



# Fan 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 fan system.

Assessment – Modify system scenarios to find potential savings opportunities.

Diagram – Graphical visualization of the existing fan 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 fan 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 Fan 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..

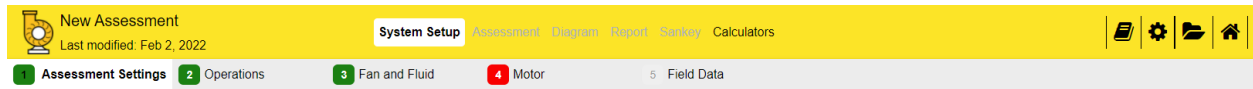
Home – The house will bring you to MEASUR’s home page.

## System Setup

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

Fan & Fluid – Data entry relating to fan and fluid specifics.

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

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.

**FIELD DATA**

**Static Pressure** | Total Pressure

Flow Rate: 129691 ACFM  
[Calculate Flow Rate and Pressures](#)

Inlet Velocity Pressure: -2.5 in H<sub>2</sub>O  
[Estimate Inlet Velocity Pressure](#)

Inlet Pressure: -16.36 in H<sub>2</sub>O  
[Estimate Inlet Pressure](#)

Outlet Pressure: 1.1 in H<sub>2</sub>O  
[Estimate Outlet Pressure](#)

Load Estimation Method: Power

Motor Power: 450 kW

Measured Voltage: 460 V

Compressibility Factor: 0.988  
[Define Compressibility Factor](#)

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

Blue links under input labels can be used to calculate the input values.

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

**RESULTS** | **HELP**

### Field Data Help

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

#### Measured Voltage

The measured bus voltage is used, along with measured current, to estimate input motor power if Current is the specified Load estimation method. If Power is the Load estimation method, the current is estimated from power and voltage.

Minimum	Maximum
1 V	13800 V

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

RESULTS	HELP
	<b>Baseline</b>
Percent Savings (%)	— —
Fan Energy Index	0.98
Fan efficiency (%)	72.5
Motor rated power (hp)	600
Motor shaft power (hp)	577.9
Fan shaft power (hp)	554.8
Motor efficiency (%)	95.8
Motor power factor (%)	85.7
Percent Loaded (%)	96.3
Drive efficiency (%)	96
Motor current (A)	659
Motor power (kW)	450
Annual CO2 Emissions (tonne CO <sub>2</sub> )	1,581.0
Annual CO2 Emissions Savings (tonne CO <sub>2</sub> )	—
Annual Energy (MWh)	3,942
Annual Energy Savings (MWh)	—
Annual Cost (\$)	236,520
Annual Savings (\$)	—

## Assessment

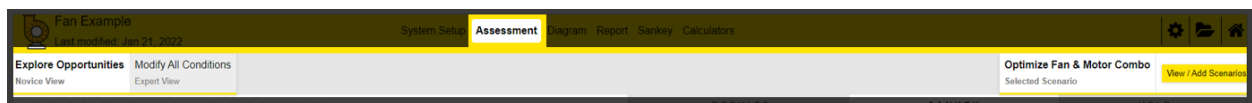
The assessment section of the module allows you to explore how modification scenarios for your system may provide cost, energy and emissions savings. Your baseline must be setup completely prior to making modifications.

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

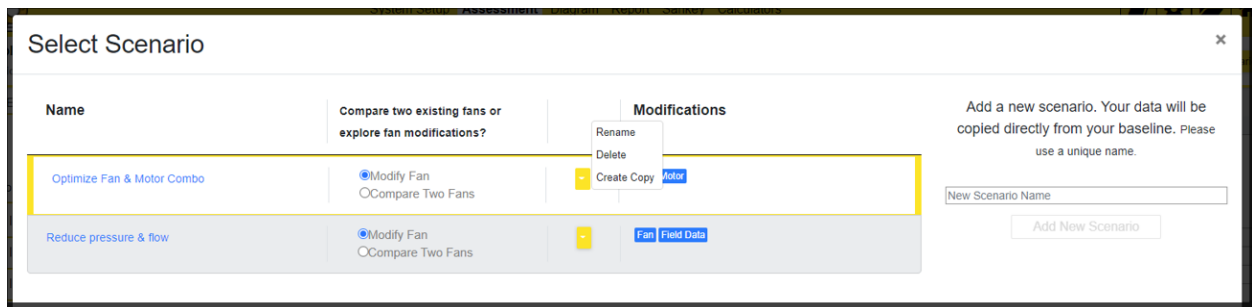
- Explore Opportunities (Novice View)
- Modify All Conditions (Expert View)

## 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 fans or modify and existing fan
- 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.

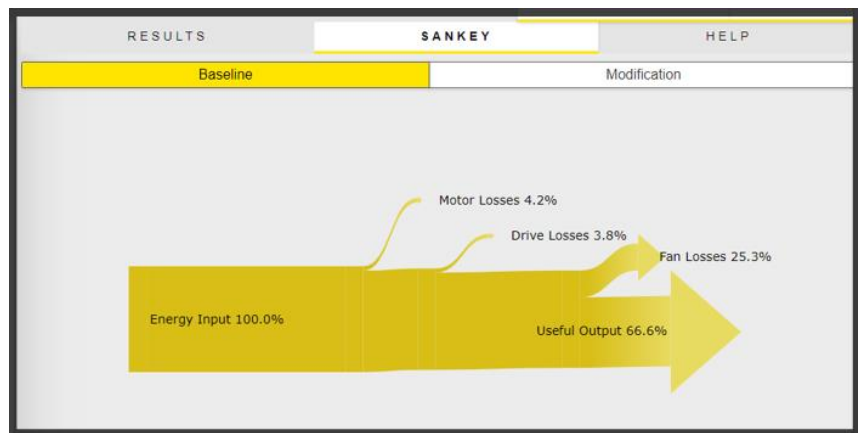
The screenshot shows the 'Explore Opportunities' Novice View interface. At the top, there are tabs for 'Explore Opportunities' (selected), 'Modify All Conditions', and 'Expert View'. Below the tabs is a section titled 'SELECT POTENTIAL ADJUSTMENT PROJECTS' with a subtitle: 'Select potential adjustment projects to explore opportunities to increase efficiency and the effectiveness of your system.' A yellow button labeled 'Add New Scenario' is present. Below this is a form for 'Modification Name' with the text 'Optimize Fan & Motor Combo'. There is a checklist of three items: 'Install VFD' (unchecked), 'Install More Efficient Drive Type' (unchecked), and 'Install More Efficient Fan' (checked). Below the checklist, there are two dropdown menus: 'Baseline Fan Type' (set to 'Airfoil (DWDI)') and 'Modification Fan Type' (set to 'Airfoil (SWSI)'). To the right of the 'Modification Fan Type' dropdown, it says 'Modification Fan Efficiency 75.66 %'. Below this, there are links for 'Known Efficiency' and 'Known Efficiency'. At the bottom, there is a checkbox for 'Install More Efficient Motor'.

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 fan that was entered in the System Setup, allowing more control of the changes you make to your baseline.

The screenshot shows the 'Modify All Conditions' software interface. The interface is split into two main panels: 'BASELINE' on the left and 'OPTIMIZE FAN & MOTOR COMBO' on the right. Both panels have tabs for 'Static Pressure' and 'Total Pressure'. The 'BASELINE' panel shows input fields for Flow Rate (129691 ACFM), Inlet Velocity Pressure (-2.5 in H2O), Inlet Pressure (-16.36 in H2O), Outlet Pressure (1.1 in H2O), Load Estimation Method (Power), Motor Power (450 kW), Measured Voltage (460 V), and Compressibility Factor (0.988). The 'OPTIMIZE FAN & MOTOR COMBO' panel shows similar input fields but with Inlet Velocity Pressure set to -1.5 in H2O and Measured Voltage set to 460 V. The 'Field Data' tab is highlighted with a blue dot, indicating it is the active scenario.

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.

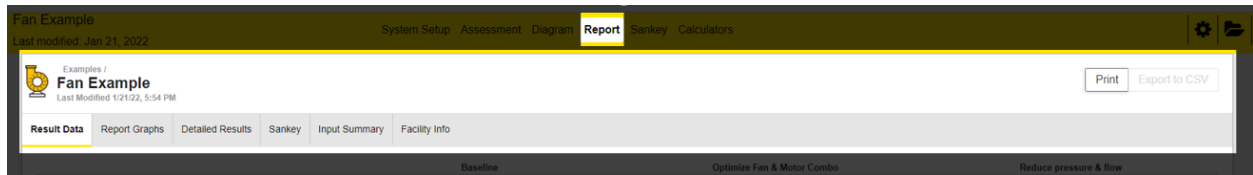
“Notes” is an input box that allows for notes on the selected scenario that will be added to the report.

RESULTS	HELP	NOTES
Baseline	Optimize Fan & Motor Combo	
Percent Savings (%)	— —	9.0%
Fan Energy Index	0.98	1.08
Fan efficiency (%)	72.5	75.7
Motor rated power (hp)	600	600
Motor shaft power (hp)	577.9	525.2
Fan shaft power (hp)	554.8	504.2
Motor efficiency (%)	95.8	96
Motor power factor (%)	85.7	85.5
Percent Loaded (%)	96.3	87.5
Drive efficiency (%)	96	96
Motor current (A)	659	599
Motor power (kW)	450	408.1
Annual CO2 Emissions (tonne CO2)	1,581.0	1,433.7
Annual CO2 Emissions Savings (tonne CO2)	—	147.3
Annual Energy (MWh)	3,942	3,575
Annual Energy Savings (MWh)	—	367
Annual Cost (\$)	236,520	214,482
Annual Savings (\$)	—	22,038



## 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.
- Detailed Results: Psychrometric data for the baseline and each scenario.
- 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.