expertpower™

Energy Management System (EMS)

Comprehensive Power Quality Analysis

Customer Billing and Invoicing

SATEC

expertpower™ at a Glance

ExpertPower™ software solution provides comprehensive energy management and micro SCADA capabilities for a wide variety of purposes such as: sub-metering, billing, meter data management, energy efficiency, demand response, power quality analysis, independent power producer core processes and generator control. ExpertPower™ is available either as an on-line cloud service (Service Edition) or as a stand-alone on premise package (Pro Edition).

SATEC's complete versatile solution includes our wide range of analyzers combined with ExpertPower™ software, offering information and analytics to improve the efficiency, reliability, security and profitability of our customers' energy system.

ExpertPower™ uses a standard web browser as user interface, for both local installations and Internet remote installations. This reduces the total cost of ownership (TCO) by eliminating the need for training and special client hardware and software. With ExpertPower™ Service, there is no need for server hardware and software or on-site IT experts.

With installations of over 40,000 managed devices at one site, ExpertPower™ is the most powerful energy management solution on the market. Its scalability allows you to start with small installations and to expand as your business grows.

Tools

| Dashboards | Reports | Charts | 1-line Diagrams | Web Access |

Applications

Energy Management

- Data Monitoring
- Data Modeling
- Navigation
- Reports
- Events & Alarms

Billing & Submetering

- Cost Calculation & Monitoring
- Invoice Management
- Tenant Management
- Tariff Management

Power Quality

- Power Quality Events
- Waveform Analysis
- EN50160, IEEE1159 GOST Reports

Demand Response

- Automatic / Manual Generator Control
- Interface to Utility Load Profiles

IPPs & Utilities

- Meter Data Management (MDM)
- Core Processes
- Billing

Energy Efficiency

- Efficiency Targeted Report Suite
- Alerts & Notifications
- COP Trend

Infrastructure

| Database | Virtual Device | Data Fetching | Web Services API | Alarms |

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Main Features

Data Collection
- Automatic data collection from energy meters (electricity, water, gas etc.), power quality analyzers and substation automation controllers
- Complex calculations from two or more devices
- Easy configuration of new devices, communication server and register mapping

Presentation
- View all data in your browser—no software installation, no employee training
- Customized dashboards, single line diagrams with real time data, graphs with status indications (color, icon)
- Multi-user, multi-security levels
- GeoLocation—positions your metering points on the map, providing geographic navigation and grouped alert monitoring
- Lobby Application—customizable full screen kiosk mode showing consumption over time, energy saving competition, weather forecast and more

Historical infor mation
- All data is logged in the database
- Chart any measured parameters
- Monitors trends to identify potential problems

Reports
- Manual, automatic or scheduled reports
- Preconfigured or customized reports
- HTML, export to MS Excel and PDF formats

Alarms and Events
- Multi-level thresholds for complex criteria
- Messaging, emails and SMS alarms
- Logs all alarms
- Requests user acknowledgement

Connectivity & Interoperability
- Integrate all energy management, automation system and billing into one web based system
- Built-in data export to different formats (Excel, PDF , CSV etc.)
- Standard RESTful Web service API and IEC 60870-5-104 interfaces allow for easy integration with third party enterprise applications such as BMS, SCADA, ERP, CRM and Accounting

Architecture
- Complete web based design with multi-browser support
- Grow as you go architecture—from single device to tens of thousands
- Distributed servers—support for server virtualization technologies such as VMWare
- Local or remote MS-SQL database
- Supports express, standard and enterprise MS SQL editions

Energy Management & Power Monitoring

Allows you to monitor your power and energy consumption in complex sites.

- Collects data from SATEC and other products over Modbus, BacNet, DLMS and SNMP protocols

- Graphic or geographic maps, icons and color status indicators

- Virtual devices—real time calculations such as summation, subtraction and more

- Historical data, trends and detection for identifying unnecessary load operation

- Advanced comparison wizard— select multiple devices, parameters and time periods

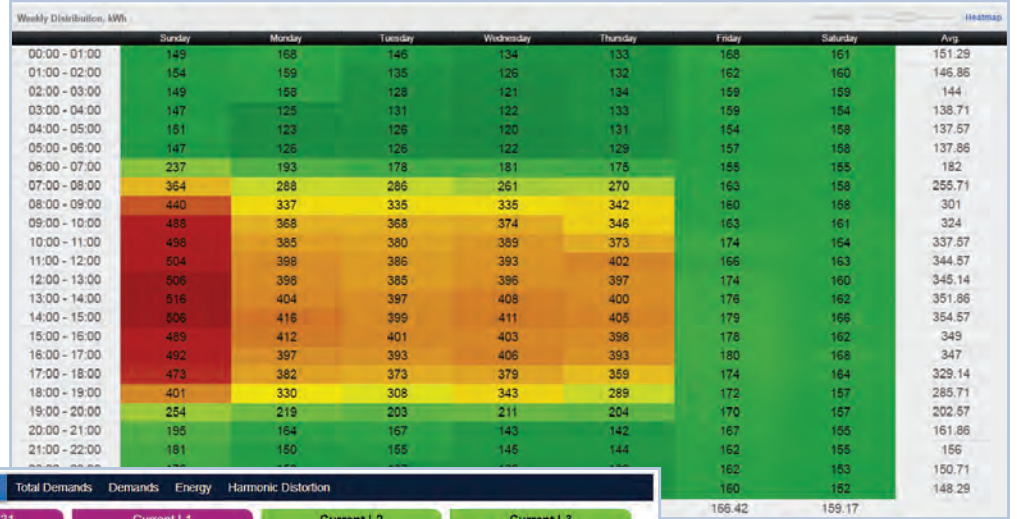## SINGLE LINE DIAGRAM
With real time date updates
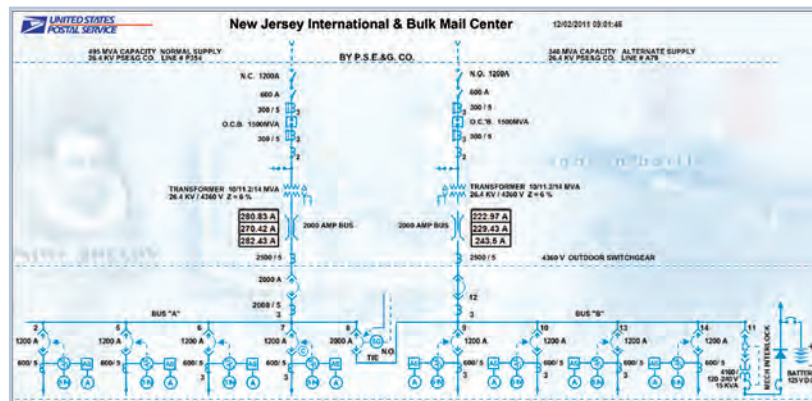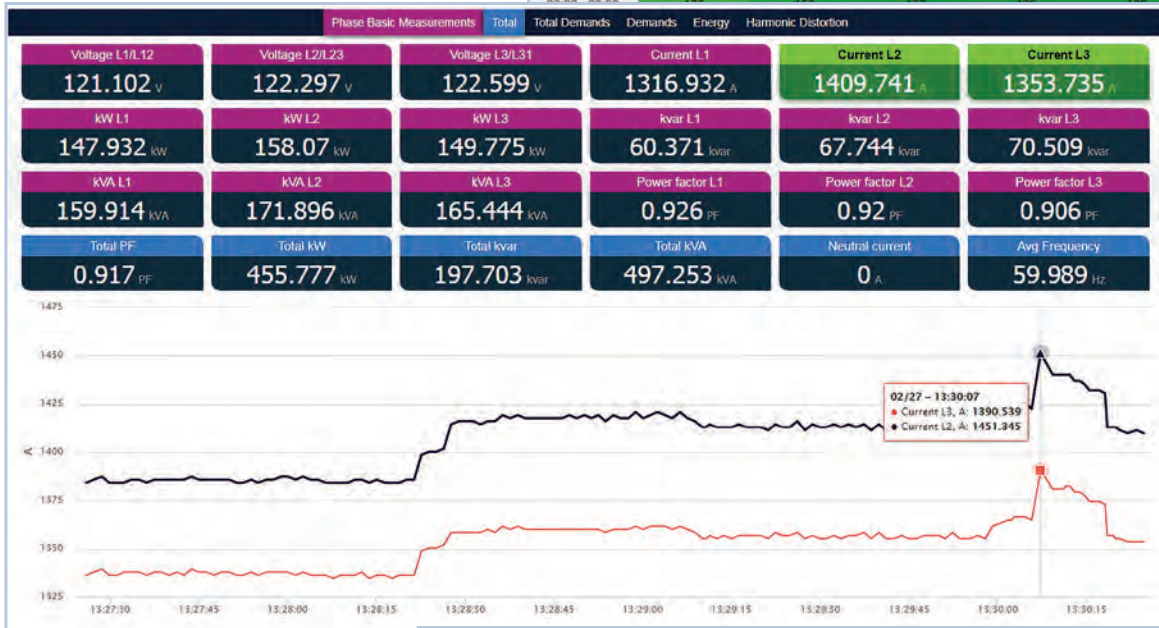

EXECUTIVE DASHBOARD
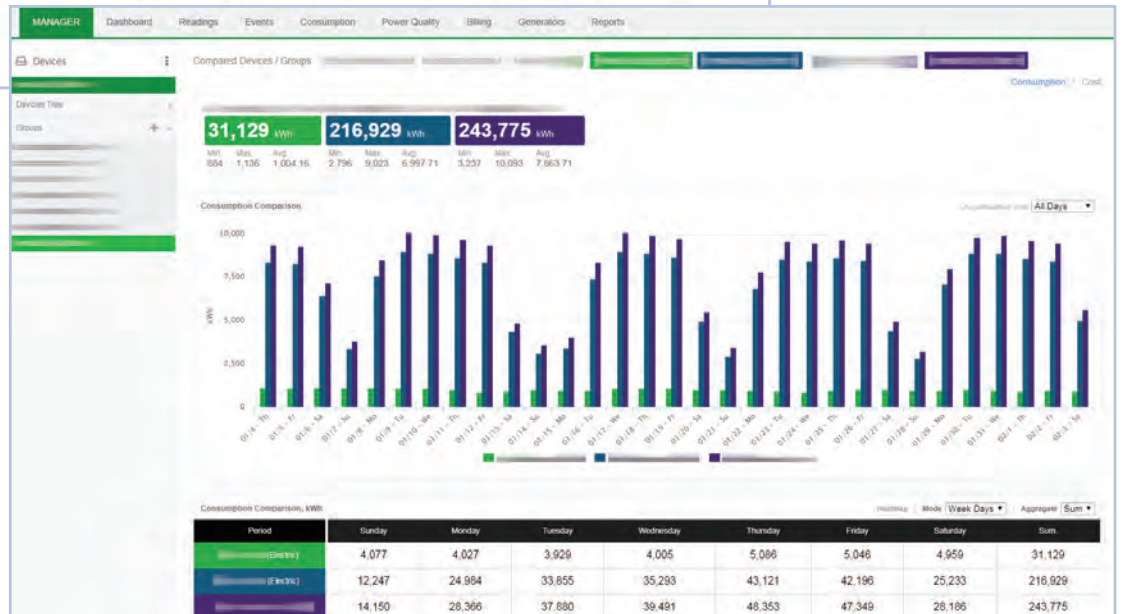Fully user-editable customized dashboards for each user

HEAT MAP

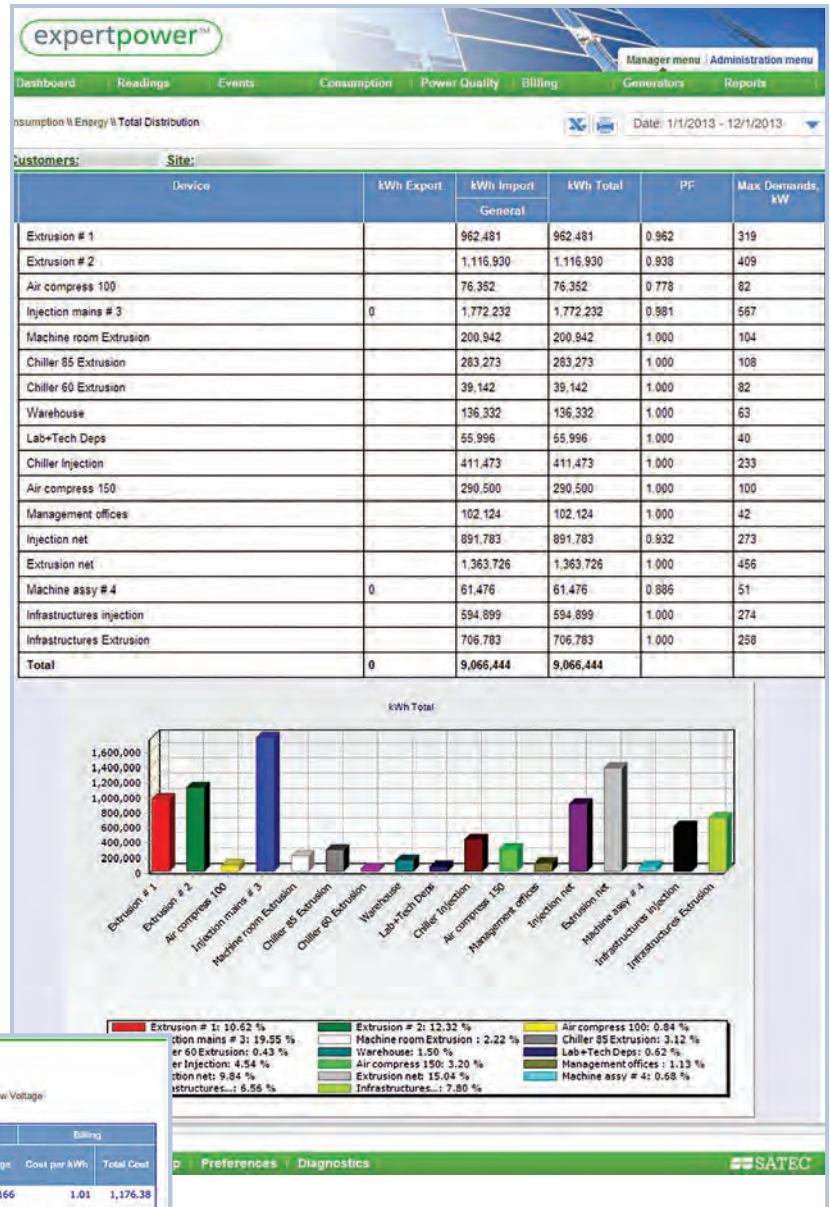ENERGY INTELLIGENCE: LIVE DATA

COMPARISON

Billing & Subtenants

Enables monitoring the consumption of sub-tenants and managing the billing process.

- Dynamic tariff settings including prices, usage and seasons
- Accurate cost calculation
- Complete submetering solution
- Tenant management
- Flexible invoicing options
- Invoice comparison

ENERGY BALANCE - TOTAL DISTRIBUTION

DETAILED CONSUMPTION REPORT

ENERGY BILL

SATEC
Powerful Solutions

Computation No.	197570		
Meter No.	C-111377	Invoice date	7/25/2017
Billing month	July 2017	Number of days in period	32
Metering period	6/16/2017 - 7/18/2017	Method of Charge	

To

Customer Name

Address

Description	Usage (kWh / kvar / kW)	Price (cents)	Total Cost ($)
: Fixed Customer Charge			56.29
: CIEP Standby Fee KWH	4,678.00	0.016	0.748
: Demand Charges KVAR	0.02	37	0.007
: Delivery Charges KWH (Off Peak Summer)	2,098.00	0.3609	7.57
: Delivery Charges KWH (On Peak Summer)	2,580.00	0.3609	9.31
: Delivery Charges KW Demand Summer	14.53	587	85.29
: Non-Utility Generation Charges KWH	4,678.00	0.1584	7.41
: Societal Benefits Charges KWH	4,678.00	0.7625	35.67
: RGGI Recovery Charges KWH	4,678.00	0.1164	5.45
: System Control Charges KWH	4,678.00	0.3296	15.42
Direct Energy Business Charge per KWH	4,678.00	7.498	350.76
Monthly Billing Fee			10.00
Sub-Metering Monitoring Charge			42.00
Total Charge			**625.92**

TOU Usage
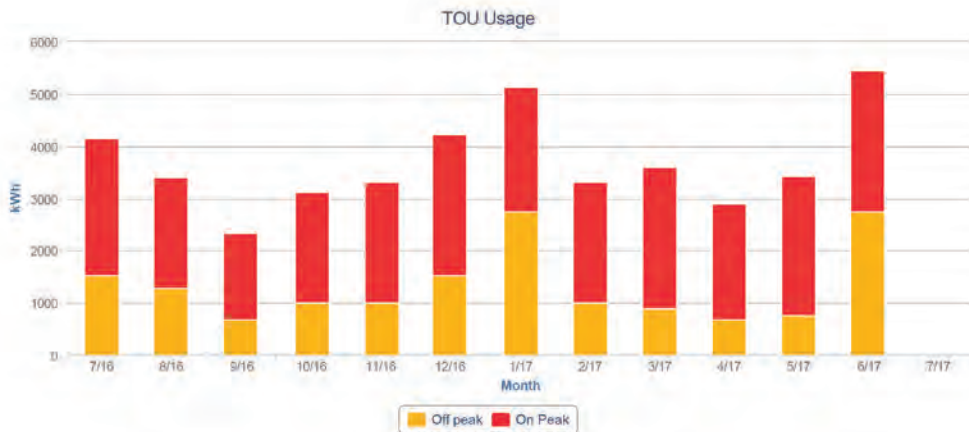
Produced by ExpertPower™

expertpower™

Power Quality

DETAILED EVENT ANALYSIS

Display RMS Chart

Harmonics spectrum

Moveable selection

Continuous waveform display

Trigger indicator

Analysis of selected time period

Symmetrical components for fault direction analysis

Demand Response & Smart Grid
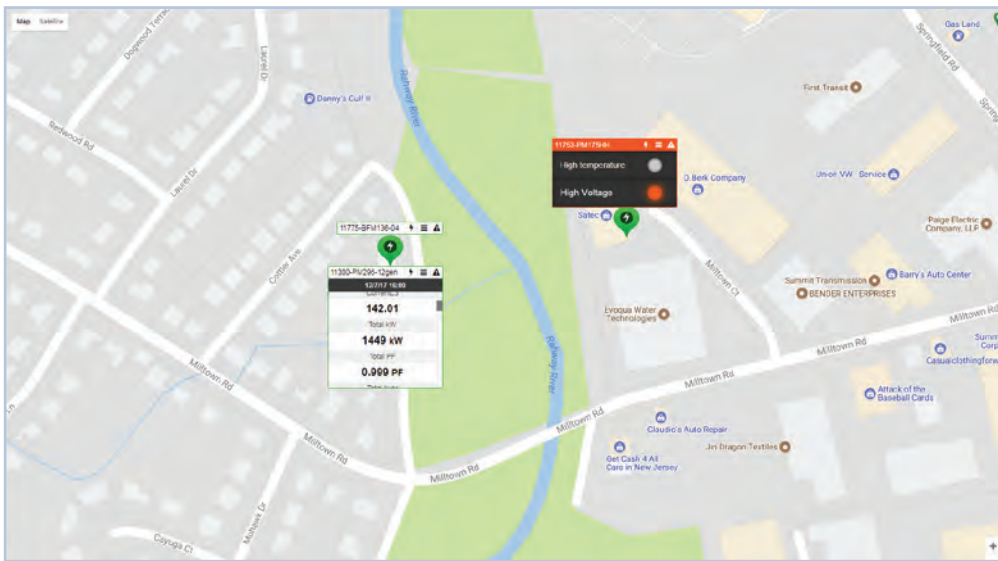
- Automatic and manual operation of generators to reduce peak demand according to schedule, incentives and availability

- Power station load management, production tracking and consumption monitoring, allowing detection of consumption irregularities and anomalies

- Control of substation automation bay controllers

GEOLOCATION

ExpertPower™ GeoLocation Dashboard allows for geographical meter display, alert notification and navigation on a map or satellite view.
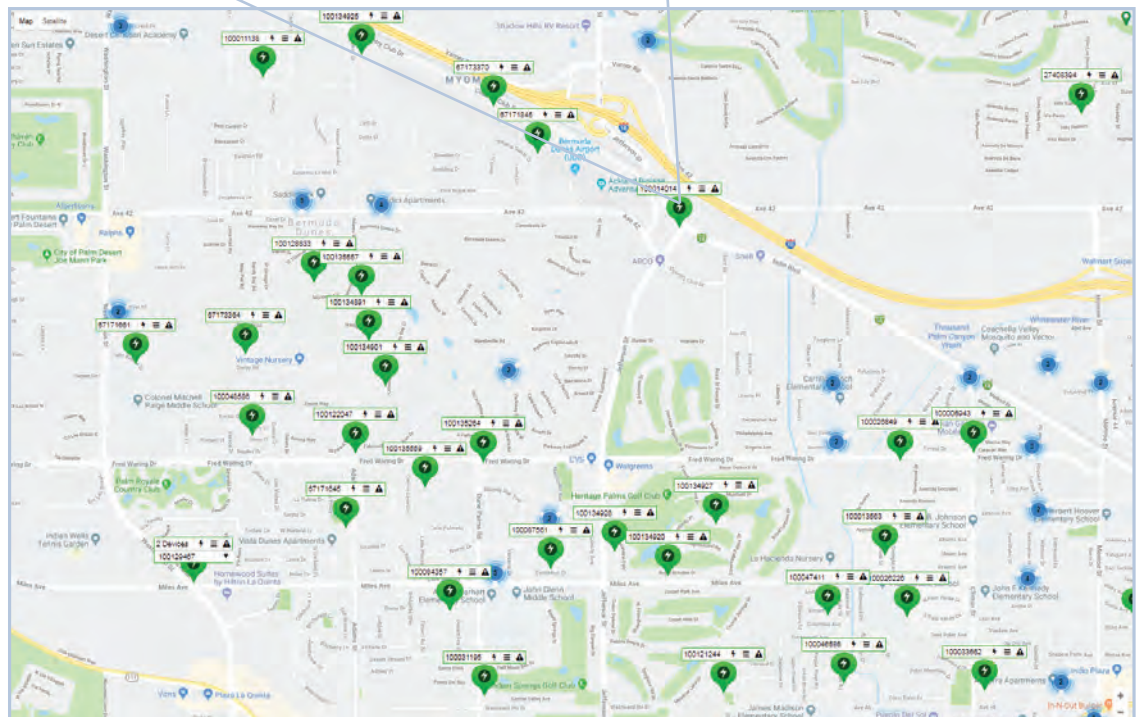
IPP Power Plant Management

- Generates daily production plans based on different algorithms, send/get daily production data from a CDC (Central Dispatch Center)

- Predicts customer consumption

- Manages power plant statuses such as: availability, startup duration and interruptions

- Issues gas orders

- Generates energy and cost balance calculations based on import & export energy, operational parameters, plant statuses and different tariffs

- Complete billing solution for electric power and related thermal products, including invoicing and a large set of configurable reports and tariffs

IPP GENERATION PLAN

From	To	Forecasted Temp. (°C)	Plant state	Production capacity NG, MW	Production capacity Oil, MW	Energy Sales, KWh	Net Available Capacity to IEC-NG, MW	Net Available Capacity Up To 10%, MW	Net Available Capacity Up To 90%, MW
00:00	00:30	9.9	No Limitation	140.99	136.92	57,410	26.17	0	26.17
00:30	01:00	8.8	No Limitation	140.99	136.92	55,897	29.196	0	29.196
01:00	01:30	8.8	No Limitation	141.06	137.02	55,230	30.6	0	30.6
01:30	02:00	8.8	No Limitation	141.13	137.12	55,082	30.966	0	30.966
02:00	02:30	8.8	No Limitation	141.17	137.17	54,815	31.54	0	31.54
02:30	03:00	8.8	No Limitation	141.2	137.22	54,761	31.678	0	31.678
03:00	03:30	9.65	No Limitation	141.36	137.49	54,814	31.732	0	31.732
03:30	04:00	8.5	No Limitation	141.54	137.81	54,824	31.892	0	31.892
04:00	04:30	8.35	No Limitation	141.54	137.81	54,893	31.754	0	31.754
04:30	05:00	8.2	No Limitation	141.58	137.86	55,128	31.328	0	31.328
05:00	05:30	8	No Limitation	141.62	137.91	55,550	30.52	0	30.52
05:30	06:00	7.8	No Limitation	141.66	137.96	55,980	29.7	0	29.7

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IPP CUMULATIVE GRAPH
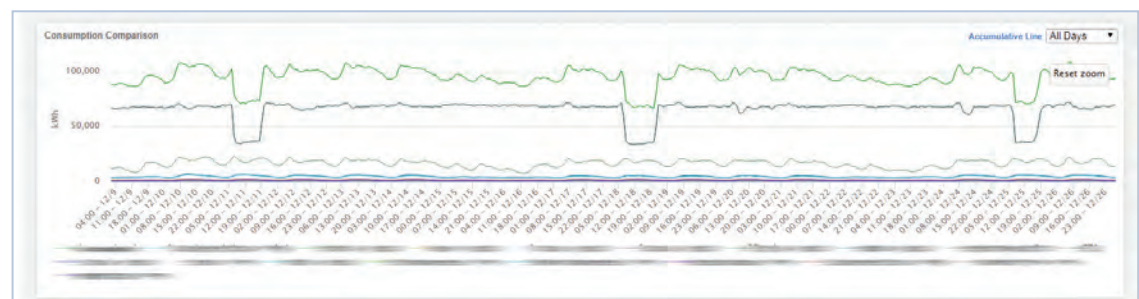
Energy Efficiency

- Rich report suite provides actionable insights
  - Compares cumulative monthly consumption with previous years
  - Highlights excessive weekend consumption
  - Highlights consumption outliers outside working hours
  - Tracks losses reflected in energy balance distribution
- Monitors HVAC coefficient of performance (COP) trends for proactive maintenance

WEEKEND RATIO

Cost or Usage:	Usage		Saturday Threshold:	9500 (kWh)			

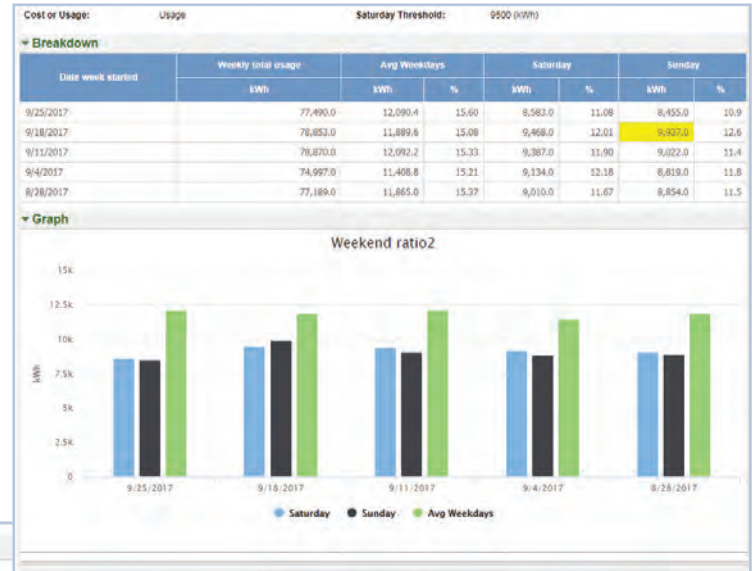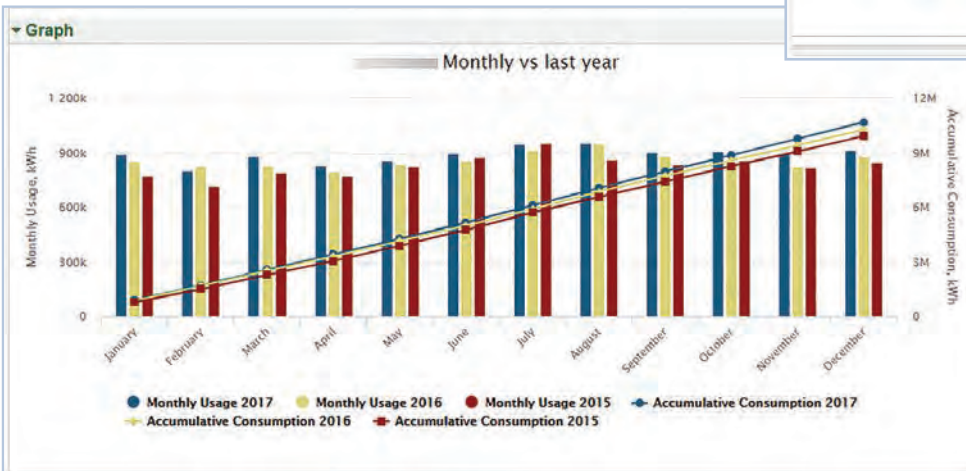▼ Breakdown

Date week started	Weekly total usage	Avg Weekdays		Saturday		Sunday	
	kWh	kWh	%	kWh	%	kWh	%
9/25/2017	77,490.0	12,090.4	15.60	8,583.0	11.08	8,455.0	10.9
9/18/2017	78,853.0	11,889.6	15.08	9,468.0	12.01	9,937.0	12.6
9/11/2017	78,870.0	12,092.2	15.33	9,387.0	11.90	9,022.0	11.4
9/4/2017	74,997.0	11,408.8	15.21	9,134.0	12.18	8,819.0	11.8
8/28/2017	77,189.0	11,865.0	15.37	9,010.0	11.67	8,854.0	11.5

▼ Graph

CUMULATIVE—LAST YEAR

HOURLY OUTLIERS
Configurable consumption alerts via email, SMS and mobile application

Report View

Report Type:	Consumption outliers per day	Report Name:	Consumption Outliers2
Report Dates:	9/1/2016 - 10/1/2016	Report generation date:	2/12/2018
Devices:	Floor 1 Meter #3, 195MO Floor 1 Meter #1, 195MO Floor 1 Meter #2, 195MO Floor 1 Meter #4, 195MO Floor 1 Meter #5, 195MO Floor 1 Meter #6		
Start Hour:	01:00	End Hour:	04:00
Threshold:	10		

▼ Breakdown

Device	Branch No.	Department	2016-09-01	2016-09-02	2016-09-03	2016-09-04	2016-09-05	2016-09-06	2016-09-07	2016-09-08	2016-09-09	2016-09-10	2016-09-11	2016-09-12	2016-09-13	2016-09-14
Floor 1 Meter #1			0	1	1	0	0	1	1	0	1	1	0	0	1	0
Floor 1 Meter #2			13	13	13	12	13	13	13	13	12	12	13	13	13	13
Floor 1 Meter #3			2	2	2	2	2	2	2	1	1	1	1	1	2	
Floor 1 Meter #4			1	1	0	0	0	0	0	0	0	0	0	0	0	
Floor 1 Meter #5			0	1	0	0	0	0	1	0	0	0	1	0	0	
Floor 1 Meter #6			2	2	3	3	3	3	3	2	2	2	2	3	3	

Tenant Mobile Application

- Supported on both iphones and androids
- Monitor monthly/daily/hourly cost
- Notifications about excessive usage and a high predicted monthly bill
- Look around to compare my normalized consumption with other tenants
- View past invoices

System Configuration

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Servers

Accounting Software

BMS / SCADA / Management System

Tenants TOU Bills

Printed Utility Bills

HVAC Management

End User / Owner / Facility Manager

Utility Vault

Notifications

Automatic Bill Data Retrieval

INTERNET / LOCAL

ExpertPower™

Site Internet Gateway

Cellular Provider Gateway

ETC-II

Modbus / M-BUS (via converter)

TCP/IP

GPRS

Concentrator

RF

HVAC Meters

Water, Gas & Steam Meters

SATEC METERS

THIRD PARTY METERS

Digital Pulse / 4-20mA

Applications
&
Case
Studies
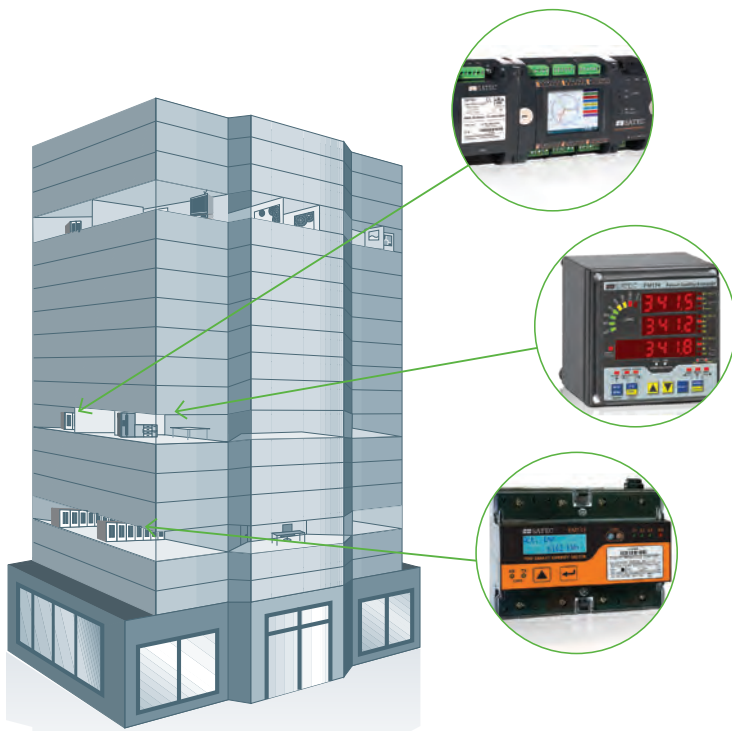
Commercial

Commercial Buildings | Shopping Centers

Universities | Hospitals | Hotels

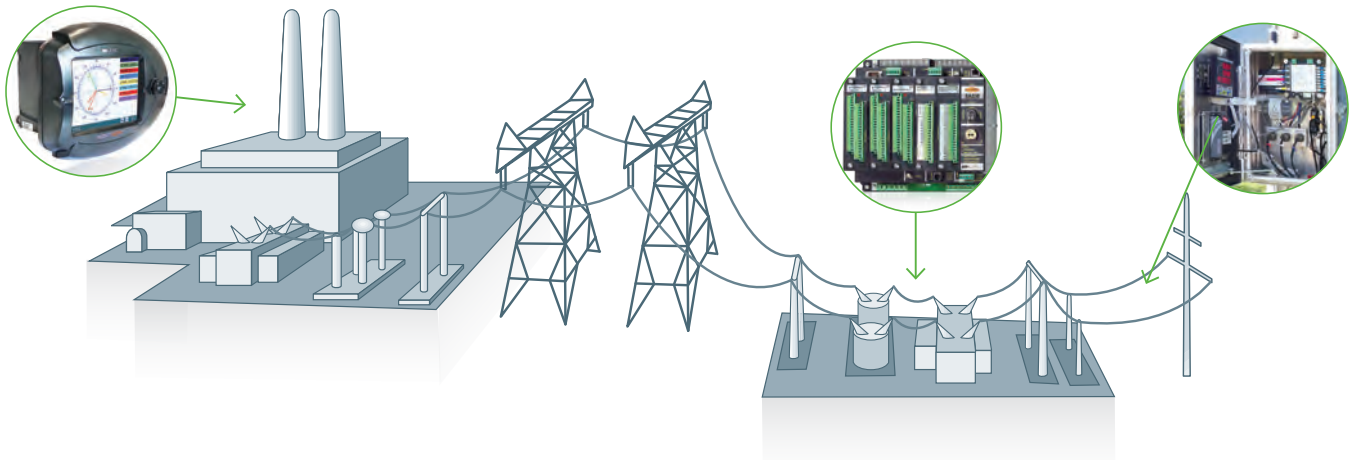Chain Stores | Residential Buildings

ENERGY EFFICIENCY & COSTS
- Reduce energy consumption
- Reduce surcharges and penalties
  (power factor, peak demand, etc.)
- Initiate corporate level saving plans
- Increase green star rating

SUBMETERING & BILLING
- Comprehensive billing solution for energy retailing
  (electrical, water, gas and air condition) to sub-tenants
- Web access for tenants, to view their bills and on-line data

POWER RELIABILITY
- Proactive maintenance for maximum system availability
- Analyze demands to help utilize existing infrastructure
  and prevent overdesign

Utilities | Smart Grid | Renewable

Generation | Power Plants

Transmission | Distribution | Smart Grid

Renewable: Solar | Wind | Waste Water

SMART GRID
- AMR/AMI complete solution including billing
- Comprehensive substation automation
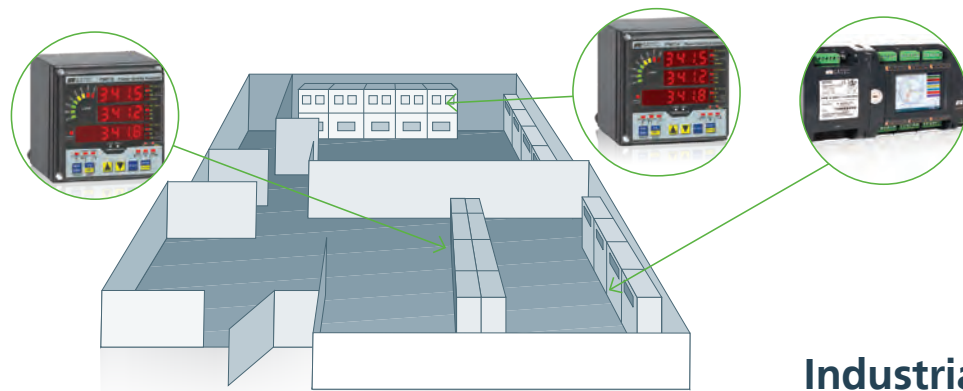- Monitor and reduce energy losses

POWER QUALITY
- Analyze source of power quality issues to allow isolation

- Manage customers' power quality

NETWORK SECURITY
- Proactive maintenance for maximum system availability
- Analyze demands to help utilize existing infrastructure and prevent overdesign

Data Centers

ENERGY EFFICIENCY & COSTS
- Reduce energy consumption
- Reduce surcharges and penalties (power factor, peak demand, etc.)
- Initiate corporate level saving plans

SUBMETERING AND BILLING
- Comprehensive, high-resolution billing solution for retailing energy to customers, down to an individual electric cabinet or even individual computer
- Web access for customers to view their bills and online data
- Power reliability
- Proactive maintenance for maximum system availability
- Analyze demands to help utilize existing infrastructure and prevent over design

Industrial

Process Industry

Semi-Conductors

Pharmaceutical

Process Industry

Mining

Automotive

ENERGY EFFICIENCY & COSTS
- Reduce energy consumption
- Reduce surcharges and penalties (power factor, peak demand etc.)
- Initiate corporate level saving plans

POWER RELIABILITY
- Proactive maintenance for maximum system availability
- Analyze demands to help utilizie existing infrastructure and prevent over-design

POWER QUALITY
- Effectively monitor power quality to prevent failures
- Verify the quality of the supplied voltage
- Generates compliance reports in accordance with international and local regulation

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