

# Utility Monitoring & Targeting: Save Energy, Cut Costs

The more you know about utility consumption at your plant, the better you can manage it and the healthier your bottom line will be. All too often, utility consumption is invisible, treated as a fixed cost on the balance sheet. Some organizations simply estimate utility costs without an exact understanding of how these costs differ between product lines or affect operating equipment efficiency (OEE). Companies that actively manage the highly variable costs of hydro, water, sewer and gas become more efficient, more competitive and more profitable.

Utility monitoring and targeting (M&T) relates to the management axiom, “you cannot manage what you cannot measure.” M&T systems are designed to reduce utility costs through improved utility efficiency and management. M&T provides essential feedback to support “Lean Manufacturing”, OEE, utility management projects and utility forecasting for more accurate production budgeting. It also makes your business more environmentally sustainable by reducing greenhouse gas emissions.

M&T determines the relationship between utility use and key performance indicators (production levels, weather patterns, etc.) in order to:

- identify and explain increases or decreases in utility use
- establish utility consumption trends (daily, weekly, seasonal, operational)
- forecast utility use when planning business changes
- diagnose specific areas of waste
- monitor how your business reacts to changes
- develop performance targets for utility management programs
- link the rate of utility use to improvements and/or setbacks in your environmental performance
- improve operating equipment efficiency
- manage consumption, rather than accept it as a fixed cost with no control

## M&T benefits

M&T is different than a utility audit, which identifies specific projects. M&T provides ongoing benefits by establishing baseline performance and a process of continuous improvement. The benefits include:

- documented utility cost savings ranging from 5% to 15%
- improved product costing models as sub-metering identifies process and line costs for specific shop keeping units (SKU's)
- improved annual budgeting (M&T linked to production forecasts can help predict future utility needs and opportunities for energy contracting)
- waste avoidance



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Implementing M&T in your facility can be as simple as monitoring inlet consumption using real-time water, gas and electricity meters. M&T can also target selected streams or areas with sub-metering for a specific objective.

The targeted application of M&T is the “hands-on” management tool. Separately metering production units, such as refrigeration, freezing, ovens and/or other cooking operations allows you to optimize their performance. The impact of capital improvements on utility consumption can be measured directly. Metering processes with high utility demand, such as compressed air, lighting, HVAC and air makeup and exchange, allows you to ensure that switches and valves are shut off when they are not required.

Unique applications for the food processing industry also include:

- Monitoring specific cost centers with strategically placed sub-meters for more accurate product costing
- Using sub-meters to identify OEE in order to respond to situations where energy use rises above the baseline target for that process
- Identifying non-production, fixed costs, such as comfort heating and lighting
- Determining the most efficient products on specific lines, particularly useful for frequently changing product types that involve frying, cooking, baking, and freezing (where product size, shape and mass have an impact)
- Tracking energy use in real time by process, accompanied by an alarm if energy consumption exceeds a target (valuable in energy-intensive situations such as in-season vegetable processing)
- Allowing supervisors on the shop floor to better manage utility use by increasing their awareness of utility consumption

A seasonal vegetable processor spending \$1 million on utilities during the processing season could save as much as 10% of that cost using M&T.

### Implementing an M&T program

#### **Step 1: Estimate utility consumption**

The first step in preparing an M&T program is to conduct a survey of your facility and equipment in order to estimate utility consumption. This quantifies the key energy and utility consumers in your plant. You also need to quantify other variables that impact your utility consumption, such as production levels or weather patterns in order to “normalize” utility use. Once these aspects are defined for your facility, an M&T plan can be initiated.

#### **Step 2: Determine objectives**

Now you need to develop and understand the objectives you want the M&T system to achieve in your plant. Your objective can be to monitor the whole plant or focus on a small number of processes or certain machinery. Focused objectives result in a cost-effective M&T project.

#### **Step 3: Install meters and measure**

Based on your objectives, you must determine what meters are required and where to put them. Once your meters are installed, the next step is to aggregate the data they provide. It is possible to do this manually if you have just a few meters. However, we recommend that you retrieve your data electronically and send it to a spreadsheet where the data can be collated automatically. This can be done for a relatively low cost.

How often you compile your data depends on your desired reporting level. There is a trade-off between getting enough data to track trends but not getting so much that it is difficult to manage. Some measures can be taken directly from the meters, while others may need to be calculated. Embedded cells in spreadsheets can help automate this task. Factors such as production rates or degree days may also be collected at intervals to match the meter data.

#### ***Step 4: Define your baseline***

The compiled data is plotted on tables to define your general consumption baseline measurement. Your data will need to be normalized by plotting utility consumption rates against production levels or any other identified variable that affects the data's accuracy, such as temperature or humidity. The "best fit" line is then automatically calculated.

#### ***Step 5: Set improvement targets***

Once your baseline is established, your management team can develop realistic targets for improvements. The targets can have two aspects – the amount of utility consumption to be reduced and the timeframe to implement the changes. Your targets can include reducing high consumption peaks identified by the meters (possibly procedural changes) or the more challenging target of reducing overall average consumption (possibly requiring capital projects).

**Sub-metering departments will allow supervisors to better manage utility use.**

#### ***Step 6: Monitor variations***

With your data gathering processes under way, you must compare consumption patterns to the objectives and targets you set. Variations in consumption should be identified and compared with your baseline to determine their significance. Variations can include:

- short term surge or peak results that can cause demand spikes on generating equipment
- systematic changes in consumption that may be a reflection of equipment or machinery performance
- a measured increase or decrease in average consumption based on a change in operations

#### ***Step 7: Analyze data and identify root causes***

You can use a number of tools to analyze your data and interpret how changes in your production system affect your utility use. For example, measuring the difference between expected consumption and actual consumption can be performed by CUSUM (Cumulative SUM of the differences). CUSUM is an analytical tool that plots the relationship between two parameters to determine how they affect each other. For example, the simple application of measuring energy cost per unit of production will allow a project team to identify if energy efficiency changes are working.

## Additional resources

Utility monitoring and targeting is specific to each facility. To learn more about how to implement M&T, the following resources are available:

### **OMAFRA fact sheets:**

- *Benchmarking Utility Performance in the Food Industry*
- *Selecting Meters for Your Food or Beverage Processing Facility*

Natural Resources Canada's Office of Energy Efficiency website [www.oeenrcan.gc.ca](http://www.oeenrcan.gc.ca) (click on "industrial" for links to training and other resources).

Engineering companies that design utility M&T programs include:

- The Altech Group ([www.altech-group.com](http://www.altech-group.com))
- Energy at Work ([www.energy-efficiency.com](http://www.energy-efficiency.com))
- Agviro Inc. ([www.agviro.com](http://www.agviro.com))
- Hatch Management Consulting ([www.hatch.ca](http://www.hatch.ca))

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To find out how the Business Development Branch, Ontario Ministry of Agriculture, Food and Rural Affairs can provide you with knowledge, connections, and resources to help you grow your business, call toll-free at 1-888-466-2372 extension 63795 or e-mail at [foodinvest@ontario.ca](mailto:foodinvest@ontario.ca).