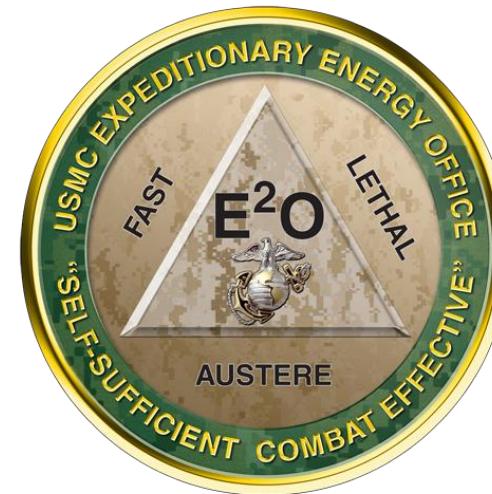


ECU Optimization Tool

User Guide





Step 0: Install AutoDISE

Software Center

Marine Corps Enterprise Network

Applications 1

All Required Featured

Filter: All Sort by: Most recent

AutoDISE

Updates
Operating Systems
Installation status
Device compliance

AutoDISE v7.1.9
Build 2
Serco
7.1.9

The screenshot shows the MCEN Software Center interface. On the left is a sidebar with links for Updates, Operating Systems, Installation status, and Device compliance. The main area is titled 'Applications' and shows one item: 'AutoDISE'. Below the application name are its details: 'v7.1.9', 'Build 2', 'Serco', and '7.1.9'. A red box highlights the 'AutoDISE' card.

If you haven't already, download AutoDISE from the MCEN Software Center.



Step 1: Build Your Layout in AutoDISE

The screenshot shows the AutoDISE 7.1.9 software interface with a layout titled "ECULayout.adfx". The layout contains several green rectangular structures representing shelters. Inside these shelters, various electronic components are connected, including "36K ECU", "60K ECU", "30kW TOGL", "MAGTAB", "HP Laptop", "AN/PRC-150", "AN/PRC-100", "AN/PRC-117F", "Server", "Router", "Switch", and "AFA/TDS". The layout is overlaid with a grid and includes a legend for "Layout Items", "Shapes", "Icon Manager", "Map and Terrain", "HVAC", "Calculator Viewer", "Align", "Transparent Shelters", "Grid", "Textbox", "Link", "3D", and "Show/Hide". A central window displays a detailed network configuration for "Base-X 305 60K". A yellow star highlights the "AirBeam 2032 60K" shelter on the right side of the layout.

- Build as many shelter configurations as you wish.
- Ensure all consumers and ECUs are properly connected.
- Name your shelters something distinct that you can remember. The tool uses these names.

Zoom: 106% X = 106 Y = 59 Scroll: 0, 48 Rated Loads used for warnings, microgrid priorities, etc [Change]

The ECU you use here does not matter. The tool will test all different combinations of ECUs.



Step 2: Set Your Environment

Click here to set up the environment

The screenshot shows the AutoDISE 7.1.9 software interface. The main window displays the 'HVAC Requirements Calculator'. On the left, there's a panel for 'Shelter Internal Conditions' showing graphs of ambient air temperature, ground temperature, and solar load over a 24-hour period. The right side contains tabs for 'Electrical Load Adjustments', 'Roof Configuration', 'Shelter Material Properties', 'Windows / Liner / Fly / Solar Shade / Camo Netting', and 'Results'. A red box highlights the 'HVAC' button in the toolbar at the top. Another red box highlights the left panel with the environmental condition graphs.

Electrical Load Adjustments:
Select a Shelter: AirBeam 2032 18K
Time of Day: 1500 - 1600
None Use Demand Factors Use Diurnal Loads
Note: These adjustments only affect electrical/equipment heat load.

Roof Configuration:
Roof Configuration: Rectangular Dome
Width at Base: 21ft - 10in
Length at Base: 32ft - 11in
Height: 10ft - 11.5in
Eave Height: 8 ft
Angle of Wall Side to Horizontal: 80 °

Shelter Material Properties:
Shelter Material U-Factor: 0.4 BTU/F-sqft hr
Solar Absorption: 0.7

Windows / Liner / Fly / Solar Shade / Camo Netting:
No windows or skylights
% Coverage, Angled Walls: 0 %
% Coverage, Vertical Walls: 0 %
% Coverage, Roof: 0 %
Normal Absorptance: 0.09
Normal Solar Transmittance: 0.83
UFactor: 1 BTU/F-sqft hr
Emissivity (E): 0.84
Has Reflective Coating? No

Thermal Resistance: 1 F-sqft hr/BTU

Results:
Steady State Temp inside Shelter: 85 °F
The given conditions result in the Heat Load values shown to the right, in BTU/hr.
Elect. Equipment: 18486
Ventilation: 6254
Personnel: 11000
Structure: 21575
Total Heat Load: 57315

Structure Summary:
The following is a breakout of the total Structure heat load:
Vertical Walls: 4241
Angled Walls: 7437
Roof: 8561
Floor: 1335
Total Structure Heat Load: 21575

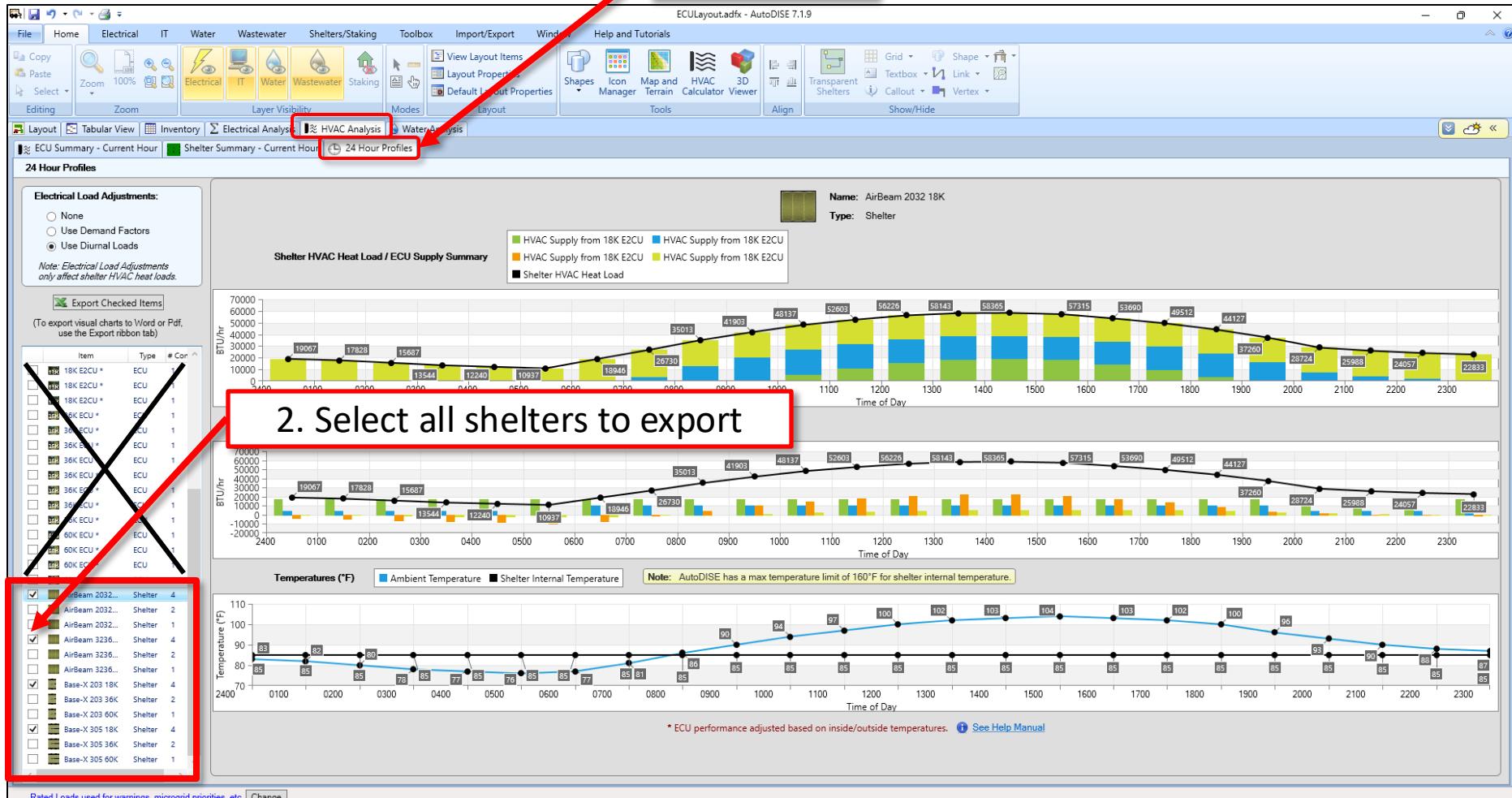
The more realistic you make your environment and shelters, the better the analysis will be.

Optional: While AutoDISE comes preloaded with climate data, it can be inaccurate in some cases. Average climate data can be accessed [here](#) if you wish to manually input real data.



Step 3: Select Shelters To Export

1. Go here

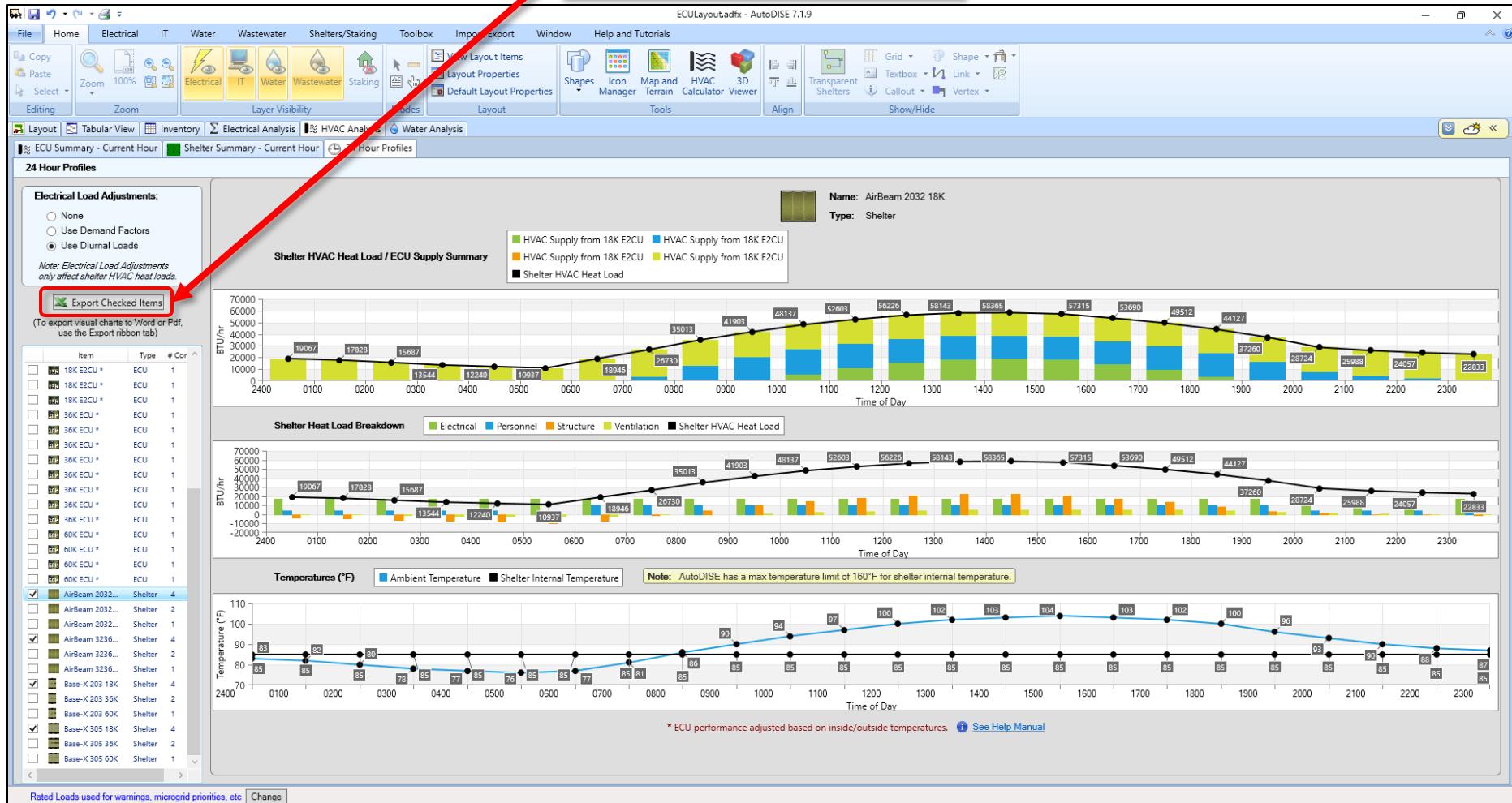


Select all the shelters you want to analyze on the left using the check boxes.
Do not select anything but shelters.



Step 4a: Download Data

Click this to download



Export the data to anywhere on your computer. It will output an XLS file.



Step 4b (Optional): Convert To CSV File

Click this once you open the file in browser

This step is optional because the tool can accept either XLS or CSV files.

The screenshot shows a Microsoft Excel window titled "HVAC24HourProfile_Palms_Cust...". The "File" menu is open, and a red box highlights the "Export" option. Below it, a sub-menu is displayed with "Download as PDF", "Download as CSV UTF-8", and "Download as ODS". A red box highlights "Download as CSV". The main menu bar includes Home, Insert, Share, Page Layout, Formulas, Data, Review, View, Help, and Draw. The ribbon tabs show various Excel features like Font, Alignment, Number, Styles, and Cells. The status bar at the bottom right shows "100%".

MCEN computers can't open XLS files using the desktop app. If you wish to open the file, you can view and convert it to a CSV file using Excel Online ([link](#)).



Step 5: Input ECU Data

Semper Fidelis • United States Marine Corps

U.S. MARINE CORPS EXPEDITIONARY ENERGY OFFICE
E2O • PAST • PRESENT • FUTURE
AUSTERE • COMBAT EFFECTIVE

AutoSave (Off) ECUSpec... Search CC - X

File Home Insert Page Layout Formulas Data Review View Help Comments Share

Paste Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins

D14 : X ✓ fx

	A	B	C	D	E	F	G	K	L	M	N	O
1	Unit (ECU)	Cooling Capacity (BTU/hr)	Cooling Load (kVA)	Cost	Weight (lbs)	Size (ft3)	Window Mount					
2	60K	60000	12.9	20251	560	48.4	FALSE					
3	36K	36000	7.7	15092	472	43.3	FALSE					
4	18K	18000	5.1	10020.66	230	9.7	TRUE					
5	HDT	72000	21.1	22000	540	30.18	FALSE					
6												
7												
8												
9												

All column header names must remain unchanged.

ECUSpecs +

Ready Accessibility: Unavailable Display Settings

100%

If you haven't already, input all ECU data into the ECU specifications spreadsheet. This data will come from the Technical Manual or manufacturer.



Step 6: Open The Tool

ECU Selection Optimizer - Streamlit

Type or paste link

ECU Selection Optimizer

Upload your HVAC CSV (output from AutoDISE) and your ECU catalog (spreadsheet with all the available ECUs). Then choose weights and press Optimize.

Upload AutoDISE Output (HVAC24Profile...csv):

Drag and drop file here
Limit 200MB per file • CSV

Browse files

Upload ECU Specifications File:

Drag and drop file here
Limit 200MB per file • CSV

Browse files

Cost

Power

Weight

Size

BTU Penalty

Set Weights

Click Optimize after changing weights.

Download Example AutoDISE Output

Download Example ECU Specifications

Run Example Scenario

Upload both an HVAC file from AutoDISE and ECU Specifications file to continue.

Getting Started

Help

Information

About The Developer

This will work in any browser.

Open your browser and go to the link:
<https://ecuoptimizationtool.streamlit.app/>



Step 7: Upload Files

ECU Selection Optimizer · Streamlit

https://ecuoptimizationtool.streamlit.app

Set Weights

Click Optimize after changing weights.

Cost

Power

Weight

Size

BTU Penalty

Getting Started

ECU Selection Optimizer

Upload your HVAC CSV (output from AutoDISE) and your ECU catalog (spreadsheet with all the available ECUs). Then choose weights and press Optimize.

Upload AutoDISE Output (HVAC24Profile...csv):

Drag and drop file here
Limit 200MB per file • CSV

HVAC24HourProfile_Palms_Custom.csv 31.5KB

Browse files

Upload ECU Specifications File:

Drag and drop file here
Limit 200MB per file • CSV

ECUSpecs.csv 412.0B

Browse files

Files uploaded.

Drag and drop each file into its respective place or click “Browse Files”

The screenshot shows the Streamlit interface for the ECU Selection Optimizer. On the left, there are five sliders for 'Cost', 'Power', 'Weight', 'Size', and 'BTU Penalty'. Below them is a 'Getting Started' button. The main area is titled 'ECU Selection Optimizer' and contains instructions to upload an HVAC CSV and an ECU catalog. Two input fields are shown: 'AutoDISE Output' (containing 'HVAC24HourProfile_Palms_Custom.csv') and 'ECU Specifications File' (containing 'ECUSpecs.csv'). A red box highlights the 'ECU Specifications File' section, and a red arrow points from the text 'Drag and drop each file into its respective place or click “Browse Files”' to the 'Browse files' button. A green bar at the bottom of the highlighted section says 'Files uploaded.'

Target BTU and Window Compatibility ⓘ

Action: Select whether each shelter is compatible with window ECU units.

ShelterName	TargetBTU	Window Unit Compatibility
AirBeam 2032	58365	<input checked="" type="checkbox"/>
AirBeam 3236	77883	<input checked="" type="checkbox"/>
Base-X 203	48526	<input checked="" type="checkbox"/>

ECU Catalog

All ECUs loaded from ECU Specifications file uploaded above.

Model	CapacityBTU	PowerKW	CostUSD	Weight	Size	Window Mount	\$/BTU	KW/BTU	ft3/BTU
60K	60000	12.9	20251	560	48.4	<input type="checkbox"/>	0.3375	0.0002	0.0008
36K	36000	7.7	15092	472	43.3	<input type="checkbox"/>	0.4192	0.0002	0.0012
18K	18000	5.1	10020.66	230	9.7	<input checked="" type="checkbox"/>	0.5567	0.0003	0.0008

Upload your AutoDISE output (CSV, XLS, or XLSX) and ECU specifications file (CSV or XLSX)



Step 8: Window Compatibility Check

ECU Selection Optimizer - Streamlit

https://ecuoptimizationtool.streamlit.app

Set Weights

Click Optimize after changing weights.

Cost

Power

Weight

Size

BTU Penalty

Getting Started

Optimize

Target BTU and Window Compatibility ⓘ

Action: Select whether each shelter is compatible with window ECU units.

ShelterName	TargetBTU	Window Unit Compatibility
AirBeam 2032	58365	<input checked="" type="checkbox"/>
AirBeam 3236	77883	<input type="checkbox"/>
Base-X 203	48526	<input checked="" type="checkbox"/>
Base-X 305	59336	<input checked="" type="checkbox"/>

Generator Catalog ⓘ

These generators are loaded from a background file. The 'XX% Load' columns indicate the number of gallons per hour each generator can produce at various load levels.

Generator Name	Model	TAMCN	Max Power (kW)	Fuel Capacity (gal)	25% Load	50% Load	75% Load	100% Load	Full Data
15kW AMMPS Generator Set	MEP-1050/MEP-1050A	B00437B	15	8.61	0.46	0.65	0.9	1.06	<input checked="" type="checkbox"/>
			5	3.8	0.26	0.31	0.38	0.43	<input checked="" type="checkbox"/>
			3	4	None	None	None	0.5	<input type="checkbox"/>
			10	6.3	0.34	0.48	0.61	0.75	<input checked="" type="checkbox"/>
			10	9	None	None	None	1.07	<input type="checkbox"/>
			30	16.7	0.9	1.23	1.8	2.46	<input checked="" type="checkbox"/>
2kW LTWT, Man-Portable Generator Set	MEP-531A	B09807B	2	1.6	None	None	None	0.3	<input type="checkbox"/>
60kW AMMPS Generator Set	MEP-1070/MEP-1070A	B10217B	60	34.7	1.59	2.47	3.51	4.47	<input checked="" type="checkbox"/>

ECU Catalog

All ECUs loaded from ECU Specifications file uploaded above.

Model	CapacityBTU	PowerKW	CostUSD	Weight	Size	Window Mount	\$/BTU	KW/BTU	ft ³ /BTU
60K	60000	12.9	20251	560	48.4	<input type="checkbox"/>	0.3375	0.0002	0.0008
36K	36000	7.7	15092	472	43.3	<input type="checkbox"/>	0.4192	0.0002	0.0012
18K	18000	5.1	10020.66	230	9.7	<input checked="" type="checkbox"/>	0.5567	0.0003	0.0005
HDT	72000	25.2	30164	640	96.8	<input type="checkbox"/>	0.3375	0.0002	0.0008

Optional: Change shelter name if needed.

Toggle window-unit compatibility on/off

If any of the shelters in your data can't accept a window-mounted ECU, toggle the check off.



Step 9: Select Weights

ECU Selection Optimizer - Streamlit

https://ecuoptimizationtool.streamlit.app

Set Weights
Click Optimize after changing weights.

Cost
Power
Weight
Size
BTU Penalty

Target BTU and Window Compatibility ⓘ
Action: Select whether each shelter is compatible with window ECU units.

ShelterName	TargetBTU	Window Unit Compatibility
AirBeam 2032	58365	<input checked="" type="checkbox"/>
AirBeam 3236	77883	<input type="checkbox"/>

ECU Catalog
All ECUs loaded from ECU Specifications file uploaded above.

Model	CapacityBTU	PowerKW	CostUSD	Weight	Size	Window Mount	\$/BTU	KW/BTU	ft3/BTU
60K	60000	12.9	20251	560	48.4	<input type="checkbox"/>	0.3375	0.0002	0.0008
36K	36000	7.7	15092	472	43.3	<input type="checkbox"/>	0.4192	0.0002	0.0012
	18000	5.1	10020.66	230	9.7	<input checked="" type="checkbox"/>	0.5567	0.0003	0.0005
	72000	21.1	22000	540	30.18	<input type="checkbox"/>	0.3056	0.0003	0.0004

Set weights to prioritize the optimization of different parameters.

These generators are loaded from a background file. The 'XX% Load' columns indicate the number of gallons per hour each generator burns at the percentage of electrical load.

Generator Name	Model	TAMCN	Max Power (kW)	Fuel Capacity (gal)	25% Load	50% Load	75% Load	100% Load	Full Data
15kW AMMPS Generator Set	MEP-1050/MEP-1050A	B00437B	15		8.61	0.46	0.65	0.9	<input checked="" type="checkbox"/>
5kW AMMPS Generator Set	MEP-1030/MEP-1030A	B00777B	5		3.8	0.26	0.31	0.38	<input checked="" type="checkbox"/>
3kW Generator Set	MEP-831A	B07307B	3		4	None	None	None	<input type="checkbox"/>
10kW AMMPS Generator Set	MEP-1040/MEP-1040A	B08917B	10		6.3	0.34	0.48	0.61	<input checked="" type="checkbox"/>
10kW Tactical Quiet Generator (TQG)	MEP813A	B09217B	10		9	None	None	None	<input type="checkbox"/>
30kW AMMPS Generator Set	MEP-1060/MEP-1060A	B09537B	30		16.7	0.9	1.23	1.8	<input checked="" type="checkbox"/>
2kW LTWT, Man-Portable Generator Set	MEP-531A	B09807B	2		1.6	None	None	None	<input type="checkbox"/>
60kW AMMPS Generator Set	MEP-1070/MEP-1070A	B10217B	60		34.7	1.59	2.47	3.51	<input checked="" type="checkbox"/>

Optimize

These weights are used to score the mixes of ECUs that the algorithm tries. The solution for each shelter becomes the mixture that scores the best (lowest) for each shelter.



Step 10: Solve

ECU Selection Optimizer - Streamlit

Select “Optimize”

Optimize

Solution success.

Set Weights

Click Optimize after changing weights.

Cost

Power

Weight

Size

BTU Penalty

Solution Overview

The ECU_Mix column shows the type and number of ECUs that are optimal based on the user-input weights.

Shelter	TargetBTU	AchievedBTU	ExcessBTU	TotalKW	TotalCost	TotalWeight	TotalSize	ObjectiveValue	ECU_Mix
AirBeam 2032	58365	60000	1635	12.9	20251	560	48.4	3.5599	{"60K":1}
AirBeam 3236	77883	96000	18117	20.6	35343	1032	91.7	6.5529	{"36K":1,"60K":1}
Base-X 203	48526	60000	11474	12.9	20251	560	48.4	3.7683	{"60K":1}
Base-X 305	59336	60000	664	12.9	20251	560	48.4	3.5431	{"60K":1}

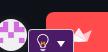
Fuel Consumption Metrics ⓘ

Only generators that were capable of handling the electrical load of the ECUs are shown.

Generator Name	AirBeam 2032 - Fuel Consumption (gal/hr)	AirBeam 2032 - Runtime (hr)	AirBeam 3236 - Fuel Consumption (gal/hr)	AirBeam 3236 - Runtime (hr)	Base-X 203 - Fuel Consumption (gal/hr)	Base-X 203 - Runtime (hr)	Base-X 305 - Fuel Consumption (gal/hr)	Base-X 305 - Runtime (hr)
30kW AMMPS Generator Set	1.32	12.69	2.09	8.01	1.32	12.69		
60kW AMMPS Generator Set	1.66	20.95	2.22	15.63	1.66	20.95		

Plots

If the solution is successful, the solution metrics and multiple graphs will be shown.





Optional Additional Steps

Change weights and re-run as needed. Must click “Optimize” again after changing any of the weights.

Set Weights
Click Optimize after changing weights.

Cost
Power
Weight
Size
BTU Penalty

AirBeam 2032 AirBeam 3236 Base-X 203 Base-X 305

Fuel Consumption (gal/hr)
Runtime on Single Tank of Gas

Observed vs. Achieved Heat Load per Shelter

Heat Load (BTU/hr)

Shelter Name

Observed Head Load (BTU) Achieved Head Load (BTU)

AirBeam 2032: 58365, 60000
AirBeam 3236: 77883, 96000
Base-X 203: 48526, 60000
Base-X 305: 59336, 60000

Number of ECUs by Type Per Shelter

Shelter

ECU Name: 60K, 36K

Download Tables and Plots (zip)

Click to view any of the graphs in full screen

Help
Information
About The Developer

Download all outputs to your computer in a single zip folder

View additional help and information

Feel free to run the optimization as many times as you wish.