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A River of Energy Solutions

A Flood of Data

Jim Heller, Naval Facilities Engineering Service Center

A Flood of Data Leading to a River of Solutions

- Historical manual methods for tracking energy use
- Evolution from manual processes to automated
- IT security vs. the need for data
- Energy data management – all organizational levels

The Christian Science Monitor Bennett

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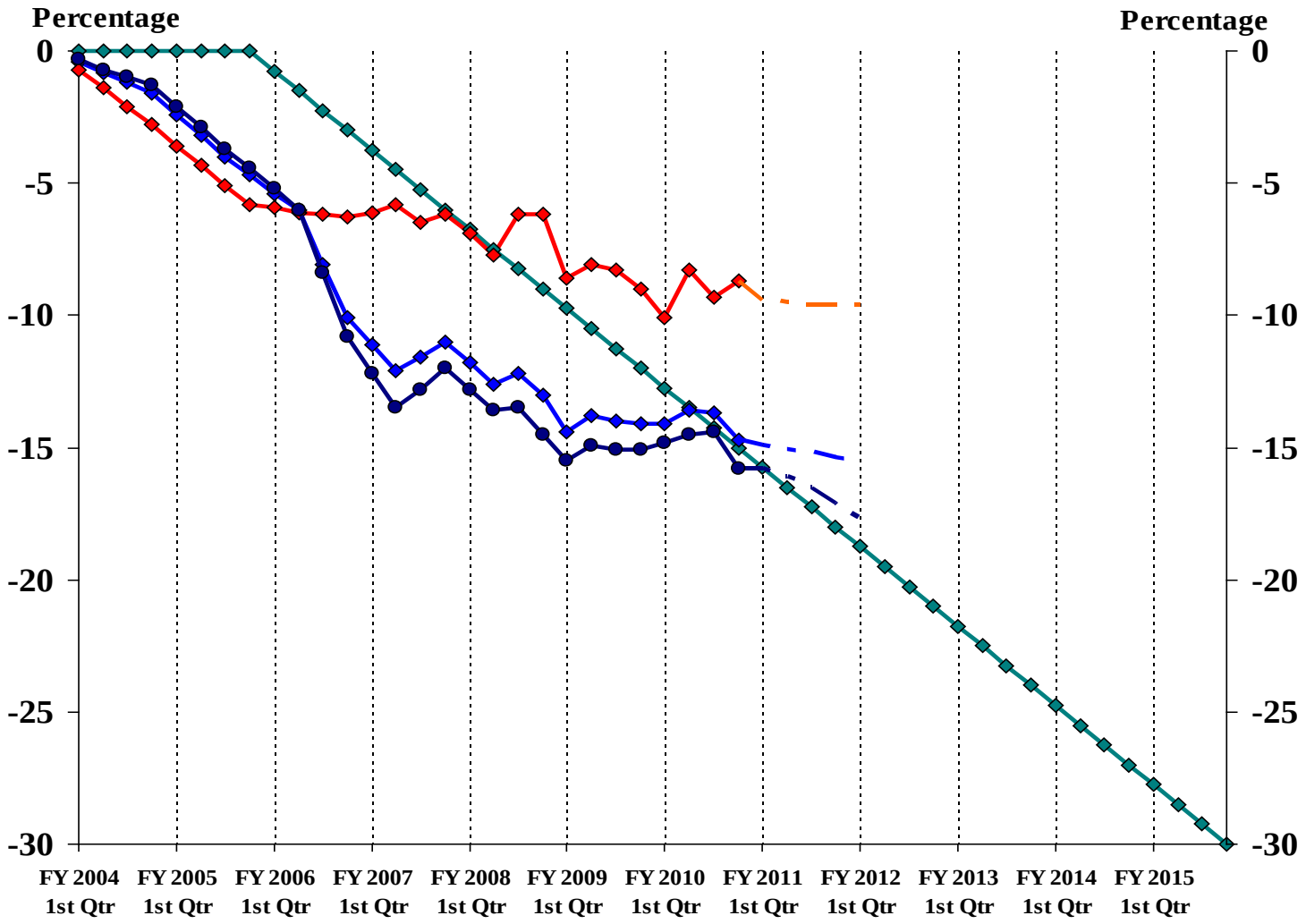
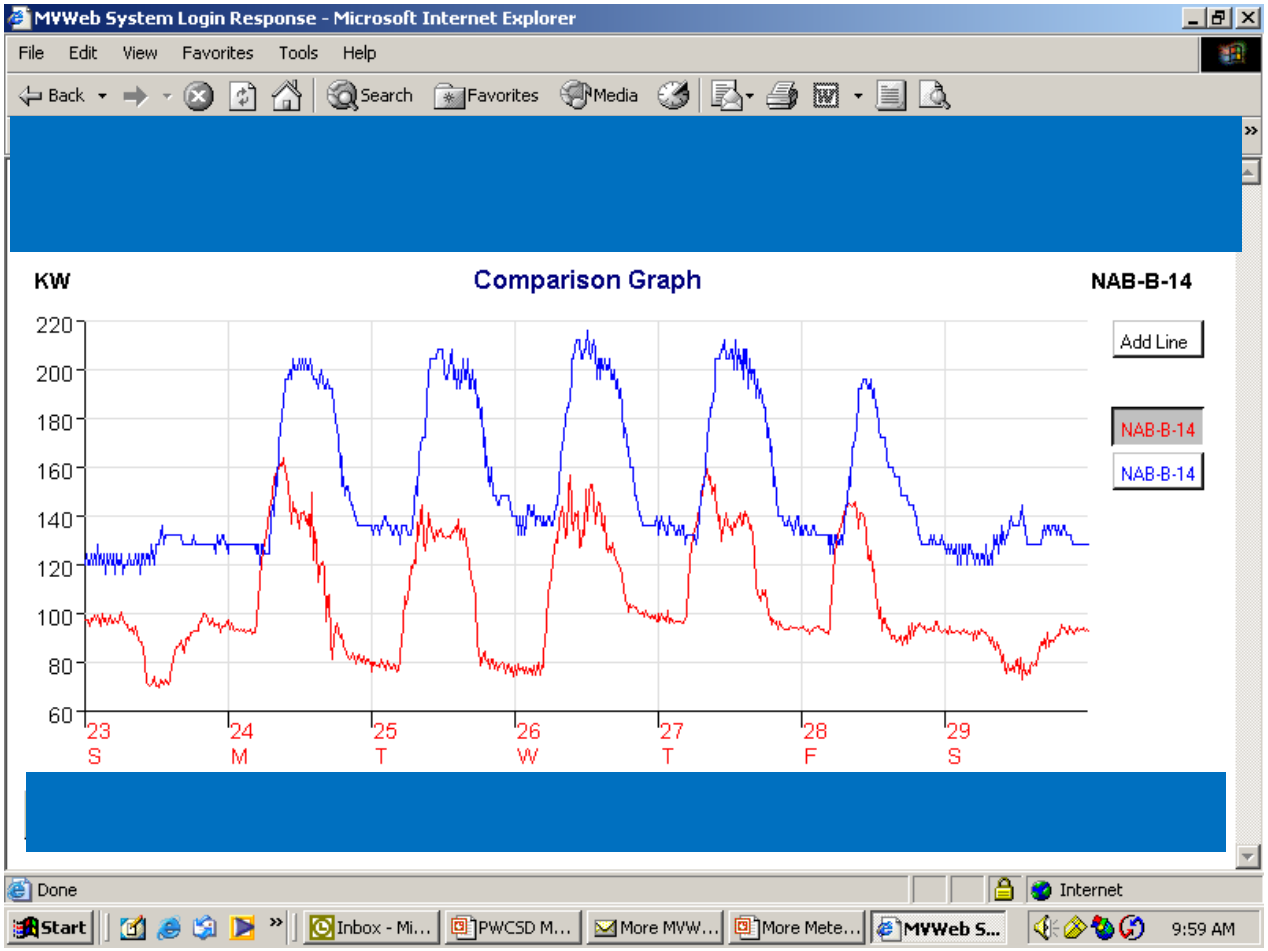
Service Level Data– Built from Installation Level Reporting



Data as of 30 September 2010

Building Level, Read Monthly, Aggregated Quarterly



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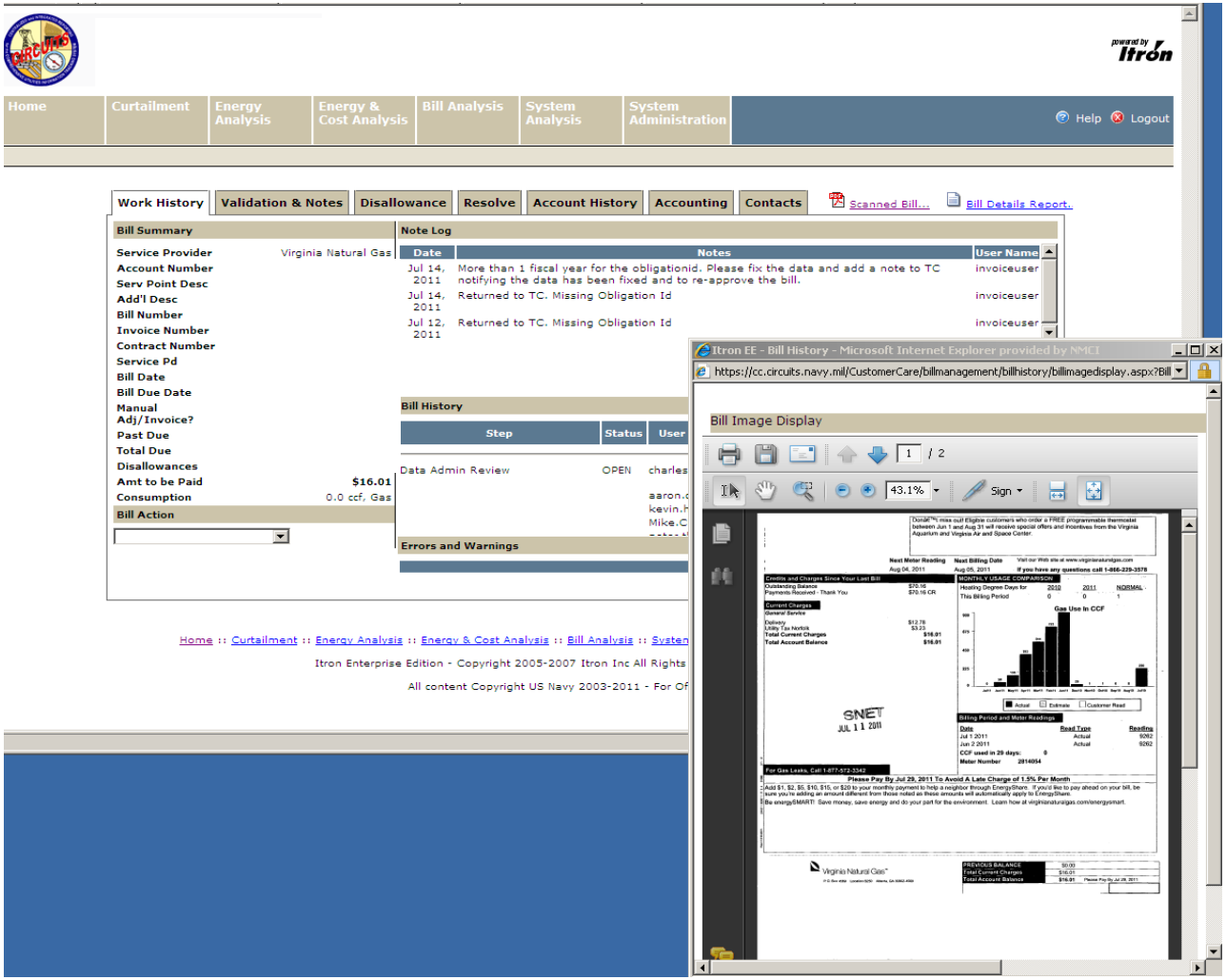
Hand Held Meter Reading Device

CIRCUITS - Utility Bills, Allocations and Automated Metering



Northwest (3 sites)
Award Jul 09 (ARRA) $32.09M
1,799 electric meters
323 gas meters
542 water meters
122 steam meters

Midwest (3 sites)
Award Sep 10 (ARRA) $9.60M
467 electric meters
187 gas meters
169 water meters
64 steam meters

Hawaii (3 sites)
PMRF Award Sep 09, rest of HI Dec 10 (CNIC) $11.23M
741 electric meters
0 gas meters
318 water meters
0 steam meters

Washington (7 sites)
Award Sep 09 (OMN) $12.69M
1,173 electric meters
6 gas meters
135 water meters
100 steam meters

EURAFSWA
"Estimate" (5 sites)
731 electric meters
43 gas meters
100 water meters
65 steam meters

FarEast "Estimate"
(5 sites)
1,880 electric meters
0 gas meters
28 water meters
126 steam meters

Midlant "Estimate"
(15 sites)
1,635 electric meters
179 gas meters
726 water meters
589 steam meters

Marianas "Estimate"
(3 sites)
609 electric meters
0 gas meters
239 water meters
5 steam meters

Southwest (13 sites)
NBVC Award Sep 08, rest of SW Aug 09 (ARRA & CNIC) $31.06M
2,104 electric meters
520 gas meters
975 water meters
22 steam meters

Southeast (15 sites)
Award Sep 09 (ARRA &CNIC)
$38.70M
2,461 electric meters
593 gas meters
1,185 water meters
34 steam meters

Metering data from all regional DAS's to the MDM

~63% of the meters to be installed are under contract

MDM as part of CIRCUITS system: Enterprise metering database, and data analysis tool

Meter Data Management

Awarded
Award Plan FY11
Award Plan FY12

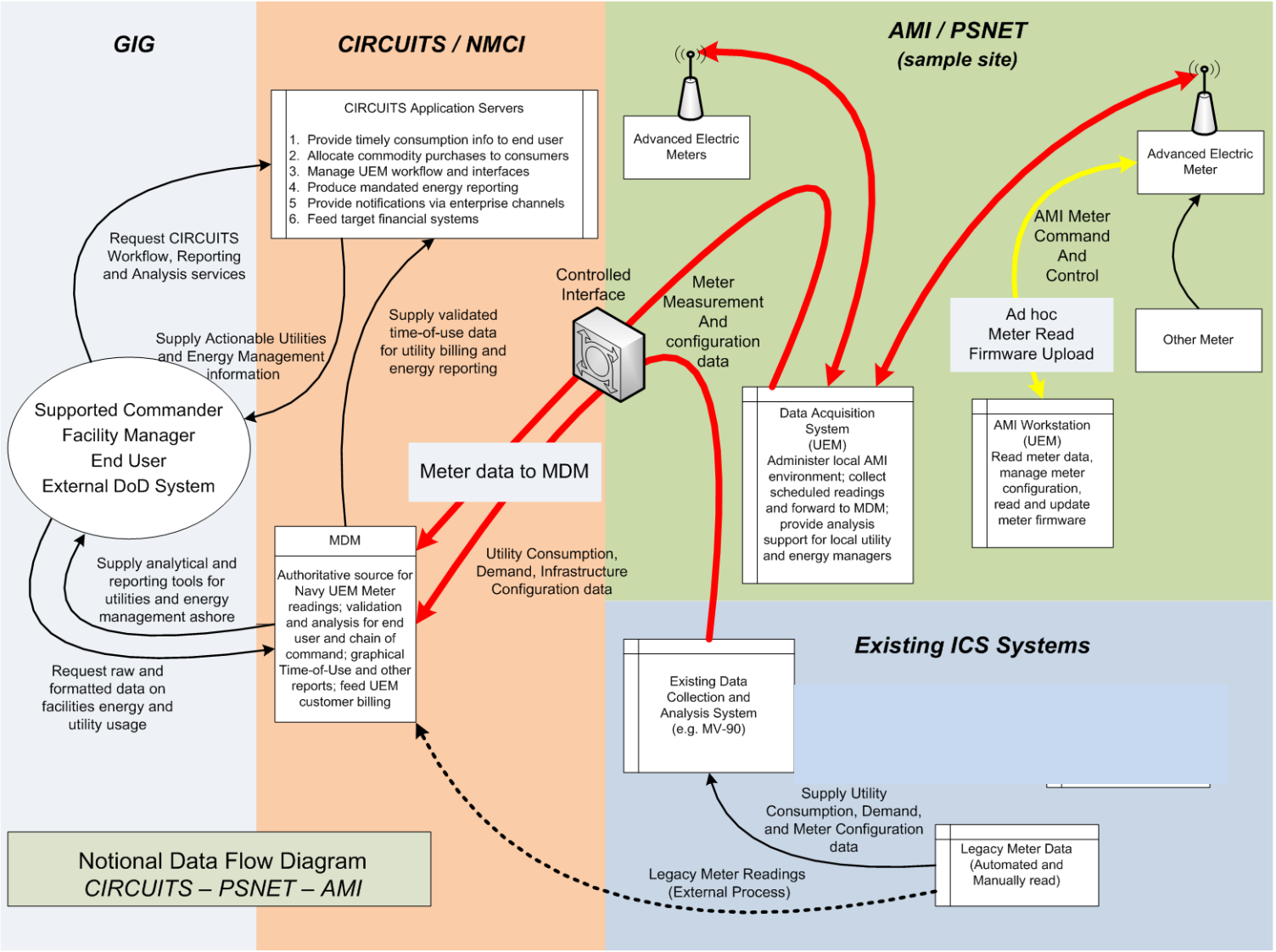
Core functional requirements

- Meters
  - Multiple communication protocols and are IP addressable
  - Monitors power quality and stores data (mechanical as well)
  - Very Accurate (0.2% Class accuracy)
- Communication
  - Two way communication via a wired and/or wireless solution
  - Meets enhanced security requirements (IA)
- Data Acquisition Server (DAS)
  - Retrieves 15 minute data at least every 4 hours (electrical and mechanical)
  - Management of alarms, outages, unusual demand, meter failures, etc
  - Provides tools for energy / system management

Regional / Site to Global

- Meter Data Management (MDM)
  - Receives and stores data from DAS's and other non-AMI meter resources
  - Provides enterprise energy analysis
  - Information available at your desk top.

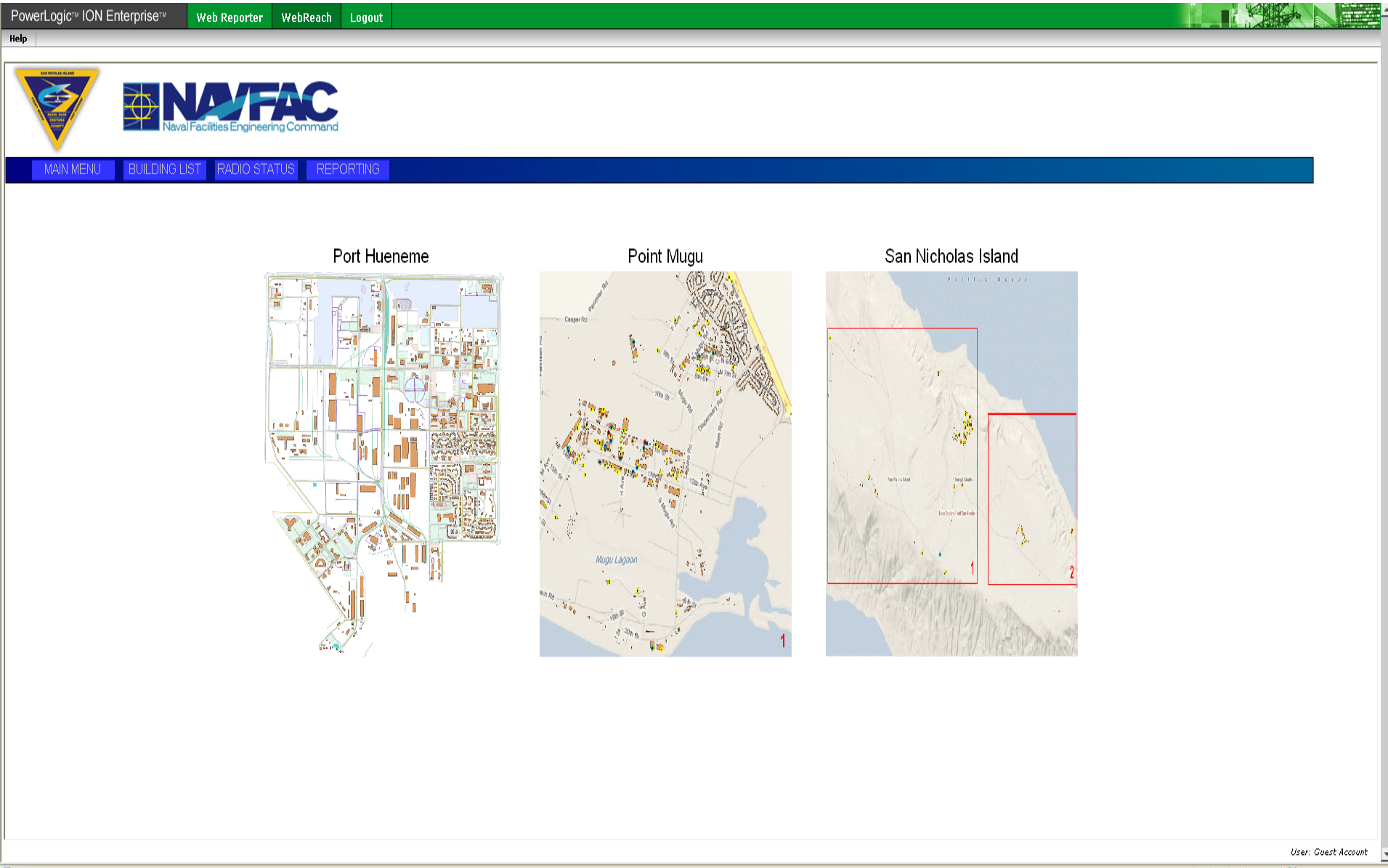
CIRCUITS-AMI SYSTEM COMMUNICATION



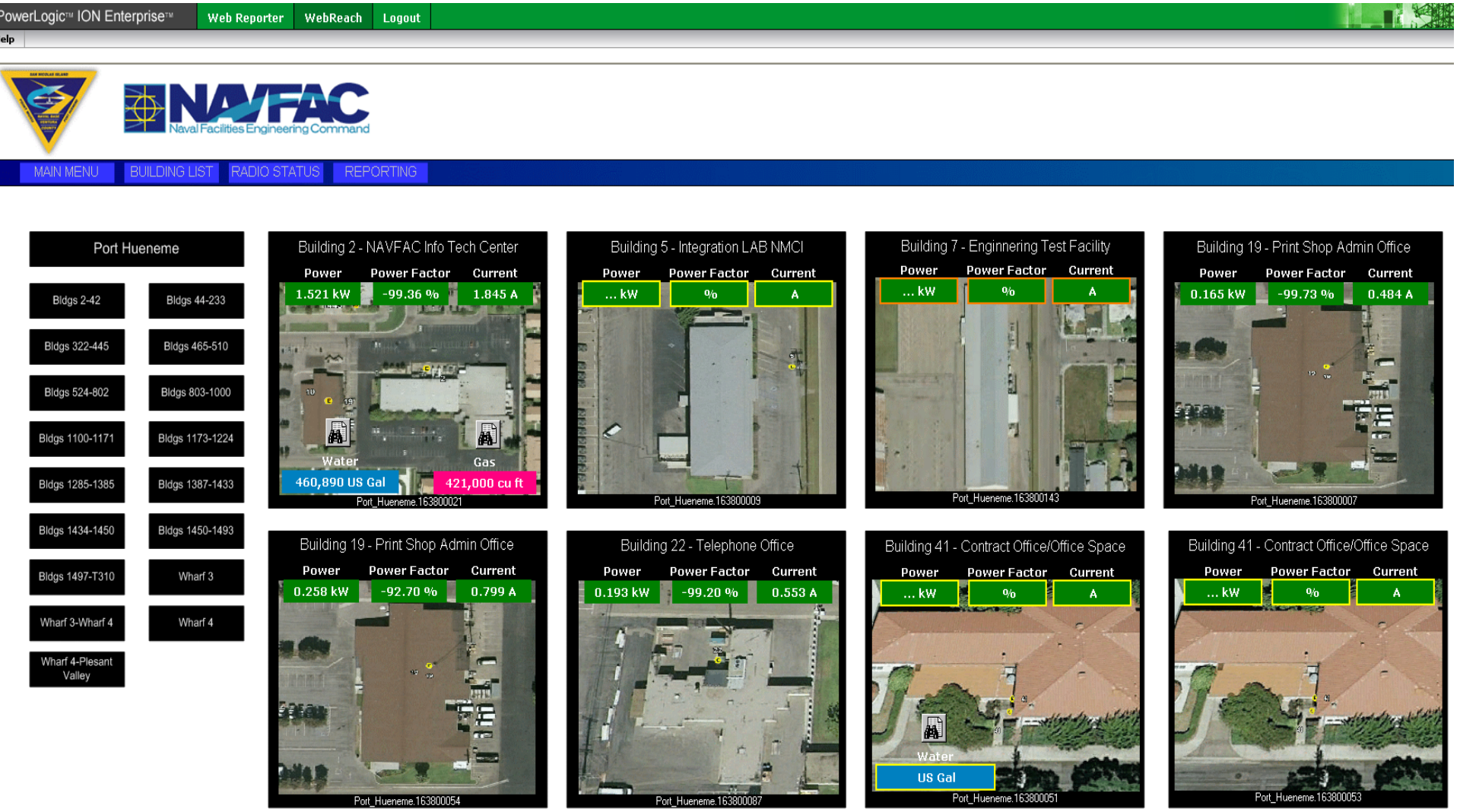
Managing Energy and Data

- Energy Data Useful at All Organizational Levels
- Building and Installation Level – the Energy Manager is Key
  - Consumption, Night/Weekend loads, demand management, trends
  - Project validation (M&V), Benchmarking
  - Utilities billing, diagnosis power quality, outages support
- Regional
  - Similar on aggregated levels and over broader territory
  - Facilitates data calls and reporting
  - Facilitates management decisions such as broad based demand reductions, time of use rates, generate vs buy decisions
- Corporate
  - Information for strategic decision making
  - Immediate data response

NBVC’s three geographically separated locations



Port Hueneme Bldg's



Bldg. “2”, NAVFAC Info Tech Center (aka NITC)

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NAVFAC Naval Facilities Engineering Command

Home

Port_Hueneme.163800021

Real-time

Power	Current
1.5227 kW	1.8641 A a
0.1736 kVAR	1.8261 A b
1.5326 kVA	1.8545 A c

Power Factor	I average
-99.4 %	1.8482 A

Frequency	Vll average
60.00 Hz	479 V

Long-term min/max

Energy

25,667 kWh
2,473 kVARh
25,798 kVAh

Multiplier 240

Power Quality

Total Harmonic Distortion (THD)

V1(ab)	1.2 %	I a	4.2 %
V2(ca)	1.2 %	I b	4.2 %
V3(bc)	1.2 %	I c	4.3 %

Voltage Unbalance 0.20 %

Sag/Swell Count 1

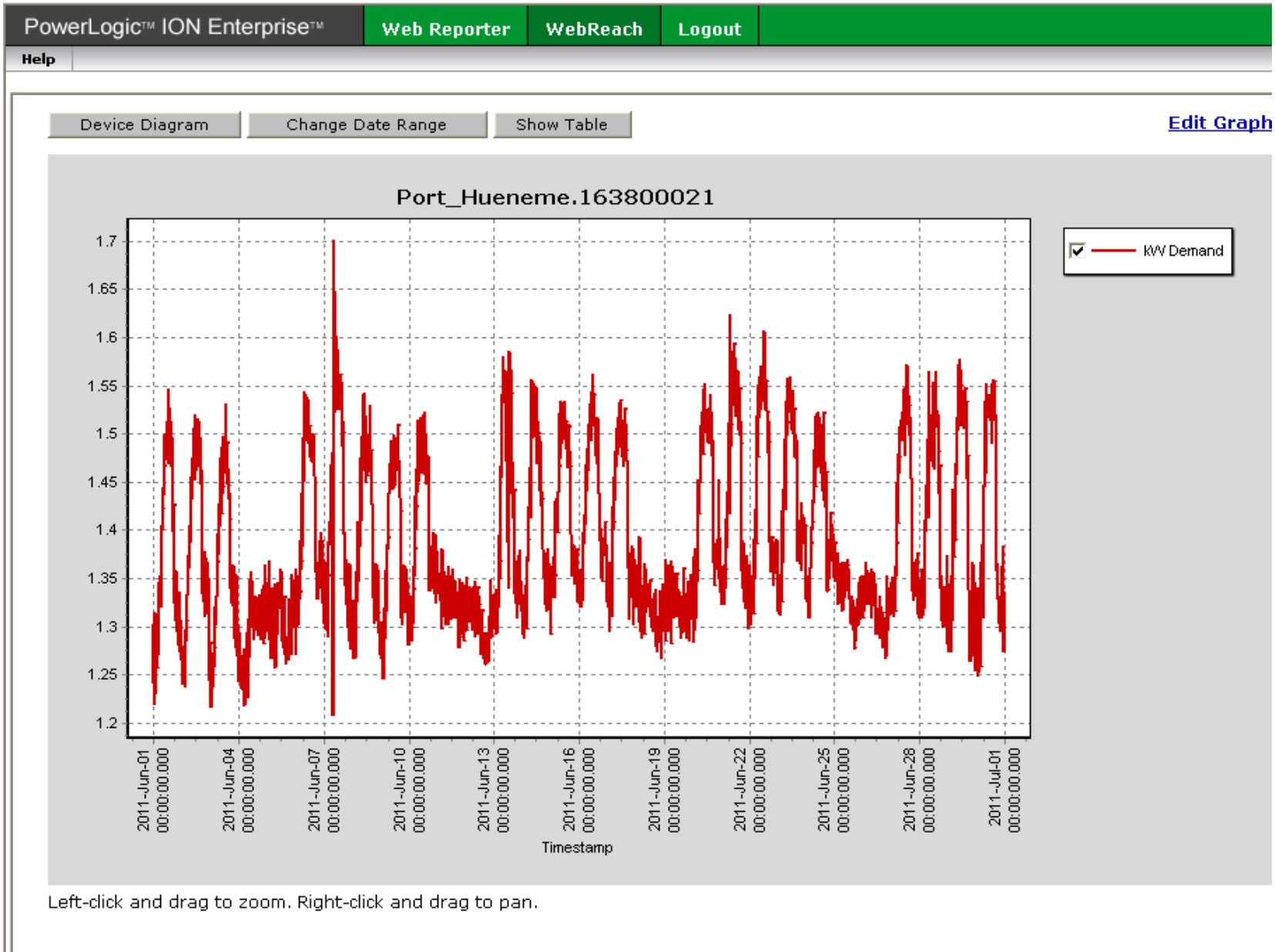
Peak Demand

1.6025 kW	7/6/2011 12:30:00.000 PM
0.2687 kVAR	7/5/2011 7:45:00.000 AM
1.6181 kVA	7/6/2011 12:30:00.000 PM

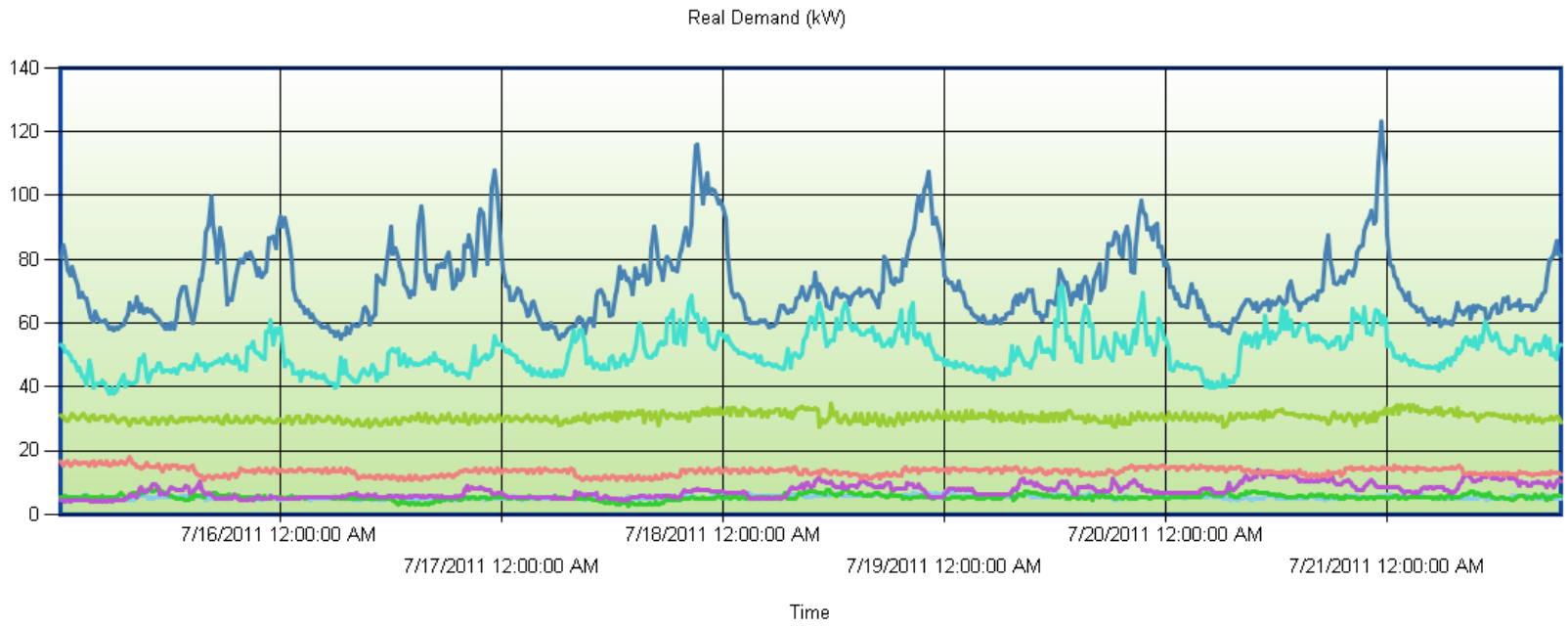
Analysis & Reports

Data Logs	Pivots	Reports
kWh Interval	kWh Last Week	Energy Cost Report
kW Demand	Load Profile	Energy Period over Period
I & V	Peak Demand by Day	kW Trend Summary
PF/THD		
Sag/Swell	Meter Events	

NITC, KW Demand for June



Benchmarking Buildings
Identify Loads and Variation



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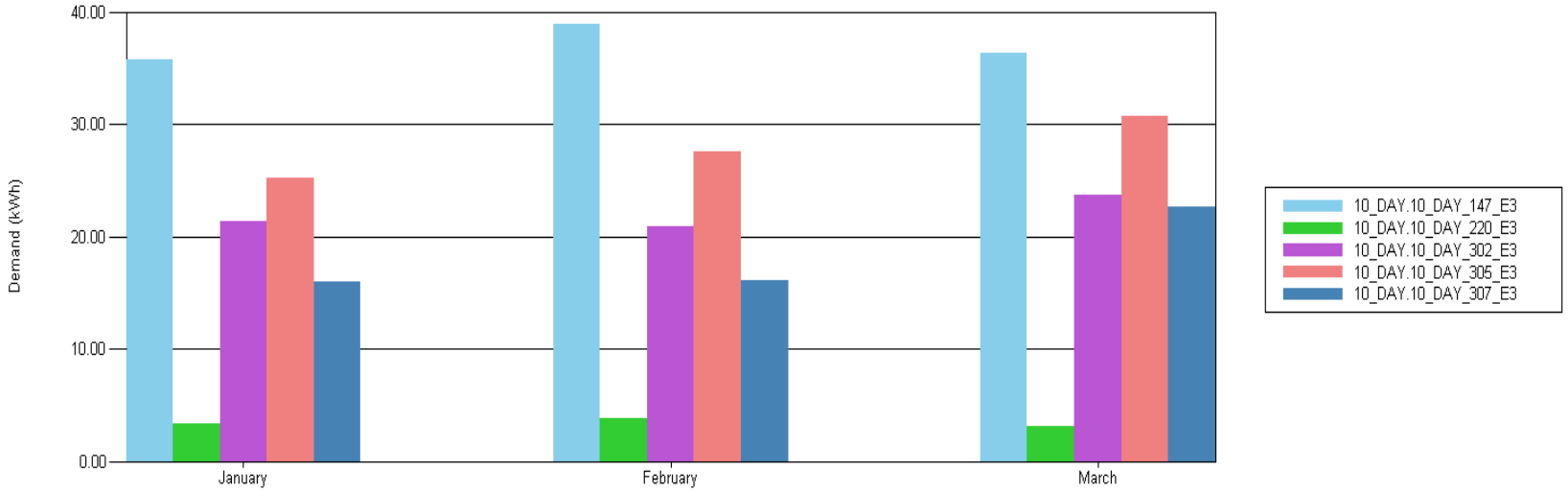
Benchmark in Same Climate Zone



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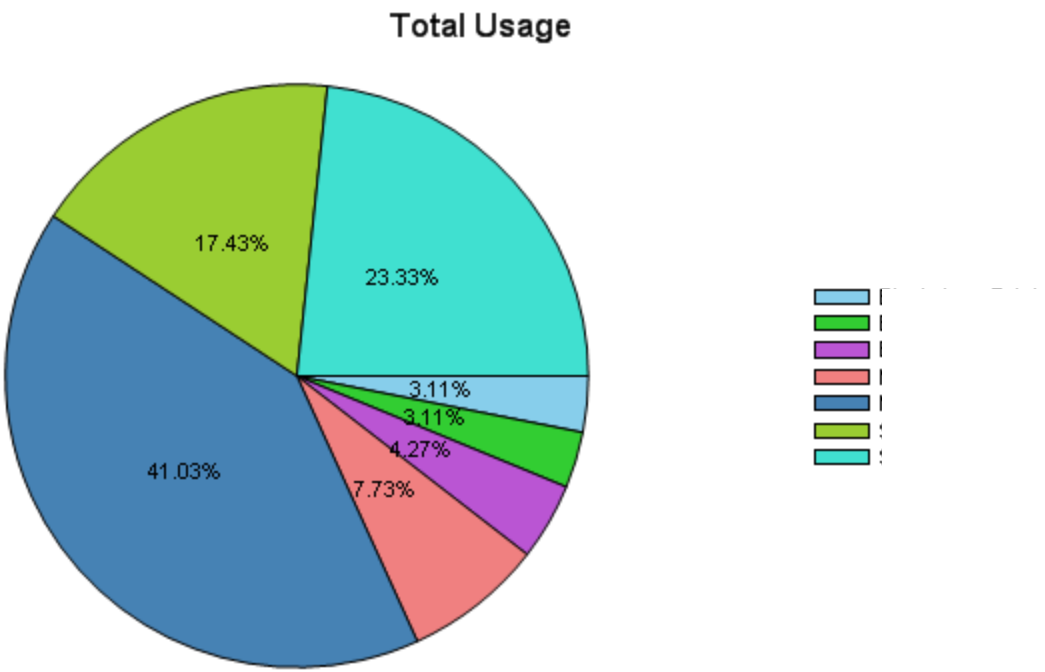
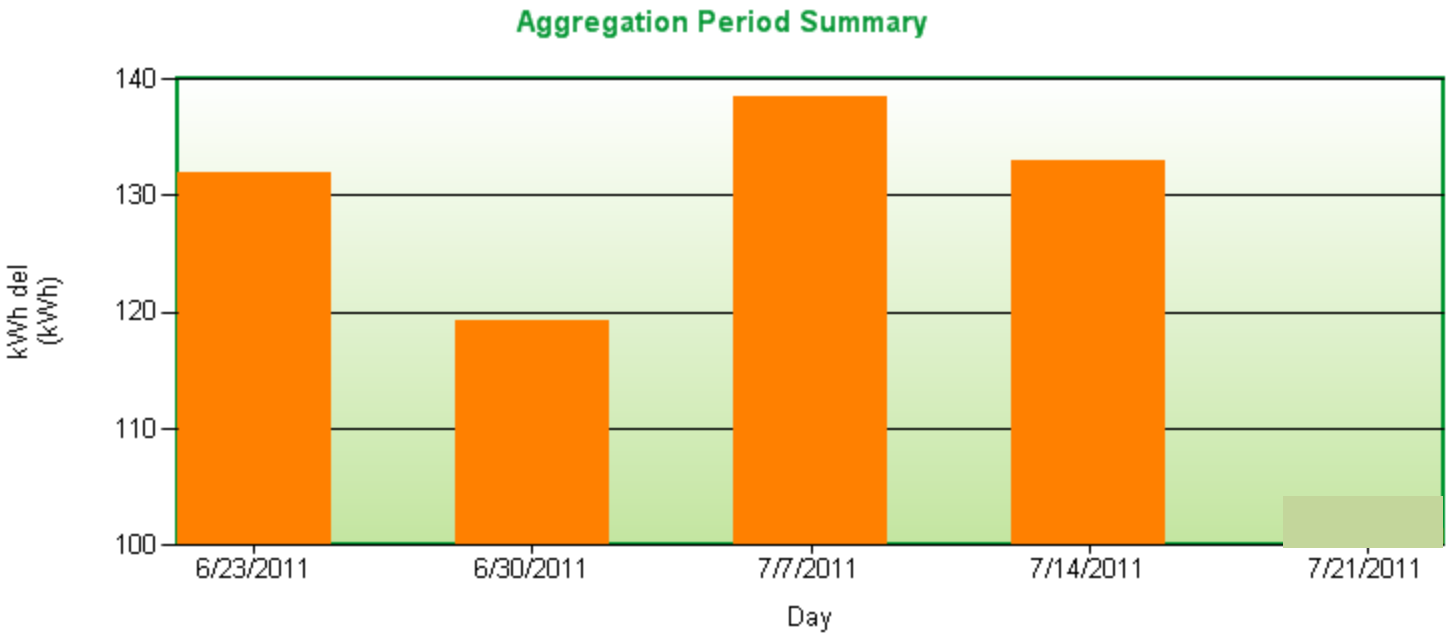
Identify Largest Loads



Thursdays Different Weeks



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M&V for Energy Projects

FY10
FY11

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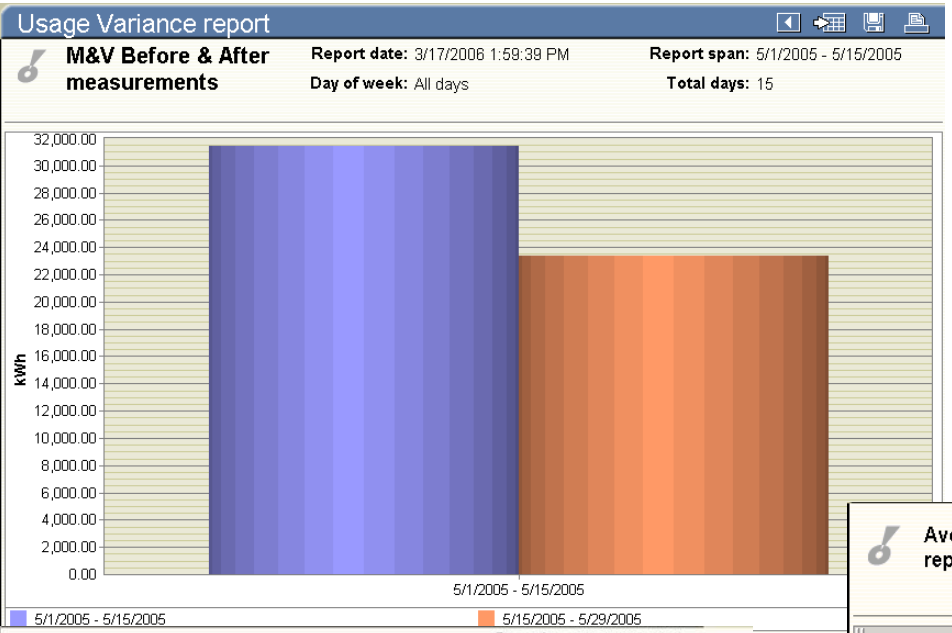
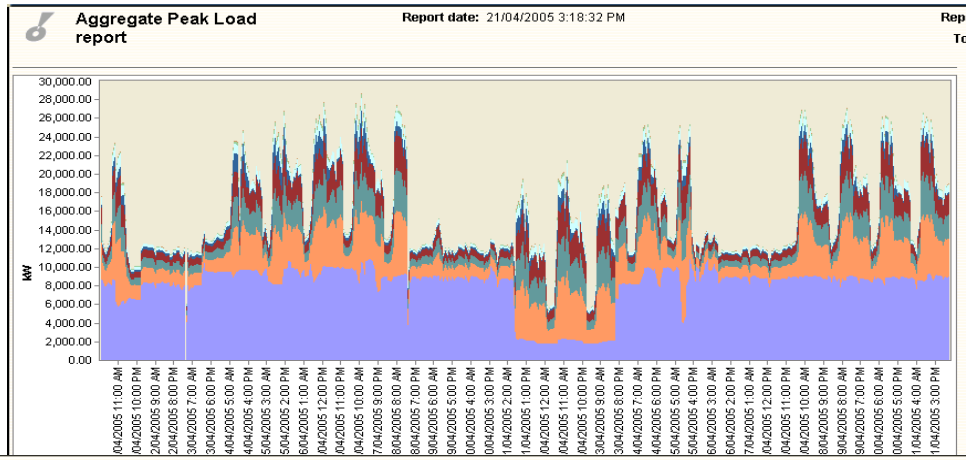
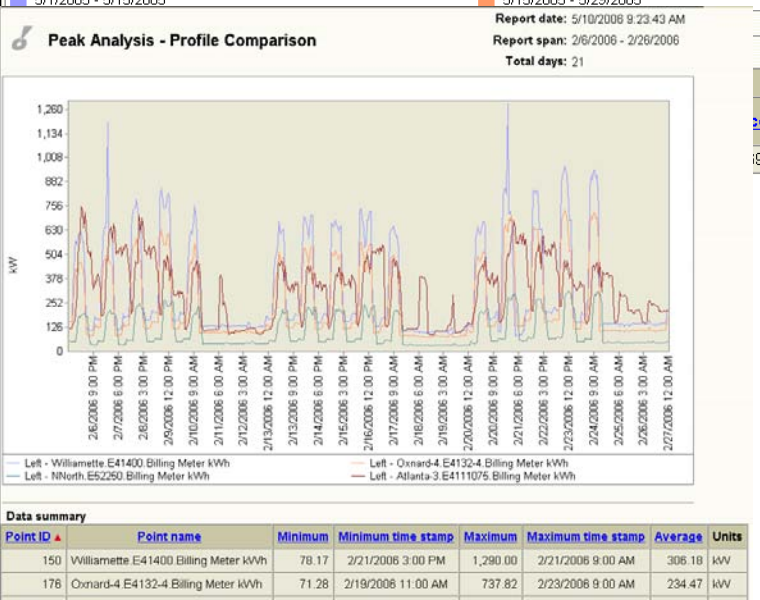
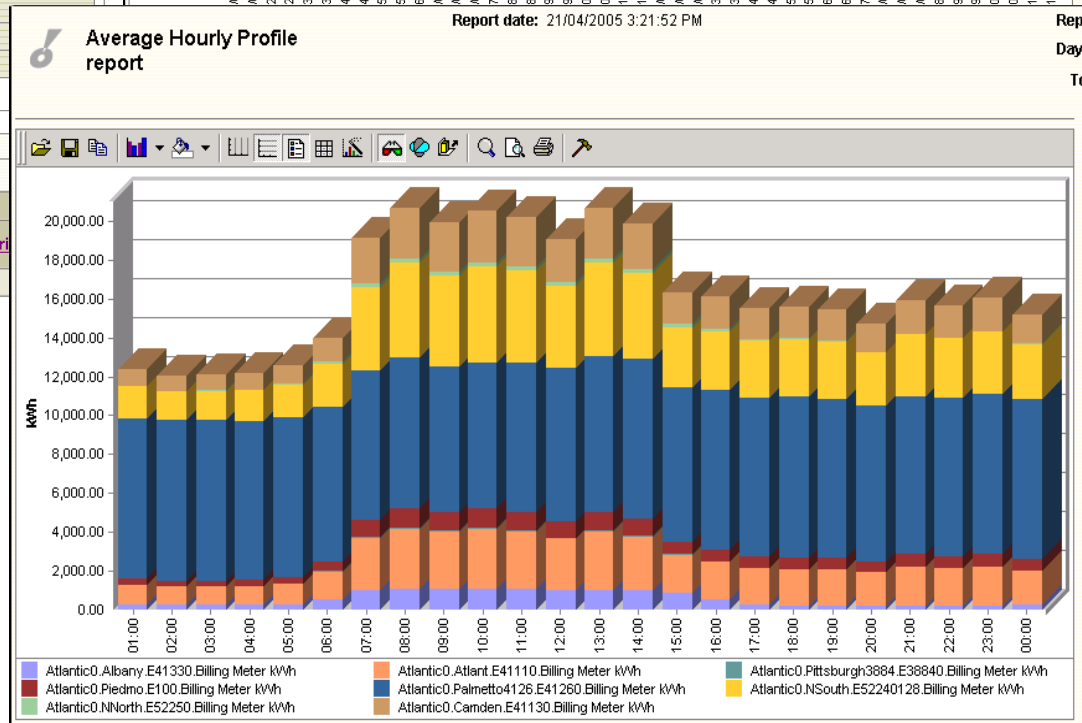
Meter Data Warehouse from Desktop







Point ID	Point name	Minimum	Minimum time stamp	Maximum	Maximum time stamp	Average	Units
150	Williamette.E41400.Billing Meter kWh	78.17	2/21/2006 3:00 PM	1,290.00	2/21/2006 9:00 AM	306.18	kW
176	Oxnard-4.E4132-4.Billing Meter kWh	71.28	2/19/2006 11:00 AM	737.82	2/23/2006 9:00 AM	234.47	kW



Service Level Data Use

- Strategic Initiatives and Decision Making
- Progress Toward Goals
- Congressional Response

Largest Power Provider	Total Kwh per Year
Dominion Power – Norfolk Area	**1,377,561**
Hess – D.C Area	**680,177**
WAPA – CA	**1,148,962**

Summary – A Flood of Data
A River of Solutions

- Closed network, controlled interface to desktop
- 20,000 meters, over 1500 bills
- 10 Billion data points annually
- Staff needed to make good use of data
- Standard reports are needed to ease analysis
- Huge potential for better management of energy

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