Delivering Energy Monitoring Services using the Internet

New Tools and New Environments Drive Energy Efficiency

Robert S. Brasier and Karl W. Johnson

UOP LLC

Des Plaines, Illinois

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Abstract

The refining and petrochemical industries worldwide continue to face a challenging and demanding business environment. As refinery margins decrease, the cost of energy relative to product differentials has increased, forcing organizations to find solutions that lower operating costs of existing assets just to stay competitive.

Several refiners have found that establishing simple programs that address energy efficiency and energy optimization have given significant benefits in effectively lowering operating costs. In addition, organizations that have a strong understanding of their refineries' energy demands have benefited from:

- Finding new market opportunities by quickly responding to the deregulation of energy markets,
- Increasing focus on lower-risk "energy" projects requiring little or no investment,
- Improving their environmental image by increasing energy efficiency and
- Using proper site-wide energy integration to enhance the profitability of existing projects.

Introduction

The current economic climate of low margins in the refining industry requires refiners to manage their operating costs more carefully than ever before. The lower profitability also causes refiners to avoid capital investment, reduce staff and minimize all consulting costs. As a result, companies that want to maintain a competitive advantage must provide their frontline staff easy access to technical specialists. In this report, Internet-based tools have been developed to bridge this gap and to help refiners address the increasing demand to improve energy efficiency, reduce operating cost, and lower greenhouse gases.

Business Drivers

Refiners are finding that minimizing operating cost is a principle handle needed to stay competitive. In the refining industry, variable operating cost is typically made up of 40% personnel, 40% energy, and 20% others. Reducing headcount has been practiced across the industry; however, this unfortunately has left refiners with even less ability to address energy inefficiency and other technical issues.

As a result of limited resources and the need to reduce operating costs, refiners are finding they need easy access to specialists on an on-demand basis. Ideally, these specialists need to have a good understanding of the specific technical area, an awareness of the latest technology across the industry, and a working knowledge of best practices and procedures for their specific area. Specialists also need to be able: to quickly and accurately assess a site's performance, to identify gaps in key areas, and to combine their experience with field proven solutions to truly impact a refiner's issues. On-line tools, with enough detail to assist a specialist and a good interface to provide information to the end user, can bridge this gap.

A New Tool for Energy Monitoring

Typically, to initiate an energy reduction process, refiners call on a specialist in the field of energy efficiency to help reduce operating costs. For the case described here, the refiner uses an Internet-based program called e-Trak™ Energy Monitoring Service. The program starts out with an on-site

assessment by a specialist to review current operations, collect key operating data, interview staff to understand work processes, and configure the e-Trak energy analysis program to a customer's specific requirements. The e-Trak program calculates energy consumption in each process unit, compares performance to benchmarks, sets performance targets, and performs diagnostic techniques to identify gaps. The work process for the e-Trak service is shown below in Figure 1.

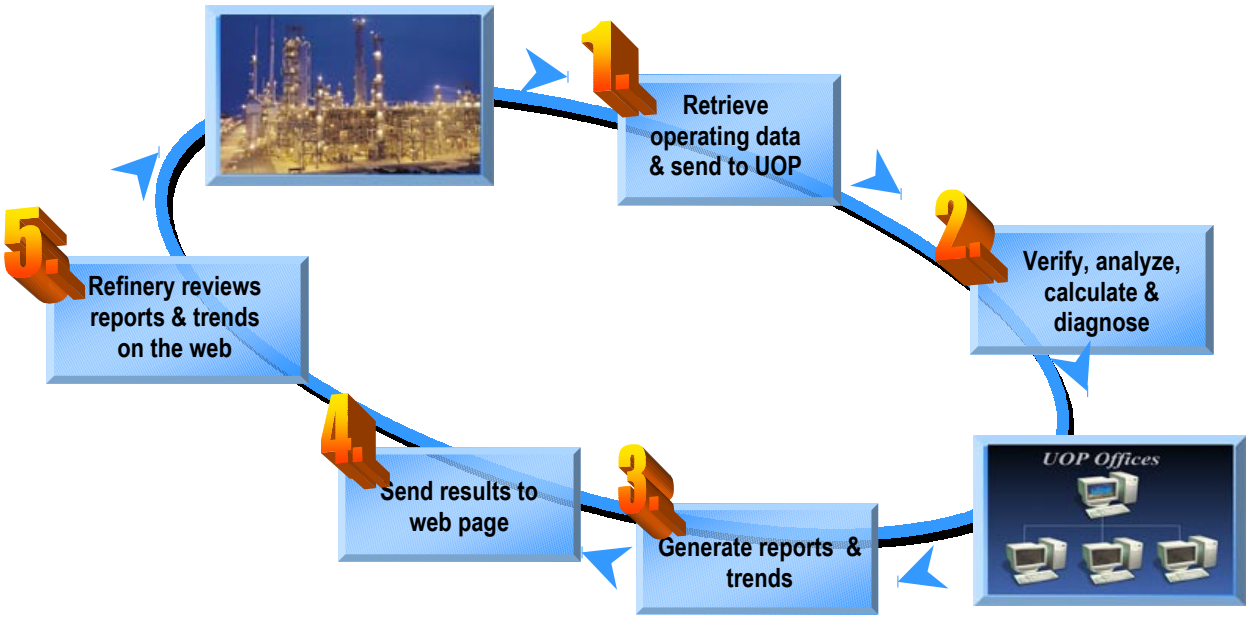

Figure 1: e-Trak Service Process Flow

Once this tool is configured, the system is set up to automatically update using live data and the site personnel are trained to interpret the information. As the refinery staff becomes familiar with the data, they will begin to interact with the energy specialist to discuss specific issues and concerns, while the specialist can view the same data and make recommendations based on his experience and the refiner's input.

In addition to general energy monitoring and diagnostics, the user gains the ability to:

- Generate regular energy reports,
- Receive training on technical issues using their own data,
- Interpret energy diagnostic reports,
- Share energy data between sites and
- Track actual progress on implementation of energy improvements.

Key Service Requirements

There are several key requirements to make the energy monitoring service a success.

- **Level of detail**

  Trying to put all potential information in a tool is futile. Programs can quickly become too complex to decipher and difficult to configure. Alternatively, the tool with too little information is not useful. By using a specialist, the appropriate amount of detail can be configured in, while the more complex issues can be pulled out and handled individually.

- **Level of Expertise**

  The profitability of a refinery is not determined solely by energy efficiency. The specialist needs to understand the economic drivers of the refinery to implement effective solutions. Minimum energy is rarely the optimum economic point and the specialist needs to be able to flag areas where decisions that impact energy can also impact yields, capacities, or reliability. A strong understanding of the business drivers is critical.

- **Connectivity**

  The web browser interface allows anyone in the refinery to access the same level of information as the person responsible for energy. It also avoids the need to install and maintain custom software. This provides a quick and easy way to get key information directly to the staff for making daily operating decisions.

- **Common Platforms**

  The common software platform has the obvious advantage that the specialist and the users are viewing the same reports and trends when discussing key issues. Additionally, the common platform allows data from multiple sites to be automatically collected in a format that can generate comparative reports between similar operations. These comparative reports facilitate communication between sites and sharing of best practices. Having a system that processes the data in a well-defined manner is critical to these types of reports.

Key Tool Requirements

The development of the e-Trak system incorporates the critical requirements of level of detail, connectivity and common platform for the reasons listed above. In addition, the design of the e-Trak tool meets the following key requirements for success.

- **Flexibility**

  The system was designed to allow the users to customize the dynamic graphs and charts to suit the current focus of their study without changing the data structure or the user interface.

- **Simplicity**

  The system was designed to facilitate interaction with a variety of roles within the refinery (e.g., engineer, operator or planner) and the service provider (e.g., configurer or energy expert). The user interface was designed for informative displays and intuitive interaction (see Figure 2).

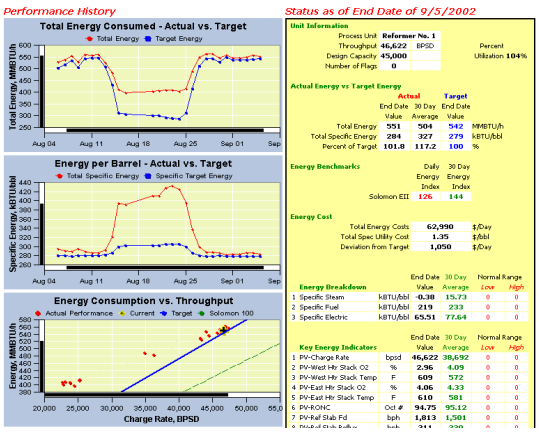

Figure 2: e-Trak System Trend Sample

- **Scalability**

  The system was designed to allow additional sites to be added quickly without significantly affecting tool performance. The system can be rapidly rolled out to new users by exploiting the connectivity of the Internet and the advantages of application hosting.

- **Granularity**

  The system was designed to allow the users to drill down to an appropriate level of detail specific to their job function.

- **Reliability**

  The system was designed to operate continuously without manual intervention for extended periods of time.

- **Consistency**

  The system was designed to enforce a consistent interface and data processing algorithm to allow comparison of data across the application.

- **Security**

  The system was designed to ensure that access to the data and results is restricted to users from a specific company and site.

Success Factors & the Delivery of Value

The key issue, described above and proven in several customer engagements, is that combining web-based tools with specific specialized services enable the delivery of real value to the customer. In one specific case, a customer reduced purchased fuel gas by 35% and electricity by 6%.[1] The combined tool and service deliver not only data, but also information in a useable form by cost effectively connecting the specialist's technical experience with the refiner's specific knowledge of requirements, limits, and work processes. In the case described above, customers have used the output of these energy tools along with the experience of a specialist to directly improve operating practices and to implement projects resulting in reduced energy costs.

[1] Oil and Gas Journal; DOE-sponsored energy program yields big savings for Flying J refinery; December 2, 2002