

“Energy Management Solutions”

Electrical Sub-metering Strategies
for Energy Efficiency and Cost Reduction

by

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www.measurlogic.com

Outline

- Measurlogic overview
- Sub-metering
 - Reasons to sub-meter
 - Who needs to sub-meter
 - What & Where to sub-meter
 - Installation considerations
 - Key features of a electrical sub-meter
- Visualization of the data
- Power Quality – its impact on costs



Measurlogic Overview

- Based in Centennial, Colorado - where the DTS product family of AC and DC electrical sub-meters are manufactured and supported.
- Complies with “Buy American Requirement” of the American Recovery & Reinvestment Act (ARRA).
- Have been in the US market for over 12 years
- Over 30 years of experience in electrical measurement and its associated markets



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Utility Charges

➤ Utility Costs:

- Continue to rise
- Used to be an overhead expense now an operating cost



Month	Process No. Entry	Usage	Rate	Amount
12/31/14	12/31/14	12/31/14	12/31/14	12/31/14
12/31/14	12/31/14	12/31/14	12/31/14	12/31/14
12/31/14	12/31/14	12/31/14	12/31/14	12/31/14
12/31/14	12/31/14	12/31/14	12/31/14	12/31/14

➤ Utility Bill:

- kWh charge
- Demand charge (15 minute data)
- Time of use tariffs
- Power factor performance / penalty

What is a Sub-meter

YOU CAN'T CONTROL / MANAGE / REDUCE
UNTIL YOU CAN MEASURE !!

A "SUB-METER" is any measuring device deployed inside a facility to provide data from one or more measuring points.



Cost reduction strategies

- Billing
 - Revenue grade bills to tenants, common space and other utilities
- Cost Allocation
 - Divide energy bill per area, cost center, line or even an individual piece of plant
- Measurement and Verification
 - Track savings after installation of energy savings solution / initiative
 - LEED requirements
 - “Shadow” utility meter to see real-time data rather than after the fact utility bill



Cost reduction strategies - cont

- Demand side management
 - Reduce demand charges
 - Identify load peaks
 - Optimize use of electrical tariffs
- Net metering
 - Renewable resources (wind or solar)
 - Identify the utility credit for power returned to the grid
- Aggregation
 - Negotiating of lower power rates based on volume in a deregulated market



Who can benefit ?

- Owner Occupied Properties/Facilities
 - Integration into BMS/EMS or SCADA
 - Detailed Energy accountability
 - Process optimization
 - Load control and shedding
 - Cost allocation
 - Departmental
 - Process
 - Production line
 - Energy Conservation
 - Base lining
 - Identify “low-hanging” energy savings opportunities
 - Ongoing analysis of existing Energy Initiatives
 - LEED Points – credits
 - Measurement & Verification



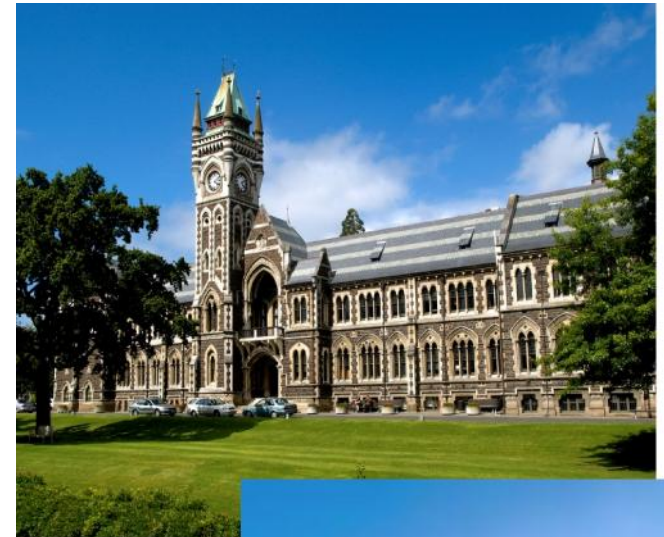
Who can benefit ?

- Property Management
 - Integration into BMS
 - Cost allocation
 - Tenant Billing
 - Common Area management
 - Equipment Monitoring
 - Preventative maintenance strategy
 - After Hours Energy usage
 - “Green” Building Initiatives
 - Measurement & Verification
 - Confirm performance of similar building types in portfolio



Who can benefit ?

- Educational Institutions
 - Integration into BMS/EMS
 - Detailed Energy accountability
 - Load control and shedding
 - Building Monitoring
 - Departmental
 - Special Events
 - Student housing / dormitories
 - State/ Local Government
 - State Policies can dictate compliance to “green” building standards in order to get funding
 - LEED Points – credits
 - Education
 - Today's kids are tomorrow's green advocates



Who can benefit ?

➤ Healthcare Facilities

- 24/7 operation with unique requirements on power delivery and consumption
- > \$5.3 billion annual energy bill for this sector
- Uses 2.7x more energy than typical office building

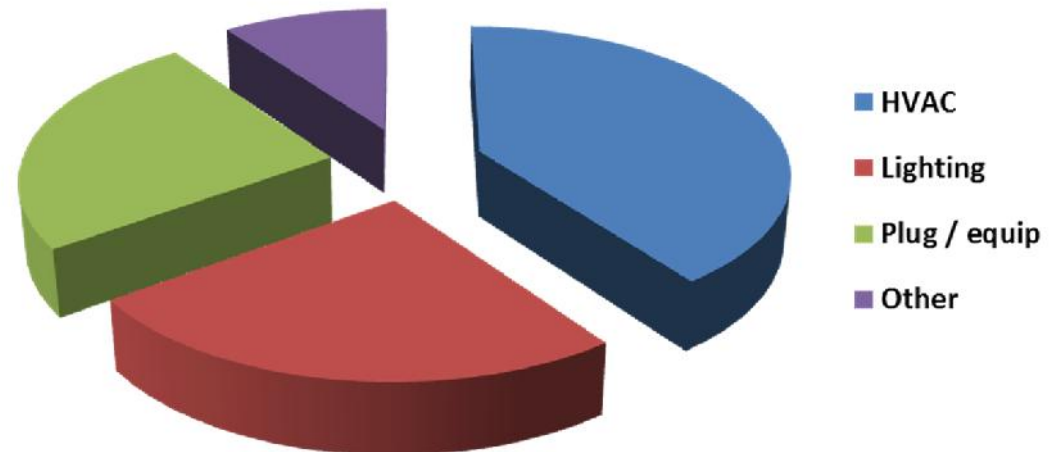
➤ “Green” Building Initiatives

- Cost allocation
- Energy conservation
- M & V



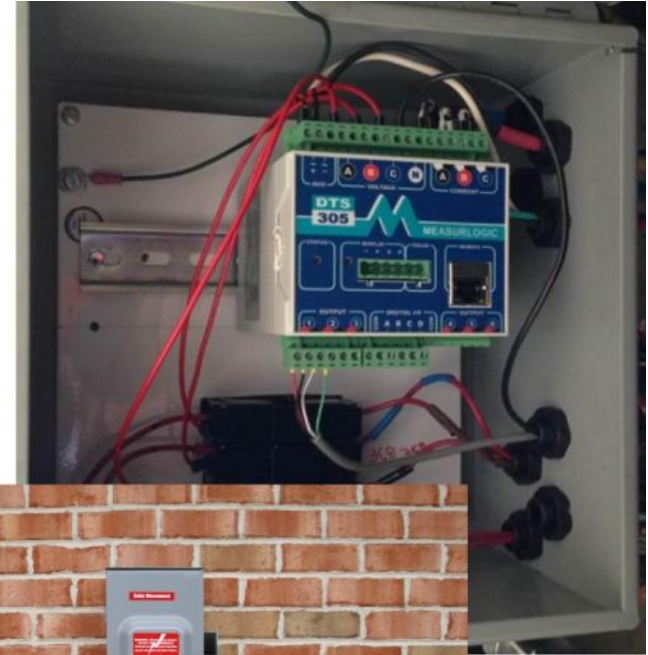
What to sub-meter ?

- Service Entrance
 - Check meter to the single utility meter
 - Provides real-time data
- Individual Buildings
- Feeder sub-panels
- Process lines
- Departments
- Individual loads



Installation Considerations

- Where ?
 - Existing control cabinet
 - Stand-alone surface mount enclosure
 - Indoor
 - Outdoor



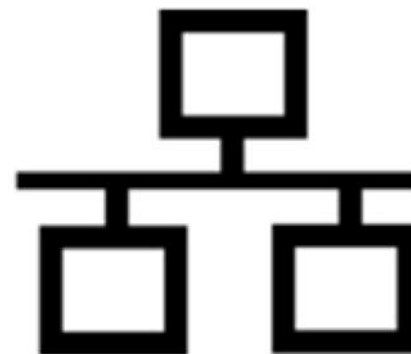
Installation Considerations

- Current Transformers - Type
 - Solid core – new installations
 - Split Core – retro fit applications
 - Flexible RopeCTs – large bundles
- Current Transformers - Output
 - 5A – traditional utility style output
 - “Safe” millivolt output
- Keep distance between CT and DTS meters as short as possible
- Secondary wires should be twisted and run in separate conduit



Communication Considerations

- Pulse output for kWh
- Serial communications
 - Modbus
 - BACnet
 - LonWorks
- Ethernet Communications
 - Modbus
 - BACnet
 - SNMP
 - DNP3



AC Sub metering – key features

- “Revenue” Grade
 - ANSI C12.1 Class 0.5 Energy Meter
- Flexible Measurement Interface
 - Must be able to interface with any power system
 - Must be able to interface to 5A, millivolt and flexible RopeCTs
- Multiple Remote Communications options
 - Modbus, BACnet, LonWorks & SNMP
- Various I/O configurations
 - Allows interface of other utility meters such as water, steam, gas etc.
- Net metering – renewable applications

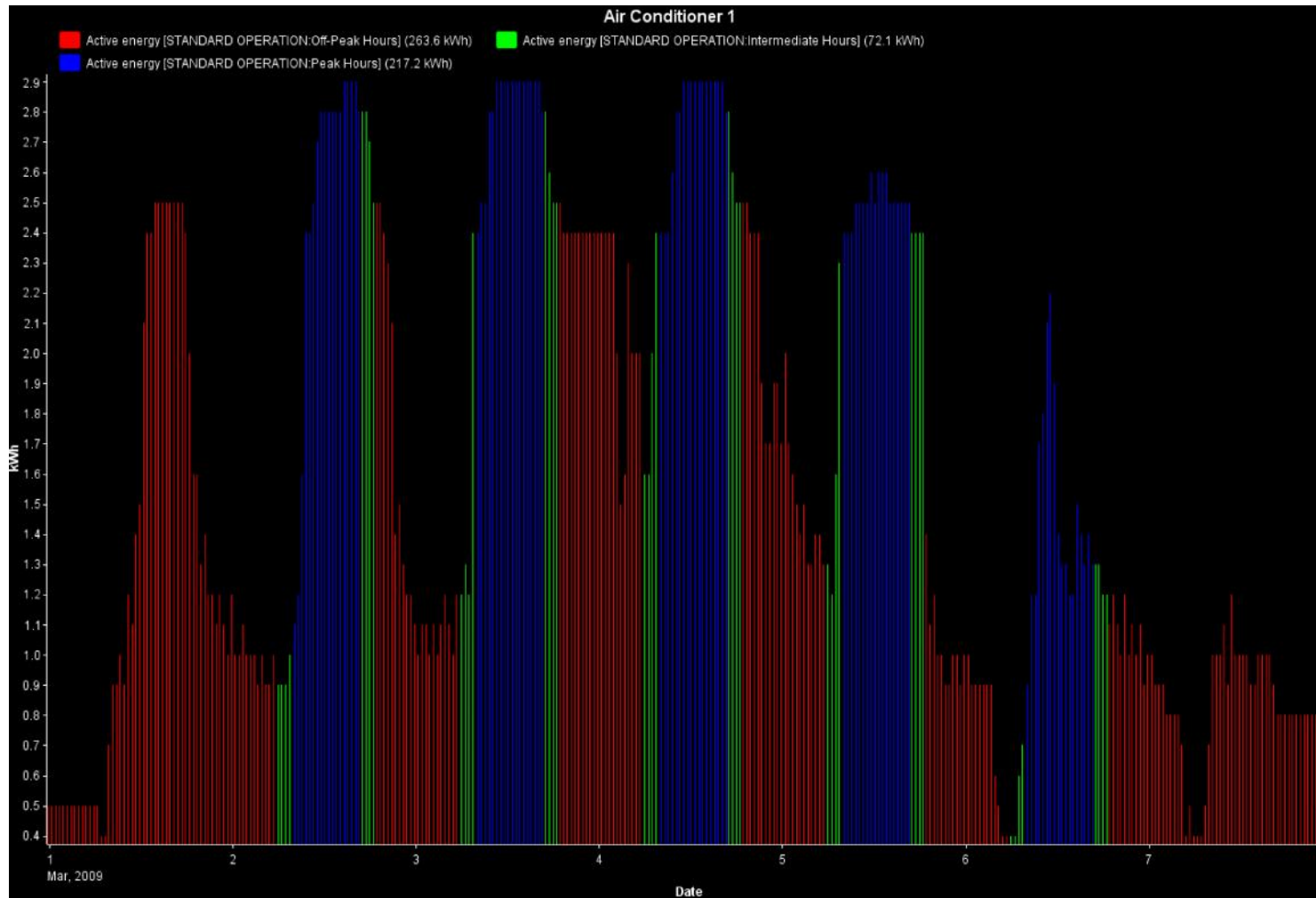


What can you Monitor ?

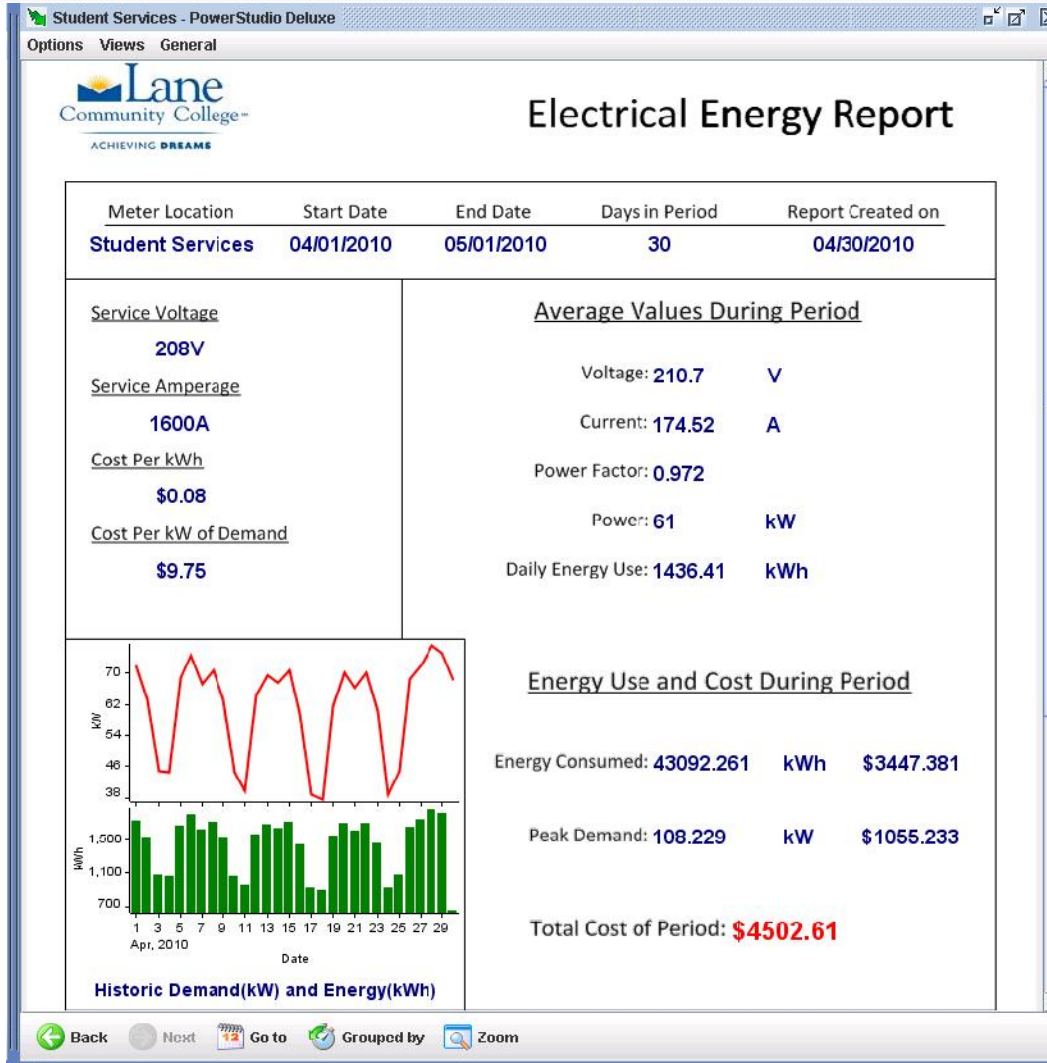
- Utilities
 - electrical energy
 - water
 - gas
- Solar systems
 - AC & DC measurements
- Other
 - Weather data
 - steam



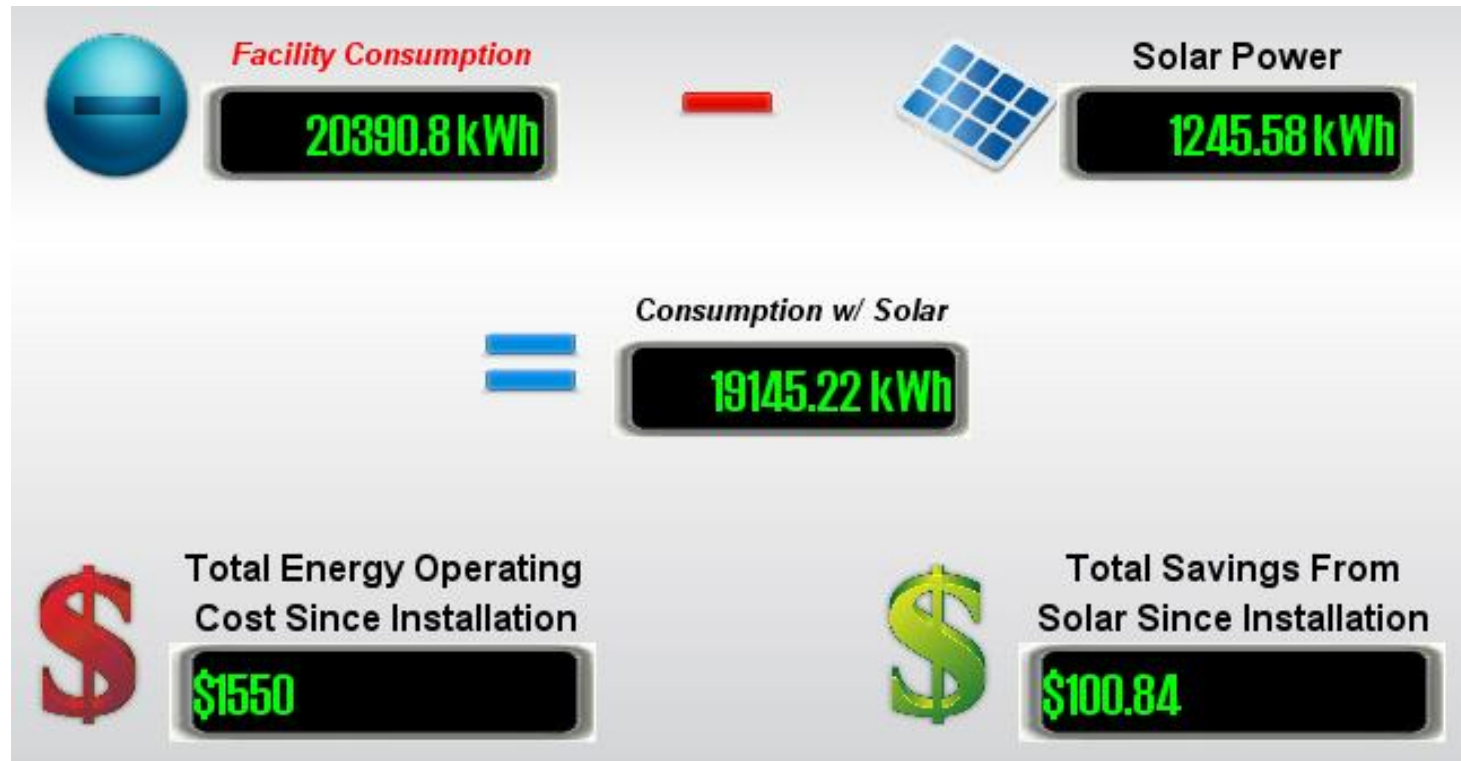
Energy - TOU



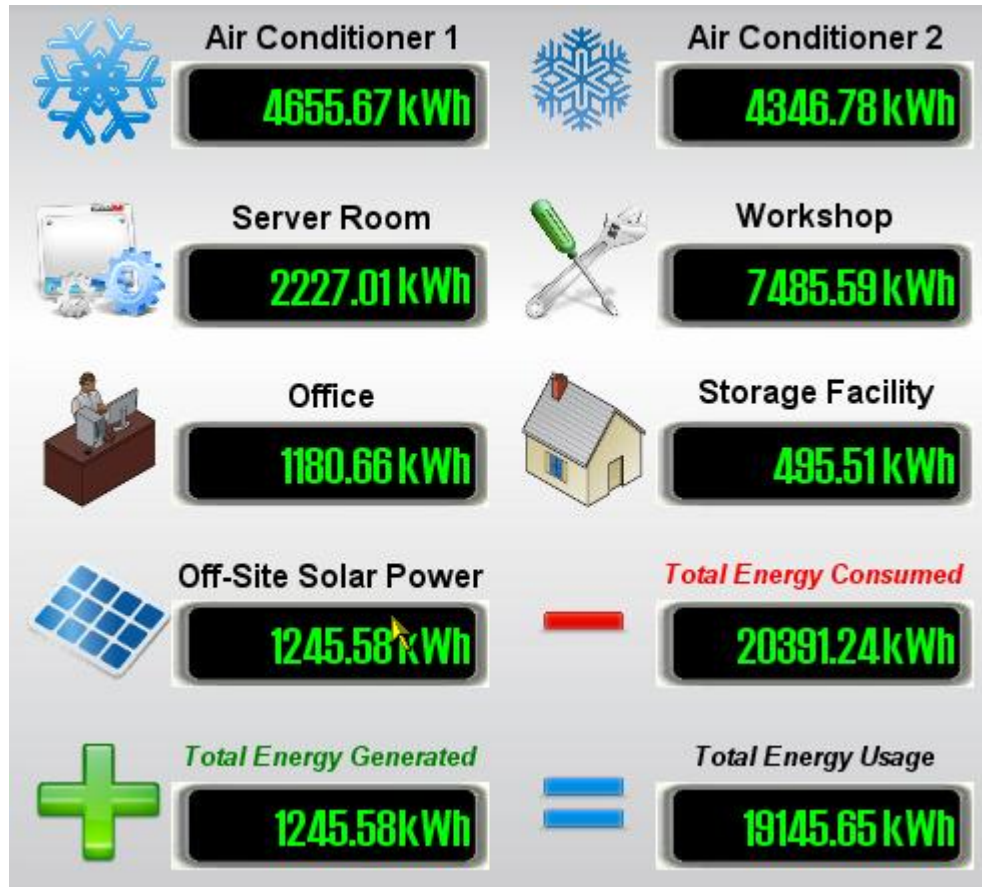
When, Where & how much?



Verify your Savings

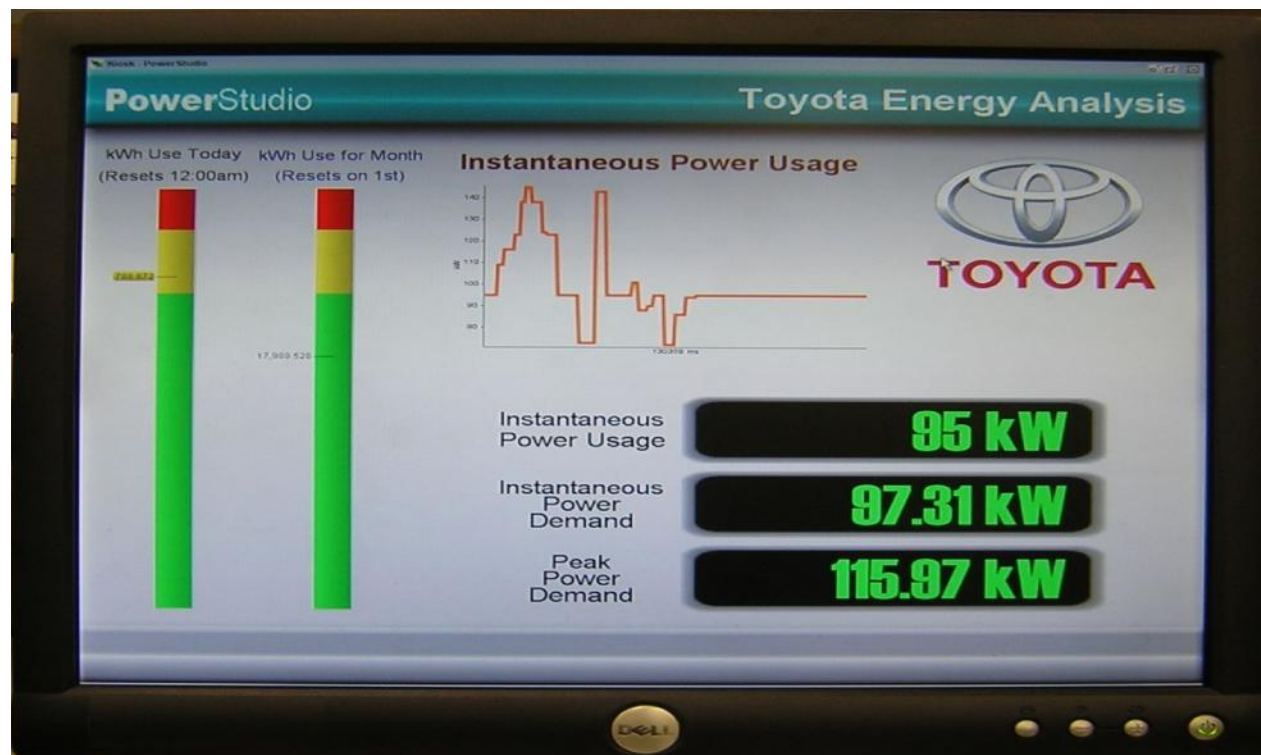


Energy Allocation



Educational / Information Kiosks

Customizable Kiosks and/or informational flat screen monitors are ideal ways to inform customers and/or employees of performance targets and energy reduction goals achieved



Power Quality – Voltage Sags

➤ Natural

- Lightning
- Snow storms
- Line Faults
- Overgrown Vegetation
- Flash-overs
- Animals



➤ Artificial

- Heavy load switching
- Internally generated s/c
- Automatic reclosing

Power Quality

- Power disturbances (voltage sags)
 - From the utility side
 - 1 -30 cycles in duration
 - Processes are now "Digital"
 - Cost the US economy billions in lost productivity annually



- Harmonics
 - Caused internally thru non-sinusoidal loads like VFD's, electronic ballasts, CFLs, PCs etc.
 - Shorten transformer life or cause de-rating
 - Overheat equipment



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