

VERIFI: A Software Tool for Tracking Industrial Utility Data

Nate Roberts

Kristina Armstrong

Christopher Price

Paulomi Nandy

Thomas Wenning

DATE



DOE Technical Support Programs



Pledge and achieve 25% energy intensity reduction over a 10-year period for all U.S. manufacturing.



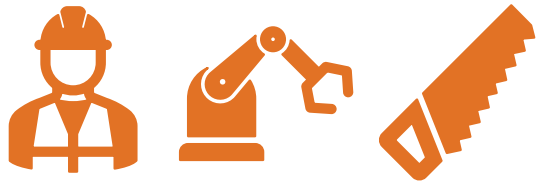
Pledge and achieve at least a 50% reduction in portfolio-wide Scope 1 and 2 GHG emissions within 10 years

- **Voluntary, public-private partnership programs for manufacturers and other industrial organizations**
- **Help partners set long-term efficiency and decarbonization goals**
- **Receive technical assistance from DOE and its network of national laboratories to achieve goals through four major support pillars**

DOE Industrial Software Tools

Designed to help energy and sustainability teams identify savings opportunities in their operational energy usage and emissions

Energy Systems



MEASUR

Electrification for Decarbonization
Compressed Air Scoping Tool

Energy Management



VERIFI

50001 Ready Navigator
Energy Footprint Tool
Plant Energy Profiler
Implementation Guidance Toolkit

Carbon, Water, & Waste



Plant Water Profiler
Plant Carbon Footprint &
Decarbonization Assessment Tool
Carbon Emissions Calculator
Waste Stream Energy Content

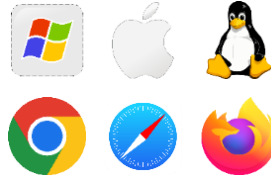
VERIFI is an Integrated Energy Tracking Tool

- **FREE!!!**

- **OS and Platform Agnostic**



- Windows, Linux, Mac
- Desktop and Mobile



- **Use Internationally**

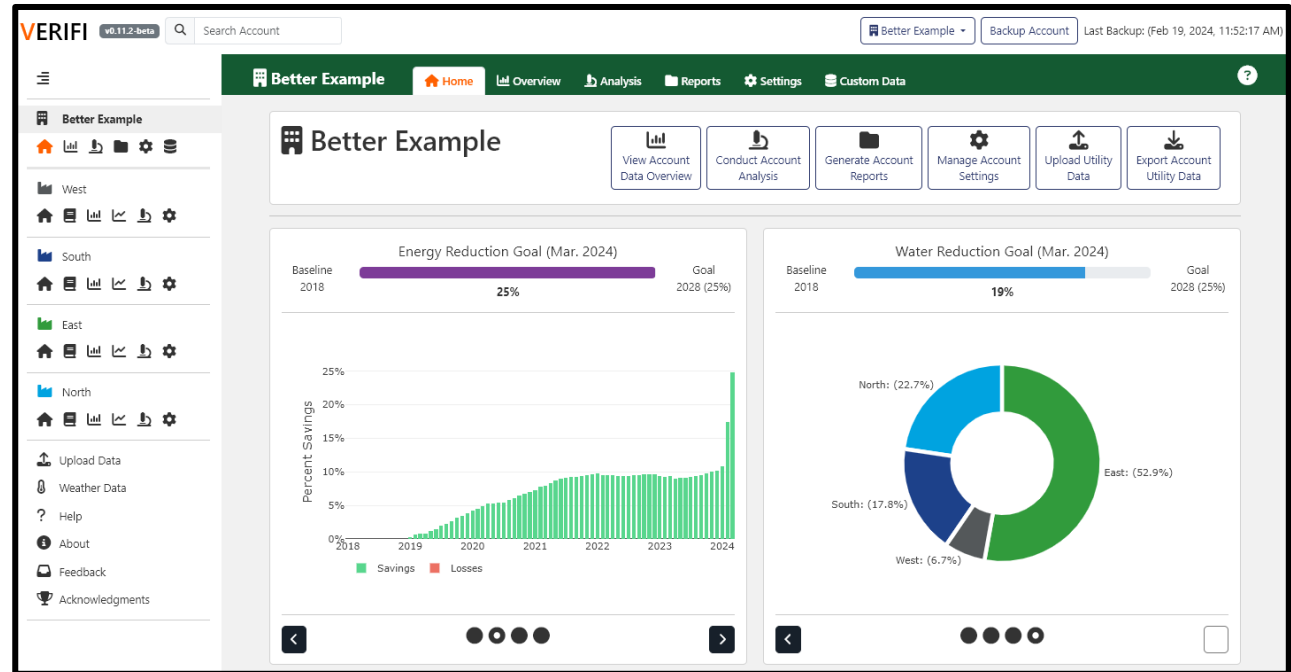


- No limits on where VERIFI can be downloaded or accessed
- Unit flexibility (imperial or metric)

- **Cybersecurity**

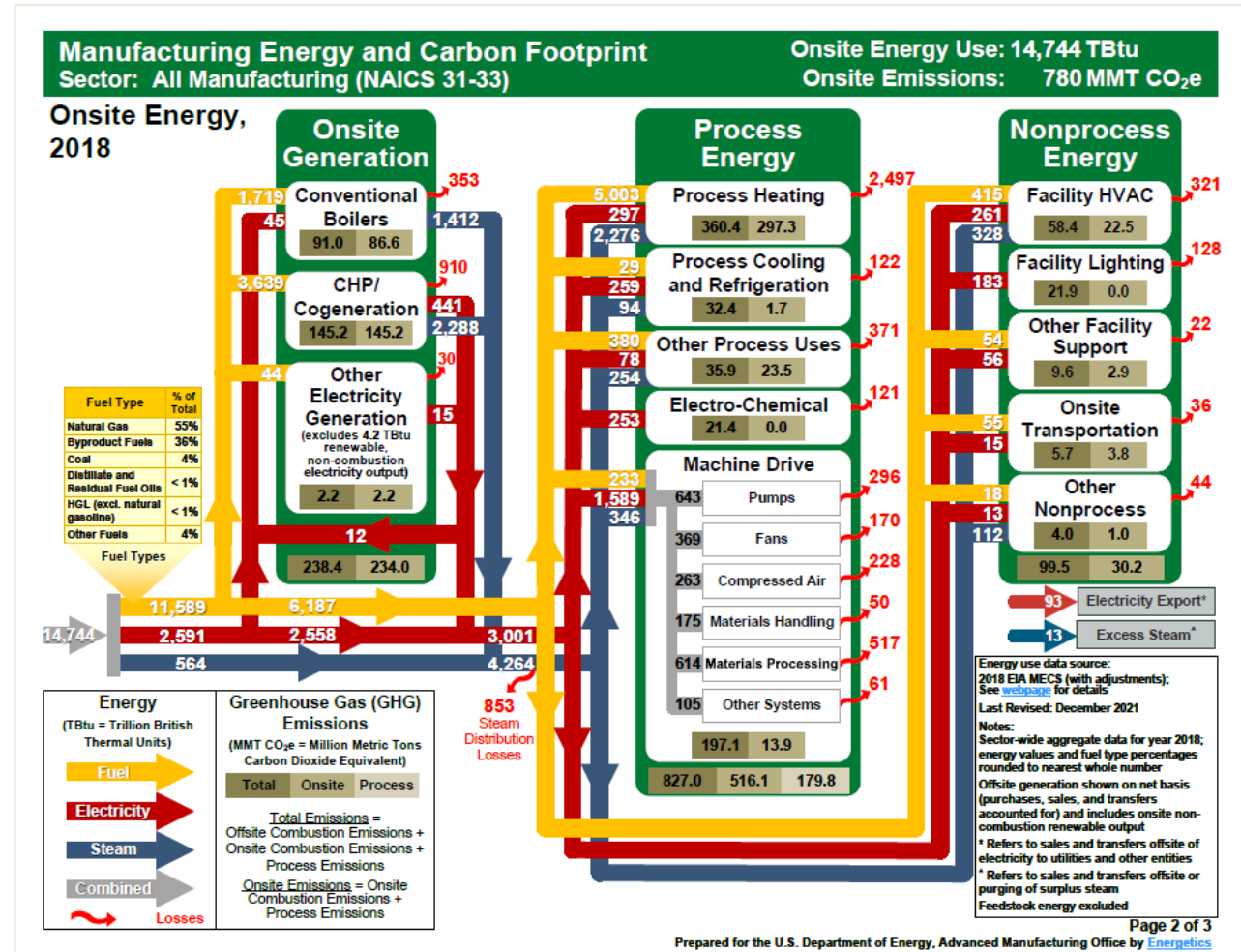


- Data is stored on ***YOUR*** device
- Interaction data (where you click, etc.) is collected to improve tool
- No data you enter is sent to DOE or ORNL unless you send it to us directly



How VERIFI can help Energy Managers

- Normalize manufacturing energy use and generation
- Identify potential savings
 - Help reduce losses in key manufacturing systems (~4.7 QBTU as of 2018)
- Identify high performing and low performing facilities with biggest impact on company-level performance
- Simple analysis tools for absolute, intensity, and regression-based targets



How VERIFI can help Sustainability Teams

- Track direct stationary (Scope 1) and indirect (Scope 2) emissions
 - Including Fugitive/Process and Mobile Emissions!
- Automatic EPA eGRID subregion emission factors based on ZIP code
 - Including residual mix for market-based
- Emission factors for common fuels
- Custom emission factors for electricity or fuels

VERIFI v6.10.6 beta Search Account Better Plants Example Backup Account Last Backup: (Feb 13, 2023, 12:53:07 PM)

Better Plants Example Home Overview Analysis Reports Settings Custom Data

Better Plants Example Emissions Factors

Manage Custom Electrical Emissions Factors
A database has been provided by VERIFI that pulls emissions output rates from eGRID Subregions based on the EPA Emissions & Generation Resource Integrated Database (2021).
Use this section of VERIFI to create and manage custom emissions factors that can be used for calculations regarding local and market emissions.

Add New Emissions Subregion
Create a custom subregion and corresponding emissions that can be used in any facility within this account.

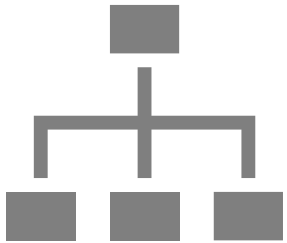
U.S. Average

Year	Emissions Rate (tonne CO ₂ /kWh)
2014	0.562
2015	0.518
2018	0.456
2020	0.432
2021	0.403
2022	0.373

No Residual Emissions Rates Found For Subregion

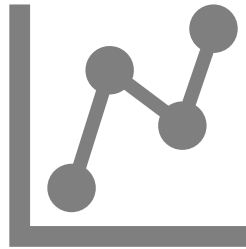
U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy

VERIFI Key Features



Tracking Utility Data

- Track energy usage, utility costs, and GHG emissions
- Monitor facility and company level progress on energy and GHG emission reduction goals



Data Visualization

- Easily identify unusual usage or high energy costs
- Determine correlation between energy use and relevant variables such as production or weather



Analysis

- Automatic weather data based on facility location
- Simple regression modeling to track energy intensity
- Carbon and GHG emission performance analysis



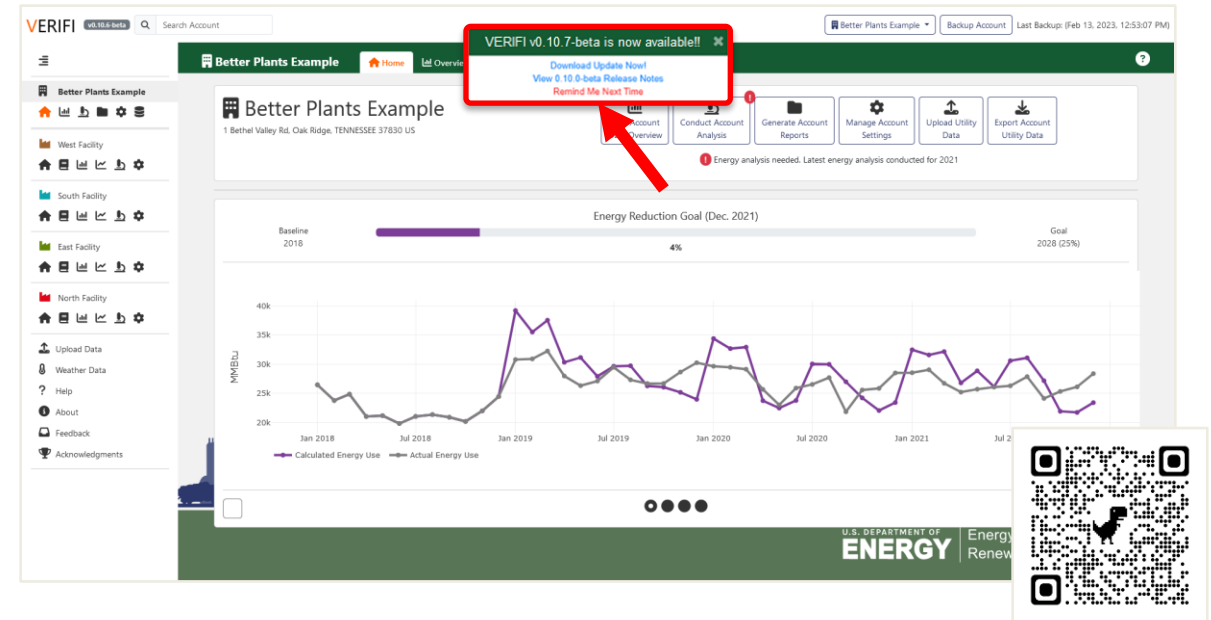
Reporting

- Automatically create annual reports for the Better Plants and Climate Challenge programs*
- Create automatic performance reports

*coming soon

Finding VERIFI

- Beta version released in early 2023
- Updates will occur often
 - Notification of updates if connected to the internet
 - Please report bugs to: accawigk@ornl.gov
armstrongko@ornl.gov
- Download from ORNL GitHub
 - Uninstalling will delete your data!
- If using online:
 - Webpage may need a “hard refresh” to see latest update
 - Cleaning your cache will delete your data!



- Download at <https://ornl-amo.github.io/>
- Visit <https://verifi.ornl.gov/> in your web browser
- Type “ORNL VERIFI” in your web search

VERIFI Demo



First Time Starting VERIFI

VERIFI v0.11.2-beta-20eb9c8 Account Required

Corporate Account Setup Welcome Setup Account Setup Facilities Confirm Setup

Welcome to VERIFI Corporate Account Setup

Use the account setup wizard to create a new corporate account and its corresponding facilities.

1. Setup Corporate Account Details
2. Setup Facilities
3. Confirm Setup and Begin Energy Tracking

Want a quick start? [Load our test data](#) [Load Account Backup](#)

U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy

Welcome to VERIFI [Continue](#)

Create Account

Load sample data

Load Backup data

Create your own corporate level account

Navigating within VERIFI

- **Side Bar**

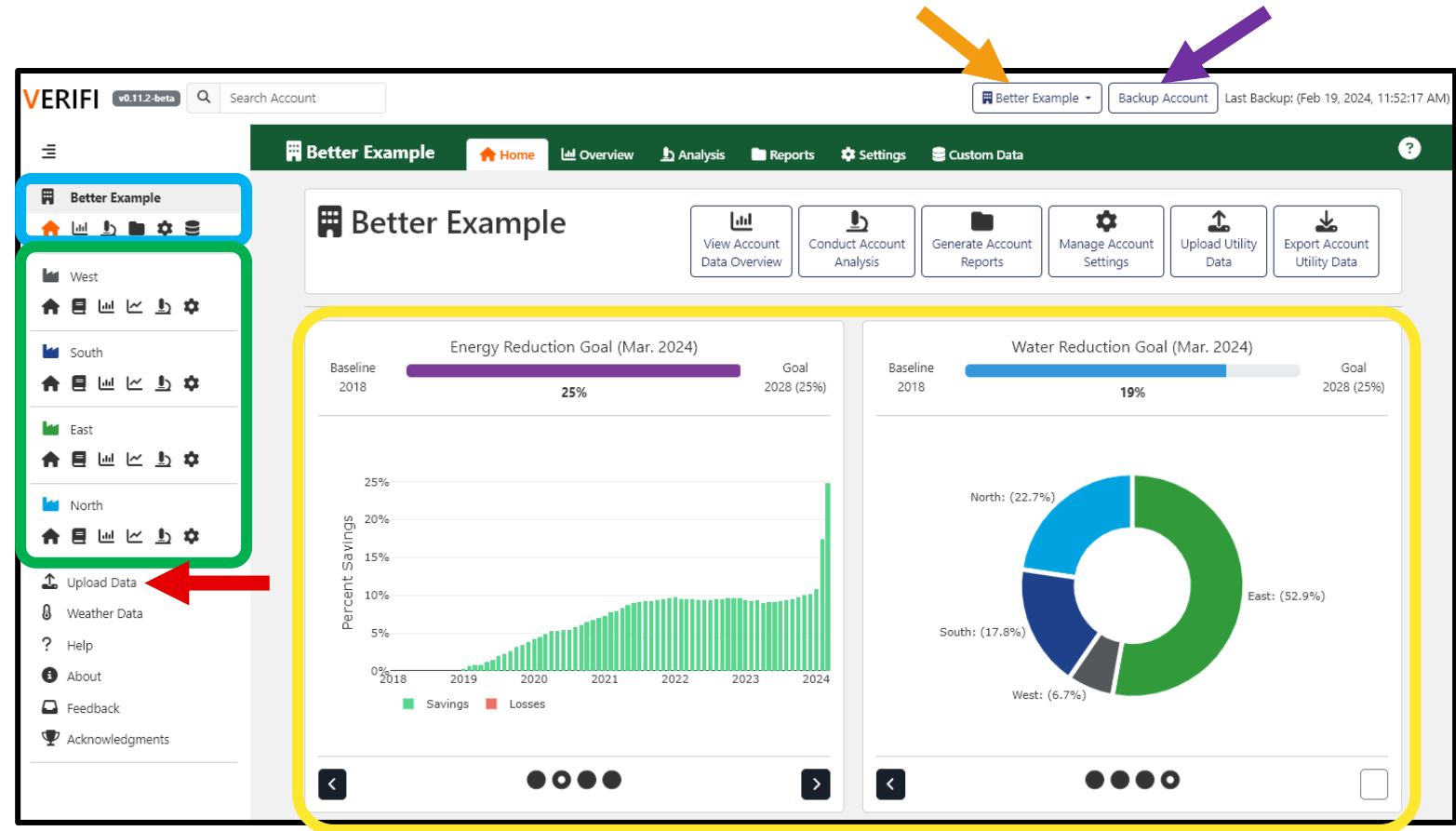
- Company-level info
- Facility-level info
- Data upload tool

- **Top Bar**

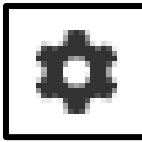
- Switch “Accounts”
- Backup Data

- **Window**

- Company Progress
- Graphs!



Company & Facility level info



- **Company Info**

- “Demographics”
- Unit default preferences
- Sustainability goals
- “Housekeeping”

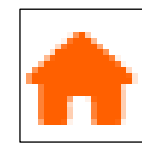
- **Facility level**



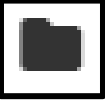
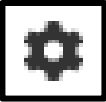

- Most same information
- Inherited from **Company** but able to changed

The screenshot displays the VERIFI web application interface for a facility named 'West'. The page is divided into several sections:

- Facility Information:** Fields for Facility Name (West), Address (1845 Scott St.), Country (United States of America), State (CALIFORNIA), City (Sacramento), Zip (94203), NAICS Code, Facility Classification (Manufacturing), Facility Area, and Facility Color.
- Facility Units:** Options for Units of Measure (Custom), Result Energy Unit (Million British Thermal Units), and Default units for setting up meters (Electricity Unit: Kilowatt-hour, Volume Unit: Gallon, Volume Unit (Gases): Standard Cubic Feet, Mass Unit: Pounds).
- Sustainability Questions:** A series of questions regarding energy and carbon reduction goals, with options for Absolute or Intensity goals and Baseline Year (2018, 2020, 2028, 2030).
- Financial Reporting:** Options for When is your fiscal year (Calendar Year, Non Calendar Year).
- Action Buttons:** Delete Facility, Import Backup Data, and Export Facility.

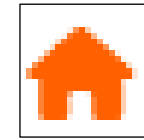
Company Home & Navigating within a “Company”










- ➔ Overview 
- ➔ Analysis (Rollup) 
- ➔ Reports 
- ➔ Settings (Company Info) 
- ➔ Custom Emissions Factors 
- ➔ Export to data template

The screenshot shows the VERIFI web application interface for a user named 'Better Example'. The top navigation bar includes 'Home', 'Overview', 'Analysis', 'Reports', 'Settings', and 'Custom Data'. Below this, a secondary menu contains buttons for 'View Account Data Overview', 'Conduct Account Analysis', 'Generate Account Reports', 'Manage Account Settings', 'Upload Utility Data', and 'Export Account Utility Data'. The main content area features a left sidebar with navigation options like 'Home', 'Overview', 'Analysis', 'Reports', 'Settings', and 'Custom Data'. The central dashboard displays two key performance indicators: 'Energy Reduction Goal (Mar. 2024)' with a bar chart showing savings and losses from 2020 to 2024, and 'Water Reduction Goal (Mar. 2024)' with a progress bar at 18% and a donut chart showing a breakdown by month (North: 22.7%, East: 22.9%, South: 27.8%, West: 26.7%). Colored arrows from the legend point to corresponding icons in the interface: blue for Overview, green for Analysis, red for Reports, yellow for Settings, and purple for Custom Emissions Factors. A yellow arrow points to the 'Export Account Utility Data' button.

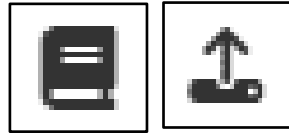
Facility Home & Navigating within a “Facility”



- ➔ Bills / Data Entry  
- ➔ Overviews 
- ➔ Visualizations 
- ➔ Analysis (Regression) 
- ➔ Settings (Facility Info) 
- ➔ Weather Data 

The screenshot displays the VERIFI interface for a facility named 'West'. The top navigation bar includes tabs for Home, Utility Data, Overview, Data Visualization, Analysis, and Settings. A central dashboard shows facility details (1845 Scott St, Sacramento, CA), a 'Water Reduction Goal' progress bar at 26%, and a 'Percent Savings' bar chart from 2018 to 2024. A bottom navigation bar contains icons for Home, Bills, Overview, Visualizations, Analysis, and Settings. Colored arrows from the legend point to these various UI elements.

3 Ways to Enter Data into VERIFI



1. With the Data Template

The spreadsheet shows data for various meters and dates, including consumption and cost details. The VERIFI interface shows the 'Upload Data' process with a table of facility details.

Facility Name	Meter Name	Is Valid?	Source	Units	Group	Auto Group	Calendarize?	Toggle	New / Existing	Skip Import
West Facility	Office 1	Yes	Electricity	kWh	Office Electricity	Do Not Calendarize	Existing	<input type="checkbox"/>		
West Facility	Office 2	Yes	Electricity	kWh	Office Electricity	Do Not Calendarize	Existing	<input type="checkbox"/>		
West Facility	Shop 1	Yes	Electricity	kWh	Shop Electricity	Do Not Calendarize	Existing	<input type="checkbox"/>		
West Facility	Shop 2	Yes	Electricity	kWh	Shop Electricity	Do Not Calendarize	Existing	<input type="checkbox"/>		
West Facility	NG1	Yes	Natural Gas	Therm	Natural Gas	Do Not Calendarize	Existing	<input type="checkbox"/>		
West Facility	NG2	Yes	Natural Gas	Therm	Natural Gas	Do Not Calendarize	Existing	<input type="checkbox"/>		
South Facility	Electricity	Yes	Electricity	kWh	Electricity	Do Not Calendarize	Existing	<input type="checkbox"/>		
South Facility	Natural Gas	Yes	Natural Gas	Therm	Natural Gas	Do Not Calendarize	Existing	<input type="checkbox"/>		
East Facility	Electricity	Yes	Electricity	kWh	Electricity	Do Not Calendarize	Existing	<input type="checkbox"/>		
East Facility	Natural Gas	Yes	Natural Gas	Therm	Natural Gas	Do Not Calendarize	Existing	<input type="checkbox"/>		
East Facility	Solar	Yes	Electricity	kWh	Electricity	Do Not Calendarize	Existing	<input type="checkbox"/>		
North Facility	Elec (kWh)	Yes	Electricity	kWh	Electricity	Do Not Calendarize	Existing	<input type="checkbox"/>		
North Facility	Gas (CCF)	Yes	Natural Gas	CCF	Natural Gas	Do Not Calendarize	Existing	<input type="checkbox"/>		

2. Enter each bill individually

The interface shows a form for entering a new bill, with fields for general information, emissions, and costs.

Best for entering data every month

Best if you want to enter bill data (calendarize, group, billing analysis, etc.)

3. Directly enter old EnPI files

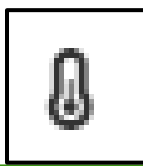
The spreadsheet shows historic data for various meters and dates, including electricity and natural gas consumption, emissions, and production. The VERIFI interface shows the 'Upload Data' process with a table of facility details.

Date	Electricity (MMBtu)	Natural Gas (MMBtu)	CO2	HDD	Production	Period
1/1/2018	2,245	565	0	777	39,247	2018
2/1/2018	1,696	418	0	896	48,145	2018
3/1/2018	2,729	292	13	526	43,914	2018
4/1/2018	1,958	143	0	655	49,053	2018
5/1/2018	2,788	147	18	337	47,562	2018
6/1/2018	2,678	93	227	11	40,576	2018
7/1/2018	2,520	76	315	0	39,755	2018
8/1/2018	2,458	76	510	0	37,552	2018
9/1/2018	2,234	106	539	0	46,192	2018
10/1/2018	2,312	252	182	1	35,150	2018
11/1/2018	1,915	370	130	192	46,471	2018
12/1/2018	1,945	568	9	492	41,919	2018
1/1/2019	2,245	574	0	656	48,145	2019
2/1/2019	1,837	418	0	848	48,145	2019
3/1/2019	2,127	249	0	672	48,145	2019
4/1/2019	2,320	169	10	592	48,145	2019
5/1/2019	2,820	148	47	137	48,145	2019
6/1/2019	2,363	103	190	51	46,238	2019
7/1/2019	2,446	110	865	0	44,893	2019
8/1/2019	2,339	117	583	0	48,654	2019
9/1/2019	2,193	105	492	0	39,996	2019
10/1/2019	2,385	249	306	0	38,938	2019
11/1/2019	1,831	447	71	82	54,851	2019
12/1/2019	2,392	586	0	535	43,961	2019
1/1/2020	2,080	446	0	700	30,471	2020
2/1/2020	1,711	289	0	675	44,895	2020

Best if you have large amounts of historic data

Many ways to enter data!

Can also get select Weather Data directly into VERIFI



- Create weather data for different U.S. facilities
 - From local weather stations via zip codes
- Calculate HDD/CDD with custom balance points
- View hourly data for a given month

Weather Data Used by VERIFI

This page provides a detailed look of the weather data available for use by VERIFI. The weather data is pulled from [The National Centers for Environmental Information](#). If quality data is found VERIFI can automatically calculate heating and cooling degree days. The calculated degree days can be used as predictor data for analysis. For much more information on all things degree days, visit <https://www.epa.gov/degdays>.

Weather Stations

Explore weather stations. Set the zip code and the radius distance from that location to include weather stations.

Station Name	State	Distance, Miles	Data Start	Data End
DOWNTOWN (+38.555, -121.418)	CA	4.518 miles	Jul 2, 1996	Oct 14, 2023
SACRAMENTO EXECUTIVE AIRPORT (+38.507, -121.496)	CA	5.155 miles	Jan 1, 1973	Oct 15, 2023
SACRAMENTO MCCLELLAN AFB (+38.667, -121.400)	CA	7.796 miles	Nov 9, 1939	Oct 15, 2023
SACRAMENTO INTL AIRPORT (+38.701, -121.589)	CA	9.876 miles	Jan 1, 1973	Oct 15, 2023
SACRAMENTO MATHER AIRPORT (+38.567, -121.300)	CA	10.549 miles	Sep 2, 2002	Oct 15, 2023
UNIVERSITY AIRPORT (+38.533, -121.783)	CA	15.951 miles	Jan 2, 2009	Jul 6, 2023
LINCOLN REGIONAL AIRPORT KARL HARDER FIELD (+38.909, -121.351)	CA	23.905 miles	May 10, 2009	Oct 15, 2023
NUT TREE AIRPORT (+38.378, -121.959)	CA	28.799 miles	Jan 1, 2006	Oct 15, 2023
TRAVIS AIR FORCE BASE (+38.267, -121.933)	CA	32.189 miles	Aug 11, 1943	Oct 15, 2023
AUBURN MUNICIPAL AIRPORT (+38.955, -121.082)	CA	34.047 miles	Jan 1, 2006	Oct 15, 2023
YUBA COUNTY AIRPORT (+39.102, -121.569)	CA	36.18 miles	Jan 1, 2006	Oct 15, 2023
SAN FRANCISCO BAY RESERVE (+38.917, -122.017)	CA	37.887 miles	Jan 1, 2009	Oct 14, 2023

Weather Data Used by VERIFI

This page provides a detailed look of the weather data available for use by VERIFI. The weather data is pulled from [The National Centers for Environmental Information](#). If quality data is found VERIFI can automatically calculate heating and cooling degree days. The calculated degree days can be used as predictor data for analysis. For much more information on all things degree days, visit <https://www.epa.gov/degdays>.

Weather Stations / SACRAMENTO MCCLELLAN AFB (+38.667, -121.400)

Explore weather stations. Set the zip code and the radius distance from that location to include weather stations.

Select Year: 2021 | Select Data: Both Degree Days | Heating Base Temperature: 60 | Cooling Base Temperature: 70 | Create Facility Degree Days

One or more months have gaps of more than twelve hours in their data. Click the month with **⊖** for more details.

Monthly Degree Days (2021)

Month	Heating Degree Days	Cooling Degree Days
Jan. 2021	170,344	0.981
Feb. 2021	251,488	0.5
Mar. 2021	265.69	6.875
Apr. 2021	198.05	36.002
May. 2021	171.802	147.885
Jun. 2021	9.885	234,309
Jul. 2021	2.875	322.34
Aug. 2021	2.722	261.675
Sep. 2021	14.881	252.59
Oct. 2021	65.573	36.167
Nov. 2021	126.711	0.167
Dec. 2021	433.769	0
Total	1,746,762	1,332.872

Weather Data Used by VERIFI

This page provides a detailed look of the weather data available for use by VERIFI. The weather data is pulled from [The National Centers for Environmental Information](#). If quality data is found VERIFI can automatically calculate heating and cooling degree days. The calculated degree days can be used as predictor data for analysis. For much more information on all things degree days, visit <https://www.epa.gov/degdays>.

Weather Stations / SACRAMENTO MCCLELLAN AFB (+38.667, -121.400) / Mar. 2021

Explore weather stations. Set the zip code and the radius distance from that location to include weather stations.

Select Month: March 2021 | Select Data: Both Degree Days | Heating Base Temperature: 60 | Cooling Base Temperature: 70 | Create Facility Degree Days

A gap of more than twelve hours was found prior to the reading at March 10, 2021 at 2:03:02 PM (GMT-8). The degree day calculations for this month may not be completely accurate.

Daily Degree Days (March, 2021)

Date	Heating Degree Days	Cooling Degree Days	Dry Bulb Temp
Feb 28 1991	0	0	0 °F
Mar 7	~15	~15	~56 °F
Mar 14	~10	~10	~37.4 °F
Mar 21	~15	~15	~56 °F
Mar 28	~15	~15	~56 °F

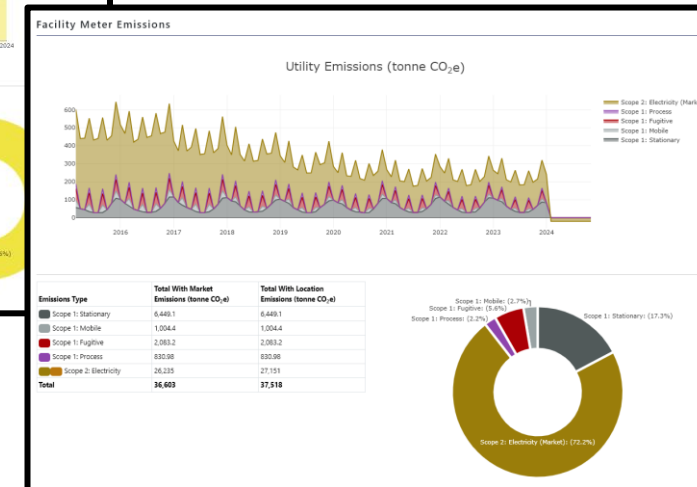
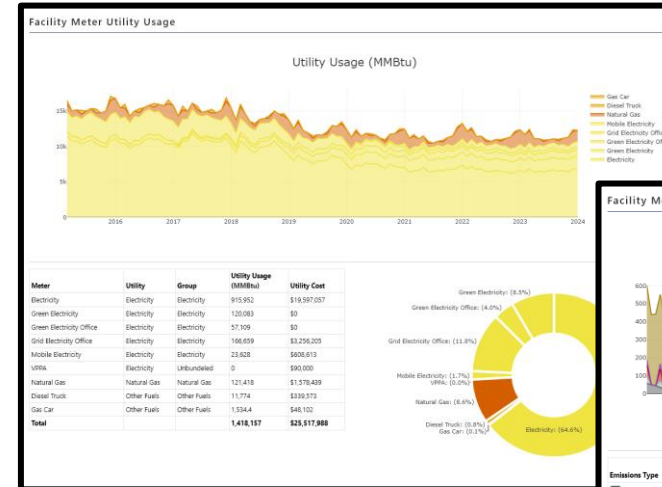
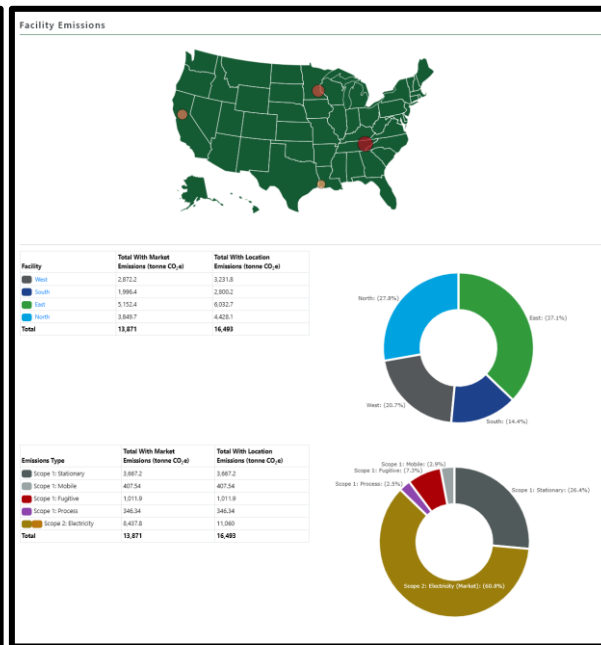
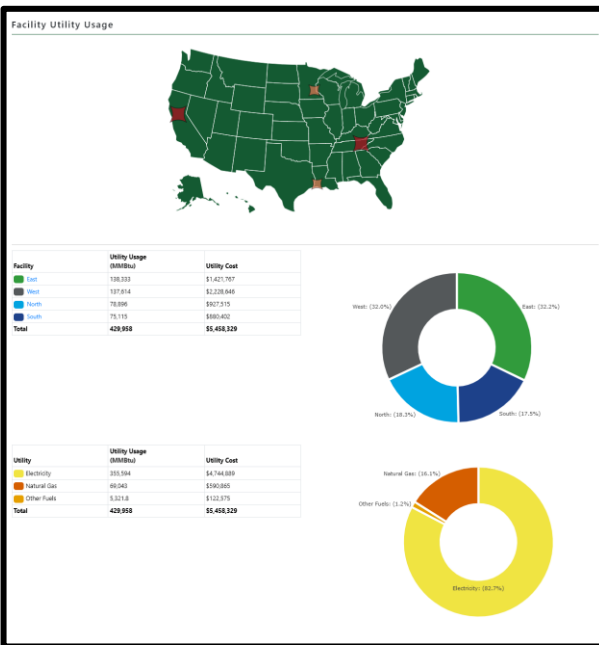
Understanding Data – Dashboards in Overview



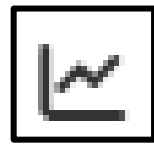
Several dashboards to keep an eye on energy, costs, and decarbonization!

Company Dashboard

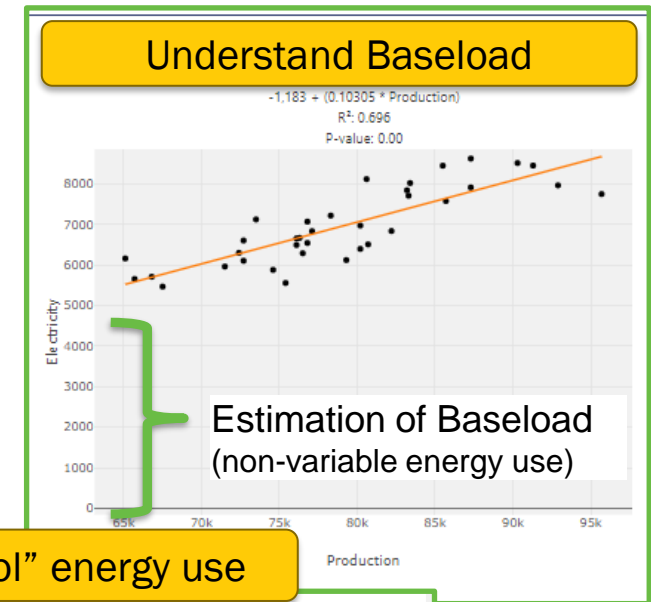
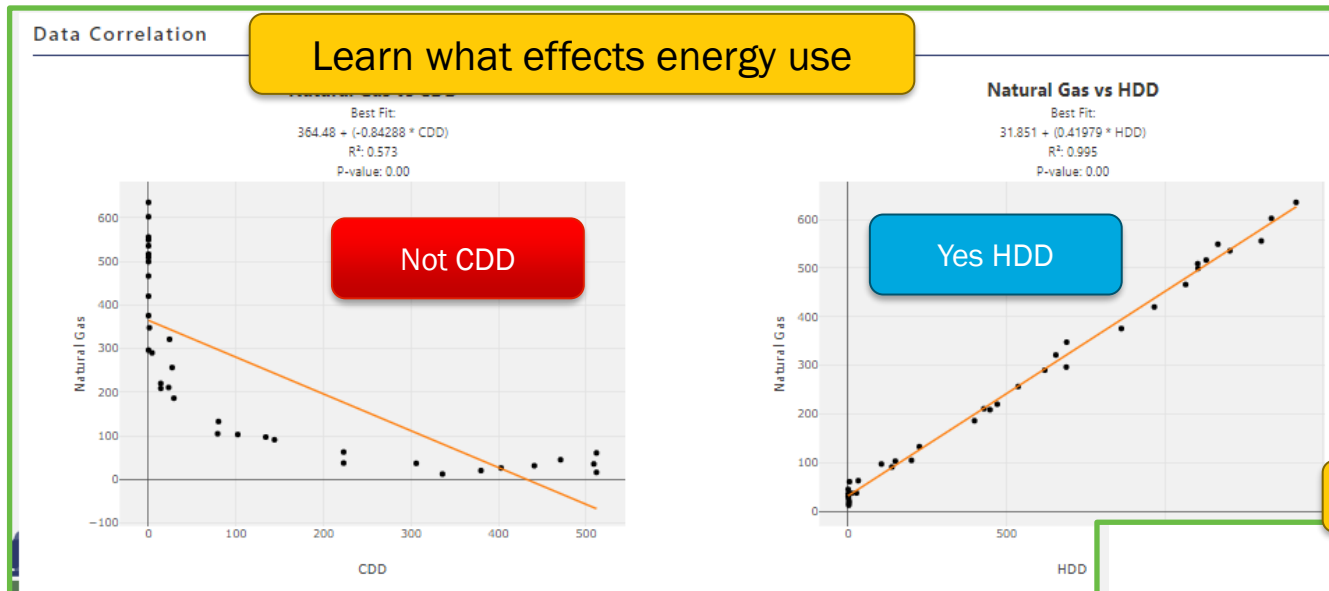
Facility Dashboard



Understanding Data – Details with Data Visualization



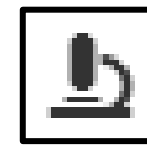
Quick graphs created from data to explore relationships between energy & predictor data



Find “out-of-control” energy use



Determining your Savings - Analysis Workflow



1 Setup Basic Info

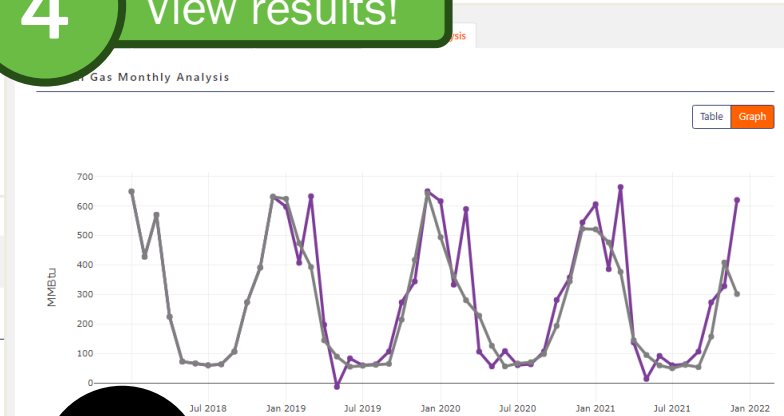
Pick a useful name!!

2 Choose Analysis Type

3 Regression made easy!

Select Model	Model Year	Variable p-Values	R2	Adjusted R2	Model p-Value	Formula	Model Notes
<input checked="" type="radio"/>	2021	HDD: 0.00	0.582	0.540	0.00	$102 + (0.429 * HDD)$	No production var
<input type="radio"/>	2021	Production: 0.01	0.553	0.508	0.01	$880 + (-0.0219 * Production)$	Production coef <
<input type="radio"/>	2018	HDD: 0.01 Production: 0.17	0.591	0.500	0.02	$901 + (0.603 * HDD) + (-0.0186 * Production)$	Production coef < Adjusted R2 < .5
<input type="radio"/>	2020	CDD: 0.02 Production: 0.09	0.583	0.490	0.02	$160 + (-0.435 * CDD) + (0.00550 * Production)$	CDD coef < 0 Adjusted R2 < .5

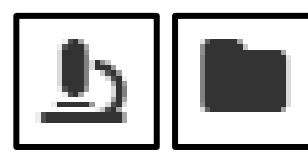
4 View results!



5 Roll up to corporate level!

Analysis Item	Group Analysis	Last Modified
<input checked="" type="radio"/> South Analysis	Electricity: Energy Intensity Natural Gas: Regression	1/10/23, 3:41 PM
<input type="radio"/> Skip Facility		

Company Analyses & Reports



Roll up facilities to a company analysis and create reports

Better Plants Report

Annual Reporting Form
BETTER BUILDINGS, BETTER PLANTS

GENERATED BY VERIFI

Better Plants Example
1 Bethel Valley Rd Oak Ridge, TENNESSEE 37303 US

Contact Information
Name: Katelyn Armstrong
Phone: 865-574-3333
Email: armstrongk@verifi.gov

	Baseline Year 2018	Report Year 2021
Number of Participating Plants	3	4
Primary Energy Consumed (MMBtu)		
Electricity	154,024	136,011
Natural Gas	83,254	83,574
Total Primary Energy Consumed (MMBtu)	237,278	319,585
Weather/Production/Other Normalizing related Adjustment for Baseline Primary Energy (+/- MMBtu)	65,780	
Baseline Adjustment Due to Increase/Decrease in the Number of Facilities Reporting Relative to Baseline Year or Other Operational Changes (+/- MMBtu)		334,058
Adjusted Baseline of Primary Energy (MMBtu)	303,058	
New Energy Savings for Current Year (MMBtu)		6,556.8
Total Energy Savings since Baseline Year (MMBtu)		1,447.3
Annual Improvement in Energy Intensity for Current Year (%)		1.94%
Total Improvement in Energy Intensity (%)		4.33%

Climate Report

Absolute Emissions (Metric tonne CO₂e)

	Emissions (Metric tons CO ₂ e)				Percent Reduction				Percent Contribution			
	2020	2021	2022	2023	2020	2021	2022	2023	2020	2021	2022	2023
Scope 1 Emissions	6,205.5	5,945.1	5,976.6	5,433	—	4.2%	3.6%	12.45%	—	1.35%	1.19%	4.01%
Stationary Emissions	3,897.7	3,855.5	4,050.5	3,667.2	—	0.11%	-4.04%	4.99%	—	0.02%	-0.99%	1%
Mobile Emissions	662.36	516.98	447.68	407.54	—	21.95%	32.41%	38.47%	—	0.76%	1.12%	1.32%
Fugitive Emissions	1,212	1,139.8	1,080.1	1,011.9	—	5.06%	10.88%	16.51%	—	0.38%	0.68%	1.04%
Process Emissions	471.49	432.79	398.28	346.34	—	8.21%	15.53%	26.54%	—	0.2%	0.38%	0.65%
Scope 2 Emissions (Location-Based) from Electricity & District Energy	13,045	11,128	10,617	11,060	—	14.7%	18.61%	15.22%	—	9.96%	12.61%	10.31%
Scope 2 Emissions (Market Based) from Electricity & District Energy	13,136	11,215	8,942.7	6,437.8	—	14.62%	31.92%	35.76%	—	—	—	—
Other Scope 2 Emissions	—	—	—	—	—	—	—	—	—	—	—	—
Total Emissions (Metric Tons)	19,251	17,073	16,594	16,493	—	11.31%	13.8%	14.33%	—	11.31%	13.8%	14.33%

Better Example

Analysis Setup | Select Facility Items | Analysis Results

West Analysis Items

Analysis Item	Group Analysis	Last Modified
Regression	Electricity: Regression Unbundled: Exclude from Analysis Natural Gas: Regression	4/16/24, 3:18 PM

Account Analysis

West (20.27%) | South (3.97%) | East (7.24%) | North (-0.81%)

Performance Report

Group Performance

Change	Top 4	Savings	Low 4	Savings
1	West (Electricity)	21.74%	North (Electricity)	-4.28%
2	South (Natural Gas)	8.91%	South (Electricity)	3.59%
3	East (Electricity)	7.5%	North (Natural Gas)	4.26%
4	East (Natural Gas)	5.74%	West (Natural Gas)	4.3%

Change	Top 4	Contribution	Low 4
1	West (Electricity)	7.22%	North (Electricity)
2	East (Electricity)	1.99%	South (Natural Gas)
3	South (Electricity)	0.55%	West (Natural Gas)
4	North (Natural Gas)	0.28%	East (Natural Gas)

Change	Top 4	Production	Low 4	Production
1	North (Electricity)	∞%	South (Natural Gas)	-13.89%
2	North (Natural Gas)	∞%	East (Natural Gas)	-10.44%
3	East (Electricity)	4.38%	West (Electricity)	-0.19%
4	South (Electricity)	3.32%	West (Natural Gas)	0.73%

Change	Top 4	Contribution	Low 4
1	East (Electricity)	0.62%	North (Electricity)
2	South (Electricity)	0.2%	East (Natural Gas)
3	West (Electricity)	0.05%	South (Natural Gas)
4	North (Natural Gas)	0%	West (Natural Gas)

Facility	State	Utility	2018	2019	2020	2021	2022	2023	2018	2019	2020	2021	2022	2023	2018	2019	2020	2021	2022	2023	Contribution	Adj. Baseline	Change
East	TENNESSEE	Electricity	120,365	126,783	129,264	133,677	128,628	125,642	0%	-2.52%	-0.5%	4.53%	5.16%	7.5%	0%	-0.68%	-0.14%	1.2%	1.37%	1.99%	0.62%	4.36%	
East	TENNESSEE	Natural Gas	24,326	22,459	23,410	23,714	24,981	21,786	0%	1.42%	5.99%	3.03%	7.03%	5.74%	0%	0.07%	0.3%	0.15%	0.36%	0.26%	-0.1%	-10.44%	
North	MINNESOTA	Electricity	0	45,441	45,745	44,037	46,026	45,049	0%	0%	1.45%	3.59%	-1.32%	-4.28%	0%	0%	0.14%	0.34%	-0.13%	-0.41%	-0.28%	∞%	
North	MINNESOTA	Natural Gas	0	33,547	32,171	30,733	33,569	30,866	0%	0%	1.43%	3.68%	3.95%	4.26%	0%	0%	0.1%	0.24%	0.27%	0.28%	0%	∞%	
South	LOUISIANA	Electricity	69,811	65,180	65,474	68,076	69,402	72,126	0%	1.2%	-0.65%	-0.03%	2.43%	3.59%	0%	0.17%	-0.09%	0%	0.35%	0.55%	0.2%	3.32%	
South	LOUISIANA	Natural Gas	6,482.4	6,616.8	5,699.1	6,371.9	7,239.7	5,582.1	0%	3.25%	3.72%	1.07%	9.33%	8.91%	0%	0.05%	0.04%	0.01%	0.14%	0.11%	-0.03%	-13.89%	
West	CALIFORNIA	Electricity	157,288	155,054	157,649	157,214	158,768	156,987	0%	12.43%	19.6%	22.65%	21.84%	21.74%	0%	-4.11%	6.59%	7.6%	7.17%	7.22%	0.05%	-0.19%	
West	CALIFORNIA	Natural Gas	14,389	13,906	14,022	14,363	14,852	14,493	0%	2.36%	4%	4.7%	4.21%	4.3%	0%	0.07%	0.12%	0.14%	0.13%	0.13%	0%	0.73%	
Totals			392,661	468,967	473,434	468,386	483,467	472,531	0%	3.78%	7.06%	9.69%	9.68%	10.14%	0%	3.78%	7.06%	9.69%	9.68%	10.14%	0.46%	20.34%	

More features and reports to come!!!

Other DOE Software Resources

MEASUR

System Level Analysis!

- FREE, Open-source software suite to analyze energy saving opportunities for industrial equipment
- Six assessment types: pumps, process heating, fans, steam, wastewater, and compressed air
- Motor and pump inventories
- Energy treasure hunt module
- 70+ stand-alone calculators for simple calculations
- Web, mobile, and desktop versions
- Can be used internationally

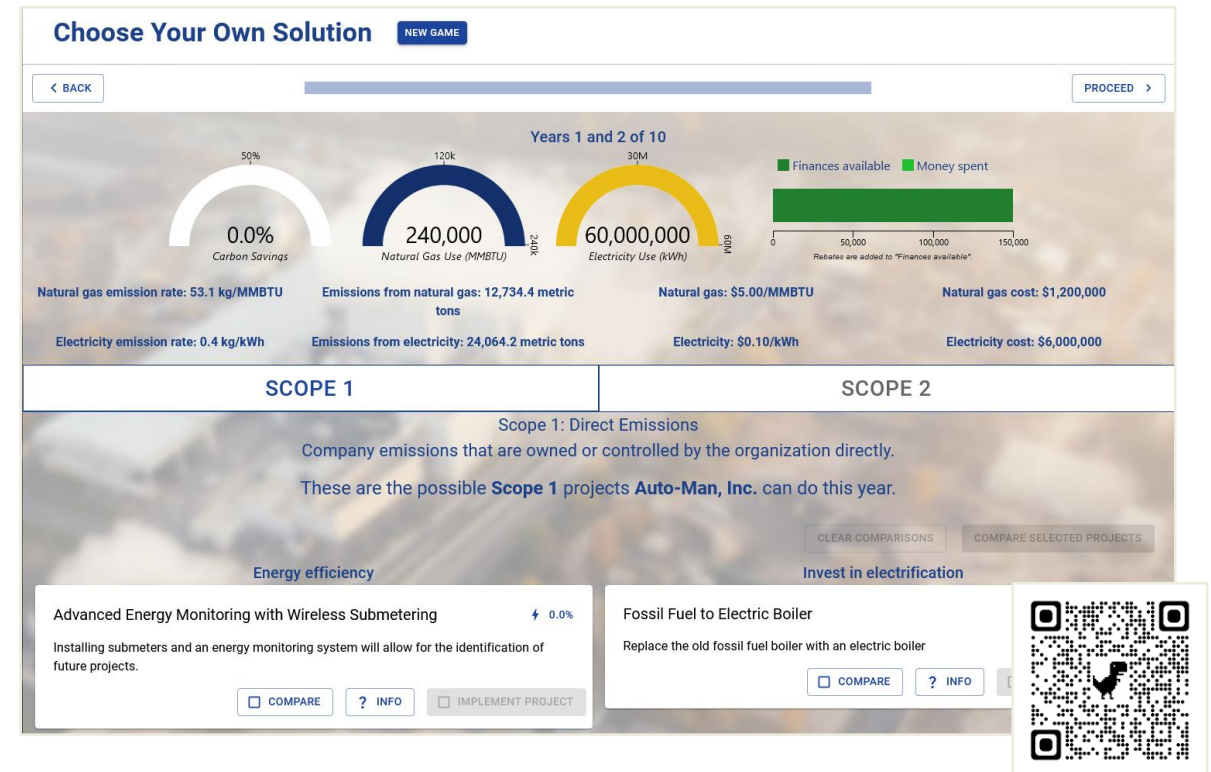


- Download at <https://ornl-amo.github.io/>
- Visit <https://measur.ornl.gov/> in your web browser
- Type “ORNL MEASUR” in your web search

Other DOE Software Resources

Choose your Own Solution

- Can you decarbonize this industrial facility?
- Interactive game that highlights the challenges of reducing GHG emissions at a manufacturing facility
- Play as an automotive industry decarbonization team
- Goal is to reduce emissions by 50% within 10 years
- Choose projects, watch your budget, overcome hurdles, find rebates, reduce emissions!



Play at <https://cyos.ornl.gov/>



Questions?