



# Facilitating Consumer Response: Itron and Choices

## Applications That Provide Consumers and Utilities Choices

Ben Boyd  
Director of Regulatory Affairs  
Itron Inc.





## Topics for Discussion

- § *Itron – Who we are*
- § *Solutions that facilitate choices such as time-based rates and demand response programs.*
- § *Advanced metering – hands on choices for consumers*
- § *Distribution Asset Optimizing – choices for utilities*
- § *National Energy Policy Sec 1252– a policy about choice*
- § *Questions*



## Itron Experience

### § Itron – What Do We Do?

- > *Itron provides turn key solutions to the energy & water market participants around the world to optimize the supply, delivery and use .*
- > *Meter Data Acquisition & Management are the key to this process*
- > *Automated Meter Reading ( AMR) is the fundamental stepping stone to improved customer service by the utilities and improved system performance*
- > *Advanced Metering Infrastructure is a migration step from AMR*

### § Itron – Facts & Figures

- > **25 years in business & Over 40 Million** AMR endpoints successfully deployed
- > Over **2800 utility customers** in **45 countries** around the globe
- > 2,300 employees worldwide
- > Itron equipment & systems touch over \$200 Billion worth of energy and water transactions
- > Over \$1B market cap company



# Itron – What We Impact





## Solutions that Facilitate - Choice

### § Hardware Solutions – Data Creation

- > Interval Metering Devices or Non-interval Meters – Choices
- > Electromagnetic Meters
- > Encoder Recorder Transmitters (ERT)
- > Solid State Metering - Centron

§ Which one would you choose if you had a choice?



## Hardware Efficiency

Best on Market



Electromechanical

**Starting Watts 24W**  
**Linearity 1.5%**  
**Sensitive to inversion**  
**Watts loss 0.7W**

CENTRON



Solid State

**Less than 5W**  
**Less +/- 0.3%**  
**Insensitive to inversion**  
**Watts loss 0.5 W**

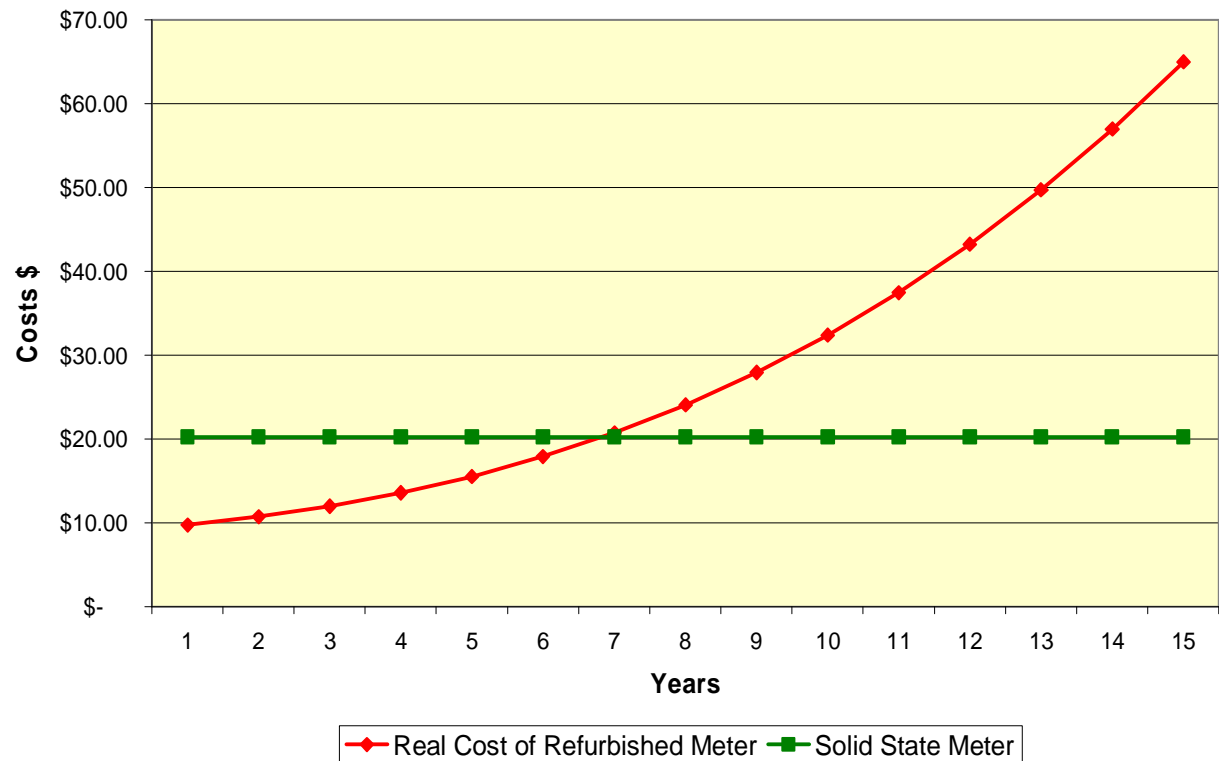


**In 15-years, a solid state meter produces \$65 of incremental cost reductions and non-fuel revenue improvement compared to an electromechanical meter**

*How expensive is an electromechanical meter? Consider the true life-cycle costs.*

*Investing in more accurate solid state meters instead of electromechanical meters can pay back within seven years.*

**Total Cost of Refurbished Meter vs Solid State Meter**







...reduces meter test shop operations costs, and positions the enterprise with more flexibility to collect customer information in the future

### Characteristics of Electromechanical vs. Solid State Meters (con't)

	Electromechanical	Solid State
<b>Meter Test Shop Operations</b>	<p><b>Cost \$9.00 per meter to ship, test and repair</b></p> <p><b>Two Point Calibration</b></p> <ul style="list-style-type: none"> <li>• Adjust full load and light load independent of each other</li> <li>• Light load test is a good indicator of friction in the meter</li> </ul> <p><b>Should calibrate meters at least every 5 - 8 years (see <a href="http://www.chapmanmetering.com">www.chapmanmetering.com</a>)</b></p>	<p><b>One Point Calibration</b></p> <ul style="list-style-type: none"> <li>• Full load and light load are not independent (flat load curve)</li> <li>• No frictional effects</li> </ul> <p><b>Opportunity to substantially reduce incoming testing</b></p>
<b>Flexibility and Distribution Operations</b>	<ul style="list-style-type: none"> <li>• Lack of an automation migration path for advanced metering, customer choice, load control and demand response</li> <li>• Labor intensive management of the metering asset portfolio</li> </ul>	<ul style="list-style-type: none"> <li>• Interchangeable circuit boards for advanced metering and AMR upgrades</li> <li>• Easier installation</li> <li>• Easier for customer to read</li> <li>• Improved accuracy will be essential with broader applications of meter data in the future</li> </ul>





## Why collect interval data? To have choices!

§ Theft Detection

§ Load Research

§ Peak Control

§ Billing

- > Real time pricing (RTP)
- > Curtailable/Interruptible rates
- > Remote meter reading
- > Aggregate billing
- > Loss calculations
- > TOU rates
- > Demand response



## Ways to collect interval data

- § Hardware to retro-fit the existing electro-mechanical meter
- § Solid State metering technology
- § Advanced Metering Infrastructure (AMI)
  - > Not to be confused with Automated Meter Reading (AMR)



## More Technology Solutions that Facilitate Choices

### § Automated Meter Reading (AMR) – Data Collection Choices

- > **Off-site Meter Reading (OMR )**
  - Hand held devices
- > **Mobile AMR**
  - Data collection computer with a transceiver installed in utility vehicle
- > **RF Fixed Network**
  - Communicates using public or private communication networks

### § Migration Path leads to Advanced metering technology

- > **A Utility's Choice**
  - Flexibility in rate recovery



## What is Automated Meter Reading?

§ Hardware – Interval Meter Data Collector (ERT or solid state time based programmable meter)

§ Automated Meter Reading ( AMR) is the deployment of communication technology to collect the meter reading – on a monthly, daily or real time basis. Time based.

§ AMR helps solve the following issues

- > No more self or estimated reads & estimated bills
- > Reliable, accurate monthly bills
- > Improves customer service
- > Provides significant operational savings



## The Migration

§ Once the utility deploys Automated Meter Reading - it can then lead to Advanced Meter Data Collection

§ Advanced Meter Data Collection provides the following key functionality

- > Innovative Rate Structures
- > TOU , Critical Peak Pricing based tariffs
- > Demand Response
- > Residential Energy Management
- > On Demand Reads
- > Smart Outage Detection and Restoration Detection
- > Revenue Assurance ( Tamper Detection )
- > Distributed Asset Optimization



## Itron Carries Multiple Solutions

§ Different drivers push customers to different AMR solution technologies. If primarily...

... looking at **safety** and **reduced estimated** reads: **Offsite Meter Reading** is the solution

... looking to **minimize** meter reading **costs**: **Drive-By Meter Reading** is the solution

... looking to (1) get **more granular data** to support advanced use cases & Advanced Meter Data Collection, and (2) **mining the data** for additional knowledge: **Fixed Network Meter Reading** is the solution



## Itron's Fundamental Philosophy

§ Utilities can deploy RF based communication modules and choose a reading technology to suit their business needs and their allowable regulated recoverable costs.

§ As the business need grows – the same Radio Endpoints can be read by different Meter Reading Technology to migrate from Automated Meter Reading to Advanced Meter Data Collection





*Electric / Gas / Water*

**Itron**

## **Advanced Metering Choices for Consumers – You Drive**

§ Advanced Metering technology gives consumers choices

- > Innovative rate structures
- > Quick Outage Detection and Restoration
- > Customer Control through a gateway



## What is Advanced / Smart Metering

- § **Definition:** The introduction of upgraded metering functionality to support complex meter data, primarily in the area of capturing time interval meter data for Time Of Use, Interval Data Reporting and Real Time Energy Pricing
- § Advanced Meter Data Collection provides the following key functionality to a deregulated energy market
  - > Free and unfettered access to aggregated consumption data to the market constituents
  - > Innovative Rate Structures
  - > TOU , Critical Peak Pricing based tariffs
  - > Demand Response
  - > Residential Energy Management ( consumer's access to its own consumption patterns)
  - > Revenue Assurance for utilities ( Tamper Detection )
  - > Distributed Asset Optimization



## Innovative Rate Structures

- § Itron's Fixed Network offers interval data collection as a Standard functionality
  
- § The Interval data can be used by utilities to create
  - > TOU Bins
  - > Critical Peak Pricing Bins
  - > Load data for Distribution System Optimization
  - > Improved Load Forecasting

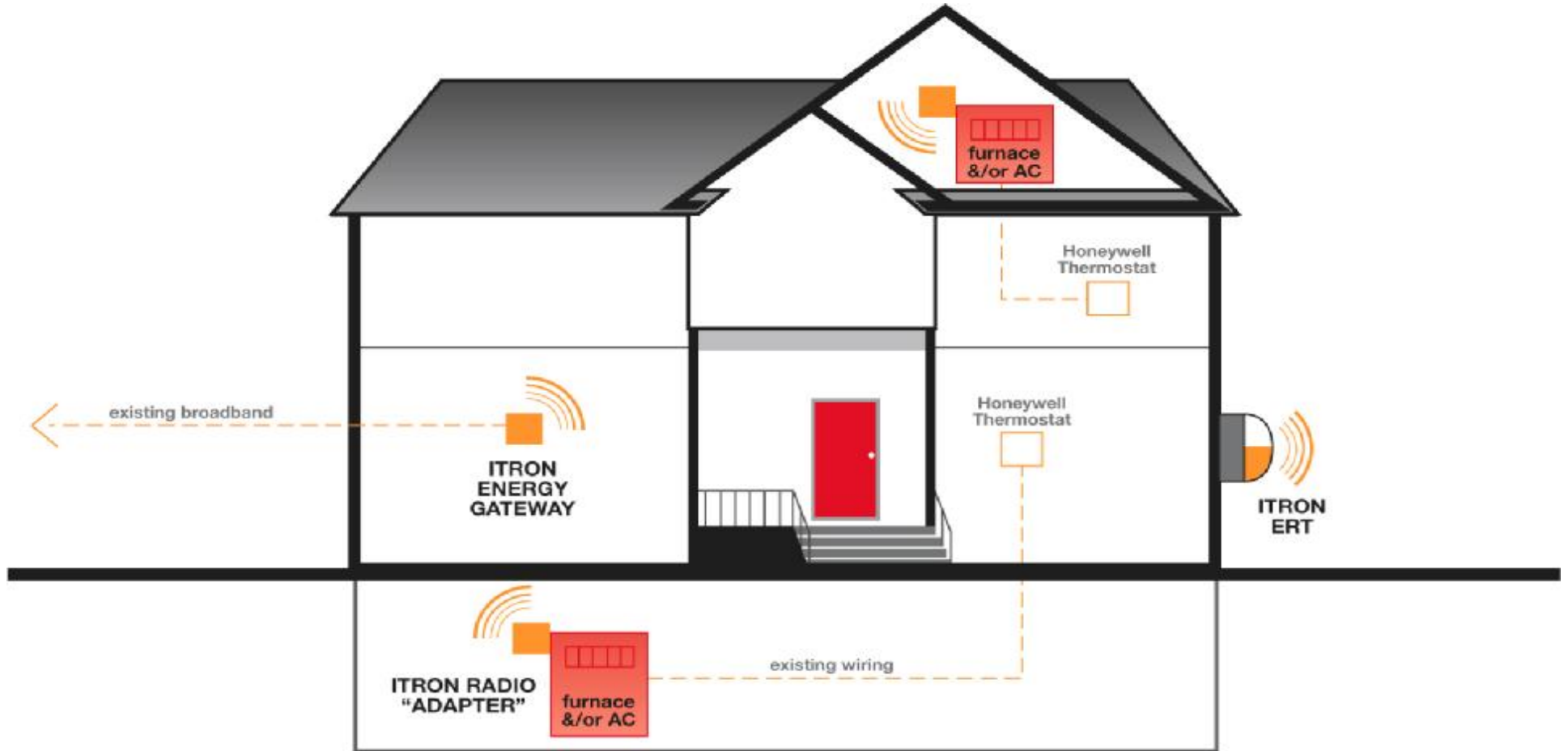


## Advanced Metering Choices For Demand Response – Customer Control Devices

- § Itron's gateway application gives the consumer control
- § In-home gateway for mass market load control
  - > Flexibility - Direct control of solid state thermostat
  - > Expansion - Platform for additional control points (pool pumps, hot water heaters, etc)
  - > Forecasting and Validation - Reads ERT to provide 15 min. time-stamped interval data
- § Leverages home's existing Broadband communications (Cable, DSL, BPL)
- § Offers intuitive, web-based, internet access:
  - > Customer Service Offerings - Provides the utility with ability to show estimated bills, actual energy consumption, budgeting, and home automation
  - > Improved efficiency - Includes built-in tools for initiating demand response events and tracking the success of the events

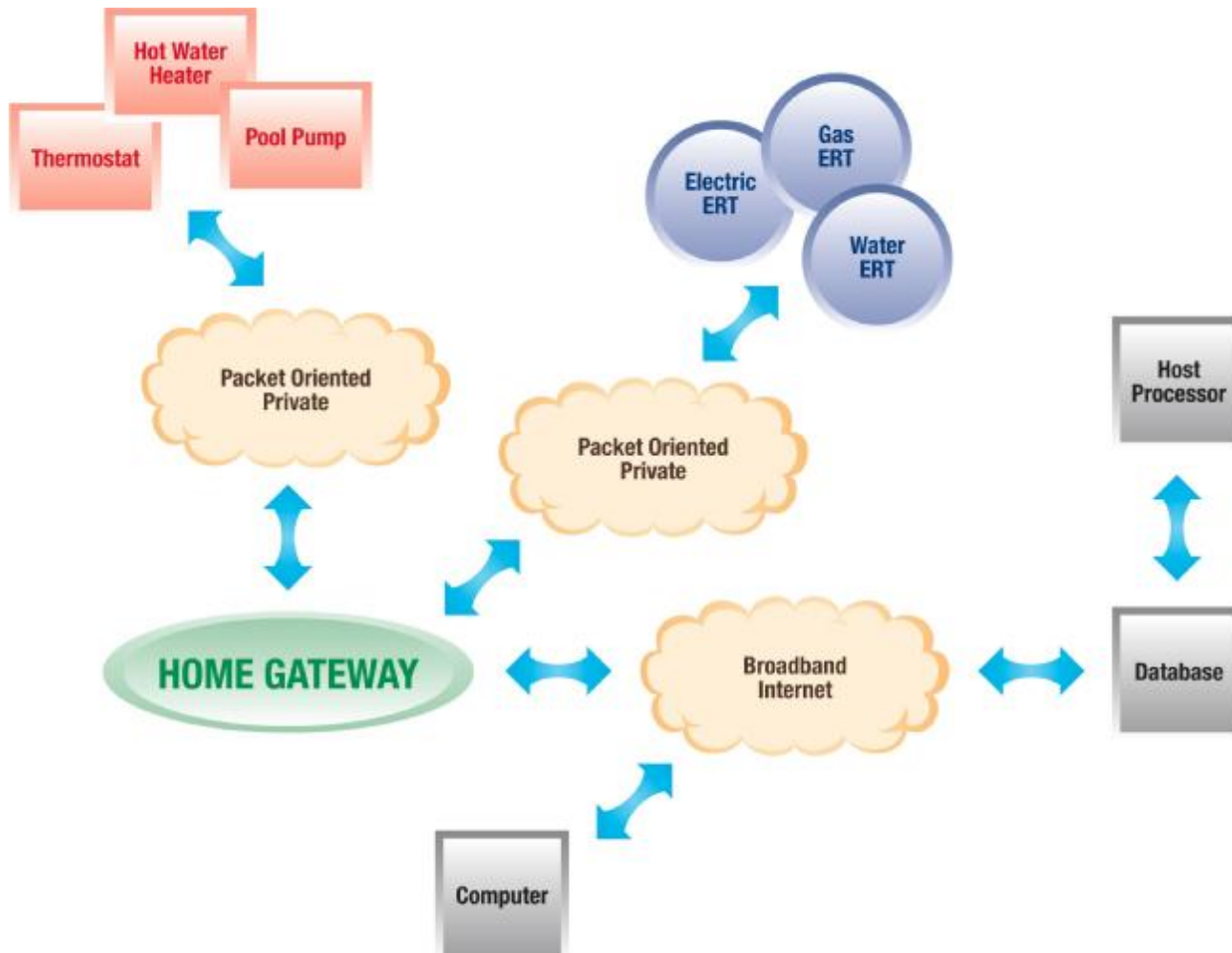


# REMS Premise Configuration





# REMS System Diagram





## End Premise Configuration

### § Itron Gateway

- > Attached to a consumers existing broadband connection (cable, DSL, etc.) at the premise
- > Can become part of an existing network or act as a router to enable sharing of the connection
- > Itron LAN Transceiver robustly communicates wirelessly with other devices in and around the premise, currently thermostat via Itron Radio Adaptor
- > Manages all communication with the head-end and implements all program logic
- > Powers from standard wall outlet (no battery backup required)
- > Does not interfere with or incur any interference from other devices in the home or office





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## Itron Gateway





## End Premise Configuration

### § Itron Radio Adaptor

- > ERT Reader
  - Compatible with any meter containing an Itron 41 or 45 ERT
  - Reading interval remotely configurable (15-minute default setting)
- > Itron Wireless LAN Transceiver
  - Robustly communicates with Gateway
- > Honeywell EnviraCom™ Serial Interface module
- > Powers from existing HVAC low voltage transformer



## Itron Radio Adaptor



Honeywell Control Module



## End Premise Configuration

### § Central A/C Control

- > Uses existing thermostat wiring
- > Supports homes with multiple thermostats (including zoned configurations controlled via thermostat)
- > Honeywell EnviraCOM™ programmable thermostat replaces existing premise thermostat

### § Installation

- > Performed by trained HVAC technicians (e.g., Honeywell DMC)
- > Average duration of 45 minutes, including thermostat training





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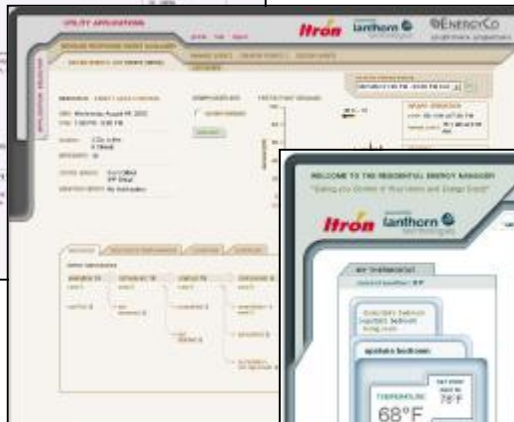
# The Utility Applications – More Choices



Customer Support



Real Time AMR & Analysis



DR Resource Manager



Customer Apps





## The Applications (cont.)

### § Utility System Administration Console

- > Create, modify and remove utility system users
- > Manage access rights to applications (demand response, customer service, etc.) for utility system users
- > Monitor the health of AMR and demand response networks

### § Demand Response Event Console

- > Create new events targeted by substation, feeder, zip, etc.
- > Monitor status of control messages broadcast to end premise
- > Monitor customer overrides and effectiveness of the events

### § Customer Care & Aggregate Data Analysis

- > Manage customer accounts
- > View individual customer usage / cost data
- > View aggregate interval meter data
- > Manage end premise equipment



## The Applications (cont.)

### § Customer Education & Budgeting

- > Presentation of interval meter data & energy cost
- > Create and track an energy budget
- > Notifications when usage / budget parameters are exceeded
- > Energy education and savings tips tailored to user profile

### § Customer Control

- > A suite of tools for configuring the programmable thermostat (weekly schedule, vacation hold, etc.)
- > Real-time control of thermostat
- > Display of demand response event history



## Enabling Screens: the Customer Chooses

Help window changes as you mouse over different functions

Thermostat mimics actual terminology and functionality of physical device



## Enabling Screens: the Customer Chooses

**Itron** powered by **lanthorn technologies** **Employee Utility** OCT 10, 2003 11:26 AM Jennifer Myers profile help logout

HOME MY THERMOSTAT MY ELECTRICITY USAGE MY SAVINGS CENTER

weekly schedule quick setup vacation hold MESSAGE INBOX 1 unread messages

### WEEKLY SCHEDULE

BACK TO MY THERMOSTAT

1st floor

PLACE MOUSE OVER BAR FOR MORE INFORMATION sleep: 6:00 am - 9:00am

WAKE LEAVE RETURN SLEEP

am pm 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12

Mon Tue Wed Thu Fri

Sleep: cool to: 75°F -- heat to: 68°F ( 09:30 PM - 05:30 AM )

Weekends am pm 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12

Sat Sun

CHANGE ALL WEEKEND DAYS

Examples help consumer understand what they have the capability to do



## Enabling Screens: the Customer Chooses

**Itron** powered by **lanthorn technologies** **Employee Utility** OCT 10, 2003 10:43 AM Jennifer Myers profile help logout

HOME MY THERMOSTAT MY ELECTRICITY USAGE MY SAVINGS CENTER

weekly schedule quick setup vacation hold MESSAGE INBOX 1 unread messages

### WEEKLY SCHEDULE: CHANGE ALL WEEKDAYS

1st floor

• TO SAVE, FOLLOW THE SETTING INSTRUCTIONS FOR THE LEAVE AND SLEEP PERIODS

	Wake	Leave	Return	Sleep
Time	5:30 am	<input type="checkbox"/> OMIT 7:00 am	<input type="checkbox"/> OMIT 5:00 pm	<input type="checkbox"/> OMIT 9:30 pm
Cool SET YOUR AIR CONDITIONER FOR WARM MONTHS	76 F	<input checked="" type="radio"/> SET TO A WARMER TEMP. 78 F	77 F	<input checked="" type="radio"/> SET TO A WARMER TEMP. 75 F
Heat SET YOUR HEAT FOR COLD MONTHS	69 F	<input checked="" type="radio"/> SET TO A COOLER TEMP. 68 F	69 F	<input checked="" type="radio"/> SET TO A COOLER TEMP. 68 F

NOTE: Your thermostat will automatically start heating or cooling your home early so that it reaches the desired temperature at this time

« CANCEL SAVE »

A SETBACK OF 8 HOURS PER DAY CAN SAVE YOU UP TO 10% ON YOUR ENERGY BILLS. ACTUAL SAVINGS VARY BY HOME AND CLIMATE CONDITIONS

Simple menu reduces a 30 minute task to a 30 second task



## Enabling Screens: the Customer Chooses

The screenshot shows the Itron Employee Utility web interface. At the top, it displays the Itron logo, powered by lanthorn technologies, and the Employee Utility logo. The date and time are AUGUST 27, 2003 12:37 PM, and the user is identified as Jennifer Myers. Navigation tabs include HOME, MY THERMOSTAT, MY ELECTRICITY USAGE, and MY SAVINGS CENTER. A MESSAGE INBOX shows 2 unread messages.

**CURRENT BILL**

**BILL PERIOD:** August 10 2003 - September 10 2003  
Day 18 of a 31 Day Billing Period

**Cost (to date)\*:** **\$36.79**      **average cost per day:** \$2.04  
**Electricity used:** **618 kWh**      **average kWh use per day:** 34 kWh  
**Rate Plan:** **Residential TOU**

**DAILY COST & USAGE**      **HOURLY COST & USAGE**

CLICK ON A DAY TO VIEW COST PER HOUR

PRICE (\$/KWH)
Critical 29
High 9.3
Medium 4.6
Low 3.5

**DAILY COST FOR CURRENT BILLING PERIOD**       Cost or  Usage

**\*Cost is estimated based on your measured usage to date. See your bill for final amounts.**

Consumer can see their rate structure and how their energy usage effects their bill





## Enabling Screens: the Customer Chooses

The screenshot displays the Itron Employee Utility web interface. At the top, it features the Itron logo, the text "powered by lanthorn technologies", and the "Employee Utility" title. The date and time are shown as "OCT 10, 2003 11:03 AM" and the user is identified as "Jennifer Myers". Navigation tabs include "HOME", "MY THERMOSTAT", "MY ELECTRICITY USAGE", and "MY SAVINGS CENTER". A "MESSAGE INBOX" shows "1 unread messages". The main content area is titled "PROGRAM EVENTS" and includes a "DESCRIPTION" of the Critical Peak Active program, a table for "CURRENT AND UPCOMING EVENTS" (showing "No events scheduled"), "THERMOSTAT PROGRAM SETTINGS" for the "1st floor" with a price tier of "Critical (\$0.29/kWh)", and a "PAST EVENTS" table.

Date	Start	End	Event Status
Aug 06, 2003	5:00 PM	7:30 PM	Completed
Jul 19, 2003	5:00 PM	7:00 PM	Completed

Thermostat settings for the 1st floor during a Critical price tier (\$0.29/kWh):

- Increase your cool setpoint: 4°F
- Decrease your heat setpoint: 3°F

Automation empowers consumer to be in control of their energy budget



## Enabling Screens: the Utility and Customer Chooses

**UTILITY** OCT 10, 2003 2:05 PM profile help logout  
Bill Stewart

HOME MY THERMOSTAT MY ELECTRICITY USAGE MY SAVINGS CENTER  
today's electricity use current bill completed bills average usage

MESSAGE INBOX  
0 unread messages

**CURRENT BILL**

**BILL PERIOD:** October 1 2003 - November 1 2003  
Day 10 of a 31 Day Billing Period

**Cost (to date)\*: \$32.84**      average cost per day: \$3.28  
**Electricity used: 289 kWh**      average kWh use per day: 29 kWh  
**Rate Plan: Residential TOU**

DAILY COST & USAGE    HOURLY COST & USAGE    COMPARE RATES    BILL COMPARISON

**YOUR TRIAL RATE:**  
Residential TOU

total cost **\$32.84**

**COST PER kWh**

price period	cents per kWh	usage kWh	cost (\$)
Low	7.0	65	\$4.55
Medium	9.2	142	\$13.07
High	18.6	82	\$15.22
total cost (to date)			\$32.84

[SEE TOU SCHEDULE](#) ↗

Your cost is lower with this rate for your current billing period.

**YOUR ACTUAL RATE:**  
ECU Residential Flat A

total cost **\$36.94**

price period	cents per kWh	usage kWh	cost (\$)
cost per kWh	12.1	289	\$34.86
base charge			\$2.07
total cost (to date)			\$36.94

\*Subtotal does not include taxes, discounts, or other adjustments.

**Promote new rate structures by showing a customer that they can save on their bill by participating**





## Utility Controlling Your Energy Cost through Technology - DAO

§ Advanced Metering technology provides utilities ways to save consumers

§ Through the use of an automated connection between AMR data inputs, weather information and the DAO model you can set triggers to warn you about overloaded equipment conditions. You can then adjust your load forecasting more accurately to the needed installation of equipment.

§ Technology to right size your distribution assets

- > What is Distribution Asset Optimization
- > How to “right size” your transformers



## Distribution Asset Optimization Technology

### § Leveraging AMR Investments for Greater Value

§ Proactively notify customer of outage status and restoration time estimates

### § Distribution Asset Management

- > Predict distribution transformer overload and resulting outages

### § At risk transformers can be identified leveraging meter data and an innovative analytical tool (DAO) that:

- > calculates hot spot temperatures
- > detects and quantifies sudden changes in usage that can be automatically flagged within weeks

§ The combination of operational responsiveness and thoughtful analysis results in significant reduction of transformer outages thereby resulting in significant utility cost savings.



## New National Energy Policy – more choices for Advanced Metering Technology

### §Consumer strategy choices

- > **Section 1252:** Amends PURPA by adopting one new section 111(d) standard on time-based metering and communications for the consideration and determination by State commissions.
- > The Time-Based Metering and Communications Standard states that, not later than 18 months after the enactment of this paragraph, each electric utility shall offer each of its customer classes, and provide individual customers upon customer request, a time-based rate schedule under which the rate varies during different time periods and reflects the variance, if any, in the utility's cost of generating and purchasing electricity at the wholesale level.
- > The time-based rate schedule shall enable the electric consume to manage energy use and cost through advanced metering and communications. The types of time-based rates that may be offered include, among others, time-of-use pricing, critical peak pricing, real-time pricing, and credits for customers with pre-established load reduction programs.
- > Each electric utility shall provide each customer requesting time-based rates with a time-based meter capable of enabling the utility and the customer to offer and receive such rate. In States where third-party marketers sell electricity to retail customers, such customers will be entitled to receive the same time-based metering and communications device and service as a retail customer of the electric utility.



*Electric / Gas / Water*



**NOW YOU HAVE MORE CHOICES  
THAN EVER BEFORE!**

**THANK YOU FOR THIS OPPORTUNITY TO SHARE  
OUR THOUGHTS WITH YOU.**

**QUESTIONS?**