White Paper

Energy Efficiency

How everyone can generate Negawatts

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What's Inside:

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How everyone can generate Negawatts

1. Energy Efficiency Initiatives Greatly Reduce Variable Production Costs

Global energy strategies present some of the most challenging issues facing businesses and governments worldwide. The fate of energy sustainability has many different outcomes depending upon who is telling the story. However, two tenets are core in every storyline; energy efficiency and emissions management. The good news is that both energy efficiency and emissions management go hand in hand. In most cases, energy efficiency initiatives provide for the lowest capital investment, lowest risk, and shortest implementation timelines for making impactful reductions in an organization's energy consumption and carbon emissions.

Energy consumption is not only an everyday topic on the evening news, it is also a key performance indicator (KPI) for many process and manufacturing companies. Companies often distill their energy consumption, or intensity, down to a unit of consumption per unit of production. These units are usually a kilowatt-hour (kWh) and a British thermal unit (BTU).

For example, a wastewater facility may calculate their energy intensity using the amount of kWh consumed per thousand gallons of water treated. The oil and gas industry will know how many BTU's are required to produce a barrel of oil or a cubic foot of natural gas. Regardless of the way an organization chooses to calculate its energy intensity, it is likely the largest variable cost of production in their operation.

Thus, it makes sense that if energy consumption or intensity is the largest variable cost many organizations face, it also represents one of the largest opportunities for cost reduction resulting in increased revenues. In 1989, Amory Lovins introduced the concept of a "Negawatt." Much like the classic concept of using machines to generate electricity or a Megawatt, reducing demand side energy consumption increases the available supply side generation capacity. This reduces the need for additional generation capacity while reducing the emissions from fossil fuels used in most electric generating technologies. This means that every organization can be a "virtual power generator" by generating Negawatts – the absence of consuming Megawatts.

An organization can reduce their energy consumption in two primary ways. First, they can reduce their level of production. This option, however, is rarely attractive since one of the primary objectives for the business is to produce a product to sell for a profit. However, sometimes market demand dictates that production levels be reduced, but this is not a consistent strategy that can be relied upon. The second and likely most effective method for reducing energy consumption is retrofitting existing assets and modifying current work processes.

As an example, a utility may choose to retrofit turbines with power augmenting devices. A chemical manufacturing plant may choose to perform more focused maintenance and optimization on the hundreds of large pumps and motors in their facility. This focus on energy efficiency not only reduces energy consumption and carbon emissions, but it also reduces the corporate risk of volatile energy costs and the ever-increasing environmental compliance regulations.

2. Keys to Enterprise Energy Efficiency

While many organizations have hired Chief Energy Officers, Vice Presidents of Energy Optimization, or similar management positions whose primary role is to optimize energy usage, many organizations still overlook the low hanging fruit that might be right in front of them. Buildings today have "smart" systems that optimize air conditioning, computers configured to turn themselves off after a period of inactivity, and many have even optimized their production processes and achieved gains in that area as well. However, few put the same effort into monitoring the "necessary equipment" that is part of the larger overall energy efficiency process.

It is important to understand the current situation, before anything can be improved upon. This usually requires a large amount of information and analysis. In process industries, much of this information is stranded in the field where providing expensive telemetry to field assets is seemingly not important enough. There may be mobile field workers inspecting or maintaining these assets already, but typically not with a focus on the aspects that would address your energy efficiency initiatives. A familiar maxim, "What gets measured gets managed," properly illustrates this challenge. Thus, the first step to addressing energy efficiency is to identify the potential energy impact of your assets and then to prioritize them based on the organization's business objectives.

While the list of potential energy efficiency opportunities is created first, it most likely will be modified based on the second step in the process. A baseline for their current operations can then be established by gathering and integrating the necessary data. Through leveraging your mobile workers to collect real operating data in the field using handheld devices, organizations can get a more accurate baseline view rather than simply relying upon OEM engineering specifications that rarely represent the real world application of the asset. This baseline data set will shed new light on many of the opportunities on your previously developed list, and almost certainly uncover a few additional opportunities that did not initially make the list.

Once a baseline exists and opportunities have been re-prioritized, an energy efficiency program must be developed. Mobile workers are literally passing by energy inefficiencies every time they take to the plant floor. While major opportunities are often on an inspections list, seemingly insignificant ones are not typically included. Empowering the mobile workforce to address issues within the plant is a low-cost, low-risk, and rapid-value realization proposition.

Although field workers may not be savvy on techniques to assess and address energy efficiency, they can leverage hand held devices they already use to deliver focused advice and step by step instructions, enabling any of them to become energy efficiency experts. This proven approach ensures consistent and compliant efforts that will significantly contribute to the overall corporate energy efficiency objectives.

By capturing these Best Practices in the mobile decision support system and deploying them to your mobile field workers, your organization is then able to address the final piece of the energy efficiency loop, the ability to manage, integrate and mobilize your Best Practices to your field operations workers.

3. A Simplified Energy Optimization Example

Pumps account for approximately 20% of the global energy demand. More specifically, pumps consume 20% to 25% of energy consumed in process industries and 90% of the cost of ownership for a pump is the energy it consumes. Below is a simple example of an energy efficiency opportunity that is related to scaling, or the unwanted build up of materials inside a pipe. This build up can reduce the flow of materials and increase the energy consumed by the pump to move materials through that pipe.

Pump Example 1

Pump scaling measuring only 1/32" can increase pump energy consumption by 8.5%.

Energy conversion:

- 200HP x .746 = 149.2/KW
- 90% Runtime is 7,884 hrs/yr x 149.2/KW = 1,176,292.8 KWh/yr
- 1,176,292.8 KWh x $.07/KWh = $82,340.50/yr
- Carbon "footprint" would be 1,164.5 tons of CO2

Assume 8.5% efficiency improvement via scaling reduction or other pro-active maintenance:

- Savings of $7,000 in energy consumption
- Reduction of 99 tons of CO2
- CO2 credits are trading for $25/ton, $2,475 credit value of reduction – not including value of compliance

The example above represents just a single pump. However, most process industries have hundreds or even thousands of pumps in their operations. This suggests that the enterprise-wide economic impact could be significant. Below are some additional scenarios that illustrate how significant these energy savings can be for various industries.

Pump Example 2

A typical refinery or chemical (liquid) plant has 100+ pumps between 100-400HP.

- $700,000+ energy savings
- 9,900+ tons of CO2 reduction annually = $247,500+ possible energy credit revenue
- This example does not address the 1000's of smaller pumps/motors under 100HP

Pump Example 3

A typical pulp and paper plant might have 50+ pumps between 100-400HP.

- $350,000+ energy savings
- 4,950+ tons of CO2 reduction annually = $123,750+ possible energy credit revenue
- This example does not include smaller pumps/motors

4. Your Enterprise Can Generate Negawatts and Reduce Expense and Risk

Most companies are accustomed to buying energy, however unpleasant the process may be. Organizations can now generate another product to add to their portfolio, the Negawatt. Very few corporations today are without energy and emission reduction initiatives. However, few are taking advantage of the low hanging energy efficiency opportunities that are not discussed in the investor conference calls. Is your mobile workforce equipped with the right toolset to help generate Negawatts today? Energy efficiency gains are not simply a one-time savings; they represent a recurring opportunity that can be realized monthly.

The Wonderware IntelaTrac® Mobile Workforce and Decision Support solution ensures that your enterprise can manage, integrate and mobilize your operational best practices for your field operations workers in support of your energy efficiency initiatives. Powerful, focused advice messages are delivered to the mobile worker, helping to ensure best practices and achieving consistent results that improve workforce effectiveness and efficiency. Wonderware IntelaTrac also provides reporting functionality to enable enterprises to define and track their key performance indicators. Wonderware IntelaTrac has already been leveraged to address mobile asset management and workforce strategies by five of the top eight integrated oil and gas companies, over 40% of the top global refineries, over 30% of the top 100 global chemical companies, and utilities which provide enough energy to power 64.5 million average homes.

With so much riding on your energy intensity, Wonderware IntelaTrac can help your organization generate cost-saving Negawatts.