**Date last modified/updated:** Click here to enter a date. **Internal audit:** Click here to enter a date.

**Who last modified/updated:** Click here to enter text. **Management review:** Click here to enter a date.

**This part of the Navigator Playbook is completed when you have:**

1. **Determined what needs to be monitored and measured for energy performance, including the key characteristics of operations affecting energy performance. Use the data and information you generated in the energy review, energy data collection plan, analysis of SEUs, your energy performance indicators (EnPIs) and energy baselines (EnBs).**
2. **For each datum/metric, defined the method used for monitoring, measuring, analysis and evaluation. Defined how often and when the results are to be analyzed and evaluated.**
3. **Implemented all needed monitoring, measurement and analysis if not already in place from prior Navigator tasks.**
4. **Evaluated your organization’s energy performance by comparing EnPI values to the corresponding EnB.**
5. **For each performance metric in the energy measurement plan, defined the criteria or parameters for a significant deviation in energy performance.**
6. **Established a process for investigating and responding to such deviations and for retaining records of the results.**
7. **Trained the appropriate personnel on how to identify and respond to significant deviations in energy performance.**
8. **Recorded results from monitoring and measurement.**
9. Determine what needs to be monitored and measured for energy performance, including the key characteristics of operations affecting energy performance. Use the data and information you generated in the energy review, energy data collection plan, analysis of SEUs, your energy performance indicators (EnPIs) and energy baselines (EnBs).

|  |  |
| --- | --- |
|  | We have reviewed and pulled together what was developed in the previous tasks relating to monitoring, measurement, analysis and evaluation of energy performance. The following task activities have been completed: |

**Task:** Energy Data Collection and Analysis

**Activity:** Collection and analysis of energy consumption by energy type and other data in the energy review to determine energy performance and provide the basis for establishing energy performance metrics (EnPIs, EnBs).

**Task:** Energy Data Collection and Analysis

**Activity:** Implemented an energy data collection plan and collected data, including relevant variables for SEUs, energy consumption, operational criteria for SEUs, static factors (if applicable) and data specified in action plans.

**Task:** Significant Energy Uses

**Activity:** Analyzed data to determine the SEUs, performed analyses to determine SEU relevant variables and SEU current energy performance and then implemented associated monitoring activities.

**Task:** Energy Performance Indicators (EnPIs) and Baselines (EnBs)

**Activity:** Implemented monitoring and analysis of the EnPIs and EnBs.

**Task:** Objectives and Targets

**Activity:** Set and then implemented monitoring of the objectives and energy targets.

**Task:** Action Plans for Continual Improvement

**Activity:** Defined how action plan results are evaluated and energy performance improvement verification methods use

|  |  |  |
| --- | --- | --- |
|  | For energy performance, our organization has determined and implemented the following: | Detailed in Playbook Worksheets for Tasks 8, 11, 13, and 20. |

What needs to be monitored and measured.

The methods we will use to ensure valid results from monitoring, measurement, analysis and evaluation.

How often the monitoring and measurement will be done.

When the analysis and evaluation of results will be done.

|  |  |  |
| --- | --- | --- |
|  | We are monitoring and measuring key characteristics of operations affecting energy performance. The key characteristics include: | Detailed in Playbook Worksheets for Tasks 9, 11, and 13. |

Effectiveness of the action plans in achieving objectives and energy targets.

EnPIs.

Operation of SEUs.

Actual vs expected energy consumption

1. For each datum/metric, define the method used for monitoring, measuring, analysis and evaluation. Define how often and when the results are to be analyzed and evaluated.

|  |  |  |
| --- | --- | --- |
|  | As part of the energy review in the Energy Data Collection and Analysis task, we identified all energy types, past and present energy consumption data was collected and analyzed and used to accomplish the following: | We have conducted this review and analysis with the DOE EnPI Tool and Energy Footprint Tracker, as detailed in earlier Tasks. |

Profiled our organization’s energy use and energy consumption.

Determined our organization’s significant energy uses.

Identified and prioritized energy performance improvement opportunities.

Developed energy performance indicators and baselines needed to evaluate energy performance.

|  |  |  |
| --- | --- | --- |
|  | We continually monitor our organization’s energy consumption and do this by comparing our present consumption to our past consumption. | This is accomplished via the EnPI Tool and forecasting/backcasting regression analysis. |
|  | Our energy consumption data is: |  |

Monitored and measured prior to any change being made (baseline).

Monitored and measured after each change is implemented and compared with the baseline.

Representative of normal operating conditions.

Reflective of consistency in factors affecting energy performance such as weather, occupancy, production, or hours of operation.

1. Implement all needed monitoring, measurement and analysis if not already in place from prior Navigator tasks.

*The following matrix may be useful in tracking energy performance data.*

Data Collection Management Matrix

*Purpose: Document data location and the process of maintaining, acquiring and storing data necessary for the EnMS and management review.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Data | Data Source | Data Location | Acquisition | Recording Method | Frequency | Needed for Mgt. Review? |
| Electricity Consumption | Utility Bills | Mail and Email | Jane Doe receives and inputs data | Input into Energy Footprint Tracker | Monthly | Yes |
| Natural Gas Consumption | Utility Bills | Mail and Email | Jane Doe receives and inputs data | Input into Energy Footprint Tracker | Monthly | Yes |
| Wastewater Flow | Internal measurement | BAS Data | Jim Doe sums all daily readings | Input into Energy Footprint Tracker | Daily | Yes |
| BOD Measurements | Internal measurement | BAS Data | Chem Lab Personnel uploads data | Input into Energy Footprint Tracker | Twice per Shift | No |
| Heating Degree Days | NOAA Website | Online | Jim Doe downloads | Input into Energy Footprint Tracker | Monthly | No |
| Cooling Degree Days | NOAA Website | Online | Jim Doe downloads | Input into Energy Footprint Tracker | Monthly | No |
| Mixed Liquor Suspended Solids (MLSS) | Internal Measurement | SCADA | Samples taken from clarifiers | Logged in SCADA System | Twice per shift | No |

*If you have not already completed the Monitoring and Measurement of Key Characteristics Planning Worksheet in Task 20, then you may find it useful to do so when implementing the monitoring and measurement process as part of this Task.*

1. Evaluate your organization’s energy performance by comparing EnPI values to the corresponding EnB.

**Effectiveness of action plans in achieving the objectives and energy targets:**

|  |  |  |
| --- | --- | --- |
|  | Our action plans are analyzed and evaluated for appropriate reproduction in other processes or areas. | The EnMS team synthesizes lessons learned and best practices from action plans to share with top Management. After approval these are published as lessons learned. |
|  | When projects fail to meet energy targets, they are analyzed and evaluated to determine the reason(s) for the shortfalls, with appropriate follow-up planned and implemented. | We analyze performance annually, including assessing projects in progress in process as appropriate. We analyze projects at their completion with respect to our initial definitions of success in terms of predicted contribution towards Targets and Objectives. If a project fails we first assess the efficacy of installation and performance verification. If these were implemented per initial expectations, we assess communications and training efforts tied to the project. Finally, we thoroughly document this analysis and findings, and identify other opportunities to achieve the performance improvement. |
|  | When action plans are not generating the intended results (i.e. ineffective), they are modified as needed. Indicators that action plans may not be effective include:   * Objectives are not met. * Energy targets are not met. * Unable to meet due dates. * Personnel are not available. * Budget is not sufficient/available. * Inadequate technology. * Change in priorities. | Action plans are reviewed and updated by the Energy Team. When appropriate management is involved if additional resources are needed to keep action plans moving forward. |

**EnPIs**

|  |  |  |
| --- | --- | --- |
|  | When evaluating our organization’s energy performance, The EnPI values are compared against the corresponding EnB. | This is common best practice |

**Operation of SEUs**

|  |  |  |
| --- | --- | --- |
|  | We collect data on SEU relevant variables, energy consumption of SEUs and operational criteria as part of our energy data collection plan. | Task 9 and Task 20 Playbook Worksheets detail this process to great length. |

**Actual vs expected energy consumption**

|  |  |  |
| --- | --- | --- |
|  | We analyze variances between the action plan’s actual versus expected results and evaluate that information to identify elements that can improve performance or identify problems to address. | See above |
|  | We have a process in place to review and update estimates on a regular basis and in response to major changes to facilities, equipment systems and processes. | Energy Team discusses whether adjustments to baseline are required after any process or equipment change. |

1. For each performance metric, define the criteria or parameters for a significant deviation in energy performance.

**Set criteria and determine the methods of identifying a deviation**

|  |  |  |
| --- | --- | --- |
|  | We employ methods for identifying, specifying and investigating significant deviations. Examples of deemed significant deviations can include:   * Values outside of control limits * Percent variation in value * Trends identified * Specified variation in EnPIs * Specified variation in SEU performance * Level of variance between expected and actual performance * Change in equipment efficiency * Variation in specific relevant variable performance * Failure to meet objectives and energy targets * Failure to meet a specific performance level | We use an objective ranking system to specify significance, which we then utilize to assess deviations. We then create action plans to investigate and remedy deviations as needed. |

**Implement and determine the criteria to evaluate if a deviation is significant**

|  |  |  |
| --- | --- | --- |
|  | Our organization has established criteria which has been determined by the key characteristics we deem acceptable or unacceptable relative to the impact on energy performance. | See above. |
|  | In addition to the characteristics established, we will investigate both positive and negative performance deviations by the following percentage: | This varies based on the metric/process we are observing but for most energy consuming processes we tend to use +/-5% from the baseline energy use. |

1. Establish a process for investigating and responding to such deviations and for retaining records of the results.

|  |  |  |
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|  | Our organization investigates and responds to significant deviations. | Anytime a significant deviation is observed a full corrective action/root cause analysis is employed and documented. |
|  | As a best practice, our organization maintains a corrective action process to address significant deviations. | We have a standardized action plan template and communications plan for implementing corrective action. |
|  | Our investigations address normal operation and evaluation of energy use and consumption expected as a result of process changes or implementation of improvement opportunities. | We use our action plan template in all of these situations. |
|  | While we always investigate deviations, we understand that a decision not to take action can be a legitimate response. Some examples include being:   * A one-time occurrence. * Result of an improvement that will persist. * Result of process changes. * Result of a simple mathematical error. * Too expensive to fix. * Requires currently unavailable technology. | We document our deviation evaluation and note circumstances that do not require additional attention. |
|  | We maintain records of all determinations, actions and decisions of inaction in response to any significant deviation occurrence. These records are located: | On our shared Google Drive under “Nonconformity/Deviation Reporting” |

In addition to records of the investigation results and the response taken, our records also track the following here

Responsibilities

Time frames

Activities undertaken

Resources consulted

Equipment / meters used

Analysis conducted and results

Response

Effectiveness of response

Other Effect (if any) on SEUs

Other Effect (if any) on Energy Performance

1. Train the appropriate personnel on how to identify and respond to significant deviations in energy performance.

|  |  |  |
| --- | --- | --- |
|  | We have trained our personnel on our organization’s processes for identifying and responding to significant deviations. | Our facilities managers coordinate activities and hold annual “lessons learned” meetings regarding equipment performance and our energy data management system. |

*A spreadsheet like the following example may be useful in helping to track who and what department has been trained in the practices of identifying and responding to significant deviations in energy performance.*

**Personnel trained in identifying and responding to significant deviations in energy performance**

|  |  |  |  |
| --- | --- | --- | --- |
| Name of Personnel Trained | Department Trained | Name of Trainer | Training Date |
| Jimmy Doe | Maintenance | John Doe | **11/15/20** |
| Jack Doe | Maintenance | John Doe | **11/15/20** |
| Jill Doe | Aeration | John Doe | **11/15/20** |
| Jane Doe | CHP | John Doe | **11/22/20** |
| Jenny Doe | Process Engineering | John Doe | **11/22/20** |

1. Record results from monitoring and measurement.

We maintain the results our monitoring and measurement activities here: Shared Google Drive Folder “Monitoring and Measurement Documentation”

Top Management Approval

|  |  |  |
| --- | --- | --- |
|  | Date approved: | 12/1/20 |
|  | Who approved: | John Doe |

Comments

Click here to enter text.