SATEC

Improved Energy Efficiency in Multi-site Organizations

Real time energy management for improving energy efficiency is one of the major objectives of the energy manager and of CFOs of electricity consumers. Energy management is a common phrase for energy suppliers but it is a key issue for energy consumers as well, as it leads to improved energy efficiency.

This document describes a real time energy management project which improved the energy efficiency by using Internet-based management software and smart meters in a nation-wide multi-site organization.

Multi-site organizations need a real time energy management solution in order to improve the energy efficiency, reduce energy costs and reduce CO_2 emission. By using Intelligent Electronic Devices (IEDs) and a powerful web-based solution, one can control each parameter in real time, predict peak demands, plan the energy consumption and manage faults in the electrical network.

Case Study – Supermarket Chain

Israel's largest retail chain, operating 240 stores nationwide, has installed SATEC's energy management solution. With a total area of 520,000 square meters and more than 10,000 employees, a combination of central and de-centralized control is required.

An energy meter with Time Of Use (TOU) capabilities was installed in several locations of each store (main service, HVAC, lights etc.). The meters have a flash memory which logs the hourly consumption. The data is sent to the central server over TCP/IP where LAN is used or over a Cellular modem in other places. In addition to the energy consumption, the meters log on their non-volatile memory all electrical parameters including voltages, currents, powers, power factor and more.

The central server resides in SATEC's server farm running the revolutionary eXpertpower™ software. The system collects the data over the Internet and processes it in real time. The data can be securely accessed from anywhere at any time with different user access privileges. eXpertpower™ monitors data in real time, allows viewing of historical information and generates a variety of reports.

The system incorporates data from several sources into one complete expert system:
1. Energy usage files from the electric utility, automatically received with the end user's approval
2. Scanned electric bill from private energy suppliers
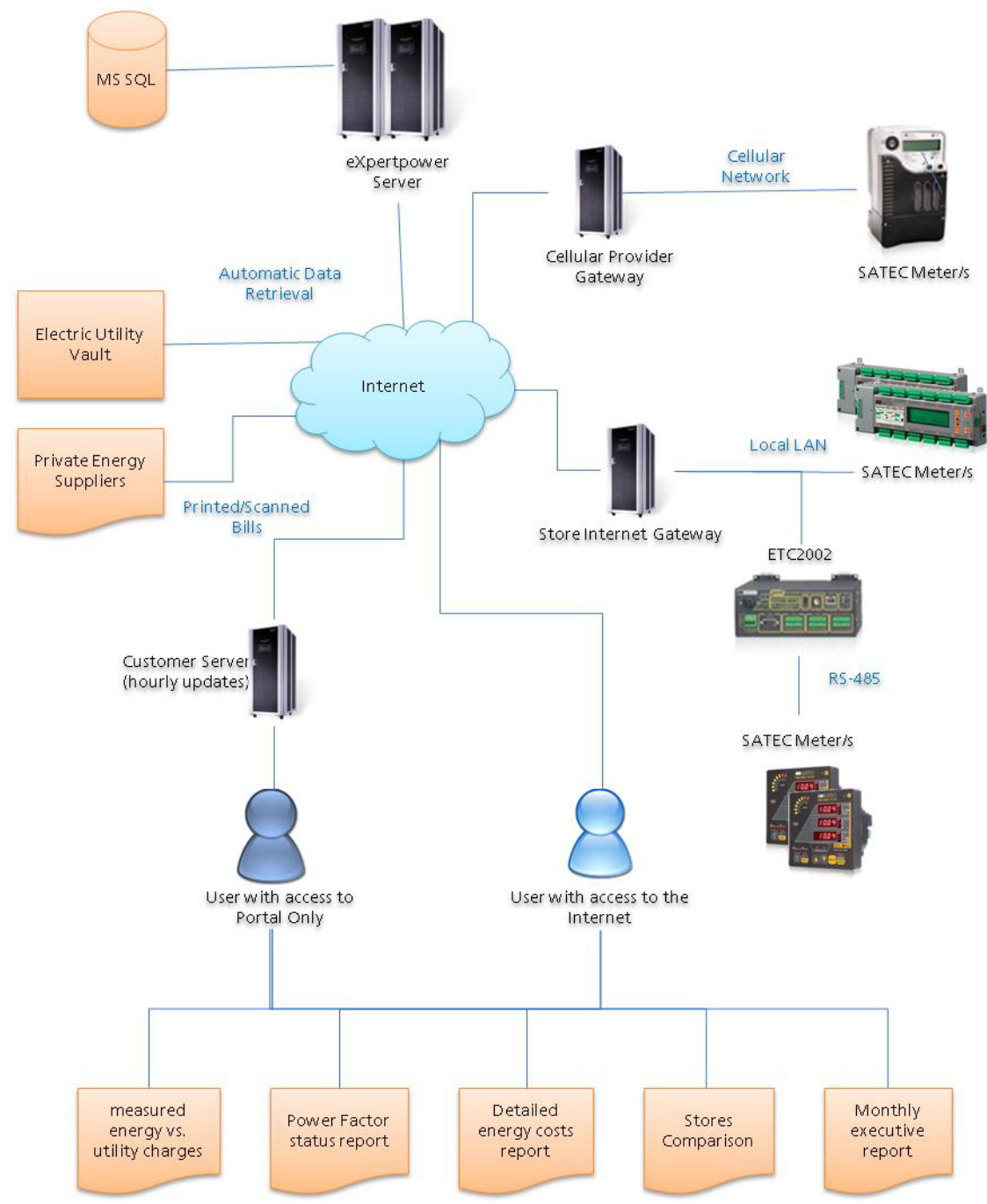3. Data collected from the different meters

The system compares the data according to different criteria, according to the billing period of the utilities. It can generate the following reports:
1. Comparison between the measured energy and the utility charges
2. Power factor status report
3. Energy costs Report, taken from SATEC meters
4. Summary of different stores and total for the whole network
5. Expected consumption, based on the season, last year's and last month readings
6. Comparing stores' consumption per square meter
7. Comparing consumption of different departments

As most users do not have Internet access, eXpertpower™ delivers the information to the organization's portal to allow easy access for store managers, maintenance managers and other levels of users.

				Customer Name				
				Bill Comparison				
				June 2010				

Dep.:	All Stores							
Store ID	Client No.	Previous Reading	Current Reading	Days	Consumption (utility), kWh	Consuption (SATEC), kWh	Price (utility), NIS	Price (SATEC), NIS	Difference
Store #1	1	01/06/2010	01/07/2010	30	37,630	37,753	13,824.87	13,870.75	-45.88
Store #2	2	01/06/2010	01/07/2010	30	90,072	90,018	32,958.24	32,940.67	17.57
Store #3	3	01/06/2010	01/07/2010	30	72,108	71,794	26,972.99	26,848.30	124.69
Store #4	4	01/06/2010	01/07/2010	30	35,000	35,072	12,703.65	12,737.34	-33.69
Store #5	5	01/06/2010	01/07/2010	30	57,620	57,927	21,370.28	21,484.67	-114.39
Store #6	6	01/06/2010	01/07/2010	30	116,360	116,713	42,924.02	43,076.17	-152.15
Store #7	7	01/06/2010	01/07/2010	30	52,818	52,956	19,408.61	19,459.82	-51.21
Store #8	8	01/06/2010	01/07/2010	30	67,264	67,341	24,347.05	24,374.69	-27.64
Store #9	9	01/06/2010	01/07/2010	30	19,705	20,764	7,100.83	7,497.94	-397.11
Store #10	10	01/06/2010	01/07/2010	30	135,990	136,469	49,236.38	49,424.05	-187.67
Store #11	11	01/06/2010	01/07/2010	30	170,730	169,937	62,711.81	62,430.64	281.17
Store #12	12	01/06/2010	01/07/2010	30	291,240	286,106	88,072.50	86,613.82	1,458.68
Total					1,146,537	1,142,850	401,631.23	400,758.88	872.35

System Diagram

MS SQL

eXpertpower Server

Cellular Network

Cellular Provider Gateway

SATEC Meter/s

Automatic Data Retrieval

Electric Utility Vault

Internet

Local LAN

SATEC Meter/s

Private Energy Suppliers

Store Internet Gateway

ETC2002

Printed/Scanned Bills

RS-485

SATEC Meter/s

Customer Server (hourly updates)

User with access to Portal Only

User with access to the Internet

measured energy vs. utility charges

Power Factor status report

Detailed energy costs report

Stores Comparison

Monthly executive report

The System's Achievements

1. Continuous real time monitoring of the electrical parameters and initiating preventive maintenance for power factor issues, over voltages, phase imbalance and more
2. Monthly monitoring of the electric utility charges
3. User real consumption information for future plans – new stores, electricity budget etc.
4. Comparing the actual and expected consumption to determine sources of energy waste
5. And the bottom line – saving energy and reducing CO_2 emissions.

Summary

Using eXpertpower™ in multi-site organizations is a key tool for energy management in real time, improving energy efficiency and optimizing the electrical network's reliability and profitability. It provides a fast return on investment (ROI) with substantial long term benefits.

Dep.:	All Stores							From 1-Jun-10 to 30-Jun-10				
Consumer				Consumption				Costs				
Store ID	Client No.	Tariff	Bill	Consumption (kWh)	Peak Demand (kWh)	Accumulated since January 1st	Total NIS	Accumulated since Juanuary 1st	Average cost	Change from last period
Store #1	1	TOU	Monthly	115,786	311	478,960	41,961.28	188,063.19	36.24	No data
Store #2	2	TOU	Monthly	356,093	786	863,127	105,999.36	252,692.94	29.77	No data
Store #3	3	TOU	Monthly	232,396	549	971,076	83,796.85	379,810.16	36.06	No data
Store #4	4	TOU	Monthly	296,832	681	370,608	88,355.07	110,347.52	29.77	No data
Store #5	5	TOU	Monthly	187,136	454	793,441	69,367.13	325,654.52	37.07	No data
Store #6	6	TOU	Monthly	175,881	383	754,119	63,771.93	299,308.36	36.26	No data
Store #7	7	TOU	Monthly	393,840	383	1,542,075	120,395.79	515,308.28	30.57	No data
Store #8	8	TOU	Monthly	309,428	383	1,276,079	92,559.82	423,124.82	29.91	No data
Store #9	9	TOU	Monthly	115,733	254	508,558	41,957.78	200,735.32	36.25	No data
Store #10	10	TOU	Monthly	75,650	187	313,435	27,965.13	126,276.54	36.97	No data
Store #11	11	TOU	Monthly	62,008	156	240,136	22,683.66	96,785.52	36.58	No data
Store #12	12	TOU	Monthly	66,905	160	276,008	24,503.22	110,162.13	36.62	No data
Total				2,388		8,388	783	3,028		No data