved unwarranted by independent laboratories.
- Remote meter reading reduces operational costs.
- Remote outage notification speeds repair and reduces vehicle trips.

Privacy and Security

- Utilities adheres to strict policies to protect customer information.
  - Federal: “Red Flags Rules of the FACT Act”
  - Colorado Open Records Act
  - internal policies
- Security
  - Detailed and confidential cyber security plan adopted.

Health

- *There appears to be no health reason to avoid the use of smart meters."*
  - Excerpt from Dr. Bruce Cooper, Health District of Northern Larimer County, based on his review of various studies
- Levels are significantly less than those from cell phones, microwaves, wireless routers, cordless phones and other common devices.
- Meters transmit only occasionally via a brief signal.

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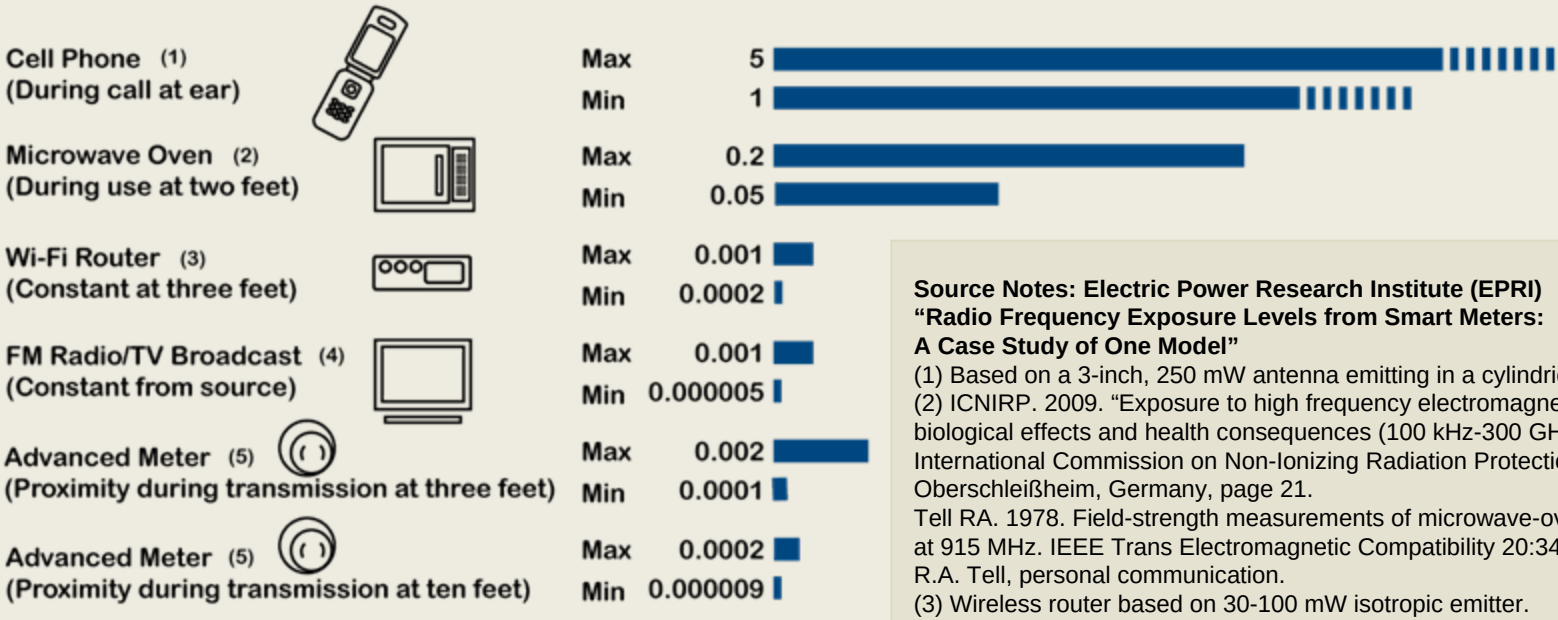
Radio Frequency Exposure Levels*



*All values are shown in milliwatts per square centimeter (mW/cm^2).

Source Notes: Electric Power Research Institute (EPRI)
"Radio Frequency Exposure Levels from Smart Meters:
A Case Study of One Model"

(1) Based on a 3-inch, 250 mW antenna emitting in a cylindrical wavefront.

(2) ICNIRP. 2009. "Exposure to high frequency electromagnetic fields, biological effects and health consequences (100 kHz-300 GHz)." International Commission on Non-Ionizing Radiation Protection, Oberschleißheim, Germany, page 21.
Tell RA. 1978. Field-strength measurements of microwave-oven leakage at 915 MHz. IEEE Trans Electromagnetic Compatibility 20:341-346.
R.A. Tell, personal communication.

(3) Wireless router based on 30-100 mW isotropic emitter.

(4) Tell RA, Mantiply ED. 1980. Population Exposure to VHF and UHF Broadcast Radiation in the United States. Proc IEEE 68:6-12.

(5) Based on spatial peak power density with 6 dB (x4) antenna gain. Maximum values are based on 5% duty cycle and 1W broadcast power. Minimum values are based on 1% duty cycle and 250mW broadcast power. For instantaneous power density during transmission, multiply the number for minimum values by 100, and the number for maximum values by 20.

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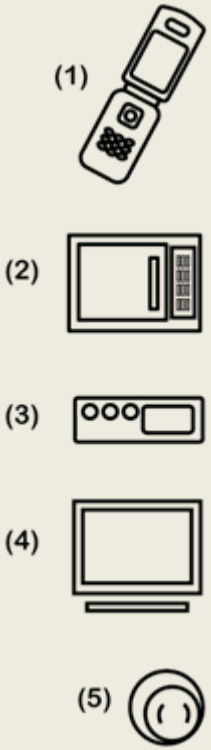
Radio Frequency Exposure Levels Source Notes



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Meter RF Exposure Comparison

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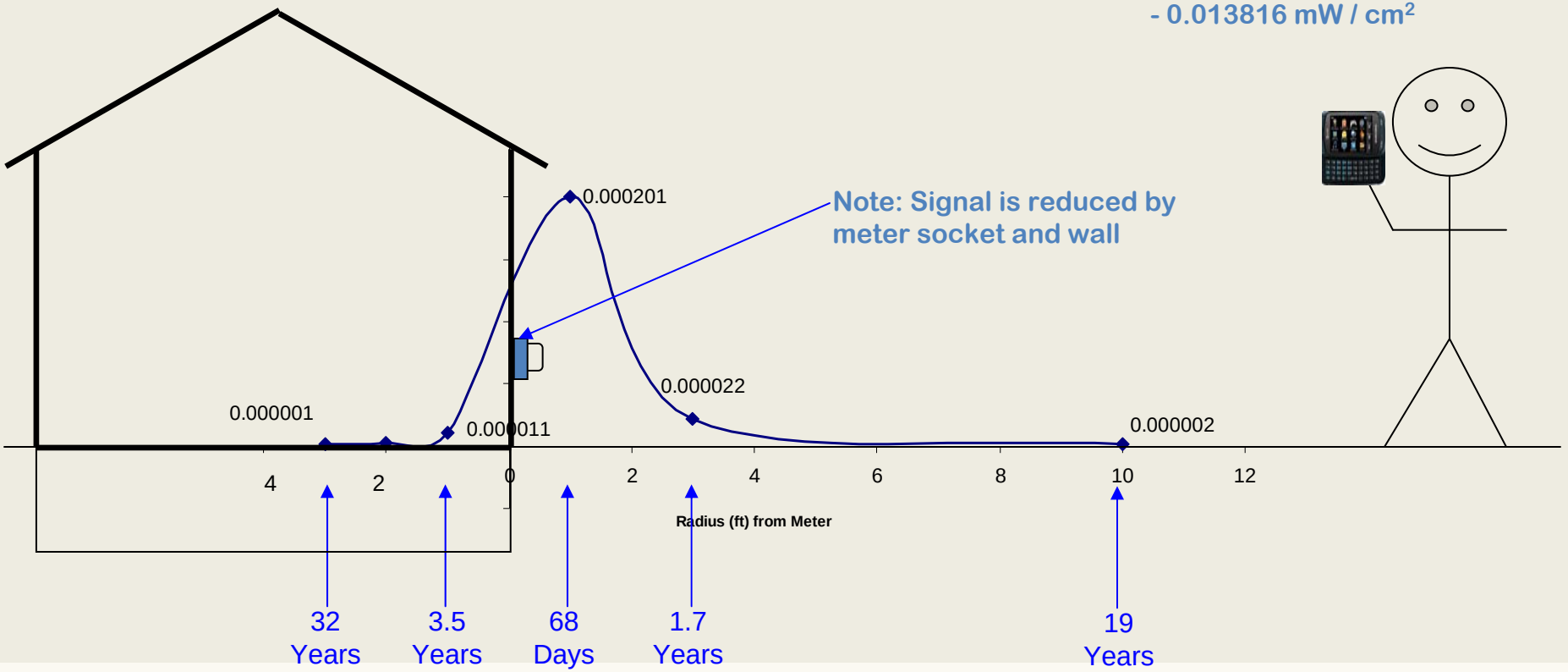
How long does it take to receive the same time-averaged RF exposure from the advanced metering system that you would receive from one cellular Phone Call?

Cell phone exposure:

- 5 Minutes at 1 cm from ear
- 0.013816 mW / cm^2



1) Values calculated by FCU for meter RF power density are shown in mW/cm^2, and are calculated based on 0.1% transmit duty cycle (86 seconds per day) and 250mW transmit power.

2) Cell phone 50mW transmit power based on FCC data for HTC Thunderbolt smart phone.

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Customer Choice: Information and Technology for Customer Choices.

New Electronic Meters

- Can provide a wealth of information if the customer chooses
- Can be programmed to:
  - communicate daily total usage
  - communicate detailed usage – every 15 minutes
  - integrate with a Home Area Network
  - be completely “silent” – just like today

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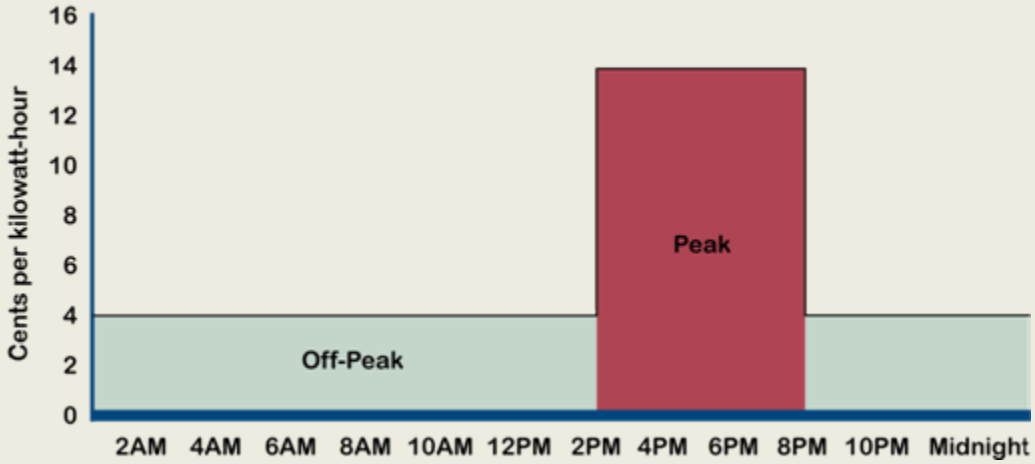
New Customer Choices

Consumers – know what your usage is before you get your bill.

Rate options:

- **Recharge your electric vehicle when it is least expensive.**
- **Sell your solar energy to the grid when it is more valuable.**
- **Smart Home – emerging smart appliances may help to save you money.**



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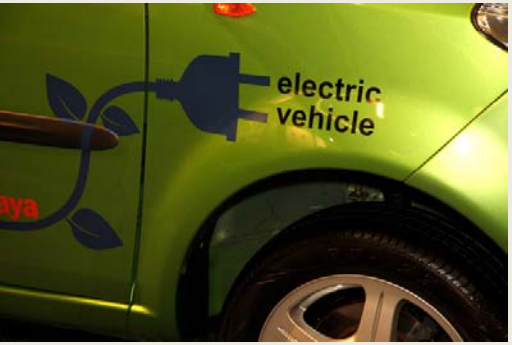
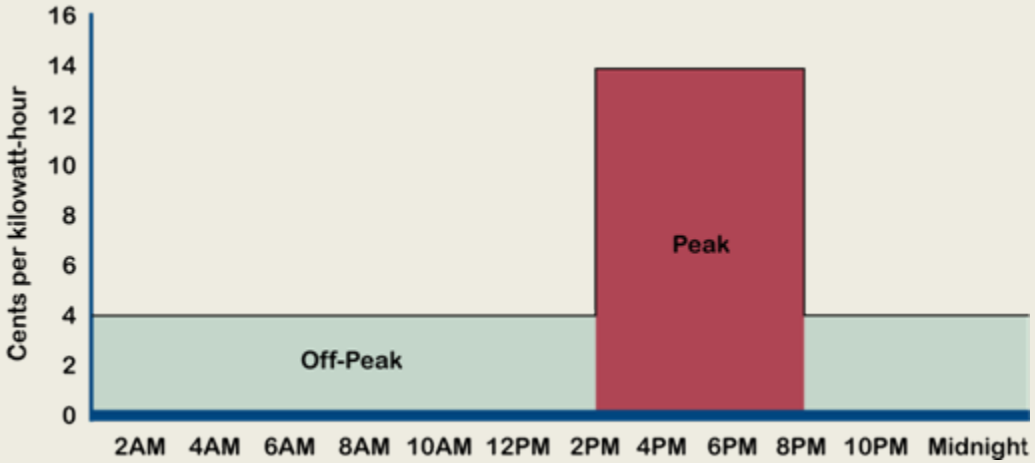
Lower Cost Electric Vehicle Charging

Charge at night – and save.

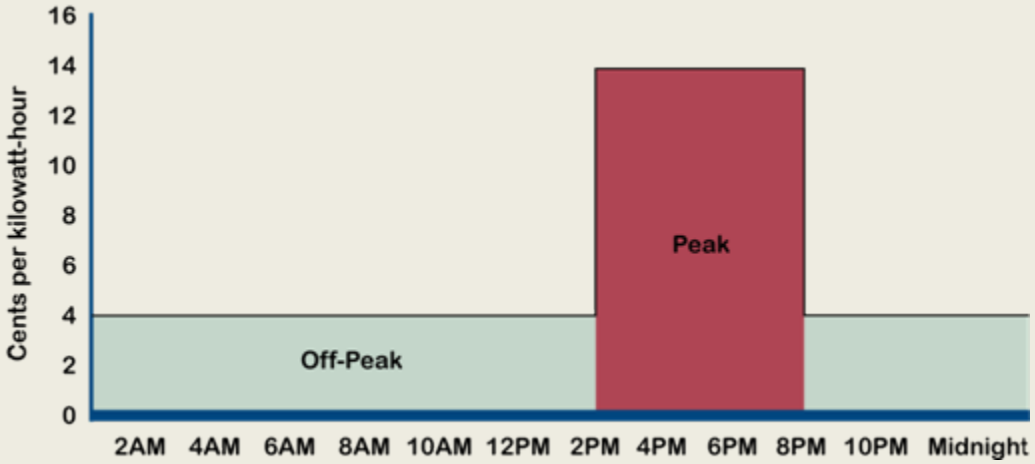
- **adequate generation for many EVs**
- **unless they charge at the same time**





Photovoltaics More Valuable

Sell energy to grid at peak times.



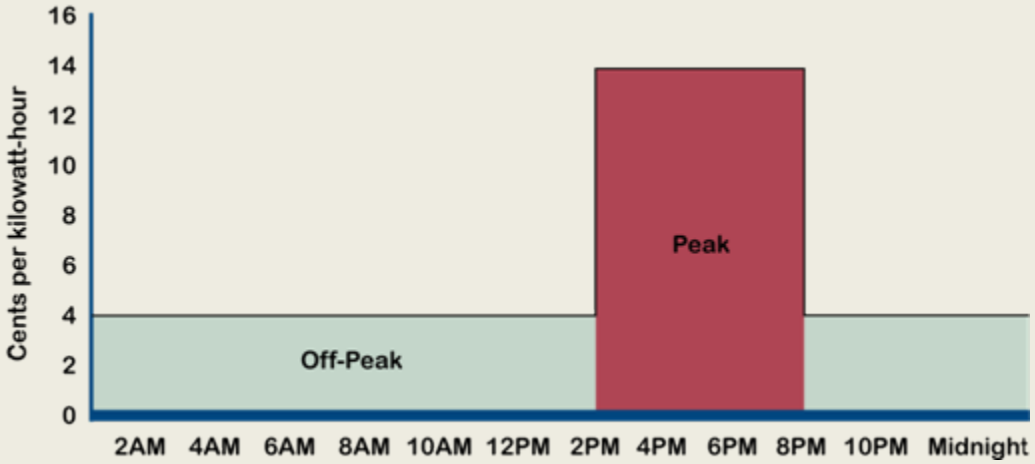
Local Energy

Clouds with a solar lining

- Solar energy (photovoltaic) is getting cheaper, so more people installing panels.
- When a cloud passes between the sun and a solar panel, output can drop in seconds, creating imbalance in the grid.
- Balancing the grid traditionally means adding standby generators (e.g., peaking generators).
- With advanced meters, it will be possible to solve this problem and balance the grid with existing load and generation – saving money.

Smarter Homes and Businesses

- automatically use electricity when it is cheaper
- if it works with *your* schedule.



New Customer Options

Benefits

- saves meter reading costs
- gives engaged consumers access to more information about their usage.
- makes off-peak electric vehicle charging easier
- enables new smart appliances and devices to automatically help customers save money.
- offers new pricing options

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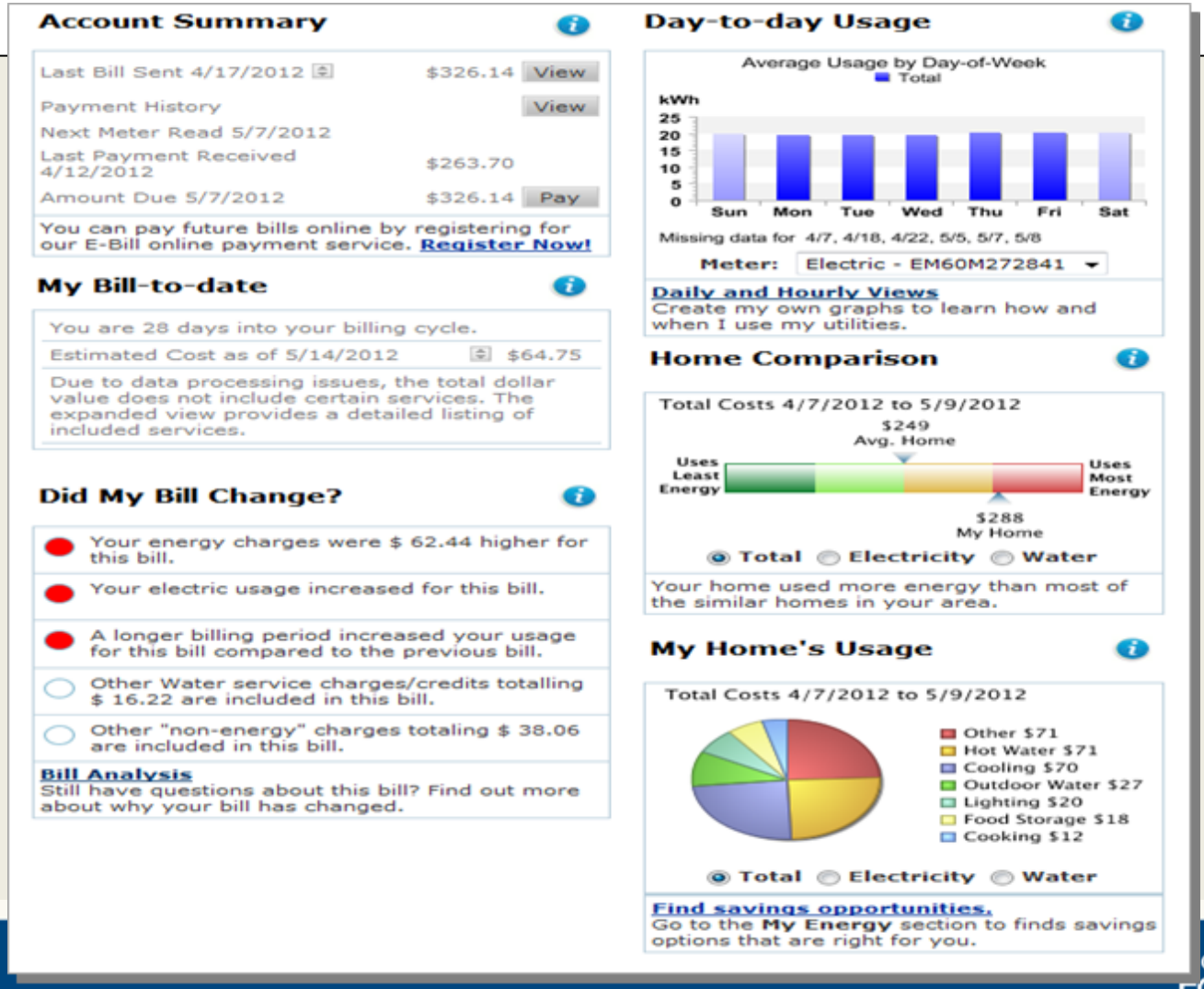
Web Portal:
Online Link data and support

Consumer dashboard



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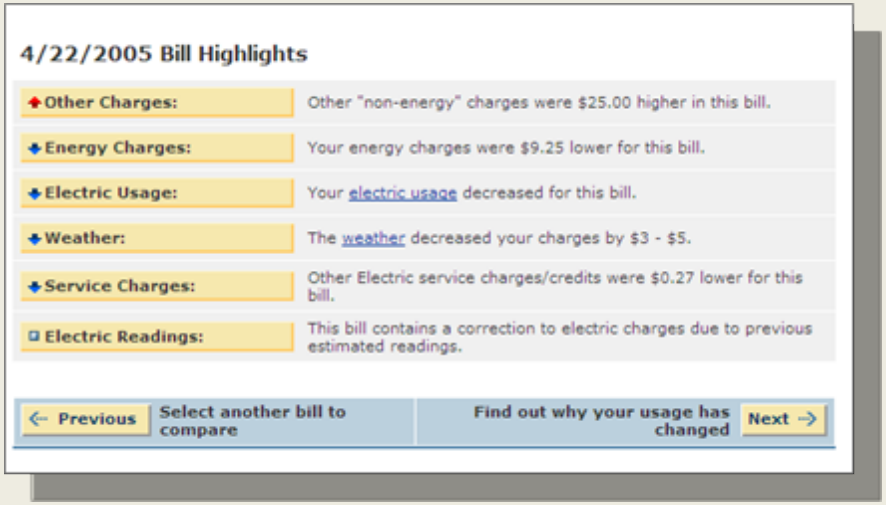
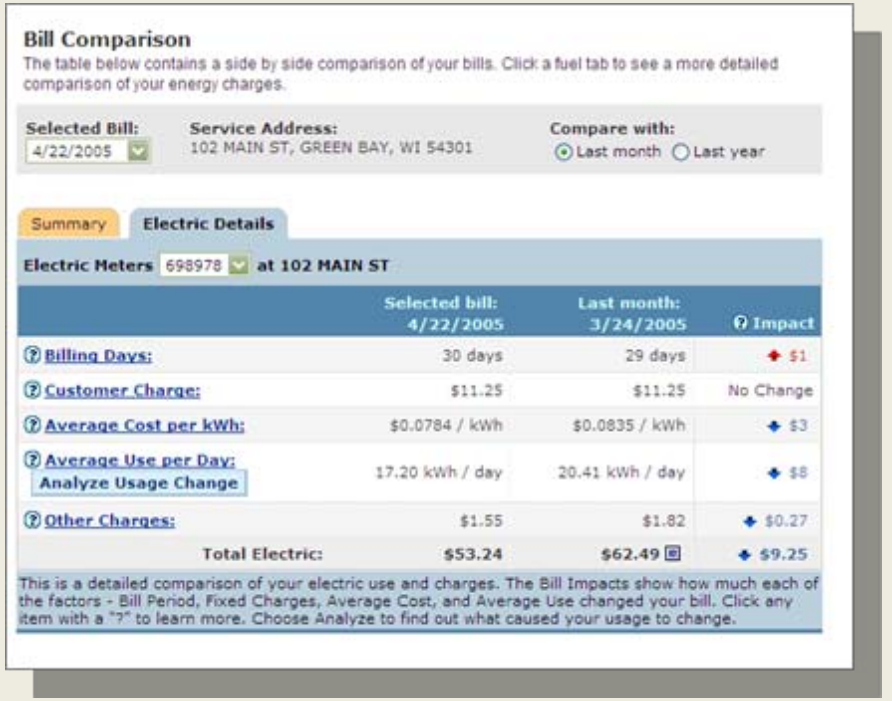
Billing data presentment - bill comparison



4/22/2005 Bill Highlights

Other Charges:	Other "non-energy" charges were $25.00 higher in this bill.
Energy Charges:	Your energy charges were $9.25 lower for this bill.
Electric Usage:	Your electric usage decreased for this bill.
Weather:	The weather decreased your charges by $3 - $5.
Service Charges:	Other Electric service charges/credits were $0.27 lower for this bill.
Electric Readings:	This bill contains a correction to electric charges due to previous estimated readings.

← Previous | Select another bill to compare | Find out why your usage has changed | Next →



Bill Comparison

The table below contains a side by side comparison of your bills. Click a fuel tab to see a more detailed comparison of your energy charges.

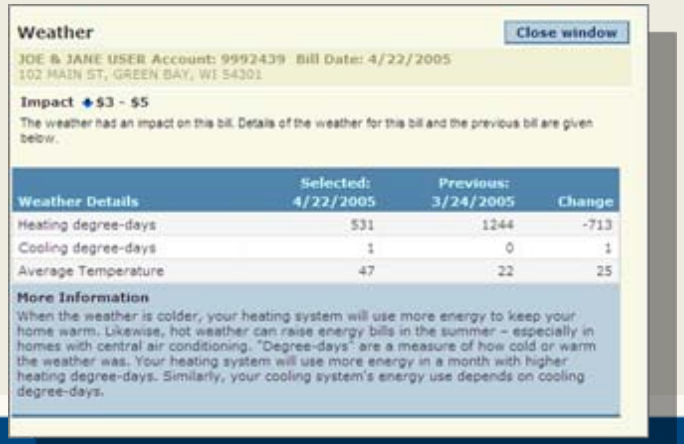
Selected Bill: 4/22/2005 | Service Address: 102 MAIN ST, GREEN BAY, WI 54301 | Compare with: Last month / Last year

Summary | Electric Details

Electric Meters 698978 at 102 MAIN ST

	Selected bill: 4/22/2005	Last month: 3/24/2005	Impact
Billing Days:	30 days	29 days	$1
Customer Charge:	$11.25	$11.25	No Change
Average Cost per kWh:	$0.0784 / kWh	$0.0835 / kWh	$3
Average Use per Day: Analyze Usage Change	17.20 kWh / day	20.41 kWh / day	$8
Other Charges:	$1.55	$1.82	$0.27
Total Electric:	$53.24	$62.49	$9.25

This is a detailed comparison of your electric use and charges. The Bill Impacts show how much each of the factors - Bill Period, Fixed Charges, Average Cost, and Average Use changed your bill. Click any item with a "?" to learn more. Choose Analyze to find out what caused your usage to change.



Weather — Close window

JOE & JANE USER Account: 9992439 Bill Date: 4/22/2005
102 MAIN ST, GREEN BAY, WI 54301

Impact $3 - $5

The weather had an impact on this bill. Details of the weather for this bill and the previous bill are given below.

Weather Details	Selected: 4/22/2005	Previous: 3/24/2005	Change
Heating degree-days	531	1244	-713
Cooling degree-days	1	0	1
Average Temperature	47	22	25

More Information

When the weather is colder, your heating system will use more energy to keep your home warm. Likewise, hot weather can raise energy bills in the summer – especially in homes with central air conditioning. "Degree-days" are a measure of how cold or warm the weather was. Your heating system will use more energy in a month with higher heating degree-days. Similarly, your cooling system's energy use depends on cooling degree-days.

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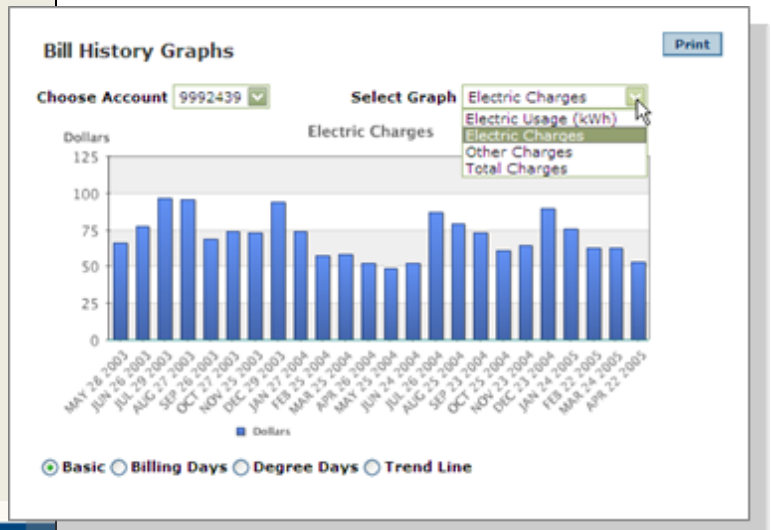
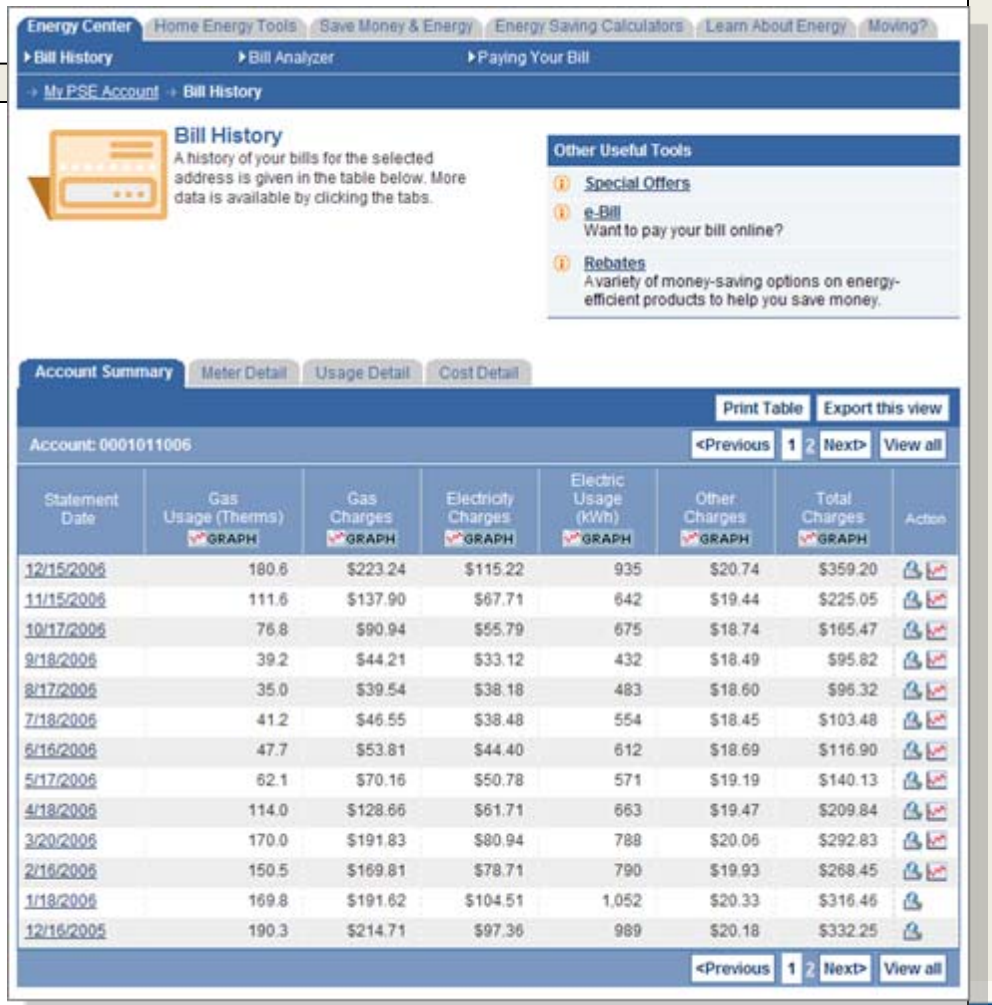
Billing data presentment – bill history

- Multiple views
- Configurable
- Monthly charts
- Action links





Statement Date	Gas Usage (Therms) GRAPH	Gas Charges GRAPH	Electricity Charges GRAPH	Electric Usage (kWh) GRAPH	Other Charges GRAPH	Total Charges GRAPH	Action
12/15/2006	180.6	$223.24	$115.22	935	$20.74	$359.20	
11/15/2006	111.6	$137.90	$67.71	642	$19.44	$225.05	
10/17/2006	76.8	$90.94	$55.79	675	$18.74	$165.47	
9/18/2006	39.2	$44.21	$33.12	432	$18.49	$95.82	
8/17/2006	35.0	$39.54	$38.18	483	$18.60	$96.32	
7/18/2006	41.2	$46.55	$38.48	554	$18.45	$103.48	
6/16/2006	47.7	$53.81	$44.40	612	$18.69	$116.90	
5/17/2006	62.1	$70.16	$50.78	571	$19.19	$140.13	
4/18/2006	114.0	$128.66	$61.71	663	$19.47	$209.84	
3/20/2006	170.0	$191.83	$80.94	788	$20.06	$292.83	
2/16/2006	150.5	$169.81	$78.71	790	$19.93	$268.45	
1/18/2006	169.8	$191.62	$104.51	1,052	$20.33	$316.46	
12/16/2005	190.3	$214.71	$97.36	989	$20.18	$332.25	

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Business Energy / Water Advisor

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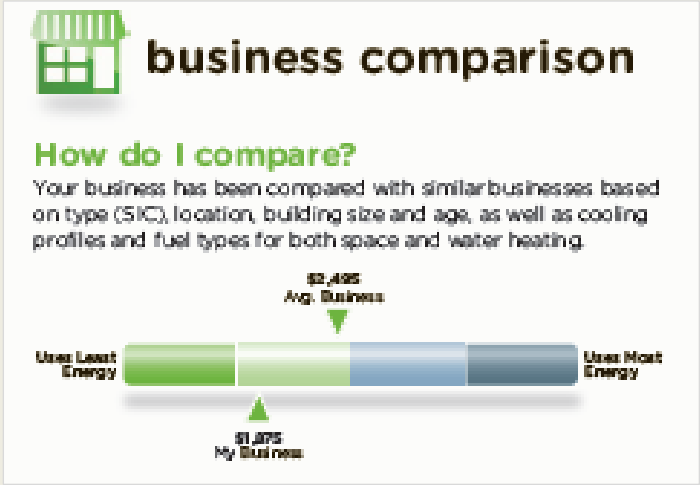
Business Energy Analysis Model

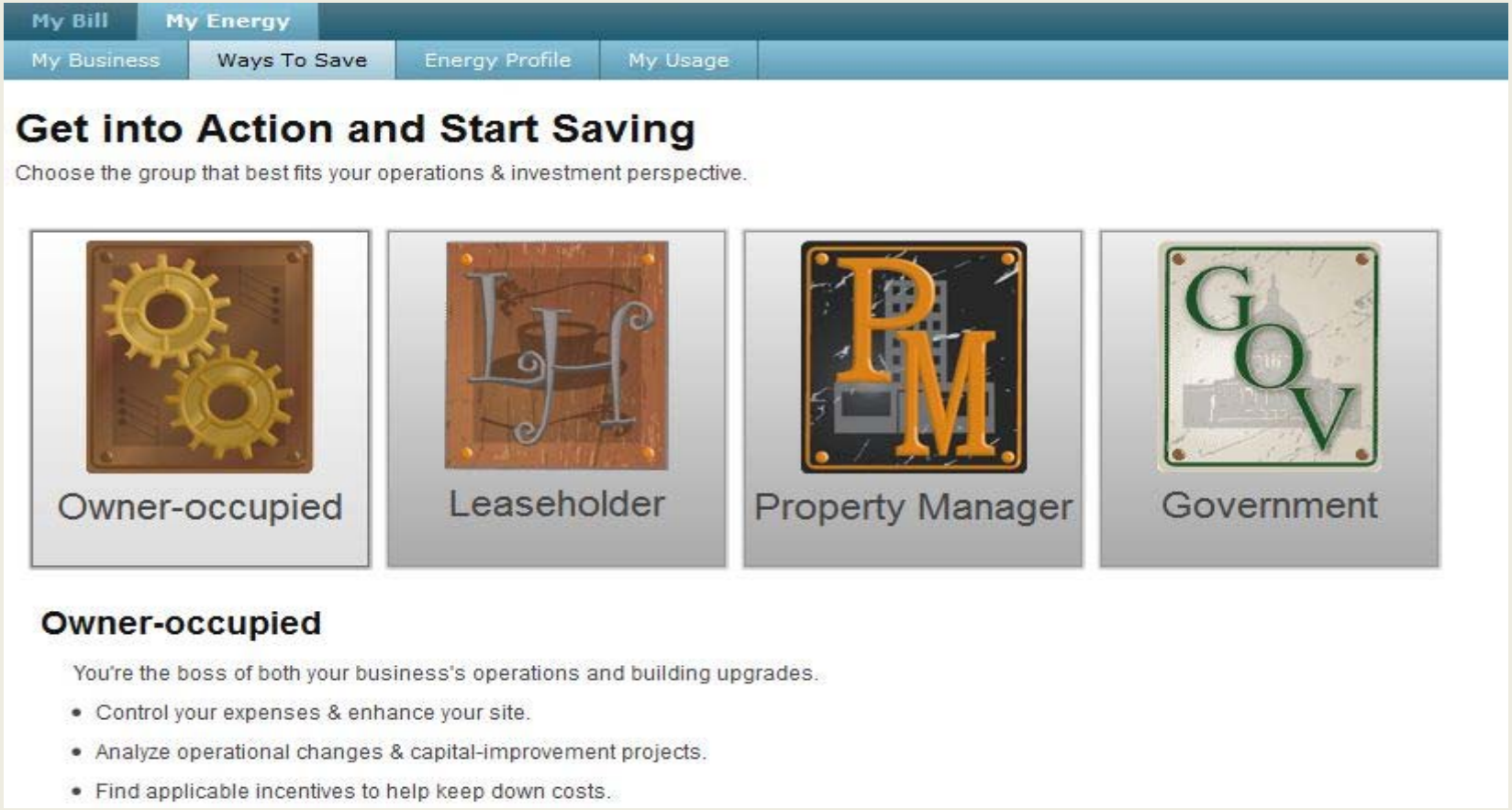
- Uses data from a range of different sources: utilities, government labs, etc
- Analyzes the heating and cooling loads using local weather conditions
- Modeling for most common business appliances and equipment
- Selects and analyzes energy efficiency measures
- Calibrated for local conditions



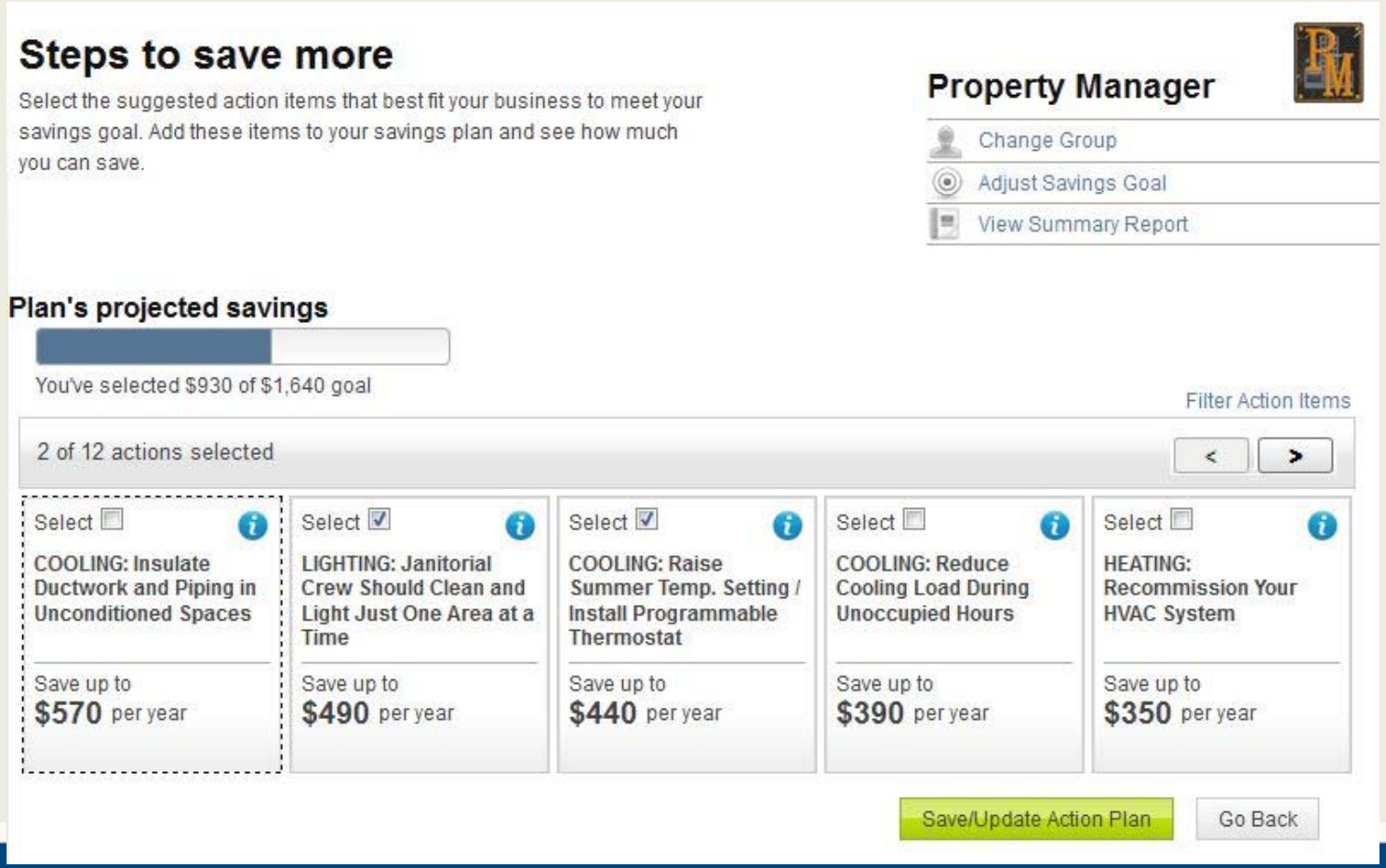
Solution Overview Business energy/ water advisor module

- Specially designed for small & mid-size Businesses
  - 40+ business segments
    - Office, Retail, Restaurant, Education, Grocery, Services, etc.
  - 500 to 100,000 square feet
  - Modeling for most common business appliances and equipment
  - Renters or Owners

Solution Overview Business energy/ water advisor module



Action Plan


Steps to save more
Select the suggested action items that best fit your business to meet your savings goal. Add these items to your savings plan and see how much you can save.
Property Manager
Change Group
Adjust Savings Goal
View Summary Report
Plan's projected savings
You've selected $930 of $1,640 goal
Filter Action Items
2 of 12 actions selected
Select
COOLING: Insulate Ductwork and Piping in Unconditioned Spaces
Save up to $570 per year
Select
LIGHTING: Janitorial Crew Should Clean and Light Just One Area at a Time
Save up to $490 per year
Select
COOLING: Raise Summer Temp. Setting / Install Programmable Thermostat
Save up to $440 per year
Select
COOLING: Reduce Cooling Load During Unoccupied Hours
Save up to $390 per year
Select
HEATING: Recommission Your HVAC System
Save up to $350 per year
Save/Update Action Plan
Go Back

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Demand Response: Enhanced options to control costs and use

Demand Response

UNDER CONSTRUCTION

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Serving Fort Collins Businesses & Homes

Visit: *fcgov.com/advancedmeter*