

Industrial Wireless is Here!

DOE Sensors & Automation 2007 Annual Portfolio Review

Distributed Wireless Multi-Sensor Technologies

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Project Description

Low-Cost Wireless Multi-Measurand Sensing Program



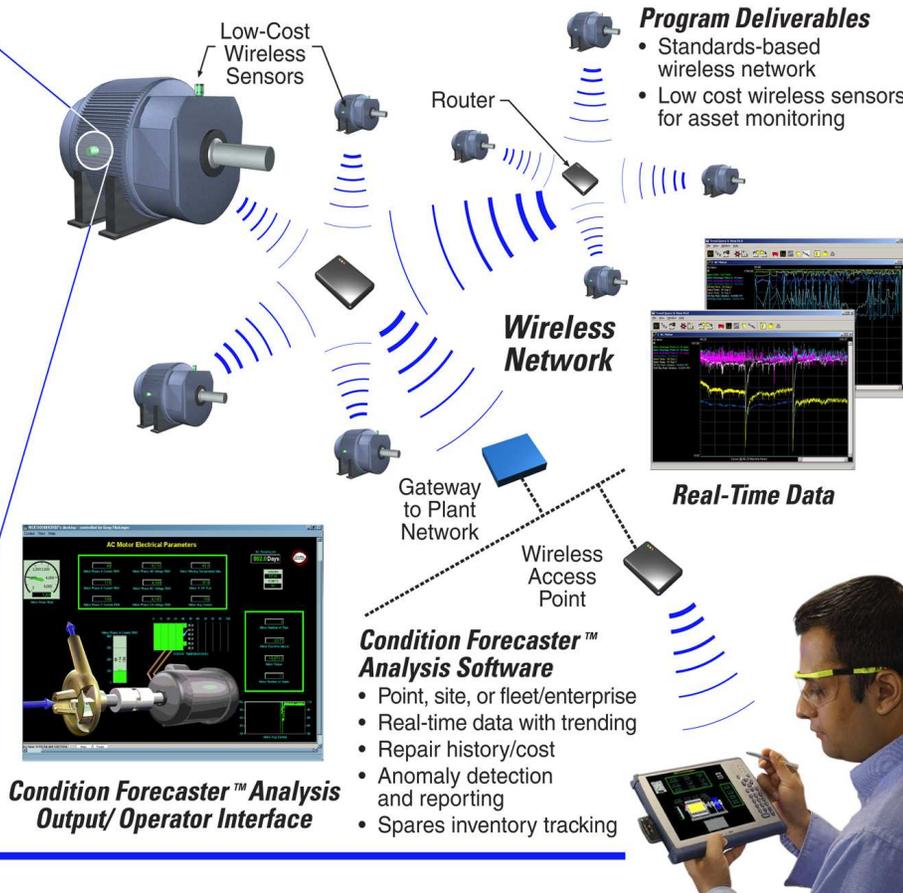
Wireless Sensor Concept

Advantages

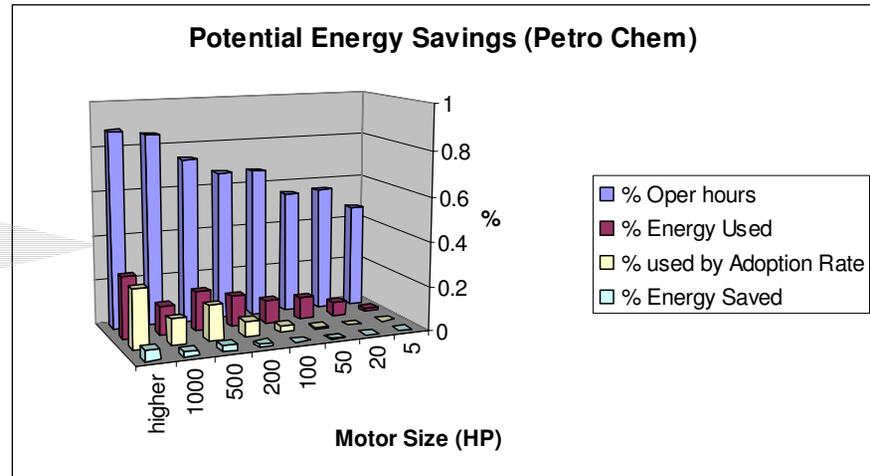
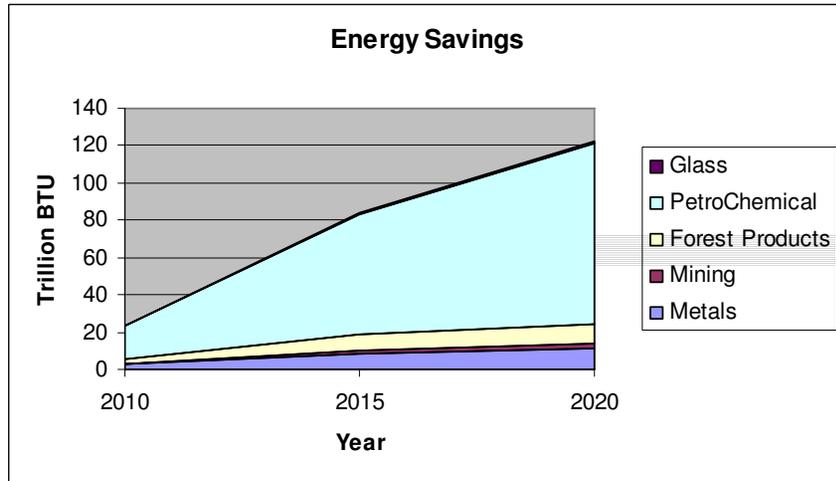
- Communication reliability
- Long life (minimum 3 years)
- Robust package (-40°C–70°C operation)
- No FCC license required (ISM band)
- Multiple sensor options in single package
- Enclosure options suitable for outdoor applications

Benefits of the Technology

- Estimation of remaining life
- Indicator of operational efficiency
- Improves asset maintenance strategies



Energy Savings Calculation



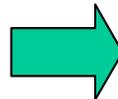
~US DOE December 2002 United States Electric Motor Systems Market Opportunity Assessment

Savings from:

- System Maintenance
- Motor Maintenance
- Motor Application Practices



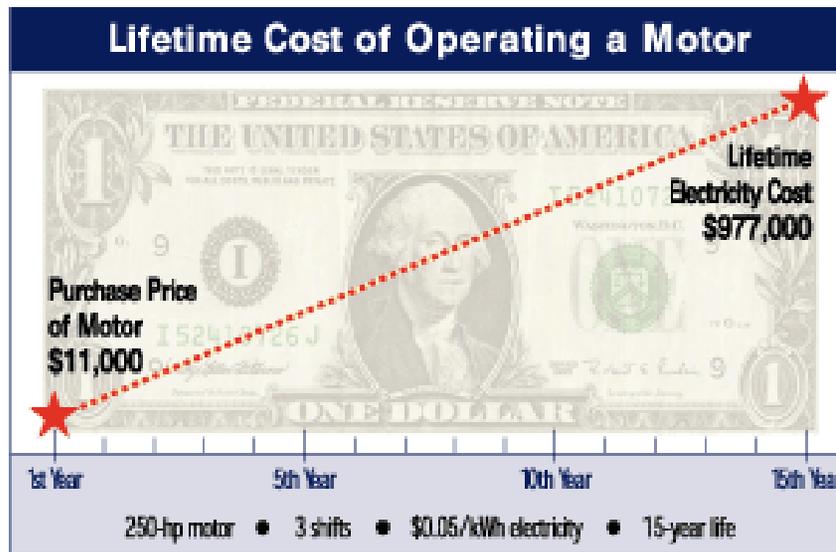
36% Captured Savings



Benefits (est.)	2020
Energy Savings	122 trillion Btu
Cost Savings	
Carbon Reduction	2.13 MMTCe



Value Proposition for End User



Source: Electric League of the Pacific Northwest

"Unscheduled downtime is the largest single factor eroding plant performance. Over \$20 Billion, or almost 5 percent of total production, is lost each year in North America alone due to unscheduled downtime."
~ ARC 2002

- Electric motors systems consume approximately 60% of all electricity generated in the United States.
- Motors Systems represent about 70% of total power costs for most process industries.

~US DOE December 2002 United States Electric Motor Systems Market Opportunity Assessment

Technology Significance

- § **Industrial hardened Wireless Technology**
- § **5 year sensor battery life on single AA battery**
- § **Able to operate with energy harvesting technologies (No battery required)**
- § **Industrial grade Security – All major threats addressed**
- § **Scalable to thousands of devices**
- § **Able to coexists with other wireless technologies**
- § **Able to operate in conditions with RF interference**
- § **Low cost using commercially available parts**

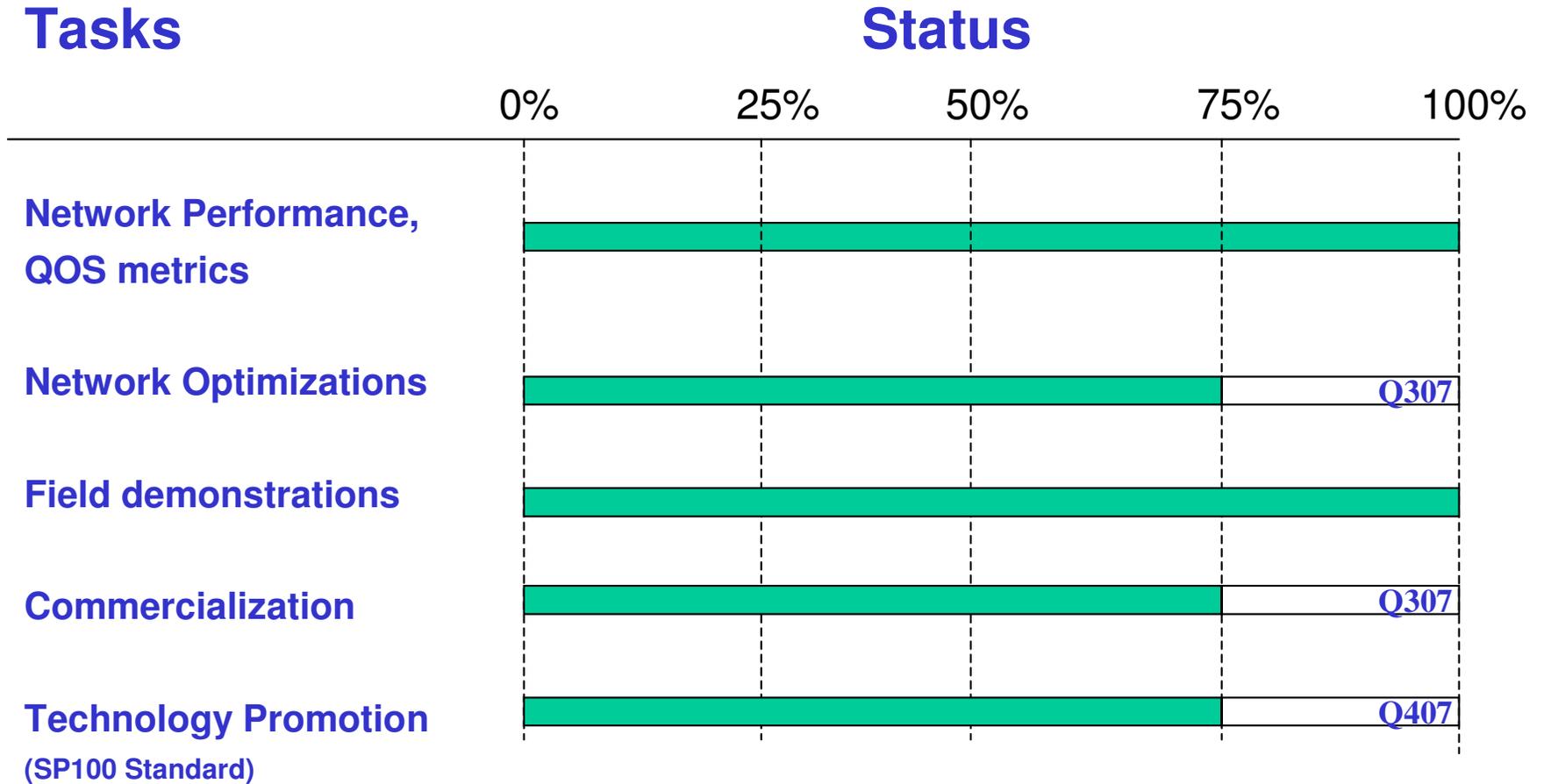


Project Accomplishments

- § **Developed a robust wireless technology suitable for industrial applications.**
 - Robust security
 - Long battery life
 - Reliable data
 - Industrial environmental specifications
- § **Demonstrated the technology in several field sites.**
- § **Developed several wireless products for industrial applications**
- § **Supported standards activities through ISA – SP100**



Current Status



- On Schedule
- Behind Schedule
- At Risk



Remaining Activities

§ **ISA SP100.11a Standards Activities**

- Participate in creation of Release 1 Draft
- Contribute to Principles of Operation
- Assist in preparation of technology Demonstration

§ **Commercialization Activities**

- Release of GE Energy equipment condition monitoring sensors
- Commercialization strategy for ISA SP100.11a with GE

§ **Customer Acceptance**

- Report on successful deployments of wireless technology
- Properly set customer expectations on the capability of the current technology



Backup Material



Commercialization Plan GE Energy – Services

Services Solutions For Improved Plant Asset Management - Microsoft Internet Explorer provided

Address: http://www.bently.com/service/Services_Solutions.htm

BENTLY Nevada

Services | home | search | products & services | support | training | company | publications | contact/vs it us

Related Links: [Packaged Systems Sample Documentation](#)

Services Solutions For Improved Plant Asset Management

Plant Asset Management

Bently Nevada, The Plant Asset Management CompanySM, offers a complete portfolio of products and services designed with one thing in mind - to help you get more from your plant's production-related assets. More availability, more reliability, more safety, more quality, more productivity.

Bently Nevada's service solutions can help improve any plant's asset management program by addressing the following important areas:

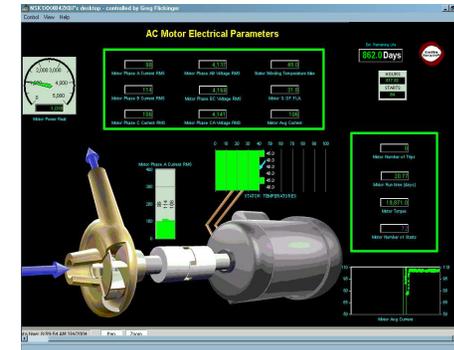
- Benchmarking Your Current Activities**
 - Opportunity/Risk Assessment Services
- Supporting Your Program**
 - Program Management Services
- Assessing/Correcting Asset Condition**
 - Pre/Post-Outage Assessment Services
 - Machinery Diagnostic Services
 - Thermodynamic Performance Services
 - Machinery Balancing And Alignment Services

Table of Contents

All files are in PDF format.

- [Plant Asset Management Services \(86KB\)](#)
- [Opportunity/Risk Assessment Services \(85KB\)](#)
- [Pre/Post-Outage Assessment Services \(82KB\)](#)
- [Project Services \(79KB\)](#)
- [Packaged Systems \(94KB\)](#)
- [Machinery Diagnostic Services \(103KB\)](#)
- [Product Verification And Repair Services \(115KB\)](#)
- [Machinery Balancing And Alignment Services \(90KB\)](#)
- [Thermodynamic Performance Services \(89KB\)](#)
- [Training \(74KB\)](#)
- [Why Bently Nevada? \(218KB\)](#)
- [Complete Services Solutions Brochure \(1528KB\)](#)

Download Adobe® Acrobat® Reader from [Adobe Systems Incorporated](#).



GE Energy: NTI 06-73 Project Overview

The commercial product
WILL NOT look Like this.



16 April 2007

NTI = New Technology Investigation
NTI \neq Commercial Product (Yet...)



What exactly does the WSIM do?

§ **Static Data Types**

- Temperature, Seismic, wSIM battery status

§ **Seismic Sub Data Type**

- Acceleration, Enveloping, Accel to Vel

§ **Static Update Rate**

- 10 to 60 minutes

§ **Dynamic Waveform**

- Enable/Disable

§ **Dynamic Waveform Size**

- 1024 or 2048 sample

§ **Dynamic Sample Rate**

- 2048, 4096, 8192,
- 30kSps, 15kSps, 7.5kSps, 3,750 samples/sec, 1,875 Samples/sec

Note: Dynamic waveform data is broken up into packets that are less than 80bytes in length. Each RF message will contain a complete static update and a fraction of the dynamic waveform. Dynamic waveforms take approximately 1 hour to upload.



GE Sensing

- The Loggers are designed for operation in warehouses, chambers, fridges and freezers.
 - Loggers have internal RH sensor and either an internal or external temperature sensor.
 - Internal RH Sensor: Range 0-100%RH, Accuracy 2%RH
 - Internal Temperature: Range -20°C to 60°C, Accuracy 0.5°C
 - External Temperature: Range -200°C to 200°C, Accuracy 0.1°C to 0.3°C
 - Battery Life: e.g. 2 years @ 1 min sample rate
- The loggers store up to 10,000 samples per sensor.

The Validation software provided with all Kaye products permits the setup, running of a qualification, calibration and generating validation reports in compliance with regulations including Part 11 and other EN norms

Kaye RF ValProbe™ RF Thermal Validation System

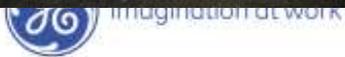
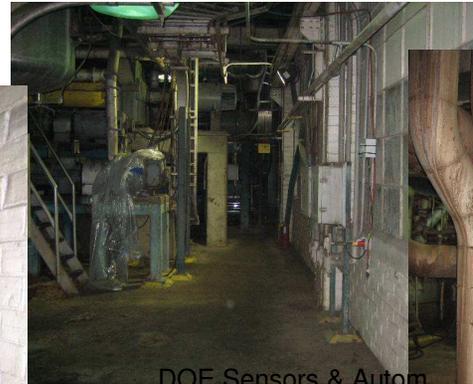
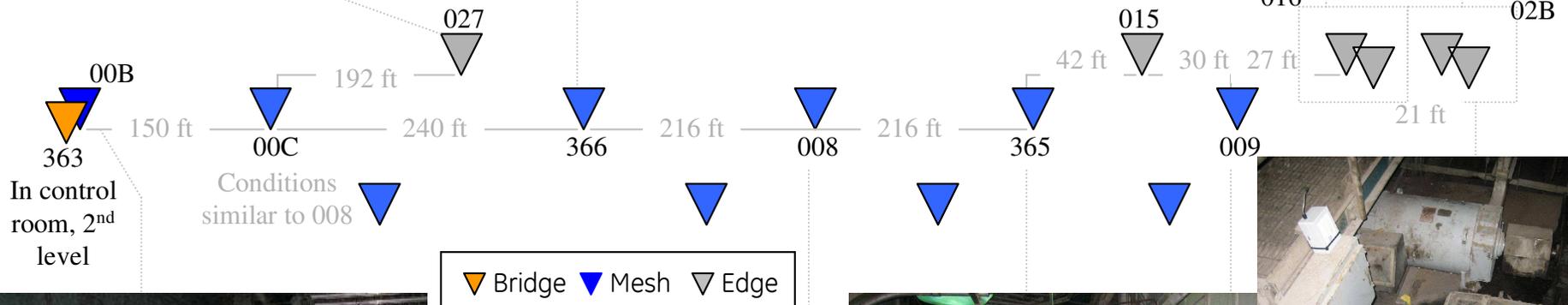
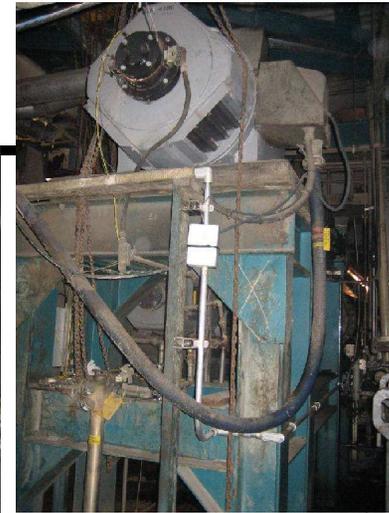
Kaye Instruments has joined other GE high-technology sensing businesses under a new name—GE Industrial, Sensing.



Product Announced in April 2007



Field Site - Paper Mills



Measuring Steam Pipe Surface Temperatures

- GE Energy Services Group
 - Temporary Installation
 - Fault Detection
- Measures Pipe Surface Temp
 - Detects leaks



Successful Field Trials

Sensicast - Rolling Mill Application



Manufacturing Process:

1. 1.2 billion pounds per year
2. Rolled metal heats to 225 degrees
3. Cooled in racks to 100 degrees
4. Moved to next step

Process Management Challenge:

- Manual temp measurement lowers plant throughput
- Difficult and very expensive to wire the plant for temperature sensing

Sensicast Wireless Advantage:

- Easy deployment temperature monitoring
- Throughput increase of 6 million pounds per year
- 3 month payback



Sensicast – Nuclear Power Application

