

Real Time Metering, Power Quality, Demand Management and Equipment Monitoring:



**Advanced Technologies
and Services for Optimal
Performance and Cost Control**

**Michael Corbin, P.E.
Sr. Vice President, SATEC Integrated Solutions**





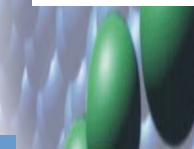
SATEC is a solutions oriented company that manufactures measurement instrumentation for the Commercial, Industrial and Power Industry.

SATEC
Union, New Jersey
USA – Corporate Headquarters

- **Product Specialization & Enhancements**
- **Product Testing**
- **Sales & Marketing**
 - **North America**
 - **South America**
 - **Pacific Rim**



Major Customers



Above contains registered trademarks of the respective companies

History



August 4, 2008

Power Surge

As electricity costs spike and demand taxes the grid, some states are eyeing ways to insulate consumers.

Energy prices up 24% since 2000.

US Energy Information Administration predicts an additional 15% by end of 2009.

New York looking for 22% bump

Tampa – 31%

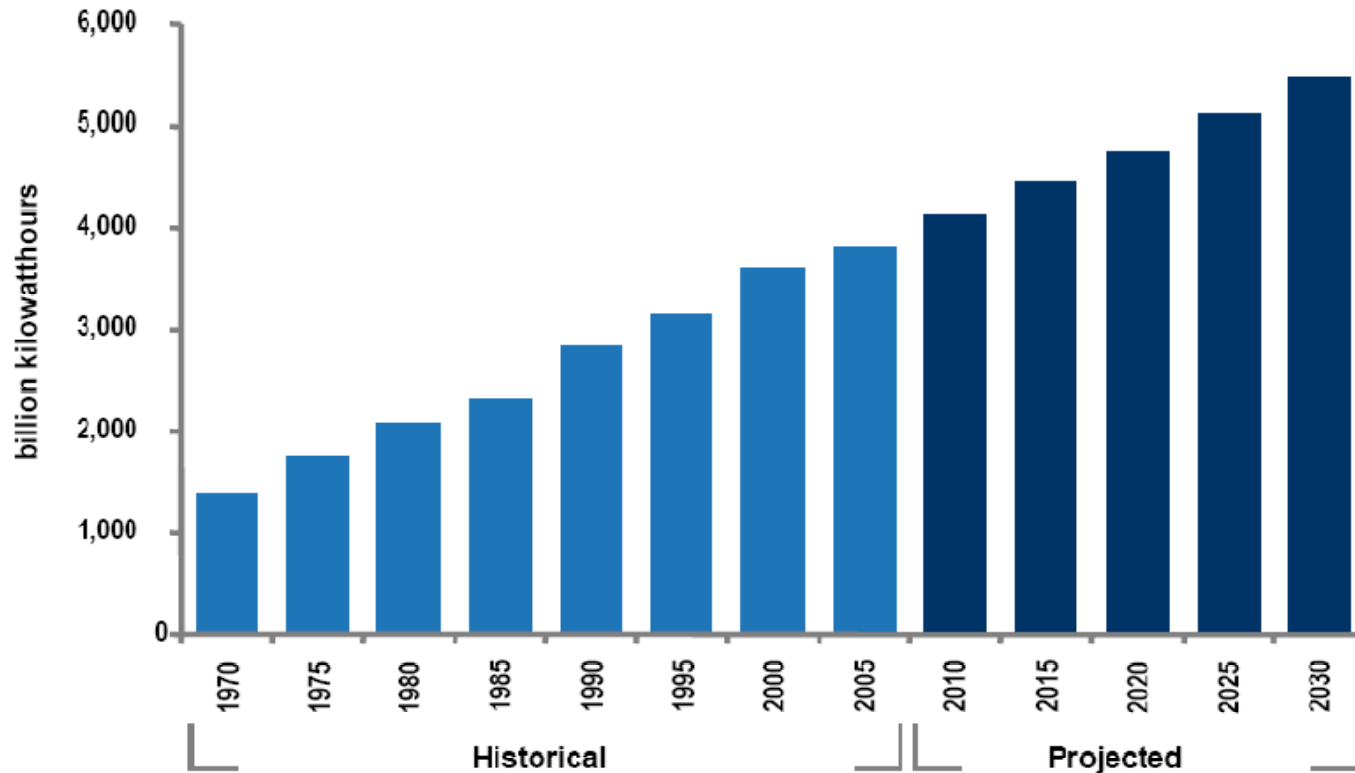
Virginia - 36%

Cause:

Demand is surging – new supply as slowed from 57GW in 2002 to 13GW in 2007



Electricity Demand Projected to Increase 40% by 2030

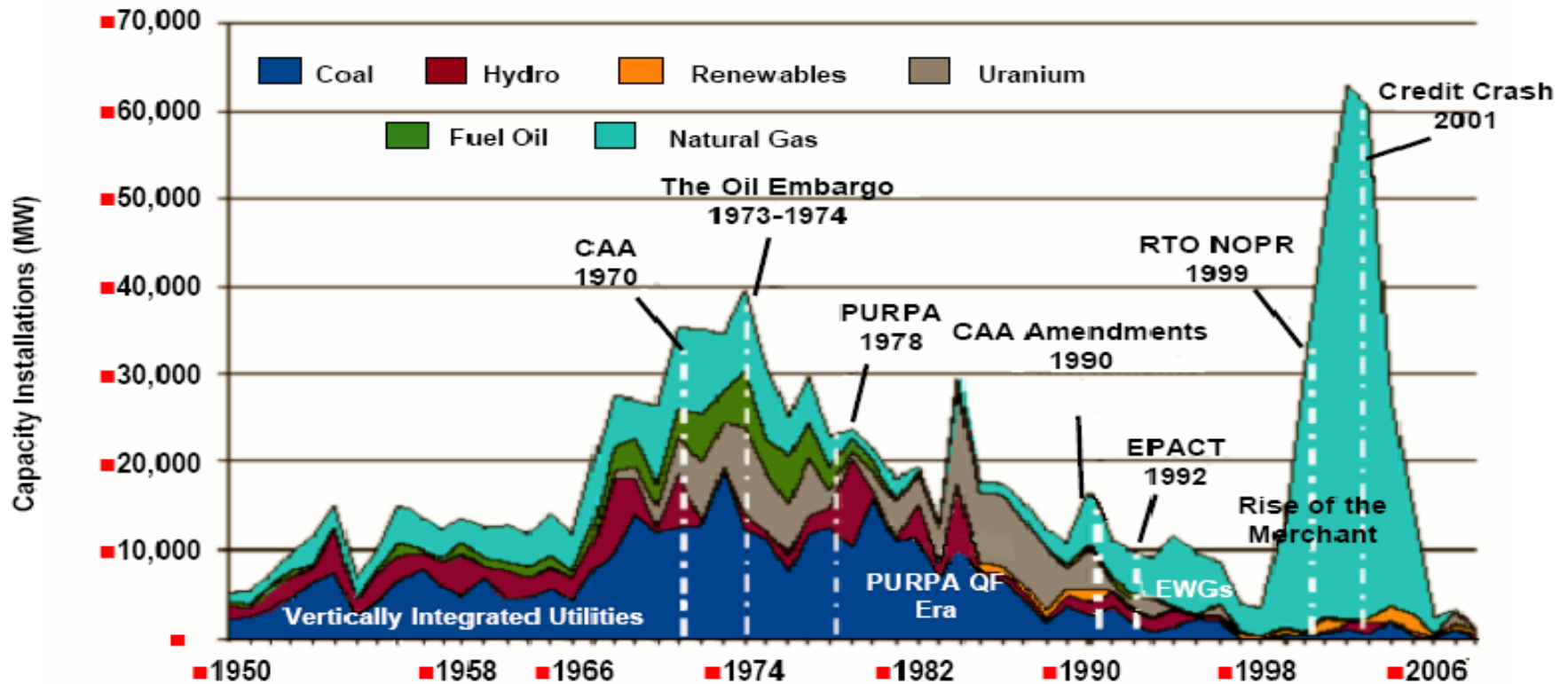


* Electricity demand projections based on expected growth between 2005 and 2030.

Sources: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2005* and *Annual Energy Outlook 2007*

Expensive alternatives for new generation options

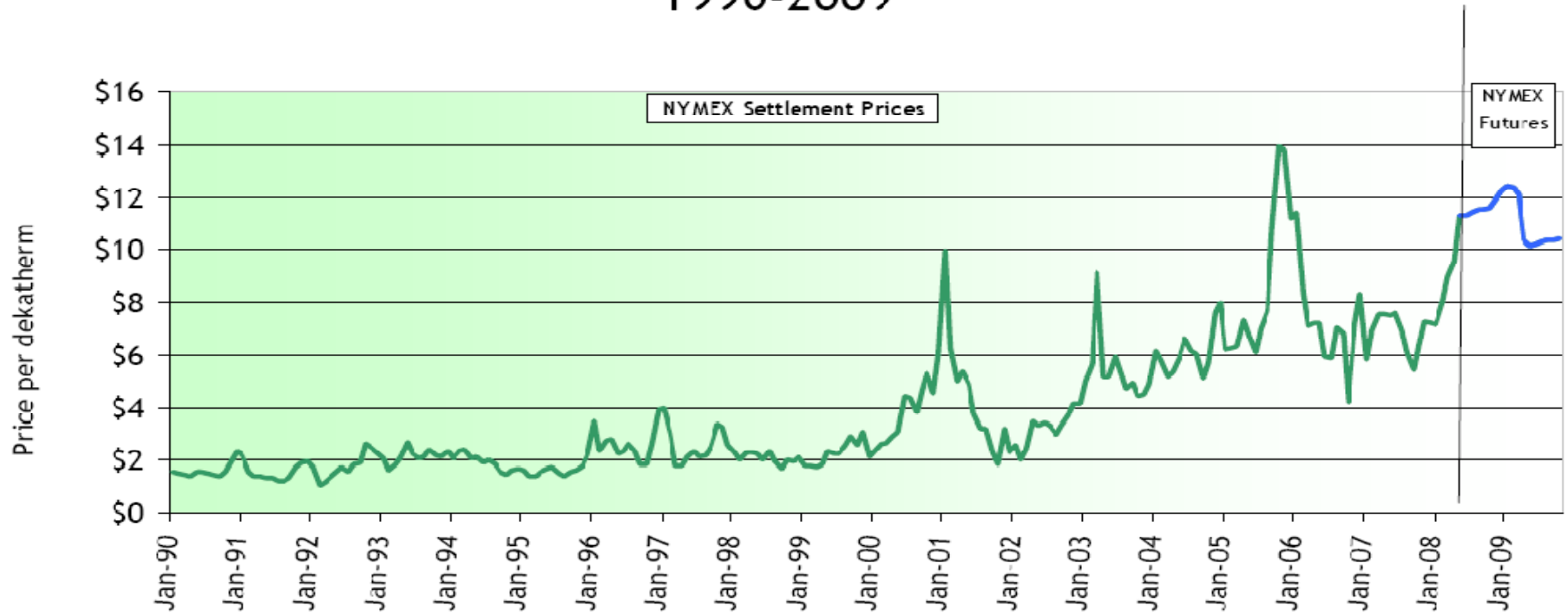
New Generation Capacity by Fuel Type, 1950 - 2007



Source: Henwood Energy Consulting

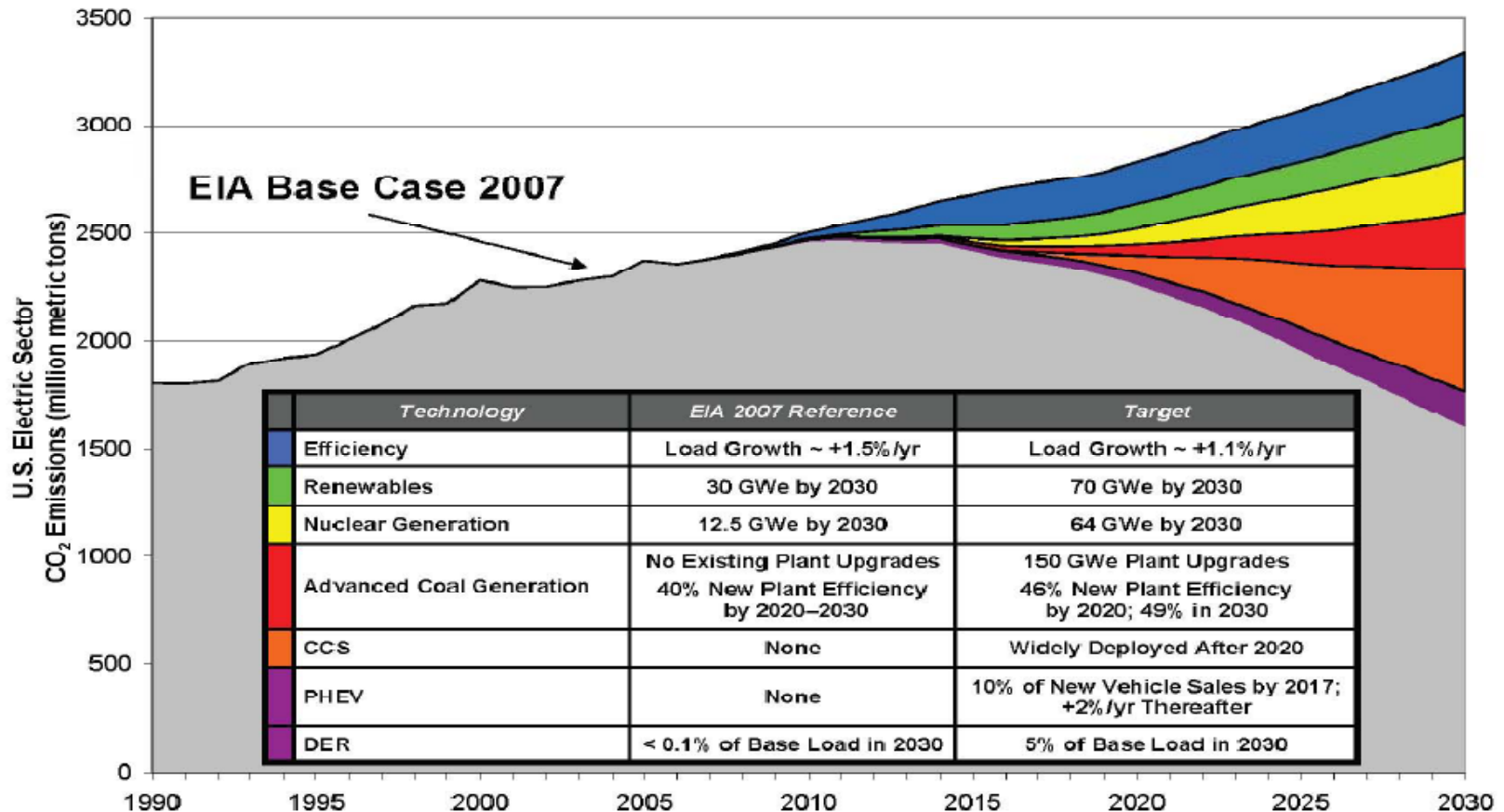
Natural Gas Pricing to remain high...

NYMEX Natural Gas Pricing 1990-2009



5/12/08 Closing
NYMEX Price

Focus on CO₂ reduction – feasible options



EPRI Conclusions

According to EPRI, the U.S. electricity sector will need ALL of the following technology advancements to significantly reduce CO₂ emissions over the coming decades:

- 1. Smart grids and communication infrastructures to enable end-use efficiency and demand response, PHEVs, and distributed generation**
- 2. A grid infrastructure with the capacity and reliability to operate with up to 30% intermittent renewable generation**
3. Significant expansion of nuclear energy enabled by continued safe and economic operation of the existing nuclear fleet; and a viable strategy for managing spent fuel
4. New commercial scale coal based generation units operating with 90%+ CO₂ capture and storage in a variety of geologies

SATEC's Solutions in the Electric Power Utility Industry

All SATEC Products have been specifically designed to withstand the rugged and harsh environment of the Electric Power Utility market.

- Wide-range Environmental Conditions
- Wide-range Voltage & Current Measurements
- High Accuracy per ANSI and IEC Utility Grade Standards
- Full EMC Certified Testing – Conducted & Radiated Surges, Impulses, Discharges, Emissions, Magnetic Fields, Radio Frequency, etc., and Safety
- ANSI/IEEE C37.90.1 Surge Withstand

SATEC has become the leading provider of Measurement, Power Quality and Fault Information products and solutions to the Electric Power Utility Industry for the Upgrade and Automation of Substations.



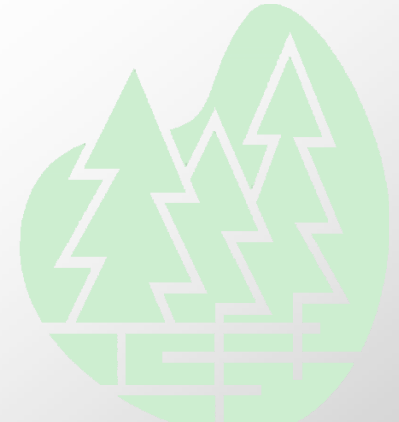
**Utility Solutions
Background**





SATEC has extended it's Utility market expertise into the Commercial and Industrial Marketplace with integrated solutions to monitor, understand, and reduce Electric Energy usage, costs and CO₂ Emissions.

- **Energy Efficiency**
- **Submetering / Tenant metering**
- **Demand Response**
- **PQ SCADA System**
- **Renewable generation control and monitoring**
- **Emission data measurement**



SATEC Offers Unbeatable Performance and Ease-of-Use in Monitoring Power and Energy with its “Integrated Solutions”

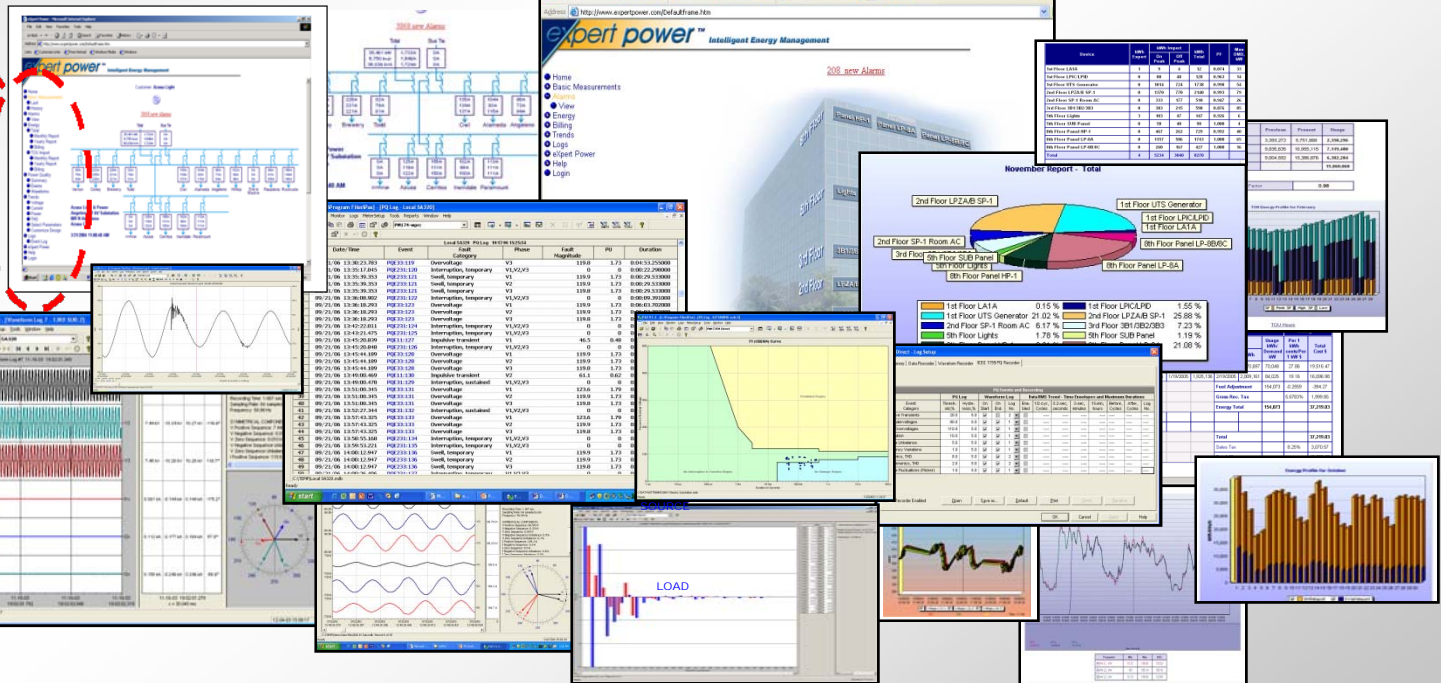
- eXpertPower™ Web-Based Energy Management Service
- eXpertManager™ PQ Supervisory Control and Data Acquisition (SCADA) Solutions

Monitoring and Managing of Utility Substations and Feeders

Monitoring and Managing of Total Building Energy Usage

MENU DRIVEN SELECTION OF:

- MEASUREMENT...
- LOADING / ALLOCATION...
- USAGE / SUB-METERING / BILLING...
- ADVANCED POWER QUALITY...
- HARMONICS...
- FAULT ANALYSIS...
- WAVEFORMS & OSCILLOGRAPHY...
- REPORTING / LOGGING / TRENDS...
- ALARMS / STATUS / EVENTS...
- HISTORICAL DATA...
- PREDICTIVE FAILURES...



Solutions



Powered by Power Rich Systems

1. Triple Redundant SCADA System

2. Integrated Historian – data storage

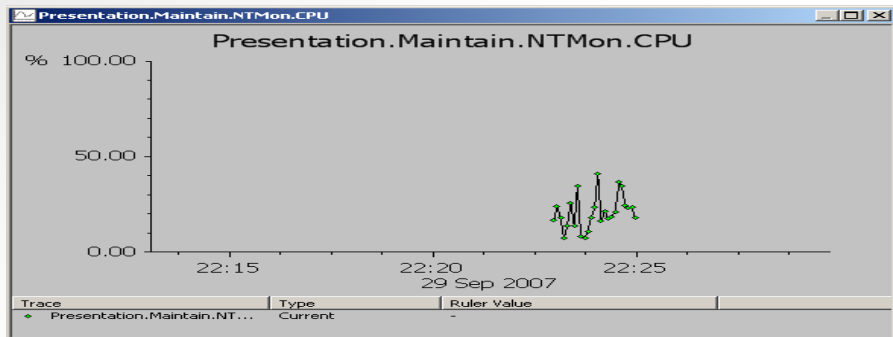
3. Advanced Alarm Notification

4. Integrated Web-server (Optional)

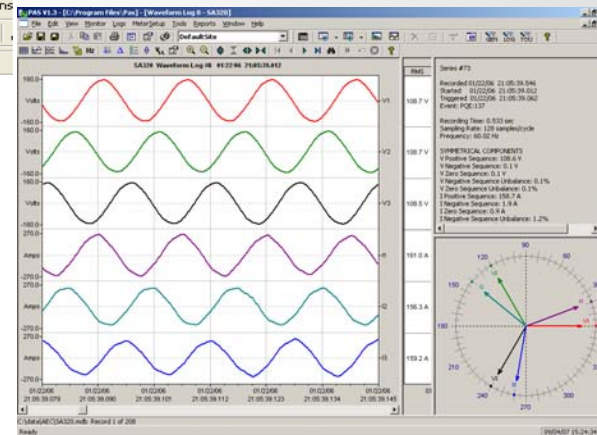
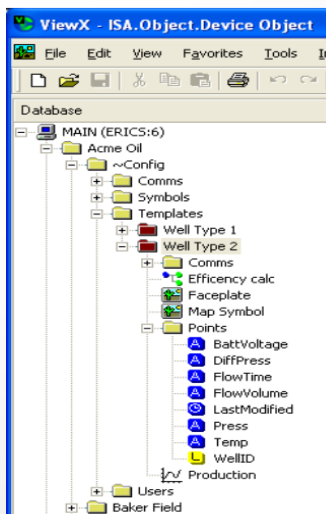
5. Object Oriented, Relational Database

6. Embedded Crystal Reports

7. SATEC PAS Software – Power Quality



Severity	Time	System	Source	Message	Category
3	02/05/2001 10:24:06	MAIN	EA.North Yorkshire.River Rye.Crook House Farm.Battery	Failed	CPPointDigital
	02/05/2001 10:24:45	MAIN	EA.North Yorkshire.River Rye.Kirkby Mills.Outstation	Failed	CPPointDigital
	02/05/2001 10:24:32	MAIN	EA.North Yorkshire.River Rye.Kirkby Mills.Battery	Failed	CPPointDigital
5	02/05/2001 09:53:33	MAIN	PX2A.Outstation (2,2)	Communication...	CAdeOversta...
	27/01/2001 08:32:45	MAIN	EA.North Yorkshire.River Rye.Howe Bridge.Battery	Failed	CPPointDigital



Multiple Third Party Product Support for eXpertManager – Lowers Total Cost of Ownership

- **ABB**
- **Basler**
- **Beckwith**
- **Cooper**
- **Cutler Hammer -
Through Netlink**
- **GE**
- **ICMI**
- **PML**
- **Qualitrol Devices**
- **SATEC**
- **Siemens**
- **SEL**
- **Square D**
- **Not locked in to one
product vendor - others
can be easily added**

Benefits eXpertManager provides to Industrial customers

- **Affordable system - starts at under \$10K for 500 data points**
- **Scalable to handle hundreds of thousands of data points for future expansion**
- **Data protection through triple redundancy**
- **Power Quality included in the solution to identify systems issues, monitor equipment, and improve system performance**
- **Real time response capability**
- **Supports multiple communication options**
- **Lowers total cost of ownership by leveraging existing infrastructure**
- **Proven, secure SCADA System with open protocol support**

eXpertPower Case Study: Power Quality Monitoring Solves Recurring Costly Equipment Damage

- 3-Phase Blower and Elevator Motors were failing and being damaged for “unknown” reasons.
- Power Quality Monitoring discovered repetitive loss of phase, low phase voltage, and large voltage unbalance conditions from Utility supply.

Events: last 15 out of total 260. This month: 0

Power Quality Events							
Event	Date	Time	Category	Line	Phase	Value	p
5422	10/29/2006	11:19:53.952	Sag	Livingston	L31	406.46	0.6
5421	10/29/2006	11:18:46.682	Sag	Livingston	L23	411.43	0.6
5332	10/15/2006	07:11:32.011	Sag	Livingston	L23	248.11	0.5
5331	10/15/2006	07:11:32.011	Sag	Livingston	L12	422.20	0.4
5294	10/7/2006	02:17:30.033	Sag	Livingston	L31	400.95	0.6
5238	9/28/2006	23:27:29.142	Sag	Livingston	L23	415.91	0.6
5234	9/28/2006	07:31:17.043	Impulsive	Livingston	L12	213.72	0.3
5099	9/5/2006	19:42:00.693	Impulsive	Livingston	L31	210.93	0.3
5041	8/27/2006	01:14:36.823	Sag	Livingston	L31	357.42	0.7
5009	8/24/2006	00:52:34.559	Sag	Livingston	L23	46.49	0.0
5008	8/24/2006	00:52:34.459	Sag	Livingston	L23	226.39	0.4
5010	8/24/2006	00:52:34.443	Sag	Livingston	L31	99.20	0.2
5007	8/24/2006	00:52:34.443	Sag	Livingston	L12	52.95	0.1
4992	8/21/2006	04:24:08.083	Impulsive	Livingston	L12	208.13	0.3
4925	8/13/2006	03:51:10.753	Impulsive	Livingston	L12	233.28	0.3

IEEE 1159 Categories

Power Quality Events - Sag
Customer: Garden Commercial Properties Site: Garden Commercial P Livingston Device: PM296

No.	Date	Time	Category	Phase	M: Val
5332	10/15/2006	07:11:32.011	Sag	L23	248.11

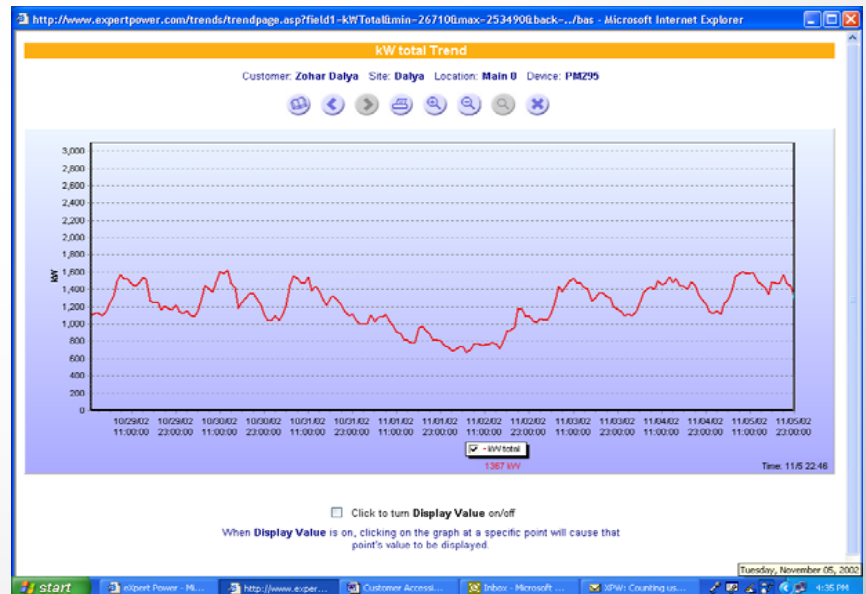
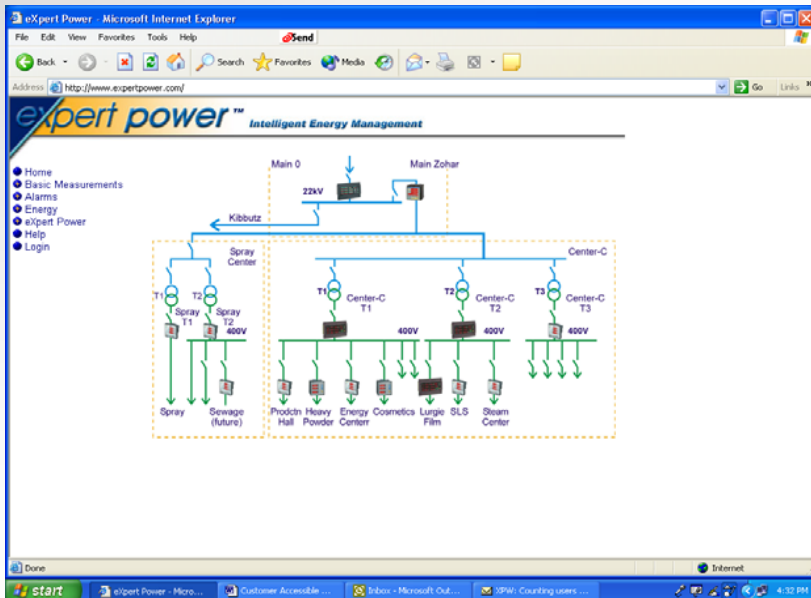
Power Quality Events - Sag
Customer: Garden Commercial Properties Site: Garden Commercial Properties Location: Livingston Device: PM296

No.	Date	Time	Category	Phase	Magnitude Value pu	Duration
5332	10/15/2006	07:11:32.011	Sag	L23	248.11 0.517	9.00 cycles

Time: 07:11:31.978
V12 491.2 V V23 488.7 V V31 491.8 V

eXpertPower Case Study: Generator Control for Demand Response

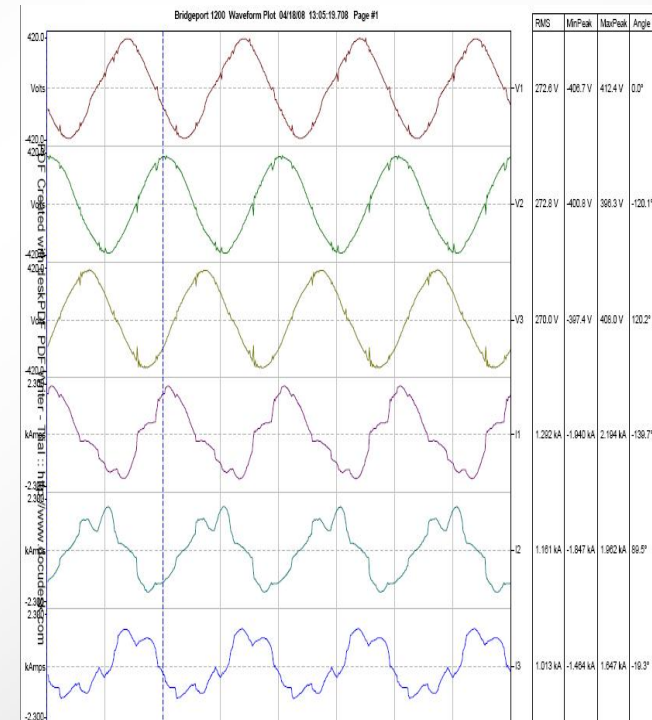
- On-site generator activated in response to utility price signals.
- Substantial savings results from avoiding the peak hours for electric prices.





Advanced Drainage Systems, Inc. - Case Study

- World's largest manufacturer of polyethylene pipe
- SATEC meters and eXpertPower at multiple locations
- While reviewing PQ data at NJ facility, noticed voltage distortion was higher than expected.
- Drive specialist checked all of the large drives in the facility and found an SCR that was not firing on a 500hp machine
- Once machine was taken off line, voltage distortion returned to normal – drive was repaired and returned to service
- Prevented equipment catastrophic failure



Merck – Rahway, NJ – 260K data points

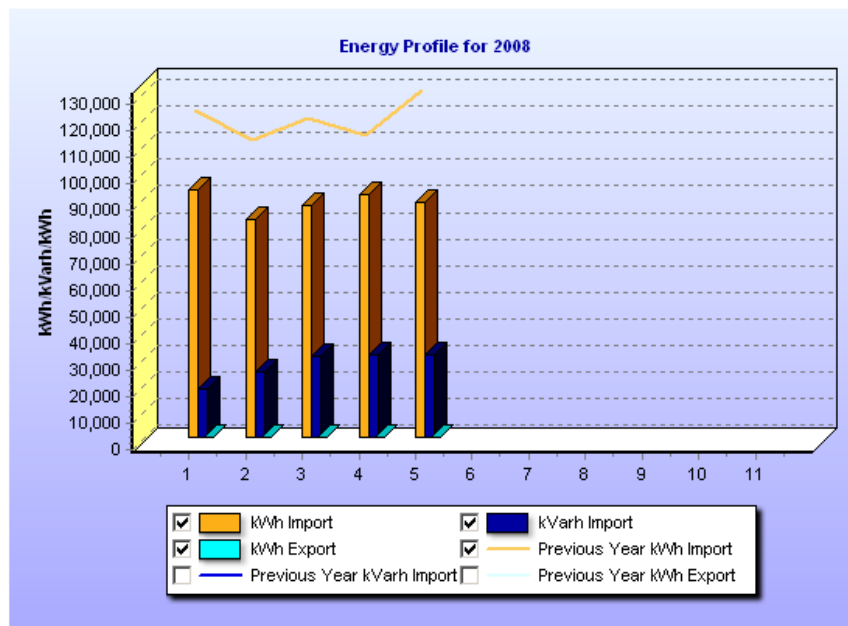
From October 2006 Control Engineering cover story.....

Merck has committed to reducing its energy use 25% by the end of 2008. But many advantages to the company are already being felt as a result of the power management SCADA system:

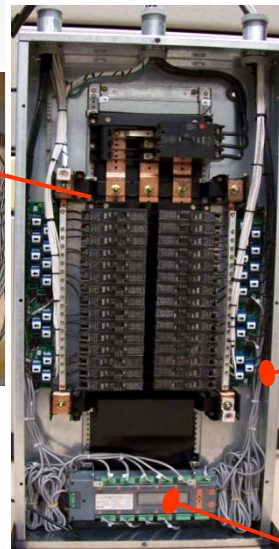
- **Technician time is saved by eliminating scheduled walk-about monitoring.**
- **Automated data gathering is saving time and preventing of data entry errors.**
- **Time for large equipment commissioning tests is reduced from four or five days to two.**
- **Smaller devices are more easily installed.**
- **Faster, more efficient troubleshooting is possible because information is available more quickly, reducing equipment maintenance and downtime.**

eXpertPower Case Study: Submetering and Billing Commercial Tenants Reduces Energy Usage

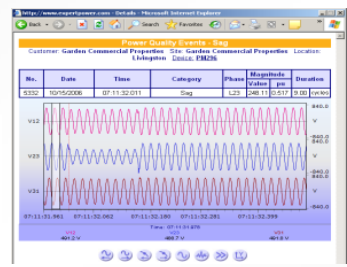
- Individual Sub-metering and billing reduced total building energy usage after one year by 25%.
- People conserve if they have to directly pay for energy.



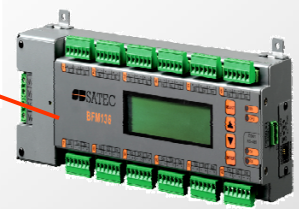
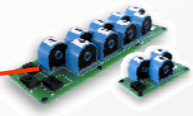
Measurement and Verification Solutions for Green Buildings



PM174
Power Quality Analyzer

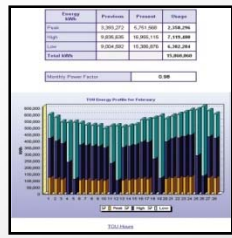


Solid Core AND Split-Core CT options

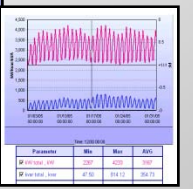
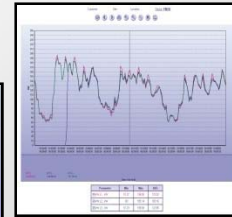
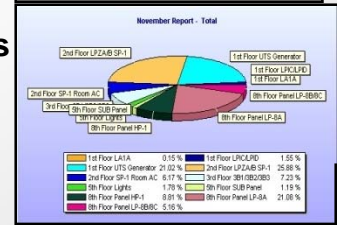


BFM136
Branch-Feeder-Monitor™

Device	100% Fault	100% Input	100% Total	10	Max. 100% Off
1st Floor LATA	1	0	0	10	0.012
1st Floor LFC/SPD	0	30	40	100	0.003
1st Floor UTLS Generator	0	8814	724	1738	0.259
2nd Floor LFC/SPD SP-1	0	1208	778	2140	0.261
2nd Floor SP-1 Room AC	0	333	577	139	0.347
2nd Floor 301-302-303	0	383	295	598	0.474
2nd Floor Lights	3	893	47	147	0.300
2nd Floor 508 Panel	0	30	48	18	1.000
2nd Floor Panel SP-1	0	467	352	724	0.500
2nd Floor Panel LP-8A	0	1317	586	1743	1.000
2nd Floor Panel LP-8B/C	0	260	357	427	1.000
TOTAL	0	1224	3608	3070	

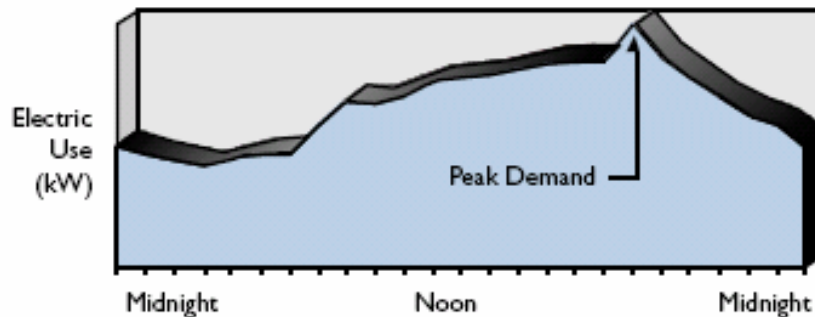


Energy Measurement	Location	Prevention	Elimination	Energy	Cost	Control
COOLING	COOL Pumps	171700000	2,100,000	2,170,000	12,000	12,000
COOLING	COOL Pumps	171700000	1,200,000	1,810,000	15,10	10,000,000
COOLING	COOL Pumps	171700000	1,200,000	1,810,000	15,10	10,000,000
Energy				554,074		37,110,000
Cost						57,110,000
Control						3,070,000
Total Change						60,000,000



eXpertManager Case Study: Predictive Demand Management Savings

- Many utilities / energy suppliers focus on 15 – 30 minute demand period for establishing peak demand
- SATEC's metering technology offers predictive demand management capability. Based on demand for the first 5 minutes in a demand period, can predict the demand for the entire 15 – 30 minute demand period and sends an alarm to eXpertManager if demand will exceed limit.
- On PSE&G rates, a 10MW subtransmission customer that is able to better manage demand (3% on peak kW reduction) saves \$4,100 per month while using the same kWh → not including any demand response payments.



SATEC Integrated Solutions Systems Offerings

eXpertPower Hosted Service

- Comfortable with outsourcing data storage
- Online reports – accessible from any PC with Internet Explorer
- Do not want to own SCADA system or pay for a system
- Can provides continuous PQ information and reporting
- Data at www.eXpertPower.com
- Pricing for service at \$16- \$25 per metering point per month after initial setup / configuration

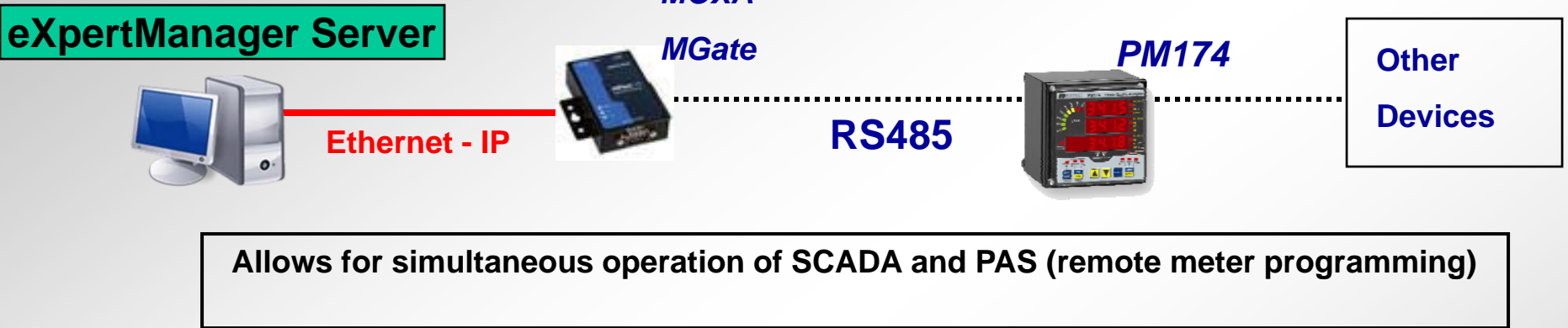
eXpertManager System

- Customer wants to own a real time monitoring, data acquisition & control (SCADA) system → will not outsource data or have it exported to the Internet
- Integrate data with other systems
- Interested in detailed PQ information when there is a problem (alarm / event flag)
- Integrate third party products
- Establish baseline of performance (M&V)
- Predictive demand management
- Interested in affordable system scalability
- Pricing under \$10K for initial system

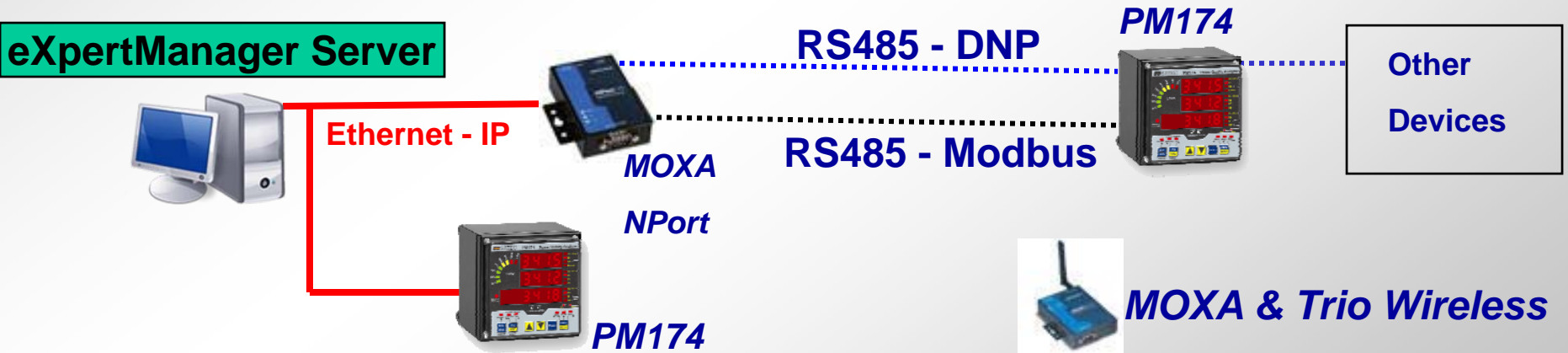
“Add-On Automation”™

Integrating communications into the Solution

1. Modbus for SCADA & PAS



2. DNP -> SCADA (Modbus for PAS)



SATEC can provide a full array of both Standard and Custom Enclosures, Cases, Mounting and Adaptor Panels and Pre-Wired Assemblies, to facilitate and reduce installation time and costs.



Custom Solutions



Database of Incentives for Renewables and Energy Efficiency

- **DSIRE – Comprehensive source of information on state, local, utility and federal incentives that promote renewable energy and energy efficiency**
- **Provides links to national, federal, state, regional and international organizations**
- **<http://www.dsireuse.org>**

Email **mikec@satecis.com** for free copy of an Energy Manager job description

SATEC Integrated Solutions

Value Proposition

- **One stop solution – advanced power quality metering technologies, communications and systems solutions**
- **eXpertPower – web based Power Quality monitoring and control service solution**
- **eXpertManager PQ SCADA System – a proven, cost effective system solution to own**
- **Substantial **savings** potential:**
 - **Operations**
 - **Capital expenditure**
 - **Maintenance labor**
- **“Add-on Automation”™ solution**
- **Advanced power quality information**

SATEC – *Leading the World in Power and Energy Solutions*



- **Power Utility**
- **Industrial**
- **Commercial**

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