Process Heating Assessment User Manual

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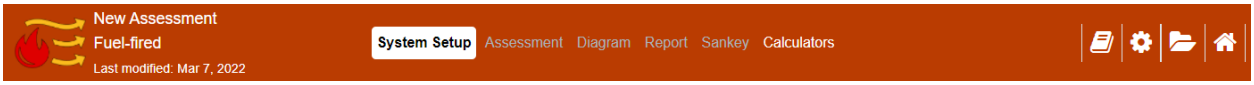
Module Navigation

Use the top banner to navigate around the module. A footer bar with “Next” and “Back” button can also be used to move through the System Setup to the Report.



Main Tabs

System Setup – Establish your baseline by entering the existing data for your process heating system.

Assessment – Modify system scenarios to find potential savings opportunities.

Diagram – Graphical visualization of the existing process heating system and the savings scenarios explored.

Report – Full printable breakdown of the system and potential saving scenarios.

Sankey – Visual representation of the energy consumption and production of the scenarios.

Calculators – Stand alone calculators for process heating properties.

*Some of the tabs will be disabled until the System Setup is completed.

Additional Buttons

Book – The book will open a new window with the Process Heating User Manual you are reading.

Gear – The gear wheel will navigate you to MEASUR’s global settings page.

Folder – The folder will navigate you to the assessment dashboard folder this assessment is in..

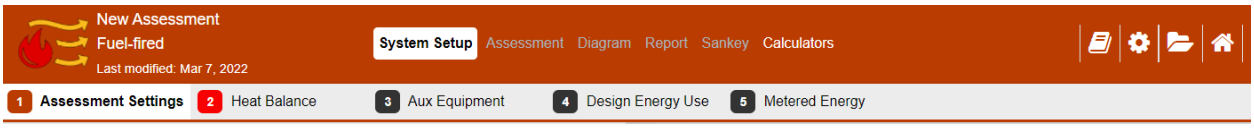
Home – The house will bring you to MEASUR’s home page.

System Setup

The system setup is where you enter the baseline data for your process heating system. The system setup is broken up into five tabs, each with a related set of input fields to be filled out. Field by field help text is provided for each input field, it will appear in the help panel when an input field is clicked on.

Navigation

Use the second bar to navigate to different sections of the Setup. The tabs will be color coded to indicate the state of the corresponding tab data. Tabs will be disabled in the previous steps have errors in their data.



Assessment Settings – Select the units for the assessment.

Heat Balance – Data entry relating to heating losses.

Aux Equipment – Data entry relating to Auxiliary Equipment.

Design Energy Use – Design specifications used for comparisons.

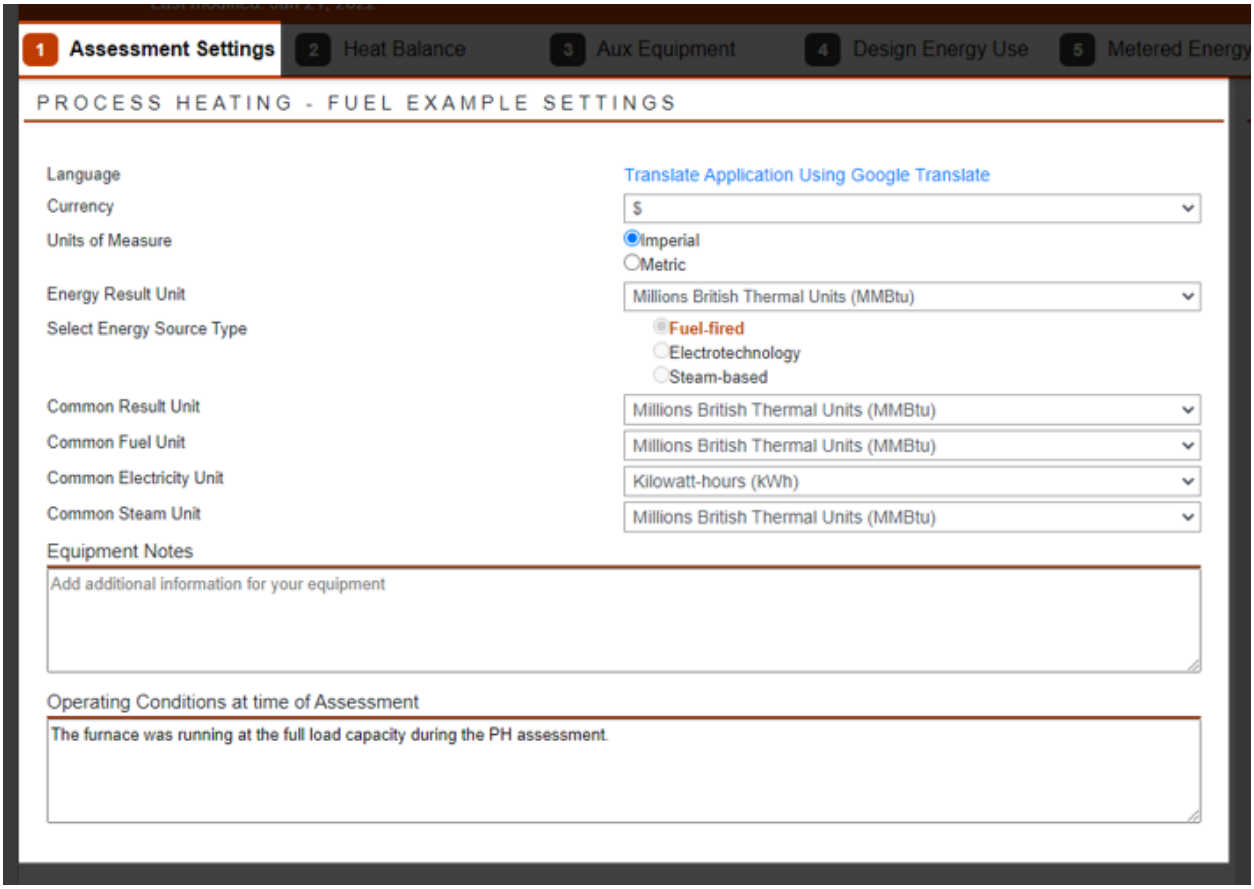
Metered Energy - Actual performance data used for comparisons.

Tab colors:

- Green - Valid data entered for tab.
- Red – Invalid or missing data entered for tab.
- Yellow – Data entered outside of expected range.
- Gray – Disabled tab, previous tab's are incomplete.

Assessment Settings

Use the “Assessment Settings” tab to set the units of measure you would like to use throughout the assessment. Select the energy source type for your system here as well, this will drive the rest of your assessment.

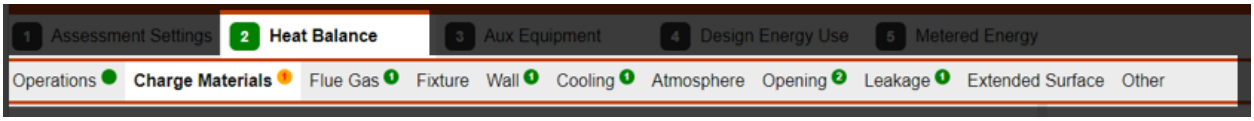


The **Heat Balance** is different for “Fuel-fired”, “Electrotechnology” or “Steam-based” Process Heaters. Once you move on to the **Heat Balance**, this CANNOT be changed without deleting your losses.

Notes added to this page will added to the report for this assessment.

Heat Balance

Heat balance…. Yada yada **KRISTINA PLEASE FILL OUT THIS QUICK DESCRIPTION OF HEAT BALANCE**



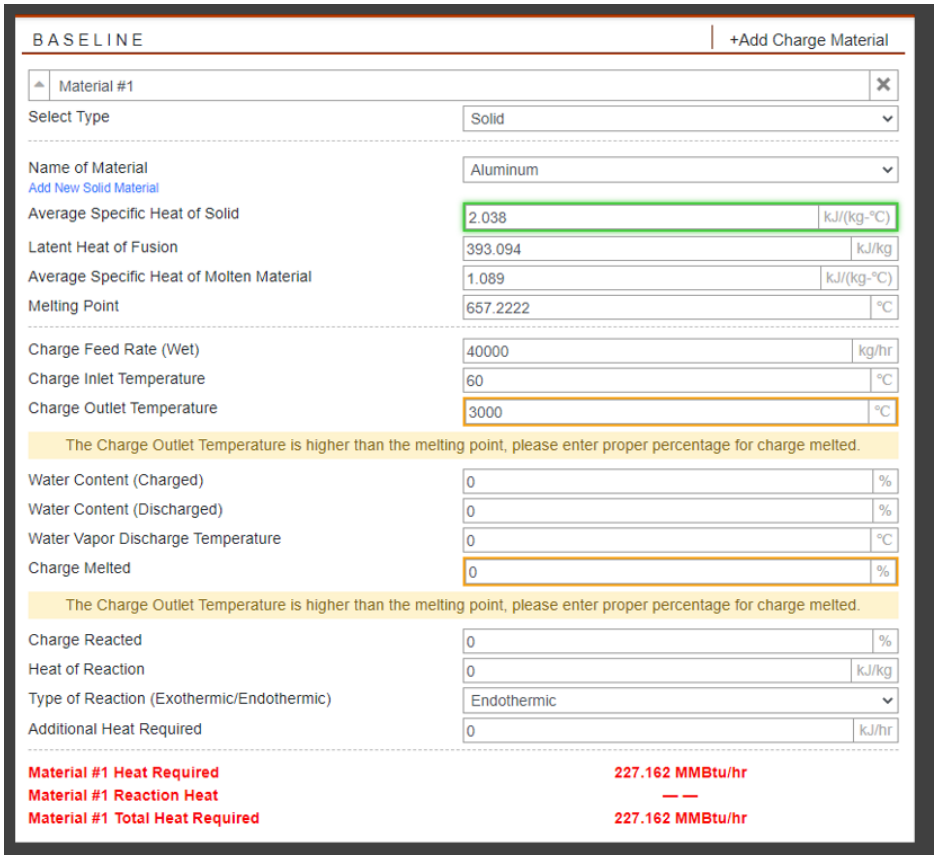
A third set of tabs will appear for heat balance. Each tab corresponds to a loss calculator that are used to add different losses corresponding to your process heating system.

The badges will indicate how many losses are entered for each calculator type. They will be three different colors.

- Green: Valid loss data entered
- Red: Invalid loss data entered, needs to be fixed
- Orange: Data entered is outside of an expected range

Data Entry

The screenshots below show how to enter data for the Heat Balance.



The left hand panel will be used for data entry of the losses.

Use the “+Add” buttons on the top right of the panel to add losses of the given type.

For many losses, a database of known substances can be selected from to fill out portions of the loss.

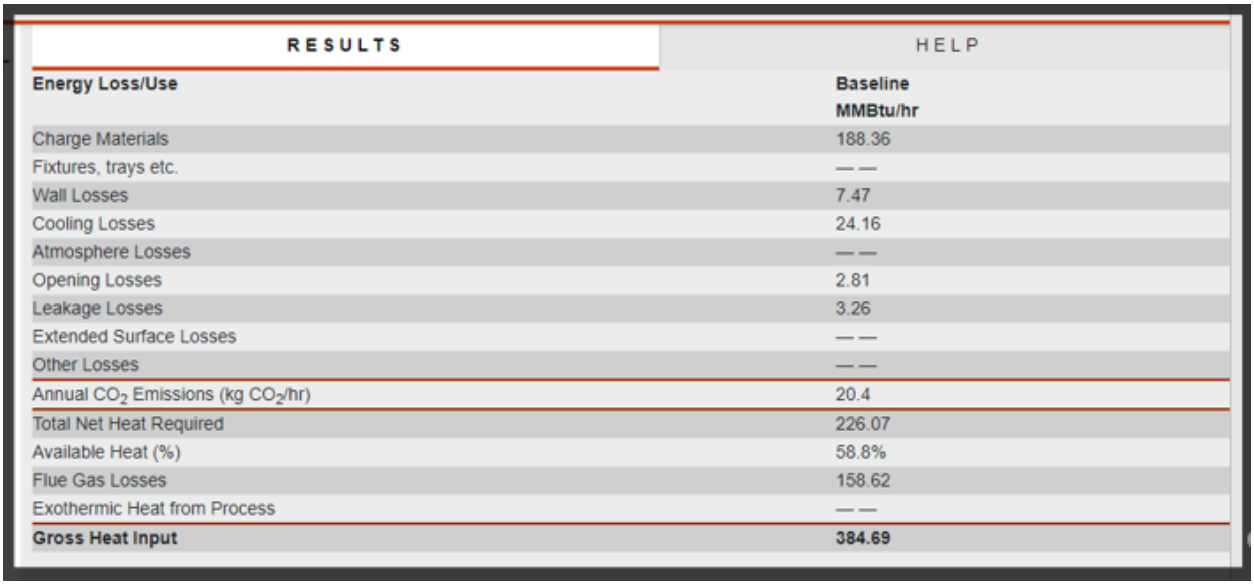
If those values are changed from the value in the database then the field is highlighted green.

Blue links under input labels can be used to calculate the input values or add new materials to the database for use later.

Yello highlighting will appear around input fields with warning messages when data values are outside of an expected range.

Red errors will appear when data is outside of an accepted range.

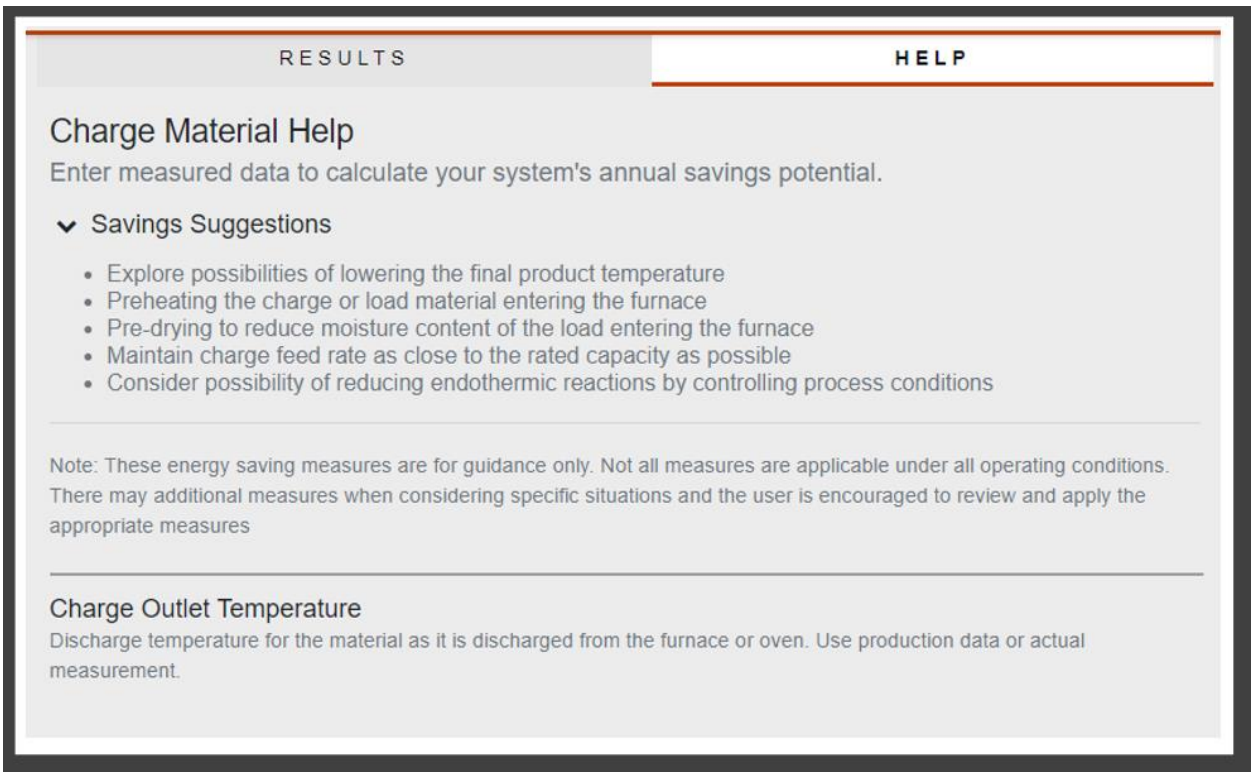
The total value of each loss is shown underneath the corresponding calculator fields.



RESULTS | HELP

Energy Loss/Use	Baseline MMBtu/hr
Charge Materials	188.36
Fixtures, trays etc.	— —
Wall Losses	7.47
Cooling Losses	24.16
Atmosphere Losses	— —
Opening Losses	2.81
Leakage Losses	3.26
Extended Surface Losses	— —
Other Losses	— —
Annual CO_2 Emissions (kg CO_2/hr)	20.4
Total Net Heat Required	226.07
Available Heat (%)	58.8%
Flue Gas Losses	158.62
Exothermic Heat from Process	— —
Gross Heat Input	**384.69**

The right hand panel will show a results summary of all the losses entered in your system. Total results for your system will also be shown.



RESULTS | HELP

Charge Material Help

Enter measured data to calculate your system's annual savings potential.

Savings Suggestions

- Explore possibilities of lowering the final product temperature
- Preheating the charge or load material entering the furnace
- Pre-drying to reduce moisture content of the load entering the furnace
- Maintain charge feed rate as close to the rated capacity as possible
- Consider possibility of reducing endothermic reactions by controlling process conditions

Note: These energy saving measures are for guidance only. Not all measures are applicable under all operating conditions. There may additional measures when considering specific situations and the user is encouraged to review and apply the appropriate measures

Charge Outlet Temperature

Discharge temperature for the material as it is discharged from the furnace or oven. Use production data or actual measurement.

Help text can be found under the “Help” tab in the right hand panel. Overall help for the loss will be at the top and field by field help text will be underneath that. As you click on each input field this section will be updated.

Assessment

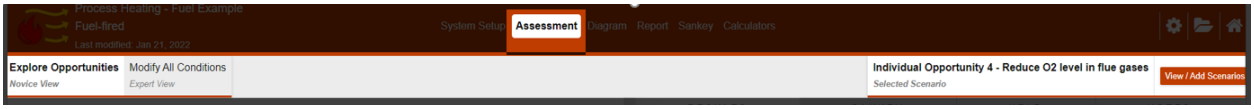
The assessment section of the module allows you to explore how modification scenarios for your system may provide cost, energy and emissions savings. Your baseline must be setup completely prior to making modifications.

There are two ways to conduct assessments which will be explained in further detail later in this section.

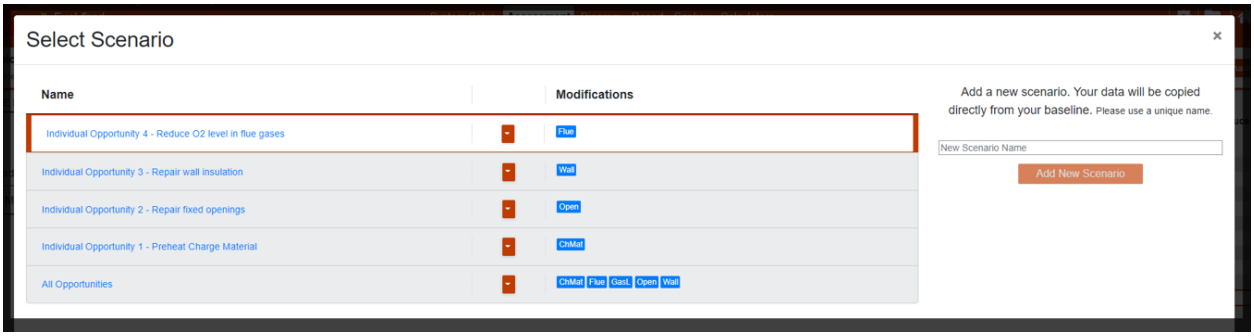
- Explore Opportunities (Novice View)
- Modify All Conditions (Expert View)

Navigation

As with the System Setup, there is a secondary set of tabs to navigate between the two assessment options.



Multiple scenarios can be created, the current “Selected Scenario” will be displayed on the right hand side of this bar. The “View / Add Scenarios” button opens up a modal used to manage your scenarios:

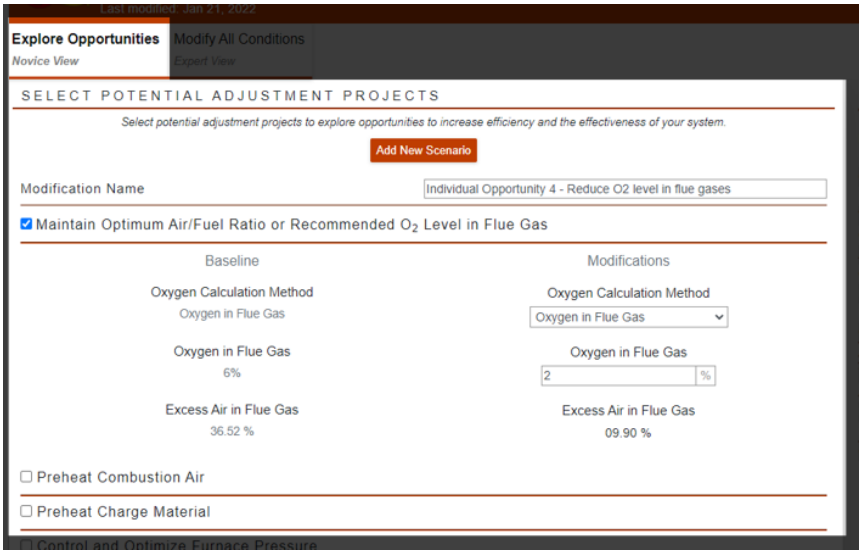


The modal can be used to:

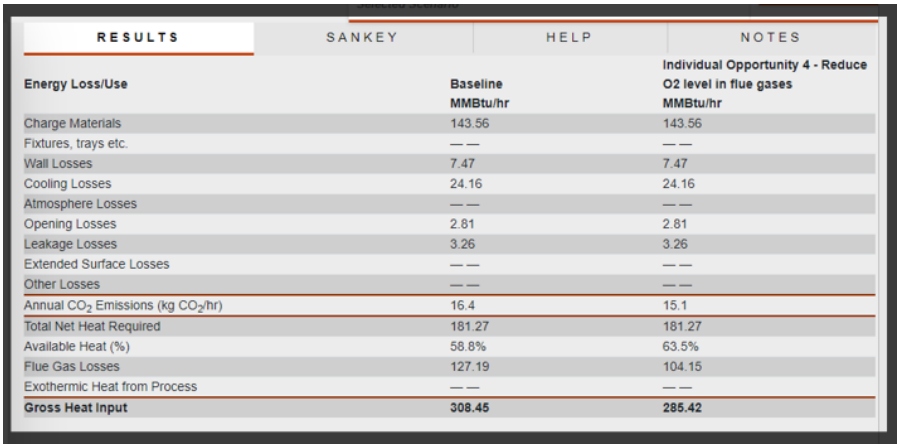
- Create new scenarios
- Create copies of existing scenarios
- Delete or rename scenarios
- Selecting scenarios for viewing and modifying

Explore Opportunities (Novice View)

In “Explore Opportunities” there are fewer data entry fields to find savings opportunities. The page is split into two sections. The left hand side has a checklist of likely modifications to improve your system. The right hand side provides results, a sankey diagram and field by field help text.



Each checklist item will provide input fields to modify the scenario. The data for your baseline is also displayed on the left.



Energy Loss/Use	Baseline MMBtu/hr	Individual Opportunity 4 - Reduce O2 level in flue gases MMBtu/hr
Charge Materials	143.56	143.56
Fixtures, trays etc.	— —	— —
Wall Losses	7.47	7.47
Cooling Losses	24.16	24.16
Atmosphere Losses	— —	— —
Opening Losses	2.81	2.81
Leakage Losses	3.26	3.26
Extended Surface Losses	— —	— —
Other Losses	— —	— —
Annual CO_2 Emissions (kg CO_2/hr)	16.4	15.1
Total Net Heat Required	181.27	181.27
Available Heat (%)	58.8%	63.5%
Flue Gas Losses	127.19	104.15
Exothermic Heat from Process	— —	— —
Gross Heat Input	**308.45**	**285.42**

The “Results” tab will show the calculated results and savings of the modified scenario.

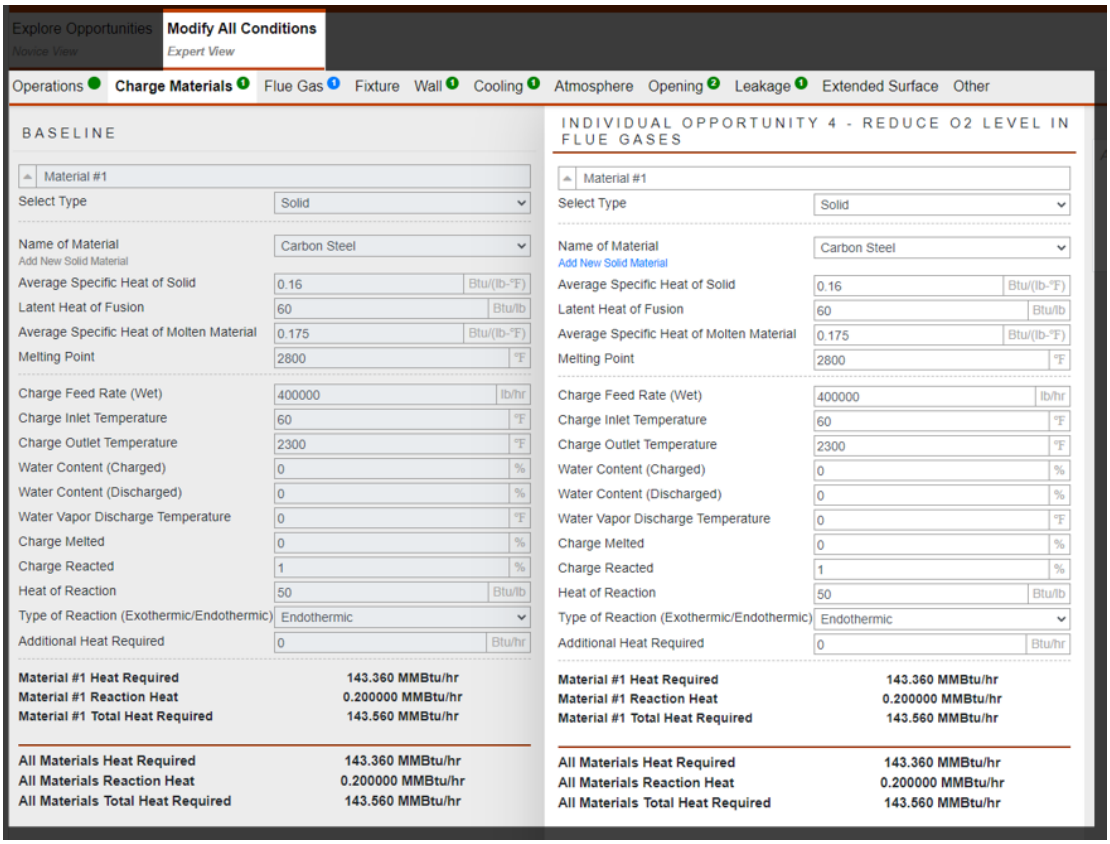
The “Sankey” tab will display a sankey diagram for either the baseline or selected modification scenario.

Field by field help text will display in the “Help” panel as input fields are clicked on.

“Notes” provides an area to take notes for each scenario that will be added to the final report.

Modify All Conditions (Expert View)

The “Modify All Conditions” tab allows you to adjust all aspects of the process heating system that was entered in the System Setup, allowing more control of the changes you make to your baseline.



The left input panel will show the input data for the baseline setup. The right input side will show the input data for the selected scenario you are adjusting.

The tabs correspond to the tabs from the System Setup, with the color coded dots corresponding to the changes that have been made to that category of the fan system.

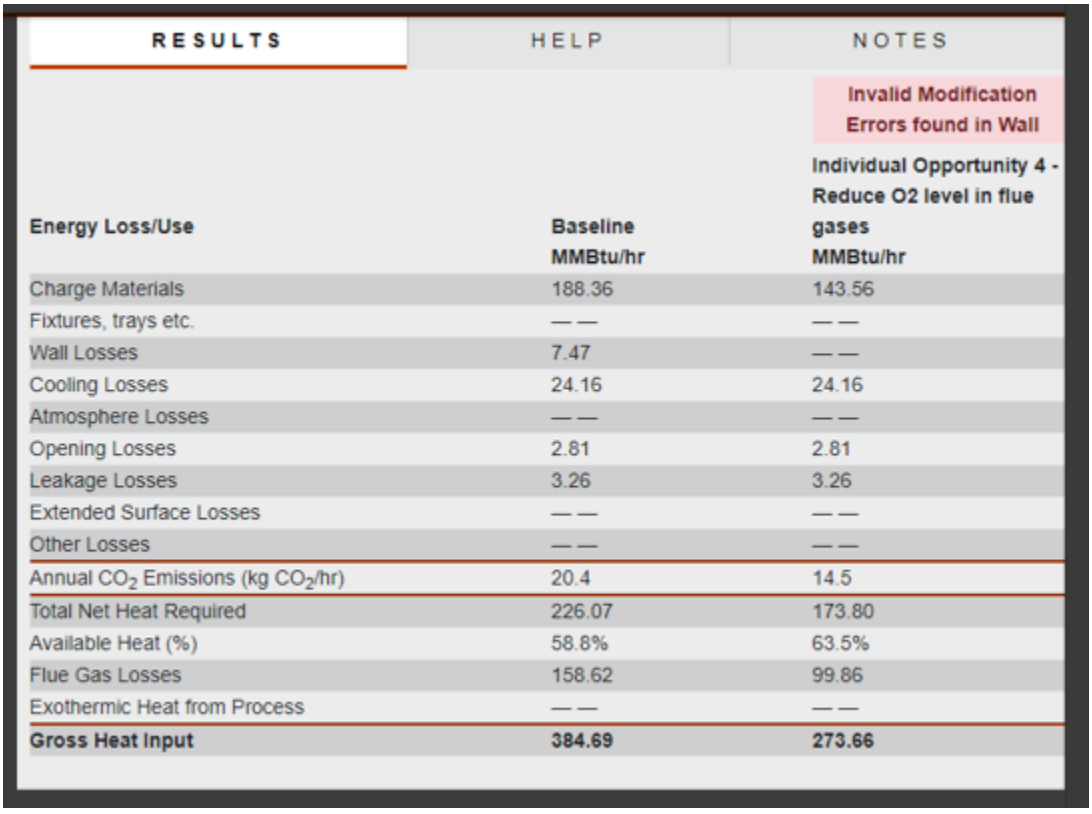
- Green: Everything is the same as the baseline
- Blue: Something has been changed from the baseline
- Red: There is invalid data somewhere in the baseline or modification scenario
- Orange: A data field has a valid value but is outside of an expected calculated range

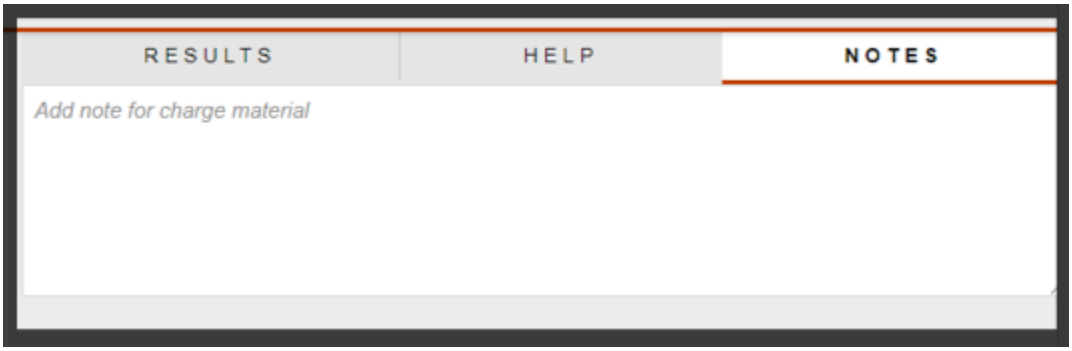
The furthest right hand side will have a panel with a set of tabs.

“Results” shows the live results of the baseline and selected scenarios with savings results calculated.

“Help” again provides field by field help text for each input field.

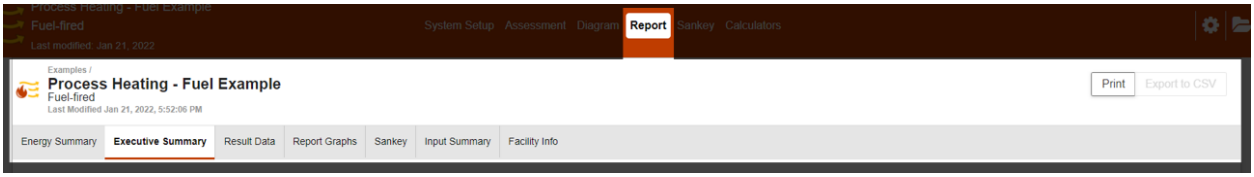
“Notes” is an input box that allows for notes on the selected scenario that will be added to the report.





Report

The report is a printable summary of the baseline and scenarios you have created in the assessment. Tables and graphs are provided to analyze the impacts the changes have on each scenario comparitively. There is a secondary set of tabs to navigate to different pieces of the report. The “Print” button in the top right hand corner will generate a PDF report.



- Energy Summary: Provides table with energy use comparisons by energy source. Additionally, a table with calculated, metered and designed energy values is provided. Notes added to the assessment are show here as well.
- Executive Summary: Provides a table of data with energy use and cost savings data.
- Result Data: Breakdown of each loss type and totals summary.
- Report Graphs: Graphical representations of loss data.
- Sankey: Sankey diagrams for the baseline and each scenario.
- Input Summary: A table of the input data for the baseline and each scenario.
- Facility Info: The facility information provided for the folder that this assessment was created in.