Energy-Saving Opportunities in Manufacturing

Participant Workbook

Use this workbook in conjunction with the “Energy-saving opportunities in manufacturing” workshop to understand what is involved in achieving energy savings for your facility.

## In this workshop, participants will:

* Understand different approaches to find energy-saving opportunities.
* Recognize energy waste that can lead to opportunities.
* Cement understanding of significant energy users at your facility.
* Identify 1-2 energy-saving opportunities you can implement at your facility.



This workshop will be hosted over Microsoft Teams.

For support using Teams, see the last page of this workbook.

# How do you find your energy-saving Opportunities?

The “how” of identifying savings opportunities can be divided into general practices and specific items.

## General Energy Opportunity Identification practices

Check off or highlight the practices you currently use to identify energy-saving opportunities.

|  |  |  |
| --- | --- | --- |
| **Data analysis**   * Energy baseline models * Interval data analysis * Energy benchmarking | **Site investigation**   * Energy audits * Energy hunt * Discussions with operators | **Employee strategies**   * Energy training sessions * Suggestion box * Reviewing capital plans |

In the space below, write down any practices to identify energy waste listed above or that were discussed in the workshop that you aren’t currently doing, and you would like to implement.

# Nine Type of Energy Wastes

|  |  |  |
| --- | --- | --- |
| Type of waste | Examples of opportunities | Opportunities within your facility |
| Unnecessary Running or Idling | * Equipment and lights on during non-operating periods. * Running pumps, conveyors or operating heat treat furnace at full temperature during idle periods |  |
| Leaks | * Compressed air leaks, uninsulated steam pipes, water valve leaks, broken duct work |  |
| Friction Loss | * Clogged filters, obstructed blower discharge, restricted flow due to damper settings, dirty heat and cold transfer services. |  |
| Sub-optimal Efficiency | * Replace existing equipment with higher efficiency models. * Ensure proper installation of equipment and set to run at peak efficiency. |  |
| Malfunctions | * Broken or stuck actuators, valves and switches. * Malfunction/broken equipment. * Bearing failure. * Broken or uncalibrated sensors and gauges. |  |
| System Imbalance | * Improper set points (overrides, bypass/manual) * Simultaneous heating and cooling. * Improperly programmed controls. * Excessive water spillage. |  |
| Misapplication | * Improperly sized or ill-suited equipment. * Compressed air used for open blowing, power tools, hand-held blowguns, vacuum generation. * Compressed air used for personnel cooling |  |
| Underutilization | * Downtime, last minute changes, rush orders, running below peak efficiency, bottlenecks. * Processes running below max capacity |  |
| Traditional Lean Waste | * Excessive material handling and excessive scrap or rework. * Unnecessary waiting. * Product over-processing. |  |

# Identifying your Significant Energy users

Knowing your large energy consumers is an important starting point for finding energy-efficiency opportunities.

## Common Significant Energy Users in Manufacturing

Common significant energy users can include:

|  |  |
| --- | --- |
| * Compressed air * Ventilation and exhaust * Process equipment | * Process cooling/refrigeration * Process heating * Space conditioning |

List your top 3 significant energy users.

|  |
| --- |
| 1) |
| 2) |
| 3) |

Are you actively managing your significant energy users (SEUs)?

* We have identified our SEUs.
* We have identified variables affecting SEU energy consumption.
* We have identified people affecting SEU energy consumption.
* We submeter our SEUs.
* We have established energy-related key performance indicators (KPIs).
* We have developed standard procedures to ensure efficient operation of SEUs.
* We regularly monitor and report on SEU energy performance.
* We pursue corrective action when KPIs are outside acceptable ranges.

For more information on managing your SEUs please explore the following sections of the 50001 Ready Navigator:

* [Task 9: Significant Energy Users](https://navigator.canada.lbl.gov/guidance/task/9)
* [Task 17: Operational Controls](https://navigator.canada.lbl.gov/guidance/task/17)

# The “ALL IN” Approach to finding Opportunities in manufacturing

While manufacturing is largely heterogeneous and opportunities may vary by site, there are some common areas of opportunity. Typical energy efficiency efforts focus on equipment commonly found in manufacturing processing facilities such as compressed air systems, ventilation and exhaust, process equipment, process cooling and refrigeration, process heating, space conditioning, and lighting. By adopting an "all-in" approach, facilities can maximize these opportunities by involving cross-disciplinary teams, empowering staff to contribute insights, and continuously evaluating energy use across all systems to identify inefficiencies.

When making change, the most effective implementation order is to first aim to reduce energy waste by reducing usage through behaviour changes, then to improve efficiency of existing systems and equipment and as a last option, upgrade to more efficient equipment or systems.

The “all in” approach leverages the expertise of site staff to help identify the best no-cost or low-cost opportunities.

## Notes on Daniel & Jon’s (ALADACO) Presentation

Summarize other topics/issues, whether they are your significant energy users, general practices or specific techniques for finding new opportunities, or new potential energy-saving projects that you learned about today and want to act on soon.

# Next steps

Thinking of the ideas and examples you’ve heard today and make a commitment to three things you’re going to start. Decide on your timeframe.

|  |  |
| --- | --- |
| Action | Timeframe |
| *e.g. Investigate why water usage is so high in our CIP system* | *Next week* |
|  |  |
|  |  |
|  |  |

# Additional Resources

**On the Energy Management Learning Platform:**

* [9 Energy Waste Tracking Workbook](https://goldfin343.sharepoint.com/:w:/s/Projects/EZP4NgxvP0ZKrpYhLPVr8eQBh54CV7-ljELBA7HYi9p4qw?e=rBIUbY)
* [Energy Hunt Tips and Tricks](https://goldfin343.sharepoint.com/:b:/s/Projects/Eck3IigA5qlGqK1GQirAr3oBCc-e1i30EqYepvJiyjwotg?e=mT2n8p)

**Manufacturing Opportunities:**

* [Canadian Industry Partnership for Energy Conservation (CIPEC)](https://natural-resources.canada.ca/energy-efficiency/energy-efficiency-for-industry/canadian-industry-program-energy-conservation-cipec/20341)
* [ACEEE: Industrial Heat Pumps: Electrifying Industry’s Process Heat Supply](https://emss.goldfin.ca/images/KIdQiPHxiLQilZXxmwF5IeqEODQxNjYzODg2NDQ4/Media_Library/In-depth_Guidance/ACEEE-Electrifying_Industrial_Process_Heat_Supply-2022.pdf)
* [CIPEC: Energy Efficiency Opportunities in Canadian Plastics Processing Industry (2007)](https://ressources-naturelles.canada.ca/sites/nrcan/files/oee/files/pdf/industrial/plastics-guide-english-january-2008.pdf)
* [CIPEC: Guide to Energy Efficiency in Canadian Foundries (2003)](https://natural-resources.canada.ca/sites/www.nrcan.gc.ca/files/oee/pdf/cipec/ieep/newscentre/foundry/Foundry_eng.pdf)
* [LBNL: Energy Efficiency Improvements in Vehicle Assembly Industry (2008)](https://live-lbl-eta-publications.pantheonsite.io/sites/default/files/ee_vehicle_assembly.pdf)
* [US DOE: Energy-saving Opportunities for Manufacturing Enterprises](https://www.nrel.gov/docs/fy11osti/50365.pdf)
* [US EERE: A Quick Start Guide to Small and Medium Manufacturers](https://www.energy.gov/eere/iedo/energy-saving-quick-start-guide-small-and-medium-manufacturers)
* [Energy Star: Energy Efficiency Opportunities for Metal Casting (2016)](https://www.energystar.gov/sites/default/files/tools/ENERGY%20STAR%20Metal%20Casting%20Energy%20Guide.pdf)

Teams Instructions

## Joining the Workshop

If you are not familiar with Teams, please see the following links for instructions on how to join. You can also join a test meeting by following [these instructions](https://support.microsoft.com/en-us/office/manage-your-call-settings-in-microsoft-teams-456cb611-3477-496f-b31a-6ab752a7595f#:~:text=Make%20a%20test%20call&text=Settings%20and%20more-,next%20to%20your%20profile%20picture%20at%20the%20top%20of%20Teams,and%20record%20a%20short%20message.) to familiarize yourself with using Teams.

* [How to join a Teams meeting (app or web)](https://support.microsoft.com/en-us/office/join-a-teams-meeting-078e9868-f1aa-4414-8bb9-ee88e9236ee4)
* [How to join a Teams meeting in Microsoft Teams (free version)](https://support.microsoft.com/en-us/office/join-a-meeting-in-microsoft-teams-free-047b93e5-1777-4289-a3be-0ed6ca3fa12a#ID0EBF=Desktop)
* [How to join a Teams meeting without a Microsoft Teams account](https://support.microsoft.com/en-us/office/join-a-meeting-without-an-account-in-microsoft-teams-c6efc38f-4e03-4e79-b28f-e65a4c039508)
* [How to join a Teams meeting by phone](https://support.microsoft.com/en-gb/office/join-a-teams-meeting-by-phone-1e710768-bde6-4289-a1f9-17a20ff9b8ee)

If you are having trouble connecting, please see the following resources on [troubleshooting when you can’t join a Teams meeting](https://support.microsoft.com/en-us/office/i-can-t-join-a-meeting-in-microsoft-teams-85f8eb98-b815-4007-90c9-0c56b87e288d).

## TEAMs Features Used in this Workshop

|  |  |
| --- | --- |
| Raise your hand  1. At the top of your screen, click **Raise**. 2. A hand should show up next to your name under Participants. 3. To lower your hand, click **Raise** again.   A black rectangular with orange and white text  Description automatically generated  A screenshot of a video conference  Description automatically generated | use the chat to ask questions  1. To use the chat, click **Chat** at the top of your screen. 2. The chat should appear on the right side of your screen. Type your message in the message box.   A black rectangular with white text  Description automatically generatedA screenshot of a computer  Description automatically generated |
| A screenshot of a chat  Description automatically generatedJoining a Breakout Room When a breakout room is opened, you will see a button at the top of your screen labelled ‘Join Room’. Click the Join button to begin the breakout. | |