Advanced Real-Time Energy Metering

30th **ANNIVERSARY**
Established 1977
aee ®
Three Decades of Achievement
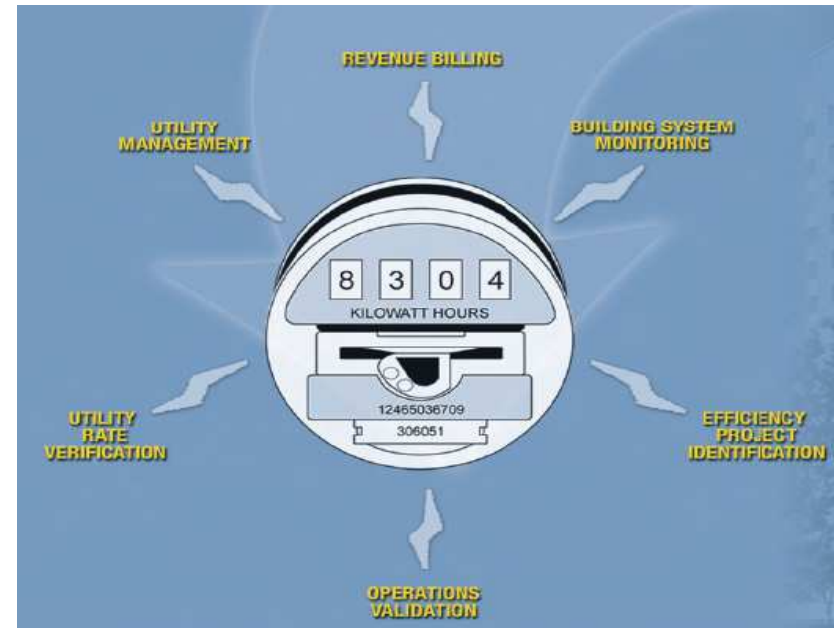
Energy Data in Real Time
Energy Tracking, LLC.

Reliable data to the right place and right time

- **What is real time Metering?**

  – For some, this may mean a micro second while to another this may be 1 second or longer.
  – Let's assume that a 1 second update or access to metered data is 'Real-Time'.

- **Reporting**

  – Real time logging and reporting later.

  – Real time logging and reporting immediately.

  – Providing data on demand.

Meter communication modes

- Display

- Local Network (RS-232, RS-485) – Sub Metering

- Remote Network (Telephone - Modem)

- Re-Flex 'Two way paging'

- Cellular

- Ethernet – Wired

- Ethernet - Wireless

IP metering- the next emerging technology

- TCP/IP has an extremely strong foothold and dominates the mode of communications. The Internet offers a fast, reliable, and low cost medium for communications.   With it we:
    – Browse the Internet
    – Send and receive emails.
    – Instant Messaging
    – VOIP
    – Update or retrieve files from FTP Servers.
    – Audio and video on demand.

- It is time for innovation, time to move metering into the world of the Internet.
- As conventional products such as thermostats, automation systems, switchgears become more Ethernet / IP based, meters must evolve to join them on a common Internet platform.

The new world of web enabled devices

- Unlocks the ability of a typical energy manager to be self reliant.

- Devices are easy to connect, set up and use.

- NO REQUIREMENT FOR MANUFACTURER SOFTWARE
  - Open protocols allow user to get the data and process them in Excel, Access etc.
  - Opens up competition is software applications.

- They will communicate directly with each other.

- Proprietary protocols will not be allowed to play.
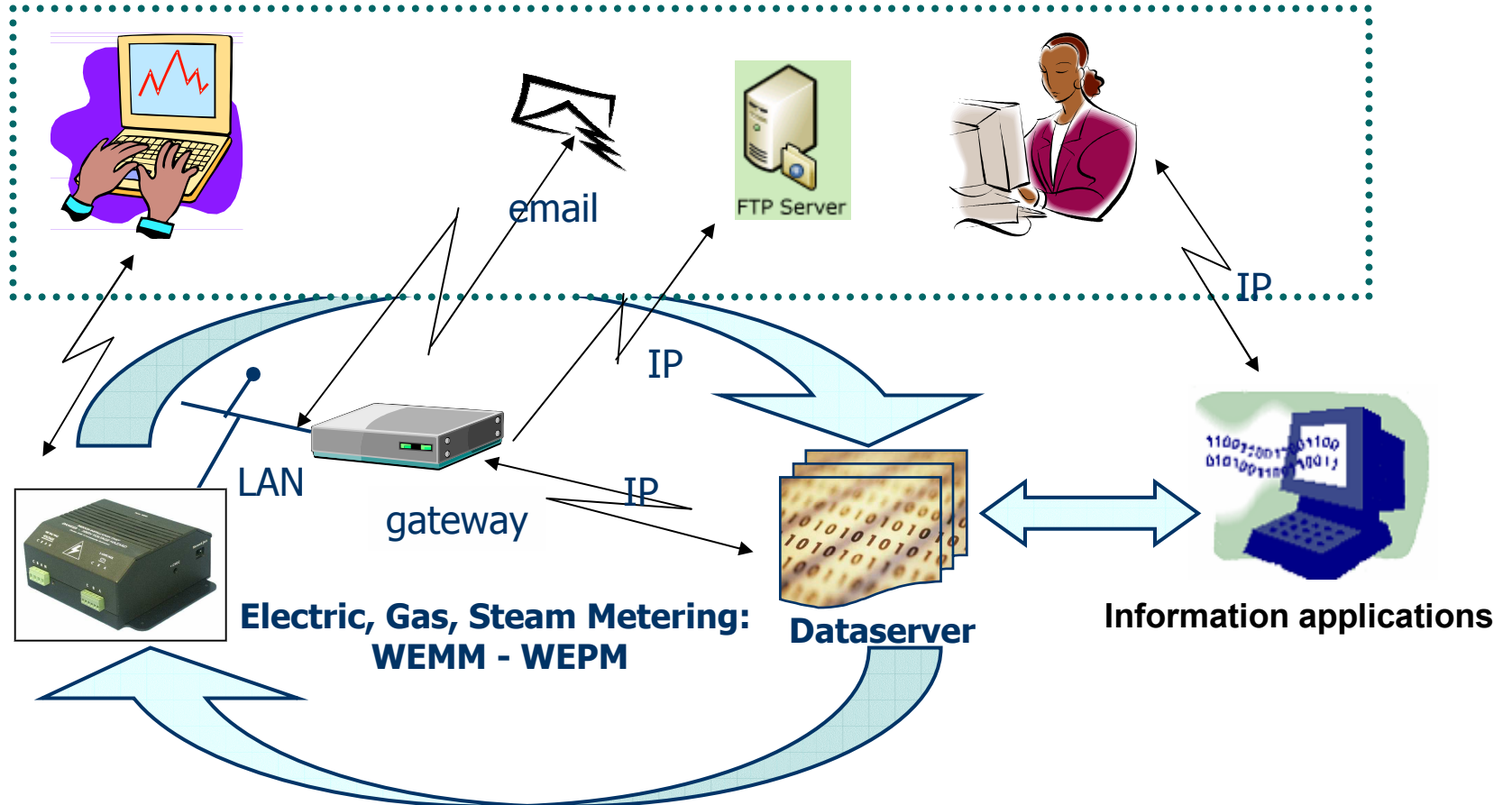
Benefits of energy data in real time

- Better quality of service.
- Lower costs.
- Fast access to data to make better decisions and create value in response to changing markets.
- Notification of consumption & demand.
- Notification of rise or new peak demand being set.
- Notification upon power failure (fiber stays hot).
- Energy usage bill-to-date (mid-month).
- Acquire price signals.
- Demand Response messaging from central station.

How smart is an intelligent IP meter?

- Open protocol.
- Two way communication AND respond within a reasonable timeframe.
- Energy usage data upon demand (Web Server).
- Flexible interval data reporting. 1, 5, 15 minutes or hourly.
- Peak Load monitoring and reporting.
- Send energy usage and demand reports on schedule
- Communicate with other devices and share data. (IP thermostat).
- Interface to control external loads.
- Communicate with a Web Server for a Demand Response signal.
- Net metering capability for on-site generators, solar, wind power plants.
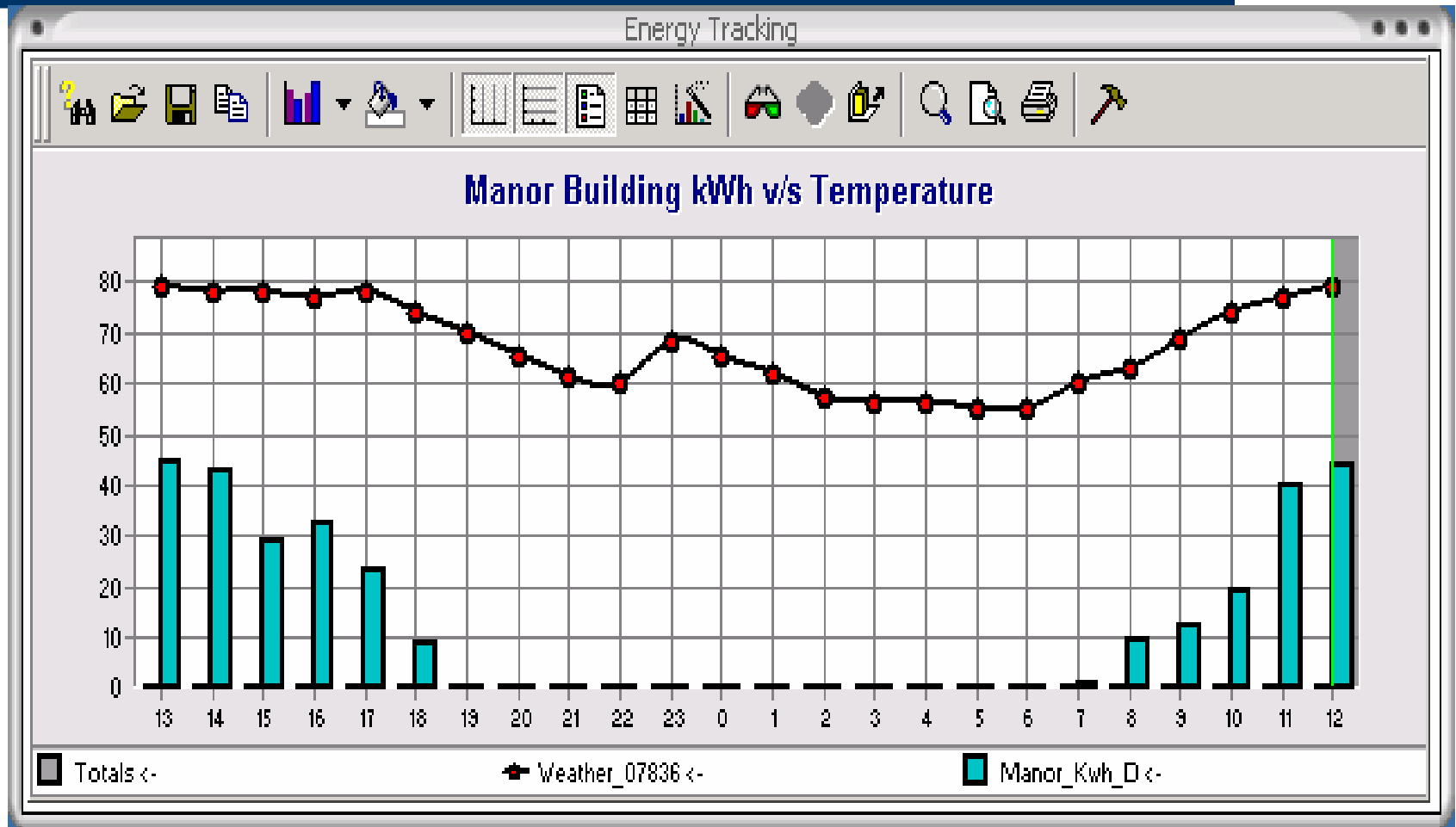- Remote firmware upgradeability.

IP meter features

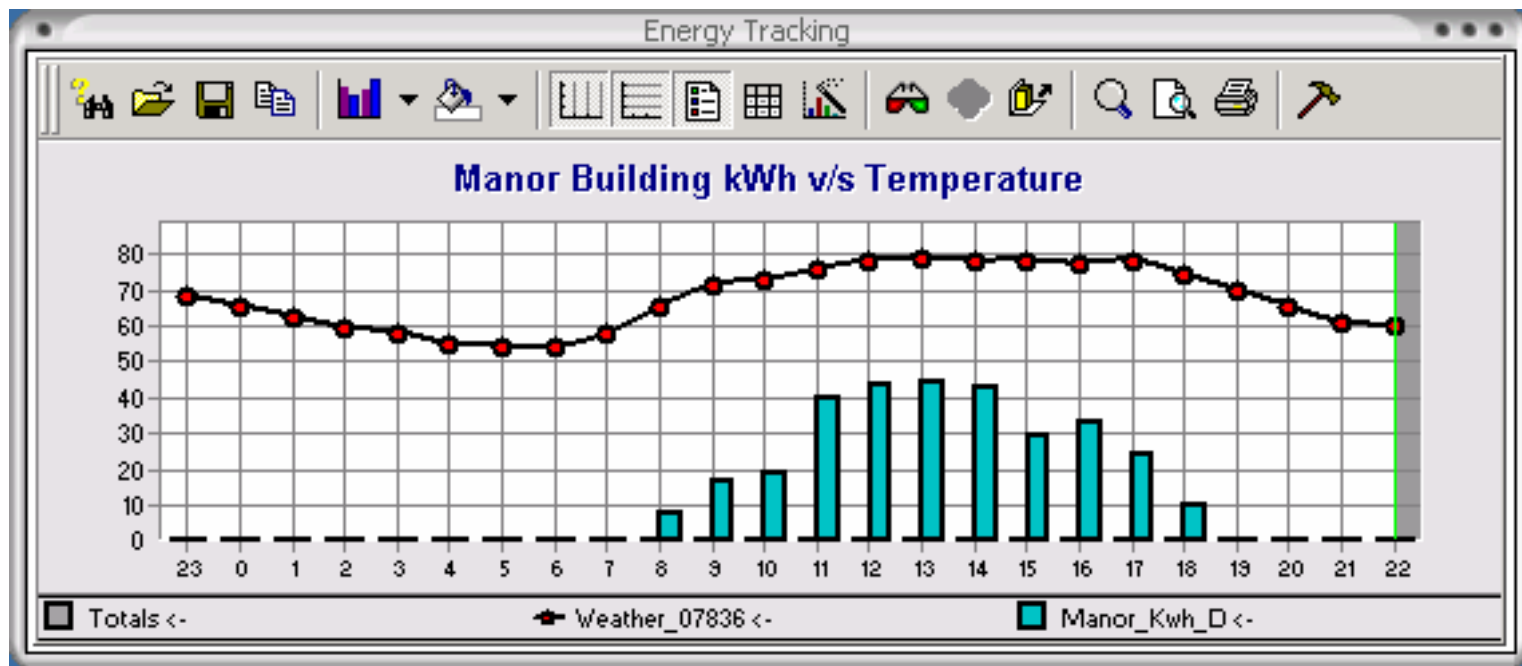- Energy Data On Demand, to multiple Users, through an Open System.

email

FTP Server

IP

LAN

gateway

IP

IP

**Electric, Gas, Steam Metering:
WEMM - WEPM**

Dataserver

Information applications

Reporting and Analytics:

Manor Building kWh v/s Temperature
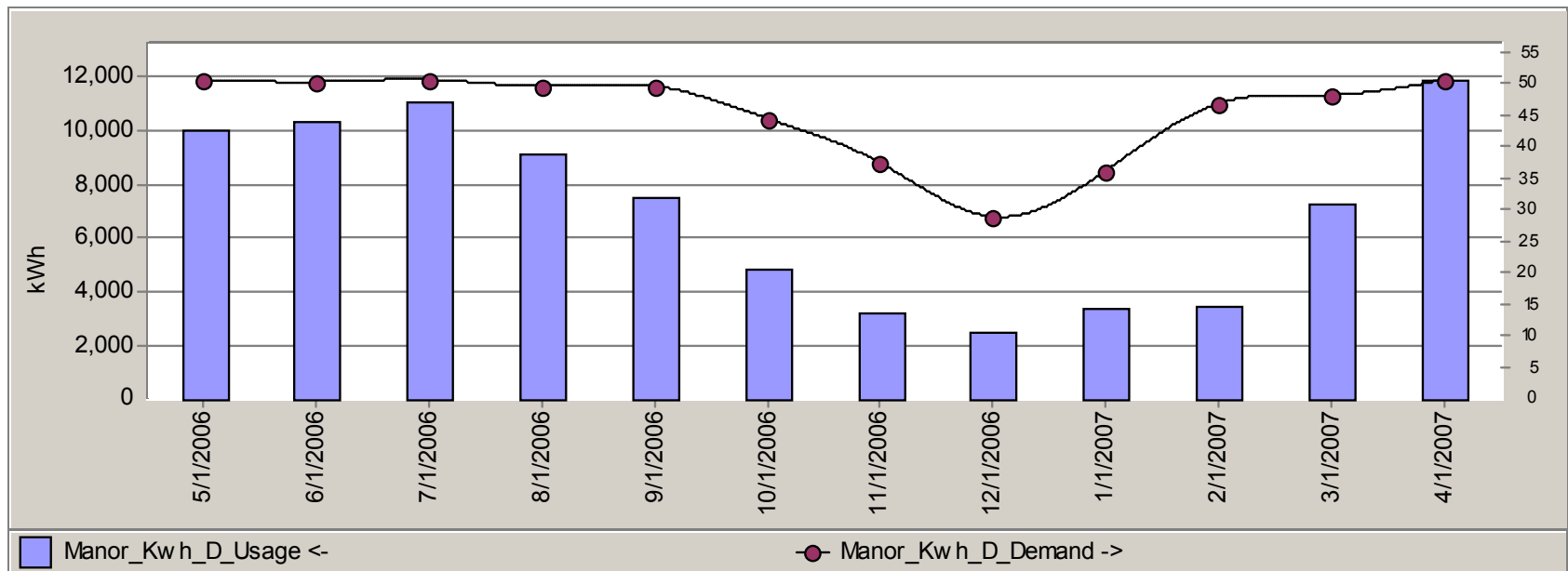
Totals <-   Weather_07836 <-   Manor_Kwh_D <-
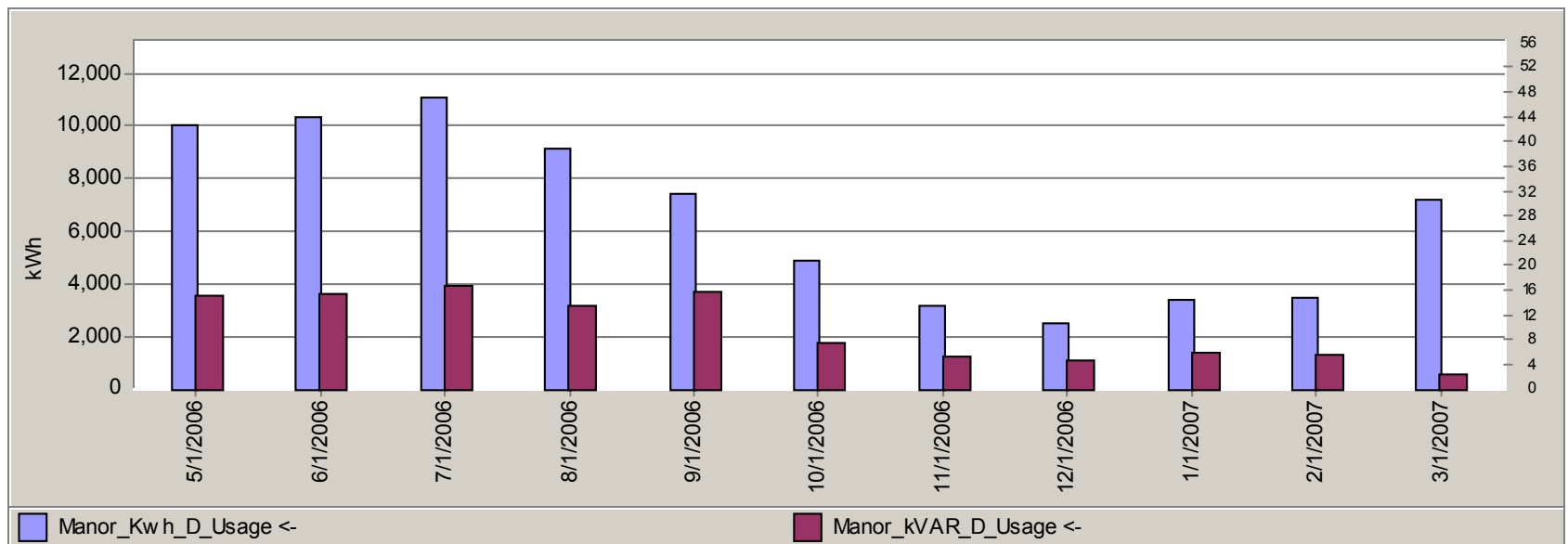
Reporting and Analytics:

- The greatest challenge in business today is having the relevant information in the right place at the right time in the right form for the right people. IP based metering technology makes it easier.
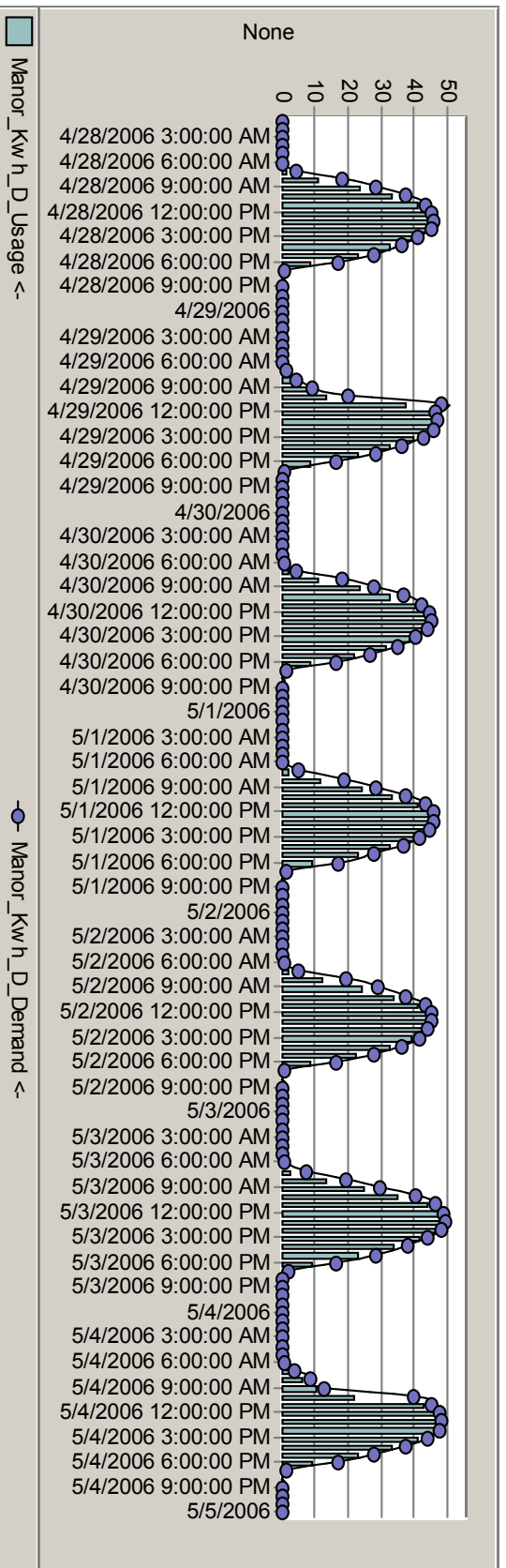

Manor Building kWh v/s Temperature

12 Month kWh & kW graph

kWh v/s kVARh comparison

kWh hourly consumption by week

None

Manor_Kwh_D_Usage <-

—●— Manor_Kwh_D_Demand <-

0 10 20 30 40 50

4/28/2006 3:00:00 AM
4/28/2006 6:00:00 AM
4/28/2006 9:00:00 AM
4/28/2006 12:00:00 PM
4/28/2006 3:00:00 PM
4/28/2006 6:00:00 PM
4/28/2006 9:00:00 PM
4/29/2006
4/29/2006 3:00:00 AM
4/29/2006 6:00:00 AM
4/29/2006 9:00:00 AM
4/29/2006 12:00:00 PM
4/29/2006 3:00:00 PM
4/29/2006 6:00:00 PM
4/29/2006 9:00:00 PM
4/30/2006
4/30/2006 3:00:00 AM
4/30/2006 6:00:00 AM
4/30/2006 9:00:00 AM
4/30/2006 12:00:00 PM
4/30/2006 3:00:00 PM
4/30/2006 6:00:00 PM
4/30/2006 9:00:00 PM
5/1/2006
5/1/2006 3:00:00 AM
5/1/2006 6:00:00 AM
5/1/2006 9:00:00 AM
5/1/2006 12:00:00 PM
5/1/2006 3:00:00 PM
5/1/2006 6:00:00 PM
5/1/2006 9:00:00 PM
5/2/2006
5/2/2006 3:00:00 AM
5/2/2006 6:00:00 AM
5/2/2006 9:00:00 AM
5/2/2006 12:00:00 PM
5/2/2006 3:00:00 PM
5/2/2006 6:00:00 PM
5/2/2006 9:00:00 PM
5/3/2006
5/3/2006 3:00:00 AM
5/3/2006 6:00:00 AM
5/3/2006 9:00:00 AM
5/3/2006 12:00:00 PM
5/3/2006 3:00:00 PM
5/3/2006 6:00:00 PM
5/3/2006 9:00:00 PM
5/4/2006
5/4/2006 3:00:00 AM
5/4/2006 6:00:00 AM
5/4/2006 9:00:00 AM
5/4/2006 12:00:00 PM
5/4/2006 3:00:00 PM
5/4/2006 6:00:00 PM
5/4/2006 9:00:00 PM
5/5/2006

Time series data used to estimate a bill

Demand Response Reporting
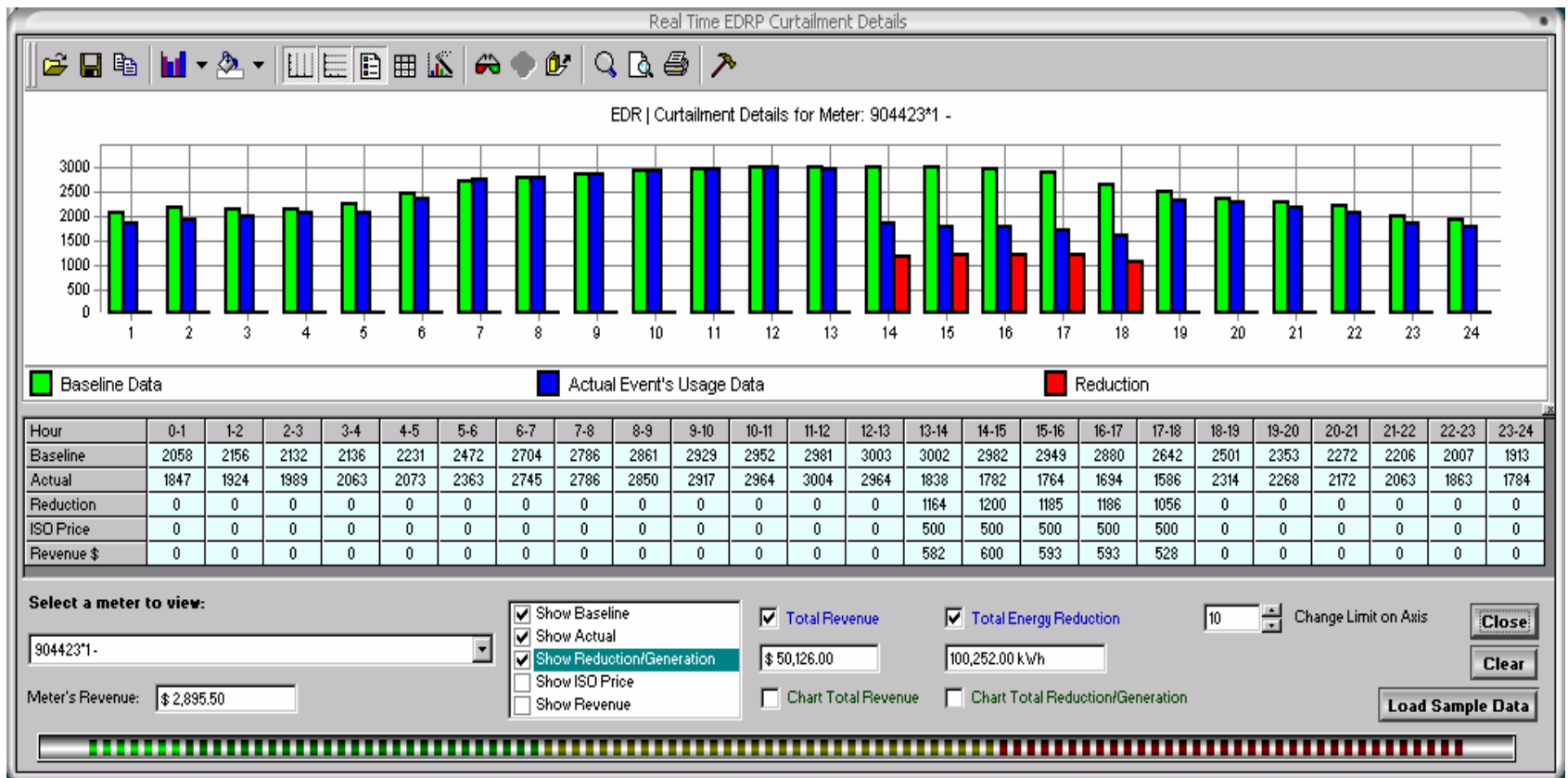
Energy consumption w/ NYISO data
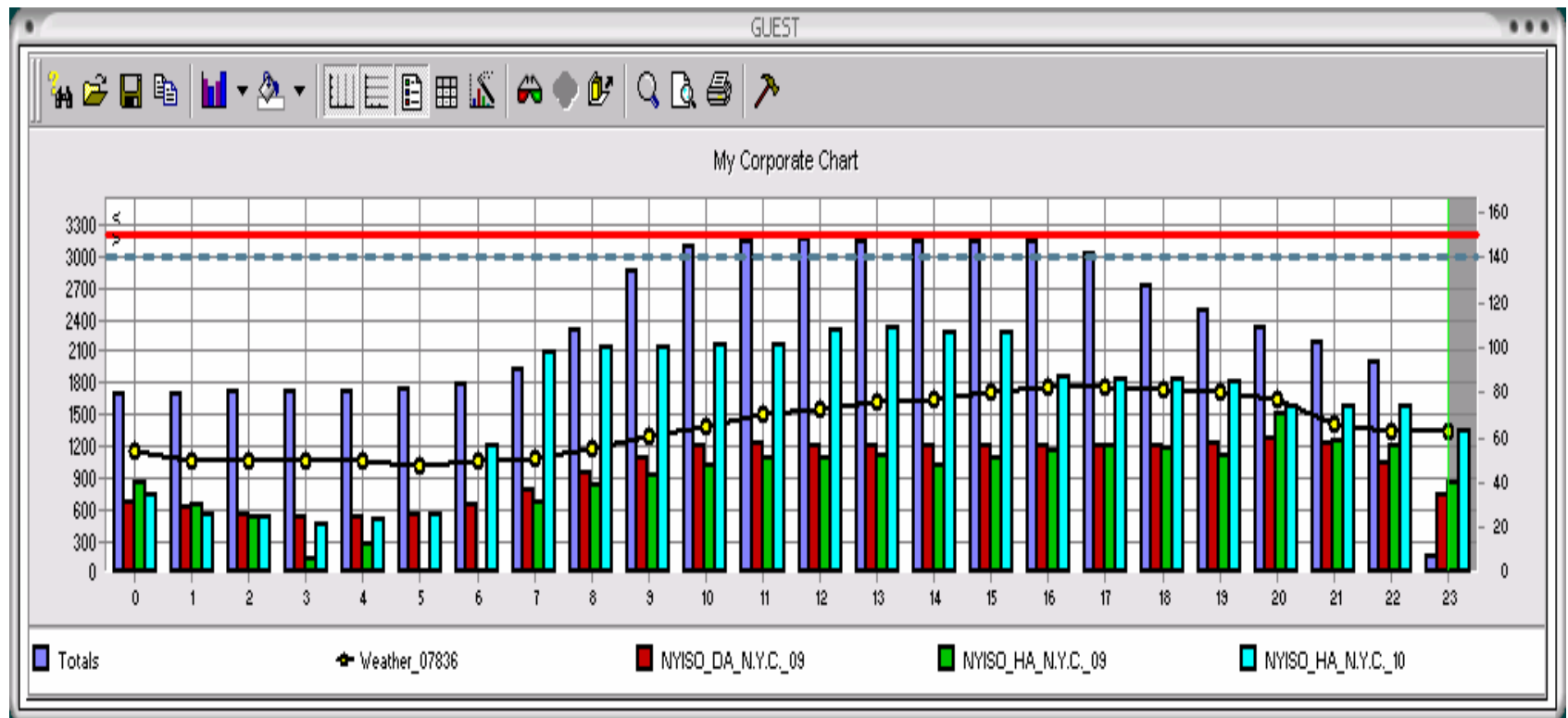
Web Server:

Meter ID	1111111111111110125
Meter Address	WEM Location
Meter Time (mm/dd/yyyy)	08/15/07 12:02 Wednesday

Current Billing Values		
Demand Interval	15	
Num. of Sub-Intervals	0	
Current Season	0	
Current Tier	A	
Number of Demand Resets	5	
Max.kW Delivered	89.604	08/14/07 12:43
Cum.kW Delivered	375.554	
Cont.Cum.kW Delivered	465.158	
Max.kVAR Delivered	8.035	08/14/07 14:58
Cum.kVAR Delivered	114.964	
Cont.Cum.kVAR Delivered	122.999	
kWh Delivered	3525.673	
kVARh Delivered	668.024	

Open Protocol: XML is Ideal

- <XML>
- <METER_ID>11111111111111110125</METER_ID>
- <METER_ADDR>WEM Location</METER_ADDR>
- <METER_TIME>08/15/07 12:02 Wednesday</METER_TIME>
- <DMD_INT>15</DMD_INT>
- <NUM_SUB_INT>0</NUM_SUB_INT>
- <SRL_NUM>1111111111110125</SRL_NUM>
- <CURR_TIER>A</CURR_TIER>
- <NUM_DMD_RESETS>5</NUM_DMD_RESETS>
- <MAX_KW_DEL>89.604</MAX_KW_DEL>
- <MAX_KW_DEL_T>08/14/07 12:43 </MAX_KW_DEL_T>
- <CUM_KW_DEL>375.554</CUM_KW_DEL>
- <CONT_CUM_KW_DEL>465.158</CONT_CUM_KW_DEL>
- <MAX_KVAR_DEL>8.035</MAX_KVAR_DEL>
- <MAX_KVAR_DEL_T>08/14/07 14:58 </MAX_KVAR_DEL_T>
- <CUM_KVAR_DEL>114.964</CUM_KVAR_DEL>
- <CONT_CUM_KVAR_DEL>122.999</CONT_CUM_KVAR_DEL>
- <KWH_DEL>3525.673</KWH_DEL>
- <KVARH_DEL>668.024</KVARH_DEL>
- </XML>

Measure, Process and Execute!

MEASURE

PROCESS INFORMATION

ACTION

Advanced IP Enabled Device

Power Markets

Web Server

M2M

Actionable Information

BAS

Read-Only Access (End Users)

Send / Acquire Data & Send Commands (DR)

19