



Pump Assessment User Manual

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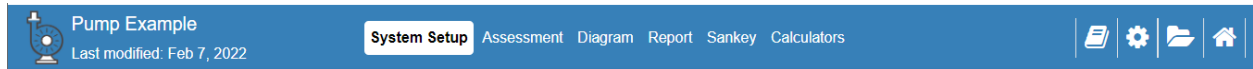
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Module Navigation

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 pump system.

Assessment – Modify system scenarios to find potential savings opportunities.

Diagram – Graphical visualization of the existing pump 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 pump and motor 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 Pump 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..

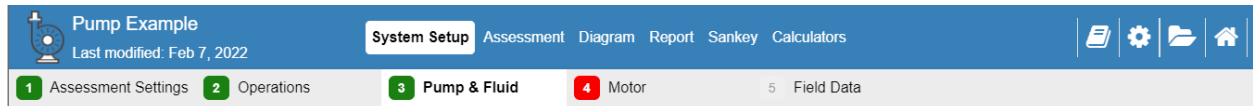
Home – The house will bring you to MEASUR’s home page.

System Setup

The system setup is where you enter the baseline data for your pump 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.

Operations – Data entry relating to cost and operation.

Pump & Fluid – Data entry relating to pump and fluid specifics.

Motor – Data entry relating to motor specifics for the pump.

Field Data - Data entry relating to system operations.

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.

Data Entry

The screenshots below show how to enter data for the System Setup. Input fields will highlight red and an error message will appear if the data that is entered is invalid. Links underneath input labels can be used to calculate the values of the corresponding input field.

The screenshot shows two panels for data entry. The 'PUMP' panel includes fields for Pump Type (a dropdown menu), Pump Speed (a text input with '2000' and a unit dropdown set to 'rpm'), and Drive (a dropdown menu). The 'FLUID' panel includes fields for Fluid Type (a dropdown menu), Fluid Temperature (a text input with '68' and a unit dropdown set to '°F'), Specific Gravity (a text input with '1.002'), Kinematic Viscosity (a text input with '1.107' and a unit dropdown set to 'cSt'), and Stages (a text input with a minus sign, a plus sign, and the number '1').

Use the left panels in the System Setup to enter the data for your existing pump system.

The right sides of the panel contain help text. The panel will show help relating to the field you are currently focused on.

The 'HELP' panel provides information on pump types and impeller configurations. It includes a section for 'Pump Type' with a description and a link to 'Pump & Fluid Help'. Below this, it lists 'Overhung Impeller' and 'Between Bearings Impeller' configurations, each with a diagram and a table of options.

Overhung Impeller	Between Bearings Impeller
End Suction Slurry	Multistage Boiler Feed
End Suction Sewage (and Submersible)	API Double Suction
End Suction Stock	Double Suction
End Suction ANSI/API	Horizontal multistage pumps, axially split, segmented ring diffuser barrel
Large End Suction	API Double suction
Slurry pumps, end suction	Double suction
Solids-handling, end suction (Submersible)	
Stock, end suction	
End suction - small, API end suction, ASME B73	
End suction - large (>5000 gpm)	

In the "Field Data" tab, once your system setup is completed, the "Results" tab will give you the calculated results for your Baseline.

RESULTS		HELP
		Baseline
Percent Savings (%)	---	
Pump efficiency (%)	81.2	
Motor rated power (hp)	350	
Motor shaft power (hp)	332.5	
Pump shaft power (hp)	319.2	
Motor efficiency (%)	94.3	
Motor power factor (%)	89.2	
Percent Loaded (%)	95	
Drive efficiency (%)	96	
Motor current (A)	370	
Motor power (kW)	263	
Annual CO2 Emissions (tonne CO ₂)	992.6	
Annual CO2 Emissions Savings (tonne CO ₂)	---	
Annual Energy (MWh)	2,304	
Annual Energy Savings (MWh)	---	
Annual Cost (\$)	152,077	
Annual Savings (\$)	---	

Assessment

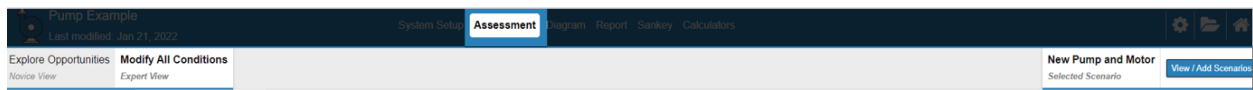
The assessment section of the module allows you to explore how modification scenarios for your system may provide cost, energy and emissions savings. Your baseline must be setup completely prior to making modifications.

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

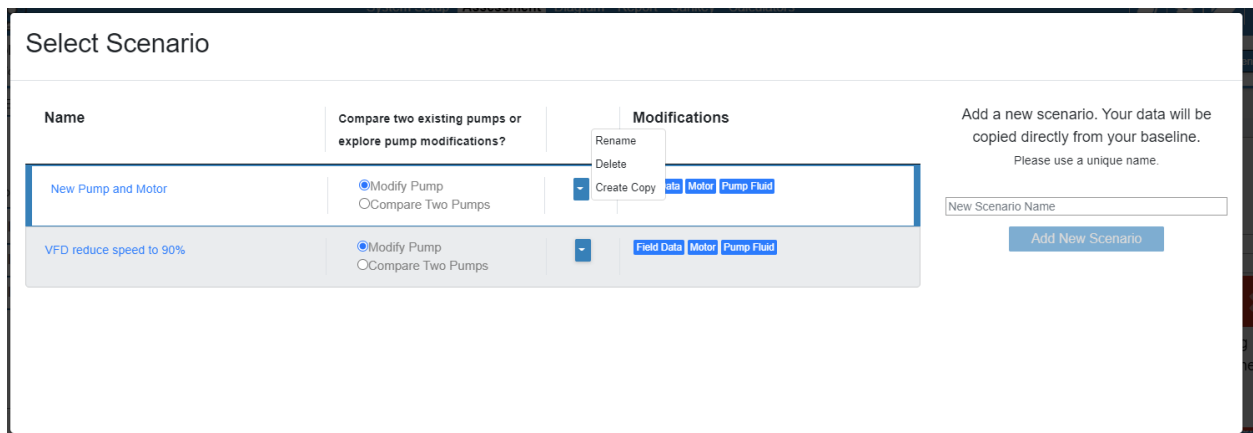
- Explore Opportunities (Novice View)
- Modify All Conditions (Expert View)

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
- Choose if the scenarios compare two pumps or modify and existing pump
- 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.

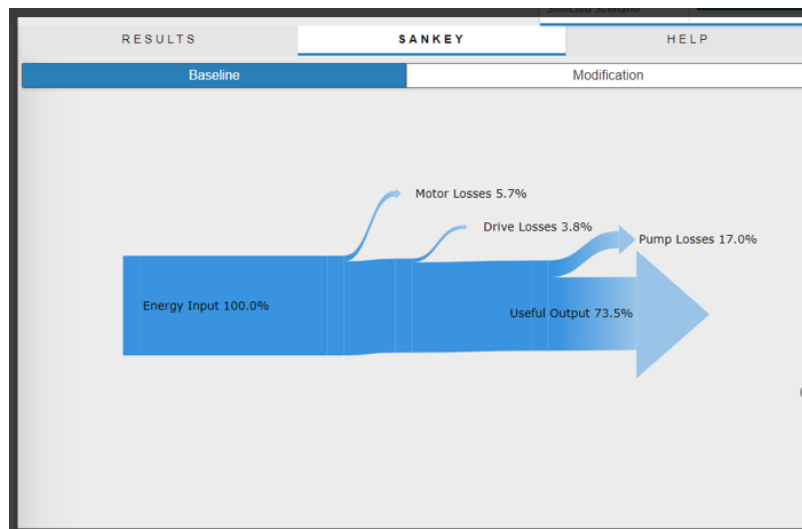
The screenshot shows the 'Explore Opportunities' Novice View interface. At the top, there are tabs for 'Explore Opportunities' (selected), 'Modify All Conditions', and 'Expert View'. Below the tabs is a section titled 'SELECT POTENTIAL ADJUSTMENT PROJECTS' with a subtitle: 'Select potential adjustment projects to explore opportunities to increase efficiency and the effectiveness of your system.' There is a button labeled 'Add New Scenario'. Below this is a form with a 'Modification Name' field containing 'New Pump and Motor'. There are three checkboxes: 'Install VFD' (unchecked), 'Install More Efficient Drive' (unchecked), and 'Install More Efficient Pump' (checked). Below the checkboxes are two dropdown menus: 'Baseline Pump Type' (set to 'End Suction ANSI/API') and 'Modification Pump Type' (set to 'End Suction ANSI/API'). To the right of the 'Modification Pump Type' dropdown, the text 'Modification Pump Efficiency' is displayed with a value of '87.52 %' and a link 'Known Efficiency'.

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

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.



Modify All Conditions (Expert View)

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

BASELINE	
Flow Rate	2500 gpm
Head	410 ft
Calculate Head	
Load Estimation Method	Current
Motor Current	370 A
Measured Voltage	460 V

NEW PUMP AND MOTOR	
Flow Rate	2499.99 gpm
Head	409.99 ft
Calculate Head	
Measured Voltage	460 V
Implementation Costs	

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 pump system.

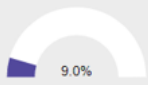
- Green = Everything is the same as the baseline
- Blue = Something has been changed from the baseline
- Red = There is invalid data somewhere in the baseline or modification scenario
- Orange = A data field has a valid value but is outside of an expected calculated range

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.

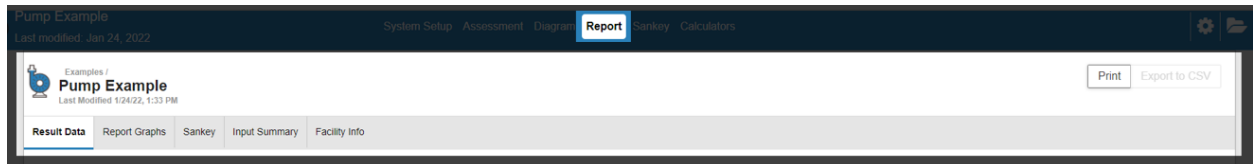
“Help” again provides field by field help text for each input field.

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

RESULTS		HELP	NOTES
Baseline		New Pump and Motor	
Percent Savings (%)			
Pump efficiency (%)	81.2	87.5	
Motor rated power (hp)	350	350	
Motor shaft power (hp)	332.5	308.6	
Pump shaft power (hp)	319.2	296.2	
Motor efficiency (%)	94.3	96.1	
Motor power factor (%)	89.2	90.2	
Percent Loaded (%)	95	88	
Drive efficiency (%)	96	96	
Motor current (A)	370	334	
Motor power (kW)	263	239.6	
Annual CO2 Emissions (tonne CO2)	992.6	1,364.2	
Annual CO2 Emissions Savings (tonne CO2)	—	-371.6	
Annual Energy (MWh)	2,304	2,099	
Annual Energy Savings (MWh)	—	205	
Annual Cost (\$)	152,077	138,522	
Annual Savings (\$)	—	13,555	

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.



- Result Data: Provides a table of calculated results and summary of the selected energy projects in each scenario. Notes added to the assessment are show here as well.
- Report Graphs: A set of graphical representations of the energy in the system.
- 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.