

## Tips for improving performance in operational control in utilities



### Introduction

The Sustainable Energy Authority of Ireland's (SEAI) Large Industry Energy Network has established a special working group to improve energy performance in utilities for its members. One focus area for the group was the use of operational controls in utilities.

This guidance outlines ten good practice tips for improving performance in utilities' operation control. It has been developed based on experience at several sites during this work, as well as on the contributors' previous experience. It supports the principles of operational control as outlined in the ISO 50001:2011 Energy Management Systems standard.

### 1 Talk to the operators

In implementing effective operational controls, these controls need first to be defined. Operational personnel, who work daily with the plant and are familiar with how it runs, can help in the definition process. Any existing operational controls, either energy related or established to meet other service needs, can be reviewed and adapted to include energy-relevant controls. Including the operators improves engagement and incorporates their input in practical controls with an improved chance of long-term successful implementation of any new controls.

### 2 Know the controls

A good understanding of the current control philosophy should be established. This includes machine sequencing, set points, part-load approach, and so on. Knowing for example, the condenser set point in a refrigeration system and how it relates to ambient temperature allows the operator to understand when too great a temperature difference leads to performance deterioration.

Understanding how boilers are sequenced and which boilers are the most efficient enables good decision-making on how best to meet loads. Establishing set points, such as thermodynamic systems, means that they can be checked against others on the site and against established best practices, with potential to adjust for improved energy performance.

### 3 Check the design intent

Over time, with developments on site and changes in processes and operations, a utility may not run as originally envisaged. A check on the original design intent, where possible, can help to either re-establish original performance or provide insight into improving current set points or controls. In some cases, it can establish a case for recommissioning. Examples have been noted where additional equipment, originally provided for redundancy, may be running in parallel at part load, resulting in reduced efficiency.

### 4 Run the process better

While this may seem obvious, there are many instances where concentrating on delivering a good process result inherently improves energy efficiency. To illustrate this point, consider a wastewater treatment plant. Controlling the aeration process based on dissolved oxygen not only leads to a more consistent effluent discharge, which is a process goal, but also reduces the energy used. Closer monitoring and forecasting of incoming load means that only the process steps necessary to ensure compliant discharges are used, and unnecessary steps and energy waste are avoided.

### 5 Include your contractors

External maintenance contractors tend to prioritise reliability over energy performance unless they are actively included in the implementation of effective energy operational controls.

They can provide input on typical faults, as well as on settings and maintenance, to improve efficiency while maintaining the desired level of service. Including external contractors also improves the chances of settings being consistently maintained by on-site and off-site personnel.

### 6 Learn from your history

Unless the site is new, the chances are that various projects have previously been carried out to improve energy use in your utilities. Because the most difficult aspect of performance improvement is often embedding it, many of these projects still may not be working as intended. Therefore, a review of past improvements and their status can lead to defining checks and controls intended to maintain any gains.

### 7 Match equipment to needs

A review of the demand profile for the utility and the available capacity to address it should include the efficiency of the equipment at part load. For example, refrigeration screw compressors operating in parallel at part load may be better sequenced so that the more efficient model ramps up to full load before a second comes on. This exercise can deliver large savings at low cost, not only in relatively new plants, but also in older plants where operating profiles may have changed.

### 8 Mind the maintenance

Good preventive maintenance has been demonstrated to be essential to the energy performance of utilities. For example, the efficiency of a wastewater treatment plant can be improved by ensuring that fat is regularly cleaned from pump impellers. Other examples include servicing gas heaters, adjusting gas pressure, or conducting thermographic surveys to identify heat loss in insulation.

Furthermore, the savings from maintenance can often be clearly shown if energy metering is in place and monitored before and after the service. This helps reinforce the business case for maintenance.

### 9 Dig a little deeper

Many of the other tips referred to here are aimed at gathering information to establish and implement operational controls. During this process, it is likely that a number of questions and anomalies will arise. Examples have included make-up water to a steam system not matching the expected condensate return rate, waste water treatment plant inflow being significantly below capacity for most of the time, and a combined heat and power plant taking most of the steam load but having unnoticed potential for further improvement. These examples were unearthed as part of the investigation process, and typically showed potential that was not visible before the process began. While the root cause of each inefficiency needs to be determined, it demonstrates indirect savings potential through the focus on good operational controls.

### 10 Make it last

When good controls are defined or adopted, it is essential to integrate them into day-to-day operations. The approach to this depends on how the organisation operates. For many, updating operating procedures and training the relevant people is a good method. Making it known which operational controls impact which energy performance indicators helps to cement the implementation, as these indicators are tracked regularly.

Remember to include external contractors in any training initiatives. Internal audits can also be used to check effectiveness of operation. Applying this set of principles can deliver robust energy performance operational controls to keep utilities energy use and performance on target.

### **About SEAI**

SEAI is Ireland's national energy authority investing in, and delivering, appropriate, effective and sustainable solutions to help Ireland's transition to a clean energy future. We work with Government, homeowners, businesses and communities to achieve this, through expertise, funding, educational programmes, policy advice, research and the development of new technologies.

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### **About the Large Industry Energy Network**

The Large Industry Energy Network is one of the world's leading energy efficiency networks, made up of prominent organisations operating in Ireland, all working towards a strategic approach to energy management. Some 200 of Ireland's largest energy users are members of the network and together they account for 55% of Ireland's industrial Primary Energy Requirement. Network members are companies with annual energy bills of €1 million or over. Supported by SEAI, they work together to improve their energy performance and inspire others to follow.



**Riailtas na hÉireann**  
Government of Ireland

e [info@seai.ie](mailto:info@seai.ie)  
w [www.seai.ie](http://www.seai.ie)  
t +353 1 808 2100

