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## Automated Meter Reading (AMR)

*“You can’t control  
what you don’t  
measure”*

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### Opening Statement

- Increasing costs for power and the volatility of power prices have now lead many customers to look for more sophisticated ways to understand and control their demand in real time. With the cost for metering devices coming down coupled with federal mandates and state incentives for installing advanced metering systems, automating the meter reading process is finding new justification and traction.
- Many states have already implemented AMR (Automated Meter Reading) systems. Many DoD facilities have followed suit. Interval meters combined with software that analyzes usage patterns and trends are now providing customers with the ability to more precisely understand and control demand than ever before.



## **What is an AMR System?**

- A system that uses technology to measure meter/energy usage in short time intervals (15 or 30 minutes) thereby providing the end user with the ability to profile energy use across their enterprise and identify time and magnitude of peak demands (energy profiling)
- In essence, we are eliminating the human element from reading the meter and programming monthly meter usage into some type of energy data base/spreadsheet
- AMR can be real time or near real time reporting depending upon the number of meter reads per day



## **Realities of AMR for Existing Facilities?**

- Renovation projects should always include automating the meter reading process for that facility
- Provides a means to measure effectiveness of ECP's
- Can compare yearly profiles to gauge aging effect on mechanical systems and infrastructure



### **Benefits from AMR**

- Reduce operational costs
- Eliminate errors from the human factor
- Validate monthly utility bills
- Avoid peak demand surcharges
- Improve energy procurement through aggregation of meters
- Curtail usage when requested by suppliers



### **Benefits from AMR**

- Identify anomalies in consumption patterns (spikes)
- Benchmark usage between like facilities
- Enhance data value by normalizing through sq/ft and OAT
- Identify opportunities for ECP's
- Key to ESPC M&V protocol
- Mitigate potential litigation



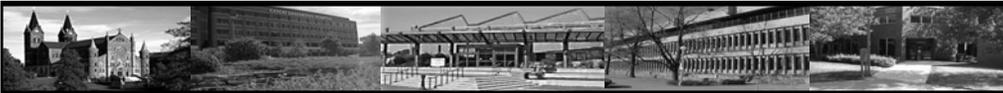
## **What are the Types of AMR Delivery Systems?**

- Hosted
  - Application Service Providers (ASP)
  - By Utility
- On-Site/End User Owned



## **What is an AMR System?**

- When a customer neither wants nor has the ability to operate and maintain an energy profiling system, he subcontracts to a vendor with expertise and the infrastructure to support this service
- AMR vendors maintain servers and software from a central location and use dialup/Internet as a means to access customer consumption data
- For an initial installation cost and monthly access fee per site (meter), the customer is provided with an Internet connection into her enterprise consumption profile



## **What is the Implementation Process for a Hosted AMR System?**

- Retrofit the meter site
- Install communication medium
- Data base configuration
- Monthly use fee



## **How Does the Telephone Option Work?**

- Customer contracts with local utility to upgrade existing meter or provide new meter with output consumption data (interval data) and modem
- Customer contracts with phone company to install a new phone line for connection to meter (meter data is either pushed to or pulled by the AMR remote server)
- AMR vendor sets up customer account and configures data base (remote AMR site)
- Customer accesses his account via Internet



## How Does the Network/IP Option Work?

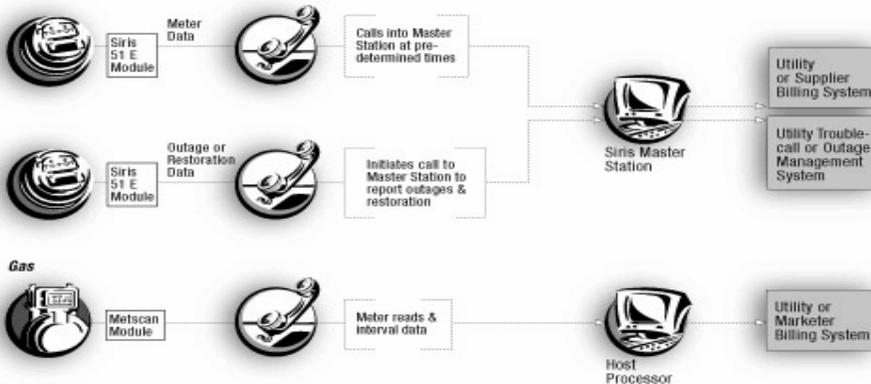
- Customer contracts with local utility to provide new meter with IP option
- Customer's IT department extends network drop to IP meter and sets up network access for communication with AMR remote server
- AMR vendor sets up customer account and configures data base (remote AMR site)
- Customer accesses his account via Internet



## Hosted/ASP AMR

### Telephone AMR

#### Electric





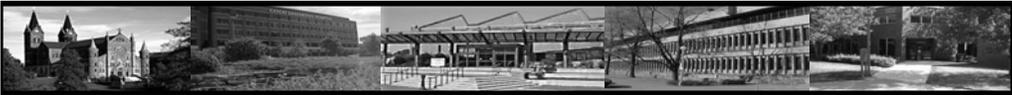
## **What are Advantages to a Hosted AMR System?**

- Lower Initial Cost (no server or software to be purchased)
- Hassle Free (vendor initializes and programs system)
- Minimal long term costs (no IT involvement)
- Low monthly use fee



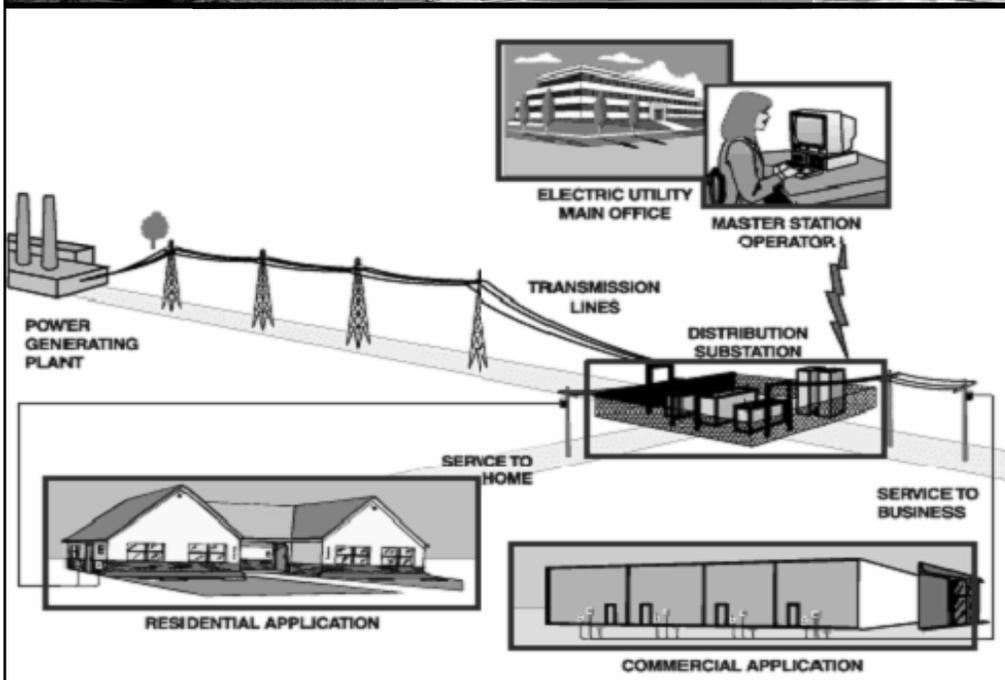
## **What are Disadvantages to a Hosted AMR System?**

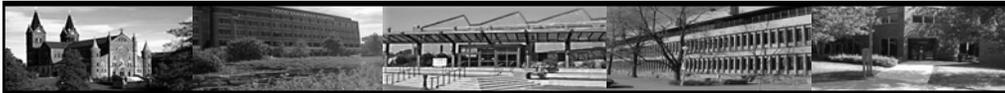
- Customer does not own data
- Cost per meter read
- Cost per phone call
- Cannot easily integrate with BAS to enhance load management strategies
- Not real time/data is 24 hours old when received
- Not effective in a rate volatile environment



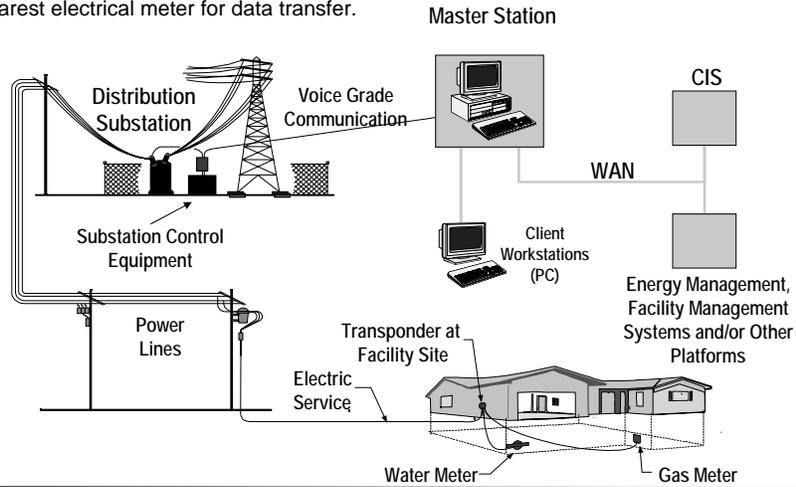
## What is a Utility Hosted AMR System?

- Very similar to vendor hosted AMR, utility owns and operates the AMR server and software
- Can provide incentives through adding costs to monthly utility bill
- Has option for power line carrier or dialup





**Power Line Carrier Option.** Every meter is configured with a PLC r/t module. Data is transmitted from the facility through the electrical distribution system to the substation equipment and from there to the host system. Gas meters use RF or hardwire to the nearest electrical meter for data transfer.



## What is an On-Site/End User AMR System?

- Where the end user owns and operates the energy profiling system
- Automating the meter reading process is usually facilitated by connecting metered data to the existing BAS

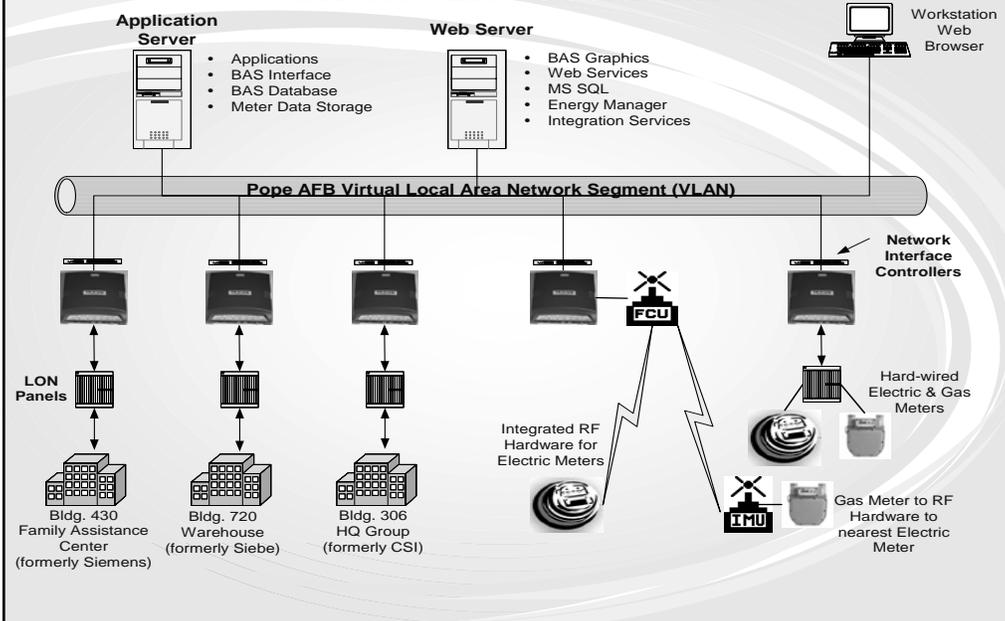


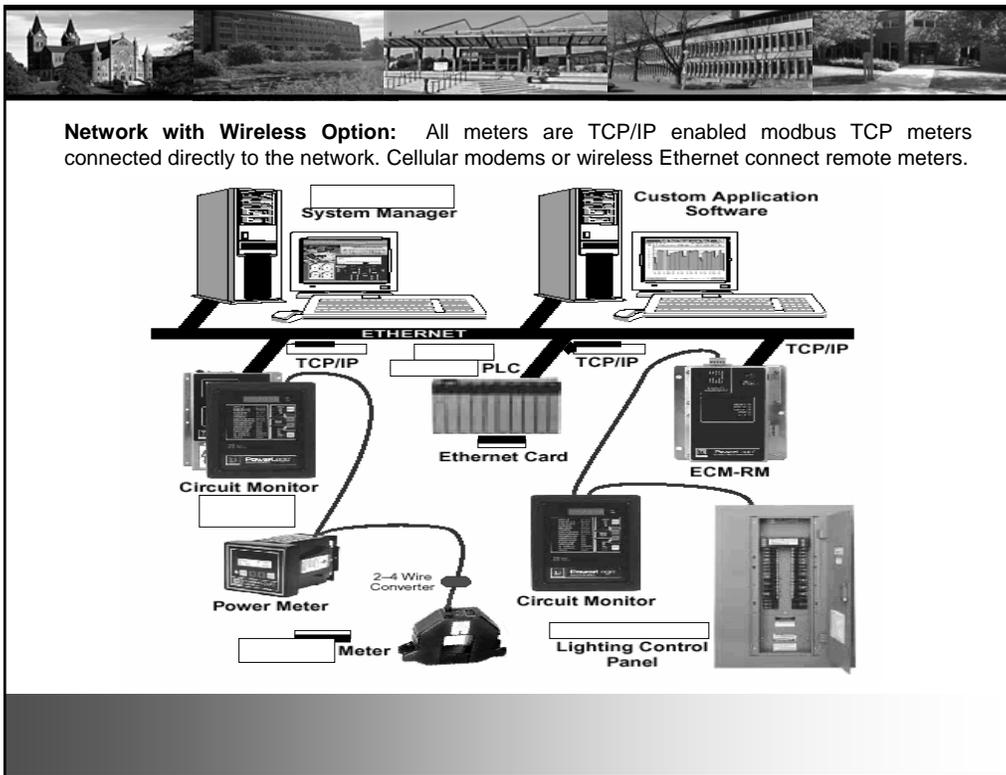
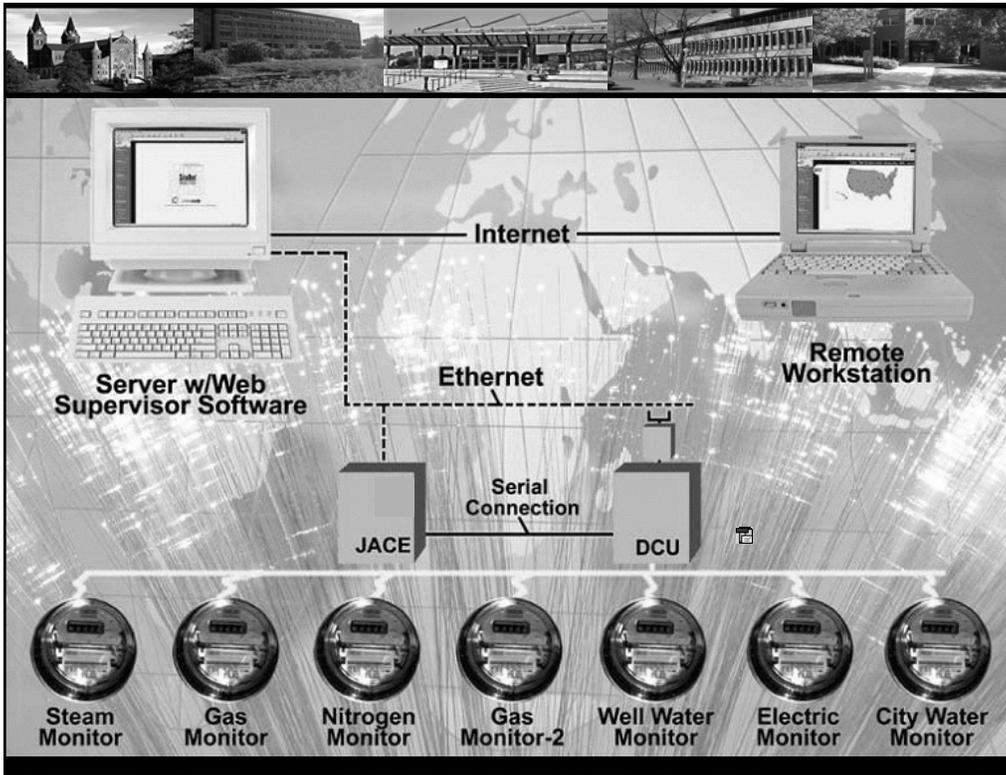
## What is the Implementation Process for an On-Site AMR System?

- This process may involve multiple vendors who provide products and services
- BAS vendor furnishes new meter or CT's, runs conduit and wire to existing DDC panel and programs meter point into BAS system
- BAS vendor furnishes load profiling software to reside on BAS server or exports data to an on-site load profiling server
- BAS vendor provides maintenance and upgrade services



## On-Site/End User AMR







## **What are Advantages to an On-Site AMR System?**

- Customer owns data
- Energy data is real time
- Can integrate with existing BAS for lower installation costs
- More complete load management strategy
- No phone lines or cost per meter read



## **What are Disadvantages to an On-Site AMR System?**

- Higher initial cost
- IT required to support server/software
- Customer is obligated to AMR software vendor for maintenance, software upgrades and associated costs

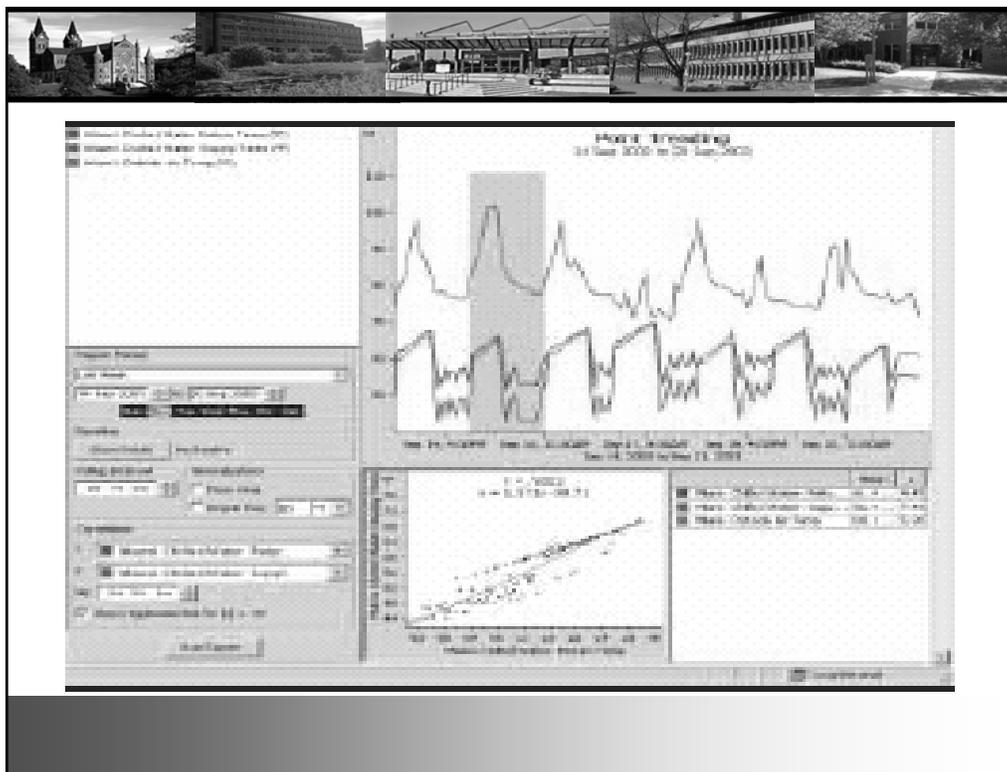


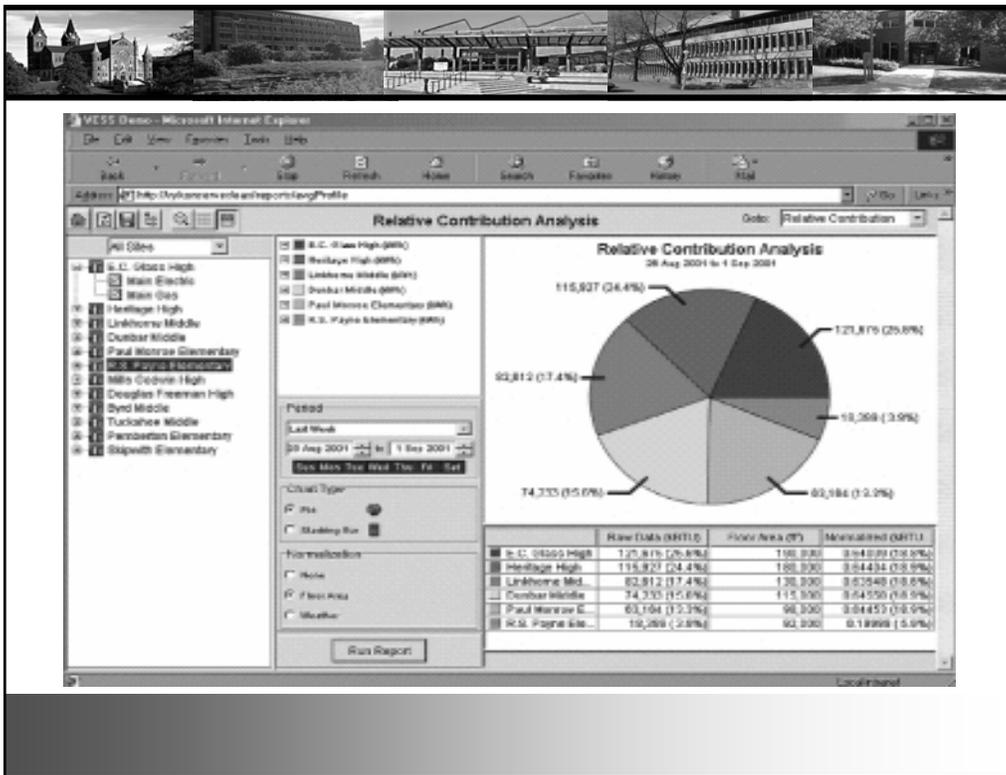
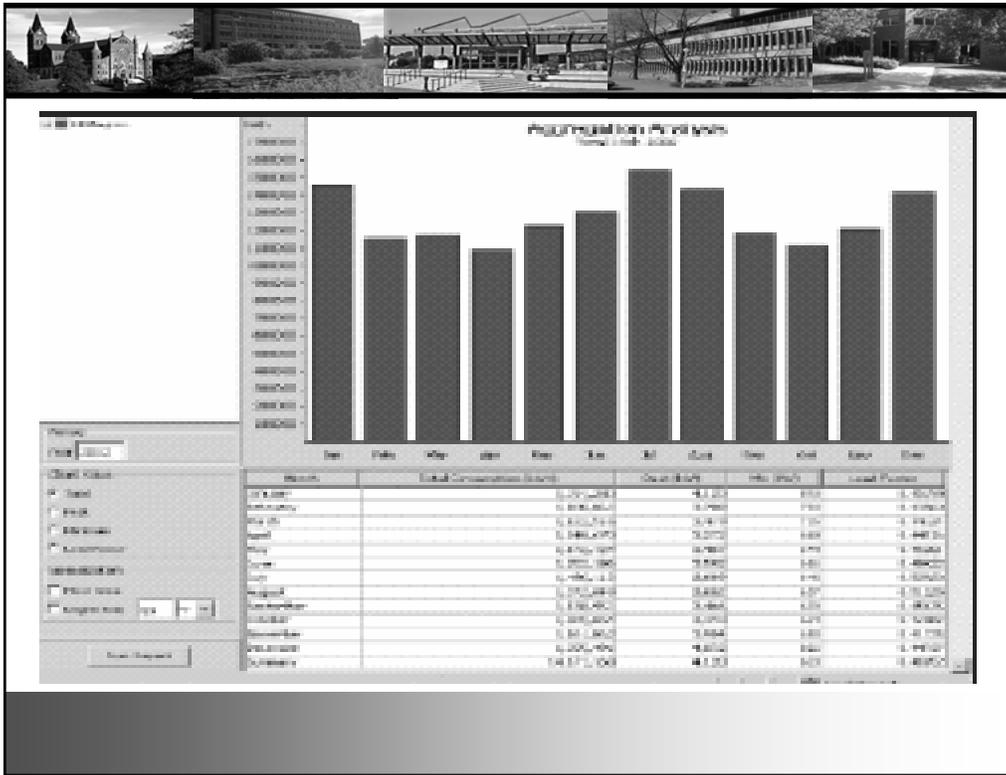
Summary | Billing | Configuration | History

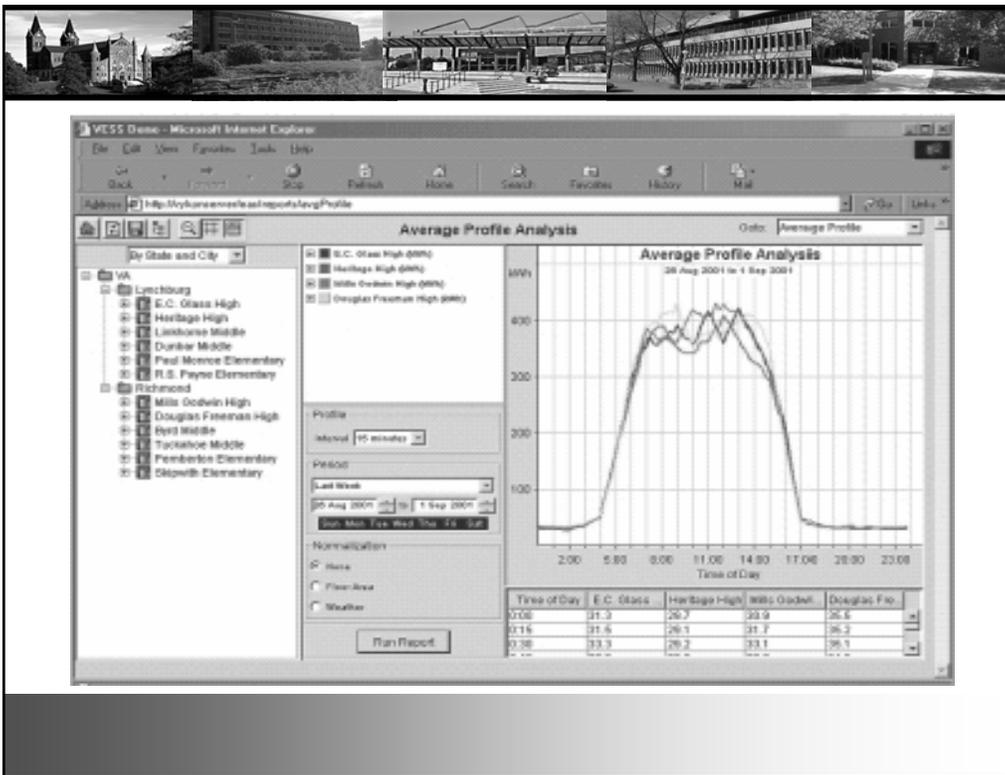
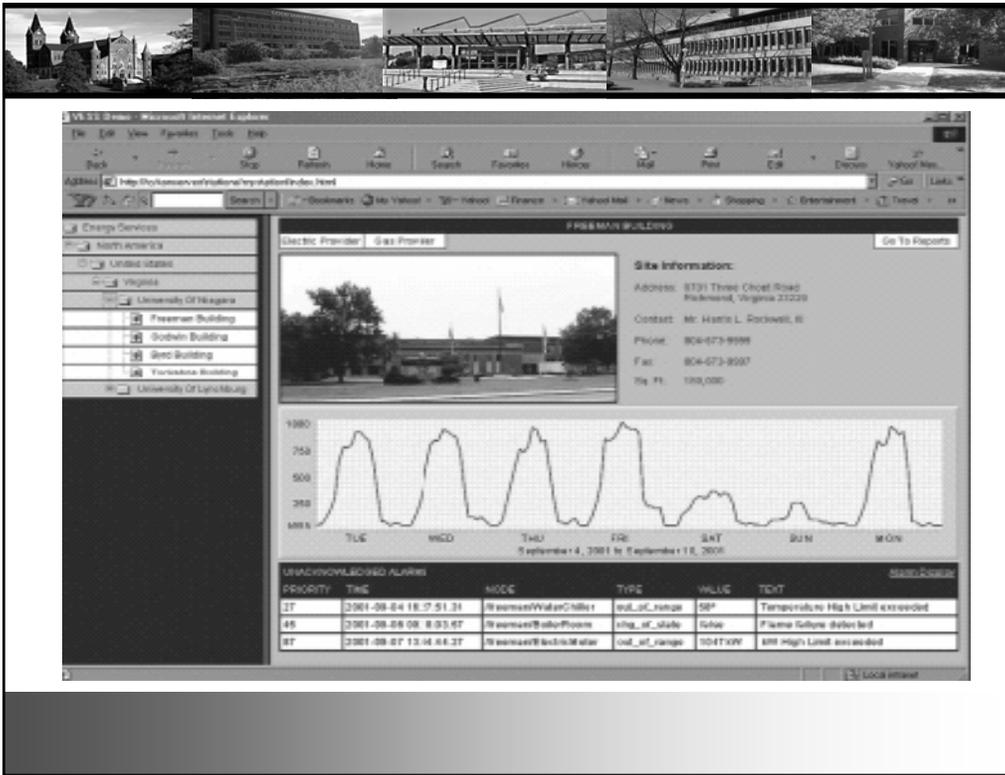
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Rate #	Class	Base Rate	Line Loss Charges	O & M (no MIL Labor)	Other Utility Costs	Military Labor	Capitalized Charges	Administrative Overhead
I	C MWR	<input checked="" type="checkbox"/>	+	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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II	DBOF	<input checked="" type="checkbox"/>	+	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
II	DoD Agencies	<input checked="" type="checkbox"/>	+	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
II	Golf	<input checked="" type="checkbox"/>	+	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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III	Federal	<input checked="" type="checkbox"/>	+	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IV	Non-Federal	<input checked="" type="checkbox"/>	+	<input checked="" type="checkbox"/>				

Rates	Unit	Basic Cost	Federal	Non-Fed	Inputs	Unit	Value
Electricity	\$/kWh	0.0559	0.0639	0.0686	<b>Electricity</b> Line Loss	%	10
Natural Gas	\$/Ther	0.5385	0.5390	0.5561	CAC 53015	\$	206,335.00
Water	\$/KGal	1.6549	1.7061	1.8003	53015 MIL Labor	\$	109,445.00
Sewage	\$/KGal	1.0084	1.1771	1.5312	Annual kWh	kWh	40,252,000
NG Heat Factor	BTU/CF	1039			Overhead	%	3
					Fuel Adjust		









## ACRONYMS

- AMR Automated Meter Reading
- OAT Outside Air Temperature
- ECP Energy Conservation Projects
- ESPC Energy Services Provider Company
- M&V Measurement and Verification
- ASP Application Services Provider
- IP Internet Protocol
- IT Information Technology
- BAS Building Automation System
- PLC Programmable Logic Controller
- RF Radio Frequency
- CT Current Transmitter
- DDC Direct Digital Control
- VLAN Virtual Local Area Network
- FCU Field Control Unit
- IMU Intelligent Monitoring Unit
- DCU Distribution Control Unit
- TCP/IP Transmission Control Protocol/Internet Protocol
- ECM-RM Electrical Circuit Monitor – Remote Monitor
- NAESCO National Association of Energy Services Companies