

DER-VET Task Force

ESIC Working Group 1: Grid Services and Analysis

Miles Evans | EPRI

Andrew Etringer | EPRI

Halley Nathwani | EPRI

Giovanni Damato | EPRI

April 1, 2021



Antitrust Guidelines

Antitrust laws apply to EPRI, its members, funders, advisors, licensees, contractors, and vendors. Violations can lead to civil and criminal liability.

DO NOT DISCUSS...

- Pricing, production capacity, or cost information which is not publicly available;
- Sales territories, market shares, future product offerings;
- Confidential market strategies or business plans;
- Other competitively sensitive information;
- Advise or try to influence others on their business decisions (except to the extent that they are already public);
- Complaints or disparaging remarks concerning customers/suppliers/competitors.

DO NOT AGREE...

- To discriminate against or refuse to deal with a supplier (boycott);
- To only do business on certain terms and conditions;
- To set (or fix) prices;
- To divide markets or technologies;
- To allocate customers/suppliers/territories;
- To suppress a technology;
- To the use, promotion or endorsement of particular vendors, contractors, consultants or products.

Webcast and Recording Notification

- The webcast is being recorded along with all Q&A. Your participation provides consent to that recording.
- As a result, please make sure your phone is on mute throughout the webcast unless speaking. Do not place your phone on hold.

DER-VET Task Force

ESIC Working Group 1: Grid Services and Analysis

Miles Evans | EPRI
Andrew Etringer | EPRI
Halley Nathwani | EPRI
Giovanni Damato | EPRI

April 1, 2021

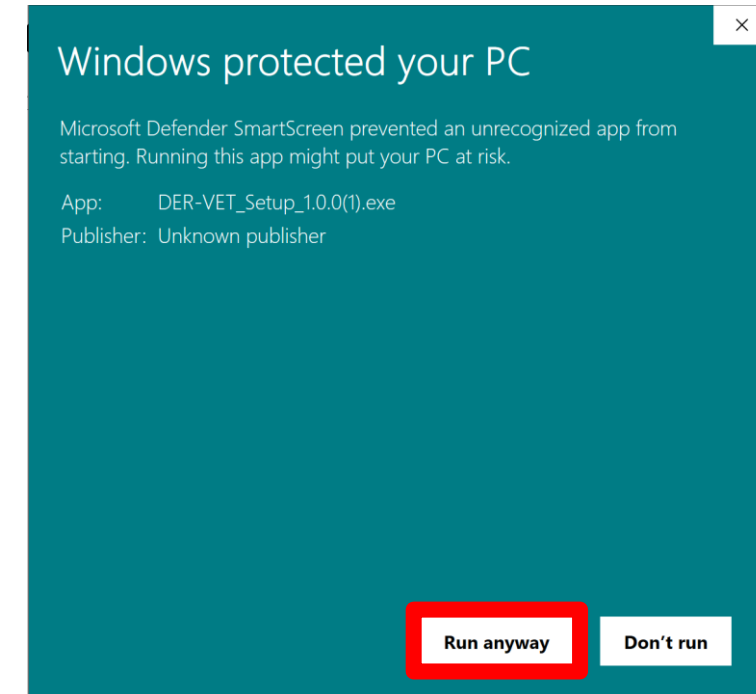
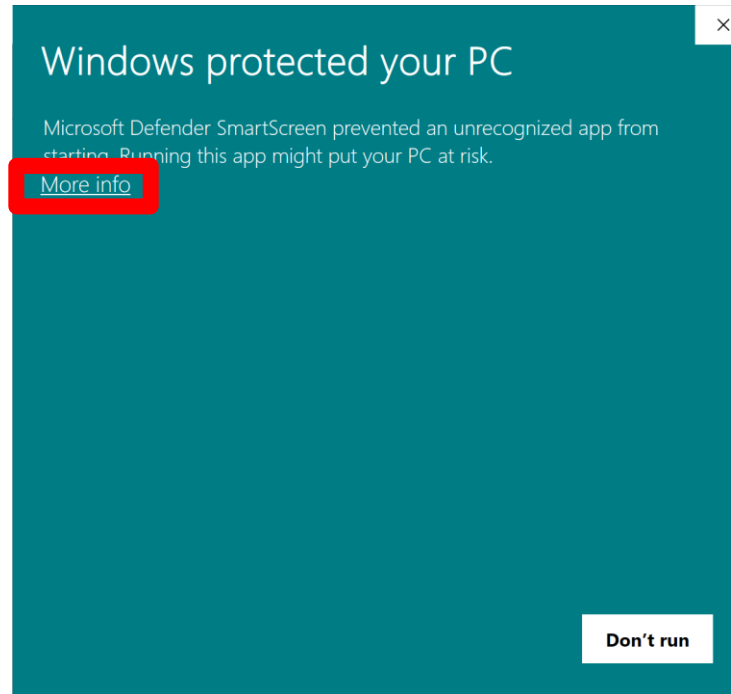


Agenda

- OpenEI USURDB API connection
- Project Import/Export (saving and sharing a case)
- Sharing technology options
- Help options
 - User Guide
 - FAQ
 - Help links in GUI
 - Feedback Form
 - How to troubleshoot your run if the GUI says something went wrong

Note on Installation

- DER-VET is not malware
- We are going to get the code signed as soon as possible



Known Bugs

- Big thanks to Alva Svoboda, who identified a problem downloading template files from the GUI. We are working on this now. In the meantime, a workaround has been posted to our FAQ: https://storagewiki.epri.com/index.php/DER_VET_User_Guide/FAQ

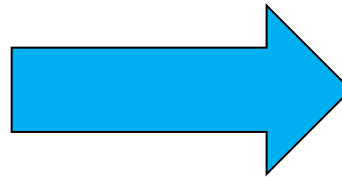


OpenEI USURDB API Connection

OpenEI USURDB API

- “United States Utility Rate DataBase”
- GUI access to the database exists here:
<https://openei.org/apps/USURDB/>
 - Will not provide tariffs in DER-VET Format

The screenshot shows the OpenEI website's search interface for the U.S. Utility Rate Database. The page has a header with the OpenEI logo and navigation links for Information, Data, and Apps. Below the header is a search form titled "U.S. Utility Rate Database". The form includes fields for "Rates in Zip Code" (with a "Zip code" input), "Utility Name" (with a "Utility name..." input), and "Sector(s)" (with checkboxes for Residential, Commercial, Industrial, and Lighting, and radio buttons for All and None). There is also a "Service Type" dropdown menu, an "Effective As Of" date field (with a "Today" button), an "Approved/Unapproved" dropdown menu, an "Is Default" dropdown menu, and an "Order By" dropdown menu (set to "Latest Update"). At the bottom of the form are "Display Results" radio buttons (Ascending and Descending, with Descending selected), a "Reset" button, and a "Search" button.



Tiered Energy Usage Charge Structure

Period	Tier	Max Usage ?	Max Usage Units ?	Rate \$/kWh ?	Adjustments \$/kWh ?	Sell \$/kWh ?
1	1		kWh	0.12799		
2	1		kWh	0.14388		
3	1		kWh	0.14099		
4	1		kWh	0.16761		
5	1		kWh	0.21818		

Fuel Adjustments Monthly (\$/kWh)

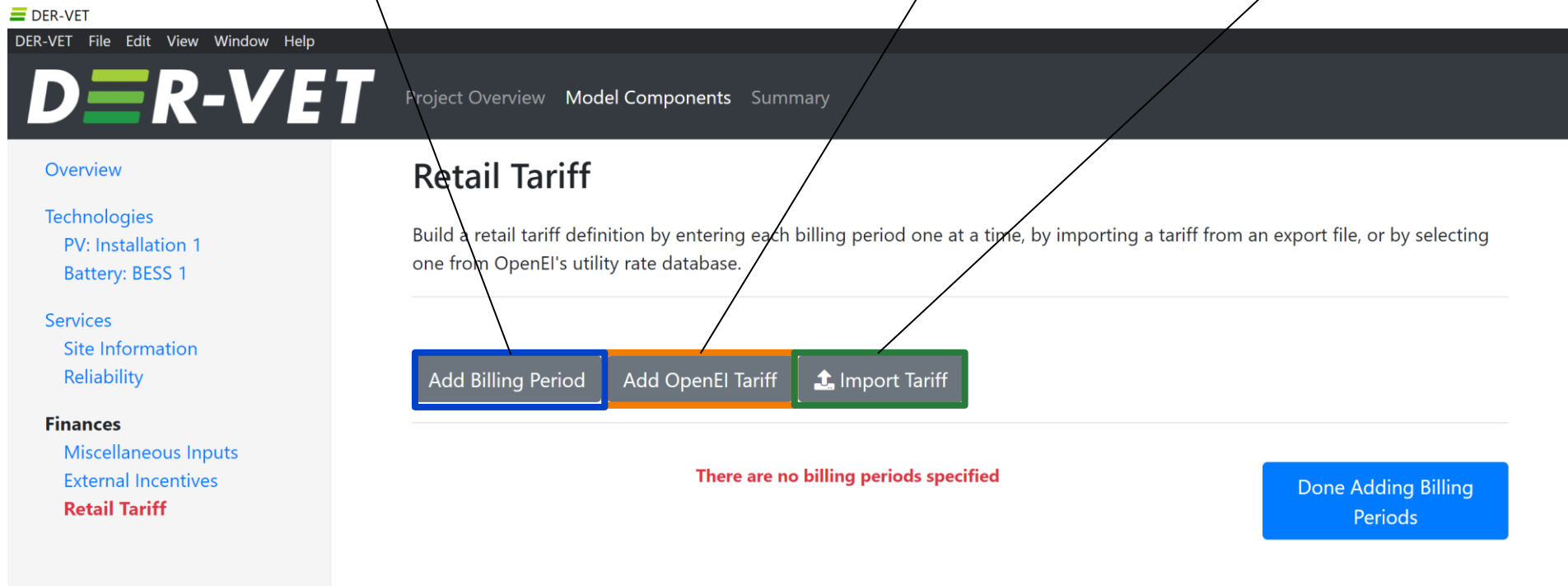
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Weekday Schedule

The Weekday Schedule heatmap shows energy usage patterns by month and time of day. The x-axis represents time from 12 am to 11 pm. The y-axis represents months from Jan to Dec. The cells are colored based on usage levels, with a color scale from 1 (yellow) to 5 (red). The heatmap shows that usage is generally higher during the day (12 pm to 6 pm) and lower during the night (12 am to 6 am). Usage is also generally higher in the summer months (Jun to Aug) and lower in the winter months (Dec to Feb).

OpenEI USURDB API

- DER-VET allows you to load an OpenEI tariff, import a tariff from csv, or build your own in the GUI.



OpenEI USURDB API

- Using the OpenEI USURDB API requires an API key. It is a free sign up here:

<https://openei.org/services/api/signup/>

Open EI

OpenEI Connection

To use this tool, you must sign up for an API key on [OpenEI's website](https://openei.org/services/api/signup/). Please enter the key below and click 'Save'.

API Key

Save

Sector

☐ Residential

☐ Commercial

☐ Industrial

☐ Lighting

Zip Code

Note: Tariffs displayed will be all those provided by the utilities serving this zip code.

Utility

Search

<< Back

Add Tariff

OpenEI USURDB API

- DER-VET offers similar search features to the USURDB GUI.
 - Search by zip code and filter by sector, utility, and a keyword to find the rate you are looking for
- Click ‘view’ to open the OpenEI web page for the tariff in your default browser

Sector

☒ Residential
☐ Commercial
☐ Industrial
☐ Lighting

Zip Code

Utility

Search

Note: Tariffs displayed will be all those provided by the utilities serving this zip code.

<input type="radio"/> EV-A	View
<input type="radio"/> EV-A	View
<input type="radio"/> EV-B	View
<input type="radio"/> EV-B	View
<input type="radio"/> Electric Vehicle EV-A	View
<input type="radio"/> Electric Vehicle EV-A	View

OpenEI USURDB API

- Select one and click ‘Add Tariff’ to convert the OpenEI tariff into DER-VET format and use in the analysis.

<input checked="" type="radio"/> EV-A	View
<input type="radio"/> EV-A	View
<input type="radio"/> EV-B	View
<input type="radio"/> EV-B	View
<input type="radio"/> Electric Vehicle EV-A	View
<input type="radio"/> Electric Vehicle EV-A	View
<input type="radio"/> Electric Vehicle EV-B	View
<input type="radio"/> Electric Vehicle EV-B	View
<input type="radio"/> E-1 - Baseline Region Q	View
<input type="radio"/> E-7 - Baseline Region P	View

«

<

1

2

3

4

5

6

7

8

9

...

>

»

<< Back











Add Tariff

OpenEI USURDB API

- This returns to the Retail Tariff page, but now the tariff is populated

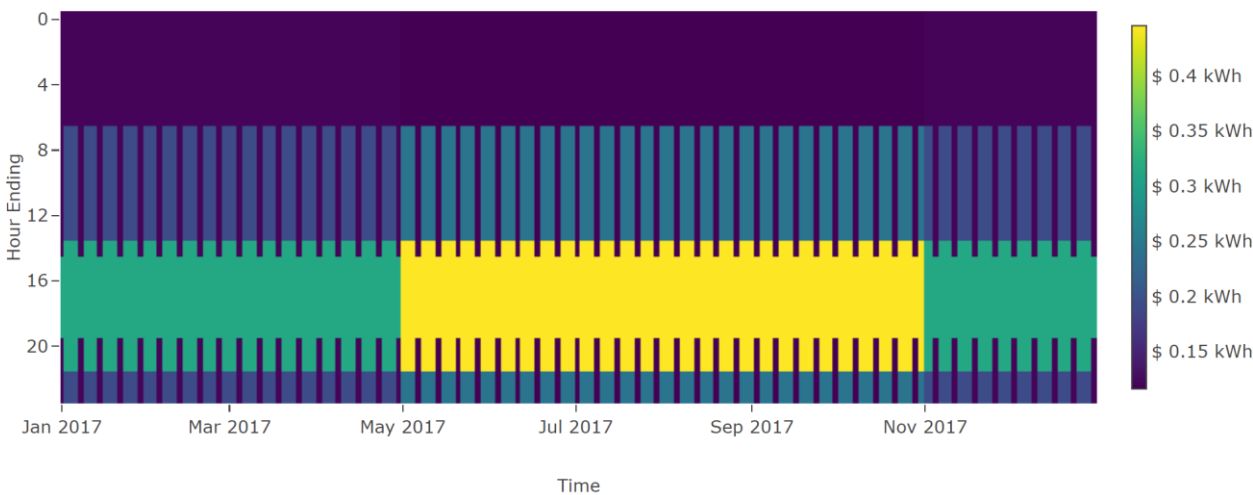
Retail Tariff

Build a retail tariff definition by entering each billing period one at a time, by importing a tariff from an export file, or by selecting one from OpenEI's utility rate database.

Start Month	End Month	Start Time	End Time	Excluding Start Time	Excluding End Time	Weekday?	Value	Charge	Name	
1	4	1	7			1	0.11904	Energy		Edit 
11	12	1	7			1	0.11904	Energy		Edit 
1	4	8	14			1	0.19197	Energy		Edit 
11	12	8	14			1	0.19197	Energy		Edit 
1	4	15	22			1	0.31374	Energy		Edit 
11	12	15	22			1	0.31374	Energy		Edit 
1	4	23	24			1	0.19197	Energy		Edit 
11	12	23	24			1	0.19197	Energy		Edit 
5	10	1	7			1	0.11628	Energy		Edit 

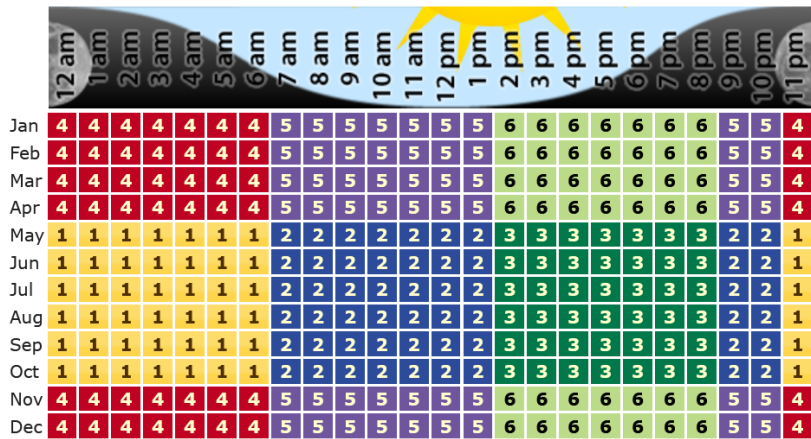
OpenEI USURDB API

- Comparison between the DER-VET energy price heatmap and OpenEI's visualization

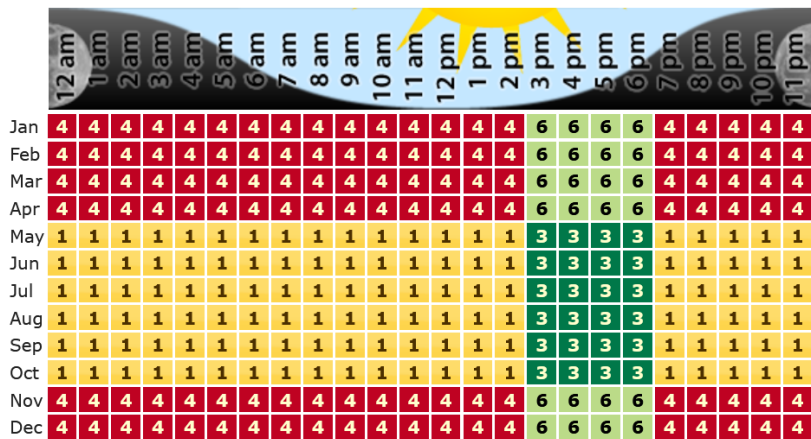


Period	Tier	Max Usage ?	Max Usage Units ?	Rate \$/kWh ?
1	1		kWh	0.12559
2	1		kWh	0.26503
3	1		kWh	0.48889
4	1		kWh	0.12866
5	1		kWh	0.20726
6	1		kWh	0.34021

Weekday Schedule

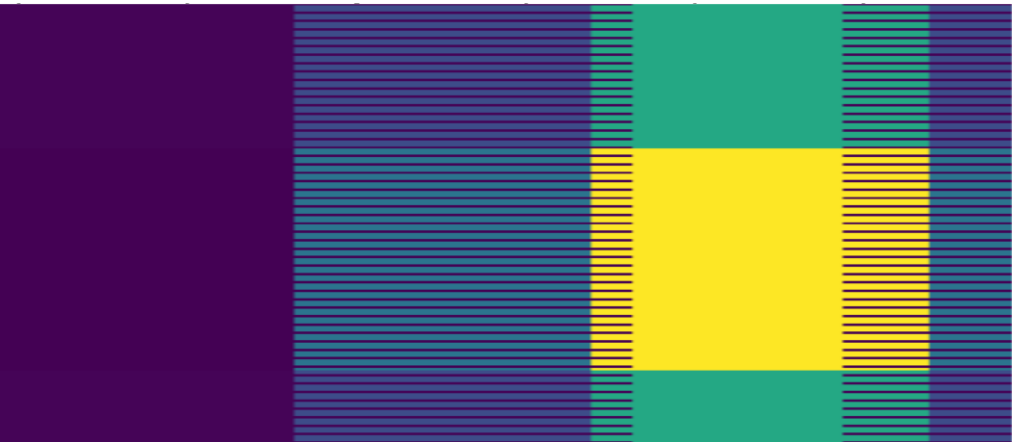


Weekend Schedule

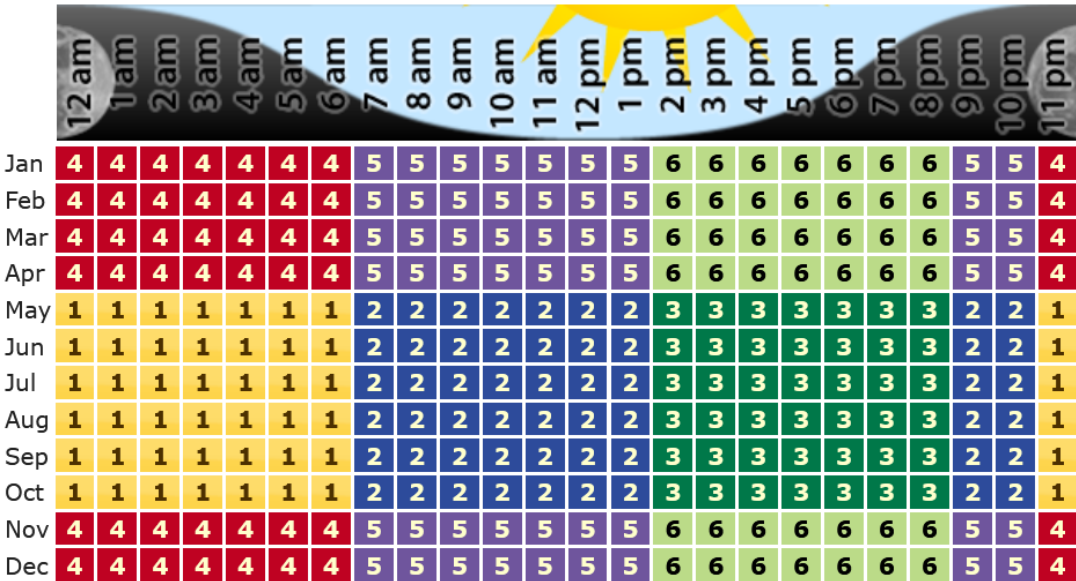


OpenEI USURDB API

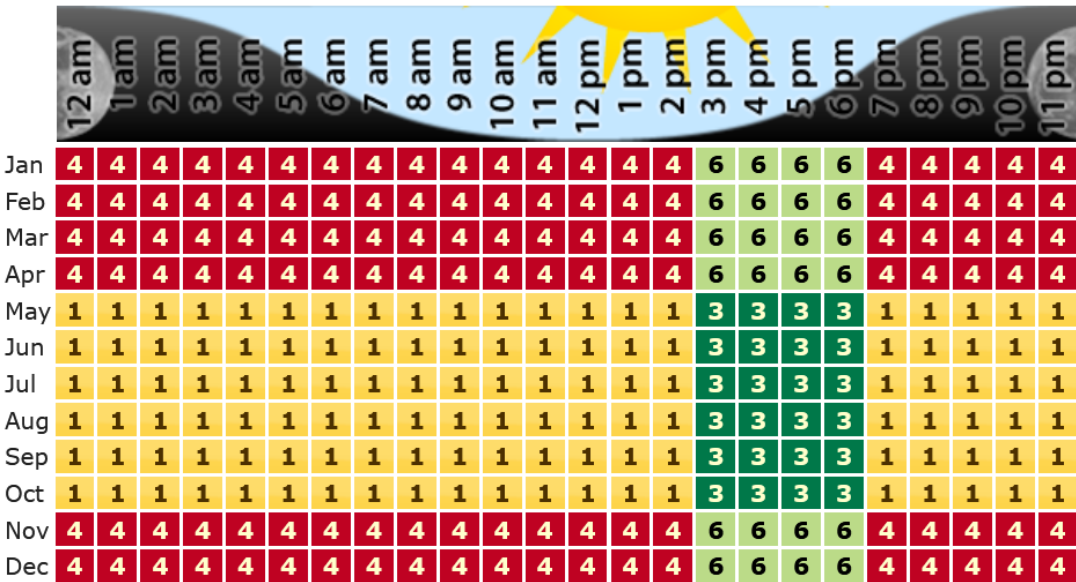
Transforming DER-VET plot to match OpenEI Shape



Weekday Schedule



Weekend Schedule





Be sure to validate the tariff and change anything that needs to be changed before moving on!



Project Import/Export

Project Export

- Button found on summary page
- Yields a .json file containing all of the project setup information:

Economic BTM DER Sizing - Use Case 1				
Name	Date modified	Type	Size	
 application.json	2021-04-01 09:05 AM	JSON File	1 KB	
 project.json	2021-04-01 09:05 AM	JSON File	1,172 KB	

- Save this folder with a meaningful name and share at will

Project Overview Model Components Summary Results	
Data year	2017
Grid Domain	Customer
Ownership	Customer

Technology Specifications

- PV: Installation 1
- Battery: BESS 1

Services

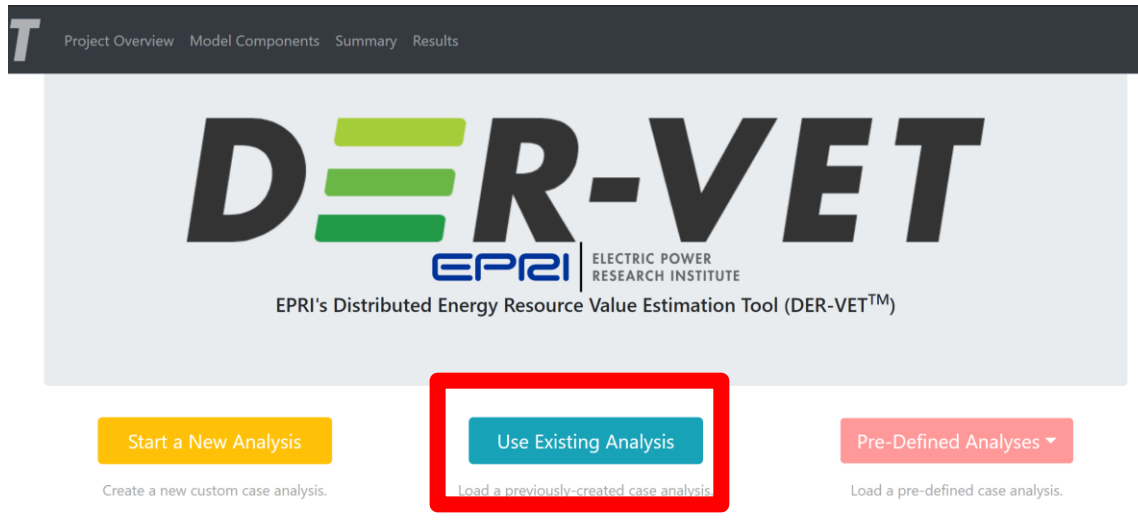
Financial Inputs

Discount rate	6 %
Inflation rate	2.2 %
Federal tax rate	0 %
State tax rate	0 %
Property tax rate	0 %

Export Project

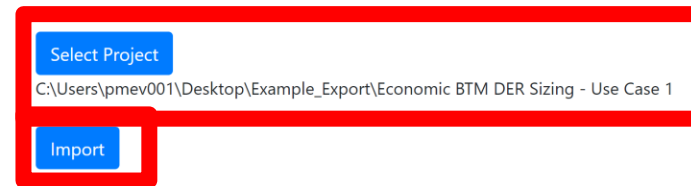
Project Import

- “Use Existing Analysis”



Import Existing Project

Import an existing project by clicking the "Select Project" button below and selecting the folder from your computer that contains the project you wish to import. Note that this folder must include the DER-VET `project.json` and `application.json` files.



- Takes you to the project summary page, ready to run



Sharing technology options

Technology Database

- Not able to get this into v1.0, but have a workaround
- Export project and open .json file in a text editor
- Inspect the technology option you are interested in sharing to ensure it represents the tech you're interested in sharing
- Copy/paste the text into a text file, save, share, etc.
- Paste text into a different project.json file to populate, then import it.

```
35459  "mtsDrEnergyPrice": {  
35466  "technologySpecsBattery": [  
35579  "technologySpecsControllableLoad": [],  
35580  "technologySpecsDieselGen": [],  
35581  "technologySpecsFleetEV": [],  
35582  "technologySpecsICE": [],  
35583  "technologySpecsSingleEV": [],  
35584  "technologySpecsSolarPV": [  
53163  "listOfActiveTechnologies": {
```

```
35466  "technologySpecsBattery": [  
35467  {  
35468    "active": true,  
35469    "associatedInputs": [  
35523    "associatedInputsComplete": true,  
35524    "auxiliaryLoad": null,  
35525    "calendarDegradationRate": 0,  
35526    "capitalCost": 0,  
35527    "capitalCostPerkW": 800,  
35528    "capitalCostPerkWh": 250,  
35529    "chargingCapacity": null,  
35530    "complete": true,  
35531    "constructionYear": 2017,  
35532    "dailyCycleLimit": null,  
35533    "dischargingCapacity": null,  
35534    "decommissioningCost": 0,  
35535    "energyCapacity": 100,  
35536    "energyCapacityMaximum": null,  
35537    "energyCapacityMinimum": null,
```



Help options

Help Options

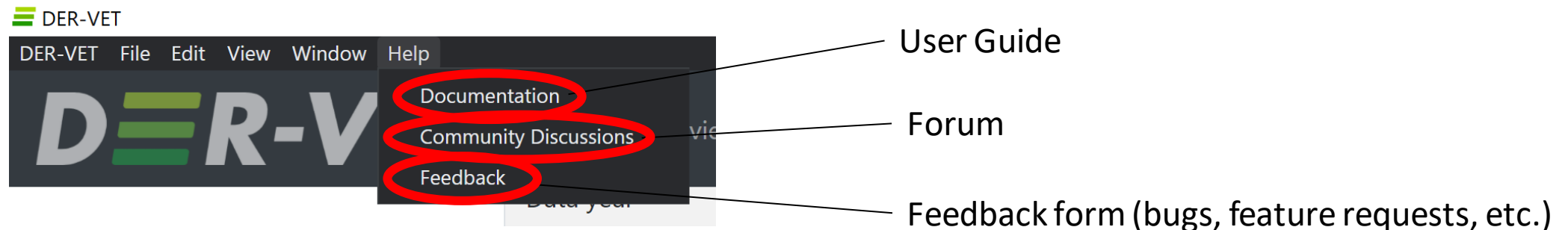
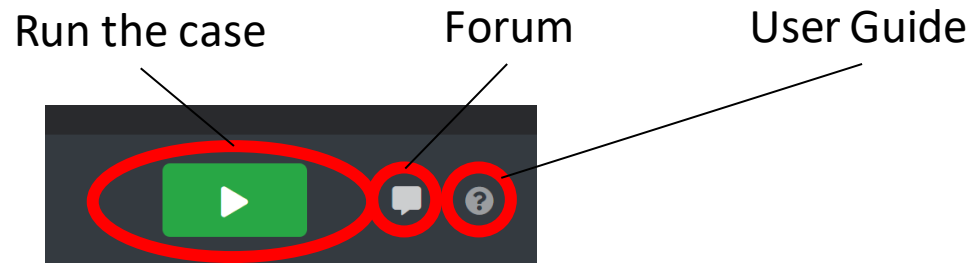
- User Guide:

https://storagewiki.epri.com/index.php/DER_VET_User_Guide

- FAQ:

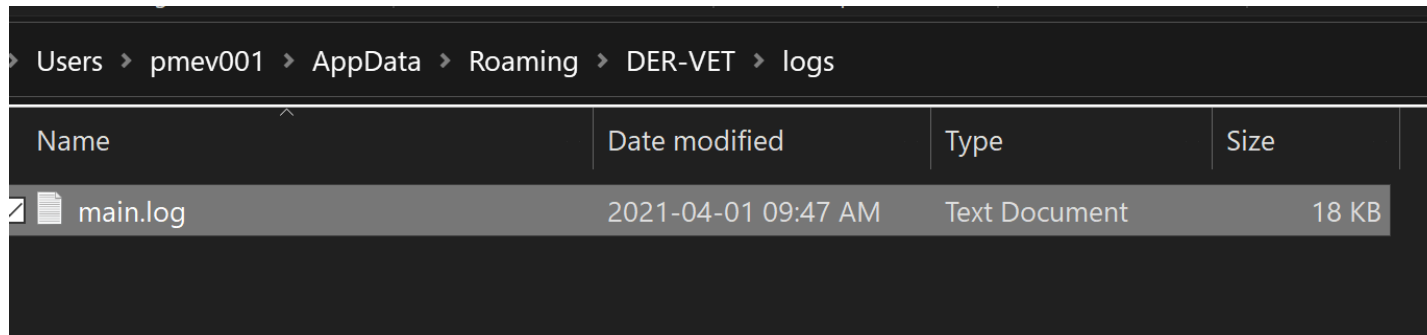
https://storagewiki.epri.com/index.php/DER_VET_User_Guide/FAQ


- Links in GUI



Help Options

- Bug reports, new feature requests, etc.:
<https://www.surveymonkey.com/r/dervetfeedback>
- How to troubleshoot your run if the GUI says something went wrong.
 - Look in FAQ
 - Evaluate your log files and look for an easy solution



Users > pmev001 > AppData > Roaming > DER-VET > logs				
Name	Date modified	Type	Size	
 main.log	2021-04-01 09:47 AM	Text Document	18 KB	

- Post your issue in the forum, submit a feedback form describing a bug, etc.



Next Meeting

Next Meeting

- Next meeting is **Thursday, May 6, 11:00 a.m. Pacific Time**
 - Use case development
 - Technology database
 - Include a database of technical definitions of batteries on the market. This information would be provided by the suppliers. Similar to what is done with PV module .pan files and inverter .ond files useful in PVsyst.
 - Using the tool to maximum effect
 - shared knowledge base for the tool use
 - "study group" concept where users are asked to develop particular use cases for the meetings?
 - create a universe of use cases as quickly as possible.
 - I think it would be really helpful if DER-VET was easily accessible via python, meaning it could be embedded into scripts or Jupyter notebooks.
 - Set up a database of load shapes (8760s or 8760*4 for 15 minute intervals). We did this for the SGIP GHG signal Working Group, it took longer than we expected (hard to get public, individual customer load shapes with metadata describing the customer, location, attached PV and/or batteries, etc.)

A blue-tinted photograph of four people, three men and one woman, standing in a row. They are all wearing white lab coats with the EPRI logo on the left chest. The woman in the center is also wearing a white hard hat. They are all smiling and looking towards the camera. The background is a solid blue color.

Together...Shaping the Future of Electricity